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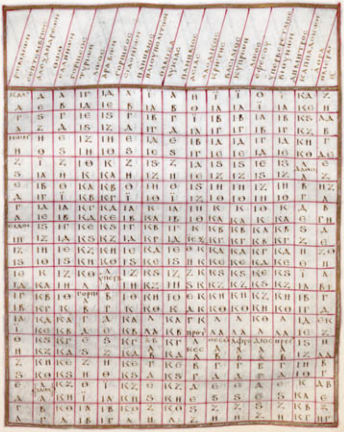
CALENDARS IN ANTIQUITY

Empires, States, & Societies



SACHA STERN

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Preface

This book is intended not as a catalogue, but as a piece of social history. Calendars are not a technical curiosity, but a fundamental aspect of social life, an organizing principle of human experience, a constitutive component of culture and world views. My purpose in this book is to examine the structure of all the known calendars of the ancient Near East and Mediterranean, and to capture the social context of their largely common history.

The chapters in this book follow at once a thematic and an approximate chronological order, except for Greece, which for various reasons I have placed before the much earlier Babylonian and Egyptian calendars (Chapters 1–3). My central argument, in these and subsequent chapters, is that calendars were primarily political; their development was closely related to the political changes that transformed the ancient world from the mid-first millennium BCE to late Antiquity. The rise of large-scale empires in this period such as the Achaemenid, Seleucid, and Roman Empires led to the formation of increasingly fixed and standardized calendars, most notably the Persian and the Julian calendars (Chapter 4). The break-up of the Seleucid Empire, conversely, led to the fragmentation of calendars in the Near East (Chapter 5). In Chapter 6, I argue that the unofficial use of lunar calendars in the Roman Empire, such as the Gallic and Jewish calendars, was a way of expressing subtle political dissidence. In Chapter 7, I investigate the relationship between the calendar and sectarianism, heresy, and social schism in Judaism and Christianity of late Antiquity.

I have written this book with the general reader in mind, avoiding as far as possible excessive technical detail. Not everyone will be familiar with all these areas and periods of history. Some readers may restrict themselves to their own areas of interest or specialization; but the Conclusion, which sums up the argument of the whole book, is meant for all to read.

I first conceived this book in 2003, during a period of research leave funded by the Arts and Humanities Research Board (now AHRC); but because of professional distractions, it has taken many years to complete. I wish to acknowledge the personal assistance that many friends and colleagues have given me in areas that often lay beyond my expertise. The following read earlier versions of chapters or parts of chapters, and contributed insightful, informative, and critical remarks: Robert Parker (Ch. 1), Samuel Greengus, John Steele (Ch. 2), Leo Depuydt (Ch. 3), François de Blois (Ch. 4. 1), David Levene (Ch. 4. 3), Chris Bennett (Ch. 5 and parts of Ch. 1), Jonathan Ben-Dov and Fergus Millar (parts of Ch. 7); and last but not least Jörg Rüpke and

Leofranc Holford-Strevens, who read and commented on the entire manuscript. An early draft of Chapter 5 was sent to Peter Derow, my former tutor, days before his unexpected demise; the late Simon Price, another former tutor, read and commented on parts of the same chapter; I dedicate it to both their memory. The book as a whole, however, is dedicated to my wife Evadne, whose share in this work has been earned through tireless support and steadfast friendship.

A generous reviewer (J. M. Baumgarten 2003, himself the author of lucid studies on the Qumran calendars, who died as I was completing the last chapter of this present work) described my previous work on Jewish calendars as 'a challenging and exciting foray into the links between the measurement of time and a millennium of Jewish social history'. I hope the same will be said of this present work: through the study of ancient calendars, a new perspective on Antiquity will have been achieved.

SS

London, September 2011

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Introduction

'Since all human activities occur in time, the existence of a social system necessitates some organization of time.'[1] These words, the beginning of an eminent anthropologist's encyclopedia article on time and calendars, suggest that calendars are, above all, a necessity for the existence of society. Without dating and time-keeping devices, it would be close to impossible to coordinate political, economic, religious, and all other social activities; without calendars, society would not be able to function.

This is surely correct, but only part of the story. The calendar is far more than a functional, utilitarian device for the organization of social life. As a shared conception of time or of the flow of human and natural events, which it assumes (for example) to be structured and recurrent, the calendar contributes to a certain perception of reality, and hence, to socially shared world views. Calendars have often been invested, indeed, with ideological meanings that transcend the temporal organization of society and assume sometimes cosmic significance. Thus in Antiquity, the calendars of ancient Egypt and of Qumran (where the Dead Sea Scrolls were discovered) have been interpreted, each in their own way, as representations of cosmic stability and harmony. To the Babylonians, the length of calendar months and years had astrological implications that could affect, in turn, the welfare of the kingdom and of men. To the Jews, the procedure for declaring the new month was an act of 'sanctification', the fulfilment of a 'commandment'; calendar reckoning did not just serve the practical needs of determining the dates of festivals, but constituted a religious activity in its own right. The design and reckoning of ancient calendars were often also an intellectual, scientific achievement, involving arithmetical techniques and some knowledge of astronomy. The calendar was thus, in many respects, a constitutive part of what is called 'culture'.

The calendar is often trivialized as a technical curiosity, only useful to epigraphists and ancient historians for the purpose of working out chronology

[1] Goody (1968) 30; I am grateful to Stanisław Iwaniszewski for this reference. Similar thoughts were expressed already by Malinowski (1927) 203–4. See also the opening statement of Hannah (2005) 1–2, partially cited below.

and datings. The marginalization of this subject, sometimes related to a real or disingenuous phobia of numbers, is what this present work intends to rectify. Far more than a technical device, the calendar was at the heart of ancient society and culture, as an organizing principle of social life and as constitutive of ideologies and world views. The calendar should not be confined, as it sometimes is, to the history of science or to a marginal aspect of the history of religions. It firmly belongs to the core of social history.

In this book, particular emphasis will be placed on the political character of ancient calendars. This is largely because, as we shall soon discover, most ancient calendars were set and controlled by political rulers. The political character of calendars has been noted by others before: thus another anthropologist has remarked, 'calendars are eminently political: they only function in response to communal agreement' (Drucker-Brown 1999/2000: 9). Calendars depend, indeed, on communal agreement, because unless they are reckoned by all in the same way, they cannot effectively coordinate events and activities within the social group; and political rulers were those who had the power, in Antiquity as in other periods, to enforce a common calendar upon society. But another reason why political rulers assumed control of the calendars was that the latter represented an effective instrument of social control. This is especially true in societies where the calendars were flexible, and where rulers and politicians were free to determine the length of months and years: these calendars gave them the means of regulating economic activity, state administration, religious cult, and in some political systems, their own tenures of office—often to their personal advantage. This explains why control of the calendar was a fundamentally political function in ancient society, either as the privilege of political rulers, or for others, conversely, as means of asserting political opposition and dissidence. The relationship between calendar and political authority is critical, therefore, to our understanding as much of ancient calendars as of political forces in ancient society.[2]

This political dimension, which much of this book will emphasize, may seem alien to our modern experience of calendars. The Gregorian calendar, which dominates today the western and most other parts of the world, does play an important political role in its contribution to the process of globalization. But in terms of its structure, this calendar has been treated as immutable ever since its institution in the sixteenth century; political rulers have never dared to tamper with it or adjust it. The Gregorian calendar is indeed a simple, abstract scheme that does not depend on any empirical data or *ad hoc* decisions; it is fixed and runs itself without any human input; political or

[2] This is endorsed by Rüpke (1995), who concludes his study of the Roman calendar (625) with the observation that its history and development were driven by political motivations rather than by religious or other factors. For a similar observation on ancient Greece, see Loraux (2002) 171–90. For a modern anthropological perspective, see Gell (1992) 300–13.

other social authorities are never called upon, therefore, to determine it or set it. This calendar is consequently universal, democratic, and accessible to all; but the corollary is that calendar reckoning in modern times has largely ceased to belong to the political domain.[3]

This is not to say, however, that fixed calendars—by which I mean, calendars determined in advance by a set calculation or following a set scheme—are a purely modern phenomenon. They existed long before the institution of the Gregorian calendar in the sixteenth century. Already in late Antiquity, by the third century CE, fixed calendars pervaded the Mediterranean and the Near East. The western half of the Roman Empire was dominated by the Julian calendar, precursor of our Gregorian calendar; whilst the cities and provinces of the Roman East almost all modelled their calendars, in various ways, on the Julian calendar, with a fixed sequence of twelve months, a 365-day year, and an extra day every four years. Further east, in the Persian Empire, Sasanian rulers were also using a fixed calendar, consisting more simply of a twelve-month, 365-day year (without leap years).

The situation had been quite different a thousand years earlier. Around 500 BCE, the numerous calendars of Greece, Asia Minor, and the Near East were nearly all flexible, determined on a month-to-month basis, and under the control and whim of political rulers. The only exception was the calendar of Egypt, which from ancient times had always been fixed; as we shall see, it is largely out of this single calendar, directly or indirectly, that fixed calendars spread to the rest of the Roman and Persian Empires by the late antique period.

The explanation of how and why ancient calendars developed along this apparently common trajectory, from flexibility in the mid-first millennium BCE to fixed schemes in late Antiquity, will be one of the main challenges of this present study. This trajectory has often been explained as an outcome of civilization or progress—an explanation that is unconvincing for a number of reasons. As we shall see, flexible calendars were retained by some of the most scientifically advanced societies in Antiquity, for reasons that are easy to understand: political rulers who used flexible calendars as a means of controlling society had every political interest to maintain the status quo. The adoption of a fixed calendar invariably meant the abdication, by political rulers, of an important source of political prestige and social control. From this political perspective, the question should not so much be why the rulers of some ancient societies maintained their flexible calendars, but rather, on the

[3] I am referring specifically to calendar reckoning or the structure of the calendar, rather than to the contents of the calendar, e.g. the dates of public holidays, with which modern governments frequently interfere (the distinction between calendar structure and contents will be explained further below). On the extent to which the calendar has remained part of the political domain in the modern world, if only at the level of political debate and reform proposals, see Rüpke (2006).

contrary, why other rulers became willing, during the last millennium of Antiquity, to abdicate political control and switch over to fixed and immutable calendar schemes.

The decisive turning point, I shall argue, was the rise of large-scale empires in the Near East during the first millennium BCE—Assyrian, Babylonian, Persian—later to be followed by the Hellenistic and Roman Empires. The Persian Achaemenids, in particular, accumulated in a short period of time, during the third quarter of the sixth century BCE, an unprecedented territorial empire stretching from the western shores of Asia Minor to Egypt, the Indus river, and the central Asian territories of Transoxania: for the first time, nearly all the major western civilizations of Antiquity were brought under a single geopolitical entity. The rise of the great empires had, besides other implications for ancient history, the effect of promoting the spread of fixed calendars, partly (but not only) because they were more suited to the administration of far-flung imperial territories. The geopolitical processes and the calendar changes that went with them were complex and multi-directional, and I shall not attempt to summarize them at this stage (for a grand summary, readers are referred to the Conclusion). For now, it suffices to remark that the history and development of ancient calendars reflected the political and administrative structures of the empires, kingdoms, and cities that used them and sustained them.

A shift from flexible to fixed calendar was studied already in my earlier work on the Jewish calendar (Stern 2001), where I observed a tendency in the Jewish lunar calendars of late Antiquity to abandon empirical methods (such as new moon observations) and adopt instead fixed calendar schemes. Much attention was given in this earlier work to the possible causes of this change. But my awareness that a similar process had affected other calendars in Antiquity subsequently led me to consider the history of ancient calendars as a whole.[4] Then, as the present project progressed, I began to develop a different perspective on the Jewish calendar and to understand its development as a general, rather than particular, historical process. Thus in my earlier work I argued that the rabbinic calendar was gradually fixed, between the third and eighth centuries, because of the increasing geographical dispersion of the rabbinic movement (it had expanded, by the beginning of this period, from Palestine to Babylonia) and the perceived necessity of rabbinic communities to observe the festivals at the same time; a fixed, predictable calendar was the only way of ensuring that the same dates between them were observed (Stern 2001: 211–56). But in this present work, the fixation of the rabbinic calendar will be viewed very differently as part of a macro-historical phenomenon, the same that affected all ancient calendars and was related to the development,

[4] This is already evident in Stern (2000*a*), where I applied to the Babylonian calendar some of the ideas developed in the context of the rabbinic calendar in Stern (2001).

expansion, and increasing centralization of the great empires of late Antiquity (Ch. 6).

Both approaches remain, of course, valid and plausible; but they raise the question of the relationship between micro- and macro-history.[5] This question is not confined to the Jewish calendar, but will arise many times in the course of this work. In Ch. 4, for example, I shall be asking whether the dissemination of the fixed, Egyptian calendar in the possessions of the Ptolemaic kingdom, and later Julius Caesar's reform of the Roman calendar (and its fixation in the form of the Julian calendar), were caused by specific, micro-historical circumstances, or belong to a broad, macro-historical pattern of change from flexible calendars to fixed schemes—or whether again, both explanations are correct. This partly depends on the theoretical question, familiar to historians, of whether history is the outcome of macro-historical patterns and forces, or rather the sum of micro-historical events which each came about for local, specific reasons and for which an integrated, macro-historical interpretation is only illusory—a question that remains open and at the core of this present study.

DEFINITIONS AND SCOPE

The calendar is defined in this work as a structure that divides and organizes the temporal continuum into discrete, recurrent periods, with the day as the smallest period and the year as the largest (the length of the year being usually defined by the calendar itself). The objective of a calendar is primarily to identify points in time, to measure durations of time, and to structure the flow of time into cyclical, repetitive patterns.[6]

Nearly all ancient calendars within the scope of this study used the month, a period of approximately 30 days, as the main intermediary time unit between

[5] By 'macro-history'—a term that will appear not infrequently in this work—I mean a history that is 'long' both in time and in space, as it considers at once many periods, lands, and peoples. It is not identical with the *Annales* concept of *structure de longue durée*, which usually designates a long-term structure that is either static or cyclical and repetitive. Macro-history is a more neutral term that makes room for dynamic, ever-changing, and non-repetitive patterns and structures.

[6] Systems for subdividing the day, e.g. into hours, are usually not categorized as calendars. Periods of time that are longer than the year, e.g. eras and reigns, in the framework of which years can be counted, do not belong to calendars but rather to what is commonly called chronology. In contrast to calendars, chronological structures tend to be linear and non-recurrent, although cycles are sometimes also found (e.g. jubilees, indictions). On subdivisions of the day in the Graeco-Roman world, see Hannah (2009). On chronology in Roman society and culture, see the excellent study of Feeney (2007); chronological systems in late Antiquity were surveyed by Grumel (1958); see also Mosshammer (2008). Subdivisions of the day and chronology are outside the scope of this work.

the day and the year; the structure of calendars was thus determined by the number of days in the months, and the number of months in the year. The month was the fundamental component of lunar calendars, where it corresponded, at least in theory, to a full cycle of the phases of the moon, normally (but not always) beginning from the new moon; the typical length of a lunar month was 29 or 30 days. In solar calendars—of which, in Antiquity, the Julian calendar was the only true exemplar—the fundamental component of the calendar was the year, corresponding to a full cycle of the sun or the seasons, approximately 365¼ days. The division of the solar year into months is artificial, as its twelve months are somewhat longer than lunar months (counting 30 or 31 days) and out of step with the moon's phases. In lunar calendars, conversely, the year is only an artificial sequence of twelve or thirteen months, neither of which corresponds to a solar year or any other astronomical reality. Nearly all lunar calendars in Antiquity counted twelve months in the year, but occasionally added a thirteenth month (a procedure known as 'intercalation') so as to keep up, at least approximately, with the sun and the seasons. These calendars are sometimes called 'lunisolar', a term, however, that I shall generally not use.[7]

Some ancient calendars also employed smaller time units, sometimes but not always subdivisions of the month: for example, the *hamuštum* in early-second-millennium Assyrian documents, which some have identified as a seven-day week, but which alternatively may have meant a quarter of the lunar month (thus variably seven or eight days); the decad or ten-day period in Greek calendars representing a third of the lunar month (the third numbering sometimes only nine days); the eight-day *nundinae* or market week in the Roman calendar; and the seven-day week in the Jewish calendar, later adopted by Romans and Christians as a planetary, astrological scheme or as a Jewish, biblical tradition.[8] In this study, however, I am more interested in

[7] Although I have been criticized in the past for not using this term, I shall refrain from it again in this work for several reasons (see also Stern 2001: 1–2). The term 'lunisolar' is in my view a misnomer, because it implies that lunar and solar elements are equivalent in status; whereas in most of these calendars the lunar element was dominant, as it defined the length of the months, whilst the solar year was only approximately tracked by a calendar year of twelve or thirteen months. Furthermore, 'lunisolar' assumes that a *solar* criterion governs the intercalation, whereas in most ancient calendars it was on the basis of the seasons, the stars, or a fixed schematic cycle that the intercalation was governed. The term 'lunisolar' is also unnecessary, because purely lunar calendars (i.e. without intercalation) are not attested in Antiquity before the institution of the Islamic calendar in the seventh century CE (on the old Assyrian calendar, see Ch. 2 n. 78); in the context of Antiquity, therefore, there is no need for a special terminology to distinguish lunar calendars with and without intercalation.

[8] *Hamuštum* as a seven-day week: Veenhof (1995–6). The Greek decad: Ch. 1 nn. 13 and 67; decads are also attested in ancient south Arabia (de Blois 1998). *Nundinae*: Rüpke (1995). The Jewish week: Ch. 4 n. 113; the seven-day week in Roman sources, Blackburn and Holford-Strevens (1999) 566–8 and Ch. 6 n. 65.

the structures that were common to all ancient calendars, and for this reason I shall focus on days, months, and years.

For similar reasons, and in order to keep this study within a manageable scope, I shall only deal with the *structure* of ancient calendars, as described above, but not with their *contents*. By contents I mean the identification of certain days or dates within the calendar as religious festivals and fasts, as auspicious or inauspicious, as days appropriate or inappropriate for various economic, political, legal, or religious activities, etc. Lists of festivals and other such qualified days are well represented in Mesopotamian hemerologies and menologies and in the Roman *fasti*, but outside the scope of the present study.[9] Furthermore, I shall not deal with the practical uses of the calendar, such as dating. Thus I shall not address, for example, the questions of which activities or events were chosen to be dated—i.e. brought into relation with calendars—and with what precision; how dates were expressed and presented in documents and inscriptions; and how different calendars or dating systems could be simultaneously used.[10] The contents and uses of calendars were culture-dependent and subject to considerable diversity, which makes them less obviously susceptible to a comprehensive and integrated history of calendars in Antiquity.[11] It is my narrow focus on the common dimension of ancient calendars, i.e. their structure and method of reckoning, that permits me to capture, in a single monograph, the history and development of calendars in Antiquity as a whole. My scope is thus at once very narrow and very broad.

My period extends from the origins to the Muslim conquest in the early seventh century, although I do not go much beyond the fifth century CE. The territory which I call, eurocentrically, the 'ancient world' extends roughly from the Middle East to the Atlantic; its geographical limits could be defined more precisely as the borders of the Achaemenid Empire to the east, and of the Roman Empire to the west.

SOURCES, METHODOLOGY, THEORY

The evidence consists almost entirely of the written word; but whether literary, epigraphic, or documentary, it is very sporadic and incomplete. This is because most ancient societies did not bother to write out their calendars in full. The

[9] On ancient Near Eastern cultic calendars, see Cohen (1993). On Mesopotamian hemerologies and menologies, Labat (1939) is now very outdated; a new edition and study are being prepared by Alasdair Livingstone. On Roman *fasti*, see Rüpke (1995) and, in summary, Feeney (2007) 184–9.

[10] Dating practices are given some general consideration by Bickerman (1968).

[11] For similar reasons I shall not deal with the use, meaning, and etymology of day and month names, on which see Greengus (1987), (2001) for Mesopotamia and Trümpy (1997) for Greece.

only notable exception were the Romans, whose elaborate *fasti* were displayed in sometimes monumental, public, and private inscriptions. Some other calendars are attested in full in literary sources, such as the Greek astronomical calendars and the calendar rosters of the Dead Sea Scrolls; but the extent to which these sophisticated calendars were implemented in real life remains uncertain. It is only in late Antiquity that full-length descriptions of calendars begin to proliferate in literary sources, with Censorinus' *De Die Natali* (third century CE), Christian treatises on the date of Easter, Talmudic accounts of the rabbinic calendar, and the late antique *hemerologia* or tables of the calendars of the Roman East.

In earlier Antiquity, however, we are told remarkably little about the structure and workings of the calendars. The Babylonian calendar is never described or explained in any cuneiform source, in spite of the staggering number of astronomical and economic cuneiform tablets that have been recovered and that assume and use this calendar. The Hebrew Bible says nothing about how its calendar of numbered months was reckoned. Egyptian sources are equally reticent: the sixteenth-century BCE Ebers papyrus, which will be examined in Ch. 3, gives only a very partial account of the Egyptian calendar; whilst the third-century BCE decree of Canopus, which calls for the institution of leap years in the Egyptian calendar, remains strangely unclear about when or how the additional day in leap years is to be added. Significantly, it is an outsider, the Greek historian Herodotus, who gives us in the fifth century BCE the earliest full description we have of the Egyptian calendar.

The procedures through which the flexible calendars of Babylon, Greece, and Republican Rome were managed are also very poorly documented. In the context of the Greek lunar calendars, for example, we do not know how the new moon was sighted (if indeed it was), who made the decisions about when to begin the month, and how these decisions were disseminated and publicized. Perhaps no particular significance should be attached to the silence of our sources, because ancient texts are generally selective about what they choose to describe. It is no surprise that the only ancient source, to my knowledge, that describes in any detail a procedure of new moon sighting and declaration of the new month is the Mishnah—for rabbinic literature stands out, in Antiquity, for its interest in *realia* and daily life.

The lack of evidence is frustrating to the modern scholar, but also an interesting challenge. It means that in many cases, the structure of ancient calendars must be reconstructed on the basis of inferences from dated inscriptions and documents—a procedure fraught with methodological difficulties. Indeed, the major controversies that have divided modern scholars on the calendars of Athens, for example, are due to the difficulty of drawing any cogent conclusions from the very large number of Athenian dated inscriptions (see Ch. 1). Modern scholars have had a tendency to extrapolate from tenuous inferences and very limited evidence. Thus a short comment of Tacitus about the Germans that only tangentially relates to the calendar has been cited as evidence that 'the Germanic' calendar was lunar.[12] Entire calendar cycles, rules, and schemes have sometimes been reconstructed on the basis of a small number of scattered dates; resort, for this purpose, to statistical and mathematical models has sometimes been over confident and misleading (see for example, again on the Athenian calendar, Ch. 1. 1). My general approach, in this study as elsewhere, has been to avoid speculative models and remain as close as possible to the explicit evidence; but I may still be criticized for having relied, on occasion, on insufficient evidence—a tendency that is difficult, in this field, to avoid. It is critical to remember, moreover, that this present study reflects only the evidence that happens to be extant. Experience has shown me, while writing this book, that fresh discoveries can very easily upset earlier theories and interpretations, and call sometimes for very radical revisions.

I have not made much use of theory—not out of ignorance or phobia, but rather as a critical and informed decision. My scepticism towards theoretical models and approaches, which reflects perhaps a certain post-modern perspective, is explained and justified in the next section below. Nevertheless, some theory has occasionally been used. I have tried a touch of structuralism in Ch. 4, where I explore the relationship between calendar and political structures in late Republican Rome, and of post-colonial theory in Ch. 6, where I interpret unofficial calendars in the Roman Empire as expressions of subversion and dissidence.

Related to post-colonialism is the concept of globalization, of which the present-day experience has probably exerted a significant impact on my interpretation of calendars in the ancient world. Just as globalization today may be seen as the product of post-colonial, political, and economic hegemonies supported in turn by the ever-improving technologies of communications, so I have argued that it is the great imperial powers of Antiquity that led to the unification of cultural practices, and more specifically, to the development and dissemination of fixed and standard official calendars across wide imperial territories. This politicized interpretation may go down well in the

[12] Bickerman (1968) 17, on the sole basis of Tacitus' comment that the Germans treat as auspicious the new and full moon days and reckon the night before the day (*Germania* 11). The auspiciousness of new and full moon days does not necessarily imply, however, the use of a lunar calendar (as we shall see in Ch. 3, a non-lunar calendar was used in ancient Egypt, even though special cultic significance was given to various phases of the moon; the same applies to Zoroastrianism, on which see de Blois 2006: 45–7). The practice of beginning the 24-hour period in the evening, and thus of reckoning the night before the day, is admittedly distinctive of lunar calendars based on new moon sightings (e.g. the Babylonian and Jewish calendars), but in actual fact Tacitus does not even clearly say this: his comment is only that the Germans do not count the number of days ('like us') but only the number of nights, so that 'the night seems to lead the day'. Counting the number of nights is not a feature of lunar calendars, nor of any other particular calendar (it is practised, for obvious reasons, in hotels today).

present generation; whether the next will view it in quite the same way is a story worth following through.

FALSE MODELS, FALSE THEORIES

Earlier scholarship on ancient calendars has commonly drawn on a number of models, theories, and assumptions that I consider flawed, inadequate, or anachronistic. It may be useful to explain from the outset why I have avoided them.

A frequent model in the study of ancient calendars is that of the dual (or multiple) calendar, which posits the coexistence of two or more calendars in any given society, typically a 'civil' and a 'religious' calendar. This terminology draws its origins, at least in part, from the designation of the ancient Egyptian calendar as *civilis*, first attested in the Latin work of Censorinus (third century CE). But the contrastive pairing of 'civil' with 'religious' is most likely the product of early modern scholarship, and as most ancient historians would now acknowledge, an anachronism. More importantly, the hypothesis of civil and religious calendars—or of concurrent calendars with other, less problematic designations—is in many cases not grounded on any evidence, but only an awkward, purpose-made solution to apparent inconsistencies in the primary sources.

The dual or multiple calendar model, with or without the designations of 'civil' and 'religious', has been invoked by modern scholars in the context of just about every ancient society. Thus the civil calendar of ancient Egypt has been conceived as running alongside a so-called 'Sothic' calendar (regulated by the star of Sothis, i.e. Sirius—not all scholars accept this) and a lunar calendar (or even, according to some scholars, two types of lunar calendar), the latter reserved—significantly—for cultic purposes only. In the context of ancient Mesopotamia, the lunar Babylonian calendar is said to have coexisted with a schematic calendar of 30-day months which was reserved for accounting and (later) astronomical purposes. In ancient Israel and Judaea, some scholars have argued that a civil calendar (lunar) was used alongside a priestly, cultic calendar of 364 days; a similar model of 'civil' and 'religious' calendars has also been proposed for Persia in the Achaemenid period (sixth–fourth centuries BCE).[13] In Classical and Hellenistic Greece, the civic lunar calendars, which were generally prone to irregularities, were used, it has been argued, in conjunction with a regular lunar calendar (the '*kata theon* calendar')—and the list of examples goes on. The pervasiveness of the dual or multiple calendar

[13] This theory, which I shall not return to, is in Hartner (1979) 10–14.

model in earlier scholarship does not confirm its historical plausibility; it is rather indicative of a modern scholarly trend, with needs to be treated with suspicion.

This is not to say that dual or multiple calendars had no place at all in the ancient world. Close interaction between different communities often entailed the simultaneous use of different calendars by the same people, sometimes with the additional complication of sharing the same or similar month names: this was common, in particular, among the cities and islands of ancient Greece. In the second-century CE province of Arabia (and probably also in other parts of the Roman Near East), Aramaic- or Nabataean-speaking Jews were simultaneously using the structurally very different Jewish calendar (lunar) and the official calendar of the Roman province (based on the Julian calendar, and thus solar), with exactly the same month names for both calendars. More generally, the adaptation of local lunar calendars to the Julian calendar in the early Roman Near East led for a while to the simultaneous use of old and new calendars, as is evident at least in Josephus' writings (for Judaea) and in Roman Egypt.[14] But dual or multiple calendar use did not have to be the result of external interference or interaction with other cultures. In some cases, the concurrent use of several calendars developed on a purely local, indigenous level: in Athens, for example, the lunar calendar called 'archontic' or 'festival' calendar was used alongside an entirely different, schematic calendar commonly called 'prytanic', which is well attested in double-dated inscriptions and in literary sources.

Firm evidence of dual or multiple calendar use remains, however, unusual. The evidence in Athens of archontic and prytanic calendars is somewhat exceptional, as in most other cases, double-dated documents do not convincingly prove the existence of two independent, fully formed calendars. As I shall argue, for example, in the cases of the alleged 'lunar calendar' in Egypt and '*kata theon* calendar' in Greece, the second dates in double-dated documents do not presuppose a continuous calendar that was reckoned consistently and independently from the first. Even less conclusive is the evidence of inconsistent dates in the primary sources, which can often be errors or explainable in other, more convincing ways than on the basis of a dual calendar model. The dual or multiple calendar model, indeed, can often create more problems than it solves. Proponents of dual calendar models are often forced to assume, for example, that the same month names were used for both calendars, for the only reason that no other month names are attested in the sources (this applies, for example, to the Sothic and lunar calendars of Egypt, and the schematic calendar of Babylon). The use of identical month names for two

[14] On multiple calendar use within the province of Arabia, see Stern (2001) 38–42; on calendar confusion in Josephus' writings, ibid. 34–8 and below, Ch. 5, near n. 75; on Egypt, see ibid. n. 81.

different calendars is bound to have led to confusion, and although not intrinsically impossible (it appears to have occurred, for example, in the Roman province of Arabia and in the Sasanian Empire; see Ch. 5), as a hypothesis it is far from ideal. The absence in Egypt and Babylon of distinctive month names for their various putative calendars—in contrast to the archontic and prytanic calendars of Athens, which are well attested and clearly distinguished with different month lengths and month names—raises in fact the plausibility that in Egypt and Babylon, there never was more than one calendar. To sum up, the dual or multiple calendar model is at best a complication; it should not be assumed unless there is compelling evidence.

Another well-established belief in ancient calendar studies is that modern astronomy can enable the date of institution of ancient calendars to be precisely worked out. Accordingly, the institution of the Egyptian civil calendar has been dated precisely to 2781–2778 BCE, when modern astronomy tells us that the Egyptian New Year coincided with the heliacal (late morning) rising of the star of Sothis; the Persian Zoroastrian calendar was allegedly instituted in 481–479 BCE, when its New Year coincided with the vernal equinox; and the Jewish fixed rabbinic calendar in the mid-fourth century CE (more precisely, according to one medieval tradition, in 359 CE), when the earliest Passover in the 19-year cycle coincided with the vernal equinox. These astronomical arguments give an impression of scientific reliability and precision that are rarely achieved in the discipline of history; but in almost all cases, this impression is only illusory. The use of modern astronomy for dating calendars depends, in fact, on a number of unfounded assumptions: firstly, that ancient calendars were constructed on the basis of precise astronomical events (such as the rising of Sothis or the equinox), which in most cases is actually moot; secondly, that the calendar institutors were able to establish the dates of these astronomical events with a high level of precision, and in the same way as modern astronomers; and thirdly, that the calendars were instituted at a point in history when they were in optimal alignment with these astronomical events, even if this would have meant waiting a long time for the alignments to occur (this is especially relevant to the institution of the Persian Zoroastrian calendar). The dates when calendars were instituted are unlikely to have been determined by astronomical circumstances: calendars are far more likely to have been instituted as and when societies or their rulers wanted them. As Bickerman wrote on the Egyptian calendar: 'there is no inherent necessity to start a new calendar on its first day'.[15]

Related to these astronomical arguments is what I would call 'scientific reductionism', which consists in reducing ancient calendars (and hence their

[15] Bickerman (1968) 41–2. On the astronomical argument in the context of the Egyptian and Persian Zoroastrian calendars, see Chs. 3 and 4. In the context of the fixed rabbinic calendar, see Stern (2001) 197–200, 209.

study) to a purely scientific discipline. Fostered by a nineteenth-century tradition of handbooks of so-called *mathematische und technische Chronologie*,[16] this approach assumes that calendars were constructed and regulated on the sole basis of scientific, especially astronomical and mathematical, knowledge, and hence that their development was driven by scientific progress. Thus the design of a fixed 19-year cycle of intercalations in the Babylonian calendar during the Achaemenid period has been interpreted as the outcome of advances in Mesopotamian mathematical astronomy; similar arguments have been invoked, without much evidence, to explain, for example, the emergence of a fixed Jewish rabbinic calendar in late Antiquity.[17] But Mesopotamia was perhaps a special case, because in the rest of the ancient world, the impact of astronomers and astronomical science on the development of calendars was rather limited. The inaccuracy of the Egyptian civil calendar as a solar calendar was evident to Egyptian astronomers and could easily have been corrected with the insertion of an additional day every four years, as in fact was proposed in the mid-third century BCE in the decree of Canopus; but this did not prevent the Egyptian calendar from remaining unchanged for several millennia, until the arrival of the Romans in the late first century BCE—whereupon the calendar was reformed, for political rather than astronomical reasons. In Athens and other cities of the Greek peninsula, flexible and irregular lunar calendars were retained until the end of Antiquity in spite of the considerable progress in astronomical knowledge that was achieved in the Graeco-Roman world, and in spite of the emergence, in Greek astronomical sources, of highly developed lunar calendar schemes that were used by astronomers but not, as far as we can tell, in any aspect of civic and public life. Even in Mesopotamia, astronomy had less of an impact on the development of the official Babylonian calendar than has been assumed. Although Mesopotamian astrologers were involved in setting the months and years of the Babylonian calendar—in contrast with most other ancient societies, where calendars were controlled entirely by political rulers—decisions were often taken by the king or imperial officials, and not always on the basis of astronomical considerations. As I shall argue, even the 19-year cycle that was eventually adopted was not the best scheme that Babylonian astronomy could have produced; it was, to a large extent, the historical result of intercalation policies that successive Achaemenid kings had instituted. Julius Caesar is one of the few political rulers in Antiquity to have especially commissioned astronomical experts for the design of a new, schematic calendar, although we now know that his average 365¼-day solar year was slightly excessive (this was eventually corrected in the sixteenth century by Pope Gregory, again with the help of especially recruited astronomical expertise).

[16] Ideler (1825–6); Ginzel (1911).

[17] On the Babylonian calendar, see Ch. 2. On the Jewish calendar, see Schürer (1973–87) i. 594 and my critique of it in Stern (2001) 227–32.

But Caesar himself was no scientist (in spite of some attempts to project such an image of him); he was driven by political motivations, not by the progress of astronomy. The rabbinic calculation of the *molad* (conjunction or 'new moon') was perhaps the closest attempt in history, in the context of a fixed lunar calendar, to track the lunar month on the basis of accurate, state-of-the-art astronomical values. This was achieved by avoiding the use of schematic cycles—at the expense of arithmetic neatness and practical convenience—and adopting instead a complex calculation drawn from astronomical sources, probably Ptolemy's *Almagest* (Stern 2001: 200–10). However, this early medieval calendar scheme (first attested in the eighth century) lies outside the period and scope of this study.

Besides astronomy, which I am arguing had a limited impact on the history of ancient calendars, consideration must be given to the arithmetic skills that were employed in the design of fixed, schematic calendars. There is a good case for arguing, indeed, that the development of such calendars in later Antiquity was facilitated by progress in arithmetic techniques. The fixed, lunar calendar schemes that were designed in various parts of the ancient world from the Hellenistic period (third century BCE) until late Antiquity were particularly sophisticated, as in most cases they were synchronized with other, solar (or nearly solar) calendars: these include the Greek astronomical calendars, the lunar cycles from Ptolemaic Egypt, the Qumran calendar rosters, and in late Antiquity, the Christian Easter cycles. The arithmetic ingenuity of these calendar schemes, especially the Qumran calendars and the Easter cycles, reflects a certain level of technical or scientific progress which warrants the inclusion of these calendars in the history of science in Antiquity.[18]

This said, progress in arithmetical techniques—just like progress in astronomy—cannot explain, on its own, how and why ancient calendars arose and developed the way they did. The design of Qumran calendars and Christian Easter cycles was religiously motivated and largely determined by religious traditions; whilst in most other ancient calendars political factors played an essential role. For reasons explained above, indeed, most ancient calendars were instituted and controlled by political rulers, and their development—even in the case of the Julian calendar, despite its explicit astronomical foundations—was driven by political motivations. To treat ancient calendars

[18] e.g. Neugebauer (1975). Qumran and Easter calendars often lacked astronomical sophistication, being constructed on the basis of fixed lunar and solar values that were borrowed from other sources and whose astronomical meaning was not necessarily fully understood; but it is important to note that schematic calendars (and especially calendar cycles) tend by nature to favour arithmetical neatness over astronomical accuracy. On the relationship between astronomical science and these schematic calendars, see, on Qumran, Glessmer (1996*a*) and Ben-Dov (2008), and on Easter cycles, McCluskey (1998), Mc Carthy and Breen (2003), and Lejbowicz (2006).

as a purely scientific discipline is thus not only reductionist but also, in most cases, misplaced.

The notion of progress in the history of calendars, which scientific reductionism implicitly assumes, depends in turn on another common misconception, that the flexible and irregular calendars of early Antiquity were inferior to, and less desirable than, the fixed and regular calendar schemes that later replaced them. It is on this basis, for example, that Julius Caesar's reform of the Roman calendar in 46 BCE is generally accepted by modern scholars as a necessity in no need of justification—an assumption that I shall question in Ch. 4. Fixed calendars such as the Julian calendar did offer the undeniable advantage of stability and predictability, which facilitated long-term planning in political, economic, and possibly other spheres; but the flexibility of earlier calendars had certain advantages which must be given equal consideration. For example, flexible lunar calendars, if based on astronomical observations (like the Babylonian calendar), could keep a closer track of the new moon and the seasons, whereas most fixed calendar schemes had to compromise on astronomical accuracy and incur long-term discrepancies (even the Babylonian 19-year cycle, for all its accuracy, deviates from the seasons at a rate of about one day in 200 years).

Flexible calendars, such as the Roman calendar before Caesar's reform, also had significant political advantages, because they could be used by political rulers as means of social control—often even for the public good. It is debatable, indeed, whether predictability in calendars should be regarded as a superior virtue. We treat it as a virtue because in societies dominated by the fixed, Gregorian calendar, predictability is what we have come to expect of calendars. It is difficult for us to imagine how a flexible calendar could function in the modern world, and how modern economies could function with months and years of unpredictable lengths. However, it must be recognized that even in the modern world, not everything is predictable or in need of predictability: for example, interest rates, share prices, precious metal and oil prices, and currency exchange rates are not only unpredictable but also deliberately kept unpredictable, out of concern that otherwise world economies would be adversely stifled. Far from being a hindrance, the flexibility and unpredictability of the modern economy are what give it its vital dynamism. The calendar, in modern society, happens not to be one of its dynamic, unpredictable variables, but there is no reason in theory why it could not be so. The assumption that flexible, unpredictable calendars are socially and culturally inferior to fixed calendar schemes is only a reflection of modern prejudice. The cities of the Greek peninsula where flexible calendars were retained were no less 'civilized' than the rest of the Roman Empire; the flexible, irregular calendars that dominated the ancient world until around 500 BCE (with the only exclusion of Egypt) were not intrinsically inferior to the fixed schemes that were generally adopted later.

The misconceived classification of flexible, unpredictable calendars as inferior and primitive and of fixed, predictable calendars as superior and advanced, implying in turn the notion of progress from the former to the latter, lies at the foundation of evolutionism, a social theory which has been particularly influential, albeit latently, in modern calendar scholarship. Although evolutionism has largely fallen from favour in the social sciences, calendar scholars persist in assuming an almost deterministic, evolutionary trend which is variously described as a progression of calendars from unpredictable to predictable, flexible to fixed, irregular to regular, and empirical to calculated (or cyclical, or schematic), often together with a shift from lunar to solar reckoning. This evolutionary model was largely promoted by Nilsson in a seminal work entitled, revealingly, *Primitive Time-Reckoning* (1920; see esp. 148–9); it has been reiterated by several more recent historians including Bickerman, who writes, for example:

> The evolution of the calendar, thus, follows three logically and also historically successive stages: 1. separation of the beginning of the month from the sighting of the new moon; 2. the empirical adjustment of the lunar count to the course of the seasons, that is practically to the solar year; 3. the cyclic calculation of lunar months.[19]

The supposedly logical underpinning of this model is particularly noteworthy; the extent to which Bickerman means it as deterministic or evolutionist (note his use of the term 'evolution') is perhaps, in fairness, uncertain, but nevertheless this is the impression that he conveys. For Bickerman and others, logical-historical sequences of this kind account for the development of several ancient calendars such as the Babylonian, Persian, Roman, and Jewish calendars. At first sight, this approach might find justification in that the shift from lunar to solar and from flexible to fixed calendars appears to have been a general trend in the ancient world, and that there is hardly an attested case of shift in the reverse direction.[20] However, the generality and apparent irreversibility of this trend do not necessarily turn it into a law of nature, nor into some logical, deterministic, evolutionary force inherent to the history of ancient calendars. In this book, I shall argue that this general trend must be

[19] Bickerman (1968) 19; see also Schürer (1973–87) i. 594. What exactly Bickerman means in this passage, how these three stages follow from one another (especially 3 from 2), and how they might be partially or wholly exemplified by the ancient calendars, Greek, Babylonian, Egyptian, etc., which he mentions immediately afterwards, are not entirely clear. Stages 1 and 2 seem to refer to a shift from lunar to solar calendars, whilst 1 and 3 refer to a shift from empirical methods to fixed, cyclical schemes.

[20] A shift from solar to lunar calendar seems only to have occurred in exceptional circumstances: e.g. at Singara (upper Mesopotamia) in 363 CE, when the city was transferred from Roman to Persian Sasanian rule and, most probably for this reason, abandoned the Julian calendar in favour of its earlier, Mesopotamian tradition of lunar calendar reckoning (Stern 2004: 468).

explained in relation to the broader context of ancient calendars, i.e. the societies and political structures in the context of which ancient calendars were designed, managed, and used.

Nilsson's evolutionist approach, echoed somewhat by Bickerman, was largely fuelled by the assumption that lunar calendars were closer to nature and therefore more primitive than solar calendars, but this again is only modern prejudice. Neither calendar, in fact, is closer to nature than the other. As explained above, in lunar calendars the fundamental time unit is the month, as defined by the natural phases and motion of the moon, whereas the year is only an artificial sequence of twelve or thirteen months which fails to keep regular track of the sun and seasons; in solar calendars, conversely, the fundamental time unit is the year, as defined by the natural motion of the sun, whereas the months are an artificial subdivision of the year which fail to keep track of the lunar months. Both calendars are thus at once natural and artificial in different respects. In terms of practical utility, it could be argued that lunar calendars are, if anything, less relevant to nature or real life than solar calendars, because the lunar month and the phases of the moon are only important in daily life for night illumination and (of relevance only to coastline and river-mouth settlements and navigators) for determining the times of tides; whereas the solar year and the cycle of the seasons that is related to it are critical to nearly all human needs and activities such as agriculture, pastoralism, hunting and fishing, clothing and shelter, navigation, land travel and migration, etc. In terms of practical reckoning, however, lunar calendars are arguably closer to nature than solar calendars: for although lunar calendars are slightly complicated by the practice of intercalation, lunar dates can easily be estimated by observing the size and shape of the moon, whereas it is virtually impossible—without accurate astronomical instruments and knowledge of astronomical theory—to estimate a solar date by observing the position of the sun (it is possible to estimate it at night time, but again, only on the basis of good knowledge of the stars, which even in Antiquity not everyone could necessarily have boasted of).[21] My point, in short, is that it is difficult to argue that either the lunar or the solar calendar is inherently closer to nature, and for that reason inherently more primitive. The general shift in Antiquity from lunar to solar calendars was not the result of some inherent progress from primitive to advanced, but rather of socio-political processes and changes which affected in many other ways the whole of ancient society.

Softer forms of evolutionism have been implied by others, e.g. Jack Goody, who argues, in a short encyclopedia article, that the formalization of calendars

[21] In modern life, where the calendar is solar, it is quite common for people not to know the date and to ask for it—which surely must be viewed as something of a flaw; see further discussion in Ch. 3. 3.

through the course of history (by which he seems to mean, though not very clearly, the introduction of formal systems of reconciliation between lunar months and solar years) was the inevitable result of the development of agriculture, trade, and the military and administrative activities of increasingly centralized polities—which rings a chord with my own theories—but above all, of the rise of literacy and of written calendars (Goody 1968: 35–6). Goody implies a somewhat deterministic, evolutionist historical trajectory which is open to some criticism, but his suggestions remain valuable because he refrains from identifying calendars as inherently 'primitive' or 'advanced' and relates instead their development to changes that occurred in broader society. His emphasis on literacy is of much relevance to this present study, especially in the context of early scribal societies such as Egypt and Babylonia and in societies such as Rome where calendars were written out and publicly displayed. Literacy on its own cannot account for the major calendar changes that began in the middle of the first millennium BCE, long after many of the societies under study had become at least partially literate. But there can be little doubt that the design and adoption of fixed calendar schemes would have been greatly facilitated by the use of writing and written reckoning, and were closely linked to the development of literacy. My use in this study of almost only written sources (epigraphic, documentary, and literary) as historical evidence, although unavoidable—it is difficult to imagine how other surviving aspects of ancient cultures could usefully inform us about the structure of their calendars—may be regarded in itself as indicative of the importance of literacy to the history of calendars in Antiquity.

Another theoretical approach that has been much criticized in recent decades is functionalism. In the specific context of calendars, a functionalist approach might seem at first sight appropriate, on the grounds that calendars are primarily designed to fulfil a practical function in society, in economic, political, religious, and other social spheres. The practical function of calendars is often taken as their driving force and main *raison d'être*, with the effect that calendars come to be interpreted purely in terms of their social function. This assumption underlies Goody's opening reference to time reckoning as a social necessity (which I have cited at the beginning of this introduction), and others have followed a similar line. For example, Hannah (2005) 1–2 begins his book on Greek and Roman calendars with the statement that he will examine the calendar 'both as an astronomically based timepiece and as a social instrument by which people organised their activities'. Even in functionalist terms, this short description is limited: it misses, for example, the fundamentally political function of calendars, i.e. the way in which the rulers of city states and empires could use calendars to control society (the implication, in the first clause, that ancient calendars were based purely on astronomy is also somewhat misleading). But more importantly, the conception of the calendar as an 'instrument'—a term that is shared by many other calendar scholars—[22] is misleading. It suggests that the calendar is a tool that society utilizes as if it were somehow external to it, whereas in fact (as I have argued above) the calendar is an intrinsic, constitutive part of society and culture, and its relation to other elements of society and culture is complex, reciprocal, and in any event far more than merely instrumental or functional.

Functionalist assumptions have led to implausible theories about the origins of ancient calendars: for example, it has often been claimed that ancient Egypt developed a fixed, schematic calendar—in contrast to all other ancient societies—because of its unique administrative needs. Besides the fact that other ancient states had arguably equally complex administrative and bureaucratic needs, yet still maintained flexible lunar calendars (e.g. the neo-Assyrian kingdom), the Egyptian civil calendar had functional disadvantages that are often overlooked, and that cast doubt on the assumption that it was the administration of Egypt that necessitated the use of a fixed calendar of this kind. In Ch. 3, I shall argue that the Egyptian calendar should rather be explained in relation to the distinctive features of ancient Egyptian religion and ideology, which the calendar did not functionally serve, but rather of which it formed a constitutive part.

This culturally context-bound interpretation of the Egyptian calendar may be associated with another theoretical approach known as cultural relativism, which I would argue must also be used with caution. Its use is justified at first sight in the case of Egypt, of which the calendar, at least until the mid-first millennium BCE, was unique in the ancient world and arguably specific to Egyptian culture. However, the rapid spread of this same calendar (or its derivatives) in subsequent centuries across the whole of the ancient world raises questions about its specificity to any single cultural milieu. In general, most of the calendars that will be studied in this work were based on objective astronomical phenomena (especially the new moon) and/or annual seasons of which the perception and conceptualization transcended, to a certain extent, social and cultural differences. This explains why calendars were so easily shared, assimilated, and adopted from one culture to the next: thus after Alexander's conquest the Macedonian and Babylonian calendars, both lunar, seem to have effortlessly merged. Rather than stressing cultural diversity and particularism, which others have chosen to focus on,[23] this work is largely about cultural exchange and cultural cohesion within the ancient world as a whole.[24]

[22] e.g. Parker (1950) 53: 'instrument for the measurement of time'.

[23] e.g. Samuel (1972): see below, end of Ch. 1.

[24] Another false theory that has gained much acceptance in modern scholarship, especially in the context of the Jewish calendar, is the claim (self-styled, rightly or wrongly, Durkheimian), that the calendar was so essential to social cohesion that diversity of calendars within any given society unavoidably led to social division and schism. I shall not elaborate on this theory here, as it will be given full treatment in Ch. 7.

BRIEF OVERVIEW OF THE LITERATURE

The comprehensive survey of ancient calendars is an ancient, well-established literary genre, although it was sporadically pursued before the modern period. It may be traced back to Antiquity itself, with substantial passages in the works of Geminus (first century BCE) and Censorinus (third century CE), followed in the Middle Ages by al-Biruni's encyclopedic work, *Chronology of the Ancient Nations* (written *c.*1000), then in substantial passages of Joseph Scaliger's *De Emendatione Temporum* (1583). Particularly noteworthy in modern scholarship are: the extensive 'handbooks' of Ideler (1825–6) and Ginzel (1911), though now unreliable and outdated; Nilsson (1920), which is focused on a problematic evolutionist theory (see above); and Otto Neugebauer (especially 1975), whose concern was the history of science rather than of ancient calendars.

Elias Bickerman's *Chronology of the Ancient World* (second edition 1968) has long been treated as the authoritative reference work on the subject, although its section on calendars is brief and somewhat uneven (pp. 13–61—the rest of the work deals with the count of years and chronology). Because of its brevity, Bickerman's work tends towards oversimplification and consequently inaccuracy; it is weak on Egyptian and Near Eastern calendars, but quite useful on Greek ones (27–38). Alan Samuel (1972) confined himself, perhaps more wisely, to Greek and Roman calendars; his work is a mine of information, notwithstanding David Lewis's scathing review (1975). Grumel (1958) covers late Antiquity, but focuses on chronology and is not entirely reliable about the calendars. Cohen (1993) is essential on ancient Near Eastern calendars, but says little of the structure of the calendars and how they were reckoned. Richards (1998) offers a general survey of world calendars; Blackburn and Holford-Strevens (1999) is much broader in scope, but also presents in some detail how world calendars were (and are still) reckoned. More recently, Hannah (2005, 2009) presents an interesting discussion of aspects of Greek and Roman calendars and time reckoning.

The contribution of a number of scholars to the study of individual ancient calendars is worthy of particular mention. I am much indebted to the works of W. Kendrick Pritchett on Greek (especially Athenian) calendars, Chris Walker on the Babylonian calendar (though much of his relevant work remains unpublished), Leo Depuydt on Egyptian calendars, François de Blois on Iranian calendars, and Chris Bennett on Ptolemaic, Roman, and the early Julian calendars. These scholars address a wide range of detailed calendrical problems which, for reasons of scope, I have not been able to discuss in depth in this study. Although I have often relied on their research and findings, I have always re-evaluated the arguments and the primary evidence, and in many cases, I have found that fresh research and fresh interpretations were needed.

Many of the general works surveyed above present themselves as lists or catalogues of ancient calendars, with the often explicit purpose of serving as reference works for ancient historians and epigraphists; as Samuel (1972: viii) candidly stated in his preface, 'basically, I am trying to be useful'. My purpose in this work is not to be useful, even though much 'useful' information could probably be culled by the reader from it. I have not listed, either in appendices or in the main text, the month-lists of all ancient calendars (which might resemble a telephone directory, and judging by Samuel 1972 and Cohen 1993 alone could easily take up a whole volume); for these the reader is referred to the above-mentioned works, with the warning, however, that tables of ancient calendars are sometimes simplifications, sometimes reconstructions based on sporadic evidence, and sometimes misleading impressions of historical changelessness and stability. I do not approach ancient calendars as technical devices for reckoning time, but rather as integral aspects of society and culture. In short, my purpose is to write a piece of social history.

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Part I

From City States to Great Empires: The Rise of the Fixed Calendars

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1

Calendars of Ancient Greece

Ancient Greek calendars go back to early Antiquity, but evidence of how they were structured and reckoned begins only in the sixth century BCE.[1] In general the calendars of Greece were lunar, but their lunar character could be disrupted by deliberate interference or tampering. More is known about the calendars of Athens than those of any other city, but there is sufficient evidence from elsewhere to confirm that all Greek calendars broadly shared the same structural features. Perhaps the main difference between the calendars of Greek cities and islands was their month-names, which gave the outward appearance of considerable diversity.[2]

The main Athenian calendar is often called 'archontic' or 'festival calendar'—although its use went far beyond the determination of festival dates—to distinguish it from the so-called 'prytanic calendar', peculiar to Athens, that was used at Athens alongside it. As we shall see, this dual calendar system has not helped modern scholars to work out how each calendar worked; on the contrary, it has only exacerbated the difficulties. I shall examine first the festival calendar, because it was common, in its broad features, to the whole of Greece; the Athenian, prytanic calendar and the problems arising from it will be discussed later in this chapter.

[1] Earlier literary sources such as Homer or Hesiod are remarkably uninformative about the way their calendars were structured or reckoned (on Hesiod see also below, n. 104). For discussion of the evidence for archaic Greek calendars, see Hannah (2005) 16–27. A tradition reported by Diogenes Laertes (1. 59, *c.*3rd c. CE) that Solon ordered the Athenians to 'run their days according to the moon' is unlikely to mean that prior to the 6th c. BCE, the Athenian calendar took no account of the lunar month (Hannah 2005: 29). If this tradition is reliable, it means perhaps that Solon demanded the calendar to be more precisely aligned with the lunar month.

[2] Evidence for non-Athenian calendars is assembled by Samuel (1972) 64–138; see also the review by D. M. Lewis (1975). For a general introduction to the Athenian calendars, see Samuel (1972) 57–64 and Woodhead (1992) 117–22. The Athenian month-names (in the archontic calendar) were Hekatombaion, Metageitnion, Boedromion, Pyanepsion, Maimakterion, Poseideon, Gamelion, Anthesterion, Elaphebolion, Mounychion, Thargelion, Skirophorion. I shall not list the month-names of other cities and islands, as they are less important to our study, and available in Samuel (1972); see also Bickerman (1968) 20–1. For a comprehensive study of Greek month-names, their order, meaning, and etymology, see Trümpy (1997).

Sections in this chapter follow a rough chronological order: the archontic or festival calendars are undoubtedly the most ancient, followed by the prytanic calendar (instituted at Athens in the early or mid fifth century BCE), the astronomical calendars (from the late fifth century BCE), and finally the so-called *kata theon* calendar (from about the third century BCE). One of the questions I shall raise is whether this chronological succession reveals any development or evolution in the ancient Greek concept and use of calendars. On the whole, the answer to this question will be negative, since the festival calendars appear to have remained dominant in the Greek world until the end of Antiquity.

1. THE FESTIVAL CALENDARS

Although the term 'festival calendar' is only necessary for Athens, to distinguish it from the prytanic calendar, it can be legitimately applied to all other Greek civil calendars because of their close connection to the religious festivals. The months in Greek calendars are very commonly named after the major festivals occurring in them, and it has thus been argued that originally, the primary use of the calendar would have been the determination of festival dates (Hannah 2005: 27–8). In the historical period, however, Greek calendars were used for a wide range of purposes: religious, political, and economic, public and private, etc. Outside Athens, I shall prefer to refer to these calendars more neutrally as 'civil'.

The new moon

In principle, all Greek calendars were lunar, and so they were generally perceived.[3] According to later writers such as Geminus (first century BCE),[4] the Greek month began when the new moon crescent was first sighted.[5]

[3] As stated e.g. by Aristotle, *Ath. Pol.* 43. 2; Geminus, *Elem. Astr.* 8. 10–15 (Aujac 1975: 49–50); and Plutarch, *Solon* 25. 3. This is also evident from Selene's speech in Aristophanes, *Clouds* (615–26), which will be discussed below.

[4] Geminus, *Elem. Astr.* 8. 11, 9. 7 (Aujac 1975: 49–50, 59–60). For this revised dating of Geminus, see A. Jones (1999*a*). See also Philo, *Special Laws* 2. 11 (41), 2. 26 (140–1), on which see Stern (2001) 116–19; it may be argued, however, that Philo is only referring to the Jewish calendar. Pliny, *Natural History* 18. 75 (321–5), is often cited in this context but actually irrelevant, as he refers not to a calendar month, but to the cycle of the moon.

[5] First visibility of the new moon crescent always occurs in the evening, shortly after sunset, and only for a relatively short period (see Stern 2001: 99–103). If this marked the beginning of the month, the first day of the month would have been reckoned from that evening or from the following morning. The beginning of the day in the Greek calendar remains a matter of

Accordingly, these late authors commonly distinguish the day of *synodos* ('conjunction'), the last day of the month, from that of *noumenia* ('new month'), the first of the next month.[6] Conjunction is when the moon, along its orbit, passes between the sun and the earth; it is then at minimal illumination, and completely invisible to the naked eye. The reason why the month does not begin then, but only one day later (on the *noumenia*), is presumably that this is when the new moon becomes first visible.

However, the matter is not completely clear-cut. The same Geminus states elsewhere that the new moon can sometimes be sighted on the 1st of the month, but sometimes not until the 3rd.[7] This possibly means that although the month begins when the new moon *should* first be visible, in practice it is sometimes not sighted until the 3rd because of extraneous factors such as bad weather. This would imply that the calendar did not depend on actual sightings of the new moon, but rather on calculations or estimates of when the new moon would first be visible. But although this interpretation is completely plausible, it is equally possible that Geminus means that the Greek month did not strictly follow first visibility of the new moon, and could sometimes begin a little earlier.[8]

There are difficulties, furthermore, with the traditional ancient assumption that the day of conjunction is the last day of the old month. The typical interval between day of conjunction and day of first visibility of the new moon is actually two days; thus if the month began when the new moon was first sighted, conjunction should have been typically on the *penultimate* day of the previous month.[9] It may be argued that association of the conjunction with the last day of the month was a literary convention, rather than a precise astronomical truth.[10] Alternatively, it is possible that the month often began one

controversy, but sunset should be preferred (as at Censorinus, *De die natali* 21. 6): see more recently Bowen and Goldstein (1994) 695–6 and nn. 3–5, 713–14.

[6] Geminus, *Elem. Astr.* 8. 14 (Aujac 1975: 49); also scholia on Hesiod, *Op.* 765–8, 769 (comments attributed to Proclus). Plutarch (*Solon* 25. 3) writes that Solon ordained at Athens that the day of the *synodos* should be reckoned as 'old and new' (last day of the old month), and the next day as *noumenia* (first day of the new month).

[7] Geminus, *Elem. Astr.* 9. 14 (Aujac 1975: 61). The possibility of the new moon being sighted on the 1st of the month seems to rule out an astronomical interpretation of this passage, whereby the passage would be referring to a theoretical, astronomical lunar month running from conjunction to conjunction.

[8] See the remarks of A. Jones (2000*a*) 153 and n. 36.

[9] See Stern (2001) 99–103.

[10] Bowen and Goldstein (1994) 710–13 argue on the basis of P.Oxy. 53. 3710 (col. ii, ll. 33–43), Geminus, *Elem. Astr.* 9. 6, 16, 10. 6 (Aujac 1975: 59–62), Plutarch (*Romulus* 12, on the foundation of Rome when a solar eclipse occurred on the last day of the month), and other sources that the dating of solar eclipses—which necessarily occur at the time of conjunction—on the last day of the month was only a later literary convention, which went back to an erroneous, over-exacting reading of the text of Thucydides. On the apparently contradictory passages in Thucydides (2. 28. 1, 4. 52. 1–2), where solar eclipses occur on the *noumenia*, see Bowen and Goldstein (1994) 702–7; it is clear that Thucydides does not mean a precise dating.

day after the conjunction, before the new moon was sighted or even theoretically visible.

Further ambiguities arise from a passage of Aratus, *Phaenomena* 733–9 (third century BCE), who writes that 'when the moon with slender horns is sighted in the west, she declares a waxing month' (the text continues that when moonlight begins to project a shadow, it is the 4th day of the month, etc.). Geminus cites this passage as evidence that the days of the calendar month are related to, and possibly determined by, the phases of the moon.[11] However, the first sighting of the new moon, which Aratus is evidently referring to, is associated here with a month that is already 'waxing', which suggests some time after the month's beginning. Some commentators suggest that Aratus is referring to an astronomical month that begins earlier on at the conjunction, as opposed to the calendar month which began at the new crescent.[12] Alternatively, Aratus' term for 'waxing', *ἀεξομένοιο*, may be interpreted as referring to the first day of the month, particularly if we assume it is interchangeable with *ἱσταμένοιο*, which designates, in the Athenian and many other Greek calendars, the first ten days or 'decad' of the calendar month (including the first day of the month).[13] Nevertheless, this passage does open the possibility that the Greek calendar month began before the first sighting of the new moon; Aratus' ambiguity is frustrating but perhaps, in itself, significant.

Modern scholars have generally accepted Geminus' statements that the Greek month began at first visibility of the new moon.[14] However, it is clear on Geminus' own evidence, as well as on the evidence of the other passages just mentioned, that this rule was not strictly followed, and indeed, quite possibly, that it did not constitute a rule. Moreover, we do not know of any procedure that may have been used, and indeed that would have been necessary, for such a rule to be enforced. There is no evidence, for example, in the whole of Graeco-Roman literature of anyone sighting the new moon.[15] The beginning of the month may have corresponded approximately to first visibility of the new moon—and this may have been, as suggested by Geminus and

[11] *Elem. Astr.* 8. 13 (Aujac 1975: 49); and so Pritchett (2001) 91–2.

[12] J. Martin (1998) ii. 457. See also Bowen and Goldstein (1994) 696 n. 4, Kidd (1997) 426.

[13] Samuel (1972) 57; on decads, see ibid. 60, 70, 101, 110. The term *ἱσταμένοιο* would be more usual for a waxing moon (cf. Homer, *Odyssey* 14. 162, 19. 307): Kidd loc. cit.

[14] Bickerman (1968) 18; Samuel (1972) 57, 141.

[15] Apollonius mentions the difficulty of sighting the new moon at the beginning of the month (*Argonautica* 4. 1479–80, cited in Dunn 1998: 218); but this says nothing of calendrical practice. The *νουμηνιασταί* (in Lysias fr. 195. 2, Carey 2007: 423) should be interpreted as a society meeting on the *noumenia* (first day of the month), rather than as a body of professionals in charge of observing the new moon and/or setting the calendar at Athens (Pritchett 2001: 36). Observation of the new moon is not listed as one of the archon's duties, e.g. in Aristotle, *Ath. Pol.* 56. Pritchett (2001) 94–7 speculates on how the old and/or new moon may have been observed at Athens for calendrical purposes; he deplores the lack of evidence, but without reflecting that this lack of evidence itself may be significant. On Macrobius' account of new moon sighting in ancient, (pre)-Republican Rome for purposes of setting the calendar month, see Chapter 4 near n. 137.

others, the nominal intention—but in practice no effort was made to enforce it precisely. Statements associating the conjunction with the last day of the month and the new moon with the first day of the next month—which, as mentioned above, are arguably astronomically incompatible—represent Graeco-Roman rationalizations or simplifications of a calendar that was actually somewhat fluid and undefined.[16]

Political control

What precisely defined the beginning of the new month was thus not the appearance of the new moon—with respect to which the month may have been somewhat flexible—but rather political decisions. It is evident from our sources that in ancient Greece, the calendar was controlled by political authorities: in every city, it is the local magistrates (the eponymous archon at Athens, ephors at Sparta, etc.) who decided when the months began and whether the year should be intercalated. This is why the Athenian calendar (which we also call 'festival calendar') is commonly designated, in epigraphic sources, as 'according to the archon'; hence its alternative modern designation, 'archontic'.[17] Political authority established and maintained the calendrical consensus; the process of calendar reckoning was thus a fundamentally political activity.[18]

The calendar at the city of Abdera appears, in this context, as an exception that proved the rule. Stratonicus (early fourth century BCE) is said to have seen,

[16] Various attempts have been made to establish the precise beginning of the Greek month on the basis of specifically dated events, e.g. the date of Alexander's death (e.g. Grzybek 1990: 15–6, 29–35, 52–60), although the inference remains speculative and inconclusive (A. Jones 1997: 164). Depuydt (1996*a*) infers from the date of Meton's observation of the summer solstice on 13 Skirophorion in 432 BCE, which is given in some sources as equivalent to Egyptian 21 Phamenoth, that the Athenian month began on the day of conjunction (see also Bowen and Goldstein 1988: 64; Hannah 2005: 54–7). But even if this is correct for that particular month, it does not necessarily reflect general practice, which may have been variable and, as I argue, undefined. Moreover, Depuydt does not take into the account the possibility of suppression of days (on which see presently below); the suppression of one or two days before Skirophorion in 432 BCE could easily have caused this month to commence on the day of conjunction. Furthermore, Depuydt's argument is based on the assumption (following Bowen and Goldstein; see also Hannah 2005: 57–8) that the date of Meton's observation was given according to the Athenian civil calendar; however, since the sources of this date are not earlier than the first century BCE (Diodorus 12. 36 and the Miletus *parapegma*), it is equally possible that it was retrospectively calculated according to a schematic, astronomical calendar attributed to Meton and based on the day of conjunction (even though there is no evidence that such a calendar was instituted as early as Meton's time: see §3 and n. 88 below, Bickerman 1968: 100–1 n. 35, and in more detail Samuel 1972: 44–6, A. Jones 2000*a*: 150–1).

[17] Evidence for the role of the ephors at Sparta is in Plutarch, *Agis and Cleomenes*, 16 (Samuel 1972: 93–4).

[18] As rightly sensed, though from a more narrow perspective, by Loraux (2002) 171–90.

on a visit to Abdera, that each citizen appointed his own herald to announce the new month whenever he thought it began.[19] This suggests that there was no official announcement of the new month at Abdera, and consequently, that people disagreed as to when the month began. The story seems somewhat incredible, although it has much to teach us about what a fourth-century Athenian like Stratonicus would have expected of a calendar: decision of the archons, official announcement of the new month, and consequently, calendrical consensus imposed by the political authorities. It is the absence of these at Abdera that made Stratonicus' story worth telling.

The account of Stratonicus should not be dismissed as historically implausible. It is not inconceivable that in Abdera political authorities really had no involvement in calendrical decisions, and hence that people made their own assumptions about when the month began. Consensus about when the month had begun could have been reached informally, later in the month, after the initial period of disagreement had elapsed.[20] A similar situation may have existed on the island of Ceos, as may be implicit in the saying: 'What is the date on Ceos?'[21]

But whatever happened exactly at Abdera and in Ceos, it is clear that elsewhere in Greece, the calendar was determined and enforced by political authorities. At Athens, the formal decision was taken by the archon(s), although other members of the political body could also participate in the decision-making process. Thus in the text of a late fifth-century BCE decree issued by the Boule (city council) and the people's Assembly, it is an influential politician (Lampon, also an expert in cultic matters) who puts forward the

[19] The story is told by Machon (third century BCE, Alexandria), fr. 11, ll. 119–23, ed. Gow (1965) 41; see also Bickerman (1968) 32, Pritchett (2001) 36. I am grateful to Leofranc Holford-Strevens for first drawing my attention to this text.

[20] Calendrical systems of this kind are attested in modern anthropological studies. Turton and Ruggles (1978; see also Gell 1992: 300–5, Drucker-Brown 1999/2000) show how the calendar of the Mursi of South-Western Ethiopia is lunar, with half-monthly periods adding up to 29 or 30 days; however, the date is frequently subject to disagreement because of different claims as to when the new or full moon has been seen (the evidence presented by Turton and Ruggles suggests to me that early, and thus false, new moon sightings tend to be the cause of disagreement). Disagreements are retrospectively resolved when the next full or new moon respectively is seen (Turton and Ruggles 1978: 591). Persistent disagreement with retrospective correction thus preserves a certain level of calendrical consensus; what makes this consensus possible is the empirical, lunar foundation of the calendar. The same (or something similar) might have been possible at Abdera and Ceos, even if it seems somewhat unlikely. Turton and Ruggles show further how, among the Mursi, the name of the month is also subject to persistent disagreement (with retrospective correction), because although it is known that some years can have 13 months, there is no official or deliberate procedure of intercalation. This finds no parallel, to my knowledge, in ancient Greece (but it does perhaps in Egypt: see Ch. 3).

[21] Crates, fr. 32. 5 Kassel–Austin, which is interpreted as meaning that nobody knew the date, and that each person announced the *noumenia* for himself (Gow 1965: 86; see also Gomme, Andrewes, and Dover 1945–81: iv. 75).

motion—duly endorsed and recorded in the text of the decree—that the next archon shall intercalate a second month of Hekatombaion.[22]

Political authorities had control over more than one aspect of the calendar. They had the power of deciding whether a month was 'hollow' (*koilos*, i.e. 29 days long) or full (30 days long), but also of arbitrarily intercalating or suppressing days, at any point during the month.[23] The practice of intercalating days is well attested in epigraphic sources.[24]

They also decided when to intercalate an extra month in the year, as is evident from the fifth-century Athenian decree above mentioned. Epigraphic sources show that at Athens and elsewhere, different months of the year could be made intercalary[25] and the frequency of intercalation was variable.[26] This suggests that the intercalation of months—just as of days—was not determined by any fixed rule, but depended largely on the *ad hoc* (and somewhat unpredictable) decisions of political authorities.

[22] *IG* I^3. 78, Meiggs and Lewis (1988) 217–23 no. 73, ll. 53–4 (commonly known as the 'First-fruits decree'). I am grateful to Robert Parker for this reference. See also Hannah (2005) 66–7.

[23] It may be presumed that intercalations and suppressions did not affect the count of days of the month, because if (e.g.) a day was intercalated after the 5th of the month, it would be numbered '5 *embolimos*' (5 intercalary), whereas if the 5th was suppressed, the count of days would jump from 4th to 6th.

[24] For epigraphic evidence of intercalary days, see Pritchett and Neugebauer (1947) 20–2; Dunn (1998) 221; Pritchett (2001) 6–7 (with evidence, in one case, of as much as 8 successive intercalary days). Positive epigraphic evidence of suppressed days is unavailable (indeed it is, by nature, more difficult to find), but one literary source, Diodorus 1. 50. 2, informs us that 'most Greeks' intercalated and suppressed days and months (see also Plutarch, *Table Talk* 9. 6 and *Brotherly Love* 18—on which see Loraux 2002: 171–90—and Philostratus, *Lives of Sophists* 2. 1. 10, but these passages seem to refer to the permanent suppression of specific days in the Athenian calendar, rather than to the irregular, *ad hoc* suppressions which we are discussing here). Moreover, it is evident that if days could be arbitrarily intercalated, an equivalent suppression of days had to be made elsewhere, otherwise the lunar character of the Greek calendar would have been irreversibly lost. In second-century BCE inscriptions with both archontic and *kata theon* dates (the latter are regular lunar dates: see §4 below), the archontic date is always lower (see Dunn 1998: 225), which would suggest that intercalations were always made first, and suppressions thereafter to compensate. However, this conflicts with evidence that most intercalations were made at the end of months and end of years (see Loraux 2002: 221–2), as if to compensate for earlier suppressions; and note also Woodhead's inference (1997: 149) that suppression of days did not occur at Athens in Skirophorion, the last month of the Athenian year. It is difficult, therefore, to infer any consistent pattern for the intercalation and suppression of days.

[25] The most common intercalary month at Athens was Poseideon, but other months are also attested: e.g. Hekatombaion (Meiggs and Lewis 1988: 217–23 no. 73, ll. 53–4), Gamelion (*IG* ii^2. 1487. 54), Anthesterion ibid. 844. 33) (the latter are cited in Meiggs and Lewis loc. cit.). See also Hannah (2005) 43.

[26] See especially Pritchett (2001) 7–8, 21–2. Note, however, that the interpretation of epigraphic evidence can sometimes be uncertain: see e.g. Woodhead (1997) 381. For a full listing of epigraphic evidence, see Dunn (1998) 221–2.

Irregularity

The ability of politicians to tamper with the calendar by intercalating or suppressing days and months raises questions about the regularity of ancient Greek calendars, their conformity to lunar phenomena, and their alignment to the seasons. The question of the regularity of the Athenian festival calendar (and by extension, of other Greek calendars) was subject to an intense and protracted controversy during the entire second half of the twentieth century between the American scholars Pritchett and Meritt.[27] Pritchett was of the view that Greek calendars were frequently disrupted through arbitrary or erratic management, often at the expense of conformity with the moon. Deviation from a true lunar calendar meant that the 1st of the month was not necessarily anything near the new moon, nor the 14th or 15th anything near the full (Pritchett 1947: 242–3). Epigraphic evidence confirmed, in his view, that the archontic calendar at Athens could remain disrupted over very lengthy periods (Pritchett 1999; 2001: 1–40). Meritt, his older colleague, argued on the contrary that the festival calendar was fundamentally regular, and that instances of political tampering and of calendar irregularities, which may be attested in literary and epigraphic sources, could be dismissed as merely exceptional.

This controversy has remained unresolved, although scholars now tend to lean in favour of Pritchett (e.g. A. Jones 2007: 165 n. 2); to some extent the controversy is insoluble, as for reasons that will be later explained, it is partly a matter of perspective. However, it is important to point out that whilst we have positive evidence of calendar disruption in Greece through most of the Classical and Hellenistic periods (sixth–first centuries BCE), calendar regularity is more difficult to prove. Evidence of calendar disruption can be found, for example, in the island of Samos, where a third-century BCE inscription lists no less than four embolismic (i.e. intercalary) months in a single year. In a well-regulated lunar calendar, never more than one intercalary month would be allowed in any given year.[28]

[27] The bibliography is lengthy and somewhat repetitive, and need not be listed here (a selection of significant works can be found in the References).

[28] Michel (1900) 738–9 no. 899 (cited in Samuel 1972: 120–1, Trümpy 1997: 78–80). The four embolismic months appear consecutively, at the end of the year. This demands an explanation. Unless it was part of some major calendrical reform (as when Julius Caesar artificially prolonged the year 46 BCE by 90 days: see Ch. 4)—for which we have no evidence—we must assume that some or all of the four embolismic months were compensating for a long period where insufficient or no intercalations had been made; alternatively, they were making up for months that had been suppressed in the same year, or they were made up by month suppressions in the following year. This is difficult to verify, as the inscription (and list of months) is not complete. It may be noted, however, that the month of Artemision, attested in another inscription from Samos (Hallof 2000 no. 169; see Samuel and Trümpy, loc. cit.), is not listed in this present inscription. By analogy with the calendar of nearby Miletus, where the same month-names occur

Deviations from the true lunar month can be inferred from literary and epigraphic sources. Plutarch reports that the battle of Marathon (490 BCE) was on 6 Boedromion, and other sources confirm that the Athenians commemorated it every year on that date; yet according to Herodotus (6. 106, 120), the battle took place around the full moon.[29] Whether or not Plutarch's date is historically authentic (he may simply have inferred it from the annual commemoration of this victory in the Athenian calendar),[30] it remains significant that he must have been aware of the Herodotean passages, and yet seems not to have considered them contradictory to his own dating. The first passage in Herodotus (6. 106) might also imply that the full moon could have occurred on the 9th of the Spartan month.[31] Epigraphic sources, mainly from the second century BCE, provide more tangible evidence of deviation from the true lunar month: for example in Attica, a date of 5 Pyanepsion that corresponded to the 16th of the lunar month;[32] or in Boeotia, a 1 Thouios that corresponded to the 16th of the following lunar month, Homoloios.[33] An inscription from Athens indicates that 19 Elaphebolion corresponded in one year to what should have been the 12th of the following lunar month, Mounichion.[34] Persistent deviations from the true lunar month may further explain why Hellenistic sources are unclear, as we have seen, about the beginning of the calendar month and its relation to the new moon. For although visibility of the new moon served as a criterion, perhaps a primary criterion, for the beginning of the month, in practice this criterion would have been frequently ignored.[35]

(Samuel 1972: 114–18), the month of Artemision is likely to have been normally placed between Anthesterion and Taureon, which appear consecutively in the Samos inscription (Trümpy loc. cit.). It is possible, therefore, that Artemision was one of the months suppressed in that year. The possibility of month suppression would constitute further evidence of the tremendous flexibility of Greek calendars.

[29] Pritchett (1947) 238, and Dunn (1998) 219, citing Plutarch, *Camillus* 19 and parallel passages.

[30] As well argued, in general terms, by Grafton and Swerdlow (1988).

[31] Dunn (1998) 214, based on Herodotus' statement that the Spartans 'would not march out on the ninth unless the moon were full'. However, the implicit possibility of the full moon's occurring on the ninth might be purely theoretical; Pritchett's inference (1947: 238) that the 9th of the Spartan month was actually expected, at the time, to coincide with the full moon, is certainly not convincing.

[32] The latter is designated *kata theon* (and so in the next two sources; on this designation, see below): Pritchett and Neugebauer (1947) 19, and for further examples, Pritchett (2001) 1–6.

[33] Bickerman (1968) 33, and Samuel (1972) 69, citing *IG* vii. 517. The discrepancy between months (also in the next case) would have been due to an excessive intercalation.

[34] Bickerman (1968) 38, citing Pritchett and Neugebauer (1947) 15.

[35] Pritchett and Neugebauer (1947) 18, 20 put forward the conjecture that every new year the festival calendar at Athens was closely readjusted to the lunar calendar. Their argument is that since civic magistrates, such as the archons at Athens, were normally elected for only one year, their term of office was not allowed to be extended through artificial retardation of the calendar; therefore, the terminal limits of the civil year had to be regulated by the moon, with the first day of the year (1 Hekatombaion at Athens) occurring exactly at the new moon. This conjecture,

Calendar disruption is also evident when calendars of different cities are correlated in epigraphic sources. Double dates reveal that the months of different cities were not consistently related to one another: for example, the Thessalian month of Thyos corresponded in *c*.161/0 BCE to the Delphic month Endyspoitropios, but in *c*.124 BCE to the Delphic month Bysios. Inasmuch as the Delphic Endyspoitropios and Bysios are two months apart, this inconsistency was presumably the result of irregular or arbitrary intercalation, in one—or both—of these calendars.[36]

The relation between days of the months of different cities was also particularly erratic. Aristoxenus (late fourth century BCE) remarks, though only by way of example, that '. . . the 10th of the month at Corinth is the 5th at Athens and the 8th somewhere else'.[37] But more concrete evidence is available from other literary sources. Documents cited by Thucydides suggest that in the spring of 423 BCE the date of 14 Elaphebolion at Athens corresponded to 12 Geraistios at Sparta; whilst in 421 BC, 25 Elaphebolion at Athens corresponded to 27 Artemisios (which probably preceded Geraistios) at Sparta.[38] Ps-Themistocles (*Epistles* 7—date uncertain) refers to a last day of Boedromion (at Athens) that corresponded to 10 Panemos (at Corinth). Plutarch (*Life of Aristides*, 19. 8–9) reports that the battle of Plataea (479 BCE) was on 4 Boedromion in the Athenian calendar, and 27 Panemos in the Boeotian; he goes on to remark about the diversity of civil calendars.[39] Epigraphic evidence is available in Crete, where the 20th at Knossos once corresponded to the 4th in Gortyna.[40]

however, is yet to be supported with evidence; and even if true, it would have been difficult to conform to this rule in practice, since intercalations were often required for religious or other reasons (see §5 below).

[36] Bickerman (1968) 31, Hannah (2005) 81–2. But inconsistencies within a margin of one month, such as between the Athenian and Delian calendars (see Hannah 2005: 73–7), are not necessarily indicative of irregularity: they could easily have arisen if Athens and Delos were using regular but different systems of intercalation.

[37] Aristoxenus, *Harmonica* 2. 37 (Macran 1902: 192). Pritchett (1947: 239–40, 243) rightly remarks that there is no indication, in this passage, that these discrepancies were exceptional.

[38] Thucydides 4. 118. 12 (423 BCE Athens), 119. 1 (423 BCE Sparta), 5. 19. 1 (421 BCE). The correspondence of Elaphebolion with different Spartan months in 423 and in 421 suggests that different intercalation(s) of months were made in each city. Attempts by Gomme (1945–81) iii. 713–15 to explain why Athens was two days ahead of Sparta in 423, but then two days behind in 421, are completely speculative and futile (see Dunn 1998: 219). Pritchett (1947) 238–9 questions whether the dates given by Thucydides for Athens and Sparta in 423 BCE refer in fact to the same day, as Sparta may have sworn the truce a little later; see also Samuel (1972) 93.

[39] Pritchett (1947) 238–40, Samuel (1972) 68 and n. 1, Dunn (1998) 219–20. On the sources Plutarch would have used for his datings, see Grafton and Swerdlow (1988) 26–7. As to his comment on calendrical diversity, Plutarch seems to be referring also to his own period (late 1st–early 2nd c. CE); however, in this period the diversity of Greek and Macedonian calendars would have been due to very different factors, namely the transformation of the latter into solar, Julian-type calendars (on which see Ch. 5).

[40] Bickerman (1968) 33 (and generally 32–3), citing *IG* xii/3. 254.

Awareness that the Athenian calendar in the Classical period was irregular, mismanaged, and discrepant from the true lunar month finds vivid expression in several passages of Aristophanes' comedies (late fifth century BCE). In *The Peace* (414–15), we are told that for a long time, the sun and the moon have been 'stealing days and nibbling at the cycle' (of the year). This should be interpreted as a reference to calendar disruption. More importantly, in *The Clouds* (615–26) Selene (the moon) is reported as complaining, in a rather lengthy speech, about her appalling treatment:

> (The moon) expressed her annoyance at the awful way she has been treated, after helping you all not with mere talk but with plain action . . . she says that though she does you other favours too, you don't keep track of your dates correctly, but scramble them topsy-turvy, so that the gods scold her, she says, every time they're misled about a dinner and go home having missed the festival that was specified in the calendar.[41] Furthermore, when a sacrifice is scheduled, you're busy armtwisting witnesses and rendering verdicts; and time and again, when we gods are holding a fast in mourning for Memnon or Sarpedon, you're pouring libations and laughing. As a result Hyperbolos, allotted this year to be Holy Recorder, was stripped of his chaplet by the gods.[42] That way he will better understand that the days of his life should be reckoned by the Moon (trans. Henderson 1998: 89–91).

The days are topsy-turvy, and the months are out of line with the moon; as a result, the festivals are celebrated on the wrong days—and the politicians are to blame. Although Aristophanes alludes, at the end, to a specific incident (which to us remains rather obscure), his account in the rest of the passage suggests that calendar disruption was frequent and maybe even—as Pritchett argued—persistent.[43]

[41] *κατὰ λόγον τῶν ἡμερῶν* ('according to the order of days'). Note that there is no specific term in Greek (or indeed in any other ancient language) for 'calendar' in the sense of a system for reckoning days, months, and/or year.

[42] This obscure sentence alludes to an embarrassment that must have occurred to Hyperbolos, an eminent Athenian politician who—we are told here—was appointed 'to be Holy Recorder' (*ἱερομνημονεῖν*); the *hieromnēmōn* or Holy Recorder was a delegate from Athens to the Delphic Amphictiony, a league of states concerned with protecting the sanctuary at Delphi. Aristophanes suggests that this was a divine reprisal for his failure to run his days according to the moon—which implies that he had been involved (though probably not in his capacity of Holy Recorder) in the disruption of the calendar (Gomme, Andrewes, and Dover 1945–81: iii. 713–5). Gomme argues further that this alludes to the calendar discrepancies implicit in Thucydides 4. 118. 12, 119. 1 for the year 423 BCE (see above, n. 38), when this comedy was performed; see also Dover (1968) 177. This interpretation, however, remains conjectural. On this passage, see also Pritchett (2001) 89–90.

[43] Dunn (1998) 228 (see also Hannah 2005: 51) argues that both these passages refer to changes made at the time to the prytanic calendar that would have caused the prytanic year and archontic year no longer to be conterminous. However, that these changes occurred is largely speculative; moreover, this interpretation does not account satisfactorily for Aristophanes' suggestion that the festivals—which were always dated according to the archontic, not the prytanic calendar—were being celebrated on the wrong days. Hannah (2005: 51–2) suggests alternatively that the moon's speech in *The Clouds* refers to an attempt to introduce a solar

Regularity: the new moon

As mentioned above, Meritt believed against Pritchett that the festival calendar at Athens (and elsewhere in Greece) was fundamentally regular.[44] This was largely an assumption which, however reasonable, remained difficult to prove. It meant that the attested cases of calendar irregularity (some of which have been discussed above) had to be dismissed, rather unconvincingly, as marginal or merely exceptional.[45] Positive evidence of regularity, as we shall now see, is difficult to find.

The assumption that the month was lunar is well attested already in fifth-century BCE sources such as Aristophanes, *The Clouds* 615–26 (see above), but this does not mean *ipso facto* lunar regularity—as the same passage in Aristophanes proves. Likewise, the names 'old and new' and *noumenia* for the last and first day of the month respectively, which seem to imply a lunar calendar regulated by the new moon,[46] do not necessarily reflect how the calendar was reckoned in practice.[47] But another passage in *The Clouds* does seem to

calendar in Athens; but that such an attempt was ever made is completely unsubstantiated and highly unlikely.

[44] In some publications, Meritt (e.g. 1964) went as far as arguing that the Athenian calendar conformed to the astronomical, Metonic calendar; this will be criticized below (§3). Meritt's position has led Woodhead (1997), in his reconstruction of the Athenian epigraphic record, to assume *a priori* a Metonic cycle, with a regular alternation of full and hollow months. However, this assumption is unwarranted and indeed misleading, as—on Woodhead's own admission—it is regularly contradicted by the evidence.

[45] Following this line of argument, Dunn (1998), followed in turn by Hannah (2005) 49, 51, explains the attested cases of calendar disruption as being the result not of deliberate tampering (Pritchett's thesis), but rather of imprecisions inherent in the way the lunar calendar was reckoned. He argues that discrepancies between the calendar and the true lunar month may have resulted from delayed new moon sightings because of bad weather, or from inaccurate predictions as to when the new moon would first be visible. But whilst this may well explain minor discrepancies, e.g. why Athens was two days ahead of Sparta in 423 BCE and two days behind in 421 (ibid. 219; see above, n. 38), this does not explain how greater discrepancies could occur. Dunn's contention (1998: 214–17) that in a calendar based purely on new moon sighting, the full moon can sometimes occur on the 9th of the month (which would explain Herodotus 6. 106) is plainly incorrect. Similarly implausible is his explanation (ibid. 220) of how e.g. a 5-day discrepancy can accumulate between two lunar calendars (which would explain Aristoxenus, *Harmonica* 2. 37; see n. 37 above). In a number of cases, indeed, Dunn himself is forced to concede that the discrepancy must have been due to deliberate tampering. Even if this tampering was legitimate (e.g. for religious reasons, as Dunn attempts to explain away, e.g. 1998: 219; see discussion below, §5), the fact remains that in these cases, the relationship between the calendar and the lunar month was profoundly disrupted.

[46] 'Old and new' (ἕνη καὶ νέα) designates the last day of the month, regardless of whether it is hollow or full: see e.g. Pritchett and Neugebauer (1947) 23–31 (misinterpreted by Bowen and Goldstein 1994: 697 n. 9) and n. 6 above. It probably means that the old moon is no longer visible, but the new moon is not yet visible either (see further discussion in Hannah 2005: 43–4). *Noumenia* means 'new moon', and can sometimes be used in this sense, i.e. the day when the new moon first appears (e.g. Thucydides 2. 28. 1, on which see below, §4).

[47] Indeed in the Roman period, the beginning of Julian calendar months was still called in Greek *noumenia*, even though the calendar was not lunar. In the Roman calendar, the terms

suggest that the calendar month could be assumed to conform, to some degree, to the phases of the moon. In a scene set in the early hours of the morning, the character Strepsiades mentions seeing the moon in its 'twenties' and gets worried about his debts, which—we know from what follows—were due at the end of the calendar month (*Clouds* 16–18; see Hannah 2005: 50). It is not completely clear, however, that Strepsiades means literally the moon, which he has seen in the early morning sky and which he treats as indicative that the end of the calendar month is approaching, as opposed to meaning 'moon' metonymically in the sense of 'month'.[48] Even if he literally means the moon, it is not clear how precisely its size would have been expected to indicate the current calendar date.[49]

Firmer evidence of conformity to the lunar month belongs to the Hellenistic and Roman periods (from the third century BCE). Literary sources that describe the Greek month beginning at the new moon (see above), implying that the calendar was lunar and regular (even if the notion of 'new moon' was not precisely defined, as discussed above), are not earlier than the third century BCE.[50] There is also some epigraphic evidence of calendar regularity, but again, relatively late (mostly from the second century BCE). An inscription from about 166 BCE informs us that in that year, the 26th of the eleventh month at Athens corresponded to the 26th of the same month at Ambrakia, and to the 27th of the same month at Akarnia; thus no discrepancy between the former, and only a one-day discrepancy between the former and the latter. This agreement between calendars cannot be fortuitous; it must certainly be attributed to these calendars' being based, *a priori*, on a common lunar criterion such as first visibility of the new moon.[51] Similarly, a treaty of 196 BCE which is dated 16 Pyanopsion according to the Milesians and 15 Hagneon according to the Magnesians, would suggest that both calendars were based on visibility of the new moon;[52] and the same can be inferred, again, from a treaty of 120 or

kalendae and *nonae* could be interpreted by some as survivals from an archaic lunar calendar (see Ch. 4 n. 137), yet they were used in a calendar that already in the Republican period had long shed its lunar features.

48 It should be noted that the concept of 'twenties' is more appropriate to the calendar month (which in Greek calendars was normally divided into three periods of 10 days, the last of which would thus be '20s') than to the moon or lunar month (which is more naturally divided into 4 phases). The passage reads: ὁρῶν ἄγουσαν τὴν σελήνην εἰκάδας.

49 Strepsiades' countdown of days in *Clouds* 1131–4 is discussed below.

50 Aratus, *Phaenomena* 733–9; but as discussed above, even this is moot. The earliest unambiguous statement that the month begins at the new moon is from the 1st c. BCE (Geminus: see above, n. 4).

51 Pritchett (1999) 83, (2001) 91. The difference in longitude between Athens and Akarnia, about 3°, would not have been sufficient in this case to affect the dates of visibility of the new moon. However, the one-day discrepancy may still have been due to non-political factors, e.g. bad weather.

52 Dittenberger (1915–24) ii. 108–11 no. 588 (referred to in Bickerman 1968: 33). In this case, the one-day discrepancy can be related to new moon visibility: Miletus, on the western coast of

98 BCE between Ephesus and Sardis, dated respectively 27 Taureon and 27 Daisios in the calendars.[53]

Epigraphic evidence of calendar agreement between various cities, and hence of calendar regularity and conformity to the moon, may reflect in this later period the influence of the Seleucid calendar. As we shall see in Chapter 5, in the Seleucid Empire the Macedonian calendar was assimilated to the Babylonian calendar, which itself was regular, conforming entirely to the new moon (see Chapter 2), and served as official calendar throughout the Seleucid Empire. The Seleucid calendar is likely to have influenced the calendars of neighbouring Greek cities like Miletus, Magnesia, Ephesus, and Sardis (along the western edge of Asia Minor)—where the above-mentioned evidence appears—even after they achieved independence from the Seleucids during the second century BCE.[54] It is possible that other Greek calendars also increased in regularity and conformity to the new moon during the Hellenistic period because of Seleucid influence.[55]

Regularity: the intercalation of months

Because of the discrepancy of ten or eleven days between twelve lunar months and the solar year, a lunar calendar can only remain in stable relation to the solar year through the intercalation, every two or three years, of a thirteenth month. In Athens, different months of the year were intercalated throughout Antiquity, which has been taken by some as an indication that no fixed rule of intercalation was followed.[56] Plato (*Laws* 6. 767 C), in his description of an ideal city, refers to the new year as beginning in the month following the

Asia Minor, would have had access to a much better view of the western horizon (where the new moon is sighted) than land-locked Magnesia, which may explain why, in this case at least, the Milesians declared the new month one day earlier.

[53] Dittenberger (1903–5) ii. 11 no. 437, ll. 90–2 (= *Inscr. Perg.* 268); cited in Samuel (1972) 123.

[54] Note that in Sardis Macedonian month-names were retained: Samuel (1972) 132–3.

[55] As the Athenian and other mainland Greek evidence, cited in the previous paragraph, might perhaps suggest. I take issue with Hannah, who states, almost in reverse: 'explicit evidence for tampering with the festival calendar in the fifth century is very limited. There is more later, from the Hellenistic period, which is usually, but probably anachronistically, taken to represent similar practices in earlier times' (Hannah 2005: 50). Whatever is exactly meant here by 'tampering', political interference with the calendar, whether or not disruptive, is clearly attested in the 5th-c. BCE 'Firsts fruits' decree (see above, n. 22); whilst evidence of calendar *irregularity* in the 5th–4th cc. (cited above) suggests political interference in this earlier period.

[56] Follet (1976) 353–66, pointing out, however, that from the mid-2nd c. CE onwards, Athenian intercalation may have become more regularized by becoming restricted to the month of Poseideon (now renamed Hadrianion). She attributes this, tentatively, to an Athenian tendency in this period towards archaism, or alternatively, to the Roman administration's preference for order and predictability.

summer solstice; assuming this to reflect a rule that was adhered, in Athens, in practice, many scholars have inferred that the Athenian year was regularly intercalated in such a way that Hekatombaion, the first month, always began after the solstice. The same is implicit, indeed, in the works of slightly later Athenian authors.[57] These sources, however, do not confirm how regularly or rigorously this rule—if indeed it was a rule—was followed.[58]

Attempts have been made by Merritt and other scholars, in particular Müller (1991) and Osborne (2009), to infer from epigraphic evidence that the intercalation of months at Athens was not only regular but even followed a fixed 19-year cycle (the Metonic cycle, on which see in more detail below, §3). Ordinary and intercalated years attested in Athenian inscriptions between the late second century BCE and the late second century CE are tabulated by Müller (reproduced in Table 1.1) and would seem to indicate, at first sight, compatibility with such a cycle. The table is laid out in rows of 19 years, starting from 126/5 BCE as year 1 of the first 19-year period. A consistent pattern appears to emerge, with intercalated years occurring in years 3, 6, 8, 11, 14, 17, and 19 of the 19-year periods. The only deviations from this pattern are the first entry of the table, 126/5 BCE, which was intercalated (instead of ordinary), and the last entry, 211/12 CE, ordinary (instead of intercalated); Müller identifies these two years as the outer limits of his period, which is to say that the 19-year cycle was only instituted at Athens from after 126/5 BCE, and abandoned by 211/12 CE.

All the data in Müller's table are drawn from Athenian epigraphical sources, with the exception of the intercalated years 91/0, 89/8, and 75/4 BCE, which are from coins of the kingdom of Pontus. The latter are clearly irrelevant to the calendar of Athens, and should therefore be ignored (I have bracketed these years in the table; the calendar of Pontus will be discussed in Chapter 5). This leaves us with two very distinct periods: one extending from 125/4 to 95/4 BCE, reasonably well documented and apparently attesting the 19-year cycle, and the other in the second century CE.[59] Although the data for the later period are sporadic (only eleven entries for 111/12—177/8 CE), Müller argues that their compatibility with the 19-year cycle proves that the cycle was also then in use, since there would have been a less than 0.1% probability for the data to agree with the cycle purely at random. Finally, Müller extrapolates from these two periods and concludes that the cycle must have been continuously in use from the late second century BCE and to the late second century CE.

[57] Aristotle, *Hist. Anim.* 543^{b}12, Theophrastus, *Hist. Plant.* 4. 11. 4–5 (cited in Jones 2007: 150). See Samuel (1972) 64 (citing earlier scholarship) and Hannah (2005) 72, but some reservations in Bickerman (1968) 37.

[58] Plato's reference further in *Laws* (7. 809 D) to the calendar conforming to the courses of the heavenly bodies is certainly not a realistic account of the Athenian calendar.

[59] For the earlier period, Müller draws mainly on the works of Pritchett; for the later, on Follet (1976) 354–6, 363–6, with evidence from ephebic lists of gymnasiarchs and prytanies of the 2nd to the early 3rd cc. CE.

Table 1.1. Ordinary (O) and intercalated (I) years epigraphically attested at Athens, arranged in continuous 19-year periods, late second century BCE–second century CE (after Müller 1991: 88)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Year 1 in row																			
126/5 BCE	I	O	I		O	I	O	I	O	O	I	O			O			O	I
107/6	O	O	I	O	O	I	O				I		O				(I)		(I)
88/7														(I)					
. . .																			
103/4 CE									O										
122/3																	I	O	
141/2			I							O				I	O				
160/1				O		I				O									
179/80									O										
198/99														O					

Müller's argument, however, is misleading and unsound. To begin with the later period (second century CE), his probability calculation is only correct if one posits that the alternative to a 19-year cycle was that intercalated and ordinary years occurred purely at random. No one, however, has ever made a claim of this kind. The whole purpose of intercalation was clearly to keep the lunar calendar in line with the solar or seasonal year, and this would have required the right number of intercalations to be made, and at the right frequency. Even if intercalations were irregular (e.g. because decided on a year-to-year basis, or on the basis of extraneous, political, or other considerations), at times causing deviations from a well-regulated scheme, we cannot expect them to have been completely random. The probability of agreement of our eleven cases with a 19-year cycle would have been therefore considerably higher than Müller allows (even if this probability would be difficult to measure or calculate). Furthermore, as Müller himself points out, if only one single 'contradictory' year were to be discovered and firmly established, his hypothesis would have to be abandoned. The risk of there being a 'contradictory' year among the 66 (as yet) unattested years in the second century CE (between 111/12 and 177/8) should be treated as high, especially as an irregular intercalation is attested at the 'outer limit' of 211/12 CE. Müller's probability calculations create an illusion of mathematical certainty, but mask the fact that the record for the second century CE remains too sporadic to infer any fixed pattern of intercalations.

On this basis, it is no longer possible to extrapolate to the intervening period (between 95/4 BCE and the second century CE), for which there is no evidence at all. We are left only with the short period of 125/4 to 95/4 BCE; and there again, Müller's inference is unconvincing. Although this period is reasonably well furnished with evidence, the only sequence of years that is repeated after 19 years is 125/4–120/19, repeated in 106/5–101/0, thus only a six-year section of Müller's 19-year cycle.[60] There is no other evidence of cyclicity, except for a single intercalation in 116/15 that is repeated, 19 years later, in 97/6. This is clearly insufficient to confirm the existence of a recurring 19-year pattern. We cannot even be sure that seven intercalations were made in any 19-year period, because of the gap in the evidence between 115/14 and 109/8. Müller assumes that two intercalations would have been made in 113/12 and 110/9 (years 14 and 17 of the cycle), but we cannot rule out the possibility that only one intercalation was made.[61]

[60] Actually only five years, since 123/2 (year 4 of Müller's cycle) is not attested.

[61] The possibility of three intercalations in these years is also possible but less likely, because this means that two consecutive intercalations would have been necessary (since an ordinary year is attested in 112/11), which is uncommon. For a brief refutation of Müller (1991), see also Lehoux (2007) 92 n. 49.

More recently Osborne (2008), (2009), following several earlier attempts by himself and other scholars, has reconstructed a list of Athenian archons in the third century BCE on the basis of epigraphic sources which he dates and arranges in chronological sequence on the *a priori* assumption that the Metonic, 19-year cycle must have been followed. It therefore goes without saying that his archon list cannot serve as proof of a Metonic cycle, as such an argument would be completely circular. But although Osborne treats the Metonic cycle as a given premise,[62] he also argues that 'in the periods 286–266 and 228–200 [*recte* 210] where the archon list is largely secure, the Metonic cycles are faithfully observed, leaving a heavy onus of proof on those who would deny their continuation in the intervening period'.[63] Yet as can be seen in Table 1.2, even in these two periods the sequence of years is incomplete, and cannot therefore determine with certainty that the Metonic cycle was followed without deviations. What happened in the unattested years within these two periods, and all the more so in intervening period (between 266 and 228), remains simply unknown.

Nevertheless, it may be noted that the periods 286–266, 228–211 (in Osborne) and 125–95 BCE (in Müller)—or at least the years that are attested within these periods—replicate the same pattern of intercalation. This may be taken as a reasonable indication of cyclicity, even if *consistent* adherence to such a cycle is undermined by the deviation from this cycle attested in 126/5 BCE (in Müller's table), and as argued above, nothing prevents similar deviations from having occurred in other years. It may also be noted that even with the 'deviant' intercalation of 126/5, there is no evidence in these tables of gross irregularities such as consecutive intercalated years or excessively long runs of ordinary years. This may justify the broad conclusion that intercalation was at least well regulated at Athens, even if not necessarily cyclical. This possibly ties in with my earlier suggestion that in the Hellenistic period—which the studies of Osborne and Müller relate to—the regularity of the Athenian calendar (and possibly also of other Greek calendars) increased.

But the most important conclusion to emerge from these tables is how little we know about intercalation at Athens. This stands in contrast with Babylonian intercalations, of which we have complete and continuous sequences, and the dating of which is in most cases backed up by astronomical evidence (as we shall see in Chapter 2). It is important to stress, besides, that the dating of the Athenian epigraphic sources (and of the archons mentioned therein) adopted by Müller and Osborne in these tables is far from straightforward, and often dependent on debatable inferences. An unbiased assessment, on the basis of

[62] 'The Metonic cycle ought to provide an independent framework for the location of archons' (i.e. on a chronological scale) (Osborne 2008: 87).

[63] Osborne (2009) 84; the year '200' is probably an error for '210', beyond which his data, in Osborne (2008), do not extend.

Table 1.2. Ordinary (O) and intercalated (I) years epigraphically attested at Athens, third century BCE (after Osborne 2008; 2009)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Year 1 in row																			
316/5																	O	O	
297/6			I		O							O	O		O	I	O	O	[I]
278/7	O	O	I	O		I	O	I	O	O		O	O						
. . .																			
240/39													O	I	O	I			I
221/0		[O]	I	[O]	[O]			I	O		I								

Sources: Osborne 2008 (for 228–211 BCE), id. 2009 (for 300–266 BCE).

epigraphic evidence, of the regularity of Athenian intercalation and its possible conformity to fixed cycles remains entirely to be made.[64]

Strepsiades and the count of days

One further passage in Aristophanes' *Clouds* (1131–4) has been taken to suggest that already in the fifth century BCE the length of Athenian months was regular and predictable—even if this would run counter to another passage in the same comedy, which has been cited above, where the moon complains of calendar disruption. Because of its importance, detailed attention will be given to this passage here. In this passage, Strepsiades counts down the days until the end of the month, from the fifth day to 'old and new' (the last day of the month) which he is dreading.[65] Strepsiades' apparently exact knowledge of how many days are left in the month suggests, at first sight, a calendar set in advance without the possibility of irregularity or tampering.[66]

In actual fact, however, Strepsiades' countdown is quite unremarkable, as it represents the way Athenian days of month were normally reckoned. The last ten days ('decad') of the Athenian month were reckoned backwards from '10th' to '1st' ('1st' being the last day, normally called 'old and new'), as was the practice in many other Greek calendars.[67] This backward count appears to

[64] Even more problematic is the evidence of Athenian 'new silver' coinage, which some scholars in the 1960s attempted to use as evidence of a 19-year cycle (notably Meritt 1964; see also Bickerman 1968: 35, 100 n. 33, Samuel 1972: 59). It has since been shown that these coins are insecurely dated, and indeed cannot be dated independently from the epigraphic evidence; consequently, they cannot prove anything that is not already known from inscriptions (Mattingly 1971: 39–43, Müller 1991).

[65] 'Day five, day four, day three, after that day two, then the day that above all days intimidates me . . . because the next day is the Old and New Day, when every single one of my creditors has vowed to file a lawsuit against me' (Henderson 1998: 161–3; commentary in Dover 1968: 231). According to Walsh (1981) 112 n. 10 and Dunn (1998) 217 n. 16, 'old and new' was a debt-collection day.

[66] And hence, possibly, that a regular alternation of full and defective months could be assumed (as suggested by myself in Stern 2001: 103 n. 17). Alternatively, however, Strepsiades could have been relying on an earlier, monthly announcement of the month length by the archon. Many scholars have used this passage in support of the theory of the gibbous moon (see below, nn. 68, 70, 73).

[67] Woodhead (1992) 141 n. 28, *contra* Samuel (1972) 59–61. On decads in Greek calendars, see above, n. 13. De Blois (1998) 16, referring to South Arabian calendars that appear to have used a similar system, suggests, as a rationale for this backward count, that the intention was for the moon crescent to be the same size in the same-number days of the first and last decad (e.g. 3rd and 28th of the month, the latter also called '3rd'). However, even in the most accurate lunar calendar this correspondence is unlikely to have obtained. In particular, if day 1 of the month followed the first appearance of the new moon (as assumed in the Greek calendars), on day 30 (and probably also day 29) the moon would have been invisible; which is sufficient to demonstrate that the first and last decad could not have been symmetrical with regard to the appearance and size of the moon crescent.

have been made on the provisional assumption that the month would be full (30 days). If the month turned out to be hollow, the 29th day became the last day of the month and was re-named 'old and new' (instead of '2nd', as it would have been named in a 30-day month), and '2nd' was purely and simply suppressed from the sequence.[68] Strepsiades' countdown from 5 to 'old and new' without suppression of the 2nd does not necessarily imply, therefore, that he knew in advance that this month would be full. His apparent foreknowledge is only the reflection of a conventional counting system which was built on the assumption—later to be corrected if necessary—that the month was always full.[69]

It has been argued, however, that if Strepsiades was dreading the coming of 'old and new', he should have feared, in his countdown, the possibility of a hollow month and hence of 'old and new' coming one day earlier. This would support the view that length of the month—in this case, full—had been set in

[68] Pritchett and Neugebauer (1947) 3–4, 24–5, Samuel (1972) 59–61, Pritchett (1982), (2001) 41–87, 117–25, Hannah (2005) 43. This is against the theory of Meritt (1961), following earlier studies (for other references see Bickerman 1968: 100 and Walsh 1981, followed by Woodhead 1992: 120–1; 1997: 113) that the length of the Athenian month was determined in advance by observation of the gibbous moon around the 20th of the month, and not (as one generally expects in the context of the ancient world) on the basis of observation of the new moon (or alternatively of the disappearance of the old moon). According to this theory, the 21st day of the month (i.e. 10th from the end) was the day omitted if it was decided that the month should be hollow. However, this bizarre theory is convincingly refuted by Pritchett and Neugebauer (1947) 23–31, Pritchett (1982), (2001) 41–87, 117–25, for a number of reasons. Firstly, regulation of the moon according to the gibbous moon would have been highly impractical, because without precise instruments or an accurate lunar theory, the shape and size of the gibbous moon would have been very difficult to measure empirically or to calculate. It seems highly unlikely, therefore, that such a method was ever thought of or used. Secondly, the theory of the gibbous moon calendar has no positive evidence to support it, whereas Pritchett can cite as evidence at least a fragment attributed to Proclus in the scholion to Hesiod, *Op.* 765–8, which states that it is the penultimate day that is omitted in a hollow month. In some places outside Athens, furthermore, the evidence confirms that it was the penultimate day that was normally omitted: the last day of the month was called *triakas* (literally '30th') regardless of whether the month was hollow or full, whereas the penultimate day ('2nd' in the Athenian calendar) was called *protriakas* ('before the 30th') and omitted in hollow months: Samuel (1972) 69 (Boeotia), and 110 (Rhodes). Walsh (1981) 110, 112 n. 9 predictably argues that Athens was different, basing himself on the assumption that Solon would have attempted to make the calendar more predictable, by instituting a method to determine month-lengths in advance; but such a concern for predictability is modern, and not necessarily relevant to ancient Athens. Athenian society was surely adapted to an unpredictable calendar, especially as the calendar was subject to archontic tampering (as I shall argue further below); there is no evidence that calendrical unpredictability was ever considered at Athens, in itself, a problem.

[69] Note also the common assumption of 30-day months for the calculation of lengthy periods, particularly for accounting purposes, on which see Hannah (2005) 34–5, referring to an Athenian record of wages (*CIA* ii. 2, 834c, l. 60) and passages from Hippocrates (*On Flesh* 19. 27–8) and Ps.-Aristotle (*Economics* 1351^{b}11–15); also Pritchett (2001) 113, 151 n. 22 and Bickerman (1968) 37. The use of 30-day months for accounting purposes is also attested in Babylonia, as we shall see in Ch. 2.

advance, and that irregular tampering was not to be expected.[70] But this argument is weak, because in the context of a light-hearted comedy, attention to such detail is unnecessary. Aristophanes may well have chosen to ignore, in his text, the possibility of a hollow month because this would have been a potentially distracting complication in Strepsiades' speech.

From this same passage it may be inferred that debt collection and/or instigation of legal proceedings took place, at Athens, on the last day of the month, 'old and new'—the day that Strepsiades was dreading.[71] Some have argued that this last day of the month must have been known on the day itself, and not determined later, retroactively, by sighting the new moon in the subsequent evening; otherwise, creditors would never have known whether to collect their debts and file their cases on the 29th or on the 30th.[72] This has been taken further as evidence that the end of the month was determined at least some days in advance.[73] Not enough can be inferred, however, from this brief passage of Aristophanes, and not enough is known about the practice of creditors at Athens, for such conclusions to be drawn. It quite possible, for example, that debt collections and/or legal proceedings were always instigated on the 30th day of the outgoing month, even if this day turned out later (or even on the day itself) to be not 'old and new', but the 1st of the new month (this would explain, incidentally, why Strepsiades ignores the possibility of a hollow month). Alternatively, it is possible that the archons made sure the beginning of the new month, and hence 'old and new' of the old month, were determined and publicized no later than the 29th day. This would admittedly mean that they could not have determined the beginning of the new month on the basis of actual sightings of the new moon; at most, the date of appearance of the new moon would have been anticipated or estimated.[74] But this is completely plausible, for as noted above (near n. 15), there is no evidence of new moon sighting in ancient Greek sources, and anyway, conformity to the moon was not always strictly maintained. This passage does not furnish evidence, however, of predictability or regularity of the length of the Athenian month.

[70] Walsh (1981) 112 n. 10 (citing Meritt), in support of the theory of the gibbous moon (above, n. 68).

[71] See above, n. 65.

[72] Dunn (1998) 217 n. 16, rightly rejecting, for the same reason, Pritchett's suggestion that the 29th remained nameless until moon watches were carried out in the evening.

[73] See n. 70.

[74] New moon sightings may still occasionally have been made for the purpose of verifying the accuracy of the calendar: see Dunn (1998) 216–17, unfairly dismissing Pritchett's suggestion that predictions of new moon visibility may have been based on observations of the waning of the old moon. Note also that if the archons' predictions went very wrong, they always had the option—if they so wished—of adding an intercalary last day of the month (*hena kai nea embolimos*), i.e. an extra day after the 29th or 30th, as is attested in the epigraphic record (see e.g. ibid. 221–2).

2. THE PRYTANIC CALENDAR

Peculiar to Athens was the prytanic calendar (also known as the bouleutic calendar), introduced at the end of the sixth or mid-fifth centuries BCE.[75] This calendar followed, and indeed represented, the terms of the prytanies (presiding or working committees) of the *boule* (city council), which succeeded each other in turn and among which the year was equally divided. The year, in this system, was thus not divided into 'months' but into prytanic terms. This calendar was primarily designed for measuring the terms of the prytanies, but it was also used as a dating device for other, mainly official and governmental purposes.[76]

Until the third century BCE there were ten prytanies (comprising 50 members each), and thus the year was divided into ten terms; the term of each prytany exceeded the lunar month, therefore, by a few days. The number of prytanies was increased to twelve for most of the third–second centuries CE; but since this calendar was reckoned differently from the archontic (festival) calendar, it cannot be assumed that the terms of the prytanies in this period were equal or conterminous with the months of the archontic calendar.

How the prytanic calendar was reckoned remains, however, controversial. According to a late fourth-century BCE work attributed to Aristotle, the year of the prytanic calendar was lunar (which means, presumably, conterminous with the archontic year) and divided into ten almost equal terms, of 36 days (for the first four prytanies) and 35 days (for the last six).[77] Pritchett and Neugebauer (1947) treat this as a historically reliable account of the prytanic

[75] On the dating, and for a general account of the prytanic calendar, see Samuel (1972) 61–4, Pritchett (2001) 32–4, and (better perhaps) Rhodes (1972) 224–9.

[76] The prytanic calendar is commonly found e.g. in financial records such as the famous Choiseul marble of the late 5th c. BCE (Meiggs and Lewis 1988: 255–60 no. 84); however, its uses (as those of the festival calendar) are variable cannot be consistently categorized (Pritchett loc. cit., arguing that the prytanic calendar was more useful in financial contexts because of its greater regularity; see also Bickerman 1968: 34–5, 37, Rhodes loc. cit.). The festival calendar, by contrast, was the one normally used by Athenians: as Rhodes (1972) 228 puts it, it was the 'natural' calendar by which ordinary Athenians instinctively dated. Unless otherwise indicated, it is the festival calendar that was used in inscriptions (Pritchett and Neugebauer 1947: 19, Samuel 1972: 57–8, Woodhead 1992: 140 n. 18). Preference for this calendar can be explained on a number of grounds: first, it was the more ancient, traditional calendar of Athens, whereas the prytanic calendar was a novel institution (so Pritchett 2001: 146–7); secondly, it served to date all the festivals, which permeated Athenian religious and social life; thirdly, it resembled the calendars of other cities and thus was more useful to international relations (Pritchett 2001: 34–5, the last two arguments). Hannah's description of the festival calendar as 'serving to regulate the celebration of religious festivals' and the prytanic calendar as 'political' (2005: 42, 44) is a simplification.

[77] Aristotle, *Ath. Pol.* 43. 2. The authorship of this work is disputed (Martha C. Nussbaum in Hornblower and Spawforth 1996: 166), but for convenience I shall refer to the author as 'Aristotle'. It is reasonable to assume that according to this text, the prytanic new year would have coincided with 1 Hekatombaion, the archontic new year.

calendar for the fourth century BCE and later. In the period of the twelve prytanies (during the third and second centuries BCE), they argue that the prytanic terms would have been proportionally shorter. Furthermore, to accommodate for variations in the length of the lunar year, they assume that in any of these periods, one day could be either added to or suppressed from the last prytany. Finally, they assume that in an intercalated (13-month) year, the prytanic terms would have been adjusted proportionally, i.e. 39 and 38 days (in the period when there were ten prytanies).

This reconstruction of the prytanic calendar in the fourth century BCE and later, somewhat hypothetical, unwittingly implies that the decision whether or not to intercalate the year could never have been made later than the first prytany, otherwise it would not have been known whether this first prytanic term should be of 36 or 39 days, and the whole system would have been disrupted.[78] Whether intercalations were set so well in advance—five months before Poseideon, the month that was normally intercalary—remains to be confirmed.[79] It is also debatable whether Aristotle's brief (and incomplete) description of the prytanic calendar should be taken as reliable and accurate, and as reality rather than mere theory.

In the fifth century BCE, epigraphic evidence suggests that the structure of the prytanic calendar was different. Pritchett and Neugebauer (1947) put forward the theory, again hypothetical, that in this earlier period the prytanic calendar was completely independent of the lunar, festival calendar, and consisted of a schematic, 366-day year divided into ten terms of 37 and 36 days (variants of this theory have a 365-day year).[80] This theory assumes that similarly to Aristotle's model, the prytanic calendar in this earlier period was regular, schematic, and fixed. It also implies the introduction and use of a solar calendar in fifth-century Athens (since 366 or 365 days are very close to a solar year),[81] which would have been unique and quite unusual in the context of ancient Greece. This theory remains, however, largely conjectural.

Meritt (1961) and his followers, in opposition to Pritchett and Neugebauer, reject Aristotle's model as a schematic simplification of a calendar that was, in practice, considerably more fluid. They interpret the epigraphic evidence, more particularly double-dated inscriptions where the dates appear not to match, on the contrary assumption that the festival calendar was regular (Meritt's view of the festival calendar has been discussed above), whereas the

[78] This point appears not to have been noted by Pritchett, but it is by Hannah (2005) 45.

[79] Evidence that the decision to intercalate was taken already in the previous year is in the 5th-c. 'First fruits' decree (above, n. 22). But for a possible example of a mid-year decision to intercalate causing disruption to the prytanic calendar (in 307/6 BCE), see Rhodes (1972) 226, citing Meritt (1961) 176–8.

[80] The change to the prytanic calendar would have been made in 407 BCE: see also Samuel (1972) 62–3, Hannah (2005) 44–5.

[81] As correctly pointed out by Hannah (2005) 42, 44.

prytanic calendar was prone to irregularities (both in the fifth century and from the fourth century BCE onwards). This assumption, like Pritchett's, is impossible to prove, which is why the Meritt–Pritchett controversy (now more than half a century old) has largely turned in circles.[82] But although diametrically opposed, both sides hold in common the premise that *one* of the Athenian dating systems must have been regular, whilst irregularities in the other would account for mismatches in double-dated inscriptions. This paradigm has since been questioned by Woodhead (1992), who suggests that the search for one regular calendar may reflect an excessively modern perspective on ancient calendars. According to Woodhead, the epigraphic evidence is best interpreted if *both* the festival and the prytanic calendars are considered to have been, to some extent, irregular and prone to political interference. The prytanic calendar was probably more regular than the festival calendar, inasmuch as we lack explicit evidence of political tampering with it.[83] But the rigid, Aristotelian model for the prytanic calendar can no longer be assumed.[84] In this light, the institution of the prytanic calendar in the late sixth or mid fifth centuries represented only a political, administrative measure but should not be interpreted as a move towards the regularization of the Athenian calendar.

3. GREEK ASTRONOMICAL CALENDARS

Greek 'astronomical calendars' designate a type of calendars that were lunar—inasmuch as their months corresponded to the moon's cycle, and their years consisted of 12 or 13 months—but fixed and modelled on the basis of purely mathematical, astronomical schemes.[85] Their designation as 'astronomical' reflects the probability that they were created by and for astronomers. Their

[82] See Woodhead (1992) 140 n. 17. The arguments on both sides are often rather weak (see e.g. Pritchett 2001: 127–83). Pritchett (2001) 145 cites *IG* i^3. 396. 6, according to which '7 days were left in the prytany', as evidence that the length of the prytanies was fixed and determined in advance; but this may be likened to Strepsiades' backward count of the last days of the archontic month (on which see above). He has occasionally made some concessions: most recently, he has acknowledged (2001: 182–3) that the 5th-c. prytanic calendar remains full of imponderables, and thus that the number of 366 days should be treated as only conjectural.

[83] In 2nd-c. BCE double-dated inscriptions from Athens, prytanic dates (when, in this period, there were twelve prytanies) are generally equivalent to *kata theon* dates (on which see below, § 4), suggesting regularity in both systems (Dunn 1998: 223–4); whereas discrepancies between prytanic and archontic dates remain ibid. 226).

[84] Woodhead (1992) 118–19 (but on p. 120 he accepts Pritchett's 366-day prytanic year), and (1997) 109, 128, 149–50, etc., although in the latter work Woodhead still tends to lean in favour of Meritt's approach (1997: 117, 119, 128, 152, etc.).

[85] For a general survey see Samuel (1972) 33–55.

Athenian origin is evident in their normal use of Athenian month-names, although recent discoveries reveal that the month-names of other civil calendars could also sometimes be used.[86]

An eight-year cycle called octaeteris, comprising three intercalated years (of 13 months), is attributed by Roman-period writers to Greek astronomers from as early as the sixth or early fifth centuries BCE. A 19-year cycle (comprising seven intercalated years) was devised in the late fifth century BCE; it is variously attributed to the Athenian astronomer Meton (hence its common name 'Metonic') or one of his contemporaries.[87] This cycle is very accurate and would have maintained the lunar calendar in an almost completely stable relationship with the solar year. The Metonic cycle seems to have consisted, at least by the early fourth century, of a full sequence of named months.[88] It was later refined by the Athenian astronomer Callippus with a 76-year cycle (consisting of four 19-year Metonic cycles minus one day). All the months in this longer cycle were given specific, pre-determined lengths, which resulted in a fully fledged calendar (rather than just a sequence of months). The first Callippic cycle began in the summer of 330 BCE.[89] Callippic dates were widely used by Hellenistic astronomers, because they offered a stable,

[86] The month-names of a Corinthian-type calendar have recently been identified in the Metonic calendar represented on the Antikythera mechanism of *c*.100 BCE, possibly pointing to a Syracusan origin: Freeth *et al.* (2008) 614–16, (supp. nn.) 14–17. See further below, n. 93.

[87] The creation of the Metonic cycle, or rather perhaps its epoch, is dated to the summer solstice of 432 BCE: see above, n. 16, Samuel (1972) 44–6, and Lehoux (2005). On Meton and the relationship between this cycle and its Babylonian equivalent, see Bowen and Goldstein (1988) and Hannah (2005) 54–7.

[88] The evidence is in Ptolemy's *Almagest* (4. 11), and consists of three dates of Babylonian lunar eclipse observations from 383–2 BCE that are given according to the Egyptian calendar and an Athenian month. The Athenian months are unlikely to have been drawn from the civil (festival) calendar, because by the time these reports of eclipses arrived in Greece and their original Babylonian dates were converted into Egyptian and Athenian dates, past dates in the Athenian festival calendar would have been difficult to recall and anyway of limited significance (Toomer 1984: 12, 211–13). The month of the third report is called 'Poseideon I' (i.e. Poseideon was repeated that year), which indicates that these names are not mere translations of Babylonian month-names (not least because the equivalent Babylonian month, presumably Kislimu, would never have been repeated in the Babylonian calendar), but rather belong to an autonomous calendar. Since the Callippic calendar was not yet in existence, the most likely candidate might be a Metonic cycle (according to A. Jones 2007: 165 n. 3, this hypothesis is 'plausible enough but cannot be confirmed'). It should be emphasized—as this is often overlooked—that these Athenian month dates (which, significantly, do not specify the day of the month) only prove the existence of a sequence of named months with an indication of which months in the cycle are repeated (hence intercalary), but not—as in the Callippic cycle—a sequence of months with pre-determined month-lengths; it would not necessarily have been, therefore, a fully-fledged calendar as the Callippic was later to be.

[89] The Callippic calendar (alongside earlier cycles) is described in some detail by Geminus, *Elem. Astr.* 8. 26–60 (see further below). See Ginzel (1911) ii. 409–19; Pedersen (1974) 127–8; Samuel (1972) 47–9; A. Jones (1997) 157–8 and most importantly (2000*a*); Lehoux (2007) 90–4.

long-term time-reckoning frame; they are well attested in astronomical sources from the early third century BCE to the mid-first century CE.[90]

Astronomical and civil calendars

It has been argued by some scholars that astronomical calendars, particularly the Metonic and Callippic cycles, were adopted at Athens to regulate, and possibly even determine, the festival (archontic) calendar.[91] The evidence, however, does not support this theory. Deviations from the Metonic and Callippic cycles are sufficiently attested in the epigraphic record at Athens to conclude that in practice, a 19-year cycle was never consistently used.[92] Strict adherence to the Callippic cycle would have been impossible without abolishing the practice of intercalation and suppression of days, which is attested at Athens long after the period of Callippus (see above, §1). Outside Athens, likewise, there is no evidence that the Metonic or Callippic cycle was ever adopted by civil calendars.[93]

The use of the eight-year cycle (octaeteris) in Greek cities is often inferred from the statement of the chronographer Julius Africanus (early third century CE) that Greeks (and Jews) make three month-intercalations in eight years.[94]

90 A. Jones 2000*a* and, for a summary, (2007) 149. From the 1st c. CE, the Egyptian calendar came to be favoured instead.

91 Especially Meritt (1964); also Müller (1991), cited favourably by Jones (2000*a*: 156 n. 46), but see my critical comments above (section §1); Woodhead (1997), inasmuch as he assumes *a priori* the Metonic cycle for the interpretation of all Athenian epigraphic datings (see above, n. 44); and Osborne (2008), (2009), see above (§1).

92 This has been widely acknowledged by other scholars, including Samuel (1972) 55–61, Woodhead (1992) 118–19, Bowen and Goldstein (1994), Pritchett (2001).

93 The use of local civil calendar month-names for the Metonic cycle in the Antikythera mechanism (see above, n. 86) is taken by Freeth *et al.* (2008) as evidence that 'it may have been common for Greek civil calendars to follow the Metonic cycle by about 100 BC'. ibid. 614); and further, 'it is difficult to avoid the conclusion that the way that the calendar is structured on the Mechanism . . . reflects the local practices of the time, since otherwise the information displayed on the Mechanism would have frequently been in conflict with reality' (ibid. 17; 'local practices' and 'reality' presumably mean here the local civil calendar). This inference is excessive and unwarranted. The use of local month-names, rather than the normal Athenian names, in the astronomical calendar of the Antikythera mechanism is most likely only an expression of local patriotism, but without any bearing on how the local civil calendar was actually reckoned. Perhaps it shows that the Mechanism's authors believed, or rather liked to think, that their local civil calendar could be rationalized as a Metonic cycle; but we need not assume an expectation, on their part, that the Mechanism would consistently display actual civil calendar dates—indeed, if their civil calendar was irregular and unpredictable, they must have realized that no mechanism could possibly conform to their local calendar, and would therefore not have regarded a discrepancy between the Mechanism and their local calendar as unexpected or problematic.

94 e.g. Bickerman (1968) 30. The passage from Julius Africanus' *Chronography,* book 5, appears in Eusebius, *Proof of the Gospel,* 8. 2 (390 D. *PG* 22. 609 D–612 A; translation in Mosshammer 2008: 390).

However, Julius Africanus probably only means that on average, over lengthy historical periods, intercalations in the Greek (and Hebrew) calendars can be assumed to occur at the rate of three in eight years (Stern 2001: 23). The theory that the dates of the Olympic and Pythian games, and hence of the Elean and Delphic calendars respectively, were regulated by the octaeteris is only a tenuous inference from late sources (mainly Censorinus 18. 6) which, if correct, reflects only the concerns of their astronomically minded late-antique authors.[95] Epigraphic sources prove that at Athens, the octaeteris was not used from the Classical period until at least as late as the second century CE (Follet 1976: 353–5, 359, 365–6).

The use of the 19-year cycle is sometimes inferred from a passage of the historian Diodorus about Meton, where he comments that still in his day (i.e. mid–late first cent. BCE) 'most Greeks' were using Meton's 19-year cycle.[96] Diodorus cannot be referring to a fixed, fully constituted astronomical calendar with pre-determined month-lengths, because this would contradict his own comment elsewhere (1. 50. 2) that 'most Greeks' again, seemingly also in his day, still practised the intercalation and suppression of days. He probably only means a sequence of intercalated years (i.e. seven intercalations in a cycle of 19 years), which anyway is possibly all that Meton instituted (see above). Although such a cycle was not regularly followed at Athens, the Greeks of Asia Minor and the East in the first century BCE did quite possibly follow it, and in his period, Diodorus may have had good reason to refer to them as the 'majority of Greeks'. However, this was not because they had adopted the astronomical calendar of Meton (as Diodorus misleadingly suggests). It was rather because as former subjects of the Seleucid Empire, they used the Seleucid calendar (or derivative versions of it) which itself was assimilated to the Babylonian calendar and based on a 19-year cycle.[97] As has been noted above (§1), Greek calendars appear generally to have increased in regularity during the Hellenistic period, most likely under Seleucid influence. This was a political process, not the result of exposure to astronomical schemes.

Although astronomical cycles and schemes were not adopted whole piece as civil calendars, they may still have been consulted for the purpose of regulating the civil calendars and maintaining their conformity to the moon's cycle and the annual seasons. The city magistrates' *ad hoc* decisions to make months full or hollow, to intercalate or suppress days, or to intercalate extra months in the year, could thus have been based at least in part on the stable scheme that

[95] So rightly Hannah (2005) 35–41, who, however, gives this theory far more attention than it deserves.

[96] Diodorus 12. 3, in the context of his account of Meton's cycle: *μέχρι τῶν καθ' ἡμᾶς χρόνων οἱ πλεῖστοι τῶν Ἑλλήνων χρώμενοι τῇ ἐννεακαιδεκαετηρίδι οὐ διαψεύδονται τῆς ἀληθείας.*

[97] See Ch. 2; it is at least a reasonable assumption that the Babylonian calendar followed a 19-year cycle of intercalations in this period, as it had done in earlier centuries. On the Seleucid and post-Seleucid calendars, see Ch. 5.

astronomical calendars provided. This may explain why 19-year cycles appear to be followed, albeit not consistently, in parts of the Athenian epigraphic record (§1). However, the use of astronomical calendars would not have been without problems, because the beginning of the month in the civil calendars was meant in principle to coincide with the first appearance of the new moon (as discussed in §1), whereas in the astronomical calendars the month normally began at the conjunction.[98] This should have led to a typical discrepancy of two days between an astronomical calendar and a well-regulated civil lunar calendar. This discrepancy does not mean that astronomical calendars could not have been used to help regulate the civil calendars, but it does confirm, at the very least, that astronomical calendars were fundamentally not designed or well suited for this purpose (Jones 2000*a*: 156–7).

There are good reasons why in spite of their scientific accuracy, the adoption of fixed astronomical calendars should have been resisted in the Greek cities. As I shall be arguing throughout this book, calendars were not a scientific pursuit, but primarily a political affair. The ability to manipulate the calendar through suppression and intercalation of days and months was a political privilege as well as an important tool of government, as I shall discuss further towards the end of this chapter. City councils and magistrates would not have lightly given this up. The adoption of a fixed astronomical calendar would have meant the abolition of the politicians' ability and right to control it, and thus effectively a major political reform. There is no evidence that such a reform was ever even proposed.[99]

Astronomical and chronological uses

In this light, the astronomical calendars have often been characterized as 'theoretical', their main use being confined astronomical dating. We know at least that the Callippic cycle was used for dating astronomical observations

[98] For the Metonic cycle and its epoch, see above, n. 16. For the Callippic cycle, see A. Jones (2000*a*) 144: the epoch of the first Callippic cycle was 28 June 330 BCE, when summer solstice and the conjunction almost exactly coincided (at least according to modern astronomy; we do not know how accurately these events were reckoned at the time). The coincidence of the beginning of months with the conjunction can also be inferred from Callippic dates attested in astronomical sources. But as Jones rightly stresses, this does not prove that the Callippic cycle was deliberately designed in such a way that its months would always coincide with the conjunction.

[99] As well argued by Pritchett (2001) 89–90, 98–101, who points out that a reform of this kind could not have failed to generate debate in the city's political arena, and probably also to meet with considerable resistance, which would not have gone unnoticed in the writings of ancient historians and orators; the absence of any hint to this effect in ancient sources—e.g. in the passage of Diodorus above-mentioned—suggests that no such reform ever took place. This general conclusion is endorsed by Lehoux (2007) 76–7 and (more reservedly) Hannah (2005) 68–70, 81.

and predictions between the early third century BCE and the mid-first century CE,[100] and it is likely to have been constructed primarily for this purpose. The need for an astronomical calendar or cycle of this kind was due to the complete inadequacy of civil calendars and eponymous year-counts for the record of astronomical events, not only because they differed from one city to the next and thus were only of local value, but also because within a single city, the calendars were so irregular and unpredictable that generations later—indeed, even a few years later—the civil date of an astronomical event would have lost any precise significance. Astronomical calendars, by contrast, provided a precise, long-term chronological framework that was at once stable and commonly known.[101]

As far as we know, astronomical calendars were not used as long-term dating schemes for any other purpose. They were not used, for example, by historians for dating past historical events, even though these calendars were unique in providing an absolute chronological scheme. In one passage Dionysius of Halicarnassus (1. 63) may be using the Callippic cycle to give a precise Athenian date to the fall of Troy in 1184 BCE, but this would have been most exceptional.[102] Herodotus and Thucydides—the founding fathers of historiography—generally refrain from dating events at all.[103] The only chronological markers Thucydides uses are seasonal (i.e. winter or summer), astronomical (e.g. the solstice), or agricultural (e.g. 'when the wheat was ripe'), all of which were somewhat indefinite and vague, but commonly known and not dependent on any specific civil calendar.[104] In contemporary and later scientific, Hippocratic, and Peripatetic works, dates are usually

[100] A. Jones 2000*a*, with citation and discussion of the evidence; on pp. 156–7 he suggests that astronomical calendars may also have been used for the construction of *parapegmata* (on which see below).

[101] For similar reasons, the Egyptian calendar was also used by Greek astronomers for astronomical dates, eventually superseding the Callippic cycle; see in summary A. Jones (2007) 149.

[102] Ibid. 150, but Jones fails to note the exceptional nature of this usage. For other interpretations of this passage, see Grafton and Swerdlow (1988) 19.

[103] See Bouvier (2000), who argues further that modern scholars have resisted this observation because it contradicts the modern perception that history—of which Herodotus and Thucydides are supposedly the founders—can only be grounded on a firm chronological scheme.

[104] Seasons: Thucydides 5. 20. 1–2; astronomy: 7. 16, 8. 39 (winter solstice), 2. 78 (rise of Arcturus); agriculture (when the wheat is ripe): 2. 19, 3. 1, etc. See Bouvier (2000) 125–31, arguing that in this respect Thucydides was no more advanced than Hesiod (to whom the same problematic applies, since in *Works and Days* he delineates an agricultural year with reference to mostly astronomical events, but without using any calendar dates—with one exception only: see A. Jones 2007: 150–4, also with similar examples from later, Hippocratic sources). Herodotus refrains even from these forms of dating; for a possible explanation, see Bouvier (2000) 139–41. See also Bickerman (1968) 56, Bowen and Goldstein (1994) 704 n. 30, Feeney (2007) 18. Hannah (2005) 46 refers to Thucydides' dating system as a 'seasonal calendar' (alongside the festival and prytanic calendars in use as Athens), but the term 'calendar' is not really applicable here (except in a very broad sense), since Thucydides' time-markers do not afford him the means of reckoning days precisely and (most importantly) continuously.

determined only with reference to astronomical phenomena. As Galen, in the second century CE, aptly explained:

> If all the nations had the same [months], Hippocrates would not have referred to Arcturus and the Pleiades and Sirius and the equinoxes and solstices, but he would have been content to state that such and such conditions occurred in the makeup of the environment at the beginning of [the month] Dios, naming [the month] according to the Macedonians if that was the state of affairs [i.e. if all nations used Macedonian months]. But since in fact a reference to Dios is clear only to the Macedonians, but not to the Athenians and the rest of mankind, whereas Hippocrates intended to be of service to people from all nations, it was better for him to record just the equinox without mentioning in which month.[105]

The point is well made, even though Galen does not mention that anyway a lunar calendar would not have been suited for dating Hippocrates' mainly *seasonal* medical phenomena; moreover, he omits referring to the irregularity of Greek lunar calendars, which should have been a further reason for not using them.[106] But whilst this explains Hippocrates' preference for astronomical dates, which can be reasonably precise, it does not go far enough to explain the tendency of Herodotus and Thucydides to avoid any precise form of dating altogether. Their apparent lack of interest in precise dating suggests, more fundamentally, a very different view of chronology from ours: their conception of the past was certainly not dependent on a calendar or a calendar-based chronology.[107]

Later historians make more use of civil calendar dates, although—much to the annoyance of modern scholars—these dated events remained relatively rare. Some use the Egyptian or Julian calendars, which both provided long-term time frames that were stable and commonly known; but they also give dates according to Greek and other civil calendars, which could be (at the time, and still to this date) historically uninformative and sometimes plainly confusing.[108] The absolute chronology afforded by astronomical calendars,

105 Galen, *In Hippocratis Librum Primum Epidemarium Commentarii* 3. 19 (ed. Kühn, xvii/1), translation cited from A. Jones (2007) 151–2.

106 These omissions were perhaps deliberately intended by Galen so as to avoid confusion, because in his own day the Macedonian calendar (of Asia Minor and the Near East), which he uses as an example, had become fixed and modelled on the Julian, solar calendar (see Ch. 5).

107 See Bouvier loc. cit., who also points out (p. 125 n. 38) that in one passage Herodotus (2. 4) notes the deficiencies of the Greek calendars, but fails to draw the implications this may have had for historical writing. The lack of an absolute chronological framework was clearly not an issue to him as a historian.

108 Particularly when different civil calendars appear to have been simultaneously used, e.g. in Josephus (see Stern 2001: 34–8). Grafton and Swerdlow (1988) show that the civil dates of past historical events were normally reconstructed by ancient historians (rather than retrieved from records or firm traditions). These reconstructions were based either on their assumptions (often erroneous) about the calendars, or on the dates of the annual commemoration of these events in the local civil calendars (I am grateful to Robert Parker for referring me to this important article).

however, was never exploited by Greek historians. Astronomical calendars were invented by astronomers for their own use, and had only a limited impact on Greek society, culture, and Greek views of history.

Geminus' history of Greek calendars

Another function of astronomical calendars may have been to rationalize, for purely speculative, intellectual purposes, the chaos that in real life pervaded the Greek civil calendars. This may be apparent in Geminus' history of calendars, where the Greek calendar is conceived as evolving from one astronomical scheme to the next with ever-increasing accuracy. According to Geminus, the ancient Greek calendar originally consisted of 30-day months only, with the intercalation of a thirteenth month every other year. This scheme was superseded by the eight-year cycle (octaeteris), with three intercalations in eight years and a regular alternation of 29- and 30-day months. This was superseded in turn by a 16-year cycle, then by a 160-year cycle (both elaborations of the octaeteris), thereafter by the 19-year cycle (here attributed only to contemporaries of Meton), and finally by the 76-year cycle of Callippus.[109]

The historicity of this account is clearly dubious. A calendar consisting of 30-day months only—the earliest stage in Geminus' history—could never have sustained itself as lunar, as after only one year the month would have begun at the first quarter (instead of the new moon), and after two years at the full moon. Moreover, intercalations in alternate years would have been blatantly excessive (after 24 years, the new year would have shifted by one whole season). It is implausible, therefore, that this scheme was ever used in practice in the archaic period.[110] Geminus' later schemes, although much more accurate, were similarly never adopted or used at Athens or in any other Greek city (as discussed above). Geminus' account should best be read, therefore, as a

[109] Geminus, *Elem. Astr.* 8. 26–60; see also Censorinus, *De Die Natali*, 18. 2–5. Both are cited and discussed in Samuel (1972) 33–49, Hannah (2005) 32–3.

[110] As apparently assumed by Bickerman (1968) 28, 38, although he concedes elsewhere (pp. 29–30), somewhat inconsistently, that this account of Geminus' would have been irrelevant to actual calendrical practice. Hannah (2005) 29, 32–4 gives too much credence to Geminus' account, but still concludes that intercalation in alternate years (or the 'dieteris') must have been 'impractical and unpracticed' in ancient Greece. The notion of the dieteris existed—if only as a notion—quite early on, as it is assumed by Herodotus (1. 32; see also 2. 4) in a speech attributed to Solon; but significantly, Solon is only using this scheme for the purpose of an approximate calculation. This passage does not serve as evidence, therefore, that in early sixth-century BCE Athens the dieteris was followed in practice. On the theory that this scheme was used in early Ptolemaic Egypt, during the reign of Ptolemy II Philadelphus, see Ch. 3. 2.

scholarly rationalization.[111] It illustrates how astronomical calendars could be used by a first-century BCE Hellenistic writer as a device to make sense of Greek calendars that, in the real world, were variegated and followed no apparent rule or reason.

Parapegmata

An entirely different type of astronomical calendar—characteristically not lunar, and with very different uses—were the so-called Greek *parapegmata*. Normally written on tablets and placed in prominent public places, they were essentially star charts that listed, in chronological order, annually recurring astronomical events such as the first appearance of a star (or constellation) and the weather conditions that were believed to come with it. These astronomical (or 'astro-meteorological') events were not given a date: indeed, they were undatable according to any of the Greek calendars, since the latter were lunar and thus irreconcilable with the motion of stars and seasonal changes of weather. Instead, the astronomical events were simply listed consecutively on the chart, together with the intervening days between them; in this way, the *parapegmata* presented an undated but continuous sequence of all the days in the year. To cite, as an example, an excerpt of a *parapegma*:

o The Sun is in Aquarius
o . . . . .] begins setting in the morning and Lyra sets
oo
o Cygnus begins to set acronychally
ooooooooo
o Andromeda begins rising in the morning[112]

Each day was represented by a hole in the tablet (represented here by **o**), in which a peg could be inserted. Every day, the peg would be moved to the next hole along the chart, which made it easy to keep track of the days through the year.

The origin of Greek *parapegmata* is unclear. The earliest datable attestation, a Greek document from early third-century Egypt (P. Hibeh 27), comes in the form of a literary text rather than as a physical tablet.[113] In this text, rather

[111] A. Jones (2000*a*) 152–6. It may be possible to read Geminus' account as a history of Greek *astronomical* calendars, showing how theoretical schemes were successively improved upon by earlier Greek astronomers; but here again, his account (e.g. regarding the Callippic cycle) may actually be unreliable ibid.

[112] *Parapegma* fragment from Miletus, late 2nd c. BCE (?), translation from Lehoux (2007) 14, 478–9 (for the dating 180–1); see further Lehoux (2005). Also cited in Hannah (2005) 59.

[113] A. Jones (2007) 161–2 and Lehoux (2007) 153–4, 217–23, who revises (pp. 22–6, 142) on this basis the hitherto common assumption that the first astro-meteorological *parapegmata* were

exceptionally, the entries are dated according to the Egyptian civil calendar—which, unlike Greek lunar calendars, was fixed and fairly compatible with an annual star calendar[114]—and festivals are also mentioned by name; this *parapegma* is thus considerably more calendrical than the example above. But the integration of the civil calendar, festival dates, and astronomical events would only have been possible in Egypt, and should thus be regarded as uncharacteristic of Greek *parapegmata*.[115] A different dating method is used in the perhaps contemporary Greek *parapegma* text appended to Geminus' astronomical work, where the entries are dated according to a rather original zodiacal calendar (where the year is divided into twelve zodiacal signs of 29–32 numbered days); thus each entry begins with the day of the zodiacal sign and (where necessary) the zodiacal sign's name.[116] This zodiacal calendar is not known to have been used elsewhere; it can only be regarded as a 'calendar' in the limited context of this specific *parapegma*.[117] Most Greek *parapegmata* are otherwise devoid of any calendrical features. As in the example cited above, the days that are continuously listed are not structured (e.g. into 'months'), named, or numbered. Greek *parapegmata* were thus not calendars, either in form or in function.

The purpose of Greek *parapegmata* was probably mainly didactic. The information that they provided about astronomy and the weather, besides satisfying intellectual curiosity, would have assisted farmers, sailors, and a whole range of other professionals to work out their daily and annual schedules.[118] But it has also been suggested that *parapegmata* were used by city magistrates in places like Athens and Miletus (where *parapegmata* are thought to have been publicly erected) for aligning the civil (or 'festival') calendar with the seasons and the solar year. Knowledge of the summer solstice, for example, which appears at least in some versions of *parapegmata*, would have helped

designed in the 5th c. BCE by contemporaries of Meton such as Euctemon (so Hannah 2005: 59–70; cf. A. Jones 2007: 154–60).

114 The length of the Egyptian year—on which see Ch. 3—was 365 days, thus very close to the sidereal year (i.e. the period of full revolution of the stars) of approximately 365¼ days. Nevertheless, since the Egyptian calendar receded from the sidereal year by about one day in four years, the Egyptian dates in this *parapegma* would soon have become obsolete.

115 A similar scheme is later adopted in another literary parapegmatic text from Egypt, Ptolemy's *Phaseis* (2nd c. CE): Lehoux (2007) 17, 161, 261–309.

116 Geminus, *Elem. Astr.*, appendix (Aujac 1975: 98–108, with notes in 157–68); Lehoux (2007) 226–39 (and for this early dating 157–8); partial citation in Hannah (2005) 60.

117 As similarly argued by Lehoux (2007) 70–84. A small number of dates 'according to Dionysios' cited in Ptolemy's *Almagest* seem also to belong to a zodiacal scheme in use by Alexandrian astronomers for a short period in the 3rd c. BCE: A. Jones (2006) 285–9, (2007) 160–4.

118 See in general Lehoux 2007, and Hannah loc. cit. Latin *parapegmata*, by contrast, tend to be more calendrical: see Ch. 6.

the city magistrates to determine whether to intercalate a month in the lunar calendar year.[119]

If true, this might explain the comment of Columella (first century CE) that the 'calendars'—in Latin *fastus*, which may be taken here to mean the *parapegmata*—of Eudoxus, Meton, and other ancient astronomers were 'adapted' to the public festivals. The context of this passage is the determination of the dates of solstices and equinoxes, which suggests perhaps that it is specifically the solstice dates in *parapegmata* that were 'adapted', whatever this exactly means, to the civil calendars.[120] However, it is equally possible that the 'public festivals' referred to here by Columella are not Greek but Roman, which were dated, in his period, according to the Julian calendar, which was solar. If Columella only means, effectively, that the Julian calendar assumed equinox and solstice dates that conformed to those of the *parapegmata*, his comment would be of trivial significance.

4. THE *KATA THEON* CALENDAR

The phrase *kata theon* ('according to the goddess', i.e. the moon) or alternatively *kata selenen* ('according to the moon') is used to indicate true lunar dates, i.e. of a calendar conforming strictly to the monthly cycle of the moon. *Kata theon* or *selenen* dates are attested mostly in second-century BCE inscriptions, particularly in Attica (the district of which Athens was the main city).

The first attestation of this phrase is a much earlier passage of Thucydides (2. 28. 1, fifth century BCE), according to which a solar eclipse occurred at a *noumenia* (first of the month) 'according to the moon' (*kata selenen*). But this passage does not imply, as yet, the use of *kata theon* or *selenen* dates. The function of the phrase in this passage is only to specify that this *noumenia* was not calendrical, i.e. the first day of a calendar month, but purely astronomical and lunar, i.e. the day when the new moon first appeared.[121]

119 Hannah (2005) 61–2. The Geminus *parapegma* text (see above and n. 116) begins explicitly at the summer solstice—a convention that may be related to the beginning of the Athenian year (see above and n. 57). Hannah argues further (2005: 59–70) that the availability and use of *parapegmata* would have generated an awareness, among the Greeks, of the solar year (since solar and sidereal year are almost identical in length). However, there is no evidence that a solar calendar was ever suggested as an alternative to the lunar civil calendars (see further above, n. 43).

120 Columella, *Agri.* 9. 14. 12 (*Eudoxi et Metonis antiquorumque fastus astrologorum qui sunt aptati publicis sacrificiis*); see Hannah 2005: 62. The exact meaning of *aptati* is a little unclear: one would have expected the reverse, i.e. that public festivals were adapted to the *parapegmata* of Eudoxus and Meton.

121 As proposed, in essence, by Bickerman (1968) 28 (by 'New Moon' Bickerman actually means 'new moon day'—*pace* Bowen and Goldstein 1994: 703) and Bowen and Goldstein (1994)

The phrase *kata theon* (or *selenen*) begins to appear in inscriptions from the third century BCE, where it appears to take on a calendrical function and meaning.[122] It is now used for all days of the month, not just the *noumenia*, together with explicitly named months. This suggests that *kata theon* dates were now continuously reckoned, and formed an annual calendar with its own months and days which differed, as double-dated inscriptions clearly indicate, from the archontic (festival) calendar. Whereas the archontic (festival) calendar was prone, as we have seen, to tampering and deviation from the true lunar month, the *kata theon* calendar would have been strictly lunar and regulated, as is perhaps most likely, through observation of the new moon.[123] On this basis, Pritchett and Neugebauer (1947) propose that the *kata theon* dates constituted a third calendar, alongside the archontic and prytanic calendars, that came into use at Athens and elsewhere from the third century BCE.[124]

According to Pritchett and Neugebauer, the purpose of the *kata theon* calendar was to regulate the archontic calendar, and in particular, to control the terminal limits of the year (which, in their view, had to be the same for all

703–7 (but they introduce an unnecessary complication by arguing that the phrase *noumenia kata selenen* means a calendrical, archontic *noumenia* that has been regulated by the new moon and not artificially advanced or retarded; yet there is no indication that Thucydides is referring to the archontic or any other calendar); see also Pritchett (2001) 89. Others have argued that *noumenia kata selenen* refers in this passage to the first day of the astronomical month, i.e. the day of the conjunction (before the new moon becomes visible), when solar eclipses indeed occur (e.g. Dunn 1998: 218). However, it is doubtful whether Thucydides would have been aware of the concept of astronomical conjunction, which moreover later sources refer to as *synodos* (whereas *noumenia* is the day of appearance of the new moon: see above, n. 6).

[122] These dates are sporadically attested in various parts of Greece from the early third century, e.g. Boeotia (Samuel 1972: 69), Euboea (see below), and the city of Stymphalos in Arcadia (*IG* v/2, no. 357, ll. 17–18: see Pritchett 2001: 90, Bickerman 1968: 33). They become common in Attica throughout the second century, but after that the evidence fades away. Note also the mention of *noumenia kata selenen* in P. Carlsberg 9, l. 125 (an Egyptian calendrical document from after 144 CE: see Ch. 3).

[123] Pritchett and Neugebauer (1947); Pritchett (2001) 88–101; Samuel (1972) 52–5; Dunn (1998) 223–4. Against this Meritt (1964) argues that *kata theon* dates were based on the Metonic calendar. These theories are not mutually exclusive, as *kata theon* dates may have been reckoned differently by different people, but it remains questionable how widely Metonic or other astronomical calendars would have been known; new moon sighting, or other observations of the moon phases, could have been carried out by anyone and are more likely, in general, to have served as the basis of *kata theon* dating. The equivalence of *kata theon* and prytanic dates in double-dated inscriptions confirms that both calendars were regular in this period and not subject to tampering (see above, n. 83).

[124] Bowen and Goldstein (1994) 704–6 disagree and, apparently extrapolating from Thucydides' passage, reject altogether the existence of a distinct *kata theon* calendar. In their view, *kata theon* designates individual dates within the mainstream, archontic calendar that conformed to the moon (i.e. that were not artificially advanced or retarded). This may be possible for Thucydides' period (although it is completely unattested), but certainly not for the 3rd c. and beyond, where in double-dated inscriptions *kata theon* and archontic dates are very clearly distinct.

three calendars).[125] For this purpose, however, it would have been unnecessary to reckon a whole separate calendar (and all the more so, to use it for dating inscriptions); new moon sightings would have sufficed entirely. It seems more likely, as others have suggested, that *kata theon* dates represented a common calendar—purely lunar, and thus not specific to any one city—of which the purpose was to facilitate commerce and other relations between cities where calendars could otherwise differ considerably (Dunn 1998: 223–4, 229). This is especially evident in inscriptions involving more than one city. Thus, an early third-century BCE law inscription from Eretria (Euboea) decrees that theatrical performers who wish to sign contracts should present themselves at another city, Chalcis, on the 20th of the month Apaturion *kata theon*. Since the law was addressed to all the cities in the island of Euboea, which reckoned different calendars independently, it was necessary for a common date to be given.[126] Similarly, a treaty between Messenia and Lakedaimonia in *c.*140 BCE uses a date *kata selenen*, evidently because only this date was common to both parties.[127]

As a true lunar calendar, the *kata theon* calendar would have been considerably more regular and reliable than the politically controlled calendars of the cities. But if it depended, as is widely assumed, on lunar observations such as new moon sightings, this calendar would not have been completely standard or fixed. Inasmuch as new moon visibility depends on geographical coordinates, atmospheric conditions, and observational skills, it would have been virtually impossible for the new moon to be sighted everywhere on the same day. Likewise, if astronomical schemes were used (rather than lunar observation), the existence of a single, standard scheme cannot be assumed. Even if intended to be common, the extent to which the *kata theon* calendar was reckoned everywhere exactly in the same way remains therefore uncertain.

Epigraphic evidence declines sharply after the second century BCE, but the phrase *kata theon* was sufficiently well known in the Greek world in the first century CE for Philo of Alexandria to use it.[128] In Philo's period, however, the need for *kata theon* dates would have greatly declined, as other common calendars—in particular, the Julian calendar and its derivatives (see Chapters 4–5)—were now available in Greece and other parts of the Mediterranean, and

[125] Pritchett and Neugebauer (1947) 18–20; regarding their theory that the New Year was strictly regulated by the new moon, see above, n. 35.

[126] *IG* xii/9. 207, ll. 59–61: see Pritchett (2001) 93–4.

[127] Pritchett (2001) 91, citing Dittenberger (1915–24) iii, no. 683, ll. 44–6. The purpose of the use of *kata selenen* dates in other sources, e.g. the Stymphalos law (above, n. 122), is less clear.

[128] Philo, *Decalogue* 96, as correctly read by Pouilloux (1964). Why Philo uses this phrase in this context is a little unclear. In this passage, he states that whereas the Jews observe the seventh day of the week as holy, the Greeks observe the *noumenia kata theon* (1st of the lunar month). However, the festivals at Athens (and presumably elsewhere in Greece) are known to have followed the archontic calendar, thus often deviating from the true lunar calendar (see Aristophanes, *The Clouds*, 615–26, cited above); whilst among the Greeks of the former Seleucid Empire, by the 1st c. CE calendars had become solar.

these were completely reliable and fixed.[129] This may explain why *kata theon* dates fade away from the beginning of the first century BCE.

5. THE GREEK CALENDARS: POLITICS, TAMPERING, PARTICULARISM, AND UNITY

The persistence of Greek calendars in Antiquity

The Greek civil calendars, lunar but flexible and controlled by political rulers, appear to have lasted until the end of Antiquity. Epigraphic evidence reveals at least that the archontic and prytanic calendars were still in use in Athens until the third century CE, and references to intercalary months indicate that these calendars had retained their lunar character.[130] Contemporary literary sources confirm that the Greeks still reckoned a lunar calendar,[131] so that their dates were always out of line with the Julian calendar.[132] It can be

[129] For a possible example of use, by Roman-period lunar calendar users, of Julian dates as stable and universal reference points, see the double-dated Macedonian inscriptions discussed in Ch. 6 n. 8.

[130] Follet (1976) 353–66, largely based on lists of gymnasiarchs and prytanies; the evidence suggests that still in the 2nd–3rd cc. CE, intercalations did not follow any fixed cycle. Although this evidence is restricted to Athens, Follet argues (pp. 357, 365–6) that the Athenian calendar had become dominant among all Greeks in the Roman period (and probably already earlier: see Feeney 2007: 58). For evidence of a lunar calendar in 2nd- and 3rd-c. CE Macedonia, see Ch. 6 n. 8.

[131] Galen (late 2nd c. CE) writes that 'in most of the Greek cities at present, and in all of them in olden days', the months were counted according to the moon (*In Hippocratis Librum Primum Epidemarium Commentarii* 3, ed. Kühn, xvii/1. 21, cited in A. Jones 2007: 152). Censorinus, *De Die Natali* 22. 5 (written in 238 CE), attributes a lunar calendar to Athens and 'most cities in Greece' (see Follet 1976: 359). The comment of his contemporary Julius Africanus (see above, n. 94) reveals at least that in his day, Greek calendars were lunar. Other sources cited by Follet (p. 358), however, are less convincing. Secundus of Athens (2nd c. CE), question 6, refers to the moon as 'indicator of the festivals, cycle of the months' (σημεῖον ἑορτῶν, μηνῶν ἀνακύκλευμα), but this may be an archaism. The account in Philostratus, *Lives of Sophists* 2. 1. 10, of how a day was suppressed from the Athenian calendar, may indicate that the lunar, archontic calendar was still in operation in the 2nd c. CE, but certainly does not prove it. Much later, in the mid-4th c., the emperor Julian writes (*Hymn to King Helios* 41, 155 A–B) that all nations other than the Romans and Egyptians have a lunar calendar; but again, Julian's rhetoric can hardly be treated as historically reliable.

[132] So Plutarch, *Romulus* 12. 2 (cited in Follet loc. cit.), possibly referring to his own day; however, he may have in mind the calendars of Asia Minor that had adapted in the Roman period to the Julian calendar (see Chapter 5) but whose months were not conterminous with the Julian ones. Appian (*Civil War* 2. 149) gives the date of Caesar's assassination as 'the day called Ides of March, about the middle of Anthesterion'; since 15 March 44 BCE fell actually in the last quarter of a lunar month, this may suggest that the Athenian calendar was no longer lunar, but aligned instead to the Julian calendar. However, it is more likely that Appian reconstructed this date (for the benefit of his Greek readers) on the general assumption that the lunar month of Anthesterion corresponded approximately to March, and therefore, that the Athenian equivalent

plausibly assumed that the Athenian calendar persisted unchanged until the fifth century CE.[133]

The survival of flexible, politically controlled calendars deep into late Antiquity was exceptional for the ancient world, as we shall later see (Chapter 5), and did not occur for want of any alternative. In the Classical and Hellenistic periods, enough astronomical knowledge was available for the cities to institute, if they had so wished, a fixed lunar calendar (such as the astronomical calendars discussed above); whilst in the Roman period, the cities could easily have converted to the Julian calendar, as happened everywhere else in the Roman East (see Chapter 5). The truth is, however, that there was nothing intrinsically inadequate about the flexible, lunar Greek calendars. These calendars did suffer from unpredictability, since the length of months (whether hollow or full) and the intercalation of months were both unknown in advance and subject, sometimes, to last-minute political decisions. Calendar unpredictability is something modern scholars have difficulty coming to terms with,[134] as it runs counter to modern expectations of what a calendar should offer; yet there is no evidence that Athenians or other Greeks ever complained about it or perceived it as problematic. Flexible, unpredictable calendars were normal in most societies through most of Antiquity, and social, religious, and economic life could happily be organized accordingly.[135]

Nevertheless, resistance in the Hellenistic period to the adoption of astronomical calendars, and in the Roman period to the dominant trend of adaptation to the Julian calendar, must have been to some extent a deliberate choice. This choice may have been partly culturally motivated: the survival of the Athenian calendar, in particular, has been attributed to a cultural conservatism characteristic of the city that perceived itself, in the Roman period at least, as the navel of Hellenistic civilization.[136] But inasmuch as the Greek calendars were always under the control of archons (or equivalent city magistrates), one would expect the retention of the calendars to have been motivated

to the Ides of March would have been 'about' (*μάλιστα*) mid-Anthesterion (on assumptions of this kind by ancient historians, see Grafton and Swerdlow 1988).

133 By the late 5th c., however, the Athenian calendar appears to have become assimilated to the Julian calendar, as Proclus' death in 485 CE is given in that year as 17 Mounychion, 17 April (in Marinus of Neapolis, *Proclus or on Happiness*, 36: see Follet 1976: 362, Saffrey and Segonds 2001: 41, 176 n. 12). I have argued elsewhere that in 485 CE a lunar month of Mounychion could actually have begun on 1 April, so that it is just possible that the months of Mounychion and April happened in that year to be conterminous, although the Athenian calendar was still lunar (Stern 2001: 43 n. 179). However, Marinus' wording perhaps suggests that he considered (albeit perhaps erroneously) both months, Athenian and Roman, to be assimilated and equivalent: *μηνὸς κατὰ μὲν Ἀθηναίους Μουνυχιῶνος ιζʹ, κατὰ δὲ Ῥωμαίους Ἀπριλίου ιζʹ.*

134 As finds expression e.g. in Walsh (1981); see above, n. 68.

135 The same applies to the empirical lunar calendar of the Mishnah, where the social and economic consequences of calendar unpredictability are discussed though never presented as problematic (Stern 2001: 228–32).

136 See the remarks of Follet (1976) 355, and below, beginning of Ch. 6.

by primarily *political* factors. The power of city magistrates to manipulate the calendar and tamper with it was clearly to their political advantage, through the Classical and Hellenistic periods and even, to some extent, under Roman rule. In all these periods, control of the calendar was to the city magistrates not only a personal privilege and a mark of political prominence within the city (or, if applicable, 'city state'), but also, in terms of government, an effective instrument of social organization and social control. The ruling classes had no interest in abolishing this system, and it is this, above all, that explains the longevity of ancient Greek calendars in Antiquity.

Calendar tampering: political and other motivations

To understand further the political advantages of the Greek calendar system, it must first be stressed that calendar tampering did not always or necessarily serve the personal, selfish interests of unscrupulous individuals. In some cases, no doubt, the calendar would have been tampered with for the sole advantage of political rulers: for example at Sparta in 242 BCE, when the ephor Agesilaus is said to have intercalated a thirteenth month before it was due, and so to have exacted taxes for it (Plutarch, *Agis and Cleomenes*, 16). But in many cases, calendar tampering would have served the interests of the city or state as a whole.

These interests could often be related to war.[137] According to Thucydides (5. 54), during their campaign against Epidauros in 419 BCE the Argives postponed their holy month of Karneios by intercalating some days after the 27th of the preceding month. Their purpose was clearly to avoid fighting during the holy month.[138] Xenophon (*Hell.* 4. 7. 2) reports that in 388 BCE, likewise, the Argives advanced the holy month so as to create an excuse not to fight together with Sparta (Sparta rejected the excuse as contrived). According to Plutarch (*Alexander* 25), towards the end of the siege of Tyre in 332 BCE an omen was given that the city would be captured in the same month; as it was the last day of the month,[139] Alexander ordered that this day be counted instead as the 28th. The end of the story, however, is that having thus regained confidence, the Macedonian army attacked and took the city on that very same day. Plutarch seems to be suggesting that Alexander's calendar change turned

[137] See further Dunn (1998) 226–7.

[138] So A. Andrewes in Gomme, Andrewes, and Dover (1945–81) iv. 75, although this explanation is not explicit in Thucydides, as pointed out by Pritchett (2001) 25. Thucydides does make plain in this passage that the Dorians regarded the month of Karneios as holy, which is why, in anticipation of it, the Dorian allies of Epidauros did not come to its rescue.

[139] *Triakas*; it is not clear, in this case, whether this day was the 29th or the 30th (see above, n. 68).

out to be unnecessary; although it could be argued that without it, the army would not have had the confidence to take the city. Earlier in the same work, Plutarch describes how before the battle of the Granicus in 334 BCE, Alexander respected a religious objection to fighting in the month of Daisios and renamed it instead 'second Artemisios'. It is not clear whether this was the intercalation of an extra month (and second Artemisios was subsequently followed by Daisios), or simply the renaming of Daisios (which, in that year, would have been suppressed from the sequence).[140] The practice of renaming months (as opposed to intercalation) is also attested in 302 BCE, when the Athenians renamed the month of Mounychion first 'Anthesterion', and then 'Boedromion', so as to enable the Macedonian king Demetrius I, then visiting Athens, to be initiated in one go through all the stages of the Eleusinian mysteries.[141] Here, calendar tampering would have served important, if ignoble, diplomatic purposes.

In some cases, intercalation of days was justified for religious reasons, for example, for the effective coordination and performance of public rituals. Thus a law from Eretria (on the island of Euboea) from the early third century BCE grants authority to the officials of four Euboean cities to intercalate up to three days in the month, so as to provide more time for the theatrical troupe to travel across the island during the Dionysiac festivals.[142] It has been argued that the intercalation of days at the beginning of the Athenian month Boedromion, prior to the battle of Marathon in 490 BCE, was to give more time to the ephebes to bring sacred objects to the temple of Eleusis; and similarly, that the decree to intercalate a second month Hekatombaion at Athens, some time in the later fifth century BCE, was to give longer notice of the date at which, by this decree, the first fruits were to be delivered at Eleusis, probably during the festival of Eleusinia in the month of Boedromion.[143] It has also been argued that the intercalation in 270 BCE of four days after 9 Elaphebolion (in the Athenian calendar) was to give more time to prepare for the Dionysiac festival on 10–14 Elaphebolion.[144]

Some have plausibly argued that in certain cases, the intercalation or suppression of days may have been required for purposes of calendar regulation

[140] Plutarch, *Alexander* 16: see Pritchett (2001) 25–6. An intercalated Artemisios is attested in the Macedonian calendar in P.Oxy. XVII 2082 (the date of Cassander's death *c.*297 BCE, as recorded in chronography from the 2nd c. CE); but this does not prove (as proposed by Edgar 1931: 51) that Artemisios was the normal month to be intercalated.

[141] Plutarch, *Demetrius* 26; the renaming of months in this year appears to be epigraphically confirmed (Woodhead 1989).

[142] *IG* xii/9. 207, ll. 28–9: Pritchett (1947) 243 n. 39, id. and Neugebauer (1947) 20–2; and Pritchett (2001) 26–7.

[143] 490 BCE: Dunn (1998) 219. First fruits: above, n. 22.

[144] Dinsmoor (1954) 299, 308–9, Pritchett (2001) 27 (and p. 28 with another possible example of this kind).

itself.[145] Dunn notes a high incidence, in the epigraphic record, of intercalation of days at the ends of months—including intercalation of an extra last day of the month (*hena kai nea embolimos*). This suggests last-minute adjustments to ensure that the new month would begin at the right time, i.e. at the first appearance of the new moon (Dunn 1998: 221–2). Finally, it been suggested that intercalations were sometimes artificially made so as to ensure the coincidence of certain dates with specific agricultural seasons.[146] But whatever the reasons for interfering with the calendar—whether related to war and foreign relations, to religious cults, to economic factors, or even to calendar regulation itself—the calendar was always under political control, and in this respect, calendar tampering was primarily a *political* process.[147]

It would be futile to ask whether calendar tampering was more often used by political actors for personal interest or for the public good. Not only is the evidence lacking for such a quantitative assessment, but also the distinction between personal and public interest, in the complex arena of politics and civic social life, was never so straightforward. The subtext of this question—that in the context of calendar tampering, personal interest would have been illegitimate and the public good legitimate—is also problematic. In ancient Greek society, personal ambition was considered a legitimate motivation, if only because it led indirectly to the public good; and conversely, the 'public good' ultimately served the personal interests of the individuals who promoted it. Modern historians, however, have commonly addressed the question of legitimacy of calendar tampering in ancient Greece on the basis of their own ideological paradigms. A 'left-wing' historian would thus argue that the public-minded justifications for tampering with the calendar were really excuses for powerful aristocrats—or demagogues—to manipulate the calendar to their own advantage; whereas a conservative, 'right-wing' historian would argue, in reverse, that calendar tampering was fundamentally for the public good, and instances of illegitimate tampering for personal gain were only exceptional anomalies.[148] Yet the polarity between 'legitimate' and

[145] This may be implicit in the explanation that Plutarch (*Conviv.* 9. 6) gives for the permanent suppression of 2 Boedromion in the Athenian calendar, namely that it was 'not to suit the moon, but because that is the day on which the gods are believed to have had their territorial dispute' (see Loraux 2002: 184–8). 'Not to suit the moon' (οὐ πρὸς τὴν σελήνην) suggests that adjustment to the moon was otherwise the normal reason for the suppression of days. Cicero (*II In Verrem* 2. 129, written in the early 60s BCE) claims that the Sicilians 'and other Greeks' are accustomed to suppress or add only one or two days to the month, and only for the purpose of regulating the calendar. However, he is probably exaggerating the regularity of the Sicilian and Greek calendars in order to contrast it with the suppression of one and a half months which Verres (governor of Sicily in the late 70s CE) arbitrarily carried out in one particular year.

[146] Pritchett (2001) 30, but this remains entirely speculative.

[147] See Loraux (2002) 171–90, esp. 186.

[148] Dunn (1998) is a good example of the latter paradigm, which for some reason tends to be more dominant.

'illegitimate', implicit in these paradigms, obscures the complexity of the political situations that led to manipulation of the calendar and that were always open to a variety of intentions and interpretations.

In ancient literary sources, calendar tampering by political rulers occasionally comes under criticism, though not because the system itself was considered undesirable or illegitimate, nor on the basis of a distinction between public good and personal gain. Xenophon is clearly unimpressed with the Argives' attempt to put off war through calendar manipulation (as were their enemies, the Lacedaemonians), and Plutarch objects to Agesilaus' intercalation for the purpose of raising additional taxes (see above). The former involved the public good, the latter personal gain; and what was criticized in these cases is not the system, but only its abuse. The same Plutarch has no criticism of Alexander's renaming of Daisios at the Granicus, or of his intercalation of day(s) at the siege of Tyre—quite on the contrary, these episodes exemplify Alexander's resourcefulness and initiative. But Plutarch does condemn the Athenians' renaming of the months in 302 BCE, presumably because the sequence of months was disrupted (Beodromion, normally the third month, was relocated after Anthesterion, the eighth), which was not allowed within the terms of the Athenian calendar and went well beyond acceptable norms of calendar tampering.

The only text, as far as I can tell, that may be interpreted as a critique of the system itself and not just its abuse is the moon's tirade in Aristophanes' *Clouds* 615–26 (cited above). In the context of a comedy, a tirade such as this should obviously not be taken too seriously; but it does express, at the very least, an element of unease at the deviation of the calendar from the phases of the moon as a result of tampering. This unease may have been religiously motivated—implicit in the moon's complaint that sacrifices are being offered on the wrong days—or pragmatically motivated, as in daily life it would have been more useful to be able to estimate the day of the calendar month by observing the moon, its shape, size, and/or position. Similarly, Plato's description of an ideal well-regulated calendar that conforms entirely to the seasons may express a veiled criticism of the prevailing situation (Plato, *Laws* 7. 809 D). Unfortunately, these are lone passages; it is difficult to establish how common this kind of criticism might have been.

Particularism and unity

A consequence of calendar tampering, i.e. the widespread practice of intercalating and suppressing months and days, was the tremendous variety between ancient Greek calendars. In spite of being in principle all lunar, the days of months of different cities were often very different from one another, and their months were often very inconsistently related. Besides reckoning their calendars independently from one another, Greek cities also employed different sets of month-names, which only enhanced their distinctiveness and particularism. Disagreement between calendars complicated, no doubt, communications, commerce, and other relations between cities or citizens of different cities. Public and private documents involving more than one city (e.g. treaties, contracts, etc.) always needed to be multiply dated, and date conversion was never straightforward as it did not follow any consistent rule or pattern. This complication, however, is likely to have been also a source of local pride. Especially in situations of conflict, calendar particularism would have contributed to the feeling of autonomy and distinct identities of the rival cities.

It is no surprise, therefore, that in the context of friendship and alliance between cities, attempts were conversely made to unify calendrical practice. Thus a mid-fifth-century BCE treaty drawn up in Argos between the Cretan cities of Knossos and Tylissos requires them to keep the first day of the month at the same time—which highlights, incidentally, the importance that could be attached to calendar agreement.[149] We do not know how, in practice, this agreement was to be implemented; but by the second century BCE—whether or not in continuity with this earlier treaty—the months of the cities of Crete appear to have been all conterminous.[150] Harmonization of calendar practice is also evident, in a variety of forms, in other geopolitical regions. In the cities of Thessaly, the same calendar appears to have been used.[151] In some of the leagues and 'empires', the calendar of the dominant city imposed itself on the other, constituent cities: thus the calendar of Sparta appears to have been used in the whole of Laconia; the Aetolian calendar is attested outside Aetolia, in parts of western central Greece that belonged to the Aetolian League; and the calendar of Miletus was used in its far-flung colonies.[152] But in some leagues, more egalitarian arrangements were adopted: thus a neutral calendar of purely numbered months was used in the Achaean League (in the early second century BCE, and possibly also later), though without necessarily displacing the local calendars of named months.[153] Similary, numbered months attested in Phocis and in Ozolian Locris may have belonged to 'federal calendars' that

[149] Meiggs and Lewis (1988) 99–105 no. 42, ll. B21–3, where the fragmentary text is reconstructed as follows: *πρ[α]τομενίαν ἄγεν κατὰ ταὐτ[ὰ κατὰ τὸ δόγμα] τὸ ἀμ[φ]οτέρον* ('They shall keep the first day of the month at the same [time according to the decision] of both'). Referred to in Bickerman (1968) 32.

[150] As evident e.g. in Dittenberger (1915–24) ii, no. 712 (dated 116/15 BCE), where the date given according to each of the three cities of Knossos, Lato, and Olos has different month-names, but the same day of the month (the 2nd). For further evidence see Samuel (1972) 134–6.

[151] Ibid. 83–6.

[152] Laconia: ibid. 93. Aetolian League: ibid. 78. Miletus: ibid. 114–18, and Trümpy (1997) 89–93 (and for a more general statement, ibid. 1–2).

[153] Samuel (1972) 94–7.

were shared in common by these neighbouring cities.[154] Calendar uniformity is still evident in the leagues of Greek cities in the Roman period.[155] The mechanism through which this was achieved remains to us unknown.

The *kata theon* or true lunar calendar—in common use, for example, in Attica and in the island of Euboea, alongside local civil calendars (see above, §4)—was another way of balancing out the particularism of civil calendars with common, calendrical unity. The emergence of this calendar in the third–second centuries BCE reflects, perhaps, a trend towards political solidarity and hence also cultural integration that was developing in this period, in Greece, under the shadow of the neighbouring Seleucid Empire. This massive Hellenistic empire, extending in the third century right up to the western coast of Asia Minor, employed one official calendar—Macedonian, assimilated to the Babylonian calendar (see Chapter 5)—throughout its territories, and this single-calendar policy may well have had an impact on calendar practices in Greece. The *kata theon* calendar, moreover, would have been very similar to the Seleucid Babylonian calendar, in that both were truly lunar and strictly regulated by new moon observation (see Chapter 2). Seleucid influence is also discernible in this period in the apparent regularization of Greek civil calendars and their closer conformity to the phases of the moon, leading to more frequent agreement between different civil calendars—although even empirical observation of the new moon could lead, in different parts of Greece, to marginal, one-day differences, through which a measure of particularism was eagerly cultivated and retained.[156]

In his preface to *Greek and Roman Chronology*, Alan Samuel concluded:

> I am reasonably comfortable with this assumption of great individualism in local calendaric practice. Although I am one to argue that classical civilization is, in a way, a unity, and certainly must be studied as a whole, I tend to think that in this unified and cohesive culture there existed an extraordinary degree of local particularity, and that this particularism persisted in the face of continuing cultural, economic, and political influences with centripetal tendencies. The calendars, central as they are to life in all the cities, show this particularism if they are not coalesced by a modern passion for order, and the longevity of many of these calendars shows the vitality of local traditions (Samuel 1972: p. ix).

These eloquent words remain on balance correct, though only with reference to Greek calendars (on which Samuel's work is indeed focused). Notwithstanding the various uses of common calendars in political leagues, the rise of

[154] Ibid. 70–2, 75–7 respectively; Trümpy (1997) 203–4 (calling it a 'Bundeskalender'); Hannah (2005) 78–9.

[155] Thus the *koinon* (league) of the Roman province of Asia, in its decree of 8 BCE, implies that the same lunar calendar was used in all its cities (see Ch. 5 n. 117), and so inscriptions of the *koinon* of Macedonia in the mid-3rd c. CE (Ch. 6 n. 8).

[156] For pertinent examples see above, near nn. 51–3.

kata theon calendars in the Hellenistic period, and some regularization of the civil calendars under Seleucid influence, particularism was and remained a dominant feature of Greek calendars, reflecting the long-standing political disunity of the Greek cities and, in Samuel's words, the vitality of their local traditions. As we shall see in the next chapters, it is only in the more homogeneous, larger-scale kingdoms of Mesopotamia and Egypt, and later in the Persian, Hellenistic, and Roman Empires, that uniformity of calendrical practice became established and throve.

2

The Babylonian Calendar

Sources from Mesopotamia and the Levant of the third and second millennia BCE reveal the existence of numerous calendars, all lunar but different, and exerting a complex nexus of influences over one another.[1] But in the course of the second millennium BCE a standard sequence of months became dominant in Babylonia, and later spread to the whole of Mesopotamia. By 1100 BCE the Assyrian kingdom (in northern Mesopotamia) had adopted it as its own calendar.[2] In the first millennium BCE the westward imperial expansion of Mesopotamian kingdoms, and in particular the formation of the Persian Achaemenid Empire, led further to the diffusion of the standard Babylonian calendar throughout the Near and Middle East. This was largely, but not solely, the result of its use as official calendar by the neo-Assyrian and neo-Babylonian empires, later continued under the Achaemenids and the Seleucids.

The diffusion of the standard Babylonian calendar in the Levant is evident already in the late second millennium BCE, when scribes in Ugarit or Ḥana, in western Syria, appear to have known it and sometimes used it (Cohen 1993: 380–1). A little later, in the seventh–sixth centuries BCE, the calendar is found again in Neirab (northern Syria).[3] But the expansion of the standard Babylonian calendar reached its highest extent in the Achaemenid Empire

[1] On the early origins of the Mesopotamian lunar (or 'lunisolar') calendars, see Brack-Bernsen (2007).

[2] The most detailed studies of Old Babylonian month-names are Greengus (1987, 2001); see also Cohen (1993) 297–305, Bickerman (1968) 21, 24. Greengus shows that the standard Nisannu sequence did not emerge until the Middle Babylonian period (early second millennium), perhaps in the city of Babylon (1987: 228–9); whereas Cohen loc. cit. and Britton (2007) 115–16 reiterate the traditional view that the standard sequence originated in the city of Nippur. See also Cohen (1993) 302–3, 330–1 on the Elamite derivation of the Babylonian month-names Shabatu and Addaru, and the possible Old Persian derivation of Araḫsamnu (whereas Hartner 1979: 744–6 and Hallock 1969: 74 n. 11 suggested on the contrary, but with reservations, that the Old Persian name was derived from the Babylonian calendar).

[3] Dhorme (1928). These tablets, however, are Babylonian and refer sometimes to transactions carried out in Babylon; they do not prove that the Babylonian calendar was adopted in Syria by the local population.

(sixth–fourth centuries BCE). In this period, the Babylonian calendar was used as official imperial calendar by Persian satraps and administrators as far as Bactria (northern Afghanistan) in the east; in the west, the Babylonian calendar was used in Judaea (as found in the post-exilic biblical books of Zechariah, Ezra, and Nehemiah), further to the west in Asia Minor (in Xanthos in Lycia, and Sardis in Lydia), as well as in Egypt, as far south as Elephantine.[4] After Alexander's conquest (in the late fourth century), the Macedonian calendar was introduced to the Near East by the early Hellenistic rulers; but it was sufficiently close to the Babylonian calendar to be assimilated to it, so that the Babylonian calendar was appropriated by the Hellenistic dynasty of the Seleucids, who translated its month-names into Macedonian equivalents. This calendar, or something similar to it, then survived the disintegration of the Seleucid Empire (around the second century BCE): it was used not only by the Parthians in Babylonia, but also by smaller kingdoms, such as the Nabataeans in Arabia and the Hasmonaeans in Judaea, and city states such as the coast-line cities of Sidon, Tyre, and Ascalon. As a result, by the time the Romans arrived in the first century BCE, all or most calendars of the Near East were Babylonian, or at least, closely derived from the Babylonian calendar.[5]

Thus we find, starting from the second millennium BCE and culminating in the late first millennium BCE, a movement towards unification of Near Eastern lunar calendars. In this respect, the Near East differed radically from Greece, where as we have seen (Chapter 1), extreme diversity of lunar calendars maintained itself in city states and islands until the Roman period. This contrast reflects perhaps a fundamental difference of political attitudes, agenda, and policies in Greece and in the Near East. The unification of calendars in the Near East in the second millennium BCE was clearly intended to serve the administrative, and perhaps also ideological, purposes of the expansionist, imperialist policies of the great Babylonian and Assyrian kingdoms.[6] Imperialism on this scale did not exist in Greece, with the only exception—proving the rule—of Alexander's Macedonian empire, which ended up adopting, predictably, the imperial Babylonian calendar of the Near East.

The contrast between Greece and Near East was also due to inherent calendrical factors. Although both lunar, the Babylonian calendar (and so, perhaps, other Near Eastern calendars) differed from the Greek calendars in their regularity and relatively close conformity to the phases of the moon. As a result, the months of all the different Near Eastern calendars began more or

[4] Bactria: Shaked (2004) 42–5, Naveh and Shaked forthcoming. Xanthos: Dupont-Sommer (1979), Fried (2004) 140–54. Sardis: S. A. Cook (1917), Buckler (1924) 1–4 (no. 1). Elephantine: Stern (2000*a*).

[5] This paragraph is a simplification of a rather more complex situation to be discussed in Ch. 5.

[6] Cohen (1993) 303–5 (but not noting the ideological implications of a single, imperial calendar).

less on the same dates; the differences between them would have been mainly only nomenclatural. These calendars lent themselves much better to a process of unification and homogenization than in Greece, where months were often erratic and lunar only in name, and where calendars were consequently far more diverse.

Unlike the Greek calendars, as stated, the standard Babylonian calendar was rigorously lunar: its month always began on the evening when the new moon crescent was first visible or within no more than one day of it, and month-lengths were restricted to 29 or 30 days. The Greek practice of adding or suppressing days to the month, and hence of deviating from the true lunar month, was alien to the Babylonian calendar. This does not mean, however, that the Babylonian calendar was devoid of any flexibility and unpredictability. First visibility of the new moon is a complex phenomenon that does not recur at regular or easily predictable intervals; there is no regular alternation, for example, of 29- and 30-day lunar months. For this reason, the determination of the Babylonian month was largely dependent on monthly, empirical sightings of the new moon, which would have been subject to a number of unpredictable factors such as poor atmospheric and visibility conditions. Furthermore, the intercalation of a thirteenth month in the year, necessary for lunisolar synchronism, was an important aspect of the Babylonian calendar that could be subject to some flexibility and unpredictability. Overall, however, the Babylonian calendar was considerably more regular than the Greek calendars.

This distinctive regularity was only to increase in the course of the first millennium BCE. During this period, techniques for predicting new moon visibility were developed and used, increasingly, for the advance determination of the length of months; whilst the intercalation of the year became regularized and eventually cyclical and fixed. These predictive techniques and cycles, and the resulting regularity of the standard Babylonian calendar, were clearly related to the Mesopotamian tradition of astronomy, observational and (later) mathematical. Indeed, by the neo-Assyrian period, but probably already much earlier, astronomical experts variously identified in modern scholarship as 'scholars', 'astrologers', or 'astronomers'—I shall refer to them, purely for convenience, as 'astrologers'—were closely involved in the determination of the months and of the intercalation. In Assyria, in the neo-Assyrian period, some astrologers were directly associated with the imperial court; in Babylonia they were primarily temple officials whose importance in the great temples rose further in the Persian and Seleucid periods.[7] Either way,

[7] Brown (2000) 41–7, Rochberg (2010) 245, 248–53. 'Astrologers' are referred to in the sources as *ṭupšarru enūma anu enlil*, literally 'scribes of the astrological compendium Enūma Anu Enlil', though this term is relatively rare, and other, more general titles are also used. The term *ṭupšar* itself has a broader meaning than 'scribe', as it is also used for scholars and high

the political and religious status which astrologers held in Mesopotamian society, together with their astronomical expertise, explain how they came to exercise such authority over the calendar in a way that was second only to the king. But they still remained directly answerable to the king, and it was to the king that all calendrical decisions were ultimately referred. The 'scientific' character of the Babylonian calendar was thus overshadowed, in several respects, by the overriding force of social and political authority. As I shall argue, the regularization of the Babylonian calendar in the first millennium BCE was largely the outcome of political factors, such as its use as official calendar in increasingly expanding territorial empires.

There is no explicit description of the calendar in extant Mesopotamian cuneiform sources,[8] but administrative and economic documents, and more importantly astronomical texts, provide us with a large amount of data on the Babylonian calendar, far more than is available for Greek calendars. Consequently, our study of the Babylonian calendar will differ considerably, in method and approach, from that of the Greek calendars. Substantial evidence, administrative as well as astronomical, only begins in the neo-Assyrian period (eighth–seventh centuries) and lasts until the first century BCE. This chapter will focus on this period, with only occasional references to earlier origins; later developments of the Babylonian calendar and its derivatives will be examined in Chapter 5.

The use of astronomical sources for the study of the calendar raises methodological problems which cannot be ignored. Many astronomical sources are known to have been theoretical and predictive; the calendar they assumed was only a projected future time frame, which might differ from how the calendar was eventually reckoned in practice. Considerable care needs to be exercised, therefore, when using these sources as evidence of how the Babylonian calendar was reckoned in Mesopotamian society.[9] But a large number of astronomical texts, referred to in modern scholarship as 'Astronomical Diaries', contain reports of actual astronomical observations. It is unlikely that the calendar assumed for dating these observations was a theoretical 'astronomical calendar', because the regularity with which dated astronomical observations

officials (cf. Jer. 51: 27), and these astrologers were certainly far more than scribes. The professional identity of the astrologers was complex; my use of the term 'astrologers' should not be taken to mean that astrology (or astronomy, a distinction that was not clearly made) was their sole function or area of expertise. See further Parpola (1970–83) ii, p. xiv, Rochberg (2010), and Geller (2010).

[8] This may explain why relatively little attention has been given to the Babylonian calendar in modern scholarship (with some notable exceptions, e.g. Beaulieu 1993, Steele 2007), by comparison with the well-established tradition of scholarship on Babylonian astronomy.

[9] This will restrict our use e.g. of Saros Canon texts for charting the intercalated years.

were transmitted from astrologers to the king and on the basis of which calendrical decisions were often made suggests that the Diaries were dated according to the calendar in use in society at large. Consideration must also be given to the close involvement of astrologers in the temple cults and in the economic administration of the temples—to which they were officially attached, at least in Babylonia—and to the fact that astronomical observations, astrological omens, the dates of festivals, and the dating of administrative temple documents, were all closely intertwined: it is quite unlikely that different calendars were used for these related activities.[10] Our use of astronomical sources (at least of the non-predictive, observational kind) as evidence of how the Babylonian calendar was reckoned seems therefore reasonably secure. But whether we should expect the Babylonian calendar to have been reckoned accurately and uniformly across the vast expanses of the Achaemenid and Seleucid Empires is another question altogether, which will be addressed more fully in Chapter 5.

The months of the Babylonian calendar were named as follows:[11]

I	Nisannu
II	Aiaru
III	Simanu
IV	Duzu
V	Abu
VI	Ululu
VII	Tashritu
VIII	Araḫsamnu
IX	Kislimu
X	Ṭebetu
XI	Shabaṭu
XII	Addaru

These names survived, with slight variations, in the post-Babylonian calendars of Nabataea, Judaea (hence in the Jewish calendar), and late antique Syria (hence in the Syriac calendar), as will be seen in Chapter 5.

This chapter will examine separately the two main features of the Babylonian calendar: the beginning of the month, and the intercalation.

[10] See further below, n. 73.

[11] In cuneiform sources the months are usually represented by Sumerian ideograms; their Akkadian names (of which this list is an adaptation) are spelt out in full in a Sumerian–Akkadian lexicon as follows: ni-sa-an-nu, a-a-ru, si-ma-nu, du-ú-zu, a-bu, ú-lu-lu, taš-ri-tú, a-ra-aḫ-sam-na, ki-si-li-mu, ṭe-bi-tum, šá-ba-ṭu, ad-da-ru (Landsberger 1957: 25–6; cited in Schürer 1973–87: i. 587; I am grateful to Mark Geller for the information and reference).

1. THE BEGINNING OF THE MONTH

The new moon

It is generally agreed that the Babylonian month began, in principle, when the new moon crescent was first visible and sighted. Although explicit evidence is lacking—there are few, if any, explicit statements in the sources that the evening of the 1st of the month was when the new moon was either first visible or first sighted—indications to this effect are very clear.

The assumption, or perception, that the month began at the first appearance of the new moon can be traced back to the origins of Babylonian civilization. In the lunar festivals such as the *eššešu* (attested from the end of the third millennium until the neo-Babylonian period), full moon celebrations were held on the 14th or 15th of the month; this suggests that celebrations on the 1st of the month would have been intended to mark the new moon's first appearance.[12] In the Creation epic *Enuma Eliš* (tablet 5), the god Marduk tells the moon that it will be full on the 15th and in conjunction on the 30th—which implies first visibility on the 1st.[13]

Sources from the sixth–first centuries BCE confirm that the new moon was, by and large, when Babylonian months actually began. The Astronomical Diaries report a range of observed astronomical events (lunar, planetary, and/or stellar) and date them according to the Babylonian calendar.[14] They do not mention explicitly the first appearance of the new moon, but they do provide, as a standard entry, the time-lag between sunset and moonset on the first evening of the month. Modern astronomy enables us to calculate when this time-lag would have occurred, and hence, the equivalent Julian date of the first evening of the Babylonian month.[15] In the vast majority of cases, this date is when (again, according to modern astronomy) the new moon would have been first visible (Stern 2008). The same procedure can be applied to other entries in the Astronomical Diaries, which can be similarly astronomically dated. Since these entries are dated in the texts according to the Babylonian calendar, it is possible to establish, by working back to the beginning of the month, that the Babylonian month began on the evening when the new moon

[12] See Brown (2000) 113–14, 248. If the full moon occurs on the 14th or 15th of the month, the month can only begin at first visibility of the new moon (see e.g. Stern 2001: 130).

[13] Pritchard (1950) 67–8; Brown (2000) 235, 253; Steele (2007) 133–5. For the meaning of 'conjunction' see Ch. 1, near n. 6.

[14] The Astronomical Diaries extend from the 8th to 1st cc. BCE (but mainly only from the 6th c. BCE), and are thought to be almost all from the city of Babylon; they have been edited, translated, and astronomically dated by Sachs and Hunger (1988–2006). Some of this material was only preserved in later (and sometimes much later), Seleucid- or early Parthian-period compilations, but there is no reason to doubt its authenticity. For a general introduction see Hunger (1999).

[15] This procedure is known as 'astronomical dating': Sachs and Hunger (1988–2006) i. 19.

would have first become visible. Thus the lunar, planetary, and stellar positions supplied and dated by the Diaries according to the Babylonian calendar enable us to calculate that in the vast majority of cases the months began when the new moon was first visible.

Sighting and prediction

In the Babylonian calendar, the length of the month was only either 29 or 30 days (other month-lengths are unattested in the sources). The beginning of the new month could therefore occur on only one of two days, the determination of which depended, as explained above, on the first appearance of the new moon. The problem was how to determine when the new moon first appeared. This could be achieved empirically, by scanning the evening sky above the western horizon in the area of the path of the moon, 29 days after the last new moon had been sighted. But new moon sighting was not always possible, for example, in poor weather conditions. In such cases, new moon visibility could instead have been predicted.

The practice of predicting new moon visibility, or rather, the length of forthcoming months (itself dependent, presumably, on new moon visibility prediction) goes back to an early period. In seventh-century astrological texts, month- length predictions are already well attested[16] and seem to have been inferred, rather inaccurately, from the dates of previous new and full moons.[17] A fourth-century BCE text suggests that month-lengths may have been similarly inferred from the dates of lunar eclipses (which occur at the full moon), predicted in advance at 19-year intervals.[18] By this period, however, more advanced methods had been developed. One source lays down various rules for inferring month-lengths from predicted sunset–moonset lags on the first evening of the month.[19]

It is not known which of these rules—if, indeed, any at all—were ever used in practice for predicting the new moons and hence the lengths of Babylonian

[16] e.g. Parpola (1970–83) i, nos. 45,70, ii. 54; Hunger (1992) nos. 46–7, 58–60, 83, 257, 267, 516.

[17] Parpola (1970–83) ii. 53; Beaulieu (1993) esp. 67, 72–6; Brown (2000) 198–200.

[18] Neugebauer and Sachs (1967) 205; see discussion in Stern (2008) 36–7 n. 10.

[19] This text is TU11 (Brack-Bernsen and Hunger 2002), which comes from late-3rd-c. BCE Uruk but is thought to be of pre-Seleucid origin (ibid. 6). It includes a number of rules for predicting month-lengths which are mostly based on predicted sunset–moonset lags, and are clearly related to new moon visibility: thus the rule that if the sunset–moonset lag is less than 10°, the 1st of the month will be postponed to the next evening (and the old month will be full: obv. 33, 37, see ibid. pp. 35, 43–5), is clearly based on an assumption that if the lag is less than 10°, the new moon will not be visible. According to Brack-Bernsen and Hunger, this rule would achieve an accuracy of about 95% (pp. 45, 48–50 and n. 51), which is good but still means that one prediction in twenty would have been inaccurate. See further Stern (2008) 37 n. 11.

calendar months.[20] The purpose and function of month-length prediction, indeed, was not necessarily calendrical: it may have fulfilled a purely astrological or astronomical role. The ability of astrologers, particularly in the later period, to predict month-lengths long in advance with a reasonable degree of accuracy does not mean that this is how the calendar was reckoned in practice.

The extent, therefore, to which the Babylonian calendar month was regulated by new moon sighting or by new moon prediction is a complex question that will be addressed below. I shall argue that until the neo-Assyrian period (eighth–seventh centuries) the month was determined on the sole basis of new moon sightings; but later, new moon predictions—and hence, the possibility of setting the calendar in advance—were introduced.[21]

The neo-Assyrian period (eighth–seventh centuries BCE)

Although, as mentioned above, the practice of predicting new moons (or month-lengths) was already well established in the neo-Assyrian period, in this period it appears to have been intended only for astrological purposes, and not for the determination of calendar months.[22] Astrological omen lists of the early seventh century BCE suggest, indeed, that the month only began when the new moon had actually been sighted.

This can be inferred in more than one way. Firstly, the omen lists lay down that if the moon was sighted on day 30 (i.e. on the evening preceding day 30 of the outgoing month), it 'rejected' the day (by turning it into day 1 of next month);[23] whereas if the moon was not sighted on day 30, the day was 'not rejected' but 'completed' (i.e. kept within the old month).[24] But the possibility

[20] The Astronomical Diaries suggest that the criterion used for predicting new moon visibility could not have been based on the sunset–moonset lag on its own, and hence did not conform to the rules of TU11 (see previous n.). Indeed, some new moon predictions in the Diaries are recorded with predicted sunset–moonset lags as low as 8° or 9°, whereas some predicted sunset–moonset lags higher than 10° appear elsewhere to have been disregarded as evidence of new moon visibility. This apparent inconsistency suggests that the new moon visibility criterion, or the criterion for determining month-lengths, was not dependent on the sunset–moonset lag alone; this does not necessarily mean, however, that it was more accurate than the new moon visibility criteria of TU11. See further Stern (2008) 37 n. 12.

[21] For a detailed presentation of the argument and evidence, see Stern (2008).

[22] They may also have been intended for cultic purposes, as well argued by Beaulieu (1993) and Brown (2000) 161–207. The astrological purpose of month-length predictions is evident in Hunger (1992) (above, n. 16).

[23] e.g. Hunger (1992) no. 53, reporting that on two consecutive months the moon had 'rejected the day'. The notion that the moon itself, somewhat anthropomorphically, rejected the day by appearing on day 30, emphasizes that it was the actual appearance of the moon that determined the beginning of the month.

[24] Ibid. no. 3.

of beginning the new month on day 30 *without* a sighting, e.g. purely on the basis of a new moon prediction, is apparently not considered.

Secondly, omen lists indicate that sometimes the new moon could be sighted earlier, on days 29 or even 28 of the outgoing month (in which case, the month presumably ran its course until the end of day 29, since months could not be shorter than 29 days).[25] But our sources do not ever refer to first sightings of the new moon on day 2 of the incoming month (or later). This blatant asymmetry—which seems to imply that sightings on day 2 never occurred—confirms that the month could not begin on a day before the new moon had actually been sighted.[26]

However, another body of sources from the same period, the letters of astrologers to the king, suggest that the month was not solely determined by new moon sighting, and that predictions could also be taken into account. The following letter, from the Assyrian astrologer Bulluṭu, presents the king with a dilemma arising from the fact that the new moon had been predicted (or rather was 'postdicted')[27] to be visible on one evening, but was only actually sighted on the next:

> We watched on the 29th day;[28] the clouds were dense, we did not see the moon. We watched on the 30th day; we saw the moon, (but) it was (already) very high. The (weather) of the 29th day has to do with it. What is it that the king my lord says?[29]

[25] The possibility of the new moon being sighted on the 29th or 28th of the month is frequently implied in the astrological omen lists, e.g. Hunger (1992) nos. 14 ('if the moon becomes visible on the 28th day as if on the 1st day'), 63 (visible on the 28th), 457 (on the 29th); see also Huber (1982) 7, Beaulieu (1993) 86 n. 39, and Brown (2000) 146–8. An actual sighting on the 29th, some time in the early 7th c., is reported in Hunger (1992) no. 457. In another text, the Assyrian astrologer Nabû-ahhe-eriba reports that on the night following the 29th day (i.e. night of the 30th) he did not see the moon because of clouds, but on the night following that, the moon looked like two days old (ibid. no. 79); this suggests that it should have been visible two days earlier, on the night of the 29th.

[26] The explanation is not simply that since the calendar month was based on sightings of the moon, it never began on a day before the new moon was first sighted. This, in fact, would not be quite correct: for if—as is generally assumed—there was a rule that the month could not exceed 30 days, then there could have been cases where the new month began on day 31 even without the moon being sighted (e.g. because of bad weather), and in such cases, the moon would have first appeared on day 2 of the new month. The lack of references in omen lists to first new moon sightings on the 2nd day suggests rather that the calendar month had a *general tendency* of beginning late in relation to first visibility of the new moon. This tendency is characteristic of lunar calendars based on actual sightings of the new moon.

[27] In this letter, it is actually a combination of prediction and postdiction. The attempt to sight the moon at the end of the 29th implies that they predicted, to some extent, its visibility; then, after observing the moon's height at the end of the 30th, they postdicted that it should have been visible the evening before.

[28] This means at the end of the 29th day of the outgoing month (Astronomical Diaries and most other sources would have called it the 'evening of the 30th'). For a similar usage in the neo-Assyrian letters, see Parpola (1970–83) i, nos. 91, 96–9, 102, and his comment ibid. ii. 88 n. 179.

[29] Parpola (1970–83) ii. 102 (with a judicious interpretation); Hunger (1992) no. 120; Beaulieu (1993) 66–7 n. 4, whose translation is cited here.

Bulluṭu is clear that only bad weather had prevented the new moon from being seen on the '29th'; by the next evening, indeed, the moon was no longer new. His question to the king suggests that the month should perhaps begin not when the moon was actually sighted, but rather when it should have been first visible. This suggestion would contradict the inference from the astrological omen lists that new moon pre/postdictions were not used to determine the beginning of the month. The contradiction may be resolved in several ways. It may be argued that the seventh–century astrological omen lists were compilations of much earlier traditions, reflecting a period when pre/postdictions were still not used for determining the calendar month. Alternatively, it may be argued that although in the seventh century the calendar was still solely based on new moon sighting, astrologers such as Bulluṭu were attempting to introduce the principle of new moon pre/postdiction, and petitioning the king to recognize its calendrical legitimacy.

Insufficient confidence in the legitimacy of new moon pre/postdictions—or perhaps in their astronomical accuracy—may explain why some astrologers of the same period, facing a similar conflict between pre/postdiction on one evening and sighting on the next, urged the king to obtain reports of new moon sightings from other localities. The following letter was probably addressed to King Assurbanipal (669–633 BCE) from one of his leading scholars:

> To the king, [my lo]rd: your servant Adad-[šumu-usur]. Good health to the king, [my lord]! . . . I observed the (crescent of the) moon on the 30th day; it was high, (too) high to be (the crescent) of the 30th. Its position was like that of the 2nd day. (So) if it suits the king, my lord, the king should wait for the report from Assur before fixing the date. Perhaps the king, my lord, will say: 'Why didn't you decide (about the matter)?' Am I [. . .]? The king should [ask] the scri[bes]: the days . . .[30]

The author of this letter was presumably hoping that the report from the city of Assur would attest a new moon sighting on the (end of the) 29th, and thus confirm his own postdiction.[31] A similar request for other reports of new moon sightings is made in the following letter (dating from the same period); again, the astrologer seems to lack confidence in the evidence of his pre/postdiction, which is why he asks for other reports to be sought:

> . . . (There were) clouds. We did not (see) the moon, probably because of the cl(ouds). The king, my lord, should send messeng(ers) to the cities of Assur (and) Arbela, to go (and) find out definitely about the m(atter), (and to inform) quickly the king, my lord. (The report) of (Calah) . . .[32]

[30] Parpola (1970–83) i, no. 119 (also ii. 101–2); (1993) no. 225; see Beaulieu (1993) 66–7 n. 4. The remainder of the text is unfortunately lost. Wacholder and Weisberg's translation (1971) is incoherent (see also Huber 1982: 7). Brown (2000) 276 rejects any precise dating.

[31] In this case it was only a postdiction, based on the height of the moon at its first sighting.

[32] Parpola (1970–83) i, no. 323 (see also citation of ABL 895. 5–10, ibid. ii. 337).

Other letters confirm that reports of new moon sightings were frequently sent from various Assyrian cities to the royal court at Nineveh.[33] Some came from even as far as Babylonia.[34] It is unclear whether reports from other cities were sent as a matter of course, or only on demand. The letter of Adad-šumu-usur (cited above) implies that a report from Assur was anyway expected, but the letter just cited implies that reports from Assur and Arbela needed to be actively sought. In any event, these letters seem to confirm that the resolution of conflicts between pre/postdiction and actual sighting depended on new moon sightings from other localities: astrologers and kings were still reluctant, in this period, to rely on new moon pre/postdictions alone.

The socio-political context of these letters is also worthy of attention. It seems clear that the relationship between astrologers and the king was crucial to the process of determining the new month. The astrologers—many of whom, in the neo-Assyrian kingdom, were directly employed by the king—were invested with the responsibility, which also means the authority, of observing the new moon at the beginning of every month and of communicating their observations to the king. The regularity of their reports, at least from astrologers in Nineveh, is evident from the large number of letters that simply inform the king whether or not the new moon was sighted.[35] It is on the basis of these reports that the decision was taken, presumably by the king, on which day to begin the month. The letters cited above suggest that whenever the matter was doubtful—in these cases, because of a conflict between new moon prediction and sighting, but perhaps just as frequently, when conflicting new moon sighting reports were received from different cities—the decision rested entirely with the king.

The letter of Adad-šumu-usur cited above suggests that sometimes the king would try to hand over the decision to his astrologers, a responsibility which astrologers would be reluctant to accept. But in other cases astrologers were far more assertive. In one text a Babylonian astrologer, Ašaredu the younger, confirms the validity of his new moon sighting on the 30th (i.e. end of 29th) by stating categorically that the moon cannot remain invisible for as much as four days (between last sighting of the old moon and first sighting of the new); the old moon had already been invisible on the 27th (in the morning).[36] The tone

[33] Ibid. nos. 91 (Assur), 96, 99 (Arbela). But nos. 119 and 323 (cited above) were presumably sent locally from Nineveh.

[34] Ibid. no. 290 (Beaulieu 1993: 70): Mar-ištar, Esarhaddon's agent in Babylonia, informs the king that the moon was seen on the 1st (i.e. 31st of the old month), thus retroactively determining the beginning of the month of Du'uzu.

[35] Parpola (1970–83) i, nos. 91, 96–9, 100, 102, 352; (1993) nos. 140, 142, 145–6.

[36] Hunger (1992) no. 346: 'On this 30th day [the moon became visible]. The lord of kings will say: 'Is [the sign?] not affected?' The moon disappeared on the 27th; the 28th and the 29th it stayed inside the sky, and was seen on the 30th; when else should it have been seen? It should stay in the sky less than four days, it never stayed four days.' Beaulieu (1993: 66 n. 2) misinterprets this text as referring to the interval between conjunction and first visibility of the new moon.

of his letter appears to be polemical: either against some other astrologer, or perhaps even against the king himself. In any case, the astrologer asserts his expertise and expects the king to respect it; here, the king is not invited to express his own opinion. The relationship, in calendar matters, between the king and his astrologers was thus clearly complex and variegated.[37]

The joint involvement of the king and his astrologers in setting the month gives this process at once a 'political' and an astronomical or 'scientific' character. But astronomical observation, astrological omens, royal administration, and royal policy were all directly interrelated, in such a way that it would be misleading to treat 'politics' and 'science' as completely distinct.[38] We do not know, for example, how the king would have resolved a conflict between a predicted new moon and the actual sighting. His decision may have been guided by political considerations, but it is equally possible (perhaps even more likely) that other factors, e.g. religious or astrological, would have come into play.[39] What matters only is that in most cases, it was the king who was invested with the final authority.

Also politically significant was, as noted above, the frequent dispatch of new moon reports from the cities of the empire to the royal court, executed by astrologers but also in some cases by imperial officials (e.g. Mar-ištar, King Esarhaddon's agent in Babylonia).[40] Inasmuch as the month was determined on the basis of new moon reports from all over Mesopotamia, the calendar which the Assyrian king controlled was intended to represent a common time frame for all the cities of the empire—even if, in practice, the calendar was perhaps not always reckoned everywhere in the same way.[41] Not only did this

[37] The king's dependence on astrologers for calendrical matters is also apparent in letters where the king asks an astrologer 'what do you take the present month to be?', and the astrologer replies by giving the current date: Parpola (1970–83) i, nos. 12 (where the date given is 25 Addaru) and 65 (27 Addaru, and the next month is Nisannu—i.e. there will be no intercalation), (1993) no. 23. It is possible that the king was asking for the day of the month, rather than for the month's name (id. 1970–83 ii. 15), although it is likely that the issue was also whether there was to be an intercalation. These texts suggest that if the king had lost count of the days, he would refer to astrologers for the authoritative date.

[38] See e.g. Brown (2000).

[39] In some cases the decision may have been based e.g. on the astrological tradition that a 30-day month was auspicious and a 29-day month inauspicious (see below, n. 53, and Beaulieu 1993: 67–8, Brown 2000: 146–8).

[40] Above, n. 34.

[41] Parpola (1970–83) ii. 337 conjectures, with reference at least to the neo-Assyrian period, that separate calendars were reckoned in Babylonia and Assyria because the distance between them would cause the new moon to be sighted at different times. However, the difference between the geographical coordinates of Assyria and Babylonia is rarely significant so as to affect new moon visibility and the beginning of the month. If separate calendars were reckoned in Babylonia and Assyria in this period, this is more likely to have been due to the difficulty of communicating new moon reports from Babylonia to Assyria in a sufficiently short period of time (see further below, near n. 85). It will also have depended on the level of Babylonia's subservience to Assyria: in the chequered history of Babylonian–Assyrian relations, the Babylonians might not always have conformed (see discussion on the intercalation below).

procedure embody the centralizing force of the king over the cities of the empire, but it also turned the standard Babylonian calendar into a truly imperial calendar.

In summary, astrological omen lists from the neo-Assyrian period suggest that the beginning of the month was determined on the sole basis of new moon sightings, but letters from astrologers to the king suggest that some account was also taken of new moon predictions: if the latter conflicted with evidence from new moon sightings, the matter was resolved on the basis of new moon sighting reports from other cities. New moon sighting, therefore, was the paramount criterion. Astrologers were responsible for reporting new moon sightings, but decisions about the month were ultimately taken by the king.

The later periods (sixth–first centuries BCE)

New moon reports from astrologers to the king are less common, if at all extant, in the neo-Babylonian, Achaemenid, Seleucid, and early Parthian periods (*c.* late seventh–first centuries BCE). In these later periods, indeed, astrologers of the great city temples were less directly answerable to the king.[42] But a few early Achaemenid sources indicate that the calendar month was centrally determined and, presumably, still under the king's control. Thus, a letter from some temple official to a governor at Sippar (in Babylonia) asks for a report on whether the last month was 29 or 30 days. The reference to a 'report' suggests that he was not asking for the governor's own opinion or decision, but rather for an official report that will have been received from elsewhere, most probably from Babylon (at that time the imperial capital).[43] This letter—addressed as it is from a temple official to a governor—implies that the calendar month was dependent on and centrally set by the imperial administration, and not by the temple astrologers.

Nevertheless, the Astronomical Diaries, which become available in this period and which will be studied in some detail below, reveal a Babylonian calendar that was far more regular in relation to the new moon than it had been in the neo-Assyrian period. This suggests that although calendar month decisions were still taken by the king and the imperial administration (at least

Nevertheless, positive evidence of discrepancies between Assyrian and Babylonian months is yet to be discovered.

42 Brown (2000) 41–7, 162.

43 Beaulieu (1993) 70–1. Another letter, dating from the reigns of Cyrus or Cambyses, from an official of the Ebabbar temple at Larsa to an official of the Eanna temple at Uruk mentions that he has received a report that the last month was of 29 days: ibid. 76–8.

in the early Achaemenid period), these decisions were based more than ever on the astronomical expertise that would have been offered by the astrologers.

Administrative and economic dated documents are also useful as evidence for the Babylonian calendar in this period. In the next few pages, however, I shall argue that their datings are more likely to reflect scribal conventions than how the calendar was actually reckoned.

Administrative and economic documents

The information that administrative and economic documents are able to provide about the Babylonian month is limited.[44] Unlike astronomical texts, these documents cannot be astronomically dated; their Babylonian dates cannot be converted, therefore, into precise Julian calendar equivalents, and their relationship to the new moon cannot be precisely determined. These sources can only tell us that certain months were 30 days long, by providing dates on the 30th of the month.

Evidence of 30-day months in administrative and economic sources was used, however, by Peter Huber to determine the accuracy of the Babylonian month in relation to the new moon. Modern astronomy enabled him to establish whether any given month should have been 30 days long had it been accurately based on first visibility of the new moon. He concluded that as much as 33% of the Babylonian months attested in the administrative and economic documents deviated from the new moon, and began either one day too early or one day too late. This considerable inaccuracy contrasted, however, with his analysis of astronomical sources, according to which only between 5% and 5.5% of Babylonian months began one day earlier or later than first visibility of the new moon.[45]

The contrast between the evidence of administrative/economic and astronomical sources—which Huber did not attempt to explain—is problematic. As argued above (near n. 10), it is unlikely that different calendars were used in administrative/economic documents and in the Astronomical Diaries. The contrast cannot be explained as reflecting different historical periods: for although the administrative/economic sources that Huber studied are generally earlier than his astronomical sources (the former dating mainly from the mid-seventh to mid-fifth centuries, and the latter from the fifth to second centuries BCE), both are reasonably well represented in all periods.[46] The

[44] The terms 'administrative' and 'economic' are not clearly distinguished and can often be used for the same document.

[45] Huber (1982) 25–9. A different analysis of the astronomical sources yields the higher result of approximately 8% (see below).

[46] See ibid. 26, 51–5. The last economic text in Huber's list is in fact quite late: an accounting tablet dated 30 Aiaru 219 SE (= 93 BCE), of which the month would have been one day off

contrast is evident, for example, in 522 BCE when the same month is accurately given 29 days in the Astronomical Diaries, and a 30th day in an administrative text.[47]

The most simple explanation is that dates in administrative/economic texts, particularly at the end of the month, were less accurately recorded than in the Astronomical Diaries.[48] The reason for this can be explained, first by analysing Huber's own data. His sample of administrative and economic texts comprises a total of 155 months, of which 151 are of 30 days, and four of 29 days. The very much higher proportion of 30-day months is surprising—it is certainly not reflected in astronomical sources—and suggests that there is something wrong with this sample. A partial explanation may be that in the context of administrative/economic documents, 30-day months are easier to identify (on the basis, simply, of 'day-30' dates), whereas months of only 29 days are more difficult to identify and positively prove. However, I suspect that the very high proportion of 30-day months in Huber's sample also reflects, to a significant extent, a scribal tendency to date documents to the '30th day' even if the calendar month only counted 29 days. I would question, therefore, Huber's fundamental assumption (1982: 51) that documents with day-30 dates necessarily attest 30-day calendar months. As I shall now argue, the preponderance of day-30 dates in administrative/economic documents teaches us something about scribal dating practices, but not necessarily about the Babylonian calendar or its accuracy.

A scribal tendency to date documents to 'day 30' even in 29-day calendar months is only to be expected. In most cases, indeed, scribes writing documents on the day following the 29th of the month would not have known whether the new month had already begun, i.e. whether it was the 30th of the old month or the 1st of the new month. This question depended on the king and his astrologers, whose decision would normally have been taken on the day itself, and hence could not have been instantly known even in the capital city; it would have taken a few days to reach the other cities of Mesopotamia

(ibid. 55). Indeed, the new moon should have been visible on 20 May and 18 June 93 BCE, thus making Aiaru a 29-day month; the date in this text suggests that the month either began one day early, or ended one day late (thus yielding a 30-day month). The latter is assumed (for no clear or cogent reason) by Wallenfels (1992), who takes this as evidence that the month was still based in this period on actual sightings of the new moon (which in this case would have been postponed, on 18 June, because of bad weather). Whatever the merits of his argument, the date of 30 Aiaru in this document may be considered suspect, for reasons that I shall explain below.

[47] Year 7 of Cambyses, month XI (= *c.* February 522 BCE) is given in Sachs and Hunger (1988–2006) v. 168–9 (no. 55, col. iii l. 12) as 29 days long, as indeed it should have been according to new moon visibility, but the document in Strassmaier (1890) 228 no. 395 is dated to the 30th of that same month (Huber 1982: 54). I have identified another ten months that are attested both in astronomical and in administrative/economic sources (from Huber's list), but there, the dates are in agreement.

[48] For a rudimentary and not quite accurate suggestion on these lines see Cohen (1993) 4–5.

and beyond.[49] Thus an early Achaemenid-period letter from a temple official in Larsa to a colleague in Uruk mentions receiving a report that the last month had been of 29 days—suggesting that this information did not reach everyone immediately. The same is implicit in another letter, referred to above, of some temple official to a governor at Sippar asking for a report on whether the last month was 29 or 30 days.[50] It is no surprise that the administrative/economic document from 522 BCE that assumes a 30-day month, whereas the Astronomical Diaries have only 29 days for this month (see above), was written at Sippar—at some distance from Babylon where our Astronomical Diaries were compiled and where the calendar, in this period, is most likely to have been set. All this suggests that on the 30th day itself, if not also later, most people would have had no idea when the new month had begun.

If the beginning of the new month was widely unknown, the most sensible policy for scribes would have been to assume a 30-day month and to write '30th' (on the day after the 29th) as a provisional or tentative date. This practice would have been justified in a number of ways.[51] Firstly, this option was least likely to lead to errors: for if it later turned out that there had only been 29 days in the outgoing month, the date of '30th' could easily be corrected, or rather re-interpreted, as meaning the 1st; whereas if on the contrary the scribe had written '1st' (assuming a 29-day month), but then the month turned out to be of 30 days, it might have become unclear, later on, which day the scribe had really meant.[52] Secondly, in astrological tradition 30-day months were considered normal and auspicious, and 29-day months were inauspicious.[53] This may explain a preference for day 30 (Beaulieu 1993:

[49] Beaulieu (1993) 71 and n. 18. A similar problem affected the dissemination of decisions to intercalate the year, at least in the neo-Assyrian period: thus an order from Esarhaddon in 670 BCE to intercalate Ululu and postpone the cult ceremonies to the next month (i.e. to the second Ululu) only arrived from Assyria to Babylon on or after the 6th of the month, when the ceremonies of the 1st–6th had already been performed (Parpola 1970–83: i, no. 287, with commentary ii. 284–5; 1993: no. 357). In Stern (2000*a*), I argue that in much more remote locations such as Elephantine in southern Egypt, where reports on the new month could never have arrived within the same month, the inhabitants had no option but to improvise—often rather erratically—the dates of the Babylonian calendar. For similar evidence from Idumaea and Bactria, see below, nn. 75–6.

[50] Above, n. 43.

[51] For a similar practice in ancient Greece, see Ch. 1, near n. 69.

[52] The preponderance of day-30 dates in extant administrative/economic documents suggests that documents were not corrected or rewritten, but at the most, reinterpreted. The same is likely to apply to documents dated to the first days of the month, when the length of the outgoing month was yet widely known; in this context, however, it would have been difficult to avoid uncertainty, later on, as to which day the scribe had really meant.

[53] Hunger (1992) e.g. nos. 7, 9–13 (a new moon on the 30th is a bad omen, on the 1st (= 31st) a good omen); nos. 106, 119, 290–1 (the 'normal' length of a month is 30 days); see Brown (2000) 106–21, 249.

67–8), not only in documents written at the end of the month, but also in documents written earlier in the month and anticipating its end.[54]

If, as I am arguing, day-30 dates were regularly used in administrative/economic documents on a purely provisional or tentative basis, the information they give about the Babylonian calendar can only be very limited. They do not indicate which months, in the calendar, were eventually determined to be of 30 days. In some contexts, for example if a document was written later and retrospectively dated, the day-30 date could be treated as informative about the calendar. But to identify such cases would require a detailed, qualitative analysis of the sources which Huber did not undertake. His sample of administrative/economic sources needs, in any event, a thorough re-examination. My suspicion is that if provisional and tentative day-30 dates could be successfully weeded out, the remaining sample of 30-day months would be as astronomically accurate as the months attested in the Astronomical Diaries. But until such a re-examination is carried out, it is safer to leave administrative/economic sources aside and restrict ourselves to the evidence of astronomical sources.

As an appendix to our discussion of 30-day months, mention should be made of the 360-day year scheme, although it is unlikely to explain the high incidence of 30-day months in Huber's sample. This scheme, consisting of twelve months of 30 days, originated in Mesopotamia in an administrative context: during the second half of the third millennium BCE, it was in standard use for the calculation of accounts over lengthy time periods.[55] Its purpose was only to simplify accounting, not to serve as an annual calendar; the calendar that was used for dating and other general purposes was lunar.[56] Although the 360-day scheme was inaccurate in relation to the real-life lunar calendar (where months could be 29 or 30 days long), it was acceptable as an administrative convention because it could work equally for or against the interests of the state's bookkeepers (Englund 1988: 129–30). It fell into disuse as an administrative scheme in the second millennium BCE, but was then taken

[54] e.g. *YBT* 7. 123 (English translation in Fried 2004: 40) is dated 25 Araḫsamnu (528 BCE) and refers in advance to '30 Araḫsamnu' (other documents sometimes refer neutrally to the 'end of month'). This assumption is also made in astrological texts, where one-month periods are referred to as 'from day 1 to day 30' (e.g. Hunger 1992: nos. 4–5).

[55] Englund (1988) 122–33, Brack-Bernsen (2007). This scheme was used to calculate salaries, allowances, rent, expenses, goods to be delivered, etc. over extended periods. In an intercalated year, the year-length of 390 days was assumed (thirteen 30-day months).

[56] As Brack-Bernsen (2007) emphasizes, the 360-day scheme is never used as a dating method in the sources. Neugebauer (1942) 400–1 describes the 360-day year as a fixed, schematic calendar, which would have been used by administrators and businessmen for the purpose of determining future dates 'regardless of the irregularities of the moon and the inability of the astronomers to predict the outcome'. But this interpretation is not supported by the evidence, and only reflects a modern, anachronistic concern for calendar regularity and predictability which the lunar calendar did not offer.

over in astronomical writings as a schematic, ideal year, and continued being used in this context until the Seleucid period.[57]

Astronomical sources

Sources such as the Astronomical Diaries are far more informative about the calendar than administrative and economic documents, not least because their dates can be astronomically identified with relatively high precision, and thus converted if necessary to equivalent Julian dates. This enables us to determine the exact relationship between the new moon and the beginning of the Babylonian month. The dates in the Astronomical Diaries can be treated as reliable, as they were meticulously redacted and would not have been prone to error. For reasons explained above (near nn. 9–10), the calendar employed in the Astronomical Diaries is highly unlikely to have differed from that which was generally used in public life. Moreover, as we shall soon see, the information in the Diaries is relevant, if only implicitly, to how in practice the calendar month would have been fixed.

The Astronomical Diaries reveal that in the sixth–first centuries BCE, the Babylonian calendar had evolved, to a certain extent at least, from new moon sighting to new moon prediction. For in contrast to the neo-Assyrian period, when as we have seen the month was almost entirely based on new moon sightings, the Diaries often have the month beginning on an evening when the new moon was not sighted but only predicted. Although, as mentioned above (near n. 15), the Diaries are not explicit about how the beginning of the month was set, they do provide, as a standard entry, the time-lag between sunset and moonset on the first evening of the month. A new moon sighting is implicit when the sunset–moonset lag is reported to have been observed (with phrases such as 'I have watched' or 'measured'), or when the appearance of the moon crescent is explicitly described as faint, bright, or whatever else. But in many cases the moon is reported not to have been seen ('I have not watched' or 'not measured'), often because of 'clouds' or 'mist'; in these cases it may be assumed that the sunset–moonset lag was predicted (or possibly sometimes postdicted)

[57] Brack-Bernsen 2007. The 360-day year is attested in the form of an annual calendar in late second-millennium astronomical works such as MUL.APIN and Enūma Anu Enlil, tablet XIV (Neugebauer loc. cit.; Hunger and Pingree 1989; Brown 2000: 106–21, 249; Brack-Bernsen 2007: 93–8; Britton 2007: 117–19). This calendar, however, was only intended as theoretical or ideal; this is evident e.g. in that dates are only given in multiples of 5 days (e.g. equinoxes and solstices are given the standard but inaccurate date of the 15th of months 1, 4, 7, and 10). The ideal year is generally believed to have served practical astronomical purposes as a model ('grid') or approximate calendar from which the actual dates of astronomical events could be inferred (Brack-Bernsen loc. cit.); Brown (loc. cit.) favours a primarily divinatory or astrological purpose, because of its gross imprecision in relation to the lunar calendar.

through some sort of calculation.[58] The Diaries clearly imply in these cases that sunset and moonset, and therefore the sun and the moon, *should* have been visible on that evening if not for adverse atmospheric conditions; thus what was being predicted (or postdicted) in these cases was not only the length of the sunset–moonset lag but also, effectively, the first appearance of the new moon. This leads us to conclude that some months began with an actual new moon sighting, and others, with a new moon prediction.

The accuracy of new moon sighting and prediction in the Astronomical Diaries and their relevance to the calendar have been discussed in detail in an article (Stern 2008) which I shall present here with minor corrections and only in summary. The lunar accuracy of new moon sightings and predictions in the Diaries can be established on the basis on modern astronomy.[59] A small proportion (*c*.1.5%) of new moon sightings occurred one day before the new moon should have been visible; these were, presumably, false sightings.[60] More frequent are new moon sightings that are one day late (*c*.6.5%), presumably as a result of bad weather on the previous evening.[61] These results are evenly spread throughout the period of the Diaries, but mainly during the fourth–first centuries BCE.

Of the non-sighted, predicted new moons, late predictions seem not to be attested. Predictions that are one day early (i.e. before the new moon should have been visible according to modern astronomy) amount to 6.5–10% of cases. This suggests a tendency for early new moon prediction;[62] which in turn suggests, very importantly, that new moon predictions are unlikely to have been backed up, as in the neo-Assyrian period, by new moon sightings from other localities.[63] Calendar months beginning on an evening when, according to the Diary, the new moon was not sighted but only predicted are therefore

[58] Sachs and Hunger (1988–2006) i. 21–2 refer only to 'predictions', but the possibility sometimes of corrective postdictions cannot be entirely excluded. How sunset–moonset–lag predictions were made is unknown, but various models have been proposed by Brack-Bernsen (1997), (1999) and Brown (2000) 173–89, and one text, TU11, lays down a range of prediction rules (Brack-Bernsen and Hunger 2002).

[59] For an explanation of the methodology, see Stern (2008) 38–9 nn. 17–20.

[60] On the possibility of false sightings, see Doggett and Schaefer (1994), Stern (2001) 110–11, and Hoffman in http://chem.ch.huji.ac.il/nmr/foo/ppt/nmoon_files/frame.htm; it must be assumed, however, that the Babylonian astrologers were well trained to avoid them. One of the 'early' sightings listed in Stern (2008) 24 is erroneous: in −194 (= 195 BCE) the entry should be 7 June (not 6; my error), and thus the moon sighting was on time, not early; this brings down the percentage to about 1.2%.

[61] One of the 'late' sightings listed in Stern (2008) 26 is erroneous: in −145 (= 146 BCE) the entry should be 7 February (not 8; Sachs and Hunger's error), and thus the moon sighting was on time, not late; this brings down the percentage to about 6.2%. I am grateful to Victor Reijs for alerting me to both these cases.

[62] The criterion (or criteria) used by Babylonian astronomers in the Diaries for predicting new moon visibility remain(s), however, unknown; see discussion above, nn. 19–20.

[63] With one possible exception: see below, n. 71.

likely to have been set—by whoever was in charge of setting the calendar—on the basis of prediction alone.

Another conclusion that emerges from this analysis is the general accuracy of the Babylonian calendar in the Astronomical Diaries. In spite of the relatively high incidence of one-day deviations from the new moon (early and late, totalling about 8% of all cases), modern astronomy shows that the new moon would always have been visible—even if in practice, not always sighted—on either the 30th or the 31st day of the outgoing month.[64] This contrasts with the neo-Assyrian period, where as we have seen, it was sometimes possible for the new moon to be sighted on the 28th or 29th. This means that in the later period, the Babylonian month conformed much more accurately to the new moon.

This conformity to the new moon was the direct result of increasing reliance on new moon predictions. In the neo-Assyrian period, indeed, the possibility of new moon sightings on the 28th or 29th was the result of excessive dependence on new moon sightings for determining the beginning of the month. For if the new moon was not sighted after 29 days (e.g. because of bad weather), the beginning of the month was always postponed to the next day, and the outgoing month thus counted 30 days. This could lead to an excessive number of 30-day months, each time the result of bad weather, which had the cumulative effect of delaying the month in relation to the moon. A run of 30-day months, for example, could easily cause a subsequent new moon to become suddenly visible on the 28th or 29th.[65] The elimination of such fluctuations and irregularities in the period of the Astronomical Diaries—when new moons were never visible outside the 30th or 31st of the outgoing month—was the result of a new calendrical policy, where months were allowed to begin even when the new moon had not actually been sighted: long runs of 30-day months were avoided by beginning certain months when the new moon had only been predicted. A judicious combination of new moon sighting and new moon prediction thus maintained the Babylonian month in a stable—and in 92% of cases, accurate—relationship with the new moon.

How exactly new moon sighting and prediction were combined can be further established on the basis of the Diaries. If the new moon was sighted

[64] This is because in the Astronomical Diaries early cases always occur on the 30th and late cases always on the 31st, and these deviations are never more than of one day. My reference to '30th' and '31st' days is only notional, since one of these days was always designated day 1 of the new month. By 'visible' I mean that in astronomical terms it should have been possible to see the new moon, even if in practice this may have been prevented by bad weather.

[65] One text, Hunger (1992) no. 506, reports that in four consecutive months (VI, VII, VIII, and IX) the moon had been sighted on the 1st (i.e. 31st of the outgoing month), which means a run of four 30-day months. This occurrence could have caused a subsequent new moon sighting on the 29th or 28th. Significantly, runs of four 30-day months are not attested in the Astronomical Diaries.

and predicted on the same day, then obviously the month began on that day. If the new moon was not sighted on either the 30th or the 31st (of the outgoing month), e.g. because of persistent bad weather, then the beginning of the month was based entirely on a prediction, and could be either the 30th or the 31st.[66] The problem arose only in cases of conflict between sighting and pre/postdiction: typically, when the new moon was predicted (or postdicted) on the 30th, but only first sighted on the 31st.[67] Conflicts of this kind are attested in the Diaries, but inconsistently resolved: in some cases, the month begins with the prediction on the 30th,[68] and in others, with the first sighting on the 31st.[69] This inconsistency is attested throughout the period of the Astronomical Diaries—sometimes even within the very same year[70]—and therefore does not reflect any historical change. The inconsistency cannot be explained, moreover, on the basis of a calendrical rule: the conflicts were not resolved, for example, in such a way as to achieve an alternation of 29-day and 30-day months (typical of schematic lunar calendars).[71]

The inconsistent resolution, in the Diaries, of conflicts between predictions and sightings can only be the reflection of informal, *ad hoc* procedures. We do not know who had the authority of deciding when to begin the month. In the neo-Assyrian period, it would have been the king: indeed the letters of astrologers to the Assyrian kings, cited above, deal exactly with the problem of the new moon that should have been seen on the 30th but because of bad weather was only sighted on the 31st; according to these letters, it is the king who is expected to decide when the month begins.[72] We cannot assume that the situation remained unchanged until the end of the Astronomical Diaries

[66] For instance, on 4 November 274 BCE the month began with a non-sighting on the 30th (which, as it happens, was an early prediction); the moon was still not sighted on the second evening, which is recorded in the Diary as 'very overcast' (Sachs and Hunger 1988–2006: i. 338–9).

[67] It is difficult to find evidence of the reverse, i.e. conflicts between sighting on the 30th and pre/postdiction on the 31st, and to establish how they would have been resolved. But this scenario must have been very rare, because of the general tendency in the Astronomical Diaries (as seen above) towards early predictions on the one hand, and late sightings on the other.

[68] Even though the new moon was sighted on the next evening, as is explicitly reported in a number of cases in the Diaries: see Stern (2008) 40–1 n. 36 (cases ranging from 322 to 137 BCE).

[69] This would seem to apply to months beginning with a late new moon sighting on the 31st (listed ibid. 40 n. 30, with cases ranging from 303 to 87 BCE): in these cases, presumably, the new moon was correctly predicted for the 30th, but the prediction was ignored.

[70] See ibid. 41 n. 37 (cases ranging from 329 to 87 BCE).

[71] Ibid. n. 38. In one case where the month began on the 30th of the outgoing month, 19 May 376 BCE, it is reported that the sky was misty and the moon not seen (i.e. in Babylon), but that it was seen in Borsippa (Sachs and Hunger 1988–2006: i. 130–1, and comment p. 138). This suggests, perhaps, that a problem regarding the beginning of the month was resolved on the basis of a new moon sighting in another city (much in the same way as is attested in the neo-Assyrian period: see above, near n. 31). This case, however, is exceptional in the Diaries and its significance remains unclear.

[72] See above, the letters of Bulluṭu and Adad-šumu-usur (note that these sources call '29th' and '30th' what the Astronomical Diaries call '30th' and '31st' : see above, n. 28).

(first century BCE), but it is quite possible that decisions were still taken by the king or his administration. As we have seen above, there is at least some evidence of this in the early Achaemenid period (late sixth century BCE). The inconsistency of calendar month decisions (in cases of conflicts between predictions and sightings) suggests that although the Babylonian month was considerably more regular in relation to the new moon than it had been in the neo-Assyrian period, it was still flexible and subject to a measure of political control.[73]

Summary and discussion

The Babylonian month began, in principle, on the evening of first visibility of the new moon, although deviations of one day on either side were not uncommon. These deviations would not have affected the generally lunar and astronomical character of the Babylonian calendar, but the precise beginning of the month would have remained often unpredictable. There was certainly no regular pattern or calendrical scheme.

Astrological omen lists from the neo-Assyrian period (eighth-seventh centuries) suggest that the beginning of the month was based solely on new moon sightings, although letters of astrologers from the same period indicate that attempts were being made to legitimize the use of new moon predictions (or postdictions). By the Achaemenid period and later (sixth–first centuries BCE), new moon prediction had become a legitimate way of setting the beginning of the month. This had the effect of improving the month's conformity to the evening of first visibility of the new moon, and thus of regularizing the Babylonian calendar.

In the neo-Assyrian period, but probably also in later periods, new moon sightings and predictions were made by astrologers who conveyed the relevant information to the king. In cases of uncertainty—e.g. when the new moon was sighted one day later than predicted—the king decided when the new month began. Thus in spite of its relative astronomical regularity, the beginning of the month remained under the king's control. It is unclear whether the king remained personally involved in this process in the later periods (especially in the Seleucid and Parthian periods), but the inconsistent resolution of conflicts between prediction and sighting in the later periods suggests that some flexibility remained.

The evolution of a calendar based on new moon sighting alone (in the neo-Assyrian period) to one based on a combination of new moon prediction and

[73] Furthermore, the inconsistent, apparently random character of these decisions confirms perhaps that we are dealing with a real-life calendar, rather than with a theoretical calendar of astronomers: see discussion above, near n. 10.

sighting (in the Achaemenid and Seleucid periods) demands an explanation. It reflects, perhaps, increased confidence in the astrologers and the accuracy of their new moon predictions. This increased confidence was possibly the result, in turn, of the significant progress that was being made by Babylonian astronomy, mainly in the Seleucid period; but it may equally reflect a change in the socio-political status of astrologers and their authority over calendrical decisions. Thus it is difficult to know whether calendar change was, in this case, the result of 'scientific' progress or rather of socio-political change.

The regularization of the Babylonian month through the use of new moon predictions may also be related to the formation and rise of the great Near Eastern empires. As early as the neo-Assyrian period, the Babylonian calendar was used as an official state calendar; the beginning of the month, which the king determined, had to be transmitted in the form of 'reports' across the Assyrian Empire—a procedure that could take several days, even within Mesopotamia (from Assyria to Babylonia). In the vastly increased territories of the Achaemenid Empire, the dissemination of this information month by month became an impossibility: in remote areas such as Memphis and Elephantine in Egypt, new moon reports were well beyond reach. This is why the Babylonian months in Egypt had to be reckoned locally, on an independent—and frequently divergent—basis.[74] Evidence from Idumaea (southern Palestine),[75] and in the east, from Bactria (northern Afghanistan),[76]

[74] Evidence for this may be drawn from 5th-c. Aramaic sources from Memphis and Elephantine dated according to the Egyptian and Babylonian calendars, where the Babylonian date differs (typically by one day) from what would be expected of the central Babylonian calendar: see Stern (2000*a*), also (on Memphis) Parker (1941) 297 and Porten (1990) 29; sources are in Porten and Yardeni (1986–99). This argument is slightly speculative, however, as we do not possess Babylonian records of new moons (e.g. in the Astronomical Diaries) for most of this period; without them, the dates of the central Babylonian calendar cannot be established with certainty.

[75] This may be inferred from two Aramaic ostraca, but the evidence is weak. The first is dated 30 Sivan year 46, which can only be of Artaxerxes II, thus 359 BCE (Porten and Yardeni 2007: 149 no. 74); whereas the month of Sivan (i.e. Simanu) of the Babylonian calendar in 359 BCE should have been of 29 days. The second is similarly dated 30 Sivan year 16, most probably of Artaxerxes III, thus 343 BCE (Eph'al and Naveh 1996: 56 no. 104); again, Sivan in this year should have been of 29 days. Unfortunately, we do not have an astronomical diary (or any other Babylonian evidence) to confirm that in either of these years, the Babylonian month had only 29 days. Furthermore, as argued above, day-30 dates in economic documents are not necessarily indicative of the length of the calendar month.

[76] Evidence from Bactria is firmer, although confined at present to one Aramaic document dated year 2, Shebat 20, day *dain* (Shaked 2004: 42–5, Naveh and Shaked forthcoming). In the Persian calendar, which was not lunar but based on a 365-day year, *dainā* was the name of the 24th day of the month (see Chapter 4 and n. 62). The nearest (and indeed, the only possible) equivalence of Shebaṭ 20 to *dainā* of any Persian Zoroastrian month in any year 2 of the Achaemenid period is in the reign of Artaxerxes III (in 357/6 BCE), when *dainā* of Isfandārmuδ (the twelfth month of the year) is expected to have coincided with 22 Shabaṭu of the Babylonian calendar. This dating finds further confirmation in that the document belongs to a batch from the late Achaemenid period, and that the document refers to offerings for the spirits of the dead (*prwrtn*), which were honoured during the epagomenal days following the twelfth month of the

suggests that there too, Babylonian months could diverge from the central Babylonian calendar, presumably for exactly the same reasons.[77] It was perhaps to remedy this problem that new moon prediction came to be favoured in the Babylonian calendar. Whereas empirical new moon sightings carried out in Babylon were not conducive to wide dissemination, new moon predictions could be made well in advance, and could thus be circulated in good time across the Empire. There is no evidence that predictive calendars were disseminated in practice in this way, but the possibility of doing so may have been attractive to the rulers of the great ancient empires in the Near East.

Thus in more than one way, the evolution of the Babylonian month towards greater predictability and regularity may have been related to social, political, and imperial administrative factors, rather than to the development of scientific expertise. This conclusion, albeit tentative in the context of the new moon, will find confirmation in the context of the intercalation.

2. INTERCALATION

In order for a lunar calendar to keep up with the solar year and the seasons, it is necessary to intercalate a 13th lunar month every two or three years. The practice of intercalation appears to have been widespread in Mesopotamia throughout Antiquity, from already the third millennium BCE.[78] Evidence from this early period, however, is limited. Intercalation appears to have been quite irregular: in the early second millennium BCE, intercalations were sometimes made in three or four consecutive years.[79] The decision to

Zoroastrian year; it makes sense that preparations for these offerings were being made during the final days of the twelfth month (de Blois, forthcoming). The two-day discrepancy between the Babylonian date of this document (Shebaṭ 20) and the date expected in the central Babylonian calendar (Shabaṭu 22, assuming a month beginning with first visibility of the new moon in Babylon) can be explained as the result of a local, approximate reckoning of the Babylonian calendar.

77 On similar divergences in the Seleucid and post-Seleucid periods, see Ch. 5.

78 The only possible exception is the Assyrian calendar of the Middle Assyrian period, in the 15th–12th cc. BCE (before Assyria's adoption of the standard Babylonian calendar in *c.*1100 BCE), where an apparent drift of the calendar in relation to the seasons and the solar year has been interpreted as due to absence of intercalation (Cohen 1993: 237–47; Reade 2000). But the Old Assyrian calendar (20th–18th cc.), according to recently discovered evidence, was clearly intercalated (Veenhof 1995–6: 13–15; 2000: 140–7).

79 Huber (1982) 56–61; Englund (1988) 123–5 n. 2 (I differ from Englund, who considers the evidence to indicate that intercalation was generally regular); Greengus (1987) 214 n. 20; Britton (2007) 119. Greengus loc. cit. also shows evidence that an intercalation could be known as much as 35 days in advance, which indicates that the decision to intercalate was not necessarily taken *in extremis*.

intercalate may have been largely a matter of royal decree, as implicit in the following letter from Hammurabi (king of Babylon in 1848–1806 BCE):

> Tell Sin-iddinam, Hammurabi sends you the following message: 'This year has an additional month. The coming month should be designated as the second month of Ululu, and wherever the annual tax has been ordered to be brought in to Babylon on the 24th of the month of Tashritu, it should now be brought to Babylon on the 24th of the second month of Ululu' (Labat 1939: 26; Britton and Walker 1996: 45).

The months that could be repeated (and thus intercalary) varied widely from one city to the next. Even within one calendar (e.g. at Mari) several months of the year could be made intercalary, although the intercalation of the last month of the year (month XII) was already then preponderant.[80] The fluidity of intercalation in this early period might explain why festivals of the same name occur in different months of the year in different cities.[81]

The standard Babylonian calendar, which emerged towards the end of the second millennium, appears to have been considerably more regular: its intercalations were made at fairly regular intervals, and were restricted to months VI and XII (i.e. second Ululu or second Addaru) only. In the neo-Assyrian period (eighth–seventh centuries BCE), significant evidence begins to emerge about how these intercalations were made. But continuous lists of intercalated years can only be compiled from the neo-Babylonian to the early Seleucid periods (late seventh–early second centuries BCE).

Intercalation in the neo-Assyrian and neo-Babylonian periods

Sources from the neo-Assyrian and neo-Babylonian periods indicate that the intercalation of a 13th month, similarly to the determination of the beginning of the month, depended on both scholarly expertise and royal authority. Scholarly expertise is dominant in the following letters from the Assyrian astrologer Balasî, in which he appears to be making all the decisions:

> As regards the adding of the intercalary month which the king wrote to me, this is indeed an intercalated year. After Jupiter has become visible, I shall write again to the king, my lord. I am waiting for it; it will take the whole month. Then we shall see how it is and when we have to add the intercalary month.[82]

80 Greengus (1987) 212, 214 n. 20, 220–1; (2001) 262.
81 See Greengus (2001) 259.
82 Parpola (1970–83) i, no. 38 (partially cited in Brown 2000: 196), dated late in Nisannu 670 BCE (Parpola 1970–83: ii. 45; but see Brown 2000: 270).

> Let them intercalate a month; all the stars of the sky have fallen behind. Month XII must not pass unfavourably. Let them intercalate.[83]

But other sources suggest that although astrologers were expected to make recommendations, the decision to intercalate was ultimately the king's.[84] Thus in one text, Mar-ištar writes from Babylonia to the Assyrian king that a second Ululu should be intercalated; but a little later, on or after the 6th of (first) Ululu, the same Mar-ištar reports that because the king's order to intercalate had not reached Babylon until that date, the cult ceremonies that should have been postponed to the second Ululu had already been performed.[85] The king's authority over intercalation is further evident in several neo-Assyrian royal orders instructing Babylonian temple officials to intercalate Ululu or Addaru.[86] In the neo-Babylonian period, likewise, King Nabunaid commands for example a temple official in Uruk to intercalate Addaru;[87] and in another text from this period, temple officials in Babylon convey to their counterparts of the Eanna temple in Uruk that the king has ordered the intercalation of Addaru.[88]

The dispatch of royal intercalation orders from Assyria to Babylonia in the neo-Assyrian period expresses, far more explicitly than in the context of month beginnings and month-lengths (on which see above), an expectation that intercalations should be uniformly made throughout the regions of the empire. But to what extent Babylonians were willing to comply with the decisions of the Assyrian king is not always clear. A letter to King Esarhaddon reports that noblemen from Babylon and Borsippa were asking him whether there should be an intercalation;[89] but this request was only transmitted to the king through the intermediary of an Assyrian astrologer in Calah (Urdu-Nabû), so the accuracy of the report may be open to doubt. Certainly in periods of Babylonian revolt or independence from their Assyrian masters one expects the calendar to have been run differently; and yet evidence of calendar divergence in the neo-Assyrian period is very scant. In 678/7 BCE it seems that a second Ululu was intercalated in Assyria and a second Addaru in Babylonia; and in 667 BCE a second Addaru in Assyria was followed by a second Ululu in

83 Parpola (1970–83) i, no. 325, as corrected ibid. ii. 342; Hunger (1992) no. 98; I have cited the translation of Brown (2000) 150.

84 Oppenheim (1969) 133 n. 52. This applies even to Balasî, who in another letter, if correctly reconstructed, suggests that an intercalation had been ordered by the king: Parpola (1993) no. 44.

85 Parpola (1970–83) i, nos. 285 and 287 respectively, which he dates both to 670 BCE (see commentary ii. 282–5 and n. 516). No. 285 is, however, very fragmentary. On the scholars Balasî and Mar-ištar, see ibid. ii, p. xvi, Rochberg (2010) 238.

86 Parpola (1970–83) i, no. 190 (1993: no. 253), ii. 285; Cole and Machinist (1998) 6–7 nos. 4 and 5.

87 Parpola (1970–83) ii. 504–5 (from Clay 1919: no. 115), with further examples ibid. 285; see also Parker and Dubberstein (1956) 1, Wacholder and Weisberg (1971) 230.

88 Parpola loc. cit. (from Clay 1919: no. 152); see Wacholder and Weisberg loc. cit.

89 Parpola (1970–83). ii. 187; Cole and Machinist (1998) 54–5 no. 60.

Babylonia.[90] Some have conjectured that in these years, the Assyrian king had momentarily lost political control over Babylonia.[91] However, since in both cases the intercalation was first made in Assyria, and then six months later in Babylonia, it is alternatively possible that the royal order to intercalate arrived too late from Assyria to Babylonia, and that a pragmatic decision was therefore taken in Babylonia to postpone the intercalation to the next available slot, i.e. six months later.

Communication problems of this nature would have been exacerbated in the Achaemenid period, because of the sheer size of the greatly expanded Achaemenid Empire. Although a Babylonian residing at Ecbatana in Media in 537 BCE could be aware that a second Ululu had been intercalated (Stolper 1990), in more remote regions such as Elephantine in southern Egypt the year could be treated as non-intercalated sometimes many months after an intercalation had been made in Babylonia; the calendar was corrected only after news of the intercalation arrived (Stern 2000*a*). Still, this demonstrates that as a matter of principle, the same intercalations were expected to be followed across the Achaemenid Empire. Communication problems disappeared in the later Achaemenid period, when the intercalation became fixed and cyclical (see below) and the same intercalations could be made everywhere without error.

It is evident from the neo-Assyrian sources cited above that in the earlier period, the decision whether or not to intercalate was made on a year-to-year basis, and depended sometimes perhaps on royal whim (Brown 2000: 195). But this does not mean that intercalation was erratic. Literary texts from the late second millennium BCE onwards indicate that a number of astronomical criteria could be used to regulate intercalation, such as the synchronism of lunar months with the first appearances of planets, stars, or constellations.

The astronomical compendium MUL.APIN, for example, states that if the moon is in conjunction with the constellation of Pleiades on 1 Nisannu, no intercalation is needed, but if this occurs on 3 Nisannu, then an intercalation must be made (and further rules of this kind appear after that in the same passage).[92] The rule is also given there that intercalations are made every three years.[93] The three-year rule would yield an insufficient number

[90] Parpola (1970–83) ii. 381. Evidence for the intercalation of Addaru in Assyria in 667 BCE is not explicit but inferred from Assyrian astronomical sources (ibid.), as well as from Balasî's request to intercalate Addaru in that year (ibid. i, no. 325, cited above; see above, n. 82). The dating of the latter is not certain, however, as 672 BCE remains a possibility (Brown 2000: 275).

[91] Parpola (1970–83) ii. 186 n. 323.

[92] MUL.APIN II gap A8—ii 8, in Hunger and Pingree (1989) 89–93 (partial citation in Hannah 2005: 31). On the date and origins of this work, see discussion in Brown (2000) 115–16, 259; in broad terms, it was composed during the late second millennium and the early centuries of the first.

[93] MUL.APIN II ii 9–17, in Hunger and Pingree (1989) 93–5. On these intercalation schemes, see ibid. 152–3. Hunger and Pingree (ibid. 150–2, followed by Brown 2000: 117–18) identify yet

of intercalations and is clearly inadequate for a lunar calendar; it has also been argued that the other rules in MUL.APIN (e.g. that of the Pleiades) are similarly inaccurate and possibly derived from the three-year rule, which may suggest that these rules belonged to a simplified or idealized astronomical scheme typical of MUL.APIN that was not intended for practical calendrical use.[94] In practice, however, the conjunction of the moon with the Pleiades could still have afforded a reasonably accurate criterion for intercalation, provided it was determined through empirical observation rather than by relying on the simplified, schematic calculations of MUL.APIN.[95] Similar intercalation rules are also implicit in the *Babylonian Diviner's Manual*;[96] whilst Balasî, in the letters cited above, uses Jupiter and the stars to determine, very much in practice, the intercalations.[97]

The use of astronomical criteria for setting intercalations was not always driven by a concern for calendrical accuracy; in most cases, it was driven rather by astrological concerns. A number of sources, such as the letters of Balasî, suggest that intercalations were primarily made to prevent certain astronomical events from occurring in inappropriate (hence unpropitious) months, where they would have been interpreted as bad omens (Brown 2000: 121–2, 150–1, 195–6). These astrological motivations, however, would have resulted in maintaining the lunar calendar, through intercalation, in a stable relationship with the stellar year. Indirectly, astrology would thus have played an important part in the regulation of the Babylonian calendar.[98]

another intercalation scheme in MUL.APIN II i 22–4 (pp. 76–7), which states: 'assess how many days are in excess'. They interpret this as meaning the excess of days in a solar year over a lunar year, which brings about the need for intercalation. However, it is equally possible (and perhaps more likely) that this passage refers to the excess of days between the ideal, 360-day year (see above, near n. 56) and the lunar year, or between the solar year and the 360-day year; calculation of these excesses would have been necessary for translating the ideal astronomical information contained in MUL.APIN into real astronomical data (on this procedure see Brack-Bernsen 2007: 97–8).

94 Brown (2000) 119 n. 304. Similar arguments apply to the 'Astrolabe' texts: for a summary, see Lehoux (2007) 103–6.

95 If accurately followed, this rule would lead to an average drift from the seasons of about one day in 70 years (because of the precession of equinoxes), which is arguably not excessive.

96 Britton and Walker (1996) 46; Brown (2000) 120–1 (the date of this work is similar to MUL.APIN).

97 For an explanation how Jupiter could have been used to regulate intercalation, see Brown (2000) 196, and 121 and 197 for the suggestion that true equinoxes were observed for the purpose of calendar regulation; but explicit evidence is lacking (the mention, in the context of intercalation, of the 'first appearances of the sun and moon in months XII and VI' in the *Babylonian Diviner's Manual* is not necessarily a reference to the equinoxes; the significance of these months is only that they can be intercalary).

98 *Pace* Brown, who argues that the use of astrological criteria would, if anything, have disrupted the calendar.

The institution of a fixed cycle: the evidence

It is commonly accepted that in the Achaemenid period, from the early fifth century BCE, the intercalation was fixed through the adoption of a 19-year cycle (comprising seven intercalations). This fixed cycle meant, effectively, that the king and astrologers lost their authority to determine intercalations at will. If this accepted notion is correct, its socio-political implications would thus be quite considerable.

The institution of a fixed cycle is not explicitly referred to in any source, but can be inferred from sequences of known intercalated years. Intercalated years are sporadically attested for the Assyrian and early neo-Babylonian periods,[99] but almost completely and continuously from the late seventh to early second centuries BCE. It is through analysis of this continuous sequence of intercalations that modern scholars have inferred the existence of a fixed, 19-year cycle from the beginning of the fifth century BCE.[100]

This consensus can be criticized, however, from two opposite directions. On the one hand, the 19-year cycle was not consistently reckoned in the Achaemenid period, and I shall therefore argue that it took some time for the 19-year cycle to become fully fixed. On the other hand, I shall argue that the process of fixing intercalation was already initiated under Cyrus, at the beginning of the Achaemenid period, and that some earlier attempts were even made in the early neo-Babylonian period. Thus the fixed cycle was not a sudden institution of the early fifth century; it was the result of a gradual process which began early and was not completed until late in the Achaemenid period. Nevertheless, the turning-point was clearly the beginning of Achaemenid rule.

My analysis of the origins and development of intercalation cycles will be based on Christopher Walker's (unpublished) list of intercalated years with the cuneiform sources that attest them.[101] I have supplemented this list on the basis of texts published in Sachs and Hunger (1988–2006) and Hunger (1988), (1999) (the latter only for the Seleucid period). For reasons of scope, I shall not provide references to the cuneiform texts attesting every intercalated year (as in Walker's list), except only in controversial cases.

[99] For the years 684–51, see Parpola (1970–83) ii. 381–2; many of his entries, however, are unsubstantiated and only based on a presupposed 'intercalation pattern'. For the reign of Kandalanu (646–628), see Walker (1999). My approach, following Walker (as explained below), is empiricist and minimalist in comparison to Britton (2007) 120–3, who claims that from 667 BCE onwards the record of intercalations is 'nearly complete'.

[100] See mainly Parker and Dubberstein (1956), Aaboe *et al.* (1991) 14–16, and Britton (1993) 66–8, (2007) 120–3. See also Wacholder and Weisberg (1971) 234–7, Hartner (1979) 2–3 and (1985) 742–3, Bowen and Goldstein (1988) 42 n. 17, Britton and Walker (1996) 46, 52, Brown (2000) 261, Assar (2003) 174.

[101] I am grateful to Christopher Walker for his generous assistance, and in particular, for giving me a copy of this provisional list.

Intercalation in the neo-Babylonian period

In Table 2.1, I present the intercalated years ranging from the reign of Nabopolassar (when our continuous record of intercalations begins) to the fall of the neo-Babylonian dynasty and the accession of Cyrus, and the intervals between intercalations. A cursory glance at this table suffices to establish that throughout this period, there was no pattern of intercalations or any repeated sequence of intervals between them. The erratic succession of intercalations means that no cycle, such as the 19-year cycle, was employed.

Some important remarks, however, need to be made. At the beginning of this table, there is an almost unbroken succession of 2½ year intervals between intercalations in the period corresponding broadly to Nabopolassar's reign (625—604). This suggests a deliberate attempt, in this period, to institute a fixed intercalation scheme. The recurrence of 2½-year intervals could not just have been the result of a strict astronomical regulation of the intercalation such as is described in MUL.APIN and other earlier sources (see above), because this would not have yielded repeated identical intervals. Moreover, the 2½-year scheme yields excessive intercalation, unlike stellar criteria such as those in MUL.APIN which are reasonably accurate.[102] Thus it is clear that the astronomical principles used earlier on by Assyrian astrologers (such as Balasî, cited above) to regulate intercalation were being abandoned in favour of a fixed scheme. It may be conjectured that the adoption of this innovative scheme was intended to signal Babylonia's newly acquired independence, under Nabopolassar, from the Assyrian kingdom (which eventually fell in 612 BCE). At the very least, the concurrence of this scheme with the reign of Nabopolassar suggests that it was directly instigated by the king, who, as we have seen, had traditionally been in charge of the process of intercalation.[103]

The 2½-year scheme runs until the beginning of Nebuchadnezzar's reign (603/2, year 2 of his reign), after which it was abandoned and the sequence of intercalations became, it seems, completely erratic. Intervals between intercalations, however, were never less than 2 or more than 3½ years. The only exception occurred towards the end of Nebuchadnezzar's reign, in 569/8–563/2, with a 4½-year interval followed by an obviously corrective 1½-year interval (the latter still in Nebuchadnezzar's reign). The reason for this aberration is unknown, but political factors might be considered: calendrical disruption was possibly caused, somehow, by Nebuchadnezzar's failed campaign in Egypt in 567.

[102] Intercalations at regular intervals of 2½ years amount to 8 intercalations in 20 years, significantly more than the optimal relation of 7 intercalations in 19 years. The only three-year interval, towards the end of Nabopolassar's reign (in 608/7), may have constituted an attempt to correct this inaccuracy by exceptionally delaying the intercalation by six months.

[103] See also below, n. 106.

Table 2.1. Intercalations in the neo-Babylonian period

Year BCE	Intercalation (month number)	Interval from previous intercalation (number of years)
624/3	XII_2	
621/0	VI_2	2½
619/18	XII_2	2½
616/15	VI_2	2½
614/13	XII_2	2½
611/10	VI_2	2½
608/7	VI_2	3
606/5	XII_2	2½
603/2	VI_2	2½
600/599	VI_2	3
598/7	VI_2	2
596/5[a]	VI_2	2
594/3	XII_2	2½
591/0	XII_2	3
588/7	XII_2	3
584/3[b]	VI_2	3½
582/1	XII_2	2½
579/8[c]	XII_2	3
577/6	XII_2	2
574/3	VI_2	2½
572/1	XII_2	2½
569/8[d]	XII_2	3
564/3	VI_2	4½
563/2	XII_2	1½
560/59	XII_2	3
557/6	XII_2	3
555/4[e]	XII_2	2
553/2	XII_2	2
550/49	XII_2	3
546/5	VI_2	3½
544/3	XII_2	2½
541/0	XII_2	3
537/6	VI_2	3½

[a] One text has VI_2 in 597/6 (BM 55905, in CT 57:404; Walker, unpubl.). This is probably an error, but other explanations (e.g., possibly, provenance) should be investigated.
[b] This entry follows YBC 4110 and 8860 (Parker and Dubberstein 1956: 5), as well as two other sources listed by Walker (BM 54603, and PTS 3175). However, according to BM 35196 as transcribed in Sachs and Hunger (1988–2006) v. 152 (no. 53), the intercalation was six months earlier, in 585/4 XII_2 (hence a three-year interval). It is possible, however, that the regnal year number in this text has been misread, or that it belongs to another reign.
[c] One text has XII_2 in 580/79 (BM 69027; Walker ibid.), which appears a plausible alternative to the intercalation of 579/8. This inconsistency in the texts may be the result of error, but again, other explanations should be considered.
[d] This intercalation is well attested. One text in Sachs and Hunger (1988–2006) i, no. 567 appears to place this intercalation one year later, in 568/7, but this is probably a misinterpretation.
[e] Also well attested. One text, however, has XII_2 in 556/5 (VAT 8508; Walker, ibid.); the same comment as on 579/8 (note *c* above) applies.

Avoidance of an over-rigid pattern (such as the 2½-year scheme) in the reigns of Nebuchadnezzar and his successors enabled a more accurate lunisolar synchronism than under Nabopolassar, although intercalations were still slightly excessive.[104] It is questionable, however, whether this slight excess would ever have been noticed. In the absence of any fixed pattern or cycle (e.g. of 19 years), it would have been difficult to track the long-term progress of the calendar year in relation to the seasons. Only obvious excesses would have been noticed and corrected: for example, in 552 Nisannu began excessively late, a whole month after the vernal equinox, because there had just been three intercalations at short, two-year intervals; this was corrected by making only one intercalation between 552 and 546, bringing back the beginning of Nisannu (in 546) to just before the equinox. But short-term, *ad hoc* measures of this kind did not prevent the overall tendency towards over-intercalation. The fine tuning needed for maintaining consistent synchronism with the seasonal year would have required a long-term policy of intercalation which was simply not in existence.[105]

Intercalation in the early Achaemenid period

At the beginning of the Achaemenid period, we find a long interval of 3½ years (from 541/0 to 537/6) followed by an obviously corrective, short interval of 1½ years (from 537/6 to 536/5) (seeTable 2.2). These irregularities were clearly related to Cyrus' conquest of Babylon and overthrow of the neo-Babylonian dynasty (in 539), as a result of which intercalation would have been put on hold and only resumed in Cyrus's second year (537/6).[106] This excessive delay indicates, again, the extent to which Babylonian intercalation depended on the king.

After this initial crisis, regular patterns of intercalation appear to have become firmly established. From 536/5, a steady alternation of 3- and 2½-year intervals was sustained throughout the reigns of Cyrus and Cambyses, only to be discontinued soon after the accession of Darius (in 522). This must be interpreted, again, as a politically led attempt to fix the intercalation. This

[104] In Nebuchadnezzar's reign there were 16 intercalations in about 42 years, thus an average of 8 intercalations in 21 years. In Nabunaid's reign (555–539), there were 6 intercalations in 16 years. From Nebuchadnezzar's accession to the fall of the dynasty, there were altogether 24 intercalations in 65 years. All these exceed the optimal frequency of 7 intercalations in 19 years. Consequently, Nisannu was occurring increasingly late in relation to the vernal equinox (Britton 1993: 66–8).

[105] Britton (2007) 120–4 believes that over-intercalation in this period was part of a grand, long-term calendrical policy; see discussion below, n. 126.

[106] Similarly Britton (2007) 121, with another possible example of a delayed intercalation in 626 BCE, this one related to the formal accession of Nabopolassar in the following year.

Table 2.2. Intercalations under Cyrus, Cambyses, and (early) Darius I

Year (BCE)	Intercalation (month number)	Interval from previous intercalation (number of years)	Year number in 8-year cycle
541/0	XII_2	–	–
537/6	VI_2	3½	–
536/5	XII_2	1½	–
533/2	XII_2	3	8
530/29	VI_2	2½	3
527/6	VI_2	3	6
525/4	XII_2	2½	8
522/1[a]	XII_2	3	3
519/8	VI_2	2½	6
517/6	XII_2	2½	8
514/3	XII_2	3	3
511/0	VI_2	2½	6
509/8[b]	XII_2	2½	8
506/5[c]	XII_2	3	3
503/2	VI_2	2½	6
500/499	XII_2	3½	–

[a] This intercalation is well attested. One text, however, has XII_2 in 523/2: BM 33066, in Strassmaier (1890) no. 400. This is probably an error, but other explanations might be considered; for example, uncertainty or confusion might have arisen in these years because of the succession crisis between the reigns of Cambyses and Darius I.
[b] This intercalation is well attested. One text, BM 65215, appears to place this intercalation one year later in 508/7 (Walker unpubl.), but this is probably an error.
[c] Ditto, with only BM 55782 suggesting instead 505/4, probably an error.

scheme was slightly more precise than the 2½-year scheme of Nabopolassar, although it entailed, this time, slightly insufficient intercalation.[107]

Alternatively, it is possible to identify in these years the institution of a fixed eight-year cycle. This cycle, known in later Hellenistic sources as the 'octaeteris', has three intercalations in years 3, 6, and 8. If we assume that it did not matter which month (VI_2 or XII_2) was intercalated in these years, the cycle could have started from year 8 in 533/2. In the second cycle, starting from year 8 in 525/4, the intercalated months were XII_2, XII_2, and VI_2 (in years 8, 3, and 6 respectively); this sequence was then repeated unchanged until about the end of the century (see Table 2.2).[108]

[107] With eight intercalations in 22 years, slightly less than the optimal seven in 19 years.

[108] It is also possible to identify a repeated sequence of VI_2, XII_2, and XII_2 (in years 6, 8, and 3, respectively) starting from 527/6, as other scholars have already suggested (Hartner 1979: 3, 1985: 742–4, following van der Waerden; Britton 1993: 67–8; Assar 2003: 174). These scholars did not consider, as I am suggesting, that the eight-year cycle could have begun in 533/2 (still in Cyrus' reign), because of an implicit assumption that in this cycle, the intercalary months cannot be altered (and according to the post-527/6 sequence, the intercalary month in 530/29 should

The origins of the eight-year cycle are unclear, but its institution may have come about in an unintentional manner. A sequence, indeed, does not become a cycle until it is repeated. The fact that the first octaeteris began in 533/2 (or 527/6, or 525/4) does not mean that it was deliberately or even knowingly instituted as a cycle in that year. The institution of the cycle could well have been retrospective, when it was decided to repeat the sequence of the foregoing eight years, or later still, after that the sequence had been inadvertently repeated. It appears most likely that the initial attempt, under Cyrus, was to institute a fixed pattern of intervals such as had been attempted under Nabopolassar, although this time with greater precision. Instead of using a constant interval (2½ years), an alternation of two intervals (2½ and 3 years) was used. After a while, however, and at the latest at the beginning of the reign of Darius, it was noticed that this alternate-interval scheme had produced an eight-year cycle. Consequently, after the intercalation of 519/18, a choice needed to be made: for if the next intercalation was to happen after a three-year interval, as required by the alternation scheme, the eight-year cycle pattern would have been broken. For some reason—perhaps awareness that the alternate-interval scheme was not providing sufficient intercalation—the eight-year cycle was preferred, and the next intercalation was made in 517/16, 2½ years later. In short, I am suggesting that the eight-year cycle gradually evolved from an alternate-interval scheme. This would have represented, in calendrical terms, a radical paradigm shift, since no cycle had ever been used hitherto in the Babylonian calendar.

It is clear, nevertheless, that neither the alternate interval scheme, nor the eight-year cycle, was sufficiently established or known in this period for the intercalation to have been predictable. Intercalation was still subject to a process of trial and error, and changes to existing patterns could have been made at any time. This is why it was still necessary, at least under Cyrus and Cambyses, for officials of the Esagila (the great temple of Babylon) to inform the officials of the Eanna (its counterpart in Uruk) that certain months had been made intercalary.[109] Nevertheless, we must regard the regularization of intercalation from the beginning of Cyrus' reign as a profound, innovative, and long-term change in the Babylonian calendar.

have been XII_2, whereas it was VI_2). The same issue arises again with the 19-year cycle, and will be discussed in detail below.

[109] Parpola (1970–83) ii. 504 (from Clay 1919 nos. 15 and 196); see Parker and Dubberstein (1956) 1, Wacholder and Weisberg (1971) 230. These texts may also suggest that the officials of the Esagila were responsible, in some way, for the intercalation.

The 19-year cycle

The institution of a 19-year cycle is generally ascribed to Darius' reign, around the turn of the fifth century.[110] It is generally assumed that a fixed 19-year cycle was instituted as such from its inception, and that occasional deviations from the cycle, during the following century, were merely errors or 'exceptions'. This common, scholarly perception must be revised, however, on two counts. On the one hand, a 19-year cycle can be identified already from the beginning of Darius' reign (in 522), and not at the turn of the fifth century. On the other hand, it seems evident that the cycle remained subject to variation until the Seleucid period (in the late fourth century). Deviations from a standard 19-year cycle in the Achaemenid period should not be interpreted as errors or exceptions, but rather as evidence that no standard cycle had yet been fixed.

The fixed 19-year cycle that eventually emerged by the Seleucid period, as attested at least in the Saros Canon texts, consists of a sequence of intercalations at the following intervals:

Saros Canon 19-year cycle 3–3–2–3–3–2½–2½

I shall refer to this as the 'Saros Canon cycle' (because it appears in the so-called 'Saros Canon' texts); it is not to be confused with the 'Saros cycle' itself, which is an 18-year cycle of lunar and/or solar eclipses (which these texts present). The possible relationship between these two cycles, however, will be considered below.

The rationale behind this 19-year sequence is not entirely clear. A more homogeneous sequence could have been achieved by suppressing the short interval of 2 years (in third position), and thus spacing out intercalations more evenly. This would only have required a small modification to the second and third intervals of the sequence, as follows:

Improved 19-year cycle 3–2½–2½–3–3–2½–2½

An even more homogeneous sequence could then have been achieved by inverting the third and fourth intervals (see Table 2.3):

Optimal 19-year cycle 3–2½–3–2½–3–2½–2½

Such improved cycles are not attested, however, in the Babylonian calendar. Why the Saros Canon cycle was never modified as above is a question I shall return to. It so happens that the latter, 'optimal' sequence occurred from 536/5

[110] This common view supersedes an earlier theory that the cycle was instituted in the 4th c.; for references, see above, n. 100. There is not much point in surveying the various starting-dates that have been more specifically suggested (503/2, 498/7, 482/1, etc.).

Table 2.3. The Saros Canon and the optimal 19-year cycles

Year	Saros Canon 19-year cycle		Optimal 19-year cycle	
	Intercalation (month number)	Interval from previous intercalation (number of years)	Intercalation	Interval
3	XII_2	3	XII_2	3
6	XII_2	3	VI_2	2½
8	XII_2	2	VI_2	3
11	XII_2	3	XII_2	2½
14	XII_2	3	XII_2	3
17	VI_2	2½	VI_2	2½
19	XII_2	2½	XII_2	2½

Source. The Saros Canon text is in BM 34597 (LBAT 1428)

to 517/16 (see Table 2.2), but inasmuch as it was not repeated, it was presumably not intended as a cycle. Its fortuitous occurrence is only the result of the regularity of intercalation in the early Achaemenid period.

It is important to stress that the 19-year cycle has no natural starting-point (or 'epoch'). The Saros Canon cycle could equally be expressed starting from another epoch, e.g. (as often assumed in modern scholarship): 2½–3–3–2–3–3–2½, with the same sequence, but starting one intercalation earlier. Thus although I have assumed, in my tables, the sequence laid out above and I have numbered the years of the cycle accordingly from 1 to 19, it must be remembered that my numbering is arbitrary.[111]

In Table 2.4, I present the sequence of intercalations attested from the reigns of Darius I, Xerxes, and Artaxerxes I, with a view to establishing to what extent the Saros Canon cycle may have been already in use. I also consider the possibility of a 'loose 19-year cycle' in which intercalations occur in fixed years (the same years as in the rigid, Saros Canon cycle), but the intercalary month (VI_2 or XII_2) in each of these years can vary (similarly to the eight-year cycle that might have been used under Cyrus and Cambyses, as I have suggested above). The possibility of a loose cycle has not been considered by previous scholars, because of an unspoken assumption that in a 19-year cycle, the intercalary months are fixed and cannot be altered. This assumption is unreasonable. There is evidence, indeed, that the question of which month to be intercalary (VI_2 or XII_2) was regarded as secondary to the question of whether the year should be intercalated. In a letter to the Assyrian king (cited

[111] Hartner (1979) 2–3 treats my year 17 as the epoch of the cycle, and so implicitly Britton (1993) 67–8, largely following Neugebauer (1955) i. 33 n. 2, ii. 442–3, who infers from a list of twenty intercalated years starting in 170 SE (142/1 BCE) that year 1 of the Saros Canon cycle must have been the year of the intercalation of VI_2. This single text, however, hardly serves as evidence: its starting-point in 170 SE may well be incidental. There is no evidence, in fact, as to how the Babylonians themselves conceptualized this cycle.

above), Balasî confirms that the year should be intercalated, but suggests that they wait and see when to add the intercalary month.[112] Similarly, it is possible that under Darius I a cycle was used that determined which years to intercalate, but without specifying which months to be intercalary. This 'loose 19-year cycle' would have enabled the king to retain some measure of control over the intercalation, as he could decide, on each intercalated year, which month to designate as intercalary. In this way, the institution of a cycle would not have compromised entirely the authority that the king had exercised over the calendar in previous centuries. It is quite plausible that at this stage in history a flexible, loose cycle of intercalations was therefore preferred.

From Table 2.4 it is evident that the sequence of intercalations in this period does not fully conform, at any point, to the rigid 19-year cycle as later known from the Saros Canon texts. The Saros Canon cycle could have run briefly from 525/3 to 514/13, but the next intercalation in 511/0 should have been XII_2, whereas it was VI_2. It could have run from 514/13, but in 503/2 it would have failed again for the same reason. It could have run from 498/7—when many scholars deem the 19-year cycle to have been instituted—but it failed in 479/8 when there should have been an intercalation of XII_2 (or possibly earlier than 479/8, as the evidence for the 480s is not complete). It could have run continuously from 476/5 (or somewhat later—the evidence for the 470s is not satisfactory) until the end of our period (and indeed beyond), although it failed at two points: in 446/5 and in 427/6 the intercalary month should have been VI_2. If we ignore these last two deviations—commonly attributed to a policy, under Artaxerxes I, of intercalating only XII_2—it may be possible to conclude that a rigid 19-year cycle was not instituted before the 470s.

Before the 470s, it may be argued that the eight-year cycle was used continuously between 525/4 and 503/2, and then resumed between 495/4 and 482/1 (see Table 2.4).[113] But the possibility of a loose 19-year cycle also deserves serious consideration. Table 2.4 demonstrates that a cycle of this kind could have run without interruption from 525/4 to the mid 480s. This pattern was disrupted by the next two intercalations (in 482/1 and 478/7),[114] whereupon a new, more rigid 19-year sequence would have begun, with intercalations of almost only XII_2 (except for one VI_2, in 465/5).

The notion that a rigid 19-year cycle was 'instituted' in the 470s needs, however, to be further refined. As I have argued above (in the context of the eight-year cycle), the institution of a cycle does not become evident until its

[112] Above, near n. 82.

[113] It has often been argued that the eight-year cycle was used three times in succession between 525/4 and 503/2, followed by the institution of the 19-year cycle not long after (see above, n. 108); however, the data in Table 2.4 do not exactly support this view.

[114] The intercalation of 478/7 cannot be reconciled with any eight-year or 19-year cycle. The disruption of intercalation in this period has no clear explanation; it is unlikely to be related to the short-lived Babylonian revolt of 481 BCE (on which see Briant 1996: 541).

Table 2.4. Intercalations under Darius I, Xerxes, and Artaxerxes I

Year BCE	Intercalation (month number)	Interval from previous intercalation (number of years)	Possible year number in a Saros Canon cycle	Possible year number in a loose 19-year cycle	Possible year number in an 8-year cycle
527/6	VI$_2$	3	–	–	6
525/4	XII$_2$	2½	11	11	8
522/1[a]	XII$_2$	3	14	14	3
519/18	VI$_2$	2½	17	17	6
517/16	XII$_2$	2½	19	19	8
514/13	XII$_2$	3	3 or 14[b]	3	3
511/10	VI$_2$	2½	17	6	6
509/8[c]	XII$_2$	2½	19	8	8
506/5	XII$_2$	3	3	11	3
503/2	VI$_2$	2½		14	6
500/499	XII$_2$	3½		17	
498/7	XII$_2$	2	11	19	
495/4	XII$_2$	3	14	3	3
492/1[d]	VI$_2$	2½	17	6	6
490/89	XII$_2$	2½	19	8	8
487/6	XII$_2$	3	3 or 14[b]	11 or 14	3
unattested[e]					
482/1[f]	XII$_2$		8 or 19[g]	19	8
478/7	VI$_2$	3½			
476/5	*XII*$_2$	*2½*	*6*	*6*	
unattested[h]					
471/0	*XII*$_2$		*11*	*11*	
468/7	*XII*$_2$	*3*	*14*	*14*	*3*
465/4	VI$_2$	2½	17	17	6
463/2	XII$_2$	2½	19	19	8
460/59	XII$_2$	3	3	3	
unattested					
455/4	XII$_2$		8	8	
452/1	*XII*$_2$	*3*	*11*	*11*	
449/8	*XII*$_2$	*3*	*14*	*14*	
446/5	XII$_2$	3		17	
444/3	*XII*$_2$	*2*	*19*	*19*	
441/0	XII$_2$	3	3	3	
unattested					
436/5	XII$_2$		8	8	

(*continued*)

433/2	XII_2	3	11	11
430/29	XII_2	3	14	14
427/6	*XII_2*	*3*		*17*
425/4	XII_2	2	19	19

[a] See Table 2.2 n. *a*.
[b] This intercalation can be interpreted either in relation to preceding years as year 3 of a cycle, or in relation to the following years as year 14 of a cycle.
[c] For this and the next entry, see Table 2.2 nn. *b*, *c*.
[d] So according to a number of unpublished British Museum sources listed by Walker, proving wrong the conjecture of Parker and Dubberstein (1956: 6, 35) that the intercalation was XII_2 in 493/2, six months earlier. According to Sachs and Hunger (1988–2006: v. no. 54, BM36823), the intercalation was XII_2 in 493/2; this, however, is only a textual reconstruction (presumably, following Parker and Dubberstein) that is anyway erroneous. The intercalation of VI_2 in 492/1 is also attested in the Old Persian calendar (on which see Ch. 4): G. G. Cameron (1965) no. 19.
[e] An intercalation of VI_2 in 484/3 is attested in sources from Persepolis (G. G. Cameron 1948, nos. 10-11), but only in the Old Persian calendar. It is generally assumed that in this period, the Old Persian calendar was fully assimilated to the Babylonian calendar, and hence that Old Persian dates can serve as evidence for the Babylonian calendar (e.g. Walker 1997: 23–4); but this assumption needs further discussion (see Ch. 4).
[f] Evidence for this and the next entry is debatable but generally accepted: see Parker and Dubberstein (1956) 8, Aaboe *et al.* (1991) 5, Britton (1993) 67.
[g] i.e. 8 in the sequence of foregoing years, and 19 in the sequence of forthcoming years. If we include the Old Persian evidence for 484/3 (above, n. *e*), the preferable sequence (for the Saros Canon cycle) should be 14–17–19.
[h] An intercalation of XII_2 in 474/3 is attested in Cameron (1948) no. 27, which would be compatible with year 8 in the Saros Canon and the loose 19-year cycles; but again, this is only in the Old Persian calendar (see above, n. *e*).
Entries in italics designate intercalations that are only attested, according to Walker's list (with my supplements), in astronomical sources that I have identified as theoretical and non-observational.

sequence is repeated. Moreover, the 19-year cycle that seems to have been used from the 470s may still have been perceived, at the time, as 'loose': this would explain why an intercalation of VI_2 could still be made in 465/5. It seems more likely, therefore, that it was in the reign of Artaxerxes I (which started in 464/3, after the intercalation of VI_2 in 465/5) that we should consider a rigid 19-year cycle, with intercalations of only XII_2, to have become formally established. Indeed, in view of the connection between regnal periods and intercalation practices (which we have noted so far, stretching back to the reign of Nabopolassar), it seems likely to attribute the innovation of a rigid 19-year cycle to Artaxerxes.[115] The rigid 19-year cycle would have represented a further step in the evolution of Babylonian intercalation.

[115] However, the absence of evidence for the years 457/6 and 438/7 (see Table 2. 4; all the other years are attested) remains cause for some concern, because it means we have no proof of XII_2 in year 6 of the cycle for the entire reign of Artaxerxes I. The use of a single intercalary month may reflect an ancient Babylonian tradition. A passage in MUL.APIN (II ii 18–20) states that the intercalary month I_2 (i.e. a second Nisannu, no longer used in the first millennium BCE) belongs to reign of Šulgi, XII_2 belongs to the reign of the Amurru (Amorites), and VI_2 to the reign of the Kassites, which suggests that different kings or dynasties favoured specific intercalary

After Artaxerxes' reign, a small change was made to the cycle with the intercalation of VI_2 (instead of XII_2) in year 17, the first time probably in 408/7, towards the end of the reign of Darius II (see Table 2.5 n. *a*). This effectively established the 19-year cycle as later assumed in the Saros Canon texts. I thus propose to differ from the common view that Artaxerxes I 'deviated' from the Saros Canon cycle by intercalating XII_2 in year 17, and that the Saros Canon cycle was 'restored' after his reign. In actual fact, the Saros Canon cycle was not instituted until the reign Darius II. Before Artaxerxes I, the 19-year cycle was loose; Artaxerxes I was the first to make use of a rigid 19-year cycle; and it was only when his cycle was altered, under Darius II, that the Saros Canon cycle was instituted.

That a fixed cycle took a long time, over the course of the fifth century, to become established, finds further support from the dated documents of Elephantine in southern Egypt. The authors of these documents were often unaware that an intercalation had been made, and depended on information reaching them from Babylonia which could often be considerably delayed (Stern 2000*a*). It seems clear that in this period the establishment of a rigid cycle of intercalations was not yet common knowledge, or at least the existence of such a cycle could not yet be taken as definitive. Even in the late fifth century, the intercalations may still have been subject to a decision-making process and royal decree. At the very least, kings like Artaxerxes I and Darius II were at liberty to decide how the 19-year cycle of intercalations would run during their reigns.

Intercalation in the late Achaemenid and Seleucid periods

The evidence for intercalations in the late Achaemenid and Seleucid periods, as laid out in Table 2.5, is reasonably sound. The vast majority of entries in the Table, extending from 422/1 to 178/7, are attested either in economic/administrative sources, or in observational astronomical sources. The latter are likely to have been drawn from authentic records of astronomical observations (such as astronomical diaries) and thus can be treated as historically reliable.[116] Some entries, however, are attested only in theoretical astronomical sources (such as the Saros Canon texts) which may have assumed, for convenience, a purely theoretical intercalation scheme which was not necessarily followed in historical reality. Entries that are based only on theoretical sources tend to

months (the dynasties of Šulgi, the Amorites, and the Kassites cover a continuous period from the late third to the late second millennium BCE).

[116] This table, largely based on Walker's subsequent research, dispels his earlier concern (Walker 1997: 24) that intercalations in the late Achaemenid and Seleucid periods might be attested mainly in theoretical astronomical sources which could not be relied upon as historically accurate.

be grouped together, in 406/5–400/399, 343/2–335/4, and 322/1–308/7 (all inclusive), and particularly at the end of the Achaemenid and beginning of the Seleucid periods (between 343/2 and 308/7); for these periods, more evidence from economic or observational astronomical sources would therefore be desirable. After 218/17 there are a few missing entries, and after 178/7 the record becomes sporadic, without any attested intercalations in years 17 and 19 of the Saros Canon cycle.

The general impression is thus that the Saros Canon cycle was regularly followed throughout the later Achaemenid and Seleucid periods, but still, we cannot be certain about the last decades of Seleucid rule, before the fall of Babylonia to the Parthians in 141 BCE. There are, furthermore, two cases where intercalations were made in the wrong years: in 385/4 (and possibly also at the next intercalation, in 382/1) and in 266/5 (but sources here are inconsistent). There is no simple explanation, e.g. political, for these deviations from the Saros Canon cycle. These deviations suggest that intercalation was still not completely fixed in the Achaemenid, and possibly even early Seleucid, periods.

As noted above, the Saros Canon cycle was instituted under Darius II, when the intercalation of month VI_2 was substituted in year 17 (the first time, probably, in 408/7). The purpose of this substitution may well have been to improve the lunisolar synchronism of the Babylonian calendar. In the 19-year cycle of Artaxerxes I, the last months of year 17 occurred excessively early in relation to the solar year. This was remedied by bringing forward the intercalation from Addaru (XII_2) to Ululu (VI_2). By the time of Darius II, the notion of a fixed cycle of intercalation may have been sufficiently well established in the Babylonian calendar for the king and the astrologers to study this cycle and take deliberate action to improve it.

But the improvement of the 19-year cycle could have been carried a few steps further. As I have explained above, the Saros Canon cycle is by no means perfect: a better, optimal 19-year cycle would have spaced out its intercalations more evenly, so as to achieve minimal swaying from the solar year. The institution of such a cycle would only have required the substitution of VI_2 in year 6 (instead of XII_2), and of VI_2 in year 9 (instead of XII_2 in year 8; see above, Table 2.3). Such improvements, however, were never made, and the Babylonian calendar seems not to have progressed beyond the Saros Canon cycle. This was surely not due to ignorance—Babylonian astrologers were perfectly capable of designing the optimal 19-year cycle—but probably rather to political choice. At some stage after the 380s (when deviations from the Saros Canon cycle could still occur), the Saros Canon cycle appears to have become unchangeable and fixed. We cannot be certain that this was ever established as a deliberate policy; but if, as we have seen in the case of Cyrus and the Achaemenids, it was the advent of new dynasties that often led to profound, long-term calendrical change, it makes sense to attribute a policy of

Table 2.5. Intercalations in the later Achaemenid period (from Darius II) and the Seleucid period, arranged in 19-year cycles

Year 1 of cycle	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
424/3			XII_2			XII_2		XII_2			XII_2			XII_2			VI_2[a]		XII_2
405/4			XII_2			XII_2		XII_2			XII_2			XII_2			VI_2[b]		XII_2
386/5		XII_2[c]			(XII_2)[d]			XII_2			XII_2			(XII_2)[e]			(VI_2)[f]		XII_2
367/6			XII_2			XII_2		XII_2			XII_2			XII_2			VI_2		XII_2
348/7			XII_2			XII_2		XII_2			XII_2			XII_2			VI_2		XII_2
329/8			XII_2			XII_2		XII_2			XII_2[g]			XII_2			VI_2		XII_2
310/9			XII_2			XII_2		XII_2			XII_2			XII_2			VI_2		XII_2
291/0			XII_2			XII_2		XII_2[h]			XII_2			XII_2			VI_2		
272/1			XII_2			XII_2	XII_2[i]	XII_2			XII_2			XII_2			VI_2		XII_2
253/2			XII_2			XII_2		(XII_2)[j]			XII_2[k]			XII_2[l]			VI_2		XII_2
234/3			XII_2			XII_2		XII_2			XII_2			XII_2			VI_2		
215/14			XII_2			XII_2		XII_2						XII_2			VI_2		XII_2
196/5			XII_2			XII_2		XII_2			XII_2			XII_2			VI_2		XII_2
177/6						(XII_2)[m]		XII_2						XII_2					
158/7			XII_2											XII_2					

[a] So, for 408/7, according to two sources (of which one is economic) listed in Parker and Dubberstein (1956: 9) and one additional source listed by Walker (unpubl.: LBAT 1411–12). Walker notes that according to LBAT 1427 the intercalation was XII_2; it is likely that LBAT 1427, a Saros text of lunar eclipses, represents a theoretical reconstruction of the calendar that is historically incorrect (see Walker 1997: 24).

[b] So, for 389/8, in Parker and Dubberstein (1956: 9) and in an observational text in Sachs and Hunger (1988-2006: v, no.59; see also textual reconstruction ibid. no. 61). It has been suggested that LBAT 1414 implies instead XII_2 (Walker 1997: 24)—which if correct, would push the institution of the Saros Canon cycle even later—but according to Sachs and Hunger (ibid. no. 2, pp. 6–7; also the appendix by J. M. Steele, ibid. 390–9), this entry in LBAT 1414 is to be dated –333 (334 BCE).

[c] So according to observational astronomical texts in Sachs and Hunger ibid. i, no. 384, v, nos. 59–61. Saros Canon texts, however, place this intercalation in the next year (384/3), where indeed it would rightly belong according to the Saros Canon cycle (in year 3): see Aaboe *et al.* (1991) 14–16. Britton (2007: 122) argues that 'since this is the sole anomaly in a century of

otherwise consistent practice, it seems likely that [385/4] is mistaken, although a plausible explanation of the error is hard to find'. But inasmuch as Saros Canon texts are purely theoretical, it seems far more likely that it is their record (384/3) that is unreliable, representing a later reconstruction of the calendar according to the ideal Saros Canon scheme.

[d] This entry, for 382/1, should be treated as tentative. A theoretical lunar eclipse text (LBAT 1422) and Saros Canon texts have the intercalation in 381/0, where it belongs according to the Saros Canon cycle (in year 6). However, an observational text in Sachs and Hunger (1988–2006: v, no. 59) implies that the intercalation was not in 381/0, but in 382/1 (see comment ibid. 209; this seems not to have been noted in previous scholarship). An intercalation in 382/1 is consistent with the intercalation of 385/4; it looks as though the Saros Canon cycle jumped one year forward in these years.

[e] Not certainly attested, but an economic source (BE ix. 32) dated year 32 of Artaxerxes may belong here, i.e. to Artaxerxes II (otherwise to Artaxerxes I in 433/2; Walker, unpubl.).

[f] The evidence is scant, and appears restricted to an economic document from Nippur that can be dated to this year on the basis that other documents from the same batch belong to the reign of Artaxerxes II (Joannès 1982: 4–6).

[g] Not explicit in any source, but inferable from Saros Canon texts.

[h] Besides being in the Saros Canon, this entry is attested in Sachs and Hunger (ibid. v, no. 69), but the text is not clearly observational.

[i] The previous entry (for 267/6, in year 6), which conforms to the Saros Canon cycle, is attested in ibid. no. 72, an observational text. The present entry (for 266/5), completely out of sequence, is attested in Clay (1913) no. 11 (dated 21 XII_1 46 SE; first Addaru implies intercalation); its provenance from Uruk (as opposed to Babylon, the presumed provenance of Sachs and Hunger v, no.72) is unlikely to account for the discrepancy. Clay (1913: 84) marks the year number with a question mark, presumably only because of this discrepancy.

[j] In this year (246/5 BCE, i.e. 66 SE) one would expect the intercalation of XII_2; but this intercalary month is missing in Sachs and Hunger ibid. v, no. 39, a monthly list of lunar data for the years 62–93 SE. Nevertheless, one intercalation must be posited between 248/7 and 243/2, otherwise the calendar would have fallen one month behind. The right half of the column where, on the tablet, this intercalary month would have appeared is broken (see ibid. pl. 14), which justifies the conjecture that this intercalary month was actually listed (although the editors do not conjecture it, ibid. 101). The tablet is otherwise complete, which excludes the possibility of an intercalation one year earlier or later.

[k] This intercalation is attested once in Sachs and Hunger ibid. v, no. 74 (a text from Uruk dated 121 SE), twice ibid.. no. 39, and once ibid.. vi, no. 69. It is missing in ibid.. v, no. 40, but the dating of this text is uncertain (see next n.).

[l] Attested ibid.. v, no. 39, vi, no. 6. In v, no. 40, XII_2 appears not in this year but one year earlier (241/0, i.e. 71 SE); but the astronomical dating of this source is problematic, and I would regard it therefore as uncertain.

[m] The year of this intercalation (from Sachs and Hunger ibid.. v, no. 81) is uncertain.

Note: Italics are for intercalations attested only in theoretical astronomical sources (generally disregarded if they conflict with other sources). Brackets are for entries that are conjectural or textually problematic.

this kind—the fixation of the Saros Canon cycle—to the advent of Seleucid rule, after Alexander the Great's conquest in the late fourth century BCE.

Why the Saros Canon cycle would have become fixed under the Seleucids is only a matter of speculation. It is unlikely to have been related to Hellenization or Hellenistic culture, for the Greek calendars (and presumably also the Macedonian) were traditionally far more flexible and erratic than their Babylonian counterpart (as we have seen in Chapter 1). It is possible, instead, that the Seleucid kings, although bearers of the title 'king of Babylon', did not consider themselves, as Greeks, sufficiently Babylonian to dictate how the Babylonian calendar should be reckoned. They may have been reluctant, for that reason, to deviate from the Saros Canon cycle that had become established in Babylon under Achaemenid rule.[117]

Intercalation in the Parthian period

It is commonly assumed that the Babylonian calendar and its cycle of intercalations remained fixed for ever through the whole of the Parthian period, and possibly even after the fall of the Parthians in 224 CE.[118] This assumption, however, is impossible to prove, because intercalations are even less well documented in the Parthian period than in the last decades of Seleucid rule, as shown in Table 2.6(*a*). The Saros Canon cycle is reasonably well attested in the first twenty years of Parthian rule (142/1–123/2 BCE), though not without a conflict of evidence in 125/4; after that, the record becomes very sporadic. The few sporadic intercalations that are later attested do match the Saros Canon cycle (Assar 2003); but in the absence of continuous sequences, they cannot prove that the Saros Canon cycle was consistently followed. The conflict of evidence in 125/4 (which previous scholars appear not to have noticed) may be interpreted, in fact, as the beginning of a breakdown of the Saros Canon cycle in the first decades of Parthian rule; although it may also be taken as an irregularity similar to those attested already in the Seleucid period (in the 380s and in 266/5). Astronomical sources such as the Diaries (which date until the mid-first century BCE) suggest that during the early Parthian period the Babylonian calendar was stable in relation to the stars and solar year, which suggests at least that intercalations were well regulated;[119] but this could have been achieved without a fixed 19-year cycle. Given that the Saros Canon cycle

[117] In this section and the next, I am only concerned with how the Babylonian calendar was reckoned in the Seleucid and Parthian periods. The *Macedonian* calendar of the Seleucid and Parthian rulers—in principle, but not necessarily in practice, assimilated to the Babylonian calendar—will be discussed in Ch. 5.

[118] As assumed e.g. by Parker and Dubberstein (1956), Stern (2004).

[119] The texts in Sachs and Hunger (1988–2006), however, are often restored and dated on the assumption of the Saros Canon cycle, which can lead in some cases to a circular argument.

is only firmly attested, as we have seen, for about two centuries (fourth–third centuries BCE), and even then, not without irregularities, there is actually no compelling reason to believe that it was maintained unchanged under the Parthians in subsequent centuries.

Cuneiform evidence ends, with Table 2.6(*a*), in 88/7 BCE, but later in the century Parthian coins become available and may shed light on Babylonian intercalations. Inscribed in Greek, they give the year according to the Seleucid Era and sometimes a Macedonian month-name, which may sometimes be intercalary, although in most cases the name of the intercalary month is not specified. On this basis, Assar (2003) has attempted to reconstruct middle Parthian-period intercalations, as tabulated in Table 2.6(*b*). The record, again, is terribly sporadic (for example, without any attestation of year 3 of the Saros Canon cycle). Assar's reconstruction, moreover, depends on a number of problematic assumptions, as follows:

1. the Macedonian calendar which Parthian rulers used was assimilated and completely equivalent to the Babylonian calendar.
2. the Babylonian calendar thus used was based, in this period, on the Saros Canon cycle (see notes to Table 2.6).
3. the Seleucid Era used on these coins differed from Babylonian usage: it began six months earlier, in VII 312 BCE, and hence all its years began in month VII.

The last assumption (3) may be regarded as reasonable, but the same cannot be said of the first (1); the relevance of Parthian dates to the Babylonian calendar remains, therefore, unclear (see discussion in Chapter 5). More importantly, it is evident from assumption (2) that this table cannot serve as evidence that the Saros Canon cycle was followed, without falling into a circular argument. Every entry in it can only be treated as tentative—especially when, as in most cases, the month-name is not specified in the sources.

Discussion and conclusion

The evidence surveyed above should lead us to reconsider the origins of the Babylonian 19-year cycle. It is commonly assumed that the 19-year cycle was a scientific discovery, the product of advances in Babylonian mathematical astronomy. Britton (1993, 2007) notes that the introduction of a 19-year cycle in the late fifth century BCE coincides approximately with a significant change in the Saros scheme of Babylonian astronomical sources, and suggests that it was the study of eclipses and their cycles that led to the discovery and adoption of the 19-year cycle. The argument is that although the Saros cycle of eclipses is only 18 years long, it would have been noticed that at two lunar eclipses occurring 19 years apart, the moon is positioned near the same star or

Table 2.6. Babylonian intercalations in the Parthian period

(*a*) Early Parthian period (142/1–88/7 BCE), from cuneiform sources

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Year 1 of cycle																	VI_2[a]		*XII_2*
139/8			XII_2			XII_2					(XII_2)			XII_2	VI_2[b]		VI_2		
120/19								XII_2											
101/0			XII_2											XII_2[c]					

(*b*) Middle Parthian period (26/5 BCE–78/9 CE), from numismatic sources (after Assar 2003)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
																			(XII_2)
BCE 25/4																			
6/5											XII_2								
CE 14/15																			
33/4														(XII_2)			VI_2		(XII_2)
52/3						(XII_2)								(XII_2)					
71/2								(XII_2)											

[a] Year 142/1, in Sachs and Hunger (1988–2006) iii. 128–9 (year astronomically identified) and Neugebauer (1955) ii. 442–3 (with also the next entry).
[b] The previous entry (for 126/5, in year 14), which conforms to the Saros Canon cycle, is attested in BM 45629 (= CT 49: 143). The present entry (for 125/4), which suggests an intercalation six months later, is inferred from the date VI_1 (Ululu 1) in BM 33018 (text 21 in Hochberg 1998: 117–20).
[c] Year 88/7 BCE, the latest dated intercalation attested in cuneiform sources (in Sachs and Hunger 1988–2006 iii).

Notes to Table 2.6 (b): Entries in brackets indicate intercalations where the month name is not specified; Assar assumes in all cases XII_2, but only on the basis of the Saros Canon cycle.

Assar argues that the Seleucid Era assumed in Parthian coins begins in autumn 312 BCE, as in Macedonian practice, and thus that all years begin in the autumn (more precisely in Babylonian month VII; Babylonian cuneiform sources assume a Seleucid Era beginning six months later, in the spring of 311 BCE; see further Chapter 5). This table follows Assar in this respect, but for the sake of consistency with Table 2.6(*a*) and previous tables in this chapter, I have converted the data in such a way that years run from spring to spring (month I to month XII).

Not included in the table is a tetradrachm from the reign of Orodes II (57–38 BCE), dated Gorpaios *embolimos* (VI_2) but without the year. Assuming the Saros cycle, the year could only have been 47 BCE. In any event, this is the earliest evidence of intercalation on Parthian coins (Assar 2003: 178).

group of stars; on this basis, a 19-year lunisolar (or more precisely, lunistellar) cycle of intercalations could have been constructed and instituted.[120]

It cannot be denied that astronomy played an important part in calendar regulation. As we have seen, evidence from the neo-Assyrian and earlier periods suggests that the relationship between lunar months and the solar or sidereal year was regularly evaluated, maybe on an annual basis, in order to establish whether an intercalation was necessary. This may have been achieved through the observation of equinoxes and solstices, or (much easier) of stars or groups of stars. Later, by the Seleucid period, the formulation of a fixed scheme for calculating equinoxes and solstices (known as the 'Uruk scheme')[121] may have provided an easier method of establishing whether an intercalation was needed.

But the astronomical foundation of the Babylonian 19-year cycle remains entirely unclear. It is frequently claimed that the cycle was designed in such a way that the year would always begin on or after the true vernal equinox.[122] In objective terms this is correct, since at its earliest occurrence in the cycle, in year 17, the month of Nisannu always began on the day of the vernal equinox, whilst in all other years it began later.[123] However, the Babylonians themselves were probably unaware of this, because their calculation of the vernal equinox was different from ours: according to the 'Uruk scheme', widely used in the Seleucid period, the vernal equinox occurred a few days later than what we know as the true equinox, and schemes used in earlier sources could assume an even later date.[124] As a result, the earliest Nisannu (in year 17) is deemed in the sources to begin a few days (typically, three days) *before* the vernal equinox.[125] In Babylonian terms, therefore, there was no clear relationship

[120] Britton (1993) 66–8, and with more detailed explanation, Brown (2000) 174–5. A particular interpretation of text E, re. 18 (Neugebauer and Sachs 1967: 205) may lend support to this theory, but I consider it unlikely (see Stern 2008: 36 n. 10). Brown (2000) 193 suggests that an astronomical text relating to 616–588 BCE (BM36731) implies an attempt to work out the length of the year, which may have been used in some way for regulating the intercalation; this is another expression of the same paradigm, that calendar regulation depended on advances in mathematical astronomy.

[121] Neugebauer (1975) i. 357–63; Slotsky (1993). Neugebauer (1975) i. 366 surmises that the Uruk scheme may have been introduced in the early 4th c. BCE; Britton (2007) 125 dates it to *c.*350 BCE.

[122] Britton (1993) 67–8, (2007) 120–4.

[123] As astronomically demonstrated e.g. by Huber (1982) 8–10 (note that his analysis is based on the conjunction preceding 1 Nisannu, not on the first day of Nisannu). Hartner (1979) 2–3, (1985) 742–3 argues, on this basis, that the 19-year cycle must have been instituted in 503/2 BCE because in this year 1 Nisannu coincided with the vernal equinox, and this would have constituted the natural beginning of the cycle.

[124] On pre-Seleucid deviations from the Uruk scheme, see Slotsky (1993): e.g. in Sachs and Hunger (1988–2006) v. 194–5 (no. 57, 423 BCE), the equinox is reckoned one day later than according to the Uruk scheme, and so ibid. 236–9 (no. 62, 379 BCE).

[125] This is explicit e.g. in Sachs and Hunger (1988–2006: iii. 116–7), where in 142 BCE (year 17 of the 19-year cycle) the equinox is said to have been on 4 Nisannu. See also ibid. i. 108–9, where

between the equinox and the 19-year cycle; the equinox, therefore, does not provide an astronomical rationale to the Babylonian 19-year cycle.[126]

Furthermore, the odd construction of the Saros Canon cycle, with one short, two-year interval and two sequences of two long, three-year intervals (see Table 2.3) suggests very strongly that this cycle was not the intentional design of any astronomer. A cycle designed by an astronomer would have been given a far more rational pattern. The 'optimal' 19-year cycle (see Table 2.3) would have been not only better balanced, but also the easiest and most natural to construct from first principles, as it consists very simply of an alternation of 3 and 2½ year intervals—as was already followed during Cyrus' and Cambyses' reigns—with an additional 2½ year interval at the end. That this cycle was not used, so far as the evidence suggests, at any stage in Babylonian history must be regarded as highly significant. It indicates that the various intercalation cycles that were adopted, culminating with the Saros Canon cycle in the later Achaemenid and Seleucid periods, were not the result of scientific discoveries, but rather the result of a gradual, haphazard

in 373 BCE (year 14 of the cycle) the equinox is said to have been on 2 Nisannu (which would have 30 March, whereas we know the true equinox was 4 or 5 days earlier). Britton (2007) 123 suggests that the framers of the 19-year cycle must have had 'a more accurate idea of the date of the equinox' than was later laid down by the Uruk scheme; but this is an unwarranted hypothesis. There is no reason why anyone should assume that the equinox as we now reckon it would have been of any significance to the Babylonians.

126 Britton (2007) 120–4 sees a progressive retardation of the Babylonian calendar between the mid-8th and late 6th cc. BCE, such that at the beginning of this period Nisannu always began before the equinox, whereas by the early 5th c. BCE, when the 19-year cycle was instituted, Nisannu always began on or after it. He further interprets this progressive retardation (due, no doubt, to a slight but consistent tendency to over-intercalate) as 'a gradual program of letting the beginning of the year slide later in the seasonal year with the aim of restoring the ancient calendaric tradition in which the equinox fell in . . . month XII' (as in the Old Babylonian calendar, and not in month I as in the more recent, neo-Assyrian calendar). In the first half of the 6th c. the process was accelerated, which suggests 'an effort to restore the calendar to the Old Babylonian convention immediately rather than gradually'. However, 'that effort was quickly countered by a reversion to a more gradual and less discontinuous path of change'; eventually, this more conservative approach won out (ibid. 124). It seems most unlikely, however, that a program of calendar reform should have been intentionally designed—as Britton argues—in such a way as to be implemented over the very long period of about two centuries. This would have meant that the reformers would never have lived to see the outcome of their reform, and would have needed to rely on future generations to accept the terms of the reform and understand it sufficiently well to carry it out effectively and accurately. Far more reliable and expedient, instead, would have been to carry out a single supernumerary intercalation, which would have shifted instantly the whole calendar into the desired (on this interpretation, Old Babylonian) relation; this is how calendar reforms are normally implemented. The equinox is therefore unlikely to have motivated the tendency to over-intercalate in the earlier period, or to have determined the institution of a fixed cycle (and hence, naturally, the arrest of this tendency) in the 5th c. BCE.

Table 2.7. Intercalation schemes in the Babylonian calendar

Period	Dominant reigns	Intercalation scheme
7th c. BCE–537/6	Neo-Babylonian dynasty	none[a]
536/5–519/8	Cyrus, Cambyses	3–2½-year intervals in alternation
533/2–503/2	Cambyses, Darius I	8-year cycle (loose, then rigid)
525/4–465/4	Darius I, Xerxes	Loose 19-year cycle
464/3–411/10	Artaxerxes I, Darius II	Rigid 19-year cycle (with only XII_2)
425/4–141 BCE (?)[b]	Darius II–end of Seleucid rule (?)	Saros Canon 19-year cycle
141 BCE–early 3rd c. CE	Parthian dynasty	?

[a] Except for the reign of Nabopolassar (625–604); see Table 2.1.
[b] The evidence becomes very patchy after 178/7 BCE.

Note: The purpose of the middle column is to show that specific intercalation schemes were often linked to specific kings. This column names the dynasties or kings whose reign occupied *most* of the relevant period, but often ignoring the first few years of the period: for example, the third row covers the period of 533/2-503/2, but omits referring to Cyrus (although he was still reigning in the late 530s), on the assumption that although the intercalation scheme (eight-year cycle) may have already started in the late 530s, in these early stages it would not have been regarded as formally established.

process of trial and error in which mathematical astronomy played but a minor part.[127]

To gain an understanding of this gradual, developmental process, the results of our investigation are tabulated in Table 2.7. In this table, different intercalation schemes are assigned to specific periods that tend to coincide, significantly, with specific dynasties and reigns; but many of these periods overlap with one another. This partially reflects our own uncertainty as to when exactly, for example, the 3–2½-year interval scheme was abandoned in favour of the eight-year cycle, or when the eight-year cycle was superseded by the loose 19-year cycle (if indeed, in this case, there ever was an eight-year cycle; all this has been discussed above). But the overlaps in this table also reflect, more importantly, the *objective* difficulty in identifying transitions from one intercalation scheme to the next, since during the periods of overlap it could be said that both schemes were simultaneously in use. Indeed, in many cases the Babylonians themselves may have been unsure whether, or unaware that, they were in the process of switching from one scheme to another. Thus, the years of overlap should best be regarded as indeterminate transition periods. It is through these transitions that the 19-year cycle of the Saros Canon was eventually formed.

It stands to reason that the gradual fixation of the intercalation was a process led by the kings—who had always been invested with control of the

[127] The relationship between calendar regulation and astronomy has generally been overstated. It is certainly absurd to argue, as many have done, that the development of Babylonian astronomy itself was motivated by an urge to regulate the calendar: indeed, planetary and stellar astronomy, which dominate Babylonian astronomy, have no relevance to the lunar calendar (Brown 2000: 170 and n. 195).

intercalation, and whose reigns, e.g. Artaxerxes I, often coincide with specific intercalation schemes—rather than by the astrologers. The fact that fixed intercalation schemes were introduced precisely from the beginning of the Achaemenid period, early in Cyrus' reign, suggests beyond doubt a deliberate, dynastic policy. Why the Achaemenids promoted the regularization and fixation of the intercalation, eventually with a 19-year cycle, is by no means self-evident. In political terms, indeed, this policy should have been regarded as disadvantageous: to the kings, fixed cycles meant loss of control over intercalation and of the ability to order it at will. Why this ability was forfeited in favour of fixed cycles must therefore be explained.

Brown (2000) 170 and n. 195 argues that the Babylonian calendar, and more particularly intercalation, were regulated in order to facilitate the work of astronomical prediction. But although astrological omens, which often depended on astronomical predictions, were given considerable importance in Babylonian society and in royal decision-making and policy, it seems unlikely that the convenience of astrologers (who were responsible for these predictions) was the only or main reason why the intercalation was fixed.

The regularization and fixation of the intercalation was, far more likely, the result of much larger-scale developments in Babylonian society. As we have seen, already in the Assyrian period the calendar of Babylon was no longer local or civic, but had become an official imperial calendar. Its use in the Assyrian Empire was hindered, however, by the difficulty of communicating the king's calendrical decisions (such as whether or not to intercalate) from Assyria to Babylonia in good time: in one case, for example, the decision to intercalate a second Ululu arrived in Babylon five or six days late.[128] The territorial expansion of the empires only exacerbated this problem. In the Achaemenid Empire, in particular, the use of the Babylonian calendar for official, administrative purposes is attested far to the east in Elam, Persia,[129] and Bactria (Afghanistan),[130] far to the west in Asia Minor (Xanthos, in Lycia, and Sardis in Lydia); and far to the south in Egypt, as far as the imperial, southernmost outpost of Elephantine.[131] The Babylonian calendar was also disseminated through population movement within the Empire: thus, it is

[128] See above, n. 85.

[129] At least inasmuch as it strongly influenced the Elamite and Old Persian calendars, which soon became assimilated to it (these calendars are attested in the first half of the 5th c. BCE: see Hallock 1969, and further Ch. 4). The biblical books of Esther (2: 16, 3: 7, 3: 13, 8: 9, 8: 12, 9: 1) and Nehemiah (1: 1, 2: 1) suggest the official use of the Babylonian calendar in Susa, capital of Elam, in the early Achaemenid period; this is likely to be true, even if these literary Jewish sources do not necessarily constitute reliable evidence.

[130] Shaked (2004) 42–5, Naveh and Shaked forthcoming, documents from the late Achaemenid period. Some Babylonian month-names were adopted, in the late Achaemenid period, in the Sogdian and Bactrian calendars (see Sims-Williams and de Blois 2005, and discussion in Ch. 4, near n. 47).

[131] See above, n. 4. For Asia Minor, the evidence is also late Achaemenid.

used by Babylonians in Ecbatana (Media) in 537 BCE (Stolper 1990), and by Greeks (probably Ionians) in Persepolis in the early fifth century BCE.[132]

The use of a single politically controlled calendar across such vast territories became a sheer impossibility. Although the Persian imperial post was famed for its speed and efficiency, it could easily have taken one whole month for a government courier to get from Babylon to southern Egypt;[133] and we do not know whether or how regularly Achaemenid kings were prepared to send express messengers for the specific and only purpose of conveying calendrical decisions. Evidence shows that at Elephantine in the fifth century BCE news of the intercalation was sometimes delayed by many months, leading to a one-month discrepancy between the local calendar and the official calendar of Babylon (Stern 2000*a*). This suggests that the dissemination of calendrical information across the Persian Empire was never more than random and sporadic.

I would like to propose, therefore, that the regularization and eventual fixation of the intercalation from the beginning of the Achaemenid period represented a politically motivated attempt to overcome these difficulties and enable the observance of a single identical Babylonian official calendar

[132] Hallock (1969) 2. This Greek document (Fort. 1771) uses the Babylonian month Ṭebet in Greek transliteration (TEBHT)—an interesting mixture of languages and cultures. The calendar normally used in Persepolis in this period was Old Persian (itself probably assimilated to the Babylonian calendar: see above, n. 129), but foreigners seem to have preferred the more 'international' Babylonian names of months.

[133] On the Persian imperial post, see Herodotus *Histories* 8. 98, Xenophon *Cyropaedia* 8. 6. 17–18. In his description of the Susa–Sardis royal road, Herodotus assumes an average travel speed of 150 stades per day, hence a total journey of three months from Sardis to Susa (*Histories* 5. 52–4). However, imperial couriers are likely to have travelled much faster, as in emergencies the 2400 km journey from Susa to Sardis could have taken just one or two weeks: for various estimates, see D. M. Lewis (1977) 56–7, J. M. Cook (1983) 108, Graf (1994) 167, and Briant (1996) 372–3, 382–4 (who also cites Arrian, *Indica* 43. 3–5, on an 8-day forced march across the Arabian peninsula). We may assume similar distances from Babylon to Elephantine: unless in cases of emergencies, the journey would normally have taken at least the best part of a month. For comparative purposes, see Wellesley (1967) 27, on the speed of couriers in the Roman Empire (based on Tacitus, *Histories* 1. 18. 1). Early rabbinic sources suggest that in late antiquity, it took more than two weeks for the dates of the new month to be transmitted from Palestine to Babylonia (hence the necessity, in Babylonia, to observe *two* festival days in the middle of the month: see Stern 2001: 243–7). For a late medieval estimate of the time needed to convey calendrical information from Jerusalem to (Lower) Egypt, see Maimonides, *Sanctification of the New Moon* 5. 10 (Gandz, Obermann, and Neugebauer 1956: 25): 'eight days or less'. On the possibility of rapid communication through fire signals and chains of beacons in the Achaemenid Empire, see Lewis loc. cit., Graf (1994) 168, and Briant (1996) 382–4, 953; but although this method is mentioned in the Mishnah as means of disseminating calendrical decisions, it seems unlikely to have been used for these purposes in the Achaemenid Empire, let alone for the purposes of the Jewish Mishnaic calendar itself (see Stern 2001: 158, 162–3). The same applies to Achaemenid systems of rapid communication through hill-top criers described by Diodorus (19. 17. 6–7), especially as Diodorus suggests that this system operated only in the rugged terrain of the Persian satrapy; the story in Cleomedes (*Caelestia* 2. 1. 156–61) that under Xerxes messages were conveyed through criers from Athens to Susa in two days looks more like legendary fantasy.

throughout the vast expanses of the newly formed Achaemenid Empire. A similar argument has been suggested above with regard to the regularization of the Babylonian month and the use of advance predictions for the determination of month-lengths (§1); but with regard to intercalation the administrative advantages of calendar regularization are even more evident. Once a fixed scheme or cycle became established and known, imperial administrators in the more remote regions of the empire could easily calculate and predict when the next intercalation was due. In this way, the whole empire was able to reckon the same, identical calendar without depending on the sporadic and delayed dissemination of calendrical information from the centre of the empire to its periphery.

This policy appears to have achieved a measure of success. It is no coincidence, indeed, that cases of inconsistency (i.e. where different cuneiform sources assume different intercalated years) are confined to the early period, largely the sixth century BCE.[134] Whilst we are unable to explain these inconsistencies,[135] it is significant that they hardly occur after the reign of Darius I, once fixed cycles of intercalations were introduced. Clearly, these cycles enabled the same intercalations to be assumed in all cuneiform texts, without any further inconsistencies.

The regularization of intercalation had also other imperial, administrative advantages. Control of the calendar had always been a privilege of the king, but in the context of the Achaemenid Empire, where the king was no longer based in the city of Babylon or in Mesopotamia (except for limited periods of time), management of the calendar of Babylon may have become a burden. Again, the scale of the empire meant that it was no longer practical for kings to participate in Babylonian calendrical decisions on a monthly basis. By instituting various intercalation schemes at the beginning of their reigns, Achaemenid kings were able to assert their personal authority over the calendar whilst not having to involve themselves excessively in matters of calendar control. They could also maintain their authority over the calendar by

[134] Inconsistencies occur in 596/5, 584/3, 597/8, 555/4, and 522/1 (the first year of Darius I), as noted above in the tables. Two further cases occur in 509/8 and 506/5, but these are probably errors. In the subsequent period, only one inconsistency occurs in 385/4 (as explained above, most probably a reflection of the theoretical nature of the Saros Canon) and another in 267/6 (the only comparable case to those of the 6th c.).

[135] Our information about the provenance of the cuneiform sources, for instance, is insufficient to establish whether these inconsistencies might have been due to regional difference and the difficulty of communicating calendrical decisions to from one region to the next, as is attested in the Elephantine papyri of the 5th c. In general, however, the provenance of our 6th-c. cuneiform sources appears to be Babylonia; this does not readily account for these inconsistencies, since the distance between various Babylonian cities was relatively small. In all the cases from 596/5 to 522/1, the single inconsistent source places the intercalation one year *earlier* (in 584/3, six months earlier; whereas in 509/8 and 506/5, the inconsistent intercalation is one year later). This may well be significant, although I am unable to explain how.

reserving the right to deviate, on occasion, from the fixed cycle. Thus the kings did not entirely relinquish control of the calendar; however, their priority was now to establish a standard calendar for the whole empire.

The evolution of the Babylonian calendar in the Achaemenid and later periods—with the regularization of the beginning of the month, and even more distinctively, the fixing of intercalation—was thus not led by scientific discoveries, but by political objectives. These objectives were not peculiar to the Achaemenid dynasty, but also shared by the Seleucids and common, indeed, to all the great empires that established themselves thereafter in the Near East.[136] In the course of subsequent centuries, the rise of vast empires together with the need, perceived or real, for a single official calendar within them was to lead to the increasing fixation of calendars that had previously been flexible. The use of fixed, homogeneous calendars across the empires became, in administrative as well as in cultural terms, an important source of cohesion in the ancient world.

[136] Similar motives led the Achaemenids, as we shall see in Ch. 4, to institute a new Persian calendar that was used in the northern and eastern sectors of the Empire, which was non-lunar and completely fixed.

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3

The Egyptian Calendar

The Egyptian calendar was probably the simplest calendar of the ancient world. In contrast to the irregular, unpredictable calendars of Babylonia and Greece, it was regular, changeless, and fixed. Its structure was almost completely uniform: all months were of 30 days, and all years of 12 months. The only anomaly was the addition of 5 days (the 'epagomenal', i.e. additional, days) at the end of each year, so as to bring its total length to 365 days.

Nilsson has written of this calendar that it was 'the greatest intellectual feat in the history of time-reckoning'.[1] This is undoubtedly an overstatement. The average or approximate solar year-length of 365 days is not very difficult, empirically, to work out, hence not much of an intellectual feat. Besides, the Egyptian calendar was not without deficiencies. As it did not have the equivalent of our leap years, this calendar drifted away from the solar year by one day every four years.

The excessive praise that is commonly bestowed on this calendar, by Nilsson as well as other scholars, reflects to some extent a modern bias. The modern attraction to the Egyptian calendar is partly due to its structural and functional similarity to the present-day Gregorian calendar: it corresponds, more than anything else in the ancient world, to what we expect nowadays of a calendar. This, however, is no historical accident, as the origins of the Gregorian calendar go back to the Egyptian. As we shall see in the next chapter, the Egyptian calendar was gradually adopted, in various shapes and forms, by the peoples of the ancient Mediterranean and Near East; by the end of Antiquity, it had displaced nearly all other calendars, resulting in the Julian and later the

[1] Nilsson (1920) 280, cited in Depuydt (1997) 9. Similarly inflated statements are made in later scholarship, e.g. Neugebauer (1969) 81: 'the only intelligent calendar which ever existed in human history'; Hannah (2005) 88: 'extraordinary achievement'. Note, however, Neugebauer's earlier opinion (1942) that the Egyptian calendar, drifting by one day every four years, was simple, 'primitive', and only preserved unchanged out of an innate conservatism. The year-length of 365 days, and its use in the form of a fixed calendar, was actually not unique to Egypt in the history of humanity: similarly fixed calendars of 365 days were conceived and used, quite independently from Egypt, by the civilizations of Central America from the first millennium BCE until the present day (see Edmonson 1988; Mesoamerican calendars, however, are outside the scope of this work).

Gregorian calendar that is universal currency today. As distant inheritors of the Egyptian calendar, we naturally have more affinity with it than with any other ancient calendar.

This said, the Egyptian calendar also attracted praise among the ancients, especially the ancient Greeks. Thus Herodotus (fifth century BCE), who provides us with the earliest comprehensive account of the Egyptian calendar:

> As to human matters, they [the Egyptian priests] all agreed in saying that the Egyptians by their study of astronomy discovered the year and were the first to divide it into twelve parts—and in my opinion their method of calculation is better than the Greek; for the Greeks, to make the seasons work out properly, intercalate a whole month every other year, while the Egyptians make the year consist of 12 months of 30 days each and every year intercalate five additional[2] days, and so complete the regular cycle of seasons (*Histories* 2. 4; Sélincourt 2003: 96).

Herodotus seems to commend the Egyptian calendar as superior to the Greek not because of its arithmetical simplicity, but rather because of its greater conformity to the seasons. This was strictly inaccurate, since the Egyptian calendar drifted from the seasons at the rate of one day in four years, a discrepancy which Herodotus may not have been aware of. But even if he was aware of it, he may still have considered the Egyptian calendar more stable, in relation to the seasons, than the calendars of the Greeks, which often fluctuated as a result of irregular intercalations. This finds explicit expression in the first-century BCE account of Diodorus Siculus, who similarly emphasizes that the Egyptians 'do not intercalate months or suppress days as most of the Greeks do'.[3] Effectively, what was being praised by these authors was the Egyptian calendar's *regularity*.[4]

Another reason for praising the Egyptian calendar, among Graeco-Roman writers, was its alleged astronomical foundations (alluded to already in

[2] Or better, 'supernumerary' (*πάρεξ τοῦ ἀριθμοῦ*). In later sources (e.g. the Canopus decree ll. 44–5, to be discussed below), the standard Greek term became *ἐπαγόμεναι*, i.e. additional or 'epagomenal'.

[3] Diodorus Siculus 1. 50. 2. According to him, the Egyptian year counts 365¼ days; this must be a reference to the Alexandrian calendar, instituted under Roman rule towards the end of his life (20s BCE), in which a sixth epagomenal day was added every four years (discussion of this calendar will be left to Ch. 5). Another passage (1. 44. 4) suggests that Diodorus was writing this part of his work before the Roman annexation of Egypt in 30 BCE, which appears to rule out the possibility of a reference to the Alexandrian calendar; however, the words 'and a quarter' (*καὶ ἡμέρας τέταρτον*) may be a later scribal addition, or even a later addition by the author himself. Diodorus' statement that unlike the Greeks, the Egyptians 'do not intercalate months or suppress days'—without mention of intercalation of days—seems to suggest that Egyptians do have in common with Greeks the intercalation of days. This might be on account of the intercalation of the sixth epagomenal day; alternatively, Diodorus may be thinking of the five epagomenal days of the pre-Roman Egyptian calendar, which could reasonably be construed as an intercalation (Diodorus' text is therefore not internally contradictory, *pace* Bomhard 1999: 28–9).

[4] As noted long ago by Weill (1928) 46–8. See similarly Macrobius, *Saturnalia* 1. 12. 2.

Herodotus' passage). Many believed that the Egyptian calendar was regulated by the sun;[5] only the more astronomically inclined recognized that the Egyptian calendar was regulated neither by the moon nor by the sun, as it was constantly falling behind the seasons.[6]

But the reason why the Egyptian calendar spread and took over the ancient world was not that Greek writers had praised it; in actual fact, of all peoples in Antiquity, the Greeks probably remained the most resistant to its adoption. Nor can one assume that the Egyptian calendar was attractive because of its inherent simplicity. To some extent, the notion that the Egyptian calendar was simple and easy to use is a modern misconception, based on the modern experience of the Gregorian calendar; but as will be argued further on in this chapter, ancient perspectives may have been quite different. The displacement of other calendars in the Mediterranean and the Near East in favour of the Egyptian calendar or its derivatives will be discussed in the next chapter, but it is unlikely to have been due to belief in the intrinsic superiority of the Egyptian calendar.

The Egyptian calendar is so simple and non-problematic that it would appear, at first sight, not to demand any discussion or analysis. Yet for a number of reasons, it has been the focus of considerable debate among Egyptologists.[7] Above all, there is the problem of the evidence. The earliest description we have of the Egyptian calendar is in Herodotus, an external and relatively late source (cited above); descriptions of this kind appear only later in indigenous Egyptian sources. The calendar can be identified in much earlier Egyptian texts, but the evidence is sporadic and usually open to more than one interpretation. The first section of this chapter will address some of the debated issues, including the origins of the Egyptian calendar, and how Egyptian society accommodated itself to a calendar that was slowly drifting from the seasons: in particular, whether there was a 'Sothic calendar' (an alternative calendar that remained stable in relation to the seasons), and how the decree of Canopus should be interpreted. The second section of this chapter will turn to the Egyptian lunar calendar—an alternative, cultic calendar that appears to have regulated the organization of priesthoods and

[5] Diodorus Siculus loc. cit.; Strabo 17. 1. 29, 46. Strabo's explanation of the sixth epagomenal day makes it clear that he is referring to the Alexandrian calendar, which was instituted by the time he was writing, even though in the first passage he claims, perhaps not unreasonably, that the year length of 365¼ was known to Egyptian priests already in the period of Plato and Eudoxus. The Alexandrian year length is much closer to the solar year than the 365 days of the pre-Roman Egyptian calendar, but I suspect Strabo would have also characterized the latter as solar. Whether Diodorus is referring to the Alexandrian calendar or the pre-Roman Egyptian calendar is more ambiguous: see above, n. 3.

[6] Geminus, *Elem. Astr.* 8. 16–25 (Aujac 1975. 51–2).

[7] The literature is abundant, and stretches right back to 19th-c. scholarship. For various summaries, see Parker (1950) and Clagett (1989–99) ii. The most important single contribution to this subject was probably made by Parker, although he certainly did not have the final word.

temples—of which the nature and relationship to the main (or 'civil') Egyptian calendar have also generated considerable debate. At the end of the chapter, I shall reflect on the uniqueness of the (civil) Egyptian calendar in the context of the Mediterranean and Near East, and why, in spite of its uniqueness, the Egyptian calendar or its derivatives succeeded eventually in taking over nearly the whole of the ancient world.

1. THE CIVIL CALENDAR

The Egyptian 365-day calendar is known today as the 'civil' calendar, a term first used by Censorinus in the third century CE (*De Die Natali* 18. 10). It consisted very simply of a fixed 365-day year, divided into twelve 30-day months and ending with five extra or 'epagomenal' days. This calendar was thus nearly solar, but not quite: because there was no equivalent to the 'leap year' of our modern, Gregorian calendar, the Egyptian calendar fell behind the solar year at a rate of about one day every four years. The civil calendar appears in virtually all dated documents and inscriptions in ancient Egypt, whether in cultic or in more general contexts; this clearly was the dominant calendar.

Origins

The civil calendar was extremely ancient, as evidence goes back to the third millennium BCE; but its origins are shrouded in mystery. On the one hand, the subdivision of its year into 30-day periods ('months') suggests that the calendar may have been originally lunar, since periods of this length have no inherent rationale in any other calendrical system. Moreover, the hieroglyph for 'month' (*Abd*) includes a crescent moon, which implies a lunar connotation.[8] The civil, 30-day month calendar could thus have been the simplification of an originally lunar calendar comprising 29- and 30-day months; the addition of five epagomenal days would have represented an attempt to bring this calendar in line, albeit approximately, with the solar year.

On the other hand, the Egyptian names of months suggest that this calendar may have been originally seasonal. In the Egyptian calendar, indeed, the twelve months of the year are grouped into three seasons and named after them; each

[8] Clagett (1989–99) ii. 7; Depuydt (2009) 117 n. 2. The interpretation of this hieroglyph as a crescent moon appears to be beyond dispute, even though it is depicted as pointing downwards (i.e. its concavity faces downwards), whereas in reality a moon crescent is always either facing upwards or slightly tilted sideways.

season comprises four months numbered I to IV. The season names are, with their common translations:[9]

Akhet (*Aḫt*), 'inundation'
Peret (*prt*), 'emergence' (growth, seed, winter)
Shemu (*šmw*), 'low water' (dryness, summer)

The months of the year are thus called, in Egyptian sources, I Akhet, II Akhet, etc. Egyptian months also had individual names, sporadically attested in the New Kingdom period (second half of the second millennium), but these only came into systematical use in the Achaemenid period (fifth–fourth centuries) and Ptolemaic periods (from the third century BCE), when they appear in Greek texts as Thoth, Phaophi, Athyr, Choiak, Tybi, Mechir, Phamenoth, Pharmuthi, Pachons, Payni, Epiphi, and Mesore.[10]

The earlier nomenclature (which persisted even after the Ptolemies, with I Akhet equivalent to Thoth, etc.) suggests that the dominant feature of the calendar was agricultural or seasonal, whereas the subdivision of seasons into four months was only for a schematic, arithmetic convenience. Seasons such as the inundation (of the Nile) follow the solar year, and are thus independent of lunar phenomena. The month-names of the civil calendar suggest, therefore, that the origins of this calendar were not lunar but seasonal. The institution of a fixed, 365-day calendar may have represented an attempt to schematize the seasonal year. But because this scheme was short of one day every four years, the Egyptian civil calendar soon lost its relationship with the seasons (for example with I Akhet occurring, for considerable historical periods, outside the actual season of inundation and thus representing 'inundation' only by name).

Scholars generally assume that the Egyptian calendar was originally lunar, and later replaced by the civil calendar.[11] However, the possibility that it was originally seasonal must also be given serious consideration.[12] It is also possible that the calendar originally combined both features, i.e. lunar months, but with a system of intercalation that maintained these months in the same seasons. In the absence of evidence, the question remains open.

The civil calendar of 365 days is attested very early on, with evidence going back to the third millennium BCE. The entries in the royal annals of the Fourth

[9] On these names and their translation, see Depuydt (2007) 72–3.

[10] Clagett (1989–99) ii. 4–5, Depuydt (1997), 2009 (134). In the Achaemenid period, the same names are attested in Aramaic (see Porten and Yardeni 1986–99); and in late Antiquity they are attested in Coptic. A list of twelve other month-names appears in the Ebers calendar (late 16th c. BCE), but clearly not pertaining to the civil calendar; the nature of these months will be discussed below.

[11] Parker (1950, 1974); Neugebauer (1942); Clagett (1989–99) ii. 31–6; Depuydt (1997) 16–18.

[12] Clagett (1989–99) ii. 4.

and Fifth Dynasties (normally dated to the third quarter of the third millennium BCE) indicate, on the accession of a new king, that the year (from New Year to New Year) that he shared with his predecessor amounted to twelve months and five days.[13] Although the length of these months is not specified, the addition of five days is characteristic of the civil calendar and cannot be explained as relating to any other calendrical system. More evidence from the Fifth Dynasty is the testament of the priest Nekonkh, where five epagomenal days appear to be positioned at the beginning of the year.[14] A little later in the third millennium, inscriptions on Pepi II's pyramid (Sixth Dynasty) refer to the birth of the gods during the five epagomenal days, which again are specific to the civil calendar.[15]

The common scholarly view is that the civil calendar was instituted even earlier, around 2780 BCE. This precise date is based on an astronomical argument which I shall now explain, but which on balance, as we shall see, is unconvincing. It is based on the assumption that the New Year was originally set to coincide with an astronomical event that recurs on an annual basis, the heliacal rising of Sothis. Sothis (the Greek derivation of Egyptian *spdt*) is a very bright star known today as Sirius; its heliacal rising is when it appears for the first time, following a long period of invisibility, on the eastern horizon shortly before sunrise. A number of ancient Egyptian sources establish a connection between the New Year and the heliacal rising of Sothis (more on this below). However, as mentioned above, the Egyptian civil year fell behind the solar year—and thus behind the rise of Sothis—by about one day every four years, which means that the coincidence of the civil New Year with the heliacal rising of Sothis could never be maintained (the New Year returned to its original position in relation to Sothis only after a cycle of 1461 Egyptian civil years).[16] Nevertheless, the traditional association of the New Year with the rising of Sothis suggests that the New Year of the civil calendar was *meant* to coincide with this astronomical event, and that it did so when the calendar was originally instituted. Prior to the third quarter of the third millennium BCE, when we know the civil calendar was already in place (see above), the civil New Year and the heliacal rising of Sothis would have coincided in the four-year period of 2781 to 2778 BCE; it is then, therefore, that the civil calendar was supposedly instituted.[17]

[13] So for the accession of Neferirkare (Fifth Dynasty), and possibly for that of Shepsekaf (Fourth Dynasty; based on a conjectural but plausible reading): ibid. i. 86–7, 92–3, 107, ii. 28–9. This is assuming that the royal annals are reliable records, not later reconstructions.

[14] Ibid. ii. 170–2, 183; Weill (1926) 63.

[15] Clagett (1989–99) ii. 28–9; further evidence is adduced, but in my view not as convincing.

[16] Because 1461 Egyptian civil years equal exactly 1460 Julian years, as noted e.g. by Censorinus, *De Die Natali* 18. 10.

[17] Clagett (1989–99) ii. 31–33, rightly stressing that this theory remains conjectural.

This ingenuous argument depends, however, on a number of questionable assumptions. Firstly, it is based on a precise date for the heliacal rising of Sothis, which is taken to be 20 July (which coincided with the Egyptian civil New Year, I Akhet 1, in 2781–2778 BCE). Whether or not this date is astronomically correct, heliacal risings are difficult in practice to observe; we do not know how accurately the Egyptians, in the early third millennium BCE, would have been able to establish its date.[18] Moreover, the date of the heliacal rising of Sothis varies according to the earthly latitude of the observer by about one day per degree of latitude; since the kingdom of ancient Egypt extended across seven degrees of latitude (from Aswan to the Mediterranean), the heliacal rising of Sothis would have been visible in different parts of Egypt on different days, and hence could have been dated at any time within a six- to eight-day period.[19] Sources from the Ptolemaic and Roman periods indicate that the rising of Sothis was assumed at that time to take place on 19 or 20 July,[20] and it is on the basis of the latter that scholars have worked their way back to the precise dates of 2781–2778 BCE. However, there is no evidence that the heliacal rising of Sothis was defined in the same way in earlier centuries, as far back as the third millennium BCE, as occurring on a date corresponding to 20 July of the retrojected Julian calendar.

Secondly, the astronomical argument assumes (1) that the heliacal rising of Sothis was observed and recorded in Egypt as early as the third millennium BCE, and (2) that it was associated with the beginning of the civil year. Both points are evidenced in the second millennium BCE, but not earlier. A letter from the archive of Illahun (nineteenth century BCE) predicts the date of the rising of Sothis, clearly for cultic purposes:[21] other documents from

[18] Modern astronomical data actually suggest that in the early third millennium BCE, a more accurate date for the apparent heliacal rising of Sothis in lower Egypt would have been 16/17 July (and in upper Egypt, even earlier): Schaefer (2000) 150.

[19] Weill (1926) 189–204, (1928) 27–37; Bomhard (1999) 46–7; Belmonte Avilés (2003) 19, 42.

[20] This date can be treated as fairly stable, because the date of the rising of Sothis varies very little in relation to the (retrojected) Julian calendar. Sources from the Ptolemaic and Roman periods assume dates ranging from 19 to 22 July (but mainly 19 July: O'Mara 2003: 18 n. 5). Thus the decree of Canopus, from 238 BCE, gives the date of Sothis for that year as 1 Payni (i.e. II Shemu 1), which corresponded then to 19 July (ll. 36–7 of the Greek version, cited below; also in Clagett 1989–99: ii. 326–31, Pfeiffer 2004: 121–3). Much later, in the 3rd c. CE, Censorinus (*De Die Natali* 21. 9–10) reports that the last coincidence of the New Year (1 Thoth) and the heliacal rising of Sothis was in 139 CE, when 1 Thoth was 20 July (Clagett 1989–99: ii. 333–5; the text reads 21 July, which is erroneous and may be Censorinus' own error); however, this source cannot be treated as authoritative, as Censorinus was clearly picking a date of Sothis that would suit his own chronological purposes (O'Mara 2003). The date of 20 July would appear to suit the latitude of Alexandria, i.e. the northernmost point of Egypt (see Schaefer 2000; also Weill 1926: 195–7; Bomhard 1999: 46–7), which is not surprising for the Ptolemaic and Roman periods but perhaps less appropriate to Old Kingdom Egypt.

[21] Pap. Berlin 10012 A (Luft 1992: 54–7). On the question of whether the rising of Sothis was actually observed, or rather calculated on the basis of the civil calendar (i.e. by adding one day to its civil date every four years), see Clagett (1989–99) ii. 307–15.

the archive confirm that this day was treated as a festival,[22] and so does a contemporary document from the temple of Amon-Re in Thebes.[23] But its calendrical significance only becomes evident in the Ebers calendar, dating from the sixteenth century BCE (more on this text below), where the rising of Sothis appears as a marker of the beginning of the year.[24] The assumption that the same tradition existed more than a millennium earlier is simply unwarranted. It is quite possible, indeed, that the association of the New Year with the rising of Sothis was only developed at a later stage.

A more plausible theory of origins is that of Neugebauer, who argues that the civil calendar could not have been established on the basis of an astronomical criterion (the heliacal rising of Sothis), because the calendar's drift of one day every four years would have disrupted the relationship between Sothis and the New Year almost from the outset. Instead, Neugebauer suggests that the calendar was originally based on a seasonal criterion, whereby the New Year, I Akhet 1, was intended to coincide with the beginning of the inundation of the Nile, as indeed the name Akhet ('inundation') suggests.[25] Unlike the heliacal rising of Sothis, the inundation of the Nile was not a punctual event but a gradual process, which started every year in southern, upper Egypt a little after the summer solstice, and then spread downstream to lower Egypt during the following two months.[26] Thus, the beginning of inundation was not an event that could be precisely defined. If the original intention had been to set the New Year at the beginning of inundation, it may have taken a long time for anyone to realize that the calendar was drifting away from it (by one day every four years), which means that the calendar would not have been invalidated

[22] Pap. Berlin 10007, 10012 B, 10344 (Luft 1992: 44–7, 57–8, 122–4, 321–4).

[23] Clagett (1989–99) ii. 259, 271. Similar evidence from Elephantine, early 15th c. BCE: ibid. 325–6 (also Weill 1926: 124).

[24] Clagett (1989–99) ii. 9–11, 167–70 (refuting earlier evidence adduced by Parker 1950), and 193–216 (for the text of the Ebers calendar, on which see further below). Other texts that associate the rising of Sothis with the New Year are pap. Chester Beatty 1 (see below, near n. 37) and the early 12th-c. BCE temple inscription of Medinet Habu (Weill 1926: 8, 128). Much later, in the 3rd c. BCE, the inscriptions on the statue of the astronomer and temple priest Harkhebi associate Sothis with the New Year (Clagett 1989–99: ii. 489–96), whilst the decree of Canopus (238 BCE) presents it as a well-established tradition: 'the day on which the star of Isis (i.e. Sothis) rises, which is reckoned in the sacred writings to be the New Year' (l. 36 of the Greek version, cited below; see also Clagett 1989–99: ii. 326–31, with Greek text in fig. III 94b, and Depuydt 1997: 15) and Pfeiffer 2004: 121–3, both translating the demotic version as 'beginning of the year' and the hieroglyphic version as 'festival of opening of the year'); there is no indication of how ancient these 'sacred writings' might be.

[25] Neugebauer (1942); the interpretation of the name Akhet as 'inundation' is questioned by Depuydt (2007) 70–3, but see below, n. 34.

[26] Belmonte Avilés (2003) 21–2. I say 'was' because with the construction of the Aswan dams in 1970, the inundation of the Nile has become completely disrupted.

from the outset. According to this theory, the institution of the calendar cannot be dated exactly to 2781–2778 BCE, but rather more loosely to some time in the early third millennium BCE, when I Akhet coincided roughly with the beginning of the inundation; any attempt at further precision is futile.[27]

The drifting calendar and the Sothic year

In some respects, the drift of the civil calendar from the solar year and the seasons (by one day in four years) was not a major flaw. It was too slow and gradual to affect any individual in his lifetime: in a lifespan of, for example, sixty years, the calendar would only have drifted by fifteen days, which means that the months of the year would still have been occurring in approximately the same seasons.[28] Many people would not have been sensitive to this drift; even if they were (e.g. through stellar observation, or because they had been told of it), in practical terms it would not have made much of a difference.

Yet even if this drift was inconsequential in the short term of an individual human life, no one could have ignored the long-term effect it was having on the civil calendar. For there were periods in history when the calendar months of 'inundation', Akhet, would have occurred a half a year before the inundation of the Nile actually took place. It seems remarkable, from a modern perspective, that a calendar so conspicuously out of step with the seasons—which its month-names were meant to represent—should have lasted as long as three millennia. This perhaps has encouraged modern scholars to search for evidence of an alternative calendar, in which the year regularly began at the heliacal rising of Sothis, and which was reckoned in Egypt alongside the drifting year of the civil calendar.[29]

Evidence of a Sothic calendar has been drawn, almost entirely, from the so-called Ebers calendar (late sixteenth century BCE). This important text will

[27] Clagett (1989–99) ii. 32–3. According to this theory, the heliacal rising of Sothis could have become associated with the New Year at a later stage, in the second millennium BCE. It is important to note that the inundation of the Nile, a seasonal event related to equinoxes and solstices, is not in a constant relationship with the rising of Sothis: because of the precession of equinoxes, the latter occurs progressively later than the solstice. In the early third millennium BCE, when the summer solstice was on about 17 July, the rising of Sothis occurred in Egypt at the solstice or earlier (see above, nn. 18–20), which means that it *preceded* the beginning of inundation in upper Egypt by some days; it is only in the second millennium that Sothis proceeded to the season of inundation and rose at the beginning of it (nowadays, Sothis rises about 1½ month after the solstice: Bomhard 1999: 26). This reinforces perhaps the view that the New Year (I Akhet, 'inundation') could only have become associated with Sothis in the second millennium BCE.

[28] Weill (1926) 55–6; also Depuydt (1997) 19, who assumes an average life-span of 30–40 years, hence a ten-day drift.

[29] See most recently Bomhard (1999), effectively a popularized version of Weill (1926), (1928), (1946).

be examined in some detail here and in the next section of this chapter. Written on the verso of a long medical papyrus, it contains a total of thirteen lines in hieratic script of which the first, an indented header, gives the year as '9th of Amenhotep'. The remaining twelve lines specify certain dates in the order month or feast name, month number, season, 'day 9', and 'rising of Sothis':

Year 9 of King Amenhotep Eternal

wp-rnpt	III	Shemu	day 9	rising of Sothis
tḫy	IV	•[30]	day 9	•
mnḫt	I	Akhet	day 9	•
ḥwt ḥr	II	•	day 9	•
kA ḥr kA	III	•	day 9	•
šf bdt	IV	•	day 9	•
rkḥ (wr)	I	Peret	day 9	•
rkḥ (nḏs)	II	•	day 9	•
rnwtt	III	•	day 9	•
ḫnsw	IV	•	day 9	•
ḫntj ḫt	I	Shemu	day 9	•
jpt ḥmt	II	•	day 9	•

The season and month number in the second column represent, as usual, a date in the Egyptian civil calendar. In l. 2, the rising of Sothis appears to be dated to III Shemu day 9, which would suit the late sixteenth century BCE; this has been used as prime evidence for the regnal dates of Amenhotep I (Amenophis), and more generally, for establishing an absolute chronology of the New Kingdom dynasties. But problematic are the other month-names, listed in the first column (at the beginning of each line). The name *wp-rnpt* appears in some sources as the twelfth month of the year,[31] not the eleventh (which III Shemu is in the civil calendar); it cannot be interpreted, therefore, as another name of III Shemu. It seems most likely that the column beginning with *wp-rnpt* relates to a different calendar.

It must be emphasized, from the outset, that the identity of this other calendar remains completely unknowable—even though two theories have been in circulation for more than a century. The first, which will be considered here, is that the first column refers to a Sothic calendar. The second, that it refers to a lunar calendar, will be considered later. Whilst I am inclined to favour the latter, both interpretations remain completely speculative.

The theory of a Sothic calendar is based on the assumption that *wp-rnpt* refers not to the twelfth month (as attested in some sources, mentioned

[30] The bullet point, as in the original document, represents a 'ditto' sign (referring to the term above in the same column). For a full text and discussion of the Ebers calendar, see Depuydt (1996*b*), (2008); the text is also available in translation in Clagett (1989–99) ii. 215.

[31] Thus on the ceiling of Senmut's tomb (*c*.1473 BCE): Clagett (1989–99) ii. 229, but see below, n. 109.

above), but to the first day of the year (as attested elsewhere).[32] This would account for its position at the beginning of the document: it represents New Year's day, but in a calendar differing from the civil calendar. This New Year's day coincides with the heliacal rising of Sothis, which in this year occurred on (civil) III Shemu day 9. The next term, *tḫy*, which coincides with IV Shemu day 9, represents the first day of the next month, 30 days later; and so through the entire calendar. This column is thus a record of the 'Sothic calendar', which is structurally similar to the civil calendar (with 30-day months) but always begins the year at the heliacal rising of Sothis.

Although structurally similar to the civil calendar, this Sothic calendar would have differed with regard to the epagomenal days which, in most cases, were not positioned at the end of the year. In the year of the Ebers calendar, for example, the day of *mnḫt* (on line 4) coincided with I Akhet day 9, thus after an interval of 35 (or 30 + 5) days (because in the civil calendar, five epagomenal days are inserted between the end of IV Shemu and the beginning of I Akhet). This means that the epagomenal days of the Sothic calendar had to be positioned, in this year, after the second month (beginning with *tḫy*). As the civil calendar drifted through the centuries, the position of this longer, 35-day interval (which includes the five epagomenal days) would have changed. Thus, in a rather complex manner, the position of the epagomenal days in the Sothic calendar would have drifted together with the drift of the civil calendar.

A further structural difference between the Sothic and civil calendars would have been, in the Sothic calendar, the addition of a sixth epagomenal day every four years, so as to remain in line with the heliacal rising of Sothis. According to the Ebers calendar scheme, this extra day could only have been added at the end of the Sothic year, and thus would have been separate from the five epagomenal days.

The 'Sothic' interpretation of the Ebers calendar has fallen out of favour, partly because of the structural complexity that its Sothic calendar would entail, and more importantly, because there is no convincing evidence of a Sothic calendar in any other source.[33] The reference in a number of other sources to the heliacal rising of Sothis as the 'beginning of the year' (see above, n. 24) does not necessarily imply the existence of an alternative calendar: the rising of Sothis could have been called 'New Year', and even celebrated as such,

[32] e.g. pap. Berlin 10007 (Luft 1992: 44–7) and pap. UC 32191 <http://www.digitalegypt.ucl.ac.uk/lahun/festivallistmk.html> where *wp-rnpt* coincides with the civil date I Akhet day 1. On the ambiguity of this term, meaning either twelfth month or the festival of New Year's Day, see Clagett (1989–99) ii. 14–15, 195–9, Depuydt (1997) 56—where he calls it the 'Brugsch phenomenon'—and (2009) 136–7, and Bomhard (1999) 34–6. Note also pap. Berlin 10218 (Luft 1992: 107–9), where *wp-rnpt* is associated with a period beginning on IV Shemu 20 (towards the end of the civil year). The meaning of *rnpt* is 'year', but that of *wp* is less certain.

[33] Depuydt (1996*b*), (1997) 15, Belmonte Avilés (2003) 54–5. Clagett (1989–99) ii. 42–8, 193–216 partially rescues this interpretation by suggesting that the Sothic year of the Ebers calendar was not regularly and continuously reckoned, but only an *ad hoc* arrangement for just that year.

in a purely notional or symbolic sense, without any need to construct a calendar beginning every year on that date.[34]

The theory of a Sothic calendar reckoned alongside the civil calendar introduces an unnecessary complication in ancient Egyptian calendrical practices. It responds to a modern scholarly need to make sense of a calendar that drifted in relation to the seasons, and to balance it out in some way with an alternative, stable scheme. The reason why modern scholars have considered the drift of the civil calendar as problematic is largely that it runs counter to modern expectations of what a calendar should offer. But there is actually no evidence that the drift of the civil calendar was ever regarded as a problem in ancient Egypt. Although festivals were normally dated according to the civil calendar, and consequently, festivals with specific seasonal connotations could at times be celebrated in an entirely wrong season, this seems not to have affected their meaning or ritual validity.[35] The drift of the calendar was a reality which Egyptian society appears to have been completely adapted to, and which did not demand any corrective, alternative scheme.

The only Egyptian source that might be cited as evidence of dissatisfaction with the drift of the civil calendar is pap. Anastasi iv. 10. 1–2, dating from the Nineteenth Dynasty (*c.* thirteenth century BCE), a prayer or invocation to Amon that opens as follows:

> Come to me, Amon, and save me in this wretched year. It has come about that the sun rises not, winter (*peret*) is come in the summer (*shemu*), the months come about turned backwards, and the hours are confused.[36]

[34] Alternatively, these sources may be interpreted as referring to the New Year of a lunar calendar regulated by the rising of Sothis—a possibility that will be explored below. The *Calendar of Lucky and Unlucky Days* (Leitz 1994) associates the first day of the year, I Akhet 1, with the beginning of the inundation of the Nile, even though this date would have been constantly shifting from it; Leitz suggests that this text is using an idealized civil calendar beginning from the heliacal rising of Sothis (a 'Sothic' calendar), and thus also from the beginning of the inundation ibid. 13–14). This interpretation, however, depends on a general assumption that the *Calendar of Lucky and Unlucky Days* provides a list of precisely dated astronomical and meteorological events, which could not have been dated according to the drifting civil calendar; but this assumption is questionable (Lehoux 2007: 129–36, who also doubts whether this particular passage is referring to the beginning of the inundation, but this is over-sceptical). It is more likely, in this passage, that the association of (civil, not Sothic) I Akhet 1 with the beginning of the inundation is a traditional topos with only notional or symbolic meaning.

[35] On the seasonal, agricultural connotations of the festivals of Choiak and of Nehebkau (which were dated by the civil calendar, and thus presumably could occur in the wrong seasons), see Borghouts (1986) 5. In the Ptolemaic period, Geminus (*Elem. Astr.* 8. 17–24, Aujac 1975: 51–2; see A. Jones 1999*a*) refers to summer festivals' occurring in the spring, winter, or autumn, and explains that although the Isia festival was meant to be associated with the winter solstice, it had shifted away from it by his own period; all this may have bothered Geminus a little, but even to him it seems not to have been a major problem.

[36] Translation from Caminos (1954) 171. Other translations do not differ substantially, e.g. Schott (1950) 119: 'Der Sonne geschieht es, dass sie nicht aufgeht. Der Winter ist im Sommer gekommen. Die Monate sind verkehrt, die Stunden verwirrt.' See also Weill (1926) 107, (1946),

This text raises immediately a problem, because the thirteenth century BCE is precisely a period when the civil calendar conformed to the seasons (the civil New Year coincided with the heliacal rising of Sothis around 1320 BCE). This was noted some time ago by Weill (1926) 55, 107–11, who rightly suggests that by the time this document was written, the reference to 'winter coming in the summer' was only a literary *topos*. But although its meaning here was only figurative, Weill argues that the origin of this literary *topos* must have been calendrical: it must have originated, in other words, from a much earlier period when the winter season had actually occurred in 'summer', i.e. in the calendar months of *shemu*. However, there is no evidence that in this earlier period, the *topos* of 'winter coming in the summer' was intended as a *criticism* of the drift of the civil calendar.

In a later article (1946), Weill suggests that the expression translated here as 'wretched year' is a technical term, referring to a civil calendar year when it is out of line with the Sothic year. Its opposite, 'happy year', would refer to a civil calendar year when it is in line with the Sothic year—or indeed to the Sothic year itself—as attested in one other source: 'the star (Sothis) rises at the beginning of the happy year'.[37] This terminology would imply, at the very least, a veiled criticism of the calendar when it had drifted away from the seasons. This interpretation is possible, but the fact remains that the complaint that is voiced in pap. Anastasi iv—written at a time when the calendar was in line with the seasons—is most likely about bad weather or season failure, and this is most likely what the phrase 'wretched year' is expressing here. This text shows no clear evidence, therefore, of any complaint about the civil calendar.

Inasmuch as the drift of the civil calendar appears not to have been cause for concern or complaint in ancient Egyptian society, there is no need to search for the existence of an alternative, Sothic calendar. Even if a Sothic calendar is inferred from the Ebers document, its use and function in Egyptian society would have been so minimal that it could only have been of very marginal importance. It is only with the advent of the Ptolemaic dynasty in the third century BCE that attitudes towards the drift of the civil calendar began, however, to change.

The decree of Canopus

The decree of Canopus, dated 17 Tybi year 9 of Ptolemy III Euergetes (7 March 238 BCE), is one of the few Egyptian texts that explicitly discuss the

Bomhard (1999) 8. The use of *peret* and *shemu* in this seasonal sense is later attested in the Canopus decree (see below), and later still in Coptic, where the derivative terms prw and swm mean 'winter' and 'summer' (Depuydt 2007: 72).

[37] Pap. Chester Beatty 1 (verso C 1. 1–2). See also Bomhard (1999) 8.

calendar. It was issued at Canopus, near Alexandria, in the form of a trilingual text (more precisely, Greek and Egyptian bilingual, with the Egyptian text in hieroglyphic and demotic scripts). A number of copies have been discovered in various locations, suggesting that the decree was circulated across the whole of Egypt, as indeed the text of the decree stipulated that it should be (Greek text, ll. 73–6). The object of the decree was firstly to institute an annual festival in honour of the rulers on the day of the rising of Sothis—which was reckoned as occurring in that year on 1 Payni (i.e. II Shemu 1)—and secondly to stabilize the calendar by adding an extra epagomenal day every four years, thus arresting for ever the drift of the civil year. To cite from a translation of the Greek version (ll. 35–46):[38]

> (be it resolved) for there to be held each year a public festival in the temples and throughout the whole country in honor of King Ptolemy and Queen Berenike, the Benefactor Gods, on the day on which the star of Isis rises, which is reckoned in the sacred writings to be the new year, and which now in the ninth year is observed on the first day of the month Payni, at which time both the little Boubastia and the great Boubastia are celebrated and the gathering of the crops and the rise of the river takes place; but if, further, it happens that the rising of the star changes to another day in four years, for the festival not to be moved but to be held on the first of Payni all the same, on which (day) it was originally held in the ninth year, and to celebrate it for five days with the wearing of garlands and with sacrifices and libations and what else that is fitting; and, in order also that the seasons may always do as they should, in accordance with the now existing order of the universe, and that it may not happen that some of the public feasts held in the winter are ever held in the summer, the star changing by one day every four years, and that others of those now held in the summer are held in the winter in future times as has happened in the past and as would be happening now, if the arrangement of the year remained of 360 days plus the five days later brought into usage, (be it resolved) for a one-day feast of the Benefactor Gods to be added every four years to the five additional days before the new year, in order that all may know that the former defect in the arrangement of the seasons and the year and in the beliefs about the whole ordering of the heavens has come to be corrected and made good by the Benefactor Gods.

It is evident from the text of the decree that the second measure—the addition of an extra day every four years—served, above all, the purpose of the first: to stabilize for ever the date of the new festival, 1 Payni, on the day of the rising of Sothis. However, it also served a more general purpose: to ensure

[38] The standard edition of the Greek text is in Dittenberger (1903–5) i. no. 56 (see also Pfeiffer 2004: 57–65, with German translation); an English translation by R. Bagnall, which is cited here, is available at <http://www.columbia.edu/itc/classics/bagnall/3995/readings/b-d2-9.html>. For the hieroglyphic and demotic texts (with translation and discussion), see Clagett (1989–99) ii. 326–31 and 338 n. 10, with drawings in fig. III 94a–c, and Pfeiffer (2004), with separate translations of each version.

that the 'seasons'—which means perhaps the Egyptian calendar months, named after the seasons—would accord 'with the now existing order of the universe'—i.e. would remain forever in the same relation to the heavenly bodies as they were in 238 BCE. Moreover, this measure would prevent some of the public feasts from occurring in the wrong seasons: 'that it may not happen that some of the public feasts held in the winter (χειμών, *peret*) are ever held in the summer (θέρος, *shemu*) . . . and that others of those now held in the summer are held in the winter in future times' (ll. 40–3).[39] The text concludes, finally, that this royal decree and calendar reform would correct the 'former defect in the arrangement of the seasons and the year and in the beliefs about the whole ordering of the heavens'.

This final point, but also the decree as a whole, convey very clearly a feeling that the civil calendar had been faulty or defective. This feeling is unlikely to have been shared by many Egyptians, and was certainly a very new idea. Although the phrase 'winter in the summer, or summer in the winter' echoes the passage from pap. Anastasi iv (cited above) and confirms the suggestion that this was a literary topos (Weill 1926: 110), in that earlier source the phrase was only used, as we have seen, to complain about bad weather or failure of seasons. The Canopus decree is the first known source where this phrase was employed as a critique of the civil calendar.[40]

It is highly significant that the perception of the Egyptian civil calendar as defective and in need of reform appears for the first time in a document from the Ptolemaic period. This new perception was almost certainly related to the new political situation that the Hellenistic dynasty in Egypt had ushered in. The proposal to reform the calendar is most unlikely, indeed, to have originated from some internal, age-old Egyptian tradition. It is true that the decree of Canopus was allegedly issued by Egyptian 'chief-priests, priests, prophets, and sacred scribes' (ll. 3–5), and draws on a number of native Egyptian traditions (such as the association of the New Year with the rising of Sothis). But on linguistic and literary grounds it has been argued that the base text

39 Pfeiffer (2004: 131–5) renders the Greek and demotic versions as 'winter' and 'summer', and the Hieroglyphic version as *peret* and *shemu*. The text may be playing on the double meaning (in an Egyptian context) of 'winter' and 'summer' as both calendar periods (of four months each) and natural seasons, and thus mean that 'feasts in (calendar) winter months should not be celebrated in the (natural) summer season' (and vice versa). Clagett (1989–99: ii. 328) translates the Egyptian text as follows: 'feasts [originally] celebrated in Peret (winter) should not be celebrated in Shemu (summer)' (and vice-versa). The term 'originally', however, is not in the text and implies a historical consciousness which is far from evident.

40 In contrast with pap. Anastasi, which as we have seen belongs to a period when the calendar was roughly in line with the seasons and hence the topos 'winter in the summer, summer in the winter' was unlikely to be used as a critique of the calendar, the Canopus decree was composed in a period when winter feasts (e.g. of Choiak and of Nehebkau: see above, n. 35) were actually occurring in the summer, thus when the topos is more likely to have been used with reference to the civil calendar.

must have been the Greek, of which the Egyptian version (in hieroglyphic and demotic scripts) was only a translation.[41] All this points to the decree's being instigated by the recently arrived Hellenistic kings—as is almost explicit, in fact, in l. 46 (end of the passage cited above), which says that the calendar had 'come to be corrected and made good by the Benefactor Gods' (i.e. Ptolemy and his royal consort).[42]

The changes that were being proposed to the Egyptian civil calendar made sense, indeed, from the perspective of Greek calendrical tradition. Although Greek calendars were not without considerable irregularities (see Chapter 1), they did have the merit of conforming, at least in broad terms, to the seasons of the year. The celebration of Egyptian winter feasts in the summer season (or vice versa) would have appeared surprising, and maybe even improper, to the newly arrived Greeks in Egypt.[43] Furthermore, the intercalation of days for purposes, sometimes, of correcting the calendar was a specifically Greek calendrical practice (see Chapter 1), and this is precisely what was being proposed, on a four-year basis, for the Egyptian civil calendar.

This said, it is unlikely that Ptolemy Euergetes was motivated by an interest in well-regulated calendars. His own Macedonian calendar, which was used by the Ptolemaic administration alongside the Egyptian civil calendar (for example, in the date of the Canopus decree itself, l. 3), was hopelessly drifting in this period from the seasons, as we shall later see in this chapter; and yet he did not seek to reform or rectify it.[44] His objective in the Canopus decree was probably

[41] Spalinger (1992) 32–5; but with reservations, Pfeiffer (2004) 52–5.

[42] This has long been the scholarly consensus (e.g. Weill 1926: 56–8, Clagett 1989–99: ii. 309–10). Pfeiffer (2004) 251–7 argues instead in favour of an Egyptian, priestly initiative, mainly on the basis that if reform of the calendar had been instigated by Ptolemy, it should have been presented as a royal decree, whereas in fact it is presented as a decree of the priests (in the opening of the Canopus text). This argument, in my view, is weak and somewhat simplistic. It was clearly in Ptolemy's interest to present this decree—breaking, as it was, an ancient Egyptian tradition—as coming from the Egyptian priests rather than from the king, so as to secure its acceptability among his Egyptian subjects. The formal attribution of the decree to the priests does not mean, however, that calendar reform was their own spontaneous initiative (and indeed, whoever drafted this decree ensured that Ptolemy was given full credit for it, in l. 46); quite on the contrary, the attribution of the decree to the priests can be read in itself as a public expression of their submission to the King's authority. See further n. 44.

[43] Geminus addresses this as a problem, but reasons that the Egyptian calendar had been *deliberately* conceived in such a way that the festivals would occur, over a long historical period, in all the seasons of the year (*Elem. Astr.* 8. 16–25, Aujac 1975: 51–2). I suspect that few Greeks would have been impressed with this justification.

[44] On this basis, Pfeiffer loc. cit. questions whether Euergetes was really interested in calendar reform, and hence whether he could have been the initiator of the Canopus decree. Whilst I agree that Euergetes was not interested in calendar reform, I do not consider this contradictory to the decree's being instigated by him for broader, political motives. Samuel (1962) 76 suggests, very differently, that Euergetes intended to apply a similar reform to the Macedonian calendar (by reducing the frequency of intercalation), but once the decree of Canopus failed to be implemented (as we shall see below), he gave up on the Macedonian calendar too; this theory, however, is purely speculative (see also below, n. 92).

not calendar reform for its own sake, but rather to enforce the political subservience of the Egyptian priestly elite to the Ptolemaic dynasty, by getting it to accept a modification of its ancestral calendar (alongside the institution of a new festival in honour of the rulers). The disorder of the Macedonian calendar, in contrast, was irrelevant to this political objective; Euergetes' choice not to reform it remained entirely his own prerogative. As in the context of many other ancient calendars, we should expect the driving force behind the Canopus decree to be political control rather than calendar accuracy.

Indeed, for the purpose of correcting the civil calendar, the decree of Canopus was actually inadequate. The proposal was only to add an epagomenal day every four years, and thus to arrest the drift of the calendar and maintain it in its current position; but there was no proposal to realign the festivals and calendar months with the natural seasons. This is paradoxical, because the decree mentions explicitly that the day on which the star of Isis (i.e. Sothis) rises 'is reckoned in the sacred writings to be the New Year' (l. 36); yet the decree was to fix this event for ever on 1 Payni (II Shemu 1), three months before the calendar's New Year on I Akhet 1. Furthermore, the rationale of the decree was to prevent the occurrence of 'winter feasts in the summer', yet this is precisely how they would have remained, for ever, had the decree been heeded. If anything, the decree of Canopus would have exacerbated the problem, by making it impossible for the festivals ever to return to their right natural season (Pfeiffer 2004: 255).

The reason why the Canopus decree did not seek to realign the months can easily be explained. The addition of one day every four years was only a minor adjustment, but the re-alignment of months—which would have necessitated the omission of three whole calendar months in the year of the reform—would have had major religious implications, as the festivals due in these months could not have been celebrated in that year. The Egyptian priesthoods were unlikely to be willing to comply with such a drastic measure, and Ptolemy Euergetes must have been well aware of this. The decree of Canopus may thus be interpreted as a politically cautious half-measure.[45]

But even the addition of an extra epagomenal day every four years, as decreed at Canopus, seems not to have been successfully implemented: for the evidence indicates that the civil calendar continued drifting until the end of the Ptolemaic period (late first century BCE).[46] There is every reason to assume that this part of the decree of Canopus was blocked, directly or

[45] See Weill (1926) 56–8.

[46] Whereupon the Roman-period Alexandrian calendar was instituted: see Ch. 5. For evidence and discussion of this widely accepted view, see Pfeiffer (2004) 250–1 and Bennett < http://www.tyndalehouse.com/Egypt/ptolemies/chron/chronology.htm> (also, but less convincingly, Clagett 1989–99: ii. 331–1). Nevertheless, Bennett (2011) demonstrates on the basis of some double-dated documents that until at least the mid-2nd-c. BCE, a Canopic scheme was assumed

indirectly, by the Egyptian priesthoods (Bickerman 1968: 41), even though we have no report in the sources of any dispute or conflict on this account. The Egyptians would have resisted the reform of the civil calendar for the simple reason that they saw nothing wrong with it.[47] The arguments presented in the text of the decree were probably not of their own making, and would have appeared to them unjustified. Far more important, from their perspective, would have been to preserve the calendar as it had always been for close to three millennia.[48]

2. THE EGYPTIAN LUNAR CALENDAR

The lunar dates that appear in a number of Egyptian sources suggest that a lunar calendar was reckoned alongside the civil calendar. Since these dates are attested only in the context of the temples, i.e. their cults, festivals, and the organization of the priesthoods, they have been legitimately identified as belonging to a specifically cultic calendar.[49]

In his influential work on Egyptian calendars, Richard Parker (1950) put forward the theory that two lunar calendars were used in Egyptian history: an 'old' lunar calendar, based on empirical sightings of the moon and regulated by the heliacal rising of Sothis (on which see above), and a 'new' lunar calendar, regulated by the civil calendar; the new calendar may have been initially empirical and based on lunar sightings, but in the fourth century BCE, it became completely schematic and cyclical—thus yielding, effectively, a

by some Egyptian calendar users. This suggests that the demise of the Canopic decree was neither universal nor immediate.

[47] There is no evidence of any formal prohibition, in Egyptian law, on altering the calendar. Nigidius Figulus, a Roman intellectual of the mid-1st c. BCE, reports that at their royal initiation rites, the kings of Egypt would be taken by a priest into the sanctuary of the temple of Isis and there be adjured by oath not to intercalate a month or a day, nor to change the date of the festivals, but only to keep the 365-day calendar as instituted by the ancients (cited in a scholium to Germanicus' version of the *Phaenomena* of Aratus: Legrand 1931: 201–2). But in the absence of any parallel in Egyptian sources, this report is more likely to have been the product of Hellenistic imagination (Weill 1928: 47, correcting an earlier statement in id. 1926: 57–8; see also J. Yoyotte in Bomhard 1999: xiv). This legend may have been formed as a polemic against Ptolemy III Euergetes—who would have been breaching such an oath in the decree of Canopus—or much later, as a polemic against the leap year of the Julian calendar (see Pfeiffer 2004: 252 n. 255). Nigidius Figulus sided with Pompey during the civil wars, and was consequently sent into exile by Julius Caesar in 49 BCE, where he died in March 45 BCE (Legrand 1931: 13–5; Rawson 1985: 94); he thus lived long enough to be able to witness the institution of the Julian calendar, and perhaps, to polemicize against it in this passage.

[48] This raises the question of why, in contrast, the intercalation of an additional day every four years was successfully instituted in the early Roman period. This will be discussed in Chapter 5.

[49] Lunar dates are well attested e.g. in the archive from the temple of Illahun (lower Egypt, between Memphis and Heracleopolis), dating from the 19th c. BCE, published by Luft (1992).

three-stage history of the Egyptian lunar calendar. This theory has become the standard paradigm of all subsequent studies of the Egyptian calendar, but I shall subject it to some criticism. I shall question whether at any point in history there existed an official or standard lunar calendar, as taken for granted by Parker and most other scholars, and indeed, whether the lunar dates and other evidence extant indicate the existence of any 'lunar calendar' at all. But first, the characteristics of Egyptian lunar reckoning will be examined.

The lunar month

The old moon crescent is visible for the last time, at the end of the lunar month, when it rises shortly before sunrise above the eastern horizon (after sunrise, it disappears from sight). It is generally agreed that the Egyptian lunar month began the next morning, i.e. when the old moon was no longer visible.[50] The disappearance of the old moon marked the end of the month and, simultaneously, the beginning of the new. Beginning the month on the morning of invisibility is consistent with the view, for which there is independent evidence, that the Egyptian day-unit began in the morning. Thus in every respect the Egyptian lunar month differed from the Babylonian and Greek months which began when the new moon was first visible on the western horizon in the evening.

The evidence, however, is late and limited on the whole to double-dated documents (with civil and lunar dates, which enable us to determine when the lunar month began) from the Ptolemaic and Roman periods. Before the third century BCE, most documents are insufficiently dated—particularly with regard to their years—for reliable inferences to be made. Regnal years are often provided, but the names of the kings frequently not; and our ignorance of the absolute chronology of Egyptian dynasties compounds the difficulty of assigning dated documents to specific years. As a result, little can be inferred from documents about the way the lunar calendar was reckoned in the Pharaonic period.[51]

[50] Parker (1950) 13–23; Grzybek (1990) 140–1, 146–51; Clagett (1989–99) ii. 22, 280–90 (but with some reservations, as in his view firm evidence is only available in pap. Carlsberg 9, i.e. the Ptolemaic or Roman periods).

[51] Absolute chronology is only securely known from the 7th c. BCE onwards; thus only double-dated documents from the later period are useful to calendrical analysis (Depuydt 1997: 172). Luft's attempt (1992) to establish an absolute chronology for the documents of the Illahun archive (19th c. BCE) depends on a given date of the heliacal rising of Sothis, which is itself inconsistently recorded in the sources (pap. Berlin 10012 A and B, 1997ibid. 54–8; Luft's solution is unconvincing). Conversion of this Sothic dating, for our purposes, into a Julian date (e.g. 17 July, as commonly assumed for this period) is moreover uncertain for a variety of astronomical reasons that have been explained above. There are too many variables in Luft's reconstruction (pp. 224–9) for it to be used as firm evidence of how the lunar month was reckoned.

Nevertheless, there are early traditions that suggest an association of the beginning of the Egyptian lunar month with invisibility of the old moon. The hieroglyph for *Abd*, the second day of the lunar month, includes a moon crescent.[52] This makes sense in the context of a month beginning at first invisibility, which means that the new moon crescent would normally become visible on day 2 in the evening.[53] This inference finds support in a Middle Kingdom (early second millennium BCE) coffin text which states that the moon (Thoth) is small at *Abd*, and great at the feast of *smdt* (half-month). 'Small', in opposition to 'great', i.e. the full moon at the half-month, presumably refers to a new moon crescent at its first sighting; since this occurs on day 2 of the month, the month presumably begins at first invisibility. Clearer still is a later, Ptolemaic inscription from Karnak, where Khons (god of the moon) is described as 'conceived on the feast of *psḏntyw* (day 1 of the month), born on the feast of *Abd* (day 2), and mature on the feast of *smdt* (half-month, day 15)'.[54] This confirms that the period when the moon becomes invisible, or when the new moon is 'conceived', corresponded to day 1; whereas the new moon's birth, when it becomes first visible, was day 2.

This last text raises the question, however, of whether the lunar month should have begun more appropriately at the time of the new moon's 'conception' or at its time of 'birth'. In some Egyptian lunar calendars, indeed, the latter appears to have been favoured. Thus the temple service months—i.e. monthly periods allocated in rotation to different priestly groups (or 'phylai') for the performance of various temple duties—were lunar but counted from the feast of *Abd*, i.e. from the second day of ordinary lunar months.[55] This one-day discrepancy between lunar and temple service months introduces a further complication in our understanding of the Egyptian lunar calendar. It suggests perhaps that the feast of *psḏntyw*, when the moon is invisible, was regarded as an ambiguous, interstitial day that could serve both as the last day of the old lunar month and as first day of the new.[56] Above all, it shows that lunar calendars were not uniform in Egypt but reckoned in a variety of ways.

[52] Depuydt (2009) 117 n. 2, e.g. in a 19th-c. document from Illahun (pap. Berlin 10006, in Luft 1992: 39–42), and in an inscription from the temple of Medinet Habu, early 12th c. BCE (Clagett 1989–99: ii. 268).

[53] Visibility of the new moon on day 1 in the evening would have been possible but rare; on day 3 it would have been less rare, especially if weather conditions were unfavourable. See Stern (2001) 99–100.

[54] Parker (1950) 12; Clagett (1989–99) ii. 280–6; but see Clagett's reservations ibid. 22), pointing out that evidence of this kind (implying that the lunar month began on the day of invisibility of the old moon) is generally late.

[55] Luft (1992) 205–8 on the Illahun archive, early second millennium BCE; Bennett (2008) and Lippert (2009) on the Ptolemaic and Roman periods. Temple service months are usually called *wrš*, whereas lunar months are *Abd*, which suggests a formal distinction between them. But not all the evidence is conclusive: e.g. in pap. Berlin 10056 (see further below) it cannot really be determined whether the service months that are listed begin on *psḏntyw* or on *Abd*, even though these months are clearly lunar (see Luft 1992: 189–95, Depuydt 1997: 147–8).

[56] Similarly to the term *wp-rnpt* (see above and below, nn. 32, 69): Leo Depuydt, pers. comm.

Empirical or schematic: the Illahun archive

The practice of determining the lunar month on the basis of empirical observations of the moon phases can be inferred from a document of the Illahun archive (*c.* nineteenth century BCE). In this document, an interval between the 'feast of *Abd*' and the feast of half-month (*smdt*) amounts to 16 days, whereas it should have been 13 (as *Abd* is normally on day 2, and *smdt* normally on day 15), and another interval, between half-month and feast of *Abd*, amounts to 15 days, whereas it should have been 16 or 17. Both intervals can be interpreted as resulting from the feast of half-month's occurring two or three days too late: not on day 15 of the lunar month, but rather on day 17 or 18.[57] This later date of the half-month feast suggests that it was established empirically, most likely on the basis of observation of the full moon.[58] Furthermore, the lunar month in which this full moon occurred on day 17 or 18 must have begun too early: An early beginning of the lunar month would have been most likely due to the empirical observation of the disappearance of the old moon: for if bad weather prematurely prevented the old moon crescent from being sighted, the beginning of the next month would have been set too early.[59]

Another document from the Illahun archive, however, suggests that lunar months were determined on the basis of a calculation or schematic calendar. This document provides a one-year calendar for the allocation of almonds and honey to six priestly divisions; the overseer of each division is given a 30-day term, precisely dated (with starting and finishing dates) according to the civil calendar. It is evident from these dates that the 30-day terms correspond to alternate lunar months.[60] The full sequence of the lunar months can be inferred from the civil calendar dates in the document, and consists of the

[57] The reverse, that these intervals result from the feast of *Abd* (normally on day 2) occurring two or three days too early, is impossible, because this would push *Abd* into the previous lunar calendar month.

[58] Pap. Berlin 10282 recto (Luft 1992: 114–18 no. 49), as interpreted by Luft (pp. 196–8) and Depuydt (1997) 149–50.

[59] This is the reverse of calendars (e.g. Babylonian) based on the appearance of the new moon, where poor atmospheric conditions have the effect of *delaying* the beginning of the month. Consequently, if the criterion for beginning the month was invisibility of the old moon, new moon visibility could not have been used as a secondary criterion, because this would have led to contradictions (especially in cases of bad weather). In this lunar calendar, therefore, the coincidence of *Abd* (day 2) with new moon visibility could only have been notional (Depuydt 1997: 149, but wrongly arguing on this basis that the *entire* calendar must have been non-empirical and schematic).

[60] Pap. Berlin 10056 verso (Luft 1992: 73–8 (no. 24)); see Parker (1950) 63–4, Clagett (1989–99) ii. 174–6, 186–7, and Depuydt (1997) 147–51, 178–84. On the question of when these months began, see above, n. 55.

following month-lengths (in days): 30–(29)–30–(30)–30–(29)–30–(29)–30–(29)–30 (brackets indicate months that are not allocated to the overseers, mostly of 29 days). The alternation of 29- and 30-day months is characteristic of schematic lunar calendars, because calendars based on empirical observation do not yield regular, alternating sequences (see Huber 1982: 24–5).

The only anomaly in this sequence is the succession of three 30-day months (months 3–5 in the sequence), which is possible in empirical calendars but unusual in calendrical schemes. However, this anomaly has been plausibly explained as the result of an arithmetical scheme that was tied to the civil calendar. The beginning dates of the priestly periods (i.e. alternate lunar months) are given in this document as II Shemu 26, IV Shemu 25, II Akhet 20, IV Akhet 19, II Peret 18, IV Peret 17. The arithmetical rule is thus simply to recede every other month by one day in the civil calendar. This yields, for example between II Shemu 26 and IIII Shemu 25, a total of 59 days, hence one full and one hollow lunar month. From Shemu to Akhet, however, the date recedes by 5 days (in this particular case, from IIII Shemu 25 to II Akhet 20) to take account of the intervening epagomenal days. Why it does not recede by 6 days (i.e. 5 for the epagomenals + 1 as in all other alternate months) remains a little unclear; but this is the arithmetical rule that appears to be followed, and this is what leads to the anomalous run of three 30-day months.[61]

The evidence of these two documents from the Illahun archive, the first suggesting empirical observation and the second an arithmetical, calendrical scheme, is not necessarily contradictory. The context of the second document—a schedule for the allocation of supplies of almonds and honey—suggests that it was redacted in advance, at the beginning of the year, when the dates of the forthcoming lunar months were possibly not yet known. If so, its arithmetical scheme could have been used as a provisional working model, on the understanding that the lunar dates would be adjusted later during the year on the basis of empirical observation.[62] The evidence, however, remains too limited and tenuous for any general or firm conclusion to be reached.

Much later, in the Ptolemaic period (305–30 BCE), evidence begins to emerge of elaborate, schematic lunar calendars, whose significance—and whether they indicate a general shift, in this later period, to the use of schematic calendars—will be discussed below.

[61] Depuydt (1997) 180–2. This rule, with three consecutive 30-day months, results in a lunar year of 355 days, which is only slightly excessive (12 average lunar months are about 354⅓ days). This was also the year length of the Roman calendar in the Republican period, probably the survival of an earlier lunar calendar (see Ch. 4 n. 133).

[62] Ibid.

Intercalation and Sothic synchronism: the Ebers calendar

As we have seen in previous chapters, lunar calendars need to be intercalated in order to remain in line with the seasons. Without intercalation, the drift of the lunar calendar from the seasons, at a rate of about eleven days a year, would have been far more severe than that of the civil calendar.

There is no explicit evidence that Egyptian lunar calendars were intercalated; however, the Ebers calendar has been used as evidence that the lunar calendar was regulated by the rising of Sothis, which may imply a practice of intercalation. In the previous section, I have discussed (and criticized) the theory that the Ebers document presents a fixed Sothic calendar alongside the drifting civil calendar. I shall now consider the more likely theory that the Ebers document presents a lunar calendar (in the first column) in relation to the civil calendar (in the second; see text citation above, near n. 32). Prima facie this interpretation is more likely, because unlike the fixed Sothic calendar, the lunar calendar is well attested in other Egyptian sources.

As we have seen above, the first two lines of the Ebers document give the date of the rising of Sothis as III Shemu, day 9, in year 9 of Amenhotep (late sixteenth century BCE). According to the 'lunar' interpretation of this text, the term *tḫy* in the first column on the next line (l. 3) designates the first lunar month of the year, which must always follow the heliacal rising of Sothis. The term *wp-rnpt* on the previous line (l. 2) represents therefore the last (lunar) month of the year, a meaning that is actually attested in other sources (see above, n. 32). The last month of the year is listed at the beginning of the document, on the same line as the mention of the rising of Sothis, because it is the lunar month within which the rising of Sothis occurs.[63] The purpose of the rest of the document, as recently explained by Depuydt (1996*b*), would be to provide a rule for establishing, on the basis of the civil date, the name of the current lunar month. Thus if *wp-rnpt* is the lunar month during which the heliacal rising of Sothis occurs, which in this year (year 9 of Amenhotep I) is III Shemu day 9, a similar relation can be projected onto the subsequent months of that year: the next month, *tḫy*, is the lunar month during which day 9 of the next civil month (IV Shemu) occurs, etc. This rule is not entirely accurate, because lunar months are shorter on average than civil calendar months, but it is very simple and easy to use, and accurate enough to be effective.[64]

[63] Parker (1950) and in summary (1974). For a rebuttal of Parker's interpretation, see Clagett (1989–99) ii. 8–23 and 31; but whilst Parker clearly overstated his evidence, Clagett's rebuttal ultimately rests on his own interpretation of the Ebers calendar as referring to an (*ad hoc*) Sothic year, which in my view remains less likely.

[64] Depuydt (1996*b*) argues also that the reason why day 9 of every civil month is implicitly called 'rising of Sothis' in the Ebers document is that this civil date functions, for every lunar month, in the same way as the date of the actual rising of Sothis functions for the month of

According to this interpretation, the rising of Sothis would have played a critical, regulatory role in the lunar calendar. But the Ebers document does not hint at any procedure of intercalation. This opens the possibility that unlike Greek and Babylonian calendars, the synchronism of the lunar months *wp-rnpt*, *t̲ḫy,* etc. with the rising of Sothis was achieved through other procedural means. The rule outlined above would have obviated, in fact, the need for any formal procedure of intercalation. As explained above, the lunar months were named in the Ebers document with reference to day 9 of the civil calendar that occurred within them; but sometimes (once every two or three years), there would have been a lunar month without any civil day 9 within it.[65] This unnamable, interstitial month was effectively intercalary, though not as the result of any deliberate procedure of intercalation, but only as the result of an anomaly in the calendar's rule.

How this unnamed month would have been referred to is unknown; it is not explicitly featured in the Ebers calendar, and there is no evidence of a 'nameless' lunar month in any Egyptian source.[66] The insertion of this extra month may well have led to uncertainty about the names of subsequent months, at least until the next rising of Sothis arrived. Uncertainty about month-names as a result of informal intercalation is a well-attested phenomenon in other non-modern cultures;[67] it is all the more plausible in ancient Egypt where lunar month-names were probably not that important in public life.[68] The sequence of Egyptian named lunar months, in spite of the

wp-rnpt. See further ibid. 75–6, 80–3, and n. 39, for a convincing refutation of other interpretations. In a later article, Depuydt (2008) argues that *wp-rnpt* is not a lunar month-name, but rather a feast-day name (whereas the other names in the text, starting from *t̲ḫy*, still designate lunar months).

[65] This would occur when a 29-day lunar month began on day 10 of one civil month and finished on day 8 of the next: no lunar month-name would be available for it, since it did not include day 9 of any civil month. An unallocated or unnamed lunar month of this kind was even more likely to occur within the 35-day interval from IV Shemu to I Akhet.

[66] It could have been given the next lunar month-name on the list, but this would only have postponed the problem. Depuydt (1996*b*: 69–70) suggests a formal system whereby *wp-rnpt* was repeated either at the beginning or at the end of an intercalated year; but there is no evidence for this in the Ebers document, and indeed, this system would run counter to the synchronism put forward in this document.

[67] See Turton and Ruggles (1978), on the calendrical practices of the Mursi of south-western Ethiopia (also in Gell 1992: 300–5): the difficulty of reconciling the lunar calendar with the seasonal year frequently leads them to disagreement or uncertainty regarding the current lunar month; these ambiguities are only resolved retroactively at a much later stage. As a result, the occasional addition of a thirteenth lunar month is always *ex post facto*; it is not formally, deliberately, or even knowingly intercalated—much as I am arguing, in fact, in the context of the Ebers calendar (see further Chapter 1, n. 20). A similar case might be the Dakota of North America, whom Nilsson (1920) 241 cites as having often heated debates about which month it is (but other examples ibid. 246 are, in my view, less clear). For a further example, see next n.

[68] Similarly, Malinowski (1927) 209–15 points out that the frequent uncertainty of Trobriand islanders regarding the current lunar month reflects the fact that their dominant calendar is not their lunar but their seasonal one; see also Leach (1950).

rule proposed in the Ebers calendar, may thus have remained somewhat ambiguous.[69]

On this interpretation, the Ebers calendar provides a reasonable idea of how an Egyptian lunar calendar could be synchronized with the seasons and, more specifically, the rising of Sothis. However, it does not justify the identification of the lunar calendar regulated by Sothis as ‘old’ (so Parker 1950), because as we have seen above, the Ebers calendar is in fact the earliest source that associates the rising of Sothis with the New Year. It must also be emphasized that the ‘old’ Egyptian lunar calendar is only attested in a single piece of evidence—indeed, a single sheet of papyrus—of which the meaning is by no means explicit.[70] The historical context of this document is completely unknown, which makes it impossible to evaluate its representativeness of how the lunar calendar was generally reckoned in Egypt at the time: indeed, as I have argued above, there may have been a variety of ways of reckoning the lunar calendar at any one time in Egyptian history. It would thus be imprudent to conclude that the Ebers calendar, even if correctly interpreted as a lunar, represents the standard, ‘old’ lunar calendar of ancient Egypt (as Parker and others since assumed).

The ‘new’ lunar calendar and the 25-year lunar cycle: pap. Carlsberg 9 and related sources

Richard Parker’s theory, to repeat, is that there were two lunar calendars in ancient Egypt, an old and a new. The former was regulated by the rising of

[69] For an alternative argument, but similarly assuming an ambiguous use of lunar month-names (and in particular, an ambiguous numeration of these months), see Depuydt (1997) 37–44 (distinct from his argument in 1996*b*, cited above, n. 66). Depuydt also argues that the reason why *wp-rnpt* appears in first position in the Ebers calendar, whereas elsewhere it is the twelfth month (see above, n. 32), is that *wp-rnpt* actually functioned as a ‘straddle month’ or ‘zero month’, straddling the heliacal rising of Sothis, which was regarded as the New Year day. He draws an analogy from Servius (on Vergil,*Georgics* 1. 43), according to whom the archaic Roman calendar originally comprised only ten named months (‘December’ means the tenth month), whereas the last months of the year were unnamed, unnumbered, and treated only as additional (on the historicity of this theory, however, see Ch. 4 n. 138; for a possible parallel in the Trobriand islands, see previous n.). Another analogy may be drawn from Bede’s list of English lunar months (*De Temporum Ratione* ch. 15: Wallis 1999: 53–4), which seems to be missing one month-name (with only eleven names in total). However, two of his month-names (Giuli in the winter and Litha in the summer) seem to be used for two consecutive months, whilst a third Litha is added when necessary for intercalation (and the year is then called Thrilithi); it is debatable whether this apparent excess of months, arising from the excessive repetition of month-names, is the reflection of a certain fluidity within the pre-Christian English calendar—as Depuydt and I argue, in different ways, for the Ebers calendar—or rather of Bede’s possible amalgamation of different English calendrical traditions.

[70] For earlier evidence of a lunar calendar regulated by the rising of Sothis, though highly contentious, see in summary Depuydt (2009) 133.

Sothis, whereas the new lunar calendar was regulated by the civil calendar, with the first lunar month always following the civil New Year. According to Depuydt (2009), this new lunar calendar came about and superseded the old calendar in about the fourteenth century BCE, when the dates of the rising of Sothis and the civil New Year were concurrent, and when the latter took the place of the former as fixed reference point of the lunar year. Indeed, the synchronic relationship between the lunar and the civil calendars becomes evident in subsequent centuries, when month-names were commonly transferred between the two calendars.[71]

The clearest attestation, however, of the new lunar calendar is a much later document, pap. Carlsberg 9, which Parker took as evidence that in the fourth century BCE empirical observation of the moon was abandoned in favour of a fixed, cyclical scheme. This document, discovered and first published in 1938, presents a comprehensive 25-year lunar cycle with nine intercalated years. It assumes that 25 years of the Egyptian civil calendar equal exactly 309 lunar months (which is a reasonable approximation); consequently, the lunar months in this 25-year cycle recur on the same Egyptian civil dates, which pap. Carlsberg 9 extensively lists. This lunar calendar is thus not regulated by the rising of Sothis, but tied completely to the civil calendar; just like the civil calendar, it recedes by one day in four years in relation to the seasonal (or Sothic) year.[72]

The document itself, pap. Carlsberg 9, is relatively late and could not have been produced before the mid-second century CE, because it mentions a 25-year cycle beginning in year 7 of the Roman emperor Antoninus (144 CE) and an earlier cycle beginning in year 6 of emperor Tiberius (19 CE). Parker argues, however, that this lunar calendar must have been conceived and instituted already in the fourth century BCE. It is only in this period, indeed, that the dates in this document would have conformed to the day of first invisibility of the old moon, when the Egyptian lunar month traditionally began. More precisely, in 357 BCE (Parker's preferred date for the institution of the cycle), the first 25-year cycle would have begun on the day of first invisibility of the old moon (equivalent to 20 December), and likewise the majority of lunar months in the cycle. In subsequent centuries, however, because of a slight discrepancy in the 25-year cycle,[73] the dates of the lunar months (and more particularly, of the first month of the cycle) would have

[71] Depuydt (2009); on the transfer of month-names see also id. (1997) 161–7.

[72] Parker (1950); Clagett (1989–99) ii. 23–4, 295–306.

[73] After 25 years, the mean conjunction of the moon recurs on the same date of the Egyptian civil calendar, but $1^1/_5$ hour earlier. This small discrepancy only becomes calendrically significant after 20 cycles (500 years), when it accumulates to one whole day: the astronomical lunar month then falls behind the civil calendar (and hence also behind the 25-year cycle, since the latter is based on the civil calendar) by one day.

gradually shifted towards the day of first visibility of the new moon, which was surely not the original intention of the creators of this calendar.[74]

In support of his argument, Parker cites a total of seventeen epigraphic and documentary sources with a double date, civil and lunar, dating from the Ptolemaic and early Roman periods (between 237 BCE and 190 CE). According to Parker, all the lunar dates conform to the 25-year cycle, which confirms that this cycle was in standard use throughout this period. He argues further that these dates could not have been reckoned in any other way, e.g. empirically, because the range of these dates, from the mid-third century BCE to the second century CE, reflects accurately the gradual shift of the 25-year cycle from day of invisibility of the old moon to day of visibility of the new moon; this would not have arisen if these dates had been consistently reckoned through empirical observation of invisibility of the old moon.[75]

But Parker's interpretation of pap. Carlsberg 9, and his claim that it was used as the standard lunar calendar in the Ptolemaic and Roman periods, can be criticized in several ways. According to Parker, pap. Carlsberg 9 only supplies the dates of alternate lunar months, i.e. months beginning in even-numbered months of the civil calendar; the dates of lunar months beginning in odd-numbered civil months must be reconstructed, and this can only be achieved on the basis of conjecture. Of the seventeen cases where the double dates corroborate (according to Parker) the 25-year cycle, nine correspond to the dates of odd-numbered civil months, i.e. to dates that are not in pap. Carlsberg 9 but only in Parker's reconstruction. These nine cases, therefore, cannot serve as evidence that the 25-year cycle was used. More importantly, Parker's assumption that pap. Carlsberg 9 lists only alternate lunar months is strange and intrinsically unlikely.[76] A completely different reading has been suggested by Depuydt (1998), according to which, as is more likely, the dates of *all* the lunar months in the 25-year cycle are supplied.[77] According to this reading, however, pap. Carlsberg 9 no longer matches the double-dated documents and inscriptions that Parker invoked in support of his theory.[78]

[74] Parker (1950) 16–17. Note also that in spite of referring only to Roman regnal years, this document makes use of the ancient Egyptian civil calendar (i.e. as it was before the Alexandrian reform): A. Jones (1997) 161. But this does not necessarily prove that the cycle must have been composed before the beginning of the Roman period.

[75] Parker (1950) 17–23; Clagett (1989–99) ii. 25, 137 n. 30; Jones (1997) 161–2.

[76] Neugebauer (1975: i. 563 n. 4) suggests that the alternate months omitted in the document were deliberately intended to be left indeterminate and flexible; he disagrees, therefore, with Parker's assumption that these dates must be somehow reconstructed. It seems to me, however, that the notion of flexible months in this document would contradict the spirit and purpose of a schematic calendar.

[77] The 25-cycle as reconstructed by Depuydt also has the advantage of beginning neatly on a I Akhet day 1 (the civil New Year), whereas Parker's cycle begins on II Akhet day 1. See Depuydt (1998) for further arguments (e.g. linguistic) in favour of his reading.

[78] I have found that according to Depuydt's reading (1998), the cycle differs from the following double dates (as numbered by Parker 1950: 19–22): nos. 5 (46 BCE), 7 (142 BCE),

The recent discovery of additional double-dated documents which do not agree with the cycle of pap. Carlsberg 9 (even on Parker's reading) further disproves the claim that this cycle determined all lunar datings in the Ptolemaic and Roman periods.[79]

There is evidence, moreover, of other schematic lunar calendars in the Ptolemaic period, which undermine the notion of a 'standard' 25-year lunar cycle. Pap. Rylands inv. 666, a fragmentary Greek papyrus firmly dated to 180 BCE,[80] contains a lunar 25-year cycle that starts one year later than in pap. Carlsberg 9 (its cycle starts in 181 BCE, whereas the cycle of pap. Carlsberg 9 would have started in 182 BCE). More importantly, it has different dates for the lunar months[81] and a different sequence of 29- and 30-day months.[82] It is possible that these cycles were designed in different periods (depending on when exactly the cycle of pap. Carlsberg 9 is dated); cultural context may also account for the differences between them, since pap. Rylands is distinctly Greek not only in language, but also in other features that will be discussed

8 (two dates in 144 BCE), 9 (212 BCE), and 10 (237 BCE), thus six cases out of seventeen. In each of these cases, the cycle's date is one day earlier.

[79] Bennett (2003) 227–8, citing grMedinet Habu 43 and 44 (in both cases, the lunar date is one day later than pap. Carlsberg 9), and n. 41 with references to further evidence; see also id. (2008) 527–8, Lippert (2009).

[80] Turner and Neugebauer (1949–50); Roberts and Turner (1952) iv. 56–62 (no. 589); see also A. Jones (1997) 162, Depuydt (1998) 1294–5, and Lehoux (2007) 179–80, 474–7 (where it is identified as P. Rylands 589). The dating to year 1 of Cleopatra and Ptolemy (Philometor) appears in ll. 92–4, 108–111. The provenance is thought to be Philadelphia (Arsinoite nome): Turner and Neugebauer (1949–50) 82, Roberts and Turner loc. cit.

[81] According to pap. Rylands, the second lunar month of 181 BCE began on 19 Phaophi, whereas according to pap. Carlsberg 9, it would have been on the 20th. Note that 19 Phaophi (= 24 Nov. 181 BCE) would have been too early, as the old moon would have been still visible on that morning. However, the first month of the pap. Rylands cycle begins on the right day, i.e. 20 Thoth (= 26 Oct. 181 BCE), which corresponds to the day of invisibility of the old moon. How exactly this cycle was designed remains, nevertheless, unclear. The phrase *noumenia kata selenen* ('first day of month according to the moon') frequently used in pap. Rylands (e.g. l. 95, cited below, n. 100, and fr. 7, in Turner and Neugebauer 1949–50: 82) does not mean that the beginning of the month was determined by lunar observation (as proposed by Depuydt 1998: 1295 n. 13). This phrase, in Greek sources, is used for a month that conforms to the moon and has not been tampered with, but without implying anything about lunar observation (see Ch. 1. 4); in the context of pap. Rylands, it simply designates the beginning of a *lunar* month as opposed to that of an Egyptian civil month (Turner and Neugebauer 1949–50: 86).

[82] According to pap. Rylands, the consecutive lunar months beginning in Phaophi and in Hathyr are both of 30 days (so in 181 BCE and—assuming the fragments have been correctly collated—in 180 BCE; the rest of the document is lost, although it does state explicitly, on ll. 97–8, that the calendar is a 25-year cycle). This is precluded in pap. Carlsberg 9, where the total length of these two months is always 59 days. Note also that the sequence of months in pap. Rylands differs in other ways from Parker's *reconstruction* of pap. Carlsberg: in the former, the months from Choiak to Pachons are in a sequence of 29–30–29–30–29–30, whereas in the latter they are in the reverse.

below (whereas pap. Carlsberg 9 is written in Demotic). But some Ptolemaic-period Demotic documents suggest that even in an 'Egyptian' context, other calendrical schemes—not conforming to 25-year cycles—may also have been in use. Thus, a second-century BCE list of monthly payments to be made to priests for food and other expenses, extending over a period of six ostensibly lunar months, implies a repeated sequence of 29–29–30–30 days. This sequence does not fit any of the 25-year cycles, but its apparent regularity suggests a schematic calendar, rather than a calendar based on empirical observations of the moon.[83]

Parker's early dating of pap. Carlsberg 9 is also problematic. According to Depuydt's reading, many of the dates should be one day earlier than in Parker's reconstruction. This pushes the date of composition of the cycle to the third century BCE at the earliest, thus well within the Ptolemaic period: before that period, the first lunar month of the cycle would have begun too early, on a day when the old moon was still visible (Depuydt 1998: 1295–6). Furthermore, it cannot be certain that this cycle was designed to determine lunar months beginning on the day of *psḏntyw*, i.e. at invisibility of the old moon, as was assumed by Parker. If its purpose was to determine temple service months, and if these began on *Abd* (on the next day—see discussion above), then the dating of this cycle can be placed very firmly in the early Roman period (Bennett 2008: 542).

The significance of pap. Carlsberg 9 must therefore be reassessed. It seems reasonably clear that by the Ptolemaic period, and probably many centuries earlier (as reasonably argued by Depuydt 2009), Egyptian lunar calendars were regulated by and closely dependent on the civil calendar. But the 25-year cycle of pap. Carlsberg 9 was clearly not the only lunar scheme in Ptolemaic or Roman Egypt, and it is also doubtful to what extent and for what purposes it was used. The existence of a variety of lunar calendars in this period certainly casts doubt on the notion of a standard Egyptian lunar calendar. The variety of practices we have noted above, especially in relation to the beginning of the month and the use of empirical or schematic methods, suggests that at any one time there could be several ways of reckoning the lunar calendar in Egypt. Inasmuch as the lunar calendar was not as public as the civil calendar, but confined to the cult and organization of temples, each individual temple could have reckoned the lunar calendar independently and on its own. It would not have mattered much, indeed, if the lunar calendar was reckoned differently in the different temples of Egypt.

[83] Pap. Cairo Demotic 30801, in Parker (1950) 19–21, Depuydt (1997) 147–51, 178–84.

The 25-year cycle and the Ptolemaic Macedonian calendar

Although there was thus no standard 'new' lunar calendar, the appearance of various 25-year cycles and other fixed schemes in the Ptolemaic period represents, at first sight, a considerable change in the way Egyptians reckoned the lunar calendar, which perhaps demands to be explained.

The possibility of external influence has been explored in several different ways. On the basis of Parker's fourth-century BCE dating of the cycle of pap. Carlsberg 9—which, as we have seen, as is actually quite uncertain—some have suggested that the 25-year cycle may have been imported into Egypt by its Persian Achaemenid rulers.[84] Although the Persians themselves are not known for expertise in astronomy or calendars—in fact, as we shall see in Chapter 4, calendrical influence between them and Egypt worked in the opposite direction—they may have facilitated the spread of the Babylonian calendar and, perhaps, of Babylonian mathematical astronomy. This suggestion should be rejected, however, because the 25-year cycle cannot be related to any aspect of the Babylonian calendar. The only known Babylonian cycle was of 19 years, and this cycle only regulated the intercalations (see Chapter 2); the Babylonians are not known to have designed a cycle where—as in the Egyptian 25-year scheme—the beginning of each month was fixed. It should also be said that the astronomical knowledge that was necessary to design the 25-year cycle would have been minimal: essentially, all that was required was the knowledge that 25 civil years equal 309 months. This would certainly not have necessitated any borrowing from Babylonian mathematical astronomy.[85]

An alternative attempt has been made to relate the 25-year cycle—which, as Pap. Rylands shows, was definitely in existence by the Ptolemaic period—to the Macedonian lunar calendar. The Macedonian calendar was introduced into Egypt by the Ptolemaic dynasty in the late fourth century BCE, and was used by the Macedonian elite as a lunar calendar until the early or mid second century BCE, after which it lost its lunar characteristics and became assimilated to the Egyptian civil calendar.[86] Some have suggested that the 25-year cycle

[84] Neugebauer (1975) ii. 563–4, but not without reservations (also Clagett 1989–99: ii. 137–8 n. 31).

[85] Depuydt (1998) shows that the scheme of pap. Carlsberg 9 was not based on mathematical astronomy, but on simple arithmetic; the purpose of this scheme was simplicity, not astronomical accuracy. Although Depuydt is assuming his own reading of the text, whereas the theory of Babylonian influence which we are now considering assumes Parker's reading, it remains uncontestable that the scheme is built on the simple alternation of 29- and 30-day months, not on a sophisticated astronomical calculation of when new moons are actually likely to occur.

[86] As convincingly demonstrated by Samuel (1962) 129–38, on the basis of double-dated documents from this period and later where the same date is given for Macedonian and Egyptian civil months, indicating that both calendars had become identical. Samuel dates this change to the end of the 3rd c.; for the later, mid-2nd-c. date, see now Bennett (2008) 527 n. 9. But the equivalence between Macedonian and Egyptian month-names did not remain consistent: until

was of Macedonian origin,[87] but as we shall see this is unlikely for several reasons.

Little is known about the Macedonian calendar before its introduction to Egypt, but it was clearly lunar[88] and most probably similar to other Greek calendars,[89] thus subject to arbitrary, irregular intercalation of days and months.[90] After Alexander's the Great conquest of the Near East, the Macedonian calendar in the Seleucid Empire was very soon assimilated to the standard Babylonian calendar (see Chapter 5), and thus conformed to its fairly stable 19-year cycle and its strictly lunar month (see Chapter 2). But in Ptolemaic Egypt the Macedonian calendar appears to have fallen behind the seasons. This is evident from third-century BCE double-dated documents (with Macedonian and Egyptian dates), which demonstrate that months were being excessively intercalated. Thus an Idumaean ostracon from year 6 of Ptolemy II Philadelphus (285/4–247/6 BCE) dated (Babylonian) Tammuz and (presumably, Ptolemaic Macedonian) Panemos[91] suggests that already then, the Ptolemaic calendar was retarded by one month in relation to the more stable Seleucid calendar. Excessive intercalations are then attested in the last two decades of Philadelphus' reign, so that by the early reign of his successor, Ptolemy III Euergetes, the Ptolemaic calendar was four months behind its Seleucid counterpart (this is evident, for example, from the Macedonian date of the decree of Canopus in 238 BCE, year 9 of his reign); the discrepancy increased to about six months by the end of Euergetes' reign in 222 BCE.[92]

In spite of this, it is commonly believed that the Ptolemaic Macedonian calendar conformed to certain fixed patterns or cycles. Edgar put forward the theory, subsequently endorsed by most scholars, that in the latter part of Philadelphus' reign intercalations were made on a regular, biennial basis.[93]

131/0 BCE the month of Dystros was assimilated to Thoth (first month of the Egyptian civil year), whereas from 119/18 BCE it was Dios that became assimilated to Thoth.

[87] Grzybek (1990) 52–60, 171–4.

[88] See Samuel (1972) 139 and n. 1, Grzybek (1990) 15–16.

[89] See Trümpy (1997) 263–5, with specific attention to the Macedonian month-names.

[90] Evidence of arbitrary intercalation of days in the Macedonian calendar may be found in Plutarch, *Alexander* 25, where at siege of the Tyre in 332 BCE Alexander added one or two days at the end of the month, and of irregular intercalation ibid. 16, where Alexander renamed the month of Daisios as 'second Artemisios' (but see discussion in Ch. 1, near n. 140).

[91] Geraty (1975); for full discussion, see Ch. 5. In this period, Idumaea was under Ptolemaic rule.

[92] The evidence was originally listed and analysed in Edgar (1931) 56–7 and Samuel (1962), esp. 48–9, 60–73, but it is now updated and reviewed by Chris Bennett < http://www.tyndalehouse.com/Egypt/ptolemies/chron/chronology.htm> and (2011). Bennett argues that excessive intercalation was part of a deliberate programme of calendar reform whose purpose was to achieve a realignment of Macedonian months in relation to the Egyptian calendar; but why such a realignment was sought, and why it was implemented in such a long-term, gradual way, remain unexplained and problematic to his theory (see further Ch. 2, n. 126).

[93] Edgar loc. cit., Bickerman (1968) 28, 38, Bennett (2011). But Samuel's theory of biennial intercalation in the first decades of Philadelphus' reign is no longer acceptable.

The principle of biennial intercalation is mentioned in one passage in Herodotus (1. 32),[94] which means that Philadelphus could have been drawing on some early Greek calendrical tradition. However, the record of intercalations under Philadelphus is not sufficiently complete to confirm the consistency or regularity of his intercalations; even if they occur *on average* in alternate years, this does not prove the existence of a fixed biennial scheme. The intercalary month is known to have varied under his successor Euergetes, and the same cannot be ruled out in Philadelphus' reign; this alone would undermine the theory that intercalation in their reigns followed a fixed and rigid scheme.[95]

Samuel (1962) proposed, more boldly, that the months of the Ptolemaic Macedonian calendar were set according to the Egyptian, 25-year cycle (i.e. Parker's cycle)[96]—which would imply a connection between the institution of this cycle in Egypt and the arrival of the Ptolemies. According to Samuel, double-dated papyri from the third century BCE conform exactly to Parker's 25-year cycle, with the only exception that Macedonian dates were set one day later. He explains this discrepancy as an attempt by the Ptolemies to retain the Greek tradition of beginning the month at first visibility of the new moon, rather than one day before, at first invisibility of the old moon. This theory, however, has been demolished by Jones (1997) on the grounds that in one case out of six, the Macedonian dates in double-dated documents occur not one but two days after the date in Parker's 25-year cycle (and according to Depuydt's 1998 reading of Pap. Carlsberg 9, the incidence of two-day discrepancies may be even higher).[97] This effectively proves that the Ptolemaic Macedonian

[94] See discussion in Ch. 1 n. 110.

[95] In the reign of Ptolemy II Philadelphus, only intercalary Peritios is attested; but under Ptolemy III Euergetes (246–221 BCE), attested intercalary months include Hyperberetaios, Peritios, and Panemos (for the latest assessment of the evidence, see Bennett 2011). Samuel (1962) 75–6, (1972) 149 concluded that under Philadelphus the only intercalary month was Peritios, as it was indeed the last month of the Macedonian year in Egypt, but that this rule was broken under Euergetes. The record of intercalations, however, is insufficient to verify this conclusion.

[96] Samuel (1962) 54–61; see also Bickerman (1968) 39–40, Grzybek (1990) 135–41.

[97] Samuel was aware that some dates were discrepant from the 25-year cycle, and argued that these were concentrated in the reign of Ptolemy III Euergetes, during which the calendar became particularly disrupted (Samuel 1962: 75–106); but the theory of calendar disruption under Euergetes is without good foundation (see now Bennett 2011). Grzybek (1990) *passim* attempts to rescue Samuel's theory by arguing that these irregularities result from some documents' having been written at night, when according to the Macedonian calendar the next calendar day would already have begun. This device has been used in other contexts to explain away one-day calendrical discrepancies (e.g. in the Elephantine papyri: see Stern 2000*a*); but it implies that legal documents were regularly written at night (and furthermore that this affected the way they were dated), which is historically implausible ibid. Furthermore, the beginning of the day in the Greek (and Macedonian) calendars remains a matter of controversy (Bowen and Goldstein 1994: 696 and nn.; Bennett loc. cit.).There is no need to rescue Samuel's theory with far-fetched explanations such as Grzybek's; far more likely is that the 25-year cycle theory is simply erroneous (see A. Jones 1997: 163–4).

calendar did *not* conform to Parker's cycle; it could have been based instead, for example, on empirical observation of the new moon.[98]

A slightly different argument applies to the 25-year cycle of pap. Rylands inv. 666, which in this context has been given surprisingly less attention by modern scholars. This cycle, like that of pap. Carlsberg, cannot account for Ptolemaic Macedonian dates because the latter tend to occur several days later. Nevertheless, consideration needs to be given to the cultural context of pap. Rylands; for as mentioned above, this document is distinctly Greek. This is evident from its being written in Greek, and from an account of debts in the same manuscript that contains almost entirely Greek names.[99] In addition, an implicit opposition may be read in the text between the 'Egyptian' calendar and the 25-year lunar cycle,[100] perhaps implying that the latter was considered not Egyptian but specifically Greek. The purpose of the 25-year cycle is not stated, but several possibilities can be suggested. The reference in one of the papyrus fragments to Hermes, Demeter, and Hephaistos together with the new moon suggests perhaps a list of festivals in honour of these gods; the purpose of the 25-year lunar scheme might thus have been to determine the dates of these festivals.[101] It is also possible that the cycle was designed to facilitate the conversion of Egyptian civil dates to and from Macedonian lunar dates, even if in practice, as the evidence of double-dated documents shows, Macedonian lunar dates were seldom based on this fixed cycle.[102] At the very

[98] So Jones; however, dates that deviate from Parker's 25-year cycle do not all conform to empirical lunar observation, and are better explained, I would suggest, as the result of arbitrary intercalation or suppression of days (as common in other Greek calendars: see Ch. 1). Bennett (loc. cit.) argues alternatively that Macedonian dates that do not conform to the lunar month (as defined by empirical lunar observation) are confined to documents from outside Alexandria, where the Macedonian lunar calendar was not consistently or carefully reckoned (since this was chiefly the calendar of the Alexandrian, Macedonian ruling elite). He also argues that in some of the double-dated documents the Macedonian date can be interpreted as correctly lunar if the corresponding Egyptian date is assumed to be Canopic (see above, n. 46).

[99] Turner and Neugebauer (1949–50) 80–2, 87, 92, according to whom the account of debts and the lunar calendar are written in different hands, but still on the same papyrus and from the same period. The account suggests to them (p. 87) that the document belonged to a gymnasium or some other Hellenistic association.

[100] On ll. 94–8. Although this passage is fragmentary, and thus its reconstruction is open to criticism (e.g. on the reconstructed *παράπ[ηγμα]*, see Roberts and Turner 1952: 62), it is worth citing here in full: *παράπ[ηγμα τ]ῶν κατ[ὰ σ]ελήνην νομηνεῶ[ν ὥς εἰσι κ]ατὰ [τὰς ἡ]μέρας τῶ[ν] κατ' Αἰγυπ[τίους δωδε]καμή[νω]ν τεταγμέναι*, which translates as: 'calendar (*parapegma*) of lunar new moons, how they are arranged in relation to the days of the Egyptian twelvemonth'.

[101] Turner and Neugebauer (1949–50) 87; Roberts and Turner (1952) 57. The fragment in question (fr. 7) is difficult to place in relation to the rest of the document, although it clearly belongs to it.

[102] This suggestion depends on Bennett's revised dating (2008; see above, n. 86) of the lunar Macedonian calendar as having persisted in Egypt until the mid-2nd c. BCE, thus after the redaction of pap. Rylands in 180 BCE.

least, the 25-year lunar cycle in this Greek document is likely to have had some relevance to the Macedonian lunar calendar.[103]

This does not mean, however, that the 25-year cycle that arose in Egypt during the Ptolemaic period was essentially Macedonian or (as some have argued) a Hellenistic import. Besides the fact that the early Macedonian calendar was not cyclical (see above), a lunar cycle of 25 years is not attested anywhere in Hellenistic tradition, where only eight-year and 19-year cycles (or their multiples) are known.[104] In actual fact, unlike the 19-year cycle or even the less accurate eight-year cycle, the 25-year cycle is not suitable for synchronizing the lunar calendar with the solar year or the seasons, but only for synchronizing it with the Egyptian civil calendar, together with which it gradually drifts away from the seasons;[105] there would have been no need, therefore, for such a cycle outside Egypt. The 25-year cycles of pap. Carlsberg and pap. Rylands, both tied to the Egyptian civil calendar, belonged thus firmly to the Egyptian calendrical tradition, even if the Greek authors of pap. Rylands adopted this tradition and applied it, in some way, to their own calendar. The Egyptian identity of these cycles is further evident in their lunar months' beginning at first invisibility of the old moon (at least in pap. Rylands—the case of pap. Carlsberg is more debatable), following Egyptian tradition; for in Greek tradition, as well attested even in the double-dated documents of third-century Ptolemaic Egypt, the lunar month began at first visibility of the new moon.

This makes all the more plausible a brief suggestion by Clagett (1989–99) ii. 299 that the 25-year cycle was not the result of Perso-Babylonian or Ptolemaic Macedonian influence, but the result of a long-standing native Egyptian tradition, which had always been distinctive for its proclivity towards schematic calendars. This proclivity is evident, above all, in the civil calendar itself, which for millennia remained unique, as a schematic calendar, throughout the ancient world. But we have also seen a document from the Illahun archive (nineteenth century BCE) suggesting, already then, the existence of a lunar calendar that was schematic and, like the Ptolemaic-period 25-year cycles, was

[103] Lehoux (2007) 179–80 suggests as another possibility that the purpose of this document is astrological (i.e. to track lunar days for purely astrological purposes), perhaps because of its self-designation as a *parapegma* (see above, n. 100), which in a Greek context usually has an astrometeorological connotation. However, there is no reference in this document to astronomy or the stars; this does not suggest any other purpose than calendrical.

[104] See Ch. 1. 3. A 25-year period is used for lunar computations by Ptolemy in the *Almagest* (6. 2–3, Toomer 1984: 276–9), but he was based, not insignificantly, in 2nd-c. CE Egypt, and moreover, his main time-scale in the *Almagest* was the Egyptian civil calendar, in conjunction with which the 25-year cycle was most suited for lunar computation (see next n.).

[105] This is because the 309 lunar months in the cycle are much closer in length to 25 Egyptian civil years than to 25 solar years (of approximately 365¼ days).

tied to the civil calendar.[106] Although, as argued above, this early schematic calendar may have been intended purely as a working model for future planning, there is nothing to suggest that the Ptolemaic-period 25-year cycles were not used for exactly the same purpose. In this respect, the latter lunar schemes may be regarded as belonging to a single and continuous calendrical tradition. The Egyptian predilection for lunar calendar schemes is itself a reflection of the central position which had always been occupied by fixed calendars, in particular the civil calendar, in Egyptian culture.

Were there lunar calendars in ancient Egypt?

In conclusion to this section, the fundamental question must be asked as to whether there were any lunar calendars in ancient Egypt. This depends, to a large extent, on how 'calendars' are defined. A calendar is normally understood to be a structured and continuous count of days and longer time units (e.g. months) which is used to date events. Sporadic lunar dates as those attested in Egypt indicate an awareness of the phases of the moon, but do not constitute, by themselves, a continuous calendar so defined. Scholars have therefore debated whether the existence and use of a lunar calendar in Egypt can be inferred.[107]

The first point to note is that in all the sources, lunar dates are never (or rarely) provided on their own, but instead appear together with corresponding dates in the civil calendar. This suggests not only subordination to the civil calendar, but also that lunar dates were not readily understandable unless related to the civil calendar. This would appear to indicate that although lunar dates could be determined for cultic and other related purposes, they were not reckoned independently as a self-standing calendar.[108]

Moreover, some of the features that one expects to find in lunar calendars are conspicuously absent. Lunar months, for example, are in most cases neither numbered nor named. The only text with a possible list of twelve lunar month-names is the Ebers calendar, although its interpretation is contentious.[109] Lunar month-names are otherwise only very sporadically attested: in three double

[106] See above, near n. 61. This runs counter to Parker's assertion that no schematic lunar calendar is attested before the 25-year cycle of pap. Carlsberg 9 (Parker 1950: 27), as well as to his general contention that the lunar calendar tied to the civil calendar was 'new'.

[107] See Depuydt (1997) 139–59, (2009) 124–6; Belmonte Avilés (2003).

[108] Luft (1992) 232; Depuydt (1997) 147–52, 183–4.

[109] See above. On this interpretation, the lunar month-names in the Ebers calendar would be *wp-rnpt*, *tḫy*, *mnḫt*, etc. The name *wp-rnpt* possibly refers also to a lunar month in pap. Berlin 10218 (Luft 1992: 107–9; see above, n. 32). On the ceiling of Senmut's tomb (*c.*1473 BCE), *wp-rnpt* is usually interpreted as the twelfth month of the civil year (above, n. 31), but a lunar interpretation cannot be ruled out.

dates from the sixth and second centuries BCE, the lunar months are ascribed the same nomenclature as in the civil calendar.[110] Intercalation is implicit but apparently not implemented by any formal system (see discussion above, in the context of the Ebers calendar), which may be indicative that a fully constituted lunar calendar did not exist. The concept of a lunar year (i.e. a period of twelve or thirteen lunar months, approximately in line with the solar year), which would imply a continuous reckoning of lunar months, is also only evident in the sequence of twelve lunar months of the Ebers calendar (according to its lunar interpretation). Attempts have been made to infer a lunar year from a document of the Illahun archive, because it lists six lunar months alternately, hence implicitly a total of twelve months, and moreover refers at the beginning of the document to a 'year'.[111] This 'year', however, could actually mean the *civil* calendar year, since the dates in this document are given according to the civil calendar and cover all the months of the civil year, from II Shemu (year 30) to I Shemu (year 31: Depuydt 1997: 149). A contemporary (*c.* nineteenth century BCE) inscription from the tomb of Khnumhotep II at Beni Hasan lists a 'feast of the great year' and 'feast of the small year', which has been interpreted as referring to the years of two distinct calendars, civil and lunar.[112] This evidence, at best, is tenuous.

Furthermore, the range of lunar dates that appears in the sources tends to be restricted to specific days within the lunar month, suggesting that the days of the lunar month were not reckoned continuously or in succession. In the entire Illahun archive, only five days of the lunar month are represented: days 1, 2, 4, 6, and 15.[113] Later feast-lists, from the fifteenth to thirteenth centuries BCE, contain a maximum of eleven lunar month days (Clagett 1989–99: ii. 279). At the temple of Medinet Habu (early twelfth century), lunar dates in the feast-list include only days 29, 30, 1, 2, 4, 6, 10, and 15 ibid. 268–9). In the Ptolemaic period, some feast- lists contain for the first time all thirty days of the lunar month ibid. 285–6: inscriptions from Edfu and Dendera); but even in this period, double-dated documents use only a small sample of days.[114] Thus

[110] Depuydt (1997) 161–7; Belmonte Avilés (2003) 14–17 (also, for the latter two dates, Parker 1950: 19).

[111] Parker (1950) 37 and Depuydt (1997) 178–84, referring to pap. Berlin 10056 (Luft 1992: 73–8), on which see above, near n. 60.

[112] Neugebauer (1942), Clagett (1989–99) ii. 173–6, 185–6: a 12-month lunar year is 'small' in relation to the civil year, which is 'great'; alternatively, the civil year is 'small' in relation to a 'great'13-month lunar year. It is also possible that the inscription is referring to a 12-month year and a 13-month year (both lunar). Other interpretations, involving e.g. a Sothic year or a 360-day year (ignoring the epagomenals), are far less likely (see Belmonte Avilés 2003: 17–18).

[113] Clagett (1989–99) ii. 184, referring to texts in Luft (1992) 159–60, 144–7, 157, 179, and 163–6 respectively.

[114] Parker's corpus of double-dated documents (1950: 17–23) has only days 1, 5, 6, 16, and 23 of the lunar month; but this may need updating in the light of more recent discoveries.

although we detect, at least by the Ptolemaic period, a development towards representations of a continuous lunar month, the focus tends to remain on specific days. Many of these days correspond to distinctive points in the monthly cycle of lunar phases (old moon, new moon, full moon, lunar quarters) that were celebrated in the temples as lunar monthly feasts. Most of these days are identified not by number, but by name; each day bears the name of the feast celebrated in it, and some names or their hieroglyphs refer explicitly to the lunar phases.[115] Thus, it may be argued that the lunar days in Egyptian sources refer to *lunar events* rather than calendar dates. The use of day-names rather than numbers suggests that the days of the lunar month were not counted, and thus not conceived as part of a continuous lunar reckoning. Instead, it is possible that the date of each lunar feast was determined *ad hoc*, on the basis of observation or calculation of the phases of the moon, and then dated according to the civil calendar.[116]

Even the later, elaborate 25-year cycles of the Ptolemaic period do not prove the existence of a continuous lunar calendar, because these cycles only provide the starting date of each lunar month. They may have been used as schemes to calculate the dates of lunar festivals (new moons, full moons, etc.) in relation to the civil calendar, but they do not mean that a lunar calendar, albeit implicit in these cycles, was continuously or consistently reckoned and used (Depuydt 1997: 151–2).

3. THE CIVIL CALENDAR AND SOCIETY IN ANCIENT EGYPT

The common paradigm of two calendars in Egypt, civil and lunar, with further subdivisions between 'civil' and 'Sothic' 365-day calendars on the one hand, and 'old' and 'new' lunar calendars on the other, is very misleading. The Sothic 365-day calendar, as we have seen, is a modern scholarly hypothesis that has not been satisfactorily substantiated; there is little evidence that the drift of the civil calendar, for which the Sothic calendar is supposed to have compensated, was ever regarded as a problem. Lunar dates are well attested but still relatively rarely; they are restricted to the cultic context of the temples, and limited in range. As we have seen, methods of lunar reckoning appear to have varied

[115] e.g. *Abd* (day 2, represented by a moon crescent; see n. 8), *smdt* (day 15, a half-moon), etc. The only days referred to by number are lunar 6 (e.g. in pap. Berlin 10018: Luft 1992: 60–1, 179; Depuydt 1997: 167, 184) and 10 (both at Medinet Habu). Those aside, three double-dated documents, from 559 BCE (Thebes) and 142 and 140 BCE (Edfu), have both lunar month-names (see above, n. 110) and numbered days (see Parker 1950: 18–21, Depuydt 1997: 172–7).

[116] As may be inferred from pap. Berlin 10282: see discussion above, and references cited in n. 58.

widely: the lunar month could begin at the disappearance of the old moon or alternatively one day later, and it could be based on a variety of fixed lunar cycles and schemes. Parker's simple and over-neat distinction between 'old' and 'new' lunar calendars (the former regulated by the rising of Sothis, the latter tied to the civil calendar) is problematic not only because it assumes the existence of standard and official lunar calendars, and not only because it classifies them according to one, arbitrarily chosen criterion, but also because evidence of Sothic regulation of the 'old' lunar calendar derives entirely from a single document, the Ebers calendar, whose interpretation remains conjectural, whilst evidence of 'new', schematic calendars tied to the civil calendar can now be traced back to Illahun as early as the nineteenth century BCE. Lunar calendar variety was far more complex than previously assumed, and suggests that no method of lunar reckoning was either normative or standard. Indeed, for reasons explained above, it is unclear whether lunar reckoning constituted, in ancient Egypt, an autonomous lunar calendar.

The only calendar that is clearly attested in ancient Egypt as standard and official was the civil calendar. Throughout the history of Egypt, this calendar served as the principal or perhaps the only method of continuous time reckoning and dating. It is no surprise that outsiders such as the Greeks identified the civil calendar as *the* calendar of Egypt. It is on this calendar, therefore, that we now need to focus.

In the ancient Mediterranean and Near Eastern world, the Egyptian civil calendar was unique in its design and in its very concept. Everywhere else, until about the Roman period, ancient calendars were almost all lunar; they were irregular, flexible, and therefore unpredictable. Their flexibility and unpredictability could depend, to varying degrees, on empirical lunar phenomena and on interference by political rulers (see for example Chapters 1–2). The Egyptian civil calendar, in contrast, was not lunar but (approximately) solar; it was fixed,[117] regular, and completely predictable; and it was free from all political interference (the Ptolemaic, Canopus decree was an unusual attempt to interfere, which in the event failed). Unlike all other calendars, the Egyptian calendar drifted through all the seasons of the year; but even more unique and original was the very concept of a fixed, schematic calendar, which was alien to other calendars and emulated only much later (see Chapter 4). It is legitimate to ask why such a radically different calendar arose, very early on, in Egypt.

The normal explanation (or better perhaps, assumption) has always been that a fixed calendar was instituted in Egypt to suit the specific needs of its highly bureaucratic kingdom. Parker, for example, argues that the lunar calendar (which, in his view, preceded the institution of the civil calendar in

[117] By 'fixed' I mean of course that it was changeless. I am not referring to the Sothic calendar, which is often referred to as 'fixed' because it would not have drifted in relation to the seasons.

the early third millennium BCE) was inadequate for the economy and administration of a 'well-organized kingdom'; the civil calendar was instituted for the purposes of administrative, economic, and fiscal efficiency, as a 'simple and easily workable instrument for the measurement of time'.[118] Neugebauer expresses the same view, adding that in Babylonia a fixed calendar of this kind was not necessary because the Babylonian Empire was not as centralized and each city state within it could manage the calendar separately.[119] But instead of solving the problem, Neugebauer draws our attention towards it: for he does not satisfactorily explain why the Assyrian and Babylonian Empires, which—as we have seen in Chapter 2—strove to some extent towards calendrical integration and unity, did not adopt a fixed calendar as was adopted in Egypt.

This explanation of the Egyptian civil calendar, essentially functionalist, also errs in emphasizing its administrative advantages but ignoring its disadvantages. It is true that the civil calendar made it possible to calculate backwards any date in the past (an advantage which late antique, medieval, and early modern historians and astronomers exploited), as well as to predict any date in the future (particularly useful for drawing up contracts and schedules). The complete predictability of the civil calendar meant that it could be reckoned exactly in the same way in any part of the 'two kingdoms' of Egypt (Upper and Lower), without having to transmit any calendrical information between them. This eliminated the problem of communications which (for example) made it impossible, in the Achaemenid Empire, for Jews and Arameans in Elephantine in southern Egypt to reckon the Babylonian calendar in the same way as it was being set in Babylon (see Chapter 2). The availability of a single, widely known and predictable calendar in ancient Egypt was undoubtedly a valuable asset for the effective administration of its relatively extensive territory along the Nile valley.

But in functional terms, the civil calendar also had significant disadvantages. For ordinary people, it was actually not that easy to use. If someone did not know the current date, s/he had no way of working it out alone: the only way to find it out was by asking someone else who knew it. Since the civil calendar was independent of the moon and (to a lesser extent) of the sun and seasons, the current date could not be estimated on the basis of natural phenomena—unlike in Babylonia, or wherever lunar calendars were used, where it was possible for anyone, at any time of the month, to glance at the shape of the moon (provided it was visible) and make a reasonable guess as to the current date. Seasons (such as the inundation) were not much use to estimate Egyptian civil dates, partly because seasons are prone to irregularity and not clearly defined, and partly because the civil calendar itself was

[118] Parker (1950) 53, cited and endorsed by Clagett (1989–99) ii. 34.
[119] Neugebauer (1942); see Clagett (1989–99) ii. 31–2.

unstable in relation to the solar year (drifting by one day every four years). In practice, therefore, it was impossible for anyone in Egypt to work out the current date on the basis of either lunar observation or (except very approximately) seasonal phenomena. Accurate and reliable knowledge of the date depended entirely on someone's keeping a continuous day-by-day record of the civil calendar.[120]

This is not such a problem in highly literate societies like ours, which is why it may have escaped the notice of modern scholars. In modern society, if one does not know the date (as is still common in daily life), one can easily get it from a daily newspaper, a wristwatch, a wall calendar, or—since the 1990s—a mobile telephone or computer screen. We also have the benefit of another count of days—the seven-day week—that can be used as a reference point when working out a date.[121] But in ancient Egypt knowledge of the date would have been exclusive to professional scribes or whoever else, presumably literate, was able to keep a rigorous and continuous count of the calendar. Ordinary people who needed to know the date for religious or other purposes depended, for this, entirely on the literate. Thus although attractive to the modern Western mind (as I have argued at the beginning of this chapter), this calendar would have been difficult to live with for much of the population of ancient Egypt.

The challenge of keeping a continuous and unfailing count of the calendar is also likely to have been a source of error, even for those who were in charge of counting it. Again, there were no natural phenomena with reference to which the calendar could be corrected if a day was missed or any other error occurred. Significantly, it is neither reliability nor ease of use which Herodotus chose to praise about the Egyptian calendar.[122] We should thus seriously question to what extent the civil calendar would have been a 'simple and easily workable instrument' (to cite again Parker) for the administration of the Egyptian kingdom.

Another functional disadvantage of the civil calendar would have been, paradoxically, its changelessness and inflexibility. From a modern perspective,

[120] The same applies to the similarly schematic Mesoamerican calendars (based on 260-day and 365-day years; see Edmonson 1988), of which the correct reckoning depended entirely on the 'day-keepers', a literate scribal priestly elite drawn from aristocracies and royal households and often in positions of political leadership (Boone 2007: 20–8, Rice 2007: 48–50, 54–6; I am grateful to Stanisław Iwaniszewski for his detailed advice).

[121] Knowledge of the day of the week is helpful to us e.g. when using a wall calendar to find out today's date. Alternatively, it can be used in mental calculations: if I know this month began on a Tuesday, and today is also Tuesday, this can help me to establish that today's date is e.g. the 15th (the same procedure can be carried out with reference to another memorable date and day of the week, rather than the first day of the month). The seven-day week, however, was not known in ancient Egypt.

[122] Instead he praises its synchronism with the seasons: see citation at the beginning of this chapter.

inflexibility is regarded as a virtue for calendars, which is why modern scholars have not questioned the assumption that the rulers of the 'well-organized' kingdom of Egypt preferred a fixed calendar. There are, however, considerable advantages in a calendar that is flexible and open to adjustment. I am not referring to the possibility of correcting errors or discrepancies, e.g. (in the context of the Egyptian calendar) the drift of one day in four years. In functional terms, this discrepancy was not necessarily problematic (and as we have seen, there is no evidence that it was ever regarded as a problem, until the decree of Canopus in 238 BCE). I am referring rather to the possibility of controlling months and years for purposes extraneous to the regulation of the calendar itself. As we have seen in previous chapters, the rulers of Greek city states and (perhaps to a lesser extent) of Mesopotamian empires reserved the right to set the beginning of the months and the intercalations for reasons that were not always calendrical, though not necessarily for that matter directed towards their own self-seeking advantage. The political, economic, religious, and other social benefits of calendar flexibility were certainly well appreciated, for example, in the city states of ancient Greece (see Chapter 1). In a 'well-organized' kingdom like Egypt, the kings might have profited from a calendar that was flexible and under their control. By instituting the civil calendar, they effectively abdicated an important source of political power and social control.

The issue is not simply whether the civil calendar was particularly suited to the needs of ancient Egypt, or whether the calendrical needs of the kingdom of Egypt were different from those of other kingdoms. I would like to argue that in the context of calendars, the functionalist argument outlined above—whereby calendars are conceived of entirely in terms of their function, e.g. administrative—is reductionist and therefore flawed. A functionalist argument reduces calendars to tools (or 'instruments', in Parker's word), suggesting somehow that they are objects that societies use; but this conception is far too restrictive. In actual fact, calendars are among the inherent structures of political processes, economic activity, religion, and the rest of social life; they are also a formative part of the culture, world view, and ideology of the societies that use them. Calendars must therefore be viewed as constitutive parts of society and culture, rather than as instruments that are only there because they are useful (see Introduction). The same applies, indeed, to any other aspect of culture and society in ancient Egypt: no one would seek to argue that anthropomorphic sarcophagi or hieroglyphs, for example, were mere 'instruments' for the disposal of dead bodies or for writing, or that they were used in Egypt because they were functionally more suited to ancient Egyptian society. The institution of the Egyptian civil calendar in the early third millennium BCE and its maintenance, unchanged, over a staggering period of nearly three millennia (no doubt a world record) are a complex socio-cultural phenomenon that cannot be explained purely in terms of the calendar's administrative usefulness and efficiency.

To give a better account of the civil calendar as an inherent structure and a constitutive part of Egyptian society and culture, it could be suggested for example that a fixed, homogeneous, and unchanging calendar was particularly congruous to Egyptian religious ideology in which the ideas of cosmic order, stability, permanence, and eternity were particularly valued and emphasized.[123] Whilst this approach may not suffice, perhaps, to explain the origins of the civil calendar or its remarkable longevity in Egypt, it does clearly situate this calendar in the broader socio-cultural context of ancient Egypt, and explains more satisfactorily why it differed so radically from all other calendars in the ancient world.

In this light, we may legitimately wonder why, as we shall see in the next chapter, the Egyptian calendar and its derivatives were adopted in the second half of the first millennium BCE by the other peoples of the Mediterranean and Near East, eventually supplanting, by the end of Antiquity, virtually all other calendars in the ancient world. As I have suggested at the beginning of this chapter, it is not that the Egyptian calendar was regarded, for whatever reason, as intrinsically superior to theirs; in fact the Greeks, who were among the earliest to commend it, probably remained the most resistant to its adoption. The spread of the Egyptian calendar could not have been due directly to imperial expansionism, since of all the Near Eastern and Mediterranean powers, Egypt in this period was least involved—or least successful—in building an empire of any significant size beyond the valley of the Nile.

In the next chapter, I shall argue that the spread of the Egyptian calendar was the cumulative result of a haphazard sequence of events, attributable to discrete and specific historical circumstances; but that from a broader, macro-historical perspective, the spread of the fixed, Egyptian calendar to other parts of the Mediterranean and the Near East can be related to the wider, socio-political changes that were brought about by the rise of the great empires of late Antiquity. How exactly these processes were interrelated is a question that will be explored in the next chapter. But it remains remarkable, in any event, that in spite of its uniqueness and radical differences from the mainly lunar calendars of the ancient Mediterranean and Near East, the Egyptian calendar succeeded eventually in playing the most decisive part in the history of calendars in later Antiquity.

[123] See e.g. Bomhard (1999) 2–4 and especially J. Yoyotte in his foreword to this work ibid., p. xi). On the meaning of 'eternity' in this context, see Stern (2003*a*) 113–14. On the relationship between calendars, world view, and ideology, cf. Stern (1996).

4

The Rise of the Fixed Calendars: Persian, Ptolemaic, and Julian Calendars

Before the sixth century BCE, nearly all the calendars of the Mediterranean and the Near East were flexible, variable, and under the control of political rulers; but in the course of the following centuries these calendars evolved, in different ways, into fixed and immutable schemes. This remarkable change began in late sixth- or early fifth-century Persia, with the institution of the Persian Zoroastrian calendar, and culminated in 46 BCE in Rome, with the institution of the Julian calendar. Other calendars were also affected, though to a lesser degree: thus the Babylonian calendar, with the adoption in this period of fixed 19-year cycles (see Chapter 2), and to a lesser degree still, the slow regularization of the calendars of Greece (Chapter 1) and of pre-Julian, Republican Rome (below in this chapter).[1] By the end of the first millennium BCE, however, the majority of ancient calendars had become fixed. This had long-term historical consequences. The Julian calendar, as is well known, went on to establish itself as dominant in the Roman Empire, in late antique and medieval Christendom, and much later (in its slightly modified, Gregorian form) throughout the modern world. This chapter is thus not simply about the rise and development of a few ancient fixed calendars, but about a major process which affected the whole of the ancient world and eventually led to the formation of our modern calendar today.

The most decisive factor, in this general shift from flexible to fixed calendars, was the spread and influence of the Egyptian calendar. During the last centuries of the first millennium BCE, the Egyptian calendar—the only fixed calendar to have existed in earlier Antiquity—began spreading to a number of regions, some astonishingly remote. This occurred, however, in very different

[1] For an excellent study of the progressive centralization and standardization of the Roman calendar in the Republican and early Imperial periods, mainly from the perspective of the calendar's contents (i.e. annual festivals and qualified days), see Rüpke (1995). In this chapter, as elsewhere in this book, I focus only on the bare structure of the calendar, i.e. how months and years were reckoned.

ways. The Persians and their satrapies far to the north and the east adopted the Egyptian calendar almost whole piece; Julius Caesar just used it as a model for restructuring the Roman calendar year. In some cases, the adoption of the Egyptian calendar by other nations was the result of Egyptian, or more specifically Ptolemaic, territorial expansion (Cyrene, Cyprus, and possibly Judaea). Elsewhere, on the contrary, it was the annexation of Egypt into other empires that led to the appropriation of the Egyptian calendar by its foreign rulers (Achaemenid Persian, and Roman).

In each of these cases, moreover, the Egyptian calendar was adopted or emulated for very specific, local reasons. Julius Caesar's reform of the calendar was motivated by political conditions specific to late Republican Rome (as we shall later see); he certainly did not conceive the fixation of the Roman calendar as following some general trend or grand, macro-historical trajectory. The trend towards fixation that we discern in the calendars of the late first millennium BCE, and that we attribute or relate to the spread of the Egyptian calendar, was uneven, disparate, and piecemeal. Whether we are justified to interpret it as a general macro-historical pattern, and not as a fortuitous amalgamation of discrete calendar changes occurring at different places and times in the ancient world, needs further consideration. To some extent, the question will have to be left open.

The main question to ask, in this context, is whether a unifying explanation can be offered for the rise of fixed calendars and calendar fixation in the second half of the first millennium BCE. I have already suggested in earlier chapters that fixation of calendars was related to the rise, in this period, of increasingly large empires in the Near East and (slightly later) the Mediterranean. These vast geo-political entities were hampered by limited communication resources. Besides the political, administrative, and military problems this entailed, it had become impossible for politically controlled calendars to be reckoned uniformly across the empires: for if the calendar depended on monthly decisions by the king or ruler, these decisions could not be transmitted to all parts of the empire before the next month was due. Fixed calendars, however, could be reckoned uniformly across vast empires without any risk of disruption. The introduction of fixed and predictable calendars may thus have been intended for the sake of administrative cohesion. This would explain why the Egyptian calendar began to spread so successfully in this period (e.g. in the Persian and Roman Empires), and why, by the Roman period, most calendars had become completely fixed.

This explanation is attractive and may lend some weight to a general, macro-historical approach to the process of calendar fixation. However, it assumes a very specific relationship between the calendar and imperial administrative expediency, which may be over-restrictive. In the last chapter, I criticized functionalist interpretations of the Egyptian calendar as a suitable instrument for the administrative needs of the Egyptian kingdom. The calendar was not merely a technical device, but a core element of society and culture; it was not *used* by society and culture, but rather *constitutive* of them. In this light, the relationship between the fixation of calendars and the rise of the great empires need not be purely functional. The fixed calendars of Persia, Ptolemaic Egypt, and the Roman Empire were not just useful for the administration of the empires, but also active participants in the formation of common, imperial cultures: the observance of the same Babylonian Seleucid calendar from Elam to the Ionian coast must have contributed to the political, social, and cultural cohesion (or to use a modern, fashionable term, 'globalization') of the Seleucid Empire,[2] and so, *mutatis mutandis*, the Julian calendar in the Roman Empire.[3] On this basis I shall consider, at the end of this chapter, the possibility of other, non-functionalist explanations for the rise of fixed calendars in the great empires of this period.

This chapter will trace the spread of the Egyptian calendar, and thus of fixed calendars, through three distinct phases: Achaemenid, Ptolemaic, and Roman. These phases follow a chronological order but also represent a geographical shift from East to West. The weakest link in this chain will be the Ptolemaic Empire, where paradoxically, the Egyptian calendar spread far less than in the great empires that preceded and followed it.

1. THE PERSIAN CALENDAR AND ITS NEIGHBOURS

The institution of a fixed calendar in Persia and its diffusion in the eastern and northern parts of the Persian Achaemenid Empire, at some point in the late sixth or fifth century BCE, was a very radical change from earlier calendrical practice. Our knowledge of the earlier calendar of Persia is limited, but it was very clearly lunar. Most of the evidence belongs to the last decades of its existence, when it was becoming assimilated to the Babylonian calendar. This process of assimilation deserves attention, as it may provide a background to the adoption of the fixed, Egyptian calendar soon after. Because of the nature of the evidence, the Old Persian calendar will be considered together with that of Elam (the region lying between Mesopotamia and Persia).

[2] The Seleucid calendar was not universally adopted in Ionia (western Asia Minor), but it seems at least to have been the official calendar of Sardis: Samuel (1972) 132 (see also 125–6, on Pergamum).

[3] Although the main sphere of use of the Julian calendar was the western half of the Roman Empire, it was also used, under a different nomenclature, in parts of the East such as the province of Syria: see Ch. 5.

Old Persian and Elamite calendars

The most ancient calendars attested east of Mesopotamia are those of Persia and Elam.[4] The evidence is tenuous, but until the mid-first millennium BCE, they were almost certainly lunar. This is supported by an Elamite document from late second-millennium BCE Anšan, that appears to include an intercalary month.[5] But our knowledge of the ancient, Old Persian and Elamite calendars derives mainly from early Achaemenid sources of the sixth–fifth centuries BCE, more precisely from the reigns of Darius I (the trilingual Behistun inscription, dated year 1 of Darius or 522/1 BCE, and the Persepolis Fortification Tablets) and of Xerxes and Artaxerxes I (the Persepolis Treasury Tablets), which use Old Persian and Elamite as well as Babylonian month-names concurrently.[6] Reference in these sources to Old Persian and Elamite intercalary months suggests again lunar calendars; more importantly, the correlation of these three calendars confirms that like the Babylonian calendar, the Old Persian and Elamite calendars were lunar.[7]

The similarity of the Old Persian to the Babylonian calendar in the sixth century BCE is most evident in the trilingual Behistun inscription, where the same days of the month are recorded for Old Persian months in the Old Persian and Elamite texts as for Babylonian months in the Akkadian text. These exact equivalences, however, cannot be taken at face value: they only mean that the Akkadian translators of the Elamite or Old Persian texts[8] believed both calendars to be identical, or assumed so for translation convenience. In reality, even if both calendars were lunar, there could have been

[4] See Cohen (1993) 362–6, citing evidence of Elamite month-names from Susa and Anšan going back to the late second—early first millennia BCE. For an attempt to reconstruct the ancient Elamite calendar, see de Blois (2006).

[5] Hinz and Koch (1987) ii. 1153, s.v. še-ru-um (1), with a plausible restoration 'še-ru-um DIRIG' (i.e. intercalary Šerum).

[6] For a translation of the Behistun (also known as Bisitun) inscription, see Lecoq (1997) 83–97 and 187–217; for a full edition of the Aramaic version found at Elephantine, see Porten and Yardeni (1986–99) iii. 60–71. For the Persepolis Fortification Tablets, see Hallock (1969), with discussion on pp. 74–5; for the Persepolis Treasury Tablets (which actually begin at the end of the reign of Darius I), see G. G. Cameron (1948), (1965). The Behistun inscription has Old Persian and Babylonian month-names (in the Old Persian and Akkadian texts, respectively); its Elamite text does not give Elamite month-names, but only Old Persian month-names in transliteration. The Persepolis Fortification Tablets, written in Elamite, have mainly Old Persian month-names but also other names that are presumed to be Elamite, on the grounds that tablets with these month-names relate to the administration of workforces in various regions of Elam (so Hallock 1969: 74–5), and more importantly, that some of these month-names are similar to those in Elamite documents from late second-millennium BCE Anšan (see Stolper 1984: 14–15; de Blois 2006). The Persepolis Treasury Tablets, also written in Elamite, have only Old Persian names.

[7] Old Persian month-names suggest an association with agricultural seasons (Boyce 1975–91: ii. 23–5; Lecoq 1997: 171–4); but this would be compatible to a lunar calendar with intercalation.

[8] The earliest and main text of the inscription is either the Elamite (Kuhrt 1995: ii. 666) or Old Persian (Lecoq 1997: 87) versions, of which the Akkadian version is a translation.

substantial differences between them, in terms of when exactly the lunar month began and when intercalations were made.[9] But even if the correspondence between both calendars may have been in reality not quite as exact, the Behistun inscription can still be taken as evidence of a certain process of adaptation of the Old Persian to the Babylonian calendar. This process would have arisen in the context of the Babylonian calendar's becoming dominant, by the sixth century, in most of the Near East.

The adaptation of the Old Persian and (now also) Elamite calendars to the Babylonian calendar becomes more evident slightly later, in the Persepolis Fortification and Treasury Tablets. A continuous sequence of Old Persian (with some Elamite) intercalations is attested in these documents for the years ranging from 506/5 to 490/89 BCE, and corresponds exactly to the sequence of intercalations in the Babylonian calendar, which we know from Babylonian sources elsewhere—see Chapter 2 and Table 2.4: the same months were intercalated in the same years.[10] This correspondence can hardly have been fortuitous. It clearly means that Old Persian and Elamite calendars had become assimilated, in this period, to the Babylonian calendar.[11]

Still, in a small minority of Persepolis Fortification Tablets the Old Persian intercalations do not agree exactly with those of the Babylonian calendar. In three documents relating to 503/2 BCE, the Old Persian intercalary month is X_2

[9] *Pace* de Blois (2006) 43–4.

[10] Walker (1997) 23–4. An Elamite intercalation is only attested for 500/499 BCE (XII_2), in Hallock (1969) nos. 1046, 1049, and 1057; it is the same as in the Babylonian calendar. Old Persian intercalations, conforming to Babylonian intercalations, are attested as follows: 506/5 BCE (XII_2) Hallock (1969) no. 881; 503/2 (VI_2) ibid. nos. 660, 894, 1790, 1943; 500/499 (XII_2) ibid. nos. 764, 870, 875, 966, 1718; 498/7 (XII_2) ibid. nos. 246, 297, 765, 998, 999, 1257, 1844; 495/4 (XII_2) ibid. no. 864; 492/1 (VI_2) G. G. Cameron (1965) no. 19; and 490/89 (XII_2) id. (1948) no. 2. Old Persian intercalations are also attested for the years 484/3 (VI_2, Hallock 1969: nos. 10–11) and 474/3 (XII_2, ibid. no. 27), but in the absence of Babylonian evidence for these years, we cannot be certain that the same intercalations were made (see Table 2.4 nn. *f*, *i*). One final Old Persian intercalation is attested for 460/59 (XII_2, G. G. Cameron 1948 no. 79), the same as in the Babylonian calendar (Sachs and Hunger 1988–2006: v. no. 56).

[11] The widely-held opinion that the Old Persian and Elamite intercalary months in the Persepolis Fortification and Treasury Tablets coincided with those of the Babylonian calendar depends, however, on whether in general Old Persian and Elamite month-names can be reliably correlated with those of the Babylonian calendar. The Behistun inscription remains a reasonable source of evidence for 522/1 BCE, but we cannot be certain that the same correlation maintained itself from year to year. The correlation of Elamite month-names with Babylonian months is particularly speculative. The identity of Aššetukpi as the twelfth month of the Elamite year is convincingly established by Hallock (1969: 75); but this leads him to assume that Aššetukpi was equivalent to (and thus coincided with) Babylonian Addaru, which is impossible to prove. But even if we cannot be certain that the sequence of months in all three calendars was concurrent (and hence, that their intercalary months, e.g. XII_2, occurred at the same time), it remains true that in the years 506/5 to 490/89 BCE, Old Persian intercalations occurred in the same years as in the Babylonian calendar, at the same intervals, and with months designated in both calendars as either the sixth or the twelfth of the year. Thus it is evident that even if they did not necessarily coincide, Old Persian (and perhaps also Elamite) intercalations were modelled entirely on the Babylonian sequence of intercalations.

(i.e. a second 10th month), whereas in the Babylonian calendar (as attested in Babylonian sources) it was VI_2, i.e. four months earlier.[12] In a single document relating to 499 BCE, the Old Persian intercalary month is given as I_2, whereas in the Babylonian calendar it was XII_2, one month earlier.[13] These deviations from the Babylonian calendar are probably survivals of the Old Persian calendar: the intercalation of months X_2 and I_2 may have been normal practice in the original Old Persian calendar, in contrast with the Babylonian calendar that only allowed the intercalation of VI_2 and XII_2.[14]

Before going further, a brief explanation is needed. My interpretation of the evidence depends on the meaning of the term *beptika*, which appears in these four documents as an epithet of the month-name (X and I respectively), and which I take to mean 'intercalary'. Although the normal Elamite term for 'intercalary' is *me-ša-na* ('later': Hinz and Koch 1987: ii. 916–17), the term *be-ip-ti-ka* is clearly used in other Fortification Tablets for Elamite intercalary months.[15] There is no reason to assume that *beptika* meant anything else for Old Persian months. Hallock interprets the term *beptika* differently, because of a tacit (and unsupported) assumption that Old Persian intercalary months must have been the same as in the Babylonian calendar, thus precluding an intercalary month X_2 or I_2. In his view, *beptika* means not 'intercalary' but 'shifted', and indicates a month occurring some time after an intercalation (e.g. in 502/3, X occurred after the intercalation of VI_2); for this intercalation had the effect of 'shifting' or postponing all subsequent months.[16] But this interpretation must be rejected on a number of counts. Firstly, as stated above, it is unlikely that the term *beptika* had a different meaning for Elamite and Old Persian months. Secondly, the designation of some months of the year as

[12] Hallock (1969) nos. 1069, 1070, 1073. My use of Roman numerals follows modern scholarly convention; in the sources, only month-names are used.

[13] Ibid. no. 1053. By 'earlier' (in both cases) I mean in positional terms, i.e. in terms of its position within the annual sequence of months. If, however, the sequence of months of both calendars concurred (as is commonly assumed: see above, n. 11), then also in temporal terms, the Babylonians would have made the intercalation (in this case) one month before the Persians.

[14] Hartner (1985) 746–8. Note also that according to de Blois (2006) 52, Old Persian month X would have corresponded to the Elamite month of Šerum, which is attested in the late second millennium BCE as being repeated (see above, n. 5). This may confirm that month X was specifically designated for intercalation (even though no repetition of Šermi, the early Achaemenid Elamite successor of Šerum, is attested in our sources). A further possible argument is that the Old Persian name of month X, Anāmaka (which means 'nameless'), may express the fact that this month could be repeated (the intercalary month would have been 'nameless' because extra-sequential). However, this would not clearly explain why the regular, non-intercalary month X should also have carried this name; moreover, the use of the same word in Sanskrit for intercalary months (mentioned by Boyce 1975–91: ii. 23–4 and Lecoq 1997: 173) is actually not clearly attested (de Blois 2006: 45).

[15] Hallock (1969) nos. 1046, 1049, and 1057. Thus in no. 1046, Elamite months X to XII *beptika* are reckoned as a four-month period.

[16] Hallock (1969) 75, endorsed by Hinz and Koch (1987) i. 181–2 (s.v. be-ip-ti-qa, which they translate as *verzögert*, delayed).

'shifted' (because subsequent to an intercalation) would have been unique and unparalleled in the ancient world. Thirdly, in a context of a lunar calendar where intercalations were regularly made, any month could be regarded as having been, at some level, shifted. The information that a particular month had been 'shifted' would have been of limited use, and indeed could have led to confusion, unless there was a clear rule dictating for how long after an intercalation the months would continue being called 'shifted'. Fourthly, the term *beptika* has been interpreted (through linguistic derivation) as meaning 'hostile', 'rebel', or 'foreign',[17] none of which lend themselves to Hallock's translation 'shifted': there would have been no good reason for a 'shifted' month to be regarded as either hostile or foreign. In contrast, 'foreign' would have been a very suitable designation for extra-sequential, intercalary months. It is far more plausible, therefore, to interpret the Old Persian *beptika* months as being intercalary.[18]

The Old Persian intercalations above-mentioned for 503/2 and 499 BCE are inconsistent not only with the Babylonian calendar, as we have seen, but also with the Old Persian dates of other documents from the same corpus of Persepolis Fortification Tablets that give for these years the same intercalations as in the Babylonian calendar.[19] The four deviant cases of 503/2 and 499 BCE may thus be regarded as exceptional to the general pattern of Old Persian adaptation to the Babylonian calendar; they reveal that in this period, the adaptation to the Babylonian calendar was not fully or consistently implemented.[20] An explanation may in fact be given as to why the dates in these

[17] See de Blois (2006) 44, 49–51, who subscribes nevertheless to Hallock's interpretation of *beptika* (in the context of Old Persian months) as referring to 'shifted' months, and argues that shifted months were called *beptika,* i.e. 'hostile', because these months could be wrongly identified by negligent scribes and hence could lead to errors. This explanation seems unnecessarily far-fetched.

[18] I follow here the interpretation of Hartner (1985) 746–8, except that in his view, *beptika* means an intercalary month deemed to occur *before* the regular month of the same name; this however is refuted by no. 1046, where an Elamite XII *beptika* appears at the end of the four-month sequence from month X (see above, n. 15), and no. 1053 with an Old Persian four-month period from I *beptika* to IV. Hartner's interpretation is designed to fit his broader theory that intercalation in the Old Persian calendar was regulated by the winter solstice, which itself is unsubstantiated and implausible.

[19] See above, n. 10. One tablet from 503/2 BCE, no. 1943, is internally inconsistent: in l. 3, it refers to a sequence of four months from VI_1 to VIII, including the Babylonian-compatible intercalation of VI_2; but in ll. 13–14, 22–3, 35–6 it has sequences of months without the intercalation of VI_2 (seven months from III to IX, seven months from II to VIII, and four months from V to VIII). It is quite possible that in the latter section of the tablet, VI_2 was omitted because the scribe switched, at that point, to the Old Persian calendar where the intercalation was not made until later in the year (X_2).

[20] This justifies my reluctance, in Ch. 2, to use Old Persian sources as evidence of Babylonian intercalations. Further deviations from Babylonian intercalations are apparent in other documents, but these are less conclusive. Hallock (1969) no. 1055 refers to (Elamite) months XII to I in the 22nd year (of Darius I, i.e. 500/499 BCE) as a two-month period, which would imply no intercalation of XII_2; yet this year is known in the Babylonian calendar to have been intercalated.

particular documents were not adapted to the Babylonian calendar. These documents are all accounts of the distribution of rations by an imperial agent called Irtupiyya;[21] not insignificantly, no intercalation conforming to the Babylonian calendar is attested in any of Irtupiyya's accounts.[22] Unlike other government officials, Irtupiyya appears to have had a personal preference for traditional Old Persian intercalations, and refrained from adapting them to the Babylonian calendar. Why he did so is a matter of speculation; his motivation was probably not nationalism (arguably an anachronistic concept) but rather just conservatism.[23]

Old Persian and Elamite calendars appear to have been abandoned at some stage after 458 BCE, when they are last attested.[24] Their disappearance may be attributed to their complete assimilation to the Babylonian calendar. Alternatively, the Old Persian calendar may have been superseded by the new Persian Zoroastrian calendar, to which we shall presently turn. The assimilation of the Old Persian to the Babylonian calendar at the beginning of the Achaemenid period provides a context for the subsequent adoption of the Egyptian calendar (in its Persian Zoroastrian form): the Achaemenid rulers clearly had an interest in the calendars of the people whom they had conquered.

The Persian Zoroastrian calendar

Our knowledge of the Persian Zoroastrian calendar depends almost entirely on early medieval sources, from which period the calendar has remained unchanged, with only minor modifications, until today.[25] Nevertheless, as we shall see below, there is firm evidence that it was instituted already in the early Achaemenid period.

The same is found in nos. 1056 and 108, with a three-month period from XI to I, same year. Similarly, no. 1928 refers to a 5-month period from IX to I in the 19th year, which should also have been intercalated (see Table 2.4). In all these cases, however, we must assume that the year number relates to the *last* month of the sequence (i.e. month I), because it is in this month (or after it) that the document would have been written and dated; this resolves the inconsistency with the Babylonian calendar. no. 794 refers to a twelve-month period from (Elamite) I to XII in the 27th year, which in the Babylonian calendar was intercalated with XII_2; but it is possible that this account happened not include the final month of the year.

21 On Irtupiyya, see Hallock (1969) 34.

22 Hallock (1969) no. 1790, with the intercalation of VI_2 in 503/2, is addressed to Irtupiyya, but it is not one of his own accounts. no. 1943, discussed above (n. 19), is a journal of Iršena, an apportioning official at Hadaran.

23 The use of the term *beptika* in these documents (otherwise unusual for Old Persian months) may also have something to do with Irtupiyya's conservatism.

24 When they were actually abandoned cannot be known, because of the general paucity of epigraphic and documentary evidence for the later Achaemenid period (on which see Lecoq 1997).

25 De Blois (1996), largely superseding Boyce (1970), Bickerman (1983), and Panaino (1990).

In contrast to the Old Persian calendar, the Persian Zoroastrian calendar was non-lunar and fixed. It consisted of twelve months of 30 days, plus five additional ('epagomenal') days—thus in structure, the same as the Egyptian civil calendar. In fact, its months were conterminous with Egyptian months. Both calendars were therefore identical, with the only differences that the Persian first month, Farwardīn, corresponded to the Egyptian fourth month (IV Akhet or Choiak), and that the epagomenal days were positioned elsewhere in the year (more on this later).[26] This almost complete identity could not possibly have been fortuitous, and leads to the inescapable conclusion that the Persian Zoroastrian calendar was directly modelled on the Egyptian.[27]

Like the Egyptian civil calendar, the Persian 365-day calendar drifted from the seasons by one day every four years. Various Muslim authors from the tenth century CE (culminating with al-Biruni, in *c.*1000 CE) acknowledge that this held true in their own period, but claim that in the pre-Islamic period (before the seventh century CE) the Persians corrected this drift by intercalating one 30-day month every 120 years.[28] But the historicity of this claim has been rejected by de Blois (1996) as a mere legend or unsubstantiated theory, on the grounds that one-month intercalations are not mentioned in any contemporary or earlier Zoroastrian source (although the notion of intercalation is discussed, rather unclearly, in Zoroastrian sources from the ninth–twelfth centuries CE) or in any other source from Antiquity.[29] Positive evidence that the calendar was not intercalated in the pre-Islamic period (or later) could be inferred, I would suggest, from the date given in various sources for Ardashir's victory over the Parthian king Artabanus IV in 224 CE.[30] But a

[26] The month-names of the Persian Zoroastrian calendar are Farwardīn, Urdībihišt, Xurdāδ, Tīr, Murdāδ, Šahrīwar, Mihr, Ābān, Āδar, Day, Bahman, Isfandārmuδ; the epagomenal days are called the Gatha days.

[27] As already recognized in the 16th c. by J. J. Scaliger, in his seminal work on calendars and chronology, *De Emendatione Temporum* (1583): see Hartner 1985 (756), de Blois 1996 (48–9). Bickerman's suggestion (1968: 43) that the Persian Zoroastrian calendar was based on the Babylonian 'business year' of twelve 30-day months (on which see Ch. 2, near nn. 54–6) is plainly wrong.

[28] According to some, the frequency was every 116 years; the sources are also inconsistent about the dates of these pre-Islamic intercalations (de Blois loc. cit.).

[29] Boyce (2005) 13–19 rejects de Blois's argument and maintains the theory of intercalation in the Sasanian period, but her argument is uncritical of the sources and considerably less convincing.

[30] According to the Syriac *Chronicle of Arbela*, ch. 8, the date was Wednesday. 27 Nisan 535 SE (i.e. 224 CE), which may be corrected to 28 Nisan (= 28 April), as 27 Nisan was a Tuesday (Sachau 1915: 61 and n. 1). According to the Arabic chronicle of al-Ṭabari, on the other hand, it was the last day of (the Persian month) Mihr (Nöldeke 1879: 14; Bosworth 1999: 13–14 and n. 54). The dates of 28 Nisan and 30 Mihr coincide in this year only if we assume that the Persian Zoroastrian calendar was not intercalated (if we correct instead the weekday in the *Chronicle of Arbela*, and thus prefer the date of Tuesday 27 Nisan, we still have approximate compatibility to a non-intercalated calendar, whereas an intercalated calendar remains completely incompatible). More ambiguous is the date of the martyrdom of Anahid, which is given in the Syriac Martyr Acts (Bedjan 1890–7: ii. 603) as 'in the (Syriac) month of Ḥaziran, on day 18, that is the

further, and perhaps decisive, argument against the historicity of this claim, intimated also by de Blois, is that if the Persian Zoroastrian calendar had been intercalated prior to the Islamic period, the position of its New Year would be inexplicable. Indeed, at the beginning of the Islamic period we know that the Persian Zoroastrian year began around the summer solstice (from which point it has been drifting, by one day every four years, until today). If prior to that it had been regularly intercalated, and thus maintained in stable relation to the seasons, its New Year would always have occurred in the season of the summer solstice; yet this would run counter to the well-established, ancient Persian Zoroastrian tradition of beginning the year at the vernal equinox.[31] It is reasonable to assume that the Persian Zoroastrian calendar was originally instituted in such a way that Farwardīn, the first month, occurred around the vernal equinox; whereas a New Year around the summer solstice finds no justification in the context of Persian or Zoroastrian tradition.[32] If we assume, however, that the Persian Zoroastrian calendar was *not* intercalated in the pre-Islamic period, just as it was not intercalated later, the position of Farwardīn can easily be explained. If at the beginning of the Islamic period Farwardīn was at the summer solstice, then in the early Achaemenid period (*c.* early fifth century BCE) it would have occurred in the spring, in accordance with the traditional Persian New Year. At that time, the Egyptian New Year occurred in the winter; the Persians, however, would have chosen the Egyptian fourth month (IV Akhet or Choiak), then occurring in the spring, as Farwardīn or first month of their own year—a correspondence that remained throughout the history of both calendars.

This argument, that the Persian Zoroastrian calendar was never intercalated, leads also to the conclusion that it was instituted in the early Achaemenid

month of Sapnadarmad (= Persian Isfandārmuδ), on Friday, year 9 of Yazdgerd (447 CE)'. The occurrence of 18 Ḥaziran in Isfandārmuδ is only possible if we assume that the ancient Persian Zoroastrian calendar was intercalated, and that the last intercalation was made after 447 CE, in the reign of Peroz (459–84) (as reported by al-Biruni in one work, but contradictory to his report elsewhere that the last intercalation was made in the reign of Yazdgerd I, i.e. in 399–420; see de Blois 1996: 40). However, the weekday remains problematic, as 18 Ḥaziran (whether interpreted as a Julian date, i.e. 18 June, or as a lunar date) should have been a Tuesday or Wednesday, not a Friday. It may be argued that 'Friday', in this text, is only a literary *topos* for martyrdom dates. However, it seems more plausible that 'Ḥaziran' in this text is an error for the next Syriac month, Tammuz, when the 18th of the month would have been a Friday (whether a Julian or a lunar date) and would have coincided with Isfandārmuδ in a non-intercalated Persian Zoroastrian calendar (as argued in Stern 2004: 462–3; the possibility of an intercalated calendar was overlooked in this article, but it should still be regarded as less likely).

[31] According to Boyce (1975–91: i. 175), this tradition was instituted by Zoroaster himself.

[32] The position of Farwardīn around the summer solstice cannot be explained as having been determined by the Egyptian calendar (on which the Persian Zoroastrian calendar was originally modelled), because throughout the period when the Persian Zoroastrian calendar is likely to have been instituted, i.e. from the Achaemenid conquest of Egypt to the reform of the Egyptian calendar under Augustus (see below), the Egyptian New Year (1 Thoth) never occurred around the summer solstice, only in the winter and the autumn.

period. This early dating needs further discussion. It seems likely that the Persian Zoroastrian calendar was instituted before the reform of the Egyptian calendar under Augustus (in the 20s BCE; see Chapter 5), because otherwise it would most probably have been modelled on the reformed, Alexandrian calendar, with a leap year every four years. Referring to events in 333 BCE, Quintus Curtius Rufus (3. 3. 10; first century CE) mentions that the Persians have a 365-day year; but this may just be a first-century anachronism. Some have attempted to argue on linguistic grounds that the Persian Zoroastrian calendar could only have been established in the Parthian period, i.e. from the second century BCE. The basis of this argument is that had this calendar been established earlier, it would have been given month-names in either Old Persian or late Avestan;[33] but since a number of the Zoroastrian month-names are clearly not Old Persian, and none of the names are Avestan, by default they can only be identified as Parthian (Lecoq 1997: 174). This argument, however, is not particularly strong, as month-names could easily have changed at a later stage. Moreover, although none of the Zoroastrian month-names are Avestan, their derivation from Avestan is in most cases clear.

On historical grounds, moreover, Parthian origins are completely implausible, because there never were political, commercial, or cultural contacts of any importance between the Parthian kingdom and Egypt. There is no reason why the Parthians should have adopted the calendar of a distant kingdom with which it barely had any relations. The only period when Persia was associated with Egypt (politically, and hence also perhaps in other ways) was under the Achaemenids, more precisely from the time of Cambyses' conquest of Egypt (*c.*525 BCE) to the dissolution of the Empire and the separation of the Ptolemaic and Seleucid kingdoms after Alexander's death (late fourth century BCE) or earlier, to the late fifth century BCE, after which Egypt become *de facto* independent from Achaemenid rule;[34] it is only within this period that the Egyptian calendar is likely to have been introduced.

On purely calendrical grounds, the early Achaemenid period should be preferred because, as mentioned above, it is only then that Farwardīn (month I) coincided with the spring equinox, the traditional Persian New Year. Had the calendar been instituted later, the position of Farwardīn would not be possible, on any account, to explain. De Blois (1996) 49 works out that the beginning of Farwardīn coincided exactly with the spring equinox in the years 481–479 BCE,

33 The language of the ancient body of literature called *Avesta*, identified as Eastern Iranian.

34 In the last century of the Achaemenid empire (i.e. late 5th–late 4th cc.), for most of the time Egypt was *de facto* independent from Achaemenid rule; it is thus perhaps less likely that the Egyptian calendar was borrowed by the Persians in this later period. Boyce (1975–91: ii. 144–5, 243–5) dates the institution of the Persian Zoroastrian calendar to the reign of Artaxerxes II, but with the only justification that this is when evidence of the Old Persian calendar ceases. Actually, it ceases already in the mid-5th c. BCE.

and concludes that the institution of this calendar can thus be dated precisely to the reign of Xerxes (486–465 BCE). Although de Blois allows for some flexibility, by extending 481–479 BCE to the entire reign of Xerxes, he still places excessive confidence in an astronomical argument, which—like all astronomical arguments—is not without considerable flaws. In 481–479 BCE, 1 Farwardīn would have occurred on 26 March, which according to modern astronomical calculation was indeed the date of the true vernal equinox.[35] This is to assume, however, that the Persians in this period were capable of calculating the equinox to the same level of precision as modern astronomers, which is most unlikely.[36] The Persians themselves were not distinguished in the field of astronomy (Pingree 1987: 858); if, as is quite possible, they consulted Babylonian astronomers, they would have been given a date of the equinox that could be as much as three days later than ours.[37] Furthermore, and more importantly, this astronomical argument is based on the assumption that the Persians waited—possibly decades—for the *exact* coincidence of the vernal equinox and the 1st day of an Egyptian month (to be renamed Farwardīn) before instituting their new calendar. This assumption is unreasonable: it seems far more likely that the new calendar was instituted whenever the decision to do so was taken, with its first month, Farwardīn, corresponding to the Egyptian month that was the *closest*, at the time, to the vernal equinox.[38] A margin of 15 days on either side of the equinox should therefore be allowed. The period during which 1 Farwardīn would have occurred on or within 15 days of the vernal equinox, with Cambyses' conquest of Egypt as a *terminus a quo*,[39] is from *c*.525 to 430 BCE. The astronomical argument thus leads to the conclusion—as is indeed most likely from a historical perspective—that the Egyptian calendar was introduced in Persia at some point during the first century of Achaemenid rule over Egypt.

[35] Not 25 March, as erroneously in de Blois (1996) 49. In 482 BCE, 1 Farwardīn also coincided with the true vernal equinox (in this year on 27 March), provided we assume the day unit began at midnight or at early dawn. All this is based on the model of the Armenian, Sogdian, and Choresmian calendars, which for reasons explained below are rightly considered by de Blois as representative of the original Persian Zoroastrian calendar. According to backward calculation of the later, post-Sasanian Persian Zoroastrian calendar, 1 Farwardīn would have been five days earlier in these years, i.e. 21 March.

[36] The same assumption pervades the work of Hartner, who argues that the old Avestan, pre-Zoroastrian calendar was regulated by the precise observation of equinoxes (1979: 8–9, 1985: 748–56), and that the 'Young Avestan' (his term, i.e. Persian Zoroastrian) calendar was been instituted in 503 BCE, when on his reckoning 1 Farwardīn coincided with the vernal equinox and Babylonian 1 Nisannu (1979: 2–5, 10–14; 1985: 757–72).

[37] Assuming the Babylonian astronomers used, as in all cuneiform sources, a schematic calculation such as the later 'Uruk scheme' (see Ch. 2 nn. 124–5). On the difficulty of observing equinoxes empirically, see A. Jones (2007) 153.

[38] See further Introduction, near n. 15.

[39] However, the absence of this calendar in the Behistun inscription suggests that it was not yet in existence at the beginning of Darius' reign.

Sogdian, Choresmian, and Armenian calendars

Other ancient calendars that were structurally similar to the Egyptian calendar, and more particularly to the Persian Zoroastrian calendar, are also most likely to have been adopted in the Achaemenid period. The calendars of Sogdiana, Choresmia (both in Transoxania, present-day Uzbekistan), and Armenia are known from early medieval sources to have been identical with each other; they were also identical, in the early Middle Ages, with the Persian Zoroastrian calendar, but with some minor differences.[40] This identity of calendars is remarkable, considering the vast geographical distance that lies between Transoxania (south-east of the Aral Sea) and Armenia (west of the Caspian Sea), and the fact that these regions are not known to have ever been related either politically, commercially, or culturally. It seems most unlikely, therefore, that this calendar was transmitted directly from Transoxania to Armenia (or vice versa). We must assume, instead, that it was disseminated to both regions from a common source, which can only have been Persia (de Blois 1996).

However by the early Middle Ages, the Persian Zoroastrian calendar differed slightly from that of Sogdiana, Choresmia, and Armenia. These differences are significant and need to be explained. Firstly, in the Sogdian-Choresmian-Armenian calendar, the New Year occurred five days later than in the Persian, i.e. on the 6th day of Persian Farwardīn; and secondly, the epagomenal days were positioned at the end of the twelfth month, whereas in the Persian Zoroastrian calendar they were positioned, rather oddly, at the end of the eighth month (Ābān). Both differences are clearly related. It would seem that originally all four calendars were identical, with—as in the Egyptian calendar—the epagomenal days at the end of the twelfth month (their twelfth month, however, corresponding to the Egyptian third month). Then, at some stage, the Persians postponed their epagomenal days from the end of the twelfth month to the subsequent eighth month, with the effect of bringing their New Year forward by five days.[41] Why they did so is unknown, but de Blois (1996) makes a plausible suggestion. The intention may have been to

[40] See Panaino (1990) 664–6; these differences will be considered in detail below. Evidence of the Sogdian and Choresmian calendars derives entirely from al-Biruni (*c.*1000 CE); his account can be treated as reliable for his own period, not least because he was himself a native of Choresmia, and also because the names of months he provides are largely corroborated by ancient Sogdian and Choresmian sources (de Blois 1996: 46). Al-Biruni does not appear to have known the Armenian calendar, but this calendar is well attested in late antique and early medieval Armenian literature; for a summary, see Tumanian (1974), Panaino (1990) 664. Before the introduction of the Persian Zoroastrian calendar, the calendar of Armenia is assumed to have been lunar, as everywhere else in the Near East (Tumanian 1974); the evidence, however, is slim.

[41] This scenario is far more likely than the reverse, i.e. that the epagomenals were originally at the end of the eighth month, and that the Sogdians, Choresmians, and Armenians—by some inexplicable common agreement—brought them forward to the previous twelfth month.

correct, at least temporarily, the effect of the drift of the 365-day calendar, and to make the New Year celebrations that were held during the epagomenal days agree with the vernal equinox, which traditionally was deemed the season of the New Year. At the beginning of the sixth century CE, the vernal equinox had shifted to the beginning of the ninth month (Āδar); it is in this period (late Sasanian), therefore, that the epagomenal days would have been repositioned at the end of the eighth month.[42] The Sogdian, Choresmian, and Armenian calendars thus preserved the scheme that had originally been instituted in Persia, whereas the Persians altered it slightly at some time in late Antiquity.[43]

The most likely context for the dissemination of the Persian Zoroastrian calendar to these distant regions would have been the Achaemenid Empire. It is only under Achaemenid rule that Sogdiana, Choresmia, and Armenia were part of a single geopolitical entity, in which they are likely to have shared the same calendar with Persia; whereas they became independent, and thus politically disconnected from each other, during the first century of Seleucid rule (third century BCE).[44] At the beginning of the Seleucid period, moreover, when Sogdiana was still part of the Seleucid Empire, it came under intensive Hellenistic influence through colonization and imperial governmental control,[45] which makes it quite unlikely that the Persian Zoroastrian calendar was adopted there in this period. In the unlikely event that it was after the Achaemenid period that the Persian Zoroastrian calendar spread to any these regions, this would not have happened through political means, but only through the religious medium of Zoroastrianism. But this depends on how widespread or significant Zoroastrianism really was in these regions in this period;[46] it also depends on the extent to which the calendar that I call

[42] De Blois (1996) 47, inferring from the Syriac Martyr Acts of Gregory that this change could not have been made after 518 CE (for possible evidence that it was made before 482/3, see Sims-Williams and de Blois 2005: 191). He also explains on this basis the origin of further anomalies in the Zoroastrian ritual calendar: in particular, the celebration of a 'Great New Year' on the 6th of the first month, which will have originated from a refusal by some to omit the five epagomenal days before the New Year in the year when these five days were officially shifted to the end of the following eighth month. For an alternative theory as to the origins of the 'Great New Year', see Boyce (2005) 8: it may have arisen as a result of popular confusion regarding the five epagomenal days, or deliberate opposition to insert them in the calendar year, at the time when the Persian Zoroastrian calendar was originally instituted.

[43] Further minor changes were made to the Zoroastrian calendar during the Middle Ages, but this is beyond my scope; see de Blois (1996).

[44] So argued by Boyce (1975–91) ii. 244, and esp. de Blois (1996).

[45] Briant (1990) 48–52, Sherwin-White and Kuhrt (1993) 103–13; also (on Bactria, which formed a single satrapy with Sogdiana in this period) Boyce (1975–91) ii. 24, iii. 51–68, 152–93.

[46] Evidence of Zoroastrianism in Sogdiana, Choresmia, and Armenia, as well as in Bactria and Cappadocia (to be discussed below) in the Achaemenid and Seleucid periods is at best sporadic and mingled with elements from other cults or religions; although this is a reflection of the eclectic nature of Zoroastrianism in this early period, as well as of the general scarcity of historical evidence for these regions in Antiquity. For Sogdiana, see Sims-Williams (2000) 8–12. Boyce (1975–91) provides some evidence for Choresmia (iii. 192–3), but very little for

'Persian Zoroastrian' was primarily religious and Zoroastrian—a question which will be addressed below.

There is also more specific evidence that the Persian Zoroastrian calendar had already reached Sogdiana under the Achaemenids. The third month of the Sogdian year is called *nysnyc*, which is derived from the Aramaic Babylonian month-name *nisan* (Akkadian Nisannu, first month of the Babylonian year).[47] The designation of the third Sogdian month by the name of the first Babylonian month is odd, and can only be explained by assuming that the name *nisan* was adopted in a period when the Sogdian, i.e. Persian Zoroastrian, third month coincided with the Babylonian Nisan.[48] This occurred in the late fourth—early third centuries BCE, i.e. around the end of the Achaemenid and beginning of the Hellenistic periods.[49] By then, both Persian Zoroastrian and Babylonian calendars would have been in use in the Sogdian satrapy.

The Cappadocian calendar

The Persian Zoroastrian calendar also spread to Cappadocia, immediately to the west of Armenia. The evidence is limited to late Antiquity, by which time the Cappadocian calendar had been adapted to the Julian calendar with the addition of one day in Julian leap years.[50] But from its structure and month-names it is evident that before the arrival of the Romans, the Cappadocian calendar had been identical with none other than the Persian Zoroastrian

Cappadocia (ii. 274–5, iii. 264–5) and Armenia (ii. 185–6). Bactria is assumed to have been a stronghold of Zoroastrianism from the earliest period (ibid. i. 275–6, ii. 7–8, 217–8, 276–8, iii. 6–8 and mainly 152–93—but this is largely the reiteration of a traditional belief); whilst in Armenia, according to Russell (1987), Zoroastrianism became the main religion already in the Achaemenid period, until the Christianization of the country at the beginning of the 4th c. CE. On the whole, there is no evidence that Zoroastrianism, or for that matter the Persian Zoroastrian calendar, suddenly spread to any these regions in the Seleucid or Parthian periods (I am grateful to Nicholas Sims-Williams for his assistance).

47 Babylonian month-names are also attested in late antique Bactria (northern Afghanistan), with *neisano*, *sioano*, and *þabato*, clearly derived from the Aramaic Babylonian *nisan*, *siwan*, and *shebat* (Sims-Williams and de Blois 2005). It is not known how the Bactrian calendar was structured, but given the affinity of Bactria to Sogdiana (both using East Iranian languages, similar month-names, and having formed a single satrapy in the early Seleucid period), it is likely to have been identical with the Sogdian calendar (ibid.; this supersedes their less likely argument that the Bactrian calendar was lunar throughout Antiquity, eid. 1996: 153–4, 160–1).

48 A similar phenomenon occurs in the Mandaean calendar, and will be discussed below.

49 This calculation is based on the Babylonian Nisan's beginning *on average* two weeks after the vernal equinox (see Ch. 2, near n. 122). In reality, however, the relationship between Babylonian lunar months and the Persian Zoroastrian year fluctuated from year to year. If we assume (as I think is less likely) the earliest Nisan in the 19-year cycle, then its coincidence with the Persian Zoroastrian third month would not have occurred until the mid-3rd c. BCE; or if the latest Nisan in the cycle, it would have been the early–mid-4th c. BCE.

50 The evidence derives mainly from the late antique *hemorologia* (Kubitschek 1915): see Samuel (1972) 177, Grumel (1958) 171, Panaino (1990) 663–4, and further Ch. 5.

calendar. For the Cappadocian calendar, as known in late Antiquity, consisted of twelve 30-day months followed by five epagomenal days, and its month-names were clearly of Avestan origin.[51] The use of Avestan month-names may also suggest that the introduction of this calendar to Cappadocia went as far back as the Achaemenid period.

Further evidence that the Cappadocian calendar was originally Persian Zoroastrian can be drawn from its relationship to the Julian calendar in the late Roman period, when the Cappadocian New Year was fixed on 12 December. This seemingly arbitrary date can be explained on the assumption that when the drifting Cappadocian calendar was adapted and stabilized in relation to the Julian calendar through the addition of one day in leap years, its New Year happened to occur on Julian 12 December. The earliest the Cappadocian calendar could have been 'Julianized' in this way was after the institution of the Julian calendar in 46 BCE, at which time the Persian Zoroastrian New Year (1 Farwardīn) fell a few days earlier than 12 December (and in subsequent years, earlier still).[52] Although the dates do not agree exactly (a solution to this problem will be presented in Chapter 5, where the Julianization of the Cappadocian calendar will be discussed in detail), at present it is sufficient to note that the date of the Roman-period Cappadocian New Year (12 December) is at least approximately compatible to an originally Persian Zoroastrian calendar,[53] which confirms that the latter was originally used in Cappadocia.

Sistan, Mandaeans

A totally different region of the Achaemenid Empire where the Persian Zoroastrian calendar may have been introduced is Sistan, a south-eastern province of Iran. In al-Biruni's period (*c.*1000 CE), indeed, its calendar was a 365-day year.[54] Nothing is known, however, about the earlier history of this calendar.

More can be said of the Mandaeans, whose modern-day location in southern Iraq and Khuzistan (ancient Elam) probably goes well back into Antiquity.

[51] Boyce (1975–91) iii. 279–81, Panaino (1990) 663–4; see also Kubitschek (1915) 102–4. The Avestan month-names indicate that this calendar was specifically Persian Zoroastrian rather than Egyptian. The Egyptian calendar is known to have been adopted elsewhere in the Eastern Mediterranean (see later in this chapter), but this is very unlikely in Cappadocia, where Egypt is not known to have ever exerted any influence.

[52] This is assuming, following de Blois (see above), the original Persian Zoroastrian calendar before its Sasanian reform.

[53] By contrast it is incompatible an originally Egyptian calendar, because the Egyptian civil New Year (1 Thoth) never occurred in December during the whole of the Roman period.

[54] Panaino (1990) 666. Surprisingly, Panaino makes no reference to the Mandaean calendar.

Their drifting, 365-day calendar, still in use today, consists of twelve 30-day months with five epagomenal days inserted at the end of the eighth month.[55] This is identical with the late Sasanian, Persian Zoroastrian calendar (see above, near n. 42) and in direct continuity with it, as in fact their months are exactly conterminous.[56] But although this calendar could have been borrowed from the Zoroastrians at any time in the early Middle Ages, some peculiarities of the Mandaean calendar suggest much earlier origins that would predate the Middle Ages, the Sasanians, and even Mandaism itself, as I shall now explain.

The twelve months of the Mandaean year are grouped into four seasons and named with reference to them, the first month of the year being called *awwal sitwa*, 'first winter', followed by the months of 'middle winter' and 'last winter', then the months of the spring, etc. As in the Egyptian calendar, these seasonal names are only nominal since the calendar drifts behind the seasons. But the designation of the first month as 'early winter' is incongruous with the Persian Zoroastrian tradition of associating the New Year, as we have seen, with the spring. Another peculiarity arises from the additional use, in the Mandaean calendar, of Babylonian (Aramaic) month-names. These names are arranged in such a way that the month of Nisan corresponds to the third month of the year (i.e. 'last winter'), exactly as in the Sogdian calendar, but incongruously, since Nisan is the first month of the Babylonian year.[57] Given the considerable distance between Sogdiana and the Mandaean settlements in southern Iraq and Khuzistan, it seems completely unlikely that the Mandaeans borrowed this arrangement of Babylonian month-names from the Sogdians (or vice versa, Sogdians from Mandaeans), and indeed, there would have been no

[55] Drower (1962) 83–5, accurately reporting that in 1935, the New Year occurred on 8 August. This date is consistent with present-day New Year dates (e.g. 20 July 2010 <http://www.nd.edu/~ssaddawi/M%20Calendar/Mandaean%20Calendar.pps>, accessed 1 June 2010), as well as with the late Sasanian, Persian Zoroastrian calendar. Earlier reports of Mandaean New Year dates are inconsistent and problematic (see references in Lupieri 2002: 19). Thus the 1875 date of 20 August should be corrected to 22 August. The 1854 dates of 23 February, 28 May, 26 August, and 24 November for the beginning of the four seasons are internally inconsistent, and should be corrected to 23 February, 29 May, 27 August, and 25 November. The 1678 New Year date of 1 October should be either 8 October (Gregorian) or 28 September (Julian) depending on which calendar the reporter used. The 1665 New Year of 14 October should be either 11 October (Gregorian) or 1 October (Julian). These errors might be the fault of the reporters, but it is equally possible that at various times Mandaean communities committed errors in the count of days (on the potential for error in this type of calendar, see Ch. 3, near n. 122).

[56] Assuming Drower's and present-day dates (see previous n.). The Mandaean calendar shares other similarities with the Zoroastrian calendar, e.g. the celebration of a 'Little New Year' on the 6th of the first month (except that for the Zoroastrians, this date is the 'Great New Year'); see above, n. 42.

[57] Drower loc. cit. The months are also named by the signs of the Zodiac, with Nisan equated to Aries, etc. This equivalence follows ancient and medieval standard convention, but has the effect, in the context of the Mandaean calendar, of identifying Nisan = Aries with the last month of winter, which is also in itself incongruous.

good reason for such an exchange. The similarity between both calendars is probably the independent result of similar historical circumstances. As argued above in the context of the Sogdian calendar, the third month of the Persian Zoroastrian calendar coincided with Babylonian Nisannu around the beginning of the Hellenistic period, in the early third century BCE; this provides an approximate date for the adoption of Babylonian month-names in the Mandaean calendar.[58] At this time, moreover, the first month of the Persian Zoroastrian year occurred in the middle of the winter, which may also explain why it was designated in the Mandaean calendar as 'first winter' month (alternatively, this designation could have been instituted in the first century BCE—but no later than that—when the Persian Zoroastrian New Year fell early in the winter). It appears therefore that the Mandaean calendar, a Persian Zoroastrian calendar but with peculiar seasonal month-names and a peculiar arrangement of Babylonian month-names, has origins that go back to the third century BCE.

In this period, however, Mandaism—a Gnostic religion inspired by Judaism and Christianity—did not yet exist. The calendar that the Mandaeans eventually adopted as their own must therefore have been originally a non-Mandaean, local calendar, presumably in use in southern Mesopotamia or Elam,[59] which followed the Persian Zoroastrian calendar but had adopted Babylonian month-names already in the early Hellenistic period. If so, the Mandaean calendar would constitute evidence of the early diffusion of the Persian Zoroastrian calendar in south-western Iran, as far at least as Elam—the closest it may ever have come to Babylonia.

An official, imperial calendar

The institution of the Persian Zoroastrian calendar and its wide diffusion in the northern and eastern sectors of the Achaemenid Empire need now to be explained. The first question to ask is for what purpose it might have been instituted. Some have maintained that this calendar was essentially Zoroastrian, thus liturgical and devotional, and that its institution and

[58] They coincided again in the 12th c. CE, but this is unlikely to have been when the Mandaeans adopted the Babylonian Aramaic names, which in this period would have been from either Christians or Jews. This is because some of the Mandaean names are not attested in the Christian Syriac calendar (*Siwan*, *Mashrwan*, *Ṭabit*), while others are attested in the Syriac but not in the Jewish calendar (*Kanun*); moreover, there is no historical reason why such borrowings should have been made by the Mandaeans at this late date. The late Achaemenid (or early Hellenistic) dating, therefore, is far preferable.

[59] The origins of the Mandaeans are notoriously unclear, but they seem to have been settled in southern Iraq and Khuzistan by the late Parthian period (see Buckley 2002: 3–5). We cannot rule out the possibility, however, that the Mandaean calendar was imported from elsewhere.

diffusion in the Achaemenid period was carried out entirely by Zoroastrian priests.[60] The Zoroastrian character of this calendar is evident from its naming of the months and days of the month after the *yazatas* (Zoroastrian divine beings), to which each of the months and days of month are dedicated;[61] and it may be assumed that these names were used from the time of the calendar's inception. However, documentary and epigraphic evidence indicates that the uses of this calendar in Antiquity were much broader than Zoroastrian and cultic. A Persian Zoroastrian date appears to be mentioned in an official, satrapal account from mid-fourth-century BCE Bactria—the earliest attestation of this calendar discovered to date.[62] The next document to be dated by this calendar is a first-century BCE Aramaic economic ostracon from Nisa, the main city of Parthia (now Turkmenistan, which incidentally provides evidence of this calendar in the region between Transoxania and Persia).[63] In the late Parthian period, this calendar is used in the inscription of Artabanus IV at Susa (*c.*215 CE), and a few decades later, in Iranian inscriptions from Dura-Europos in Syria, just within the Roman Empire.[64] In the Sasanian period (third–early seventh centuries), the Persian Zoroastrian calendar appears to have become widespread as what appears to have been an official, imperial calendar.[65] Its public use continues in medieval Iran after the Muslim conquest, as well as in Armenia, Choresmia, Sogdiana—much the same regions as earlier in Antiquity. The evidence does not suggest, therefore, that the calendar I have been calling for convenience 'Persian Zoroastrian' was either essentially Zoroastrian or intended specifically for religious use.

In this light, it is much more plausible to attribute the institution of the Persian Zoroastrian calendar to the Achaemenid rulers than to Zoroastrian priests. The Achaemenid rulers had the administrative and political means of

60 Boyce (1975–91: ii. 243–5), conjecturing that it was designed and instituted by a large convocation of leading Zoroastrian priests.

61 The *yazatas* after which the days are named follow their order of appearance in *Yasna* 16 (part of the ancient body of Avestan literature): ibid. 243–50.

62 Shaked (2004) 42–5, Naveh and Shaked (forthcoming): this fragmentary document is dated year 2, 20 Shebaṭ, which is apparently equated with the Zoroastrian day *dainā*, i.e. 24th of the month (the name of the month, if there ever was one, is missing; my alternative suggestion that DYN might simply be an Aramaic demonstrative, i.e. '*this* day', has been rejected by Aramaist colleagues). The calendar *dainā* belongs to must be the Persian Zoroastrian calendar, because if it was some archaic, Iranian lunar calendar, the equivalent Babylonian date should have been 24 Shebaṭ or something close to it. It has been suggested, however, that the mention of *dainā* in this document is related to the Zoroastrian cult, which might lend support to the calendar's 'Zoroastrian' interpretation: see Ch. 2 n. 76.

63 Chaumont (1968), Boyce (1970) 516–17. Boyce assumes that Nisa in this period was a stronghold of Zoroastrianism, but this need not be the explanation for the use of this calendar in this document.

64 Artabanus IV: ibid. 517. Dura-Europos: Ameling (2004) iii, Syr111–17, Syr120, and Syr122.

65 So according to Bickerman (1983) 785–6. Persian Zoroastrian dates occasionally appear, e.g. in Syriac Christian sources from Sasanian Mesopotamia (e.g. above, n. 30); see further Ch. 5.4.

instituting a new calendar and disseminating it across their empire; the Zoroastrian priesthood less clearly so.[66] Zoroastrian priests had no good reason to seek out and adopt a new calendar from Egypt, displacing whatever cultic calendar had been used hitherto; Egypt was a distant civilization with which Zoroastrian priests are not known to have had any contacts or cultural affinity. The Achaemenid rulers, in contrast, would have discovered the Egyptian calendar after Cambyses' conquest and annexation of Egypt. The new calendar which they instituted would have been intended not only for religious purposes—as the Zoroastrian nomenclature of months and days suggests—but also—as the documentary evidence seems to indicate—for political, administrative, and economic use.

The Achaemenid rulers, however, were not in any need of an official, imperial calendar, as this function was already fulfilled by the Babylonian calendar. It is becoming increasingly evident that the Babylonian calendar was used by Persian officials in all periods and all parts of the Achaemenid Empire, from Bactria in the east[67] to Lycia (Asia Minor) in the west[68] and Elephantine in the south of Egypt.[69] The biblical books of Zechariah, Ezra, and Nehemiah suggest its use in the province of Judaea, whilst Esther and Nehemiah suggest its official use in Susa, Achaemenid capital of Elam—all in the early Achaemenid period.[70] As we have seen in Chapter 2, individual Achaemenid kings played an important part in determining how Babylonian intercalations were made during their reigns; their interest in the Babylonian calendar was undoubtedly related to its use as an official imperial calendar.

Nevertheless, the institution of the Persian Zoroastrian calendar appears to have been an attempt—which may never have materialized as fully as intended—to introduce a new and distinctively Persian, official imperial calendar in parts of the Achaemenid Empire that had never been ruled by Assyrians or Babylonians, and that had therefore no prior tradition of using the Babylonian calendar. These regions, which in territorial terms constituted maybe half the Empire, were marked out by the continuous mountain ranges

[66] More recently Boyce (2005) 7 has conceded that the calendar must have been instituted by Persians from the 'Treasury' together with 'astronomer-priests', and that only the Achaemenid rulers would have had the power and military resources to enforce and disseminate this new calendar among the Zoroastrians in the Persian Empire.

[67] Shaked (2004) 42–5, Naveh and Shaked (forthcoming). Babylonian month-names were adopted in this period in Bactria as well as in Sogdiana: see above, near n. 47.

[68] Dupont-Sommer (1979), Fried (2004) 140–54. In this trilingual inscription, the Lydian and Greek texts are an appeal of the city of Xanthos to the satrap Pixotaros; the Aramaic text is his official reply to them. Only the latter is dated, 'Siwan, year 1 of Artaxerxes'.

[69] e.g. a letter in the Elephantine archive dating from 427 BCE, from the satrap Arsames to his Persian officials Achaemenes and Bagadana (Porten and Yardeni 1986–99: i. 94–5 no. A6. 1); also perhaps Arsames' letter of 411 BCE authorizing a boat repair (ibid. 96–101 no. A6. 2).

[70] Judaea: Zech. 1: 7, 7: 1, Ezra 6: 15, Neh. 6: 15. Susa: Esther 2: 16, 3: 7, 3: 13, 8: 9, 12, 9: 1, Neh. 1: 1, 2: 1. These works are likely to have been composed in Judaea (perhaps still during the Persian period), and thus represent reliable sources for calendar practice there.

stretching from the Taurus (northern Syria) to the Zagros (east of Mesopotamia), and included all the satrapies beyond them to the north (e.g. Cappadocia and Armenia) and to the east (e.g. Sogdiana and Bactria, Sistan, and parts of Elam). It is in these regions, which had never been under Assyrian or Babylonian dominion, that the Persian Zoroastrian calendar became particularly well established, as we have seen, already under Achaemenid rule.

It is significant to note, indeed, that no attempt was ever made to introduce the new Persian calendar in Babylonia, Mesopotamia, and other parts of the former neo-Babylonian Empire, where use of the Babylonian calendar was long established and would have been difficult to abolish. Even in Egypt, where the native civil calendar was actually identical with the new Persian calendar (which had been based on it), the Babylonian calendar was used as the imperial calendar. The appearance of Babylonian dates in official documents in Egypt (sometimes alongside Egyptian dates) can be partly explained as being appropriate to the Aramaic language they are written in; it may also be related to the Babylonian ethnicity of some of the imperial officials involved. But the Babylonian calendar was also used in Egypt by ethnically Persian officials in their own, internal correspondence.[71] This confirms that in the West, the Babylonian calendar was consistently treated by Persians as the official imperial calendar.

The profound calendrical cleavage that was thus marked out by the Taurus–Zagros mountain range with, as official imperial calendars, the Babylonian calendar to its south and west and the Persian Zoroastrian calendar to its north and east, was the result of an Achaemenid policy which had a long-term historical effect. Until the end of Antiquity, indeed, the dominant calendar in Mesopotamia and the Levant remained the Babylonian calendar (albeit adapted, in some regions, to the Julian calendar, as will be discussed in detail in Chapter 5), whereas in Iran and the outlying regions of Choresmia, Sogdiana, possibly Bactria, Armenia, and Cappadocia, the official calendar was the Persian Zoroastrian. Nevertheless, in the northern and eastern satrapies the policy was not consistently or continuously implemented, as the Babylonian calendar was also used at times for official purposes. We know at least that in the last decades of the Achaemenid Empire the (Persian) satrap of Bactria was dating his documents according to the Babylonian calendar, even though one of his letters includes a Persian Zoroastrian date (see above, n. 62). The Sogdian and Bactrian use of Babylonian month-names also suggests, as noted above (near n. 47), that the Babylonian calendar was used in these regions in about the same period. After the end of the Achaemenid period, the Persian Zoroastrian calendar is likely to have declined in the

[71] e.g. the shipyard journal from Memphis, dating from 473–471 BCE, uses Egyptian and Babylonian dates and involves people with Egyptian, Persian, and Babylonian names: Porten and Yardeni (1986–99) iii. 194–204 (no. C3. 8).

eastern sector of the Empire, as the Babylonian Macedonian calendar became the dominant calendar of the Seleucid rulers (Bickerman 1983). We thus find a list of Macedonian month-names in a second-century BCE inscription from Armawir (Armenia),[72] the Macedonian month of Gorpiaios in third-century BCE Iran (Samuel 1972: 144), the Macedonian month of Oloios (i.e. Loios) in early second-century BCE Bactria (Rea, Senior, and Hollis 1994), the Babylonian month of Elul in a mid-third-century BCE inscription from Afghanistan (then part of the Mauryan Indian empire),[73] and then numerous Babylonian and Macedonian month-names (alongside Indian month-names) in epigraphic sources from Gandhara (eastern Afghanistan) dating all the way to the second century CE.[74] In this period, the new Persian calendar may have become identified as primarily Zoroastrian; and it is perhaps mainly through the medium of Zoroastrianism that the calendar survived, until its apparent revival as an official, imperial calendar under the Sasanians in the third century CE.

Why the Egyptian calendar?

It remains to be asked why the Achaemenid rulers chose, for the purpose of this policy, the calendar of what must have been to them a distant and quite alien civilization. Its adoption in Persia and other regions even more remote from Egypt is indeed bizarre and in need of explanation.

Some have suggested that the old Avestan Iranian calendar was not lunar but similar to the Egyptian calendar, which would explain why the latter might have been eventually adopted. According to this theory, the old Avestan calendar consisted of a 360-day year, or twelve 30-day months (but without the addition of epagomenal days). The only basis for this theory consists of parallels between the seasonal division of the year in the Avesta and in ancient Indian Vedic sources, and of references in the latter to a 360-day year (the *sāvana* year).[75] These parallels, however, are flimsy and do not warrant the assumption that Iranian and Indian calendars were identical. Indeed, if

[72] Even though Armenia had already become independent from the Seleucid Empire, *c.*190 BCE: Russell (1987) 57–8.

[73] Aramaic inscription Laghmān II: Boyce (1975–91) iii. 145.

[74] Chakravarty (1975) 22; Falk and Bennett (2009) esp. 204–5, 211.

[75] This theory is defended by Boyce (1970) 515, (1975–91) i. 171–4, (2005); for a more balanced view, see Hartner (1979) 8–9, (1985) 748–56, Blois (1996). The number 360 often appears in Hellenistic sources in the context of the Persian solar cult, but this has no bearing on the calendar (*pace* Briant 1996: 292–3). Al-Biruni describes a Persian 360-day calendar (Boyce 1970: 516), but his reliability is doubtful (see de Blois 2006: 48, and generally 1996). A 30-day month is assumed in *Yasna* 16 (on which see above, n. 61), but this standard month-length could equally belong to a lunar calendar, to a 360-day calendar, or even to the later, Zoroastrian 365-day calendar (de Blois, ibid).

the identity of the old Iranian calendar is to be inferred through parallelism, a parallel with the Old Persian calendar—which we know was lunar—would be just as plausible. Moreover, in ancient India itself the dominant calendar is known, again through Vedic sources, to have been lunar, whereas the 360-day *sāvana* year seems only to have functioned in certain contexts as a simplified scheme.[76] Thus even if the Indo-Iranian parallel is preferred, it should lead to the conclusion that the original Iranian calendar was most likely lunar.[77] Furthermore, if the adoption of the Egyptian calendar consisted only of improving a pre-existing, Iranian 360-day calendar by adding five epagomenal days, it would not have been necessary to make the months of this new calendar conterminous with the Egyptian months: much easier would have been to preserve without change the months in the year of the calendar reform. The adoption of the Egyptian calendar whole piece, with conterminous months, suggests a radical break from previous calendrical practice.

This radical innovation, even if instigated (as I have argued above) by Achaemenid rulers rather than by Zoroastrian priests, seems at first sight unwarranted in the context of the calendars in existence in this period. If the Achaemenids were only seeking to institute an official, imperial calendar, a lunar calendar would have been perfectly adequate. We know that the Old Persian calendar was lunar—and so also, as we have just seen, other Iranian calendars—and largely adaptable to the Babylonian calendar. If most peoples in the Achaemenid Empire used a lunar calendar, a good option would have been to merge Babylonian and Persian/Iranian lunar calendars—much in the same way as the Seleucids were later to achieve with their Babylonian Macedonian calendar.

The choice of the Egyptian calendar, however, may have been dictated by the administrative advantages of a fixed calendar that could be reckoned identically, without local variation, across the wide territorial expanses of the Empire.[78] As we have seen in Chapter 2, the Babylonian calendar which was used as the official imperial calendar was based on new moon sightings and, in

[76] Similar to the Babylonian ideal 360-day year (on which see Ch. 2, near nn. 55–7); see de Blois (2006) 47, and more generally, Shamasashtry (1912) and Chakravarty (1975).

[77] Accounts of the length of the moon's phases in *Yašt* 7, *Yasna* 1. 8, 2. 8, including the designation of specific days (in groups of five) within the moon's cycle as auspicious or inauspicious, are taken by de Blois (2006: 45–9) as evidence that the early Avestan calendar was lunar. These passages certainly suggest that the days of the moon's cycle were carefully reckoned, even if the existence of a fully constituted lunar calendar (that may have been used for civil or other religious purposes) is not explicitly attested, and even if there is no evidence of any practice of intercalation.

[78] A similar suggestion is made by Boyce (1975–91) ii. 243–5 (see also ead. 2005: 7), although she attributes the institution of this calendar to Zoroastrian priests. It seems to me that uniformity of calendrical practice would have been less a concern to Zoroastrian priests than to those in charge of administrating the empire. On whether any importance was attached, in ancient religions, to the simultaneous observance of festivals in different places, see further Ch. 7.

this period, unpredictable intercalations on which information could take several months to be communicated to the more remote regions of the empire. As a result, the Babylonian calendar in Elephantine (southern Egypt) had to be improvised and occasionally differed from its central reckoning in Babylonia, which may have led, at times, to some administrative confusion. In Chapter 2, I argued that the introduction of fixed intercalation schemes in the Babylonian calendar was an Achaemenid policy designed to facilitate calendrical uniformity and hence administrative efficiency. The radical innovation of the Persian Zoroastrian calendar, which consisted in disseminating an Egyptian calendar to distant Persia and even further satrapies, was even more clearly the outcome of a deliberate, calendrical policy. As a fixed calendar, this new 365-day scheme was particularly well suited for establishing uniformity of calendrical practice in the northern and eastern satrapies. The choice of the Egyptian civil calendar for this purpose would have been justified by the fact that this was the only fixed calendar that the Persians could draw on as a model, in this period, from anywhere in the ancient world. Its adoption and spread in the Achaemenid Empire was thus not the result of Egyptian influence, but rather the indirect result of the sudden expansion of great empires in the Near East. The geo-political extent of the Achaemenid Empire far exceeded that of its foregoers, bringing about much greater problems of communications, administration, and central imperial control. The institution of a fixed calendar was an appropriate way of overcoming some of these difficulties.

Other possible explanations for the adoption of the Egyptian calendar are more directly related to the Achaemenid conquest of Egypt in 525 BCE. The institution of a new imperial calendar, distinct and very different from the Babylonian, may have represented a bid of the Achaemenids to carve for themselves an independent, competing identity. In this political-ideological context, the choice of the Egyptian calendar would have had particular advantages. Egypt was one of the wealthiest provinces of the Achaemenid Empire, and thus one of its most prized possessions. The Achaemenids had good reason to be proud of it, since despite numerous attempts, their Assyrian and Babylonian predecessors had never successfully conquered it.[79] The Achaemenid appropriation of the Egyptian calendar, far from representing submission to a foreign culture, may thus have been intended on the contrary as a demonstration and showpiece of Persia's unrivalled imperial expansion.

Although we have no explicit evidence of Achaemenid motivations, we may assume that it is through political and imperialistic processes of this kind that the Egyptian calendar was adopted in Persia, and then disseminated, slightly

[79] Except for a short period by the Assyrians in 674–664 BCE: Kuhrt (1995) ii. 634–6.

modified and with a Zoroastrian nomenclature, to Cappadocia, Armenia, as well as to some most unlikely regions deep into Central Asia.

2 THE PTOLEMAIC EMPIRE

After the end of the Achaemenid Empire, the Egyptian calendar began to spread in the eastern sector of the Mediterranean basin. This was the direct result of the expansionist policy of the Ptolemaic kingdom, newly established in the late fourth century BCE.[80] It was not the first time in history that Egypt had been active in the east of the Mediterranean. In the New Kingdom period, Egypt had held Cyprus and parts of the Levant from the reign of Tutmoses III (*c.* fifteenth century BCE) to that of Ramses III (twelfth century BCE; Kuhrt 1995: i. 317–29). Parts of the Levant came back under Egyptian control in the late seventh century BCE, during the interregnum between the decline of the Assyrian Empire and the rise of the neo-Babylonian. Cyprus was occupied again by Egypt in the short interregnum between the end of the Babylonian Empire and the Achaemenid conquest in 525 BCE (ibid. ii. 662). There is no good evidence, however, that the Egyptian calendar was exported to these regions in any of these earlier periods.[81]

The Egyptian calendar is known to have spread under the Ptolemies to Libya Cyrenaica and Cyprus, as we shall presently see. These areas were held as provinces from almost the beginning of Ptolemy I Soter's rule, around 320 BCE. It seems that the Egyptian civil calendar, alongside the Ptolemaic Macedonian calendar also attested in these provinces, was used there as the official calendar of the Ptolemaic kingdom.[82]

The Egyptian calendar sporadically appears also in other possessions of the Ptolemaic kingdom, but there its acceptance and use as the official calendar is more doubtful. A list of Egyptian months is found in a third-century BCE inscription from the island of Samos,[83] which was under Ptolemaic control between about 280 and 190 BCE; but we know from other sources that a local calendar was used at Samos, for official and all other purposes, throughout the

[80] On the Ptolemaic Empire, see Bagnall (1976); but he ignores, in this early work, the calendrical implications of Ptolemaic expansionism.

[81] Lachish bowl 3 (Tufnell 1958: 132–3, *c.*13th c. BCE) contains Egyptian dates. But as this bowl is written in Egyptian hieratic, it only proves Egyptian presence in Lachish in this period, not that the Egyptian calendar was adopted by the local population.

[82] The calendars of Ascalon, Gaza, and Arabia, although structurally similar to the Egyptian calendar, were not instituted in the Ptolemaic period but rather under the Romans: see Ch. 5.

[83] Hallof (2000) no. 218. The 3rd-c. BCE dating remains conjectural. Bickerman's comment (1968: 39) on this inscription is incorrect.

period of Ptolemaic control.[84] This inscription only proves that the Egyptian calendar was known to whoever wrote it, but not that this was the calendar that even he himself used.[85]

The case of Samos reminds us that the spread of the Egyptian calendar in the Ptolemaic Empire was by no means ubiquitous. Nevertheless, it is significant that Egyptian dating is not attested anywhere outside the possessions of the Ptolemaic Empire.[86] The spread of this calendar in the Mediterranean was clearly contingent on Ptolemaic rule.

Libya Cyrenaica

The Egyptian civil calendar already makes its first appearance in the city of Cyrene under Ptolemy I Soter (in *SEG* 9. 1). It was used there continuously through the Ptolemaic period, although the Ptolemaic Macedonian calendar was sometimes used along with it.[87] By the Roman period, and apparently until the end of Antiquity, the Egyptian civil calendar—now, presumably, adapted to the new Alexandrian calendar—seems to have become completely standard.[88]

The Egyptian calendar is also well attested in other cities of Lybia Cyrenaica in the Roman period, e.g. Ptolemais and especially Tocra.[89] In the city of Berenike, two substantial Jewish inscriptions from the late first century BCE or early first century CE are dated according to the Egyptian calendar.[90] The use of the Egyptian calendar by Jews—whose own religious calendar was otherwise lunar, as can be demonstrated from these very inscriptions[91]—demonstrates

[84] See e.g. Hallof (2000) nos. 82, 151, 169, 172, Michel (1900) 738–9 no. 899, Samuel (1972) 120–1.

[85] In actual fact, the omission of Choiak in this list of months may suggest poor knowledge of the Egyptian calendar.

[86] According to *CIL* viii. 17584, the Egyptian date '4 Choiak 269' appears in a fragmentary mosaic floor from late Roman Byzacena (present-day Tunisia), i.e. well beyond the geographical area of the earlier Ptolemaic Empire. The reading of this inscription, however, is very uncertain. The meaning of 269 is also unclear, as a long era is not known to have been used in Africa in the late Roman period.

[87] Double datings appear in inscriptions from Cyrene of 155 BCE (*SEG* 9. 7) and 108 BCE (*SEG* 9. 5, l. 60; for this year—better than 161 BCE—see Bennett <http://www.tyndalehouse.com/Egypt/ptolemies/chron/chronology.htm>). The latter also mentions (in l. 45) the Greek month-name of Theudaisios, which is presumably local and pre-Ptolemaic (it is well attested in other ancient Greek calendars: see Samuel 1972: 297).

[88] *SEG* 9..4 (16/15 BCE), 244 (112 CE), 246 (20 CE), 267 (late 3rd c. CE), and 286 (?); *SEG* 52: 1841–2 (1st c. CE).

[89] Ptolemais: *SEG* 9. 375, 379. Tocra: ibid. 467, 557–723, and the Jewish tombstones in *SEG* 16. 877–929.

[90] *SEG* 16. 931; Reynolds (1981) 244–7 (nos. 17–18). For the precise dating of these inscriptions, see Stern (2001) 58–61, 120–1.

[91] Stern (2001) 120–1. On Jewish Diaspora calendars, see Ch. 6.

that this must have been the calendar employed in Berenike for official, public purposes.[92]

Cyprus

Dated inscriptions in Cyprus from the mid-third century BCE use only Macedonian months names; this suggests that the official (and only) calendar in use, in this period, was the Ptolemaic Macedonian calendar. But from the mid-second century BCE Egyptian civil dates begin to be attested in inscriptions (Mitford 1961: 129–31; 1971: 74–6). It seems likely that after the assimilation of the Ptolemaic Macedonian to the Egyptian civil calendar the mid-second century BCE (see Chapter 3), the Egyptian civil calendar rose in importance and eventually superseded its Macedonian counterpart. The Egyptian civil calendar seems to have become dominant in Cyprus through the rest of the Ptolemaic period.[93]

The 364-day Judaean calendar

A fixed, 364-day calendar is attested in Judaean (or 'Jewish') literary sources from the third–first centuries BCE, and appears to have been designed during the period of Ptolemaic rule. The extent to which it was used in practice is unknown and very contentious, but it certainly occupied a position of importance in the literature and culture of Judaean Jews in this period. This calendar was highly sophisticated, as we shall see, and represents a significant stage in the development and rise of fixed calendars in the ancient world.

The origins of this calendar are also highly contentious, but I shall argue that it was largely inspired by the Egyptian civil calendar. Unlike the calendars surveyed so far in this chapter, the 364-day calendar was structurally different from the Egyptian calendar, as its year was shorter by one day; its relationship to the Egyptian calendar is in this respect debatable. But like the Egyptian

92 Reynolds no. 17 is dated 25 Phaophi and the Jewish (Biblical) festival of Tabernacles. In the late 1st c. BCE–early 1st c. CE, the Egyptian date of 25 Phaophi occurred at the end of October, which would be compatible to the early autumn festival of Tabernacles (Stern 2001: 58–61). This may be taken as confirmation (though not as absolute proof) of the general assumption that the authentic Egyptian calendar was still used in Cyrenaica in the Roman period, and not, as in Salamis (see next n.), a modified calendar with Egyptian month-names.

93 At the end of the Ptolemaic period, it is attested e.g. in an inscription from Kourion dated 34 BCE (Thonemann 2008). Egyptian month-names were still in use in Salamis (eastern Cyprus) in the Roman period and late Antiquity, still with a calendar structure of twelve 30-day months and five epagomenal days; but in other respects, the calendar had parted ways from the Egyptian (or Alexandrian) calendar (Jerphanion 1932, Mitford 1961: 118–19, Stern 2010*a*). As we shall see in Ch. 5, these changes are likely to have been made in the early Roman period.

calendar, the 364-day calendar was distinctively abstract and schematic. This justifies the inclusion of this topic within the chapter subheading 'Ptolemaic Empire', rather than placing it under a separate subheading of its own, as I shall argue that the formation of this fixed calendar in this period was related to the spread of the Egyptian calendar under Ptolemaic rule.

The earliest attestation of this calendar is probably in chapters 72–82 of the Ethiopic book of Enoch (or 1 Enoch), a section referred to sometimes as the 'Astronomical Book of Enoch'; originally a separate work, it is the earliest Jewish text describing how a calendar is reckoned.[94] It was most probably composed by Jews in Judaea, originally in Aramaic, in the late third century BCE. Only fragments of the Aramaic version have survived; we are therefore dependent almost entirely on the Ethiopic translation, which cannot predate the Christianization of Ethiopia in the fourth century CE, and whose fidelity to the Aramaic original is a matter of debate.[95]

1 Enoch (ch. 72) presents a solar year of 364 days, divided into twelve months of 30 days except for the 3rd, 6th, 9th, and 12th months that have 31 days 'on account of the (sun's) sign' (72: 13, 19). This obscure phrase has been taken to refer to the four cardinal points of the solar year (i.e. the solstices and equinoxes), which would account for the four additional days (the 31st day of each of these four months). Later in the book (82: 4, 11–20), the four additional days are described as 'leaders' of the year and of its four seasons, which lends some support to this interpretation.[96]

Although in 1 Enoch the 364-day year is presented mainly as an astronomical scheme, it seems also to be favoured as a calendar for people to use (but for what purpose exactly is not specified). It is contrasted with a 360-day calendar (the same, but omitting the four additional days), which some (or all?) people are criticized for using (75: 1–2, 82: 4–6). But in a passage on the relationship between the solar year and a schematic lunar year of 354 days resulting from an alternation of 29- and 30-day months, 1 Enoch assumes inconsistently a 360-day year (hence a difference of 6 days per annum, or 30 days in five years: 74: 10–11) and then a 364-day year (50 days in five years: 74: 12–14). Even

[94] Milik (1976), VanderKam (1998), Ben-Dov (2008); see also Schürer (1973–87) iii. 250–68. English translations of 1 Enoch and Jubilees are in Charlesworth (1983–5), i. 5–89, ii. 35–142.

[95] The Aramaic fragments from Qumran were first published by Milik (1976), who argued that the Ethiopic version was an abridgment of the Aramaic original. It is generally accepted that the Ethiopic translation was not made directly from the Aramaic original, but rather from a Greek intermediary version. It should also be noted that the earliest of the Qumran fragments, 4QEnastr[a] (= 4Q208), cannot be directly related to any passage of the Ethiopic Enoch, which makes the relationship between these sources all the more uncertain. See Ben-Dov (2008) 69–77, 116–18. On the dating, see discussion below, n. 115.

[96] This assumes, however, that equinoxes and solstices, which represent astronomical positions of the sun, were also conceptualized as the beginning of the four seasons; but there is no explicit statement in 1 Enoch to confirm this. The position of the four additional days, according to these passages, is ambiguous: see Ben-Dov (2008) 38–40.

more inconsistently, the number of 364 days appears at the end of verse 74: 10, where 360 days are otherwise assumed. These inconsistencies have been explained as the result of two distinct stages in the redaction of this work, with 360 days in the earlier stage, and the addition of the four days in the latter.[97] In its present form, 1 Enoch clearly assumes the 364-day year as normative.

The 364-day calendar then dominates the book of Jubilees, a work with a similar history of transmission; its original composition is dated slightly later, to the mid-second century BCE.[98] It seems to use the book of Enoch as a source (Jub. 4: 17–24), but describes its calendar in rather different terms; moreover, the purpose of the 364-day calendar, in this work, is not astronomical but largely to date biblical events and religious festivals. Jubilees is the first source to point out that the 364-day year consists of exactly 52 weeks, which it groups into four seasons of 13 weeks each (6: 28–32). This means, by implication, that the New Year and the festivals always occur on the same day of the week.[99] The 364-day year is also divided into twelve months; the first day of the 1st, 4th, 7th, and 10th months are called 'days of remembrance' or 'days of appointed times',[100] and begin each of the four parts or seasons of the year (6: 23, 29). These days presumably correspond to the four additional days which are called '31st' in 1 Enoch, except that here they are unambiguously placed at the beginning of the months.[101]

The 364-day calendar is also prominent in the literature from Qumran (the 'Dead Sea Scrolls'), which can be securely dated to the second century BCE—first century CE. Although there is no single 'Qumran calendar'—a variety of schemes are represented in the sources, each with their own level of detail and complexity—the 364-day year tends to be their single, common denominator. This year-length and calendar is assumed in many non-calendrical sources as well as in a number of purely calendrical texts dating from the late second–late first centuries BCE, which lay out this calendar and derivative cycles in exceptional detail.[102] In these sources, the 364-day calendar is rarely presented in its

[97] Ben-Dov (2008) 34–7, 126, with further references. Less likely is the suggestion of E. Isaac (Charlesworth 1983–5: i. 54 note u) that 74: 10–16 (which implies the 360-day year) is the 'later fragmentary intrusion'.

[98] Schürer (1973–87) iii. 308–18, 256, VanderKam (1998), Ben-Dov (2008). This work has only been preserved in full in its Ethiopic version; Hebrew fragments, presumably of the original text, have been found at Qumran, but not of the passages relevant here.

[99] According to Qumran calendar texts, the New Year is always on a Wednesday; all months in the year begin either on Wednesday, Friday, or Sunday (the latter for all the 31-day months), and most festivals occur or begin on a Wednesday.

[100] According to O. S. Wintermute's translation in Charlesworth (1983–5) ii. 68.

[101] See above, n. 96. For further details on the calendars of 1 Enoch and Jubilees, see VanderKam (1998) 17–33, Glessmer (1999) 235–8, Ravid (2003), Ben-Dov (2008).

[102] The main texts are 4Q319–37, in Talmon, Ben-Dov, and Glessmer (2001) (with tabulations on pp. 4, 17–28). See also VanderKam (1998) 74–90, Glessmer (1999), Stern (2010*b*).

simple, pure form (as in 1 Enoch and Jubilees), but almost always brought in relation with other calendrical elements and schemes, thus lending the calendar considerable complexity. These additional elements include the priestly courses (a 24-week cycle) and lunar calendar days; the 364-day calendar is thus expanded into three-year lunar cycles and six-year priestly cycles, which (happily) are mutually compatible and yield complex but highly rigorous and coherent structures.[103] A further level of complexity is achieved in one remarkable text, 4Q319 (*Otot*), which combines the six-year cycle with the seven-year sabbatical cycles and the 49-year jubilees, a chronological tradition going back to Leviticus and prominent in 1 Enoch and Jubilees. Because 49 is not a multiple of 6, these cycles can only be reconciled through a multiplication of 6 and 49, thus yielding a grand cycle of 294 years, which is represented in summary form in the text of *Otot*.

Qumran calendars, which variously combine and synchronize the 364-day year in its weekly and monthly subdivisions, the three-year lunar cycle, the six-year cycle of priestly courses, and (in *Otot*) the grand jubilee cycle of 294 years, far exceed in complexity the schematic calendars of Antiquity that we have until now examined, including the Egyptian civil calendar, the Babylonian ideal year, and the Greek astronomical calendars. These calendars, particularly the latter, were sophisticated in conception but did not involve the synchronization of different calendar schemes in the same way.[104] It may be said that in complexity and sophistication, Qumran calendars remained unrivalled in Antiquity until the emergence, in the third century CE, of the Christian Easter cycles that synchronized the Julian and lunar calendars (see Chapter 6. 2). Within the Jewish tradition, likewise, the complexity and sophistication of Qumran calendar texts remained unique and unrivalled until the redaction of Jewish calendar monographs in the medieval period.

The importance of Qumran sources to the history of calendars in Antiquity is unfortunately often ignored. In spite of their apparently sectarian and marginal nature (to be discussed in Chapter 7), these sources represent a significant development in the conceptualization of fixed, schematic calendars in the ancient world, which fits in, at least from a macro-historical perspective, with the general evolution of ancient calendars, in the context of the great empires, towards ever-increasing schematization and fixation.

The complexity and sophistication of Qumran calendars must also be considered in relation to Judaean society and culture. It is unknown to what extent these calendar texts were produced by small 'sects' rather than by

[103] See Ch. 7 for a more detailed description.

[104] The only evidence of sustained calendar synchronization in the Hellenistic astronomical tradition is perhaps the Antikythera mechanism (*c.*100 BCE), in which one front dial indicated the days of the Egyptian calendar and another *may* have indicated the days of a lunar month (Freeth *et al.* 2008: 2, 14).

groups representative of 'mainstream' Judaea (more on this below), but either way, Judaea was not renowned in Antiquity for knowledge of either astronomy or mathematics. This may be taken as another indication, intimated already in earlier chapters, that calendars have less to do with expert scientific knowledge, astronomical or mathematical, than is commonly assumed.

The origins of the 364-day calendar

The origins of the Judaean 364-day calendar are very contentious. Most influential has been the theory of Jaubert, who claimed it was the priestly calendar of ancient Israel. According to Jaubert, this is the calendar assumed in the late, priestly narratives of the Hebrew Bible; it remained the official, cultic calendar of the Jerusalem Temple until the end of Hellenistic rule; and after its downfall at the beginning of the second century BCE, its observance was still advocated in the books of Enoch and Jubilees.[105] In actual fact, the Hebrew Bible does not explain how its calendar is to be reckoned; Jaubert's theory, therefore, is no more than a hypothesis. It rests on the finding that if one assumes a 364-day calendar, in which the relationship between dates and weekdays is constant, dated events in Biblical narratives consistently occur only on 'significant' weekdays—Sunday, Wednesday, and Friday, which correspond to the weekdays when, in the 364-day calendar, the Biblical festivals occur—and significantly (almost) never on the Sabbath. The fallacy of this theory, however, has been subsequently exposed in a number of independent studies. Wacholder, in particular, has shown that the pattern of event dates in the Hebrew Bible (which Jaubert exploits) can be explained entirely as a literary predilection, in the Bible, for 'round' or other standard numbers.[106]

In historical terms, it is far more likely that the calendar of ancient Israel was lunar, as everywhere else in the ancient Near East. The noted silence of the Hebrew Bible with regard to the workings of its calendar—even though it frequently gives precise dates for festivals and narrated events—is highly significant in this respect. It is precisely because all calendars in the Near East were lunar that the Hebrew Bible did not need to specify that its own was too. A description of the calendar would only have been necessary if its calendar had differed from the Near Eastern lunar norm. The 364-day calendar is unlikely, therefore, to have early Israelite origins. There is no reason to

[105] See especially Jaubert (1957*a*); also ead. (1953), (1957*b*).

[106] Wacholder and Wacholder (1995). More specific elements of Jaubert's theory have been criticized and/or refuted by J. M. Baumgarten (1962), (1987) 76, Beckwith (1996) 101–4, and Ravid (2003). Baumgarten (1962) points out that the weekdays of these dated events are never mentioned in Jubilees, which suggests that they were not regarded as significant. See further below, n. 117.

predate it from its earliest known appearance, in the third-century BCE Astronomical Book of Enoch.[107]

On the basis of this later dating, some have argued more recently that the origin of the 364-day calendar may have been Babylonian. This argument is largely dependent on the increasingly accepted notion that the astronomical contents of the book of Enoch, especially Enoch's description of the solar and lunar courses, are derived from Babylonian astronomy and in particular from the classical, seventh-century BCE astronomical compendium MUL.APIN. This compendium assumes a theoretical or ideal year-length of 360 days (twelve 30-day months) which, as we have seen, seems to have been also assumed in the earlier textual layer of 1 Enoch, where it is most likely of Babylonian origin.[108] But the 364-day year of 1 Enoch's later textual layer has also been ascribed a Babylonian origin, on the basis on an inference from a short passage of MUL.APIN which states that the year consists of twelve (lunar) months and ten days, and that one intercalation is therefore made every three years.[109] Assuming that twelve lunar months equal 354 days (based a regular alternation of 29-and 30-day months), this passage would imply a year-length of 364 days. The argument, therefore, is that this short passage would have been the source of the Judaean 364-day calendar, as well as of its synchronization with the three-year lunar cycle that is attested in Qumran sources.[110]

This argument, however, is implausible on more than one count. The inference of a 364-day year from this passage of MUL.APIN is unconvincing not only because this year-length is unattested in Mesopotamian astronomical sources, but also, more specifically, because the calendar used throughout MUL.APIN is the 360-day year (e.g. Hunger and Pingree 1989: 139–40); if a 364-day year were assumed in this short passage, it would be inexplicably inconsistent.[111] Furthermore, this passage discusses the length of the year only

[107] This *ex silentio* argument has not been proposed, to my knowledge, elsewhere. For my earlier, less decisive view, see Stern (2001) 2–3. See also Ben-Dov (2005) 241–2, (2008) 2.

[108] Albani (1994) 173–272, Glessmer (1996*a*). On MUL.APIN, see Ch. 2 n. 92. The 360-day year is also assumed in 4Q318 (4QZodiology: J. Greenfield in Pfann *et al.* 2000: 259–74), an astrological work from Qumran containing other elements of Mesopotamian origin. Similarly, Ben-Dov and Horowitz (2005) have shown that the lunar dates that are listed in Qumran synchronistic calendars (*duqah* and 'x', on which see further Ch. 7, near n. 16) correspond to elements of the 'Lunar Three' tradition in Babylonian astronomical sources, which would confirm the influence that Babylonian astronomy exerted on Jewish astronomical literature of the Hellenistic period (see also Ben-Dov 2008: 153–287).

[109] MUL.APIN II ii 11–12 (Hunger and Pingree 1989: 94).

[110] Horowitz (1994) 94, (1998); also Albani loc. cit. and 278, Glessmer (1996*a*) 278, 281, (1997) 143–4, (1999) 217, 274–5, Ben-Dov (2008) 166–7, 182–3.

[111] Koch (1996), refuting Horowitz (1994) but failing, all the same, to provide a satisfactory explanation of this passage. See Horowitz's rejoinder and remarks (1998). Koch also points out that the inference is based on the assumption that twelve lunar months equal 354 days, which itself is not mentioned anywhere in MUL.APIN (see also Hunger and Pingree 1989: 153).

to explain why intercalations (in the lunar calendar) must be made every three years; it certainly does not necessitate or imply a calendar based on this year-length. It should also be emphasized that the evidence of this passage is at best only implicit, and thus not the likely source material from which a whole calendar might have been constructed. Thus the suggestion that this short, inconsistent, and not at all explicit passage, or some tradition underlying it, generated the formation of Enoch's 364-day year-length and calendar is extremely far-fetched.

The question is rather how 1 Enoch progressed from a 360-day year, discernable in the earlier layers of the text and ostensibly inherited from Babylonian astronomical sources such as MUL.APIN, to its own distinctive 364-day year. The addition of four days to the 360-day year lacks justification. Some has suggested that they were added at the beginning (or end) of each season for purely ideological reasons, to draw out the importance of the fourfold division of the year (Ben-Dov 2008: 34–7); but why this division should have been ideologically important remains to be explained.[112] A year of 364 days does have the advantage, from a Jewish or biblical perspective, of being a multiple of seven, thus dividable into 52 weeks exactly, with the New Year and other festivals occurring annually on the same day of the week. But although these features are noted and emphasized in the book of Jubilees and in the Qumran scrolls, the book of Enoch makes hardly any mention of weekdays or weeks (only briefly in ch. 79).[113] If it is in the book of Enoch that the 364-day year was first formulated, it would not have been conceived, in first instance, as consisting of a whole number of weeks, and this will not explain, therefore, the addition of four days to the 360-day year.

The origins of the 364-day year need also an explanation in terms of its intended function. In the book of Enoch, the 364-day calendar serves only an astronomical purpose: it is a schematic time frame for the annual course of the sun. In spite of the religious character of this work, and in spite of 1 Enoch's strong advocacy for the 364-day year (in 75: 1–2, 82: 4–6), this calendar is never used for dating the biblical festivals and the Sabbaths or for any other liturgical purpose (VanderKam 1998: 26). This fits well with Babylonian

Further evidence of a 364-day year in Babylonian astronomy is inferred by Horowitz (1994) 94 from a few 7th-c. BCE *ziqpu* star lists (lists of stars at their culmination), but this notion—if the inference is correct—would still remain only implicit. A division of the circle into 364 parts (as opposed to 360 degrees, normal in Babylonian astronomy) is implied by one cuneiform text, AO 6478 (see Hunger and Pingree 1989: 143), but this source is marginal to Babylonian astronomy and not easily reconcilable with it. See Britton (2007) 126.

112 The evidence that Ben-Dov (2008) 40–7 adduces for the importance of the four seasons in Jubilees (the Flood story) and a few passages in Qumran literature is not very strong.

113 On the importance of the septenary principle in Jubilees and Qumran sources (also underlying the pentecontad calendar of the Temple Scroll, 11Q19 xviii f., xxi, on which see also Stern 2001: 22), see Ben-Dov (2008) 52–67. On 1 Enoch 79: 4, see ibid. 109.

tradition, in which the 360-day year (in MUL.APIN and other sources) is strictly astronomical and intended only as a theoretical, schematic simplification of the Babylonian calendar to provide an approximate time frame for annually recurring astronomical events (see Chapter 2 n. 56). But in the book of Jubilees and in Qumran calendrical sources, the 364-day calendar is used to determine the dates of festivals and the whole liturgical year; Jub. 6: 31–8 explicitly states that observance of this calendar is essential for the festivals to be celebrated on the right days. The notion that a fixed, schematic calendar—with a completely changeless year-length and structure—could determine the dates of festivals represents a significant departure from Babylonian tradition, where the calendar in religious life was always flexible and lunar. This is an important argument against Babylonian origins. The practical, liturgical function that is ascribed in these sources to the fixed, 364-day calendar draws us away from Mesopotamian culture, and leads us instead in the direction of Egypt.

The 364-day year and the Egyptian civil calendar

The possibility that the 364-day calendar was designed under Egyptian influence has not received sufficient consideration.[114] Not only was its year-length of 365 days the closest, of all ancient calendars, to the 364-day year, but as has been stressed more than once, the Egyptian calendar was unique in the ancient world in being fixed, changeless, and abstract (i.e. independent of empirical phenomena), whilst serving as an official, public, and religious calendar. These features, of which the uniqueness cannot be understated, were also characteristic of the Judaean 364-day calendar: a fixed and abstract calendar scheme, designed for practical religious use. If an external source is to be sought for the 364-day calendar, it is thus most likely to have been Egypt. Notwithstanding the evident exposure of the book of Enoch to Babylonian astronomical influence, its 364-day calendar—especially as developed and applied for religious purposes in the slightly later book of Jubilees and in Qumran sources—seems to have been inspired by Egyptian calendrical tradition.

[114] The suggestion was first made by Milik (1959) 110–11, although he assumed—perhaps out of deference to Jaubert's theory—that the Egyptian calendar was borrowed 'through the Phoenicians at the beginning of the Israelite monarchy', and later modified to a 364-day year after the Exile of 586 BCE; why specificially through the Phoenicians in the first stage, and why a modification after the Exile in the next stage, is not explained. A. I. Baumgarten (1997) 85–6 similarly suggests that the 364-day calendar was the Egyptian calendar minus one day; see also Ravid (2003) 390, but with little elaboration on this theory. Eshel (2005) 108–10 seems to have been the first to suggest that the calendar resulted from Egyptian influence during the Ptolemaic period, as I myself shall argue below.

To sustain this theory, it will be necessary to account for the differences between the Egyptian 365-day and the Judaean 364-day calendars, and above all, why the Egyptian year may have been reduced in Judaea by one day. The 364-day calendar could be interpreted, in various ways, as a Judaization of the 365-day Egyptian calendar. Mention has been made above of the advantage, from a Jewish perspective, of a year-length of 364 days dividable by seven, making it 52 whole weeks. In the context of the book of Enoch, where the notion of weeks is largely ignored, the reduction of the Egyptian year to 364 days could have been intended instead to obtain a multiple of four, i.e. a year dividable into four equal seasons. The notion of four seasons was alien to Egyptian tradition, where the year counted only three seasons, but it is prominent in the astronomical scheme of 1 Enoch (e.g. 82: 4, 11–20, and implicitly in ch. 72) as well as in Babylonian astronomy (e.g. MUL.APIN). The 364-year could thus be seen, in Enoch, as a compromise between the 365-day year of the Egyptian calendar and the quadripartite year of Babylonian astronomical tradition.

Another way in which the 364-day calendar may be interpreted as a Jewish modification of the Egyptian calendar is that the Jews may have objected to the latter's five epagomenal days. These days may have been regarded as anomalous (because outside the sequence of months) or as religiously objectionable (because they were celebrated in Egypt as the 'birth of the gods', a highlight of the ritual year; Borghouts 1986). This would explain why, in the Jewish 364-day calendar, the epagomenal days were relocated to the four cardinal points of the year (equinoxes and solstices), and why they were consequently reduced from five to four.

The relationship between the Egyptian 365-day and the Judaean 364-day calendars finds further support from the simple fact—which again, has not been given sufficient notice—that the 364-day calendar makes its first appearance in the late third century BCE (in the book of Enoch), precisely when Judaea was under Ptolemaic rule.[115] This seems more than a mere coincidence.

[115] This dating of the Astronomical Enoch is Milik's (1976: 7, 273), based on an Enoch fragment from Qumran (4QEnastr[a] = 4Q208) which he dated to the late 3rd–early 2nd c. BCE, and which implied that the original composition was somewhat earlier, presumably in the 3rd c. BCE (see also Schürer 1973–87: iii. 254–6; E. C. J. Tigchelaar and F. García Martínez in Pfann *et al.* 2000: 95–171, esp. 106). However, Milik's dating of 4Q208 was only palaeographical, and thus may be treated as somewhat conjectural. Since then, ^{14}C analysis of 4Q208 has suggested a later dating, i.e. (according to the calibration in Jull *et al.* 1995: 14) either between 166 and 102 BCE or between 182 and 92 BCE, or better (according to the more recent calibration in Doudna 1999: 470) either between 167 and 53 BCE or between 172 and 48 BCE (with an intercept in 100 BCE). As Doudna (1999) 438 explains, any date within these ranges is equally possible, although there is a slightly higher probability at the intercept. These results suggest, therefore, that the fragment could belong to any time between the second quarter of the 2nd c. BCE and the mid-1st c. BCE, thus considerably later than Milik's dating; which opens up, in turn, the possibility that this work was composed in Judaea's post-Ptolemaic period (the need to redate this fragment on the basis of ^{14}C is surprisingly ignored by Jull *et al.* as well as by Tigchelaar and García Martínez; on redating the

In the context of Ptolemaic Judaea, the mechanism through which the Egyptian calendar may have exerted its influence would have been more complex than in Libya Cyrenaica and Cyprus, because in Judaea the Egyptian civil calendar was never used as an official calendar. This is probably because Ptolemaic rule lasted in Judaea only from *c.*301 to 200 BCE, when the Ptolemies were still using a Macedonian lunar calendar (see Chapter 3); moreover, the inhabitants of Judaea would have been more comfortable with the Ptolemaic Macedonian calendar, as the same calendar (or at least the same set of month-names) was in use in the neighbouring Seleucid Empire. This may explain why third-century letters and documents from Judaean officials to the Ptolemaic court are all dated according to the Macedonian calendar.[116] In this context, Jewish exposure to the Egyptian civil calendar could only have been subtle. Egyptian rule certainly meant a greater exposure to the Egyptian civil calendar (as to other aspects of Egyptian culture) than in any other period; but at the same time, the Jews were under no pressure to adopt it. This is perhaps what gave them the freedom to create their own, Judaized fixed calendar with a 364-day year.

The extent to which the 364-day calendar was used in practice is a contentious issue, but at the best of times, it would appear to have been followed only by a minority of Judaean Jews.[117] Jub. 6: 31–8 prescribes this calendar in no uncertain terms, but its polemical tone suggests at the same time that most people followed instead a lunar calendar.[118] The marginality of the 364-day calendar may have been due to its incompatibility with the official calendars in use in Judaea, which in the Hellenistic period and until the arrival of the Romans (in the first century CE) were consistently lunar (see Chapters 5 and 6).

Dead Sea Scrolls in general, see Doudna 1999: 463–4). The current scholarly consensus remains, however, with a late-3rd-c. dating for the composition of the Astronomical Enoch; even if this work is post-Ptolemaic, the concept and design of the fixed, 364-day calendar could still be attributed to exposure to the Egyptian calendar during the Ptolemaic period.

[116] Two letters of Toubias, a Jewish aristocrat in Transjordan, to King Ptolemy's minister Apollonius are dated to the Macedonian month Xandikos (257 BCE); Toubias' agent's deed of sale to Zenon (himself an agent of Apollonius) is also dated to Xandikos (259 BCE); and a letter of Alexander, local official in Judaea or Idumea, is dated Peritios embolimos (258 BCE): Tcherikover and Fuks (1957–64) i. 118–30 (nos. 4, 5, 1, and 6 respectively).

[117] For evidence of the widespread use of lunar calendars among the Jews in this period, see Stern (2001) 18–46. According to Jaubert (above, n. 105), Milik (1959) 110–11, and VanderKam (1981), (1998) 113–16, followed by others (e.g. Eshel 2005: 108–10), the 364-day year served as the dominant, official calendar in Judaea and the Jerusalem Temple until its replacement by the lunar calendar under Seleucid influence in the early 160s BCE, under Antiochus IV, the proof-text for this being Dan. 7: 25). But this is convincingly refuted by Davies (1983, esp. 82–3), on the basis of evidence of much earlier use of Babylonian month-names in Judaea, already in the Persian period (e.g. Zech. 1: 7, 7: 1, Ezra 6: 15, Neh. 6: 15), and of lack of positive evidence that any other calendar was used in Judaea in the Persian and Ptolemaic periods. The exclusive use of biblical, numbered months in some late Hebrew biblical works (Haggai and Daniel) does not necessarily imply a non-lunar, 364-day calendar.

[118] Davies (1983), Stern (2001) 11, and further discussion below, Ch. 7. 1.

It was also an intrinsically impractical calendar. Because its year-length was approximately one and a quarter days shorter than the true tropical solar year, it fell behind the seasons far more rapidly than did the Egyptian civil calendar.[119] Observance of this calendar over a protracted period would have caused the Biblical festivals to occur in the wrong agricultural seasons, in violation of Mosaic Law, which most Jews are unlikely to have tolerated. Indeed, even in Qumran sources where the 364-day calendar is prominent, the seasonal and agricultural significance of the festivals is emphasized.[120] This has led some to conclude that if the 364-day calendar was ever followed in practice, it would have been abandoned early on, as soon as its drift from the seasons was found to have become excessive (Beckwith 1992: 461).

The questions of whether, how, and by whom the 364-day calendar was observed in practice will be addressed in further detail in Chapter 7. At present, I shall only remark that its possible derivation from the Egyptian civil calendar, which I have argued here, may provide fresh insight into the problem of its drift. Indeed, the long-term drift of the civil calendar affected the Egyptians in a similar way as with the 364-day calendar, albeit less acutely: their seasonal festivals were celebrated, more often than not, in the wrong seasons.[121] The Egyptian example tells us not only that that observance of seasonal festivals in the wrong seasons was possible in ancient eastern Mediterranean societies—as indeed it was also, for different reasons, in Greece [122]—but also that if the Judaean 364-day calendar was inspired by the Egyptian calendar, its Jewish followers may have been undeterred, similarly to the Egyptians, by its seasonal discrepancy.

[119] On unconvincing attempts by modern scholars to conjecture that the Qumran calendar must have been adjusted through intercalation, see Ch. 7 n. 18.

[120] e.g. in the Temple Scroll, which adds the extra-biblical festivals of the wine and oil harvests (cols. 17–29). The agricultural significance of biblical festivals is also emphasized in Qumran liturgical texts (e.g. 4Q509: the ‘First fruits’ festival, i.e. Pentecost), and agricultural seasons are mentioned in the context of festivals in the Community Rule (1QS 10: 7–8). Note also Jub. 6: 21 (and parallel in Temple Scroll 19: 9): ‘for it [Pentecost] is the feast of weeks and the feast of first fruits: this feast is twofold and of a double nature’.

[121] The seasonal and agricultural significance of Egyptian festivals may have been suppressed, early on in history, because of the drift of the Egyptian civil calendar. Thus the Egyptian New Year festival, although still associated with the annual, heliacal rising of the Sothis star, appears no longer to have been associated with the inundation of the Nile (Borghouts 1986: 5). One can imagine it would have been difficult for Egyptians to celebrate this extremely important seasonal event at the wrong time of the year, which may explain why this original aspect of the New Year festival was suppressed. Note, however, the reference in the Canopus Decree to the New Year as the time of the rising of Sothis and of ‘the gathering of the crops and the rise of the river’ (Greek text, l. 38: cited in full in Ch. 3). As we have just seen (previous n.), there is no evidence of any such suppression in Judaean 364-day calendar sources.

[122] Lack of conformity with the seasons in Greek and also pre-Julian Roman calendars would have been due to the irregularity of their intercalations: see Ch. 1, below, and Feeney (2007) 199–200. The Persian Zoroastrian New Year drifted in the same way as the Egyptian calendar (see above, near n. 28).

Conclusion

The Egyptian civil calendar spread in the eastern Mediterranean, during the Ptolemaic period, in a variety of ways. In Cyrenaica and Cyprus, it was adopted as the official calendar. In Judaea the Egyptian calendar was not used for official purposes, but still it seems to have inspired the creation of an original, 364-day calendar, which was adopted and used in some circles and which eventually became, in Qumran sources, the most complex and sophisticated fixed calendar that has been so far encountered in the ancient world.

The evidence surveyed above suggests that the Egyptian calendar spread only, in these various ways, to a limited number of Ptolemaic possessions. The sporadic and variegated diffusion of the Egyptian calendar in the Ptolemaic Empire indicates that it was not a consistent policy led from above, as might have been the case earlier in the Achaemenid Empire. It is quite possible, indeed, that the decision to adopt the Egyptian calendar in Cyrenaica and Cyprus was taken entirely locally. This raises the question of whether we should interpret the diffusion of the Egyptian calendar under the Ptolemies as part of a grand, macro-historical pattern. There clearly was no intention of establishing a single, fixed calendar across the Ptolemaic Empire, and even less of pursuing a policy that had been initiated by the Achaemenids in the East. Nevertheless, the adoption of the Egyptian calendar by cities under Ptolemaic rule must have been motivated by a desire to participate in the eastern Mediterranean Ptolemaic *koine*. The adoption of the Egyptian calendar in Cyrenaica and Cyprus was no doubt a sensible move in terms of commerce, trade, and political relations. Thus even if led from below, and probably on a smaller scale, the diffusion of the Egyptian calendar in the Ptolemaic Empire had the same net result as in the Achaemenid Empire. The promotion of unity within the Empire through the use of a single, fixed calendar was as much to the benefit of the rulers as of the ruled, and this—albeit to a lesser extent than in the Achaemenid Empire—is what ultimately was achieved.

3. THE JULIAN CALENDAR

The institution of the Julian calendar in Rome in 46 BCE represents one of the most significant stages in the rise of fixed calendars in Antiquity. It was not identical with the Egyptian calendar, but its distinctive features, in particular its year-length of 365 days and the mere fact that it was fixed, suggest that the Egyptian calendar was used as a model for its creation. This finds confirmation in ancient sources describing Egyptian involvement in the institution of the Julian calendar (as we shall later see). The Julian calendar, however, improved its Egyptian model by adding the four-yearly leap year; the solar accuracy which this produced was the Julian calendar's most significant novelty.

The importance of the Julian calendar needs no spelling out. Its rapid spread and reception in the provinces of the Roman Empire, which laid its grounds for becoming the dominant calendar of the modern world, will be examined in Chapter 5. In this chapter, attention will be given to the Roman calendar of the Republican period (which preceded the institution of the Julian calendar); I shall then examine the origins of the Julian calendar, its early years, and the motivation that may have led to its institution.

The calendar was an important institution in Roman society. Tangible evidence of this is the practice, attested throughout the Roman imperial period, of erecting engraved and/or painted *fasti* (permanent annual calendars, with sometimes detailed lists of festivals) on private and public buildings, especially on walls of temples.[123] The *fasti* that have survived are a useful source of epigraphic evidence on the Roman calendar, although from the Republican period only one exemplar, the *Fasti Antiates*, has survived.[124] Literary sources on the Republican calendar and on how the Julian calendar was instituted are mostly non-contemporary and late (first–fifth centuries CE); they tend to agree with one another, but this is more likely due to literary borrowings than to independent historical accuracy. In spite of the wealth of evidence that we have for the general history of late Republican Rome, some aspects of the Republican and early Julian calendars are very poorly known.

The Republican calendar: structure

The calendar of Republican Rome, before the institution of the Julian calendar in 46 BCE, was unique in its kind and irreconcilable with any other known calendar in this period. It was clearly not lunar (although once it might have been), but its relationship with the solar year was also unstable and inconsistent. It was not a fixed calendar, because of its irregular intercalations; but its months were fixed, though with disconcertingly heterogeneous lengths—making it an unusual, idiosyncratic combination of rather different calendrical features.

[123] Degrassi (1963), Rüpke (1995), and for a general introduction, Salzman (1990) 6–8, Feeney (2007) 167–70. Public *fasti* engraved on marble stone are specific to the Augustan and early imperial period (mid-1st c. BCE–mid-1st c. CE); painted *fasti*, usually in private buildings, are attested in the 3rd–4th cc. (Rüpke 1995: 84–90, 145–51).

[124] This calendar, sometimes called *Fasti Antiates Maiores*, is from Antium (south of Rome) and dates from 84–55 BCE. See Degrassi (1963) 1–28 (no. 1); Rüpke (1995) 39–44; also Beard, North, and Price (1998) ii. 61–4, Hannah (2005) 102–6, and Feeney (2007) 183–4.

The Republican Roman calendar consisted of twelve months of fixed lengths of 28, 29, or 31 days, adding up to a fixed, 355-day year.[125] The days of the month were numbered in descending order with reference to three points in the month: the Kalends (1st of the month), the Nones (5th or 7th—depending on the month), and the Ides (13th or 15th).[126] Since the 355-day year-length fell short of the solar year (by about ten days), a block of 22 or 23 additional days was frequently intercalated, typically (but not necessarily) every other year. The complicated intercalation procedure brings out again the idiosyncratic nature of this calendar: an intercalary 27-day month (called Intercalaris or Intercalarius)[127] was inserted after the 23rd or 24th day of Februarius, thus cutting that month short (it was usually 28 days long) and effectively adding 22 or 23 days respectively to the total number of days in the year.[128]

In the later period of the Republic—which is all we really know about securely—the length and frequency of the intercalation was neither standardized nor fixed, but dependent instead on the annual, *ad hoc* decisions of the members of one of the most important priestly bodies, the pontifical college (perhaps, more specifically, of the minor pontiffs).[129] Their intercalations were often irregular, leading to an erratic relationship between the Roman calendar

[125] For the list of months, see below, Table 4.1. It does not appear to have followed any logical sequence (note in particular the succession of three 29-day months from November to Januarius). For a concise introduction, see Bickerman (1968) 43–6.

[126] For an example see below, n. 158.

[127] The alternative name Mercedonius is mentioned in Plutarch (*Numa* 18, *Caesar* 59) but not attested elsewhere (Michels 1967: 18, Samuel 1972: 161 n. 1, Rüpke 1995: 321–2).

[128] There is no comprehensive account of the intercalation in ancient sources, but the procedure described above is the plausible reconstruction of Michels (1967: 16–22, 145–67) on the basis of sporadic literary and epigraphic evidence. Among the relevant literary sources, the earlier are Varro, *De Lingua Latina* 6. 13 and Livy 43. 11. 13, 45. 44. 3; later sources include Censorinus 20. 6, Plutarch, *Numa* 18, and Macrobius *Saturnalia* 1. 13. 22; epigraphic evidence consists chiefly of the *Fasti Antiates*, the only pre-Julian *fasti* extant. For a summary of Michels's argument see Samuel (1972) 159–64; also Brind'Amour (1983) 27–8.

[129] Ancient sources refer only to 'pontiffs' (e.g. Suetonius, *Julius Caesar* 40), or even less clearly to *sacerdotes* ('priests': Solinus 1. 43). Van Haeperen (2002) 219–21 assumes, accordingly, that the whole pontifical college was in charge. However, Rüpke (1995) 372–3 notes the consistent involvement of minor pontiffs in calendrical matters (e.g. the publication of *fasti*) throughout the Republican period. On the other hand, some sources suggest that the *pontifex maximus* may also have had some control over the calendar: according to Censorinus (20. 7–8), indeed, it is as *pontifex maximus* that Julius Caesar instituted his new calendar in 46 BCE; whilst Suetonius (*Augustus* 31. 2) suggests that Augustus' reform of the Julian calendar in 8 BCE was related to his recent appointment, in 12 BCE, to the same office (see Bennett 2003: 232–3; note also that Bennett 2005: 178 relates intercalation patterns between 191 and 46 BCE to the terms of the *pontifices maximi*, suggesting perhaps that the latter controlled the intercalation). Rüpke argues, however, that it is as *dictator*, not as *pontifex maximus*, that Caesar decreed the institution of the new calendar (1995: 380–1), and that Censorinus' mention of Caesar as *pontifex maximus* refers only to a preparatory stage in his calendar reform, namely the intercalation of the year 46 BCE (pp. 384–7; followed by Van Haeperen 2002: 223). In any event, this means that the *pontifex maximus* had some part to play in controlling the calendar.

and the solar year. Thus in 190 BCE a solar eclipse was recorded on 11 Quintilis (July) of the Roman calendar, when we know it occurred on (Julian) 14 March—a discrepancy of nearly four months, obviously caused by insufficient intercalation. By 168 BCE, however, a lunar eclipse was recorded on the night before (Roman) 4 September, instead of (Julian) 21 June—a discrepancy of only about two-and-a-half months, which suggests that by then the discrepancy had been partly corrected through additional intercalation.[130] In Julius Caesar's time, the year had fallen short of some 90 days; the failure to intercalate which caused this shortfall can be broadly attributed to the civil wars and the political upheavals of the end of the Republican period.[131] For this reason, 46 BCE was extraordinarily extended into a 445-day year,[132] whereupon the Republican calendar was abandoned and the Julian calendar was instituted.

The Republican calendar: origins

There are several indications that the Roman calendar, like most other calendars in Antiquity, was originally lunar. Its month-lengths (in the Republican period) of 28, 29, and 31 days and year-length of 355 days are loosely compatible with a lunar calendar.[133] This may explain why Appian (second century CE) and Dio (third century CE) state, somewhat oddly, that the months of the Republican calendar were lunar,[134] although in reality, in the Republican calendar, the intercalations of 22 or 23 days ruined their synchronism with

[130] By 'Julian' I mean the backward (hence anachronistic) projection of the Julian calendar, which is commonly used by modern historians and astronomers as a stable and well-known time frame for ancient, pre-Julian times; 'Roman' refers to the Republican calendar that was then in use; 'Quintilis' is the month later to be named Julius (July). The sources for these two events are Livy 37. 4. 4, 44. 37. 8. See Bickerman (1968) 46, Samuel (1972) 163, Hannah (2005) 111–12, and in more detail, Rüpke (1995) 290–2 (with further references) and Bennett (2005) 177–8. Bickerman attributes the 190 BCE discrepancy to a failure to intercalate during the Hannibalic wars, which were concluded in 202 BCE, after which the discrepancy must have taken several decades to correct.

[131] See references in previous n. Assuming with Brind'Amour (1983) 76–8 and Hannah loc. cit. that the Roman calendar was aligned with the seasons around 70 BCE and through much of the subsequent decade (but see the reservations of Samuel 1972: 162–3 on the use of Plutarch, *Pompeius* 34 as evidence for 66 BCE), four intercalations would have been omitted between the mid-60s and 46 BCE: for various reconstructions, see Beaujeu (1976), Brind'Amour (1993: 35–54, 123), Bennett (2004*b*).

[132] Suetonius, *Julius Caesar* 40, but the sources do not all agree on this figure. For detailed discussions see Ideler (1825–6) ii. 122–3, Beaujeu (1976), Rüpke (1995) 384–9.

[133] Even though lunar month-lengths should not be less than 29 days or more than 30 days, and an average lunar year of 355 days is slightly excessive: Michels (1967) 16–22, 145–72. The lunar character of the 355-day year is unduly dismissed by Lehoux (2007: 49–50). See Ch. 3 n. 61.

[134] Appian, *Civil War*, 2. 154; Dio 43. 26; and for further sources see Samuel (1972) 159 n. 2, 168 n. 1, Brind'Amour (1983) 33–4. The same assumption seems to have been made by Plutarch (Grafton and Swerdlow 1988: 18).

the moon. According to many ancient authors, the Roman calendar in archaic times had been strictly lunar: thus, Romulus (the founder of Rome) was said to have begun the months on the day when the new moon was first sighted,[135] and Numa (its second king) to have instituted a lunar calendar with a 20-year cycle of intercalations.[136] Macrobius (late fourth–early fifth centuries CE) describes how, in ancient times, the new moon would be sighted each month by one of the minor pontiffs, who reported his sighting to another member of the pontifical college, the *rex sacrorum* ('king of sacrifices'); they both made a sacrifice to mark the beginning of the month, and announced to the assembled people how many days were to elapse between the Kalends and the Nones.[137] Whatever we make of these legends and late-antique accounts, the survival of lunar features in the Republican Roman calendar supports the tradition that originally the Roman calendar was lunar.[138]

135 Macrobius, *Saturnalia* 1. 15. 5. Elsewhere Macrobius refers to the archaic Romans as using a lunar calendar 'like the Greeks' (ibid. 1. 13. 8, also 1. 15. 20). But according to Plutarch (*Numa* 18), Romulus' calendar was a 360-day year with erratic month-lengths.

136 Livy 1. 19. 6; this 20-year cycle is not explained, but presumably Livy means really a 19-year cycle, counting the first years of the cycles inclusively (see Rüpke 1995: 203 n. 51). See also Solinus 1. 37–8. Cicero (*De Legibus* 2. 29) and more explicitly Plutarch (*Numa* 18) disagree with Livy and attribute to Numa the Republican system of intercalation; similarly Censorinus (20. 4) attributes to either Numa or Tarquinius (Priscus, Rome's fifth king) the 355-day year, which probably means the Republican calendar. Intercalation, which in context refers again to the Republican calendar, is attributed by others to Romulus, Numa, or Servius Tullius (Macr. *Sat.* 1. 13. 20). Julian claims that Numa's calendar was simply solar (*Hymn to King Helios* 41, 155 A–B). Obviously, these conflicting legendary accounts are in themselves of limited historical value.

137 Macrobius, *Saturnalia* 1. 15. 9–12, partly following Varro, *De Lingua Latina* 6. 27–8, who mentions only the announcement of the 'pontiffs' and on that basis derives *kalendae* from an archaic Latin verb *kalare* (to call, to announce; Hannah 2005: 100, and with parallel sources Rüpke 1995: 211 n. 85). Somewhat inconsistently, Varro also derives *nonae* from *nov*(*us*)/(*a*), referring to the new month or new moon; his other suggestion, that *nonae* means the ninth day before the Ides, is far more plausible (Feeney 2007: 152, Lehoux 2007: 49). On the etymology of Kalends, Nones, and Ides, see further Michels (1967) 19–21, 120 n. 5, 123, Brind'Amour (1983: 225–7), and Rüpke (1995: 210–14). On the *rex sacrorum*, see Rüpke (1995: 313 n. 77) and Beard, North, and Price (1998: i. 24–5). According to Livy, the minor pontiffs were originally called 'pontifical scribes' (22. 57. 3 *scriba pontificius*), which says perhaps something about their original function within the pontifical college, but also implies that the title of 'minor pontiff' in Macrobius' account is an anachronism (Lehoux 2007: 49).

138 For a suggested reconstruction of this lunar calendar, see Rüpke (1995) 209–30, and of its intercalation system, ibid. 295–319. On the question of whether the Roman New Year was at one time on 1 March, see Michels (1967) 97–9, Samuel (1972) 164–5, and Brind'Amour (1983) 130–2, 225–7. Rüpke (1995) 193–7 plausibly argues for a multiplicity of New Year days in the Roman year (for a similar phenomenon in ancient Near Eastern calendars, see Ch. 5, near nn. 13–14). On the related theory, already debated by the ancients (according to Censorinus 20. 2; also Servius on*Georgica* 1. 43), that the Roman calendar consisted originally of a ten-month year from March to December (possibly followed by an unnamed interval equivalent to two months), see Michels (19670 207–20), Bickerman (1968) 44–5, Samuel (1972) 167–70, Rüpke (1995) 192–202, and Hannah (2005) 99; the theory has been much discussed, but remains completely speculative.

If the Roman calendar was originally lunar, its conversion to the Republican calendar scheme, early in the history of Rome, needs to be explained. The fixed lengths of its months—including 28 and 31 days, but strangely not 30 days—and the intercalation of only 22 or 23 days (albeit in the form of a whole intercalary 'month') are structurally bizarre and difficult to understand. The Republican calendar appears to have attempted a compromise between lunar and solar schemes,[139] but this would have failed on both counts: the months lost their lunar character, whilst the average year-length, assuming intercalation in alternate years, exceeded somewhat the solar year.[140] The inaccuracies of this idiosyncratic lunar and solar calendar may have arisen partly from ignorance (Bickerman 1968: 44–5), but more likely, they were the outcome of political and religious processes that had little concern for astronomical or calendrical accuracy.[141]

The nature of these processes, and indeed, how and when the lunar calendar gave way to the Republican scheme, are largely unknown. Two laws (or sets of laws) regarding the intercalation—that of the Decemviri in 450 BCE, and that of Acilius in 191 BCE—suggest that formal changes were made to the Roman calendar at these times; however, these laws are only briefly mentioned in late sources, and nothing is known about their specific contents.[142] The date of the *lex Acilia* (to begin with the latter) suggests that it was related somehow to the disruption of the calendar around 190 BCE (mentioned above); it certainly seems to have had the effect of rectifying the calendar, at least partially, by 168 BCE.[143] Some see the *lex Acilia*, accordingly, as a regularization of the intercalary month-length;[144] others interpret it as a law investing the pontiffs with the

[139] As suggested already by Plutarch, *Numa* 18 and Macrobius, *Saturnalia* 1. 13. 8–13 (the latter's theory, in this context, that the original Roman lunar calendar was based on an eight-year cycle—the octaeteris—is excessively learned and historically unlikely; see Brind'Amour 1983) 28–30. See also Michels (1967) 16–22.

[140] Since 355 + half of 22.5 exceed the solar year (*c*.365¼ days) by one day (see Rüpke 1995: 294–5).

[141] Macrobius, *Saturnalia* 1. 13. 5, explains the avoidance of 30-day months and 354-day years as due to a traditional preference for odd numbers (cf. Vergil, *Buc*. 8. 75). For a cogent, though speculative attempt to explain some of the Republican calendar's peculiarities, see Rüpke (1995) 230–4 with the suggestion that they resulted from an attempt to compromise between the sometimes conflicting demands of economic time divisions (the 8-day week of *nundinae*, regulating markets) and religious cultic dates. I do not think, however, that this alone could account for either the end of the Roman lunar calendar, or the failure to institute an accurately solar calendar.

[142] Macrobius, *Saturnalia* 1. 13. 21 (partially cited below, n. 148).

[143] Michels (1967) 101–3, Samuel (1972) 167, Rüpke (1995) 289–92.

[144] Bennett (2005) argues that the *lex Acilia* determined that intercalations should always follow the 24th day of Februarius, i.e. an addition of 23 days, except when they occurred in pairs (i.e. in two consecutive years), in which case the first intercalation would be after the 23rd of Februarius, i.e. an addition of 22 days. This rule would imply that intercalations were determined at least one year in advance, which in Cicero's period seems not to have been the case (see below, n. 181). According to Bennett, this rule was consistently followed from 191 BCE onwards, except in 55 BCE with a single (unpaired) intercalation of 22 days.

power to adjust the calendar as they saw fit.[145] Although these theories rest on substantial arguments (which cannot be reviewed in detail here), the evidence they depend on is extremely scant. The law of the Decemviri of 450 BCE has commonly been identified as the actual institution of the Republican calendar; but the evidence, again, is extremely scant.[146] More recently, it has been argued that the Republican calendar was instituted in the late fourth century BCE by the scribe Cn. Flavius, who is mentioned at least in several sources as having 'published the calendar' or *fasti*.[147] In the absence of better evidence, however, the question of the origins of the Republican calendar and of its possible, subsequent evolution cannot be satisfactorily resolved.

Although the precise activities of the Decemviri, Flavius, and Acilius in relation to the calendar or the intercalation remain unclear, something can be said of the socio-political contexts in which they were operating, and which may have led to the emergence of a fixed, non-lunar calendar. The Decemviri are thought to have been involved with the process of codification and publication of Roman law in the form of the Twelve Tables; the institution of a (partially) fixed calendar, to be publicly displayed in the form of inscribed

145 Rüpke (1995) 319–30, with a detailed explanation of the political agenda and interests that supposedly motivated the appointment of the pontiffs to this privileged position. Rüpke assumes that prior to the *lex Acilia*, the intercalation was not controlled by any political body, but regulated by the simple, fixed rule of a 22-day intercalation every alternate year. This scheme, which yielded an average year-length of 366 days, would have been discrepant from the solar year by about one excessive day per annum; because of this discrepancy, the rule was eventually neglected and fell into disruption (by the early 2nd c. BCE), which called for the *lex Acilia* and a new system of intercalation which no longer followed a fixed rule, but was now at the entire discretion of the pontiffs (Rüpke 1995: 292–319, esp. 294–5; see also Bickerman 1968: 44–5, with a similar theory that the intercalation was originally fixed to alternate years, but because of its discrepancy from the solar year, it was later abandoned 'at some unknown time'). However, if the original intercalation of 22 days had been found excessive, it is difficult to understand why the option of 23-day intercalations would have been introduced; if anything, the *lex Acilia* should have introduced a shorter intercalation of 21 days. Moreover, even if we concede to Rüpke that the *lex Acilia* placed the intercalation under pontifical control, this does not necessitate the assumption that prior to that, the Roman calendar was fixed. For a critique of Rüpke's theory on the grounds of insufficient evidence, see Van Haeperen (2002) 218.

146 Michels (1967) 121–30, Samuel (1972) 166, Bickerman (1968) 45, Brind'Amour (1983) 186–7, 225–7, Rüpke (1995) 204–7, and Hannah (2005) 106. The evidence that has been drawn from a solar eclipse of around 400 BCE (based on a manuscript reading of Cicero, *De Re Publica* 1. 25) is disputed by Humm (2000) 106–9, but not convincingly according to Oakley (2005) 612 n. 3.

147 Humm (2000), now favoured by Rüpke (2006) 26–7. The sources for Cn. Flavius are Cicero, *Pro Murena* 25, *Ad Atticum* 6. 1. 8, Livy 9. 46. 5, Valerius Maximus 2. 5. 2, and Pliny, *Natural History* 33. 17; they claim that the calendar had existed before Flavius' time, but had been kept secret by the powerful few until Flavius publicly revealed it. Humm's main argument—in my view simplistic and not compelling—is that the Republican calendar scheme could hardly have been kept secret, and therefore, that there would have been no need for Flavius to publish it, unless he really was its institutor. Humm also cites Macrobius 1. 15. 9, which (vaguely) implies that before Flavius the calendar was lunar, and (very tenuous) evidence from a possible solar eclipse in 344 BCE (in Livy 7. 28. 6–8). For a succinct summary of the evidence and *status quaestionis*, see Oakley (2005) 610–13.

fasti, may well have been related to this process.[148] Cn. Flavius was closely involved with the reform of the tribal system in the late fourth-century Roman Republic; these politically inclusivist changes, which also entailed the extension of the City's *territorium*, and responded to Rome's expansion from a small city state to a dominant, widely flung power in central Italy, may have necessitated the reorganization of the calendar and its publication as a commonly known, fixed scheme.[149] The institution of a partially fixed calendar with fixed month-lengths, whenever exactly it occurred, was a significant step towards the full fixation of the Roman calendar in 46 BCE, and is likely to have been guided by not dissimilar motivations.

The Julian calendar: structure and institution

In 46 BCE Julius Caesar instituted a new calendar consisting of a completely fixed 365-day year, but with the regular intercalation of one day every four years (the 'leap year')—the same as our modern calendar today.[150] The influence of the Egyptian calendar on the institution of this new calendar is evident in two respects: firstly, the Julian year-length of 365 days, which had no antecedent in Roman tradition and which was distinctive of the Egyptian civil calendar; and secondly, the mere fact that the Julian calendar was completely fixed and free from political control—which, in the ancient world, had always been unique to Egypt. The influence of the Egyptian calendar is acknowledged, in fact, in a number of ancient sources.[151] Appian reports that when Caesar was in Egypt, restoring Cleopatra to the throne (in 48–7 BCE), he made inquiries about the Egyptian calendar and on this basis later converted the Roman calendar to a solar scheme 'in the manner of the

[148] Rüpke (1995) 235–42. The 2nd-c. BCE annalist Tuditanus, cited in Macrobius, *Saturnalia* 1. 13. 21, implies that it was the same Decemviri who added two tables to the Ten (hence 'Twelve Tables') and legislated on the intercalation (*Tuditanus refert ... decem viros, qui decem tabulis duas addiderunt, de intercalando populum rogasse*). By contrast, however, the almost contemporary codification of laws in the city states of Greece, which Rüpke (1995) 236 himself cites as a parallel, may well have led to the publication of detailed festival lists but certainly did not lead to the fixation of Greek calendars or to their conversion to non-lunar schemes (see Ch. 1).

[149] Humm (2000); see also Oakley (2000) 613. The sources (above, n. 147) explicitly relate Flavius' publication of the *fasti* to his radical political activities.

[150] See in general Bickerman (1968) 47–51 and Samuel (1972) 155–8. The modern 'Gregorian' calendar is identical with the Julian calendar with the only exception that the leap year is omitted three times in 400 years.

[151] e.g. Dio 43. 26 and Macrobius, *Saturnalia* 1. 14. 3. Some ancient authors, however, prefer implicitly to de-emphasize the Egyptian origins of the Julian calendar: Pliny (*Natural History* 18. 211) classifies it as separate from the calendars of the Chaldaeans, Egyptians, and Greeks, and the emperor Julian (*Hymn to King Helios* 41, 155 A–B) presents Romans and Egyptians as independently reckoning a solar calendar from archaic times. For the dismissal of an early-20th-c. theory that the Julian calendar was derived from the Greek Callippic cycle, see Lehoux (2007) 79–80.

Egyptians'.[152] Also significant may be the likelihood (and indeed, common assumption) that the astronomer Sosigenes, whom Julius Caesar called upon to design his calendar,[153] came from Alexandria.

The structural differences between the Julian and Egyptian calendars reflect an attempt, on the one hand, to accommodate traditional elements from the Roman Republican calendar, and on the other hand, to improve the existing structure of the Egyptian calendar. Thus the Julian calendar retained from the Republican calendar its month-names[154] as well as an idiosyncratic (albeit different) sequence of month-lengths, that has survived in our calendar until this very day. It may seem strange that Julius Caesar did not take the opportunity to rationalize the calendar and institute, for example, a regular alternation of 30- and 31-day months.[155] He may have been constrained by religious considerations, as certain changes in the month-lengths may have affected the dates of festivals.[156] Still, the changes that were made to Republican month-lengths so as to produce the Julian months were not without

[152] Appian, *Civil War* 2. 154. Appian may be slightly overstating the case, out of native Egyptian patriotism. See also Lucan, *Civil Wars*, 10. 172–218, where Caesar while in Egypt in 48 BCE is depicted as conversing with an Egyptian Hellenistic scholar about his knowledge of astronomy.

[153] So at least according to Pliny, *Natural History* 18. 211–12, who adds that Sosigenes composed three astronomical treatises on this subject, but does not indicate Sosigenes' place of origin (see also ibid. 2. 39). However, the figure of Sosigenes is not attested outside Pliny. According to Macrobius, *Saturnalia* 1. 14. 2, the Julian calendar was designed with the help of a local individual, the scribe M. Flavius. On the possibility that this *scriba* was a minor pontiff (see above, n. 137), see Rüpke (1995) 372–3. It seems to me, however, that the similarity of this name with that of the scribe Cn. Flavius (mentioned ibid. 1. 15. 9; see above, near n. 147)—albeit not an uncommon name—should be regarded as suspicious.

[154] After Caesar's murder in 44 BCE, the month Quintilis was renamed Julius, as described in Dio 44. 5. 2. See Weinstock (1971) 152–8, Rüpke (1995) 394–5, 405–6, the latter with discussion also of the later change of Sextilis to Augustus, on which see references below, n. 161.

[155] Blackburn and Holford-Strevens (1999) 98 and Bennett (2003) 225 and n. 33 rightly denounce the commonly accepted, but completely groundless theory, that the Julian calendar was originally instituted as a regular alternation of 30- and 31-day months (except for Februarius in a non-leap year). This theory was originally put forward by Sacrobosco (13th c.), who gave the original sequence of months as follows: Januarius (31), Februarius (29/30), Martius (31), Aprilis (30), Maius (31), Junius (30), Julius (31), Sextilis (30), September (31), October (30), November (31), December (30). According to Sacrobosco, the length of Sextilis was increased to 31 days when it was renamed Augustus *c.*8 BCE. As a result, Februarius had to be reduced by one day; and then, to eliminate a sequence of three 31-day months from Julius to September, the order of 30- and 31-days months from September to December was reversed. This theory finds no support in any of the sources: quite on the contrary, the accounts of Julius Caesar's calendar reform in Censorinus (20. 9) and Macrobius (*Saturnalia* 1. 14. 7) imply the same month-lengths as were later in use in the Julian calendar. Furthermore, as Bennett points out, sources contemporary or close to the institution of the Julian calendar provide clear evidence against this theory: P.Oxy. LXI 4175, a papyrus dating from 24 BCE, assumes already 31 days for the month of Sextilis (A. Jones 2000*b*: 165); whilst Varro (*De Re Rustica* 1. 28), writing no later than 37 BCE and referring to the newly instituted calendar (*dies civiles nostros qui nunc sunt*) provides dates and lengths of the seasons that are only compatible with the Julian calendar as later known.

[156] See Macrobius, *Saturnalia* 1. 14, Rüpke (1995) 376–8), Feeney (2007) 152–6.

Table 4.1. Republican and Julian month lengths

	Republican month	Days added	Julian month
Januarius	29	2	31
Februarius	28	0/1	28/9
Martius	31	0	31
Aprilis	29	1	30
Maius	31	0	31
Junius	29	1	30
Quintilis/Julius	31	0	31
Sextilis	29	2	31
September	29	1	30
October	31	0	31
November	29	1	30
December	29	2	31

rationale, as I shall now explain. The Republican 31-day months were left unchanged, as there was no need to increase them. The 28-day month of Februarius, formerly designated for intercalations and now for leap years, was also left unchanged (except in leap years), perhaps to indicate its special status. Changes were only made to the remaining 29-day months. Most of these were increased by just one day; but since there were only seven 29-day months in the Republican calendar, whereas a total of ten days had to be added to convert the Republican 355-day year into the Julian 365-day year, three of these months had to be increased by two days. Not unreasonably, these two-day increases were spread evenly through the months of the year, i.e. at the beginning, near the middle,[157] and at the end of the year (see Table 4.1).

Although the sequence of month-lengths in the Julian calendar was primarily derived, in this way, from the Republican calendar, it may also have been viewed as a structural improvement over the Egyptian calendar: for the use of 31-day months—a survival from the Republican calendar—eliminated the need for the anomaly, in the Egyptian calendar, of the five epagomenal days. But a much clearer improvement on the Egyptian calendar was the leap year, with the insertion every four years of an extra day (called 'bissextile') after 24 Februarius.[158] The leap year maintained the Julian calendar in alignment with the solar year and the seasons, thus making it a truly solar calendar—the first of its kind in the ancient world. But this improvement is likely to have been

[157] The month of Sextilis (increased by two days) was not exactly in the middle of the year, but perhaps we should not expect too much precision. It is also possible that Junius, more in the middle of the year, was not given the two-day increase so as to avoid a run of three 31-day months (from Maius to Julius).

[158] In the Julian calendar (as in its Republican antecedent) 24 Februarius was *ante diem VI kalendas Martias* (the sixth day before the Kalends of March, inclusive count); the intercalated day was accordingly *a.d. bis VI kal. Mart.*, or simply *bissextus* (i.e. the 'second sixth' day): see Ulpian in *Digest* 4. 4. 3. 3, Celsus in *Digest* 50. 16. 98, Augustine, *On the Trinity*, 4. 8.

itself an Egyptian import. As the Canopus decree of 238 BCE makes evident, it was known for quite some centuries in Egypt that the intercalation of one day every four years would prevent the civil calendar from drifting (see Chapter 3). An Egyptian astronomer like Sosigenes is thus perhaps the most likely person to have suggested it. The Julian calendar was thus essentially an improved version of the Egyptian calendar, with some idiosyncratic features (uneven month-lengths) inherited from the Republican calendar; its main improvement on the Egyptian calendar (the leap year) was a calendrical notion that originated from Egypt itself.[159]

The first decades of the Julian calendar

Later sources suggest that in the decades following the institution of the Julian calendar, the pontiffs remained in charge of declaring the leap years.[160] This survival from the Republican calendar was not a mere formality. In these early years, when the Julian calendar was not yet fully known and established, it could not have been left to run itself on its own: political authority was needed to ensure that leap years, in particular, were duly made. Thus although the Julian calendar was meant, from its inception, to be permanently fixed and free from political control, in practice this did not quite happen immediately.

Unfortunately, pontifical control of the Julian calendar had an adverse effect on its proper running: the same sources inform us that in error, the pontiffs declared the leap year every three years (instead of four). How exactly leap years were reckoned in these decades is not clearly known, but a model has been recently proposed by Bennett (2003), (2004*a*) that plausibly accounts for the literary, epigraphic, and papyrological evidence that is currently extant. According to this model, the first leap year was set in 44 BCE, followed by leap years at three-year intervals (41, 38, etc.) until 8 BCE (inclusive).[161] The error was then recognized, and to correct, as it were, the disruption caused by the

[159] Bickerman (1968) 47 may thus have good reason to comment that Caesar did not merely reform the Roman calendar, but rather replaced it with an entirely new calendar.

[160] This is implicit in Pliny, *Natural History* 18. 211, Suetonius, *Augustus* 31. 2, and Solinus 1. 45–7, and very much explicit in Macrobius (*Saturnalia* 1. 14), who actually suggests that the priests were 'in charge of months and days': *(Caesar) statuit ut quarto quoque anno sacerdotes qui curabant mensibus et diebus unum intercalarent diem.*

[161] See Ch. 5, Table 5.4. This differs from the common, but unsubstantiated, view that the first leap year was 45 BCE, followed by leap years at three-year intervals until 9 BCE (e.g. Samuel 1972: 157). According to Dio 55. 6. 6 it was in 8 BCE that the month of Sextilis was renamed Augustus, whilst Suetonius (*Augustus* 31. 2) associates the renaming of Sextilis with Augustus' reform of the leap years; the combination of these sources suggests that the reform was enacted during 8 BCE (Samuel 1972: 155, Hannah 2005: 119), which remains compatible with Bennett's model. On the renaming of Sextilis to Augustus see also Macrobius, *Saturnalia* 1. 12. 35, and Rüpke (1995) 185.

excessive leap years, the emperor Augustus suspended all leap years until 4 CE, when the leap year was resumed.[162] It is only from this year that the Julian calendar was correctly reckoned, never to be adjusted again until the Gregorian reform of the later sixteenth century.

The occurrence of this error and its perpetuation over such a long period is perhaps forgivable, inasmuch as the Julian calendar had only recently been instituted; but still, the rule of one intercalation in four years should have been simple enough for errors to be prevented. The confusion, which Suetonius (*Augustus* 31. 2) puts it down to the priests' negligence, is usually thought to have been due to the common Roman practice of inclusive count (for example, in the count of days of the month): thus 'every fourth year' (*quarto quoque anno*) was misinterpreted as meaning, inclusively, every three years.[163] But a more precise explanation of the error can be offered on the basis of a report of Dio (48. 33. 4) that an additional day was intercalated in 41 BCE to prevent the coincidence of the subsequent 1 Januarius (40 BCE) with the *nundinae* (the market day, which recurs every eight days), which would have been inauspicious; and that to compensate for this, a day was suppressed at a later stage. We may assume that this later one-day suppression was made in 40 BCE. Although it is unknown whether the added day in 41 BCE was a bissextile day in Februarius, and whether the suppressed day in 40 BCE was the bissextile day that should have been due—according to Bennett's model—in Februarius that year, Dio clearly implies that the 366-day year occurred in 41 BCE instead of 40 BCE. This may have misled the priests to believe that the leap-year interval was three years, as it had been from 44 to 41 BCE. The subsequent leap year was consequently declared in 38 BCE, instead of 36 BCE; and the practice of three-year intervals became established thereafter.[164]

[162] This differs again from the common view that the first leap year after Augustus' calendar reform was 8 CE. The literary sources (above, n. 160) on the error of the priests, the intercalation at three-year intervals, and the reform of Augustus, do not provide any dates; Augustus' reform is only referred to as a twelve-year period without intercalation, which Bennett interprets as a twelve-year interval (inclusive count) from 8 BCE to 4 CE. The rationale behind Augustus' calendar reform remains to be fully understood. It is unclear why a suspension of leap years was needed, when in fact the Julian calendar could have been left in the same relationship to the solar year as it had reached in 8 BCE; all Augustus really needed to do was to change the leap-year interval from three years to four (for some not very convincing explanations, see Bennett 2003: 230–2; 2004*a*: 166–7). Had the intention been to restore the Julian calendar to the same relationship to the solar year as it had been at the time of its original institution (in 46 BCE), then three leap years at correct four-yearly intervals should have been omitted (because three excessive leap years had been reckoned between the institution of the Julian calendar and 8 BCE), whereas according to Bennett's model, only two such leap years were omitted by Augustus (in 4 BCE and in 1 CE), or alternatively, three leap years at three-year intervals (in 5 BCE, 2 BCE, and 2 CE). See further Ch. 5 n. 90.

[163] Brind'Amour (1983) 12–15; Bennett (2003) 232; but for a different explanation, Rüpke (1995) 381–3.

[164] Bennett loc. cit. Rüpke (1995) 582–7 argues the same, with the additional suggestion that the use of the leap year in 41 BCE as a means of avoiding a clash between the New Year and the

Bennett argues further that the error of the pontiffs could have been corrected by the pontifex maximus, M. Aemilius Lepidus, who had succeeded Julius Caesar in this office after Caesar's assassination in 44 BCE. Lepidus had been the consular colleague of Caesar in 46 BCE, the year when the Julian calendar was instituted, and is likely to have understood the Julian calendar far better than his pontifical colleagues, most of who seem to have been relatively new in office.[165] However, his departure from Rome to Africa in 42 BCE, and then his house arrest from 35 BCE till the end of his life, prevented him from involvement in the determination of leap years. It is only when he died in 13 BCE and his office was taken over in 12 BCE by Augustus that the latter—in his capacity of pontifex maximus[166]—was able to step in and reform the Julian calendar.[167]

The adoption of the fixed, Julian calendar was thus far from smooth or straightforward, as our familiarity with this calendar today may otherwise mislead us to assume.[168] The manipulation of the year-length in 41 BCE clearly demonstrates the abiding flexibility of this calendar, at least soon after its institution. The role of the pontiffs in the remainder of the first century BCE reveals, furthermore, that the emancipation of the new, fixed calendar from political control was not complete or immediate.

Why was the Julian calendar instituted?

Modern scholars rarely bother to ask why Julius Caesar instituted his new calendar.[169] This is because the Julian calendar is taken for granted as a necessary correction of the Republican calendar, and hence as a natural

nundinae would have provided a legitimization of Caesar's newly instituted practice of intercalating only one day (in leap years), which may otherwise have been difficult for Romans to accept. Others have argued, however, that the option of intercalating single days for this kind of purpose may have existed already in the Republican calendar, even though there is no firm evidence for this: see Michels (1967) 164–7, Samuel (1972) 161–2. The leap year of 38 BCE (instead of 36 BCE) may have been motivated by the same intention to prevent the coincidence of 1 Januarius with the nundinae, which would have occurred otherwise in 37 BCE; but from this point onwards, leap years were solely determined by triennial intercalation.

165 See on this Taylor (1942), Rüpke (2008) 128–32.

166 This detail is emphasized in Suetonius (*Augustus* 31. 2); see further Van Haeperen (2002) 223.

167 Bennett (2003) 232–3. See also Heslin (2007), on the political advantage that Augustus would have drawn from this over his deceased rival Lepidus.

168 It should also be noted that our system of reckoning years according to the Christian Era (CE) enables us to identify leap years with ease, as they are multiples of four. This era was not in use before the end of Antiquity (see Mosshammer 2008).

169 The motivation behind the institution of the Julian calendar has been given surprisingly little attention by general historians such as Weinstock (1971). The question is raised by Rüpke (1995) 371–5 (see also 625) and less explicitly by Feeney (2007) 193–7, but not satisfactorily resolved.

progression from it. Already in the sixteenth century, Scaliger wrote that 'the Julian calendar . . . marked a victory in the realm of culture more lasting than any Roman victory on land and sea', by contrast with the pre-Julian Republican calendar of which he earlier remarked: 'no nation in human memory has used a worse calendar'.[170] The Julian calendar was simply much better—with its regularity, predictability, and conformity to the solar year—and represented the most appropriate solution to the calendrical chaos that had reigned in the Republican period.

The question, however, deserves to be asked, because irregular calendars were actually quite normal in the ancient world. As we have seen in Chapter 1, the Greeks happily maintained irregular and unpredictable calendars for quite a long time—perhaps till the end of Antiquity—without any calendar reform. The same could have equally endured in Rome. The 90-day shortfall that had accumulated by the beginning of Julius Caesar's dictatorship could have been simply corrected through some *ad hoc* measure, either with one long, 445-day year—which Caesar anyway had to decree in 46 BCE—or with a run of consecutive intercalated years. The abolition of the old calendar was certainly not necessary or called for. Indeed, this was not the first time in history that the Roman calendar had lagged to such an extent: as we have seen, in the early second century BCE the Roman calendar had been nearly four months behind (much more than 90 days), without being abolished as a result. Why Julius Caesar instituted an entirely new calendar demands, therefore, to be explained. What we perceive today as the intrinsic superiority of the Julian calendar is not sufficient to explain why, at the time, it was instituted.[171]

It may be instructive to begin with the ancient sources, even though they were written long after the event, in the second century CE and later. These sources suggest that the institution of the Julian calendar was motivated by a number of factors: Caesar's interest in Egyptian and solar calendars, his concern that in the old calendar festivals were liable to occur in the wrong seasons, and finally, his resolve to stamp out the abuse of the pontiffs in charge of the intercalation. These distinct motivations, which may be respectively categorized as intellectual, religious, and political, are difficult, in the sources, to separate or unravel. Nevertheless, ancient authors tend emphasize one or the other. Appian emphasizes (and perhaps exaggerates) Caesar's personal interest in the Egyptian calendar, suggesting that whilst in Egypt he made inquiries about the local calendar and on this basis converted the Roman calendar to a solar scheme 'in the manner of the Egyptians' (see above, n. 152). In a similar vein, Plutarch (*Caesar* 59) presents the institution of the Julian

[170] Joseph Scaliger, *De Emendatione Temporum* (1583), cited in Feeney (2007) 193.

[171] Rüpke (1995) 593–6 presents the various reforms of the Roman calendar, culminating with the Julian reform, as a series of 'technical improvements'. This observation may be correct, but does not explain in itself *why* these reforms were made.

calendar as a purely scientific exercise, with Caesar engaging a team of philosophers and mathematicians (i.e. astronomers) to design, under his patronage, a faultless solar calendar.

But most authors prefer to emphasize the political dimension of this calendar reform. Suetonius presents the institution of the Julian calendar as the first measure taken by Caesar, as dictator, to 'tidy up the Roman State'. He goes on to imply that Caesar's main concern was to ensure that the festivals occurred in the right seasons; but even here, the opportunity is not lost to emphasize that the disruption of the calendar in the Republican period, with the effect that 'harvest festivals no longer occurred in the summer, nor vintage festivals in the autumn', was the fault of the pontiffs who had abused their authority over the intercalation.[172] More details, along these lines, are suggested by later authors. Censorinus (third century CE) explains that in the Republican period, the pontiffs in charge of the intercalation had acted out of hatred and friendship, and through intercalation had extended or reduced the length of tenure of magistrates and tax collectors in order to cause them either profits or losses. Because the calendar had become disrupted, Julius Caesar, as pontifex maximus, corrected the effect of past abuse and prevented future error by instituting a fixed, solar calendar.[173]

None of these explanations should be discarded as implausible. The discrepancy between the festivals and the seasons would have disturbed any Roman, even if this did not necessarily justify the abolition of the Republican calendar (as I have argued above). The image of Caesar as a patron of astronomical and calendrical sciences, although perhaps exaggerated in Plutarch's account, is not incompatible with what is otherwise known about Caesar and late Roman Republican society.[174] The credit of having created and instituted an accurate solar calendar—which, to repeat, would have been unique until then in the whole of Antiquity[175]—should have given Caesar

[172] Suetonius, *Julius Caesar*, 40: *conversus hinc ad ordinandum rei publicae statum, fastos correxit iam pridem vitio pontificum per intercalandi licentiam adeo turbatos ut neque messium feriae aestate neque vindemiarum autumno competerent*. Compare Ovid, *Fasti* 3. 155–6, *sed tamen errabant etiam tunc tempora, donec / Caesaris in multis haec quoque cura fuit* ('but the times were still wandering around, until Caesar took charge of this along with many other things'), which may be interpreted as describing both a scientific correction of the Roman calendar, and a political rectification of the Roman world: Feeney (2007) 202–3 sees in this passage 'a microcosm or even an allegory of the Roman world, moving from a ramshakle freedom to increasing regulation under the Caesars' (more on this below).

[173] Censorinus 20. 7–8. Similar comments are made by Solinus (1. 43–4), Ammianus Marcellinus (26. 1. 12–13), and Macrobius (*Saturnalia* 1. 14. 1).

[174] See Rawson (1985), esp. 162–7 (on astronomy in the late Roman Republic).

[175] Conformity to the solar year should not be confused, however, with conformity to 'natural time' or with 'astronomical accuracy' (*pace* Feeney 2007: 193–7). Many calendars before the Julian were equally astronomically accurate—in particular, the Babylonian calendar in relation to the moon—but what distinguished the Julian calendar as unique was its *solar* accuracy, and hence its conformity to the seasonal year.

some useful kudos among the ruling elites of the Mediterranean world. This is conveyed at least in Lucan's epic, where Caesar is depicted at a banquet in Egypt, in the company of Cleopatra and her entourage, boasting about the astronomical superiority of his calendar.[176]

Caesar's interest in the Egyptian calendar is also likely to have been related to his personal attraction to Cleopatra. But more importantly, the appropriation of an Egyptian institution such as its civil calendar may be regarded as part of an imperialistic claim. Not unlike the adoption of the Egyptian calendar by Achaemenid Persia in about the fifth century BCE (as argued above in this chapter), Caesar's appropriation of the Egyptian calendar was a demonstration of his military and diplomatic achievements in the East, which had led to the prestigious kingdom of Egypt being effectively subdued and brought under Rome's sphere of influence. Indeed, the institution of the Julian calendar in 46 BCE was directly linked to Caesar's triumph for Egypt that was celebrated at Rome in the very same year.

Political motivations

But the dominant theme in most ancient sources, as we have seen, is Caesar's concern to stamp out the abuse of intercalation at the hands of self-interested pontiffs. That abuses of this kind occurred, possibly on a regular basis, is almost beyond any doubt; but it is difficult to back this up with contemporary evidence. Cicero, writing in the late 50s BCE, concurs at least that the pontiffs had become neglectful in the administration of the calendar, although he does not mention in this context self-interested motivations.[177] In a much earlier, political speech, he argues for calendars' being well regulated and not tampered for purposes of personal gain, political or financial, but the context of this argument is not the Roman calendar.[178]

176 Lucan, *Civil Wars*, 10. 185–7 (written in the mid-1st c. CE): after mentioning his interest in the sky and the stars, Caesar concludes: *nec meus Eudoxi vincetur fastibus annus* ('and my year shall not be defeated by the calendar of Eudoxus')—a much-quoted line (e.g. Bickerman 1968: 47). Eudoxus was an eminent Greek astronomer of the 4th c. BCE (see Samuel 1972: 29–31). The octaeteris (eight-year lunar calendar) was commonly attributed to him (although Censorinus 18. 5 rejects this); Lucan is perhaps hinting at this common belief. Alternatively, Lucan may be thinking of a four-year cycle attributed to Eudoxus by Pliny (*Nat. Hist.* 2. 48; on its lack of historicity, see Lehoux 2007: 80–1). The scene is set in 48 BCE, so Caesar's statement is possibly anachronistic (since the Julian calendar was only instituted two years later).

177 Cicero, *De Legibus*, 2. 29: *diligenter habenda ratio intercalandi est, quod institutum perite a Numa, posteriorum pontificum neglegentia dissolutum est.*

178 Cicero, *In Verrem II* 2. 128–30, where he attacks Verres (pro-praetor of Sicily in the late 70s BCE) for having suppressed one and a half months from the Sicilian year. The Sicilian calendar was not Roman, but lunar in the Greek tradition. Cicero's main argument is that Greek calendars only allow the intercalation or suppression of one or two days per month, and that Verres' action was therefore preposterous (hence Cicero's analogy, at the end of this passage,

The extent to which pontifical tampering with the calendar, e.g. through failure to intercalate, would have been regarded in Roman society—even by Cicero himself—as wrong or illegitimate is actually far from straightforward. Failure to intercalate could be motivated sometimes by disinterested, public considerations, for example religious or 'superstitious' (as Macrobius suggests in *Saturnalia* 1. 14. 1), or for example out of concern that generals and governors in distant provinces might not be informed of the intercalation with sufficient notice.[179] But even if purely personal interests were involved, tampering with intercalation was not necessarily considered illegitimate. Significantly, the same Cicero who criticized the pontiffs' neglect of the calendar can be caught writing to his friend Atticus, in the summer of 51 BCE, with a request to exert his political influence so as to prevent the intercalation of the forthcoming year. Cicero was then on his way to assume a one-year proconsulship in Cilicia, which he dreaded like exile, and he wanted to prevent this year from being prolonged through an intercalation.[180] His attempt to prevent the intercalation—which turned up to be successful[181]—was clearly nothing but self-motivated, because in calendrical terms an intercalation in 50 BCE was well overdue. But corruption of the calendar, in this context, seems not to have worried Cicero in the slightest way.

Cicero's attitude is best understood if control of the calendar is viewed as one of the many political processes that constituted the Roman Republic. Politicians were entitled to canvas for or against an intercalation just as they were entitled, for example, to canvass for their own election to office. The pursuit of personal interests, in this context, was normal and encouraged, and not without good reason: for it was personal interest that motivated individuals to contribute to the public good. Furthermore, the delegation of control

to a hypothetical suppression of one and a half months, from the ides of Januarius to the kalends of Martius, in the Roman calendar). But he also suggests that in the context of the Greek calendar, intercalation or suppression are only justified for purposes of lunisolar synchronization, whereas Verres had acted out of personal financial interest, to secure the election of a local grandee to the high priesthood in Cephalaedum (see Ch. 1 n. 145). This argument would presumably have been relevant also to the Roman calendar, although this is not the context of the speech.

179 Michels (1967) 168–70; see next n.

180 Cicero, *Ad Atticum* 5. 9. 2, 5. 13. 3. Later in his year, on 13 Feb. 50 BCE, Cicero was still concerned that an intercalation might be made (ibid. 5. 21. 3)—which indicates, incidentally, how late in the year the decision to intercalate could be taken (although we must allow a few weeks for the information to have reached him in Cilicia). A week later, on 20 February, Cicero wrote that he was prepared to act on the assumption that there had been no intercalation (ibid. 6. 1. 12), but as he still did not know what had been decided, he dated receipt of his correspondent's letter not from the Kalends of March (which would have been the wrong date if an intercalary month had been inserted) but from the Terminalia on 23 Februarius (ibid. 6. 1. 1: 'five days before the Terminalia'). See Brind'Amour (1983) 96–8, Samuel (1972) 164, Rüpke (1995) 292–3, Van Haeperen (2002) 219–21, Hannah (2005) 110–11.

181 As Cicero was eventually informed, in a letter dated February 50 CE which may have reached him somewhat later (*Ad Familiares* 8. 6. 5).

of the intercalation to the pontiffs (possibly just to the 'minor pontiffs'), rather than to the highest officials in the Senate (such as the consuls), and their license to exercise some discretion in their calendrical decisions contributed to the even distribution of power across the Senate and the priesthoods, which in turn sustained political fair play within the Roman State.[182]

It is no wonder, therefore, that Cicero—according to Plutarch's account—opposed the institution of the Julian calendar.[183] His stance was not merely traditionalist. Cicero is likely to have sensed that Caesar's rejection of the old calendar on the grounds that the pontiffs had neglected or abused of the intercalation was only an excuse to abolish yet another 'distributive', fair-handed institution of the *res publica*. By instituting a fixed calendar and thus removing it from the control of the pontiffs, Caesar was confirming and strengthening—in symbolic as well as in real terms—his own, autocratic position within the Roman State.

But if Caesar's main purpose was to strip the pontiffs of their calendrical powers, the complete abolition of the Republican calendar would appear to have been a far too drastic measure. It would have been sufficient, for this purpose, for Caesar to bring the intercalation under his own control; the flexible year-length of the Republican calendar would have remained for him a useful device of social and political control, which the fixed Julian calendar would no longer be able to provide. It seems, however, that seizure of control of the intercalation was an option that, in the political climate of the late Republic—even in the years of his dictatorship—Caesar could not reasonably consider. The position he held as pontifex maximus, the highest ranking pontiff, did not give him the legal right to interfere with or take over the calendrical powers of his colleagues;[184] and although, in practical terms, the pontifical college was by then well under his control,[185] a formal, explicit takeover of the calendar would have met too much resistance from the pontifical college and from the Senate. Caesar had to find other, indirect ways of depriving the pontiffs of the power that control of the 22- (or 23-) day intercalation afforded. The scientific accuracy of a new, solar calendar gave him a reasonable pretext for the old system to be abolished, and for the pontiffs to be left only with the very small concession of having authority to declare one-day intercalations in Julian leap years.[186]

[182] On the fragmentation and distribution of political and religious power within the Roman Republican State, see Scheid (1984), Beard (1990) 42–3, 47, and Beard, North, and Price (1998) i. 103–4.

[183] Plutarch, *Caesar* 59. Note that for Plutarch this illustrates Cicero's general opposition to Caesar's rule.

[184] This at least is likely in view of the strict differentiation and distribution of priestly tasks within the pontifical college, on which see Beard, North, and Price (1998) esp. i. 18.

[185] See Taylor (1942), Rüpke (1995) 372 n. 13.

[186] The possibility that Caesar consulted a minor pontiff (see above, n. 153) or possibly even the pontifical college as a whole (Van Haeperen 2002: 223) would not contradict, in any way, the

It is fair to comment that Caesar was, above all, a political creature. Although he employed scientific expertise for the creation of his calendar, it was not scientific accuracy, but political attainments, that drove him. Suetonius and most other ancient sources rightly emphasize, in the context of Caesar's calendar reform, that his intention was to curb the pontiffs and 'tidy up the Roman State'. For the institution of the Julian calendar was, primarily, a political process. It was about reducing the powers of the Senate and priesthoods, and consolidating Caesar's autocratic position; it was part of the wider political changes that were transforming the Roman State under Julius Caesar's rule. It is no wonder that the new calendar may have become, in due course, a symbol of Caesar's power in the new political order.[187]

Calendars and political systems: towards a structuralist approach

The institution of the Julian calendar was thus the outcome of very specific conditions, mainly political, that were unique to the Roman State at the end of the Republican period. It is the peculiarity of these conditions that explains why a similar rationalization of the calendar did not occur, for example, in contemporary (or earlier) Greece—even though Greek calendars suffered, it may be argued, from similar defects as the Republican calendar. Without these peculiar conditions, reform of the calendar would not have occurred in Rome either.

The comparison of Republican Rome with the city states of Greece is instructive precisely because of the similarity of their political traditions. The complexity, irregularity, and unpredictability of the calendars in both Republican Rome and Greek city states embodied and reflected, in a certain way, the political fragmentation and divisions between the states, the complex structures of their internal political systems (whether defined as democratic, oligarchic, or mixed), and the inherent unpredictability of political life within such structures. By contrast, the simplicity, regularity, and predictability of Caesar's calendar—just as of the civil calendar of ancient Egypt, the Persian

notion that Caesar was aiming at restricting the power of the college. The pontiffs would have had a political interest in backing the dictator; whilst from Caesar's perspective their involvement would have enhanced the legitimacy of his calendar reform.

187 The first use of the Julian calendar as a symbol of Caesar's autocratic power was perhaps, as has been recently argued, the impressive *horologium* monument erected by Augustus on Campus Martius in around 8 BCE: Hannah (2005) 129–30, Feeney (2007) 196–7 and n. 131, and Heslin (2007), who argues that it was not strictly speaking a *horologium*, being neither a sundial nor a calendar; its function was only astronomical, to indicate the annual course of the sun. However, its intended effect would have been to demonstrate, in a monumental way, the exactitude of the Julian calendar in relation to the solar year, and the authority of Augustus who, as *pontifex maximus* and corrector of the Julian calendar, had erected it.

Zoroastrian calendar of the Achaemenids, and to a lesser extent, the standard Babylonian calendar of the Near Eastern empires—embodied and reflected, in structural terms, the political simplicity of these large kingdoms and empires, all under autocratic or monarchic rule, in the context of which these fixed calendars arose.

I am suggesting, in other words, that ancient calendars can be interpreted as structural replicas or reiterations of the socio-political order in which they were formed and in which they operated. This does not necessarily mean that ancient calendars should be read as 'allegories' of the socio-political order (as argued by Feeney with reference to the Julian calendar: see above, n. 172). I am proposing a more purely structuralist interpretation, which avoids determining the calendar as a *signifier* in relation to the socio-political order and focuses more neutrally on similarity, replication, and structural consistency. Calendars, indeed, do not signify more than a certain perception of the experience of time and events, and/or an imposition of structure upon the latter. However, the cogency and meaning of calendars as time and event structures depends on the extent to which these structures successfully replicate, reflect, or are consistent with the other structures, especially socio-political, with which they are profoundly interdependent and interrelated in social life. The fixed calendar that Julius Caesar instituted was structurally analogous to his own rising position as dictator of an empire that was rapidly expanding and unifying territories and peoples under single, autocratic rule. The analogy or structural consistency between the fixed calendar and the new Roman Empire under autocratic rule explains, perhaps, why the Roman calendar developed the way it did.

Calendars and imperial administration: towards a macro-history

It should be clear by now that the institution of the Julian calendar was not a historical, teleological necessity, or—as has so often been assumed—an evolutionary stage in the grand history of calendars. As has been argued above, the institution of the Julian calendar did not respond to a need of abolishing an (apparently to us) intrinsically defective calendar, nor was it the natural outcome of scientific progress and enlightenment. It was, above all, the result of political processes peculiar to the late Republic. Nevertheless, the adoption in Rome of an Egyptian calendar (or at least a close derivative of it) stands in direct, macro-historical continuity with the similar adoption of this calendar in the earlier empires of the first millennium BCE.

In this context we should reflect further on the implications of fast-expanding empires, not in terms of their political structures (which I have discussed in the previous section), but now in terms their administration. The administration of large empires had a more practical, and possibly more explicit, effect on the development of calendars than the implicit, structural forces that I have suggested above. As we have seen in this chapter, it is in the context of large empires that in the second half of the first millennium BCE the Egyptian calendar, or Egyptian-type calendars, was adopted for official imperial use. Although there may have been specific reasons, in each case, for such fixed calendars to be adopted, it remains a fact—whether or not explicitly acknowledged by those who instituted them—that these calendars were also efficient tools for the administration of extensive imperial territories. This observation is highly relevant to the institution of the Julian calendar. In the two decades preceding Caesar's dictatorship, the Roman Empire had expanded dramatically with the creation of new provinces in north-western Europe, Asia Minor, and the Near East. Cicero's proconsulship in the distant, newly formed province of Cilicia in 51/0 BCE—where the difficulty of knowing whether the year had been intercalated in Rome became, for him, a major issue (see above, n. 180)—provides a good example of how the Roman calendar had become inadequate for the administration of a far-flung empire. By the time of Caesar's dictatorship, the Roman Empire had sufficiently expanded to necessitate the adoption, as in the other great empires of earlier centuries, of a fixed and standard official calendar. In this respect, the institution of the Julian calendar was the next stage of a grand, macro-historical trajectory.

It remains unknown, however, whether these administrative considerations—any more than a need for structural replication of the new, autocratic political system (as discussed in the previous section)—*explicitly* motivated the institution of a calendar such as Caesar's. It is not impossible that Caesar sensed the imperial administrative value of a fixed calendar, and this may have played some part in the institution of the Julian calendar, but there is no explicit evidence of this in any of the ancient sources.[188] Caesar is certainly unlikely to have realized that his institution fitted into a wider, macro-historical trend that had been developing through the last five centuries. Even if he did realize this, it would have mattered little to him. From his perspective, the Julian calendar served only the specific purposes for which he had instituted it: it was, in this sense, a micro-historical event. The relationship between micro-historical motivations and macro-historical trends remains therefore unclear, even if in this case—the institution of the Julian calendar—they seem to have converged and supported each other. It is perhaps the mutual corroboration of these micro- and macro-historical factors that enabled the institution of the Julian calendar to succeed.

188 See the reserved comments of Rüpke (1995) 371.

Conclusion: the Julian calendar in the Roman Empire

The dissemination of the Julian calendar across the Roman Empire was relatively rapid. How this occurred is not clearly understood. According to Macrobius, Caesar put out an edict that was widely publicized, although its intention was not necessarily to be binding on those who did not use the Roman calendar.[189] The text of this edict is not extant, but Macrobius' account is not implausible, as Julianized calendars are known to have been slightly later instituted and disseminated through official edicts.[190] But even without an edict, the Julian calendar will have spread through the agency of the Roman army (Feeney 2007: 210), Roman colonies,[191] and the fledgling provincial administration of the Roman Empire.

The adaptation of local Italian calendars to the Roman calendar may have begun already in the late Republican period, before the Julian calendar was instituted.[192] But after Caesar's calendar reform, and certainly by the reign of Augustus, the Julian calendar had been massively diffused in Italy, mainly through the medium of publicly inscribed *fasti*.[193] The Julian calendar was similarly adopted in the Western provinces of the Roman Empire, even if the practice of erecting *fasti* in public places seems not to have spread outside Italy.[194] Dated evidence from the Augustan period is sparse, if at all existent, but the only calendar attested in Gaul, Britain, Spain, and the north African coast (up to and including Libya Tripolitana), from the beginning of the Roman period until the end of Antiquity, is Julian. The calendars that must have pre-existed in these regions—e.g. Celtic calendars, which appear to have

[189] Macrobius, *Saturnalia* 1. 14. 13 (*edicto posito publicavit*).

[190] In particular, the Julianized calendar of the province of Asia, of which the widely publicized decree of 8 BCE has survived in several copies: see Ch. 5.

[191] As seems evident from the early-1st-c. CE *fasti* of the *colonia* of Tauromenium (Sicily), the only publicly inscribed Roman calendar that is known from outside Italy (*AE* 1988 no. 625–6; Rüpke 1995: 133–8).

[192] Rüpke (1995) 170–3. Similarities between the Roman and other pre-Julian Italian calendars (e.g. with the use of kalends, nones, and ides) suggest, at least, a pool of shared calendrical practices (Edlund-Berry 1992, on the Etruscan calendar). It is generally assumed that Italian calendars were originally lunar (see Borgeaud 1982: 21–42, on the Umbrian and Oscan calendars, and Emiliozzi 1983 and below Ch. 6, on the Etruscan calendar), but the evidence is scant.

[193] Rüpke loc. cit. and Crawford (1996) 426. For the corpus of Italian *fasti* from the early imperial period, all using a Julian calendar scheme, see Degrassi (1963) and Rüpke (1995) 95–145, who notes, however (170–3), the concentration of these *fasti* in and around the city of Rome.

[194] Except for the *fasti* of Tauromenium, in Sicily (above, n. 191). For an early attestation of the Julian calendar in the province of Noricum, see *AE* 2006; 971, an inscription dated to the *bissextus* from Magdalensburg, southern Austria, first half of 1st c. CE. For the Julian calendar in Gaul, see e.g. Ch. 6 n. 36. For Numidia, the evidence is in *CIL* viii. 1859, a list of Julian dates from Theveste.

been lunar—were rapidly superseded by the calendar of the Roman Empire and even, perhaps, obliterated from memory.[195]

The Julian calendar also spread very rapidly to the East, reaching most of the eastern Mediterranean by the end of the first century BCE and penetrating further into the Near East during the first–third centuries CE, as the Roman Empire was gradually expanding into this region. In the East, however, the Julian calendar was generally not adopted wholesale as in the West. The Eastern cities and provinces adapted the structure of the Julian calendar to their local calendrical traditions, leading to a proliferation of different calendars with, as only common feature, a fixed 365-day year. It is only at the end of Antiquity, from the sixth century CE, that the Julian calendar itself came to be widely used in Greece, Asia Minor, and parts of the Levant such as Palestine and Arabia (Samuel 1972: 187–8, Meimaris 1992: 41–5).

The differentiation and fragmentation of the Julian calendar in the Roman East, which reflected in many cases the patriotism of individual cities and their sentiment (or fiction) of independence from the Roman Empire, perpetuated in fact a tradition of calendar fragmentation that had always prevailed in Greece (see Chapter 1) and that had also established itself in the Near East after the break-up of the Seleucid Empire. The Julian calendar in the Near East and its fragmentation will be one of the subjects of the next chapter. For now, the impact of the Julian calendar as a unifying force in the Roman East needs to be given emphasis. The institution of Julian or Julian-type solar calendars (displacing the earlier, Near Eastern lunar calendars), which happened rapidly and often simultaneously with the annexation of Near Eastern cities and provinces into the Roman Empire, was an important part of the establishment of *Romanitas* or a common Roman culture that was spreading East and West and unifying the Roman Empire into a single cultural, social, and political *koine*.[196]

[195] See brief discussion in Rüpke (1995) 172–3. The only evidence to the contrary is the survival of a Gallic lunar calendar in the Roman period, that will be considered in Ch. 6.

[196] From a Roman perspective it would clearly have been preferable—for both administrative and political reasons—for the Julian calendar itself to have been adopted in the East, just as it had been in the West. The failure of the Roman Empire to impose it in the East is explained by Feeney (2007) 209–10 as partly 'a reflection of the Romans' general administrative preference for laissez-faire and subsidiarity', but partly also a reflection of 'the way that the Roman calendar itself continued to be a distinctive marker of Romanness'. He goes on: '[The calendar's] reach was not universal: it was not meant to be a unifying grid for all the peoples of the Empire, but it retained its specific power for Roman citizens as a context for apprehending and exploring Roman identity. This irreducibly Romanocentric dimension of the calendar potentially enabled any Roman anywhere in the Empire to feel part of a shared community of citizens.' Whilst I agree entirely with the first 'partial' explanation (administrative laissez-faire), I must take issue with the second. The wholesale imposition of the Julian calendar on the provinces of the Latin West demonstrates on the part of Rome a clear intention, or at least an unambiguous consent, to make it a universal, imperial calendar; the preservation of its specifically Roman identity, in this context, was clearly not an issue. The failure to impose it similarly in the East must ascribed instead to the political and cultural strength of the Greek Eastern cities and provinces and to the consequent tenacity of their local calendrical traditions, as we shall see in the next chapter.

The result of the institution and diffusion of the Julian calendar in the Roman Empire, and indeed of the whole process described in this chapter, was that by the end of the first century BCE, fixed calendars based on the Egyptian 365-day year had become dominant throughout the ancient world, from Gaul in the West to Sogdiana in Central Asia. The lunar calendars that had dominated the ancient world until *c*.500 BCE only survived in restricted (although, arguably, significant) areas: Greece (or parts of it; see Chapter 1), some Near Eastern client kingdoms of Rome (e.g. Nabataea, until it became Provincia Arabia in 106 CE—and Judaea: see Chapters 5–6), and parts of the Parthian Empire, in particular Mesopotamia (Chapter 2).

This widescale takeover of fixed calendars should not be interpreted as the result of scientific progress: indeed, the Babylonians and Greeks were probably the most advanced astronomers of the ancient world, and yet they retained their flexible lunar calendars. The fixed Egyptian calendar was adopted in various regions (mainly in the Persian and Roman Empires) for specific, local reasons, which distinguish them clearly from one another. Nevertheless, these distinct, discrete events fall into a grand, macro-historical pattern—the spread of a common, fixed calendar—which can be linked to the rise of great empires in the Near East and Mediterranean in the second half of the first millennium BCE. The fixed calendar was not only an effective system for the administration of extensive territorial empires, but also a medium for cultural exchange and cultural cohesion, and thus in itself a constituent element in the formation of common culture across the great empires of the ancient world.

Part II

The Empires Challenged and Dissolved: Calendar Diversity and Fragmentation

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Fragmentation: Babylonian and Julian Calendars in the Near East, Third Century BCE–Seventh Century CE

In the previous chapters we have seen how the rise of great empires in the Near East and the Mediterranean during the first millennium BCE led to the use of official imperial calendars across extensive territories, and how this brought about in turn a process of calendar standardization and fixation. But this process was not irreversible or unidirectional. When, as sometimes happened, great empires collapsed and fragmented into smaller geopolitical entities—for instance, when the Seleucid Empire disintegrated in Asia Minor and in the Near East—their calendars often went the same way. In the absence of any unifying, imperial authority, the small kingdoms and city states that succeeded were free to set their calendars as they wished; in some cases, in fact, control of the calendar was a way of asserting their newly acquired autonomy (similarly, for example, to their control of coinage). This led, unavoidably, to calendar fragmentation and differentiation.

This process—in a way, the reverse of what has been studied earlier in this book—will be the subject of this present chapter. Further causes of calendar fragmentation and differentiation will be considered in the next two chapters. In Chapter 6, I shall argue that calendrical difference could arise when subgroups within large empires maintained or developed their own, traditional calendars as an expression of dissidence or subversion towards the ruling imperial powers. In the final chapter, I shall consider how or whether calendar difference could serve the needs (or even, perhaps, constitute the basis) of religious sectarianism and heresy, thus challenging, again, the prevailing tendency in great empires towards calendar unification and fixation.

Besides representing, in structural terms, the reverse of Part I above, Part II also succeeds it loosely in chronological terms, running from the third century BCE until the end of Antiquity in the seventh century CE. The chronological progression from Part I to Part II of this book may be taken to reflect a real historical process, whereby the integration and unification of calendars during the first millennium BCE was followed in later Antiquity by their fragmentation. This interpretation, however, is over-simplistic. It is hardly disputable that the fixed calendars that were formed during the first millennium BCE, especially the Julian calendar, remained firmly established as standard until the end of Antiquity and well beyond. In political terms, moreover, grand-scale imperialism continued unabated until the end of Antiquity without giving way, in any sense, to political fragmentation. The gradual disintegration of the Seleucid Empire during the third–first centuries BCE in Asia Minor and the Near East was only short-lived; it was followed not long after with the rise and domination of the Parthian and (later) Sasanian Empires in the east, and the Roman Empire in the west. Each of these empires employed or restored the use of standard imperial calendars (Babylonian/Macedonian, Persian, and Julian, respectively) throughout their territories.

Nevertheless, the post-Seleucid period was critical in establishing a tradition of calendar differentiation in Asia Minor and the Near East which the Roman Empire was only partially able to reverse. Although lunar calendars were abandoned soon after the arrival of the Romans and replaced with 365-day Julian-type calendars, the Asian and Near Eastern calendars in the Roman period retained local characteristics and remained, almost until the end of Antiquity, considerably fragmented and diverse. The Julian calendar proper did not come into use in the Near East until the sixth century—shortly before the Muslim conquest, and too late to have had any significant, long-term effect. In this respect, calendar fragmentation was much more evident in late Antiquity than in the earlier period. In Asia Minor and the Near East, the dominance of a standard, official imperial calendar reached its apex in the Achaemenid and Seleucid periods, but was never to recover thereafter.[1]

The failure of the Roman Empire to impose a single Julian calendar in Asia Minor, the Near East, as well as in Egypt and Greece runs counter to my thesis, in Part I, that the rise of large empires led to the unification and standardization of the calendar. But it is important to stress that the rapid adoption of 365-day calendars in the early Roman period throughout Asia Minor, Egypt, and the Near East was a clear expression, indeed an intrinsic part, of the integration of these provinces into the Roman Empire. The reason why these eastern provinces did not adopt the Julian calendar itself, and preserved instead a variety of local, Julianized calendars, can be explained in more than one way. It was partly the survival of a post-Seleucid tradition of calendar differentiation; but it was largely also one of the numerous ways through which the cities and provinces of Hellenistic East asserted their independent identities vis-à-vis the Roman Empire, reflecting in many cases their

[1] This contrasts with the West, i.e. western Europe and the western half of the Mediterranean basin, where the use of a standard and fixed official calendar began and culminated in the Roman period with the universal use of the Julian calendar (see Ch. 4, end).

patriotism and a sense (albeit somewhat fictitious) of political autonomy. The partial adaptation to the Julian calendar, and partial retention of local calendar traditions, reflected the mixed and ambiguous political allegiances of the cities and provinces of the Roman East. In this respect, the processes under study in Part II of this book are not simply, as suggested above, the reverse of those discussed in Part I. This present chapter, in particular, does not depict the undoing of the fixed, imperial calendars of earlier Antiquity, but rather the complex processes, in later Antiquity, that involved at once adoption and preservation of standard imperial calendars on the one hand, and their challenging and disintegration on the other.[2]

The various forms that Julian-type calendars were able to take in the Roman Near East[3] refute, moreover, a simplistic historical determinism whereby the rise of great empires automatically led to the standardization and fixation of their calendars. Conversely, the preservation of the standard Babylonian calendar in some of the fragmented post-Seleucid kingdoms and city states shows that political fragmentation did not automatically lead to calendar flexibility and diversification. In this chapter, more than in any of the preceding chapters, it will become evident that the history of calendars was not *determined* by grand, macro-historical forces. Although the large-scale structures of the great empires were conducive to calendar integration and standardization, and conversely, small-scale political entities were conducive to calendar differentiation, the changes that were made to calendars were always a matter of choice. The decision, by various states and peoples, to alter their calendar or switch over to an entirely different system was mostly political, but often also based on religious, economic, and other specific considerations. This raises the question, again, of whether we should be interpreting the history of calendars in terms of general, macro-historical structures, or rather on a discrete, case-by-case basis—a question that I deliberately leave open, because it does not really have any simple answer.

Until now, the misleading impression may have been conveyed of a monolithic and essentialist view of 'Greek', 'Babylonian', and 'Egyptian' calendars, each with a separate chapter on its own (Chapters 1–3). It is only in Chapter 4 that the spread of the Egyptian calendar to areas far beyond Egypt has begun to draw our attention to the transferability of calendrical traditions, and to the consequent difficulty of referring, for example, to a particular calendar as 'Persian', 'Zoroastrian', or still 'Egyptian'. From this chapter onwards, the hybridity of calendars in the Seleucid, post-Seleucid, and Roman Near East

[2] I use the term 'later Antiquity' in an unusually broad sense, since the period referred to begins already in the 3rd c. BCE. This period is only 'late' in relation to the much earlier calendars (especially Egyptian and Babylonian) that have been studied in Part I.

[3] The term 'Near East' in this chapter (as in its title) will often be used in a broad sense to include not only the Levant but also Egypt to the south and Asia Minor to the north.

will make it even more difficult, and indeed increasingly pointless, to identify any given calendar as essentially 'Macedonian', 'Seleucid', 'Babylonian', or 'local'. Admittedly, the complex identity of calendars was not specific to later Antiquity: already in the second millennium BCE, the calendar that I have called 'Babylonian' in Chapter 2 originated, as we have seen, as a hybrid of various Mesopotamian calendrical traditions. But the Seleucid and post-Seleucid worlds bring into focus the inherent difficulty of identifying calendars through ethnic labels and of treating them as self-contained, monolithic entities. The official calendar of the Seleucid Empire, when Macedonian and Babylonian calendars were assimilated to one another, also shows that hybridity was not specific to post-imperial fragmentation (when calendars became differentiated) but also throve in the context of the official calendars of the great empires. It was precisely through hybridity and assimilation that these official calendars became acceptable to all.[4]

Dearth of evidence will be one of the greatest challenges in this chapter. Information on individual calendars of the post-Seleucid and late Antique Near East is generally scarce (with the notable exception of the Jewish calendar, which will be studied in detail in the following chapters); all the more difficult is to establish the specific circumstances and motivations that may have led to the diversification of calendars in this period. In many cases, we need to rely on evidence relating to the point at which the calendar under study came to an *end*, being superseded by something different. Thus the evidence will often require us to start from the end, and then extrapolate backwards.

1. THE SELEUCID CALENDAR

It is widely believed that under the Seleucids the Babylonian calendar was retained as the official calendar of the Empire. The Seleucid calendar was identical with the Babylonian calendar, except that in Greek documents, equivalent Macedonian month-names were used. This effectively means that the Macedonian calendar ceased to exist as an independent reckoning, and was completely assimilated to the Babylonian calendar. In only one respect did

[4] Post-colonial theory has rightly insisted that hybridity is as much a feature of colonial, imperial societies as of the post-colonial world (see e.g. Bhabha 1994). By 'assimilation' I mean a special type of hybridity where some elements of the hybrid compound are dominant and subsume the others, often in a context of socio-political domination. In the Seleucid calendar, however, the assimilation of Macedonian and Babylonian elements appears to have worked both ways, as we shall presently see. My use of the term 'post-Seleucid' in this chapter may evoke, not without reason, the notion of 'post-colonialism'; for an interpretation, in this context, of the prefix 'post', see ibid. 1–9.

the Seleucid calendar differ from the Babylonian: its New Year was not in the spring but in the autumn. The Macedonian autumn month Dios was thus reckoned as the first month of the year, and consequently, the Macedonian Seleucid era began six months earlier than its Babylonian counterpart, in autumn 312 BCE.

This widely held view seems generally correct, although the evidence is limited, and as we shall see, the situation is likely to have been considerably more complex. I shall first examine the Seleucid New Year, and then investigate the assimilation of the Macedonian to the Babylonian calendars.

The New Year and the Seleucid Era

Autumn New Years are well attested in Macedonian calendars of the Roman period, but evidence of an autumn New Year in the Seleucid calendar—distinct from the Babylonian New Year in the spring—is very sporadic. The statement attributed to Zenobius (second century CE) that 'among the Macedonians the last month of the year is entitled Hyperberetaios'—which implies that the autumn month of Dios, which follows it, is the first month of the year—may well refer to the calendar of the Seleucids, as is commonly assumed;[5] but the possibility that it refers to users of Macedonian month-names in a later period (e.g. Roman) cannot be excluded. More convincing is the contemporary evidence of a letter of Antiochus II dating from 254 BCE, which instructs the payment of three instalments in year 60 SE to be made firstly in Audnaios, secondly in Xandikos, and thirdly in the following three months (Welles 1934: 91 no. 18, ll. 21–3). Xandikos was equivalent to month XII of the Babylonian calendar (see below); yet this letter implies that the three months following Xandikos belonged to the same year (Hannah 2005: 93).

Although not much more evidence can be adduced, the assumption of a Macedonian Seleucid Era from autumn 312 BCE helps to resolve certain chronological inconsistencies in literary, epigraphic, and numismatic sources, which may be taken as further evidence of its existence.[6] The dates in the first book of Maccabees can only be reconciled with each other and with external evidence if one assumes that some are Macedonian (from the autumn) and some Babylonian (from the spring); e.g. in 1 Macc. 4: 52 the month of *Chasleu* (Kislew, see Table 5.2) is identified as the 9th month, which implies the Babylonian count with a New Year from the spring. But in 1 Macc. 6: 16 the

[5] Zenobius, *Centuria* 6. 30, cited in Johnson (1932) 7 n. 21, Assar (2003) 184 n. 11, Hannah (2005) 82–3.

[6] Samuel (1972) 245–6. It has been argued that the dating of coins from Seleucid and post-Seleucid (but pre-Roman) Asia Minor generally fits best the assumption of an autumn New Year: Callataÿ (1997) 30, 170.

year of Antiochus' IV death is given as 149 SE, whereas we know from Babylonian Astronomical Diaries that his death was around month X year 148 (about December 164 BCE; Sachs and Hunger 1988–2006: iii. 18–19); the date in 1 Macc. is compatible if we assume a Seleucid era beginning six months earlier. Similarly, Demetrius' II accession is dated to year 151 (1 Macc. 7: 1) not long before 13 Adar (1 Macc. 7: 49), i.e. month XII of the Babylonian calendar; whilst according to the Astronomical Diaries it was some time between month VII year 150 (autumn 162 BCE) and month II 151 (Sachs and Hunger 1988–2006: iii. 34–5). These dates can be reconciled if we assume that Demetrius acceded not long before month XII 150 (Babylonian), but that 1 Macc. calls it 'year 151' because it reckons the year from the previous autumn, following Macedonian usage. However, this interpretation creates a further inconsistency, because the events following immediately the defeat of Nikanor in 13 Adar 151 are dated to the first month of 152 (1 Macc. 9: 1–3), which suggests that Adar was the last month of the year, following Babylonian usage. It may be safer to conclude, therefore, that whilst the assumption of a Macedonian Seleucid era from autumn 312 BCE helps to resolve some inconsistencies in the datings of the first book of Maccabees, the chronology of 1 Maccabees is generally too confused to serve itself as evidence of the existence of such an era.[7]

The Macedonian autumn New Year (and hence the Macedonian Seleucid era from autumn 312 BCE) is much better attested in later periods, and may reasonably be regarded as a survival from the Seleucid period. Almost all the calendars of Asia Minor and the Near East in the Roman period began the year in the autumn.[8] In the Parthian kingdom, the Macedonian calendar seems also

[7] Grabbe (1991) suggests that the first book of Maccabees is consistently using an era from spring 312 BCE. This may resolve most of the difficulties, but the existence of such an era would be historically unaccountable except as an error on the part of this book's author.

[8] e.g. the calendars of Antioch (with a New Year on 1 October: Samuel 1972: 174 n. 1), Gaza (28 October, according to Samuel 1972: 177 n. 4, and following a similar argument Ascalon, 27 November; alternatively we may suggest 29 August for both, on the assumption that the epagomenals, in both calendars on 24–8 August, marked the end of the year), Gerasa (ibid. 180–1), and Cyprus (in its various calendars: ibid. 183–6). The year at Palmyra began in Hyperberetaios = Tishrei, as attested from a late-2nd-c. CE inscription (ibid. 178–9 n. 3); the calendar of Palmyra may still have been lunar in this period (see discussion in Ch. 6 n. 6), but in any case this month would have occurred in the early autumn. A number of calendars began the year on 23 September, in the provinces of Asia, Bithynia, Cyprus, Crete, and possibly in the city of Heliopolis (Baalbek) (ibid. 174–6, 181–2); but since 23 September was Augustus' birthday, this should not necessarily be interpreted as the survival of a pre-Roman, Seleucid autumn New Year. See however Callataÿ (1997), 170, who argues from numismatic evidence that the pre-Roman Macedonian calendar of Ephesus (later in the Roman province of Asia) must have begun the year in the autumn (see also Samuel 1972: 123). The calendar of the province of Arabia (instituted in 106 CE) is the only known calendar of the Roman Near East to have begun the year in the spring (assuming that its epagomenals, on 17–21 March, marked the end of the year; see Samuel 1972: 177). Some have explained this as a result of Arabia's cultural affinity with Babylonia, where the year began in the spring (MacAdam 1986: 34, adding that this 'also broadens the scope of the

to have begun the year in the autumn. Thus a document from Dura-Europos dated 87 CE in the month of Panemos refers to a transaction that had been made the same year in the month of Dios; this is only compatible with an autumn New Year.[9] An autumn New Year also explains the inconsistent correlation between Seleucid era years and Arsacid era years in Parthian documents in Greek from Babylonia (111/10 BCE), Susa (21 CE), and Dura-Europos (87 CE, 121 CE): consistency can be achieved if one assumes that the Arsacid era began in the spring (following Babylonian usage), and the Seleucid era in the autumn (Assar 2003: 177). A Macedonian autumn New Year is further confirmed by Parthian numismatic evidence. Parthian coins from the late first century BCE–early first century CE, which are dated according to the Seleucid calendar and refer occasionally to intercalary months, appear to assume a year beginning in the autumn;[10] officina letters (mintmarks) on a series of Parthian coins dating from 77/8–78/9 CE suggest a year beginning in the month of Dios.[11] By late Antiquity, the autumn New Year and Seleucid era from 312 BCE were standard in the Syrian and Jewish calendars.[12]

But although the preponderance of an autumn New Year in post-Seleucid Asia Minor and the Near East suggests, as I am arguing, a direct survival from the Seleucid period, it should be noted that autumn New Years existed in the ancient Near East long before the arrival of the Seleucids. Even in Babylonian hemerologies from the second millennium BCE, it appears that a 'second New Year' was celebrated at the beginning of month VII.[13] A neo-Assyrian omen text states, albeit obscurely, that 'months XII and VI are the beginning of the year, because months I and VII are at the beginning of the year'.[14] The main New Year celebrations at Ugarit appear to have been in the autumn, although there are indications also of a secondary New Year in the spring (de Moor 1971: 56–62, 77–80). A similar multiplicity of New Years is attested much later

term "Arab"'), but this explanation is speculative. The New Year at Miletus, from the 3rd c. BCE onwards, is thought to have been in the spring; but inasmuch as non-Macedonian month-names were used in this city, the 'Seleucid' nature of its calendar is generally questionable (see Samuel 1972: 114–18, and below, n. 35).

[9] Hannah (2005) 91; the reference should be Welles, Fink, and Gilliam (1959) no. 18, ll. 13, 16. By this period, the New Year may have already shifted from Dios to Hyperberetaios; see discussion below.

[10] However, this is only true if one assumes that the intercalations were based on the fixed 19-year cycle of the earlier Babylonian calendar, which is far from certain: see discussion in Ch. 2.

[11] Sellwood (1983) 282, 292; Assar (2003) 183. However, the geographical and chronological disparity between these various sources allows for other possible explanations.

[12] Even in Babylonia, the Jews assumed that the Seleucid era began in Tishrei (i.e. the autumn): Babylonian Talmud, *Avodah Zarah* 10a.

[13] Labat (1939) 27; Cohen (1993) 6–7; Wagenaar (2005) 119.

[14] Hunger (1992) no. 165. The first clause may be a citation from an older Mesopotamian source, interpreted in the second clause. For an alternative interpretation, see Parpola (1970–83) ii. 186–7 (with further evidence of a New Year in month VII, Tashritu) and Cohen (1993) 400. It is also possible that 'beginning' in the first clause is a scribal error.

in rabbinic sources: according to Mishnah, *Rosh Ha-Shanah* 1: 1 (early third century CE), 'There are four New Years: the 1st of Nisan is the New Year for kings and for [the cycle of] festivals . . . the 1st of Tishrei is the New Year for [the count of] years, sabbatical years, and jubilees, etc.' The prevalence of autumn New Years in the Seleucid and post-Seleucid periods may thus reflect local traditions rather than a specifically 'Macedonian' calendrical practice. This raises questions as to whether the autumn New Year could have been used by Seleucid rulers as a 'Macedonian' identity marker, although it would certainly have distinguished the Seleucid-Macedonian from the Babylonian calendar.

Calendar assimilation: the evidence

As stated above, it is widely believed that the Macedonian calendar of the Seleucid Empire was assimilated to the Babylonian. The evidence is very slim, however, and not entirely satisfactory. A passage of Malalas (sixth century CE) is occasionally cited, but all it says is that Seleucus I, while at Antioch, ordered that the months of Syria be named in the Macedonian way.[15] This is generally construed as meaning that the Babylonian calendar (which had been used in Syria during the Achaemenid period) was fully retained, but with Macedonian month-names.[16] However, other interpretations are equally possible: e.g. on the contrary, that the Macedonian calendar replaced entirely the Babylonian one. This rather vague report written by a very late chronographer—albeit himself from Antioch—can hardly be used as a reliable source for the early Seleucid period.

Earlier, contemporary evidence amounts to a handful of double dates. The date of Alexander's death (in 323 BCE) is independently given in a Babylonian astronomical diary as 29 Aiaru, which was the last day of the month,[17] and in some Greek sources as the last day of Daisios.[18] Other Greek sources, however, give the date as 28 Daisios, which would undermine the conclusion that in this early period (and before the Seleucid period had properly begun) the Macedonian calendar was identical to the Babylonian.[19]

[15] John Malalas, *Chronography* 8. 15 (16) (Thurn 2000: 153; Jeffreys, Jeffreys, and Scott 1986: 106). This statement is followed by an apparent textual lacuna, which does not help with clarity (see Thurn loc. cit. n. 12).

[16] Hannah (2005) 95, and implicitly Samuel (1972) 141.

[17] BM45962, obv. l. 8, in Sachs and Hunger (1988–2001) i. 206–7; the year and month are not extant, but identifiable astronomically. This month was hollow, thus 29 was its last day: ibid. 218.

[18] Plutarch, *Alexander* 75, citing Aristoboulos (a member of Alexander's staff) gives the day as *triakas*, which generally means 'last day of the month' (i.e. either 29th or 30th) rather than '30th' (see Ch. 1 nn. 68, 139). This could mean, therefore, 29 Daisios.

[19] Plutarch, ibid. 76, citing the Diaries (i.e. of Alexander's court). Attempts at reconciling these dates (Samuel 1962: 46–7; Oelsner 1974: 132 n. 13; Grzybek 1990: 29–35, 52–60) have been

Table 5.1. Double dates in Ptolemy's *Almagest*

Source in *Almagest*	'Chaldaean' year, and Macedonian date	Nabonassar year, and Egyptian date	Julian equivalent (not in text)
9. 7. 10	67, Apellaios 5	504, Thoth 27[a]	245 BCE Nov. 18/19
9. 7. 9	75, Dios 14	512, Thoth 9	237 BCE, Oct. 29/30
11. 7	82, Xandikos 5	519, Tybi 14	229 BCE, Mar. 1/2

[a] Since the Egyptian day starts in the morning, '27' means (in the context of astronomical observations) the night running from the 27th in the evening through to the next morning, at the turn of the 28th (by contrast the Julian day starts at midnight, and therefore the night period straddles two dates, here 18/19). In the Babylonian calendar, the day starts in the evening. This report actually relates to an astronomical observation in the morning, i.e. at the turn of the 28th (Jones 2006: 258, 264–5).

The other double dates, from the Seleucid period, are inferable from three third-century BCE astronomical reports cited in Ptolemy's *Almagest* (mid-second century CE, but probably using earlier, intermediary sources). The actual reports are dated by a year number 'according to the Chaldaeans' (i.e. the Seleucid era), followed by a Macedonian month-name and day number. Ptolemy then provides the equivalent year number in the era of Nabonassar (his standard chronological scheme) and an Egyptian date, which we can easily convert into Julian calendar dates (see Table 5.1).[20]

The Macedonian month-names (Apellaios, Dios, and Xandikos) can be securely established as really referring to Babylonian months, for the following reasons:

1. Ptolemy (or his source) calls these dates 'Chaldaean' (although this may arguably refer only to the Seleucid year, not to the months and days).
2. The distinctive language and form of the astronomical reports cited here by Ptolemy suggest that they are direct translations of Babylonian sources such as the Astronomical Diaries (A. Jones 2006: 257). In their original language, the dates of these reports would obviously have been recorded according to the local Babylonian calendar.
3. These dates imply months beginning at first visibility of the new moon, as in the Babylonian calendar.[21]

controversial and not very convincing. See now Bennett in <http://www.tyndalehouse.com/Egypt/ptolemies/ptolemy_i_fr.htm> (accessed 30 June 2010), n. 6.

[20] Ptolemy, *Almagest* 9. 7. 10 (Toomer 1984: 452), 9. 7. 9 (ibid.), and 11. 7 (ibid. 541), cited in Hannah (2005) 92. See Samuel (1962) 47–8, but most importantly A. Jones (2006).

[21] So at least the first two cases: thus the second (of 237 BCE) implies that Dios began on the evening of 16 October, when the new moon was indeed first visible (*pace* Parker and Dubberstein 1956, followed by A. Jones 2006: 264, who take 17 October as first evening of new moon visibility; in fact the date of this report appears to be confirmed by Sachs and Hunger (1988–2006) v. 105–6 no. 39, even if—as pointed out by A. Jones (2006: 264 n. 15)—we cannot assume its textual reliability). The third case, of 229 BCE, is more problematic as it implies a month beginning one day later; see discussion below, n. 26.

4. It is evident from the year of Nabonassar, as well as from the astronomical data associated with these dates, that the 'Chaldaean' or Seleucid Era is assumed to begin in the spring of 311 BCE, as was Babylonian practice (whereas, as we have seen, Macedonian practice was to begin in autumn 312 BCE); Samuel 1972 (245–6), Toomer (1984) 13.

In these reports, therefore, Macedonian month-names designate Babylonian months. These Babylonian months can be independently identified on the basis of the Egyptian dates, our knowledge of the Babylonian calendar, and astronomically, as follows:

Apellaios = Araḫsamnu
Dios = Tashritu
Xandikos = Addaru

These equivalences are not only internally consistent (given the known order of the Babylonian and Macedonian months of the year), but also consistent with the Aiaru—Daisios equivalence obtained for Alexander's date of death (see above). This supports the existence of a standard, consistent system of equivalences between Babylonian and Macedonian month-names, as tabulated in Table 5.2.

The evidence from the *Almagest* thus leads Samuel (with most other scholars) to the conclusion that no later than the mid-third century BCE (to which these double dates belong), the Macedonian calendar in the Seleucid Empire was completely assimilated to the Babylonian calendar and only ever

Table 5.2. Seleucid months

Month no.[a]	Babylonian[b]	Macedonian(Seleucid)	Macedonian (post-Seleucid)[c]
I	Nisannu (Nisan)	Artemisios	Xandikos
II	Aiaru (Iyyar)	Daisios	Artemisios
III	Simanu (Siwan)	Panemos	Daisios
IV	Duzu (Tammuz)	Loios	Panemos
V	Abu (Ab)	Gorpiaios	Loios
VI	Ululu (Elul)	Hyperberetaios	Gorpiaios
VII	Tashritu (Tishrei)	Dios	Hyperberetaios
VIII	Araḫsamnu (Marḫeshwan)	Apellaios	Dios
IX	Kislimu (Kislew)	Audnaios	Apellaios
X	Ṭebetu (Tebet)	Peritios	Audnaios
XI	Shabaṭu (Shebat)	Dystros	Peritios
XII	Addaru (Adar)	Xandikos	Dystros

[a] These numbers relate to the Babylonian calendar. It is generally assumed that in the Seleucid Macedonian calendar, the first month was Dios (i.e. Babylonian month VII), as discussed above.
[b] Akkadian names, with Aramaic names in brackets. The latter are generally found in non-cuneiform sources.
[c] This column will be discussed and explained later in this chapter.

referred to it.[22] This conclusion, however, is overconfident. The sources presented above do not prove that the Macedonian calendar did not exist independently of the Babylonian calendar. They only prove that writers in Greek commonly *translated* Babylonian month-names into Macedonian names, and that they had a consistent way of doing so. But whether this translation convention reflected an actual reality—whereby, in the Seleucid period, Macedonian and Babylonian months were indistinguishable—is an entirely different matter: in reality, the Macedonian calendar could still have been reckoned separately and independently, coinciding only approximately with the Babylonian calendar. Nevertheless, the existence of a consistent, conventional translation scheme from Babylonian to Macedonian month-names suggests that the relationship between Macedonian and Babylonian months must have been quite stable. This would imply, at least, that the intercalation of months was carried out in the same way, and if so, that those who reckoned a Macedonian calendar generally followed the Babylonian fixed, 19-year cycle.

Calendar assimilation: extent and limits

The Seleucid adoption of the Babylonian calendar and the assimilation to it of Macedonian month-names is a likely assumption, even if it is difficult to prove this from Macedonian-dated documents of the Seleucid period. The Babylonian calendar had a long history as the official imperial calendar in the Achaemenid and preceding empires. The Seleucids inherited it together with the other imperial and administration institutions of the Achaemenid Empire, and had every reason to continue using it as official calendar. By the time of Alexander's conquest, indeed, this calendar was widely used in daily life by Aramaic-speakers across the Empire;[23] its ever-increasing regularity, which we have traced in Chapter 2, made it particularly suited to the administrative needs of a large empire. At the same time, however, the preservation of the Macedonian calendar remained a political advantage to the Seleucids; its month-names were also more appropriate for dating documents in Greek, the new official imperial language. To reckon both calendars separately would not have made much sense, especially as both were lunar. It was much easier,

[22] Samuel (1972) 140–1; also Toomer (1984) 13 n. 22, who, however, argues that the assimilation of Babylonian and Macedonian months may actually be later than the mid-3rd-c. BCE, as Ptolemy's translation of the Babylonian month-names into Macedonian equivalents may have been carried out at a later date.

[23] It is well attested, e.g., in Aramaic ostraca from Idumaea (southern Palestine) of the late Achaemenid and early Hellenistic periods: see e.g. Eph'al and Naveh (1996). For evidence from Samaria (dated 335 BCE), see Cross (1985).

and administratively more expedient, to use Macedonian month-names for Babylonian months and thus to assimilate the former to the latter.

There are several reasons why it is the Macedonian calendar that was assimilated to the Babylonian, and not vice versa. Although the Babylonian calendar had always been under royal control, which might have given the right to Seleucid rulers to modify it in line with a Macedonian calendar, they may have been reluctant to interfere with a calendar that was well regulated by astrologers in the great Babylonian temples. As we have seen in Chapter 2, it is under the Seleucids that the Babylonian cycle of intercalations became firmly fixed, perhaps because Seleucid kings did not consider themselves sufficiently 'Babylonian' to tamper with the Babylonian calendar or to dictate how it should be reckoned.

The Macedonian calendar was also more suited to becoming adapted to the Babylonian calendar (rather than vice versa) because of its inherent flexibility. Little is known about the original, pre-Seleucid Macedonian calendar, but as a Greek lunar calendar, it is likely to have allowed the arbitrary intercalation and suppression of days, and the intercalation of any month of the year (see Chapter 3, near n. 89). In the Babylonian calendar, in contrast, all months began regularly at the new moon, and only a second month of Ululu (VI_2) or Addaru (XII_2) could be intercalated (see Chapter 2). The Macedonian calendar could therefore become adapted to the Babylonian without its identity's being compromised, whereas the reverse would not have been so easy. The use of Macedonian month-names made it possible for the Seleucid calendar to be still construed as 'Macedonian', even though it had adopted the rigid structure of the Babylonian calendar.

The evidence we have surveyed, however, suggests only the assimilation of Macedonian month-names to Babylonian months, and hence (implicitly) the adaptation of the Macedonian calendar to the Babylonian 19-year cycle of intercalations; but it is far from certain that calendar assimilation went any further, e.g. with months in both calendars beginning exactly on the same days. It must be remembered, as has been stressed in previous chapters, that it was generally impossible to maintain an identical lunar calendar across the vast imperial territory of the Seleucids. Although Babylonian intercalations were standardized and fixed by the Seleucid period, which made it possible for the same intercalations to be carried out throughout the Empire, the beginning of the months did not conform to any fixed cycle or pattern, but depended instead on a sophisticated combination of empirical new moon sightings and astronomical predictions of it first visibility that were carried out by astrologers in the great temples of Babylonia (see Chapter 2). Anyone at a distance from Babylonia and without the benefit of Babylonian astronomical expertise would have been incapable of knowing or predicting when exactly the Babylonian month had begun. Already in the Achaemenid period, this had led to some flexibility and diversity with how the Babylonian calendar was reckoned in the various regions of the Empire.[24] In the Seleucid period, for the same reason, discrepancies could have arisen between Macedonian and Babylonian days of the month. The Seleucid kings or other imperial officials, when travelling or campaigning away from Babylonia, are likely to have reckoned and used the Macedonian calendar without much notice of the calendar decisions that were being taken in Babylon, which in any case could not be communicated to them in sufficient time.[25] As has been noted above, there is no evidence that the Macedonian calendar ceased to exist in the Seleucid Empire as an independent calendar. Even if Macedonian and Babylonian calendars were *perceived* to be identical, in reality the months in both calendars could often have been reckoned separately, leading in some cases to small margins of discrepancy. It is difficult, however, to find explicit evidence of such occurrences.[26]

Discrepancies between the Macedonian and Babylonian calendars are likely to have become more frequent after the Parthian conquest of Babylonia in 141 BCE. Now that the Seleucid rulers were cut off from Babylonia (and confined largely to Syria), they must have relied entirely on their own reckoning of the lunar month, perhaps on the basis of their own sightings of the new moon. It is possible, however, that they still followed the Babylonian 19-year scheme of intercalations: for in 47 BCE, some years after the fall of the Seleucid Empire and the creation of the Roman province of Syria, the calendar of Antioch—former Seleucid capital—seems to have been still in continuity with the Babylonian calendar of the Seleucid period.[27]

[24] See Stern (2000*a*) on Elephantine, and above, Ch. 2 nn. 74–6 and near n. 133, with further examples from the late Achaemenid period.

[25] On communications in the Seleucid Empire, see Sherwin-White and Kuhrt (1993) 61–2. Documents from the neo-Assyrian period suggest that Babylonian scholars, but also the Assyrian kings, attached considerable importance to the exact beginning of the months because of their complex astrological implications (see Ch. 2); but whether Achaemenid and Seleucid kings took the same view is difficult to ascertain.

[26] The only discrepancy I am aware of is in the double date of Ptolemy's third 'Chaldaean' astronomical report, 5 Xandikos and 14 Tybi, which implies that Xandikos began on the evening of 26 Feb. 229 BCE (see Table 5.1). The new moon was actually visible already on the evening of 25 February, and a Babylonian astronomical diary for that year confirms that this is when the Babylonian month of Addaru began (Sachs and Hunger 1988–2006: ii. 126–9, cited in Jones 2006: 269; although the text is very fragmentary, the lunar data of the middle of the month are sufficient to confirm that it began on 25 February; Chris Bennett, pers. comm.). But rather than evidence of a one-day discrepancy between the Macedonian and Babylonian months, this is more likely to be the result of error in the conversion of 5 Xandikos (itself a Greek translation of Babylonian Addaru) into its Egyptian equivalent, which should really have been 13 Tybi (as argued by Jones ibid. esp. 284–5). A possibly better example (although slightly earlier, i.e. pre-Seleucid) might be the death of Alexander in 323 BCE, if we favour the tradition that Alexander died on the Macedonian date of 28 Daisios, whereas in the Babylonian calendar it was the 29th (see above, nn. 17–19), *pace* Samuel (1972) 141)

[27] The evidence is from Julius Caesar's entry into Antioch in 47 BCE, which is dated by John Malalas (*Chonography* 9. 5: Thurn 2000: 163, Jeffreys, Jeffreys, and Scott 1986: 114) to 23 Artemisios and implicitly by Cicero (*Ad Atticum* 11. 20. 1) to not long before (Roman) 18

The bilingual ostracon from el-Kōm

Calendar assimilation was a complex process in which the separate identity of the calendars—Macedonian and Babylonian—never completely faded. A good example of this complexity, from the early Seleucid period, appears in epigraphic evidence from just outside the Seleucid Empire: the bilingual ostracon from Khirbet el-Kōm (Idumaea, southern Palestine), dated 12 Tammuz in Aramaic and 12 Panemos in Greek. Both sections are dated 'year 6'; since this ostracon belongs, on ceramic and palaeographic grounds, to the early third century BCE, 'year 6' can only be that of Ptolemy II Philadelphus, i.e. 280 BCE, when Idumaea was under Ptolemaic rule.[28]

At first sight, this double date is trivial; but unlike the sources analyzed above (e.g. in Ptolemy's *Almagest*), it is not merely a date with its translation in another language. The Aramaic and Greek texts of this ostracon are not the same (i.e. one is not translated from the another), but represent different

Quintilis, which in that year would have been equivalent to some time early in (Julian) May. Assuming, as we should, that Artemisios was still a lunar month, a 23rd occurring not long before early May in that year could only have been *c.*16 April. The month of Artemisios would therefore have coincided with Babylonian Nisan (which, assuming that the 19-year cycle was still followed in Babylonia, began in that year on 25 March), exactly as according to the Seleucid scheme (Table 5.2). The evidence is presented by Beaujeu (1976) 27–8; although he uses it, contrariwise, to establish the dates of the pre-Julian Roman calendar on the basis of an assumed identity of Artemisios with Nisan, there is sufficient independent evidence to support the equivalence of 18 Quintilis and (Julian) early May in 47 BCE, and thus to support my argument (I am grateful to Chris Bennett for drawing my attention to this article). Although the chronology of Malalas is confused in this context (he places Caesar's visit to Antioch *before* his campaign in Egypt, and seems to date it to 48 BCE, in the first indiction and year 1 of the Antiochene era; moreover, he anachronistically identifies Artemisios with the Julian month of May), and in spite of its suspicious similarity to the date of the foundation of Antioch in 300 BCE (which was on 22 Artemisios, according to Malalas 8. 12 (13)), the date of 23 Artemisios is presumably drawn from a local Antiochene tradition, and need not be treated *a priori* as unreliable.

[28] Geraty (1975); an ostracon is a potsherd; el-Kōm lies between Hebron and Lakish. Geraty dates the ostracon to 277 BCE; however, Hazzard (1987) has since shown that year 6 of Philadelphus corresponds to 280/79 BCE, and since the Macedonian year in Egypt began in this period in Dystros (about seven months before the Egyptian New Year, 1 Thoth), the ostracon should be dated to 280 BCE (I am grateful to Chris Bennett for this correction). Other possibilities for 'year 6' can be excluded by elimination. It cannot be year 6 of the Seleucid Era (306 BCE), because this era was not in use (at least in Babylonia) before its 7th year (Oelsner 1974: 130, 139; Assar 2003: 175, 185 n. 13; but Geraty's argument—that in year 6 SE, Seleucid control of Idumaea was under Ptolemaic threat and therefore the Seleucid Era would not have been used—is far less convincing). Similarly, it cannot be year 6 of Ptolemy I Soter (299 BCE, at which stage Idumaea had just passed into Ptolemaic hands), because his regnal years were not yet in use in Egypt in this period (Geraty loc. cit.). Geraty's palaeographic dating to the early 3rd c. (rather than a pre-Ptolemaic dating, e.g. to the 310s BCE, which would lead to a rather different interpretation of the ostracon's calendrical significance) is confirmed on the basis of more recently published ostraca from the same region that are firmly dated to the late 4th c. BCE (e.g. Eph'al and Naveh 1996): the script of the el-Kōm ostraca looks somewhat more developed than that of the late-4th-c. ostraca, and should therefore be dated to the 3rd c. BCE (Ada Yardeni, pers. comm.). This leaves us only with 280 BCE.

sections of a loan record between the Idumaean Qosyada and the Greek Nikēratos (the former, in Aramaic, the statement of Qosyada's loan, and the latter, in Greek, Nikēratos' receipt); it is likely, therefore, that the Aramaic and Greek dates were supplied by each party independently of one another.[29] Nevertheless, the day of the month is the same in each section (12th), which suggests perhaps that both calendars were identical or assimilated to one another.

This ostracon shows that the Babylonian calendar was still in use by Aramaic-speakers in areas beyond Seleucid control.[30] In these areas, however, the assimilation of Macedonian and Babylonian calendars was different from that in the Seleucid Empire: on this ostracon, at least, Tammuz is equated with Panemos, whereas according to the Seleucid scheme, it should have been equated with Loios (or Siwan with Panemos: see Table 5.2). It seems most likely that the Macedonian calendar assumed in this ostracon was that of the Ptolemaic rulers, which was reckoned quite independently from that of the Seleucids (Samuel 1972: 146–9); this would explain the equation of Tammuz and Panemos.[31] As to the day of the month (12th), it is impossible to tell whether the Macedonian Ptolemaic (Greek) and Babylonian (Aramaic) days of the month happened on this occasion to coincide, or the Greeks in Idumaea were following the dates of the Babylonian calendar still dominant in this region, or again, on the contrary, the Aramaic-speaking Idumaeans were following the dates of the now politically dominant Macedonian Ptolemaic calendar.

Analysis of this ostracon reveals how complicated, and perhaps somewhat indeterminate, the process of calendar assimilation could be. But what needs to be most emphasized, out of all this evidence, is the *assimilatory* tendency of calendars in the Seleucid and Ptolemaic Empires.[32] This assimilatory

[29] Geraty (1975) 59 n. 30 notes, however, that the ostracon is written in a single handwriting, except for the name 'Nikēratos' in both the Aramaic and Greek sections, which perhaps Nikēratos himself filled in. Nikēratos' Semitic patronym, transliterated in Greek as *Sobbathos*, suggests that his origins were perhaps Idumaean, although his use of Greek in this ostracon was clearly a marker of Greek identity.

[30] It is unlikely that in this early period, the Idumaeans were using a local, independent calendar that had only retained Babylonian month-names. Since they did not form a coherent and independent political entity, but were still subject to the successors of the Achaemenid Empire (now Ptolemaic, but not long before Seleucid), they would have continued using their official imperial calendars. The development of independent calendars in the Near East was characteristic of the post-Seleucid period, as we shall presently see.

[31] The later years of Ptolemy II Philadelphus (from year 21 onwards) are known, from papyrological sources, to have been over-intercalated (see Ch. 3, near n. 92). This inscription confirms that by year 6 of his reign, one excessive intercalation had already been made, so that Panemos coincided no longer with the Babylonian month of Siwan, but with the following month of Tammuz.

[32] On the assimilation of the Macedonian calendar to the Egyptian civil calendar in early- or mid-2nd-c. Ptolemaic Egypt, see Ch. 3 n. 86.

tendency, driven by the political context of the large empires, stands in contrast with contemporary Greece, where, as we have seen (Chapter 1), even one-day differences between the lunar calendars of different city states were still cultivated and meticulously recorded in the inscriptions.[33] In the Seleucid and Ptolemaic Empires, in contrast, calendars were assimilated and differences suppressed.

2. POST-SELEUCID CALENDARS

In the post-Seleucid world, this assimilatory trend was dramatically reversed. The disintegration of the Seleucid Empire was a gradual process that lasted through almost its entire history, with the secession of Bactria in the mid-third century BCE, then the secession of Parthia, Armenia, and most of Asia Minor by the early second century BCE, the loss of Babylonia to the Parthians in 141 BCE, the secession of Judaea and other Levantine kingdoms and city states around the same period, and finally, Pompey's defeat of the last Seleucid king in Syria, in 65–62 BCE.[34] It is important to note, therefore, that what I shall refer to as 'post-Seleucid period' did not begin in all places at the same time. The break-up of the Seleucid Empire into smaller kingdoms and states—which I shall refer to, again, as 'post-Seleucid'—led, as we shall see, to calendar fragmentation and differentiation.

Continuity

The kingdoms and states that succeeded the Seleucid Empire retained, in the first instance, the Macedonian and Babylonian calendars that had served as official calendars of the Seleucids. The Parthian kingdom is probably the most important example: Macedonian month-names are used in the corpus of Parthian coins from the mid-first century BCE to the mid-first century CE, and clearly functioned as one of the Parthian official calendars (Assar 2003). The Macedonian or Babylonian calendar is also well attested in other parts of the post-Seleucid world. Macedonian month-names (in Greek) or their Babylonian equivalents (in Semitic languages such as Aramaic) are found in most

[33] e.g. an inscription from 166 BCE dated 26 XI in the calendars of Athens and Ambrakia, and 27 XI in that of Akarnania; or a treaty of 196 BCE dated 16 Pyanopsion according to the Milesians and 15 Hagneon according to the Magnesians (Ch. 1, near n. 52; note that by 196 BCE, Miletus and Magnesia were no longer under Seleucid control).

[34] For a more nuanced assessment of the disintegration of the Seleucid Empire, see Sherwin-White and Kuhrt (1993), esp. 84–90 (Parthians), 107–11 (Bactria), and 217–18 (Seleucid 'decline').

calendars of the post-Seleucid and Roman Near East, and in some cities and kingdoms of post-Seleucid Asia Minor.[35]

These calendars were now set independently in the post-Seleucid city states and kingdoms—probably on the basis of local new moon sightings, and presumably without the benefit of the astronomical predictions that had often determined the beginning of the Babylonian month—which means that minor variation between the calendars would have become inevitable.[36] Such minor variations are attested at least in post-Seleucid cities of western Asia Minor, where although Macedonian month-names were not used in all the cities, the calendars were still lunar and broad conformity to the Seleucid calendar appears to have been maintained. Thus, a treaty of 196 BCE attests a one-day discrepancy between the calendars of Miletus and Magnesia (above, n. 33), and a decree of the province of Asia in 8 BCE reveals that the month did not begin exactly on the day of first visibility of the new moon, as would have been the case in the Babylonian calendar, but two days earlier.[37]

These small variations, however, must have been common already in the Seleucid period, and even beforehand under the Achaemenids, as has been argued above. Small discrepancies of one or two days would never have been considered a significant deviation from the Seleucid Macedonian or Babylonian calendars. In this respect, the calendars of post-Seleucid city states and kingdoms were in direct continuity with those of the Seleucid Empire.

[35] e.g. for Asia Minor, Sardis (Samuel 1972: 123, 132–3; for examples see Sherwin-White and Kuhrt 1993: 181–2, Gibson 1981: 215–16) and the kingdom of Pontus (Callataÿ 1997: 29–30). Pergamum seems to have used both Macedonian and local month-names (Samuel 1972: 125–7; Trümpy 1997: 249). Most cities of Asia Minor, however, did not use Macedonian month-names even under Seleucid rule: e.g. Miletus (Samuel 1972: 114–18), Magnesia (121–2), and Iasos in Caria (114; see e.g. Sherwin-White and Kuhrt 1993: 127). Non-Macedonian names are also attested, but only after the period of Seleucid rule, in Priene (Samuel 1972: 118–200), Ephesus (122–4), Smyrna (175), and Bithynia (ibid.). It may be relevant to note that Seleucid rule did not last much more than a century in most of Asia Minor. Miletus and Pergamum enjoyed periods of independence in the mid-3rd c. BCE, whilst Bithynia, Pontus, Cappadocia, and Armenia were completely independent by the same period. After the treaty of Apamea in 188 BCE, Seleucid rule in Asia Minor was reduced to Cilicia only. This may go some way towards explaining the tenacity of local month-names in Asian cities and kingdoms.

[36] On the regular use of astronomical predictions of the new moon in the Babylonian calendar, see Stern (2008) and above, Ch. 2. 1. Jewish rabbinic sources, especially Mishnah, *Rosh Ha-Shanah* (3rd c. CE), suggest in contrast that perhaps already in the post-Seleucid Hasmonaean period the Judaean month was determined entirely by new moon sightings, not by astronomical predictions (see further Ch. 6, near n. 110). This corrects my assumption that 'the methods employed by the Hasmonaeans to determine lunar months were probably similar to those of the Babylonians' (Stern 2001: 30); it is clear, at least, that by the 3rd c. CE rabbinic methods of determining the new month were actually quite different (*pace* Wacholder and Weisberg 1971). For the evidence of Josephus, *Antiquities* 13. 8. 4 (250–2), relating to John Hyrcanus' campaign in Adiabene in 130 BCE and suggesting a Judaean month beginning at first visibility of the new moon, see Stern (2001) 113–16.

[37] See below, near n. 117 (two-day discrepancy) and after n. 58 (otherwise broad conformity, at least in that year, to the Seleucid Macedonian calendar).

Change

In other ways, however, the calendars of post-Seleucid city states and kingdoms developed their own, distinctive characteristics and drifted away from their Seleucid matrix. The main factor in this process was intercalation. It seems that once kingdoms and cities broke loose from the Seleucid Empire, they did not consider themselves bound to the strict observance of the Babylonian 19-year cycle. A single change in intercalation was sufficient to create a one-month discrepancy from the Seleucid calendars; the resulting fragmentation and differentiation of calendars could become, therefore, significant.

Among the earliest to have deviated, in this manner, from the Babylonian 19-year cycle was the kingdom of Pontus (along the south of the Black Sea). Actually, Pontus had never really been part of the Seleucid Empire, for it had already emerged as an independent kingdom already at the end of the wars of the Diadochi, by the beginning of the third century BCE. But it had previously been part of the Achaemenid Empire, when it presumably used the official Babylonian calendar; and in the Hellenistic period, the kingdom of Pontus is known to have used a Macedonian calendar.[38] One might have expected this calendar to have been assimilated to the Babylonian calendar, just as it was in the neighbouring Seleucid Empire. In the kingdom of Pontus, however, intercalations differed from those of the Babylonian calendar. Numismatic evidence from early first-century BCE Pontus reveals that a thirteenth month was intercalated in 90, 88, and 74 BCE;[39] whereas in the Babylonian calendar, we know from an astronomical diary that an intercalation was made in 87 BCE.[40]

The most important post-Seleucid state in the proper sense of the term was the Parthian kingdom; not much is known about its calendar until the mid-first century BCE, when numismatic evidence of month-names becomes first available. Analysis of this evidence has been marred by the assumption that Parthian intercalations conformed to the Babylonian calendar, but this is

[38] Two 2nd-c. BCE Pontic inscriptions are dated to the Macedonian months of Daisios and Dios: Callataÿ (1997) 29–30. The early-1st-c. BCE numismatic attestations of a 13th month (discussed below) confirm that the calendar was lunar.

[39] Ibid. 39, 43, and 48 respectively. This follows Callataÿ's preferred dating of the Pontic era as beginning in 297/6 BCE, hence year 207 (Pontic era) is 91/0 BCE. The alternative, that the era began one year earlier, would place year 207 in 92/1 BCE and 209 in 90/89 BCE (ibid. 30–2).

[40] See Ch. 2, Table 2.6 and n. *c*: this was in the spring, i.e. second Addaru (XII_2) 87 BCE. Callataÿ assumes that the Pontic intercalations were made in the autumn, on the grounds that the year probably began in Dios, following Macedonian usage, and that intercalations were made at the end of the year (ibid. 29–30). If Callataÿ is right (and indeed, this remains the most plausible theory), the discrepancy from the Babylonian calendar would have been of six months; if Pontic intercalations were made earlier in the year, e.g. in the spring, the discrepancy from the Babylonian calendar would have been of one year. If we assume the alternative dating of the Pontic era (see previous n.), the Pontic intercalation would have been in (autumn) 89 BCE, thus a discrepancy of one and a half years from the Babylonian calendar.

precisely what needs to be questioned.[41] This question is prompted, in particular, by the observation that by the first century BCE (but possibly already much earlier) the Babylonian calendar was no longer used as official calendar in the Parthian kingdom: in Parthian sources, only Macedonian dates appear to have been used.[42] Although this may have been due mainly to language—the Parthians used Greek or Parthian or other Iranian languages for official imperial purposes, but hardly Aramaic[43]—the effect could well have been a dissociation of the Macedonian from the Babylonian calendars, and a marginalization of the latter within the Parthian kingdom.[44]

Parthian coins reveal, indeed, that by the first century BCE the Macedonian calendar in use by the Parthians had deviated from the Macedonian Babylonian calendar of the Seleucid period. A Parthian tetradrachm from the reign of Orodes II (57–38 BCE) is dated Gorpiaios *embolimos* (intercalary), and so a much later coin from 49/50 CE, whereas according to the Seleucid Macedonian-Babylonian calendar, it is the following month, Hyperberetaios (Elul), that would have been intercalary (see above, second column of Table 5.2). Similarly, a Parthian coin from 5/6 CE is dated Dystros *embolimos*, whereas according to the Seleucid calendar only the following month of Xandikos (Adar) would have been intercalary.[45] Dystros *embolimos* also appears in inscriptions from Dura-Europos from the period of Parthian rule (i.e. some time before the third century CE).[46] These deviations from the Seleucid

[41] The entire analysis of Assar (2003), e.g., is built on the assumption that Parthian intercalations conformed to the Babylonian calendar. It should also be said that in this period not enough is known about the Babylonian calendar either: see discussion in Ch. 2 with Table 2.6.

[42] So in Parthian coins (see ibid.), inscriptions, and documents (e.g. from Parthian-period Dura-Europus: see Cumont 1926, Welles, Find, and Gilliam 1959). I am not aware that this observation has previously ever been made. In areas east of the Zagros mountain range, the Parthians also used occasionally the Persian Zoroastrian calendar, probably also for official purposes: see Ch. 4 (near nn. 63–4) and below, n. 174.

[43] Colledge (1967) 68–71; Boyce (1983) 1151–4. Aramaic was only used as a script for Iranian languages (including a stock of Aramaic words used for Iranian as ideograms).

[44] The fact that Parthian tetradrachms were all minted in Seleucia on the Tigris (Sellwood 1983: 282) should not lead to the assumption that they were influenced by the calendar of the nearby city of Babylon: Seleucia was a Greek city, where an independent Macedonian calendar would have been naturally favoured.

[45] Assar (2003) 178–80, and above Ch. 2, Table 2.6. These recent numismatic discoveries correct the assertion of earlier scholars that the new equation only began in Parthia from 17 CE (Bickerman 1968: 25, Samuel 1972: 143). In 1st-c. BCE Sardis, by contrast, epigraphic evidence shows that the intercalary month was still Xandikos *embolimos*: Gibson (1981) 215–16 (reference courtesy of Chris Bennett).

[46] Cumont (1926) nos. 20, 23. The provenance of these inscriptions, the temple of the Palmyrene gods at Dura-Europos, led Cumont to assume that they were dated according to the Palmyrene calendar (1926: 349; also Samuel 1972: 187); however, there is no reason not to associate these dates with the official Parthian calendar, which would have been in dominant use in the city. Gorpiaios *embolimos* is also attested in 2nd-c. CE Gandhara, east of the Parthian Empire (Falk and Bennett 2009); in this case, I would refrain from the editors' assumption that the calendar of Gandhara was identical to that of the Parthians.

calendar can be interpreted in one of two ways: either the Parthians intercalated different months from the Babylonian calendar (more precisely, they intercalated the previous month), or—a preferable because more conservative scenario—they intercalated the same months as in the Babylonian calendar, but for some reason the Babylonian intercalary months of Elul (VI) and Adar (XII) were now called Gorpiaios and Dystros, and thus, the equation of Babylonian and Macedonian month-names had shifted by one month (see third column of Table 5.2). Although this change would have been largely nomenclatural, it must have been caused originally by an additional intercalation in the Parthian Macedonian calendar, at some stage before Orodes' II coin in the mid-first century BCE; this single deviation from the Babylonian calendar would have had the effect of retarding the Macedonian calendar by one month in relation to the Babylonian, and thus of realigning the equation of months between them.[47] Evidence of this one-month retardation may be inferred from a much later inscription in Dura-Europos dating from 176 CE, where a horoscope that can be astronomically assigned to between 3 and 5 July is given the date of 9 Panemos,[48] presumably in the official Parthian calendar—whereas according to the Seleucid Macedonian–Babylonian calendar, the lunar month in early July should have been the next one, Loios.

Deviations from the Seleucid calendar due are also evident, in other ways, outside the Parthian kingdom and along the Near Eastern Mediterranean coast. These deviations may have occurred quite early in the post-Seleucid period, although the evidence is only from the end of the first century BCE—the point at which these calendars began converting to the Julian calendar and ceased being lunar altogether (as will be explained in §3, where the evidence will be discussed in detail). Although we cannot determine how long before the end of the first century BCE these lunar calendars began to deviate from the Seleucid, Macedonian or Babylonian calendars, the disparity between the calendars of the cities and kingdoms in this region (even between close neighbours such as Ascalon and Gaza, as we shall presently see) make it evident that these deviations developed when these states were politically independent from one another, i.e. in the period which I call 'post-Seleucid'.

Thus, by the end of the first century BCE, the city of Ascalon was employing a Macedonian, lunar calendar with its first month, Dios, occurring around the

[47] *Pace* Assar (2003) 187 n. 49, who writes: 'The assumption that the shift was caused by an excessive intercalation remains unattested. The Parthians might simply have changed the name of the first month of their calendar at Seleucia from Dios to Hyperberetaios.' This is to ignore that in practice, such a change of name—at the time when it was made—would have necessitated the repetition of Hyperberetaios, which amounts effectively to an intercalation.

[48] Neugebauer and Van Hoesen (1959) 49 (no. 176); Johnson (1932) 1–2, 76. See also Samuel (1972) 142.

time of December.[49] This contrasts with the Seleucid calendar, in which the Macedonian month of Dios (equivalent to the Babylonian Tishrei, month VII) occurred around the time of October, thus two months earlier.[50] The only explanation is that Ascalon had made, at some stage beforehand, two excessive intercalations.[51] But in the calendar of Gaza, its southern neighbour, Dios occurred around the time of November,[52] and was thus discrepant from the Seleucid calendar by only one month; which suggests that only one excessive intercalation had previously been made. Further north along the coast, the calendar of Caesarea seems to have had Dios in November,[53] thus again implying one excessive intercalation. Continuing northwards, the calendar of Tyre had Dios in November or December, thus one or two excessive intercalations.[54] Still further north, the calendar of Antioch had Dios in November, thus one excessive intercalation.[55] The greatest discrepancies appear to have been in the calendars of Heliopolis and Sidon. The calendar of Heliopolis (Baalbek) placed *Thisirin* (Tishrei) at the time of January, considerably later than the Babylonian Tishrei and suggesting that three excessive intercalations had previously been made.[56] In Sidon, the month of Dios occurred in January, suggesting again three excessive intercalations.[57]

[49] This can be inferred from the fact that when the calendar of Ascalon was adapted to the Julian calendar, at about the end of the 1st c. BCE, 1 Dios was fixed at 27 November (Samuel 1972: 177). This is presumably a reflection of the time of the year when the lunar month of Dios generally occurred.

[50] See Table 5.2. As has been shown in Ch. 2, even if it is not proved that the Babylonian calendar still followed in this period the Saros Canon 19-year cycle, it is fairly certain that intercalations were sufficiently regular (i.e. with an even distribution of seven intercalations over any period of 19 years) for the relation between the Babylonian calendar and the seasons (or the solar year) to have remained stable. Indeed, astronomical diaries stretching until the mid-1st c. BCE confirm that throughout the Achaemenid, Seleucid, and early Parthian periods, month I of the Babylonian calendar consistently remained the first lunar month after the vernal equinox (i.e. mostly in April). This means that month VII would have corresponded roughly to October.

[51] Ascalon became independent from the Seleucids in 104 BCE (Schürer 1973–87: ii. 90–1, 106–7); the excessive intercalations would therefore have been made at some point during the 1st c. BCE.

[52] The inference is the same as for Ascalon (see above, n. 49), except that in Gaza, 1 Dios was fixed at 28 October when it was Julianized.

[53] Since in Caesarea, 1 Dios was fixed at 3 November (so according to the reconstruction of Rey-Coquais 1978, which, however, remains uncertain; see below, n. 142).

[54] In Tyre, 1 Dios was fixed at 18 November (Samuel 1972: 176). See further below, after n. 141.

[55] In Antioch, Dios of the Julianized calendar was assimilated to the month of November (this calendar eventually became dominant in late Roman Syria; ibid. 174). The excessive intercalation which this implies would have been made after 47 BCE, when the calendar of Antioch appears to have still conformed to the Seleucid equation of Macedonian and Babylonian calendars, with Dios occurring around October (see above, n. 27).

[56] In Heliopolis, where Babylonian month-names were exceptionally used, 1 Tishrei was fixed at 23 December (ibid. 176); see below and Table 5.7.

[57] In Sidon, Dios of the Julianized calendar was assimilated to the month of January: ibid. 174. Sidon was independent from the Seleucid Empire since 111 BCE (Schürer 1973–87: ii. 90–1), so that the three excessive intercalations would have been made during the following one hundred

In Asia Minor, it is more difficult to identify discrepancies of this kind, because most calendars had month-names that are unidentifiable with Macedonian or Babylonian months. In Lycia, however, where Macedonian month-names were used, the discrepancy between the local and Seleucid calendar may have been as much as three months, with Dios occurring in the month of January, which would suggest again that three excessive intercalations had been made.[58]

In this light, it cannot be assumed that the Seleucid Macedonian and Babylonian calendars with their rigid 19-year cycle of intercalations were consistently observed in any post-Seleucid state, even if there is evidence, in some years, of calendrical conformity. Thus in 8 BCE, when a new calendar was instituted in the Roman province of Asia, the month of Peritios—in those cities of the province that used Macedonian month-names—began on 10 January (see below, §3), a date which is compatible with the Seleucid Macedonian–Babylonian calendar; however, this does not prove that these cities were dependent on this calendar or followed it consistently. In 8 BCE, indeed, the Seleucid kingdom was no longer in existence, and the province of Asia (on the western coast of Asia Minor) is unlikely to have had any contacts with distant Babylonia; unless the cities of Asia were committed to the perpetuation of the 19-year cycle—for which there is no positive evidence—compatibility to the Seleucid, Macedonian-Babylonian calendar in 8 BCE could have been purely fortuitous.

Similarly, the calendar of Judaea shows conformity to the Babylonian calendar in the years 130 BCE, 37 CE, and 66 CE;[59] but continuous conformity to the Babylonian calendar cannot necessarily be extrapolated from these three dates. In 130 BCE, when Judaea had only recently become independent from the Seleucid Empire and the Hasmonaean ethnarch, John Hyrcanus, was still campaigning alongside Antiochus VII Sidetes against the Parthians in Adiabene—whilst the Seleucid king himself had only lost Babylonia to the Parthians some eleven years earlier—it is natural to expect that both Judaean and Seleucid rulers still followed the Babylonian cycle of intercalations. But in the first century CE, compatibility of the Judaean calendar to the Babylonian

years. In the case of Sidon, however, the evidence is not completely conclusive, as it is possible that the calendar was arranged to make the Macedonian New Year (1 Dios) coincide with the Julian New Year in January, without any indication of when (lunar) Dios occurred at the point when the calendar was Julianized.

58 As in Sidon, Dios of the Julianized calendar of Lycia was assimilated to January (ibid.). Lycia was independent from the Seleucid Empire already in 139/8 BCE (Schürer 1973–87: i. 194–5 and n. 16, iii(1). 4 n. 2, based on 1 Macc. 15: 22–3), which could explain how a large, three-month discrepancy from the Seleucid-Babylonian calendar had built up by the end of the 1st c. BCE. However, the same reservations as with Sidon apply here (see previous n.).

59 With the first month of the year beginning on or after the vernal equinox: see evidence and discussion in Stern (2001) 55–7, 61–2, 114–15, 121–2.

calendar in 37 and 66 CE could have been only fortuitous, since Judaea had little to do with Parthian Babylonia in this period, and the Seleucid kingdom was long extinct; the 19-year cycle, moreover, does not appear in Jewish sources before the eighth century CE.[60]

The same may be argued with regard to Nabataea when the kingdom became a Roman province (the province of Arabia) in 106 CE, and when the local lunar calendar—with Babylonian month-names—appears to have been in line with the Babylonian calendar:[61] the extent to which conformity to the Babylonian 19-year cycle was consistently or deliberately observed until then in Nabataea is impossible to know. In Macedonia of the second–third centuries CE, the local Macedonian calendar—which had remained lunar until this period—seems also to have conformed to the Seleucid Macedonian and Babylonian calendars;[62] but it cannot be assumed that Macedonia had been continuously and deliberately following the Babylonian 19-year cycle, when its political connection to distant Babylonia hardly outlasted Alexander's reign (which ended in 323 BCE), and when—by the second-third centuries CE—the Seleucid Empire had long ceased to exist.

Intercalation in post-Seleucid states

As we have demonstrated, in the Parthian kingdom and many other post-Seleucid kingdoms and cities of Asia Minor and the Near East, the calendar sometimes deviated by several months from the Seleucid Macedonian and Babylonian calendars. These deviations cannot be attributed to ignorance or error, for it should have been very easy for post-Seleucid states to follow the fixed, Babylonian 19-year cycle of intercalations, and to correct themselves in the unlikely event that errors were made. These deviations were clearly the result of deliberate decisions by the post-Seleucid states, in a political context of independence from the Seleucid Empire and consequent freedom to divert from its official imperial calendar (Bickerman 1968: 25). Indeed, deviation from the Seleucid calendar may have been intended as a positive statement of political independence from Babylonia and (whatever was left of) the Seleucid Empire.[63] This is implicit at least in Hasmonaean Judaea, as the books of 1 and

[60] Ibid. 196–7. The 19-year cycle is mentioned earlier in the Slavonic Enoch (16: 5–8), but the date and provenance of this passage is very unclear (Stern 2001: 9–10). On the compatibility of the Judaean calendar with the Babylonian in 37 and 66 CE, see further below, n. 67.

[61] The Nabataean (lunar) Nisan began in 106 CE shortly after the vernal equinox, in line with the Babylonian calendar: see discussion below, near the end of §3.

[62] e.g. with Xandikos around the time of March (corresponding to the last month of the Babylonian year), or Hyperbertaios equated with September. See Ch. 6 n. 8.

[63] This explanation applies less to the city of Antioch, which did not ever become 'independent' from the Seleucid Empire but rather remained one of its capitals until the fall of the Empire in 65–62 BCE.

2 Maccabees, although written in Greek, insist on using only Babylonian month-names (transliterated into Greek); this usage, consistent with the general anti-Hellenistic stance of these works, shows perhaps an intent to distinguish the Judaean calendar from that of the Seleucids.[64]

Significantly, all the discrepancies we have noted above—from Parthia to Asia Minor—were the result of *excessive* intercalation, with for example the month of Dios occurring later than in or around October. In no calendar do we find Dios occurring before the time of October, which would have been the result of deficient intercalation. This confirms, firstly, the deliberate character of post-Seleucid deviation from the Seleucid calendar: for had it been random, we should have found as many cases of deficient as of excessive intercalations. Secondly, if—as I suggest—deviation from the Seleucid calendar represented a statement of political independence, then we can understand that this purpose would have been better served by the addition of an intercalary month—which is more conspicuous, hence more politically effective—than by the omission of an intercalation.

Excessive intercalation may also have been the result of internal political processes. In the post-Seleucid city states, for example, civic magistrates may have sought at times to extend their term of office by adding an intercalary month to the year. In taking such liberties with the calendar, they would have been drawing on the Greek (or now, 'Hellenistic') tradition of tampering with calendars, which has been studied above in Chapter 1. It seems plausible that the general tendency in Greek calendars, when tampered with by politicians, was to intercalate rather than to suppress.[65] This tendency may explain why only excessive intercalations are attested in post-Seleucid calendars, but not the reverse.

Besides purely political motivations, a range of other social factors may have led to post-Seleucid deviation from the Seleucid, Babylonian cycle of intercalations. In some cases, the motivation may have been religious. The absence of any reference to an intercalary Elul in contemporary and later Jewish sources suggests that in Judaea, perhaps as early as the Hasmonaean period, the Babylonian practice of intercalating sometimes a second Elul (Ululu, month VI_2—in the Saros Canon cycle, once every 19 years) was abandoned.[66]

[64] Stern (2001) 28 n. 127. Note that in 2 Macc. 15: 36 the month-name 'Adar' is explicitly qualified as 'Syriac', i.e. Aramaic and non-Greek (ibid. 30 n. 133). More recently I have suggested, however, that the authors of 1 and 2 Maccabees might simply have been following the literary tradition of the Septuagint (Stern 2010*a*: 108 and n. 18).

[65] Tampering in Greek calendars seems usually to have taken the form of intercalation (of either months or days), which only subsequently would be rectified through the suppression of months or days—but not the reverse. The evidence, however, is not entirely conclusive: see discussion in Ch. 1 n. 24.

[66] The Babylonian Talmud frequently cites a saying that since the days of Ezra the month of Elul had never been intercalated: *bRosh Ha-Shanah* 19b, 32a, *bBetzah* 6a, 22b. This has been interpreted by some modern scholars as a reference to the Babylonian practice of intercalating a

This may have been to ensure that the biblical seventh month, in which major festivals were celebrated, should always correspond to the month of Tishrei (if an intercalary Elul had been inserted, Tishrei would have become the eighth month: Stern 2001: 165–6). It is also possible that intercalations in Judaea deviated sometimes from the Babylonian calendar because they were now governed, in accordance with biblical law, by the requirement that Passover in the first month be celebrated in the agricultural season of *ʾaviv*, the ripeness of the crops—a requirement which might have conflicted sometimes with the Babylonian practice of beginning the year after the vernal equinox.[67]

Finally, some post-Seleucid discrepancies from the Seleucid Macedonian and Babylonian calendars may have resulted from purely calendrical considerations. If, as discussed above, the Macedonian year generally began in the autumn, preference may have been given in post-Seleucid states for intercalations at the end of the year in the autumn, unlike the Babylonian calendar (which the Seleucids followed) where most intercalations were made in the spring.[68]

The new equation of Macedonian and Babylonian month-names

As we have seen, a single excessive intercalation in the Parthian kingdom in or before the mid-first century BCE had the effect of shifting by one month the Seleucid equation between Macedonian and Babylonian month-names. Thus Babylonian month I (Nisan), previously equated with (or translated as) Artemisios, became Xandikos, month VI (Elul), previously Hyperberetaios, became Gorpiaios, month VII (Tishrei), previously Dios, became Hyperberetaios, and month XII (Adar), previously Xandikos, became Dystros (see

second Elul, which according to this saying, had never been followed by the Jews since the days of Ezra in the Persian period (Wacholder and Weisberg 1971: 238). However, the medieval interpretation of this Talmudic saying, that the month of Elul had never been full (i.e. of 30 days), seems to me more plausible: Stern (2001) 165–6.

67 Exodus 12: 2 , 13: 4, 23: 15, 34: 18; Deut. 16: 1; see Stern (2001) 52–3. But whilst this is historically possible, there is actually no evidence that on this account the Jewish first month occurred sometimes one month earlier (*pace* Bickerman 1968: 25–6, whose statement is only based on the much later rabbinic calendar): on the contrary, as we have seen above, there is evidence that in some years at least, the Judaean calendar remained in line with the Babylonian calendar. See discussion in Stern (2001) 30–1, 61–2, with a further suggestion that in the Herodian and early Roman periods the intercalation of a second Adar may have sometimes been used to postpone Passover by one month and thus enable pilgrims to reach Jerusalem on time for the festival; this may have had the indirect (and unintended) effect of realigning the Judaean calendar with the Babylonian.

68 This would account, e.g., for the six-month interval between the Pontic and Babylonian intercalations in 88 and 87 BCE respectively (see above, near n. 40). Chris Bennett (pers. comm.) suggests that this may also have led to post-Seleucid Macedonian adaptations of the Babylonian 19-year cycle with a permanent one-month discrepancy from the Babylonian calendar.

above, table 5.2). This would explain why the Parthian intercalary months, in coins and in inscriptions, were now called Gorpiaios and Dystros *embolimos*.

In the Parthian context, this new equation seems to have been never more than implicit; but it soon became explicit in other regions of the Near East, where it rapidly spread in the first century CE and eventually became standard in late Antiquity. It is explicitly attested in bilingual Graeco-Palmyrene inscriptions, first in 17 CE (by which time Palmyra was no longer ruled by Parthians, but part of the Roman Empire: Millar 1993: 34–5), Gorpiaios being correlated with Elul; the correlation of Dystros and Adar, and Xandikos and Nisan, is then attested in inscriptions from 84 and 83 CE respectively; and subsequently in numerous Graeco-Palmyrene inscriptions until as late at the third century.[69]

The new equation is assumed and frequently expressed by Josephus in his *Antiquities*, written towards the end of the first century CE.[70] We then have early second-century CE documents from the Judaean Desert dated according to the calendar of the Roman province of Arabia (established in 106 CE), which as we shall later see, was a Nabataean Macedonian calendar adapted to the Julian. In one bilingual document dated 132 CE Panemos and Gorpiaios in the Greek section are rendered as Tammuz and (as reconstructed by the editors) Elul in the Aramaic (Yadin 1989: no. 27); and in a Greek-only document of 125 CE Hyperberetaios is equated with the transliterated *Thesrei* (i.e. Tishrei: ibid. no. 15), all in conformity with the new equation.

In the late Roman period, the mostly Babylonian month-names of the Syrian calendar were equated as a matter of course with the Macedonian

[69] Samuel (1972) 179, for a few examples. By the third c., at the very latest, the 'Babylonian' calendar of Palmyra is likely to have become adapted to the Julian calendar, although the evidence remains inconclusive (see discussion in Ch. 6 n. 6).

[70] For a full list of references to Babylonian–Macedonian equations in the *Antiquities*, which are also implicit in a number of passages of Josephus' *Jewish War*, see Stern (2001) 36–7 and (2010*a*) 108 n. 19. In some passages, month numbers (a designation which may be construed as 'biblical') are also supplied: e.g. 2nd month = Marsouanes (i.e. Marḥeshwan) = Dios, and 1st month = Nisan = Xanthikos (*Antiquities* 1. 3. 3 (80–1)). The equation of Tebethos (i.e. Tebet) and Apellaios in *Antiquities* 11. 5. 4 (148), which corresponds neither to the Seleucid nor to the post-Seleucid scheme, is presumably erroneous: instead of Tebethos, the text should probably read Khaseleu (i.e. Kislew), which is equated elsewhere with Apellaios: ibid. 12. 5. 4 (248), 7. 6 (319). Of particular interest is the equation of Ab = Loos = (Athenian) Hekatombaion (ibid. 4. 4. 7 (84); on the textual problems of this passage see Stern 2010*a*: 109 n. 22), which suggests that equivalences, if only perhaps approximate, could also be drawn between the Macedonian and Athenian calendars. Similar equations are provided much later by Epiphanius (late 4th c.), with reference to the date of birth of Jesus as ('Syrian or Greek') 6 Audynaios = (Athenian) 5 Maimakterion = ('Hebrew') 5 Tebet (*Panarion* 51. 24. 1), and to the date of his baptism at the Jordan 29 years later as (Macedonian) 16 Apellaios = (Athenian) 7 Metageitnion = (Hebrew) 7 Marḥeshwan (ibid. §§4–5; Williams 1987–94: ii. 55). But these three equations of Macedonian, 'Hebrew', and Athenian months are mutually inconsistent, which suggests that for the Athenian calendar—probably still quite irregular until late in Antiquity (see Ch. 1)—no consistent scheme of equivalences existed.

Table 5.3. The Syrian-Antiochene calendar

Syrian	Antiochene	Julian
Tishrei I	Hyperberetaios	October
Tishrei II	Dios	November
Kanun I	Apellaios	December
Kanun II	Audnaios	January
Shebat	Peritios	February
Adar	Dystros	March
Nisan	Xanthikos	April
Iyar	Artemisios	May
Ḥaziran	Daisios	June
Tammuz	Panemos	July
Ab	Loos	August
Elul	Gorpaios	September

Note: all months are exactly conterminous.

month-names of the calendar of Antioch (itself equivalent, by then, to the Julian calendar) in accordance with the new equation, as is well attested in literary and other sources (see Table 5.3). In this case, however, some elements of the old equation survived. A distinctive feature of the Syrian calendar is that some of its month-names are doubled up: Tishrei I and II, Kanun I and II. This feature is quite unusual (although it was later imitated in the Muslim calendar), as previously and elsewhere, the practice of doubling month-names was restricted to intercalary months. What seems to have happened is that after Hyperberetaios was realigned with Tishrei (and hence became Tishrei I), Dios retained nevertheless its old equation with Tishrei (hence Tishrei II). A similar phenomenon could have occurred to Kanun: the alignment of Kanun with different Macedonian months could have given rise to the two Kanuns in the Syrian calendar.[71]

The post-Seleucid one-month shift in the equation of Macedonian and Babylonian month-names, which seems to have become established as standard by the first century CE, has generally been attributed by modern scholars to the decision of a first-century BCE Parthian king.[72] But as has been pointed

[71] This month-name is not Babylonian, but it is attested in the calendar of Palmyra, where it is equated with Dios (Samuel 1972: 179), and in the calendar of Heliopolis (Baalbek), where it appears in third position after Tishrei (ibid. 176). One of the earliest attestations of Tishrei I is in a Syriac inscription from Serrin (on the Euphrates) dated 73 CE (Healey 2009: 226–8 no. 47).

[72] Johnson (1932) 11; Bickerman (1968) 25; Samuel (1972) 143; Assar (2003) 183. Samuel (loc. cit.) suggests, as a possible alternative, a late Seleucid king; however, this would run counter to the apparent conformity of the Antiochene calendar to the Babylonian calendar in 47 BCE, still after the fall of the Seleucid Empire (see above, n. 27). According to Assar, the new equation was instituted in Parthia in the mid-1st-c. BCE (in his view, more precisely in 48 BCE), but in 67 CE the old system was reinstated. This is based on a series of coins from 77/8 and 78/9 CE that seem to attest a year beginning in the month of Dios (see above, near n. 11). The evidence is tenuous, and

out, this would not explain why the new equation became accepted—and indeed, explicitly formulated—outside the Parthian kingdom, in post-Seleucid states that became part of the Roman Empire.[73]

The Parthian kingdom, however, was not the only post-Seleucid state where the relation between Macedonian and Babylonian months was altered. As we have seen, changes of this kind were particularly common in the city states of the Near Eastern Mediterranean coast, where, as in the Parthian kingdom, the Macedonian calendar was used alone without much regard for the Babylonian calendar, and where excessive intercalation commonly caused it to deviate from the latter. The shift in the equation of Macedonian and Babylonian months was therefore not a punctual or local historical event, but rather the cumulative effect of several post-Seleucid states over-intercalating their Macedonian calendars. This general tendency eventually led, by the first century CE, to a perception that the relationship between the Macedonian and Babylonian calendars had changed, and hence to a readjustment of the standard equivalence between Macedonian and Babylonian months.

This change would only have been noticeable—indeed, would only have mattered—in contexts where both calendars needed to be used: for example in the bilingual Graeco-Palmyrene inscriptions, where the new equation is attested explicitly for the first time. Josephus, writing in Greek about Hebrew- or Aramaic-speaking Judaean Jews, needed to translate Babylonian into Macedonian month-names. The calendar of the province of Arabia was created by translating, somewhat artificially, the local Nabataean Babylonian month-names into Greek Macedonian equivalents. The same translation process seems to have occurred, in reverse, when the Syrian calendar was assimilated to the Antiochene Macedonian model. It appears therefore that the new equation functioned, above all, as a conventional way of translating dates from Aramaic to Greek or the reverse.

This new translation scheme would not necessarily have suited all calendars in the Near East. In Ascalon, for example, where two excessive intercalations had apparently been made by the end of the first century BCE, the local month of Dios would have been more appropriately translated as Kislew than (according to the new equation) as Marḥeshwan. We do not know how in practice Ascalon would have translated its own months into Babylonian equivalents, if ever this had been needed. But since the new equation, following general trends in the post-Seleucid Near East, had established itself as standard, it is quite likely to have been used, whenever necessary, in Ascalon too.

anyway, a change in the New Year does not necessarily mean that the equation between Macedonian and Babylonian month-names was redefined.

[73] Bickerman loc. cit.

In short, the shift in the equation of Macedonian and Babylonian month-names was not the result of a single, centralized political decision (e.g. by a Parthian king), but rather the effect of a general tendency, in most post-Seleucid cities and kingdoms of the Near East, to over-intercalate the Macedonian calendar—typically, but not always, by one month—whereas the less commonly used Babylonian calendar had apparently remained stable. The new equation did not necessarily represent a calendrical reality, as a number of post-Seleucid calendars (e.g. Ascalon) did not quite conform to it. It was rather a standard, conventional translation that suited better the realities of the post-Seleucid world.

Calendar diversity

The most important effect of over-intercalation in the post-Seleucid period, arguably more important than the new Macedonian–Babylonian equation, was calendar diversity. The proliferation of independent calendars in Asia Minor and the Near East was a major departure from the Seleucid period, when a single official calendar had been in use. The resulting diversity was to remain a characteristic of Asian and Near Eastern calendars even in the Roman period, when these calendars became adapted in various ways to the Julian calendar. Calendar diversity was a reflection of the political fragmentation of the post-Seleucid world, but as we shall now see, it survived in the Roman Near East until the end of Antiquity.

3. THE JULIAN CALENDAR IN THE EAST

After Pompey's campaigns in the East in the 60s BCE, most of Asia Minor and part of the Near East were brought under Roman rule; Egypt was annexed in 30 BCE, and the Roman Empire went on expanding into the Near East until the end of the second century CE (Millar 1993). One of the many indices of the Romanization in the Near East was the introduction and spread of the Julian calendar, which had been instituted in Rome—perhaps not entirely by chance—soon after Pompey's conquests.[74] One by one, the calendars of Asia Minor and the Near East—until then, mostly lunar and based on the Macedonian or Babylonian calendars—converted and became adapted to the Julian scheme. This calendar change signaled the political, administrative, and

[74] On the possible connection between the institution of the Julian calendar in 46 BCE and the expansion of the Roman Empire, see above Ch. 4. 3.

perhaps also cultural integration of the eastern cities and provinces into the Roman Empire.

But the adoption of the Julian calendar in Asia Minor and the Near East was neither homogeneous nor straightforward. In most cases, the month-names and several other features of the local calendars were tenaciously retained. Although the calendars became adapted to the Julian, 365-day year (with a leap year every four years), the internal structure of this year—the sequence and length of the months, their dates, the date of the New Year—differed considerably between provinces and cities. This tremendous diversity, and the confusion that it might sometimes have caused, is evident for example in the works of Josephus (late first century CE), where the frequently inconsistent datings are clearly due to the variety of sources, and hence the variety of calendars, that Josephus was using.[75]

The diversity of calendars that emerged in this process in the Roman East is enshrined, most distinctly, in a group of texts known as *hemerologia*. These texts, preserved in early medieval manuscripts, consist of full-length tables with the days of the Julian calendar in one column and the equivalent days in more than a dozen different Roman Eastern calendars in the other columns.[76] The origin of the *hemerologia* is unknown, but they presumably go back to the Roman period when the calendars were still in use (medieval scholars would have had little incentive, and indeed limited resources, to compose them). There is, in fact, late Roman evidence for such *hemerologia*;[77] and a first-

[75] See Schürer (1973–87) i. 596–9, Stern (2001) 34–8. My statement there that 'Macedonian calendars differed far more from each other in the first century [CE] than in the period when they were still lunar, and when the months would have begun, approximately, on the same days' (ibid. 38) is probably incorrect, inasmuch as even when they were still lunar, different patterns of intercalation led to differences of one or several months between the various post-Seleucid calendars, as we have seen above.

[76] The most important manuscripts from Florence, Leiden, and the Vatican, were published in a seminal work by Kubitschek (1915). See Samuel (1972) 171–3, Meimaris (1992) 35–6.

[77] The earlier manuscripts (Florence and Leiden) are dated by Kubitschek (1915) 58–70 to the 9th c., but they are clearly copies of earlier works. The existence and availability of *hemerologia* already in the late Roman period are implicit in Epiphanius' ability in the 370s CE to supply the dates of Jesus' birth and baptism in a wide range of calendars (Egyptian, Syrian, Cypriot, Paphian, Arabian, etc.:*Panarion* 51. 24, Williams 1987–94: ii. 55), for which he (or his source) is likely to have used a *hemerologion* (Kubitschek 1915: 73–5). A number of ancient Greek ephemerides include more than one calendar in separate columns: most common are columns for the Julian and Egyptian calendars (A. Jones 1999*b*: no. 4175, dated 24 BCE); some have a third column for an astronomical lunar calendar (designated as *kata selenen*: ibid. no. 4183; pap. Graec. Vindob. 29730b in A. Jones 1994: 125–6; pap. Mich. inv. 1454 in Curtis and Robbins 1935, dated 467 CE); and from the 5th c. CE and later, a fourth column is sometimes added for a Julian calendar with days of the month counted not in the Roman style but serially from the beginning of the month (pap. Graec. Vindob. 29730 in Gerstinger and Neugebauer 1962, redated to 489 CE by A. Jones 1994: 121–5). It is unclear whether this fourth column should be identified with a civic/provincial calendar such as that of Antioch or Syria (which was modelled on the Julian calendar but with a serial count of days), as suggested by Gerstinger and Neugebauer (see Jones 1999*b*: i. 13); it could simply be an alternative representation of the Julian calendar, which

century CE inscription, recently discovered in Metropolis (Lydia) and palaeographically dated to the reign of Tiberius, comprises a table of Julian calendar days and their equivalent in the calendar of the province of Asia (Engelmann 1999: 142–3), which confirms at least the existence of two-column *hemerologia* in the early Roman period. The marble stone it is inscribed on suggests that it was set up in a public place (ibid.), not only for public use but also perhaps as a monumental, symbolic statement of the harmonious relationship between the institutions of the city (or province) and of the Roman Empire. The *hemerologia* manuscripts, however, which contain many more columns, were probably intended more specifically for scribes and imperial administrators, to help them with the conversion of multiple calendar dates into one another—a task which in the Roman East was often likely to be needed. These handbooks are remarkable not only in the quantity of information they provide (especially as different calendars appear in the different manuscripts), but also in the mere fact that they were produced. They are, in themselves, a powerful testimony of calendar diversity in the Roman East, but at the same time of the integration of these calendars into a fixed and stable common denominator, the 365-day year of the Julian calendar.

The calendars that are listed in the *hemerologia* vary considerably, in spite of sharing the basic structure of the Julian calendar, i.e. a 365-day year (with, implicitly, an additional day every four years).[78] Some are structurally identical with the Julian calendar, in particular the calendars of Antioch (and hence of the province of Syria: see above, Table 5.3), Sidon, and (in Asia Minor) Lycia, which differ from the Julian calendar only in their use of Macedonian month-names and (for Antioch) an autumn New Year. Other calendars use a sequence of months with similar lengths as in the Julian calendar, but beginning the year on 23 September, i.e. Augustus' birthday; the most important of these is the calendar of the province of Asia. Other calendars have a sequence of 30- and 31-day months, but no 28-day month (like the Julian month of February): these are the calendars of Tyre and Heliopolis (Baalbek). Others, finally, are conterminous with the Alexandrian calendar (i.e. the Egyptian civil calendar after its adaptation to the Julian calendar, on which see below),

may have been conventional among astronomers in this period. Earlier scholars have associated the use of multiple calendars in ancient ephemerides with the *hemerologia* (Gerstinger and Neugebauer loc. cit., Samuel 1972: 171–3); however, the calendars used in ephemerides are not quite the same as in *hemerologia* (in particular the astronomical lunar calendar, and possibly also the serial Julian calendar). Ephemerides and *hemerologia* are different literary genres serving very different purposes, and I would not necessarily assume any dependency between the two.

[78] See, with tabulations, Samuel (1972) 174–8 and Bickerman (1968) 50; but the most accurate and comprehensive tabulations remain Kubitschek (1915) 42–53. The additional day (in leap years) and its position in the year are not indicated in the tables, but are implicitly there because otherwise these calendars would not have remained in a stable relationship with the Julian calendar.

namely Gaza and Ascalon, or structurally similar to it, namely Arabia and Cappadocia.

But although the *hemerologia* are one of our most important sources, their value as evidence remains limited in that they do not provide the historical context of the calendars that they list. Moderns scholars have generally assumed that the calendars of the *hemerologia* were used in real life in their respective cities and provinces, and lasted without change throughout the Roman period, from the arrival of the Romans until the end of Antiquity (e.g., implicitly, Samuel 1972). But whilst this can be verified in a few cases—the Alexandrian calendar, for example, which is well attested in epigraphic, documentary, and literary sources, from its inception in the first century BCE until the late Roman period (see e.g. Hagedorn and Worp 1994) and indeed until the present day, in the Coptic and Ethiopian churches—we cannot make this assumption for all the calendars in the *hemerologia*. By their very nature, the *hemerologia* are likely to simplify, schematize, and ossify a historical reality that one expects to have been far more complex, flexible, and open to change.

Little is known, furthermore, about when, how, and why the calendars of Asia Minor and the Near East converted from a lunar Seleucid to solar Julian schemes, and why they did so in so many different ways. The *hemerologia* are uninformative; but some answers to these questions can be inferred from a remarkable group of inscriptions that relate to the institution of the calendar of the province of Asia, and date it firmly to the last decade of the first century BCE. As we shall see, these inscriptions suggest that cities and provinces of the Roman East adapted their calendars to the Julian calendar for mainly *political* reasons, i.e. to express allegiance to the Roman Empire. However, their reluctance to switch to the Julian calendar in its pure form and the retention of local calendrical traditions expressed, simultaneously, a calculated measure of political independence and patriotic particularism. The mixed and ambiguous political allegiances of the cities and provinces of the Roman East explains why their calendars were only partially adapted to the Julian calendar, and why in the Roman period they remained so diverse.

The adaptation to the Julian calendar may have been motivated also by other reasons, in particular, administrative efficiency. The adoption of a fixed, 365-day year (with regular leap years) stabilized the relationship of local to Julian calendars on a permanent basis, which greatly facilitated the conversion of dates from one calendar to the other. This would have been to the benefit of the imperial and civic administration, as well as more generally to commerce and legal transactions. Interestingly, however, this benefit is not mentioned in ancient sources such as the province of Asia inscriptions. It also does not account for the diversity of calendars in the Roman East: administrative efficiency would have demanded, indeed, that all provinces and cities adopt an identical calendar. Contrary to modern expectations, ancient calendars were not driven by utilitarian advantages, but rather by political loyalties.

The process of adaptation to the Julian calendar was rapid in the Roman East, but not immediate. It seems generally not to have been resisted or to have been cause for political dissent and conflict, but some resistance and delay may be suspected in some cases (Alexandria and Egypt, as we shall presently see), and in some cases the calendars simply did not adapt, but instead remained lunar until the end of Antiquity (especially in the Greek peninsula, Macedonia and the lower Danube, and in Jewish and Samaritan communities—see Chapter 6). The first calendars to adapt to the Julian were those that were structurally similar to it: most importantly the civil Egyptian calendar, which only needed to add the leap year (i.e. one additional day every four years) in order to conform to the Julian scheme (likewise the calendars of Cappadocia and Cyprus). But the adaptation and conversion of the lunar Babylonian and Macedonian calendars in Asia Minor and the Near East was far more radical and, probably for that reason, delayed: we know at least that it is not before 8 BCE that the calendar of the province of Asia was instituted.[79] The province of Asia inscriptions suggest that this radical calendar change might never have happened without the strong-handed initiative 'from above' of a Roman governor, the proconsul of Asia. The adaptation to the Julian calendar was thus not automatic or immediate, but dependent on the nature of the local calendars as well as on local political circumstances.

Nevertheless, the fairly consistent pattern of Julian adaptation throughout the Roman East, and more specifically, the intervention of the Roman governor in 8 BCE, bring out quite clearly that these calendar changes, in spite of their diversity, were a direct result of Roman imperial rule.[80] In broader terms, they were also part of the general, macro-historical pattern of calendar fixation in the great empires of later Antiquity.

The Alexandrian calendar

'Alexandrian' designates, in the *hemerologia*, the Egyptian civil calendar after its adaptation to the Julian. Although it was not the first to adapt to the Julian calendar –as I shall argue, the calendars of Cappadocia and Cyprus came

[79] We do not know when the other calendars of Asia Minor and the Near Eastern coast were Julianized, but a similar, late-1st-c. BCE date seems reasonable. The calendar of the province of Arabia appears to have been instituted immediately at the time of the province's annexation in 106 CE; by then, the principle of adapting lunar calendars to the Julian had become well established in the Near East, which explains how it could have been implemented immediately.

[80] As Bickerman (1968) 48 implies, though perhaps too categorically: 'the imperial government introduced the solar year [i.e. Julian calendar] slowly and, as it seems, in agreement with the local authorities'. For a different view, see Feeney (2007) 209–10 and my comments in Ch. 4 n. 196.

first—I shall begin with the Alexandrian calendar because its origins are better documented and known.

The Egyptian civil calendar of twelve 30-day months and five epagomenal days (see Chapter 3) was adapted to the Julian calendar by adding a sixth epagomenal day every four years. This adaptation was made in the 20s BCE (more on this below), and seems to have become standard in Egypt through the rest of Antiquity.[81] It may be assumed that it was similarly adopted in other regions where the Egyptian calendar was used, in particular, Libya Cyrenaica.[82]

The exact date of the institution of the Alexandrian calendar—which, in practical terms, would have been when the first leap year was observed in Egypt—has been subject in modern scholarship to considerable uncertainty. This question has depended, in turn, on whether the Alexandrian calendar adopted from the outset the structure of true Julian calendar, or whether it followed the calendar that was reckoned in practice in Rome in this period (see Chapter 4. 3). The uncertainty of how the Roman calendar was reckoned in this period has compounded the confusion. The difficulty, above all, has been for scholars to reconcile the various Roman and Egyptian dates that are attested in contemporary documents and literary sources into a single, consistent model. A detailed review of earlier scholarship, of the evidence, and of it various interpretations, would be excessively complex and unnecessary here. For our purposes, it is sufficient to present the general conclusions.[83]

Earlier scholars (Snyder 1943, followed by Skeat 1993: 1–4) favoured the view that the Alexandrian calendar, when instituted, followed the Roman calendar as it was reckoned at the time in practice—which seems, a priori, the most plausible scenario. When the Julian calendar was first instituted, leap years were erroneously inserted every three years (instead of four: see Chapter 4. 3); until this error was corrected (towards the end of the first century BCE), the Alexandrian calendar would have done the same, adding a sixth epagomenal day every three years, in the year preceding a (Roman) 29 February. According to this model, the Alexandrian calendar would have been instituted in or soon after 30 BCE, the year when Egypt became a Roman province—which again seems historically most plausible.

In more recent years, however, analysis of the documentary evidence has led scholars to the view—now virtually a consensus—that the Alexandrian

[81] Although in late Antiquity the unreformed, Egyptian civil calendar continued to be reckoned and used in specific contexts (e.g. astronomical: see Jones 1999*b*), the Alexandrian calendar was very clearly the norm (Hagedorn and Worp 1994).

[82] I made this assumption in my analysis of the Berenike inscriptions in Stern (2001) 58–61, although there is no firm evidence to prove it.

[83] For a summary of the scholarship, see Chris Bennett's article in <http://www.tyndalehouse.com/Egypt/ptolemies/chron/egyptian/chron_lnk_augustus.htm> and more briefly in Bennett (2003).

calendar followed from the outset the structure of true Julian calendar, with leap years every four years.[84] This pushes the date of the institution of the calendar to later in the 20s BCE. Within this consensus, Chris Bennett (2003) (2007) has proposed a model of the Alexandrian and Roman calendars that reconciles all the documentary evidence, and that should therefore be preferred—at least on the basis of the evidence that is currently extant. According to this model, the Alexandrian calendar began, in practical terms, in 22 BCE when the first leap year was observed (see Table 5.4).[85]

This model entails that the institution of the Alexandrian calendar did not immediately follow the annexation of Egypt in 30 BCE, and that the three leap years that were made in the Roman calendar in 29, 26, and 23 BCE had no effect or influence on the Egyptian calendar. The limited influence of the Roman calendar is evident, furthermore, in that the Alexandrian calendar was instituted with leap years every four years, whereas the Romans in this period were making them every three. This suggests that the institutors of the Alexandrian calendar had no intention, at least at the time, of conforming to the Roman calendar and stabilizing their calendar in relation to the latter. This point, often overlooked, is surprising and demands an explanation, because it appears to defeat the whole purpose of the Egyptian calendar reform.

It seems fairly clear that the institutors of the Alexandrian calendar were driven, in first instance, by a concern for scientific accuracy. As has been noted in Chapter 3, for some centuries already the Egyptians had known that conformity of the civil calendar to the solar year would require the intercalation of one day every four years: this principle was stated (though not successfully implemented) in the decree of Canopus of 238 BCE.[86] In Chapter 4 we have seen that Julius Caesar drew on Alexandrian tradition and expertise for the design of his new calendar, and that his original intention had almost certainly been to insert a leap year every four years—even though, in practice, his successors misunderstood this and inserted it every three. It was thus probably known in Egypt that the Roman three-year interval was a mistake. The decision to institute a leap year every four years in the Alexandrian calendar was probably intended as a correction of the Roman mistake and a

[84] Hagedorn (1994), A. Jones (2000*b*), Bennett (2003), (2004*a*). Most important is the evidence of pap. Vindob. L. 1c and P. Oxyrhynchus LXI 4175 (an astronomical source relating to the year 24 BCE with Egyptian and Roman datings, on which see mainly Jones, loc. cit.).

[85] In earlier publications, Bennett (2003), (2004*a*: 168) inferred from SB 18. 13849 that the first Alexandrian leap year was possibly in 24 BCE, which would entail an interruption of the four-year cycle of leap years between 12 and 6 BCE with a six-year interval instead (which is historically difficult to explain). But this inference has been convincingly refuted by Bennett (2007); the first Alexandrian leap year was therefore in 22 BCE, and the four-year cycle was followed thereafter without interruption

[86] Hannah (2005) 113 notes that the average year length of 365¼ days might also have been known already as the foundation of Callippus' cycle, which was designed in Athens in the 4th c. BCE (Geminus, *Elem. Astr.* 8. 50–60: see Ch. 1 n. 89).

Table 5.4. The Egyptian calendar in the Augustan period (after Bennett 2003; 2007)

Year	Egyptian leap years[a]	Roman leap years[b]	1 Thoth[c] (Roman dates)	Julian leap years	1 Thoth (Julian dates)
45 BCE			5/9	45	3/9
44		44	4/9		3/9
43			4/9		3/9
42			4/9		3/9
41		41	3/9	41	2/9
40			3/9		2/9
39			3/9		2/9
38		38	2/9		2/9
37			2/9	37	1/9
36			2/9		1/9
35		35	1/9		1/9
34			1/9		1/9
33			1/9	33	31/8
32		32	31/8		31/8
31			31/8		31/8
30			31/8		31/8
29		29	30/8	29	30/8
28			30/8		30/8
27			30/8		30/8
26		26	29/8		30/8
25			29/8	25	29/8
24			29/8		29/8
23		23	28/8		29/8
22	22		29/8		30/8
21			29/8	21	29/8
20		20	28/8		29/8
19			28/8		29/8
18	18		29/8		30/8
17		17	28/8	17	29/8
16			28/8		29/8
15			28/8		29/8
14	14	14	28/8		30/8
13			28/8	13	29/8
12			28/8		29/8
11		11	27/8		29/8
10	10		28/8		30/8
9			28/8	9	29/8
8		8 BCE	27/8		29/8
7			27/8		29/8
6	6		28/8		30/8
5			28/8	5	29/8
4			28/8		29/8
3			28/8		29/8
2	2 BCE		29/8		30/8
1 BCE			29/8	1 BCE	29/8
1 CE			29/8		29/8
2			29/8		29/8

3	3 CE		30/8		30/8
4		4 CE[d]	29/8	4	29/8
5			29/8		29/8
6			29/8		29/8
7	7		30/8		30/8
8		8	29/8	8	29/8

[a] Years from January to December during which, late in August, a sixth epagomenal day was added at the end of the Egyptian year.
[b] 'Roman' designates the calendar that was actually used in this period by Romans. 'Julian calendar' (in the last two columns of this table) designates a theoretical, backward projection of the Julian calendar, a convenient chronological time-scale used by historians and scientists for dating ancient events, even those from long before Julius Caesar's calendar reform (see Jones 2000: 159 n. 1). Inclusion of this time-scale in this table helps us to plot the development of the Roman and Egyptian calendars in this period.
[c] 1 Thoth (or I Akhet 1) is the Egyptian New Year, immediately after the epagomenal days (see Chapter 3). In this column, the dates before 22 BCE refer to the Egyptian civil calendar, which has no leap year and drifts from the solar year (or the theoretical Julian calendar) by one day every four years. From 22 BCE onwards, the dates refer to the reformed, Alexandrian calendar. Dates in this column are given in the form of day/month.
[d] From 4 CE onwards, leap years occur every four years, in conformity with the Julian calendar (and as in the fifth column of the table).

reinstatement of the Julian calendar in what the Egyptians knew to be its authentic, accurate form.

However, if the primary motivation of the calendar reform was to synchronize the Egyptian calendar with the Roman, this scholarly correction would have been misplaced: no matter how inaccurate, leap years needed to be made every three years, at the same time as at Rome. Why synchronization with the Roman calendar was ignored demands an explanation that goes beyond the concern for purely scientific accuracy.

The political context of the calendar reform needs at this point to be considered. A question that is rarely asked, although quite fundamental, is who instituted the Alexandrian calendar. Elsewhere in the Roman East, it is usually assumed that the adaptation of local calendars to the Julian year was carried out by local political authorities, i.e. the city councils or provincial leagues of cities (although evidence for the province of Asia, which will be examined below, shows that involvement of the Roman governor could also be considerable). But in Egypt, after the end of the Ptolemaic dynasty in 30 BCE, there was no indigenous political authority that could have carried out a reform of the calendar and enforce it across the whole province. The city council of Alexandria would never have wielded such authority over Egypt.[87] The only political authority that could have reformed the calendar for the

[87] The designation of the new calendar as 'Alexandrian' appears to be late, being attested from the 4th c. in Theon's *Commentary on the Almagest*, 908 (Mosshammer 2008: 175) and then in the *hemerologia*, but not in ancient inscriptions (see below, n. 89); it should not be taken as indicative of any specific connection to the city of Alexandria.

whole of Egypt was the effective successor of the Ptolemaic kings, i.e. Augustus, as represented by the Roman prefect of Egypt. Although no edict to this effect has survived, it must be assumed that the Alexandrian calendar was instituted by no other authority than him.

At first sight, this only compounds the problem, because the Roman prefect is most likely to have sought, above any other consideration, synchronization to the Roman calendar. However, it must be assumed that the Roman prefect could not have implemented this calendar reform without local input and co-operation. Although this is only speculative, one can well imagine a conflict developing between the Roman prefect, pressing for reform of the Egyptian calendar and its synchronization to the Roman, the remnants of the Ptolemaic state bureaucracy, perhaps in favour of the same, and the Egyptian priesthoods, resisting any change whatsoever to their millennia-old calendar—just as they had resisted the decree of Canopus in 238 BCE. A complex, drawn-out conflict of this kind might explain why the Alexandrian calendar was not immediately instituted in 30, but rather in the late 20s BCE.[88]

The ultimate decision to intercalate the calendar every four years may be accounted for as a form of compromise between these conflicting parties. From the Roman perspective, the agreement of the Egyptians to insert leap years—albeit at different, incompatible intervals—may have been regarded as a sufficient statement of loyalty to Rome. The Egyptians, for their part, were probably the bigger losers: it remains unclear, indeed, why they succumbed here after having successfully resisted the decree of Canopus under the Ptolemies. But they did not lose face entirely, as the institution of a leap year every four years, and thus the implicit correction of the Roman error, constituted an assertion of Egyptian superiority, in calendar matters, over the Romans. More importantly, by adopting a calendrical practice that resembled that of the Romans, yet differed significantly from it, the Egyptians could declare their allegiance to the Roman Empire whilst at the same time asserting a measure of independence from it—a pattern which, as we shall further see, was characteristic of all calendar reforms in this period in the East.[89]

In the event, the disparity between the Roman and Alexandrian calendars was only to be short-lived: for at the turn of the first century CE, the Roman

[88] The institution of the Alexandrian calendar in the late 20s may have been related also to the realignment of Augustus' regnal years with the Egyptian year, starting from 26 BCE <http://www.tyndalehouse.com/Egypt/ptolemies/chron/egyptian/chron_lnk_augustus.htm>, and also to the change of Roman prefect in 26 BCE (suggestions of Chris Bennett).

[89] Recognition of the Roman imperial character of the Alexandrian calendar is evident in its designation as *κατὰ Καίσαρα* ('according to Caesar'), commonly found in Egyptian inscriptions and papyri with variations, and alongside the alternative *καθ' Ἕλληνας*, 'according to the Greeks'; as opposed to the old calendar, designated 'according to the Egyptians' or 'according to the ancients': for examples see Hagedorn and Worp 1994, esp. 245; A. Jones 1999*b*: i. 12; Lippert (2009) 186–7.

error was corrected by the emperor Augustus with leap years at four-year intervals (see Chapter 4. 3 and Table 5.4). It is not impossible that the Alexandrian calendar played a decisive part in this process: just as Julius Caesar had drawn on Egyptian expertise when instituting his calendar, Augustus may have taken (or rediscovered) the four-year interval from the Alexandrian calendar.[90] If so, Augustus' intervention should be regarded as the final stage in the dialectical interface between Roman and Egyptian calendars which had begun under Julius Caesar, and which eventually led to their stabilization and permanent alignment.

Cappadocia

The first calendar in the Roman East to adapt to the Julian calendar was not the Egyptian, however, but probably the Cappadocian. In Chapter 4 we have seen that the Cappadocian calendar was originally none other but the Persian Zoroastrian calendar, itself a derivation of the Egyptian calendar, which would have been introduced in Cappadocia as an official imperial calendar under Persian Achaemenid rule. The Persian origins of the Cappadocian calendar are evident from its Avestan month-names as well as from its structure which, according to the *hemerologia*, consisted still in the Roman period of twelve 30-day months and five epagomenal days. Its adaptation to the Julian calendar would have involved, as with the Alexandrian calendar, the addition of a sixth epagomenal day in Julian leap years.

According to the *hemerologia*, the Cappadocian New Year (i.e. the day following the epagomenal days) corresponded in the Roman period to 12 December, a date that appears rather arbitrary and in need of explanation. As stated above, the *hemerologia* are problematic as evidence because they do not necessarily represent the calendars at the time of their original adaptation to the Julian calendar. But if we assume, as is perhaps not unreasonable, that the New Year on 12 December does go back to when the leap year was first instituted (rather than representing some later development in the Cappadocian calendar), this date must presumably have been the New Year of the *old*

[90] Dependence on the Alexandrian calendar may also explain why Julian leap years were resumed by Augustus in 4 CE—thus establishing a pattern that has remained unchanged until today—which is out of sequence from 8 BCE, whether in a sequence of four-year intervals (4 BCE, 1 CE, 5, 9) or three-year intervals (5, 2 BCE, 2 CE, 5, 8) (assuming Bennett's model; see Table 5.4, and Ch. 4 n. 162). It is possible that Augustus deliberately set the Julian leap year as closely as possible to that of the Alexandrian calendar (which occurred in 3 CE), so as to minimize the period of one-day shift between the calendars (between the Alexandrian sixth epagomenal day on 29 August 3 CE and the Julian bissextile day of 25 February 4 CE, the relationship between the two calendars is shifted by one day, with 1 Thoth on 30 August instead of 29 August; see Table 5.4).

calendar at the time when it was adapted to the Julian year. This should help us to determine when the Cappadocian calendar was Julianized. The Persian Zoroastrian New Year is known to have coincided with (Julian) 12 December in 65–62 BCE; but although this is precisely when Cappadocia became a Roman client kingdom following Pompey's campaigns in the East, this cannot be when the Cappadocian calendar was Julianized, since in this period the Julian calendar had not yet been instituted.[91] By the time the Julian calendar was instituted, in 46 BCE, the Cappadocian (or Persian Zoroastrian) New Year had receded to 9 December; in subsequent years, it would have continued receding.[92] We cannot find, therefore, a suitable year for the adaptation of the Cappadocian to the Julian calendar with 12 December as its New Year.

Nevertheless, it may be possible to explain this New Year date on the assumption that the Cappadocian calendar was adapted to the Julian calendar almost as soon as the latter was instituted. A sixth epagomenal day would have been added in the first Julian leap year, i.e. in December 44 BCE (see Table 5.4), so that the Cappadocian New Year remained at 9 December during the years 44–42 BCE. From this point onwards, the relationship with the Roman/Julian calendar would have remained the same (with the New Year on 9 December), as a sixth epagomenal day was added in every Roman leap year, which in this period occurred every three years. But then, when Augustus reformed the Julian calendar and suspended all leap years between 8 BCE and 4 CE, the Cappadocians would have continued intercalating every three years, thus adding a sixth epagomenal day in 5, 2 BCE, and 2 CE. This may have been a mistake, or a deliberate show of independence vis-à-vis Augustus.[93] In any event, these extra leap years retarded the Cappadocian calendar by three days (in relation to the Roman calendar), so that by 2 CE, the New Year fell on 12 December. In 4 CE, when Roman leap years were reinstated, the Cappadocians followed suit and returned to adding a sixth epagomenal day each time a Roman leap year occurred, from now onwards every four years. In this way, the Cappadocian calendar became permanently synchronized to the Julian calendar with the New Year on 12 December. This suggested scenario is of course conjectural, but a plausible explanation of the Cappadocian New Year.

A scenario such as this would imply that the Cappadocians were the first to adapt to the Julian calendar, even though Cappadocia in this period was only a client kingdom of Rome. When the Julian calendar was instituted, Ariobarzanes III was in the last years of his reign. He had been installed as king of Cappadocia by Pompey *c.*62 BCE, and sided with Pompey during the Roman

[91] The suggestion that already then the Cappadocians might have adjusted their calendar to the solar year of 365¼ days is anachronistic, as noted already by Kubitschek (1915) 102.

[92] In 44–42 BCE it would have been 8 December, etc. I am assuming the Persian Zoroastrian calendar as expounded by de Blois (1996), for which see Ch. 4. 1, and the Roman calendar as actually reckoned in this period, set out in Table 5.4.

[93] Cappadocia was then ruled by the strong-minded Archelaus I (36 BCE–18 CE).

civil wars. In 48 BCE, after Pompey's defeat, Ariobarzanes was able to make peace with Julius Caesar. The adaptation to the Julian calendar, which I suggest took place in 44 BCE, may have been a rather original attempt by Ariobarzanes to find favour with Caesar.[94] But unwittingly, this set a trend that was soon to spread to all the Roman provinces of Asia Minor and the Near East.

Salamis and other Cypriot calendars

As we have seen in Chapter 4, the Egyptian civil calendar was originally adopted in Cyprus during the period of Ptolemaic rule, and in this period, there is no reason to doubt that it was reckoned in exactly the same way as in Egypt. But in late Antiquity, sporadic evidence reveals that the Egyptian calendar in Cyprus had undergone significant changes.[95] From dates supplied by Epiphanius (bishop of Salamis in the late fourth century) and Alexander of Cyprus (mid-sixth century, also from Salamis), it can be inferred that the calendar of Salamis, the main city of eastern Cyprus, had retained Egyptian month-names and the structure of twelve 30-day months and five epagomenal days, although it was now adapted to the Julian calendar (presumably, again, with a sixth epagomenal day in leap years). However, two Egyptian month-names had been suppressed from the sequence, probably to make space for two new names at the end of the year, one of which was possibly named 'Rhomaios' in honour of Rome (as some epigraphic evidence suggests: see Table 5.5 and Stern 2010*a*). Furthermore, the New Year in Salamis occurred on 4 September, whereas in the Alexandrian calendar it was 29 August—thus a six-day difference between the two calendars.

Although the literary evidence is late (fourth–sixth centuries), the calendar of Salamis is far less likely to have undergone these changes in late Antiquity than during the political upheavals of the mid-first century BCE, when Cyprus was detached from Ptolemaic rule and annexed to Rome. Earlier scholars have argued, indeed, that the New Year of 4 September indicates that the calendar was instituted in the late 40s BCE, because the New Year of the Egyptian civil calendar (1 Thoth), which until then was used in Cyprus, corresponded to Roman 4 September in 44–42 BCE; this date could have become fixed through the addition of a sixth epagomenal day in 41 BCE and subsequently in all

[94] Unfortunately, by December 44 BCE Julius Caesar had already been assassinated; Ariobarzanes was killed not long after by Cassius. See Sullivan (1980), (1990) 174–85.

[95] For a detailed study of the calendar of Salamis, which is presented here in summary, see Stern (2010*a*), updating and revising Jerphanion (1932). The main sources of evidence are Epiphanius, *Panarion* 51. 24 (Williams 1987–94: ii. 55) and Alexander of Cyprus, *Laudatio Barnabae* ll. 846–50 (Van Deun 1993: 120). Unfortunately, this calendar is not attested in the *hemerologia*.

Table 5.5. The calendar months of Salamis (after Stern 2010*a*)

	Alexandrian calendar	Calendar of Salamis
I	Thoth	Thoth or Phaophi
II	Phaophi	Phaophi or Hathyr
III	Hathyr	Choiach
IV	Choiach	Tybi
V	Tybi	Mechir or Phamenoth
VI	Mechir	Phamenoth or Pharmuthi
VII	Phamenoth	Pharmuthi or Pachons
VIII	Pharmuthi	Pachons or Payni
IX	Pachons	Payni or Epiphi
X	Payni	Mesore
XI	Epiphi	?
XII	Mesore	Rhomaios?
	Epagomenal days	Epagomenal days

Note: all months are 30 days long, but the months of Salamis are not conterminous with the Alexandrian (the year begins on 29 August at Alexandria, on 4 September at Salamis).

Roman leap years.[96] On historical grounds, however, this specific dating is implausible, as it is reasonably well established that in the mid- and later 40s BCE, Cyprus belonged to the Ptolemaic kingdom.[97] In this period, Salamis would have had no reason to adapt its calendar to that of the Romans; quite on the contrary, it had every reason to maintain the Egyptian civil calendar of its Ptolemaic rulers.[98] It is far more likely, instead, that the calendar of Salamis was adapted after 30 BCE, when Cyprus became part of the Roman Empire and was, moreover, administratively detached from the now Roman province of Egypt.[99] The adaptation of the Egyptian calendar of Cyprus, or more specifically of Salamis, to the Julian year is better dated, therefore, to the early 20s BCE (elsewhere I have suggested how the New Year of 4 September might be reconciled with this slightly later dating, assuming a first leap year in 26 BCE

96 See Table 5.4. This argument was put forward by Jerphanion (1932, followed by Bickerman 1968: 48, Samuel 1972: 184–6), although assuming a different model for the Julian calendar in this period which led them to the conclusion that the calendar of Salamis was adapted to the Julian calendar as early as 46 BCE.

97 Cyprus had been annexed by Rome in 58, but was later ceded to Cleopatra, probably by Julius Caesar *c.*48 BCE. The Ptolemaic possession was later confirmed by Antonius in 40 or the early 30s. This lasted until the end of the Ptolemaic dynasty in 30 BCE. See Hill (1949) 211, 230, Schürer (1973–87) i. 288–9 n. 5, Bagnall (1976) 1, Mitford (1980) 1290–4.

98 Jerphanion (1932) 22–4 is aware of this difficulty, and attempts somehow to address it; but for some reason Bickerman (1968) 48 and Samuel (1972) 184–6 ignore it completely.

99 The imperial administrative status of Cyprus in the 20s BCE is moot (Mitford 1980: 1295), but it was clearly never associated with the Roman province of Egypt. By 27 BCE it was an imperial province, perhaps in combination with Cilicia (as it seems to have been in the 50s BCE); by 22 BCE, it was an independent senatorial province (Hill 1949: 230).

and subsequently in all Roman leap years: Stern 2010*a*: 113–14 n. 51). It is then that some Egyptian months would have been suppressed from the calendar to make space for new months, named in honour of the new world rulers.

It comes as no surprise that the calendar of Salamis may thus have preceded by some years the institution, in Egypt, of the Alexandrian calendar (in 22 BCE). In Cyprus, the Egyptian calendar would not have been viewed as a native or long-standing tradition, and its reform is unlikely to have met with any resistance. The adjustments that were made to the Egyptian calendar in Salamis were relatively minor, but it did not take long for more radical calendar changes to be made in other parts of Cyprus. A decade or so after the institution of the Salamis calendar, a completely different calendar was instituted elsewhere in Cyprus that abandoned all Egyptian features and conformed almost entirely to the Julian calendar. This 'Cypriot' calendar, attested only in a medieval manuscript, renamed all its months in honour of Rome and members of Augustus' family—in such a way as to enable us to date this calendar to around 15 BCE—but in all other respects was modelled entirely on the Julian calendar.[100] A further calendar was instituted in the last decade of the first century BCE, and is attested in first-century CE western Cypriot inscriptions as well as later in the *hemerologia* as the calendar 'of Cyprus' and in other late antique sources (e.g. Epiphanius) as the calendar 'of Paphos' (the main city of western Cyprus). This calendar also followed the sequence of Julian month-lengths, but with its first month (Aphrodisios) beginning on 23 September, Augustus' birthday.[101]

A New Year on Augustus' birthday—distinct from the Julian New Year of 1 January, yet at the same time expressing loyalty to Augustus and Rome—was not unique to Cyprus, and may have been instituted first in the province of Asia, as we shall now see. This introduces us to the far more radical calendar changes that occurred towards the end of the first century BCE when flexible lunar calendars were converted into fixed solar Julian schemes.

[100] Cod. Paris 2420 (fos. 205a–209b): Boll (1900) 139–40, Laffi (1967) 43–6, Samuel (1972) 183–4. A puzzling feature of this calendar is that its months appear to begin on the second day of the Julian months (hence a consistent one-day discrepancy from the Julian calendar). Laffi (1967) 44 and n. 57 convincingly explains this as the result of confusion arising from the common practice of naming the first day of 31-day months *Sebaste* and to begin the count of days from the second day (as 'day 1'). Less plausible is Samuel's suggestion (1972: 183 n. 2) that the Cypriot day began in the evening, and that as the first of the month began on 1 October in the evening, its daylight hours occurred on 2 October (if the day began in the evening, would one expect the first month to have begun in the evening *preceding* 1 October).

[101] This calendar will be discussed in detail below, together with the calendar of the province of Asia. The assumption of Mitford (1961) 117–18) and Samuel (loc. cit.) that this calendar replaced *ab initio* the earlier 'Cypriot' calendar (of *c.*15 BCE) is perhaps unjustified.

The calendar of the province of Asia

Among the lunar calendars of Asia Minor and the Near East that adapted to the Julian calendar in the early Roman period, the calendar later known as 'Asian' was perhaps the first. The decree that led to its institution, datable to the last decade of the first century BCE, has been uniquely preserved, and in more than one copy. The most complete version is in an inscription from the city of Priene (hence sometimes referred to, misleadingly, as the 'decree of Priene'), but other fragments have been found in inscriptions from Apameia, Eumeneia, Dorylaion, Metropolis, and the smaller settlement of Maeonia.[102] The same calendar, with the same Macedonian month-names, is also listed in the *hemerologia* as 'Ephesian' (Florence MS) or 'Asian-Pamphylian' (Vatican MS).[103] Epigraphic evidence confirms that the decree was widely diffused in the Roman province of Asia—as required by the text of the decree[104]—and that its calendar became the official calendar of the province throughout the Roman period.[105]

The inscriptions consist of an edict of the proconsul (Roman governor of the province of Asia), partly in Latin and in Greek, followed by a decree of the *koinon* (association, confederation) of the cities of the province of Asia, in Greek. In his edict, the proconsul puts forward the proposal—which, as Sherk rightly remarks, was to be read as a virtual directive[106]—that special honours

[102] Laffi (1967) with original texts, composite texts, and commentary; Sherk (1969) 328–37 (no. 65) with a composite text and commentary. For summaries, see Samuel (1972) 181–2 and, including a partial English translation, Hannah (2005) 131–5. The Metropolis fragment is a more recent discovery, and helps to correct some of Laffi's textual conjectures (Dreyer and Engelmann 2006: 175–82; reference courtesy of Simon Price).

[103] Kubitschek (1915), Samuel (1972) 175 n. 2. Minor differences between the manuscripts will be discussed below. Although the calendar, with its Macedonian month-names, is designated 'Ephesian' in the Florence manuscript, epigraphic sources from Ephesus attest the survival there of local month-names (e.g. Anthesterion, in *IBM* iii. 481 = *I. Ephesos* ii. 27, cited in Laffi 1967: 76, dated 104 CE; see Samuel 1972: 123–4, 176, Stern 2001: 43 and n. 176). Bickerman (1968) 48 wrongly infers from the survival of these local names that the calendar had remained lunar; in structure, it was in fact identical with the calendar of the province of Asia.

[104] Priene inscription, ll. 62–7: Laffi (1967) 21–3, 83–5, in Doc. VI; Sherk (1969) 332, D62–7.

[105] The calendar of the Roman province of Asia , as laid out in this decree, is well attested early on in the region of Lydia, in the cities of Nysa, dating from 1 BCE (*CIG* 2943) and Philadelphia, 40 CE (*IGR* iv. 1615)—both in Kubitschek (1915) 92–3, Laffi (1967) 75–6—also in Metropolis (early 1st c. CE: Engelmann 1999: 142–3), and later in Ephesus (104 CE: above, n. 103). It is still attested in late Antiquity in an anonymous Paschal homily of 387 CE (Floëri and Nautin 1957) and in an inscription from Sardis of 459 CE (*CIG* 3467 = *Inscr. Sardis* 18 = *AE* 2000: 1380: see Laffi 1967: 78 and Stern 2001: 43, refuting the suggestion of Samuel 1972: 132–3 and Bickerman 1968: 48 that the calendar of Sardis was still lunar). The calendar also spread beyond the province of Asia, as we shall later see.

[106] Sherk (1969) 334. The proconsul's letter refers to itself as a διάταγμα (Laffi 1967: 20, Doc. IV l. 30), which translates the Latin *edictum* and implies therefore something quite authoritarian; the tone of the letter itself, however, is considerably milder and makes it read more like a recommendation (ll. 35–6); see below, after n. 120. It may have been normal for Roman

be given to the emperor Augustus by reforming the calendar of the province in such a way that the New Year occur on 23 September, the birthday of Augustus.[107] In the Latin appendix, the proconsul also lays out the lengths of the months of the new calendar.[108]

The decree that follows, issued by the *koinon*, expresses an enthusiastic endorsement of this proposal. The New Year is to occur on 23 September, Augustus' birthday;[109] the first month, moreover, will be renamed *Kaisar* ('Caesar').[110] The months of the year and their lengths are laid out in full as follows: Kaisar 31 days, Apellaios 30, Audnaios 31, Peritios 31, Dystros 28, Xandikos 31, Artemision 30, Daisios 31, Panemos 30, Loos 31, Gorpiaios 31, Hyperberetaios 30 (total: 365 days); every month will begin on the 9th day before the kalends of the Julian month (inclusively counted, e.g. 23 September). In a leap year, an intercalary day will be added to day 1 of Xandikos, which will thus have 32 days.[111] Precise arrangements are made for the transition from the old to the new calendar: the current month of Peritios will run its course until the 14th, which will be 23 January; the next day (i.e. 24 January) will be renamed 1 Dystros of the new calendar.[112]

The year of the decree is not specified. However, the proconsul is named in more than one source as Paulus Fabius Maximus, who is known to have been consul in 11 BCE. He could have become proconsul of Asia any time after that; but the reference, in the *koinon*'s decree, to the leap year occurring after two-year intervals (i.e. every three years)[113] would not make much sense after Augustus' reform of the Julian calendar, when leap years were first suspended (after 8 BCE), and then resumed (in 4 CE) at a frequency of every four years. Furthermore, the *koinon*'s decree states that ἐφ' ἔτος, which translates as 'this year',[114] the month of Xandikos will have 32 days because of the intercalation; this implies that the decree was issued in a leap year.[115] According to the model we have followed above (in Table 5.4), the only leap year after 11 BCE,

governors, in this period, to control or interfere with local calendars, as when the propraetor Verres tampered with the Sicilian calendar in the 70s BCE (see Ch. 1 n. 145).

107 Laffi (1967) 18–20, Docs. I–IV; Sherk (1969) 329–31, Docs. A–C.

108 Latin fragment from Apameia: Laffi Doc. II, Sherk Doc. B4.

109 Priene inscription, ll. 50–2, 54–6.

110 Ibid. ll. 54, 68. This seems to have been an addition to the proconsul's proposal.

111 In this manner, the second day 1 of Xandikos will occur on the 9th before the calends of March: see Samuel (1972) 174–6 and n. 1.

112 Priene inscription, ll. 67–77.

113 Ibid. ll. 76–7; also in Laffi (1967) 21, Doc. V.

114 This translation follows the *Suda* s.v. ἐπέτειον (Adler 1928–38: ii. 340) and other lexical sources: Laffi (1967) 28 and n. 13.

115 Priene inscription, ll. 71–2. Sherk (1969) 335–6 completely ignores the evidence of this phrase, and consequently leaves open the question of the precise date of the decree.

but still before Augustus' reform, would have been 8 BCE; the decree is thus to be dated to this year.[116]

Confirmation of this dating (and hence, of the model assumed in Table 5.4) can be drawn from the fact—generally ignored by earlier scholars—that only 8 BCE fits the dates of the old calendar, which as a Macedonian calendar, was presumably lunar. According to the decree, indeed, 14 Peritios of the old calendar occurred in that year on 23 January; thus the (old) month of Peritios began on 10 January. Only in 8 BCE was the Roman date of 10 January close to the new moon: the conjunction occurred on that day (in the evening), and the new moon crescent would have been visible two days later, in the evening.[117]

The sequence of months laid down in the *koinon*'s decree differs from what the proconsul had originally proposed. The fragmentary passage from the Latin section (or version) of the proconsul's edict indicates that the last four months of the year, according to him, should have followed the sequence of 30–31–30–31 (days);[118] whereas according to the *koinon*'s decree, the sequence of the last four months was 30–31–31–30 (see above). There is no need to assume a scribal (or other) error.[119] At most, the scheme of the proconsul was not well thought out; and this would justify the *koinon*'s decision to modify it. For the month-lengths proposed by the *koinon*—unlike those of the proconsul—had the distinctive advantage of corresponding exactly to those of the Julian calendar (from October to September), with the result that all Asian months began on the same day of the Roman, Julian month (the 9th before the kalends: see above).

[116] Bennett (2003) 226–7. It is unlikely that the decree dates from 5 BCE, which the *koinon* would have taken to be a leap year because they were unaware of Augustus' reform; see Bennett in <http://www.tyndalehouse.com/egypt/ptolemies/chron/roman/008bc_fr.htm>, and Hannah (2005) 131–5. Mommsen (cited in Sherk 336), followed by other scholars (Magie 1950: 480–1, Laffi 1967: 27–34, Jones 2000*b*: 159 n. 3), preferred the date of 9 BCE, but only on the assumption that 9 BCE was the Roman leap year, which according to Table 5.4 we should no longer accept; this date, moreover, is completely incompatible with the lunar date of the older calendar (see next n.). Samuel (1972) 182 n. 1 is unnecessarily cautious.

[117] This follows the assumption that the Roman date of 10 January, in 8 BCE, was equivalent to 11 January of the theoretical, retrojected Julian calendar: see above, Table 5.4 and Bennett (2004*a*) 167. (In 5 BCE, the Roman date of 10 January (then equivalent to Julian 12 January) was also fairly close to the new moon, as the new crescent would have been first visible two evenings earlier.) The year 9 BCE can be firmly ruled out, as it would entail a discrepancy from the moon of well over ten days. The lack of an exact correspondence, in 8 BCE, with first visibility of the new moon should not be regarded as problematic: it only demonstrates that post-Seleucid calendars were not as astronomically exact as the Babylonian calendar. But it is interesting to note the assumption, implicit in the *koinon*'s decree, that all the cities of the province of Asia reckoned the lunar month in the same way (for a similar assumption in the *koinon* of Macedonia, see Ch. 6 n. 8).

[118] Laffi (1967) 19 and 86 (Doc. II). The text translates as: '9th 30, 10th 31, 11th 30, 12th 31; an intercalary (day) will be added . . .'. It is unclear to which month the intercalary was to be added.

[119] As Mommsen (followed by Laffi 1967: 19, 48) unnecessarily conjectured with regard to the text of the proconsul's edict (see Sherk 1969: 333).

By modifying the proconsul's scheme and improving its synchronization to the Julian calendar, the *koinon* were paradoxically asserting on the one hand their commitment to conform to the calendar of Rome, and on the other hand, their autonomy with regard to the proconsul's authority. The *koinon*'s decree represents, in this respect, another manifestation of the complex (albeit unequal) political relationship between provincial cities and the Roman Empire. This complex relationship is also evident in the proconsul's letter, which blends the authoritarian status of an 'edict' with the conciliatory tone of a recommendation.[120]

But these small concessions to provincial autonomy should not obscure the fact that the institution of the calendar of Asia was, fundamentally, an act of submission to the imperial rulers. It is clear from the contents, tone, and emphasis of both the proconsul's edict and the *koinon*'s decree that the main and perhaps sole purpose of this calendar reform was for the province to demonstrate its loyalty to the emperor Augustus. Indeed, the only calendar change that the proconsul proposed in the Greek version of his edict was the institution of the New Year on Augustus' birthday. Although this necessitated, by implication, the conversion of the lunar calendar to a 365-day year (otherwise, the New Year could not have remained permanently on 23 September), conversion of the calendar was only a technical and incidental aspect of the decree's implementation, which is why the proconsul did not bother to mention it explicitly. A list of month-lengths does appear in the Latin text of his edict, but its mediocre design (which we have noted above) betrays his lack of attention to technical, calendrical details. The point of the proconsul's edict was only that the province should observe Augustus' birthday as a New Year's day.

The motivation for this calendar reform, on both sides, was thus essentially political. The political gains that both the proconsul and the province stood to make in the process were, indeed, potentially considerable.[121] Significantly, and in contrast, neither the proconsul nor the *koinon* referred in their decree to the practical, administrative advantages of synchronizing the calendar of Asia to the Roman calendar. That this argument was ignored may appear surprising, because it should have been evident that synchronization of the calendars would have greatly facilitated the local administration of the province as well as its wider integration into the Roman Empire. This omission has much to teach us about how calendars were perceived in ancient society; it also calls us to revise the common modern assumption that calendar reforms were motivated in Antiquity by arguments such as administrative convenience or

[120] See above, n. 106.

[121] Magie (1950) i. 480–1, followed by Samuel (1972) 182 n. 5, refer to the decree of the *koinon* as 'flattery', but we need not assume that this expression of political loyalty was excessive or even insincere (see Sherk 1969: 336–7).

efficiency. In the context of this decree, at least, the proconsul and the *koinon* did not perceive the calendar as an administrative instrument, as we would tend to look at it today, but rather only a statement of political loyalty.

The timing of this decree is also highly significant. Above we have seen that the calendars of Cyprus and Egypt became adapted to the Julian calendar soon after the Roman annexation of these provinces; but the calendar of Asia was instituted much later, in spite of the fact that the province of Asia had existed for a very long time (*de facto* since about 129 BCE) and could in theory have adopted the Julian calendar as soon as the latter was instituted in 46 BCE. This delay may be attributed, at least in part, to the inherent difficulty of converting a lunar calendar into a solar, 365-day fixed scheme; but that this happened in 8 BCE has a particular significance. At the time of decree, indeed, Augustus was about to suspend leap years—even if the *koinon* of Asia, as noted above, appears not to have been yet aware of this—and the month Sextilis, in the Julian calendar, was about to be renamed 'Augustus'.[122] Calendar reform was clearly in the air. It is likely that the proconsul of Asia, on whose directive the decree of the calendar of Asia was issued, did not act on a purely spontaneous initiative. At the very least, the calendar change he was proposing—largely honorific, as was to be the renaming of the month of August in the Julian calendar—reflected the current policies and ambitions of the emperor in Rome. This sheds light on how the imperial authorities, both central and in the provinces, could have been responsible, directly or indirectly, for the spread of the Julian calendar (or adaptations of it) in the eastern provinces of the Roman Empire.

The diffusion of the calendar of Asia

The calendar of Asia soon spread beyond the Roman province of Asia. The same calendar structure is attributed, in the *hemerologia*, to the neighbouring provinces of Bithynia, Pamphylia (on the southern seaboard of Asia Minor), and further, to Crete and Cyprus; there is also some epigraphic and literary evidence.[123] We have no date for the institution of these calendars; however, it has been argued that the calendar of Cyprus (similar to or identical with that known elsewhere as 'of Paphos', as opposed to the eastern Cypriot calendar of Salamis; see above) was instituted around the same time as the calendar of

[122] See Ch. 4 nn. 161–2. It is also perhaps at this time that a new birthday date for Augustus was instituted in the Alexandrian calendar (27 Thoth): Bennett (2007) 197–8.

[123] There is epigraphic evidence for Bithynia (dating from 92 CE: Kubitschek 1915: 97) and Cyprus (Mitford 1961: 117–18), and for the latter, also late antique literary sources (the same as for the calendar of Salamis; above, n. 95) as well as a medieval *menologion* (Samuel 1972: 183–4).

Asia, between 12 and 2 BCE.[124] The observance of Augustus' birthday as a New Year certainly suggests that these calendars were instituted during the time of Augustus' reign.

According to the *hemerologia*, these calendars share in common a New Year on about 23 September and a 365-day year, but they have different month-names and some minor, structural differences, some of their months beginning on different days (see Table 5.6).[125] The scheme laid down in the Priene inscription is only identically matched, in the *hemerologia*, by the calendars 'of Ephesus' (distinct from the calendar 'of Asia'; Florence MS) and 'of Asia' (Leiden MS). But in a few other calendars even the New Year date differs, with 24 September (in the calendar of Asia, Florence MS) and 22 September (calendar of Cyprus, Vatican MS). At first sight, these deviant New Year dates might be attributed to scribal error, on the grounds that the whole point of these calendars must have been to start the year on Augustus' birthday, which was on 23 September.[126] But on closer inspection, as I shall now argue, these variations are more likely to reflect a historical reality; they suggest that the Asian calendar was not uniformly reckoned in cities and provinces of the Roman East.

Differences between Asian and Asian-type calendars in the *hemerologia* cannot be simply dismissed, indeed, as scribal errors in the manuscripts. Scribal errors are evident where the figures are internally inconsistent; examples of inconsistency can be found in all the manuscripts, particularly in the Asia-Pamphylia column of Vatican MS[127] The New Year of 22 September (Cyprus, Vatican MS) does not involve any such inconsistency, but may still be explained as a scribal error on the basis that day 1 of this month is duplicated (on 22 and 23 September); although duplication of day 1 is common in the *hemerologia*, it may be possible to conjecture that the first of these two days (22 September) is an error and should read '31' (of the previous month), and hence, that the year really begins on 23 September.[128] But where the figures are internally consistent, and where day 1 of the month is not

[124] This is based on one of the months' being named Archiereus (or Archierios), an apparent reference to Augustus' appointment as *pontifex maximus* in 12 BCE, and the lack of any month-name referring to the title of *pater patriae* which Augustus assumed in 2 BCE (Samuel loc. cit.); but this argument is obviously not watertight.

[125] On these variations see Kubitschek (1915) 91–6, Laffi (1967) 71–5. Samuel (1972) 175 ignores these variations and misleadingly reduces all the Asian-type calendars to a single set of dates. The account in Grumel (1958) 170–1 is also unclear.

[126] So Laffi (1967) 73 n. 134, although he concedes in conclusion that variation within the Asian calendars cannot be entirely excluded. On the date of Augustus' birthday, see below, n. 136).

[127] See e.g. Table 5.6 n. *h*.

[128] If so, the previous month would have to become a 31-day month; the original reading for its last day would have been ΛΑ, later corrupted into Α. Most 31-day months in the Cyprus calendar of the Vatican MS are counted with a duplicate day 1, and therefore end on day 30; but a day 31 is attested on 23/5, so it would not be impossible here on 22/9.

Table 5.6. The calendar of Asia and its variants according to the *hemerologia*

Ephesus (Florence MS) = Asia (Leiden MS) [a]	Asia (Florence MS)	Asia-Pamphylia (Vatican MS)	Bithynia (Florence, Vatican MSS)	Bithynia (Leiden MS)	Cyprus (Florence MS)	Cyprus (Vatican MS)	Crete (Florence MS)	Crete (Vatican MS)
23/9	**24/9**	23/9	23/9	23/9	23/9	**22/9**	23/9	23/9
24/10	24/10	24/10	24/10	24/10	24/10	**23/10**	24/10	**23/10**
23/11	23/11 or **24/11**[b]	23/11[c]	23/11	23/11	23/11	23/11	23/11	23/11
24/12	24/12	24/12	24/12	24/12	24/12	**23/12**	24/12	24/12
24/1	24/1	24/1	24/1	24/1	24/1	24/1	24/1	24/1
21/2	21/2	21/2	21/2	21/2	21/2	21/2	21/2	21/2
24/3	24/3	24/3	**23/3**	**23/3**	**23/3**	**23/3**	24/3	**23/3**
23/4	23/4	23/4[d]	23/4	23/4	23/4	23/4	23/4	23/4
24/5	24/5	24/5	24/5	**23/5**	24/5	24/5	24/5	24/5
23/6	23/6	23/6[e]	23/6	23/6	23/6	23/6	23/6	23/6
24/7	24/7	**23/7**	24/7	24/7	24/7	**23/7**[f]	24/7	**23/7**
24/8[g]	24/8	24/8[h]	**23/8**[i]	**23/8**[j]	**23/8**	**23/8**	**23/8**	**23/8**

[a] This calendar is identical with that of the Priene inscription.

[b] On 23/11 the text reads προτ’ (for προτριακάς, i.e. the penultimate day of the month; see Ch. 1 n .68), but this must be an error, since 21/11 is already προτ’, and 22/11 is 30 (of month Tiberion), whilst 24/11 is 1 (of month Apatourion). Clearly, the correct entry for 23/11 must be either 31 Tiberion or 1 Apatourion (if the latter, 1 Apatourion would be duplicated on 23/11 and 24/11; duplication of day 1 is common in the calendars of the *hemerologia*). Internal evidence supports the latter, because in the ‘Asia’ column of the Florence MS there is no ‘day 31’ (instead, all 31-day months duplicate day 1 of the month and end on day 30), and moreover, all other Asian-type calendars in the *hemerologia* begin this month on 23/11, as this table shows. However, a month beginning on 24/11 is attested in the calendar inscription of Metropolis (located south of Smyrna, firmly within the province of Asia: Engelmann 1999: 142–3), with months beginning on 24/9 and 24/10 (just as in this column of the Florence manuscript), followed by 24/11. In this light, the date of this month must be left uncertain.

[c] In this month, 20/11 is 3 (in backward count, i.e. 3rd day from the end of the month; see Ch. 1 n. 67), 21/11 is at once προτ’ and 1 (which does not make sense: προτριακάς is the penultimate or 2nd day from the end of the month, and 1, presumably also in backward count, is the last day), 22/11 and 23/11 are both *Sebaste* (i.e. ‘of Augustus’ a common alternative designation of the first day of the month, here duplicated), and 24/11 is 2. In Greek lunar hollow months (i.e. of 29 days) it was not uncommon for προτριακάς to be omitted (and thus for the count of days to jump from backward 3 to 1: ibid. n. 68), but there is no attestation of a day’s being reckoned as both προτριακάς and 1; anyway, the omission of the penultimate day of the month has no place in a Julianized calendar, which has no 29-day months. It is likely, therefore, that 21/11 is προτ’, 22/11 is 1 (of the old month, in backward count), and the next month has only one *Sebaste* day, on 23/11. Kubitschek (1915: 96) rightly remarks that the duplication of *Sebaste* here is suspect (but I see

no reason why he casts similar suspicion on the duplication of *Sebaste* at the beginning of the year in the same column, on 23/9 and 24/9). As will also be evident from the next notes, this column of the Vatican manuscript is particularly corrupt, with a tendency to allocate *προτ*' and 1 to the same day.

[d] Here 21/4 is designated again as both *προτ*' and 1, followed by the name of the next month (Desios), then two blank spaces on 22/4 and 23/4, and then 24/4 as 1. It is safe to assume that the rows have been misaligned, and that really 21/4 is *προτ*', 22/4 is 1 (backward count), and 23/4 is either *Sebaste* or day 1 (duplicate) of the new month. The Sardis inscription of 459 CE (above in this chapter, n.105) also implies that 24/4 was reckoned as 'day 1' (though not necessarily the first day of the month), since it equates *a.d. V Kal. Mai.* (27 April) with 4 Desios (Stern 2001: 43).

[e] In this month, similarly again, 20/6 is 3 (backward count), 21/6 is *προτ*' and 1, 22/6 is *Sebaste*, and 23/6 is 1; presumably, 22/6 should be 1 (backward count), and only 23/6 either *Sebaste* or 1.

[f] In this month (Hestios) day 9 is repeated on 31/7 and 1/8, most probably in error. The occurrence of this repetition at the end of July and beginning of August (thus on separate pages, since the *hemerologia* are structured according to the Julian calendar) suggests a simple dittography. We may therefore assume that the numbering of days from 23/7 to 31/7 is correct, and from 1/8 to 22/8 erroneous by one day, but without effect on the beginning date of the months.

[g] The Leiden MS is blank; however, this must be the first day of month Basileos (with duplication of day 1), since 23/8 is 31 and 25/8 is 1.

[h] The text reads 31 (following 23/8 that is 30), but this must be a scribal error for '1', since 25/8 is 2.

[i] In the Vatican MS the entry for 23/8 is unnumbered (whilst 22/8 is 30 and 24/8 is 1), but the name of the new month (Demetrios) is inscribed at this point, suggesting as in the Florence MS that this is when the month begins (with duplication of day 1).

[j] Same as in the Vatican MS (previous n.).

Notes: All dates represent the first day of the month. Deviations from the scheme of the Priene inscription (i.e. from the calendar of the first column) are indicated in bold.

Sources: This table is based entirely on the transcriptions of Kubitschek (1915: 42–53), but a fresh study of the *hemerologia* manuscripts would be desirable. The three main manuscripts are Leiden Graec. 78, Vatican Graec. 1291, and Florence cod. Mediceus Laurentianus plut. XXVIII 26. Another Florence manuscript, Med. Laur. plut. XXVIII 12, is identified by Kubitschek as a later copy of the Leiden manuscript; he therefore uses it to supplement the latter where it is lacking (especially for the month of January).

duplicated, scribal error cannot be invoked so easily.[129] The New Year of 24 September in the Asia column of the Florence MS shows no signs of error, as the previous day (23 September) is consistently counted here as day 30 of the previous month (Laodikon).[130] If this New Year date is not a scribal error, the same just as well can be assumed for date of 22 September (in Cyprus, Vatican MS).

The possibility of error may be apparent where calendars of the same name (Asia, Bithynia, Cyprus, Crete) differ from one *hemerologion* to the next: for example, in the Florence MS the calendar of Asia has the incongruous New Year of 24 September, but in the other manuscripts, the New Year of Asia is 23 September; similarly, in the Vatican MS the Cypriot New Year is 22 September, but in the Florence MS it is 23. Inconsistencies such as these arise, no doubt, from the *hemerologia* being distinct literary compositions, laid out in different ways and with calendars of not exactly the same cities and provinces; the *hemerologia* may have been redacted in different periods and places, by authors of variable competence and knowledge, and on the basis of variously reliable sources. But this does not necessarily mean that inconsistencies between calendars of the same name are the result of error. It is quite possible that the *hemerologia* are referring, under the same name, to slightly different calendars that were used in different parts of the same province or in different periods. Indeed, the Florence MS tells us explicitly that the calendar of Asia was not the same throughout the province, as it distinguishes between the calendars of Ephesus and 'Asia', the former identical with a calendar called 'of Asia' in the Leiden MS, and the latter with a New Year on 24 September and identifiable, on the basis of its non-Macedonian month-names, as the calendar of the city of Smyrna (Samuel 1972: 175 n. 1). The inconsistent New Year dates of the calendar of 'Cyprus' in the Vatican and Florence MSS could also reflect different practices in either different cities of the island or in different historical periods.[131] Indeed, some of the month-names of the

[129] This applies in particular to the following variations (in bold in Table 5.6), where day 1 is not duplicated: the Vatican MS Asia 23/7, Cyprus 23/7 and 23/8, Bithynia and Crete 23/3; The Leiden MS Bithynia 23/3 and Cyprus 23/8.

[130] In the present text, Laodikon is a 31-day month that begins with a double day 1 and terminates on day 30. If we consider day 30 on 23/9 as a scribal error, and substitute the New Year (1 Kaisarion) on this date, then Laodikon becomes a 30-day month beginning with a double day 1 and ending on day 29 (on 22/9), which is unparalleled and makes little sense. We would have to assume that the whole month of Laodikon is erroneously numbered, and amend it in such a way that it has only one day 1 and that it ends on day 30; it is unlikely, however, that the entire day-count of Laodikon is erroneous.

[131] The dates of the calendar of Paphos (western Cyprus) of 16 Apogonikos = 8 November and 14 Ioulios = 6 January, in Epiphanius (*Panarion* 51. 24, Williams 1987–94: ii. 55), imply a New Year on 23 September and a month beginning on 24 December, as in the Florence MS; but this does not necessarily mean that the 'Cypriot' dates of 22 September and 23 December in the Vatican MS are errors.

calendar of 'Cyprus' differ in the Vatican and Florence MSS, suggesting that these in fact might be different calendars.[132]

Calendar diversity within the province of Asia in the early first century CE is supported, furthermore, by epigraphic evidence. An inscription from the city of Philadelphia, dating from 40 CE, implies a New Year on 23 September, conforming to the provincial decree of 8 BCE; whereas an inscription from Metropolis, dated palaeographically to the reign of Tiberius (14–37 CE), assumes a New Year on 24 September, as in the calendar of 'Asia' of the Florence MS.[133] Although this New Year date of 24 September could go back to the original institution of the calendar in Metropolis in 8 BCE,[134] it seems more likely that deviations from the standard New Year date of 23 September, Augustus' birthday, developed after Augustus' death in 14 CE, when celebrations of his birthday began to lose importance and to wane.[135] Shifts of the New Year to 24 September in Metropolis (and possibly other cities of Asia), and perhaps also to 22 September in some parts of Cyprus, are thus quite likely to have begun in Tiberius' reign.[136]

The epigraphic evidence from first-century CE Asia, to which may be added further epigraphic deviations from the decree of Priene and the *hemerologia* in later centuries, together with the inconsistencies between the *hemerologia* themselves that have been noted above, suggest that although the calendar of the province of Asia, instituted in 8 BCE and widely diffused in and around

[132] The most distinct example is the eighth month, which is called *Δήμαρχος* in the Florence MS and *Δημήτριος* in the Vatican MS: see Kubitschek (1915) 106.

[133] Philadelphia inscription: see above, n. 105. Metropolis inscription, referred to above as a two-column *hemerologion*: Engelmann (1999) 142–3. The latter equates the 14th (of the local month) with the Nones of October, the 15th with the eighth before the Ides of October, etc.

[134] Unfortunately, the Metropolis fragment of the decree of 8 BCE (Dreyer and Engelmann 2006: 175–82) lacks the list of month-lengths; we cannot tell whether it prescribed the same sequence of months as the Priene inscription, or whether it assumed a New Year on 24 September.

[135] Price (1984) 61–2 notes the tendency for birthday cults to be silently superseded after the ruler's death, although in the case of Augustus, celebration of his birthday is still attested at Pergamum in the Hadrianic period, early 2nd c. CE (*IGR* iv. 353b = *I.Pergamum* 374B, cited in Laffi 1967: 76).

[136] The practice of extending Augustus' birthday celebrations to a two-day period on 23 and 24 September, which is attested in the East (with two *Sebaste* days at the beginning of the month, as in the Asia–Pamphylia calendar of the Vatican MS; see Table 5.6 n. *c*) as well as in northern Italy (*CIL* xi. 3303, from Forum Clodi, 18 CE) and Gaul (*CIL* xii. 4333, from Narbo, 11 CE), has been explained as arising from possible confusion or uncertainty regarding the 'correct' date of Augustus' birthday according to the Julian calendar (since he was born before this calendar was instituted); his original birthday date was known as *a.d. VIII kal. Oct.*, but confusion arose as to whether this was an old calendar-date (i.e. 23 September), which in the new calendar became *a.d. IX kal. Oct.* (as September acquired an extra day), or a new-calendar date (i.e. 24 September). This would explain why the Forum Clodi inscription dates the birthday *to a.d. VIII kal. Oct.*, against all Roman *fasti* (as well as the decree of the calendar of Asia) that date it *to a.d. IX kal. Oct.*: so Degrassi (1963) 513, Michels (1967) 180–1, Hannah (2005) 124–5, Feeney (2007 (154). Although this explanation is largely conjectural, it raises the possibility that alternative New Year dates, especially that of 24 September, could go back already to the reign of Augustus.

Asia Minor, was defined by a fixed New Year (Augustus' birthday) and tied to the Julian calendar, cities and provinces still had a small margin of freedom and flexibility in how this calendar was reckoned. This may have contributed, for cities and provinces, to a sense of independence and political autonomy; through this, the long-standing tradition of calendar diversity in Asia Minor and the Near East survived into late Antiquity. [137]

Other calendars of Asia Minor and the Near East

Most other calendars of Asia Minor and the Roman Near East were also converted and adapted, in different ways, to the Julian calendar. The evidence is restricted to the *hemerologia* and other late Roman sources, but we may surmise that adaptation to the Julian calendar occurred around the same time as the institution of the calendar of Asia in 8 BCE, or at least not later than the mid-first century CE.[138] It may have been initiated, as in the province of Asia, by Roman provincial governors, or alternatively 'from below', i.e. through the initiative of local city councils; we simply do not know.[139]

The calendars that emerged in this process were varied, in accordance with the tradition of calendar differentiation and local particularism that went back to the post-Seleucid period. Some cities and provinces adopted the Julian calendar wholesale, retaining only their local month-names, and in some cases, a different New Year. Thus the calendar of Antioch was identical with the Julian calendar, but with Macedonian month-names and an autumn New Year;[140] this calendar was widely diffused in the province of Syria, and also

[137] An early-3rd-c. inscription from Smyrna equates 4 Hekatombeon with 28 May, thus a one-day deviation from the *hemerologia* and the decree of Priene (*IGR* iv. 1465: Kubitschek 1915: 93–4, Magie 1950: ii. 1343 n. 40, Laffi 1967: 79; see Samuel 1972: 175, 182). For late-antique evidence, see above, n. 105. On whether 23 September, or any other standard date, was used in the 4th c. as New Year date for the indictions, see Grumel (1958) 195–201 and Mosshammer (2008) 22–4. In the Middle Ages, the 23 September New Year seems to have gained importance in the Byzantine Christian liturgical calendar, where it was also adopted as the date of the Conception of John the Baptist (ibid.).

[138] Samuel (1972) 178, but without supplying evidence. Firm, though limited evidence can be drawn from the date given by Josephus, *Jewish War* 4. 2. 4 (654) for the death of Vitellius (in 69 CE): the date of 3 Apellaios fits only the 'Julianized' calendar of Tyre (as known in the *hemeorologia*), where it corresponds to 20 December, and suggests therefore that this calendar was in existence by this period: see Schürer (1973–87) i. 597 n. 26.

[139] See brief discussion in Meimaris (1992) 38. The calendar of the province of Asia and its derivatives are mostly associated in the *hemeorologia* with Roman provinces (Asia, Bithynia, Pamphilia, Cyprus), whereas Near Eastern calendars are mostly associated with cities, a distinction that is perhaps historically significant.

[140] Originally its New Year may have been 1 Dios (= 1 November), as implicit from Julian, *Misopogon* 34 (361 D)—*pace* Honigmann (1945), Grumel (1958) 215–16), and Samuel (1972) 174 and n. 1, who assume it was 1 Hyperberetaios = 1 October (courtesy of Chris Bennett; see also below, n. 165).

became the model of the Syrian calendar (see above and Table 5.3). Similarly, the calendar of Seleucia in Pieria (near Antioch) was identical with the Julian calendar but with mostly Greek, non-Macedonian month-names. Closer still to the Julian calendar were the calendars of Sidon and of Lycia, in which the month of Dios—formerly the first month of the Seleucid Macedonian year—corresponded to January, first month of the Roman year.[141]

Some Near Eastern cities, such as Tyre and Heliopolis (Baalbek), adopted more original calendars that only had in common with the Julian calendar a fixed, 365-day year. The calendar of Tyre consisted of a run of five 31-day months, starting with Dystros on 18 March, followed by a run of seven 30-day months (Samuel 1972: 176). We do not know, however, whether the year was considered to begin in Dystros, in Dios (on 18 November), or in any other month. The dates of the beginning of months and their relationship to the Julian calendar seem arbitrary and without rationale. The most likely explanation is that at the time when the calendar was instituted, the old lunar month of (say) Dios happened to begin on 18 November, which was adopted as the starting point of the new calendar.

The calendar of Caesarea Maritima was probably also adapted to the Julian year, but it is not represented in the *hemerologia* and the sporadic evidence we have—a handful of dates in Eusebius' history of the martyrs of Palestine—is insufficient to provide a reliable reconstruction. It is clear, however, that it was structured differently from the other calendars of the Near East.[142]

The calendar of Heliopolis (Baalbek)

The calendar of Heliopolis was in some ways unique, and has attracted much attention—perhaps undeservedly—in modern scholarship. Its most striking feature, at least as it appears in the *hemerologia*, is its unusual use of Babylonian or Syriac month-names.[143] These names are inconsistently transliterated into Greek in the various *hemerologia* manuscripts, sometimes even within the

[141] Ibid. 174. For further analysis of Sidon and Lycia, see above, nn. 57–8.

[142] A study of this calendar was made by Rey-Coquais (1978), who collated the evidence in Eusebius' text (four Macedonian dates with days of the week, in short recension 1. 2, 4. 15, 6. 1, 7. 1— but leaving out the Julian dates, which he convincingly identified as later interpolations—and then reconstructed the calendar on the assumption that it was structurally similar to, albeit not identical with, the calendar of Tyre (this assumption is of course unjustified). The dates in Eusebius are not compatible with a lunar calendar; it is clear that the calendar consisted of 30- and 31-day months, but their distribution in the year remains unknown. See also the remarks of Burgess (1999) 37–8 n. 7.

[143] See Table 5.7. The name *Ozir* is similar to the Syriac *Ḥaziran* (see above, Table 5.3); other names are consistent with the Syrian calendar, except for *Ag* and *Gelon* (instead of Tishrei 1 and Kanun 1 in the Syrian calendar respectively) which are local names.

Table 5.7. The calendar of Heliopolis in the *hemerologia*

Month-name	Day 1 (Florence MS)	Length	Day 1 (Vatican MS)	Length
Nisan	24 May	31	24 May	30
Eiar	24 June	30	23 June	31
Ozir	24 July	30	24 July	30
Thammuz	23 August	31	23 August	31
Ab	23 September	30	23 September	30
Ilul	23 October	30	23 October	30
Ag	22 November	31	22 November	31
Thisrin	23 December	30	23 December	30
Gelon	22 January	30	22 January	30
Chanun	21 February	31	21 February	31
Sobath	24 March	30	24 March	30
Adar	23 April	31	23 April	31

Note: For month-names I have used Samuel's transliterations (1972: 176), which are only an arbitrary compromise between the numerous names appearing in the *hemerologia*, themselves transliterations from the Aramaic. Some of the names in the *hemerologia* are listed in Tubach (1994: 182), unfortunately incompletely (see also Kubitschek 1915: 99–101).

Source: Kubitschek (1915) 42–53.

same manuscript. The absence of standard Greek transliterations suggests that these month-names were predominantly used in an Aramaic-language context, which is perhaps strange given the lack of any other evidence of Aramaic use in the city in the Roman period. It is also noteworthy that these month-names are completely unattested in Heliopolitan inscriptions: all we have there, from the early Roman period, are Macedonian month-names.[144] It is impossible to know whether these epigraphic dates refer to the same calendar as that of the *hemerologia* (except that the month-names are Macedonian) or to a different one. As a result the historical context of the calendar of the *hemerologia*—for example, whether it already existed in the early Roman period for Aramaic-language users, or whether it was only introduced in the later Roman period—remains unclear.

The structure of the calendar of Heliopolis (according to the *hemerologia*) differs from that of Tyre by having, instead of a continuous run of 31-day months, an even distribution of 31-day months throughout the year (see Table 5.7). The month of Ab begins on 23 September, which raises the possibility that this date was deliberately chosen as New Year's day, as in the calendar of Asia, in honour of Augustus' birthday.[145] However, the structure of the

[144] Rey-Coquais (1967) nos. 2733 (dated 60 CE) and 2852 (113 CE), both with the month-name Loos.

[145] Samuel (1972) 176; but Kubitschek (1915) 41 is sceptical.

calendar as represented in the Florence MS would rather suggest that the year began in Nisan, just as in the Babylonian calendar: for this gives a month sequence of 31–30–30 repeated four times, except for the last month (Adar), which has 31 days (Tubach 1994: 183 n. 15). It is also possible that the New Year was celebrated six months later in Ag (on 22 November), as this name presumably means 'festival' (Aramaic *ḥag*), which suggests a month with particular religious significance (ibid. 182, 188). But even if the New Year was not in the month of Ab on 23 September, the calendar may still have been designed in such a way that one of its months began on Augustus' birthday.

Attention has been drawn to the similarity of this calendar (according to the Florence MS, which I shall first consider) to that of the astronomical book of Enoch. As we have seen in Chapter 4, ch. 72 of 1Enoch presents a solar year of 364 days, consisting of a month sequence of 30–30–31 repeated four times; the last day of the 31-day months corresponds to the '(sun's) sign' (72: 13, 19), which appears to mean one of the four cardinal points, solstices and equinoxes, of the solar year. This sequence of months is similar to the calendar of Heliopolis (except that it starts from a 30-day month, and ends with an additional 31-day month); moreover, as in 1Enoch, each 31st day in the Heliopolis calendar corresponds approximately to a solstice or an equinox, as follows:

31 Nisan: 23 June
31 Thammuz: 22 September
31 Ag: 22 December
31 Chanun: 23 March

On this basis, Tubach (1994) argues that the calendars of Heliopolis and of Enoch are directly related. In his view, the calendar of Heliopolis must have preceded that of Enoch, because the Aramaic of the Heliopolitan month-names has archaic features. He argues, therefore, that the calendar of Enoch—conceived in Ptolemaic Judaea—was borrowed from that of the not too distant city of Heliopolis, no later than the third century BCE.

Tubach's theory has much been quoted, but his argument from parallelism does little to convince (Ben-Dov 2008: 267–70). It should first be stressed that the two calendars are not identical, since the year-length of Heliopolis is 365 days, and of Enoch only 364. The similarity of their month sequences is insignificant, because the even distribution of 31-day months across the year is a rational scheme that anyone could have independently devised. More significant, perhaps, in the calendar of Heliopolis is the coincidence of the 31st days with the equinoxes and solstices, but this could be the purely fortuitous result of setting the beginning of the month of Ab on Augustus' birthday on 23 September. In fact, the 31st days do not correspond exactly to equinoxes and solstices: there is no evidence that 22 September, for example, would have been regarded as the exact day of the autumn equinox.[146] The parallelism, on balance, is thus very weak.

Tubach and others, moreover, have surprisingly overlooked the variant reading of the *hemerologia*. The Vatican MS, indeed, has a slightly different sequence with the month of Eiar beginning on 23 June instead of the 24th (see Table 5.7).[147] This small difference is significant, because it completely alters the structure of the calendar of Heliopolis: according to the Vatican MS, the year consists simply of an alternation of 30- and 31- day months, with the only exception, in October and again in January, of two consecutive 30-day months (unavoidable in a 365-day year). This calendar structure, which differs completely from the calendar of Enoch, is equally as rational and as historically plausible as that of the Florence manuscript.[148] This significant divergence between the manuscripts casts further doubt on Tubach's theory.

The early Aramaic of the month-names—if indeed it is early Aramaic—does not prove that the calendar of Heliopolis, as represented in the *hemerologia*, predates the Roman period: for as we have seen, most calendars of the Roman Near East preserved their old month-names even after converting to a Julian-type calendar. Given the broader context of ancient Near Eastern calendars, it seems most probable that the calendar of Heliopolis was originally lunar, and that during the Achaemenid and Seleucid periods it corresponded, as its month-names clearly indicate, to the standard Babylonian calendar.[149] Conversion to a 365-day solar year is most likely to have occurred much later, in the early Roman period, at the time when the cities of the Roman Near East were switching to a variety of Julian-type schemes.

[146] Note also that the commonly held assumption that the four 31st days in the calendar of Enoch, or their equivalent in the calendars of Jubilees and Qumran, correspond to equinoxes and solstices is not explicitly stated in Enoch, Jubilees, or Qumran sources: see Ch. 4 n. 96.

[147] The Leiden MS lacks the month of June; it is therefore impossible to use it as evidence in this context. In the Vatican MS day 8 of Eiar is duplicated on 30 June and 1 July. This is probably the result of dittography (as elsewhere in the manuscript: see Table 5.6 n. *f*), which should not affect the dates of the beginning of the months.

[148] The argument that scribal errors are more common in the Vatican than in the Florence MS (see above) is not sufficient, in my view, to favour the latter, because there is nothing in the text of the Vatican MS to indicate, in this case, any scribal error.

[149] The city's Greek name, which means 'sun-city', and the apparent centrality of the sun-god in the city's public cults during the Roman period (on which see Millar 1993: 285, Ball 2000: 39–47), need not have any bearing on the nature of the calendar that was used in the Hellenistic period (*pace* Tubach 1994: 188–9).

Ascalon and Gaza

The calendars of Ascalon and Gaza, as represented in the *hemerologia*,[150] were structurally identical and conterminous to the Egyptian, Alexandrian calendar, with twelve 30-day months followed by five epagomenal days ending on 28 August (except before Julian leap years, when a sixth epagomenal day would have been added: see above and Table 5.4). Both cities, however, used Macedonian month-names, at one month apart from each other: the month equivalent to Thoth in the Alexandrian calendar (beginning on 29 August) was Loos in Ascalon, and Gorpiaios in Gaza. As explained above, this one-month difference was most likely the result of an excessive intercalation in Ascalon in the post-Seleucid, pre-Roman period.

That these calendars were instituted in the early Roman period has been disputed by Meimaris (1992) 37, on the basis that under the Romans a more closely Julian calendar structure would have been chosen (e.g. with 31-day months); in his view, the Egyptian-type calendars of Ascalon and Gaza must have been adopted beforehand, during the Hellenistic period. Before the arrival of the Romans, however, there is no convincing historical context for this to have taken place. Ascalon and Gaza were under Ptolemaic rule during the third century BCE, but as we have seen, in this period the Ptolemaic Macedonian calendar was still lunar (and thus distinct from the Egyptian civil calendar) and in dominant use in Palestine for official, administrative purposes (see Chapter 4 n. 116). Even if Ascalon and Gaza had adopted the Egyptian calendar in this period, it would have been with Egyptian month-names (as in other possessions of the Ptolemaic Empire, e.g. Cyprus and Libya Cyrenaica; see Chapter 4) rather than with the Macedonian names that were used for the Ptolemaic lunar calendar. During most of the second century BCE, Ascalon and Gaza came under Seleucid rule; in this period, they would have had no reason to abandon the Macedonian lunar calendar of the Seleucid kingdom in favour of the Egyptian calendar. After Gaza was annexed by Alexander Jannaeus in the early first century BCE, its calendar would have remained largely unchanged, being similar to or identical with the lunar post-Seleucid calendar of the kingdom of Judaea. The situation in Ascalon is more uncertain after it became independent in 104 BCE, but there is no obvious reason why it should have adopted then the calendar of Egypt.[151] Both cities

[150] For papyrological confirmation of the calendar of Ascalon, dating from 359 CE (with the date 14 Gorpiaios = 12 October), see Kubitschek (1915) 97. The calendar of Gaza is epigraphically confirmed in southern Palestine in the 6th c. CE: Schürer (1973–87) ii. 103, Meimaris (1992) 119.

[151] Annexation of Gaza: Schürer (1973–87) ii. 101. Independence of Ascalon: ibid. 90–1, 106–7, Meimaris (1992) 66. It is in this period, as I have argued earlier, that Gaza and Ascalon made excessive intercalations to their lunar Macedonian calendar. A certain allegiance of Ascalon to Egypt is evident in the representation of Egyptian rulers on the city's coins after

were given by Antony to Cleopatra, probably in 37/36 BCE;[152] but soon after, with the fall of Cleopatra, Gaza was given by Augustus to King Herod of Judaea, in 30 BCE.[153] The fate of Ascalon is unclear, but it must surely also have been severed by then from Egypt. It seems unlikely that in their short association with Egypt from 37 to 30 BCE the cities of Ascalon and Gaza should have adopted the Egyptian calendar. After 30 BCE, under the rule of Herod, it is the Macedonian lunar calendar (similar to or identical with the Judaean calendar) that would naturally have been used.

It seems most likely, in short, that the calendars of Ascalon and Gaza remained Macedonian and lunar throughout the Hellenistic period, until the cities were annexed by the Roman Empire (which for Gaza was in 4 BCE, when it became part of the Roman province of Syria).[154] The changes that were then made to the calendars of Ascalon and Gaza followed the pattern of all the Roman Near Eastern calendars in this period: Macedonian month-names were retained, but with the Julian year length of 365 days. The decision of Ascalon and Gaza to adopt the structure of the Alexandrian calendar was unusual and original, but may have been motivated by geographical proximity to Egypt and frequent commerce with it.[155] This was also a way for Ascalon and Gaza to distance themselves from the other Julianized calendars of the Roman Near East, and hence—as elsewhere—to demonstrate a certain degree of political autonomy.[156] The one-month discrepancy between their sequences of months (Loos in Ascalon = Gorpiaios in Gaza: see above) may also have been an expression of the distinct and possibly rival identities of these neighbouring cities. All this, again, had the overall effect of perpetuating the post-Seleucid tradition of calendar fragmentation in the Roman Near East.

Later Roman expansion in the Near East: Arabia and Dura-Europos

The conversion of local, lunar calendars to Julian-type schemes continued in later centuries, as the Roman Empire expanded deeper into the Near East. The

104 BCE (see Schürer loc. cit.), but this does not necessarily have any bearing on the calendar it used.

[152] Schürer (1973–87) i. 298, ii. 92. The evidence is from Josephus, *Jewish War* 1. 18. 5 (361) and *Antiquities* 15. 4. 1 (95); Ascalon is not explicitly mentioned, but was clearly included (Schürer 1973–87: ii. 107).

[153] Ibid. ii. 92, 101–2, following Josephus, *Jewish War* 1. 20. 3 (396), *Antiquities* 15. 7. 3 (217).

[154] Schürer (1973–87) ii. 101–2, and Millar (1993) 43–4, following Josephus, *Jewish War* 2. 6. 3 (97), *Antiquities* 17. 11. 4 (320). The fate of Ascalon is again unclear; it is possible that it was the same as Gaza's, or that it only came under direct Roman rule in 6 CE after the Roman annexation of Judaea.

[155] Grumel (1958) 172; Stern (2001) 35 n. 153.

[156] As noted by Schürer (1973–87) ii. 103.

spread of the Julian calendar was almost conterminous, indeed, with that of the Roman Empire, and thus may be seen as a clear marker of 'Romanization' in the Near East.

In the case of the province of Arabia, the transformation of the calendar was particularly rapid. Before the creation of Roman province of Arabia in 106 CE, Nabataean documents and inscriptions were dated with Babylonian month-names,[157] suggesting that the Nabataean kingdom had retained the lunar Babylonian calendar of the Seleucid period. But Judaean Desert documents from soon after 106 CE and dated 'according to the province of Arabia' assume a completely new system: Julian and Macedonian month-names (in the Greek texts) and Babylonian month-names (still used in the Nabataean and Aramaic texts) are consistently synchronized with each other in such a way as to confirm, beyond any doubt, that the calendar of Arabia (with either Macedonian or Babylonian month-names) had been Julianized and was identical, already then, with what is later attested in epigraphic sources and the *hemerologia*.[158]

This new calendar was structurally the same as the Alexandrian calendar, with twelve 30-day months and five epagomenal days, and a sixth epagomenal day in Julian leap years;[159] but unlike the calendars of Ascalon and Gaza, its months were not conterminous with those of the Alexandrian calendar. In Arabia the first month, Xandikos, began on 22 March, whereas the Alexandrian month nearest to this date, Pharmouthi, began on 27 March.[160]

We must reject again the argument that since this calendar did not conform, in structure, to the Julian model, its institution would have preceded the annexation of Arabia into the Roman Empire. There is no reason why the Nabataean kingdom should have forsaken, at any stage, the lunar Babylonian-type calendar it had inherited from the Seleucid period. Considering the radical changes that occurred to the province of Arabia soon after 106 CE in terms not only of official language but also of political and legal structures (see

[157] See the Nabataean inscriptions published by Yadin (1962) 239 = *P.Yad.* 1–3 in Yadin (1989), Healey (1993) and (2009), all from the 1st c. CE (except Healey 2009: 113–15 no. 14, dated 34 BCE). Attested month names include Nisan, Ab, Elul, Kislew, Tebet. Further references in Stern (2001) 38 n. 160.

[158] See Stern (2001) 39–42. Later epigraphic sources include, in major part, the Greek tombstone inscriptions of Zoar (4th–6th cc.), in Meimaris and Kritikakou-Nikolaropoulou (2005), (2008).

[159] Evidence that the intercalary day in leap years was counted as an extra epagomenal comes from an inscription from Zoar (eid. 2005: 243–5 no. 148) dated Tuesday, 2nd epagomenal in the year corresponding to 436 CE (a leap year); the weekday indicates that this was 17 March (and not 18 March as in non-leap years).

[160] Samuel (1972) 177; a discrepancy of 5–10 days between the two calendars maintains itself throughout the year. On Xandikos as first month of the calendar of Arabia, see above, n. 8.

Millar 1993: 407, 414–18), it is in this period that the change of calendar must surely have taken place.[161]

It is significant that in creating its new, 365-day calendar, the province of Arabia chose not only to differ from the Julian sequence of months, but also to refrain from exact synchronicity with the Alexandrian calendar. It is difficult to argue, therefore, that the Alexandrian sequence of months was chosen because of Arabia's proximity to Egypt: if so, a conterminous calendar—such as in Ascalon and Gaza—should surely have been preferred. In this case, local particularism and a sense of autonomy seem to have been more decisive factors.

The New Year date of 22 March was presumably not selected arbitrarily. It may have been regarded as the date of the spring equinox, even though there is no contemporary evidence to confirm this.[162] Alternatively, this date may have been determined on the basis of the lunar dates of the old calendar. In 106 CE, when the calendar of the province of Arabia may have been instituted, 22 March occurred approximately at (or a little before)[163] the new moon of what would have been of the month of Nisan/Xandikos. A closer match to a lunar date can be achieved if we assume that the new calendar was instituted later in that year (when, indeed, the province itself is more likely to have been created). For example, the new moon was visible in the evening preceding 20 July 106 CE, which corresponds exactly to 1 Loos in the new calendar of Arabia. The new calendar could well have been instituted then, when the beginning of the month of Loos of the old lunar calendar happened to be on 20 July. The rest of the new calendar would have followed from this date, with a sequence of months similar to the Alexandrian calendar and with a New Year on the following 1 Xandikos, 22 March. The calendar of Arabia would thus have been instituted almost immediately when the Roman province was created. This would confirm that by 106 CE the conversion of lunar calendars into fixed, Julian-type calendars had become accepted as an inherent aspect of Roman provincial administration in the Near East.

The next stage in the spread of the Julian calendar, at least as far as the evidence attests it, appears in Dura-Europos at the end of the second century, when the city (with its surrounding region along the upper Euphrates) was

[161] Grumel (1958) 173; see further Stern (2001) 39.

[162] This explanation is assumed by Meimaris (1992) 37. The late-4th-c. *Apostolic Constitutions* (5. 17. 1, 3) give the date of the equinox as 22 Dystros (i.e. March, in the Antiochene calendar), a date which may go back to Anatolius' Easter cycle of the late 3rd c. (Grumel 1958: 31–2; Strobel 1984: 152; and see now Mc Carthy and Breen 2003), but which is not attested earlier. The contemporary Roman tradition was to date all equinoxes and solstices on the 8th day before the kalends (thus for the vernal equinox, 25 March): Pliny, *Natural History* 18. 221, 246, 256, 264, (311); Columella, *On Agriculture*, 9. 14. 11–12.

[163] Conjunction occurred in 106 CE on 23 March, which means that 22 March would have been too early for a Babylonian-type calendar based on first appearance of the new moon.

being annexed into the Roman Empire. Prior to this, the calendar in Dura had been lunar, as elsewhere in the Parthian Empire. This is evident from the mention of the month of Dystros *embolimos* (intercalary) in two inscriptions from the city, characteristic of a lunar calendar and probably identifiable with the official Parthian calendar (see above, n. 46). A horoscope inscription dated 9 Panemos 487 SE (i.e. 176 CE) and referring astronomically to a date ranging between 3 and 5 July of that year demonstrates further that in this period the Macedonian calendar in Dura-Europos was still lunar.[164] But from the early third century double-dated documents clearly indicate that the city had adopted the Julian calendar, retaining only—as in Antioch and other parts of Syria—Macedonian month-names and an autumn New Year.[165]

The end of Antiquity

The Julianization of Near Eastern calendars, conterminous with Roman expansion in the Near East, had reached its greatest extent by the third century CE. Galen could thus write already in the late second century that 'Romans, Macedonians, Asiatics, and many other nations' all used a solar calendar.[166] But some notable exceptions remained: lunar calendars were still in use in Palestine, as Galen himself noted, and so in other parts of the Roman Empire that will be considered in Chapter 6. Even in the vast majority of the Roman East where a fixed 365-day calendar had been adopted, considerable diversity remained between the calendars and few, if any, could be regarded as identical with the Julian calendar.

The Julian calendar in its pure form, complete with Roman month-names, did eventually penetrate the Roman East, but not before the fifth or sixth

[164] Indeed, if months began at first visibility of the new moon, 9 Panemos in 176 CE would have corresponded to 4 July. See references above, n. 48. Although Dura-Europos was already under Roman control by the 160s CE, it was not formally incorporated into the Roman imperial administrative structure till the 190s (Millar 1993: 114–15, 131–3, 467). In this respect, the lunar horoscope of 176 CE may be regarded as belonging still to the Parthian or post-Seleucid period.

[165] Welles, Fink, and Gilliam (1959) 10, referring to texts nos. 29 (251/2 CE) and 30 (232 CE); the former implies a New Year in Dios (ibid. 153, as pointed out to me by Chris Bennett). Text no. 32, a divorce bill from 254 CE, is dated 29 Xanthikos (upper text, l. 1) and 30 April (lower text, l. 3: [*πρὸ*] *δύο καλανδῶν* [*M*]*αείων*), a discrepancy noted (ibid. 169) that is presumably erroneous and that may be due to the fact that these dates were written by different scribes. We do not know how early the calendar change was made, but as in Arabia, it may have been simultaneous to the formal annexation of Dura-Europos in the Roman Empire. The presence of the Julian calendar in Roman Dura-Europos is also evident from the full-length Roman calendar that was produced for an auxiliary cohort stationed in the city (ibid. no. 54; also in Beard, North, and Price 1998: ii. 71–4). Some documents, moreover, are only dated by the Julian calendar (no. 26, from 227 CE).

[166] Galen, *In Hippocratis Epidemarium Libros Commentarius* 3 (ed. Kühn xvii/1. 24, see also 21–2); Palestine is mentioned on p. 23.

centuries (and not in Egypt).[167] It appears on its own in this later period in Greece (e.g. Argos, Corinth, Crete, Macedonia),[168] Asia Minor (Miletus, Sardis, Bithynia),[169] Syria,[170] and Palestine (Scythopolis-Beth Shean, Samaria, Negev).[171] It is clear from the epigraphic record, however, that the adoption of the Julian calendar in this period was slow, inconsistent, and uneven.[172]

It was not until the end of Antiquity, therefore, that calendar diversity finally gave way, in the Roman East, to the single imperial calendar that had prevailed, almost *ab initio*, in the western parts of the Roman Empire. The Julian calendar was later to become standard in the Byzantine Empire, but in the Near East its impact was only short lived: for in the seventh century and later, the Islamic lunar calendar began to compete with it as official calendar of the new Near Eastern empire.

4 THE BABYLONIAN CALENDAR IN THE SASANIAN EMPIRE

In this final section I shall consider the fate of the Babylonian calendar beyond the borders of the Roman Empire, in the eastern and southern parts of Mesopotamia that were ruled first by the Parthians and then by the Sasanians. Although, under the Parthians, the Babylonian calendar ceased to be used as the official imperial calendar (they used instead the Macedonian calendar),[173]

[167] Julian dates on their own appear earlier in the texts of imperial rescripts (e.g. *AE* 2006: 1403b, from Alexandria in Troas, 134 CE; *AE* 2001: 1949, from 2nd- or 3rd-c. Salamis in Cyprus; see also, much earlier, the Roman date in the Greek text of the *senatus consultum* inscribed in Priene in 135 BCE, *I. Priene* 41 = *AE* 2007: 1428), but these inscriptions are presumably not representative of local usage. There are still, however, some rare exceptions: a Julian date appears exceptionally in 238 CE in Maximianopolis (Trachonitis, southern Syria: Meimaris 1992: 353 no. 40; see also ibid. 323), and earlier still in Axos (Crete), in a dedication of the 1st or 2nd cc. CE (*AE* 1999: 1743).

[168] Argos: *AE* 2003: 1623–4. Corinth: Samuel (1972) 188 n. 1. Crete:*AE* 2002: 1632–3. Macedonia: *SEG* 49. 829, a floor mosaic with Julian month-names from Thessalonika, dated to the first half of the 5th c.

[169] Miletus and Sardis: Samuel ibid. Bithynia: *AE* 2003: 1652.

[170] e.g. an inscription from Nîḥa (Beka valley) dating from 539 CE, in Rey-Coquais (1967) no. 2945; and of contentious late-Roman date, Ameling (2004) iii. 46–7 (Syr30).

[171] In Scythopolis there are several 6th-c. inscriptions, e.g. the floor mosaic of the monastery of the Lady Mary: see Meimaris (1992) 83–4, 86 no. 17. Samaria: *AE* 1994: 1780 (exact provenance unknown). Negev (southern Palestine): *AE* 1996: 1573.

[172] Meimaris (1992) 42–5. Thus among the Negev inscriptions in *AE* 1996: 1573 is dated February (541 CE), but later no. 1572 is still dated Panemos (570 CE). A similar inconsistency is found among the north-west Syrian mosaic inscriptions of the same period, in Rey-Coquais (1996).

[173] See above, near n. 42. Babylonian and Macedonian calendars were similar (except for their month-names), but as I have argued above, not identical. By the 1st c. BCE, indeed, the Parthians had made an extra intercalation in the Macedonian calendar.

lunar calendars with Babylonian month-names remained in use among Aramaic-speakers in the Near East, in Parthian Mesopotamia as well as in parts of the Levant, e.g. Nabataea and Judaea. The use of Babylonian month-names in this period did not necessarily mean conformity to the standard Babylonian calendar as it had been reckoned in the Seleucid period (as the Julianized Babylonian calendars of Heliopolis and the province of Arabia demonstrate with extreme clarity). However, the evidence suggests that in the first century CE the lunar calendars of Nabataea and Judaea had remained broadly in line with the standard Babylonian calendar (although see reservations above, nn. 59–61); and this is certainly likely for the Babylonian calendar that was in use in Parthian Babylonia.

After the Sasanian overthrow of the Parthian dynasty in 224 CE, the Persian Zoroastrian calendar appears to have been promoted as official imperial calendar in all parts of the Sasanian Empire, including Mesopotamia.[174] This would explain the sporadic appearance of Persian Zoroastrian dates, alongside Syrian ones, in Syriac texts from Sasanian Mesopotamia from the late fifth century CE onwards: thus in the Syriac Martyr Acts, the date of the martyrdom of Anahid is given as 'month of Ḥaziran, on day 18, that is the month of Sapnadarmad (= Persian Isfandārmuδ), on Friday, year 9 of Yazdgerd (447 CE)'; and later, the martyrdom of Giwargis is dated 14 Kanun II, 926 SE (615 CE), on the Persian date 28 Mihr.[175] But in spite of this, the impact of the Persian Zoroastrian calendar in Mesopotamia appears to have been minimal. Babylonian month-names remain dominant in Syriac writings of the Sasanian period—as in other contemporary, literary sources from the same region, such as the Babylonian Talmud—and indeed, have been continuously used by Aramaic-speakers (and others) in the Near East until today.

In the Sasanian period, however, the evidence suggests that Babylonian month-names were no longer always used with reference to the standard Babylonian calendar (as reckoned in the Seleucid period), nor even always to a lunar calendar at all. In many cases, Babylonian month-names in sources such as the Syriac Martyr Acts refer in fact to the Syrian calendar of the Roman Near East, which was essentially a Julian calendar (see above and Table 5.3). This type of dating is designated in the sources as 'according to the Greeks', perhaps to indicate that it was modelled on the calendar of the Roman Empire, or to indicate its equivalence to the Greek, Macedonian month-names of the calendar of Antioch. The appearance of this Julian-type calendar in

[174] Bickerman (1983) 785–6. It should be noted, however, that the use of the Persian Zoroastrian calendar for official purposes is also attested in the late Parthian period in Susa, thus not far from lower Mesopotamia (in the early 3rd-c. CE inscription of Artaban V: Boyce 1970: 517). It was certainly used already much earlier in other parts of the Persian and Parthian Empires: see Ch. 4. 1.

[175] Anahid: Bedjan (1890–7) ii. 603. Giwargis: Bedjan (1895) 563–4. See discussion in Stern (2004) and Ch. 4 n. 30.

Syriac sources outside the Roman Empire, e.g. in the Syriac Martyr Acts, can only be attributed to the spread of Christianity, a 'Roman' religion, into the Sasanian east.

But in a significant number of cases, the Syrian dates in the Syriac Martyr Acts refer to lunar calendars, sometimes explicitly designated in the sources as 'according to the moon'. These dates are only used in relation to events that took place outside the territory of the Roman Empire (i.e. in Persian Mesopotamia and the adjoining regions) and clearly reflect local, Mesopotamian calendrical traditions that were presumably still alive under Sasanian rule. Elsewhere I have shown, however, that the calendars assumed by these lunar dates were not necessarily the standard Babylonian calendar, but might in fact conform to a variety of lunar calendrical schemes (Stern 2004). In the Syriac Martyr Acts, some of the lunar dates conform to the standard Babylonian scheme (on which see Chapter 2), with months beginning at first visibility of the new moon and the first month (Nisan) beginning after the vernal equinox; but in other cases, the lunar calendar seems to be based on principles similar to the Christian Easter cycles (on which see Chapters 6–7), with months beginning slightly earlier, at the conjunction, and the first month beginning frequently before the equinox. The differences between these lunar dates and calendars are likely to reflect the practices of the different localities where the martyrdoms took place and where their dates were originally recorded.

As argued earlier in this chapter, some diversity between lunar calendars is likely to have existed at all times, even when the Babylonian calendar was used as official calendar under the earlier empires. However, when under the Sasanians lunar calendars (Macedonian and Babylonian) ceased to be used as centrally controlled, official imperial calendars, diversity between local lunar calendars in Persian Mesopotamia is likely to have significantly increased. As conformity to an imperial lunar calendar was no longer necessary, cities and localities were free to adopt a variety of lunar calendar schemes. This would explain the great disparity of lunar dates in the Syriac Martyr Acts.

In this context, Christian influence seems to have been an important factor towards calendar diversification. Some Christian communities may have deliberately abandoned the Babylonian calendar, based as it was on the empirical sighting of the new moon, and adopted instead a fixed lunar scheme similar to or identical with the Christian Easter cycles.[176] Others may have adapted to the Christian Easter cycles in a milder form: they may have still sighted the new moon but reckoned the month of Nisan earlier in the year, so as to make it coincide with the month of the Jewish Passover and

[176] These fixed cycles, consisting normally of a fixed alternation of 29- and 30-day months, will be discussed in Chs. 6–7.

Christian Easter (which frequently began before the equinox). The local lunar calendars of the Near East—of Christians, but perhaps also of others[177]—thus adapted themselves, in various ways, to new calendrical concepts that were better suited to Christian liturgical practices.

The diversification (with, in some places, an element of Christianization) of the Babylonian calendar in late-antique Persian Mesopotamia was possible only because under the Sasanians, this calendar was no longer the concern of the imperial rulers. Fragmentation was the natural result of the Babylonian calendar's no longer being under central political control. After more than one millennium, the supremacy of the standard Babylonian calendar thus finally came to an end. But it survived in the Persian Near East as a lunar calendar in a variety of derivative forms.

[177] The Jewish rabbinic calendar in Babylonia also adopted fixed calendrical schemes in this period: on the possible relationship between these two phenomena, see Stern (2001) 141–3, 222–6, (2004) 471–2, and below, Ch. 6 near n. 117.

6

Dissidence and Subversion: Gallic, Jewish, and Other Lunar Calendars in the Roman Empire

All ancient calendars we have studied so far were set and controlled by political rulers. Although, in some cases, the advice of astronomers was sought (mainly in the context of the Babylonian calendar, also of Julius Caesar's calendar reform), critical decisions were always taken by kings, city magistrates, and city councils; they decided the beginning and length of all months and years, and they decided how the calendar would be structured. Control of the temporal organization of society was regarded, it seems, as an inherent right of political rulers; this is why reckoning of the calendar was understood in the ancient world as a political function, which could often be invested with political meaning. The use of the official imperial calendars in the satrapies of the Achaemenid and Seleucid Empires was thus construed as a statement of political allegiance to the king; by contrast, deviation from these official imperial calendars (e.g. through over-intercalation) in post-Seleucid city states and kingdoms was an expression of political autonomy and independence from the great Empire.

Some ancient calendars, however, were not set or controlled by political rulers, either central (the emperor, the king, the imperial administration) or local (provincial governors, city councils), but by alternative, unofficial structures of social authority that were distinct from the structures of the state. These unofficial calendars will be the subject of this chapter. Although they may have existed throughout Antiquity, it is only in the Roman Empire that they become visible. Because these calendars lay outside the control of political rulers, I propose to interpret them as a form of subculture and also, to a certain extent, as an expression of political subversion and dissidence.

The concepts of 'dissidence' and 'subversion' must be treated here with caution. Their modern use originates from the context of the twentieth-century totalitarian regimes, and it is still with political resistance to these regimes that these concepts are frequently associated. The forms of 'dissidence' and 'subversion' that will be discussed in this chapter in relation to the Roman Empire were undoubtedly expressions of political resistance, but less explicitly and less overtly aimed at actively resisting imperial rule. They certainly had no connection with any of the overt rebellions against Rome: the Jewish calendar, for example, albeit arguably dissident, was not implicated in the revolutionary activism that led to the great Jewish revolts against Rome in 66–74, 115–17, and 132–5 CE—unlike other revolts in history, such as the French Revolution, in which calendar reform became one of the revolutionary policies. In the Roman Empire, dissidence and subversion were generally not calls for rebellion but only a subculture that offered subtle and ongoing resistance to the dominant culture and political structures of the Empire.[1]

The calendars discussed in this chapter were dissident not only by virtue of their unofficial status and their independence from political authorities, but also because they differed fundamentally from the calendars of the political rulers. In the Roman Empire, dissident calendars were lunar and resisted adaption to the fixed, 365-day year of the Julian calendar which most other calendars in the Roman East had opted for by the early imperial period. Some of these lunar calendars, which will not be discussed in this chapter but which could still be included to some extent in the category of dissident, were reasonably well integrated into official political structures. The calendars of Greece (or at least of Athens), which remained lunar throughout the Roman period, were controlled as previously by city magistrates and city councils, and thus in a certain sense belonged to the political establishment of the Roman Empire and its provincial administration (see Chapter 1). Nevertheless, the refusal of Greek cities to adapt to the Julian calendar can be interpreted as a form of dissidence, or at the very least a strong expression of political autonomy and freedom towards the Roman Empire (even if, in real terms, this perception of autonomy and freedom was largely illusory). The same applies, in lesser form, to those cities of the Roman East that did not adopt the Julian calendar wholesale, but designed their own 365-day calendar scheme (as we have seen in Chapter 5): these calendars can also be interpreted as mildly dissident or subversive.

But dissidence was not necessarily the only reason in the Roman period for lunar calendars to be retained. Athens, in particular, considered itself the navel of Hellenistic civilization, and for cultural reasons alone may have seen it as its duty to preserve the Greek tradition of lunar calendars.[2] This cultural concern, although tinged with a strong element of local patriotism, is likely to have been approved of by the Roman rulers who were generally ready to acknowledge their cultural debt to the Hellenistic, and more

[1] As noted in slightly different terms by Alcock (1997) 111, Webster (1997) 170.

[2] See further Ch. 1 n. 136. On Hellenistic identity in the Roman East, see Woolf (1994) and Alcock (1997).

particularly Athenian, heritage.[3] The lunar calendar may have been retained by the Jews for similar, conservative cultural reasons. It is perhaps no coincidence that the peoples who kept a lunar calendar in the Roman Empire—Greeks (in Greece) and Jews (in Palestine, but also in the Diaspora)—were those who had preserved a rich body of literature from centuries before the arrival of the Romans.[4] However, this explanation does not consistently work: the Gauls, who also preserved a lunar calendar, were not the heirs to any literary tradition; whilst the Ionians, who adapted early on to the Julian calendar, had a respectable share in the literary tradition of Greece.

Lunar calendars could also have survived for entirely different reasons. They are attested, for example, in some border regions of the Roman Empire: Odessus (Varna) in Moesia Inferior, a little south of the Danube,[5] and perhaps Palmyra, deep in the Syrian desert.[6] The interstitial position which these cities occupied between the Roman Empire and its Germanic and Parthian neighbours respectively—particularly distinctive in the case of Palmyra[7]—could go some way towards explaining the survival of a lunar calendar in these cities. The Gallic lunar calendar that will be examined in this chapter was also discovered not far from the frontier of the Rhine, which may also be of some significance. However, the epigraphic use of lunar dates in the heart of the Roman Empire—in Italy and even the city of Rome itself—which will also be examined in this chapter undermines somewhat this explanation. Furthermore, evidence of a lunar calendar in the Roman province of Macedonia[8]

[3] Goodman (2007) 104–12, 140–7.

[4] Fergus Millar, oral response to a lecture delivered at the Institute of Jewish Studies, UCL in January 2006. This ties in with Millar's general contention (1993) that elsewhere in the Near East, local cultures and traditions were poorly preserved (if at all) by the time of the Roman period.

[5] The evidence is an ephebic list dated to 215 CE and equating 24 January with 7 Boedromion, which is compatible with a lunar calendar (according to this, Boedromion would have begun around the conjunction): Robert (1959) 210–11, Mihailov (1970) 106–8 (no. 47), and discussion in Stern (2001) 43–4.

[6] Samuel (1972) 178–80 and Stern loc. cit. In the case of Palmyra the evidence is not entirely conclusive, as it is impossible to tell whether its Macedonian and Babylonian dating systems (in Greek and Palmyrene texts respectively) had been retained as lunar or had been adapted, as elsewhere in the Roman Empire (e.g. Arabia and Dura-Europos), to the Julian calendar. It has been argued, not implausibly, that the lack of evidence of any intercalary month in the Palmyrene calendar indicates, *ex silentio*, that it must have been adapted to the Julian calendar (Johnson 1932: 10; see further Ch. 5 n. 69).

[7] See Millar (1993) 319–36.

[8] As rightly sensed by Nigdelis (1996) 63 n. 24, but without analysis of the evidence, which I shall therefore briefly present here (with acknowledgement to Chris Bennett for his assistance). (1) *IG* x/2. 1 no. 137, ll. 13–14, a Macedonian inscription (but of unclear exact provenance), is dated *a.d. kal. Apr. XVII* (16 March) = 2 Xandikos year 289 (142 CE). Tod (1918–19) 209, followed by Grumel (1958) 169, assumed that the Macedonian calendar was adapted to the Julian calendar, with its months beginning on the Ides of the Julian month (e.g. in this case, 15 March). However, this calendar scheme would be without any parallel; besides, it is contradicted by the next inscriptions. The date is actually lunar: the conjunction occurred in 142 CE on 15

(as opposed to the Macedonian calendars of Asia Minor and the Near East, which all adapted to the Julian calendar) suggests that the survival of a lunar calendar in Moesia was perhaps not a northward-looking, border phenomenon, but rather in southward, territorial continuity with the lunar calendars of Macedonia and the Greek peninsula, well inside the Roman Empire.

It is probably futile to seek a general explanation for the survival of lunar calendars in the Roman Empire; it would also make little sense to treat them as a single category, and these calendars can certainly not be all interpreted as subversive or dissident. The focus of this chapter, however, is not on lunar calendars *per se*, but rather on calendars that I would consider 'dissident' or 'subversive'. For this reason I shall not examine at further length the calendars of Greek and other cities of the Roman East, which in spite of their mild dissidence (inasmuch as they resisted the trend to conform, at least entirely, to the Julian calendar) were nevertheless part of the official political establishment of the Roman Empire (these calendars, moreover, have been sufficiently well covered in Chapters 1 and 5). The Gallic, Jewish, and other calendars that will be examined in this chapter were neither official nor under the control of any official political authority. These lunar calendars are most appropriately interpreted as politically dissident and subversive.

What made these calendars dissident was their insistence on remaining lunar, in contrast to the official calendar (in the environment of which the dissident calendars were used) that had become solar. What made them subversive, however, was almost the reverse: a tendency to borrow features of the politically dominant, official calendar, and to integrate these features into the lunar calendar in an often overtly hybrid way. In the context of dissidence, borrowing from the dominant culture may appear paradoxical and self-defeating. But as has been shown in numerous post-colonial studies, borrowing and hybridity can be profoundly subversive, and a source of empowerment rather than a symptom of identity loss or cultural weakness: for the appropriation of elements of the dominant culture, and the cultural hybridity that results from this process, simultaneously undermine the culture

March. (2) *Inscr. Beroia* 68 (Gounaropoulou and Hatzopoulos 1998) is dated 15 Panemos = 25 June 229 CE. The new moon was visible on 10 June of that year in the evening. (3) *Inscr. Beroia* 69 is dated 17 Panemos = 25 June 240 CE. The new moon was visible on 8 June of that year in the evening. (4) *AE* 1999: 1425 = *SEG* 49. 815 from Thessalonika (but issued by the Macedonian *koinon*) is dated 28 Panemos = 25 June 252 CE. Although 25 June should have been the last day of the lunar month (thus 29 or 30 Panemos), as the new moon was visible on that evening, the calendar may have been running slightly late. (5) *AE* 1999: 1427 = *SEG* 49. 817, same provenance and context, is dated 20 Hyperberetaios = 20 Sept. 260 CE. This is the only non-lunar date (if the month started at the conjunction on 24 Aug. 260 CE, the date of the inscription should have been 24 Hyperberetaios); this date would suggest, instead, a Julian calendar with Macedonian month-names. It seems unlikely that the calendar underwent such a radical change between 252 and 260 CE; we must rather conclude that this last date is either an error or a sloppy, approximate equation. On the lunar calendar of Macedonia see further Ch. 3, near n. 89.

of the politically dominant—by diverting it, perverting it, and distorting it—and control it by striving to possess it.[9]

Specific examples of hybridity, sometimes clearly subversive, will be encountered case by case, but in general nearly all the lunar calendars discussed in this chapter share, as a common feature, a tendency towards standardization and fixation that were characteristic of the Julian calendar and most probably influenced by it. The Gallic lunar calendar was thus reinvented as a fixed cycle—with some elements that may have been drawn directly from the Julian calendar—and publicly displayed in a way reminiscent of the Roman *fasti*. Italian lunar dating practices developed into the fixed lunar calendars of the Christian Easter cycles. The Jewish rabbinic calendar also underwent fixation in this period; although this is likely to have been due to peculiar historical factors, the broader historical context of this process—including the possibility of direct borrowing from the politically dominant Christian Easter cycles—cannot be ignored. Thus in a hybrid fashion, in spite of their dissidence or perhaps because of it, these subcultural calendars joined in the general, macroihistorical trend of the official calendars of the great empires by proceeding towards increasing schematization, formalization, and fixation.

1. THE GALLIC CALENDAR IN ROMAN GAUL

A calendar inscribed in Celtic language on a monumental bronze tablet, dating from the Roman period, was discovered in the late nineteenth century in the east of France, in the town of Coligny in the *département* of Ain. This rare finding revealed the existence of a Gallic lunar calendar which had been sufficiently important to be enshrined in this impressive inscription.

The calendar's structure

The calendar has been described in detail elsewhere, and I shall restrict myself to its main features.[10] Although fragments amounting to only half the tablet

[9] Fanon (1952), Bhabha (1994), Ashcroft, Griffiths, and Tiffin (2006) 137–8 and (citing R. Young) 158–62, eid. (1998) 118–21, 139–42 (s.vv. 'hybridity' and 'mimicry'). Post-colonial theory tends to focus on a simple, dualistic opposition between ruler and ruled, 'hegemonic' and 'subaltern', but the reality is usually more complex: thus the Gallo-Roman aristocracy that produced the calendar to be discussed below was in a certain sense 'ruled' in relation to the Roman Empire, but in another sense an inherent part of the political, economic, and even military power structures of Roman imperial society.

[10] The most sober study remains Duval and Pinault (1986). A more detailed (but difficult to comprehend) analysis of the contents of the calendar is Olmsted (1992). See also Monard (1999), Lehoux (2007) 194–8.

have survived,[11] it can be reasonably reconstructed as a cycle of five years or 62 months, with 29- and 30-day months occurring mostly in alternation, which indicates right away a lunar calendar scheme. Every year consists of twelve months (in most years, five 29-day and seven 30-day months), but two intercalary months of 30 days are inserted at equal intervals within the five-year cycle. The month is divided into two halves, of 15 days and 14 or 15 days; it would appear that the year is also divided into two halves, summer and winter, at the beginning of which the intercalary months are placed.[12]

The precise reconstruction of the calendar is subject to debate. If we extrapolate from the surviving fragments and assume the same distribution of months every year of the cycle, i.e. five 29-day and seven 30-day months, with an intercalary 30-day month at the beginning of year 1 and in the middle of year 3, the resulting calendar is quite inaccurate in relation to the moon and to the seasons. The average year length is 367 days, thus excessive by nearly two days (more precisely, 1¾ days), and hence by the end of the five-year cycle has an excess of about nine days. The average month length is also excessive: because of the preponderance of 30-day months, the five-year cycle ends with just over four excessive days. These discrepancies are so gross that modern scholars have generally treated this simple reconstruction as unlikely. After only four cycles or twenty years, indeed, the calendar will have fallen more than one month behind the annual seasons; whilst the average month length will have accumulated a 16-day discrepancy, thus shifting the calendar's nominal new moon to the real full moon (and vice-versa).

In order to eliminate the four-day (per cycle) discrepancy from the lunar phases, scholars have long suggested that in years 2 and 4 of the cycle, the month of Equos would have counted only 28 days (instead of 30 days, as in the other years of the cycle). This conjecture is possible because the end of Equos in years 2 and 4 is not extant in any of the fragments. In support of this conjecture, it has been pointed out that the month of Equos is designated as 'not good' (*anmatu*) in spite of counting 30 days, whereas throughout the cycle, 30-day months are consistently designated as 'good' (*matu*) and 29-day months as 'not good' (*anmatu*).[13] The designation of Equos as *anmatu* would reflect the fact that in some years it did not count 30 days, but only 28.[14] The argument for specifically 28 days (and not 29 as in other *anmatu* months) is stronger in year 2, where the number of festival days at the beginning of the

[11] Duval and Pinault (1986) 31, Olmsted (1992) xi.

[12] On the half-month and possible half-year divisions, see Duval and Pinault (1986) 270, 404–7.

[13] On these designations, which in this context should perhaps be given the sense of 'complete' and 'incomplete', see Duval and Pinault (1986) 19, 270–5, 409; Olmsted (1992) 12–13, 32–3.

[14] This conjecture, generally attributed to the early 20th-c. scholar Eóin MacNeill, is endorsed by Duval and Pinault (1986) 406, 411–15; see also Olmsted (1992) 14.

subsequent month of Elembiv implies arguably that Equos only had 28 days.[15] A month length of 28 days, unusual (though not impossible) in the context of a lunar calendar, would suggest perhaps that the Coligny calendar was not designed from first principles, but rather on the basis of certain traditions that had become established earlier through trial and error.[16]

This model provides a reasonable solution to the calendar's synchronism with the lunar phases; but in relation to the solar year and seasons, the five-year cycle remains excessive, according to this model, by five days. As a remedy, the same scholars have conjectured further, more speculatively, that the five-year calendar was actually part of a longer, 30-year cycle. At the beginning of this longer cycle (consisting of six smaller five-year cycles), one intercalary month (i.e. 30 days) would have been omitted, thus rectifying the discrepancy rather neatly.[17]

Evidence in support of this longer cycle—which is nowhere referred to in the Coligny fragments—is weak and has been grossly overstated. In a brief comment, Pliny (first century CE) states that the druids reckon the sixth day of the moon as the beginning of months, of years, and of '30-year eras'.[18] Pliny's notion that the month began on the sixth day of moon, i.e. at the moon's first quarter, is not intrinsically implausible (since the first quarter is easy to observe) and not incompatible with the Coligny calendar, as the latter does not specify the relationship between its months and the lunar phases.[19] But the interpretation of his '30-year eras' as calendar cycles is far from evident. This phrase clearly has a chronological significance—it seems to represent a way of counting years—but there is no reason to interpret it as the length of a

[15] These festival days are named IVOS, and run from the end of the month to the beginning of the next. At the beginning of Elembiv in year 2 there are five IVOS days, whereas other months begin with only three or four (see Olmsted 1992, tables 10–12). The unusually long run at the beginning of Elembiv year 2 appears to be making up for a lost IVOS day at the end of Equos (ibid. 92–3). However, IVOS days are perhaps not sufficiently attested in the extant fragments for this inference to be conclusive.

[16] If designed from first principles, one would expect the length of the month of Equos to have alternated through the five-year cycle (e.g. with the sequence 29–30–29–30–29), without resort to a 28-day month. A 28-day month is unusual in lunar calendars: its putative occurrence in the Greek Callippic cycle (on which see Ch. 1. 3) and in the lunar calendar of 1 Enoch has been rejected as unlikely (Stern 2001: 6–7).

[17] To be more precise, however, the 30-year cycle would still end with a discrepancy of over one day from the solar year; but this could have gone unnoticed for several cycles.

[18] Pliny, *Natural History* 16. 250: *sexta luna quae principia mensum annorumque his* [the druids] *facit et saeculi post tricesimum annum*, cited as evidence by Duval and Pinault (1986) 401, Olmsted (1992) 21, 61, 73, 132. This is the only literary source available on the Gallic calendar; the implication, at the very least, is that the Gallic calendar was lunar. On *saeculum*, see below. n. 20.

[19] So Duval and Pinault (1986) 401, 415–17. Monard (1999) 83–104 argues that the Gallic month began at the full moon, and dismisses Pliny's report as erroneous. Olmsted (1992) 20–1, 61, 133 argues that Pliny's comment refers to an earlier version of the Coligny calendar (see further below, near n. 23).

calendar scheme or as a cycle.[20] Even if it does mean a 30-year cycle, there is no reason to assume that Pliny is referring to the same calendar as that of Coligny. The theory of the 30-year cycle is thus not grounded on any satisfactory evidence; although it provides a good synchronism between the Coligny five-year calendar, the solar year, and the lunar month, it remains no more than a conjecture.

More recently, Olmsted (1992) has argued that the Coligny five-year calendar was part of a longer 25-year cycle. This is based on his analysis of the three-letter signs (TII, ITI, IIT) that appear recurrently in the calendar, and which he interprets, together with other recurring signs (e.g. N), as indicators of solar phenomena such as the solstices. This interpretation is only fully compatible with a 25-year cycle in which the month of Equos counted 28 days in year 2, but 29 days in year 4 of the five-year cycles.[21] These month lengths would have led to a six-day discrepancy from the solar year after five years, which would have been rectified by the omission of one 30-day intercalary month every 25 years. The three-letter signs, in this interpretation, would indicate the solstices and other solar dates in three successive 25-year cycles.[22] Olmsted (1992) 131 argues that originally a 30-year cycle was followed (and is still represented in the Coligny calendar by the N solar notation), but was later replaced by a 25-year cycle to enable, through the system of the three-letter signs, the long-term prediction of solstices with much greater accuracy.[23]

But although the 25-year cycle is well synchronized with the solar year (as well, in fact, as the 30-year cycle), it is hopelessly out of step with the lunar month. Indeed, the additional day in Equos year 4 (with a 29-day month) causes a one-day discrepancy from the moon every five years, which for a lunar calendar is very significant: it means that the calendar could not have retained its synchronism with the moon, and hence could not have remained lunar, for much longer than ten or fifteen years. This failure to conform to the moon runs counter to the general character of the Coligny calendar, of which the structure of 29- and 30-day months is very clearly designed to be lunar. Olmsted recognizes this problem but argues that the addition of one day to the

[20] Pliny's word for 'era', *saeculum*, could mean something like 'generation': see Duval and Pinault (1986) 401, Monard (1999) 98–9, and on *saeculum* in general, Weinstock (1971) 191–7, Feeney (2007) 145–8.

[21] As explained above (near n. 15), there are indications that Equos counted 28 days in year 2, but not necessarily in year 4.

[22] In each successive cycle the solar events occur one day later, to account for a small, one-day discrepancy between the 25-year cycle and the sun (cf above, n. 17).

[23] Olmsted's model is endorsed by Pinault (1996), who, however, criticizes some philological aspects of his theory. Olmsted (1992) 89–90, 100 identifies the starting-point of the calendar as the winter solstice, unlike McCluskey (1998) 59–76, who, apparently unaware of his work, argues in favour of half-way points between the solstices and equinoxes, on the basis of Celtic survivals in early medieval Christian calendars (which Olmsted in turn explains differently, in a manner consistent with his theory: 1992: 20, 131–3).

five-year calendar, and hence the effective loss of lunar synchronism, would have been deemed a worthwhile sacrifice for the sake of achieving more accurate solstice predictions. This explanation, however, is untenable on a number of counts. It amounts to arguing that the Coligny calendar was essentially an astronomical tool for the prediction of solstices, and that what counted most to its users was the accuracy of these predictions, whereas the calendar itself and its relation to the moon were only a subordinate concern. Yet, the form and contents of the Coligny inscription suggest on the contrary that its primary function was to establish the dates of festivals and 'good' and 'not good' days in a calendar that was clearly meant to be lunar, whereas the three-lettered and other solar notations were only additional and ancillary to it.[24] In addition, it is very unclear whether there would have been anything to gain, for purposes of solstice predictions, from switching from a 30-year to a 25-year cycle. Olmsted demonstrates that with a 25-year cycle the predictions would have been more accurate, but in practice, this higher accuracy would hardly have been noticeable, and would certainly not have justified the loss of synchronism with the lunar month.[25] It is most unlikely, therefore, that this 25-year cycle was ever used as a calendar in practice.

A more plausible suggestion has therefore been made by McCluskey (1998) 58–60, who refrains from conjecturing the existence of cycles longer than five years (for which there is no explicit evidence in the Coligny inscription), and suggests instead that the five-year Coligny calendar was used with irregular, *ad hoc* adjustments so as to keep it in line with the sun and moon. It may be

[24] Olmsted is, remarkably, not bothered by the one-day discrepancy of his five-year cycle from the lunar phases, dismissing it as 'not really a problem' (1992: 15; his lengthy demonstration, ibid. 126–30, of the remarkable accuracy of his reconstruction of the Coligny calendar obfuscates the fact that it is only accurate with regard to its solar, predictive notations, but not with regard to the lunar month). Olmsted argues that as long as this discrepancy was known, calendar users could easily have predicted the true dates of the lunar phases (for which, indeed, the three-lettered signs could also have been used). But this argument, again, is based on the implausible assumption that the function of the Coligny calendar was essentially predictive (i.e. of solstices and, as here argued, lunar phases), and that all that counted to people was to make accurate astronomical predictions—whereas the lunar accuracy of the calendar itself would have been of no concern.

[25] As Olmsted (1992) 126–30 shows, the three-letter scheme applied to the 25-year cycle falls behind the solar year by one day in 454 years; I calculate that a similar scheme applied to the 30-year cycle yields the same discrepancy in only 113 years. This greater accuracy of the 25-year cycle is only noticeable, however, after more than a century, and is unlikely to have been important to the calendar users. It is also questionable whether these figures, which are based on present-day values of the mean tropical year, would have been known to the authors of the calendar (more on this below, n. 33). In relation to the solstice dates of the Julian year (which they certainly could have known; see ibid.), the scheme applied to the 25-year cycle is short of one day in 100 years (which may explain, incidentally, why in Olmsted's interpretation the three-letter scheme avoided going beyond three long cycles or 75 years), whereas when applied to the 30-year cycle it is short of one day in 60 years. Again, the difference between the two is unlikely to have been significant enough for the 25-year cycle to have been adopted at the expense of lunar synchronism.

possible to suggest even further that the Coligny inscription was not used at all as a fixed calendar, but only served as an abstract representation of the Gallic calendar, or at most as a guide or regulating scheme for a lunar calendar that had remained fundamentally flexible and dependent, as most likely in earlier Antiquity, on empirical observations of the moon.[26]

In this light, Olmsted's interpretation of the three-letter notations as solstice dates in a 25-year cycle remains entirely possible, but this cycle could not have been more than theoretical. The three-letter scheme could not have served as a tool for predicting solstices (as Olmsted claims), because the dates provided in this scheme were not those of a calendar that would have been used in practice; these dates, indeed, would have been meaningless to lunar calendar users. The three-letter scheme was therefore not a predictive tool, but a purely theoretical model showing, at most, how solstices could somehow be brought in relation to a schematic lunar calendar.

Origin and dating

The Coligny calendar has often been presented as very ancient; but although some of its features are clearly ancient—in particular, the Celtic archaisms in the names of months and days (Duval and Pinault 1986: pp. xi, 421)—there are strong grounds for viewing it as a product of the Roman period. On palaeographic grounds, to begin with, the inscription is dated to the late second century CE.[27] The Gallo-Roman context of the inscription is evident from the mere fact that it is a written text (although its language is Celtic), and from its use of Latin characters. Also of Roman origin may be the peg-holes that are aligned along each day of the calendar, just as in Greek and Roman *parapegmata*.[28] But above all, the Coligny inscription clearly

[26] McCluskey loc. cit. himself remarks that the Gallic lunar calendar must have been originally empirical. The question that I am raising is to what extent the Coligny calendar was meant to supersede this empirical method with the use of a fixed calendar scheme.

[27] Duval and Pinault (1986) 23, 35–7, implying, however, that it may be even later. This dating, to my knowledge, remains undisputed (e.g. Olmsted 1992: 12, 71).

[28] McCluskey (1998) 54. On the peg-holes in the Coligny inscription, see Duval and Pinault (1986) 19–21. On Greek *parapegmata*, see Ch. 1. 3; on Roman ones, see below. Roman calendars with peg-holes include e.g. the *Fasti Guidizzolenses* (Degrassi 1963: 234–5 no. 40, Rüpke 1995: 160–4, Lehoux 2007: 191–2, and below, n. 84), but much closer to Coligny, the recently discovered *parapegma* from the territory of Nîmes (Gallia Narbonensis) which comprises both the Julian calendar in full and a list of lunar days (*AE* 2003: 1150). Woolf (1998) 96, 230 n. 107 also suggests that the designation of individual days as 'good' and 'not good' in the Coligny calendar is reminiscent of the *fasti* and *nefasti* days in Roman calendars (although the latter were not properly lucky and unlucky days); however, it would be difficult to prove that the origin of this calendrical practice was specifically Roman, as similar practices are attested in many other cultures (e.g. Mesopotamian: see Introduction, n. 9).

imitates, in its concept and design, the Roman tradition of monumental calendar inscriptions.[29]

Another important indication that the Coligny calendar was conceived under Roman influence is that it is schematic and fixed. For it is more than likely that the lunar calendar in Gaul was originally empirical (based on lunar observations) and flexible, as everywhere else in early Antiquity, and to some extent, as I have suggested above, it may still have been so in the Roman period; in this empirical calendar, the length of months and hence their determination as *matu* or *anmatu* (good and ungood) would have been completely variable. The concept of a fixed scheme with alternating 29- and 30-day months and months permanently designated as *matu* or *anmatu* is likely to have arisen by imitation or emulation of the Julian calendar, which had the distinctive and, in the context of earlier Antiquity, the unique characteristic of being schematic and fixed.[30]

The somewhat romantic theory of pre-Roman origins is partly built on the assumption that the Coligny calendar was the product of a very ancient Gallic, druidic tradition of astronomical inquiry.[31] But however much astronomy was

[29] McCluskey and Woolf loc. cit. Olmsted's claim (1992: 71) that the calendar of Coligny, 'aside from the numerals and lettering, shows no Latin influence whatsoever' may be correct (if Latin refers only to the language), but it is misleading, as it obfuscates the Roman characteristics of this inscription.

[30] On the uniqueness of fixed calendars in early Antiquity, which only came about in the latter half of the first millennium BCE by derivation from the Egyptian calendar, see Ch. 4. Olmsted (1992) 15–25, 106, 132–4 believes that the Coligny calendar, or rather an earlier version based on the 30-year cycle, goes back to the early first millennium BCE; the 25-year cycle of Coligny would have been instituted in the 2nd–1st cc. BCE, before the Roman conquest of Gaul. His argument depends entirely on a backward projection of the medieval Irish calendar, and thus on the assumptions, first that the same calendar was used by the Irish continuously throughout this period, and secondly that all Celtic peoples (or at least the Irish and the Gauls) reckoned this same calendar throughout Antiquity and the early Middle Ages. These assumptions are unjustified and historically implausible. Olmsted (1992) 71–4 argues further that only in the pre-Roman period would the druids and Gallic aristocracy have had the socio-economic resources to design this calendar; but this is to underestimate the social and economic standing of the Gallo-Roman aristocracies in the Roman period (on which see Woolf 1998). Olmsted treats the 2.8% incidence of scribal errors in the calendar's notations as evidence of a long process of manuscript transmission (ibid. 11–12, 71, and table 58), but errors such as these could equally have been committed near the time, or even at the time, of original redaction. Olmsted himself remarks that the TII notation system (and the 25-year cycle that comes with it) is too complex not to have been invented in a literate society, which is why he pushes it to the last decades before the Roman conquest (ibid. 73–4, 112); but on this argument, the Roman period is equally well, if not better, suited.

[31] Duval and Pinault loc. cit. (referring to the calendar as going back to 'la nuit des temps') and 399–400, Olmsted (1992). In this context, a passage from Julius Caesar, *Bellum Gallicum* 6. 14. 6 is frequently cited, according to which the druids had 'many discussions regarding the stars and their motions' (Duval and Pinault loc. cit., Olmsted 1992: 2). Unfortunately, however, this brief comment of Caesar's—for what it is worth—does not tell us how much or what kind of astronomical knowledge the druids actually had in the pre-Roman period.

actually known to the druids, scholars have grossly exaggerated the amount of astronomical knowledge that would have been needed for the creation of the Coligny calendar—whether as a five-year cycle, or even as the complex 25-year scheme that Olmsted has proposed. In actual fact, only minimal astronomical knowledge would have been necessary to construct this calendar. Its basic structure, as we have seen, consists of a simple alternation of 29- and 30-day nights, with possibly a few variations to the month of Equos that show signs of trial and error (see above, near n. 16) and that do little to improve the calendar's lunar accuracy. Intercalation at 2½-year intervals is also a rather elementary and inaccurate scheme;[32] even the omission of an intercalary month every 25 years, which somewhat rectifies this inaccuracy, could have been determined empirically without much astronomical expertise. It is true that dates of solstices, assuming Olmsted's interpretation of the three-letter notations, could not have been determined astronomically without considerable expertise; but scholars have failed to note that in the Roman period, the Julian calendar would have provided a convenient and reliable way of computing solstices and equinoxes over lengthy periods without any astronomical expertise whatsoever (only arithmetical competence would have been necessary). Nothing compels us to assume, therefore, that the 25-year scheme that may be implicit in the Coligny calendar was the result of centuries of druidic astronomical inquiry. It could just as well have been conceived from scratch in the second century CE, when the Julian calendar would have provided an easy way of computing its more complex features.[33]

[32] As we have seen in Ch. 2, this scheme was adopted in Babylon during Nabopolassar's reign (625–604 BCE) but abandoned immediately thereafter, and later succeeded by the more accurate 19-year cycle.

[33] The late-2nd–early-3rd-c. clepsydra reportedly discovered in Germany in the river Rhine, which comprises a *parapegma* of the Julian calendar with conventional Julian dates of solstices and equinoxes (e.g. *a.d. VIII kal. Iul.* for the summer solstice: see Ch. 5 n. 162), provides clear evidence that knowledge of these dates would have been available in the region in approximately the same period (*AE* 2003: 1279). The sequence of TII marks does not match exactly the sequence of solstices of the Julian calendar, because it is based on a five-year (or 25-year) cycle, whereas Julian leap years follow a four-year cycle; but this prevent the Julian calendar from having been used as the basis for determining and calculating the solstices of the Coligny calendar. Olmsted (1992) 126–30 shows that the TII scheme lags behind the solar year by one day in 454 years, whereas the Julian calendar exceeds the solar year by one day in 128 years; he credits the druids for discovering and designing a more accurate scheme 'which the Western world was to await 1700 years to rediscover' (ibid. 128). I would submit, however, that the greater solar accuracy of the TII scheme was not deliberate, nor based on independent astronomical knowledge, but rather only the fortuitous result of adapting conventional Julian solar dates to a lunar 25-year cycle. It should also be noted that although the authors of the TII scheme were surely aware of its slight divergences from the solstice dates of the Julian calendar, we have no evidence that they knew or considered their scheme to be more accurate than the Julian (see above, n. 25).

A dissident calendar

The Coligny inscription attests, in many ways, to the Romanization of the Gallic calendar: as mentioned above, its public, monumental display is reminiscent of Roman *fasti* inscriptions, and its fixed, schematic structure is likely to have been inspired by that of the Julian calendar. The emergence of the Gallic lunar calendar as a fixed cycle is congruent with the trend we have observed in previous chapters, where in the context of great empires, empirical lunar calendars became increasingly standardized and fixed. The Coligny calendar was thus part of a much broader historical process, the outcome of the large-scale political changes that transformed the ancient world from the mid-first millennium BCE and through to later Antiquity.

But in spite of its overt Romanizing tendencies, the Coligny calendar retained a strong sense of Gallic identity. This is evident not only in its use of Celtic month and day names, but also in its lunar (or lunar-like) structure of 29 and 30-day months and intercalary months, which bore no resemblance to the structure of the Julian calendar. Although fixed, indeed, the Coligny calendar was not synchronized in any way to the Julian calendar; even the three-letter notational scheme, which may have indicated solar events such as solstices and equinoxes and which may have been calculated on the basis of Julian dates, did not consistently conform to the solstice and equinox dates of the Julian calendar.[34] The consequent impossibility of converting the dates of this calendar into Julian dates (and vice-versa) stands in contrast to calendars of the Roman East which, as we have seen in Chapter 5, were designed to be easily convertible into the Julian calendar; this was achieved, in the Roman East, by abandoning lunar structures and adopting instead various models of the 365-day year. The Coligny calendar, by contrast, remained at least formally lunar (albeit poorly synchronized to the moon) and resisted the adoption of the 365-day year; in spite of its hybrid, Gallo-Roman features, it thus remained far apart from the official calendar of the Roman Empire. In this respect, it is appropriate to categorize this calendar as 'dissident'. By publicly displaying a model of the Celtic calendar that bore no structural identity or synchronicity with the Julian calendar, this monumental inscription constituted at once a mimicry and a grand subversion of the Julian *fasti*.[35]

[34] See previous note. It would have been very difficult for anyone to convert TII dates, in any given year and at any given point of the Coligny calendar, into Julian equivalent dates.

[35] This interpretation, inspired by post-colonial theory (see above, near n. 9), is more nuanced than that of Duval and Pinault (1986) 399, who see in this calendar a 'sentiment de résistance aux usages latins', and of Monard (1999) 235–8, who proposes that the Coligny calendar was redacted and first written down shortly after 46 BCE as a reaction against the institution of the Julian calendar and as an attempt to safeguard Gallic calendrical traditions. Instead of a simplistic model of 'Romanization' and 'resistance' to it, implicit in both these works, I assume

A further indication of dissidence is that the Coligny calendar seems not to have had any official status. It does not appear, indeed, in any dated inscription from Roman Gaul: all dated inscriptions use only the Julian calendar.[36] This suggests that neither the Coligny calendar, nor any other version of the Gallic lunar calendar, were used as local, official calendars in the Gallo-Roman cities. The status of the Coligny calendar in Gallo-Roman society remains in fact unclear. Some have suggested that the proximity of the calendar fragments to a statue of Mars discovered in the same locality and dating from a similar period (50–150 CE) indicates that the calendar was part of a sanctuary, and thus, that its function may have been cultic.[37] The argument of proximity, however, is not convincing; moreover, the multiple uses that a sanctuary may have served in ancient society, together with the difficulty of distinguishing between 'civil' and 'cultic' functions in an ancient historical context, mean that the identification of this calendar as 'civil' or 'cultic' is fraught with difficulties.[38]

This said, the Coligny calendar was neither socially marginal nor an isolated phenomenon. The monumental scale of the inscription, on a bronze plate that measured originally 1.48 m × 0.90 m, indicates that it could only have been produced by people of means. The involvement of the local aristocracy in its production seems evident from the high level of numeracy and literacy that the creation of the 25-year cycle and its complex inscription would have required (even if, as argued above, knowledge of astronomy would not necessarily have been needed). Furthermore, this calendar appears to have been widely diffused. Fragments of a similar calendar have been discovered in the town of Villards d'Héria (commune of Jura), 31 km east of Coligny (Duval and Pinault 1986: 257). These fragments are fully compatible with the Coligny

a more complex model of cultural and political interaction where Roman culture was at once espoused by the Gallic aristocracies and perverted, where it was appropriated but renegotiated and reformulated in their own terms and to their own, perceived political advantage. For similar post-colonialist approaches to Gallo-Roman culture see Woolf (1998) 240–7, Webster (1997).

36 In contrast to the Roman East, where inscriptions are normally dated according to local calendars. Note in particular the Julian dates in Bertrandy *et al.* (2005) no. 38, an inscription from Groslée (south of Coligny, along the Rhône, dated 164 CE), and Wuilleumier (1963) nos. 233–4, 239, late 2nd- and early 3rd-cent. inscriptions from Lugdunum (Lyon, also not too far, in space and time, from Coligny). The *parapegma* on the Rhine clepsydra (above, n. 33), also not far from Coligny and dating from about the same period, comprises only the Julian calendar; but here the absence of any other calendar is of limited significance, because the purpose of this *parapegma* was to adjust the settings of the clepsydra to seasonal hours for which a lunar or other calendar might not have been useful. The lunar *parapegmata* from Gaul do not necessarily imply the use of lunar calendars: see discussion further in this chapter.

37 Duval and Pinault (1986) 35–7, Olmsted (1992) 70–1.

38 Duval and Pinault (1986) 399, 431–2 conclude that the Coligny calendar served as the 'civil' calendar of the Gallo-Roman *municipia* on the grounds that—in their view—there is nothing particularly religious or cultic about it. This line of argument, distinguishing 'civil' from 'cultic' and assuming their mutual exclusivity, is clearly unsatisfactory.

calendar;[39] although too small to prove that both calendars were identical, they are sufficient to demonstrate that the Coligny calendar was not an isolated phenomenon. Although Coligny and Villards d'Héria are relatively close to one another, the topography is such that access between them is difficult; furthermore, Coligny was in the tribal territory of the Ambarri, whilst Villards d'Héria was in that of the Sequani. This indicates that Gallic lunar calendar inscriptions spread to more than one region and tribe of Roman Gaul. But in the absence of evidence that both calendars were identical, it is impossible to determine the extent to which the Gallic fixed calendar may have been standardized, and hence, to what extent calendar dissidence may have been structured and organized in the context of Roman Gallic society.

2. *LUNA* DATES IN LATIN SOURCES

Lunar dates and lunar *parapegmata*

Latin inscriptions from the Roman imperial period are dated nearly always according to the Julian calendar, but some, in addition, include a lunar date. Lunar dates are attested mainly in Italy and Rome, and suggest the survival of lunar calendar reckoning in what one would have expected to be the heartland of the Julian calendar. In this section, I shall propose that the use of lunar dates in Latin inscriptions can be interpreted as dissident.

Lunar dates in Latin inscriptions, as in later (mainly Christian) literary sources, are expressed by the standard formula: *luna* (ablative) + ordinal. This formula indicates the day number in a lunar month, but does not identify this month by name or number. The total number of inscriptions that use this formula is not large, but large enough to be regarded as significant. The formula is mainly found in Christian inscriptions from late antique Rome, but its early pre-Christian attestation supports the view that it was actually an ancient Italian tradition. Its earliest attestation, indeed, is a late republican sarcophagus inscription from Ferentium, Etruria, which is dated as follows:

> a(nte) d(iem) XV K(alendas) Octob(res) C(aio) Ca[lpurn]io Pisone M(anio) Acilio co(n)s(ulibus) mens(e) Gigne . . . luna III

The year, dated by the Roman consuls, is 67 BCE. The date is given according to the Roman republican calendar (of which the equivalent in the retrojected Julian calendar is uncertain, although we may assume some time in mid-September); but in addition, reference is made to a month called

[39] Olmsted (1992), table 62.

'Gigne'—perhaps a local Etruscan month-name, although it is not attested elsewhere—and to the third day of the lunar month. There is a short lacuna after the word Gigne (which is itself poorly legible): it may have contained the day number in month Gigne. Alternatively, Etruscan Gigne may have been assimilated to the Roman month of October and conterminous with it, thus eliminating the need for a day number. Finally, it is possible that the month Gigne (and the rest of the Etruscan calendar) was itself lunar, and that the word *luna* was only added here for clarification or emphasis. In any event, the mention of a lunar date with the *luna* formula at the end of the inscription is beyond dispute.[40]

The next inscription is from Pompeii, and dated Sunday 6 February 60 CE, *luna* 16.[41] Later inscriptions are from the third century and beyond; the following are from Rome, in approximate chronological order:[42]

1. Saturday, 20 November 202 CE, *luna* 18 (*AE* 1941: 77, 1946: 85, 1980: 60).
2. Friday, 5 November 269, *luna* 24 (Diehl 3391, *ICUR* ix. 24315).
3. Friday, 15 February (317), *luna* 17 (*ICUR* vii. 17423).[43]
4. Thursday, 17 April (357), *luna* 12 (*ICUR* v. 13104).
5. Saturday, 8 May 364, *luna* 20 (Diehl 4377, *ICUR* vi. 15587).
6. Thursday, 24 May 378, *luna* 12 (Diehl 4378).
7. Sunday (23 August 386),[44] *luna* 12 (AE 1905: 79, Diehl 4379, *ICUR* ii. 6042).
8. Friday, 17 September (392), *luna* 15 (Diehl 4381, *ICUR* ii. 6502).
9. Wednesday, 25 February 397, *luna* 12 (Diehl 2777, *ICUR* vii. 17511).
10. Thursday, 10 May (423), *luna* 15 (Diehl 4383, *ICUR* vii. 19984).
11. Thursday (26 December 463), luna 1 (*AE* 1917–18: 95, Diehl 4384, *ICUR* x. 27666).
12. (25 April 502), *luna* 1 (Diehl 4874, *ICUR* v. 13959, *CIJ* i, no. 81*, Noy i. 401).

[40] *CIL* i/2. 2511, *AE* 1922: 91; *AE* 1963: 35; *AE* 1983: 394. For full discussion see Emiliozzi (1983), whose reading I have used here.

[41] *CIL* iv. 4182, *AE* 1897: 24; the nundinal day (Cumae) is also given. The reading of the lunar date is problematic (see Holford-Strevens 2008: 206). According to our reckoning of the week, 6 February 60 CE should have been a Wednesday; this raises the possibility that in Italy. in this early period, the seven-day week was counted differently from ours (see Brind'Amour 1983: 268–70, Stern 2010*a*: 111 n. 39). From the 2nd or 3rd cc. CE, however, there is reasonable evidence that the seven-day week count had become standard and was the same as ours today, even though errors were not uncommon in documents and inscriptions (see Worp 1991; Stern 2001: 107 n. 31, Meimaris and Kritikakou-Nikolaropoulou 2005: 48–51; 2008: 44; Stern 2010*a*: 110–11); however, the seven-day count in Antiquity is still in need of a systematic investigation.

[42] References to *ICUR* (*Inscriptiones Christianae Urbis Romae*) are to the new series. Brackets are textual reconstructions (by earlier scholars, except for no. 20, which is my own). I have omitted Diehl no. 4380 (*ICUR* vi. 17249), because the reading *(luna VII)I* is only a textual conjecture.

[43] This supersedes the reading in Diehl no. 4382, still cited in Holford-Strevens (2008) 207.

[44] There are many other possible dates, all in Honorius' reign: see n. 74 below.

13. 6 Ma(y), *luna* 3 (Diehl 4386).
14. Wednesday (?), *lu(na)* (?) (*ICUR* viii. 21476).

Nearly all these inscriptions are identified by Diehl (1925–31) as Christian, yet only six have clearly Christian identity markers.[45] No. 12 (in this list) has been identified as Jewish, although this identification is questionable.[46] No. 1 is not considered Christian. There is thus no reason to assume that *luna* datings were specifically Christian in this period. The relatively high representation of Christian inscriptions in this corpus is probably only a reflection of the generally high proportion of Christian funerary inscriptions in late Antiquity, itself indicative of the extent of Christianization in late-antique Rome. The *luna* formula is also common in late-antique and medieval Christian works on the computus (calculation of the date of Easter, which is based on a lunar calendar cycle): *luna XIV*, typically, represents in these sources the date of the biblical, Passover upon which the date of Easter is based.[47] Still, this does not mean that the *luna* formula had become, in this later period, specifically Christian.

In the following list, which comprises *luna* inscriptions from outside Rome and Italy, no. 15 is Jewish,[48] nos. 16–18 are pagan,[49] and nos. 19–20 are Christian. Their provenance suggests that in the late Roman period, *luna* datings had spread to the entire Latin West. The relatively high occurrence of *luna* inscriptions from Rome (nos. 1–14 above) is probably only a reflection of the generally high proportion of funerary inscriptions from there.

15. Catania (Sicily), Friday 2(0)[50] October 383, *luna* 8 (*CIJ* i. 650, *AE* 1984: 439, Noy i. 145).
16. Apulum (Dacia), Thursday 23 May 205, *luna* 18 (*CIL* iii. 1051, *AE* 1982: 808).
17. Aquincum (Pannonia), (April, third century), *luna* 2 (*AE* 1982: 808).

[45] These are (from the list above) nos. 3, 5, 6, 8, 9, and probably 2.

[46] It is identified as Jewish by Diehl (1925–7: ii. 491, perhaps on grounds of provenance) and Noy (1993–5: ii. 331, purely because of the *luna* formula); but see discussion in Stern (2001) 135 n. 109.

[47] For a good sample, see sources cited by Krusch (1880), E. Schwartz (1905) 29–104, chs. 2–5, and Strobel (1984). The use of *lunae* (in the genitive), e.g. *XIV lunae*, is also attested in these sources but far less commonly. The computus is discussed below in this and the next chapter; see also Blackburn and Holford-Strevens (1999) 801–5 and Mosshammer (2008).

[48] See discussion in Stern (2001) 132–6.

[49] No. 16 is a dedication to Jupiter Optimus Maximus, 17 a dedication to 'Sun-God Mithras Invictus', and 18 to Mercury.

[50] The text reads *XII kal. Novembres* (21 October), but this is incompatible with Friday and presumably an error (in the context of a Jewish inscription, this is more likely than that Friday is the error: Stern 2001: 133).

18. Untersaal (Raetia), Monday 23 May, *luna* 5 (231) (*CIL* iii. 11943).
19. Vasio (Gallia Narbonensis), Monday 19 October 470, *luna* 17[51] (*CIL* xii. 1497, Diehl 1927).
20. Tiaret (Mauretania Caesariensis), Tuesday (12)[52] August 480, *luna* 21 (*CIL* viii. 21550, Diehl 4385).

The use of *luna* datings in inscriptions from outside Italy may reflect, in some cases, local calendrical practices: for example, no. 19 may be related to the Gallic lunar calendar that has been discussed above, and no. 15 is most probably related to the Jewish lunar calendar (more on this below). However, it would be wrong to generalize from these cases that *luna* dates were always reflections of local provincial calendars. At least two of the inscriptions from the Danube provinces (nos. 16 and 18) were set up by army veterans; in these cases, it was through the medium of the Roman army, rather than because of local calendrical practices, that the practice of *luna* dating spread. There is no doubt that the *luna* formula was a specifically Latin-language tradition, originally from Italy (as the early inscriptions from Ferentium and Pompeii testify) and even in the late Empire still largely confined to Italy (or more specifically, Rome). Its appearance in other provinces of the Roman Empire was only the result of the general diffusion of Latin culture in the West.

The ability to record any day of the lunar month, evident in these inscriptions, suggests that lunar days were regularly and continuously counted. Material evidence of lunar counting in Roman society can be recovered from numerous fragments of Latin *parapegmata* that tracked, with numbered peg holes, the days of the lunar month.[53] For example, the *parapegma* from Trajan's baths in Rome includes a row of the seven planets (depicted as personified figures), a zodiac wheel, and a sequence of numbers from I to XXX, all with peg holes. Its purpose was clearly to indicate, by moving a peg along the holes, the current day of the planetary week, the current zodiac sign, and the current day of the lunar month—all which the Julian calendar or traditional *fasti* did not represent. The lunar character of the third sequence is evident from the fact that it has only 30 days (whereas some Julian months

[51] This lunar date is erroneous; see discussion below, n. 82.

[52] The inscription reads *idus Augustae*, i.e. 13 August, which is inconsistent with the other calendrical data. Diehl suggests as a correction either Wednesday or *luna* 20; the former is a possibility (the latter is not), but my suggested correction (*pridie idus Augustae*, i.e. 12 August) fits better the lunar date, as it brings it in line with the conjunction (on which see discussion below).

[53] As Lehoux (2007, esp. 14, 28, 142–3) has shown, Greek and Latin *parapegmata* differ in this respect, as the former are, in content and function, mainly astro-meteorological (see Ch. 1. 3), whereas in the Latin tradition *parapegmata* are more calendrical and designed to track the days of different (and incompatible) cycles such as lunar, hebdomadal, and nundinal (see also Degrassi 1963: 299–313, Salzman 1990: 8–10).

have 31 days) and that these days are consecutively and upwardly numbered, unlike the days of Roman calendar months.[54] A similar sequence of numbers—i.e. lunar days—with peg holes is attested in the *parapegma* from Puteoli, the Latium *parapegma*, the Neapolitan *parapegma*,[55] and without peg holes, in calendar (or 'parapegmatic') inscriptions from Pompeii, Veleia, and Ostia (the latter with the caption '*Lune*').[56] A number of lunar *parapegmata* have also been found in Gaul, most notably one from the territory of Nîmes, where the sequence of numbers from 1 to 30 has a moon crescent on top, clearly designating it as lunar, and a *parapegma* mould from third- or fourth-century Trier where each of the 30 peg holes is surrounded with what may represent a lunar disk.[57] An inscription from Dura-Europos has images of the seven personified planets and lunar day numbers from 1 to 30 headed with the caption '*Luna*'.[58] Something like a *parapegma*, possibly with lunar days, is described in Petronius' *Satyricon* (30, 3–4): 'the other (board had inscribed) the course of the moon and painted pictures of the seven stars, and which days were good and which bad were marked by a peg that distinguished them'.[59] It seems reasonable to conclude, therefore, that the *luna* dates in the funerary and other inscriptions above-listed were determined with the help of lunar *parapegmata*.[60]

[54] On this *parapegma* see Degrassi (1963) 309 (no. 56), Rüpke (1995) 590–1, and Lehoux (2006) 99, with discussion in Eriksson (1956) 17–25, Lehoux (2007) 16–17, 168–70. Its 4th-c. dating should be treated as completely uncertain (ibid. 168).

[55] Puteoli: Degrassi (1963) 310, Lehoux (2006), (2007) 158–60. Latium: *CIL* vi. 32505, Degrassi 300–1 (no. 49), Lehoux (2007) 32–5, 171–2. Neapolitan: *CIL* x. 1605, Degrassi 307 (no. 55), Lehoux (2007) 173. The Latium *parapegma* is of unknown provenance; it lists the days of the week, nundinal days, season dates and lengths, and a fragmentary sequence of upwardly numbered days.

[56] Pompeii: *CIL* iv. 8863, Degrassi 305 (no. 53), Lehoux (2007) 42–3, 173–4 (with complete and separate lists of the days of the week, nundinal days, the days of the Julian month, and 30 consecutive days). Veleia: Degrassi 313 (no. 59), Lehoux (2007) 172 (marble plate with fragmentary sequence of upwardly numbered days, and images of stars and moon crescents). Ostia: *CIL* xiv. 2037, Degrassi 312, Lehoux (2007) 173.

[57] Nîmes *parapegma*: *AE* 2003: 1150 (comprising also the Julian calendar in full). Trier mould: Rüpke (1995) 591 n. 95, Lehoux (2006) 101–2, (2007) 175–7; the significance of this mould is that it shows that *parapegmata* of this kind were produced on a large scale, presumably in response to market demand (ibid.). The Rottweil *parapegma* (ibid. 178–9) is likely also to have included a sequence of lunar days.

[58] Ibid. 170–1.

[59] Translation ibid. 41–2; see also Eriksson (1956) 40–2. The location of this board, hanging on the doorpost of Trimalchio's *triclinium,* suggests perhaps that *parapegmata* of this kind could be used in private houses (unless the intention of this passage is, as elsewhere in the narrative, to expose Trimalchio's inappropriate pretensions). The Pompeii inscription (see above) was located on a shop wall.

[60] As already proposed by Eriksson (1956) 36–7.

The astrological interpretation

Most scholars have interpreted the *luna* dates in funerary and other inscriptions (e.g. Eriksson 1956: 27–9, 34–5), as well as the lunar *parapegmata* (Lehoux 2007), as astrologically motivated. This interpretation is based on the frequent appearance, in the same inscriptions and *parapegmata*, of the planets and the signs of the zodiac, which, as is well known, were both invested with astrological significance. Thus the *parapegma* from Trajan's baths combines very distinctly all three motifs (lunar, planetary, and zodiacal); whilst the Pompeii calendar, the Latium *parapegma*, the Neapolitan *parapegma,* the Dura-Europos *parapegma*, the Trier mould, and perhaps also Petronius' *parapegma*, contain the seven planetary days together with the 30 days of the lunar month. Nearly all the *luna* inscriptions (listed above) are dated also by the day of the week, of which the planetary meaning is far more explicit in Latin than in English, since the seven days of the week are named after the seven 'planets' (Sun, Moon, Mars, Mercury, Jupiter, Venus, Saturn) which were believed to exert astrological influence over their allocated day.[61] The presence of these astrological motifs, albeit implicit, in the *parapegmata* and inscriptions suggests that the lunar date had also some astrological meaning.

This astrological interpretation finds further support from the importance of lunar astrology in Graeco-Roman culture and more particularly in the Latin tradition.[62] References to the moon's influence on vegetation, crops, cattle, etc., and the specific properties of various days of the lunar month—propitious or unpropitious for various activities, people, or things—are well attested in Latin agricultural calendars, e.g. of Varro and Columella, though hardly in their Greek counterparts.[63] This seemingly traditional interest, in Rome or in Italy, in the astrological properties of lunar days may explain the concentration of lunar elements in Latin *parapegmata* as well as the preponderance of *luna* dates in Roman or Latin inscriptions.

But whilst the astrological interpretation seems justified in certain contexts, such as the *parapegma* from Trajan's baths, in many others it has been taken too far. Let us consider, for example, the calendar codex of Philocalus,

[61] As first explained by Vettius Valens (2nd c. CE), *Anthologiarum Libri* 9. 1. 10.

[62] The 30 days of the lunar month and their astrological properties are listed in the Greek *selenodromia* (see Delatte 1924: 121, with some examples pp, 71–6, 121–6), from which were largely derived the early medieval, Latin equivalent *lunaria* (see Svenberg 1963: 5–6). A 4th-c. Latin *lunaria* text attributed to Marcellus Empiricus is cited in Eriksson (1956) 35.

[63] Except for a substantial section in Hesiod (*Works and Days* 765–810), which does not recur in later Greek agricultural calendars: Hannah (2005) 116, Lehoux (2007) 42–6. For Latin sources see e.g. Cato, *De Agricultura* 29; Cicero, *De Divinatione* 2. 33; Vergil, *Georgics* 1. 277–8 (and Servius *ad loc.*); Pliny, *Nat. Hist.* 18. 228, 275–7, 290–2, 308, 314, 318, 321–5 (cited in Lehoux 2007: 253–61), and esp. 347–50; Columella, *Res Rustica* 2. 10. 10, 8. 7. 4–5, 11. 2. 85, 11. 3. 22; and generally, Tavenner (1918). Note, however, that in Manilius' *Astronomica* (early 1st c. CE, largely astrological) the moon is not given any particular importance.

composed in Rome in 354 CE. This well-studied document comprises, in section VI of the codex, an extensive calendar with a total of five columns, of which the last three are common to most Roman calendars or *fasti*: the nundinal cycle (an 8-day cycle marked with letters running from A to H), the Julian calendar months and days (starting with the Kalends of January), and finally a list of festivals, games, or other events associated with specific days. The second column, more original, is a seven-day cycle (marked with letters running from A to G), which confirms that by the fourth century the seven-day week had become an integral part of the Roman calendar. The first column can be identified as a lunar calendar, as it lists a succession of 30- and 29-day months, subdivided into ten three-day sections (with one two-day section in 29-day months) marked with letters running from A to K.[64]

Earlier scholars have interpreted the purpose of this lunar column as astrological; but this interpretation is weak, and depends entirely on an analogy with the seven-day week column, whose astrological interpretation is intricate and equally tenuous. Thus H. Stern (1953) 55–7 argues that the seven-day week in the second column begins on Saturday, because 1 January is marked with the letter A and we know that in the year 354 CE, which the calendar refers to, 1 January was a Saturday; that a week beginning on Saturday must be astrological, as is incompatible with biblical (Jewish or Christian) traditions, but corresponds to the traditional reckoning of the planetary week;[65] and that if the seven-day week column is thus astrological, the same can apply by analogy to the lunar column alongside it. But the whole premise of this argument is flawed, because it is actually unlikely that the calendar refers to the year 354 CE—even though this is the last year in section VIII of the same codex.[66] In 354 CE, indeed, 1 January fell on or around the 20th of a lunar month, whereas the lunar column in this calendar begins with the letter A, suggesting the beginning of a lunar month. The calendar must rather have been intended for 355 CE, when on 1 January we find the unusual

64 Section VI of the Codex: Degrassi (1963) 237–62 no. 42 ('*Fasti Furii Filocali*'), Lehoux (2007) 192–4. Other sections of the Codex, which are referred to presently, were published separately in Mommsen (1892). For detailed studies see H. Stern (1953) and Salzman (1990).

65 Dio (37. 18–19) and subsequent writers (including the author of section IV of our calendar codex of 354) treat the planetary week as beginning on the day of Kronos or Saturn (i.e. Saturday); but this is already evident in the (1st-c. BCE?) *parapegma* of Pausilypon (Degrassi 1963: 304 no. 52; Lehoux 2007: 12–13, 174), in several inscriptions from Pompeii (*CIL* iv. 6779, 8863), as well as in the *parapegmata* from Dura-Europus, from Trajan's baths in Rome, the Latium *parapegma*, the Trier mould (see references above, nn. 54–8), the Trier *parapegma* (Lehoux 2007) 176, the Arlon *parapegma* (ibid. 177), and the Rottweil *parapegma* (ibid. 178–9). Only Vettius Valens—whose perspective is also astrological—presents the week as beginning on the day of Helios (i.e. Sunday: *Anthologiarum Libri* 9. 1. 10). See further Blackburn and Holford-Strevens (1999) 566–8, and in this specific context, Salzman (1990) 30–2, Lehoux (2007) 40–1.

66 Mommsen (1892) 50–61. See Salzman (1990) 36–9.

coincidence of Sunday and the beginning of a lunar month.[67] Indeed, it may have been in anticipation of this triple coincidence that this calendar was especially prepared.[68]

If the seven-day column in this calendar began, therefore, on Sunday, it need not have represented anything but the Judaeo-Christian week; there is no reason to read anything astrological into it. The same applies to the lunar calendar: if anything, analogy with the seven-day column would suggest that the lunar column had some Christian purpose, e.g. to facilitate the calculation of the dates of Easter (which are themselves listed in section IX of the same codex),[69] rather than an astrological meaning of which there is no hint in this section of the codex.[70]

The astrological interpretation of the *luna* dates in funerary and other inscriptions is also based on only tenuous evidence. One of the arguments is that in at least two of the *luna* inscriptions, the date includes not only the lunar

[67] Hannah (2005) 140–1 (but ignoring the coincidence with Sunday). The lunar conjunction was actually on 31 December 354 CE, but this does not mean that 1 January 355 could not have been taken as the beginning of the lunar month. According to the *supputatio Romana* (Christian Easter cycle, on which see below), the epact (lunar date on 1 January) of 355 would have been 2 (the lunar month thus beginning on 31 December 354: Mosshammer 2008: 210); however, we should not assume that the author of the Codex necessarily followed it. Epacts are listed in the consular table in section VIII of the Codex, but the list unfortunately ends in 354. We can establish, however, that this list does not consistently follow the *supputatio*: e.g. the epact for 354 is given as 22, whereas according to the *supputatio* it should have been 21; on the other hand, an epact of 22 in 354 seems to preclude an epact of 1 in 355, so that section VIII of the Codex does not clearly support my interpretation of the lunar column of section VI. On balance, however, it seems to me that the triple coincidence (if only approximate) cannot be ignored.

[68] Lehoux (2007) 192–4 argues that the lunar column was not tied to any particular year, with A on 1 January representing the beginning of a lunar month; the lunar letters could be used in fact in any year, as long as it was known that A represented each year a different day of the lunar month, and as long as this day (the 'epact') was known—just as the nundinal letters (from A to H), in all Roman *fasti*, were used. Whilst Lehoux is right, in general, about the function of nundinal letters in Roman *fasti*, and although the lunar letters A–K in this calendar are reminiscent of nundinal letters, a flexible use of the lunar letters in this manner would have disrupted, in some years, the correct distribution of 29- and 30-day months within the calendar (in the calendar of Philocalus, as in the Roman Easter cycles, the first lunar month ending in January must have 30 days, followed by 29- and 30-day months in alternation). It seems preferable to argue that although the calendar could have been reused in other years (and may even have been intended for this purpose), it was primarily designed for 355 CE, when 1 January coincided with the beginning of a lunar month appropriately represented with the lunar letter A.

[69] Mommsen (1892) 62–4, on which see Salzman (1990) 39–41. Note that the weekdays (in the calendar, section VI) would also have been essential for the calculation of the date of Easter, which must always be a Sunday: H. Stern (1953) 57. Below I shall argue, however, that the main purpose of the lunar column is more likely to have been calendrical (i.e. to be used as a dating method).

[70] *Pace* Hannah (2005) 141. Although astrological interests are evident in some other sections of the codex (section IV on the planets, and section V on the position of the moon in the zodiac; Mommsen 1892: 42–7), this should not determine our interpretation of the calendar in section VI.

day and planetary weekday, but also the zodiac sign—distinctive of astrological dating.[71] The first of these two inscriptions (no. 5 above) reads:

> VIII Idus Madias die Saturnis luna vigesima sicno apiorno (8 from the Ides of May, Saturday, lunar day 20, sign of apiorno).

The term *apiorno* is a corruption of *capricorno*;[72] as can be astronomically verified, the moon was in this zodiac sign at the date of the inscription, Saturday 8 May 364.[73] The second inscription (no. 7 above) reads:

> . . . s Honorio [. . .] v.c. conss. [. . . di]e Solis [. . . lu]na XII signo [capricor]nus

The mention of a 'sign' is beyond doubt, but the rest of the inscription is fragmentary and the word *capricornus* (which, incidentally, would be grammatically incorrect) is only a conjecture. The date of the inscription is uncertain, because of its fragmentary state; any other zodiac sign would equally be possible.[74] Although the astrological interpretation of the term 'sign' in both inscriptions is plausible, it would be risky to infer from these inscriptions that *luna* dates were generally invested with astrological meaning.

The use of planetary weekdays in most of the *luna* inscriptions is also no evidence of any astrological intent. Weekdays could simply have served as a dating method, just as they are today. In the Christian context of the later Roman Empire, they could also have been invested with religious significance.[75]

Support for the astrological interpretation of *luna* dates has further been sought from the *lunaria* (lunar astrological texts, preserved in medieval Latin manuscripts), at least in connection with inscription no. 13 (although a similar argument could be extended also to other inscriptions). This is the funerary memorial of Samsacius, a child who was born on *luna III*. We know from a

[71] Eriksson (1956) 27–9, plausibly arguing that the inclusion of the zodiac sign could not have been purely for calendrical dating purposes.

[72] As noted by the editor of *ICUR* vi. 15587.

[73] How this would have been known to the authors of the inscription is unclear. *Parapegmata* such as that of Trajan's baths may have been used to track the zodiac sign of the moon (Eriksson 1956: 27), but this is very debatable (Lehoux 2007: 170).

[74] The date conjectured by Diehl, 23 Aug. 386, is perhaps unlikely because it assumes a lunar month beginning one day after conjunction (see discussion below). However, there are many possible dates that combine Honorius as first consul, Sunday, and *luna XII* assuming a lunar month beginning from the conjunction: 26 Apr. 386, 14 Feb. 398, 10 Jan. 404, 5 May 407, 14 Mar. 409, 10 Mar. 412, 1 Dec. 412, etc. I have not checked the position of the moon in the zodiac on all these dates, but they are surely not confined to Capricorn.

[75] Eriksson (1956) 31–3 claims that the astrologically favourable days of Jupiter and Venus (Thursday and Friday) are more frequent in late antique funerary inscriptions, which suggests a planetary astrological intention. However, his statistical evidence is not convincing: it only really shows the prevalence of Friday, which as he himself acknowledges, would have been significant to Christians as the day of the Crucifixion. On the significance of Thursday in late pagan culture see Blackburn and Holford-Strevens (1999) 578.

lunaria text that *luna* III was considered unpropitious for childbirth: *Luna III . . . infans si fuerit natus, mediocrus* [sic] *et non erit vitalis* ('on the 3rd lunar day, if a child is born he will be weak and not viable'). It has therefore been argued that the authors of inscription no. 13 (presumably the parents) specified that Samsacius had been born on *luna III* in order to provide an astrological explanation for his untimely, infant death.[76]

This interpretation, however, is untenable in view of the inconsistency of the *lunaria* texts. Although some of the Latin *lunaria* state, as cited above, that the third lunar day is unpropitious for childbirth,[77] others state on the contrary that it is propitious.[78] There is no way of knowing which of these *lunaria* Samsacius' parents used, if indeed they used any astrological text or tradition at all. We cannot confirm, therefore, that *luna* III in this inscription was invested with any astrological significance, more than simply representing a date.

An important reason for questioning the astrological interpretation of *luna* dates is that the earliest inscription with this dating formula (from Ferentium, 67 BCE—cited above) is completely devoid of any astrological content, i.e. not only zodiac sign but also planetary weekday. Even if, in later Antiquity, the *luna* dates may have become invested with astrological meaning—a theory which remains possible, although not clearly substantiated—the earlier, original *luna* dates were certainly nothing but a way of dating. There is no reason to expect that they ceased being used in this way in the later period. This leads us to consider, therefore, a calendrical interpretation of the *luna* dates.

Luna dates as a way of dating

According to the astrological interpretation which I have just discussed, the meaning of the *luna* formula was primarily astrological: what it conveyed, for astrological purposes, was the *age of the moon*—a purely astronomical fact—at the time of the event recorded in the inscription. I shall now propose, however, that the meaning of the *luna* formula was rather calendrical: what it conveyed, alongside the Julian date and the weekday, was a *lunar date*, i.e. the day of a lunar month, and was thus a way of *dating* the event in the inscription.

This interpretation implies at first sight the existence of a lunar calendar, from which the *luna* dates were derived and to which, in turn, they referred. In the context of the Ferentium inscription of 67 BCE, it is entirely possible that

76 Eriksson (1956) 34, citing the *lunaria* text in MS Gothoburg. 25.

77 To the text cited by Eriksson loc. cit. we may add MS Vat. Lat. 642, fos. 91a–94b (in Svenberg 1963: 31): *Luna III . . . qui nascitur in ea non erit vitalis.* This manuscript dates from the 12th c.

78 MS. Paris nouv. acq. lat. 1616, fos. 10a–12b (Svenberg 1963: 23): *Luna III . . . qui natus fuerit, vitalis est.* This manuscript is earlier, from the 9th c.

the *luna* date refers to a local, Etruscan lunar calendar, which was cited and used alongside the Roman date.[79] But in late Antiquity, there is no obvious lunar calendar to which these dates could have referred. The theory that epigraphic *luna* dates referred to an official lunar calendar that was publicly used, alongside the Julian calendar, in the Christian Roman Empire has long been rejected as without foundation.[80] Christian lunar calendars (the Easter cycles) were available in this period (more on this below), but they were only designed for the computation of the date of Easter; they are not known to have been used for general purposes of dating or time-reckoning. Indeed, frequent discrepancies between epigraphic *luna* dates and the Easter cycles suggest that even in late Antiquity *luna* dates in inscriptions were not derived from any known Christian lunar calendar.[81] That the *luna* formula does not imply or refer to a lunar calendar is confirmed by the limited information that it supplies: it gives the day number in a lunar month, but does not identify this month, either by name or by number. At most, *luna* dates implied a monthly—but not an annual—lunar calendar.

The absence of a standard lunar calendar for the *luna* dates to refer to, however, does not mean that *luna* dates could not have functioned usefully as a method of dating. Most *luna* dates in the inscriptions assume a lunar month beginning at the conjunction (and not, as in many other lunar calendars, at first visibility of the new crescent).[82] This apparently shared convention would have given a commonly recognized meaning to all *luna* dates. As to the absence of lunar month-names or numbers, the *luna* date would have been no worse than weekdays, which until this very day are used for dating

[79] The term *Gigne* in the inscription appears to be a local Etruscan month-name: see above, near n. 40.

[80] This theory is Mommsen's, cited in full and easily refuted by Eriksson (1956) 29–31.

[81] This can be illustrated from the Christian *luna* inscriptions from Rome of the second half of the 4th c., of which only four are securely dated (nos. 5, 6, 9, and probably also 4). If any Easter cycle was used by late-4th-c. Christians in Rome for the computation of epigraphic *luna* dates, it would have been the *supputatio Romana*. Two *luna* dates in these inscriptions conform to the *supputatio* (nos. 4 and 6) but the other two are retarded by one day (nos. 5 and 9). The relationship between Christian Easter cycles and *luna* dating will be further considered below.

[82] By 'conjunction' I mean here the day (from midnight to midnight) within which, according to our reckoning, the conjunction of sun and moon occurred. Some flexibility should be allowed, given the difficulty for ordinary ancient people to calculate the moment of conjunction with any precision. The Pompeii inscription from 60 CE (above, near n. 41), then nos. 2, 4, 5, 6, 9, 15, and 16 are reasonably compatible a lunar month from the conjunction; only no. 1 implies a lunar month from one day after (other inscriptions are uncertain because too fragmentary). See lunar data in Holford-Strevens (2008) 206–7. The lunar date of no. 19 (. . . *luna XVII, vixit ann(os) XLVI*. . .) is clearly erroneous, and should be either *VIIII* (so Diehl) or *X* (maybe preferable, as the erroneous *XVII* can then be explained somehow as dittographic, due to the word *VIXIT* that follows—and *X* would imply again a lunar month from the conjunction). The date of no. 20 is uncertain, but possibly in line with the conjunction (see above, n. 52). This all conforms to Pliny's statement that the lunar month begins at the conjunction (*coitus*) of the sun and moon (*Nat. Hist.* 18. 323–5), although he may just have meant the period when the moon is invisible (so Bowen and Goldstein 1994: 707 n. 36).

purposes without constituting in themselves a calendar, and without the weeks being either numbered or named. Just like weekdays, which are effective especially if combined with other dating schemes (e.g. Julian dates), the days of the lunar month could have functioned as an effective method of dating—especially as *luna* dates always appear, in the inscriptions, together with a Julian date.[83] In this respect, the *luna* formula could have functioned as an integral part of the inscriptions' dates.

The inclusion of the *luna* formula within the dates of the inscriptions is, indeed, a sufficient reason to interpret it primarily as a form of dating. As we have seen, it is attested as such in the Ferentium inscription of 67 BCE, in a period when the local calendar itself may still have been lunar, as were other Italian calendars in this period (see Chapter 4 n. 192). The persistence of this formula well into late Antiquity could well have been a survival of local Italian dating methods and calendars, which in the Republican period had been mostly lunar.

The survival of lunar calendar reckoning in the culture of the Latin West is also evident in other ways, not least in the well-attested lunar *parapegmata*. As noted above, the availability of lunar *parapegmata* explains how the full range of lunar days could have been used in *luna* inscriptions, and suggest that a continuous count of lunar days must have been commonly reckoned. It is unlikely that the use of lunar *parapegmata* served only astrological purposes and not the more general function of time-reckoning. *Parapegmata* in the Latin West are known to have been used as calendars, at least those that include the Julian calendar; it is entirely plausible, therefore, that lunar *parapegmata* were similarly used as lunar calendars.[84]

[83] A similar phenomenon has been observed in Ch. 3 in relation to Egyptian lunar dates: although lunar months were generally not identified by name or number, lunar dates were still used, in conjunction with civil calendar dates, as a method of dating.

[84] I disagree with Lehoux's theory, in his otherwise excellent study of Greek and Roman *parapegmata*, that *parapegmata* were distinct from calendars and designed to track only 'extra-calendrical' phenomena, i.e. phenomena not represented in calendars, which would explain why lunar days are absent in Greek *parapegmata* (since Greek calendars were anyway lunar), whereas in the Roman tradition, where the calendar was not lunar, lunar days were sometimes included (Lehoux 2007: 31, 54, 86, 97). This theory is over-neat, and ignores a considerable number of Latin *parapegmata* that include the Julian calendar and must necessarily have served calendrical purposes: the Pompeii calendar inscription (above, n. 56), the *Fasti Guidizzolenses* (which is actually a *parapegma*), the Nîmes *parapegma* (both above, n. 28), the Dura-Europos *parapegma* (n. 58), and the Capua *Fasti* parapegma (Lehoux 2007: 194). To these may be added the Julian calendar *parapegmata* that were built into clepsydras, although their prime purpose would have been to track the seasons (rather than the Julian date) for the calibration of seasonal hours: such clepsydras with *parapegmata* have been found in Salzburg and in Grand (Vosges), see references in Neugebauer (1975) ii. 870 nn. 5–6; in the river Rhine (*AE* 2003: 1279; above, n. 33); and in Vindolanda (M. Lewis 2009; I am grateful to Andrew Birley for this reference). A passage of Cicero (*Ad Atticum* 5. 14, cited by Lehoux 2007: 200–1) is further evidence that *parapegmata* were not extra-calendrical and could serve to track the days of the Roman calendar. On this basis I am arguing that lunar days in *parapegmata*, which appear in fact in some of the Julian

Further evidence of lunar calendar reckoning in the late-antique Latin West is the lunar column of the calendar of 354. This column, as we have seen above, shows no sign of any astrological intent; the suggestion that its purpose was to facilitate the calculation of the date of Easter (above, near n. 69) is perhaps unlikely, as a single indication of the *luna XIV* date preceding Easter would have sufficed for this purpose.[85] A more simple explanation is that this lunar column was intended as an alternative form of dating. The inclusion of a lunar column in this Roman calendar, not attested in *fasti* from before 354 CE, may owe something to the Christian identity of its author and his interest in the date of Easter, but it is also indicative of the resilience in Rome of ancient lunar calendrical traditions.

Finally, and going back a few centuries, we may consider a late first-century CE funerary inscription from Rome commemorating a child who had lived 8 months and 26 days and died 'before she had lived nine full circuits of the moon'.[86] If the count of 8 months and 26 days was in the Julian calendar, this period would have amounted to just over nine full lunar months.[87] We must therefore assume either that these 8 months and 26 days were lunar (hence short of nine full lunar months), or on the contrary (and perhaps more likely) that they were Julian months and metaphorically referred to as 'full circuits of the moon'.[88] Either way, this lunar reference—in a thoroughly Roman inscription—is further evidence of the enduring significance of lunar reckoning in Roman culture.

The survival of various forms of lunar calendar reckoning, and more specifically of lunar dating (with the *luna* formula) in Latin inscriptions, long after the institution of the Julian calendar and its wide diffusion in the Italian peninsula and the Latin West, may be interpreted as an expression of

parapegmata above listed (the Pompeii calendar inscription, the Nîmes *parapegma*, and the Dura-Europos *parapegma*), were similarly intended for calendrical use. Lehoux (2007) 46–50 argues further that Latin lunar *parapegmata* could not have been calendrical because the Roman calendar (Republican and Julian) was not lunar and had never been so (a point which I would dispute: see Ch. 4. 3); but this is to ignore that Italian calendars in the Roman Republican period were mostly lunar.

[85] Note also the absence of Easter, as indeed of any other Christian festival, in the last column of the calendar, although this may arguably reflect the author's respect for Roman calendrical tradition (on which see Salzman 1990, *passim*).

[86] *CIL* vi. 34114: *vixit mensibus VIII diebus XXVI rapta sinu matris iacet hic miserabilis infans ante novem plenos lunae quam viveret orbes. . .*

[87] I am assuming synodical lunar months of about 29½ days. Sidereal lunar months are considerably shorter (about 27⅓ days), nine such months being well under 8 months and 26 days of the Julian calendar; but these lunar months are not normally used for time-reckoning.

[88] This metaphorical usage, however, is hardly attested in literary sources. A striking parallel to this inscription is Silius Italicus 3. 67: *puer . . . bis senos lunae nondum compleverat orbes*, 'the child . . . had not yet completed twelve circuits of the moon', which may follow from an implicit assumption that the Punic calendar of Hannibal (the child's father) was lunar (references courtesy of David Levene).

popular, covert resistance to the imposition of the non-lunar, Julian calendar in the Roman Empire. It is significant to note that *luna* dates only appear in private inscriptions, and are not known to have ever been used for official purposes. Perhaps this usage expressed no more than a conservative disposition, among people in Rome and elsewhere in the Latin West, to preserve their local, ancient calendrical traditions that had been lunar. But even if not politically dissident or subversive, we should at least regard the enduring *luna* inscriptions as part of an unofficial subculture in the Roman world.

The Christian Easter cycles

Christian Easter cycles in the West may also be considered an offshoot of the Latin tradition of lunar calendar reckoning, even though, as noted above, they appear not to have been used for calculating the lunar dates in funerary inscriptions. The computation of the date of Easter in early Christianity will be studied in detail in the next chapter; at present, I shall only examine the Easter cycles that arose in Rome in the third–fourth centuries CE.

The festival of Easter originally derived from the Jewish Passover, which was celebrated on a lunar date, the 14th of Nisan. In most Christian communities, the established custom by the late second century CE was to celebrate Easter on the Sunday following the Passover 14th, but the latter remained a lunar date upon which the date of Easter Sunday depended. It is for this reason that, from the early third century, Christians began to determine the dates of Easter on the basis of calculated schemes. The first Christian cycles for determining the dates of *luna XIV* and hence of Easter were composed in the West, more specifically in Rome—which itself may be of some significance.[89] The earliest, attributed to Hippolytus, was a table of 112 years

[89] According to the annals of Eutychius (Melkite Patriarch of Alexandria in 933–40), letters 'about the computation of the Pascha of the Christians, and about the Fast, and about how it can be worked out from the Pascha of the Jews', were sent already by Demetrius, bishop of Alexandria (in 189–232), to the bishops of Jerusalem, Antioch, and Rome (Breydy 1985: i. 59–60, ii. 50, §172). This passage has commonly been taken to imply a fixed Easter cycle, which Coptic and Ethiopic tradition (Neugebauer 1979: 92–4) assumed to be the later, normative Alexandrian 19-year cycle (on which see further Ch. 7), whereas Richard (1974: 308–9) assumed it to be an eight-year cycle or octaeteris, which, on any of these interpretations, would have predated Hippolytus' cycle. However, it is far from clear that a fixed cycle is intended by Eutychius: for although 'computation' usually refers, in this context, to fixed cycles, it is quite possible that 'working it out from the Jewish Pascha' implies the early Christian practice of determining the date of Easter from year to year on the basis of when Jews happened to observe Passover (a practice known as 'observing Easter with the Jews', on which see Ch. 7). Moreover, the reliability of this very late source is open to questioning, particularly as it finds no parallel in any early source such as Eusebius (Grumel 1960: 165–6; *pace* Lejbowicz 2006: 11 and n. 29 and Mosshammer 2008: 110–16, who follow Richard and argue for the reliability of Eutychius, but fail to provide any positive evidence of this cycle or of any other Easter cycle in early 3rd-c.

(subdivided into blocks of 16 years, themselves double octaetereis or eight-year cycles) starting from 222 CE, which is presumably around when the table was composed.[90] This cycle, grossly inaccurate, was modified and updated in Ps-Cyprian's *De Pascha Computus*, a treatise on the calculation of the date of Easter written in 243 CE.[91] The extent to which these cycles were ever used in practice, however, remains unknown.[92] They were later superseded in Rome by the far more accurate 84-year cycles, perhaps already sometime in the third century.[93] The most important of these was the so-called *supputatio Romana*,

Alexandria). Far more reliable is the testimony of Eusebius (*Hist. Eccl.* 7. 20) that it was a later bishop of Alexandria, Dionysius, who instituted the octaeteris and rule of the equinox in *c.*253 (Richard 1974: 310–15, arguing that this octaeteris remained in use in Alexandria until *c.*323). There is thus little reason to believe that the Roman octaeteris, which forms the backbone of Hippolytus' cycle, was introduced to Rome from Alexandria by Demetrius (as argued by Richard, and followed by Lejbowicz 2006: 11, 44, Mosshammer 2008: 122; see also n. 98 below). The theory that Hippolytus himself was of eastern origin is similarly without foundation (see Mosshammer 2008: 116–25); likewise, the theory that the Roman 84-year cycle (on which see below) was of Asian origin (ibid. 131–8).

[90] E. Schwartz (1905) 29–36; Mosshammer (2008) 116–25; Holford-Strevens (2008) 167–72. The table was discovered inscribed on a chair that was supporting a statue; it consists more precisely of two tables on each side of the chair, one with the dates and weekdays of *luna XIV*, the other with the dates of Easter Sunday. See also Marcovich (1986) 12–13, Lejbowicz (2006) 13, Nothaft (2011), 38–9.

[91] Text in *PL* 4. 1023–47; discussion in E. Schwartz (1905) 36–40, Mosshammer (2008) 125–7; translations in Ogg (1955), Strobel (1984) 43–67. The author appears to have been of African origin, as his biblical citations follow an Old Latin version associated with Africa (Ogg 1955: vii), but the place of writing of this work remains unknown (E. Schwartz 1905: 40; Lejbowicz 2006: 17–18). The dating of 243 CE is almost explicitly given in ch. 22 (Ogg 1955: 19).

[92] Richard (1966) 266 (and *passim*). The authors of these cycles were not necessarily in a position to enforce their use: all we know is that ps.-Cyprian may have occupied some high office in the Church (Ogg 1955: 23 n. 18), whilst the identity of Hippolytus remains controversial and obscure (Mosshammer 2008: 118–21). C. W. Jones (1943) 14–15 argues that 3rd-c. Christian communities must have used a great variety of Easter tables, many of these local and more or less self-made; in my view, however, it is even more likely that most Christians in this period did not use any tables at all.

[93] The dating of the earliest 84-year cycles depends on a controversy surrounding the *Laterculus* of Augustalis, an 84-year cycle beginning in 213 CE that is known from the *De Ratione Paschae*, a Carthaginian treatise dating from 455 CE (text in Krusch 1880: 279–97, with references to Augustalis in 280–1, 289–90). Nothing is otherwise known about this Augustalis, but according to E. Schwartz (1905): 63–6, followed by Mosshammer (2008) 227–8, some features in his cycle point distinctly to a 5th-c. redaction: it was structured (at least according to its description provided in *De Ratione Paschae*, which, one could argue, does not necessarily represent the original conception of Augustalis) into four ogdoads (eight-year periods) and hendekads (11-year periods) in alternation, followed by one extra ogdoad (thus a total of 84 years), clearly in an attempt to reconcile this cycle with the Alexandrian 19-year cycle (8 + 11 years), which would have been of no concern whatever to a 3rd-c. Roman computist. Furthermore, the cycle commences in a year with a *luna XIV* on 25 March (whereas the *supputatio Romana* begins in a year with an epact of 1, which works out one year later), which was traditionally regarded as the Julian date of the Passover of the Crucifixion (Krusch 1880: 290); this fits in with other 5th-c. Easter computists who similarly attempted to correlate their cycle with the date of Christ's death (see also Warntjes 2007: 69–70; Holford-Strevens 2008: 207 n. 82). On the other hand, it seems strange that a 5th-c. computist should have started his cycle as early as 213 CE (rather than in 381,

which was probably conceived in the early fourth century, as its 84-year cycle started in 298 CE; it was probably in use in Rome by the 340s, and became standard among Roman Christians until the mid-fifth century.[94]

All these cycles were inventive and innovative, but in some respects, continuous with pre-Christian traditions of lunar calendar reckoning.[95] Indeed, they went well beyond the strict purpose of calculating the date of Easter, for which all that would have been needed were the dates of *luna XIV* and of the following Sunday in every year of the cycle: the Easter cycles provided, in fact, information required for the construction of full lunar calendars. The table of Hippolytus, to begin with, marks with the Greek letter *E* the years in the cycle that are embolismic, i.e. comprising thirteen lunar months; this implies 'a properly theorized calendar rather than a mere sequence of dates' (Holford-Strevens 2008: 170). The *supputatio Romana* and all subsequent Roman Easter cycles provide, in addition to the dates of *luna XIV* and Easter, the lunar dates of every 1 January, which are known as 'epacts'.[96] The epacts are not essential for the calculation of the dates of *luna XIV* and Easter Sunday. Their inclusion in tables of the *supputatio Romana* implies a scheme for calculating the lunar dates of the whole year, as becomes explicit in late-antique accounts of the *supputatio* (as of later Roman Easter cycles), which lay out a continuous lunar calendar with pre-determined, fixed-length months

or perhaps 297 by analogy with the *supputatio Romana*); this early date might support a 3rd-c. dating (as assumed by Krusch 1880: 4–23, Jones 1943: 15–16, Richard 1974: 316, Lejbowicz 2006: 21, and others: see Warntjes 2007: 70 n. 113). The reconstruction of Augustalis' *Laterculus* is also contentious: see Krusch, E. Schwartz, and (favouring Schwartz) Warntjes loc. cit.

94 The *supputatio Romana* is mentioned by name in a letter of Paschasinus to Leo in 444 CE (Krusch 1880: 248, E. Schwartz 1905: 41, Mosshammer 2008: 204), and described in detail in early medieval manuscripts published by Krusch (1880: 227–44, with discussion on 31–115; see E. Schwartz 1905: 40–58, Mosshammer 2008: 206–13, Holford-Strevens 2008: 173–8). However, its earliest attested use is in the Codex of Philocalus of 354 CE, where section VIII includes a list of epacts running from the foundation of Rome until 354 CE that broadly conform to the epacts of the *supputatio* (with some exceptions: see Mosshammer 2008: 213–16 and above, n. 67) and cannot be reconciled with any cycle other than that of the *supputatio*. This does not prove, but suggests at least, that the *supputatio* was in use in Rome by the 340s. The epoch of 298 CE suggests that it was designed no later than the early 4th c.: Mosshammer (2008) 238.

95 Holford-Strevens (2008) 175. It has been argued, for example, that the lunar cycle of the *supputatio Romana* was originally designed not by Christians but by astrologers (H. Stern 1953: 55–7, followed by Salzman 1990: 36), on the grounds that the *supputatio Romana* begins on a Saturday (1 Jan. 298, *luna I*), which is the first day of the planetary week, and not on a Sunday, the first day of the Judaeo-Christian week (see further above, n. 65).

96 On the term 'epact' see Lejbowicz (2006) 27 n. 69. It is first attested in Ps-Cyprian, *De Pascha Computus*, 7 (*PL* 4. 1031 B, *epactae lunares*); however, the word is missing in one of the two manuscripts (Ogg 1955: 28 n. 1, Strobel 1984: 47), and its meaning in this passage is unclear (see interpretations in E. Schwartz 1905: 40, Holford-Strevens 2008: 169 n. 13). The lunar dates of 1 January are listed in section VIII of the Codex of Philocalus of 354 CE (above, nn. 67, 94), suggesting that by then January epacts were incorporated into the Roman Easter computation.

of 30 and 29 days in alternation.[97] Although epacts are listed only in the *supputatio Romana* and later Easter calendars, it has been convincingly argued that the epact of 1 January is implicit already in the cycle of Hippolytus, which was clearly constructed on the basis of an epact of *luna I* on 1 January at the beginning of the cycle in 222 CE.[98] From all this it is clear that the creators of Roman Easter cycles, starting from Hippolytus, had more than just an interest in the date of Easter: they saw *luna XIV* as part of a lunar calendar that needed to be constructed in full.[99]

This interest in lunar calendars was related, perhaps, to the popularity of *luna* dates in Christian funerary inscriptions, and both in turn were continuous with the Roman (or Latin, or Italian) tradition of lunar reckoning which has been discussed above. It is true that the Christians of third-century Rome, some of whom may have identified as Jews and many of whom were Greek-speaking (as is manifest from the very fact that Hippolytus' cycle was inscribed in Greek), would not have been readily associated with local Latin traditions. Nevertheless, the subcultural status of Christians in Rome may have led them to associate themselves with practices such as Latin lunar dating which had become, in the Roman imperial period, subcultural. The combination in the Easter tables of a Judaeo-Christian tradition (the date of Passover) with a Latin tradition of lunar calendars can be interpreted as a statement of solidarity between various subcultural traditions in third-century Rome, resulting in 'horizontal' hybridity between them. The use of *luna* dates in funerary inscriptions and the creation and use of lunar, Easter calendars is thus likely to have reinforced in a very subtle and implicit manner the subcultural, dissident

[97] Krusch (1880) 51, with texts on 233–5, 242–3. The first lunar month (which ends at some point in the month of January) always counts 30 days; in Julian leap years, the second lunar month (normally 29 days) counts an extra day; in some cases, the last lunar month (ending in December) is shortened by one day (for the *saltus lunae*). For a concise exposition see Blackburn and Holford-Strevens (1999) 801–3. The lunar column of the calendar of Philocalus (section VI of the Codex) follows the same scheme.

[98] Mosshammer (2008) 122–4 and Holford-Strevens (2008) 168–72, who comments: 'That suggests we have to deal, not with one *luna XIII* determined empirically and the rest by subtraction and addition, but a calendar based on calculation by lunar epacts.' This, incidentally, makes it even less likely that the cycle was of Alexandrian origin: as Holford-Strevens demonstrates, it is clear at least that Hippolytus' cycle was a completely original design.

[99] My discussion here is restricted to the Roman West, and more particularly to the city of Rome, but a similarly argument applies to the Easter cycles that emerged in the later 3rd c. in the East (see further Ch. 7). Indeed, the 19-year cycles of Anatolius (Mc Carthy and Breen 2003, Lejbowicz 2006: 24–9) and of Alexandria (as argued by Mosshammer 2008: 76–80, though on the basis on later evidence) also include an epact earlier in the year (on 1 January and on the last epagomenal day respectively), implying continuous lunar calendars. These cycles, furthermore, are clearly derived from earlier, pre-Christian local traditions: the 19-year cycle is derived from Metonic astronomical calendars, and the lunar calendar itself from the tradition of Greek and Seleucid civil calendars (on which see Ch. 1)—just as I am arguing that in Rome, Easter cycles were inspired by local traditions of lunar reckoning.

identity of Christians in Rome in relation to the Roman state and its Julian calendar.

At the same time, however, the Easter tables can be interpreted as reflecting 'vertical' hybridity between the dominant (Roman imperial) culture and subordinate (Christian) culture. For in the process of harnessing ancient Latin lunar traditions, the authors of these tables created, perhaps for the first time in Rome or Italy, lunar calendars that were cyclical and completely fixed—thus emulating the Julian calendar, which, as has been stated many times already, was distinctive for being fixed. The Julian calendar has an important presence in the Easter tables, if only insofar as all dates in the tables (e.g. of *luna XIV*) are given with reference to the Julian calendar. But the Julian calendar also determined the design and structure of Roman Easter cycles, in several specific ways. The epact of Hippolytus' cycle, of the *supputatio Romana*, and of later Easter calendars is on the Julian New Year, and it is with reference to this date that the lunar calendar for every year is constructed. Furthermore, the determination of the epacts for every year of the cycle is based entirely on the Julian calendar: in the *supputatio Romana,* for example, the epacts on 1 January succeed each other in regular jumps of 11 days,[100] which means that the lunar year length is dependent on the length of the Julian year (with the effect that in a Julian leap year the lunar year is extended by one extra day). Thus, the lunar calendar of the Roman Easter cycles was a hybrid adaptation of Roman (Latin, Italian) subcultural traditions of lunar dating to the fixed scheme of the Julian calendar that served as official calendar in the Roman Empire.

This also leads us to consider that the invention of fixed lunar calendars by third-century Christians was not simply a response to historical conditions specific to early Christianity, such as the need to calculate the date of Easter; it was also related to much broader historical processes. The schematization and fixation of calendars was, as has been frequently observed in this work, a general trend in the great empires of Antiquity, which culminated with the Julian calendar of the Roman Empire. The late-antique adaptation of ancient Latin lunar dating traditions into fixed calendar cycles, such as the *supputatio Romana* and the lunar column of the Roman calendar of 354 CE, themselves closely linked to the Julian calendar, was part of this dominant, macro-historical trend.

[100] Thus at the start of the cycle, on 1 January 298, the epact is 1; in year two, the epact is 12; in year three, 23. If the epact goes over 30 (i.e. over the limit of days in a lunar month), a subtraction of 30 is made: thus in year four, the epact is not 34 but 4; in year five, 15; etc. The *saltus lunae* is an exception, where one unit in the epact is skipped. See Blackburn and Holford-Strevens (1999) 801–3.

3. JEWISH CALENDARS IN THE ROMAN EMPIRE

Jewish calendars deserve a place of importance in this work. The Jews wrote more about their calendars, starting from the third century BCE, than just about anyone else in the ancient world until the late Roman period, when extensive monographs on the Roman calendar and the Christian Easter cycles began also to appear.[101] Why the Jews gave such literary attention to their calendars remains unclear. In contrast, the epigraphic display of calendars that was widely practised among the Romans (the publicly displayed *fasti*) seems not to have been adopted—as it was for example by the Gauls of Coligny—by the Jews of the Graeco-Roman world.[102] Again, the reasons for this remain to be explained.

The literary sources together with some epigraphic evidence afford us detailed knowledge of the variety of Jewish calendars in Palestine, Babylonia, and the Jewish Diaspora in the Roman Empire, although in the Roman period Jewish calendars were all lunar. In the Diaspora communities in the Roman Empire, Jewish calendars were only used for the determination of Jewish new moon and festival dates; Jewish inscriptions and documents are otherwise all dated according to the local official calendars, e.g. Julian, Alexandrian, or Greek and Macedonian—with only very few exceptions from the late Roman period.[103] The use of non-Jewish local calendars was presumably dictated by the demands of daily business and public life, as well as by the conventions inherent in the Graeco-Roman 'epigraphic habit'.[104] But the use by Jews of an entirely different, lunar calendar for cultic purposes—in contrast with other, pagan cults that normally followed the dates of the local official calendars—will raise the question of whether it should be interpreted as 'dissident'.

In areas of Palestine that may have been populated by a Jewish majority until the end of Antiquity (Judaea and Galilee in particular), the Jewish calendar was commonly used for more general purposes, such as the dating

[101] Early Jewish literary sources with extensive descriptions of the calendar include the books of Enoch, Jubilees, and calendar texts from Qumran (3rd–1st cc. BCE); in late Antiquity (3rd–6th cc. CE), tractates *Rosh Ha-Shanah* (*RH*), *Sanhedrin* (*Sanh*), and other passages of the Mishnah, Tosefta, and Palestinian and Babylonian Talmuds (abbreviated *m*, *t*, *p*, and *b* respectively). By contrast, as has been noted in the first part of this work, there are surprisingly few literary sources that present or explain the Egyptian, Babylonian, and Greek calendars in any detail except Geminus' history of the Greek astronomical calendars: *Elem. Astr.* 8. 26–60. Censorinus' *De Die Natali* is a major monograph on the Roman calendar, but relatively late (3rd c. CE).

[102] All I can point to are the Jewish month-names listed in the Ein Gedi inscription (Levine 1981) and inserted in the zodiac wheel of the Sepphoris synagogue mosaic (Weiss 2005), but these hardly qualify as calendars.

[103] These exceptions are the marriage contract of Antinoopolis (417 CE: Stern 2001: 137–40) and perhaps the Catania funerary inscription of 383 CE (on which see below).

[104] Stern (2001) 24–7 and n. 105; see also (for Rome) Rüpke (1995) 443–5.

of inscriptions and legal or commercial documents.[105] This raises the question of whether it functioned there as an official (rather than dissident) local calendar, although its 'official' status would depend on the socio-political status of those who controlled it, which will be discussed below.[106]

Origin, development, change

The history of Jewish calendars in Antiquity and the early Middle Ages has been accounted elsewhere in detail (Stern 2001), and only needs a summary here. The biblical origins of the Jewish calendar are very unclear, as the Hebrew Bible itself does not specify how its calendar is structured or functions. However, the calendar of the ancient Israelites is likely to have been lunar, if only because, as we have seen, all calendars in the ancient world before 500 BCE—with the striking exception of Egypt—were lunar.[107] Under Persian Achaemenid rule the Jews, like all other people of the Near East, appear to have adopted the official imperial, Babylonian calendar.[108] But the first literary sources describing the Jewish calendar explicitly and in detail only emerge in Judaea in the third century BCE, and seem to present two calendars in competition: a lunar calendar—presumably of a Babylonian–Seleucid kind (on which see Chapter 5)—and the 364-day calendar (see Chapters 4. 2 and 7). By the first century CE, when Qumran literature came to an end, the 364-day calendar seems to have faded into complete oblivion. From the Roman period onwards, all Jewish calendars were lunar.[109]

A chief characteristic of the Jewish lunar calendars was their tremendous variety: until the end of Antiquity and still in the early Middle Ages, festivals such as Passover could often be celebrated at different times from one Jewish

[105] The Jewish calendar is commonly used in Judaean documents and ostraca from the early Roman period, and in the 4th–6th cc., in synagogue mosaics (above, n. 102) and the funerary inscriptions from Zoar in southern Palestine (Stern 2001: 24–5). Note, however, the mention of 'January' in a fragmentary synagogue mosaic from Beit Shean of the late 5th–early 6th cc. (Ovadiah and Ovadiah 1987: 33–4 no. 29; Meimaris 1992: 83).

[106] The only Diaspora community where the Jewish calendar was similarly used for general, dating purposes was in Babylonia, as attested at least in the Babylonian Talmud (*bKetubot* 94b–95a, also perhaps *bBava Metzia* 72b end). There, however, the Jewish calendar would have been very similar to, and perhaps at times indistinguishable from, the local non-Jewish Babylonian calendars, which were lunar and still dominant in the region in the late-antique Sasanian period (see Ch. 5. 4 and Stern 2004). The nature of and relationship between these calendars is unfortunately not well documented and will therefore not be discussed in this chapter, but the issue of 'calendar dissidence' must certainly have been very different there.

[107] For a refutation of the theory that the biblical calendar was that of the 364-day year, see Ch. 4. 2.

[108] This is suggested by the latter books of the Hebrew Bible and the Elephantine archive.

[109] As confirmed by Philo, Josephus, and Christian and rabbinic sources, as well as some epigraphic and documentary evidence. For this whole paragraph, see Stern (2001) 2–46.

community to the next (Stern 2001, Stern and Mancuso 2007). This variety was a reflection of the dispersion and general lack of cohesiveness of Jews in the ancient world, together with the practical difficulties of communicating an identical calendar to widespread, far-flung communities. Nevertheless, it may be assumed that Jewish calendars were similar in their broad features. As in all post-Seleucid lunar calendars, the Jewish months (usually called by Babylonian month-names) counted either 29 or 30 days, and began at first visibility of the new moon. This is well attested in rabbinic literature (particularly Mishnah, *Rosh Ha-Shanah*, third century CE: Stern 2001: 157–60), but also in non-rabbinic sources from the first and second centuries CE and from a variety of provenances, suggesting that the Jewish month was based on local, empirical sightings of the new moon.[110]

As in all post-Seleucid lunar calendars, moreover, the year could be intercalated with a thirteenth month, though not necessarily following a regular pattern such as the Babylonian 19-year cycle of intercalations. In a Jewish context, the main purpose of intercalation would have been to ensure the occurrence of Passover in the right season. A 'rule of the equinox', whereby Passover (i.e. 14 Nisan) could not occur before the vernal equinox, is attributed to Aristobulus of Alexandria (mid-second century BCE), although it was perhaps not followed in practice by Jews in this period (ibid. 50–3). Evidence from the first centuries BCE–CE suggests that Jewish months occurred sometimes later than the rule of the equinox would have demanded, but in line with the months of the Babylonian calendar.[111] Later in Antiquity, from the fourth century onwards, Jewish months seem generally to have moved ahead, with Passover often before the equinox and, therefore, the Jewish Nisan often occurring one month earlier than it would have done in the first century. However, practice still varied widely.[112]

[110] Mainly in Philo, *Special Laws*, but sporadically also in other sources: ibid. 116–24. For an alternative interpretation of the dating of Cestius' assault on Jerusalem in 66 CE (ibid. 121–2) see now Burgess (1999) 105, although on balance I prefer my own.

[111] This can be inferred mainly from a passage in Josephus (*Antiquities* 18. 5. 3) relating to Passover in Jerusalem in 37 CE, and from a Jewish inscription from Berenike (Cyrenaica) which I would date to 41 BCE (Stern 2001: 55–61). In the Babylonian calendar, the *beginning* of Nisan (not to be confused with the 14th) was always after the equinox (see Ch. 2). Note, however, that correspondence with Babylonian months in these sporadic cases does not prove that the Jews always intercalated at the same time as the Babylonians, or that they followed their (or any other) fixed cycle. By then, indeed, there is no reason to expect the Jewish calendar to have maintained any dependence on the Babylonian (see discussion ibid. 61–5).

[112] Christian sources from the late 3rd c. onwards generally assume that the Jews in their period in Egypt, Syria, Asia Minor, and also elsewhere celebrated Passover often before the equinox, although the way this was done varied considerably from one community to the next (ibid. 66–87). Jewish sources confirming variety of practice include early rabbinic traditions (especially in *tSanh.* 2, from the 3rd c. CE), the marriage contract of Antinoopolis (417 CE), and the late antique funerary inscriptions from Zoar (ibid. 70, 87–98). See now also *SEG* 46 (1996) no. 1656, a 3rd-c. inscription from Hierapolis (Phrygia), which refers to the festival of Unleavened Bread in the seventh month; if this is taken as a precise statement, it would imply that in

From the fourth century CE onwards, Jewish calendars began to use fixed cycles, rules, or schemes, either for the regulation of the intercalation or for the determination of the beginning of the month. This is evident in dated documents from this period, where it can be shown that the Jewish month began not, as previously, from when the new moon was first sighted, but from the conjunction, which could only have been known from a pre-determined, schematic table or calculation.[113] A schematic calendar is implicit in a document issued by a faction of bishops at the Council of Serdica in 343 CE, which includes a list of dates of the Jewish Passover for a period of 16 years (from 328 to 343). This list implies not only a month beginning at or near the conjunction, but also a simple scheme for calculating Passover dates, as well as a fixed rule whereby Passover could only occur within the Julian month of March.[114]

Another Jewish calendar that underwent schematization in late Antiquity, in the long term far more important, was the rabbinic calendar, that is to say the calendar represented in rabbinic literature. The earliest rabbinic sources, redacted in early third-century CE Palestine (e.g. the Mishnah and Tosefta), present an entirely empirical lunar calendar where the beginning of the month was determined on the basis of new moon sightings, and the intercalation decided year by year on the basis of various empirical criteria. In the course of the Amoraic period (third–fifth centuries CE), however, a number of rules appear to have been introduced, determining the length of certain months and preventing the year from beginning on certain weekdays; a rule of the equinox is also attested, possibly from the fourth century. These rules, which overrode the empirical observations, had the effect of gradually transforming the calendar into a fixed scheme: by the time of the redaction of the Palestinian Talmud (end of the fourth century), the rabbinic calendar consisted largely of a fixed sequence of full and hollow months in alternation.[115] From the sixth century there is evidence that the beginning of the month in the rabbinic calendar was based on the conjunction (and no longer on the new moon),

Hierapolis this Jewish festival (which immediately follows Passover) occurred always within the seventh month of the calendar of Asia, i.e. between 24 March and 22 April (see Ch. 5, Table 5.6), thus after the equinox.

113 A month beginning at the conjunction is implicit in the marriage contract of Antinoopolis (above, n. 103). The implications of the Catania inscription (Stern 2001: 132–6) will be reconsidered below (but see general discussion ibid. 139–43).

114 Ibid. 74–9, 124–32; see in more detail below. For confirmation of the year of the Serdica Council as 343 CE (and not 342 CE as Richard 1974: 318–27), see now Burgess (1999) 241–3, Lejbowicz (2006) 12, end of n. 29), and Mosshammer (2008) 183.

115 Stern (2001) 157–75. The evidence is mainly from the Palestinian and Babylonian Talmuds. The medieval tradition that the fixed rabbinic calendar was instituted in one piece by a patriarch named Hillel in the mid-4th c. is not supported by Talmudic sources (ibid. 175–81).

although this is implicit already in a fourth-century Babylonian tradition.[116] At some stage before the eighth century, a fixed 19-year cycle of intercalations (similar to the standard Babylonian cycle, but based on a rule of the equinox) was also adopted. By the early tenth century, the rabbinic calendar had become the definitive, fixed scheme that is still normative among the Jews today (Stern 2001: 191–210).

The transformation of Jewish calendars in late Antiquity from empirical and flexible procedures to calculated and fixed schemes calls for an explanation. The introduction of a month beginning from the conjunction and of a rule of the equinox may have followed the Christianization of the Roman Empire, more particularly of Palestine, in the fourth century CE: rabbis and other Jews in this period may have adopted the lunar calendar principles which the Christians had used already earlier in their Easter cycles, even if the latter's purpose, paradoxically, had been precisely to distance themselves from Jewish calendrical practice.[117] But in the specific context of the rabbinic calendar, the adoption of calendar rules and eventually a fixed calendar is best explained as the outcome of the unique relationship between the Palestinian and Babylonian rabbinic communities. These communities considered it essential to observe festivals and fasts, and generally to reckon the calendar, on exactly the same dates—a quest for unanimity that was unique to the rabbinic movement, and never pursued elsewhere in the variegated Jewish Diaspora world. Because of the impossibility of communicating the results of empirical new moon sightings from Palestine to Babylonia and thus of ensuring the observance of festivals in both communities on the same dates, it became a necessity—especially at a time when the rabbinic community in Babylonia began to develop, from the third century CE—to increase the predictability of the Palestinian rabbinic calendar by restricting it with fixed rules. The gradual fixation of the Palestinian rabbinic calendar was thus the result of an attempt to unify and standardize the calendar of the rabbinic communities of Palestine and Babylonia.[118]

Beyond these specific explanations for the evolution of the Jewish calendar, consideration must also be given to broader, macro-historical processes. As has been noted above in this chapter and frequently elsewhere in this work, the

[116] Sixth-c. evidence: ibid. 182–4, where I overlooked a tradition (attributed to the 'Nehardeans', who are usually associated with the 4th c. CE, in *bSanh.* 41b–42a) that the full moon occurs on the 16th of the month, which implies a month beginning at the conjunction.

[117] Ibid. 222–6 (on the rabbinic calendar). For a similar argument regarding the Serdica document, see ibid. 141–3 and discussion below. At the end of Ch. 5, I have argued that in late Antiquity Easter cycles may have similarly influenced non-Jewish lunar calendars in Persian Mesopotamia.

[118] Ibid. 232–56, and on the active role that the Babylonian community played in the formation of the fixed rabbinic calendar, 257–75. A similar process of unification and standardization affected the date of Easter in Constantine's Christian Empire: see Ch. 7.

schematization and fixation of calendars was part of a general trend beginning in the great empires of the ancient Near East and culminating with the Julian calendar of the Roman Empire. The schematization and fixation of Jewish calendars in late Antiquity was clearly also part, somehow, of this macro-historical trend.

The Diaspora: subversiveness, hybridity, and subculture

In most parts of the Graeco-Roman world, where the Julian or Julianized calendars had become dominant, the Jews' adherence to a lunar calendar would have appeared unusual. Lunar calendars only survived in provinces of the Roman Empire where, it so happens, Jewish communities were sparse: Greece, Macedonia, Moesia (see above, n. 8), and possibly also Gaul. But where the Jewish Diaspora was mainly concentrated, in Asia Minor, Syria, Egypt, Libya, and Italy, the dominant calendars were all non-lunar. In these provinces, the Jewish lunar calendar would have been quite distinctive.[119]

The distinctiveness of the Jewish calendar in the Diaspora context finds vivid expression in a passage of Philo of Alexandria (first century CE), referring no doubt to the Egyptians of his own day as much as to those of the biblical narrative:

> But not all (peoples) treat the months and years alike, but some . . . reckon by the sun, others by the moon . . . Wherefore (Scripture) has added, 'This month (shall be) to you the beginning' [Exod. 12: 2] . . . lest they follow the Egyptians, with whom they are mixed, and be seduced by the customs of the land in which they dwell.[120]

Not only Jewish and Egyptian calendars differ from one another, but the Jews are somehow forbidden by Scripture from changing their calendar and imitating or adopting the Egyptian ways. This passage expresses, if only implicitly, the significance that a lunar calendar may have had for the identity of the Jewish Alexandrian community: the calendar had become to the Jews, effectively, a statement of their distinct identity.

Elsewhere I have argued that for first-century Jews, maintenance of a lunar calendar and resistance to Julianization—in contrast with almost all other

[119] See ibid. 42–6. A possible exception might be the border city of Palmyra (where the Jewish community is well represented in inscriptions), if indeed its official calendar was still lunar: see above, n. 6.

[120] Philo, *Quaestiones ad Exodum* 1. 1 (Marcus 1953: 4–5), with fuller citation and discussion in Stern (2001) 33–4. Philo's implicit reference to the Egyptian calendar as solar is possibly a reflection of its adaptation, a few decades before he was writing, to the Julian calendar. The distinctiveness of the Jewish calendar as lunar is also noted in rabbinic sources from the 3rd–6th cc. (ibid. 45), but their context was Palestine, where the situation was far more complex, as will be discussed below, rather than the Diaspora in the Roman Empire.

contemporary Near Eastern calendars—represented perhaps a deliberate attempt to distinguish themselves from the culture of the Roman Empire and its Julian calendar (Stern 2001: 45). It is also important, however, to distinguish the Diaspora from Judaea/Palestine. In Judaea/Palestine, where the Jewish calendar seems to have been used as official calendar in all areas of public life, it may be possible to interpret the Jewish calendar, similarly to the lunar calendars of the cities of Greece in the Roman period, as a subtle (if illusory) statement of political autonomy (more on this below). In the Diaspora, where Jewish calendars did not have any official status and where the contrast with Julian or Julianized calendars would have been more conspicuous and immediate, the dissident, subversive character of Jewish calendars—even if confined to cultic, religious life—is likely have been more pronounced.

One feature of Diaspora Jewish calendars which points perhaps in the direction of subversiveness is their tendency towards appropriation from other calendars and their subsequent hybridity—which, as explained earlier in this chapter (near n. 9), can be effective strategies of dissidence. This tendency is apparent at least in two sources from late Antiquity, which I shall now examine in turn: the document of the Council of Serdica and the Catania inscription.

As mentioned above, the Council of Serdica document of 343 CE presents a continuous list of Jewish Passover dates for a 16-year period, alongside a list of Christian Easter dates. According to this list, Passover only occurred in the month of March (or 'Dystros', identical with March in the calendar of Antioch), sometimes long before the equinox, in contrast to the Christian Easter which had to occur after the equinox and therefore often fell in April (Xanthikos). This apparent 'rule of March' on the Jewish side, i.e. use of the Julian month of March as the criterion for determining the date of Passover and thus governing the intercalation, set the Jewish calendar clearly apart from the Christian Easter, but at the same time—paradoxically—made it closely dependent on the Julian (or Antiochene) calendar.[121]

The dependence of the Jewish Passover, in this document, on the Julian or Antiochene calendar is further exemplified by the scheme that seems to have been employed for the determination of its dates: this scheme, which could be called −11/+19, consists in deducting every year 11 days from the previous Passover's Julian date, except in an intercalated year when instead 19 days are added (and Passover is thus prevented from falling back into February). To

[121] Stern (2001) 74–9, 124–32. On the calendar of Antioch, see Ch. 5. For possible reasons why Dystros might have been associated here with Passover, even though it was the following month, Xanthikos, that was normally equated with the month of Nisan (the Passover month) in post-Seleucid calendars (see Ch. 5, Table 5. 2), see Stern (2001) 78–9, and note also that in the 5th-c. CE *fasti* of Polemius Silvius, March/Distros is equated with the Hebrew Nisan (Degrassi 1963: 263–76, Salzman 1990: 242–6, and Lehoux 2007: 161–2 with text and translation on 311 and 324).

what extent this scheme should be read into the Serdica document depends, however, on the plausibility of Schwartz's textual emendations, according to which the list of Passover dates ran as follows (the first year, 11 March, corresponding to 328 CE):[122]

1. 11 March,
2. 30 March.
3. 19 March.
4. 8 March—MS XVIII, read VIII.
5. 27 March—MS XXIII, read XXVII.
6. 16 March.
7. 5 March.
8. 24 March.
9. 13 March—MS XVI, read XIII.
10. 2 March.
11. 21 March.
12. 10 March.
13. 29 March—MS XXV, read XXVIIII (or XXIX) (?).
14. 18 March—MS XVIIII, read XVIII (?).
15. 7 March—MS V, read VII (?).
16. 26 March—MS XXXVI, read XXVI.

In some cases the textual error is evident (years 4, 5, 9, 13, and 16), and in most of these, Schwartz's emendations are inherently plausible (years 4, 5, 9, and 16);[123] but the emendation of year 13 may be regarded as uncertain.[124] The emendations of years 14 and 15 are largely conjectural.[125] But leaving aside these doubtful cases (13–15), the scheme of –11/+19 is evident at least throughout the rest of the list: starting on 11 March in year 1, 19 days are added in year 2 (hence 30 March), 11 days subtracted in year 3, the same again in year 4, 19 days added in year 5, etc. On balance, Schwartz's emendations for years 13–15 may be accepted therefore as reasonable.[126]

The –11/+19 scheme depended entirely on the Julian (or Antiochene) calendar, with reference to which all dates were calculated; but it was also borrowed from Christian Easter cycles, where a –11/+19 scheme had similarly

[122] After E. Schwartz (1905) 122–6; question marks indicate my own doubts. The text is also in Stern (2001) 127–9.

[123] The corrections of years 4 and 16 imply an error that could equally have occurred in the Latin translation (the only version extant) or in the original Greek. The corrections of years 5 and 9 are best explained as errors in the Latin numerals.

[124] E. Schwartz's emendation (XXIX) is more likely if the error occurred in the Greek version (from $\kappa\theta$ to $\kappa\epsilon$); if it occurred in the Latin version, however, XXX would be more likely.

[125] Year 15 (V) looks in need of some correction, but it is unclear whether year 14 (XVIIII) is erroneous at all.

[126] In Stern (2001) 132 my conclusion is slightly more guarded.

been used (e.g. the *supputatio Romana* and the Alexandrian cycle). Its use for the calculation of Passover dates resulted thus in a hybrid calendar, basically Jewish (because lunar, designed for the date of Passover, and allowing Passover before the equinox), but dependent on the Julian (or Antiochene) calendar (with a 'rule of March' and the use of Julian dates for designating the date of Passover), and modelled on a scheme previously used in Christian Easter cycles (the −11/+19 scheme).

This hybrid calendar could not fail to have been politically significant, even if it also served the needs of practical convenience. The integration of elements from the Julian and Christian calendars into the Jewish calendar would have had the effect of raising the latter's respectability and social profile in a society where, in the mid-fourth century, Christianity was becoming increasingly dominant. The rule of March and the −11/+19 scheme gave the Jewish calendar stability and regularity not only in terms of its structure, but also in terms of its position and integration in the culture of the Roman, Christian Empire. But this did not mean, for that matter, surrender to the dominant culture: quite on the contrary, laying claim on elements of the dominant calendars by appropriating the rule of March and the −11/+19 scheme could be interpreted as a subtle act of political subversion, putting into question the hegemony of the Julian and Christian calendars and constituting, in a certain way, an affirmation of the Jews' social status and dissident identity.[127]

It remains to be asked, however, whether the Jewish Passover dates listed in the Council of Serdica document can be considered historically reliable. The faction of eastern bishops who authored this document were probably relying on what they knew as actual Jewish practice, probably in Antioch, at least as far as concerned the 'rule of March'; but it is uncertain whether they would had kept a *precise* record of the last sixteen Passover dates that had been observed. In the absence of such records, the dates in this document could have been reconstructed with the help of a −11/+19 scheme which the bishops would have taken from their own Easter computational tradition as a convenient method of approximation. It is difficult to prove, therefore, that the −11/+19 scheme was actually adopted and used by the Jews in Antioch (or elsewhere in the Roman East), although their use of the rule of March appears to be reasonably secure.[128]

[127] On the relationship between hybridity, subversiveness, and dissidence, see above, near n. 9.

[128] As argued in more detail in Stern (2001) 75–8, 124–6. The implicit attribution of a −11/+19 scheme to the Jews in the Serdica document, whether or not historically reliable, was also a reflection of the complex relationship between Judaism and Christianity, in which the boundaries in this period were not always entirely clear. The sometimes fluid relationship between Judaism and Christianity formed itself, to a large extent, the basis of the 4th-c. Passover and Easter date controversies which we shall return to in the next chapter.

We now turn to the Catania (Sicily) inscription of 383 CE, a funerary inscription erected by a Jew, Aurelius Samuel, in memory of his wife, which is dated as follows:

> . . . fatum complebit XII Kal(endas) Novebres, diae Veneris, luna octaba, Merobaudes iterum et Satornino consulibus . . .
>
> . . . (she) completed her allotted life on the 12th (before) the Kalends of November, Friday, lunar day 8, when Merobaudes for the second time and Saturninus were consuls . . .

This extensive dating, with a Julian date (which must be corrected to XIII Kal, or 20 October : see above, n. 50), weekday, lunar day, and consular year, is quite normal for late Roman inscriptions and shows no sign, at first sight, of any Jewish calendar. The *luna* date, as has been established above, was an early Latin tradition, which by the late fourth century had come into common (but clearly not exclusively) Christian use. The practice of recording a detailed date of death was itself a distinctly Christian funerary epigraphic tradition.[129]

But although the date is thus made up entirely of Roman and/or Latin components and fits into a distinctly Christian epigraphic tradition, the rest of this inscription is, in more than one way, very distinctly Jewish. The dedicator has a biblical name; the inscription begins with a line of Hebrew, it goes on to refer to 'the law which the Lord gave the Jews', and it is footed with the standard Jewish symbol of *menorot* (candelabra). The Jewish character of the inscription as a whole makes it most likely that its lunar date, although expressed with a traditional Latin formula, represented also a date in Aurelius Samuel's Jewish calendar: for it would have been highly confusing if, for the Jewish calendar and festivals, a different lunar reckoning was used. But this effectively means that his Jewish calendar would have followed the same principles as Latin lunar dating: in particular, as can be inferred from the calendrical data in the inscription (Stern 2001: 136), the lunar month would have begun not at the appearance of the new moon, but rather at the conjunction. As a result, the dates of Jewish festivals would have been defined on the basis of a specifically Latin convention of lunar reckoning.[130]

The hybridity of the Jewish lunar calendar implicit in this inscription was not the product of 'vertical' relations between dominant and subordinate

[129] Ibid. 132–6 and nn. 107–8. In Jewish funerary inscriptions, similarly detailed dates of this kind are only attested in the contemporary and later Aramaic inscriptions from Zoar (ibid. 87–98, 146–53), which raises the possibility, there also, of some Christian influence.

[130] The lunar date in this inscription does not tally with the *supputatio Romana* (the most likely Easter cycle to have been used by Christians in late 4th-c. Sicily) or the Alexandrian cycle (ibid. 135 n. 110); but this has no bearing on whether or not Aurelius borrowed his date from Christian sources—a question that remains entirely open—since discrepancy from Easter cycles is common also in Christian *luna* inscriptions (see above, n. 81).

cultures (as may have been the case in the Serdica calendar), but rather of 'horizontal' relations between Jewish and other, local subcultures. For the Latin (and later Christian) tradition of *luna* dating which Aurelius Samuel used constituted itself, as argued above, a dissident subculture in the Roman West where the official calendar was overwhelmingly Julian. The adoption of Latin-style lunar reckoning by Jews like Aurelius Samuel represented, therefore, a form of participation in this broader subculture. Jewish dissidence in the Roman Empire did not mean isolation from other elements of society which may have shared common, if subtle, subversive objectives.

Judaea/Palestine: rabbis and city councils

In Judaea (renamed Palestine in the second century CE), in contrast to the Diaspora, the Jewish lunar calendar was used not only for setting the dates of Jewish festivals, but also for general purposes such as legal and commercial documents, and dedicatory and funerary inscriptions. This raises the question of whether it functioned there as an official local calendar, similarly to the lunar calendars of the cities of Roman-period Greece; this would have made it dissident in a much more limited sense than in the context of Jewish Diaspora communities. The status of the Jewish lunar calendar in Palestine was complex, however, and deserves more detailed investigation. We need to ask who controlled it, and whose political authority, therefore, it represented. We need to investigate whether there was a single authority in charge of this calendar, and whether other, non-Jewish calendars were also simultaneously used.

In the biblical monarchic period the calendar of Israel is likely to have been controlled by the king; this is implicit, at least, in Jeroboam's institution of a festival on the 15th day of an eighth month that he had 'contrived in his heart' (1 Kgs. 12: 32–3). This all disappeared under the great empires, when as mentioned above, the Jews appear to have simply adopted the imperial Babylonian calendar that was set or controlled by the Achaemenid and Seleucid kings. In the post-Seleucid period, however, control of the calendar would have naturally passed back into the hands of the Jewish ethnarchs or kings who were also high priests in the Jerusalem Temple, from the mid-second to mid-first centuries BCE. When in 37 BCE Judaea came under the rule of Herod, a non-priestly king, the calendar may have been left in the hands of the high priest—an arrangement that could then have been maintained throughout the period of direct Roman rule between 6 and 70 CE, when high priests often assumed political power of some importance.[131] It is also

[131] Priestly involvement in the Jewish calendar before 70 CE is attested in *mRH* 1: 7, albeit in competition with a rabbinic court: see Kurtstag (1975) and Hezser (1997) 483–4. In the late 3rd c. CE priests may still have been competing with rabbis for precedence within the rabbinic

possible, alternatively, that the Jewish calendar was controlled in this period by the council of elders or Sanhedrin (provided a permanent and well-defined institution of this kind was really in existence).[132]

After the destruction of the Temple in 70 CE and the collapse of the high priesthood, of the Sanhedrin (if it ever existed), and indeed, of any form of central Jewish political authority, control of the Jewish calendar is likely to have become an issue: who, from this point onwards, would have taken it over and determined the dates of Jewish new moons and festivals? Historians commonly believe that control of the calendar passed into the hands of an especially designated rabbinic court.[133] This traditional view, which usually assumes that rabbis had actually controlled the calendar well before 70 CE, is based entirely on rabbinic sources that describe a single rabbinic court located at one time in Jerusalem, and after 70 CE in other places, determining the new moon—in their words, 'sanctifying the month'—on the basis of witnesses' reports of new moon sightings, and deciding whether to intercalate the year of the Jewish calendar.[134]

calendrical court: *pRH* 2: 6 (58b), assuming that *kahana* ('priest') is not in fact the rabbi R. Kahana (i.e. a personal name).

[132] On the elusive identity of the Sanhedrin before 70 CE, see Schürer (1973–87) ii. 199–226, Goodblatt (1994) 77–130, Goodman (1987) 112–16, (2007) 327, 378. On its disappearance after 70 CE, see ibid. and Stern (2003*b*) 197 and n. 12.

[133] e.g. Safrai (1965), Goodblatt (1994) 207, Goodman (2000) 108. The last-named writes, in elation to the calendar: 'when [after 70 CE] the Temple Sanhedrin could no longer give them [the Jews] certainty they accepted the authority of the self-appointed rabbinic Sanhedrin [i.e. court] with relief. This was the only religious function performed by the rabbis that was genuinely needed by the rest of the Jewish nation.' This notion that the calendar was somehow unique and a religious function that only rabbis could perform after 70 CE is a common misconception, refuted by the existence of local Jewish calendars in Diaspora communities.

[134] The determination of the new moon and the decision whether to intercalate the year are presented in rabbinic sources as two distinct procedures, possibly carried out by two distinct rabbinic bodies; but for the purpose of our argument this distinction is not important here. The procedure and laws of the intercalation are mainly found in *tSanh.* 2 (note that according to 2: 6, the intercalation of the year was carried out already in Temple times, by Rabban Gamaliel, on the Temple mount). The procedure of 'sanctification of the month' (a phrase which, in some contexts, is better translated 'sanctification of the new moon') is mainly found in *mRH*, where it is clearly presented as under the monopoly of a single rabbinic court. This court is said to have been originally located in a large courtyard in Jerusalem called Beit Ya'azeq (2: 5); witnesses from all over Judaea travelled to it, sometimes even on the Sabbath, to report their new moon sightings (1: 6, 1: 9, 2: 5; also *tRH* 2: 1). The court's decision on the new moon date was supreme: any dissenting rabbi was forced to comply, as in one case when R. Yehoshua eventually submitted to Rabban Gamaliel II's authority (2: 9). This passage implies that the rabbinic court remained in charge after 70 CE, since Rabban Gamaliel was active in the early 2nd c.; in his period, however, the calendar court was located no longer in Jerusalem but in Yavneh (*mRH* 2: 8, and see *tRH* 4: 5; also *mRH* 1: 3–4 assumes a rabbinic court in charge of the calendar before and after the destruction of the Temple). Other sources suggest the persistence of this system even later, with the rabbinic court in charge of sanctifying the new month or intercalating the year (or both) located in various places in Galilee and Judaea including Usha (*tRH* 2: 1, *pRH* 2: 1 (57d)), Ein Tav (*pRH* 2: 5 (58a), *bRH* 25a, etc.: see S. Safrai 1965: 35–7), and Lod (*pSanh.* 1: 2 (18c), *bḤullin* 56b), with named rabbinic personalities from the 2nd–4th cc. serving on the appointed panel (*tSanh.*

This traditional view only reflects, however, the biased perspective of rabbinic sources. It is actually most unlikely that a function that had always been reserved to political rulers—in ancient Israel, in post-Seleucid Judaea, and indeed, throughout the ancient world—should have been handed over after 70 CE to a body that was only of marginal political significance.[135] The only local political authorities in Palestine to have survived the debacle of 70 CE were the city councils, and it is they who should be expected to have taken over control of the Jewish calendar. In this respect they would only have been emulating the 'pagan' or 'Greek' cities of the Palestinian coastline, such as Gaza, Ascalon, and Caesarea, which had taken control of their own calendars after becoming independent from Seleucid rule;[136] the predominantly Jewish cities of inland Palestine (such as Lod, Tiberias, Sepphoris) could have done exactly the same after the fall of Jerusalem in 70 CE. In the pages that follow I shall argue that even if the rabbis laid claim to the Jewish calendar—as seems evident from rabbinic sources—city councils had a stronger claim, because the calendar was primarily a political function, and they are therefore more likely to have taken effective control of it.

Evidence that the Jewish calendar was determined and controlled by city councils after 70 CE is difficult to find. Rabbinic sources are reticent, but not surprisingly, as this is a social reality that they would have sought to mask: instead, they consistently promote the idea that the Jewish calendar was controlled entirely by rabbis. Nevertheless, some passages in the Palestinian Talmud imply that the reality differed somewhat from the rabbinic ideal. The story is thus told of one Shazkar, head of the city of Gadara (south-east of the Sea of Galilee), intercepting the new moon witnesses on their way to Rabban Gamaliel's court; the latter responded by having him removed from his headship.[137] Whether 'head' (*rosh*), presumably equivalent to the Greek *archon*, means leader of the city council or perhaps only of the Jewish community of Gadara, this story suggests a conflict between rabbis and civic or communal authorities over control of the new moon declaration—even if we are told here that the rabbi prevailed.[138]

2: 1, *pRH* 2: 6 (58b), *pSanh.* 1: 2 (18c), *pRH* 3: 1 (58d), *pAvodah Zarah* 3: 1 (42c)), and with the late-3rd-c. survival in eastern Galilee of a local beacon system to disseminate the court's decisions (*pRH* 2: 1 (58a)). See further Safrai loc. cit. and Stern (2001) 157–65.

[135] On the politically marginal status of rabbis in Palestine (at least until the 3rd c. CE, and possibly even later), see Goodman (2000) 93–111, Hezser (1997) esp. 353–404, S. Schwartz (2001), and Satlow (2005) 153–8; *pace* Goodblatt (1994).

[136] On the calendars of Gaza, Ascalon, Caesarea, and further north Tyre and Sidon, which by 70 CE were all Julianized, see Ch. 5.

[137] *pRH* 1: 6 (57b), offering a different version of the story told in *mRH* 1: 6, where the person who intercepted the witnesses was Rabbi Aqiva. For a parallel see *bRH* 22a, where the name Shazkar (so in MS Leiden of *pRH*) varies considerably in the manuscripts.

[138] On the ethnic (or religious) composition of Palestinian city councils, and whether pagan city councils could have had any involvement in the Jewish calendar—a question that is

In the following passage, where city councils are explicitly mentioned, the latter appear to have had the upper hand:

> R. Yoḥanan said: If they mention you for (candidature to) the *boule* [city council], let the Jordan be your frontier.[139]
>
> R. Yoḥanan said: One may appeal to the authorities for exemption from the *boule*.
>
> R. Yoḥanan said: One may borrow at interest for . . . the sanctification of the month.
>
> R. Yoḥanan used to go into the synagogue in the morning, collect the crumbs, eat, and say: 'May my lot be with him who sanctified the month here (last) evening!' (*pSanh.* 8: 2 (26a), with parallel in *pMoed Qatan* 2: 3 (81b)).

This passage, a list of four traditions of or about Rabbi Yoḥanan, occurs in the Palestinian Talmud in the context of a reference in the Mishnah to a meal that was held 'at the intercalation of the month' (*mSanh.* 8: 2). The first two sayings, however, seem completely out of context, as they do not relate to the intercalation of the month or any other aspect of the calendar;[140] but I would suggest that their inclusion in this passage is significant and has an explanation. The story at the end of this passage implies that R. Yoḥanan was somehow excluded from a meal that had taken place, the evening before, in a synagogue; at this meal, someone had 'sanctified the month'. Although this phrase is used elsewhere for the declaration of the new moon by the rabbinic court (*mRH* 2: 7), the rabbinic court seems most unlikely to be referred to in this case, because R. Yoḥanan—probably the most important rabbinic sage of mid-third-century Palestine—would surely not have been excluded from it; indeed, he is mentioned elsewhere in the Palestinian Talmud as a member of it (*pRH* 2: 6 (58b), *pSanh.* 1: 2 (18c)). The insertion of two sayings about the *boule* at the beginning of this passage implies perhaps, instead, that it was the city council that had gathered in the synagogue, to hold a festive meal and to 'sanctify the month'. R. Yoḥanan—who earlier in this passage, paradoxically, recommended exemption from or evasion of the *boule*—now regretted being excluded from it. This story suggests, at the very least, that 'sanctification of the month' was not the monopoly of the rabbis. Calendar decisions could be taken by other authorities, perhaps the city councils, from which even great rabbis like R. Yoḥanan were excluded.

The story also suggests that the Jewish, communal practice of 'new month meals' (also known as 'sanctification of the month' or 'intercalation of the

particularly important in this case, as Gadara was probably more pagan than Jewish—see below, after n. 144.

[139] Several interpretations are possible, e.g. 'cross over the river Jordan and make it a frontier between you and them'.

[140] Moskovitz (1995) 257 notes and discusses this incongruity, but remains unable to explain it.

month' meals), which are frequently referred to in early rabbinic sources, could involve in practice, at least in some cases, a decision-making procedure of determination and declaration of the beginning of the month, which was distinct from (but functionally similar to) the procedure ascribed to the rabbinic court.[141] The context of these communal meals appears, in some passages, to have been synagogues,[142] and in a few places there are references to city councilors, although rabbis also sometimes appear.[143] The practice of using new month meals as the occasion for formally deciding the beginning of the month may have been widespread. In our passage it was presumably the *boule* of Tiberias, R. Yoḥanan's home city, that gathered for the new month meal and 'sanctified the month'. But the same could have been occurring simultaneously in other large Jewish cities in Palestine, e.g. Sepphoris and Lod, where bouleutic common meals could equally have been held to determine the beginning of the new month. In this manner, the city councils would have combined the Hellenistic traditions of archontic calendar control and bouleutic common dining[144] together with the Jewish tradition of festive new month meals.

141 See *tMegillah* 4: 15 (ed. Zuckermandel 226), *pMegillah* 1: 6 (70b), *pBerakhot* 6: 1 (10a), 6: 4 (10c), *pPesaḥim* 1: 1 (27b), 2. 5 (29c), *pMoed Qatan* 3: 8 (83d), and *bSanh.* 70b), and next n.; the practice of new month meals may have had ancient biblical origins, as evident in 1 Sam. 20: 24–34. The dominant traditional interpretation has been that the purpose of these communal meals was only to celebrate and publicize the date of the new month that had been determined beforehand by the rabbinic court (so Lieberman 1934: 102–4; but medieval commentaries on *bSanh.* 70b express different views); however, this interpretation flows from the traditional assumption that the calendar was under exclusive rabbinic control. Liturgy for these new month meals is found in later Palestinian sources from the Cairo Geniza and in tractate *Soferim* 19: 7–8; see Fleischer 1973, who rightly senses (pp. 346–8) that the *Soferim* text suggests a procedure of sanctification of the month—not least because it includes the declaration 'sanctified is the month!' as found in *mRH* 2: 7—but refrains from this interpretation because of his traditional assumption that sanctification of the month could only take place in the rabbinic court. Another type of public meal, laid on for the witnesses that presented themselves to the rabbinic calendrical court, is mentioned in *mRH* 2: 5 but probably not relevant to the present context.

142 Thus the same R. Yoḥanan instructed the 'synagogue of Kifra' (or Kufra) to begin the new month meal while it was still daylight and to declare whether the new month was on time (i.e. on the 30th of the old month) or postponed (to the 31st): *pTa'anit* 4: 5 (68b), *pRH* 4: 4 (59c) (see Lieberman 1934: 104). In this case, the synagogue is unlikely to have taken any calendrical decision itself: Kifra was a small village outside Tiberias (see *pMegillah* 1: 1 (70a), where Kifra is identified as the ancient site of Tiberias; see also *Song Rabbah* 1: 27), presumably under the jurisdiction of both the *boule* of Tiberias and the rabbinic court of R. Yoḥanan—whichever of the two, on this occasion, controlled the calendar.

143 The main players in the *Soferim* text (above, n. 141) are not rabbis but 'assemblies of elders and *bouleutai* (city councillors)' and the 'twelve magistrates of the city' (Fleischer 1973: 339). But in some other passages (e.g. *pBerakhot* 6: 1 (10a), 6: 4 (10c)), the new month meal is said to be attended by 'rabbis'.

144 On calendar control by the *boule* or archons in Hellenistic cities, see Ch. 1. On bouleutic common dining, i.e. the well-established Hellenistic tradition of *bouleutai* or select members of the *boule* (*archons, gerontes, prytaneis,* etc.) holding common meals at festivals or on other

The possible involvement of city councils in setting the dates of the Jewish calendar does not necessarily mean that membership of the city councils was entirely Jewish. Even in cities with high Jewish populations as well as centres of rabbinic activity such as Tiberias, Sepphoris, and Lod, we cannot assume that the city councils were composed entirely of Jews; and even if they were, the coinage of these cities suggests that their city councilors must have been heavily paganized.[145] But pagan non-Jews or paganized Jews (whatever the meaning of these problematic categories) were perhaps just as likely to use a lunar calendar as were the Jews. Indeed, that had been the tradition throughout the Near East before the arrival of the Romans, and lunar calendars were still being used in many parts of the Roman East (such as in Greece). Although in the Near East itself, most local calendars had become Julianized (see Chapter 5), in the cities of Palestine where Jews and/or Samaritans were numerous and perhaps in the majority, a lunar calendar is more likely to have been retained.[146] This possibly explains Galen's statement (in the mid or later second century CE) that 'those in Palestine' follow a lunar calendar, without specifying any ethnic group such as Samaritans or Jews.[147] If, in these cities, the lunar calendar functioned as the official local calendar, it could have been used equally by Jews and Samaritans as well as pagans for the dates of their religious festivals.[148]

regular occasions, see Schmitt Pantel (1992) 168–70, 175–7, 303–26, who rightly underscores the political function of this practice.

145 The common view that Tiberias, Sepphoris, and Lod were centres of rabbinic activity is borne out by the frequent association of these cities with rabbis in rabbinic literature (see Miller 2006). Note also Epiphanius' comment, for what it is worth, that Tiberias and Sepphoris/Diocaesarea (in the mid-4th c.) were Jewish only, without any Gentiles, Greeks, Samaritans, or Christians (*Panarion* 30. 11. 9–10, Williams 1987–94: i. 128). But on their pagan coinages and the implicit paganization of their city councils, see e.g. S. Schwartz (2001) 132–42.

146 Little is known about the ancient Samaritan calendar, although in the Middle Ages it was undoubtedly lunar (Weis 1946), and 3rd-c. rabbinic sources already imply that the Samaritans reckoned a similar calendar to the Jews, though sometimes with a one-day discrepancy (*tPisḥa* 2: 2, ed. Lieberman p. 145, on the date of Passover; the passage also mentions the Samaritans sometimes celebrating Passover 'not with the Jews', which probably means one whole month earlier or later due to a different intercalation; see Ch. 7 n. 180). Cities of the coastline such as Caesarea, which were largely pagan or 'Greek', are known to have adapted their calendars to the Julian calendar (see Ch. 5); so did the province of Arabia, whose calendar seems to have been influential, together with those of Gaza and Ascalon, in other southern Palestinian cities (see Meimaris 1992, although the epigraphic evidence tends to be inconclusive as to how the calendars were actually reckoned). It is perhaps because the calendar of Caesarea was not lunar that R. Abbahu, who resided there, particularly needed the decisions of the rabbinic court to be transmitted to him (*pRH* 3: 1 (58d)). But in the inland cities of western Judaea, Samaria, and Galilee there is no evidence of calendar Julianization, and there I should expect most civic calendars to have remained lunar.

147 Galen, *In Hippocratis Epidemiarum Libros Commentarius* 3 (ed. Kühn, xvii/1. 23), cited in M. Stern (1974–84) ii no. 394, who, however, attributes this phrase to Galen's ignorance of the Jews and Judaism (ibid. 309).

148 Although pagan cults in Palestine had become somewhat Romanized by the late Roman period (Belayche 2001, esp. 281–92), the dates of their festivals could well have remained lunar.

Rabbinic courts, however, were most likely also involved in the determination of the lunar or 'Jewish' calendar—as is consistently assumed in rabbinic sources, other than the passage above quoted—and if so would have been competing against the authority of the city councils. The outcome is bound to have been plurality, and sometimes diversity, of calendars. Diversity could also have arisen because of disagreements between rabbis or rabbinic courts, for in spite of the general rabbinic assumption that there was only one calendrical court, and hence a single Jewish calendar,[149] there is some evidence in rabbinic sources of plurality and disagreement between competing rabbinic authorities. In one story, new moon witnesses presented themselves first to Rabbi Yoḥanan b. Nuri (who rejected them), and then went to Yavneh to Rabban Gamaliel (who accepted them); this suggests two competing rabbinic courts.[150] Individual rabbis are often presented as intercalating the year on their own initiative, in some cases possibly in defiance of the patriarchal court.[151] Moreover, in one passage R. Simon is said to have instructed 'those

Evidence of celebration of specifically Roman festivals in Palestine—which would imply the use of the Roman Julian calendar—is limited entirely to rabbinic sources whose meaning is dubious ('Kalendae' and 'Saturnalia' in *mAvodah Zarah* 1: 3). As Belayche rightly argues (2001: 261–2), the celebration of 'Saturnalia' at Scythopolis, seemingly referred to in *pAvodah Zarah* 1: 3 (39c), is historically unlikely, as this city is not known to have been particularly Romanized; inasmuch as the Talmud is known to use generic terms for pagan practices, 'Saturnalia' in this passage could well be a generic term for a local, non-Roman pagan festival, which could still have been dated according to a lunar calendar.

[149] See above, n. 134. The assumption that only one rabbinic court was entitled to determine the new month and the intercalation explains the rabbinic practices of disseminating the court's decisions through beacons or messengers to Palestine and the Diaspora (see below) and of observing a second festival day in the Diaspora so as to prevent the inadvertent desecration of the date observed in Palestine. These practices—to the extent that they were ever actually observed—were unique to rabbinic Judaism. See Stern (2001) 242–7.

[150] *mRH* 2: 8. There is no indication that R. Yoḥanan b. Nuri ever submitted to his decision, unlike R. Yehoshua in the story that follows (ibid. 2: 8–9). According to Kurtstag (1975), R. Yoḥanan b. Nuri only gave the witnesses a preliminary hearing, without attempting to reach a calendrical decision himself; but this interpretation is unwarranted, and serves only to support the traditional view of a single rabbinic authority. Whether this story actually happened does not matter much: the assumption behind it, that rabbis could differ on the calendar, is itself significant.

[151] Hezser (1997) 377–80, following Jacobs (1995) 200–2. It is frequently claimed that the (Jewish) Patriarch presided over the calendrical court and even controlled it (e.g. S. Safrai 1965, Levine 1996: 10, Goodblatt 1994: 204–7, 1998: 182–5). However, the evidence is inconclusive and sometimes unsound, and regularly contradicted by accounts of rabbinic decision-making without patriarchal involvement; Jacobs (1995) 195–205 concludes that if there ever was patriarchal control of the calendar, it was only under Rabbi Judah I (early 3rd c. CE; see also Safrai 1965: 38, though he resists this conclusion). A good example of rabbinic defiance to the patriarchal court might be R. Simon/Simai (late 3rd c.), who is cited in *pSanh.* 1: 2 (18c) as disagreeing with the patriarchal decision (this decision is at least associated in this passage with the 'house of Rabbi', i.e. the patriarch) to relocate the procedure of intercalation from Lod to Galilee, and who in *bḤullin* 56a is depicted as going to Lod, ostensibly of his own initiative, to intercalate the year. Safrai (1965) 31–3 argues that the story in *bḤullin* must have occurred *before* the patriarchal decision to relocate to Galilee, and that R. Simon must have been sent to Lod as a patriarchal

who calculate' to ensure that the New Year (1 Tishri) and the Day of the Willow (21 Tishri) did not occur on a Sabbath. 'Calculation' is not normally associated with the calendar in early rabbinic sources, since the procedure ascribed to the rabbinic court is based entirely on empirical sightings of the new moon. This passage suggests, possibly, that other groups unlike the rabbinic court—rabbis, or perhaps even city councils—determined the calendar on the basis of a calculation, and that R. Simon attempted to exert some influence on their decisions.[152]

In general, it would have been expedient for everyone to reach accommodation and agree on common dates, whether between rabbis and city councils (as above in the story of R. Yoḥanan, who seems not to question the council's decision) or between various rabbinic courts (as when R. Yehoshua bowed to R. Gamaliel's authority).[153] But in some cases, disagreement and diversity could have remained. Epigraphic evidence of dates diverging from the rabbinic calendar has been found, in Palestine, in the fourth–sixth-century Jewish funerary inscriptions of Zoar. In this southern city, the Christian community used the Julianized calendar of the province of Arabia, but the Jews reckoned a lunar calendar that differed from that of contemporary rabbis.[154]

The emerging picture, therefore, is that the destruction of the Jerusalem Temple and collapse of the high priesthood in 70 CE led to the fragmentation and, one could call it, 'diasporization' of the Palestinian Jewish communities. This had a direct effect on the Jewish calendar. Control of the calendar was taken over by competing bodies such as city councils, individual rabbis, and rabbinic courts, leading at times to calendrical diversity—by contrast

envoy; again, this argument is unwarranted and serves only to support the traditional view of a single, patriarchal authority over the calendar (this traditional view generally forces Safrai, throughout the article, to arrange his seemingly conflicting sources into similar artificial, chronological sequences: thus according to him the mid-2nd-c. meeting in the valley of Rimmon (*pḤagigah* 3: 1 (78d)) occurred *before* the court relocated shortly afterwards to Usha (Safrai 1965: 29 etc.).

152 *pSukkah* 4: 1 (54b). R. Simon's instruction differs from the later rabbinic calendar, which allows the New Year on the Sabbath. In Stern (2001) 172 I presented the alternative argument that the attribution to R. Simon (late 3rd c., the same sage as mentioned in the previous n.) should not be considered reliable, especially as this passage is not cited as a saying of R. Simon but only a report of what he did; if so, the passage reflects rather the context of the late 4th-c. editorial layer of the Palestinian Talmud, in whose period a calendar calculation was beginning to supersede the empirical method of the early rabbinic court.

153 *mRH* 2: 8–9; see above, n. 150. The pragmatic need to reach accommodation between conflicting calendars may explain, with regard to the 1st c. CE, why Josephus says surprisingly nothing on calendar sectarianism (as pointed out in Stern 2001: 22), even though sectarianism is of much interest to him, and even though Qumran and other sources suggest very strongly the existence of fundamental disagreements about the calendar (on which see further Ch. 7).

154 Stern (2001) 87–98, 146–53, and on the Christian inscriptions, Meimaris and Kritikakou-Nikolaropoulou (2005), (2008). Some might argue that because of its distance and marginality from the rabbinic centres in Galilee and western Judaea, the Jewish community in Zoar was an unusual case (Yizhar Hirshfeld, pers. comm.).

with pre-70 Judaea, when the centripetal force of the Temple and the authority of the high priesthood are likely to have secured calendrical unity. In this complex, competitive situation, the intruders were clearly not the city councils—who could legitimately expect to control their calendar, as was the privilege of all cities in the Hellenistic world—but rather the rabbinic courts. In this respect, perhaps, rabbinic courts may have been viewed as the politically dissident party. [155] Their legitimacy is certainly likely to have been an issue.[156]

The rabbinic new moon procedure

This may explain a peculiar feature of the rabbinic new moon procedure, as it is described especially in the Mishnah, which has been generally ignored in modern scholarship: namely, its distinctly *judicial* character. The rabbinic body in charge of determining the new month is called in the Mishnah a *beit din* (lit. 'house of judgment'), i.e. judicial court; its leader is 'head of the *beit din*' (*mRH* 2: 7). This court must be composed of three judges, like all lower courts of law.[157] Its procedure is strictly judicial: as in all trials, the verdict must be based on the testimony of two witnesses; even if the court itself saw the new moon, two of its members must detach themselves from the court in order to serve as witnesses (and if necessary, more judges must be co-opted to the court to make up the quorum of three).[158] These witnesses need to be legally valid, which excludes relatives of one another, slaves, women, and people disqualified on various grounds of immorality.[159] As in all trials, the witnesses must be interrogated separately by the court, to confirm the

[155] On the complex relationship between rabbinic judiciary courts and city councils (which also regularly acted as judiciary courts), see Z. Safrai (1995) 25, 77–88, 276–9, 300–1.

[156] The need for legitimacy explains perhaps the claim, in rabbinic sources, that the rabbinic court's decisions to sanctify the month and intercalate the year were divinely sanctioned; see in particular *pKetubot* 1: 2 (25b) with parallels in *pNedarim* 6: 13 (40a) and *pSanh.* 1: 2 (19a) and elucidation in Stern (2001) 231, and more explicitly in later sources (*Exodus Rabbah* 15: 2 and 15: 20, *Pirqei de-Rabbi Eliezer* 8). According to a much-repeated tradition, God and his angelic court would not sit in judgement on the New Year (1 Tishri) until the rabbinic court had sanctified it and declared it the first day of the month: 'When the Court above see the Court below sanctifying [the month], they sanctify it too' (*pRH* 2: 6 (58b), *pSanh.* 1: 2 (18c), and similarly *pRH* 1: 3 (57b)). For a much fuller development of this tradition, *Pesiqta de-Rav Kahana* 5: 13, cited in Stern (2001) 230; see also *tRH* 1: 12 (p. 209), *bRH* 8b.

[157] *mSanh.* 1: 2. But the quorum for intercalation is disputed in this passage as well as in other sources, and can be three, five, seven, or ten (see *tSanh.* 2: 1, *pSanh.* 1: 2 (18c), *pḤagigah* 3: 1 (78d), *bSanh.* 11a, *Leviticus Rabbah* 29: 4, *Pirqei de-Rabbi Eliezer* 8, *Exodus Rabbah* 15: 20); see Goodblatt (1998) 183–4.

[158] *mRH* 3: 1. As explained in *pRH* 3: 1 (58d), *pSanh.* 1: 2 (18c), and *bRH* 25b–26a, this follows the general judicial principle that 'a witness cannot become a judge'.

[159] As listed in *mRH* 1: 7–8. A similar list appears in *mSanh.* 3: 3–4, in connection with normal judicial procedure.

plausibility (in this case, astronomical) of their testimony and to ensure that their testimonies are congruent.[160] As in all trials, the procedure must be completed in daytime, and there are rules about which of the judges—junior or senior—express their opinion first.[161] The procedure concludes with the Head of the Court declaring his verdict: 'It [the month] is sanctified!' and all the people responding: 'It is sanctified, it is sanctified!'[162]

In spite of all this, it is clear from the same sources that the determination of the new month is not a real trial, and that its judicial procedure is, in some ways, contrived. This explains why exceptions to normal judicial rules, even quite considerable ones, are in some cases allowed (in especially in relation to the new moon witnesses): as the Palestinian Talmud states, 'we are not particular about the new moon testimony' (*pRH* 3: 1 (58c)). Thus according to some opinions, the testimony of two relatives is acceptable for the new moon, whereas in normal judicial procedure, two relatives would be disqualified.[163] The cross-examination of witnesses is described, in one passage, as taking place in a rabbi's private attic—whereas in normal judicial procedure it would only take place in court.[164] Several sources rule that if the new moon has been 'sanctified' on time but without witnesses, or if the witnesses have later been found to be false, the new moon declaration remains retrospectively valid[165]—a concession which, in a normal judicial trial, would be inconceivable, but which is hardly surprising in the context of the new moon procedure: for it is a trial without litigants and without accused.

The contrived, make-believe judicial character of the rabbinic new moon procedure raises profound questions about its origin, justification, and rationale. These questions are problematic even in rabbinic terms. No explanation is given in rabbinic literature as to why the new moon procedure must imitate judicial procedures. The new moon procedure is not explicitly derived from any scriptural source, as would be expected in the context of legal rabbinic literature, although one late antique source, the Babylonian Talmud (sixth century?), implicitly suggests Ps. 81: 4–5 as the basis for determination of the new moon in a judicial setting (*bRH* 22b, 25b). According to another source of the same period, the first month of Israel (in Exod. 12: 2) was sanctified when God joined Moses and Aaron to form a court of three judges, with the angels Michael and Gabriel as witnesses.[166] This myth of origins, however, does not

160 *mRH* 2: 5–6; compare with normal judicial procedure in *mSanh.* 3: 6, 4: 1, 5: 1–4.

161 Daytime: *mRH* 3: 1, *mSanh.* 1: 2, and *tRH* 3: 1; normal procedure in *mSanh.* 4: 1. First speaker: *pRH* 2: 6 (58a), *pSanh.* 1: 2 (18c); normal procedure in *mSanh.* 4: 2.

162 *mRH* 2: 7. Cf, the declaration of the verdict in court in *mSanh.* 3: 7 (for monetary cases), and the public announcement of the verdict ibid. 6: 1 (capital cases).

163 *mRH* 1: 7. For the normal judicial procedure, on which there is unanimous agreement, see *mSanh.* 3: 1, 3: 4, *mMakkot* 1: 8, etc.

164 *mRH* 2: 8; but ibid. 2: 5–6 indicates a court setting. For the normal judicial procedure, see *mSanh.* 3: 6, 5: 1–4.

165 *tRH* 3: 1, *pRH* 2: 8 (58b); Sifra *Emor*, *pereq* 10. This ruling appears to be unanimous.

166 *Pesiqta de-Rav Kahana* 5: 15 (Braude and Kapstein 1975: 117).

explain why the new moon procedure had to be designed as a judicial trial. The procedure is bizarre not only in terms of rabbinic reasoning, but also in comparison with other ancient calendars. For as we have seen throughout this study, calendar decisions in the ancient world were always made directly by the political elite or rulers, with or without the help of experts, in the same way as all political and administrative decisions were made—and not through procedures borrowed from judicial courts.[167]

If an explanation for the judicial, or pseudo-judicial, character of the rabbinic procedure is to be sought, it must be related to the social status of rabbis in Roman Palestine. The extent to which the new moon procedure described in the Mishnah was actually applied in practice by rabbis is open to discussion, but sources such as the Palestinian Talmud suggest that rabbinic courts in late Roman Palestine were involved in the determination of the new moon, and that the procedure they followed closely emulated that of the Mishnah.[168] The judicial character of these rabbinic courts, I would suggest, was intended as a statement of dissidence from the political authorities that normally controlled the calendar. For as I have argued above, the rabbis needed to legitimize their claim on the Jewish calendar, which in the Hellenistic world and the Roman East would have been the legitimate privilege of city councils and cities. The rabbis were not city councilors or political rulers, but they did act as arbiters and judges; a judicial court (as opposed to a city council) was a social setting in which they regarded themselves, and may have been regarded by other Jews, as entitled to belong. By defining the new moon procedure as specifically judicial, the rabbis were able to draw the calendar into their own space. The judicial procedure was at once a way of appropriating the Jewish calendar and of delegitimizing the presumably political processes employed by the city councils to determine the new moon and month. In broader terms, the rabbinic calendrical court served for the rabbis

[167] The variety of methods employed in this context reflect the variety of political systems that existed in the ancient world. For Athens, reference has been made in Ch. 1 (near n. 22) to the 5th-c BCE ‘First fruits’ decree (Meiggs and Lewis 1988: no. 73), which suggests that calendar decisions were taken in the normal way by the Athenian *boule* and Assembly. In Rome, the Republican calendar was controlled by the pontifical college, and constituted one of the many political processes of the *res publica* (see discussion in Ch. 4. 3). In the Assyrian kingdom, decisions about the Babylonian month and intercalation were taken by the king on the basis of written advice from astronomer-scholars; as everywhere else, there was nothing judicial about this procedure (see Ch. 2; in this respect, the rabbinic calendar procedure differed considerably from the Babylonian, *pace* Wacholder and Weisberg 1971).

[168] See above, n. 134 and after n. 148. It is generally unclear whether the Mishnah should be read as descriptive, prescriptive, or utopian, and even if descriptive, it remains a literary text which is never more than an interpretation of historical reality. Some elements of the mishnaic procedure can be reasonably identified as theoretical or imaginary: e.g. the notion that the new moon decision was disseminated every month throughout Judaea and further to Syria and ‘the whole Diaspora’ through beacons or messengers (*mRH* 2: 2–4: see Stern 2001: 162–3, 245).

as a platform for a novel and alternative source of social authority in Jewish Palestinian society.

Dissidence and normalization in late Antiquity

The dissident, subversive character of the rabbinic calendrical procedure is likely to have waned after the rabbis' adoption, during the third–fifth centuries, of fixed rules that led eventually to the rabbinic calendar's becoming a completely fixed scheme (see above). The multiplication of these rules must have led at some stage to the realization that empirical new moon sighting and judicial interrogation of witnesses had become unnecessary and redundant. By the tenth century, although the calendar seems still to have been determined annually by a rabbinic court (in spite of having become almost completely predictable), the judicial procedure is unlikely to have still been practised.[169]

This radical, albeit gradual, conversion of the rabbinic calendar from an empirical and flexible system to a calculated and fixed scheme—comparable with the evolution of other Jewish calendars in late Antiquity, such as the fixed scheme attributed to the Jews in the Council of Serdica document of 343 CE—may have been partly the result of Christian influence (i.e. the influence of fixed, Christian Easter cycles). In the specific case of the rabbinic calendar, it was more directly the outcome of a demand of Palestinian and Babylonian rabbinic communities to observe festivals and fasts on exactly the same dates, and hence to determine the calendar with standard, unitary rules (Stern 2001: 232–75). But from a broader perspective, as we have seen in this chapter, formalization and fixation was a common trend to all subcultural calendars, whether Gallic, Christian, or Jewish: all ended up assimilating features of the dominant, official calendars of the Roman Empire (mainly the Julian calendar), and all ended up as fixed calendar schemes.

The period when the rabbinic calendar evolved in this way corresponds, moreover, to one of decline of the city councils in the Roman Empire, and of political ascendance of religious leaders such as Christian bishops and Jewish patriarchs. The adoption of a fixed calendar, authoritative without the need for any legitimizing judicial procedure, reflects perhaps a change in the position and authority of patriarchs and rabbis in late antique Palestine. The normalization of the rabbinic calendar—from an eccentric, pseudo-judicial procedure to a stable, fixed scheme—reflects itself, to a certain extent, the late antique

[169] Determination of calendar dates by a rabbinic court persisted as late as the 10th c.: Stern (2001) 188–9. But since decisions were taken then on an annual (and not monthly) basis, it is unlikely that they involved any longer witnesses of the new moon. Note, however, that according to a text attributed to R. Saadya Gaon, some Rabbanite Jews still carried out the Mishnaic judicial procedure in this period: Poznański (1898) 267–8, 272–3.

normalization of the rabbinic movement from politically marginal to mainstream in Jewish society and Judaism.

This process of normalization is also characteristic of the evolution of the Christian Easter calendar, as we shall see further in the next chapter. The formation of fixed cycles, and in the fourth century, their gradual standardization into 84-year cycles in the West and 19-year cycles in the East (the former to be supplanted by the latter in the course of the fifth century) are processes contemporary with the transformation of Christianity from a dissident subculture to an official imperial religion. As Christianity achieved social integration and cultural respectability in the Roman Empire, so did its previously dissident practice of lunar reckoning: it was now formally tied to the Julian calendar in the form of Easter cycles, and became incorporated, for example, into the far from subcultural, very 'Roman' calendar of Philocalus in 354 CE. By the time of the Christian Roman Empire, however, calendar dissidence began to find new expressions, in the form of religious heresy.

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Sectarianism and Heresy: From Qumran Calendars to Christian Easter Controversies

This chapter concerns the fragmentation and diversification of calendars resulting not from political states' breaking loose from the great empires (as in Chapter 5), nor from political or cultural dissidence within the great empires (as in Chapter 6), but from divisions internal to religious groups. This draws us somewhat away from the political domain of empires and states (which has been dominant, for good reason, through most of this book), but raises fundamental questions about the relationship between calendars, society, and social cohesion. I shall consider to what extent sectarianism and heresy could lead to calendar diversity, and conversely, to what extent calendar diversity could lead to the rise of sectarianism, heresy, and social schism; and finally, to what extent the attitude and relationship of mainstream societies towards sects and heresies could have an effect on the development of their own calendars.

Some definitions are needed. The terms 'sect' and 'heresy' tend to be poorly and variously defined, and as a result, their meaning is often left unclear. As a matter of principle I do not dispute the usefulness of these terms, but they need to be given from the outset a working definition, or better a working description, that—albeit somewhat arbitrary—is sufficiently precise to be meaningful, yet sufficiently neutral to be compatible with most of their common uses. Full discussion of these terms is outside the scope of this study, but as I shall be using them repeatedly in this chapter, a brief statement about them is necessary.

'Sect' and 'sectarianism' are terms more commonly used in the study of Judaism than of early Christianity. They are modern terms, which do not have direct equivalents in the ancient sources (Josephus refers in Greek to first-century Jewish religious groups as *haireseis*—a forerunner of the term 'heresy', to be discussed below—and what he means is quite different from 'heresy' or 'sect'; the Latin *secta* has also different connotations from 'sect'). In our modern language, 'sects' tend to apply to minority religious groups (by 'religious' I mean social groups that are generated and sustained by common religious traits) with peculiar characteristics such as separatism, marginality, and insularity. The concept of 'sect' is therefore relational: it presupposes the existence of a majority group from which the sect is or has become separate. However, 'sect' does not necessarily require the existence of an orthodoxy or 'mainstream': the majority from which the sect has broken off can be constituted itself of an amalgamation of other, similarly sectarian groups, without any group achieving social majority or political hegemony. A sect, finally, remains closely related to the rest of society and shares many features in common with it, even though it is regarded, both from within and from without, as separate and different, and even though its 'sectarian' ideology is often one of seclusion and rejection of the rest of society (and sometimes even of the world as a whole).[1]

'Heresy' tends to cover a different range of meanings. It is used most prominently in the context of Christianity, where—unlike 'sect'—the term appears already in ancient sources, although originally not in the same sense as we are familiar with today. 'Heresy' in the modern sense (in which I shall be using this word) is a relational concept, perhaps more distinctly than 'sect', because it is meaningful only in relation to an 'orthodoxy' against which it is defined and from which it is distinguished—even if, again, it is closely related to the orthodox group and shares many features in common with it. 'Orthodoxy' does not necessarily represent the mainstream or social majority: its status is not derived from any intrinsic virtue or superior truth (even if it claims it), but rather through social forces such as the backing and power of political rulers and/or the higher social status of its adherents. This means that heresies, unlike sects, are not necessarily insular or in the minority, even if they are politically and socially marginalized (and sometimes violently persecuted). Furthermore, in the case at least of early Christianity, the identity of some groups as 'heresies' is entirely subjective: for a group designated by others as heretical often sees itself as orthodox. In early Christian sources, the term 'heretical' functioned to a large extent as a label that was applied polemically to groups within early Christianity by other Christians who saw themselves as orthodox and wished to be dissociated from them. For this reason, historians today prefer to regard early Christian heresy not as a social fact, but rather as an ideological, literary, and rhetorical construct: it served, to Christianity, as a polemical method of creating, constructing, and interpreting its internal divisions and differences. This cultural construct, however, had concrete effects on the social and political world of early Christianity, which became even more pronounced after the conversion of the Roman Empire to the new religion.[2]

[1] On sects and sectarianism in the context of ancient Judaism and in modern sociological theory, see Chalcraft (2007).

[2] For modern approaches to early Christian heresy, see Iricinschi and Zellentin (2008).

Sect and heresy, therefore, are far from synonymous. A sect can only be identified as also a heresy if it is defined in relation to orthodoxy, which—in the absence of any identifiable 'orthodoxy'—is arguably not applicable in the context of early Judaism. A heresy can only be identified as also a sect if it is a minority and secluded group, which does not apply to the very wide-scale Christian 'heresies' of late Antiquity such as Arianism and Monophysitism. Furthermore, 'sect' is an objective designation, whereas 'heresy' is far more subjective. The questions we apply to 'sect' and 'heresy' in the context of ancient calendars must therefore be substantially different. In the case of 'sect', for example, a question might be to what extent calendar differences drove sects towards social insularity; whereas in the case of 'heresy', the question would rather be to what extent calendar differences were exploited, from within and from without, in the subjective construction of heretical identity.

But the potential for calendars to generate social disputes and divisions, or conversely for calendars to be generated by them, goes well beyond the narrow context of sects and heresies. Although the controversies surrounding the date of Easter in the fourth and fifth centuries (but also in other periods of Christian history) involved heretical groups such as the Quartodecimans, they were not played out exclusively between the camps of 'orthodoxy' and 'heresy': they also resulted from rivalry between different orthodox ecclesiastical authorities. Rivalry between the churches of Rome and Alexandria, in particular, had a distinctive impact on the development of their Easter calendars, even though their disagreements were subtle and did not lead to crude accusations of 'heresy', or to radical social splits or schisms. As we shall see, Easter controversies between Christian heresies and rival orthodox churches belonged in a certain sense to the same continuum, which suggests that the study of the relationship between calendars, society, and social cohesion should really be extended beyond the limited context of sects and heresies to encompass all forms of dissent and dispute within ancient social movements and societies.

In the course of this chapter, I shall question an assumption shared by many scholars that calendar difference inevitably generates sectarianism, heresy, and/or social schism. It has thus been argued that the Qumran sect (known through the 'Dead Sea Scrolls') was formed, in the second century BCE, because of its adoption of a deviant calendar of 364 days which forced it to break off from mainstream Jewish society. Similar arguments have been applied to certain Christian heresies such as the Quartodecimans of the fourth and fifth centuries CE. In actual fact, the reverse could equally be argued: at Qumran and elsewhere, it could have been the sectarian or heretical split that generated calendrical difference. But more fundamentally, we need to question the underlying assumption that calendar and sectarian (or heretical) schisms were closely linked.

This assumption is based on the premise that diversity of calendars cannot be sustained within a single, undivided society. Indeed, the main purpose of calendars is to time and coordinate human events and activities; a shared calendar is therefore essential to social life and social cohesion. If every individual were to reckon a different calendar, coordination would become impossible and the whole purpose of the calendars would be defeated. Calendars must therefore generate consensus, and be themselves consensus. As we have seen throughout this study, calendar consensus was effectively established through political authority: most calendars were controlled by political rulers, and constituted therefore a political function and political privilege. Even in the rare, perhaps imaginary cases where the calendar was not determined by political authorities but left instead to the individual to decide, such as at Abdera and Ceos, the assumption tends to be that somehow or other—though exactly how remains a little mysterious—a consensus eventually must have emerged (see Chapter 1. 1). Conversely, and following this line of argument, deviation from the calendar consensus, and indeed any form of calendar divergence, must inevitably have led to social division and schism. This is because the adoption of a different calendar inevitably disrupts the proper synchronization of human events and activities, which in turn disrupts the social order and causes it to split. On this basis it has been argued that calendar divergence generated internal division within religious groups, and led in particular to the formation of 'sects' and 'heresies'.

The question, however, is whether calendar consensus is really essential to a properly functioning society, and whether calendar divergence—just as any other form of social and cultural diversity—is necessarily a threat to social cohesion. As we have seen in the previous chapters, calendar diversity often accompanied geopolitical fragmentation and sociopolitical dissidence; but it could also be accommodated, simultaneously, within diverse but undivided societies. There is no evidence, for example, that the Gallic calendar of Coligny or the use of lunar dates in Imperial Roman-period Italian inscriptions—in conjunction, significantly, with Julian dates—led in any way to social division or schisms. This is because society tolerates, by necessity, a certain extent of diversity between its individuals (or subgroups of individuals); diversity is only a threat to social cohesion if it is perceived to transgress acceptable limits. As has been recently argued (King 2008), late antique heresiological discourse and the identification of certain Christian groups as 'heretical' depended entirely on an implicit, ever-shifting, and constantly renegotiated definition of what diversities within Christianity could be considered tolerable—and therefore not 'heretical'—and what could not. The critical question, therefore, which will be raised in this chapter, is whether or to what extent ancient society was able to tolerate internal calendar divergence, and to what extent calendar divergence was treated in society as a significant issue.

Empirical evidence, which will be examined in detail in this chapter, suggests that in the context of Qumran the calendar had less to do with sectarianism than is commonly assumed. The perception that calendar divergence was a socially (and religiously) divisive issue seems only to have developed later, in the context of late-antique Christianity. This perception was related to the Christian pursuit of calendar unification, which needs to be understood not just in terms of the struggle between heresy and orthodoxy, but also in terms of the relationship between the Roman Empire and Christianity in late Antiquity.

It is perhaps not surprising that the scope of this chapter is confined to Judaism and Christianity. The phenomena of sectarianism and heresy appear to have been unique to these religions, perhaps because of their monotheistic, exclusivist attitudes to truth—even if this explanation is probably oversimplistic. One would be hard pressed, at all events, to find examples of sectarianism and heresy in the context of other ancient cults and religion.[3] The study of calendars in relation to sects, heresies, and schisms belongs specifically to Judaism and Christianity, and therefore to late Antiquity, which makes this final chapter the most appropriate way of concluding this study.

1. JEWISH SECTARIAN CALENDARS

Biblical origins

If there ever was calendar sectarianism among the Jews of the Seleucid and post-Seleucid era, it would not have been a very ancient tradition. In the Hebrew Bible, there is virtually no trace of dissent or disagreement among ancient Israelites regarding how the calendar was to be reckoned—indeed, the question of how the calendar is reckoned does not feature in the Hebrew Bible at all. The only passage relevant to calendar schism, perhaps, is King Jeroboam's so-called calendar reform, described in the source as follows:

> And Jeroboam made a feast in the eighth month, on the fifteenth day of the month, like the feast that is in Judah, and he offered upon the altar. So he did in Beth-El, sacrificing to the calves that he had made . . . on the fifteenth day in the eighth month, in the month which he had devised of his own heart; and he made a feast for the children of Israel (1 Kgs. 12: 32–3).

[3] Humfress (2008) 133 suggests, however, some continuity between late Republican Roman expulsions of disruptive, alien cults (such as of Bacchus or Isis) and late Roman Imperial legislation against heresies.

The tone of this passage is clearly derogatory: the institution of this feast is mentioned together, in this passage, with Jeroboam's worship of calves—reminiscent of the early Israelites' sin of the golden calf—and 'devised of his own heart' is an emphatic indication that his festival was not divinely ordained. Indeed, in the festival calendars of the Pentateuch (e.g. Lev. 23, Num. 28–9, and Deut. 16) there is no festival in the eighth month. This, together with the characterization of the eighth month as 'devised in his own heart', confirms beyond doubt that the error of Jeroboam was calendrical. It is unclear in what respect his festival was 'like the feast that is in Judah', but it presumably differed in the date. The 'feast that is in Judah' is most likely a reference to Tabernacles, on the 15th of the seventh month. Jeroboam erred in holding it one month later, on the eighth.

But the precise meaning of 'the month which he had devised of his own heart' remains unclear. Some have suggested that Jeroboam was reinstating a traditional northern Palestinian calendar in which the second harvest festival was celebrated in the eighth month, thus one month later than in the southern Judaean calendar (Talmon 1986: 118–23). It is equally possible that after rebelling against the Davidic dynasty and establishing himself as king in the North, Jeroboam made an intercalation of one extra month—just as Near Eastern kings and cities were later to do when they broke loose from Seleucid rule (see Chapter 5)—with the result that his seventh month, i.e. according to his own reckoning, corresponded to the eighth month in the Judaean calendar.

Either way (the two explanations are not necessarily mutually exclusive), the purpose of Jeroboam as presented in this biblical passage would have been to demonstrate his newly acquired political and religious independence from the kingdom of Judah. 'Sectarianism'—as defined above—would not be the appropriate term in this context; and there is certainly no suggestion of disagreement about how the calendar was fundamentally structured or reckoned.

Qumran: the 364-day calendar

Jewish calendar sectarianism is most famously associated with the Qumran community, whose literature (the 'Dead Sea Scrolls') is dated to the second century BCE–first century CE. The calendar common to the Dead Sea Scrolls is based on a schematic, non-lunar 364-day year; this peculiar calendar is also attested in other, contemporary Judaean sources (1 Enoch and Jubilees) and has been discussed, together with its possible origins, in Chapter 4. 2. In this chapter I shall consider the possible uses of this calendar in the Qumran community (or 'sect'), and its relevance—if any—to Qumran sectarianism.[4]

[4] By 'Qumran community' I do not necessarily mean a community located in Qumran, an ancient settlement north-west of the Dead Sea in the vicinity of which the so-called 'Dead Sea

The 364-day calendar is implicit throughout Qumran sources, where it is assumed in the narrative of the Flood Story, in the Psalm Scroll, the Songs of the Sabbath Sacrifice, probably the Temple Scroll, and perhaps the Community Rule.[5] But the scrolls that deal explicitly with the calendar, mostly dating from the first century BCE, lay out this 364-day scheme and its derivative cycles in exceptional detail.[6] The number of these texts, some extant in multiple copies (e.g. 4Q321), is sufficient to demonstrate that calendars at Qumran were far from a peripheral concern (VanderKam 1998: 110). In this respect, the 364-day calendar stands in stark contrast with the Jewish lunar calendar, which was practised by many Jews in the same period but not described or explained in any literary source before the Mishnah and Tosefta of the early third-century CE. At Qumran, rather exceptionally, the calendar constituted a literary concern, indeed a literary genre in its own right.

Qumran calendar texts do not present the 364-day year in its pure form (as it appears in 1 Enoch ch. 72 and Jubilees ch. 6), but together with priestly weeks and lunar days that are synchronized with the 364-day year through the construction of longer cycles, as we shall see more in detail below.[7] The inclusion of lunar days does not mean, however, that Qumran calendars are 'lunisolar' or that they give equal importance to lunar and solar (or 364-day) calendar schemes. The 364-day year is not only the sole common denominator of Qumran calendar texts, but also their fundamental structure; it is only within and in relation to this structure that the lunar days are represented. Moreover, as we shall see below, the lunar calendar scheme that is implicit in these lunar days is probably no more than an arithmetical derivation from the 364-day calendar . Even more importantly, it is only according to the 364-day year that festivals are dated in the Qumran calendar texts. For this reason

Scrolls' were discovered; I only mean the community or group of communities that are described in the Qumran scrolls.

5 Flood Story (4Q252): Lim (1992), (1993). Psalm Scroll (11QPs[a]DavComp 27: 2–11): VanderKam (1998) 63–4; Ben-Dov (2008) 34–7 points out that this text also suggests the 360-day year that appears in En. 74: 10–17, which he considers an earlier stratum of the Enoch text. Songs of the Sabbath Sacrifice (4Q400): VanderKam (1998) 65, Glessmer (1999) 255–9. Temple Scroll (11QT[a] 11–29): Yadin (1983), J. M. Baumgarten (1987), VanderKam (1998) 65–70. The Community Rule (1QS 10: 5 = 4Q256, 4Q258, 4Q260) seems to refer to the four seasonal 'days of remembrance' of the calendar of Jubilees: Alexander and Vermes (1998) 120–4, VanderKam (1998) 46–7.

6 The main sources are 4Q319–30, 4Q337, and 4Q394 1–2 (=4Q327), in Talmon, Ben-Dov, and Glessmer (2001) (with tabulations on pp. 4, 17–28). See also VanderKam (1998) 74–90, Glessmer (1999), Stern (2000*b*), (2001) 11–18, and especially 2010*b*), Gillet-Didier (2001), Ben-Dov and Saulnier (2008).

7 The only exception is possibly 6Q17, with a 364-day calendar in its pure form: Talmon, Ben-Dov, and Glessmer (2001) 7.

alone, the 364-day year must be identified as the leading calendar in Qumran literature.[8]

In this respect, the corpus of Qumran scrolls stands in opposition to the mainstream Judaean practice, in the same period, of using a Babylonian-type lunar calendar. The Hasmonaean and Herodian kingdoms of Judaea (mid-second century BCE–early first century CE), indeed, retained the standard Babylonian calendar (or a slight modification of it), which they had inherited, like most other post-Seleucid states, from their imperial predecessors. This lunar calendar continued to be used by all Jews throughout the Roman period, in Judaea as well as in the Jewish Diaspora, until the end of Antiquity and even well beyond.[9] In this respect, the 364-day calendar of Qumran was exceptional and may be regarded as marginal and dissident.

Qumran scholars have gone further, however, and argued that the 364-day calendar was 'sectarian' and one of the cornerstones of Qumran's sectarian schism. This argument has been endorsed and reiterated many times since, but not subjected to a sufficient level of criticism. The frequent assumption, to begin with, that the 'Qumran community' constituted a 'sect' is open to criticism, and has in fact been questioned in recent decades. The characterization of the Qumran community as sectarian comes from a focus on certain works, in particular the Community Rule and Damascus Document, that describe communities with features that are commonly regarded as sectarian, i.e. marginality, separatism, seclusion, rejection of the rest of society, etc. Even if we accept, as is perhaps reasonable, that these works at least were 'sectarian' (and so they are commonly designated in Qumran scholarship), this does not mean that every practice or rule mentioned in these works—such as, for example, the laws of the Sabbath in the Damascus Document, inasmuch they differed in some ways from the Sabbath laws of other Jewish circles—were *ipso facto* 'sectarian'. Difference, indeed, should not be confused with sectarianism. The Jews in the Hasmonaean and early Roman periods frequently disagreed on the interpretation of specific laws, as we know from several sources such as Josephus, the New Testament, and rabbinic literature, but

[8] This counters the common claim that solar and lunar calendars had equal status at Qumran, e.g. J. M. Baumgarten (1987, concluding: 'In the Qumran library the entire spectrum of calendric traditions was represented'), VanderKam (1998: 74: 'both lunar and solar arrangements . . . with neither judged to be superior to the other'; also ibid. 86, 111), and Stern (2000*b*), (2001) 12, which I now correct. On the calendar assumed in the 'Daily Prayers' text (4Q503), which some have claimed is lunar, see Glessmer (1999) 252–4, Stern (2001) 13, (2010*b*) 239, and Ben-Dov (2008) 132–9; there too the dominant element is likely to have been the 364-day year.

[9] Above, Ch. 4 nn. 117–18, also Chs. 5 and 6, and in detail Stern (2001). This is evident (1) from the persistent use of Babylonian month-names among all Jews (except Qumran) throughout Antiquity and right down to today; (2) from dates in ancient Jewish literary, epigraphic, and documentary sources confirming that the Jewish calendar was lunar, and (3) from the alignment of these months (at least until the 1st c. CE) with those of the Babylonian calendar (ibid. 27–31, 55–62).

disagreements of this kind did not necessarily entail sectarianism, nor did they necessarily lead to social division and schisms. The Qumran calendar was clearly *different* from other Jewish calendars, but whether this difference was or should be interpreted as 'sectarian' and as the cause of a sectarian schism remains entirely to be demonstrated.

In the next section, I shall first digress by asking whether the 364-day calendar was ever used at Qumran in practice; for if it was not, but only represented a theoretical model, it is unlikely to have had the *social* effect of drawing away the Qumran community from the rest of Judaean society and turning it into a 'sect'. I shall then question whether there is any evidence, in Qumran literature or in other Jewish sources, that the calendar—364-day versus lunar—was treated as a polemical or a sectarian issue.[10]

Was the 364-day calendar observed in practice?

Our starting point, in answer to this question, must be the fact—not sufficiently noted—that the 364-day calendar is completely unattested in documents and inscriptions from Qumran or anywhere else in the whole of the ancient period. This contrasts with the frequent attestation of the lunar, Babylonian-type calendar in documents and inscriptions from Judaea (and it is also assumed in Josephus' histories). It is therefore impossible to confirm on the basis of documentary or epigraphic evidence whether the 364-day calendar was ever used in practice by anyone.[11]

There are grounds to argue, in fact, that the calendar texts at Qumran were theoretical and not intended for practical use. As we shall now see, the cycles which these texts present are mathematically flawless, but they do not successfully track either solar, or lunar, or any other astronomical or other empirical reality. Their abstract, possibly idealistic characteristics raise the question of whether these calendars could have been applied in any way to real life, and hence, on the social plane, whether they could have been implicated in any way in the formation of a sectarian community.

The idealistic nature of Qumran calendars is apparent, to begin with, from their synchronization with the priestly courses (or 'watches': in Hebrew, *mishmarot*) in calendar texts 4Q320, 321, and 321a. The priestly courses

[10] A different version of the argument that follows appears in Stern (2010*b*), and more in detail in Stern (2011).

[11] For epigraphic and documentary evidence of the lunar calendar, see Stern (2001). Unfortunately, none of the documents discovered at Qumran (including the famous *yaḥad* ostracon) are dated by the month and day, which makes it impossible to establish which calendar was assumed. The discovery of a numbered month (as opposed to a Babylonian named one) in a document from Qumran could be treated as reasonable evidence of use of the 364-day Qumran calendar.

represent a division of the priesthood into 24 groups, following 1 Chron. 24: 7–18, each course serving for one week in turn in the Jerusalem Temple. In these calendar texts, accordingly, every week is designated by its serving priestly course; consequently, the 364-day calendar is expanded into a six-year cycle, at the end of which the year begins again with the same course.[12] The practical purpose of listing these priestly courses, however, is likely to have been very limited in the context of the Qumran community, which is not known for its direct participation in the Jerusalem Temple cult (if anything, the contrary), and for which knowledge of the course that served every week in Jerusalem was of limited relevance. It is questionable, besides, whether the system of priestly courses described in 1 Chronicles was actually practised in the Jerusalem Temple in the second to first centuries BCE, if ever at all. Although the priestly courses are sufficiently important in the Qumran calendar texts to be listed in full and to restructure the 364-day into a six-year cycle, their meaning is likely to be only symbolic, expressing perhaps the community's claim over the true Temple cult. The priestly courses, in these texts, may thus represent an imagined, ideal order of the Temple cult, in the framework of which, perhaps in some eschatological era, the festivals listed in the same calendar are to be correctly observed.[13]

The idealistic, abstract character of the Qumran calendars is even more evident from their failure to conform to the sun or the moon. The 364-day year may have been intended originally as a solar year;[14] but since it is approximately one and a quarter day shorter than the true (tropical) solar year of 365¼ days, it would not have taken more than a few decades for the calendar to fall significantly behind the sun and the seasons.[15] The lunar days that are listed in Qumran calendars fail to keep track of the moon; this is the

[12] This is because the 364-day year amounts to 52 weeks exactly, which multiplied by six produces a multiple of 24.

[13] It has also been suggested that in these calendar texts the priestly courses are brought into relation with the heavenly bodies (the sun and the moon), and thus become part of an ideal cosmic order; however, this is to assume that the Qumran calendar was related to the sun and the moon, whereas in fact there is no explicit evidence of this in the sources, except perhaps for *duqah*, which might be a reference to the moon crescent or disk (see below and n. 16). A very different suggestion has been that in these calendar texts the priestly courses serve only as a neutral device for naming the weeks; this is possible, though not attested anywhere else. On these interpretations, see VanderKam (1998) 73–4 and Talmon in Talmon, Ben-Dov, and Glessmer (2001) 8–13.

[14] The books of 1 Enoch (72: 32) and implicitly Jubilees (2: 9) refer to the 364-day calendar as 'solar'; 1 Enoch 74: 12 also implies that it is stellar, and 74: 17—inexplicably—that it is solar and lunar (I am grateful to Jonathan Ben-Dov for his assistance on this and on other points). Among the Qumran sources, 1QH 20: 4–9 mentions the Great Light of Heaven (i.e. the sun) and has been interpreted as a reference to the solar character of the Qumran calendar (see Vermes 1997: 78); however, the sun is only represented in this passage as determining the alternation of day and night, and besides, it is unclear whether the calendar is referred to in this passage at all.

[15] This raises the question of whether the 364-day year deserves, in fact, to be called 'solar' rather than a purely abstract scheme: see Glessmer (1999) 231.

result of being based not on empirical lunar observations, but on an abstract scheme that appears to have been modelled on the 364-day year, as I shall briefly explain.

Qumran calendar texts list only two days of the lunar month. The first is not named but identified as 'day 29' or 'day 30' (distinct from the day number of the 364-day calendar month on which this day 29 or 30 happens to fall), which clearly represents the last day of a lunar month: indeed, 29 or 30 days is the typical length of lunar months, and in the Qumran calendars, this day occurs regularly at intervals of 29 or 30 days in alternation. Scholars refer to this unnamed day ('29' or '30') as 'x'. The second lunar day (only attested in 4Q321–321a) is called *duqah*, and always occurs 13 days before x, i.e. one or two days after the midpoint of the lunar month. The meaning of the word *duqah* has been much debated, as well as whether the lunar month assumed in Qumran calendars began at the new moon or at the full moon (or on the following day); these debates are all interrelated, and beyond our scope.[16] But those uncertainties aside, the lunar calendar implicit in x alone can easily be reconstructed as a scheme of 29- and 30-day months in alternation, with the intercalation of an extra 30-day month every three years, which amounts exactly to three 364-day years. This results in a three-year lunar cycle, which when doubled can be synchronized, most conveniently, with the six-year cycle of priestly courses. The very neat compatibility of this lunar calendar with the 364-day year suggests that it was arithmetically constructed on the basis of, indeed derived from, the 364-day calendar.[17] This came, however, at the cost of astronomical accuracy. The regular alternation of 29- and 30-day months

[16] See Beckwith (1992) 462–4, Wise (1994) 222–32, VanderKam (1998) 60, 79, and 85–6, Gillet-Didier (2001), Talmon, Ben-Dov, and Glessmer (2001) 13–14, 33–6, 209–10, Ben-Dov and Horowitz (2005), and Ben-Dov (2008) 215–37. Most scholars (VanderKam, Gillet-Didier) interpret *duqah* as the new moon crescent, and hence the beginning of the month at the full moon, which would be uncharacteristic of ancient Near Eastern and Mediterranean lunar calendars. A month beginning at the new moon (Beckwith, Wise, Talmon) would better explain why the three-year lunar cycle in Qumran calendar texts begins on day x, which on any interpretation is the *last* day of a lunar month: if the month began at the new moon crescent, day x could have represented the conjunction, which would have been a good point for a schematic lunar cycle to begin. This theory, however, has more difficulty explaining *duqah*, with would correspond, rather strangely, to one or two days after full moon. Ben-Dov and Horowitz rescue this theory in a modified form, by interpreting x and *duqah* as astronomical annotations drawn from Mesopotamian traditions, whereby x = KUR refers to the last morning of lunar visibility at the end of the lunation, and *duqah* = NA refers to the first moonset occurring after sunrise on the day following full moon.

[17] This follows Ben-Dov's argument (2008: 119–51) that the 364-day calendar, first attested in the 3rd-c. BCE Astronomical Book of Enoch, preceded and formed the basis of the Qumran triennial lunar calendar, only attested later in the mid-2nd-c. BCE calendar text 4Q317 and then later still in 4Q320, 321, and 321a (late 2nd–1st cc. BCE), where it became synchronized with the priestly courses. Ben-Dov aptly concludes: 'while lunar phenomena were taken into account in calendar reckoning, they were recognized in order to synchronize them with the 364-day year . . . The moon was no longer considered to be a physical object which moves in a complex orbit in the sky, but a "theoretical" object that behaves according to simplistic, linear, and

and the intercalation of only one month in three years are, in lunar astronomical terms, highly inaccurate (as we have seen, for example, in Chapter 2). Lunar days x and *duqah* fell behind the moon by one day every six years, hence by several days within an individual's lifetime, quickly losing any meaningful relationship with the real lunar month (Stern 2001: 15). The astronomical, lunar data that x and *duqah* may have been intended to represent bore little relationship, therefore, with empirical reality: they were purely idealized, theoretical entities.

Astronomical accuracy mattered less for the lunar days, which did not fulfil any practical (e.g. liturgical) function within the Qumran calendars, than it did for the 364-day year. The drift of the year from the sun and seasons, which accumulated to over one month per 25 years, would have soon caused the biblical festivals in the Qumran calendars to occur in the wrong agricultural seasons, with Passover in the winter, the harvest festival in early spring, etc., in violation of Mosaic Law (see further Chapter 4, near n. 120). This consideration, more than any other, raises the question of whether the 364-day calendar was ever used in practice, or intended for such use, at Qumran or in any other community.

Some scholars have suggested that if the 364-day calendar was ever followed in practice, it would have been abandoned very early on, as soon as its discrepancy from the seasons became conspicuous or excessive (Beckwith 1992: 461); however, this would not account for the longevity of the 364-day calendar tradition in literary sources extending from the book of Enoch (third century BCE) through most of the period of Qumran (second-first centuries BCE). Other scholars have argued that the 364-day calendar could have been adjusted through regular or occasional intercalations in order to keep up with the seasons (and they suggest various ways how this could have been done). However, any intercalation would have disrupted the highly structured six-year cycle of 364-day years, priestly courses, and lunar days; moreover, this theory runs counter to the textual evidence, in which intercalation is not even intimated.[18]

A different approach has been to accept the possibility that the calendar observed at Qumran wandered, like the Egyptian civil calendar, through the seasons of the year. In Chapter 4, indeed, I have argued that if the 364-day calendar originated in the Ptolemaic period as a Judaized version of the

ever-recurrent schemes . . . From then onwards, the Qumran discipline was restricted to sacred mathematics' (pp. 150–1).

[18] For a summary of the various intercalation models that have been suggested, see Beckwith (1970); for a more recent attempt (based on 4Q319, the *Otot* text), see Glessmer (1996*b*), (1999: 262–8), who emphasizes, however the hypothetical nature of his suggestion (1996*b*: 156–7). The hypothesis of intercalation is endorsed by VanderKam (1998) 82–4, 111 and Talmon (Talmon, Ben-Dov, and Glessmer 2001: 3–6), but correctly refuted by Wacholder and Wacholder (1995) 28–9, 36–7 and Ben-Dov (2008) 210–11, (2008) 18–20.

Egyptian calendar, a wandering calendar may not have been so alien to its users. A few scholars have noted, furthermore, that the grand 294-year cycle in the *Otot* text (4Q319), which synchronizes the six-year calendar cycle with the 49-year jubilees, corresponds also approximately to the period of time needed for the 364-day year to come full circle in relation to the seasons (because 294 × 1¼ days amount to 367½ days, slightly in excess of a full solar/seasonal year; this means that by the end of this grand cycle, the festivals would have returned to their right seasons). But to attribute such an implicit meaning to the *Otot* text—which would imply in turn recognition, on the part of its authors, that the 364-day calendar was meant to revolve through the seasons of the year—is somewhat far-fetched.[19] Alternatively, some scholars have argued that a calendar falling behind the seasons may have been justified by a passage in 1 Enoch (80: 2–8), which reads that in the days of sinners the years shall be shortened so that rain and vegetation will come 'late'. This passage recognizes a discrepancy between the calendar and the seasons, but instead of attributing it to a fault in the calendar, it blames the seasons (or rather human sin that caused the seasons to come late). This explanation, it has been argued, would have justified the observance of a wandering 364-day calendar.[20] However, there is no direct evidence to support this theory; this Enoch passage does not explicitly refer to the 364-day calendar, and may in fact be referring to the 360-day year, a calendar which Enoch attributes elsewhere to possibly the same 'sinners' (82: 4). A wandering calendar would have represented a radical departure from the normal observance of biblical agricultural festivals in their right seasons; it cannot be attributed to the Qumran community, or to any other community that favoured the 364-day calendar, without more explicit evidence.

In this light, serious consideration must be given to the possibility that the 364-day calendar was never used in practice nor even intended for this purpose: it was only designed as a theoretical model or imagined ideal. In 1 Enoch, where it is first attested, the 364-day calendar is certainly presented as a theoretical, astronomical calendar: its context is a description of the courses of the sun and moon, and the calendar is not suggested for any other possible use (such as the dating of festivals).[21] Although the dates of festivals become prominent in Qumran calendar texts, they may still have been intended as

[19] See discussion in Glessmer (1999) 264.

[20] This theory is favoured by Beckwith (1970) 392–5 and Wacholder and Wacholder (1995) 28–9 and 36–7. See Stern (2001) 15–16.

[21] Note also that its astronomical models tend to be simplified and schematized—similarly to the Babylonian compendium MUL.APIN, from which much of its information is derived (see Ch. 4. 2)—rather than accurate representations of empirical reality. On Enoch's calendar as theoretical or ideal, see Milik (1976) 14 and 277, Stern (2000*b*), (2001) 7, 14–16.

the representation of some cosmological (or eschatological?) ideal where solar years, lunar months, priestly weeks, and liturgical days combined in perfect harmony. Many scholars have noted the ideological implications that the Qumran calendar may have been invested with. It has thus been described as a 'sacred time-scheme from *Urzeit* to *Endzeit*',[22] or an expression of 'the theological and ideological conviction that the courses of the luminaries and the cycles of festivals and priestly duties operate in a cosmic harmony imposed upon them by the creator God himself';[23] some have even suggested that the measure of time, with the use of synchronistic calendars, was treated at Qumran as a religious act (Wise 1994: 231). These interpretations, it should be emphasized, are speculative because the sources do not provide much more than the calendars themselves. But if the Qumran calendar was invested with symbolic, ideological meaning, it becomes more conceivable to regard it as a theoretical model or an ideal, rather than as a calendar intended in real life for practical use.

It is important to reiterate, however, that the only calendar employed in Qumran sources for dating the festivals is the 364-day year; this makes it difficult to dismiss this calendar as purely theoretical, and to assume that in practice another calendar was used instead.[24] We are unable to conclude, therefore, whether or to what extent the 364-day calendar was used in practice by the Qumran community, and thus whether the festival dates of the community differed substantially from those of other Jews who used a lunar calendar. This affects, in turn, our ability to establish whether the 364-day calendar marked out, in *social* terms, the Qumran community from the rest of Jewish society, and thus whether it could have led potentially to a sectarian split.

[22] Wacholder and Wacholder (1995) 37, Talmon in Talmon, Ben-Dov, and Glessmer (2001) 9. The notion that the calendar represented a continuum beginning from *Urzeit* is based on a reference to the Creation at the beginning of the *Otot* text (4Q319 iv 11, ibid. 201, 214–15) and possibly of 4Q320 fr. 1 i, l. 3, which would imply that the first cycle of the calendar began on the Wednesday of Genesis, when the sun and moon were created (Talmon op. cit. 40–3; see also VanderKam 1998: 79). The notion of *Endzeit* is possibly based an eschatological interpretation of the priestly courses (see above).

[23] VanderKam (1998) 112. This interpretation assumes that Qumran calendars were intended to represent the courses of the sun and the moon, and thus were symbolizations of cosmic harmony; but as argued above, the Qumran calendars were primarily conceived and expressed as abstract schemes. The idea that the 364-day calendar is God-given appears explicitly in Jub. 6: 23–38, but not clearly in any Qumran source (Stern 2010*b*: 242–3).

[24] I retreat from my conclusion in Stern (2000*b*) that in practice the Qumran community must have used the mainstream Jewish lunar calendar; there is certainly no hint of this in any of the Qumran sources. Similarly, there is no good reason to surmise that the 364-day calendar was reserved for cultic purposes and the mainstream lunar calendar for 'civil' purposes (cf. Jaubert 1957*a*: 35 n., 156–7), even though one would expect the lunar calendar to have been used in commercial dealings with people outside the 'Qumran community'.

Calendar polemics in Qumran sectarian sources

We now turn to the question of whether the calendar was treated at Qumran as a polemical issue. The radical differences between the 364-day calendar, favoured in Qumran sources, and the Jewish lunar calendar, apparently dominant elsewhere, have led scholars to read calendar polemics into a number of so-called 'sectarian' Qumran texts (in particular the Damascus Document, the Community Rule, and the Habakkuk *Pesher*). They constructed in this way the impression that the calendar and how it was reckoned formed an important part of the community's sectarian identity. On close inspection, however, it emerges that most of these readings—if not all—are over-interpretations or even misinterpretations. This tendentious reading of Qumran texts has been determined by the assumption that the calendar was a sectarian issue—an assumption that will be criticized below.

Thus in the Damascus Document, God is said to have revealed to the 'remnant of Israel' the Sabbaths and festivals in which the rest of Israel had gone astray (CD 3: 13–15), and to enjoin the observance of the Sabbath in its detail and the festivals and day of fast as according to the findings of the members of the new covenant (CD 6: 18–19). These passages, clearly polemical, are commonly interpreted as referring to the observance of festivals and day of fast on their correct *dates*, i.e. according to the 364-day calendar.[25] However, calendar and dates are not explicitly mentioned here; it is just as likely that these passages are polemicizing about the correct *form of observance* of the festivals in terms of prohibitions, liturgy, and acts of worship. Another passage of the Damascus Document (CD 16: 2–4, = 4Q270 fr. 6, 2: 17, 4Q271 fr. 4, 2: 5) is often interpreted as prescribing the observance of the calendar which is 'strictly defined in the book of Jubilees', i.e. the 364-day year.[26] And yet, the passage is only referring to the book of Jubilees for the determination of the 'periods of the blindness of Israel'—i.e. certain periods (past or future) of Israel's history; this passage is about long-term chronology, not the annual calendar.[27] A fragmentary, polemical passage in the Hosea *Pesher* (4Q166 2: 16) which seems to condemn those who follow the 'festivals of the nations' has been interpreted as a reference to the observance of (Jewish) festivals on the wrong dates.[28] This interpretation is based on a similar phrase in Jub. 6: 35, to

[25] Talmon (1958) = (1989) 151, Vermes (1997) 78, VanderKam (1998) 48.

[26] Talmon (1958) = (1989) 161, Vermes (1997) 41, VanderKam (1998) 47–8, followed by Stern (2001) 12.

[27] So correctly J. M. Baumgarten (1996) 156–7, 178–9. The full passage translates as follows: 'and as to the determination of all these periods of blindness of Israel, behold, it is strictly defined in the book of *The Divisions of Times into Jubilees and Weeks*'.

[28] Bernstein (1991), and more briefly Vermes (1997) 78. But for a critique of this interpretation, see A. I. Baumgarten (1997) 85–6 n. 17. For detailed analysis of all these passages, see Stern (2011).

which we shall return below, and which refers in that context to the lunar calendar; but the Hosea Pesher, on a plain reading, is simply condemning the observance of pagan, non-Jewish festivals.

More clearly related to the calendar and the way it is reckoned is a passage in the Community Rule prohibiting the advancement or postponement of any of the 'appointed times' or festivals (1QS 1: 13–15).[29] But this only means that the calendar must be *accurately* reckoned. Any Jew within the community of lunar calendar users could have made a statement of this kind.[30] It does not imply a polemic against any competing or fundamentally different calendar.

The text most frequently cited as 'evidence' of calendar polemics and sectarianism at Qumran is Habakkuk *Pesher* (11: 2–8), which refers to the Wicked Priest's persecution of the Teacher of Righteousness and then goes on:

> And at the time of the festival of rest of the Day of Atonement, he [the Wicked Priest] appeared to them to consume them and cause them to stumble, on the day of fast, their Sabbath of rest (6–8).[31]

From the earliest days of Qumran scholarship, this passage has been taken to mean that Wicked Priest and Teacher of Righteousness observed the Day of Atonement on different dates, that this difference was due to the Teacher's use of the sectarian, 364-day calendar, and that the Wicked Priest deliberately exploited this difference by desecrating his opponent's day (Talmon 1951, 1958 = 1989: 152–3). This interpretation has rarely been seriously challenged;[32] and yet, it is obvious that many other interpretations are equally possible:

(a) The Wicked Priest is not accused, in this passage, of using a different calendar or of observing the Day of Atonement on the wrong date. At most, he is accused of *desecrating* the day of rest: for although his 'appearance' before the Teacher and his followers would not have been, in itself, a forbidden act,[33] the *Pesher* clearly implies that his choice of the Day of Atonement to 'consume' the Teacher and his followers and 'cause them to stumble'—whatever this exactly means—constituted a form of desecration. This is the meaning of the possessive 'their' at the end of the passage: 'their Sabbath of rest' implies

[29] Talmon (1958 = 1989) 151 and VanderKam (1998) 45–6 read this as further evidence of calendar polemics.

[30] As e.g. most probably *bBerakhot* 28a, and Targum Jonathan at Zeph. 3: 18, on those who 'delayed the times of the festivals'.

[31] Alternative translations may be: 'And at the *end* of the festival of rest of the Day of Atonement . . . on the day of fast, the Sabbath of *their* rest' (or again: '. . . on *their* day of fast, the Sabbath of rest'): see Nitsan (1986) 190–1; Vermes (1997) 484.

[32] It is followed entirely by Nitsan (1986) 135–6, 190–1, and VanderKam (1998) 44–5.

[33] It might have been considered a forbidden act if the Priest had travelled on that day e.g. from Jerusalem to the Qumran village, insofar as CD 10: 20 prohibits journeys on the Sabbath of more than a thousand cubits; yet there is no indication, in this passage, that such a journey was made.

that only the Teacher and his followers observed it, but not the Wicked Priest. This possessive does not mean, however, that the Wicked Priest reckoned and observed the Day of Atonement on another day.[34]

(b) Even if the Wicked Priest reckoned the Day of Atonement on another day, this does not necessarily mean that the Wicked Priest and the Teacher of Righteousness used fundamentally different calendars. They could both have been using, for example, the same lunar calendar based on sightings of the new moon, but on this occasion happened to have sighted the new moon on different days. As we have seen in previous chapters, this was very common in the ancient world among lunar calendar users.[35]

(c) Even if the Teacher did reckon a fundamentally different, 364-day calendar, this would still not be the main polemic in this passage. The central issue is the Wicked Priest's persecution of the Teacher. There is no indication in this passage that had the Priest not made his vexatious appearance on the Day of Atonement, the difference of calendars—if indeed there was one—would have been *in itself* the object of a polemical dispute.

We are thus left, in conclusion, with very little evidence to support the common view that the calendar was a polemical issue in Qumran sectarian sources. The only text where, in an unambiguous way, the 364-day calendar is polemically contrasted to the lunar calendar is Jub. 6: 31–8, from a work usually dated to the mid-second century BCE. A dozen copies of this work are attested in the Qumran scrolls, which may be taken as an indication of its importance within the Qumran community. But the relationship of this work to other, sectarian Qumran sources remains debatable; the extent to which the Qumran community would have espoused the calendar polemics of Jubilees is therefore perhaps unclear.[36] This important text will be examined separately below.

[34] As assumed by Talmon loc. cit., and used as a cornerstone to his argument; followed also by Nitsan loc. cit. If the Wicked Priest represents, as is commonly interpreted, the Jerusalem High Priest, then on the Day of Atonement one might have expected him to attend the Temple and conduct the sacrificial ritual of the day, and not to be attacking his foes elsewhere; however, the historical implausibility of this narrative does not matter much if we regard the Pesher as a polemical and edifying tale, rather than as a factual and 'true' historical account (on whether *pesher* and other Qumran texts should be read as 'historical' narratives, see Grossman 2002).

[35] A discrepancy between similar lunar calendars could also have been due to the intercalation of a 13th month at different times. A similar (though unrelated) story that is frequently quoted in this context, and that clearly inspired the traditional interpretation of the Habakkuk *Pesher* (e.g. Talmon loc. cit., Vermes 1997: 79, Grossman 2002) is found in the Mishnah (*mRH* 2: 9): two rabbis disagreed as to whether the new moon had been seen, and consequently, as to when the Day of Atonement should be observed; R. Yehoshua was forced to submit to R. Gamaliel, and to publicly desecrate the day that he had reckoned as the fast. This story illustrates the way disagreements could arise even within the same calendrical tradition (this point was missed by Talmon and his successors, who were inspired however by this story to interpret the Habakkuk *Pesher* passage as a disagreement over the date of the Day of Atonement).

[36] J. M. Baumgarten (1987) argues that the book of Jubilees stands far apart from Qumran literature precisely because of its explicit calendar polemics. The strong anti-lunar stance of

Calendars and Qumran sectarianism

The absence of calendar polemics in Qumran sectarian sources (Jubilees excepted) raises our suspicion that the adoption of a different calendar was not considered a sufficiently significant issue for the Qumran community to be defined as separatist or sectarian. However, the formation and maintenance of a sectarian identity is not necessarily dependent on polemics and rejection of the outside world. The possible relationship between the 364-day calendar and Qumran sectarianism needs therefore to be probed further.

Shemaryahu Talmon (1951, 1958) was the first to argue that the calendar was a cornerstone of Qumran's sectarian 'schism', and his theory has rarely been challenged since.[37] It is reiterated in the official edition of the Qumran calendar texts, where Talmon writes: 'the [calendar] difference caused the members of the community to abstain from participation in the Temple cult', and again:

> The discrepancies between the solar and lunar calendrical schedules inevitably undermined the social order and communal life of Judaism at the height of the Second Temple period, and effected an unbridgeable gap between the "Community of the Renewed Covenant" and its opponents. It may be said that the calendar controversy was a major cause, possibly the *causa causans* of the *Yaḥad*'s separation from mainstream Judaism.[38]

This position was argued in more detail in his article of 1958, where he emphasized, quite plausibly, that reasons for the Qumran schism should be sought in the 'sphere of action' (i.e. religious practices) rather than of ideas, and went on:

> No barrier appears to be more substantial and fraught with heavier consequences than differences in calendar calculation, to quote the French sociologist E. Durkheim, since a common calendar 'expresses the rhythm of collective activities'. An alteration of any one of the dates that regulate the course of the year inevitably produces a breakup of communal life, impairing the coordination between the behaviour of man and his fellow, and abolishes that synchronization of habits and activities which is the foundation of a properly functioning social order.... Whoever does not observe the festivals of the year at the same time as

Jubilees is another significant difference, as lunar elements are frequently included in Qumran calendar sources; see further Glessmer (1997) 145–58. The relevant passage of Jubilees, 6: 31–8, is not attested in any of the extant fragments from Qumran, although this is obviously of no particular significance.

[37] It is endorsed e.g. by VanderKam (1998) 113–16, with an elaborate historical narrative (concededly hypothetical) to go with it. Davies (1983) 85 and A. I. Baumgarten (1997) 78, 109 are alone, to my knowledge, to have challenged Talmon's theory.

[38] Talmon, Ben-Dov, and Glessmer (2001) 3, 6. 'Community of the Renewed Covenant' and *Yaḥad* are both designations of the Qumran community.

> the community in which he lives, ceases to be a member of the social body to which he hitherto belonged.[39]

The appeal to social theory, more specifically to Durkheim, well serves Talmon's argument, since (to simplify somewhat) Durkheim assumed collective cohesion or 'solidarity' to be essential to society and breach of this cohesion to be anomalous and problematic. But in our post-modern age of global but plural, often fractured multiculturalism, this simplified view of Durkheim's notion of solidarity has become rather outdated: in today's Western world, we tend to assume that societies can thrive on internal, irreconcilable differences.[40] Although a common calendar expresses, no doubt, the rhythm of collective activities, there is no good reason to assume that a society is unable to function or exist without it, and hence that calendar difference necessarily leads to social breakup and schism.

Let us adopt a more empirical approach, and assess whether there is any evidence in the sources themselves to support Talmon's contention that the calendar was associated, directly or indirectly, with Qumran's sectarian schism. Most of the sources that Talmon cites as 'evidence' are the polemical passages that have been dealt with above and effectively dismissed. Another passage that he cites, apparently more relevant to his argument, is in the Damascus Document (CD 4: 10–12), where Israel's separation from the House of Judah and from Belial (i.e. the community's separation from mainstream Jewish society) is associated with 'the completion of the period according to the number of those years'—which Talmon interprets as a reference to Qumran's distinctive calendar.[41] It seems evident, however, that this line of text is only providing a chronological marker—i.e. when the separation took place—and bears no relationship to the calendar of 364 days.

More relevant to the relationship between the calendar and Qumran sectarianism is the intriguing fact that the calendrical *Otot* text appears in the same manuscript as one of the versions of the Community Rule, $4QS^{e}$ = 4Q259. It is widely accepted that in this version, *Otot* constitutes an integral part of the Rule, where it appears instead of the Maskil's hymn in the other versions.[42]

[39] Talmon (1958) = (1989) 148–9, adding further that deviation from the calendar of the mainstream community may have been, for the Covenanters, a sign of civic and political dissidence. See also ibid. 193–4. The citation is from Durkheim (1915) 11.

[40] For a postmodern reevaluation of Durkheim's notion of solidarity, see e.g. Maffesoli (1996).

[41] Talmon (1958) = (1989) 151, and Talmon, Ben-Dov, and Glessmer (2001) 6.

[42] Metso (1997) 48–51, 140–7 and Alexander and Vermes (1998) 129, 150–2 (see also Glessmer 1996*b*: 125–32), both suggesting also that (*a*) inasmuch as the Community Rule was mainly a handbook for the Maskil (i.e. leader of the community), information about the calendar would have been important to include, and (*b*) the Maskil's hymn that appears instead in the other versions opens with calendrical material—at least with a cursory reference to the times of the day, new moons, festivals, and four days of remembrance when various prayers are to be recited (1QS 10: 1–5: Alexander and Vermes 1998: 120–4)—and thus occupies a similar functional slot within the Rule.

Regardless of which of these versions came first,[43] the appearance of a calendar text in one of the most important sectarian writings from Qumran must surely be significant—even if insufficient to prove that calendar and sectarianism were inherently linked (as argued above, not everything in a 'sectarian' text is *ipso facto* sectarian, let alone the basis of a sectarian split).

A similar, though less convincing, argument may be applied to the polemical (and perhaps also 'sectarian') letter known as *Miqtzat Maase ha-Torah* (*MMT*). In one of its copies, 4Q394, the first surviving lines refer to the year's being complete in 36[4?] days (Talmon, Ben-Dov, and Glessmer 2001: 157). But in this case, it is questionable whether these lines, which look like the tail piece of a calendrical roster, belonged to the same literary composition as *MMT* (as argued above in the case of *Otot* and the Community Rule) or rather just happened to have been included in the same manuscript.[44]

Evidence that use of a different calendar was related to, or constitutive of, Qumran sectarianism is thus, at best, extremely meagre. It is primarily a modern, scholarly assumption which finds little support in the textual sources.

This conclusion should come as no surprise. Calendar diversity was a fact of life in ancient society, among the Jews (Stern 2001) as well as in Greece and post-Seleucid Asia and the Near East (see Chapters 1 and 5). In Roman Judaea/Palestine, in particular, a very wide range of local civic calendars were available including the various 365-day calendars of Tyre, Caesarea, Ascalon, Gaza, and (later) Provincia Arabia, and the Jewish and Samaritan lunar calendars—all calendars reckoned very differently, although using mostly the same Macedonian or Babylonian month-names—as well as the Alexandrian and the Julian calendars. Documentary and epigraphic evidence suggests not only that these various calendars were ubiquitous and in wide use in Roman Judaea/Palestine, but also that individuals often had the choice, especially in smaller towns and localities which did not have a clearly defined local calendar, to pick whichever one most suited them.[45]

[43] This remains contentious and speculative, Metso (1997: 140–7) treating 4QS^e as the earliest version extant, and Alexander (1996, esp. 444–5) treating it as later.

[44] Strugnell in Qimron and Strugnell (1994) 203, VanderKam (1998) 116. Strugnell is actually referring to a much longer calendrical text known since as 4Q394 1–2 (previously 4Q327), which Qimron and he (1994: 7–9, 44–5, 109–10 took to be part of 4Q394 (*MMT*) and published together with it. However, this reconstruction has now been discredited: 4Q394 1–2 is not only a separate literary work (as sensed already by Strugnell himself, ibid. 203) but indeed a completely separate manuscript (VanderKam 1998: 75–6, and Talmon, Ben-Dov, and Glessmer 2001: 160–1, with re-edition of the text ibid.). Nevertheless, Strugnell's discussion applies equally well to the first lines of 4Q394 (proper), in which only a reference to the 364-day year appears to have survived.

[45] This clearly emerges from the work of Meimaris (1992). The calendar of Gaza, for example, is attested in 6th-c. southern Palestine outside the territory of the city (ibid. 119–21, 127 no. 115, 130 no. 127, 254 no. 352), as are the calendars of Arabia (130 no. 126, 254 no. 352) and of Alexandria or Egypt (237 no. 287). On the potentially confusing use of various calendars in the

In this context, the observance of different calendars by different Jews would have been far less of an issue than modern scholars have tended to assume. Although it is likely that in pre-70 CE Judaea, and certainly within the Temple itself, a single lunar calendar—controlled in Jerusalem by the High Priest—was consistently observed, no one could have expected the same calendar to be observed by Jews in more distant communities. Because of the empirical nature of the lunar calendar, based on new moon sightings and on *ad hoc* decisions about whether to intercalate the year, Diaspora Jewish communities were bound to observe Passover sometimes a few days or even a whole month apart (as is attested, for example, in the Jewish communities of late antique Alexandria, Antioch, and even Zoar in southern Palestine: Stern 2001: 72–9, 87–98, 146–53). It would not have mattered much, therefore, if in the somewhat secluded village of Qumran the festivals were observed on different dates; this should not have been a particular cause of social division or schism. In today's Western world, dominated as it is by the Gregorian calendar, we tend to regard the use of a single calendar as essential for society and social cohesion; but clearly calendar diversity did not disturb the cohesiveness of ancient societies and religions in the same way. To them, calendar diversity was normal and largely a matter of indifference.

The 364-day calendar, and the complex literature describing it, should therefore be regarded as just one of many peculiarities of Qumran literature and perhaps (if the calendar was used in practice) of the Qumran community. But contrary to what has been widely assumed, the calendar does not appear in Qumran sources as a polemical issue, nor does it appear to have played a particular role in forging the Qumran community's sectarian identity.

Calendar sectarianism in Second Temple Judaism

In Jewish sources from outside Qumran, we are similarly hard pressed to find any evidence of calendar-based sectarianism.

The book of Jubilees (second century BCE), as mentioned above, is the only text where the 364-day calendar is polemically contrasted to the lunar calendar (Jub. 6: 31–8). This passage commands the observance the 364-day calendar with repeated warnings that any deviation from it would lead to the disruption of the years, new moons, and seasons (6: 33–4) and to the celebration of festivals on the wrong days (6: 37–8). The narrator predicts that after Moses' death (6: 38; cf. 1: 14) the Israelites will forsake the 364-day calendar and

documents of Babatha's archive from early-2nd-c. CE Judaea and Arabia, see Stern (2001) 38–42. The ability to choose from a variety of calendars for dating documents or inscriptions may have given scope to the Palestinian individual for the personal expression of religious, social, and political allegiances; but calendar polemics and sectarianism are certainly out of context here.

observe instead a lunar calendar, and thus 'forget the feasts of the covenant and walk according to the feasts of the nations after their error and their ignorance; for there will be those who will assuredly make observations of the moon—how it disturbs the seasons and comes in from year to year ten days too soon' (6: 35–6).[46] This polemic against the lunar calendar makes no reference, however, to any sectarian schism within the Jewish people, or to any select group of Jews or 'remnant of Israel' that may have been observing the true calendar. Instead, Jubilees draws on the traditional, biblical contrast between the covenant of Israel and the error of the 'nations', and presents the adoption of the alien, lunar calendar as a sin that Israel collectively commits. The book of Jubilees certainly reveals that the calendar was the object of polemical disputes among second-century BCE Judaean Jews, but provides no indication that these disputes were or could be the cause of sectarianism, social division, or schism within the Jewish people.

Moving on to the first century CE, there is nothing about the calendar in either Philo's or Josephus' lengthy descriptions of the Essenes and other Jewish sectarian groups.[47] This omission is highly significant, particularly in the case of Josephus, who was keenly interested in sectarian difference within first-century Judaism, and who would certainly have mentioned sectarian calendars if he had known of their existence. Not only does this cast further doubt on Talmon's theory—especially if the Qumran community is identified as Essene[48]—but it also suggests that the calendar was not a sectarian issue in first-century CE Judaism.

Evidence of calendar sectarianism in Second Temple Judaism may possibly be drawn from brief mentions in early rabbinic literature of an obscure group (or sect?) called *Baytusim*, sometimes rendered in English as 'Boethusians', who believed that the reaping of the *omer* (first barley sheaf) should always be on a Sunday (and consequently also the festival of Weeks, or Pentecost, exactly seven weeks later); whereas according to the rabbis, the *omer* was always on the second day of the festival of Unleavened Bread, regardless of its weekday. Rabbinic sources suggest that because of this disagreement, the reaping of the

[46] In this last verse, the principal objection to the lunar calendar is the disruption caused by a year that is ten days too short. Elsewhere, in Jub. 49: 7–8, 14, the prohibitions on adjourning Passover 'from day to day' and 'from month to month' may be interpreted as objections to the lunar calendar on different grounds, e.g. that it leads to the celebration of Passover on varying weekdays (as opposed to the 364-day calendar, where the festival occurs always on Wednesday) and to the occasional postponement of the festival by one month whenever, in the Jewish lunar calendar, there is an intercalation. On all these passages see Glessmer (1997).

[47] For classical sources (including Philo and Josephus) on the Essenes, see Vermes and Goodman (1989). Josephus' descriptions of Essenes and other groups are chiefly in *Jewish War* 2. 8. 2–14 (119–66), *Antiquities* 13. 5. 9 (171–3), 10. 6 (297–8), and 18. 1. 2 (11–22).

[48] This identification is commonly assumed, but actually very contentious. Talmon (1958) = 1989) 184–5 acknowledges the silence of Philo and Josephus on the calendars, but does little to explain it away.

omer in Temple times (before 70 CE) did not occur without considerable commotion; and further, that the Baytusim sometimes tried to influence the rabbinic new moon procedure so as to make the rabbinic Pentecost fall on a Sunday.[49] But although the disagreement between rabbis and Baytusim is presented, therefore, as having social consequences, the extent to which observance of different dates set the Baytusim apart from the rest of society—and therefore possibly defined them as a sect—is not entirely clarified.[50] It should be noted that their disagreement affected only the dates of two interrelated festivals, but not necessarily the rest of the calendar. Although the occurrence of the *omer* and the festival of Weeks on a Sunday is also a feature of the 364-day calendar, there is no indication in rabbinic sources or elsewhere that this was the calendar of the Baytusim:[51] Sunday occurrence of the *omer* would have been equally possible in the framework of a lunar calendar. Finally, it must be emphasized that the historical reliability of these early third-century rabbinic accounts is questionable, especially as Baytusim or Boethusians are not mentioned in Josephus or any other first-century source. Still, it remains of interest that these later sources assume calendar dates to have been a bone of contention, in the Second Temple period, between competing religious groups.

Calendar orthodoxy and heresy in rabbinic literature

Although, as we have now established, there is hardly any evidence in ancient Jewish sources that diversity of calendars had the effect of dividing Jewish society into separate sects or was associated in any way with Jewish sectarianism, several ancient Jewish sources imply that only one calendar is 'correct' or 'true'—a notion of calendar orthodoxy which stands out as unique, and probably unparalleled, in the ancient world. Thus in the passage cited above, Jubilees makes the point that only its calendar—the 364-day year—is legitimate, whereas observance of a lunar calendar is wrong and even sinful. The same idea is perhaps implicit in Qumran literature, which consistently uses the 364-day calendar and ignores altogether the lunar calendar for dating festivals,

[49] Reaping of the *omer*: *mMenaḥot* 10: 3. New moon procedure: *tRH* 1: 15 (ed. Lieberman 309), as interpreted further in *pRH* 2: 1 (57d). These passages imply that the disagreement between the Baytusim and 'the Sages' hinged on the interpretation of Lev. 23: 15–16, from where the *omer* ritual is derived (see Stern 2001: 18).

[50] The schism of the Baytusim, together with that of the Sadducees, is accounted in the various recensions of *Avot de-Rabbi Nathan* (ed. Schechter, p. 26)—a somewhat later text—as the result of a purely theological dispute regarding reward after life and in the next world; the calendar is not mentioned at all in this source.

[51] As Talmon assumes (loc. cit.). There are no grounds for identifying the Baytusim with the Qumran community or for that matter with the Essenes.

although as we have seen, notions of calendar 'orthodoxy' and 'heresy' are not explicitly articulated in the context of these sources.

Perhaps more pronounced, though in very different ways and still rather implicitly, is the notion of calendar orthodoxy in rabbinic literature, of which the earliest books (including the Mishnah) date from the early third century CE. There, for the first time, we find the assumption that all Jews must follow the same lunar calendar and observe the festivals on the same date, and that this calendar must be controlled and determined by a single, designated rabbinic court (see Chapter 6 n. 134)—which implies that any other calendar is invalid. It is this assumption that explains why, according to the Mishnah, the rabbinic court's calendar decisions had to be disseminated to the Diaspora through a chain of beacons, or failing that, by sending out special envoys. This also explains the observance of two consecutive festival days in parts of the Diaspora which the envoys could not reach (e.g. in Babylonia), to prevent the unintended desecration of the correct date observed in Palestine—a practice that has survived until today, but that was unique, in Antiquity, to rabbinic Judaism (Stern 2001: 242–7). The assumption that only one calendar is legitimate underlies also the remarkable rabbinic tradition that God and his angelic court do not sit in judgement on the New Year until the rabbinic court has sanctified the month and declared that day the New Year (Chapter 6 n. 156).[52]

In most of these sources, however, the emphasis is less on calendar orthodoxy (or on correctness of the calendar) than on rabbinic authority. Thus when Rabbi Yehoshua and Rabban Gamaliel disagreed about whether the new moon had been sighted, and consequently, about the date of the Day of Atonement, it is on the strength of the authority of R. Gamaliel's court, not on the inherent merits of his calendrical opinion, that his opponent was forced to submit to his authority and to desecrate in public what he himself considered to be the true date. As the Mishnah explicitly says, whether the date was right or wrong, the court's decision had to be obeyed; the issue was not the orthodoxy of the calendar, but only the authority of R. Gamaliel.[53] Most importantly, although the Mishnah implies that in calendar matters it was particularly important to obey the rabbinic court, there is no suggestion that R. Yehoshua's dates were intrinsically wrong, or that, had he persisted and observed his own dates, he would have been guilty of sectarianism or heresy.[54]

[52] See more generally Stern (2001) 232–75.

[53] *mRH* 2: 9. See further above, n. 35. The story is cast in the early 2nd c. CE.

[54] Note also that practices attributed in early rabbinic literature to the *minim*—a term usually referring to a type of Jews and translated, a little unsatisfactorily, as 'heretics' (but by no means necessarily Christian)—never relate to how the calendar is reckoned: see e.g. *mBerakhot* 9: 5, *mMegillah* 4: 8.

A certain change arises in later rabbinic sources, where the observance of a deviant calendar becomes increasingly associated with heresy, social separatism, and schism. In the Palestinian Talmud (late fourth–early fifth centuries), the story is told of Ḥananiah, nephew of (the same!) Rabbi Yehoshua, who flouted the authority of Palestinian rabbis by setting his own calendar, or at least making his own intercalations, in Babylonia. Envoys were sent from Palestine to rebuke him, with the message that if he did not comply, he could just as well go out to the desert and establish his own sacrificial cult; the envoys insinuated that his festivals were his and not God's, and that his Torah was from Babylon, not from Jerusalem. Ḥananiah gave way, but some of the more distant Diaspora communities who could not be informed in time of his downfall ended up observing a festival on the 'wrong' date. The story is also told in the Babylonian Talmud (sixth century): in this version, Ḥananiah was threatened, more concretely, with excommunication (*nidduy*), whilst his followers in the Diaspora were warned that if they did not desist, they would have 'no share in the God of Israel'.[55]

'Excommunication' points very clearly in the direction of social, possibly sectarian schism; whilst the various accusations of defection from God suggest something close to heterodoxy or heresy. These late-antique rabbinic sources reveal a certain change of attitude towards calendar diversity, which may well be related to (or influenced by) major changes that occurred in Christianity at the beginning of the fourth century, as we shall presently see. It should be stressed, however, that even these Talmudic sources are only 'stories', indeed only cautionary tales about a rabbi who *might* have been excommunicated because of his separatist calendar—although in the end he was not. But there is no evidence that the rabbinic calendar ever became, in reality, the object of controversies or schisms: these were only to erupt much later in history, among the rabbinic communities of the end of the first millennium CE.[56] In Antiquity the Jewish, rabbinic notion of calendar orthodoxy was subtle and its social effects were limited. In this respect, late antique Judaism differed markedly from contemporary Christianity, as we shall now see.

[55] *pSanh.* 1: 2 (19a) and *pNedarim* 7: 13 (40a); *bBerakhot* 63a–b. See Stern (2001) 242, 247–9.

[56] One of the first major controversies over the Jewish calendar opposed Saadya and Ben-Meir in the 920s, and divided the Rabbanite communities of Palestine and Babylonia and beyond (ibid. 264–75). But more important, perhaps, were calendar controversies and polemics between Qaraites and Rabbanites during the 9th–12th cc. However, the traditional scholarly view that the calendar was one of the main polemical issues between Qaraites and Rabbanites (Poznański 1898: 261) and the main cause of the Qaraite 'schism' (Ankori 1959: 269–83, 292–353—citing in support, significantly, Talmon 1958) needs to be completely revised; to some extent, my arguments regarding Qumran are likely to apply there too (as suggested now by Rustow 2008: 62–5; note how provisions for calendar disagreements were written into marriage contracts involving Rabbanite and Qaraite spouses, ibid. 248–51).

2. CHRISTIAN EASTER CONTROVERSIES

It is only in the context of Christianity that the calendar became, in late Antiquity, the object of wide-scale, protracted controversies and polemics that were related in many cases to divisions within the Church, sectarian schisms, and the proliferation of 'heresies'. Why Christianity, and not early Judaism, is an important question that needs to be addressed. It is not sufficient to argue that by virtue of its monotheistic and exclusivist religious stance, Christianity was naturally disposed to accept as 'true' a single, unitary calendar and not to tolerate any calendar diversity: for the same should equally have applied, in the same measure, to Judaism.[57] If an explanation is to be sought, it must be more specific to early Christianity. In this chapter, I shall argue that the rise of calendar controversy and calendar heresy in early Christianity was largely due to political factors, i.e. the integration of Christianity into the Roman State, which only really began in the fourth century.

Christian calendar controversies mainly concerned the date of Easter, which affected also a number of related dates in the Christian liturgical calendars (in particular, the dates of the fast of Lent that preceded it, and of Pentecost that followed). These controversies are well documented in early Christian sources, including not only the ecclesiastical histories of Eusebius and his successors, Christian heresiologies, synodal canons, and other Patristic works, but also a range of Christian texts, many of unclear authorship and date, that were transmitted in early medieval manuscripts under titles such as *De Ratione Paschae* or *De Ratione Paschali* ('On the calculation of Easter') and of which the main purpose was to establish the so-called *computus* (a shorthand term for computation of the date of Easter). This abundance of evidence, as well as the inherent importance of the subject for Christian history and Christian practice, has led to prolific research in modern times, starting from the Renaissance but with increased vigour from the later nineteenth century, and with no signs of abating even today. In this half-chapter, I cannot do justice to the subject and the scholarship that it has generated, or enter the intricacies of computus in any great detail. My purpose will be more general, to explain the origin and development of Easter controversies in the context of the formation of Christian orthodoxy and heresy. For reasons of economy, I shall not go beyond the early fifth century CE.[58]

[57] But see my remarks above, near n. 3.

[58] For various attempts to present a comprehensive account of the subject, see E. Schwartz (1905), C. W. Jones (1943), Strobel (1977), Lejbowicz (2006), and most successfully, Mosshammer (2008).

The original date of Easter

The Christian celebration of Easter draws its origins from the Jewish or biblical Passover, of which the date was the 14th of the first month, identified by all Jews as Nisan, in the spring. The earliest followers of Jesus celebrated this and all other biblical festivals in the same way as all other Jews (since as is now widely acknowledged, the early Christian movement was, in its origins, fundamentally Jewish), but very early on—I would venture to surmise, already at the first Passover after the Crucifixion—the festival was invested with a distinctive, 'Christian' new meaning: it became the anniversary and commemoration of the Passion of Jesus. This new interpretation of the festival gradually drew away the Christian Easter from the Jewish Passover, eventually leading, by the later second century, to Melito of Sardis' composition of an anti-Jewish polemic centred on the meaning of the Christian Easter, the *Peri Pascha*.[59]

But in spite of this highly critical process of differentiation between Jewish and Christian interpretations of the festival, which presumably led also to the development of distinct Jewish and Christian rituals, the name (*pascha*) and date of the festival appear to have remained, at least through most of the first two centuries of the Christian Era, essentially the same.[60] This means, above all, that the date of Easter remained lunar. Although evidence is totally lacking for this period, it seems reasonable to assume that many Christians continued celebrating Easter on the same day as the Jews, as the first followers of Jesus had done.[61] Melito's complete silence on the question seems to indicate that the date of Easter was not, at least to him, a marker of Christian distinctiveness which could have been used as part of his anti-Jewish polemic.

But whether this can be generalized to all Christians of the first two centuries is doubtful. As we shall soon see, it is likely that already in Melito's period the Church of Rome celebrated Easter on a slightly different date from the Jews (and therefore from Melito), and further variety may well have existed elsewhere. However, there is no evidence that in this period the date of Easter constituted within Christianity a polemical issue. Even those Christians who used the same date as the Jews were bound to differ from one another, since—as has been pointed out above—the Jews themselves, from one

59 See Hall (1979); the work is tentatively dated to the 160s CE (pp. xxi f.). I shall use the English name 'Easter' to refer specifically to the Christian festival, although ancient Greek and Latin sources generally use the same name, *Pascha*, for both the Jewish and the Christian festivals.

60 E. Schwartz (1905) 6–7; C. W. Jones (1943) 8–9; Simon (1986) 310–22.

61 The disagreement between the Synoptic Gospels and John over the date of the Crucifixion has been explained by several scholars (e.g. Jaubert 1957*a*) as reflecting the use of different calendars, or even as due to Jesus and his followers' using a different calendar from that of the Temple and other Jews. This theory, however, is implausible, because the use of a different calendar by early Christians would surely have become an explicit polemical issue against other Jews, yet there is no evidence of this whatsoever.

community to the next, could reckon the lunar calendar in very different ways. Calendar diversity was neither planned nor deliberate: in most cases, differences are likely to have been accidental (e.g. the new moon being sighted on different days), and it is difficult to assess the extent to which Jews, and for that matter Christians, were themselves aware of calendar differences between their various, often far-flung communities. In any event, to the Christians as much as to the Jews calendar diversity was a fact of life which did not seem to disturb or bother anyone; it did not lead to either theological disputes or social divisions. In the context of ancient society, a tolerant attitude to calendar diversity would not have been in any way surprising.

Late second-century controversies: the Churches of Rome and Asia

The earliest evidence of controversies about the date of Easter—indeed, the earliest evidence regarding the date of Easter at all—belongs to the later second century. Most important are the events that took place in *c.*190, which are only described in sources from the late third and early fourth centuries (and later) but with some citations of purportedly contemporary letters. This controversy opposed, in first instance, the Church of Rome (led by its bishop Victor) and those of Asia Minor (headed by Polycrates of Ephesus). The Asian custom, which Polycrates and his colleagues defended, had been to celebrate Easter on the 14th of the lunar month, at the same time as the Jews. This practice is commonly called 'Quartodeciman' (i.e. of the 14th), and hence the events of *c.*190 CE as the 'Quartodeciman controversy'; but this designation is anachronistic, and I shall therefore not use it in the context of this controversy. As we shall later see, 'Quartodeciman' is a heretical label that appears only from the mid or later fourth century, and that was only retrospectively attributed by some fifth-century Church historians to Polycrates.[62] In 190 CE, no one would have regarded Polycrates and the churches of Asia as heretical.

The position of Victor, reflecting an old custom of the Church of Rome and eventually to become universal in medieval and later Christianity, was to observe Easter on the Sunday following the 14th.[63] The rationale of this tradition was apparently twofold: firstly, the prime significance of Easter was

[62] Socrates, *HE* 5. 22. 15. Note that the controversy of *c.*190 is only mentioned in this passage to make a point about calendar heresy in the late 4th c. (as will be explained below); Socrates' designation of Polycrates as 'Quartodeciman' is specifically intended to serve the purposes of this point.

[63] Eusebius (*HE* 5. 23) only says that Easter was observed on Sunday. Third-c. and later sources suggest (as we shall see below, n. 123) that the custom in Rome was, more precisely, to prevent Good Friday from occurring before *luna XIV*, and thus to celebrate Easter on the Sunday no earlier than *luna XVI*.

not to be the commemoration of the Passion on the Jewish Passover, but rather of the Resurrection that followed it; and secondly, the anniversary of the Resurrection was not to be dated according to the lunar month day when it took place, but rather according to its weekday, which was Sunday.

This was not the first time that a dispute had arisen between the two traditions. Eusebius, in his *Ecclesiastical History*, refers very briefly to a discussion that took place *c.*154 CE in Rome between Polycarp, bishop of Smyrna, and Anicetus, bishop of Rome, about the day of Easter—presumably, the same issue that confronted later Polycrates and Victor. Eusebius' source, which he cites in full elsewhere, is a letter of Irenaeus which concludes that as neither could persuade the other to change his custom, they parted at peace and remained together in communion.[64] Whether Irenaeus should be entirely believed is open perhaps to question, since he was writing in the 190s with the particular agenda of settling the Victor–Polycrates controversy (as we shall see below). But taking his letter as it is, the discussion between Polycarp and Anicetus is presented as not in any way threatening a schism. It was only about the right practice to follow; but the unity of the Church seems not to have even been an issue.[65]

The controversy of *c.*190 CE took a much more dramatic turn, and signals perhaps a change of attitude towards calendar diversity. The sequence of events is given again by Eusebius, in this case in much more detail, in the main section of his *Ecclesiastical History* (*HE*) that was probably completed in 313/14 CE.[66] According to Eusebius, it all began with a dispute that erupted (it is not clear on whose initiative) between the churches of Asia and their opponents. This led to the convocation of various synods of bishops across the Christian world, whose directive to observe Easter on Sunday—which, Eusebius claims, was the custom of all churches world-wide, except for Asia—was widely disseminated. Letters with this directive were sent by the bishops of Palestine, of Rome (led by Victor), of Pontus, of Gaul (led by Irenaeus, whom we shall return to), of Osrhoene, of Corinth, and others (*HE* 5. 23). The bishops of Asia then responded with a letter from Polycrates, addressed to Victor and the Church of Rome, which Eusebius cites at length (5. 24. 1–8). In this letter, observance of the Easter on the 14th is defended entirely on the strength of ancient tradition; but no attempt is made to refute the Sunday

[64] Eusebius, *HE* 4. 14. 1 and (letter of Irenaeus) 5. 24. 16–17.

[65] An earlier controversy, dating perhaps to the 160s CE, is mentioned in a fragment of Melito's *Peri Pascha* cited by Eusebius, *HE* 4. 26. 3–4 (Hall 1979: pp. xxx, 66–9; whether it was an actual part of the *Peri Pascha* remains uncertain). All the passage says is that a great dispute broke out in Laodicea (Asia) about the Pascha 'which had occurred at the right time in those days'. This line is rather obscure: the issue seems to have been the date of Easter, yet we are also told that it occurred at the right time. This controversy seems to have been local to Laodicea, without extending, as in the 190s, to the whole Christian world.

[66] Following Burgess (1997); others would date it to *c.*300 CE.

observance, nor is it even directly referred to. Polycrates just claimed that his long line of predecessors in Asia (including, notably, Melito of Sardis, and going all the way back to John the Evangelist) had consistently observed Easter on the 14th. On receipt of this letter, Victor decided to excommunicate the dioceses of Asia and neighbouring churches on the grounds of 'heterodoxy' (ibid. §9). But other bishops opposed him, among them Irenaeus in Gaul, who favoured Sunday observance but at the same time did not agree to the excommunication of churches that were faithful to their ancient custom. Part of his letter to Victor is then quoted, in which Irenaeus argues that for the sake of peace, diversity of practice in the observance of the festival and fast (i.e. Lent) had always been and should still be tolerated: 'the disagreement in the fast confirms our agreement in the faith' (10–17). Eusebius cannot resist commenting, in conclusion, that Irenaeus lived up to his name (which means 'peaceful': 18). But how exactly the controversy was eventually resolved is, rather oddly, not clarified.

A much briefer account appears in the *De Ratione Paschali* (ch. 7) of Anatolius, bishop of Laodicea (Syria), written *c.*270 CE.[67] Anatolius describes the controversy between Victor and Polycrates, and how it was settled by Irenaeus; but his account differs from Eusebius' in two significant details. Firstly—and in spite of his brevity—Anatolius spells out the resolution of the controversy: the settlement achieved by Irenaeus was that 'each party would persevere in their own rule', i.e. would be allowed to retain their custom; and indeed, he mentions earlier that the bishops of Asia were still celebrating Easter on the 14th in his own day. Secondly, he makes no mention of Victor's attempt to excommunicate his adversary, or to his charge against Polycrates of heterodoxy.[68]

[67] The text has only survived in a late 4th- or 5th-c. Latin translation, now available in the critical edition of Mc Carthy and Breen (2003). The long-standing scholarly view that this Latin text was a medieval forgery, largely misled by the first edition of the text, based on a faulty manuscript, can now be discredited on the basis of this new edition, even if not all the arguments of the editors for the authenticity of the text and the accuracy of its Latin translation (ibid. 19–24, 116) are convincing (see Holford-Strevens 2008: 188 n. 44). The strongest arguments in favour of an authentic 3rd-c. dating are that (*a*) the author's benign attitude towards those who observe Easter on *luna XIV* would appear inconceivable in a text from the 4th c. or later (as we shall see towards the end of this Ch.), and (*b*) his cycle differs completely from all Easter cycles known to us in later Antiquity, in that it provides lunar dates for all the months of the year, and very oddly, it is discrepant from the Julian calendar to the point of being totally unusable (as we shall see below). See also Lejbowicz (2006) 24 n. 57. Mosshammer (2008) 140–3 rejects the authenticity of this text on the grounds that Eusebius' citation of Anatolius differs from it (*HE* 7. 32). It seems perfectly possible, however, for these differences to have arisen from editorial corrections by Eusebius (e.g. of Anatolius' date of the equinox, which Eusebius may have considered erroneous and inauthentic) or by the Latin translator (e.g. the omission by the latter of a statement of only marginal importance that is cited by Eusebius at 7. 32. 19—if indeed this is still part of his citation of Anatolius); see Mc Carthy and Breen loc. cit. and 126–39.

[68] The first point is noted by Mc Carthy and Breen (2003) 91–2. It could be argued that Anatolius' omission of the attempted excommunication is only due to the brevity of his account;

Eusebius' treatment of the Victor–Polycrates controversy can easily be understood in the light of the concerns and perspectives of his own day. He is likely to have had trouble accepting that the controversy ended with an agreement to disagree: not only was this contrary to the notions of catholicism and orthodoxy that were gaining force in the early fourth century, but more particularly, the Council of Arles in 314 CE—at the time or shortly after Eusebius was completing this part of his *Ecclesiastical History*—was about to decree, for the first time, that all Christians should celebrate Easter on the same date (as we shall see below). This would explain why, in Eusebius' narrative, Irenaeus' resolution was quietly omitted. For similar reasons, Eusebius' account of Victor excommunicating his adversary on grounds of calendrical heterodoxy was possibly a fourth-century anachronism: for excommunication on such grounds is otherwise only attested, for the first time, at the Council of Antioch in 327 CE.

If, following Anatolius, we read Eusebius' account but without the detail of Victor's excommunication and charge of heterodoxy, and with the settlement achieved by Irenaeus, we obtain a significantly different picture. The only demand that was made on Polycrates—albeit, according to the latter with threats and intimidation(Eusebius *HE* 5. 24. 7)—was to celebrate Easter on a different day. But in the absence of any accusation of heresy, his religious authority, identity, and relationship with other Christian communities were not under any threat. The absence of excommunication and charges of heterodoxy also suggests that orthodoxy and unity of practice within the Church were not, to Victor, an end in itself, at least not in the context of this controversy: the concept of unity is not mentioned in either Eusebius' or Anatolius' narratives.[69] Victor's concern was only that Easter be celebrated on the date that he deemed correct. Finally, the resolution achieved by Irenaeus was in complete continuity with Christian practice until then (itself, as we have seen, in continuity with earlier Jewish tolerance of calendar diversity): as Irenaeus himself argued, no doubt correctly, Christians had always observed Easter on a variety of dates, without this affecting the harmony or communion of world-wide Christianity.

but I see no reason why Anatolius should not have mentioned it. Among later, mid-5th-c. Church historians, Socrates (*HE* 5. 22. 15–17) follows Eusebius in referring to the attempted excommunication and omitting Irenaeus' resolution, but Sozomen (*HE* 7. 19. 1), in a much briefer account, where he erroneously substitutes Polycarp of Smyrna for Polycrates, echoes Anatolius in omitting the attempted excommunication and spelling out the settlement by which each party retained its own custom (he also writes that they agreed to remain together in communion, which echoes the agreement of Anicetus and Polycarp as told in Irenaeus' letter cited by Eusebius; see above, n. 64). Note also that Epiphanius (late 4th c.)—not known otherwise for brevity—restricts himself to the statement that Polycarp and Victor 'would not accept letters of commendation from each other' (*Panarion* 70. 9. 8, Williams 1987–94: ii. 411).

[69] The concept of Christian unity may have been gaining strength, however, in other contexts: see King (2008) 33–4.

The intervention of Irenaeus in this dispute is of particular significance. Irenaeus was the first great heresiologist in the Christian literary tradition, and as such, a fighter of heresy and champion of the Church's unity. Yet in his major work, *Against Heresies*, where heretical practices and doctrines are exposed in considerable detail, not one mention is made of calendar deviance or diversity, nor of differences regarding the date of Easter (Pagels 2003: 134, King 2008: 35). This is not inconsistent with the conciliatory position he adopted in the Victor–Polycrates controversy and where he preached—surprisingly perhaps for a heresiologist—unity through diversity. To cite his words again, as cited in Eusebius: 'the disagreement in the fast confirms our agreement in the faith'. This demonstrates, perhaps more than anything else, that in this period the calendar was not considered a heretical issue, nor was calendar unity perceived as a necessary condition for Christian unity.

Heresiologists and computists in early third-century Rome

Some three decades after the Victor–Polycrates controversy, observance of Easter on the 14th of the moon appears for the first time in two heresiologies, and thus becomes associated, perhaps for the first time, with the notion of heresy.[70] The first of these, a short tract entitled *Adversus Omnes Haereses* falsely attributed to Tertullian but now believed to have been composed in Rome in the late 210s or early 220s CE, mentions in a brief paragraph how a certain Blastus wanted to introduce covertly 'Judaism' (which should be interpreted as 'Jewish practices') by demanding that Easter be celebrated only on the 14th.[71] The context, a list of heresies, implies that Blastus should be regarded for that reason as 'heretical'.

Nothing else is known about Blastus, except for an even shorter mention of him in Eusebius (*HE* 5. 15) as a 'heretic' (the term is used at 5. 14) who drew some followers in Rome but eventually fell; according to Eusebius, he attempted to make 'innovations in respect to the truth'—but Eusebius does not explain what these innovations were. Further on, Eusebius attributes to Irenaeus a tract against the same Blastus 'on schism' (5. 20). Blastus is positioned in Eusebius' history a little before the Victor–Polycrates controversy, which suggests that he was active earlier on. It is possible that his activities in Rome led Victor to instigate his controversy against the churches of Asia—but this would depend on linking the accounts of Eusebius and the

[70] Unless credence is given to Eusebius' account of Victor's charging Polycrates with 'heterodoxy' (see above).

[71] *Adversus Omnes Haereses* 8. 1 (Kroymann 1954: 1410).

pseudo-Tertullian, and remains therefore speculative. We do not even know if the 'schism' imputed to Blastus by Irenaeus related specifically to his call for observing Easter on the 14th: it might have been related to his other, 'innovative' teachings, or even simply to his political intrigues. But pseudo-Tertullian does seem to imply that his call for Easter on the 14th was the main substance of his heresy.

The second heresiology, composed shortly afterwards in the 220s–230s CE, is the more famous *Refutatio Omnium Haeresium*, attributed to Hippolytus. Reference is made there, without naming anyone, to those who observe Easter on the 14th of the moon regardless of the day of the week. According to the author, their motivation and error is to observe, in this respect, the Law of Moses contrary to Paul's teachings; but in all other matters, they agree entirely with Church traditions.[72] The context, again, is a list of heresies; indeed the following paragraph, on 'Phrygians', introduces the latter as 'even more heretical'[73]—implying that the preceding, those who observe Easter on the 14th, are also in some measure 'heretical'.

We must question however the meaning, in both the pseudo-Tertullian and the *Refutatio*, of *hairesis* (adjective *hairetikos*), which in this early period did not yet have the formal, quasi-legal meaning it was to acquire in the late Roman Empire and was still close to its earlier, pre-Christian meaning of 'school of thought'.[74] In both accounts, indeed, observance of the 14th is presented as a false opinion rather than as a cause of social division or schism. Indeed, it is not calendar deviance or calendar diversity *per se* that are censured, but rather the choice of a wrong date for Easter—which does not preclude the possibility of *several* Sunday Easter dates being allowable or right. And whilst individuals such as Blastus are mentioned, there is no indication of any formally named heretical groups or heresies (as stated earlier, the terms 'Quartodeciman' and *Tessareskaidekatites* are not yet attested in this period).[75]

It is also noteworthy that both works were composed in Rome—the stronghold, since the days of Victor, of Sunday observance—and make no mention of the established observance of the 14th among the churches of Asia. The authors of these works had clearly no intention, in these brief paragraphs, of reigniting the conflagration of *c*.190 CE, let alone of calling for observance of

[72] *Refutatio Omnium Haeresium* 8. 18 (Marcovich 1986: 337–8). On the considerable controversy surrounding the authorship of this work and its attribution to Hippolytus, see ibid. 8–17 and more importantly Mosshammer (2008) 118–21.

[73] *Refutatio* 8: 19.

[74] See Iricinschi and Zellentin (2008) 3–4, 17–18; Humfress (2008).

[75] Although the relevant section in the *Refutatio* is headed, in its only manuscript source, with the title *περὶ τῶν τεσσαρεσκαιδεκατιτῶν*, the authenticity of this heading must be questioned because all other sections in this book of the *Refutatio* are untitled; moreover, in the list of contents at the beginning of the book this section is simply referred to as 'those who observe Easter on the 14th' (Marcovich 1986: 322)—a description, not a name.

Easter in world Christianity on the same day. They seem to be responding only to local controversies and conflicts of authority within the city of Rome where, since the days of Blastus, the date of Easter had become a significant political issue. In this respect, the implicit designation, in these heresiologies, of the observance of the 14th as 'heretical' might be rather specific, in the context of early third-century Christianity, to the Christian community in Rome.

The attribution of the *Refutatio* to Hippolytus is significant, however, because seemingly the same Hippolytus is attributed the earliest known computation of the date of Easter, a 112-year cycle that began in 222 CE (already examined in Chapter 6, near nn. 90, 98).[76] This was the beginning of a gradual process in the Christian world, through the third and fourth centuries, whereby the date of Easter became increasingly determined through computus or fixed, calculated schemes. The motivations for designing and adopting these schemes were complex and varied. By the fourth century, as we shall later see, Easter cycles came to play a critical role in the unification of Christian communities, the eradication of calendar diversity, and the standardization of orthodox calendars. But in Hippolytus' period, Easter cycles may have been motivated by other, more specific agendas, not least the polemic against observance of Easter on the 14th.

Hippolytus' cycle, indeed, was designed in such a way as to provide not only the dates of *luna XIV* (the 14th of the moon), but also the dates of Easter Sunday (see Ch. 6 n. 90). The lunar dates were based on a double octaeteris or eight-year cycle, thus 16 years, but this period had to be multiplied by seven (thus $16 \times 7 = 112$), the number of days in the week, in order to ensure that at the end of the cycle Easter Sunday would return to the same date as at the beginning. The construction of this lengthy (and as it happens, not particularly accurate) cycle was thus governed by one paramount objective: to facilitate, on a permanent basis, the observance of Easter on Sunday. This objective was directly related to the *Refutatio*'s opposition to observance of Easter on *luna XIV*.

Another probable motivation behind the introduction of Easter cycles in this period was the complex relationship between Judaism and Christianity, and the ongoing Christian quest for a distinct identity. As we have seen, observance of Easter on the 14th was interpreted by pseudo-Tertullian as a Judaizing practice—because this is when the Jews observed Passover—and the same is implicit in the *Refutatio*'s interpretation of the practice as conforming to the Law of Moses. However, the dependence of the Christian Easter on the Jewish Passover affected Sunday observers as much as observers of the 14th. Before the introduction of Easter cycles, indeed, the date of Easter for most Christians, whether on the 14th or on the following Sunday, would have been

[76] On the question of whether it actually is the same 'Hippolytus' or the same author, see above, n. 72.

based on when the Jews celebrated the festival. Thus in his letter to Victor, Polycrates describes the 14th of the moon as 'the day when the people (i.e. the Jews) dispose of the leaven' (Eusebius *HE* 5. 24. 6), i.e. when the Jews prepared for the festival of Unleavened Bread (which began on the 15th) by throwing out all leaven from their homes. This reference to a real-life Jewish practice, indeed a public, outdoor activity that he and other Christians in Ephesus could easily have observed, rather than for example the sacrifice of the paschal lamb (on the 14th), which in this period would have been a purely theoretical, biblical notion, suggests that it was the actual, observable practices of real Jews that determined, for him and other Christians, the date of the 14th of the month.[77] Yet dependence on the Jews was not the bone of contention between Polycrates and Victor. It would not be surprising, indeed, if the Christians of second-century Rome depended on the Jewish date of Passover in exactly the same way—except that instead of celebrating Easter on the Jewish Passover, they waited for the following Sunday (this is assumed by Grumel 1960: 163).

Evidence in the West of such dependence on the Jews, and of the uneasiness that some early third-century Christians may have experienced as a result, is found in pseudo-Cyprian's *De Pascha Computus*, written in 243 CE though of unclear precise provenance (see briefly Chapter 6, near n. 91). The importance of this treatise is that it is the earliest known literary account of an Easter cycle. In its opening, pseudo-Cyprian states as follows the purpose of his cycle: 'to show that it is possible for Christians never to stray from the way of truth and walk in blindness and stupidity behind the Jews, as if not knowing on which day Easter should occur'.[78]

This passage clearly suggests that until then, Christians in the West had been following the Jews for determining the date of *luna XIV*—even if Easter was observed, in the West, on the following Sunday. As the author explains, the introduction of a fixed Easter cycle would enable Christians to become independent from the Jews and Jewish practice. This explicitly stated motivation suggests that Easter cycles in the early third century responded to a need for Christians to dissociate themselves from Jews and their Jewish origins and thus 'part ways' from Judaism.[79]

[77] Stern (2001) 222–3. If no Jews were present or available for Christians to follow, Christians are most likely to have determined the date of *luna XIV* in the same way as the Jews, i.e. by observing the new moon in the early spring. The determination of the date of Easter would thus have been purely empirical in this period, and largely dependent on Jewish practice.

[78] . . . *ostendere nunquam posse Christianos a via veritatis errare et tamquam ignorantes quae sit dies Paschae, post Iudaeos caecos et hebetes ambulare*: Ps-Cyprian, *De Pascha Computus*, 1 (*PL* 4, 1025B, Ogg 1955: 1, Strobel 1984: 44). This translation, following Ogg, is grammatically and contextually preferable to the translation in Stern (2001) 223, where I took *caecos et hebetes* to refer to the Jews.

[79] Richard (1974) 309, Stern (2001) 223–6. A further possible motivation, suggested by Holford-Strevens (2008) 165–6, might have been to facilitate the calculation of the dates of Lent, after it became customary to begin the fast on a fixed number of days (e.g. 40) long before

There is little evidence, however, to support the common scholarly view that the prime motivation behind the first Easter cycles was to enable all churches to observe Easter on the same dates, and thus to eradicate calendar diversity.[80] That such a motivation existed is supported only by a statement cited by Eusebius (*HE* 5. 25) immediately after his narrative of the controversy of *c.*190 CE, said to have been issued at the time by Palestinian bishops in favour (it seems) of Sunday Easter observance. The statement mentions in conclusion that in Alexandria the same day is kept as theirs, and that they exchange letters with Alexandria so that the holy day is observed 'in harmony and at the same time'. It is unclear whether these letters exchanged between Palestine and Alexandria were advance notices of the date of Easter, such as those that bishops had the custom of disseminating on an annual basis by the fourth century (as we shall later see); there is certainly no reference to the use, of this purpose, of Easter cycles. The context of Eusebius' narrative suggests that the point of these letters was primarily to ensure the observance of Easter, in Alexandria and Palestine, on Sunday and not on *luna XIV*. Whatever is made of it, this lone passage is too vague to be used as an *explanation* for the rise of Easter cycles in later decades.

Even if this explanation remains a possibility (and it certainly became relevant in later centuries), there is no hint of it in the early sources. Pseudo-Cyprian, for example, does not present his Easter cycle as a means of enforcing uniformity of practice and eliminating diversity. He clearly regards his cycle as true and divinely inspired—a cycle that had run uninterruptedly through the whole of history, from the Creation to the Crucifixion and right until his own day, as demonstrated in detail in the longest section of his work—and in this sense he expects all his readers to accept it. But this is a matter of establishing the truth and avoiding errors, not of unifying the Church and uprooting heresy. In fact, there is no reference in the treatise to heresies or schisms within the Church arising from the date of Easter. The treatise does emphasize, in its concluding statement, that 'Passover according to the Jews is on *luna XIV*, but according to us on the Lord's day' (*De Pascha Computus* 23, Ogg 1955: 19); but the reference is to Jews, not to deviant Christians, and this statement can thus be interpreted as a further call for Christians to dissociate themselves from the Jews (in continuity with the opening statement of the treatise, above quoted), rather than as a veiled attack on Christian observance of the 14th (which is nowhere mentioned in the whole treatise, although it may be implicitly read here). Polemics on the date of Easter, in this treatise, are extremely mild. Pseudo-Cyprian's only target for criticism is an Easter cycle of

the date of Easter. The origins of this custom, however, are not well known; it might be argued, on the contrary, that it is the rise of the Easter cycles that facilitate the development of this custom.

[80] As assumed by C. W. Jones (1943) 10–11, Mosshammer (2008) 52, 55.

his 'predecessors', in which *luna XIV* was allowed to occur two days too early.[81] But although this scheme is referred to as an error, the passage reads as a disagreement rather than a polemic. Indeed, the 'predecessors' are introduced in the text as *aliqui ex nobis* ('some from among us')—which could not express more clearly that the pseudo-Cyprian does not assume on their part any estrangement or schism.

To conclude, the writings of heresiologists and computists in early-third-century Rome do not suggest that much had changed from the 190s CE. The date of Easter could be the object of controversies, which is why the deviant practice of Easter on the 14th was included, for the first time, in several heresiologies. But differences of opinion regarding the date of Easter were not considered a source of social schism. The purpose of these works was to refute false opinions regarding Easter, rather than to marginalize or excommunicate certain groups of Christians as heretical; what bothered them was not diversity of practice, but rather practices that they considered wrong.

Likewise, the design of Easter cycles, the earliest of which was possibly authored by one of these heresiologists (Hippolytus), may have been intended to enforce the observance of Easter on Sunday, and certainly (at least for pseudo-Cyprian) had much to do with 'parting ways' from the Jews; but there is little or no suggestion at this stage that their purpose was to standardize the date of Easter, eliminate diversity, and establish uniformity of practice within Christianity, which in this period was certainly not achieved.

The first computists in the East: Anatolius' cycle

Easter cycles also emerged in the East, though slightly later in the third century. The earliest mentioned by Eusebius is an eight-year cycle instituted by Dionysius of Alexandria around 253 CE.[82] Whether it was ever used in practice, and if so for how long, is completely unknown.

The next cycle, much better known, was that of Anatolius bishop of Laodicea (in Syria—although he was himself of Alexandrian origin) whose treatise, from about 270 CE, is partially cited by Eusebius (*HE* 7. 32) and has been preserved, seemingly in full, in Latin translation under the title *De Ratione Paschali* (Mc Carthy and Breen 2003).[83] Anatolius constructed a

[81] *De Pascha Computus* 4, 6: *PL* 4. 1028, Ogg (1955) 3–4; Strobel (1984) 45; see Mosshammer (2008) 126–7. The anonymous term *antecessores* may be intended as a double entendre: they are pseudo-Cyprian's predecessors, but also those who make Easter too early.

[82] Eusebius *HE* 7. 20. On the medieval tradition that Demetrius, an earlier bishop of Alexandria, had instituted a fixed Easter cycle at the beginning of the 3rd c., see Ch. 6 n. 89.

[83] For a brief description of this cycle, see Lejbowicz (2006) 24–9; on the authenticity and accuracy of the Latin translation, see above, n. 67. Mosshammer (2008) 144–5, 150–61, who rejects its authenticity, proposes instead a reconstruction of Anatolius' cycle which is ingenious

19-year cycle in the form of two tables, the first containing a full lunar calendar, and the second (derived from the first) containing the dates of Easter Sunday, through the 19 years of the cycle. In both tables, all dates are fixed and given according to the Julian calendar; the lunar calendar and sequence of lunar months is largely modelled, in fact, on the structure of the Julian calendar. Nevertheless, Anatolius' cycle is discrepant by a few days from the Julian calendar, as it assumes fewer leap years than the Julian calendar actually has.[84] This distortion of the Julian calendar means that in practice, his cycle would have been close to useless. It was a numerically ingenious attempt to combine and harmonize different calendrical values, but highly unlikely ever to have been used (Mc Carthy and Breen 2003: 142–3).

Some time later, a completely different 19-year Easter cycle was designed in Alexandria, this one structured on the basis of the Alexandrian calendar (see Chapter 5) and considerably more accurate in relation to both the lunar month and the Alexandrian calendar.[85] The origins of this cycle are unclear, but it seems to have been well established in Alexandria by the mid-fourth century CE (more on this below). It soon became the norm in the Orthodox Churches of the Roman East, and from the mid-fifth century was also adopted, with modifications, in the West.

The rise of Easter cycles in the later third-century East was obviously linked to the slightly earlier emergence of Easter cycles in Rome and the West; however, Anatolius and other Alexandrians expressed different motivations from those of pseudo-Cyprian, who suggested, as we have seen above, that computation was intended for Christians to determine the date of Easter independently from the Jews. For Anatolius and the Alexandrians, the purpose of Easter cycles was to determine the true dates of Passover as Jesus

but over-speculative, as it is based on minimal evidence (Eusebius' citation) and some unproved assumptions (such as continuity between Anatolius' and the later Alexandrian cycles).

84 Anatolius' cycle assumes a Julian calendar with only two bissextile ('leap') years in the entire 19-year cycle, whereas in the Julian calendar there is one bissextile year every four years. This deviation from the Julian calendar was necessary for Anatolius to obtain a cycle with a fixed number of days and for this number to be a multiple of seven—without which the Julian dates of Easter Sundays could not have been fixed and recurrent every 19 years (Mc Carthy and Breen 2003: 99–100). The tables are in *De Ratione Paschali*, 10–11, ll. 159–97.

85 E. Schwartz (1905) 3–29, Blackburn and Holford-Strevens (1999) 803–5. The accuracy of this cycle, in contrast to Anatolius', derives from its greater flexibility. The only fixed dates within the Alexandrian cycle are those of *luna XIV*, but the dates of Easter Sunday are variable from one cycle to the next. It is often assumed that the Alexandrian cycle was an adaptation of Anatolius' (e.g. Mosshammer 2008), but the new edition of Anatolius' work indicates in fact that apart from being of 19 years, these cycles differed in every single point. Note, in particular, that Anatolius provides a full lunar calendar (for all the months of the year, through the entire cycle), whereas the Alexandrian cycle provides only a small number of lunar dates, most importantly *luna XIV* (Ethiopian computists, who have preserved the later Alexandrian 532-year cycle, do provide full lunar calendar tables—see Neugebauer 1979: 79–80—but their antiquity is questionable). Whoever designed the Alexandrian cycle may have drawn some inspiration from Anatolius, but it is best to regard it as an entirely new creation.

himself would have observed it in his time, as opposed to the dates which Jews in the third and fourth centuries—in their view—erroneously reckoned. It is on this basis that all Eastern computists, from Dionysius (at least according to Eusebius) to Anatolius and the Alexandrians, adopted the 'rule of the equinox', according to which the 14th of the Paschal moon (Passover) must always occur on or after the vernal equinox—a rule which contemporary Jews frequently ignored. The rejection of contemporary Jewish practice as erroneous can be interpreted, again, as an implicit call for 'parting ways' and for reckoning Easter independently from the Jews, indeed in many cases on completely different dates (because of the Christians' distinctive rule of the equinox). Nevertheless, it is on the authority of ancient Jews such as Philo, Josephus, and earlier still, Agathobulus and Aristobulus (the latter identified as one of the seventy-two authors of the Septuagint), that Anatolius defends the authenticity of the rule of the equinox.[86] In this respect, one might say that the eastern computists were trying, in their search for the authentic Passover date, to be more Jewish than the Jews.

Polemical arguments are particularly prominent in Anatolius' treatise, which raises the possibility that the date of Easter was becoming, in the later third century, a more divisive issue than it has previously been. Anatolius begins his treatise by rejecting Hippolytus' 16-year cycle, as well as other cycles of 25, 30, and 84 years, as untrue methods of computation (*De Ratione Paschali* 1, ll. 10–12).[87] He then explains the rule of the equinox and accuses those who assume a Passover date (14th of the moon) before the equinox of being 'guilty of no small error' (2–3, esp. ll. 43–4). Further on, he rejects the limits of 16th–22nd of the moon (as the allowable range of lunar dates for Easter Sunday), which were assumed by the church of Rome (although he does not mention the latter by name: 4, ll. 80–4); he also attacks 'Gaulish' computists for assuming a lower lunar limit of 21st (his own limits are 14th–20th of the moon; 5, ll. 85–90); those who go beyond the 20th, he says near the end of his work, are committing no small offence (13, ll. 225–7). The Gaulish computists are also attacked for their early Paschal limit, i.e. for allowing *luna XIV* three days before the equinox (in contravention to the rule of the

[86] *De Ratione Paschali*, 2, ll. 44–9 (Mc Carthy and Breen 2003: 64, 85–7). Anatolius does not mention contemporary Jews by name (he only mentions, more generally, 'those' who ignore the equinox), but later, 4th-c. sources in a similar context consistently identify the Jews as observing Passover before the equinox: e.g. Peter (bishop of Alexandria, 300–11 CE) in his letter to Tricentius (ap. *Chronicon Paschale*, ed. Dindorf, 1832, p. 7), similarly arguing that the authentic Passover date of Jesus must be observed (Stern 2001: 66–70). The rule of the equinox was unknown, in contrast, to the early Roman computists: Hippolytus allowed *luna XIV* on 18 March, and pseudo-Cyprian on 17; even later, the 4th-c. *supputatio Romana* (see Ch. 6, near n. 94) allowed *luna XIV* before the equinox.

[87] Easter cycles of 25 or 30 years are unknown in the 3rd c., but an 84-year cycle may have been in existence in Rome already in Anatolius' period: see Ch. 6 n. 93.

equinox: 5, ll. 107–10). Anatolius also opposes the longer cycles of the African *rimarii*, who assume different limits again (12, ll. 198–211).[88]

Anatolius' tone in these passages is thoroughly polemical; and yet, when he turns to the question of whether Easter should be on the 14th of the moon or the following Sunday, he becomes remarkably conciliatory. In chapter 7, he describes the Asian custom of observing Easter on *luna XIV* and the controversy that ensued a century earlier between Polycrates and Victor, eventually settled by Irenaeus with an agreement to disagree (see above). He then compares the merits of both customs—purely on theological grounds—and goes on to explain, in chapter 8, why he favours observance of Easter on the following Sunday, in spite of his opponents' arguments (7–8, ll. 111–51). These chapters show no animosity or polemic: Anatolius gives a voice to both sides, and then simply explains his own preference. This change of tone, in contrast to the polemics referred to above, demands to be explained.

Anatolius' sympathy for Irenaeus' 'agreement to disagree', and his apparently conciliatory stance with regard to the question of *luna XIV* or the following Sunday, seem to have been motivated by a will to unite different Christian traditions under a universal, 'catholic' rule. Indeed, the principles adopted by Anatolius in the construction of his cycle, and more precisely its 'limits', were apparently designed to accommodate these conflicting traditions. By adopting the relatively early lunar limits of 14th–20th of the moon (for Easter Sunday), Anatolius made it possible for Easter to be celebrated at least sometimes on the 14th of the moon; thus although basically siding with Sunday observance, a concession was still made for the custom of the churches of Asia. This explains why he concludes that his rules and limits are satisfactory for 'catholics': whilst falling short of insisting that his cycle must be adopted by all Christians in all its details, he does expect all Christians to adopt the rules and limits that underpin it, and in this way to come to some universal agreement.[89]

In this respect, Anatolius' stance differed significantly from that of Irenaeus in the second century. In the late third century, there was still no evidence of any fall-out or schism over the date of Easter; in spite of minor polemics in Anatolius' work—mainly directed against his fellow computists—an irenic approach was still preferred when it came to the disagreement between the churches of Rome and Asia. However, rather than simply tolerating an agreement to disagree, Anatolius sought to impose a compromise and thus a single, 'catholic' (in its original sense of 'universal') Christian calendar that would be good for all. This claim of universality explains his choice of the

[88] Of the Gaulish computists, nothing is else is known. The African *rimarii* are identified by Mc Carthy and Breen (2003) 102 as Novatians (on whom see further below), and this passage as referring more specifically to the cycle of pseudo-Cyprian.

[89] 12, ll. 198–211, and as interpreted by Mc Carthy and Breen (2003) 142–3.

Julian calendar, the calendar of the Roman Empire, as the underlying structure of his cycle, rather than (for example) the local calendar of Antioch and Syria: he clearly intended his work to be diffused throughout the Christian world.[90] Although Anatolius restrained himself by advocating only the universal acceptance of his rules and limits (rather than of his whole cycle), his latent call for a single, universal Christian calendar must be regarded as an important ideological innovation. Indeed, even if—as rightly pointed out by the modern editors—'catholic' should be read in this context with a small 'c' (Mc Carthy and Breen 2003 104), Anatolius' use of this term was inevitably implicated with the general, developing idea of 'Catholicism' in third-century Christianity.[91]

The Councils of Arles and Nicaea

The conversion of the Roman emperor Constantine to Christianity in 312 CE, and in its wake the Councils of Arles and of Nicaea, transformed the date of Easter into a social and political issue of major importance. At these Councils it was formally decided, for the first time ever, that all Christians should observe Easter on the same date. This ushered in a completely new perspective for Christians, and indeed for the ancient world at large, on calendar diversity. From then onwards, the universal observance of Easter on the same date became viewed as essential to the cohesion and integrity of the Church, whilst deviation from the mainstream Easter date became associated with schism and heresy.

This major transformation was largely due to the Roman Emperor's involvement in Church affairs, and to his resolve both as a Christian to make sense of Christianity by ironing out all its diversity, and as an emperor to bring the Church under centralized control. But it would be over-simplistic to attribute this change entirely to the emperor, and not to appreciate the role of leading bishops—especially perhaps at the Council of Arles, where the role of Constantine appears to have been more limited—in seizing the opportunity of Constantine's conversion to promote the long-standing but somewhat dormant notions of catholicism and orthodoxy. We also need to reflect on why the calendar, and more particularly the date of Easter, was

[90] Mc Carthy and Breen (2004) 95. Although the calendar of Antioch was, in broad terms, structurally identical with the Julian calendar (see Ch. 5), which means that a switch from one to another could conceivably have happened in the process of translation of his work from the original Greek to the extant Latin version (which is edited by Mc Carthy and Breen), Anatolius' use of 'Kalends', 'Nones', 'Ides', and 'pridie' (the Julian dates for which, in his first table, he provides the lunar equivalents in each month of the Julian year: 10, ll. 159–73) clearly marks out his calendar as specifically Julian and must have already appeared as such in the original version.

[91] e.g. in Tertullian, *De Praescriptione Haereticorum* 30. 2.

drawn into the post-Constantinian discourse of orthodoxy and heresy and occupied so much importance within it, when it could equally have been assigned, in this context, a status of far lesser importance.

At the Council of Arles in August 314 CE, convened by Constantine soon after his conversion and while he was still ruling only the western half of the Roman Empire, Church leaders resolved—for the first time in history—that Easter should be observed by all Christians on the same date.[92] This resolution, listed in first position in the Council's Canons (which immediately indicates the importance this matter was given), has been transmitted in two different recensions of the Canons (Gaudemet 1977: 42–3, 46–7). The first, known as 'Canons of the Council of Arles', reads as follows:

> 1. In the first place, concerning the celebration of the Lord's Easter. That it is to be observed by us on one day and at one time in all the earth, and that you should send out letters to all as is the custom.

The addressee, as indicated in the introduction to the Canons, is Sylvester, bishop of Rome (who was absent at the Council): it was he whom the Council expected to implement their decision, through the custom of circulating annual letters with the dates of Easter to all the churches under his authority. The Council of Arles was attended exclusively by western bishops, and as has been noted, it is only in the Roman West that the bishop of Rome could have been invested with this authority (Gaudemet 1977: 17). The custom of sending Easter letters, which was already in existence but may be attested elsewhere already in the late second century,[93] was to become in the fourth century an important vehicle for the enforcement of calendar unity.[94]

The second recension, a synodal letter addressed to Sylvester, offers a certain rationale for the Council's decision:

> 1. In the first place this was being considered concerning our life and usefulness, since one person has died for all and is risen again, that this same time is to be observed with a devout mind (*religiosa mente*) by all people, lest divisions and dissensions be allowed to rise up in so great an allegiance of devotion (*in tanto obsequio devotionis*). We have proposed therefore that the Easter of our Lord be observed on one day throughout the whole world.

[92] One of Constantine's letters of summons to the Council is in Eusebius *HE* 10. 5. 21–4; the letter stresses the need to unify the Church, although it does not mention the question of the date of Easter.

[93] According to Eusebius *HE* 5. 25, although the meaning of this passage is not entirely clear (see above, after n. 80). On a tradition first reported by Eutychius (10th c.), see Ch. 6 n. 89. The practice of sending letters to convey calendrical decisions is also attributed to some leading Palestinian rabbis in early-3rd-c. rabbinic sources (e.g. *tSanh.* 2: 5–6, ed. Zuckermandel, pp. 416–17: see Goodblatt 1994: 211, Stern 2001: 162 and n. 27).

[94] In the 4th and 5th cc., indeed, it remained the responsibility of the bishop of Rome to announce the date of Easter on an annual basis, in spite of the increasing availability of fixed Easter cycles (Mosshammer 2008: 60–1).

The purpose of observing Easter 'on one day throughout the whole world' is purportedly only that the devotion of Easter be not disrupted by 'divisions and dissensions'. Unity of the Church is thus not presented as a rationale or an end in itself, at least explicitly; but reference to Jesus as 'one person who died for all' may imply a need for the Church to emulate his unity.[95]

For whatever reason, the resolution of the Council of Arles is not known to have been effectively enforced (Grumel 1960: 169, Lejbowicz 2006: 30); far more important, in the long term, was the Council of Nicaea in 325 CE, which Constantine convened soon after his conquest of the eastern half of the Roman Empire, and which brought together Church leaders this time from both East and West. The date of Easter was again at the top of the Council's agenda, on a par with the question of the Arian heresy—at least according to Eusebius' account in his *Life of Constantine*, which constitutes in this context our main historical source. The Canons of this Council, in contrast, do not record anything about the date of Easter; this omission has been rightly explained as reflecting the fact—implicit also, on close reading, in Eusebius' account itself—that for reasons to be later explained, no formal or precise decision was taken at Nicaea about the date of Easter.[96] But this did not prevent Constantine from writing after the Council, in a letter to the churches that is cited by Eusebius, the general points of principle about the date of Easter which he believed, or wanted others to believe, had been unanimously agreed. These points of principle were to develop, in the course of the fourth century, into precisely defined calendrical rules, and were thus highly influential on the subsequent history of the date of Easter.

In essence, two resolutions—both rather general and vague—are laid down in Constantine's letter: that Easter be celebrated on the same date by all Christians, and that Christians no longer follow the Jews. I shall examine each of these resolutions in turn, although in conclusion it will emerge that they constituted together a single argument. The first resolution, that Easter be celebrated on the same date, is similar to the first canon of Arles, but with significant differences. On the one hand, the resolution is given a far more developed rationale, in which the unity of the Church becomes the explicit and paramount concern. On the other hand, no explanation is given as to how this universal date of Easter will be determined and proclaimed, and understandably so: for at Nicaea, there was no central episcopal authority (such as the

[95] Note also that explicit reference is made to the *ecclesia catholica* (universal church) in the opening of the synodal letter (Gaudemet 1977: 40–1).

[96] Duchesne (1880), Daunoy (1925), Jones (1943) 17–20, and above all Lejbowicz (2006) 30–63, who demonstrates that the common view (often reiterated, erroneously, in history textbooks) that the Council of Nicaea agreed to observe the rule of the equinox and the Alexandrian 19-year cycle represents a late-4th-c. reinterpretation of the events by Church leaders, starting from Ambrose in 386 CE, who were seeking to legitimize the Alexandrian cycle, and on whom see also Lejbowicz (2008) = (2010).

bishop of Rome at Arles) to which the Council as a whole could have deferred to.

Before examining how this first resolution is presented in Constantine's letter, we may consider the narrative context in which it is cited—Eusebius' story of the Council of Nicaea—if only for what it tells us of Eusebius' personal, first-hand perspective on the events. According to Eusebius, indeed, the first resolution responded directly to a situation that the Council of Nicaea had been called to address; in this respect, its formulation was a foregone conclusion. For after describing the outbreak of the Arian controversy, Eusebius writes:

> There was already another very dire sickness of longer standing than these, which had been a nuisance to the churches for a long time: the disagreement over the Feast of the Saviour. Some claimed that one ought to follow the practice of the Jews, and some that it was right to observe the exact time of the season, and not err by following those who were outside the grace of the Gospel. So in this matter too the congregations everywhere had already for a long time been divided, and the divine ordinances were in disarray, since for one and the same festival the divergence of date caused the greatest difference between those keeping the festival: some were disciplining themselves with fasting and mortification, when other were devoting leisure to relaxation. No human being was able to find a cure for the evil . . . (*Life of Constantine* 3. 5. 1–2)[97]

Particularly noteworthy, in this passage, are the highly charged references to calendar diversity as 'very dire sickness' (νόσος ἀργαλεωτάτη) and 'evil' (κακόν). These phrases are the earliest evidence of a negative attitude to calendar diversity in Christian literature, possibly even in the history of calendars in Antiquity as a whole.

The theme of unity, already evident in this passage in connection with the date of Easter, is then elaborated in more general terms in Eusebius' narrative, with Constantine summoning at public cost a council of bishops from all the provinces of the Roman Empire (*VC* 3. 7), 'who were furthest separated from each other, not only in spirit, but in physical presence and territories and places and provinces' (3. 6. 2). Eusebius' emphasis on the oecumenical nature of the Council sets again the scene for the content of its ultimate decisions. In his subsequent description of the proceedings of the Council, he focuses almost entirely on the Arian heresy; Easter is mentioned almost only in passage, with the rather enigmatic statement that 'the same date for the Festival of the Saviour was agreed on all sides' (3. 14)—the brevity of which betrays, no doubt, the absence of any clear decisions on the date of Easter at the Council. But far more information appears in the letter of Constantine that

[97] Cameron and Hall (1999) 123, whose translations I have used with minor modifications. Cf. Socrates *HE* 1. 8, in which much of Eusebius (*VC* 3. 5–7 and following) is paraphrased and directly quoted.

Eusebius cites afterwards *in extenso*, and to which we now turn; there, the notion of calendrical unity receives its most complete treatment:[98]

> . . . I have judged it appropriate for me that my aim before all else should be that among the most blessed congregations of the universal Church a single faith and a pure love and a religion that is unanimous about Almighty God be observed . . . (3. 17. 1)
>
> Thereupon, since a controversy had broken out on the subject of the most holy day of Easter, it was unanimously decided that it would be best for everyone everywhere to celebrate it on the same day. For what could be better for us, and more reverent, than that this festival, from which we have acquired our hope of immortality, should be observed invariably in every community according to one arrangement[99] and declared principle? (3. 18. 1)
>
> It is furthermore easy to see that in such an important matter, and for such a religious feast, it is wrong that there should be a discrepancy. Our Saviour has passed on the day of our liberation as one, the day, that is, of his holy passion, and it is his purpose that his universal Church be one . . . But let your Holiness's good sense reflect how dreadful and unseemly it is, that on the same days some should be attending to their fasts while others are holding drinking parties . . . (3. 18. 5–6)
>
> You ought now to accept and institute the stated principle[100] and the strict observance of the most holy day, so that when I come . . . I may be able to celebrate the holy festival with you on one and the same day . . . (3. 20. 2)

In these passages Constantine develops the notion, implicit already at Arles, that the unity of Christ should be emulated at Easter with a united Church. But for the first time in the history of Christianity, calendar unity is explicitly associated with the notion of 'the universal (*katholike*) Church' and treated as an end in itself, a self-validating purpose.

The second resolution, that Christians no longer follow the Jews for the date of Easter, is explained in detail in the letter but sufficiently vaguely to be open to a range of interpretations:[101]

> In the first place it was decreed unworthy to observe that most sacred festival in accordance with the practice of the Jews; having sullied their own hands with a heinous crime, such bloodstained men are as one might expect mentally blind. It

[98] *VC* 17–20. The same letter is cited, with negligible textual variation, in Socrates *HE* 1. 9 and Theodoret *HE* 1. 9; their source is almost certainly Eusebius. Constantine's letter is long and repetitive; I shall only cite a selection of passages, the contents of which are frequently repeated.

[99] Cameron and Hall (1999) translate *μιᾷ τάξει* as 'on one system' (and similarly below), but perhaps this is reading too much into Constantine's text and intentions.

[100] Cameron and Hall (1999) translate *λόγον* here as 'method of computation' (whereas at 3. 18. 1, cited above, they render it more accurately as 'principle'). Again, this is reading too much in a letter that—for reasons to be discussed below—does not really express awareness of systems of computation.

[101] Note that what I refer to, for my own convenience, as the 'second' resolution is actually presented in Constantine's letter 'in the first place'.

is possible, now that their nation has been rejected, by a truer arrangement which we have kept from the day of the Passion to the present, to extend the performing of this observance into future periods also. Let there be nothing in common between you and the detestable mob of Jews! (3. 18. 2)

For it is surely quite grotesque for them to be able to boast that we should be incapable of keeping these observances without their instruction. How can those people form a sound judgment,[102] when after that murder of the Lord, after that parricide, they have taken leave of their senses . . . ? Hence it comes about that in this very matter they do not see the truth, so that nearly always they get it wrong, and instead of the correct method,[103] they observe the Pascha a second time in the same year. Why then do we follow those who are by common consent sick with fearful error? We would never allow the Pascha to be kept a second time in the same year (3. 18. 3–4).

Various interpretations have been given, in this context, of the practice of 'following the Jews'; these interpretations are not mutually exclusive, but some are in my view untenable. Some scholars have interpreted Constantine's letter as aimed against the 'Quartodeciman' practice of observing Easter, at the same time as the Jews, on *luna XIV*.[104] This is problematic on a number of counts. Observance on *luna XIV* should not have led to the celebration of Easter 'a second time in the same year', but to its celebration on weekdays other than Sunday—which would have been very easy for Constantine to spell out explicitly. Moreover, a polemic against observance on *luna XIV* would have been aimed most likely at the churches of Asia (i.e. Asia Minor), as the practice is not attested anywhere else; and yet it is only some of the churches of Syria that Constantine seems to be targeting, as he writes:

. . . a suitable arrangement exists which all the churches of the western, southern and northern parts of the world observe, and also some of the churches in the eastern areas . . . with one harmonious will in the City of Rome, in Italy and all Africa, in Egypt, the Spains, the Gauls, the Britains, the Libyas, the whole of Greece, the administrative region of Asia, Pontus, and Cilicia. (3. 19. 1)

'*Some* of the churches in the eastern areas' implies not all; and in the list of provinces that follows, Asia is included whilst Syria is omitted.[105] That the churches of Syria or the 'eastern areas' were the main dissenters, and thus Constantine's main target concerning the date of Easter, is stated explicitly by Eusebius (elsewhere) and later by Socrates in his *Ecclesiastical History* (mid-fifth century).[106] That the practice, condemned at Nicaea, of 'following the Jews' was practised by the Christians in the 'east' (which is unlikely, in the

[102] Cameron and Hall (1999) translate φρονεῖν as 'calculate', again an over-interpretation.
[103] Better than 'proper calculation' (ibid.) for ἐπανόρθωσις.
[104] Mainly C. W. Jones (1943) 17–24.
[105] See further Gerlach (1998) 263–4.
[106] Eusebius, *On the Date of Easter*, 8 (*PG* 24. 701); Socrates *HE* 1. 8.

fourth century, to mean Asia) is explicitly stated in another Nicene synodal letter, not authored by Constantine, which Socrates cites in the same work.[107] If only Syrian or 'eastern' Christians were Constantine's target, but not the churches of Asia, he is unlikely to have meant observance of Easter on *luna XIV*.

'Following the Jews', in the context of Nicaea, is more commonly interpreted as the observance of Easter in the same lunar month as the Jews, which could often be before the equinox—even if Easter did not coincide exactly with Passover, but was celebrated on the following Sunday.[108] This interpretation goes back to the late fourth century, and has far more to commend itself. Indeed, the tradition of determining the date of Easter Sunday on the basis of the Jewish Passover (as opposed to following a fixed Easter cycle) was still widespread in Syria in the late fourth century, and regarded by Church leaders as dissident from the Nicene creed.[109]

In this context, however, Constantine's concern is unlikely to have been observance of Easter before or after the equinox, if only because the rule of the equinox was still unknown to western computists in this period (see above, n. 86). Moreover, Constantine's reference to celebration of Easter 'a second time in the same year' cannot be interpreted as meaning a breach of the rule of the equinox without resort to an over-scholarly and far-fetched explanation.[110] It would have been far more simple, if this really was Constantine's concern, for him to refer to the celebration of Easter 'before the equinox', or even just 'one month too early'.

As I have argued elsewhere, to keep the Pascha 'a second time in the same year' would have had in fact a much more prosaic meaning, for Christians as well as for Jews: it meant the festival being observed by different communities at different times, and hence, every year, on at least two occasions (typically,

[107] *HE* 1. 9: 'so that all the brethren in the East who have heretofore kept this festival when the Jews did, shall henceforth conform to the Romans and to us'. See also Athanasius, *De Synodis*, 5 (*PG* 26. 688 B–C), and *Ep. ad Afros Episcopos*, 2 (*PG* 26. 1032 C).

[108] Duchesne (1880), E. Schwartz (1905) 104–21, Daunoy (1925), Grumel (1960), Gerlach (1998).

[109] Schwartz loc. cit., Grumel loc. cit., Stern (2001) 68–70. The tradition of observing Easter 'with the Jews' was formally laid down in the *Didascalia*, a text written in 3rd-c. Northern Syria that will be discussed below, n. 180.

[110] This explanation, which goes back to a late-4th-c. retrospective interpretation of the Nicene Easter resolutions by Epiphanius (*Panarion* 70. 11. 5–6, Williams 1987–1994: ii. 414), assumes that the year begins on the equinox, so that if Easter is observed after the equinox and then, twelve lunar months later, before the equinox, it is effectively observed twice in the same 'year'. However, it is completely unlikely that Constantine would have regarded the year as beginning at the equinox; moreover, on this interpretation there will have been 'years' when Easter was not observed at all (if it was first observed before the equinox, and then thirteen lunar months later, after the equinox), which arguably must have been worse than observing it twice in the same year, and which should equally have been mentioned by Constantine. See in more detail Stern (2001) 80–5, arguing further that Epiphanius' over-ingenious explanation does not seem to have been shared by his contemporaries, even if it has become popular in modern scholarship.

on or near the full moons before and after the equinox). Constantine's argument was that if Christians followed the Jews for determining the date of Easter, instead of using a standard, universal rule, they would inevitably observe Easter on different dates, since Jewish communities in this period reckoned the calendar in very different ways.[111] His concern—besides an expressed aversion for the Jews[112]—was thus not the rule of the equinox, but rather unity of practice among the Christians. In this respect, the Council's second resolution (not to follow the Jews for the date of Easter) was intimately connected to the first (to observe Easter on the same date) and formed with it a single, continuous argument.

At Arles, and more decisively at Nicaea, the observance of Easter on the same date was thus conceived, for the first time in the history of Christianity, as a necessary condition for the cohesion of the universal, 'catholic' Church; calendar unity was now conceived as a social necessity, even as a social virtue. The innovativeness of this concept must be emphasized. Largely provoked by Constantine's intervention in Church affairs, it had implications that stretched far beyond Christianity or Church history. Constantine was unwittingly laying the grounds of a tradition that was soon to become dominant in Western culture, and that eventually led to the formation of modern scholarly assumptions—which I have already criticized above—about the role of calendars in either holding society together or, on the contrary, generating heresies and schisms.

Rome and Alexandria: the post-Nicene compromise and the rise of an orthodox Easter computation

Unity of the Christian calendar was not achieved, however, at Nicaea, chiefly because of the irreconcilable differences that existed between the Easter reckoning of the churches of Rome and Alexandria, and because of the tremendous influence that these churches exerted in the West and the East respectively. Evidence of Roman and Alexandrian reckoning in this period is unfortunately sporadic and unclear, but it is evident that they operated on very different principles.

It is generally believed that in this period, the Alexandrian 19-year cycle that was to become normative in Orthodox Christianity was already established and in use; but the evidence, the Festal Letters of Athanasius, is not entirely

[111] Stern loc. cit.; but this interpretation is also briefly suggested by Cameron and Hall (1999) 270.

[112] Lejbowicz (2006) 38–9 argues that the anti-Judaic tone of the letter, which contradicts the generally moderate attitude of Constantine toward the Jews, was only a pretext for creating an artificial common cause among the Council's participants with regard to the date of Easter. See further next section below.

conclusive. Athanasius was bishop of Alexandria at various times between 328 and 373 CE; his Festal Letters were written and disseminated annually, and included an announcement of the dates of the forthcoming Easter. The Letters are only extant until 348 CE, after which only fragments have survived (unfortunately, without the Easter dates). His dates of Easter, in the earlier period, are mostly compatible with the Alexandrian cycle; however, this alone cannot prove that the Alexandrian cycle was in existence or in use, because the same Easter dates could have been reached using some other method.[113] Besides the Festal Letters themselves, we also have an index of the Letters, which covers the entire period of Athanasius' career and contains considerably more calendrical data than just the date of Easter: the Index provides, in particular, the lunar date of every Easter Sunday and the epact of the year.[114] These lunar dates and epacts correspond to those of the Alexandrian cycle and prove, this time beyond doubt, that the Alexandrian cycle was used.[115] However, the Index is a later work that is likely to have retrojected the Alexandrian computation onto Athanasius' Easter dates; it cannot be treated as an authentic record of how Athanasius himself, or his Alexandrian colleagues, reckoned the date of Easter in the mid-fourth century.[116]

[113] Athanasius' Easter (Sunday) dates agree with those of the Alexandrian calendar, but he does not give their lunar dates or (alternatively) the dates of *luna XIV* (as these lunar dates would not have been important to his addressees), which makes it impossible to establish on what basis his Easter dates were reached. I write that Athanasius' Easter dates are 'mostly' compatible with the Alexandrian cycle, because there are some exceptions; however, these exceptions could be explained as deliberate deviations from the cycle for the sake of compromising with Rome, as will be explained below (and as the Index explicitly states for the year 349).

[114] In the Index and the Alexandrian cycle, the epact is the age of the moon on the last day of the Egyptian year, i.e. 29 (or 30) August, as argued by Mosshammer (2008) 76–80.

[115] See further Mosshammer (2008) 165.

[116] Athanasius' Festal Letters have only survived in a Syriac translation, published by Cureton (1848), of which there is a Latin translation in *PG* 26. 1351–1444. A modern edition is still awaited, but see Camplani (1989), Barnes (1993) 183–91, and Gwynn (2007) 45–8, 79–80. For the Index, also only in Syriac, see Martin and Albert (1985). The headings of the Festal Letters (which are also in Martin and Albert's edition) sometimes contain the lunar dates of Easter, but they are clearly a later, editorial addition to the Festal Letters, probably contemporary to the Index with which the headings generally agree. The Index and headings are tentatively dated by Camplani (1989) 115–29, 190–3 to *c*.400 CE, but this is only a guess; Martin and Albert (1985) 221 more cautiously say just that the Index was originally composed in Greek, and probably in Alexandria. Whenever the Index and headings were composed, the Alexandrian cycle was clearly well established; but this says nothing of how Athanasius himself reckoned his Easter dates. The Index is also likely to have used the Alexandrian cycle to calculate the Easter dates of the years in which Athanasius did not write a Festal Letter (more on this below). Earlier scholars (e.g. E. Schwartz 1905: 24–5, Neugebauer 1979: 98–101), therefore, placed excessive reliance on the Index as evidence of the Alexandrian cycle in the mid-4th c. It should be noted, furthermore, that the scheme implicit in the data of the Index differs slightly from the 19-year cycle that became normative in the 5th c., as its *saltus lunae* appears to have occurred one year later, in 343 instead of 342 CE (and similarly 19 years later): for the Index consistently gives the epact of 29 for 342 and 361 CE, whereas according to the Alexandrian cycle as later known, it should have been 30 (because of the *saltus*). E. Schwartz (1905) 24–5 emends it accordingly, in both years, to 30; his emendation is justified by the lunar date of Easter for 361 CE, which is given in the Index as

Nevertheless, Athanasius' ability to determine the dates of Easter well in advance—at least before the beginning of the 40-day fast of Lent preceding Easter, of which the dates are also announced in the Letters—suggests at least that some calculation or cycle was used. This is also implicit in the ability of the Council of Serdica, in 343 CE, to calculate the dates of Easter fifty years in advance (more on this below). Furthermore, the sequence of Athanasius' Easter dates in the Festal Letters until 348 CE, and from 328 to 373 CE in the Index (the reliability of which, in this context, need not be doubted), confirms that a 19-year cycle was followed, which points very clearly, though not definitively, in the direction of the Alexandrian cycle.[117]

The situation in early fourth-century Rome is even less clear. The 84-year cycle of the *supputatio Romana*—which, as discussed in Chapter 6 (near n. 94), begins in 298 CE and may have been designed already in the late third century—is only first attested in the Calendar Codex of 354 CE, where it was evidently used for compiling the list of epacts which runs from the foundation of Rome until 354 CE (section VIII of the Codex).[118] But the list of dates of Easter which runs from 312 CE in section IX of the Codex does not conform consistently with the *supputatio*: thus in 333 CE the *supputatio* would have had Easter on 25 March, but the Codex has 15 April, and in 340 CE the *supputatio* has 6 April, but the Codex 30 March;[119] more generally, the *supputatio* allows Easter to occur as early as 22 March, whereas the Codex and other evidence suggests that the rule in Rome for most of the fourth century was not to allow

'seventeen' and which necessitates, in that case, an epact of 30. But for 342 CE, the manuscript of the Index reads as lunar date 'sixteen', clearly an error and emended by Schwartz to '20' so as to agree (in this case) with an epact of 30; yet in the Syriac or in the original Greek text, 'sixteen' is far more likely to have been an error for 'nineteen' than for 'twenty', which would corroborate the epact of 29 that is explicitly given in our text. The Index, with its later *saltus*, possibly reflects small changes that the Alexandrian cycle underwent in the course of the 4th–early 5th cc. (so Mosshammer 2008: 178–82). Indeed, one Easter table in a 7th-c. Latin manuscript (MS Paris Lat. 10318) agrees with the data of the Index, and may thus be preserving the cycle that was used by it (Mosshammer 2008: 151–2, 181–2).

117 This does not help to establish when the Alexandrian cycle as later known might have been instituted. Richard (1974) 310–15 assumed that it was instituted in 322/3 CE, the first year of an Alexandrian 19-year cycle; others (see Lejbowicz 2006: 45) have suggested the beginning of the previous cycle, 303/4 CE, when Peter of Alexandria was involved in a debate about the date of Easter (on which see Stern 2001: 66–7, 72). Both these dates, however, might be too early (see previous n.). See also E. Schwartz (1905) 3–29, Blackburn and Holford-Strevens (1999) 803–5. We should not assume, in any event, that the Alexandrian cycle (or any other cycle) was necessarily instituted its first year (cf. Bickerman 1968: 41–2). As to the authorship of the cycle, Jones wavers between Athanasius himself in 328 CE (1943: 24) and Eusebius (1943: 26 n. 2), who according to Jerome (*De Viris Illustribus* 61) designed a 19-year Easter cycle at some time in this period (C. W. Jones 1943: 24 n. 2; Mc Carthy and Breen 2003: 137–8); but as Jones recognizes, the authorship of the Alexandrian cycle remains completely speculative.

118 See Ch. 6 n. 94. The epact in Roman Easter cycles is the lunar date of 1 January.

119 However, the latter could be explained, following E. Schwartz (1905) 57–8, as a deliberate deviation from the *supputatio* for the sake of compromising with Alexandria, as will be explained below (in 340, according the *supputatio*, 30 March was *luna XV*: see table ibid. 47–8).

any date before 25 March.[120] If, as is generally assumed, section IX of the Codex represents the dates of Easter that were actually observed in Rome in this period, we may conclude that the *supputatio Romana* did not determine the date of Easter, because other criteria—such as the limit of 25 March—frequently overrode the *supputatio*'s dates. It is even possible that in its original, early fourth-century version, the table of the *supputatio Romana* did not include Easter dates at all, but only lunar data such as the epacts.[121] The annual determination of the date of Easter could thus have been based on lunar data drawn from the *supputatio* together with other criteria which may have been sometimes *ad hoc* and (as in 333 CE) somewhat unclear.[122]

Whatever the extent to which the churches of Alexandria and Rome adhered, in the period of the Council of Nicaea, to these very different Easter cycles of 19 and 84 years, the two churches seem also to have differed on other principles of Easter computation, in particular the 'limits' of Easter Sunday. In fourth-century Rome, Easter Sunday could only occur within the lunar limits of *luna XVI–XXII,* and within the solar (i.e. Julian calendar) limits of 25 March—21 April.[123] These narrow solar limits (less than one full month)

[120] On this rule see below, n. 123. Thus in both 330 and 341 CE, the *supputatio* has 22 March, but the Codex of 354 has 19 April; it was only in the next 84-year cycle, in 414 and 425 CE, that the *supputatio* date of 22 March was followed. Likewise, in 357 CE the *supputatio* has 23 March, but the Codex has 30 March; whereas in 441 CE, 23 March was observed.

[121] This suggestion, which I do not know anyone else to have made, is all the more likely if, as has been argued by H. Stern (1953) 55–7, the 84-year *supputatio* was originally designed by astrologers rather than by Christians (see Ch. 6 n. 95).

[122] Earlier scholars sought to establish a specific date at which the *supputatio Romana* was instituted, e.g. 342 CE (so Richard 1974: 312–27; see also C. W. Jones 1943: 25–6). However, this is to assume a formal adoption of the 84-year cycle, whereas I doubt whether the Roman Church ever so firmly committed itself to it. Krusch (1880) 31–115 (summary in Mosshammer 2008: 217) attempted to explain the inconsistencies between the *supputatio* and the Codex in the early decades of the 4th c. by positing the existence of an 'older' *supputatio Romana*; Richard (1974) argued instead that an octaeteris was in continuous use in Rome from the early 3rd c. until 342 CE; both conjectures, however, are unnecessary and insufficiently supported with evidence.

[123] The lunar limits of *XVI–XXII* are implicit already in the Roman Easter cycles of the 3rd c., and referred to also by Anatolius (see above, near n. 88). The upper limit of *luna XVI* conforms to the chronology of the synoptic Gospels, according to which the Friday of the Crucifixion was Passover or *luna XIV*, hence the Resurrection on Sunday *luna XVI*. But the origins of the solar limits of 25 March–21 April are less clear. In the 3rd c., Roman cycles assume the lower limit of 21 April but allow Easter before 25 March. The limits 25 March–21 April only emerge in the 4th c., when they can be inferred from the list of Easter dates in the Calendar Codex of 354, starting in 312 CE; these limits are explicitly mentioned in the entry for 349 CE of the Index of Athanasius' Festal Letters (Martin and Albert 1985: 248–9, although the text actually reads '30 Phamenoth', i.e. 26 March, perhaps by confusion with the 26 March Easter date of that year). Although 25 March happens to be the traditional Julian date of the equinox (see Ch. 5 n. 162), it is unclear whether this upper limit was related to a rule of the equinox, and whether it was *de iure* rather than just *de facto*. As to the lower limit, the date of 21 April was the festival of the foundation of the city of Rome (*natalis urbis dies* or *Parilia*), which although in a certain sense 'pagan', was still celebrated by Christians in 4th-c. Rome at least out of local patriotism (Salzman 1990: 155, 184). This is almost certainly why Easter was not allowed later than 21 April in Rome, because then the festivities of the *natalis urbis dies* would have clashed, for Christians, with the fast of Lent. For the

could sometimes lead to situations where no Easter date would be acceptable.[124] The limits of Easter were different in Alexandria, at least according to the Alexandrian cycle (whenever it was instituted), with *luna XV–XXI* and 22 March–25 April (in the Alexandrian calendar 26 Phamenoth–30 Pharmuthi). The upper solar limit, 22 March, derives from the rule of the equinox, whereby *luna XIV* cannot occur before the equinox (which is assumed, in the Alexandrian cycle, to be on 21 March); 22 March, on *luna XV*, is thus the earliest Easter can occur.[125] The rule of the equinox appears to have been advocated by Peter of Alexandria in the 310s, and thus may have been followed some time already before Nicaea.[126]

These different limits, which are likely to have been followed in Alexandria and Rome already at the time of the Council of Nicaea, as well as the use of different cycles producing often different dates of *luna XIV*, would have led not infrequently to disagreement between Rome and Alexandria on the date of Easter. It is most likely because of these differences, and because of the impossibility of ignoring either Rome or Alexandria or making one surrender to the other, that no concrete decision was reached at Nicaea on the computation of the date of Easter.[127] In contrast to the Council of Arles, which was attended only by western bishops submissive to the bishop of Rome and willing to accept the latter's dates of Easter, the Council of Nicaea encompassed too much diversity, from East and from West, for any such agreement to be reached. This explains why in his post-synodal letter, Constantine cautiously avoided any reference to Easter cycles or rules. For political reasons, it was more expedient to be content with a single, relatively simple common cause: that of no longer following the Jews.[128]

Nevertheless, Constantine's directive at Nicaea that the same date of Easter be observed by all, which in subsequent decades the pro-Nicene bishops of Rome and Alexandria saw the value in obeying, led the latter to compromise with each other and adopt, in most years, the same dates of Easter. From 328 CE, Athanasius of Alexandria seems to have been the main promoter of

evidence in support of this explanation, see Lejbowicz (2006) 47, (2008) 297 n. 91 = (2010) 28 n. 91, and Mosshammer (2008) 169–70.

124 As in 387 CE: see Stern (2001) 144.

125 The generous lower limit, 25 April, is perhaps not so much a rule as the result of how the Alexandrian cycle happens to be constructed. The lunar limits of *XV–XXI* conform to the chronology of the Gospel of John, according to which the Friday of the Crucifixion was the eve of Passover or *luna XIII*, hence the Resurrection on Sunday *luna XV* (see above, n. 123).

126 On the letter of Peter of Alexandria to Tricentius, see Stern (2001) 66–7, 72–4.

127 See previous section and n. 96. The sole reference to Easter in the synodal letter cited by Socrates *HE* 1. 9 (partially cited above, n. 107) betrays the tension between Rome and Alexandria at the Council of Nicaea, as argued by Lejbowicz (2006) 39–42.

128 See above, n. 112. Lejbowicz (2006) 49–50 also suggests that the bishops assembled at Nicaea—not to mention Constantine himself [SS]—would not have known enough about computus to engage in any useful debate on the subject.

compromise, by yielding on several occasions to the Roman date; but in some cases, Rome may have also compromised.[129] The first of these compromises was possibly in 333 CE, when Athanasius' Easter date was Sunday 15 April, the same date as in Rome (according to the Calendar Codex of 354), whereas according to the Alexandrian cycle it should have been 22 April—a date that could not be accepted at Rome because it exceeded the limit of 21 April. If, as is quite possible, the Alexandrian cycle was already in use in this period, then Athanasius' change of the date from 22 to 15 April is best interpreted as a deliberate compromise with Rome.[130]

At this stage, however, compromise between Alexandria and Rome was not yet official policy. This may explain why in 343 CE Easter was held on different dates: in Rome on 3 April, and in Alexandria, as probably announced by Athanasius, on 27 March.[131] But this failure to compromise probably had a more specific, circumstantial explanation. Athanasius was then in exile in the West, whilst the Alexandrian see was (temporarily) held by Gregory of Cappadocia. As we shall later see, Athanasius' opponents in the East had no interest in compromising with the Roman Easter. Athanasius may have felt it politically more credible to announce in his festal letter the true date of the Alexandrian cycle, which he knew would be observed in Alexandria, than to announce a compromise with Rome which he knew would not be enforced, in his absence, in his home city.

It is probably his inability to enforce a compromise for Easter 343 that led Athanasius and his party in the winter of the same year to formulate an explicit policy at the Council of Serdica, where according to the Index of Athanasius' Festal Letters, a '50-year decree regarding Easter' was agreed between Romans and Alexandrians.[132] This implies not only an agreement in principle to compromise, but also perhaps that common Easter dates were calculated in advance for the subsequent 50-year period.[133] That dates were set

[129] Thus E. Schwartz (1905) 57–8 interprets Rome's Easter of 340 CE on 30 March, instead of 6 April according to the *supputatio* (see above, near n. 119), as a compromise to match the Alexandrian date. But this interpretation is based on the unverified assumption that the *supputatio* should normally have been observed (see discussion above, near n. 122)

[130] The Index of Athanasius' Festal Letters, which normally assumes the Alexandrian cycle (as explained above), suggests that the Alexandrian date of *luna XIV* was deliberately changed for this purpose from 15 to 14 April (Martin and Albert 1985: 230–1, 322–3; this is not a textual error, *pace* Neugebauer 1979: 99).

[131] The Roman date is confirmed by the *supputatio Romana* as well as the calendar of 354. For the Alexandrian date, the only source is the Index (Martin and Albert 1985: 242–3); but we may treat it as reliable, because although Athanasius' festal letter for 343 has not been preserved, the Index explicitly states that Athanasius wrote one, which suggests that the author of the Index had it before him and used it as his source.

[132] Fifteenth entry of the Index, for 343 CE: Cureton (1848), p. lii, Martin and Albert (1985) 242–3.

[133] But as Hefele and Leclerq (1907) 805 emphasize, this does not imply that a new *cycle* was devised. Curiously, this 'decree' is not recorded in the Council's Canons. On the date of the Serdica Council, see Ch. 6 n. 114.

in advance is suggested at least in Athanasius' festal letter for 346 CE, in which he announces the date of Easter as Sunday 30 March, and not (as some might have argued) 23 March, on the grounds that the former date had been made known by everyone at the 'holy synod'—which means presumably the synod of Serdica, two years before this letter was written.[134]

This Easter date was clearly an Alexandrian concession to Rome. The date of 23 March, which Athanasius vehemently rejected (thereby betraying, perhaps, that normally this date should have been followed), was actually required by the Alexandrian cycle, but it was too early for Rome in terms of its solar (and probably also lunar) limits; whereas 30 March was the Roman date of Easter.[135] By then, in 346, Gregory was dead; although Athanasius did not return to Alexandria until later that year, the time was right for compromise. A further compromise was made in 349, when Athanasius set Easter on 26 March because—as explicitly stated here the Index—the Romans insisted on Easter limits of 26 March–21 April.[136] According to the Alexandrian cycle, indeed, it should have been 23 April, outside the Roman limit. The earlier date of 26 March was unacceptable to Alexandria, because it would have assumed a pre-equinoctial *luna XIV*, on 19 March; but as 23 April was too late for Rome, Athanasius compromised.[137]

[134] Festal Letter 18: Cureton (1848) 38 (Syriac pagination). The Syriac *shaddar* (lit. 'sent'), where one would expect a word for 'proclaim', suggests that this date was not just proclaimed at the synod but also sent or disseminated (this word is wrongly translated in the Latin, *PG* 26: 1423 B, as 'definierunt', which Camplani 1989: 110 appears to have followed; whilst the text in quotation marks in Hefele and Leclerq 1907: 805 bears no relation to the original at all).

[135] So according to both the *supputatio Romana* and the calendar of 354: see Hefele and Leclerq (1907), Richard (1974) 331. The heading of the Festal Letter gives XXI for the lunar date of 30 March (Martin and Albert 1985: 330–1; the Index reads 'twenty-four', clearly an error, ibid. 244–5), although according to the Alexandrian cycle it should have been *XXII*. It seems that in this heading, as in the Index for the year 333 CE (see n. 130), the lunar date was deliberately altered by one day in order to make it look as though the Alexandrian Easter lunar limits of XV–XXI were not transgressed.

[136] Martin and Albert 1985: 248–9; see above, n. 123.

[137] In 350 CE, our sources suggest that Easter was held on different dates, even though Athanasius was still in control of his see in Alexandria: the Index gives the date of 8 April (Martin and Albert 1985: 250–1), whereas in Rome, according to both the *supputatio Romana* and the calendar of 354, it was 15 April; 8 April would have been too early for Rome because it coincided with *luna XV*. This disagreement, in flagrant contradiction to the decree of the Serdica Council, demands an explanation. Richard (1974) 330–1, followed by Lejbowicz (2008) 298 n. 92 = 2010: 28 n. 92, put forward the theory that Athanasius was only prepared to respect Rome's solar limits of 25 March–21 April, but not its lunar limits, which would explain why he did not compromise with Rome on this occasion. The question, however, is whether the date in the Index can be treated, in this case, as authentic. Although fragments of Athanasius' festal letter for that year have been preserved—regrettably, without the date of Easter—the letter is not referred to in the Index. This may suggest that the letter was not known to the author of the Index, who would have calculated instead the date of 8 April retrospectively, on the sole basis of the Alexandrian 19-year cycle (for a similar argument regarding the years 357 and 360, see Camplani 1989: 111–12 and below, n. 146).

Compromise between Alexandria and Rome remained a policy through most of the fourth century, but after the death of Athanasius in 373, for historical reasons that have been explored by others elsewhere, it is Rome that increasingly conceded to the Alexandrian cycle and its Easter limits.[138] Eventually, in the mid-fifth century, the Alexandrian 19-year cycle was officially adopted by the Church of Rome.[139] It may thus be said that the Council of Nicaea, with Constantine's directive that all Christians observe Easter on the same date, had the progressive and long-term effect of bringing into existence a single, 'orthodox' computation for the date of Easter.

Factionalism after Nicaea: the beginnings of calendar heresy

Besides uniting various churches in the observance of a common date of Easter, the Council of Nicaea had the paradoxical counter-effect of enhancing divisions regarding Easter between dissenting factions. This was only because the date of Easter had been made at Nicaea a matter of social and doctrinal significance. From Nicaea onwards, the observance of different Easter dates could no longer be dismissed as a matter of regional custom and diversity: it had to be interpreted—and consequently was often used—as an expression of factionalism and of dissent. Eventually, towards the end of the fourth century, Easter calendar diversity became interpreted as an expression of 'heresy'.

The first manifestation of post-Nicene, calendar factionalism occurred at the Council of Serdica in 343 CE, when a group (probably the majority) of eastern bishops broke off from the rest of the Council (western bishops, but with some easterners such as Athanasius), reassembled in a nearby location, and besides debating on the nature of Christ, constructed for themselves an Easter cycle of 30 years. The document that was drawn up consisted of a list of Jewish Passover dates from 328 to 343 CE, alongside a list of the Christian *luna XIV* dates from 328 to 357 CE, thus 30 years.[140] The dates in both lists were very similar, but whereas the Jewish Passover always occurred in March, the Christian *luna XIV* could not occur before 21 March: hence if the Jewish Passover was before 21 March, the Christian *luna XIV* was postponed to April.[141]

[138] Why the tide swung in favour of the Alexandrian cycle is studied in detail by Lejbowicz (2008) = (2010).

[139] Jones (1943) 55–77. Key evidence is a letter of Paschasinus (written in 443/4 CE), on which see Mosshammer (2008) 62–3.

[140] The document of the eastern faction of the Serdica Council was first published by E, Schwartz (1905) 122–3, with facsimile of the 8th-c. manuscript) with significant textual emendations; for text and discussion see Stern (2001) 74–5, 124–32. See also above, Ch. 6, near n. 122.

[141] I am assuming here, for simplicity, the emendations of Schwartz—especially that which establishes the date of *luna XIV* for 338 CE as 21 March (and not April)—even if his emendations may be open to criticism (see Stern 2001: 126–9).

This 30-year cycle was no doubt a response to the 50-year decree that was issued by the western faction of the same Council, in which Roman and Alexandrian churches agreed to compromise on the dates of Easter (as we have seen above). The 30-year cycle, indeed, was also a compromise in the spirit of Nicaea (which, significantly, is explicitly referred to with much reverence in its prologue),[142] but this compromise was only between eastern parties. Thus the occurrence in this cycle of some Easters at the time of the Jewish Passover but others one month later may be interpreted as a compromise between the Syrian custom of 'following the Jews' and the Council of Nicaea's resolution, on the contrary, not to follow the Jews.[143] The limit of 21 March was a concession to the Alexandrian rule of the equinox, whereas the construction of a 30-year cycle unlike the Alexandrian 19-year cycle and tied to the calendar of Antioch was clearly a concession to the Syrians. But no consideration was given to the Roman limits of Easter: indeed, the occurrence of *luna XIV* on 19 April in year 22 of the cycle was dangerously close to the Roman limit of 21 April, and it may not have gone unnoticed that this *luna XIV* date would lead, only five years later (in 349), to an Easter Sunday beyond the Roman limit (on 24 April). The 30-year cycle of the eastern faction of the Serdica Council was thus deliberately designed to marginalize the Church of Rome. In this way, the Easter calendar was made an integral part of the easterners' political, factionalist strategy.

Earlier in 343 CE, Easter had been observed in Rome and Alexandria on different dates; as suggested above, their failure to compromise may have had something to do with Athanasius being in exile, and the Alexandrian see in the hands of Gregory (above, after n. 131). A similar situation arose in 357 and 360 CE, when Athanasius was again in exile: Easter was observed in Alexandria on 23 March and 23 April respectively,[144] both dates outside the Easter limits

[142] Schwartz loc. cit., Stern 2001: 126–7. The pro-Nicene character of this document, albeit factionalist, has not been given proper recognition. The eastern faction at the Serdica Council has generally been labelled as Arian, hence anti-Nicene (e.g. Hefele and Leclerq 1907: 813–19, Martin and Albert 1985: 289–90 n. 43, and Lejbowicz 2006: 54 n. 140); but this reflects the perspective of a biased, Orthodox tradition that already finds expression in the entry for 343 CE of the Index of Athanasius' Festal Letters (Cureton 1848: p. lii, Martin and Albert 1985: 242–3) and that often used 'Arian' as a blanket term of abuse against its opponents. On the meanings of this term in this period, see Gwynn (2007).

[143] E. Schwartz (1905) 123. On the eastern, Syrian custom, see above, n. 109, and further below.

[144] So at least according to the Index: Martin and Albert (1985) 256–9, 260–1. Camplani (1989) 111–12 argues that as Athanasius did not write festal letters in these years—according to the Index, although some sources suggest otherwise—these dates would have been retrospectively calculated by the author of the Index on the basis of the Alexandrian 19-year cycle. Nevertheless, it may be assumed that these dates were observed in Alexandria in these years, first because there is no evidence that any compromise was made, and secondly because the further we move down the 4th c., the more justified becomes the assumption that the Alexandrian cycle was used.

of the Church of Rome, which kept 30 March and 16 April.[145] It has been argued that Alexandria refused to compromise in these two years because of the Arian—or more precisely Homoean—and thus anti-Nicene convictions of its (then) bishop George (Richard 1974: 331, Lejbowicz 2008: 298 = 2010: 28–9). Actually, it may be argued that a compromise with Rome in these years would have required a radical adjustment of the Alexandrian 19-year reckoning which any Alexandrian, even of Nicene conviction, might have had difficulty in agreeing to.[146] Nevertheless, George's failure to compromise in 360 seems to have been understood by some of his contemporaries as motivated by Arianism or Homoeanism: this would explain why Auxentius, bishop of Milan—himself also Homoean—decided in 360 to follow the Alexandrian date, presumably in solidarity with George, rather than the date of the much closer church of Rome.[147] On this occasion, therefore, the Alexandrian reckoning was appropriated by Arians as a way of uniting together against the Nicene camp.[148]

These incidents were isolated in time and place, and had but a limited effect on the Arian–Nicene controversies; but they contributed to the slowly emerging redefinition of calendar diversity as a form of heresy. In due course, as we shall now see, calendar diversity was to develop into a major heresiological issue within Christianity.

[145] So according to the Calendar of 354. Other sources give other dates for the Roman Easter of 360 CE (9 and 17 April: see Lejbowicz 2008: 299 = 2010: 30), yet only 16 April seems to have been possible.

[146] This applies to 343 as much as to 357 and 360. In 343, the redating of Easter to 3 April would have required *luna XIV* in the Alexandrian reckoning to be shifted forward by two days, from 25 to 27 March; in 357, similarly, compromise with Rome would have required *luna XIV* to be shifted forward from 21 to 23 March. In 360, perhaps more drastically, the redating of Easter would have required *luna XIV* to be shifted *backward* by two days, from 17 to 15 April; otherwise, Easter on 16 April would have occurred, absurdly, before *luna XIV*. As we have seen above (nn. 130, 135), Athanasius' compromises did not involves shifts of more than one day, although the compromise of 349 CE might have necessitated a shift of *luna XIV* from 19 to 21 March for the rule of the equinox not to be breached.

[147] That these dates were followed in Milan in 360 is attested by Ambrose in his epistle of 387 CE on the date of Easter (epistle no. 13 *extra collectionem* in Zelzer 1982: 222–34, paragraph 21 on p. 234). The explanation of this date as a reflection of Auxentius' Homoeanism is in Lejbowicz (2008) 295–300 = (2010) 26–31, following a suggestion of Leofranc Holford-Strevens. Mosshammer (2008: 170) remarks that the rationale for the Roman limit of 21 April (on which Mosshammer (2008) 170 remarks that the rationale for the Roman limit of 21 April (on which see above, n. 123) was in any case of no concern to the Milanese.

[148] The Index of Festal Letters reports that in 340 CE, Gregory and his Arian colleagues initially set the date of Easter on 23 March, six days before *luna XIV*; but this was a gross error rather than an alternative reckoning, and as the Index informs us, Gregory eventually corrected himself with considerable embarrassment (Cureton 1848: p. li; Martin and Albert 1985: 238–9).

Easter 'with the Jews': Quartodecimans, Novatians, and other heretics in the late fourth–fifth centuries

The decision at Nicaea to observe Easter on the same date did not automatically drive all calendar diversity into the margins of heresy. For prudent political reasons, as explained above, the substantial differences between the Easter cycles, limits, and computational rules of Rome and Alexandria were neither discussed nor raised at the Council of Nicaea, and accordingly never led either side, through the subsequent century, to accusations or even intimations of heresy.

Not so was the custom in some Christian traditions of observing Easter 'with the Jews', i.e. on or near the same dates as the Jewish Passover, which the Council of Nicaea specifically condemned. This had the immediate effect of redefining this custom as 'heresy'; it also led, paradoxically, to the formation in the late fourth century of new 'heresies' that adopted, as their primary definition, the observance of Easter on *luna XIV* and/or before the equinox, both Judaizing practices. As we shall see, what was considered objectionable in these practices was not their Judaizing identity *per se*, but rather that they were considered to threaten the unity of the Church and the authority of Nicaea.

The consequences of Constantine's condemnation of Judaizing Easter practices became discernable almost immediately. Soon after the Council of Nicaea, church leaders took the hitherto unprecedented measure of excommunicating whoever persisted in observing Easter 'with the Jews'.[149] The following ruling was issued soon after Nicaea, at the Council of Antioch of *c.*327 CE;[150] as at the Council of Arles, it appears in the Canons in first position. Constantine's directive is now referred to as a formal 'decree' (ὅρος); but most important to note is the threat of excommunication and the very real, social separation that this sanction explicitly entails:

> 1. Whosoever shall presume to set aside the decree of the holy and great Synod which was assembled at Nicaea in the presence of the pious Emperor Constantine, beloved of God, concerning the holy and salutary feast of Easter; if they shall obstinately persist in opposing its decrees, let them be excommunicated and cast out of the Church; this is said concerning the laity.
>
> But if any one of those who preside in the Church, whether he be bishop, presbyter, or deacon, shall presume, after this decree, to exercise his own private judgment to the subversion of the people and to the disturbance of the churches, by observing Easter at the same time as the Jews, the holy Synod decrees that he

[149] Excommunication for calendar deviance is not attested until this period, except for Eusebius' account of the Victor–Polycrates controversy in the 190s which, as I have explained above, may be dismissed as anachronistic.

[150] Earlier scholarly consensus attributed these canons to another council that was held in Antioch in 341 CE. See now Lejbowicz (2006) 52 n. 137.

> shall thenceforth be an alien from the Church, as one who not only heaps sins upon himself, but who is also the cause of destruction and subversion to many; and it deposes not only such persons themselves from their ministry, but those also who after their deposition shall presume to communicate with them. (Hefele and Leclerq 1907: 714–5)

Although the emphasis is on obedience to the Council of Nicaea, the brief reference to observing Easter 'at the same time as the Jews' does not go unnoticed: it is this deviant practice, in particular, that is being targeted. It is no coincidence, therefore, that this canon was issued in Antioch, the Syrian metropolis: for the tradition of observing Easter with the Jews, more precisely on the Sunday following the Jewish Passover (and not on a date determined independently by some fixed cycle) was distinctive, in the early fourth century, of the provinces of Syria and the East, and it is in these provinces that Constantine had met most opposition (see above, near nn. 106–7). After the Council of Nicaea, and through most of the fourth century, obedience to Nicaea became a major issue in Syria and called for firm action on the part of pro-Nicene church leaders.[151] Thus the seventh 'Apostolic Canon' of the *Apostolic Constitutions*, a Syrian work redacted around 380 CE, rules that 'if a bishop, priest or deacon celebrates the holy day of Easter before the vernal equinox with the Jews, he shall be deposed'.[152] The contemporary Canons of Laodicea—another major northern Syrian city—similarly condemn, though without specifying sanctions, the celebration of festivals with the Jews.[153] But most conspicuous is John Chrysostom's third homily against Judaizing Christians, written and delivered in Antioch in 387 CE, when, according to the Alexandrian cycle, Easter was to be celebrated on the late (and therefore highly controversial) date of 25 April. The homily was aimed at Christians in Antioch who were about to follow the Jews and observe Easter in the earlier month. Although much of the homily is a rejection of the Jewish Passover, what matters to Chrysostom—as he makes very clear—is not the correct date of

[151] As we have seen above, the practice of observing Easter with the Jews was similarly opposed, albeit in an ambivalent way, by the eastern faction of the Council of Serdica in 343 CE. In the particular case of 327 CE, however, Lejbowicz (2006) 52–3 argues that the harsh measure of excommunication was taken by the Council of Antioch, for political reasons, to counterbalance its otherwise anti-Nicene stance.

[152] *Apostolic Constitutions* 8. 47: 70, in Metzger (1985–7) iii. 300–1; on the date and provenance of this work, see ibid. i. 55–60. See also *Apostolic Constitutions* 5. 17. 1–3 (ibid. ii. 266–9, Stern 2001: 68, 84), which takes up the theme in more detail by revising the earlier ruling of the *Didascalia* (on which see below, n. 180).

[153] Canon 37 in Hefele and Leclerq (1907) 1019; the precise date and historical context of these canons remain, however, unclear (ibid. 989–95). In this context the verb 'to celebrate with' (*συνεορτάζειν*) may mean more than celebrating festivals on the same date, because the canon that follows (38) prohibits 'to receive unleavened bread from the Jews', and canon 39 prohibits celebrating festivals with the pagans (ibid. and Mitchell 2005: 221, on which see below, n. 180). Similar remarks apply to *Apostolic Constitutions* 8. 47: 70–1, which in substance is very similar to this passage.

Easter, but only obedience to Nicaea and unity of the Church: he repeatedly writes, 'we put more importance on harmony (*symphonia*) than on the observance of dates',[154] since the 'decree' of Nicaea was about keeping Easter 'together and in harmony'.[155] In summing up, it is not Judaism that is castigated, but rather calendar diversity: 'fasting at this or that time is not matter for blame; but to rend asunder the Church . . . to create dissension . . . these are unpardonable . . . these do deserve serious punishment'.[156]

It is in this climate of harsh, punitive Church canons and fiery homilies against calendar deviance, calendar diversity, and observance of Easter 'with the Jews' that we find the emergence, for the first time in history, of heretical groups defined as heretical purely or largely because of their calendrical, Easter practices. These groups emerge all of a sudden in sources from the 370s or 380s, and seem to persist well into the fifth century; they are located mainly in Asia Minor and the Near East, and are characterized by mildly Judaizing calendrical practices. Most frequently mentioned among them are the Quartodecimans (a new term, not attested earlier in history)[157] and the Novatians, whose heretical Easter observances are carefully distinguished in the sources.

A list and concise description of these heresies appears in the opening of an anonymous homily on the date of Easter, composed in Asia in the same contentious year of 387 CE. It describes in turn the 'Quartodeciman heresy', that observes Easter with the Jews, i.e. on the same date; the Novatians, who follow the Jewish month and the Jewish *luna XIV*, but observe Easter on the following Sunday; and the Montanists, another 'heresy', who observe Easter on the fixed date of day 14, month 7 (of the Asian calendar, i.e. 6 April).[158]

Epiphanius of Salamis covers similar ground, but in far more detail, in his slightly earlier heresiology, the *Panarion*. The 50th entry of the *Panarion*, on the 'Quartodecimans' (*Tessareskaidekatitai*), describes them as a 'heresy' (50. 1. 1) who hold all the doctrines of the Church (50. 1. 2–3) but differ only on the date of Easter, which they keep on one day only (i.e. the day of the Passion on *luna XIV*, but not the day of the Resurrection) (ibid.). The heresy, however, is subdivided:

> They keep the Passover on whichever day it is that the fourteenth of the month falls; but the ones in Cappadocia keep the same one day on the eighth before the Kalends of April (25 March). And there is no little dissension in their ranks

[154] John Chrysostom, *Adversus Iudaeos* 3. 3. 1 (Harkins 1979: 54); see also 3. 5. 6 (ibid. 65).

[155] *Adv. Iud.* 3. 3. 4 (ibid. 55) κοινῇ καὶ συμφώνως.

[156] *Adv. Iud.* 3. 6. 13 (ibid. 70).

[157] Actually, in the sources of this period (later 4th–5th cc.) the term is only attested in the Greek, *Tessareskaidekatitai* (see further below, n. 160). I shall use, however, the later and common translation 'Quartodeciman'.

[158] Floëri and Nautin (1957) 117–19 (chs. 7–10).

(50. 1. 6–7) . . . the Quartodecimans too have departed from the prescribed path (50. 1. 9).[159]

Epiphanius makes some use (without attribution) of the *Refutatio*'s comment on 'those who observe Easter on the 14th of the moon', which reminds us that the practice had been listed already in early third-century Roman heresiologies (as we have seen above). But what is new, and in my view significant, in Epiphanius' *Panarion* is the name of the heresy—indeed, this is probably the earliest attestation of the term *Tessareskaidekatitai*—and its sudden prevalence in late fourth-fifth centuries sources. Indeed, from this point onwards the Quartodecimans enter the stock list of the heresiological tradition. They are listed, in the early fifth century, in Augustine's heresiology, as well as in the contemporary (or slightly earlier) heresiology of the northern Italian bishop Philastrius; and again, in the mid-fifth-century heresiology of Theodoret.[160]

Another relevant heresy in Ephiphanius' *Panarion* is that of the Audians, who distinguish themselves in only two points: their belief in anthropomorphism, and their deviant calendrical practices: 'for they choose to celebrate the Passover with the Jews—that is, they contentiously celebrate the Passover at the same time that the Jews are holding their Festival of Unleavened Bread' (70. 9. 2). This practice leads to disunity and often to a breach of the rule of the equinox, which the Jews do not observe (70. 11). Epiphanius acknowledges that following the Jews used to be the Church's custom, when 'Passover was celebrated at different times in the Church, occasioning ridicule every year'

[159] Williams (1987–94) ii. 23–4. Observance of Easter on 25 March is deemed Quartodeciman because this date is when the Passion supposedly occurred, on *luna XIV*, in 29 CE, or better perhaps, because this date corresponds to 14 Teireix in the Cappadocian calendar (Talley 2003). As Leofranc Holford-Strevens points out to me, the former explanation is less likely, because whereas in the West 25 March was taken to be the date of the Passion on *luna XIV*, in the East it was that of the Resurrection (Grumel 1958: 26–9, Mosshammer 2008: 48–9, Nothaft 2011: 47–60). The Quartodeciman heresy is positioned in the *Panarion* immediately after the Phrygians, *alias* Montanists (48) and the Quintillianists, *alias* Pepuzians (49). Although the date of Easter is not mentioned here in connection with these heresies, these heresies are frequently grouped together in other sources and attributed deviant Easter practices (e.g. the Montanists in the anonymous homily of 387, above mentioned).

[160] Augustine, *De Haeresibus*, 28 (his use of the Greek name in Latin transliteration, *Tessarescaedecatitae*, suggests either that, because of its recentness, the Latin equivalent 'Quartodecimani' had not yet been coined, or that Augustine and his contemporaries regarded the phenomenon to be specific to the Greek East); Philastrius, *Diversarum Hereseon Liber*, 58 (Heylen 1957: 241–2; he does not call them by name, but attributes to them observance of Easter on *luna XIV* as well as only in the month of March; note the now familiar Nicene comment: *non cognoscunt diem paschae domini nostri veram et salutem unam, orbi terrarum statutam et confirmatam*; on the dating of this work, see ibid. 209–10); Theodoret, *Haereticarum Fabularum Compendium*, 3. 4 (*PG* 83. 406; the Quartodecimans are preceded in 3. 2 by the Montanists, and followed in 3. 5 by the Novatians, although Easter is not mentioned in the context of these; Millar 2004: 122 takes this sequence as evidence that the three groups belonged to the same geographical context, with a possibility of crossover between them; but it is equally possible that this sequence, already attested in the anonymous homily of 387, had become a standard topos in the heresiological tradition).

(70. 9. 7), but this was corrected, for the sake of accord and harmony, at the Council of Nicaea. Again, the Audians claim support from the 'Ordinance of the Apostles',[161] but Epiphanius reinterprets their teaching as a demand for unity, 'so that there would be no schisms or divisions' (70. 10). Thus, the Audians 'deceive men and women . . . with their parade of keeping the original tradition and following the Ordinance of the Apostles' (70. 14. 1); as in John Chrysostom's homily, unity of practice is paramount.[162]

Epiphanius locates the Audian heresy in the Taurus mountains, Syria, Palestine, Arabia, Mesopotamia, and at one time also in Gothia (70. 14–15). This wide geographical spread does not necessarily mean large numbers—Epiphanius himself claims that they are 'still very few'—but what is interesting is that the Audians are located in the Roman Near East, precisely where, as we have seen, the practice of observing Easter with the Jews had always been prevalent. Effectively, this means that a local Christian tradition was being renamed, in this late fourth-century work, a 'heresy'.

In a more legal context, the new set of heresies appears around the same time in the above-mentioned Canons of Laodicea, where the seventh canon reads:

> Persons converted from heresies, that is, of the Novatians, Photinians, and Quartodecimans, whether they were catechumens or communicants among them, shall not be received until they shall have anathematized every heresy, and particularly that in which they were held. (Hefele and Leclerq 1907: 999–1000)

This canon implies excommunication, and sets out a procedure for readmission of repentant heretics into the Orthodox Church. It may be assumed that Novatians and Quartodecimans (if not also Photinians, of whom we know far less) are mentioned together in this canon because of their deviant reckoning of the date of Easter. Their appearance in this relatively early text of church canons suggests that these heresies achieved, almost from the outset, a formally recognized legal status.

It did not take long, indeed, for imperial legislation to join in. In 382, the joint emperors—by then all pro-Nicene—issued a law condemning those 'who do not convene on the same day for Easter'.[163] In the early fifth century, imperial legislation began referring to specific heresies by name. Novatians thus appear in an imperial constitution of 413:

> We do not permit to go unavenged that transgression by . . . those deserters and fugitives from the company of the Novatians . . . whose name is derived from the

[161] i.e. the *Didascalia*: the passage cited below, n. 180.
[162] Williams (1987–94) ii. 410–18.
[163] *Codex Theodosianus* 16. 5. 9 (Pharr 1952: 452). The law, probably a rescript, was issued on 31 March by the emperors Gratian, Theodosius I, and Valentinian II.

> crime, inasmuch as they wish to be called 'Protopaschites'. But if the Novatians should suppose that the day of Easter . . . ought to be celebrated on another day than that observed by the bishops of the orthodox, deportation as well as proscription shall pursue the authors of such assemblies. Against such persons an even more severe punishment ought to have been promulgated, since in this crime they even surpass the insanity of the heretics by observing the festival of Easter at another time than that of the orthodox, and thus they venerate almost another Son of God than the one whom we worship.[164]

'Protopaschites' refers to the early observance of Easter, following the Jews, i.e. sometimes before the equinox; not all Novatians subscribed to this practice, as we shall later see, which explains the pejorative reference to 'deserters and fugitives from the company of the Novatians', and perhaps also the need for this sub-group to be given a distinctive name.[165] Note the emphasis on the 'orthodox', and the suggestion at the end of the constitution that these Protopaschites are worse than other heretics and 'venerate almost another Son of God'—which indicates, at the very least, the centrality that calendar deviance had come to occupy, by the early fifth century, in the definition of Christian heresy.

A similar point is reiterated in another imperial constitution in 423, which punishes with proscription of goods and exile 'those persons who are worse than all other heretics in this one belief, namely, that they disagree with all others as to the venerable day of Easter'. A little later, a long list of forbidden heresies in an imperial constitution of 428 includes the Sabbatian Novatians and the Quartodecimans.[166] The punishments laid down in these constitutions—deportation, proscription, etc.—reveal again the very real social consequences that calendar heresy could at least potentially (if the laws were implemented) entail.

Church historians in the mid-fifth century also take interest in the rise of these new Easter calendar heresies in the late fourth century, and provide us more information about the Novatians than any other source. The most important of these is Socrates (*c.*440 CE); Sozomen (a few years later) is heavily dependent on his predecessor and differs only on points of detail. According to Socrates, observance of Easter with the Jews was practised only by a breakaway movement within the Novatian heresy: Novatus, founder of the movement in the mid-third century, had observed it as in the West after the equinox (*HE* 4. 28. 14; 5. 21. 15), but his followers in Phrygia 'turned away

[164] Ibid. 16. 6. 6 (Pharr 1952: 465); see Millar (2004) 121–2.

[165] Floëri and Nautin (1957) 72–3 n. 1 dismiss the term 'Protopaschites' as a 'néologisme barbare', but they seem to have overlooked its occurrence in this passage. It is commonly used in modern scholarship, although in ancient sources, to my knowledge, it is only attested here.

[166] *C. Theod.* 16. 10. 24 (Pharr 1952: 476; see Grumel 1960: 177–8), *Codex Justinianus* 1. 5. 5 (*Novatiani sive Sabbatiani, Tetraditae sive Tessarescaedecatitae*). 'Sabbatian' will be presently explained. On the significance of the use of Greek in Latin transliteration, see above, n. 160.

from those from whom they separated and moved the festival of Pascha' (4. 28. 16)—note the emphasis on sectarian separatism. This 'innovation' occurred in the reign of Valens (364–78 CE) (5. 21. 7), when a council of Novatian bishops in the town of Pazos decided to 'watch the Jews when they observe Unleavened Bread, and with them celebrate the festival of Easter' (4. 28. 17).[167] But most of the blame is laid on a Jewish convert, Sabbatios, who in 384 started promoting the Pazos decision because of his own Jewish inclinations as well as for ulterior, self-aggrandizing motives (5. 21. 6–17; 7. 5. 2). Another Novatian council then gathered at Angarum and issued a canon which they called 'indifferent'.[168] In a remarkable attempt to relegitimize calendar diversity—for which Socrates does not hide his sympathy—the canon declared that disagreement regarding the festival was not a good reason for the church to split, and that the Pazos decision would not affect the 'catholic canon': for the ancients had differed regarding the festival, yet remained in communion and did not split. The 'indifferent canon' thus allowed everyone to follow his previous custom (5. 6. 14–16).[169] After Angarum, Sabbatios continued celebrating Easter on his own dates if they differed from the dates of the Church, but only in private; in public, he would join in with the celebrations of the Church. But later he broke off from the Church, and held separate meetings to celebrate Easter on his own dates (5. 6. 17–19; 7. 5, 3). Then, early in the reign of Theodosius II (408–50 CE), Sabbatios took the bold step of declaring 'cursed whoever observes Easter outside Unleavened Bread' (7. 5. 4). This led to a major rift within the Novatian Church. One year, when Sabbatios was celebrating Easter one month early, the Novatian bishop Sisinnios attacked him in the night with a gang of followers; the ensuing riot left seventy dead (7. 5, 7). Sabbatios' followers remain—dominated, Socrates concludes, by peasant prejudice (7. 5. 9).

This account is obviously only one version of the events, a reflection of Socrates' perspective. It is difficult to know how Sabbatios, his Novatian opponents, and other Christians, may have interpreted the events as they were unfolding. Some questions remain unanswered: for example, if the 'indifferent canon' was truly indifferent, then Sabbatios should have been

[167] *Ἰουδαίους ἐπιτηρεῖν ποιοῦντας τὰ ἄζυμα καὶ σὺν αὐτοῖς τὴν τοῦ πάσχα ἐπιτελεῖν ἑορτήν.* To 'watch the Jews when they observe Unleavened Bread' represents the original, traditional method of determining the Christian Easter date (see above, near n. 77). The same formulation, but misleadingly abbreviated, is in Sozomen *HE* 6. 24. 7. The date of the Council of Pazos is given in Theophanes' *Chronographia* (5867) as 367 CE, whereas Sozomen (6. 24. 6) places it about the time of Ambrose's ordination in 374.

[168] *ἀδιάφορος*. On the location of Angarum (which Socrates calls 'Sangaros'), see Mitchell (2005) 220.

[169] The 'catholic canon' means perhaps the 'universal character' of the Church. According to Sozomen, the indifferent canon permitted everyone to observe the feast according to his own 'opinion' (7. 8. 3–4)—a significant difference from Socrates, who mentions instead 'previous custom', perhaps implicitly to preclude the alleged 'innovations' of Sabbatios.

allowed to follow the Jews even in public. The extent to which this canon really legitimized calendar diversity would have been largely a matter of interpretation, which itself is likely to have been very diverse. Sabbatios' role—was he really the instigator of protopaschism, when a whole council at Pazos had preceded him, and when Easter deviance was already implicitly attributed to the Novatians in the Councils of Laodicea?—and his motivations are also open to anyone's interpretation. Socrates, for his part, devotes a lengthy chapter (5. 22) in defence of the indifferent canon, but not without criticizing covertly the introduction of Judaizing 'innovations'.[170] He cites, as a paradigm, the dispute between Victor and Polycrates of the 190s—the latter is here called, for the first time, 'Quartodeciman'—and how it was settled by Irenaeus with an agreement of mutual toleration (5. 22. 14–17). He argues that the date of Easter is only a matter of custom, which should therefore not divide the Church (5. 22. 1–29). But still, he criticizes the custom of following the Jews, at least because of the unnecessary divisions it brought about among the Novatians (5. 22. 73–82). This chapter exemplifies the ambivalence of a notion such as 'indifference'. To some extent, Socrates is torn between tolerance towards calendar diversity on the one hand, and loyalty to the Council of Nicaea on the other.

In the course of their narratives, Socrates and Sozomen also supply information about the other heresies. Running through the familiar list, Sozomen explains that Quartodecimans observe Easter on *luna XIV* regardless of the day of the week, Novatians follow the Jews but observe it on the following Sunday, and Montanists (also known as Pepuzites or Phrygians) observe it on a solar date, on 6 April or the following Sunday.[171] More important is Socrates' reference to the persecution of the Novatians and Quartodecimans of Asia, Lydia, and Caria (all in Asia Minor) at the hands of Nestorius, then bishop of Constantinople, in 428 CE, not long before his *History* was written (7. 29. 11–12). This reference to an event in recent history suggests that the Easter heresies of Quartodecimans, Novatians, and others existed more than just in the imagination of heresiologists or of church and imperial jurists (as might have been inferred, perhaps, from the sources surveyed above).[172] It also

[170] Hansen, Périchon, and Maraval (2004) 214–15 n. 3, pointing out also Socrates' general sympathy towards Novatianism.

[171] Sozomen, *HE* 7. 18. 10–14. Grumel (1960) 177 interprets him as meaning that the Novatians also celebrate Easter on *luna XIV* if it occurs on a Sunday. Sozomen attributes to the Montanists a calendar of 30-day months starting from the vernal equinox, on 24 March; so that 6 April, the date of Easter, corresponds to the 14th of the first month. The historicity and significance of this original calendar is difficult to ascertain. However, 24 March is also the New Year of the calendar of Asia (see above, Table 5.6); as in Cappadocia (above, n. 159), the concern seems to have been the observance of Easter on the 14th of the first month of spring in the local civil calendar (Talley 2003; I am grateful to Leofranc Holford-Strevens for the reference).

[172] Floëri and Nautin (1957) 38 question the existence of Quartodecimans in the late 4th c., but this is probably over-sceptical.

confirms that the new Easter heresies were principally located in the provinces of Asia Minor, even if protopaschism also had deep roots in Syria where, as we have seen, it was attributed by Epiphanius to the Audian heresy.

But even better evidence of the historical reality of these new heresies, at least in Asia Minor, is a record of confessions extracted from repentant heretics during Nestorius' persecutions in Philadelphia, Lydia, in 428–31 CE, which is included in the proceedings of the Council of Ephesus of 431 CE.[173] The text begins with a statement concluding that 'if anyone does not celebrate the holy day of Easter according to the decree of the holy and catholic Church, let him be anathema' (76. 11).[174] Then follows the record of over ten confessions of self-professed, repentant Quartodecimans, employing an almost standard formula (in the first person): the repentant Quartodeciman acknowledges belief in orthodoxy, approaches the catholic Church, and anathemizes every heresy, especially the Quartodecimans and those who do not celebrate the day of Easter as the catholic Church does (76. 12–22, 25). One of the confessions anathemizes instead the Katharoi and those, again, who do not celebrate the day of Easter as the catholic Church does (76. 23); 'Katharoi' are identified in another confession (that, however, does not mention Easter) with the Novatians (76. 26).[175] Although highly formulaic, these confessions are the closest we get to first-hand evidence of the actual existence of Easter heresies.

Some general comments arise. Firstly, the late fourth-century invention of the names 'Quartodeciman' (*Tessareskaidekatites*) and (less common) 'Protopaschite'—whether genuine self-designations or terms created by their 'orthodox' opponents[176]—is highly significant. Although these names describe specific observances with regard to the date of Easter, they functioned primarily as heretical labels, in that they were used as designations of heresies. They imply not only that after Nicaea calendar deviance had become heretical, but also that calendar deviance had become significant enough to define Christian groups as heresies. These names suggest that observance of Easter on *luna XIV* or before the equinox was sufficient on its own to generate complete and self-contained, albeit single-issue, heresies.[177]

Secondly, the prominence of Asia Minor in many of these sources is worthy of attention. Observance of *luna XIV* had ancient roots in Asia Minor, but not observance of Easter 'with the Jews', i.e. on the Sunday following the Jewish

[173] E. Schwartz (1929) 100–5 (no. 76: 11–31), and the excellent article of Millar (2004).

[174] Millar (2004) 120, arguing that it is probably an expression of Nestorius' views.

[175] Ibid. 123–8.

[176] See brief discussion Ibid. 129–30.

[177] In time, however, Quartodecimanism might have adopted other, non-calendrical doctrines: according to Theodoret (above, n. 160), at least, Quartodecimans agreed with Novatians in rejecting the notion of repentance.

Passover (whenever it occurred, even before the equinox), which as far as we know was specific, at least by the early fourth century, to Syria and the East. Its late fourth-century adoption by Novatians in Asia Minor, which Socrates and Sozomen refer to, perhaps legitimately, as 'innovative', raises the possibility that heretics, or Christians wishing to be identified as heretics, could opt in this period for calendar deviance—and if necessary, generate innovative forms of calendar deviance—as a way of asserting a separatist identity. This phenomenon, for some reason, seems to have been prevalent in Asia Minor. The Montanists of Asia Minor, whose identity as a heresy is considered problematic by modern scholars (King 2008: 34–5), may have similarly sought, by adopting an alternative date of Easter, a way of defining their heresy with greater clarity. As to the Quartodecimans, the question must be asked whether they were perpetuating an old Asian tradition—in which case, as we have observed in the case of the Audians, the local custom was simply renamed a 'heresy'—or whether their Easter observance was also, in some ways, an innovation. Many scholars have assumed continuity between the *luna XIV* observance of Polycrates in the 190s and of the Quartodecimans of the late fourth–fifth centuries;[178] but on closer analysis, it is questionable whether this practice had been preserved in Asia as a continuous tradition. Nothing is heard of it, indeed, in the period of some two hundred years following the 190s.[179] Its sudden emergence in the late fourth century with, for the first time, a name—*Tessareskaidekatites*—and its association with other, similarly emerging Easter heresies, suggests a new and innovative phenomenon, perhaps the revival of an older Asian custom, but driven by very different motivations.

All this leads to the conclusion that calendar deviance in the late fourth century was not necessarily a pre-existing tradition that caused certain groups to be redefined, willy-nilly, as heretical. This may have been the case of the Audians in Syria and the East, but not in Asia Minor, where heretics such as Quartodecimans, Novatians, and Montanists were not simply continuing inherited calendar traditions, but were deliberately adopting innovative Easter practices. To them, calendar deviance was a strategy

[178] Millar (2004) 120–1, Mitchell (2005) 220–1.

[179] Anatolius of Laodicea does state, in his work of *c.*270 CE (Mc Carthy and Breen 2003), that 'until this day' (*usque hodie*) the bishops of Asia celebrate Easter on *luna XIV* (*De Ratione Paschali*, 7, ll. 111–17; note also the present tense in 8, l. 136: *quod nobis inuunt*). But it is debatable whether this short comment, by an author who had no first-hand experience of Asian Christianity, could help to bridge the gap between 190 CE and the late 4th c. An argument against the continuity of Quartodecimanism in Asia Minor is that had it been still in practice in the early 4th c., Constantine would have sought to ban it at the Council of Nicaea (on the lack of reference to Quartodecimanism at Nicaea, see above, after n. 104).

for creating for themselves a dissident or heretical identity—it was a way of playing heresy.[180]

Conclusion

The Councils of Arles and Nicaea, in the early fourth century, introduced major changes not only to the Christian reckoning of the date of Easter, but also, more generally, to the perception in Western culture of the function of the calendar within society. Until this period, calendar diversity had been common in the ancient world, especially in Greece, Asia Minor, and the Near East, as well as among Jewish, Christian, and probably other Diaspora communities; it was a fact of life that no one seemed to have regarded as a problem.

[180] Besides seeking a heretical identity, it is also possible that Quartodecimans and Novatians were motivated by a Judaizing interest, but this has been grossly overstated in modern scholarship. Socrates (5. 21. 6–17; 7. 5. 2) does claim that Sabbatios was influenced by his Jewish background, and John Chrystostom does insinuate (in his third homily 'against the Jews'; see above) that those who were to celebrate Easter early would actually participate in the Jewish Passover. But the Syrian tradition of celebrating Easter 'with the Jews', which Chrysostom was opposing, is presented in the sources as quite anti-Judaic. It is formally prescribed in the *Didascalia* (21), a text written in 3rd-c. northern Syria (or elsewhere in the Roman Near East: Metzger 1985–7: i. 16) and preserved in full in a 4th-c. Syriac version (Vööbus 1979: ii. 23*, 27–8*), as follows: 'begin (the fast) when your brethren who are of the people (the Jews) perform the Passover', and 'when therefore that people performs the Passover, do you fast. And be careful to complete your vigil within their (feast of) unleavened bread' (Vööbus 1979: iv. 196, 202); another version, cited by Epiphanius, *Panarion* 70. 10. 2, 11. 3, reads: 'reckon ye not (i.e. some fixed Easter cycle), but celebrate when your brethren of the circumcision do; celebrate with them', and 'when they feast, mourn ye for them with fasting, for they crucified Christ on the day of the feast; and when they mourn on the Day of Unleavened Bread and eat with bitter herbs, then feast ye' (Williams 1987–1994: ii. 412–3). Both sources suggest that the Syrian observance of Easter 'with the Jews' consisted in the Christians fasting (for Lent) on the date when the Jews were feasting (Passover), and then feasting (at Easter) when the Jews were mourning by eating unleavened bread; thus observing the same dates as the Jews was not a Judaizing practice, but quite on the contrary it served the purpose of drawing out and enhancing the contrast between the Jewish Passover and the Christian Easter. This intended contrast is also explicit in Aphrahat's twelfth Demonstration (written in Persian Mesopotamia *c.*344 CE: Pierre 1989: 578, Gerlach 1998: 266–9, Stern 2001: 69 n. 68), and is compatible with the wording of the Novatian pronouncement at Pazos, as reported by Socrates (see above, n. 167). In the context of the Novatians, Mitchell (2005) 220–1 interprets 'with the Jews' as meaning that they 'actually attended the Jewish Passover festival', but this is not the normal meaning of the phrase in Patristic sources (which Mitchell seems not to be aware of; see e.g. Epiphanius 9. 2); there is no evidence or reason to assume that Novatians or even Sabbatios ever participated in the Jewish Passover. Note that the phrase 'with the Jews' is similarly used in a purely calendrical sense (i.e. in the sense of 'on the same date as the Jews') in 3rd–5th-cc. Hebrew rabbinic sources, with reference to the Samaritan Passover (*tPisḥa* 2: 2, ed. Lieberman, p. 145; *pPesaḥim* 1: 1, 27b *'im yisrael*). Finally, the theory that the Montanists Judaized by following the Jewish 364-day calendar (Ford 1966: 145–7, followed by Mitchell 2005: 219, although he then inconsistently suggests, p. 221, that they followed a lunar calendar), is completely unconvincing, if only because the Montanists' fixed Easter date of 6 April (see above, near nn. 158, 171) could not have been maintained in a 364-day year.

At the Councils of Arles and Nicaea, calendar diversity was conceived, for the first time in history, as a social evil; the cohesion of Christian society was linked, for the first time, to the observance of Easter by all Christians on the same date. This led, again for the first time, to the identification of calendar deviance as 'heresy', and to the rise of separatist Christian groups that were defined as 'heretical' purely because of their calendar observances—so much so that calendar differences could be exploited, as we have just seen, as a means of breaking away from orthodoxy and constructing innovative, heretical identities. In the fourth century, calendar difference became socially significant: it meant social separation, excommunication, and schism. This paradigm has become entrenched in Western culture until the present day, and has led, for example, to modern scholarly construals of calendar diversity in ancient Judaism as the cause of the Qumran community's sectarian schism.

The ideas put forward at Arles and Nicaea, however, were not completely innovative. The notion of a 'correct' calendar, indeed, had already existed in early Judaism (e.g. in the book of Jubilees and in early rabbinic sources) and early Christianity (as evident from the controversy of *c.*190 CE). However, the polemical discourses that were formed in this context were about correct practice and authority, not about the universal observance, by all people, of the same calendar. Simultaneous observance of festivals by all communities was not a realistic objective, nor was it really sought after; in a world where communications were still slow and unreliable, calendar diversity within early Judaism and Christianity could often go unnoticed and was not regarded as an issue.

Nevertheless, it may be argued more generally that the pursuit of orthodoxy and universality or 'catholicism', which were closely related to the enforcement of a single Easter date in the fourth century, had earlier roots in Christian tradition. Already in the third century, Anatolius justified his Easter cycle as 'catholic' because it incorporated a wide range of calendrical traditions, which suggests, perhaps, that he was aiming at a certain ideal of calendar unity. The development of fixed Easter cycles in the course of the third century may also itself have contributed to the rising notion of calendar orthodoxy and unity, even if the invention of these cycles was initially generated by entirely different motives: for pseudo-Cyprian (in 243 CE), for example, to reckon the Christian Easter independently from the Jewish Passover, and for Anatolius and the Alexandrian computists, to establish the authentic, post-equinoctial dates of the Biblical Easter.[181] The invention of fixed Easter cycles—to whatever extent they were used in practice in the third century—opened the way for the standardization of the Christian calendar. These cycles made it possible for

[181] See above, near nn. 76, 84. At the end of Ch. 6, I have also interpreted the institution of fixed Easter cycles that were tied to the Julian or Alexandrian calendars as a way of 'normalizing' Christian lunar calendars within Roman imperial society.

scattered Christian communities to reckon the same calendar, and in the fourth century facilitated the enforcement of a single date of Easter.

In a certain sense, therefore, the principle of calendar unity that was established for the first time at the Councils of Arles and Nicaea in the early fourth century was the outcome of gradual developments that were occurring already in third-century Christianity; but more importantly it responded to radical political changes that transformed the Roman Empire in the wake of Constantine's reign and conversion to Christianity. For the prime mover of these councils, as is well known, was Constantine himself, whose main concern at Nicaea was arguably to complete the unification of the Roman Empire following his conquest of the East in 324 CE. This unification was to be political as well as religious; the latter involved, on the same par, the eradication of the 'Arian heresy' and the united observance of Easter. The eradication of calendar diversity became essential, for Constantine, at once to the cohesion of the Church and to the cohesion of the Empire. This provides us with another, final example of how political rulers and political issues determined the formation and development of calendars in Antiquity.

In broader terms still, the rise of the fixed, Orthodox Easter cycle, the ultimate outcome of the Council of Nicaea, was the culmination of a macro-historical pattern that characterized, as we have seen in this book, all the great empires of Antiquity, where flexible, empirical calendars gradually developed into fixed, calculated schemes, and where fragmented diversity gave way to calendar unity. For the Achaemenid kings and Julius Caesar, the adoption of a fixed, Egyptian-type calendar was only implicitly (if at all) driven by an administrative need or an ideological policy of unifying, through a single time-reckoning scheme, their wide-flung imperial territories. But Constantine, near the end of Antiquity, was the first great imperial ruler to use the calendar, explicitly and deliberately, for purposes of generating political unity. His calendar policy was the culmination of a long process of imperial centralization that had begun in the Near East a millennium earlier, and that had led to an increasingly unitary conception of empire, religion, and society.

Conclusion

A wide range of sometimes very different calendars were used in ancient empires, states, and societies, but they all shared a common history. Between the mid-first millennium BCE and the end of Antiquity, calendars evolved as a whole along a similar trajectory: from lunar to solar, from empirical to schematic, from flexible to fixed, from random to predictable, from diverse to single.

To appreciate the profound transformation that calendars underwent during this period, we may compare the distribution of calendars in the ancient world in *c.*500 BCE and *c.*300 CE. In the middle of the first millennium BCE, at the beginning of the Achaemenid period, virtually all calendars in the ancient world were lunar. These calendars were flexible and unpredictable, both in their month lengths (dependent on new moon sightings and often other, extraneous factors) and in the lengths of their years (of twelve or thirteen lunar months). They are attested, more or less continuously, from Italy through Greece, Asia Minor, the Near East, and all the way to India and beyond. 'Beyond' could take us as far as China; although this lies outside the geographical scope of this study, it is important to note that lunar calendars were virtually a world-wide norm.[1] Closer to the borders of the Achaemenid Empire, there is good reason to assume that the calendars of Africa, of southern Arabia, and in northern Europe of the Celts and Germans, were all lunar.[2] The pervasive use of lunar calendars does not mean, however, unity of

[1] But Mesoamerican calendars, probably as far back as Antiquity, were based on non-lunar periods of 20 days. Purely agricultural or seasonal calendars are attested in certain other cultures, e.g. in Melanesia (according to Malinowski 1927), and probably represent very ancient traditions.

[2] The evidence is limited. Modern ethnographic studies suggest that calendars in Africa were traditionally lunar (e.g. Turton and Ruggles 1978). Ancient evidence is available for southern Arabia, with Sabaic inscriptions from perhaps as early as 200 BCE referring to the beginning of the month as 'new crescent of the month' (*s*[2]*hr wrhn*), and with evidence of intercalation persisting from then until the Himyaritic period in the 6th c. CE (de Blois 1998, 2004, and Nebes 2004). A Saracen new moon festival in the Sinai desert is described in the late 6th c. CE (*Antonini Placentini Itinerarium*, 38, in Geyer 1965: 148–9, 171), but the calendrical significance of this festival is uncertain. On the Gallic lunar calendar, see Chapter 6. 1. Evidence that Germanic

practice: lunar calendars could be reckoned in a variety of ways. In the city states of Greece and the Greek-speaking world, calendars were particularly irregular, unpredictable, and diverse (Chapter 1). The only deviation from this norm, later to become highly significant, was the calendar of Egypt (known as the 'civil' calendar) that was non-lunar, fixed, and completely schematic; this calendar, in 500 BCE, was completely exceptional in the ancient world.

By the year 300 CE, in contrast, nearly all calendars within our geographical scope had become schematic and fixed. The solar Julian calendar was now established throughout the Roman Empire, around the entire Mediterranean and in north-western Europe, either in its pure form or in the form of local calendars that had been 'Julianized' and adapted to the fixed 365¼-day year (as in Egypt, Asia Minor, and most of the Roman Near East; Chapter 5). In the Sasanian Empire to the east, the Persian Zoroastrian calendar, also schematic, fixed, and based on a 365-day year, now served as official imperial calendar. The lunar calendar survived only in limited regions of the late antique world: in Sasanian-held Mesopotamia, in Palestine (at least among Jews and Samaritans), in the region stretching from the Greek peninsula to the Balkans and the lower Danube, and perhaps in some parts of Gaul (Chapter 6). But even the lunar calendar, in these regions, had undergone a certain process of schematization and fixation. The Babylonian calendar, at least in its last attestation in early Parthian-period cuneiform sources, had adopted a fixed 19-year cycle of intercalations and was now based not just on empirical new moon sightings (as in the neo-Assyrian period) but also on calculated new moon predictions (Chapter 2). Other lunar calendars in Sasanian Mesopotamia seem to have been based on Easter cycles or similar fixed schemes (Chapter 5). Easter cycles, by 300 CE, were steadily becoming the norm in the Christian world; they were normally tied to the Julian calendar (or to the Alexandrian calendar, an adaptation of the Egyptian calendar to the Julian), thus synchronizing the computation of the (lunar) date of Easter with the dominant calendars of the Roman Empire. The Jewish calendars of Palestine as well as the Diaspora, sometimes following the lead of Easter cycles, were also increasingly based on fixed lunar schemes, as is known e.g. of the rabbinic calendar. Less is known about the lunar calendars in late Roman Greece, the Balkans, and the lower Danube, but it has been argued that the calendars of late Roman Greece (perhaps, initially, under Seleucid influence in the third–second centuries BCE) had become more regularized than in the earlier period. Last but not least, the Gallic lunar calendar as known to us from

calendars were lunar comes principally from Bede (*c*.725 CE), who devotes a chapter of his *De Temporum Ratione* (ch. 15) to the 'months of the English' with an elaborate, if not entirely coherent, description of a pre-Christian, Anglo-Saxon calendar that was lunar but regulated by the solstices with intercalations (Wallis 1999: 53–4 and above, Ch. 3 n. 69); his use of the past tense suggests that this calendar was ancient and no longer practised in his own day. On the value of Tacitus, *Germania* 11, see Introduction n. 12.

Roman-period inscriptions presents itself as a fully fixed scheme, clearly reflecting the influence of Roman *fasti* and the Julian calendar (Chapter 6).

These major changes, which unfolded in the centuries between 500 BCE and 300 CE and to which no ancient calendar appears to have been immune, can all be attributed, directly or indirectly, to the spread and dissemination of the Egyptian calendar during the second half of the first millennium BCE. As mentioned above, the fixed 365-day year calendar of ancient Egypt was unique in the mid-first millennium BCE, and best regarded, as I have argued in Chapter 3, as a peculiarity of Egyptian society and religion. Yet in the space of a few centuries, this calendar or its model became dominant throughout the ancient world. The Achaemenids first appropriated it around 500 BCE as the basis of a new Persian Zoroastrian calendar that became official calendar in the northern and eastern parts of the Achaemenid Empire. The Persian Zoroastrian calendar retained all the features of its Egyptian counterpart, with the only exception of month names and of the New Year date; the result was that already in the fifth–fourth centuries BCE an Egyptian-type calendar could be found stretching from Cappadocia and Armenia to the remote regions of Bactria, Choresmia, and Sogdiana, deep into Central Asia. Later, in the Hellenistic period, the Egyptian calendar was exported under the Ptolemies to their possessions in Libya, Cyprus, and elsewhere in the east Mediterranean, including possibly Judaea, where it may have been adapted to form the Qumran 364-day calendar. In the final stage, it was the Egyptian 365-day year that provided Julius Caesar with a model for his innovative, schematic, and solar 'Julian' calendar, eventually to become–in its revised Gregorian form–the universal calendar in today's world (Chapter 4).

The spread of the Egyptian calendar and its transformative effect on the calendars of the ancient world demands an explanation. The evolution of ancient calendars from lunar to solar, from empirical to schematic, and from flexible to fixed, cannot be simply explained as the result of Egyptian influence, because except for the short-lived and relatively restricted Ptolemaic Empire, there is no historical context within which such influence could have been exerted by Egypt over the rest of the civilized world. It was not the inevitable outcome of some deterministic progression from 'primitive' to 'advanced'; indeed, the evolution of calendars had little to do with what we would call scientific progress (see Introduction). Greek cities such as Athens, where knowledge of astronomy was easily available (at least in the Hellenistic and Roman periods), stubbornly retained their flexible, unpredictable lunar calendars until the end of Antiquity; whilst other societies with far less knowledge of astronomy, such as Qumran and more generally Judaea in the third–first centuries BCE, produced some of the most sophisticated schematic calendars that we have encountered (Chapters 4. 2, 7. 1). This is because the reckoning of calendars was not a scientific pursuit, but a social activity; their history was determined not by scientific progress, but in most cases, by political factors and political decisions.

The role of political rulers in the design, development, and management of ancient calendars was, indeed, paramount. Calendars gave rulers and politicians the means of regulating economic activity, state administration, religious cult, and in some contexts, their own political tenures; it is for this reason, presumably, that most ancient calendars were controlled and set by political rulers. Even in Mesopotamia, where the months and years of the Babylonian calendar were determined in first instance by astrologers (whose function as courtiers or temple officials had a political dimension in its own right), questions about the beginning of the new month and the intercalation were regularly referred to the king, in whose hands the ultimate decision always rested (Chapter 2). When kingdoms and cities broke off from the Seleucid Empire, accordingly, their kings and rulers retained the Babylonian calendar but began reckoning it in their own, divergent ways (Chapter 5). For similar reasons, but in very different ways, the persistence of lunar calendars in parts of the Roman Empire where the Julian calendar had become dominant (Gaul, Italy, and the Jewish and Christian Diasporas) may be interpreted as an expression of dissidence (Chapter 6). In all ancient societies, control of the calendar was thus a way of asserting both political power and political dissidence.

In this book, I have argued that the common, macro-historical trajectory that characterizes the development of calendars from the mid-first millennium BCE to the later Roman period was essentially a political phenomenon. It was directly related to the major socio-political changes that transformed the ancient world during this period, in particular, the rise of the great empires. The Achaemenid, Seleucid, Parthian, Roman, and Sasanian Empires that took over and ruled most of the civilized world within the geographical and historical scope of this study encompassed very extensive territories which, with limited means of communication, were difficult to administrate and control. A calendar based on unpredictable, empirical sightings of the new moon and on irregular intercalations could not have been diffused and reckoned uniformly across such large territories. The emergence of these large geopolitical configurations during the first millennium BCE was conducive, therefore, to the adoption of fixed and predictable calendar schemes.

But the adoption of fixed and standard calendar schemes in the large empires was not merely a matter of administrative convenience; it also served imperial ideological purposes. Thus the Achaemenid appropriation of the 365-day Egyptian calendar in the form of a new Persian Zoroastrian calendar that was widely diffused in the northern and eastern satrapies of the Empire is likely to have been intended as a propagandist display of the Achaemenid conquest and annexation of Egypt in the late sixth century BCE, and similar motivations may have been at play in Julius Caesar's calendar reform of 46 BCE

(Chapter 4). In the Roman province of Asia, the radical adaptation of the local lunar calendar to the (solar) Julian calendar in 8 BCE is presented, in the provincial decree that has survived from the period, not as an administrative convenience but as a show of political loyalty to the emperor Augustus and the Roman Empire (Chapter 5).

The decree and calendar reform of 8 BCE, which was matched in most other provinces and cities of Asia Minor and the Roman Near East, was not an empty political gesture but contributed, in very real terms, to the cultural and political cohesion of the Roman Empire. For in spite of the tremendous diversity that characterized the calendars of the Roman East, a legacy of the Seleucid Empire's fragmentation into small kingdoms and city states in the second and first centuries BCE that the Romans were never able to reverse, the 'Julianization' of these calendars in the early Roman imperial period enabled the 365¼-day year of the Julian calendar to function at least as common denominator between them, as the *hemerologia* of late Antiquity were able to exemplify, and as only a fixed scheme such as the Julian calendar could have achieved (Chapter 5). The impact of the Julian or Julianized calendars is evident also in the context of the lunar calendars in the Roman Empire that I have interpreted as dissident, because they integrated, in a rather hybrid manner, several aspects of the dominant fixed calendar. Even if their intention was subversive, these calendars participated, in a certain way, in the common culture that the Julian calendar had generated (Chapter 6). After Constantine's conversion, the imposition (with various degrees of success) of a single computation of the date of Easter for the whole Empire—which only fixed Easter cycles made possible—and, as a corollary, the condemnation of any deviation from the 'orthodox' computation as 'heretical'—a hitherto unprecedented negative attitude, in the ancient world, towards calendar diversity—represented the logical culmination of a long process of fixation, schematization, and unification of calendars that had begun in the great empires one millennium earlier (Chapter 7).

In short, it is in the context of the great empires that ancient calendars evolved from lunar to solar, empirical to schematic, and flexible to fixed. The institution of innovative fixed schemes as official calendars (e.g. the Persian Zoroastrian calendar in the Achaemenid Empire, the Julian calendar in the Roman Empire), or alternatively, the transformation of empirical lunar calendars into fixed lunar schemes (e.g. the Babylonian calendar in the Seleucid Empire, the Easter cycles in late antique Christendom), was as much a matter of administrative convenience as of imperial ideology. In the context of the great empires, indeed, these calendars became an effective medium for political unity and cultural cohesion.

A number of theoretical issues that have been raised in the course of this work remain unresolved: in particular, the question of whether discrete historical events can be viewed as part of much wider, macro-historical processes. Julius Caesar's calendar reform, for example, was motivated by political conditions specific to the end of the Roman Republic and his own political aspirations; he did not regard his new calendar as conforming to a grand, macro-historical trajectory of calendar schematization and fixation, and it is even doubtful whether he saw his calendar as responding to the administrative demands of an empire that had dramatically expanded in the preceding two decades. This raises questions not only about individual motivation in historical events, but also about what might be called macro-history and *structures de longue durée*—whether these are real historical forces, or the just product of modern scholars' interpretative imagination.[3]

There is a long-standing tradition in scholarship of studying ancient calendars as a mathematical, sometimes also astronomical, exercise;[4] one of the purposes of this work has been to reclaim the study of ancient calendars for social historians, and to establish calendars as a legitimate part of social history. The study of a specific theme through the entire sweep of ancient history, as I have carried out here with ancient calendars, provides a novel perspective on Antiquity which could be productively applied in many other specialized areas of ancient culture and society. But coverage of the whole of Antiquity has forced me, on the other hand, to restrict myself to a narrow aspect of ancient calendars: it was only possible, in this study, to focus on the bare structure of calendars, i.e. on how days, months, and years were determined and reckoned. Likewise, my emphasis in this work on the political context of calendars may be regarded as limited in scope. Ancient calendars could be approached from a variety of other angles, looking at the religious, economic, legal, or other functions and meanings of calendars in ancient societies. Questions that remain to be raised include, for example, how calendars were used in practice in the context of religious cults, economic transactions, letters and legal documents, literary and other narratives of past history and anticipated future, and a host of other socio-cultural activities. In this respect, the study of calendars in Antiquity remains a wide open field.

[3] See Introduction n. 5.

[4] This approach has ancient origins, going arguably as far back as Geminus (1st c. BCE); in modern times it was followed by Ginzel (1911) and Neugebauer (1975), to name but a few.

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