Greek & Roman Calendars

Constructions of Time in the Classical World


SCORPIO
LIBRA
VIRGO
LEO
CANCER
GEMINI
TAURUS
ARIES
PISCES
AQUARIUS
CAPRICORN
SAGITTARIUS
CELESTIAL SPHERE
EQUATOR
ECLIPTIC
23.5°

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Constructions of Time in the Classical World

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Introduction

The recent turn of the millennium regenerated interest in the history of the calendar on both the academic and the popular levels. Whether the new millennium should be celebrated at the beginning of 2000 or of 2001, or whether it had in fact already passed some years earlier, were questions which engaged people for a while through 1999, and they brought to the fore the underlying question of what constituted the beginning of our present western era.

While this era, in its traditional form of years AD, stems from the early medieval period with its explicit reference to the birth of Christ, it was nevertheless constructed on a strong base of Roman chronology, and because of that genealogy we are drawn inexorably into the ancient world of time-reckoning. On another level, the ancient modes of reckoning time continue to influence modern conceptions and methods. Our own digital wristwatches may not look it, but they are just a very abstracted form of a clock which attempted originally to measure and recreate the movements of the celestial sphere, a process which stems from Greek and Roman antiquity, and indeed beyond that to Egyptian and Mesopotamian antiquity.

The standard works on ancient Greek and Roman calendars in English are Bickerman (1968/1980) and Samuel (1972). Both are successful general surveys, erudite yet accessible. They stand at the end of a long and venerable European tradition in the history of chronology which goes back through Ginzel (1906-14) to Ideler (1825-6) to Scaliger (1629). These latter works remain fundamental, but they are also practically inaccessible for most people. This present book does not pretend to stand in the same company, but in part seeks to make available to a wider readership the results of its predecessors, that is, an understanding of the process by which the classical ancestor of our own western calendar was formed, bringing the narrative up to date with more recent discoveries on Greek and Roman calendars. The book's more novel aim is to set these time-reckoning devices, more often and very readily described just in mathematical or abstract terms, on a stage occupied by real people, by Greeks and Romans who developed these calendars for a variety of purposes and lived with them. So the book examines the calendar both as an astronomically based timepiece and as a social instrument by which people organised their activities.

In Chapter 1 I set the scene by describing the principal units of time which stem from observational astronomy: the day, the month, the seasons, the year (both lunar and solar). These form the basis of the ancient calendars, and hence our own.

The earliest calendars of the Greeks, from the late Bronze Age (*c.* 1400-1200 BC) to the Archaic period (sixth century BC), are the subject of Chapter 2. This is also a good opportunity to examine the early Greek star calendar as it is described by the poet Hesiod. The issue of how a lunar and a solar year can be married together is also discussed, as a number of systems were developed by the Greeks in this period.

Chapter 3 focuses particularly on the calendars of Athens in the fifth century BC: the festival and the political, but also the seasonal, since this is a period of considerable development for the star calendar, or parapegma, in the hands of the astronomers Meton and Euktemon. I examine the degree to which the festival calendar was tampered with by officials, and make some proposals about the role of the star calendar as a regulatory device to maintain alignment between the festivals and the seasons.

In Chapter 4 I use several regional examples as the basis of a study of the modern reconstruction of Greek calendars from the fifth to the second centuries BC. How do we know, for instance, what the months of a particular city's calendar were, and what their order in the calendar was? This provides a useful foundation for a detailed technical discussion of the synchronisation between the various cities' calendars. The contact between the Greek world and the worlds of Egypt and the Persian Empire in the Hellenistic period provides opportunities for further synchronisms, this time between the Macedonian calendar and the Babylonian and Egyptian ones.

The calendars of Rome are the subject of Chapter 5. I examine the structure of the Republican calendar, and discuss how successfully it was kept in alignment with the seasons and the sun. Its political and religious nature is also analysed. This calendar is superseded by a solar calendar, introduced by Julius Caesar at the end of the Republic, and properly embedded by Augustus. I investigate its form and origin, and some of its effects, again both political and religious.

Finally, in Chapter 6 what might be termed the 'afterlife' of the Julian calendar in antiquity is discussed. The process of the adoption of the new calendar through the eastern Roman Empire was not an easy one, and through it we can see how the local Greek calendars examined earlier are changed. A late Roman calendar gives us a chance to see how the Roman world of the fourth century AD maintained its pagan and secular past in the face of the encroachment of the new religion of Christianity. And this area of interface between pagan past and Christian future forms the basis of our last discussion, on the creation of the new era, *anno domini*, or AD, with which we live still.

In providing references throughout the text, I have not intended to be exhaustive but indicative. I have favoured quoting from Greek and Latin primary sources (unless otherwise stated, all translations are my own). When translating Greek names, I have usually sought to preserve the Greek forms rather than the Latin, so that, for instance, the hero of the *Iliad* is Akhilleus, rather than Achilles. But since consistency might on occasion be confusing to some, for familiarity's sake I have kept some Latin forms, such as Thucydides, Plato and Ptolemy. Of modern secondary sources I have focused on providing directions to works which are fundamental in their field, while still trying to keep the reader abreast of the most recent discussions.

A word of caution: while chronology and calendars are functions of time, the nature and philosophy of time are not the subject of this book. They are the focus of another project on which I am engaged.

Acknowledgements

This book started life as an idea which sprang from a book chapter I wrote on ancient calendars (Hannah 2001). This in its turn had grown out of several years' work on the Greek star calendar (parapegma), to which I was drawn after studying Greek and Roman monuments which used the zodiacal signs as a means of representing time.

Over the past 15 years or so, then, I have accumulated more debts than I can hope to remember, and I trust that friends and colleagues whose names I omit here will not feel aggrieved at my lapse of memory: Andrew Barker, John Barsby, Owen Baxter, Roger Beck, Chris Bennett, John Betts, Mary and Peter Blomberg, Alan Bowen, Bridget Buxton, Amanda Claridge, Ivor Davidson, †Chris Ehrhardt, Janis Elliott, Denis Feeney, Peter Fraser, Françoise Gury, Jon Hall, David Hammond-Tooke, David Hannah, Goran Henriksson, †Douglas Kidd, Daryn Lehoux, Doug Little, Stan Lusby, Stephen McCready, John D. Morgan II, Marina Moss, Vivian Nutton, Stefan Pedersen, Chris Prentice, Nicholas Purcell, Paul Roche, Anthony Spalinger, Wesley Stevens, Richard Stoneman, Liba Taub, Edmund Thomas, Agathe Thornton and Greg Waite. I hope this book repays in some small way the enjoyment I have had in discussing its issues with these people. To Roger Beck, Denis Feeney and Liba Taub I am particularly grateful for having read through large parts of this book in draft and offered suggestions for improvement. Of course, any errors that persist are my own responsibility.

I am also indebted to the University of Otago for a period of sabbatical leave in 2002-3, during which much of this book was written, and to the University's library staff for prompt service of my frequent interloan requests. Valerie Scott, Librarian to the British School at Rome, which holds Stefan Weinstock's library on ancient calendars, was ever helpful on my visits there. The Library of the Warburg Institute in London has been a treasure trove for the past ten years.

Deborah Blake at Duckworth has been a marvellous editor, unfazed as this project has grown into something much larger than I originally anticipated. Also at Duckworth Margaret Haynes was a sharp-eyed copy-editor who saved me from inconsistencies. The illustrations have been drawn with wit and attention to detail by Karl Hart, to whom I am extremely grateful. Star charts from the computer planetarium, Voyager (version III), Carina Software, 830 Williams Street, San Leandro, California, have been most useful.

My greatest debt is to my wife, Pat, and children, Ngaire and Mark, who have borne with my absences – more metaphysical than physical, perhaps – while I have worked on this project. This book is dedicated to them in gratitude.

1

Astronomy and Calendars

We are all aware that the sun rises in the east and sets in the west, and so creates daytime, while night-time is simply the product of the sun's absence between these two events. Similarly most of us are aware of the rising and setting of the moon along much the same trajectory as the sun. We know, though, that it does not look the same each night but presents a different phase through a monthly cycle from new, to first quarter, to full, to last quarter and back to new. Finally, some of us know that many of the stars also rise in the east, travel to the west and set there in the course of a night. If we are reasonably keen observers of the night sky, we also know that the stars visible in one season of the year differ from those of another, and so their movements across the sky represent a larger cycle than just the diurnal.

The fundamental distinction between light and dark gives us the day; the phases of the moon provide us with the month; and the changing seasons inure us to the year. Not surprisingly, then, the three categories of celestial phenomena which we listed above – solar, lunar and stellar – lie at the heart of most calendars.

Furthermore, the way in which I have described the motions of the bodies, as if they actually rise and set, captures not only our popular descriptions of the events, but also the normal mode of understanding these motions in the ancient world. These phenomena of rising and setting, we know, are the product not of the sun or moon or stars moving, but of the earth rotating on its axis and so creating the illusion for us, who live on the planet, that it is the celestial bodies which are moving. Despite our knowing the truth of the matter, our language persists in describing these astronomical events in a fashion which reflects much better the perspective of the ancient world with which we are dealing in this book.

The smooth functioning of an ordered society depends in part on the possession by that society of a means of regularising its activities according to a calendar. This is as true of tiny, subsistence-level societies, such as the 400 or so Umeda people of Papua New Guinea (Gell 1992: 37-53), as it is of our own highly urbanised Western societies in London or New York or Sydney. Different interests – political, economic, religious, agricultural

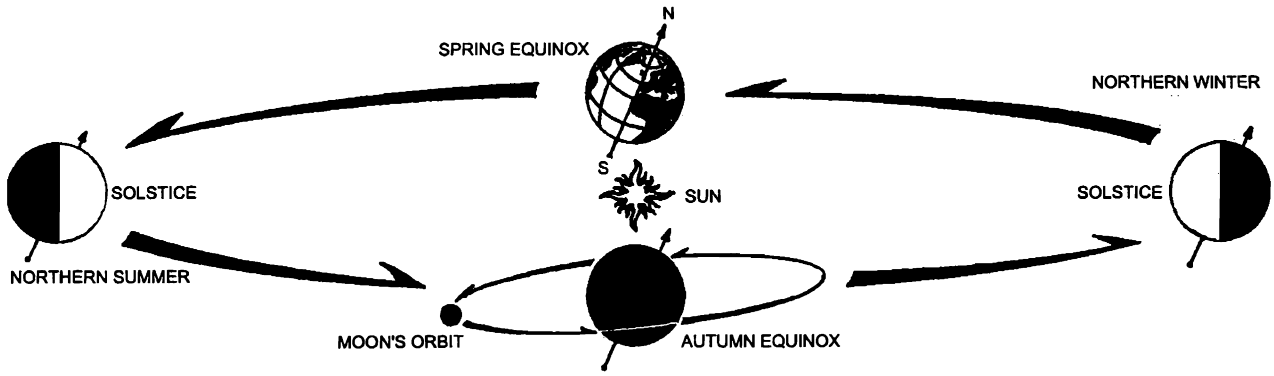

Figure 1. The annual orbit of the earth around the sun, and the monthly orbit of the moon around the earth.

– produce different ways of coordinating human activities and the natural passage of days and seasons.

The seasons, which in a temperate climate like that of Europe we call spring, summer, autumn (or fall), and winter, are a product of the annual orbit of the tilted earth circling around the sun once. The fixed tilt of the earth with respect to the sun means that as the earth orbits the sun, at one point the northern pole of the earth is closer to the sun and the southern is angled further away, while at a point opposite this one, the southern pole is angled closer to the sun and the northern is further away. These two points mark the seasons of summer and winter respectively for northern hemisphere inhabitants, and winter and summer respectively for those in the southern hemisphere. The points midway between in the orbit mark the seasons of spring and autumn (Figure 1).

In the course of this movement of the earth, we notice that day and night change in length. In midsummer the days are at their longest, while nights are shortest, as the earth, through its tilt, is exposed more fully to the sun. The opposite applies in midwinter. Midway between, day and night are practically equal in duration, and we call these points the equinoxes (from the Latin *aequinox*, 'equal night').

The summer and winter points of the orbit are called the solstices, from the Latin for 'sun' (*sol*) and 'to stand' (*sistere*). This term clearly has nothing to do with long days and short nights, or vice versa, and to understand it we need to view the earth's orbit around the sun from a different perspective, in fact, from our point of view here on earth.

Through the course of the seasons we see the sun apparently shifting north or south along the eastern or western horizons. If we are in the northern hemisphere, we observe the sun in midsummer rising and setting at its most northerly points on the horizon. As the season shifts to autumn and winter, the sun's rising or setting point on the horizon shifts also, moving further and further south, until in midwinter it reaches its most southerly point. Thereafter, the sun returns back along the track it has measured out on the horizon, through the midpoint between the two extreme turning points and back to the summer point. The two turning points of summer and winter are called the solstices because at these the sun appears to stand still for a few days before retracing its path back along the horizon in the ensuing days. The midpoint between the solstices does double service as the equinoctial points of spring and autumn.

Our own western calendar, the so-called Gregorian or reformed Julian, is a solar calendar, which uses the sun as the principal means of keeping our activities aligned with the seasons, although those activities are less season-specific the more industrial and the less agricultural our lives have become. Put very simply, the solar year on which this calendar depends measures the passage of time from one spring equinox to the next, and consists of 365.24219 mean solar days, or, to put it more approximately but also more usefully for day-to-day affairs, 365¼ days. To be of any use in the everyday world, a calendar must measure whole days, so the fact that the solar year consists of more than a whole number of days means that we have to find a way of allowing for the gradual addition of a quarter-day every year. So now we add one day every fourth ('leap') year to bring the calendar back into alignment with the sun – a fact which the Romans, the first users of this calendar, misunderstood after its introduction in 45 BC, as we shall see. The fact that the year is not exactly 365¼ days long, but rather 365.24219 days, means that further adjustments have been necessary with and since the Gregorian reform of 1582, to allow for the small differences between the practical and the precise formulations of the year which accumulate over long periods of time.

Because of the earth's daily rotation around its own axis, which creates the sense of sunrise and sunset during the day, we also gain the impression of star-rise and star-set during the night. The spin of the earth around its axis causes us to see the stars move from east to west, as they appear to rise and then set, in parallel semicircles above the horizon. These semicircles are really full circles, continuing under the horizon as the earth spins in full circles. The axis around which the stars seem to wheel is the axis of the earth extended out into space. These circles are smallest at the northern and southern poles of the extended axis, and largest at its midpoint, or equator, which is simply the extension of the earth's equator out into space too.

Stars close to the northern pole will not rise or set for observers closer to the equator, but will appear to circle perpetually around the pole. For these same observers, stars closer to the south celestial pole will not even rise above the horizon, but will always circle the pole invisible to northern viewers. Just which stars will always stay above the horizon, which will rise and set, and which will never be seen are a function of the particular latitude of the observer on earth, and can be readily calculated if that latitude is known. But experienced long distance travellers in antiquity would have gained a 'road sense' of when certain stars would dip permanently out of sight the further north they travelled, or which would appear anew from below the horizon as they travelled further south.

While no star clearly marks the south celestial pole at present, the north celestial pole is usefully indicated by Polaris in the constellation Ursa Minor (the Little Bear). But this will not always be the case in the future, nor has it always been the case in the past. Because of the effects of the sun and moon, the earth in its spin actually wobbles very slowly like a child's spinning-top. As a result, the earth's poles themselves execute a full circle every 25,800 years. This means that what we currently observe as a Pole Star will change over a long period of time: in about 12,000 years' time, or 12,000 years ago, the north celestial pole was close to the star Vega in the constellation Lyra, a star over 50° away across the sky from Polaris.

To the casual observer, the sun too appears to wheel daily in a circle parallel to the circles of the stars. But to anyone observing the sun over an extended period it becomes clear that it moves not only up and down the horizon but also gradually across the stars, tracing its own distinctive circle, which lies aslant to the unchanging paths of the stars. This separate solar track is a result of the earth's orbiting the sun through the year and of its doing so at a tilt to the sun. If the earth were not tilted towards the sun but were 'upright', then the circle traced out by the sun through the course of the year would also be parallel to the circles of the stars. But because the earth is tilted, the sun's apparent path cuts across the stars' circles at an angle.

We can map out this path if we look at the stars which follow the sun in the evening twilight and which precede the sun at dawn. These change over time through the year as the earth moves through its orbit, and they form a broad band which sweeps up, at an angle to the horizon, in a semicircle from east to west. The band continues under the horizon to form a full circle, which represents the apparent path of the sun across the backcloth of the stars through the year. This band is called the ecliptic, and the stars along its course have long been grouped into 12 constellations which are called the zodiac, a name which derives from a Greek word signifying the transformation of these stars into images of 'living creatures' of animal or human form (Figure 2). The names of these zodiacal figures as they have come down to us (Aries, Taurus, Gemini, etc.) are simply Latin translations of earlier Greek names (Krios, Tauros, Didymoi, etc.), which in their turn are translations of the Babylonian names for these groups of stars. The sun's apparent passage across each of these constellations may be used as a measure of the solar year, with each constellation marking out a rough twelfth of the year. The Greeks used this method of marking out the solar year, and the Romans borrowed it from them, recognising in the 12-part division a series of solar or zodiacal 'months'.

As a backdrop to the sun's movement through the year, the zodiacal stars form an artificial band which takes on a life of its own. These stars gain a special value commensurate with whatever value people put on the sun. In antiquity the sun was regarded as one of a special class of stars which were assumed to orbit the earth. These were the 'wandering stars', or planets (the word is derived from a Greek word signifying 'wanderer'). Like the sun, these planets have paths which are not only at variance with those of the other, 'fixed', stars, but which also happen to fall within the area of the zodiac. The Greeks and Romans (and, significantly, the Baby-

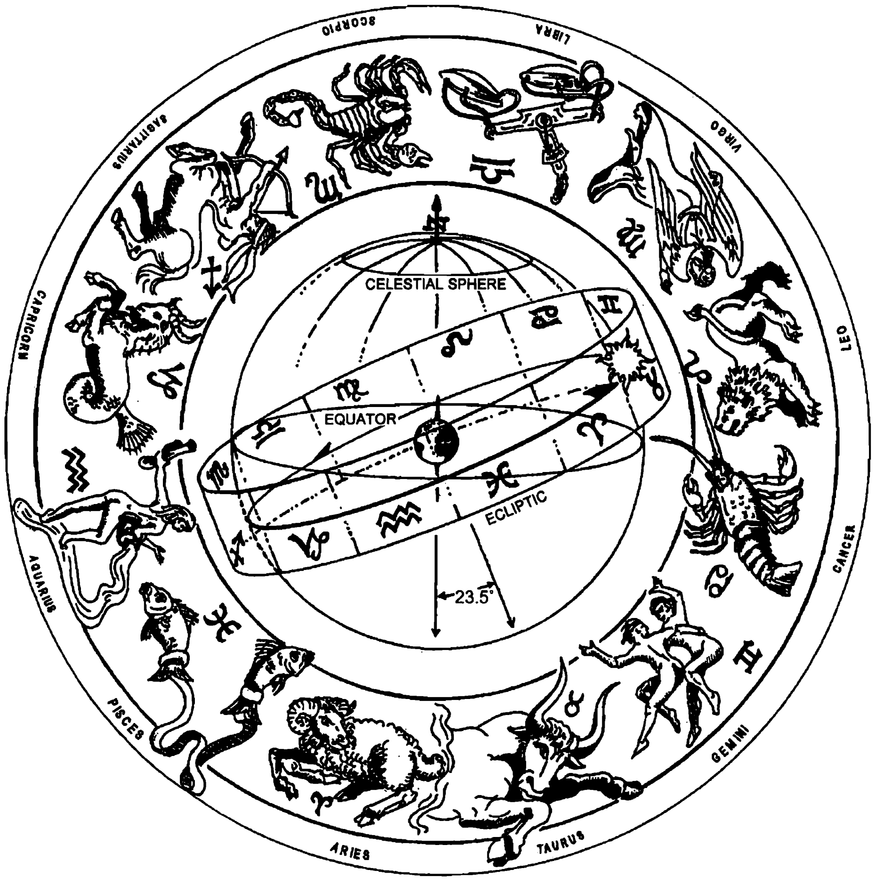

Figure 2. The zodiac. Constellations are represented in Classical fashion, as if seen from outside the celestial sphere.

lonians before them) numbered among the planets Saturn, Jupiter, Mars, the Sun, Venus, Mercury and the Moon (this is to give them their order from the furthest from the earth to the nearest to it, as the ancients saw the situation). The zodiacal constellations therefore gained even more in prestige as the apparent 'home' of the planets. Once the planets were seen as influencing human life on earth through their own special character, astrology was born.

Here it is worth recalling the earth's spinning-top 'wobble', which we briefly examined earlier. This effect is called lunisolar precession, or the precession of the equinoxes. The latter name reminds us that our view of all stars, not just those at the poles, is affected by this 'wobble'. The stars which presently mark the position of the sun at the spring equinox, for instance, have also changed over time. We see the effects of this shift most noticeably in the everyday world of newspaper and magazine astrology.

If we look up our horoscopes in the newspaper today, we look under our 'star sign', which is the zodiacal sign in which the sun was supposed to be placed at the moment of our birth. So a modern chart will tell someone born on 10 March that their sign is Pisces, on the assumption that the sun was in Pisces on that date. But on 10 March at present the sun is a whole sign, or 30°, away in Aquarius. These modern astrological charts are simply fossilised remnants of ancient Greek and Roman astrology, when the stars were seen from a different point in the earth's long 'wobble'. On 10 March in AD 150, for instance, it was true to say that the sun was in Pisces. We shall have cause to examine this world of astrology in more detail when it impinges on the Roman calendar.

Although effectively fixed with respect to their positions relative to each other, the stars which rise and set do so earlier each night by about four minutes as a result of the earth's daily shift along its orbit of the sun. At a certain time of the year (which is dependent upon the star's position in the sky and the observer's latitude on earth) a given star will rise at the same time as the sun and so be invisible because of the sun's light. Over the next few days the star will rise earlier and earlier than the sun until it first becomes visible just before sunrise, at the end of night. For a very bright star like Sirius this event occurs about an hour before sunrise; for fainter stars, it will be longer before sunrise. Over the ensuing weeks the star will rise progressively earlier and earlier back through the night, until eventually it rises at the start of night, just after sunset. How soon after sunset is again a function of the brightness of the star. Then the star will disappear into the sun's light at sunset. Thereafter, the star's rising will take place during daylight, in the evening, then in the afternoon and then during the morning through to sunrise, and so it will be invisible until the star reappears on the eastern horizon just before sunrise again. This sequence provides observers typically with two significant phenomena: a star's first visible morning rising (often termed its heliacal rising), and its last visible evening rising (called its acronychal rising). For instance, for Sirius, the brightest star in the sky, at the latitude of Athens, the heliacal rising currently takes place before dawn about 12 August, and its acronychal rising five months later after sunset on about 19 January.

A similar programme of phases can be gone through with regard to a star's setting with respect to the sun. In this case, a star will set in the west on a given day at sunrise, and so be invisible. Over the next few days the star will set progressively earlier than sunrise until it first becomes visible at the end of night, ahead of sunrise. Over the ensuing weeks the star will set earlier and earlier back through the night, until eventually it sets at the beginning of night, just after sunset. The star will then disappear into the light of the setting sun, and so on through daylight – evening, midday, dawn – and so will be invisible until the star reappears on the western horizon just before the glimmer of dawn. This sequence provides viewers with two further significant phenomena: a star's first visible morning setting (called its cosmical setting), and its last visible evening setting (termed its heliacal setting). Again if we observe Sirius at the latitude of Athens in the present day, the cosmical setting takes place before dawn around 12 December, while the heliacal setting follows five months later in the evening around 19 May.

The difference between a year measured by the stars and one measured by the sun is very small, and is a result of that slow shift of the stars called the precession of the equinoxes. We noted earlier that the solar year consists of 365.24219 mean solar days, which we tend to approximate to $365^1/_4$ days for practical purposes. This year, which is technically called the tropical year, measures the passage of the sun from one spring equinox to the next. A sidereal year, on the other hand, measures the passage of the sun across a point among the stars, and comprises 365.2564 mean solar days. Obviously this is also approximately $365^1/_4$ days, the difference between this year and the tropical year being only 20 minutes 23 seconds. Even over 100 years this difference builds up to barely a day and a half. For our purposes, then, we may treat the sidereal and tropical years as effectively the same, so that within a person's lifetime a calendar run by observations of the stars from one year to the next is equivalent to a solar calendar.

The last major celestial body which affects the ancient calendar is the moon, which we have already seen was regarded as one of the seven planets. In itself, though, it forms the basis of some of the principal units of time. Where the sun gives us the day, the zodiacal month and the solar or seasonal year, the moon gives us the lunar month and the lunar year.

The moon accomplishes its own orbit around the earth on average every 29.53059 days, or about once every $29^1/_2$ days (Figures 1 and 3). In that time it passes between the earth and the sun and becomes lost to sight as the 'new' moon. It reappears a day or two later, following the sun as it sets, and looks like a very fine crescent. Because it orbits the earth approximately once every $29^1/_2$ days, it shifts just over 12° across the sky every 24 hours. After about 14 days or so it has traversed about 180°, and so it then stands opposite the point at which it was formerly between the sun and the earth. Now being opposite both the earth and the sun, the moon is fully lit up by the sun on the face it turns towards the earth, and so it displays itself as a 'full' moon. Midway between these two positions it has presented its 'first quarter' phase, and midway between the full and the next new moon, it displays its 'last quarter' before disappearing again. This whole period constitutes a 'month'.

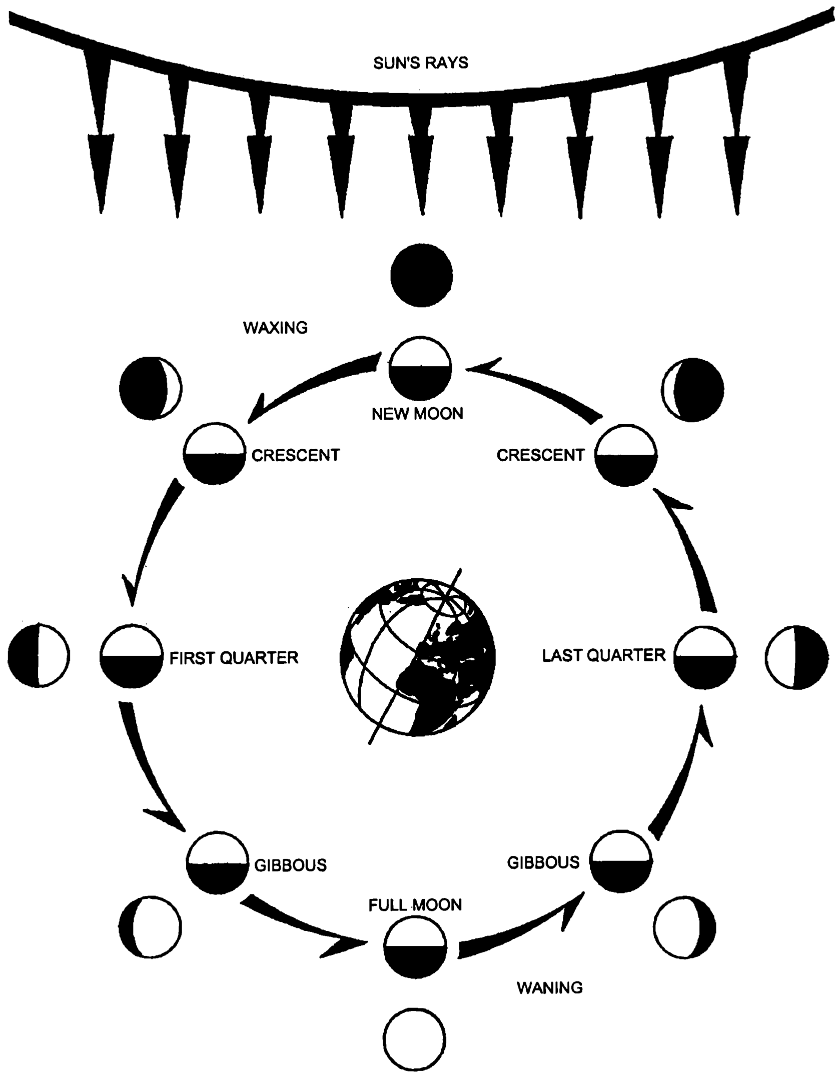

Figure 3. The phases of the moon as it orbits the earth.

The regularity of these phases, and, generally speaking, of the months themselves to casual observers, led to the use of the month as a fundamental unit of time for all ancient societies. Indeed, it is initially far more important than the solar year, which is too long as a single unit of measure for practical, everyday usage.

A lunar year is also established, usually comprising 12 such months, or

354 days on average. The trouble with such a year is that it does not sit at all well with the seasonal year, which is ruled by the sun and which comprises about $365^1/_4$ days. The effect of the difference is well illustrated nowadays by the vagaries of the Islamic religious calendar.

This calendar is a lunar calendar, using the moon as its basis. To allow for the fact that each lunar month is not a whole number of days, but instead about $29^1/_2$ days on average, the months of the Islamic year are usually made alternately of 29 days and 30 days. For some Muslims each month starts when the first sliver of the crescent moon is sighted, that is, a day or two after the actual new moon, which is invisible. If the new moon's crescent is not visible, the current month may be extended to 30 days, to be followed immediately by the next month regardless of the state of visibility. Over a 30-year cycle, an extra day is then added to the last month in years 2, 5, 7, 10, 13, 16, 18, 21, 24, 26 and 29, making these years lunar leap years, in order to bring the first day of the month back into correspondence with the date of the actual new moon.

Since 12 lunar months usually add up to only 354 days, they fall short of a seasonal/solar year by about 11 days. Because the Islamic calendar does not try to realign the two types of year, the effect of this discrepancy between them is that the Islamic religious year drifts through the seasons. The gradual nature of this shift, and its effect on every month, may be illustrated by the following selection:

Islamic months	**Gregorian dates**
Ramadan (30)	7 November – 6 December
Shawwal (29)	7 December – 4 January
Dhu'l-Qa'da (30)	5 January – 3 February
Dhu'l-Hijjah (29)	4 February – 4 March
Muharram (30)	5 March – 3 April
Safar (29)	4 April – 2 May
Rabi' I (30)	3 May – 1 June
Rabi' II (29)	2 June – 30 June
Jumada I (30)	1 July – 30 July
Jumada II (29)	31 July – 28 August
Rajab (30)	29 August – 27 September
Sha'ban (29)	28 September – 26 October
Ramadan (30)	27 October – 25 November
Shawwal (29)	26 November – 24 December
Dhu'l-Qa'da (30)	25 December – 13 January

The holy month of Ramadan, it can be seen, shifts too, and over a period of solar years it will run through each of the seasons, at one time occurring in winter, then progressively in autumn, summer and spring. Such a change is of relatively little consequence in the subtropical region in which Islam was born, but as the religion has moved into areas where summer days are much longer, the arduousness of the daytime fast of Ramadan has increased markedly.

The Islamic New Year, the first day of the month of Muharram, also necessarily drifts back through the solar year, at the rate of about 11 days a year, at one time occurring in winter, at another in summer (the following are the calculated dates published in advance of the actual occurrence):

1988	14 August	1998	28 April
1989	4 August	1999	17 April
1990	24 July	2000	6 April
1991	13 July	2001	26 March
1992	2 July	2002	15 March
1993	21 June	2003	5 March
1994	11 June	2004	22 February
1995	31 May	2005	10 February
1996	20 May	2006	31 January
1997	9 May	2007	20 January

In the western world, we still encounter the misalignment between the lunar and the solar years in the form of the Christian Lenten and Easter period. This period and festival are tied to the occurrence of the spring equinox – a solar event – and the first full moon after that – a lunar event. Easter therefore wanders through a determinable period of weeks over the years, and we naturally talk, for instance, of an 'early' or a 'late' Easter. Because of this, the whole period of Christian Lent, the 40 days preceding Easter Sunday, and a similar period after Easter wander up and down the calendar year. By contrast, other Christian festivals are tied to the solar calendar – most obviously, Christmas. This occupies the date, 25 December, which marked in the ancient Roman calendar the Birthday of the Sun around the winter solstice.

2

Early Greek Calendars

Bronze Age Greece

While writing existed in the Mycenaean Greek world of the late Bronze Age, in the form of a deciphered script called Linear B (to distinguish it from the earlier, still undeciphered Linear A script of Minoan Crete), it tells us little about the calendar systems of that prehistoric world.

The tablets from Knossos (*c.* 1370 BC) and Pylos (*c.* 1200 BC) list, respectively, up to eight and up to six month-names. These are usually attached to the word *me-no*, which is taken to be the Mycenaean Greek form of the later historical Greek word for 'month', *men*, a word which is itself related to *mene*, an early Greek word for 'moon'. This word suggests that the Mycenaean calendar was at least initially lunar or partly so. The month-names themselves appear to derive from gods' names or local place names. The partial lists from Knossos and Pylos suggest that each palace had a different set of names for the months, which is the practice in the later historical period for the city-states.

From Knossos a set of 11 tablets (in the Fp- series) provides us with the majority of the month-names from this palace. These tablets seem to form part of a ritual calendar, in which monthly offerings were recorded as being issued to various places, priests and divinities. Each tablet opens with the name of a month, followed by the offerings, as Tablet Fp1 demonstrates:

In the month of Deukios:	
To the Diktaian Zeus	12 litres of oil.
To Daidaleion:	24 litres of oil.
To *Pa-de-*:	12 litres of oil,
To all the gods:	36 litres of oil,
To the augur: ?	12 litres of oil.
Amnisos, to all the gods: ?	24 litres of oil,
To ?Erinys: ?	6 litres of oil.
To **47-da-*:	2 litres of oil,
To the priestess of the winds:	8 litres of oil.
(total)	136 litres of oil.

Knossos Fp1, trans. Ventris and Chadwick 1973: 306

The month-names preserved from Knossos are: *de-u-ki-jo-jo* (of Deukios); *wo-de-wi-jo* (and *wo-de-wi-jo-jo*, in the genitive); *ka-ra-e-ri-jo* (also in the genitive as *[ka]-ra-e-ri-jo-jo*; perhaps related to the month-name Klareon in historical Ephesos and Kolophon); *di-wi-jo-jo* (of Diwios; comparable to the historical month-name Dios found in Macedonia, Aitolia, Lesbos and elsewhere); *a-ma-ko-to*; *ra-pa-to* (i.e. Lapatos, a month-name which survived in third-century BC Arcadian Orchomenos); and possibly *pa-ja-ni-jo* and *e-me-si-jo-jo*.

At Pylos there are *pa-ki-ja-ni-jo-jo*; *di-pi-si-jo* (reminiscent of Thessalian Dipsios); *me-tu-wo-ne-wo*; *wa-na-se-wi-jo* and possibly *ki-ri-ti-jo-jo* and *po-ro-wi-to-jo*. It is tempting to wonder whether the month *ki-ri-ti-jo-jo* (of Krithios?) has something to do with barley (*krithe* in later Greek), but whether with its sowing or harvesting we cannot tell. The Pylian name *po-ro-wi-to-jo* is not qualified by *me-no* as a month, but it could be read as *plowi(s)toio* and has therefore sometimes been taken to be a month 'of sailing' or 'of navigation' (related to the later Greek *ploisdein*, to sail). If correct, this interpretation would suggest that this month belongs to the sailing season of summer, but obviously this is highly speculative. Otherwise, we do not know the order of the Mycenaean months in the year (Trümpy 1997: 2; Samuel 1972: 64).

The four month-names which may be reflected in later historical names – *di-wi-jo* for Macedonian Dios, *ra-pa-to* for Lapatos in Arcadian Orkhomenos, *di-pi-si-jo* for Thessalian Dipsios, and possibly *ka-ra-e-ri-jo* for Ephesian/Kolophonian Klareon – are all the hard material evidence that we have to suggest any continuity from the Bronze Age calendar to the calendars of Greece in the historical period.

Yet one theory has proposed that the Greek calendar ultimately is derived from Mesopotamia via Minoan Crete, thus bypassing even this material evidence from the intermediate Mycenaean Linear B. The theory is based on the apparent semesterisation of the historical Greek year around the equinoxes in certain facets of religious life, a practice which would seem to be parallel to, and derived from, earlier equinoctial ritual celebrations in the Babylonian months of Nisannu (at New Year) and Tashritu. The particular feature which was thought to connect Mesopotamian ritual with both Bronze Age Crete and historical Greece was the presence of a bull at the various rituals, while the allusion to a snake in some Greek cults was regarded as a further link back to Minoan Crete (Thomson 1972: 111-14).

As it stands, the theory of a Mesopotamian origin for the later Greek calendars remains unprovable. Linear B neither proves it nor disproves it. More recent archaeological work in Greece and Crete has tended to demonstrate an increasingly complex series of interconnections between the various areas of the eastern Mediterranean, particularly between Crete and Egypt, which were not foreseen when a Near Eastern origin for the calendar was promoted, and which may suggest that an Egyptian source of influence is at least as plausible, if outside influence there must be.

That Minoan Cretans may have used a sophisticated astronomy in various aspects of life – for instance, for orienting their palaces and other buildings towards the rising-points of the solstices and apparently even of the equinoxes as well as the moon and certain stars on the horizon – is currently being demonstrated. On this basis a native Minoan lunisolar calendar has recently been proposed, and its preservation into the historical period presumed (Henriksson and Blomberg 1996, 1997-8, Blomberg and Henriksson 2000, 2003).

The processes of continuity and discontinuity from the Bronze Age to the historical period, across the great divide of the so-called Greek Dark Age, are, however, much more complex than used to be thought, and it seems prudent to withhold acceptance of either an eastern origin or a native Cretan origin for the Greek calendar until more hard evidence is excavated.

Homer and Hesiod

The collapse of the Mycenaean Greek world between 1200 and 1100 BC was followed by a lengthy Dark Age, from which the Greek world did not emerge until the mid-eighth century BC. At that stage writing was reintroduced to Greece, but in a very different form from the Bronze Age syllabic script of Linear B. From Phoenicia in the east came the Semitic alphabetic script, which the Greeks adopted and developed into a variety of forms.

Linear B had been the language of accountants, from which an impression of contemporary social living conditions has to be reconstructed by archaeologists. The new alphabetic script may also have started life for the Greeks to express the language of commerce, though more of traders than of accountants as such. From a very early stage (*c.* 725 BC), however, writing was used to record poetry, and it soon became a means of preserving the originally oral epic poetry that had developed through the Dark Ages. This culminated in the works of Homer, the *Iliad* (*c.* 750 BC) and the *Odyssey* (*c.* 725 BC), narrative poems retailing events of the legendary Trojan War and its aftermath. A generation or so later (*c.* 700 BC) Hesiod produced epic poetry for different purposes – Creation myth, and Wisdom literature – which are more closely related to Near Eastern literary forms. Of special interest here is his *Works and Days*, in which the poet ostensibly teaches his brother how to farm. From this poem in particular it is possible to gain an idea of how the Greeks reckoned time.

Not surprisingly, given the themes of the *Iliad* and the *Odyssey*, Homer says very little explicitly regarding any form of calendar. His year incor-