

## NOTES AND DISCUSSIONS

### A NOTE ON ALEXANDER'S DEATH

In late May of 323 B.C., Alexander re-entered the city of Babylon after taking a journey down the marshy Tigris-Euphrates delta. A few days later he became seriously ill and died about June 10.<sup>1</sup> Since antiquity, much controversy has arisen about the king's death: was he poisoned, or did he die of natural causes? It is the purpose of this brief note to suggest that Alexander died of natural causes, perhaps malaria, and not from poisoning.

The theory that Alexander was poisoned has been most persuasively argued by A. B. Bosworth;<sup>2</sup> R. D. Milnes<sup>3</sup> even suggested that strychnine was administered at Medius' banquet in unmixed wine, a procedure which Theophrastus allegedly recommended.<sup>4</sup> However, it is the nonlethal variety of strychnine which Theophrastus wrote was added to unmixed wine; the lethal variety has a readily detectable, extremely bitter taste. The symptoms recorded by our sources before Alexander's death (a violent intermittent fever, loss of voice, and severe back pains) do not resemble the symptoms of strychnine poisoning, either slow or fast.<sup>5</sup> With large doses of strychnine, the victim suffers a series of muscular convulsions within fifteen to thirty minutes of ingestion, followed in a short time by unconsciousness and death. Slow poisoning—caused by repeated small doses over a long period—causes subfebrile temperatures (below 100° F.), muscular rigidity, photophobia, hypersensitivity to noise, and lassitude. Subfebrile temperatures are scarcely consistent with Alexander's violent fever as described by our sources; and lassitude is not decisive, since, whatever the cause of death, one cannot expect great feats of intellectual or physical vigor from a man who is terminally ill. Furthermore, the administration of repeated, small doses of poison to Alexander would greatly increase the probability of detecting the culprit.

In fact, Alexander himself is curiously overlooked in poisoning theories. Surely, if anyone suspected poisoning, it would be the intended victim himself, and Alexander's swift action against other conspiracies against his life—real or alleged<sup>6</sup>—

I would like to thank Professor Ernst Badian, Paul Mackler, M.D., and John English, M.D., for their helpful suggestions. Grateful acknowledgment is also due to the journal referees for their useful criticisms and advice. I alone am responsible for the views expressed and for any errors.

1. For the approximate chronology, see Arr. 7. 22. 1-7. 23. 1; A. E. Samuel, "Alexander's Royal Journals," *Historia* 14 (1965): 8, citing A. J. Sachs, "Babylonian Astronomical Tablets," *Journal of Cuneiform Studies* 2 (1948): 287-88. For Alexander's fatal symptoms, see Arr. 7. 25-27; Plut. *Alex.* 75. 3-76. 4; Curt. 10. 5. 4; Diod. 17. 117. 2-4.

2. A. B. Bosworth, "The Death of Alexander the Great: Rumour and Propaganda," *CQ* 21 (1971): 112-36.

3. R. D. Milnes, *Alexander the Great* (London, 1968), pp. 255 ff.

4. *Hist. pl.* 9. 11. 5-6.

5. For the symptoms of strychnine poisoning, see W. F. Oettingen, *Poisoning: A Guide to Clinical Diagnosis and Treatment* (Philadelphia, 1958), p. 544.

6. Cf., e.g., Alexander's immediate responses against Philotas, Parmenio, the Pages, Callisthenes, and the dissident satraps whom he purged on his return to Carmania.

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does not suggest that he would quietly die of poison over a ten-day period.<sup>7</sup> Yet none of the alleged accomplices in the plot, nor anyone else for that matter, suffered any harm during the king's terminal illness.

As early as 1872, the great French physician Emile Littré noted that Alexander's symptoms before his death did not resemble those caused by poisoning but were very similar to symptoms caused by a pernicious manifestation of *Plasmodium falciparum* malaria.<sup>8</sup> The violent fever with lucid intervals and loss of voice are common symptoms of this parasitic disease. In addition, some sources record that the king suffered a sharp back pain, "as though smitten with a spear," another common symptom of a pernicious manifestation of *falciparum* malaria when it infects the spinal cord.<sup>9</sup> The environment in which the king was present before his attack was favorable for a malaria infection, and the disease is especially common there in June and July.<sup>10</sup> The king's weakened physical condition—his many wounds and heavy drinking—may have helped induce a pernicious manifestation of the disease which led to his death.

The illness in Babylon may not have been Alexander's first exposure to malaria. The symptoms of Alexander's affliction in Cilicia are recorded in detail by the sources, and they indicate a previous attack of *falciparum* malaria. When Alexander entered the city of Tarsus in the first week of September 333, hot and dusty from a rapid march, he bathed in the Cydnus River (Tarsus Chai) which flows through the town.<sup>11</sup> While swimming in the river, the king suffered first a sudden spasm or convulsion, followed by an intense chill and loss of color. Later, after the king was carried back to his tent, he had a violent fever and insomnia. Shortly after, about the time he learned that Darius had left Babylon for Cilicia with his army, Alexander's condition worsened and he was overcome by mental depression. So severe was his affliction that all his physicians despaired of his life except Philip the Acarnanian. This doctor administered a potion, after which the king lost the power of speech, experienced breathing difficulties, became insensible, and finally lapsed

7. It makes little difference whether one accepts the standard chronology of Alexander's terminal illness, given in Arrian and Plutarch and based on the *Éphémérides*, or the account of pseudo-Callisthenes 3. 31. 11–3. 33. 27, which is accepted by Bosworth. In the former, Alexander died about ten days after becoming ill, and in the latter he died at least three days after being poisoned. In pseudo-Callisthenes, after Alexander was poisoned by Iollas and immediately suffered a violent reaction, he composed his will in leisurely fashion over a period of two days but took no action against Iollas or the other alleged conspirators. Such conduct is scarcely conceivable.

8. *Médecine et médecins* (Paris, 1872), pp. 406–415. The most thorough, detailed account of Alexander's final illness is by the Italian physician, M. Bertolotti, in *La critica medica nella storia: Alessandro Magno* (Turin, 1932), pp. 356–81, who also noted that the symptoms resemble an infection of *falciparum* malaria. Malaria was given as the cause of death, too, by F. Schachermeyr, *Alexander der Grosse* (Vienna, 1972), pp. 561–63. For the symptoms of this disease, see pp. 226–27 and n. 17.

9. Plut. *Alex.* 75. 3. For the symptoms of a pernicious attack, see S. F. Kitchen, "Falciparum Malaria," in M. F. Boyd (ed.), *Malaria*, vol. 2 (Philadelphia, 1949), pp. 1005–7; W. N. Bispham, *Malaria, Its Diagnosis, Treatment and Prophylaxis* (Baltimore, 1944), pp. 69–71; P. F. Russell, et al., *Practical Malaria* (Philadelphia, 1946), pp. 292–94.

10. Great Britain, Naval Intelligence Division, *Iraq and the Persian Gulf* (London, 1944), pp. 413–15.

11. Curt. 3. 4. 13–3. 5. 4; Arr. 2. 4. 5–11. For the chronology, see M. Dieulafoy, "La bataille d'Issus; Analyse critique d'un travail manuscrit du Commandant Bourgeois," *Mémoires de l'Académie des inscriptions et des belles-lettres* 39 (1914): 56–57; W. Judeich in J. Kromayer and G. Veith, *Antike Schlachtfelder*, vol. 4 (Berlin, 1929), p. 355; D. Engels, *Alexander the Great and the Logistics of the Macedonian Army* (Berkeley, 1978), pp. 40, 42.

into unconsciousness.<sup>12</sup> Somewhat later, the king regained consciousness; but it was not until almost two months after he had suffered his initial paroxysm that he was well enough to appear before his troops.<sup>13</sup>

Cilicia was the most virulent malarial location in Anatolia, until the development of DDT after World War II exterminated the carriers of the disease.<sup>14</sup> The entire southern coastline between Tarsus and Karataş, ten to fifteen kilometers inland from the sea, is formed by swamps and lagoons, and the environment was the same in antiquity.<sup>15</sup> Moreover, the region was particularly deadly in summer and autumn when annual malaria epidemics occurred.<sup>16</sup>

Of the four varieties of malaria, Alexander's symptoms most resemble an infection caused by the *Plasmodium falciparum* parasite, which was in fact the most prevalent form of malaria in Cilicia.<sup>17</sup> Furthermore, the *falciparum* parasite is

12. Curt. 3. 5. 3-3. 6. 13; Just. 11. 8. 4; Arr. 2. 4. 7-8; Plut. *Alex.* 19. 1-5. The symptoms listed are all the ones recorded by the ancient sources, in chronological order. Pronounced malaria symptoms do not occur until at least six days after the individual has been infected by the *falciparum* parasite, but often prodromal symptoms (i.e., symptoms which appear before the major onset of the infection) are present during the parasite's incubation period (Bispham, *Malaria*, pp. 59-61; Russell, *Practical Malariaology*, pp. 284-85). Aristobulus records (Arr. 2. 4. 7) that the king was suffering from fatigue before swimming in the river, and fatigue is a common prodromal symptom of malaria.

Alexander's symptoms after Philip's intervention may have been iatrogenic (i.e., caused by the doctor's potion), or perhaps they were the effects of the infection, which had now reached its critical stage of development. Because of the limited amount of medical knowledge in antiquity about the causes and cures of infectious diseases, doctors often inadvertently caused their patients much suffering, and even death. The "cures" described in Greek and Roman medical writers (excessive bloodletting, cold baths, and foul potions) must have caused high rates of morbidity and mortality among ancient patients: J. Scarborough, *Roman Medicine* (Ithaca, 1969), pp. 94 ff., 135. Some sources say that Alexander's chill was caused by the cold water of the Cydnus River (Plut. *Alex.* 19. 1; cf. Arr. 2. 4. 7). However, it is unlikely that the river would have been cold at all, after flowing forty-two miles, from its source to the city of Tarsus, in the 120° F. average high temperatures of Cilicia during the summer. That the river is sluggish and muddy near Tarsus would increase its temperature during the cloudless Cilician summers: Great Britain, Naval Staff, Intelligence Department, *A Handbook of Asia Minor*, vol. 4, pt. 2 (London, 1919), p. 34; Great Britain, Naval Intelligence Division, *Turkey*, vol. 1 (London, 1943), pp. 199, 410-16; J. Dewdney, *Turkey: An Introductory Geography* (New York, 1971), pp. 37, 43. J. Macdonald Kinneir, *Journey through Asia Minor, Armenia, and Kordistan* (London, 1818), p. 121, did not find the river cold at all in early November.

13. For the approximate chronology, see Engels, *Logistics*, pp. 42-43.

14. *Handbook of Asia Minor*, 4.2: 34; *Turkey*, 1: 256 ff.

15. *Turkey*, 1: 153; M. V. Seton-Williams, "Cilician Survey," *Anatolian Studies* 4 (1954): 121, 128. Apparently, the sea level has not changed with respect to the land level in Cilicia from Alexander's day to our own: Engels, *Logistics*, p. 188.

16. *Turkey*, 1: 257. In the summer of 1916, units of a German army crossing the Taurus Mountains by the Cilician Gates suffered from 25% to 83% infection rates from *Plasmodium falciparum* malaria. The First Crusade in 1097 deliberately avoided entering Cilicia in early September because of the notorious malarial conditions there at that time of year: S. Runciman, *A History of the Crusades*, vol. 1 (Cambridge, 1952), p. 190. In the summer of A.D. 275, great numbers of Florianus' troops became severely ill near Tarsus, apparently from malaria: Zos. 1. 64. 2. Many of the ancient inhabitants of Tarsus—at least those of the wealthier class—seem to have abandoned the city during the summer months and lived in residences along the nearby hills to escape the malarial conditions of the Cilician plain: W. M. Ramsay, "Tarsus and the Pass of the Cilician Gates," *The Athenaeum*, 1 August 1903, pp. 164-65.

17. *Turkey*, 1: 257. Bertolotti, *La critica medica*, pp. 306-332, was the first to note that the symptoms of Alexander's disease in Cilicia resembled those caused by *falciparum* malaria. For the ancient literary references to malaria, which has been endemic to the eastern Mediterranean since at least the sixth millennium B.C., see W. H. S. Jones, *Malaria and Greek History*, Publications of the University of Manchester Historical Series, vol. 8 (Manchester, 1909). See also J. L. Angel,

more likely than any other variety to develop pernicious manifestations, in which case the victim is in grave danger. There are three well-defined classifications of pernicious malaria, and the symptoms Alexander experienced after the intervention of the physician Philip resemble a cerebral attack, when the parasites infect the central nervous system.<sup>18</sup> A pernicious attack often begins as a simple infection of the *falciparum* parasite, but after several days the patient develops severe, agonizing backaches when the spinal column is infected; mental depression; irregular breathing; speech loss; and finally unconsciousness and coma often followed by death. Several factors may cause an infection by the *falciparum* parasite to become pernicious: it is significant that one of the most common is that the victim be a newcomer in an endemic malarial region. Alcoholism, excessive fatigue, malnutrition, heat prostration, or injury to an organ may also cause the infection to become pernicious.<sup>19</sup> Most pernicious infections occur during summer or early autumn.

When the patient recovers from malaria, usually within two months after his initial infection, there is the possibility that he will suffer relapses—repetitions of the disease caused when the latent parasite becomes reactivated. If, however, there is no relapse within one year after the initial infection, no relapse will occur; and relapses are least likely to occur with a *falciparum* infection.<sup>20</sup> Of course, the

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"Ecology and Population in the Eastern Mediterranean," *World Archeology* 4 (1972): 1-18; idem, "Porotic Hyperostosis, Anemias, Malarial, and Marshes in the Prehistoric Eastern Mediterranean," *Science* 153 (1965): 760-63. The four varieties of malaria *plasmodia* are *vivax* (formerly called tertian), *falciparum* (formerly quotidian or subtertian), *malariae* (formerly quartan) and *ovale* (formerly mild tertian). The parasitic disease, carried by the *anopheles* mosquito, attacks and destroys the body's red blood cells. For the symptoms of a typical attack, see Bispham, *Malaria*, pp. 61-63; Russell, *Practical Malariology*, pp. 285-86; S. F. Kitchen, "Symptomatology, General Considerations," in Boyd, *Malariology*, pp. 978-87. In the first stage of the attack (generally lasting fifteen to thirty minutes), the victim experiences a sharp tremor or convulsion, then an intense chill and violent shivering; skin color is pallid. This stage is followed by an intense fever (which may be continuous or intermittent), severe headaches, insomnia, parched throat, and nausea. If the fever is intermittent, it may last from twenty-four to forty hours and is followed by a sweating stage, lasting two to three hours, during which the victim experiences a decline in temperature. However, after this latter stage (if quinine is not administered), the parasite regenerates, and there is a recrudescence of the fever, which may last for another twenty-four to forty hours. A typical infection may last two weeks if it is not treated with quinine, and it is usually two months before the patient is fully recovered.

18. For the symptoms of a pernicious cerebral attack, see Kitchen, "Falciparum," pp. 1005-7; Bispham, *Malaria*, pp. 69-71; Russell, *Practical Malariology*, pp. 292-94.

19. Kitchen, "Falciparum," p. 1005; Russell, *Practical Malariology*, p. 292; Bispham, *Malaria*, p. 69.

20. Kitchen, "Falciparum," p. 1007; Bispham, *Malaria*, p. 79; Russell, *Practical Malariology*, p. 329. Bertolotti, *La critica medica*, p. 325, believed that Alexander's malaria attack in Cilicia was a relapse of a latent *falciparum* parasite which had infected him earlier—perhaps while he was still in Macedonia—and that the relapse was caused by the sudden chill the king experienced while swimming in the cold Cydnus. However, the river was probably not cold (see n. 12); and, if Alexander's malaria attack was a relapse, we should expect some mention of an earlier relapse or initial infection within the previous year. No such notice occurs and there is no record of the king's being seriously ill with malarial symptoms until he reached Babylon in late May of 323, when he was apparently reinfected. Hence Alexander's Cilician attack was probably an initial infection. Alexander was probably not the only one to have been infected by malaria in Cilicia. Although Coenus notes (Arr. 5. 27. 6) that more soldiers died of illness than in battle during Alexander's campaigns (and from what is known about mortality rates in pre-industrial societies, he is probably correct), there are only two specific references to the rank and file's suffering from illness: one in Cilicia (Arr. 2. 7. 2) and the other in the Gedrosia (Curt. 9. 10. 13). We can infer that the incidence of disease among the soldiers in Cilicia may have been high, as it certainly was in the Gedrosia.

individual may be reinfected at any time, as Alexander apparently was in the Tigris–Euphrates delta.

Obviously, without scientific blood tests and clinically accurate descriptions of his symptoms, secure diagnoses of Alexander's illnesses in Babylon and Cilicia are not possible. Nevertheless, the specific symptoms of these two illnesses recorded by our sources are consistent with malaria infections, probably pernicious manifestations of the *Plasmodium falciparum* variety, and not with poisoning. When the king's symptoms are combined with the known environmental conditions of Cilicia and Babylonia in the summer—the time of year when malaria was epidemic in those regions—the hypothesis that he suffered such attacks is strengthened. I hope that this paper may stimulate further discussion about Alexander's medical problems; and, if such discussion results in an improved theory, one of my objectives in offering this analysis will have been fulfilled.

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#### ATLAS, AIETES, AND MINOS ΟΛΟΟΦΡΩΝ: AN EPIC EPITHET IN THE *ODYSSEY*

The word *ολοόφρων*, used in the *Iliad* always of savage animals (the snake which bit Philoctetes [2. 723], a lion attacking cattle [15. 630], a furious wild boar [17. 21]), is applied in the *Odyssey* only to people, namely Atlas (1. 52), Aietes (10. 137), and Minos (11. 322), none of whom displays any evil or cruel characteristics in Homer.<sup>1</sup> Hence, even in antiquity, attempts were made to find another explanation for the word in the *Odyssey*, e.g., Schol. H *Od.* 1. 52: *δλοόφρωνος· Κλεάνθης δασύνει· τοῦ περὶ τῶν ἄλων φρονούντος ἴδιον οὕτως εἰρησθαι. ἄμεινον δὲ ψιλοῦντας ἀκούειν, τοῦ τὰ ὀλέθρια καὶ δεινὰ φρονήσαντος.*<sup>2</sup>

Thus two possible meanings are suggested for *ολοόφρων*: (a) that it was synonymous with *ὀλέθριος*; and (b) that it was derived from *ἄλος* and *φρονεῖν*.<sup>3</sup> Most modern lexicographers favor the first interpretation,<sup>4</sup> but some lexicographers and commentators have suggested that the epithet must have a meaning in the *Odyssey* different from its meaning in the *Iliad*.<sup>5</sup> However, other scholars have accepted the meaning "malign, malignant" in both Homeric works.<sup>6</sup> I suggest that they are correct, since there are several reasons for thinking that *ολοόφρων* has a negative sense also in the *Odyssey*.

1. Cf. W. B. Stanford (ed.), *The "Odyssey" of Homer*<sup>2</sup> (London, 1959), 1:213.

2. Cf. Schol. Y *Od.* 1. 52; Apoll. *Lex. Hom.* 120. 16. On Atlas, Schol. H P Q V; Eust. pp. 1389. 55, 1390. 15; Cornutus *Nat. d.* 26. On Aietes, Schol. Q V T *Od.* 10. 137; Eust. p. 1651. 34. On Minos, Schol. Q T *Od.* 11. 322.

3. A Stoic derivation; cf. Schol. H *Od.* 1. 52; Eust. p. 1389. 55; E. Tièche, "Atlas als Personifikation der Weltachse," *MH* 2 (1945): 69–70.

4. E.g., H. Frisk, *Griechisches etymologisches Wörterbuch* (Heidelberg, 1960), p. 389; E. Boisacq, *Dictionnaire étymologique de la langue grecque* (Heidelberg–Paris, 1916), p. 698; J. B. Hofmann, *Etymologisches Wörterbuch des Griechischen*, vol. 2 (Munich, 1950), p. 230.

5. LSJ<sup>9</sup> "meaning mischief, baleful" *II.*; "crafty, sagacious" *Od.* For "sagacious," see M. C. J. Putnam, "Mercuri, Facunde Neptos Atlantis," *CP* 69 (1974): 215 ff. Cf. W. W. Merry and J. Riddell (eds.), *Odyssey 1–12*<sup>2</sup> (Oxford, 1886), p. 7; Stanford's edition of the *Odyssey*, 1:213; M. Parry in *The Making of Homeric Verse*, ed. by Adam Parry (Oxford, 1971), pp. 88, 215.

6. E.g., R. J. Cunliffe, *A Lexicon of the Homeric Dialect* (London, 1924; repr. Norman, Okla., 1963), 29; A. MacC. Armstrong, "Atlas the Malignant," *CR* 63 (1949): 50.