

# “The good and the bad dying indiscriminately”: The Athenian plague reconsidered

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*As for the gods, it seemed to be the same thing whether one worshipped them or not, when one saw the good and the bad dying indiscriminately.*

—Thucydides, *History of the Peloponnesian War*<sup>1¶53</sup>

In the second book of his *History of the Peloponnesian War*, Thucydides recounts a plague that struck Athens in 430 B.C. and lasted three years. Thucydides, rarely prone to histrionics in his writing, declared the event a “catastrophe . . . so overwhelming that men, not knowing what would happen next to them, became indifferent to every rule of religion or of law.”<sup>1¶52</sup> The Athenian plague is regarded as the most disastrous epidemic of recorded ancient history, and is viewed as one of the major factors contributing to the downfall of the ancient Grecian empire.<sup>2</sup>

Thucydides’s description of the Athenian plague is widely viewed as one of the first detailed accounts of the pathogenesis and epidemiology of a disease.<sup>3</sup> Over the past two centuries, physicians and historians have pondered about the etiologic agent of this epidemic. Two diagnoses have been most commonly accepted: typhus and *Yersinia pestis*.<sup>4</sup> More recently, tularemia, leptospirosis, and infection by influenza compounded by a staphylococcal strain have been offered as possible agents.<sup>4,5</sup>

Pathogens can undergo dramatic mutations over the course of 2400 years. From our modern frame of reference and current knowledge, we can only speculate about which diseases most closely resemble the Athenian plague. Nevertheless, such an exercise enables us to better understand the nature of this plague, and to divine the way in which epidemics, modern and classical, impact the course of history.

This essay examines the merits of previously offered diagnoses, and concludes by the suggestion of a diagnosis that has not been considered seriously as the cause of the Athenian plague: melioidosis. The manifestations of this disease conform extensively with those described by Thucydides.

## The Thucydean text

In relating the pathogenesis of the plague, Thucydides notes the following symptoms:

1. burning feelings in the head
2. red and inflamed eyes
3. parched tongue and bleeding in the throat and mouth
4. malodorous breath
5. sneezing accompanied by hoarseness of voice
6. coughing and severe chest pain
7. vomiting
8. great pain
9. ineffectual retching
10. reddish skin accompanied by a burning sensation
11. small pustules and ulcers on the skin
12. an unquenchable thirst.<sup>1¶49</sup>

Most victims died by the seventh or eighth day, and if they did not, were soon afflicted with uncontrollable diarrhea that was followed by death.<sup>1¶49</sup> Those who survived were marked by ulcerations on the genitals, fingers, and toes, sometimes leading to auto-amputation. The disease was often accompanied by  $\mu\delta\acute{o}$ , frequently translated as “violent spasms.” Since Thucydides only mentions these spasms in conjunction with the coughing and ineffectual retching,<sup>1¶49</sup> it can be assumed that these spasms were strong contractions of abdominal muscles and the diaphragm that accompany the heavy coughing and vomiting. There is no reason to interpret these spasms as epileptic seizures.

Thucydides gives us a few more important clues. First, he notes that those who visited the sick were certain to contract the disease,<sup>1¶51</sup> and that “mortality among the doctors was the highest of all.”<sup>1¶47</sup> This suggests that the disease was spread through aerosolized particles from the lungs or through contact with bodily secretions. Second, we learn that the afflicted were often seen plunging themselves into water tanks in an effort to relieve their insatiable burning and thirst.<sup>1¶49</sup> It follows that the disease could have been introduced into the city’s water supply in this manner. Finally, Thucydides tells us that birds and animals were affected as well.<sup>1¶50</sup> Those animals seen eating human flesh died soon after doing so, and domesticated animals such as dogs were also observed with the disease.<sup>1¶50</sup> Now, familiarized with Thucydides’s account, we may examine alternative diagnoses.

## *Yersinia pestis*

The clinical forms of infection with *Yersinia pestis* include bubonic plague, septicemic plague, and epidemic pneumonic plague. All forms of the plague exhibit an incubation period of two to eight days, approximately what one would expect for the Athenian plague. The bubonic form is the most common. Bubonic plague and septicemic plague are improbable candidates because they are transmitted only by fleas, rats, or contact with the tissue or droppings of infected rodents or humans.<sup>6</sup> They are not known to be transmitted by person-to-person contact or by the waterborne routes that are implied by Thucydides’s account. Indeed, although rats are the most important reservoir for all forms of plague,<sup>6</sup> the absence of a word for “rat” in classical Greek has been taken as evidence that there were no rats in classical Athens.<sup>7</sup> In any case, it seems unlikely that a keen observer such as Thucydides should fail to note the presence of rats.

Bubonic plague is also characterized by the enlargement of lymph glands. Thucydides, however, mentions only

$\mu$   
“small ulcers and pustules.” It does not seem possible that either

or would have been used to describe the large buboes characteristic of bubonic plague when was the word commonly used in the fifth century to indicate a large, swollen lump.<sup>7</sup> Moreover, the use of the adjective  $\mu$  prescribes that the blisters were "small."

In contrast to bubonic plague and septicemic plague, epidemic pneumonic plague may be transmitted via person-to-person contact.<sup>6</sup> Pneumonic plague corresponds to every symptom mentioned by Thucydides with the important exceptions of conjunctivitis, a burning sensation on the skin, and small ulcers and pustules.<sup>8</sup> Moreover, within any single outbreak of *Yersinia pestis*, fewer than 35 percent of all cases are of the septicemic or pneumonic forms.<sup>6</sup>

### Typhus

Perhaps the most widely accepted diagnosis of the Athenian plague has been typhus. However, while many of the symptoms and signs of typhus are similar to those described by Thucydides (as well as having a compatible incubation period) it shares with *Yersinia pestis* the lack of a generalized burning sensation and ulcers or pustules of the skin.<sup>9,10</sup> Thucydides makes the point that the skin afflictions were common to every case.<sup>11,49</sup> The burning and skin irritation was in fact so acute "that people could not bear the touch even of the lightest linen clothing."<sup>11,49</sup> In typhus, the rash, petechiae, and maculopapules may occur in any combination, but there is little discomfort involved and these lesions appear in fewer than 50 percent of all cases.<sup>9,10</sup>

Also arguing against typhus is the fact that Thucydides never mentions the dizziness, mental cloudiness, and confusion seen in this disease. It seems unlikely that he would have overlooked these very prominent characteristics. In the realm of mental disorders, Thucydides makes note only of an amnesia that occasionally appeared among those on the path to recovery.<sup>11,51</sup> The mental ailments of typhus, by contrast, tend to arise from menin-

goencephalitis at the height of the illness and can be severe.<sup>11</sup>

There are still other flaws associated with typhus as a diagnosis: typhus, even under the most adverse circumstances, is fatal in only 40 percent of all cases and cannot be transmitted through ingestion.<sup>9</sup> Moreover, typhus is not known to afflict animals other than human beings, with the exception of rats and the flying squirrel *Glaucomys volans* of the southern United States.<sup>9</sup>

Many of these flaws in the argument that typhus was the Athenian plague have been noted by previous authors, but it has been emphasized that these flaws do not rule out typhus as a diagnosis because the organism is known to mutate rapidly. While typhus in classical Athens would certainly have differed from modern typhus, such arguments based on mutation are too speculative considering that there are an infinite number of possible mutations. Why choose a disease that we know does not fit all the symptoms, signs, and modes of transmission, and then try to justify our choice by speculating that the disease has mutated drastically? Instead, we must search for a modern disease whose manifestations more closely parallel those of the Athenian plague.

### Leptospirosis and tularemia

A few attempts to identify the Athenian plague as something other than typhus or *Yersinia pestis* have been made in recent years. J.A.H. Wylie and H. W. Stubbs have suggested leptospirosis,<sup>5</sup> a disease widely known for its renal and hepatic complications. Thucydides makes no mention of jaundice, the prominent sign common to fatal cases of leptospirosis.<sup>12</sup> Furthermore, over 90 percent of cases of leptospirosis are mild.<sup>13</sup> Leptospirosis is not known to produce the skin ulcers and pustules characteristic of the Athenian plague. It may produce a rash, but only in nine percent of reported cases.<sup>13</sup> Most cases are acquired by contact with rodent urine.<sup>12</sup> Though it is possible that the Athenian plague was spread through

contact with animal urine, the chances are slim that such a mode of transmission would affect so many so quickly.

Wylie and Stubbs also suggested tularemia,<sup>4</sup> which can be dismissed because it carries a low mortality rate and produces skin lesions in only 20 percent of all cases.<sup>14</sup> These lesions are localized to the area of contact. Although the disease is known to be contracted through direct or indirect contact with animals,<sup>14</sup> and affects a variety of animals, dogs are seemingly immune to it. Thucydides specifically mentions dogs as having been affected.<sup>11,50</sup>

### Influenza and staphylococcus

Influenza was first proposed as a cause of the Athenian plague by L. Mercier in 1974.<sup>15</sup> Subsequently, A. D. Langmuir and colleagues suggested that the "Thucydides Syndrome," was an epidemic of influenza closely followed by staphylococcal pneumonia.<sup>16</sup> Both influenza and staphylococcus mutate rapidly, and are capable of causing a wide variety of manifestations. For this reason, it is impossible to argue against the combination being the "Thucydides Syndrome" by attempting to cite symptoms or signs that infection with one or both agents fails to produce.

Influenza seems unlikely given that influenza epidemics are known to be quite brief and do not last two to three years as did the Athenian plague.<sup>17</sup> Indeed, the great influenza pandemic of 1918, like other large-scale urban influenza epidemics, lasted only six to ten weeks.<sup>18</sup> Staphylococcal infections can be excluded because this bacterium has never been known to cause outbreaks of epidemic proportion.<sup>19</sup> Twenty to forty percent of the current world population are nasal carriers of staphylococcus, yet only a fraction of these carriers actually manifest infections.<sup>19</sup>

### Melioidosis

Arguments can be made that the "Thucydides Syndrome" was caused by tularemia, leptospirosis, typhus, or *Yersinia pestis* as long as one presupposes that extensive mutations have

occurred in the organisms over the past 24 centuries. However, a far more likely candidate for the plague at Athens is melioidosis, caused by the gram-negative bacillus *Burkholderia pseudomallei*, a member of the genus *Pseudomonas*. Patients with melioidosis are known to present with every symptom mentioned: high fever (usually in excess of 102 degrees Fahrenheit), conjunctivitis, parched tongue and extreme thirst, bleeding in the mouth and tongue, pulmonary diseases ranging from bronchitis to pneumonia, vomiting, and skin involvement including ulcers, pustules, and burning.<sup>20</sup> The disease exhibits an incubation period of two to four days, and, as it takes its course, diarrhea, striking muscular tenderness, and weakness may ensue. The fever may result in disorientation or amnesia, and survivors can be left with ulcers on the extremities and conjunctivitis.<sup>21</sup> Transmission of melioidosis can be by ingestion, through aspiration of aerosolized particles, and through contact with bodily fluids and animals.<sup>20,22</sup> The bacterium can be isolated from soil, stagnant streams, ponds, pools, and market produce in endemic areas,<sup>20</sup> much as one would expect from the plague described by Thucydides. Melioidosis affects a variety of birds and other animals, both domesticated and nondomesticated, including dogs, cats, rodents, horses, sheep, goats, and cows.<sup>22,23</sup> Its onset is often very abrupt and, as with Thucydides' plague, it takes a rapidly progressive fatal course. The mortality rate for untreated melioidosis is 80 to 90 percent.<sup>20,22</sup> A particularly virulent strain could overwhelm a population without immunity.

Melioidosis is the only disease that fulfills every symptom and mode of transmission, and affects animal populations as well.

An argument against melioidosis is that the disease is fairly uncommon today outside of Southeast Asia, Africa, and northern Australia.<sup>24</sup> Cases have, however, been reported in Iran and Turkey.<sup>20</sup> When melioidosis does appear today, it often takes the form of an epidemic that lasts from several months to two years.<sup>22</sup> In northern

Thailand, for example, melioidosis accounted for 19 percent of admissions and 40 percent of deaths from community-acquired septicemia in a one-year period.<sup>20</sup> With all the invaders, prisoners, and country-dwellers descending on Athens during the early years of the Peloponnesian Wars and living "during the hot season in badly ventilated huts,"<sup>1</sup> it is possible that a bacterium brought in by a foreigner could spread rapidly. The fact that melioidosis is uncommon in modern Greece should not blind us to the striking parallels of the disease as it now is manifest and the plague that struck Athens in 430 B.C.

#### Acknowledgement

I am indebted to Dr. Barron Lerner, Dr. Rebecca Sinos, and Dr. David David, all of whom made valuable suggestions.

#### References

1. Thucydides. History of the Peloponnesian War. Warner R, translator. New York: Penguin Books; 1954.
2. Longrigg J. The great plague of Athens. *Hist Sci* 1980; 18: 209–25.
3. Longrigg J. Epidemic, Ideas and Classical Athenian Society. In: Ranger T, Slack P, editors. *Epidemics and Ideas: Essays on the Historical Perception of Pestilence*. Cambridge (U.K.): Cambridge University Press; 1992. pp. 21–44.
4. Wylie JAH, Stubbs HW. The plague of Athens: 430–428 B.C. Epidemic and epizootic. *Classical Quart* 1983; 33: 6–11.
5. Langmuir AD, Worthen TD, Solomon J, et al. The Thucydides Syndrome: A new hypothesis for the cause of the plague of Athens. *N Engl J Med* 1985; 313: 1027–30.
6. Butler T. *Yersinia* species (including plague). In: Mandell GL, Bennett JE, Dolin R, editors. *Mandell, Douglas and Bennett's Principles and Practice of Infectious Diseases*. Fourth edition. New York: Churchill Livingstone; 1995. pp. 2070–78.
7. Poole JCF, Halladay AJ. Thucydides and the plague of Athens. *Classical Quart* 1979; 29: 282–300.
8. Poland JD. Plague. In: Hoeprich PD, Jordan MC, editors. *Infectious Diseases: A Modern Treatise of Infectious Processes*. Philadelphia (Pa.): J. B. Lippincott; 1989. pp. 1296–1306.
9. Saah AJ. *Rickettsia prowazekii* (Epidemic or louse-borne typhus). In: Mandell GL, Bennet JE, Dolin R, editors. *Mandell, Douglas and Bennett's Principles and Practice of Infectious Diseases*. Fourth edition. New York: Churchill Livingstone; 1995. pp.

1735–37.

10. Dumler JS, Walker DH. Murine typhus. In: Mandell GL, Bennet JE, Dolin R, editors. *Mandell, Douglas and Bennett's Principles and Practice of Infectious Diseases*. Fourth edition. New York: Churchill Livingstone; 1995. pp. 1737–39.

11. Duma RJ. Typhus Fevers. In: Hoeprich PD, Jordan MC, editors. *Infectious Diseases: A Modern Treatise of Infectious Processes*. Philadelphia (Pa.): J. B. Lippincott; 1989. pp. 970–76.

12. Farrar WE. *Leptospira* species (Leptospirosis). In: Mandell GL, Bennet JE, Dolin R, editors. *Mandell, Douglas and Bennett's Principles and Practice of Infectious Diseases*. Fourth edition. New York: Churchill Livingstone; 1995. pp. 2137–40.

13. Heath CW Jr., Alexander AD, Galton MM. Leptospirosis in the United States (concluded): Analysis of 483 cases in man, 1949–1961. *N Engl J Med* 1965; 273: 915–22.

14. Olsen PF. Tularemia. In: Hubbert WT, McCulloch WF, Schnurrenberger PR, editors. *Diseases Transmitted from Animals to Man*. Sixth edition. Springfield (Ill.): Charles C. Thomas Publisher; 1975. pp. 191–223.

15. Mercier L. Essai d'interprétation "όμ " de et de la "Peste" d'Athènes. *Bull l'Assoc Guillaume Budé* 1974; 40: 223–26.

16. Langmuir AD, Worthen TD, Solomon J, et al. The Thucydides syndrome. A new hypothesis for the cause of the plague of Athens. *N Engl J Med* 1985; 313: 1027–30.

17. Morens DM, Littman RJ. "Thucydides Syndrome" reconsidered: New Thoughts on the "Plague of Athens." *Am J Epidemiol* 1994; 140: 621–28.

18. Galishoff S. Newark and the great influenza pandemic of 1918. *Bull Hist Med* 1969; 43: 246–58.

19. Jessen O, Rosendal K, Bülow P, et al. Changing staphylococci and staphylococcal infections: A ten-year study of bacteria and cases of bacteremia. *N Engl J Med* 1969; 281: 627–35.

20. Sanford JP. *Pseudomonas* species (including melioidosis and glanders). In: Mandell GL, Bennet JE, Dolin R, editors. *Mandell, Douglas and Bennett's Principles and Practice of Infectious Diseases*. Fourth edition. New York: Churchill Livingstone; 1995. pp. 2003–09.

21. Puthucheary SD, Lin HP, Yap PK. Acute septicaemic melioidosis: A report of seven cases. *Tropical Geograph Med* 1981; 33: 19–22.

22. Leelarasamee A, Bovornkitti S. Melioidosis: Review and update. *Rev Infect Dis* 1989; 11: 413–25.

23. Howe C. Melioidosis. In: Hoeprich PD, Jordan MC, editors. *Infectious Diseases: A Modern Treatise of Infectious Processes*.

Philadelphia (Pa.): J. B. Lippincott; 1989. pp. 1306–09.

24. Handa R, Bhatia S, Wali JP. Melioidosis: A rare but not forgotten cause of fever of unknown origin. *Brit J Clin Pract* 1996; 50: 116–17.

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### **By and about the author**

*I was born at Columbia-Presbyterian Hospital, where I now spend the vast majority of my time. I grew up in Los Angeles, and worked as a professional lighting designer during high school. I graduated Phi Beta Kappa from Amherst College in 1993, having double-majored in physics and fine arts. I also became interested in classics during my college years, which is how my interest in Thucydides took root. Seduced by the concept of being an advocate, I entered Columbia University School of Law, and worked for the United Nations after my graduation in 1996. During my last year of law school, I did advocacy work for children who were born HIV-positive and found that, while it meant a great deal to me to help them obtain housing and insurance, I longed to help them as a physician. I am a second-year student at Columbia University's College of Physicians & Surgeons. Any free time I have is spent working as coproducer and codirector of a documentary film about the effect of the Cold War on American culture. However, medicine remains the field about which I am most passionate. From an early age, I often accompanied my father as he made rounds each Saturday and Sunday, watching as he would pull up a chair beside a patient's bed and speak with them for hours. I have learned much about both science and humanity from the time I have spent in hospitals, and it is an environment to which I am excited to contribute.*