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Dark lunar eclipses in classical antiquity

Richard B. Stothers
NASA–Goddard Space Flight Center, Institute for Space Studies, 2880 Broadway, New York, New York 10025, USA

Credible reports of dark lunar eclipses do not appear to exist in surviving ancient European and Near Eastern literature, apart from some undatable allusions in astrological writings.

A question

Two independent studies have recently given conflicting answers to the question: do reliable reports of dark total eclipses of the Moon exist in ancient European and Near Eastern literature? Authentic eclipse reports would be scientifically valuable because dark lunar eclipses have been linked both to an excess opacity in the Earth's atmosphere and to a lull in the Sun's surface activity[1]. On the one hand, Stothers and Rampino[2] state that they find no credible reports up to the seventh century AD, whereas Bicknell[3] claims a succession of dark lunar eclipses in the second and first centuries BC. Here I shall attempt to show why the ancient lunar eclipse reports cited by Bicknell cannot be unambiguously interpreted as evidence for *dark* lunar eclipses.

Aglaonice

Plutarch, a knowledgeable Greco-Roman antiquarian who was writing *circa* AD 100, recorded that an astronomically-trained sorceress from Thessaly, named Aglaonice, used to deceive other women by pretending to 'draw down' the Moon during a lunar eclipse[4]. Bicknell[3] inferred from the presence of an audience to this exercise that the Moon's disc disappeared completely during the eclipse. The key word used by Plutarch (more properly, by his unknown source) was *kathairein*, for which the literal, popular meaning was 'draw down', but whose technical meaning would actually depend critically on the date of Aglaonice's life. Bicknell assigned this rather arbitrarily to the first century BC on the assumption that she belonged to the Greco-Roman scientific period.

Four arguments suggest rather strongly that Aglaonice was actually a mythological (or early legendary) character. First, the three other named sorceresses from classical antiquity who could 'draw down' the Moon were unquestionably mythological figures: Mycale, Medea, and Circe[5]. Secondly, the ancient attribution of a proverb 'She draws down the Moon' to an incident in Aglaonice's life[6] also suggests a very early origin for her. Thirdly, as the only named Thessalian witch other than Mycale, Aglaonice may have been the model for the numerous Thessalian bewitchers of the Moon that appeared as stock characters in Greek literature at least as early as the fifth century BC[7]. Fourthly, like the mythical Endymion, a mythical Aglaonice would have been easily endowed with 'astronomical knowledge' by the ancient rationalisers of the Greek myths (for the rationalised myth of Endymion and the Moon, see reference 8).

If Aglaonice did in fact predate the fifth century BC, as seems very likely, the word *kathairein* (in the context of eclipses) probably meant simply 'to darken'[9]. An anonymous ancient writer[10] informs us that, up to the time of Democritus (fifth century BC), *kathairein* was commonly applied to eclipses of all kinds. Since few total solar eclipses could have been seen from the small area of the Greek lands, *kathairein* must have been used generally for solar and lunar eclipses of all magnitudes. Thus, there is no reason to infer the occurrence of a *dark* lunar eclipse from Plutarch's use of the word.

Lucretius

The Roman scientific poet Lucretius, writing *circa* 55 BC, referred in a curious way to lunar eclipses as *latebras lunae* ('hiding-places of the Moon')[11]. Bicknell[3] interpreted this odd expression as implying a succession of *dark* lunar eclipses during Lucretius' lifetime, in the mistaken belief that the term is unique in Latin literature.

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Since the purpose of Lucretius' poem was to expound Epicurean theory, the origin of the term *latebras* probably lies in Epicurean scientific usage. According to a gloss in the text of Diogenes Laertius (third century AD)[12], the Greek philosopher Epicurus himself (*circa* 300 BC) used the Greek word *anachōrēsin* ('a retreat') for a lunar eclipse. A century earlier, the Greek sophist Antiphon appears to have described the New Moon as *apokryptomenon* ('hiding itself')[13]. But the figure of speech is not unique even in Latin literature. Both Pliny the Elder[14] (*circa* AD 77) and Ammianus Marcellinus[15] (fourth century AD) used *latet* ('lies hid') in general prose scientific explanations of lunar eclipses.

There are further reasons for not reading anything unusual into Lucretius' *latebras lunae*. This phrase also expressed Lucretius' abundant interest in verbal imagery and alliteration. In an important variation, Lucretius referred to lunar eclipses with the word *languescere* ('become weak')[16]. It is ironical that the historian Tacitus[17] (first century AD) used *languescere* to characterize the lunar eclipse of AD 14 September 27, which Bicknell[3] pointed to expressly as a case of an *ordinary* lunar eclipse! Both the orator Cicero, who was Lucretius' friend and posthumous editor, and the poet Vergil, a much younger contemporary, modeled the brief descriptions of lunar eclipses in their own poems after Lucretius, but saw nothing so scientifically significant in *latebras lunae* that they felt obliged to retain the term[18].

Cicero

In an autobiographical poem, which mentioned in passing the lunar eclipse of 63 BC May 3, Cicero wrote: "the Moon at her full withdrew her bright features and was blotted out"[18]. Bicknell[3] inferred from Cicero's choice of words that the Moon completely vanished. But is this not just Ciceronian rhetoric? A poem by the satirist Petronius (first century AD) portrayed the lunar eclipse of 48 BC July 15 in a very similar way: "the Moon extinguished her full face and took away her light"[19]. In contrast, Petronius' contemporary, the poet Lucan laconically described the same eclipse of 48 BC as "the Moon became pale"[20]. It is therefore unrealistic to ascribe any significance to the reported magnitudes of these eclipses. This conclusion is reinforced by recognising in all of these poems the obvious and intentional parallels with Lucretius' poem.

In a subsequent prose passage, Cicero used the word *obscurari* ('to be darkened') to explain very generally the character of total lunar eclipses[21]. Bicknell[3] again read into Cicero the idea of complete invisibility of the Moon. Yet Pliny the Elder[22] used the same word to explain the same general phenomenon, and some other authors introduced an even stronger word, *nigris* ('black')[23].

Lunar eclipse of 168 BC June 21

In a remarkable description of the lunar eclipse of 168 BC June 21, Plutarch wrote: "the Moon was full and high in the sky when it suddenly grew black, lost its light, changed colours of all sorts, and vanished"[24]. Plutarch's source is unknown but may have been the Roman scientist Sulpicius Gallus[25] or the historian Polybius[26], both of whom witnessed the eclipse and wrote about it in works now lost. Bicknell[3,26] claimed in this description a strong case for a *dark* lunar eclipse.

The physical details, however, appear to have been made up by Plutarch. For one thing, no other extant account of this eclipse mentions them (see especially the works cited in reference 27). In addition, Plutarch employed identical language about a sudden loss of light and a change of colours in describing the lunar eclipse of 413 BC August 27, although he did not mention any blackening and vanishing of the Moon in the latter case[28]. Yet Plutarch did know and did indicate the time of night for the 168 BC eclipse, placing it in the hours shortly after suppertime, which Livy identified more precisely as the second to the fourth hour of the night. According to pre-Greek Chaldean astrological lore, expounded by Plutarch himself[29], a lunar eclipse that occurred between eventide and a half past the third hour of the night was always supposed to be 'terribly black'. Other ancient writers bear witness to the traditional astrological significance of the various lunar eclipse colours, including the colour black[30]. Furthermore, the strong association of these colours with certain set times is independently attested by a Mesopotamian clay tablet cited by Bouché-Leclercq[31]. It is therefore very likely that Plutarch was simply drawing upon his ample astrological knowledge to infer the black colour of the 168 BC eclipse, for which he knew the hour of occurrence.

Conclusion

It is obvious that ancient Greek and Roman authors had to invent, and then make use of, certain technical terms to describe the obscuration of the Moon during total lunar eclipses. A literal reading of these terms might lead one to suppose that *dark* lunar eclipses were a very common, if not the usual, experience over a period of more than six centuries. In so reading these words in selected ancient authors, Bicknell[3] deduced a succession of dark lunar eclipses during the second

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and first centuries BC. He was, however, unable to find a plausible explanation for the large number of dark eclipses. I believe that no explanation is needed, because the technical terms have evidently been overinterpreted, and dark lunar eclipses were as rare in antiquity as they are today.

Nevertheless, some dark lunar eclipses must have occurred from time to time. The only reliable literary evidence that we possess, however, consists of a small number of undatable astrological fragments that preserve a corrupt tradition of pre-Greek Chaldean observations of dark lunar eclipses reported from Mesopotamia[32].

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