
The Witch Aglaonice and Dark Lunar Eclipses in the Second and First Centuries BC

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The following paper draws attention to the possible occurrence in the period of Ancient Rome of a prolonged succession of lunar eclipses during which the Moon's disk became entirely invisible during totality. No such succession has been witnessed in comparatively recent centuries. Since it is unlikely that volcanic dust permeated the upper terrestrial atmosphere for decade after decade, an alternative explanatory hypothesis is required.

DRAWING DOWN THE MOON

Prominent figures in the occult underworld of the ancient Greeks and Romans were witches from Thessaly. One of the more dramatic of their magical claims was the ability to draw down the Moon from its course in the heavens after depriving it of its illumination. The earliest allusion to this purported feat is at lines 749–755 of the *Clouds*, first produced in 423 BC, of the Athenian comic dramatist Aristophanes. A character in the play wistfully toys with the idea of emulating witches and, having somehow retrieved the drawn-down Moon, storing it in a box. Thus the commencement of the following month will not be indicated and payment of a debt then due avoided. A more conventional, if no less bizarre, ambition, alluded to for example by the Neronian-age Roman poet Lucan (*Pharsalia*, 6.499–506), was to collect from the vicinity of the Moon's descent a foamy substance highly prized for potions and philtres. Dimmed by a witch's incantations and lowered by her magic, according to Lucan's representation, "the Moon from close to Earth drops foam upon the plants below". The froth itself is not necessarily a total figment. Thessalian witches may have misrepresented the secretion of the spittle bug (*Philaenus spumarius*).

From the, naturally disapproving, Christian bishop Hippolytus (*Refutation of Heresies*, 4.37) we learn that by the third century AD at least the witches' operation had become merely symbolic. In a suitable chamber or hall a mimic Moon suspended against a painted or gilded backdrop of stars was lowered by means of a system of ropes and pulleys. The probability is that some earlier Thessalian witches, like recent counterparts in North Africa whose procedures are described by E. Westermarck and others¹, operated *al fresco* with very small and highly suggestible audiences. By means of hypnotic techniques such spectators were convinced that they had witnessed the Moon's descent.

AGLAONICE

Of rather more interest from the astronomical point of view is the activity of a highly sophisticated witch named Aglaonice. According to Plutarch (*Obsolescence of Oracles*, 13) writing around the end of the first century AD, Aglaonice was well informed both as to the cause of total lunar eclipses and the times of their occurrence: "Always at the time of an eclipse of the Moon she pretended to bewitch it and draw it down". In another passage (*Instructions for Married Couples*, 48) Plutarch remarks: "Aglaonice the daughter of Hegetor being thoroughly conversant with the periods of the Full Moon when it is subject to eclipse, and knowing beforehand when the Moon was due to be overtaken by the Earth's shadow, imposed upon audiences of women and made them all believe that she drew down the Moon". Mentioning Aglaonice in his comments to lines 59–61 of the fourth book of the *Argonautica* of the hellenistic poet Apollonius of Rhodes, an anonymous expositor of late antiquity adds to the facts supplied by Plutarch, that the witch's loss of a close relation after one of her performances was seen as punitive action by an outraged Moon goddess.

At this point let us diverge to recall a basic feature of total lunar eclipses. In the case of the majority with whose details we are familiar the Moon at totality does not vanish. Rather, it remains clearly visible tinged with a more or less conspicuous rust-coloured hue. Only very seldom in recent times has the Moon in eclipse been rendered so dark and obscure that one might, in ignorance of the causal mechanism involved, be persuaded that it had disappeared from the sky. According to many observers the Moon all but vanished during the eclipse of 1963 December 30². Walter Haas, who witnessed its progress at Cruces, New Mexico, subsequently noted: "I am now prepared to believe that the Moon sometimes, to the eye, disappears completely in eclipse". For the next most

recent examples of ultra-dark eclipses of the Moon one has to go back to those of 1913 March 22 and September 15.

To return to Aglaonice, it requires but little reflection on the notices we have reviewed in order to appreciate how remarkable and startling their content is. Aglaonice claimed that she brought down the Moon, removed it from the sky, no less. Not an intimation is there of compromise in favour of mere reduction of the Moon's light or the transformation of its hue to an ominous shade of red. Nor is there any hint that her performances were deemed failures. Quite the contrary indeed, for ascription of the death of one of her relations to magical 'rebound' suggests conviction of her success. Had the Moon remained clearly visible throughout an eclipse then, even to the unsophisticated who comprised her audiences, she must have become an object of derision, and this is nowhere implied. The inference, then, seems scarcely avoidable that on the, necessarily infrequent, occasions of her *pièce de résistance*, the Moon whose eclipses she exploited was comprehensively obscured. But that is not all. Had not the Moon been consistently invisible during total eclipses for as long as Aglaonice and her contemporaries had been in a position to observe them, her deception could not have been contemplated. The occult charlatan cannot afford undue risk of exposure and the ridicule which follows.

Unhappily, our informants concerning Aglaonice give no direct indications as to her chronology. The upper limit for her activity would be, of course, AD 100 when Plutarch was writing. But one does not receive the impression that it was a contemporary figure to whom Plutarch was alluding. As to the lower limit, Aglaonice's activity certainly cannot predate the middle of the third century BC. It was only reasonably well on into the Seleucid period (which began in 312 BC) that astronomers of Babylon, whose results and methods then had to be communicated throughout the Mediterranean world, perfected means of forecasting lunar eclipses infallibly and of estimating how complete any particular eclipse might be.

LUCRETIVS AND CICERO

The Roman poet of science, Lucretius, lived from 94 to 55 BC. At the time of his death his didactic epic, *The Way Things Are*, had yet to receive its final revision, so that publication was effected by Lucretius' executors. Building on a carefully articulated atomic physics, Lucretius expounded a materialist philosophy and then went on to deal with the macroscopic world at large.

At line 751 of the fifth book, one of whose subjects is celestial phenomena, eclipses of the Moon are labelled, uniquely from the point of view of Latin literature, *latebrae*. The basic meaning of the word is

'hiding-places' or 'lurking-holes', and the image conjured up is of the Moon as a hunted animal betaking itself to some enclosed retreat. While poetic considerations contribute to the determination of Lucretius' terminology the poet consistently conforms to the dictates of scientific accuracy. The natural inference from his choice of vocabulary is that the lunar eclipses with which Lucretius, writing close to 55 BC, was familiar were characterized by the Moon's complete disappearance. As that of Aglaonice, so the experience of Lucretius.

Towards the end of an eventful life (106–43 BC) the lawyer and politician Cicero wrote a number of works dealing with philosophical and related matters. These include *On Divination* penned in 44, essentially a rationalist assault on all divinatory practices and their rationale. At 2.17 he notes the ability of astronomers to calculate when the Moon will be opposite the Sun and in the Earth's shadow. At such times, he continues, the Moon necessarily becomes invisible. Cicero too, then, appears to take it for granted that total eclipses of the Moon involve the vanishing of the lunar disk.

LUNAR ECLIPSES FROM 331 BC TO THE FIRST CENTURY AD

More often than not when referring to a lunar eclipse, the writers of Greece and Rome note little more than its mere occurrence. In respect of only four such eclipses, spanning the period from Alexander the Great to the inaugural year of the Roman Emperor Tiberius, are phenomenological details preserved. I proceed to review them in chronological order.

331 BC September 20

On this date (extrapolated Julian), a total eclipse of the Moon was observed shortly before the crucial battle of Gaugamela in the plain of Mesopotamia in which Alexander the Great crushed the army of the Persian king Darius. According to the Roman author Quintus Curtius Rufus (*History of Alexander*, 4.10.1) who, writing in the first century AD, drew on accounts by Alexander's own companions, the Moon appeared to be the colour of blood during totality. This is the kind of eclipse which we regard as normal.

168 BC June 21

This eclipse also occurred before an important battle, fought at Pydna in Macedonia between the Roman consul Lucius Aemilius Paulus and the Macedonian king Perseus. We learn from the Roman historian Livy (44.37) that one of Paulus' military tribunes, Gaius Sulpicius Gallus, who was astronomically knowledgeable like Aglaonice, assembled the Roman army before the eclipse and informed the troops of its imminence and its cause. Panic of ignorant legionaries at an apparent divine portent would thus be obviated. The details of the eclipse

itself are furnished by Plutarch (*Life of Aemilius Paulus*, 17) drawing upon earlier sources. "The Moon", we are informed, "which was full was suddenly darkened and the light began to diminish; it displayed various colours and then vanished." This account, brief as it is, is not unreminiscent of eye-witness descriptions of the lunar eclipse of 1963 December 30. On that occasion, around second contact, blue and red hues were observed in different regions of the Moon's disk which subsequently all but vanished. In the case of the Pydna eclipse, evidently, the Moon's disappearance was complete.

63 BC May 3

According to Cicero (*On Divination*, 1.18) who was in a position, while consul, to observe the eclipse himself at Rome, the Moon vanished completely, leaving only a backdrop of stars visible.

AD 14 September 27

The source is the Roman historian Tacitus (*Annals*, 1.28) who had accounts of eye-witnesses at his disposal. For observers in Pannonia (Yugoslavia), it emerges that clouds eventually rendered viewing impossible, but not until the eclipse was well in progress. At no stage had the Moon become invisible. This eclipse, apparently, was normal.

That 'normality' persisted into the late decades of the first century AD can be inferred from Pliny the elder (*Natural History*, 2.42) who, writing not long before 79, takes the eclipsed Moon's visibility for granted. Two passages in Seneca (*Phaedra*, 788, and *Natural Questions*, 7.27.1), both written between 50 and 65, refer to the eclipsed Moon's redness. In the second, this is implicitly contrasted with the leaden hue of the Old Moon in the New Moon's arms. At the century's turn Plutarch (*On the Face in the Moon*, 21), apropos his own times, states categorically that the Moon is not entirely invisible during total eclipse. He then goes on to reveal familiarity with a wide range of its hues. The eclipsed Moon can be very dark or fiery red; it can display a mere hint of redness and, on occasion, a bluish or azure tinge has been observed. Plutarch then associates these colour variations with the time of night at which the eclipse is observed. This was an unhappy thought, since the time of observation depends on longitude and the same totality is witnessed over different time zones.

SYNTHESIS

Lucretius and Cicero, it seems, were familiar only with lunar eclipses in the course of which the Moon vanished entirely during totality. Just such an eclipse is attested for 63 BC, in the consulate of Cicero, eight years prior to Lucretius' death. It is difficult to see this as coincidental. Implicit in the deceptions of Aglaonice, too, is an extended series of ultra-dark

lunar eclipses. Is it not logical to regard her as roughly coeval with Lucretius and Cicero and so determine the context of her magical career? The setting is appropriate enough given the preoccupation with the esoteric and occult that became one of the late pre-Christian era's more conspicuous features.

It would be more than helpful, obviously, if we were in a position to supplement the classical data from the records of other cultures, in particular imperial China. In the view of the Chinese, unfortunately, eclipses of the Moon were not significant portents and their allusions to them are fleeting and sporadic. Distinct grounds nevertheless emerge, I suggest, on the Western evidence alone, for countenancing a prolonged succession of 'absolute' lunar eclipses, the determinant of Aglaonice's pretensions, that reaches back from around the middle of the first century BC through the year 63 BC towards or beyond the birth-dates of Lucretius and then Cicero. I add 'beyond' since the possibility cannot be totally dismissed that the phenomenology of the Pydna eclipse of 168 BC is part of the same series of phenomena rather than an isolated freak.

If some such succession is fact and not mirage then the question of its cause insistently arises.

TOWARDS AN EXPLANATION

The reddish glow of the eclipsed Moon during normal totality is readily explained. Sunlight passing through the atmosphere at the edge of the terrestrial globe undergoes refraction and is bent into the shadow cone. Its shorter wavelengths are attenuated as the result of absorption due to Rayleigh scattering. In the case of anomalous eclipses, evidently, complicating factors are brought into play.

The, to us, unusual features of the lunar eclipse of 1963 December 30 may be associated with the presence in the upper terrestrial atmosphere of volcanic dust ejected during the course of the eruption of Mount Agung in Bali, Indonesia, earlier in the same year³. Similar circumstances account for other dark eclipses of comparatively recent times. Those of 1913 March 22 and September 15 may be connected with the explosion of Mount Katmai in Alaska in the previous year. A darkish lunar eclipse of 1884 October 4 was a by-product of the celebrated Krakatoa paroxysm of 1883. The very dark or even invisible eclipsed Moon of 1816 June 16 resulted from the explosion, in the course of which 150 km³ of ash were ejected, of another Indonesian volcano, Tambora, in 1815.

Since the contents of Greenland ice cores seem incompatible with any truly large-scale volcanic events for the period from 170 to 45 BC⁴, such an explanation for the series of anomalous eclipses in Roman times is positively counter-indicated. It is difficult in any case to envisage volcanic activity on a worldwide scale so intense and so continuous as to have caused dark

lunar eclipses decade after decade. An alternative line of explanation must perforce be sought.

In 1920, in two papers, Danjon⁵ published his conclusion that the degree of brightness of the eclipsed Moon is a function of the phase of the approximately 11-year solar cycle. His view was supported in two subsequent studies by de Vaucouleurs⁶ and then, somewhat later, by Bell and Wolbach⁷ who suggested minor modifications. Most recently, it has been re-endorsed by Hughes⁸. Basically the situation appears to be the following. In the two years immediately after solar minimum the eclipsed Moon is *very dark and colourless*. As the minimum is left behind it becomes brighter and ruddier until, during the seventh and eighth years after minimum, it is at its brightest, exhibiting vivid red, copper or orange hues. The brightness then falls away sharply to its own minimum. In general, within the framework of this overall pattern, winter eclipses are seemingly brighter than those in evidence at other seasons⁹.

All gross exceptions to Danjon's law, like the eclipses just referred to, have hitherto been assumed to be the result of temporary atmospheric pollution. While the law's validity appears to be well enough authenticated, the precise causal factors involved remain, as Link¹⁰ has emphasized, embarrassingly obscure.

On various grounds, such as variations in the abundance of carbon 14 in tree rings, J. A. Eddy¹¹ has inferred various long-term excursions of solar activity

over the last millennia superimposed upon the familiar 11-year cycle. The so-called Spörer and Maunder minima mark the penultimate and most recent periods of relative quiescence. Almost certainly the last two centuries of the pre-Christian era featured, in the wake of another minimum, a very steep rise in the Sun's activity culminating in what Eddy labels the 'Roman maximum' close to its termination. With Danjon's law in mind, one speculates with extreme hesitancy that, between certain critical points, a concomitant of such pronounced escalations is a dramatic and prolonged reduction in the brightness of the eclipsed Moon¹².

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- 12 This paper owes much to my colleague Saul Bastomsky whose resolute scepticism prompted greater caution and precision.