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Minos Enneoros:

Archaeoastronomical light on the priestly role of the king in Crete

Abstract

The term *Minos Enneoros*, appearing for the first time in the *Odyssey* and explained in Plato's *Laws*, has been used to argue that the Minoans were ruled by a priest-king. It has also been argued that the priest-king had knowledge of astronomy and that the Minoans discovered the eight-year lunisolar cycle, the *oktaëteris*.

Discovery of the *oktaëteris* would have required a long tradition of systematic observations of the motions of the sun and the moon. Concrete evidence of such a tradition in Bronze Age Crete, however, has not been produced. Results of archaeoastronomical investigations of the peak sanctuary on Petsophas in eastern Crete, which indicate that the Minoans were conducting such observations in the Middle Bronze Age, are presented here.

It is proposed, furthermore: that the *Minos Enneoros* of the *Odyssey* refers, in the first place, to the Mycenaean king at Knossos, who had important priestly functions; that the Mycenaeans acquired the astronomical knowledge of their Minoan predecessors and took over as well some of the functions associated with it; that the Mycenaeans used these to establish religious and political continuity as part of their strategy for legitimising the new Mycenaean order in Crete.

In three seminal works Martin P. Nilsson demonstrated the survival of elements of Mycenaean civilization in later Hellenic culture.¹ His studies and the subsequent discovery that the language of the Mycenaeans was Greek stimulated further investigations of Bronze Age remnants in the historic period. The lack of clarity regarding the relationship between the Mycenaeans and the Minoans complicated this research. It is clear that the Mycenaeans were indebted to the Minoans for many ideas, but the extent to which they changed them for their own purposes is not yet clear. A symptom of the vague distinction between the two cultures was Sir Arthur Evans' choice of name for the person whom he designated as *priest-king*. Evans called him Minos, but he met him among the Mycenaean kings in Homer. For Evans at that time, however, *Mycenaean* meant no more than the "outgrowth" of Minoan culture on the Greek mainland.²

We would like to present here some results of the Uppsala archaeoastronomical investigations of the Minoan site on Petsophas,³ since they bear on the important problem of continuity and change in the ancient Greek world, and on the theme of this symposium. The investigations proceed from our hypotheses that the Minoans were using knowledge of the motions of the sun, moon and stars to navigate and to regulate their calendar. The latter hypothesis stems in part from the same passage in

Acknowledgements

This investigation is one of several planned for the interdisciplinary subproject *Greek astronomy in the Bronze Age*, which is part of the project *Cultural continuity and change in antiquity*. We would like to thank the members of the boards of the following foundations for making our research possible: the Axel & Margaret Ax:son Johnson Foundation, the Helge Ax:son Johnson Foundation, Humanistisk-Samhällsvetenskapliga forskningsrådet, the Gunvor & Josef Anér Foundation, and the Magn. Bergvall Foundation. We are also grateful to the Greek Archaeological Service and the British School at Athens for granting permission to study the site of Petsophas. We are especially indebted to T.G. Palaima who, with characteristic generosity, shared his knowledge of Mycenaean kingship. We would like to thank as well C. Davaras, and also N. Papadakis, present ephor of antiquities at Ayios Nikolaos, J.A. MacGillivray, director of the current excavations at Palaikastro, Robin Hägg and the staff at the Swedish Institute at Athens, all of whom were helpful in furthering our work. We are especially indebted to the members of the post-graduate seminar in Classical Archaeology and Ancient History at the University of Uppsala for their helpful comments and suggestions. We would also like to thank Lars Bägerfeldt and Petter Lindahl for their generous help with the production of our figures.

¹ MMR²; *The Mycenaean origins of Greek mythology* (Sather classical lectures, 8), Berkeley 1932; *Homer and Mycenae*, Philadelphia 1933.

² A.J. Evans, 'The Minoan and Mycenaean element in Hellenic life', *JHS* 32, 1912, *passim*.

³ Peter E. Blomberg, graduate student in the Department of Classical Archaeology and Ancient History, also participated in our investigations.

Homer which inspired Evans to take the name of Minos and give it to his priest-king.⁴ We will return to this passage below.

On the basis of our findings a case can be made for the discovery by the Minoans in the Middle Bronze Age of the *oktaëteris*, the eight-year cycle at the end of which the sun, the moon and the earth have very nearly the same relationship to each other as they had at the beginning of the cycle. For example, if the sun sets at a particular place and the moon is full, eight years later, when the sun sets at the same place, the moon will be full then also. This will not be the case again until another eight years have passed.

The significance of this eight-year cycle is that it makes practical the maintenance of a calendar such that the same lunar months will recur in the same seasons. The need for a calendar of this type stems from the religious requirement that monthly celebrations in honour of the deities occur in the proper seasons. If the Minoans discovered the *oktaëteris*, they are likely to have been motivated in their efforts by such a religious need. We know that to celebrate the gods at the proper time of the year was important to the Greeks. As Geminus explains, "When the years are reckoned exactly according to the sun, and the months and the days according to the moon, then the Greeks think that they sacrifice according to the custom of their fathers; that is, the same sacrifices to the gods are made at the same times of the year."⁵ The Greeks, in fact, were bound by laws to observe this custom.⁶ The attempt will be made to show that the method used by the Greeks to regulate their ritual calendar came originally from the Minoans and that it was conveyed via the Mycenaeans.

The traditional view is that the Greeks used the *oktaëteris* no earlier than the eighth century and that they probably got it from Babylonia.⁷ This view is based on the opinion that astronomical knowledge of the sophistication required to arrive at the cycle did not exist earlier in the Greek world.⁸ Such knowledge, moreover, would have required a long tradition of systematic observations, a tradition for which there has been no concrete evidence in the Aegean.

The basic problem in regulating a lunisolar calendar is that the motions of the sun and the moon are not commensurate. A lunar cycle consists of a little more than twenty-nine and a half days. There is no even multiple of such cycles in a solar year. Any choice of a specific number of months having a specific number of whole days to form a lunar year will inevitably have as result that any given date in this year will wander through the seasons. According to Geminus the traditional Greek

lunar year consisted of six months of 30 days and six months of 29 days, a total of 354 days, to the solar year's 365 $\frac{1}{4}$.⁹ The lunar year was thus 11 days shorter than the solar year. In three years' time, therefore, any date fixed according to the lunar year would have been more than a month behind the solar year, and in nine years it would have been a whole season behind. After 18 years the harvest festival, for example, would occur in the spring, if nothing were done about this. The sacred tradition of seasonal sacrifices required that some method be found to measure the years according to the sun and the months according to both the moon and the sun.

The solution would be to find a period of time which contains a whole number of days, months and years. Here we encounter an insurmountable problem: there is no such period, only approximations to it. The shortest interval suitable for practical use is that of eight years, the *oktaëteris*. After eight complete cycles of the sun, the moon has completed very nearly 99 full cycles. This is three months in excess of the number of months in eight Greek lunar years. Therefore three months would have had to be added to the calendar in the eight-year period. In order to keep the months as closely related to the seasons as possible throughout the eight years, the three additional months should be added at intervals as equal as possible.¹⁰

If the Minoans discovered the *oktaëteris*, this would have a number of important consequences for our appreciation of the extent to which the Mycenaeans and the later Greeks were culturally indebted to them. Of particular concern here is the tradition of the priest-king. According to the usual interpretation of the tradition the Minoan king was also the high priest and, as such, was responsible for maintaining good contact with the divine world so that the will of the gods and the correct forms of worship were known and thus could be observed. The king had this position because he was believed to be of divine descent. The view that a priest-king ruled the Mi-

⁴ A.J. Evans, 'The palace at Knossos. Provisional report for the year 1903', *BSA* 9, 1902–1903, 38. Evans supported his view of Minos as a priest-king by drawing parallels from Anatolia and Egypt (*PM* 1, 1–5).

⁵ Gem. 8.15 (ed. G. Aujac, Paris 1975, 50).

⁶ Gem. 8.7–9 (supra n. 5, 48).

⁷ M.P. Nilsson, *Primitive time-reckoning* (Skrifter utg. av Humanistiska Vetenskapssamfundet i Lund, 1), Lund 1920, 363–367.

⁸ Nilsson (supra n. 7), 363 and 367; D.R. Dicks, *Early Greek astronomy to Aristotle*, London 1970, 89f., 161.

⁹ Gem. 8.3–4 & 34 (supra n. 5, 47f., 53).

¹⁰ Gem. 8.27–33 (supra n. 5, 52f.).

noans was coupled from the beginning to the oktaëteris. It was based on the passage in the *Odyssey* where Penelope, before Odysseus has revealed himself to her, questions him about his lineage. Odysseus replies that he is the grandson of Minos Enneoros, he who ruled at Knossos, the one who talked with great Zeus.¹¹ The crucial word here is *enneoros*, literally nine-year. We are helped to its meaning in this context by the passage at the beginning of Plato's *Laws*, where the Athenian Stranger asks Klinias of Crete: "Do you not in fact, like Homer, say that Minos went regularly to communion with his father every ninth year and, in accordance with oracles from him, set up laws for your cities?"¹² It is clear from this passage that Plato understood Homer's *enneoros* to mean a period of time. We receive the additional information that Minos was believed to be the son of Zeus and to obtain from the god knowledge of benefit to his subjects. Minos and Zeus were said to meet regularly in a cave not far from Knossos.¹³ Diodoros and Strabo also knew of this tradition,¹⁴ but they could have it from Plato.

Evans' conception of the ruler at Knossos as a priest-king, having both sacerdotal and regnal responsibilities, was influenced by the passage in Homer and it was widely accepted.¹⁵ The epithet *enneoros* was interpreted as referring to a limited regnal mandate, with renewal dependant upon the satisfactory discharge of sacred duties. From Plato we gather that to give just laws was among these sacred duties. The reference to every ninth year in both Homer and Plato has led to the additional conclusions that the Minoan kings had astronomical knowledge and that the Minoans had discovered and used the eight-year lunisolar cycle.¹⁶ The cycle was referred to by the Greeks both as the oktaëteris and as the ennaëteris, depending on whether it was viewed as consisting of eight years or as beginning anew every ninth year, as we learn from Censorinus.¹⁷ Oktaëteris became the more usual term.

Thus the priest-king and the discovery of the oktaëteris have been attributed to Minoan Crete mainly on the basis of the passage in Homer. There are later Greek traditions connecting mainland kingship with a priestly function and with astronomical knowledge, but the claim for a Minoan origin, as far as we have been able to determine, has been based on the passage in Homer. No clear archaeological evidence for a Minoan priest-king has been found.¹⁸

There are, however, archaeological remains which indicate astronomical observations of such character by the Minoans that they could have discovered the oktaëteris. These are the walls of the small structure on Petsophas, the low mountain near the important Minoan town now known as Palaikastro. This is one of several sites which

we are studying and, although we think it likely that some of the others were used for the same purposes, our conclusions at this point apply only to Petsophas.

On the site is a small structure of unusual shape and it lies on a relatively flat plateau at a height of 255 meters

¹¹ *Od.* 19.178–180: "τῆσι δ' ἐνὶ Κνωσός, μεγάλη πόλις, ἔνθα τε Μίνως ἐννέωρος βασιλεὺς Διὸς μεγάλου ὀαριστής, πατὴρ ἐμοῖο πατῆρ". On this passage see J. Russo, *A commentary on Homer's Odyssey* III, Oxford 1992, 85.

¹² *Leg.* 1.624 A: "Μῶν οὖν καθ' Ὅμηρον λέγεις, ὡς τοῦ Μίνω φοιτῶντος πρὸς τὴν τοῦ πατρὸς ἐκάστοτε συνουσίαν δι' ἐνάτου ἔτους καὶ κατὰ τὰς παρ' ἐκείνου φήμας ταῖς πόλεσιν ὑμῖν θέντος τοῦς νόμους;".

¹³ *Leg.* 1.625 B.

¹⁴ *Diod.* 5.78; *Strab.* 10.4.8 & 16.2.38–39. On Minos Enneoros see also F. Tritsch, 'The judgment of Minos', *Πεπραγμένα τοῦ Γ' διεθνoῦς κρητολογικοῦ συνεδρίου Α' προϊστορικῶν καὶ αρχαίων χρόνων (Rethymnon, 18–23 September 1971)*, Athens 1973, 354–360; C. Björk & E.F. Bloedow, 'The Mallia pendant: a study in iconography and Minoan religion', *SMEA* 27, 1989, 35–49.

¹⁵ A.J. Evans, 'The palace of Knossos. Provisional report for the year 1903', *BSA* 9, 1902–1903, 38. See also E.L. Bennett, 'On the use and misuse of the term «priest-king» in Minoan studies', *CretChron* 15–16, 1961–62, 327–335.

Among those who have accepted: E.F. Bloedow, 'Evidence for an early date for the cult of Cretan Zeus', *Kernos* 4, 1991, 170; P. Faure, *La vie quotidienne en Crète au temps de Minos 1500 av. J.-C.*, Paris 1973, 266f., 326f.; K. Branigan, *The foundations of palatial Crete*, London 1970, 119f.; H. van Effenterre, 'Voies et places publiques au nord-ouest du palais de Mallia', *BCH* 87, 1963; R.F. Willetts, *Ancient Crete: a social history*, London 1965, 42f.; *idem*, *Cretan cults and festivals*, London 1962, 82–92; A. Furumark, 'Was there a sacral kingship in Minoan Crete?', in *La regalità sacra* (Contributi al tema dell' VIII congresso internazionale di storia delle religioni, Roma, Aprile 1955), Leiden 1959, 369f.; S. Marinatos, 'Διωγενες βασιλεὺς', in *Studies presented to David Moore Robinson*, St. Louis 1951, 129–134; M.P. Nilsson, *MMR*², 486. For arguments against see *infra* n. 18.

¹⁶ See for example Faure (*supra* n. 15); Bloedow (*supra* n. 15); G. Thomson, 'The Greek Calendar', *JHS* 63, 1943, 56f, 63–65.

¹⁷ Censorinus, *D.N.* 18.4.

¹⁸ On the relief fresco from Knossos with the so-called priest-king see W.-D. Niemeier, 'The "priest king" fresco from Knossos. A new reconstruction and interpretation', in *Problems in Greek prehistory* (Papers presented at the centenary conference of the British School of Archaeology at Athens, Manchester April 1986), eds. E.B. French & K.A. Wardle, Bristol 1988, 235–244; *idem*, 'Das Stuckrelief des «Prinzen mit der Federkrone» aus Knossos und minoische Götterdarstellungen', *AM* 102, 1987, 65–98. See also Robin Hägg, 'Pictorial programmes in Minoan palaces and villas?', in *L'iconographie minoenne* (BCH, suppl. 11), eds. P. Darcque & J.-C. Poursat, Athens 1985, 214; E.N. Davis, 'Art and politics in the Aegean: the missing ruler', in *The role of the ruler in the prehistoric Aegean* (= *Aegaeum* 11), ed. P. Rehak, Liège 1995, 11–20; H. Waterhouse, 'Priest-kings?', *BICS* 21, 1974, 153–155.

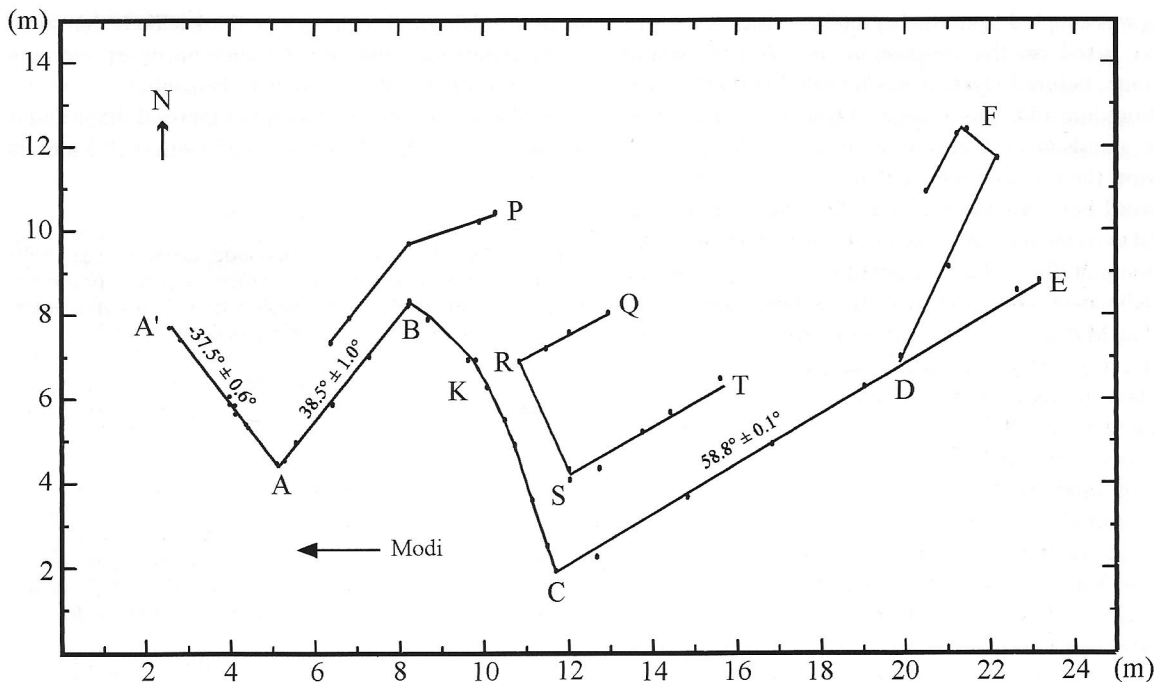


Fig. 1. Petsophas. Orientation of the walls.

(Fig. 1).¹⁹ It overlooks the sea in a wide arc from the northeast to the southeast. The Minoan town lay on the plain below to the north. To the west and south are mountains, but only two are prominent, Modi in the west and Simodi to the south, both with conical peaks. The ascent is not difficult from the east today and would have been easier had there been a frequented path. In such a case it

should have taken not more than three-quarters of an hour from the town. The building was in use apparently from the beginning of MM IB to the end of LM IA, that is, from ca. 1900 to 1600 B. C.²⁰ There are many such sites in Crete and they have been classified as peak sanctuaries because of their location on mountain tops and the nature of the finds.²¹

¹⁹ For the excavation reports see J.L. Myres, 'Excavations at Palaikastro, II. The sanctuary-site of Petsofa', *BSA* 9, 1902–1903, 356–387 (later in the same year C.T. Currelly continued with the excavation, but the results were considered not to contribute significantly to those of Myres and they were not published); C. Davaras, 'Πετσοφᾶς', *ArchDelt* 27, B:2 (Chronika), 1972, 652–654; *idem*, 'Πετσοφᾶς', *ArchDelt* 31, B:2 (Chronika), 1976, 380f. A monograph on Petsophas has recently appeared: B. Rutkowski, *Petsophas. A Cretan peak sanctuary* (Studies and monographs in Mediterranean archaeology and civilization, 1), Warsaw 1991.

²⁰ Myres (supra n. 19), 360f.; J.A. MacGillivray & Jan Driessen, 'Minoan settlement at Palaikastro', in *L'Habitat égéen préhistorique* (BCH, suppl. 19), eds. P. Darque & R. Treuil, Paris 1990, 401. Most peak sanctuaries are difficult to date closely because of the very simple character of the finds. Also there is variation in the absolute dates given for the different Minoan periods. For recent discussions see L.V. Watrous, 'Review of Aegean prehistory III: Crete from earliest prehistory through the protopalatial period', *AJA* 98, 1994, 697f. and 716 (table 1); W.-D. Niemeier, 'Knossos in the New Palace Period (MM III-LM IB)', in *Knos-*

sos. A labyrinth of history (Papers in honour of Sinclair Hood), eds. D. Evelyn et al., Oxford 1994, 71–74; O. Dickinson, *The Aegean in the Bronze Age*, Cambridge 1994, 17–21; S. Manning, *The absolute chronology of the Aegean Early Bronze Age*, Sheffield 1995.

²¹ For further bibliography and information on the Minoan peak sanctuaries see B. Rutkowski, 'Minoan peak sanctuaries', *Aegaeum* 2, 1988, 71–98; *idem*, *The cult places of the Aegean*², New Haven & London 1986, 11f., 73–98; A. Peatfield, 'The Atsipadhes Korakias peak sanctuary project', *Classics Ireland* 1, 1994 (electronic journal); *idem*, 'Rural ritual in Bronze Age Crete: the peak sanctuary at Atsipadhes', *CAJ* 2, 1992, 59–87; *idem*, 'Minoan peak sanctuaries: history and society', *OpAth* 18, 1990, 117–131; *idem*, 'Palace and peak: the political and religious relationship between palaces and peak sanctuaries', in *Sanctuaries and cults in the Aegean Bronze Age, Proceedings of the Fourth International Symposium at the Swedish Institute in Athens, 10–16 June, 1984 (ActaAth-4°)*, 35), eds. R. Hägg & N. Marinatos, Stockholm 1987, 89–93; *idem*, 'The topography of Minoan peak sanctuaries', *BSA* 78, 1983, 273–279.

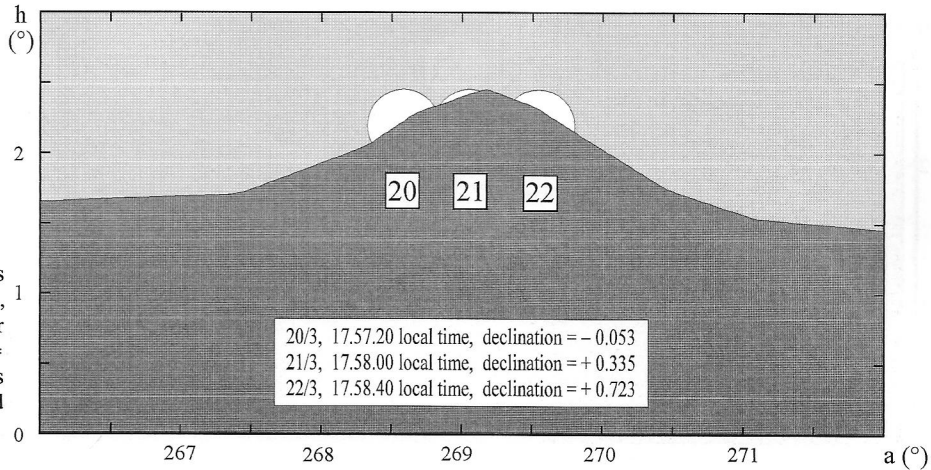


Fig. 2. Sunset behind Modi as observed from Petsophas 20, 21, and 22 March in the year 1998 B. C. (refraction for $t = + 10\text{ }^{\circ}\text{C}$). The relationship is valid for several hundred years.

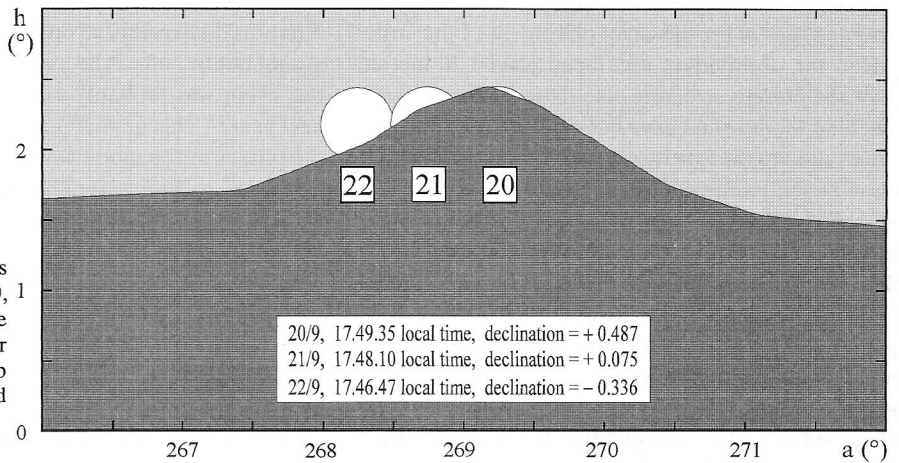


Fig. 3. Sunset behind Modi as observed from Petsophas 20, 21, and 22 September in the year 1998 B. C. (refraction for $t = + 10\text{ }^{\circ}\text{C}$). The relationship is valid for several hundred years.

The area QRST (Fig. 1) has walls remaining on three sides and there was a bench along the northern and western sides, possibly along the southern side also. The discovery of a floor of plaster suggested a room to the excavator, but the existence of ashes in the whole area, also under the floor, may speak against a covered space. The wall CE was built before the ash layer under the floor was sealed in.²² There are no remains of a wall which would complete the room in the east, but the structure is much destroyed in that area.

Of special interest here are the two alignments on Petsophas relevant to the motions of the sun. The long axis of the room-like area QRST is oriented so that the first rays of the rising sun would completely illuminate the western wall RS only at the summer solstice, had there been no impediment in the east.²³

Looking to the west we find that Petsophas is an excel-

lent place for easily determining the time of the spring and fall equinoxes. These could be determined from Petsophas by observing the sun set at these times near the top of the mountain Modi which lies nearly seven kilometers almost, but not quite, due west of Petsophas and is the only distinguishing feature on the horizon in this direction (Figs. 2 and 3). The equinoxes are directly determined from Petsophas because of the altitude, direction and shape of Modi. In addition the first crescent moon and the full moon are also observed sometimes to set behind Modi at the equinoxes (Fig. 4). We have here an additional argument that Petsophas was a carefully chosen site for the purpose of astronomical observations.

²² Myres (supra n. 19), 358.

²³ According to Myres (supra n. 19), 357, the wall DF is later than the walls BC and CE.

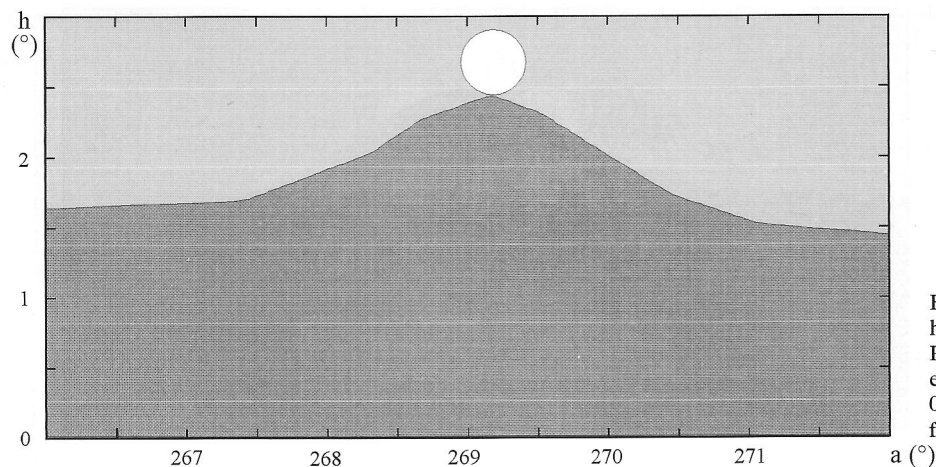


Fig. 4. Full moon setting behind Modi as observed from Petsophas at the autumn equinox (21/9) 2121 B.C., 05.13.45 local time (refraction for $t = +10^\circ\text{C}$).

The observations of the sun behind Modi seem to be the determining reason for the exact placement of the structure. Had the observation area been placed 30 meters south of the present structure, the dates of the observations behind Modi would have been different by one day. The sheer drop to the north prevents construction in that direction beyond a few meters. The observations of the moon, stars and the summer solstice are not dependent on the present placement of the building. The astronomical observations possible from Petsophas thus make it unlikely that the location of the site and the construction of the particular system of walls can have been due to any other reason than the observations of the sun, especially as there is nothing in the nature of the terrain to influence the choice of site, the plateau being large and having a gentle slope.

Of special significance for the maintenance of a calendar is the discovery that the walls A'A and AB were oriented to one of the four positions of Arcturus at the horizon (Table 1, the values are optimal for the year 1858

± 80 years).²⁴ The orientation of wall AB towards Arcturus' heliacal rising on the 23 of August, exactly one moon month before the autumn equinox, indicates that this event was probably used to signal the approaching new year.²⁵ This annual position of Arcturus relative to the phases of the moon would also have indicated when it was time to intercalate a month. The fact that the cosmical setting of Arcturus occurred in the early part of May

²⁴ The *apparent* positions are meant. On this see M.L. West, *Hesiod. Works and days*, Oxford 1978, 379f. The dates for the risings and settings of Arcturus would have been quite different in Hesiod's day as the result of precession. On this see Dicks (supra n. 8), 15f.

²⁵ M. Guarducci, 'Note sul calendario cretese', *Epigraphica* 7, 1945, 79, suggested that in the historical period the year at Knossos may have begun with the autumnal equinox. This would probably have been at the first visibility of the new moon following the autumn equinox; see also A.E. Samuel, *Greek and Roman chronology* (Handbuch der Altertumswissenschaft, 1, 7), München 1972, 17, 134–136.

Table 1. Summary of the measured azimuths and mean errors for the orientations on Petsophas (latitude 35.12°).

	Azimuth	Mean Error	No.	Comments
A'A	322.5° (-37.5°)	$\pm 0.6^\circ$	10	Arcturus' cosmical setting May 10–11, optimal for 1856 B. C. ± 63 years
AB	38.5°	$\pm 1.0^\circ$	6	Arcturus' heliacal rising August 23, optimal for 1860 B. C. ± 107 years
CE	58.8°	$\pm 0.1^\circ$	8	sunrise at the summer solstice ca 2000 B. C., valid for several hundred years
to Modi	269.2° (-90.8°)	$\pm 0.01^\circ$		sunset at the vernal and autumnal equinoxes ca 2000 B. C., valid for several hundred years

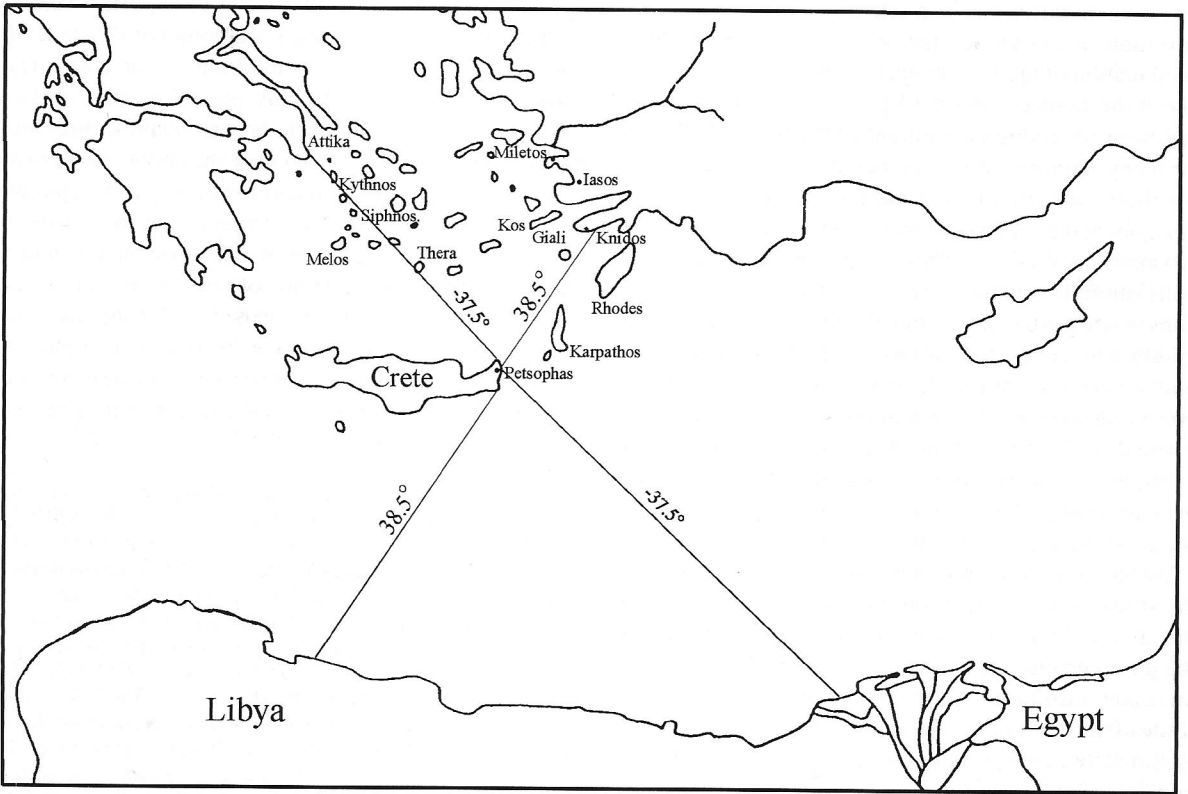


Fig. 5. Sailing routes in the same directions as the orientations of the walls A'A and AB on Petsophas.

could have been used to signal the beginning of the sailing season. These orientations towards Arcturus may indicate that the Greek and Roman interest in the horizon positions of this star stems from the Minoans.²⁶

The observations of the sun in relation to the peak of Modi as observed from Petsophas and the orientation of the wall AB towards the heliacal rising of Arcturus would have made this site especially well suited for the observations necessary for the maintenance of a lunisolar calendar. A full report of the archaeoastronomical results has been submitted for publication elsewhere.²⁷

The walls A'A and AB are also aligned nearly symmetrically with respect to true north (Table 1), and the angle which they form encloses the circumpolar stars and a number of bright constellations and stars—for example Cassiopeia, Vega and Arcturus—which rose and set in these directions in the Middle Bronze Age during the sailing season. The constellations are those of prime interest from the point of view of the sources for the raw materials which were reaching Crete at the time and the areas with which the Minoans were in close contact. Steering a boat with the help of these particular constellations and stars

during the night would have made it possible to sail over the open sea to Thera, Melos, Kythnos, Siphnos, and Attika in the northerly direction of A'A, to the Nile Delta in the southerly direction, to Karpathos and Rhodes in the northerly direction of AB, and to Libya in its southerly direction (Fig. 5).

Practical use of the celestial bodies, as for the *oktaëteris*, is the result of either a long local tradition of ob-

²⁶ Cf. Hesiod, *Op.* 566ff., 610, 619 and 663. See West (supra n. 24), 325, commentary to lines 678ff., 377–381. See also L. Casson, *Ships and seamanship in the ancient world*, Princeton 1971, 270–273. On the appropriate season for sailing from Crete today see C. Lambrou-Phillipson, 'Seafaring in the Bronze Age Mediterranean: the parameters involved in maritime travel', in *Thalassa. L'Égée préhistorique et la mer* (Actes de la troisième rencontre égéenne internationale de l'Université de Liège, Station de recherches sous-marines et océanographiques (StaReCo), Calvi, Corse, 23–25 avril 1990), eds. R. Laffineur & L. Basch (= *Aegaeum* 7), Liège 1991, 12–20.

²⁷ G. Henriksson & M. Blomberg, 'Evidence for astronomical observations from the Minoan peak sanctuaries Petsophas and Traostalos', submitted to *OpAth.*

servation, notation and instruction at suitable sites or importation of the knowledge or, perhaps more likely, a combination of the two. In view of the early contacts between the Minoans and the Egyptians, who at the time had been observing the motions of the heavenly bodies for many centuries, it may be possible that the Minoans got their start from their southern neighbours. In any case, our results show that they conducted their own observations at sites carefully chosen, and with systems of walls carefully oriented, for the purpose. Such observations would have made it possible for the Minoans of the Middle Bronze Age to have discovered the oktaëteris and similar cycles. Although the nineteen-year cycle is more exact, and quite possibly was also known to the Minoans, it would not have been as practical for a regnal period, for example. The oktaëteris in combination with simple rules of thumb would have served very well for regulating a ritual calendar of the type used by the Greeks.²⁸

We have now to show that the knowledge derived from the study of the heavens and the duties connected with the application of this knowledge were such as to justify the development of a powerful religio-political office for their administration. Although we can assume that the study of the celestial bodies at this time was considered a sacred activity, since we know that it was so in Mesopotamia and Egypt, there are finds from Petsophas which indicate that this was the case also in Crete. These include fragments with inscriptions from small stone vessels and a group of terracotta figurines. Eleven of the forty such inscriptions which have been found in Crete appear to come from Petsophas and another was found at the mouth of a cave on the slope below the sanctuary to the north.²⁹ These twelve are all of the inscriptions on stone vessels found in the Palaikastro area. The great majority of the others were also found at peak sanctuaries. Proceeding from the hypothesis that the same signs of the Linear A and B syllabaries signify the same sounds, Furumark argued that the names of the following three goddesses appeared in these inscriptions: Atana, Asasara/Jasasara and Nopina. It was later found that the Minoan language seems not to have had the syllable *no* and the third word is now assumed to begin with an *i* sound.³⁰ Also it ends either with the syllable *ma* (five instances) or the syllables *mi-na* (two instances). Furumark's theory as to the three goddesses has been challenged, however. The goddess Asasara/Jasasara has been accepted by several scholars, but not Ipinama/Ipinamina (discussion below).³¹ As for *a-ta-na*, the occurrence of this particular sequence of syllables to form a word does not seem to exist.³²

There are seven Linear A inscriptions with the signs for

i-pi-na-ma/i-pi-na-mi-na. One (Za 10) definitely comes from Petsophas, another (Za 8) was found on the slope of the mountain, and of the third from the area (Za 11) Davaras says that it is "highly probable" that it also comes from Petsophas.³³ Included among these three are both of the inscriptions which have the ending *mi-na* (Za 10 and 11). Furumark interpreted *mi-na* as an epithet meaning moon. If this were correct, then there would have been a Minoan goddess closely associated with the moon.³⁴ The interpretation of *mi-na* as moon is strengthened, it seems to us, by the fact that the signs for *mi* and *na* (AB 73 (*mi*) and AB 06 (*na*)) both are replaced in two occurrences of the same word from Agia Triada with the single sign AB 34, which seems to be a repre-

²⁸ For an example of such a rule see H. Hunger & E. Reiner, 'A scheme for intercalary months from Babylonia', *WZKM* 67, 1975, 21f. E.J. Bickerman, *Chronology of the ancient world*, Ithaca 1968, 30, gives sources for the use of the oktaëteris by the Greeks until as late as the middle of the third century AD.

²⁹ The Za series (*GORILA* 5, 127) with the following additions: IO Za 14 & 15 (A. Karetsou, 'Δύο νέες επιγραφές γραμμικής γραφής Α από το ιερό κορυφής Γιούχτα', in *ΕΙΛΑΠΙΝΗ. Festschrift N. Platon*, Heraklion 1987, 85–91), PK ZA 20 (J. Driessen, 'A fragmentary Linear A inscription from Petsophas, Palaikastro (PK ZA 20)', *Kadmos* 33, 1994, 149–152), SY Za 4 (W.C. Brice, 'Epigraphische Mitteilungen, Linear A', *Kadmos* 28, 1989, 177, also in *Ergon* 1987, 129–133). We are very grateful to Thomas Palaima for information on the latest finds.

For the inscriptions from Petsophas see also *GORILA* 4, 22–44; *PM* 1, 631f. (PK Za 4); C. Davaras, 'Two new linear A inscriptions on libation vessels from Petsophas', *Kadmos* 11, 1972, 101–112 (Agiou Nikolaos Museum nos. PK Za 14 & 15); *idem*, 'Three new linear A libation vessel fragments from Petsophas', *Kadmos* 20, 1981, 1–6 (PK Za16–18).

³⁰ A. Furumark, 'Linear A and Minoan religion', *OpAth* 17, 1988, 59–67; see also *idem*, *Linear A und die altkretische Sprache*, Berlin 1956, 25, 28f., fig. 21; *idem*, 'Gods of ancient Crete', *OpAth* 6, 1965, 97; *idem*, 'The Linear A tablets from Hagia Triada. Structure and function', *OpRom* 11, 1976, 1–21. Jasasara had been proposed earlier by Evans (*supra* n. 4), 631 and C.D. Ktistopoulos, *A contribution to the problem of the Minoan script*, 1954, 13.

On the validity of applying the phonetic values of Linear B to Linear A see Y. Duhoux, 'Le Linéaire A: problèmes de déchiffrement', in *Problèmes in decipherment* (Bibliothèque des cahiers de l'Institut de Linguistique de Louvain, 49), Louvain-la-Neuve 1989, 65–76 and J. Raison, 'Linear A: changing perspectives', in *Etudes Minoennes I*, 1978 (Bibliothèque des cahiers de l'Institut de Linguistique de Louvain, 14), 37f.

³¹ E. g., Duhoux (*supra* n. 30), 89.

³² AB 08–59–06 (*GORILA* 5, 162f.).

³³ Davaras (*supra* n. 29), 1972, 102; Furumark 1988 (*supra* n. 30), 58f.

³⁴ Furumark 1988 (*supra* n. 30), 63, 66f. For the interpretation of the Linear B *me-na* as the name of a goddess on Crete see *DMic* 1, 434, s.v. *me-na*; also R. Palmer, *Wine in the Mycenaean palace economy* (= *Aegaeum* 10), Liège & Austin 1994, 125–128.

sentation of the moon.³⁵ These four words all occur in the first line of their respective tablets.

Another point in favour of the argument is the fact that *me-na* in Linear B texts from Knossos has been taken as the name of a moon goddess.³⁶ To anticipate our main argument, this could mean that the Mycenaean continued the cult of this goddess in a similar spirit to their adoption of aspects of the role of the Minoan rulers. Such a course of action would also have served to strengthen their claim to rule at Knossos (see below). At this point in our knowledge of Linear A, in our opinion, it seems plausible that *i-pi-na-mali-pi-na-mi-na* refers to a Minoan goddess associated in some way with the moon.

A problem here is that the interpretation of *mi-na* as *moon* would indicate that the Minoan language belonged to the Indo-European family. Although several scholars have maintained it, there is no consensus on this point.³⁷ Were the Minoan language Indo-European, this language family would have to be as old in the Mediterranean area as the presence of the Minoans on Crete, which dates to the seventh millennium B.C.³⁸ We have no evidence of a widespread change of people or culture on the island from the time of its first settlement until the end of Late Minoan I. There is, to be sure, evidence of foreign contact and exchange from the Final Neolithic period, which began in the first half of the fourth millennium B.C., and possible later migrations to the island, but none of these seems to have been of such a magnitude as would have resulted in a change of language.³⁹ Most scholars have placed the arrival of Indo-European speakers in the Aegean area after *ca.* 2000 B.C.⁴⁰ Renfrew, however, has presented an attractive and plausible theory according to which the earliest farmers in Greece and Anatolia were Indo-European speakers.⁴¹ If this were the case, the most serious objection to the hypothesis that the Minoan language was Indo-European would no longer exist.

On the negative side, recent interpreters of the meaning of the texts on the small stone vessels do not propose *i-pi-na-mali-pi-na-mi-na* as referring to a goddess. The suggestions made, however, are disparate, mutually exclusive and, at this point, still very hypothetical. For example Duhoux, who suggests a verbal phrase, excluded the possibility of more than one deity in the texts at the beginning of his discussion. He accepts *a-sa-sa-ral/ja-sa-sa-ra* as the name of the deity. For Finkelberg *i-pi-na-mali-pi-na-mi-na* is a substantive in the accusative case, as is *a-sa-sa-ral/ja-sa-sa-ra*, but she considers neither of them to refer to a divinity.⁴² On the basis of her analysis, however, it seems that if *a-sa-sa-ral/ja-sa-sa-ra* is a proper name then *i-pi-na-ma* could be the same.⁴³

Some of the figurines found at the sanctuary may support the hypothesis that there was a Minoan goddess associated in some way with the moon. Among the many female forms, one type has a curious disc-shaped head (Fig. 6). As these figurines are turned, the form of the disc changes and, in doing so, suggests the different phases of the moon. The occurrence of considerable numbers of this type of figurine, in combination with the inscriptions found on or near Petsophas, lead us to suggest that we have here representations of a Minoan goddess associated with the moon and called Ipinamina, as she would appear behind the conical peak of Modi in her different phases, and that offerings were made to her on Petsophas.⁴⁴ If the Minoans believed in the divinity of the heavenly bodies,⁴⁵ this would not only have been a stimulus to astronomical observations but would also have imparted to such activity deep religious significance.

Once observation of the celestial bodies is under way,

³⁵ GORILA 5, 188f.; GORILA 4, 30–35 (Za 10–11). AB 34 (HT 15.1 and 140.1; compare HT 28b.1–2 and HT 117a.1–2).

³⁶ L.R. Palmer, 'Mycenaean religion. Methodological choices', in *Res Mycenaee. Akten des VII. internationalen mykenologischen Colloquiums in Nürnberg vom 6.–10. April, 1981*, eds. A. Heubeck & G. Neumann, Göttingen 1983, 339; M. Ventris & J. Chadwick, *Documents in Mycenaean Greek*, 2nd ed., Cambridge 1973; DMic 1, 434, s.v. *me-na*.

³⁷ E.g., M. Finkelberg, 'Minoan inscriptions on libation vessels', *Minos* 25–26, 1990–1991, 76; L.R. Palmer, *Mycenaean and Minoans. Aegean prehistory in the light of the Linear B tablets*², London 1965, 327–342. But see Duhoux (supra n. 30), 99f.

³⁸ J.D. Evans, 'The early millennia: continuity and change in a farming settlement', in *Knossos: a labyrinth of history* (Papers presented in honour of Sinclair Hood), eds. D. Evely et al., Athens 1994, 1.

³⁹ Watrous (supra n. 20), 701–704; Dickinson (supra n. 20), 32f., 211f., 239; P. M. Warren, 'Crete, 3000–1400 B. C.: immigration and the archaeological evidence', in *Bronze age migrations in the Aegean*, eds. R. A. Crossland & A. Birchall, London 1973, 41–49.

⁴⁰ See for example R. Drews, *The coming of the Greeks*, Princeton 1988.

⁴¹ C. Renfrew, *Archaeology and language*, London 1987, *passim*. Also Palmer (supra n. 37) and the relevant articles in *Antiquity* 62, 1988.

⁴² Duhoux (supra n. 30), 84. Finkelberg (supra n. 37), 53–57, 63–65.

⁴³ For the theory that *Jasasara/Asasara* is the name of a goddess see Evans (supra n. 4), 631; Ktistopoulos (supra n. 30); Palmer (supra n. 37), 327–332. Against, Pope, BICS 8, 1961, 29–31.

⁴⁴ This argument, if correct, would provide support for the hypothesis that the Minoan language is an Indo-European one.

⁴⁵ L. Goodison has argued for the Minoan belief in the divinity of the sun in her book *Death, women and the sun* (BICS, Supplement 53), London 1989.

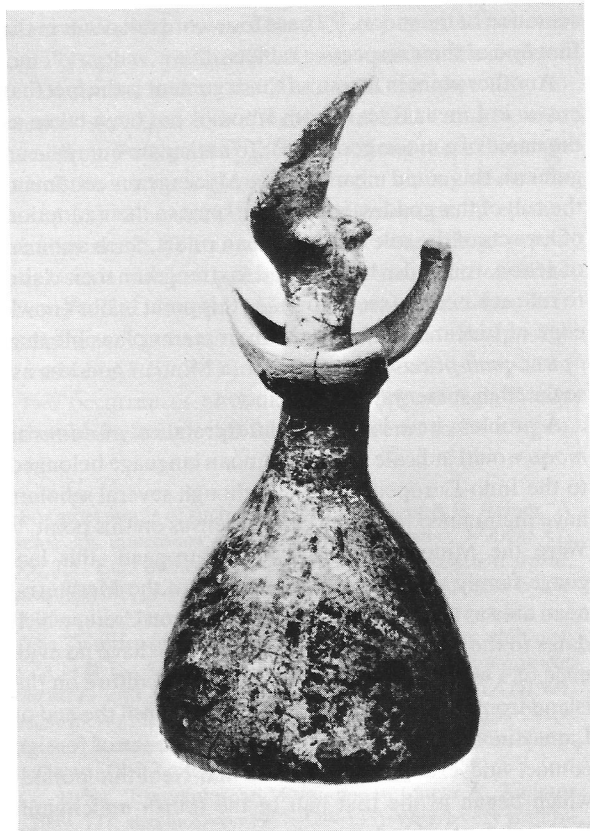
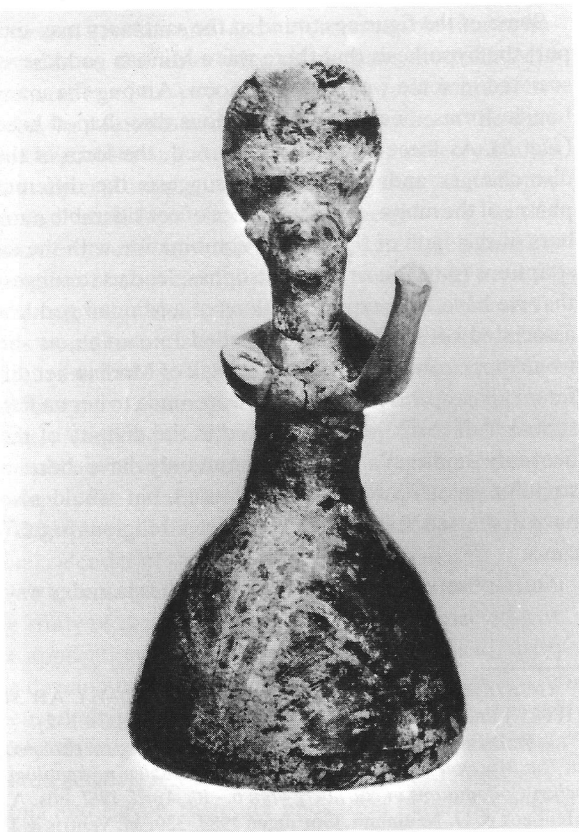


Fig. 6. Figurine from Petsophas. Archaeological Museum, Heraklion, inv. no. 3431 (photos courtesy of the museum).

the gradual comprehension of the laws which determine their motions is inevitable, provided there are no cultural hindrances to the process. The understanding of these laws would result in the ability to predict the motions of the celestial bodies and to employ this knowledge in valuable practical ways. Its use to construct a calendar that could be used to determine the correct times for religious celebrations would have increased the natural inclination to consider such knowledge as sacred. The belief in the divinity of heavenly bodies and the sanctity of the knowledge concerning them would have endowed those in possession of this knowledge with great prestige and power. It would almost certainly have been restricted to a small circle of the powerful, as it was in Mesopotamia and Egypt. In the hands of such an elite, knowledge of astronomy would have been a powerful tool for promoting religious and political policies. The understanding of the motions of the heavenly bodies, for example, would have sanctioned the policies of a priest-king as coming from one enjoying the confidence of the gods who revealed to him the divine laws of the heavens.

A difficulty here, as we have seen, is that the archaeological remains from Minoan Crete do not present us with a priest-king. This material has been examined and interpreted in many studies. The results in no case demonstrate the existence of a single powerful ruler at any of the Minoan centers. There is no clear ruler iconography, as we find in contemporary Egypt and Mesopotamia.⁴⁶ There are many depictions of humans in different media, but none can be clearly identified as a king or a priest-king. Depictions of men in ceremonial dress carrying different objects come closest, however, these have been interpreted as priest-kings, priests and gods.⁴⁷ There may have been one Minoan leader responsible for the ritual calendar and bearing the title Minos Enneoros, but we can not be certain of this on the available evidence.

⁴⁶ Supra n. 18.

⁴⁷ A.J. Evans, *PM* IV, 397–419; C.R. Long, *The Ayia Triadha sarcophagus* (SIMA, 41), Göteborg 1974, 31; N. Marinatos, *Minoan religion*, Columbia 1993, 127–133; P. Rehak, 'The Aegean "priest" on CMS I.223', *Kadmos* 33, 1994, 76–84.

The palaces and their furnishings are witness to the existence of powerful regional rulers, but they say very little as to the nature of their rule or of their number. We can only surmise that there seem to have been well-functioning forms of leadership and that social distinctions existed throughout the island by the Middle Minoan Period, probably earlier. These distinctions, however, do not seem to have been great enough to justify the conclusion that there was a powerful ruling nobility with a king at the top.⁴⁸

From the information contained in the Linear B documents, the Mycenaean form of leadership is clearer than what we can surmise of its Minoan counterpart. The information contained in these documents evoke a social and political order with just such concentration of power in one person, the Mycenaean wanax.⁴⁹ We proceed on the assumption that Knossos came under the rule of the Mycenaean in the latter part of the Late Minoan Period. Recent interpretations of the role of the wanax see him very much as the priest-king so elusive among the Minoans. Three papers delivered at the recent conference on Aegean kingship conclude that Mycenaean kings had a religious function and that it was derived from the Minoan form of leadership. The religious function, in fact, is considered to have been of primary importance for the Mycenaean king.⁵⁰ The results of our investigations lend support to these interpretations and provide some specific content to the proposed Mycenaean priest-king role, that of astronomical knowledge which was exploited for religious and political purposes.

The following course of events are conjectured as contributing to the development of the priestly function of the Mycenaean king. As newcomers to power at Knossos the Mycenaean would have been quick to adopt for their own purposes any formalised relationship of the Minoan leaders to the divine world, such as investiture as priests. They are also likely to have continued any popular cults at Knossos, e.g. that of the moon goddess—Mena in their own language—for whom there is evidence of cult on the Linear B tablets.⁵¹ Such a line of action would have been very helpful in making their exercise of power palatable to their new subjects. Adjustments would have been made to suit their own form of power structure—that of a single powerful ruler. The result at Knossos would have been one ruler, a priest-king, possessing both religious and secular authority.

Contact between the Mycenaean and the culturally more sophisticated Minoans began early in the Late Helladic period, but we know too little of their relationship and of the character of Mycenaean society at the time to draw conclusions as to possible prior stages in the devel-

opment of a Mycenaean priest-king under Minoan influence.

If we turn our attention again to the Linear B documents, we find further evidence of astronomical knowledge being used by the Mycenaean. There we come upon traces of a Mycenaean calendar very similar to the one used throughout later Greece. Ten of the eleven tablets of the Fp-series and several fragments from tablets of other series from Knossos are introduced by the name of a month, and the contents concern offerings sent to a number of gods. One of the months bears the name of a god, just as some of the later Greek months, Dios in this case. Two of the names recur in the later calendars, Lapato in Arkadia and Dios in Aitolia and Lesbos. There is evidence on tablets with month names from Pylos that they refer to seasonal festivals, for example in the sailing month (Tn 316), the period of the festival of new wine (Fr 1202), the month of *spagianes* (Fr 1224).⁵² It has been concluded by several specialists in the field that these tablets indicate the existence of a ritual calendar.⁵³ If this is the case, then the Mycenaean would have needed a system like the *oktaëteris* to keep their months in the proper seasons, like the Greeks after them and, as is proposed here, the Minoans before them. The understanding and use of astronomy to regulate such a calendar is likely to have guaranteed the prestige and status of those who had this duty.

We have read in Geminus that the Greeks had need of such a system. And we know from their names for the months—for these are overwhelmingly the same as one of the religious festivals celebrated in them—that they had a festival calendar with proper times for the celebra-

⁴⁸ Robin Hägg's suggestion of a collective of priests or religious officials could apply also to the secular leaders, if they had formed a separate group (supra n. 18), 214–216.

⁴⁹ T.G. Palaima, 'The nature of the Mycenaean wanax: non-Indo-European origins and priestly functions', in *The role of the ruler* (supra n. 18), 119–139. We are very grateful to the author for allowing us to read an early version of his paper. See also J. T. Hooker, 'The *wanax* in the Linear B texts', *Kadmos* 18, 1979, 100–111; K. Kilian, 'The emergence of *wanax* ideology in the Mycenaean palaces', *OJA* 7, 1988, 291–302.

⁵⁰ N. Marinatos, 'Divine kingship in Minoan Crete', in *The role of the ruler* (supra n. 18), 37–48; Palaima (supra n. 49); J. C. Wright, 'From chief to king in Mycenaean Greece', in *The role* (op. cit.), 63–80. We are very grateful to Thomas Palaima for informing us of these papers.

⁵¹ E.g., Palmer (supra n. 36); Ventris & Chadwick (supra n. 36).
⁵² Ventris & Chadwick (supra n. 36), 303–312; T.G. Palaima, 'The last days of the Pylos polity', in *Proceedings of the 5th international Aegean conference, Heidelberg 10–13 April, 1994* (forthcoming).

⁵³ Ventris & Chadwick (supra n. 36), 284–289.

tions of the many religious festivals. This was true in all the city-states as far as we can tell. In Attika and Delos, for example, we have Hekatombaion, when the Hekatombaia for Apollo were celebrated. There is the Dorian Karneios when the Karneia were celebrated and so on.

Some of these celebrations were also connected to the seasons. From Hesiod we learn that Lenaion, when the Lenaia were celebrated, was a winter month.⁵⁴ We know too that the Anthesteria were celebrated in the spring, in the month Anthesterion. This month and a number of others were common to the Greeks in Attika and in Ionia, and therefore were older than the Ionian migrations. The calendars of the Aiolian and Dorian tribes seem to have been of the same type and also to have had a greater uniformity before migrations at about the same time.⁵⁵ These considerations indicate that the Greek ritual calendars existed as early as the eleventh century B.C. and that there was already at that early date need of a way to keep the months adjusted to the seasons. The problem now is to show that it was likely to have been the *oktaëteris* which the Greeks were using at that time to keep their calendars in order.

The earliest textual evidence for the use of the eight-year cycle is in Herodotos, from whom we learn, "the Greeks added an intercalated month every third year for the sake of the seasons".⁵⁶ It was pointed out earlier that the *oktaëteris* requires the intercalation of three months and that these should be added at even intervals to maintain the closest agreement between the lunar and the solar years. From Geminos we learn that the cycle of nineteen years replaced that of the eight-year cycle because the latter was not exact enough.⁵⁷ From other sources we are informed that the nineteen-year cycle was introduced at Athens in 432 B.C. by Meton.⁵⁸ The inexactness of the *oktaëteris* amounts to three days every sixteen years. After 160 years the lunar year would have been ahead of the solar year by one month. It would have taken 300 years or more for this advance of the lunar year to be generally appreciated. Geminos states that this problem was compensated for by leaving out one of the three intercalary months every 160 years. Arbitrary intercalations of a day or two every now and then would also have resolved the discrepancy. We know that this was a practice of the officials responsible for the religious calendars in the different city states and the source of confusion and irritation.⁵⁹ Thus dissatisfaction with the *oktaëteris* in the fifth century seems to indicate that it was being used early in the eighth century, as Nilsson considered possible. Nilsson's arguments were based on the setting of the dates for the Olympic games.⁶⁰ Geminos considered the

eight-year cycle to have been an achievement of the ancients, "οἱ ἀρχαῖοι",⁶¹ and that it was used by the Greeks to follow the traditions of their ancestors. From these considerations we conclude that the *oktaëteris* was so ancient that nothing was known as to its origin. This is in contrast to the nineteen-year *Metonic* cycle, where the names of the responsible astronomers and a year for its introduction in Athens is recorded, although there are problems about this, as we have seen.

The theory as to a foreign origin for the eight-year cycle has not been substantiated. The only possible source is Babylonia where an octennial cycle just may have been used briefly from 529–503 B. C. But the evidence is weak since regular intercalations of months, the hallmark of calendar cycles, seem not to have occurred in Babylonia before the fourth century. At that time they were on the basis of the nineteen-year cycle, which had been introduced at Athens nearly a half-century earlier, as we have seen. The evidence seems to be stronger for the suggestion that the Babylonians were following the lead of the Greeks and that the eight-year cycle was not used earlier anywhere else than in Greece.⁶²

Since a system such as the *oktaëteris* builds upon hun-

⁵⁴ *Op.* 504

⁵⁵ M. Sakellariou, *La migration grecque en Ionie*, Athens 1958, 32, 300; Samuel (supra n. 25), 57–138; J. Sarkady, 'A problem in the history of the Greek calendar (the date of the origin of the months' names)', *Acta Classica Universitatis Scientiarum Debreceniensis* 21, 1985, 3–17.

⁵⁶ Hdt. 2.4.

⁵⁷ Gem. 8.50 (supra n. 5, 56).

⁵⁸ Dio. Sic. 12.36. Discovered by Euktemon, Philippos and Kalippos according to Geminos (8.50, supra n. 5, 56), by the school of Meton and Euktemon according to Ptolemy. *Alm.* (ed. Toomis, London 1984, 139).

⁵⁹ W.K. Pritchett & O. Neugebauer, *The calendars of Athens*, Cambridge MA, 1947, 17–23. The willingness of the responsible officials to "tamper" with the calendar for practical reasons may have been a result of the availability of the astronomical knowledge needed to get back on track later. There may well have been rules-of-thumb which would have been helpful for this purpose, cf. Hunger & Reiner (supra n. 28).

⁶⁰ Nilsson (supra n. 7), 364f. Nilsson made a distinction between the *oktaëteris* calendar and the *oktaëteris* period, which was countered by Thomson (supra n. 16), 52–65.

⁶¹ Gem. 8.26–27 (supra n. 5, 52).

⁶² R.A. Parker & W.A. Dubberstein, *Babylonian chronology 626 B. C.–A. D. 75*, Providence 1956, 2, 30f.; B. L. van der Waerden, *Science awakening II: The birth of astronomy*, Leiden 1974, 103; O. Neugebauer, *The exact sciences in antiquity*, 2nd ed., Providence 1957, 103, 140; M.E. Cohen, *The cultic calendars of the ancient Near East*, Bethesda 1993, 5f.; Nilsson (supra n. 7) admitted that there is no evidence for regular intercalations of months in Babylonia before the sixth century B.C.

dreds of years of astronomical observations, its use in the eighth century means that its origins probably lay in the Bronze Age. Thus the most likely explanation for its use in Greece would be as part of the inheritance from the Mycenaean Period. If the Mycenaean used the *oktaëteris*, this can only be explained by their having received it from the Minoans, as there is little evidence for Mycenaean peak sanctuaries, or other observation places, that pre-date those of the Minoans. Our hypothesis that the Minoans discovered the *oktaëteris* is thus supported by the Mycenaean and later Greek use of similar ritual calendars which would have required such a cycle.

Are there later Greek traditions concerning the exercise of astronomical knowledge in ways that remind us of the use proposed for the Mycenaean priest-king? This would mean that forms of leadership which exploited astronomical knowledge, and which survived, would have been passed on by the Mycenaean. Do we have evidence of such survival? Two later traditions connect the right of kings to rule to astronomical knowledge and to the satisfactory discharge of sacred duties. One concerns the choice of Atreus as Argive king over Thyestes because of his astronomical knowledge. Atreus was credited with the discovery of what the Greeks referred to as the contrary motion of the sun, the annual solar movement relative to the so-called fixed stars.⁶³ This is related by both Polybius and Lucian and was known also to Sophocles and Euripides, according to Achilles Tatius the astronomer.⁶⁴ In the other tradition the tenure of the Spartan kings, if they had not transgressed in their dealings with the gods, was confirmed every ninth year by the ephors after an inspection of the stars for a divine sign as to the kings' guilt or innocence.⁶⁵ These traditions may derive from similar ones in the Mycenaean period whereby demonstration of astronomical knowledge was in some way required by each new candidate for the priest-kingship.

These two traditions bring to mind Minos, priest-king at Knossos as described by Homer, not as found among the Bronze Age archaeological remains in Crete. They

may also indicate that an original Minoan idea of leaders with a priestly role remained viable after the Mycenaean period. We may perhaps have additional evidence of its later influence in the officials who had responsibility for the festival calendars in the city-states, for example the eponymous archon at Athens.

To sum up, evidence has been presented that the Minoans carefully arranged an observation place on Petrosphas so that they could easily follow the motions of the sun, the stars and probably also the moon. As a result of their observations they acquired considerable knowledge of astronomy and may have implemented the use of the *oktaëteris*. It has been argued that this knowledge was restricted to a small group of leading men who had priestly duties, among which was the adjustment of the ritual calendar so that the festivals to the gods would occur in the proper seasons.

It has been argued further that the Minoans' knowledge of astronomy passed into the hands of the Mycenaean who exploited it to justify their right to rule in Crete. This was part of the process by which the Mycenaean king at Knossos assumed the religious functions of the Minoan leaders and the result became a new local version of Mycenaean kingship, that of a king with important priestly functions, Homer's Minos.

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⁶³ Dicks (supra n. 8), 16.

⁶⁴ Polyb. 34.2.4–9; Lucian. *Astr.* 12; Ach. Tat. *Intr. Arat.* (ed. Maass, Berlin 1898, 28). Soph. *Fr.* 738 (ed. A.C. Pearson, Cambridge 1917, vol. 3, 5f.); Eur. *Fr.* 861 (2nd ed. Nauck, Leipzig 1889, 639f.).

⁶⁵ Plut. *Cleom.* 11.3.