

Chapter 7

Responses to Natural Disasters in the Greek and Roman World

J. Donald Hughes

Abstract Ancient Greek and Roman records contain many references to natural disasters. Analyzing the immediate reactions to the events, as well as the ensuing responses, is only possible where there is dependable evidence. Two case studies offer eyewitness accounts of disaster, as well as archaeological and scientific studies. These are the plague that struck Athens in 430 BCE during the Peloponnesian War, described by Thucydides who witnessed and suffered from it, and the eruption of Vesuvius in 79 CE, recorded in letters by Pliny the Younger, who saw it and fled from it during its height. The victims of these disasters were plunged into confusion and uncertainty about what to do to survive. In many cases, social cohesion dissolved, and individuals broke norms and traditions. Some sought help from the gods, and others felt there were no gods. In the aftermath, leaders responded with measures intended to help people, restore the body politic, and rebuild. Although frustrated by physical and social barriers, they achieved a degree of success.

Keywords Athens • Greece • Naples • Pericles • Plague • Pliny • Rome • Thucydides • Typhoid • Vesuvius • Volcano

7.1 Introduction

References to natural disasters are scattered through the surviving documents of the ancient Greeks and Romans, and abundant geological and archaeological evidence offers confirmation for them. The Mediterranean area is the unstable meeting place of several of the Earth's moving tectonic plates, so that earthquakes are common, as are sporadic volcanic eruptions of various kinds and intensities, from the explosion

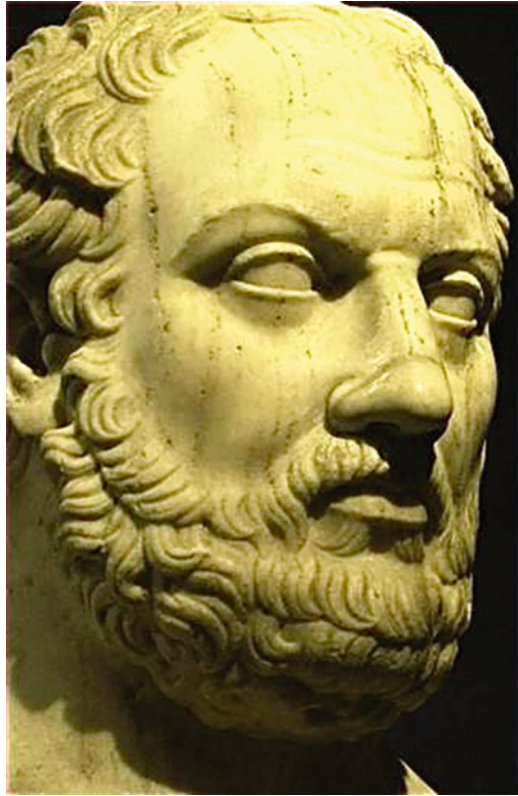
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of the island of Thera in the seventeenth century BCE to the relatively constant rumblings, smoking, and lava flows of Mount Etna. Thucydides (3.89) gives an excellent circumstantial account of a tsunami that struck the Aegean seacoasts in 426 BCE and concludes that the cause was an earthquake (Papadopoulos and Chalkis 1984). Pliny the Elder (*Historia Naturalis* 2.82, 83, 86) remarks that earthquakes cause waves at sea and inundations on land. A major earthquake off the west coast of Crete in 365 CE created a tsunami that killed thousands of people in the Nile Delta and elsewhere around the coasts of the eastern Mediterranean (Stiros 2001, 545–562). Other earthquakes caused landslides and avalanches (Guidoboni 1994). The climate, although much admired by northern Europeans, is unstable, with extreme variations in rainfall from year to year producing heat and cold waves, flood, and drought. Floods are natural disasters because they result from excessive precipitation, but they are much more sudden, and carry damaging material such as rocks and silt, when forests have been removed from the watersheds by fire and/or cutting by humans. The latter is certainly true of the floods of the Tiber River in Rome, which increased in frequency over the centuries as the land upstream was deforested (see Aldrete 2007). The predictable annual flood of the Nile in Egypt provided a blessed gift of water and fertile soil, but either low or very high floods could bring lean years and famine (Garnsey 1988). Winds such as the sirocco and mistral cause sand- and dust storms, while thunderstorms are an annual occurrence, and cyclones and tornadoes or waterspouts are not uncommon.

Another class of natural disasters caused by various organisms is reported by the ancient sources, including locust invasions, diseases of crops and domestic animals, and irruptions of commensal rodents and insects. Most noteworthy were the plagues that killed appreciable proportions of human populations during their attacks. *Nosos* and *loimos*, the Greek words for plague, are general terms for disease; in Latin, the equivalents are *pestis* and *pestilentia*. The most-noted instances in ancient Greek and Roman sources are the plague of Pericles in Athens, which began in 430 BCE; the plague of Marcus Aurelius in Rome, 165 CE; and the plague of Justinian in Constantinople, 542 CE. These diseases, which are not easy to identify, occasioned the loss of as much as 20–40 % of the population in the areas they affected. Malaria, which incrementally invaded the Mediterranean basin, became an undulating drain on health and population rather than a sudden disaster, and although the fact that mosquitos are the vector was unknown, people learned to avoid living in wetlands, building villages on hilltops where possible (Sallares 2002).

It is clear that many natural disasters can be identified in the classical Mediterranean world, but it becomes more problematic to recover the responses of people and societies to disasters. There are several important reasons for this. One is the simple lack of evidence for some periods and places, especially from early times and less urbanized areas. Literature survives from the upper, educated class, from those who could write it and whose texts were valued by later generations of literati. Another factor is that many descriptions of disaster were written long afterward, lacking direct sources of information and possibly corrupted by tendentious explanations that had arisen in the interim. It is also all too easy for a writer to imagine how he and his society might have reacted in a similar situation

Fig. 7.1 A bust of the historian Thucydides, who described the plague in his history, *The Peloponnesian War* (Source: Downloaded from Wikipedia in public domain)



and to impute that reaction to different people living under other circumstances and with different traditions and beliefs. This occurs with a historian writing in Roman times about classical Athens, Plutarch, for example, or with Christian writers like Eusebius or Sozomen writing about what they considered to be pagan antiquity. It can be a pitfall for historians writing in the present age too, this author included, if we are not careful.

I will therefore select two ancient disasters for consideration where we have a first-hand commentator who was qualified to give an eyewitness account of the disaster and the responses made by his contemporaries. The fortunate survival, both of the writers and of their documents, is quite rare in the ancient period. Modern historians, buried as they may find themselves under avalanches of diaries, correspondence, official government reports, etc., may not appreciate how lucky ancient historians consider themselves when they discover that they have a genuine primary source that has been dependably preserved.

The first case is the plague that struck Athens near the beginning of the Peloponnesian War. The historian who recorded it, Thucydides (see Fig. 7.1), not only witnessed its progress but also actually suffered from it himself and survived. The second case is the eruption of Mount Vesuvius in 79 CE that destroyed several

Italian cities and damaged others and was described by Pliny the Younger in letters to his friend, the historian Tacitus. Pliny had an unobstructed view of the eruption and fled from his house through the ash fall, returning later.

7.2 The Plague of Athens

The onset of the plague of Athens occurred in 430 BCE, in the second year of the Peloponnesian War. Pericles (see Fig. 7.2), a general and the leading statesman in Athens, had led Athens into war against Sparta. Since the Spartans were the most-feared army in Greece, while the Athenian navy ruled the waters of the adjacent seas, the Athenians had built strong walls around the city and parallel walls

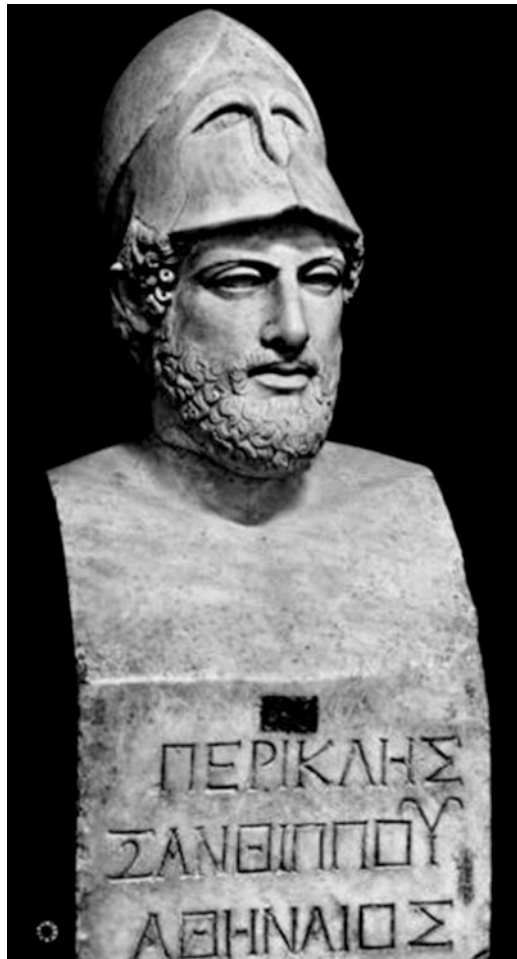


Fig. 7.2 Pericles, the great Athenian general and statesman (Source: Downloaded from Wikipedia in public domain)



Fig. 7.3 Remains of the Wall of Themistocles that surrounded the crowded city during the time of the plague (Source: Photographs were taken by J. Donald Hughes)

connecting it with the port of Piraeus (see Fig. 7.3) so that they could have naval and mercantile access to the sea without exposing themselves to Spartan incursions on land. When the war began, Pericles ordered the Athenians to abandon their farms and other holdings and move inside the walls, abandoning the countryside to the Spartans, who made an annual invasion and ravaged the crops but did not attack the walls. Conditions inside the city were very crowded; in the emergency, citizens occupied every bit of ground even including sacred groves. Estimates of the Athenian population vary, but it is probable that the normal peacetime population in metropolitan Athens and Piraeus was around 100,000, with perhaps 200,000 additional in the rest of Attica. Recognizing that many Athenians were absent from the city with military expeditions on land and sea,¹ it still seems safe to say that the population within the walls at least doubled as a result of the Periclean decree. Ships brought food and other necessities into Piraeus, and it was through the port that the plague also arrived. Thucydides reported that the first cases appeared there.

The author of the eyewitness account of the plague was Thucydides, who says that he started writing his history of the Peloponnesian War the moment the war started, which implies that his record is contemporary with the events he relates (Thucydides, *Peloponnesian War*, 1.1). He could have, and undoubtedly did, revise his text later, but the document is not complete, since it breaks off 6 years before the end of the war, that is, 20 years after the plague arrived in 430 BCE. Most historians believe that he died around 410.

¹Hanson 2005, p. 80, estimates that the trireme warships in the navy required 40,000–60,000 sailors.

He was an Athenian citizen of an elite family with interests in Thrace (northern Greece) including gold mines at a place called *skapte hyle* (“excavated forest”) that ensured his wealth and position. He was an admirer of Pericles, the democratic leader of Athens, in an apparent break from a background that included connections with the most prominent conservative oligarchs. This is exceptional since family and political loyalties went hand in hand in Athens. What Thucydides liked about Pericles was the ability to guide the democracy and keep it from foolhardy actions, at least most of the time. Unfortunately, from Thucydides’ point of view, the Athenians did not always heed Pericles’ advice, and there were always more radical demagogues ready to urge the people to overreach themselves.

Thucydides places his description of the plague immediately after his recounting of Pericles’ funeral oration in honor of the Athenian military men who had died during the first year of the war against Sparta. This speech, one of the greatest in all written history, is a stirring democratic manifesto. The sudden descent into the horrific details of the plague’s effects is arguably the starkest transition in ancient historical literature. In his book, Thucydides does not spare his readers’ harrowing descriptions of the cost of war in human lives and suffering, but his measured opinion is, “The thing that did the most damage and which destroyed the most human life was the virulent plague” (Thucydides, *Peloponnesian War*, 2.47–48; Luginbill 2011, 198).

Rumors reported by Thucydides (2.47–48) said the disease had originated in Ethiopia, spread down the Nile through Egypt to the dominions of the Persian emperor, and then to the island of Lemnos and other parts of the Athenian alliance before advancing to Athens through Piraeus.

The nature of the illness was unknown to anyone, including physicians who frequently died of it after visiting the homes of the sick. Thucydides does not try to guess the name of the contagion but gives a detailed clinical description of the symptoms, which he knew well because he had experienced them himself and wanted his readers to recognize them if the disorder should recur:

Many who were in perfect health, all in a moment, and without any apparent reason, were seized with violent heats in the head and with redness and inflammation of the eyes. Internally the throat and the tongue were quickly suffused with blood, and the breath became unnatural and fetid. There followed sneezing and hoarseness; in a short time the disorder, accompanied by a violent cough, reached the chest; then fastening lower down, it would move the stomach and bring on all the vomits of bile to which physicians have ever given names; and they were very distressing. An ineffectual retching producing violent convulsions attacked most of the sufferers, some as soon as the previous symptoms had abated, others not until long afterward. The body externally was not so very hot to the touch, nor yet pale; it was of a livid color inclining to red, and breaking out in pustules and ulcers. But the internal fever was intense; the sufferers could not bear to have on them even the finest linen garment; they insisted on being naked, and there was nothing that they desired more eagerly than to throw themselves into cold water. And many of those who had no one to look after them actually plunged into the rain tanks, for they were tormented by unceasing thirst, which was not in the least assuaged whether they drank little or much. They could not sleep; a restlessness that was intolerable never left them. While the disease was at its height the body, instead of wasting away, held out amid these sufferings in a marvelous manner, and either they died on the seventh or ninth day, not of weakness, for their strength

Fig. 7.4 Remains of plague victims found in a pit in Athens; note the disorderly arrangement of the burials (Source: Downloaded from Wikipedia in public domain)



was not exhausted, but of internal fever, which was the end of most; or, if they survived, then the disease descended into the bowels and there produced violent ulceration; severe diarrhea at the same time set in, and at a later stage caused exhaustion, which finally with few exceptions was fatal. For the disorder which had originally settled in the head passed gradually through the whole body, and, if a person got over the worst, would often seize the extremities and leave its mark, attacking the privy parts and the fingers and the toes; and some escaped with the loss of these, some with the loss of their eyes. Some again had no sooner recovered than they were seized with a forgetfulness of all things and knew neither themselves nor their friends. (Thucydides, *Peloponnesian War*, 2.49)

Modern medical historians are just as confused about how to diagnose the ancient disease as Thucydides and the Athenian doctors were. No present-day communicable malady matches exactly this list of symptoms, but disease organisms can mutate genetically and phenotypically, and this is certainly possible over a period of 2,500 years. Nevertheless, numerous attempts, some of them very convincing, have been made to identify the outbreak as bubonic plague, typhus, measles, anthrax, smallpox, hemorrhagic fever, or even toxic shock syndrome or Ebola virus. Typhoid fever is possibly the most likely candidate; a study of the dental pulp of the skulls of victims by Dr. Manolis Papagrigorakis (2006) and others at the University of Athens found in a burial pit that can be dated to the first years of the Peloponnesian War (see Fig. 7.4) shows DNA sequences similar to those of the bacterium that causes typhoid. I recited a list of the symptoms reported by Thucydides to Dr. Eric A. Hughes, M.D., Ph.D., a recognized authority in the field of communicable disease and my son-in-law, and he immediately suspected that it was typhoid. Thucydides writes that carrion-eating birds and dogs either died of the plague or escaped it by not touching the bodies of the dead. Typhoid is known to have canine and avian victims.

Typhoid epidemics are common in history and have not disappeared. As I write (2012), they are raging in parts of sub-Saharan Africa, such as Zambia, Zimbabwe, and the Democratic Republic of Congo, with millions of victims. Usually, outbreaks are local and caused by contamination of water and food by fecal material from infected persons or animals. A rumor reported by Thucydides said that the Peloponnesians (the Spartans and their allies) had poisoned the open reservoirs that supplied Piraeus. He did not believe the rumor, and it is unlikely that the Spartans were guilty since they were not suffering from the plague (Thucydides, *Peloponnesian War*, 2.57),² but the story does connect its spread with the water supply. It is more likely that the city's water was contaminated after the plague entered, given the overcrowded conditions. There were numerous wells, local springs, and cisterns that might have received sewage, and even the bodies of victims crazed with thirst, whereas the main supply came through an aqueduct that ran 7.5 km (2.3 miles), from nearby Mount Hymettus, built in the sixth century BCE by the tyrant Peisistratus and his sons, with branches added later from other mountains including Parnes and Penteliko (Tassios 2006, 2007). These were tunnels with vertical airshafts usable for maintenance access built at a distance apart of 40–50 m; the diameter of these shafts is about 1.5 m (4–5 ft), and many of them still exist (Crouch 1993). Outside Athens, the conduits met in a large reservoir, from which the water was distributed by a ramification of underground channels throughout the city. The main one under the agora, which supplied the main springhouse called Enneakrounos (“fountain with nine spouts”), is high and broad enough to allow two men to pass in it. Often pipes of baked clay, about 20 cm (8 in.) in diameter, were laid within them (Koutsoyiannis et al. 2008). This system was built to prevent enemies from interfering with it, but the Spartans, in control of everything outside the walls, could have cut the aqueducts at times, inadvertently causing the Athenians to use sources inside the city that, unknown to them, carried the disease organisms. Whether there was interference with the aqueducts or not, the crowding would have caused water shortage and the use of many sources other than the aqueducts (Hanson 2005, 65, 68).

The plague struck perhaps 50 % of the Athenians who were in the city and killed 25–30 %. The army in the field also suffered from it, especially Hagnon's troops who were sent to northern Greece to help in the siege of Potidaea. The conditions of an army camp located in one position for a long time make the spread of disease easy, and Hagnon returned to Athens after the loss of 1,050 out of his 4,000 men, a 26 % death rate (Thucydides, *Peloponnesian War*, 2.58). The outbreak recurred twice, in 429 and in the winter of 428–427, and the depletion of Athens' manpower undoubtedly contributed to the eventual Spartan victory in the war.

The reactions to the plague as reported by Thucydides are not always those that might be expected by those with some knowledge of ancient Greek literature.

²Thucydides says that very few of the Peloponnesians caught the plague, although they had invaded Attica and were aware of the many funerals being held for its victims. They did not invade in 429, fearing the plague.

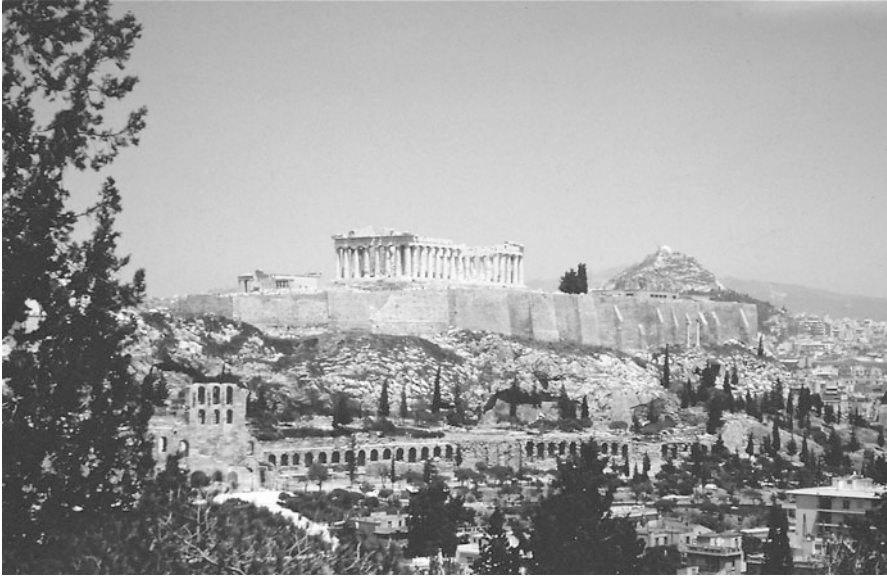


Fig. 7.5 The Acropolis of Athens and the Parthenon seen from the Hill of Philopappos (Source: Photographs were taken by J. Donald Hughes)

The Homeric poems (*Iliad*, 1, 33–67) say that the gods, Apollo in particular, send pestilence when they are angry. They do this not to punish some sin or moral failure but to avenge dishonor against themselves or those they protect. It would be reasonable to expect that the Athenians would ask which of the gods had smitten them with the plague and which offerings to make to mollify the divine anger. Nothing of the sort is mentioned by Thucydides, who says people noticed that those who worshipped the gods died with the same frequency as those who did not. He does say that old men remembered an ancient oracle that said “A Dorian [Spartan] war shall come and with it a pestilence” (2.54.2). Then, further showing his skepticism in matters of religion, he notes that the word *loimos* (pestilence) is pronounced about the same as *limos* (famine) and that the oracle could be taken in more than one way, as often happened. Another oracle, from Apollo at Delphi, promised the Spartans that he would fight on their side, and since Apollo’s weapons in the *Iliad* are arrows of plague and that the plague did not affect the Spartans, Thucydides recalls that some Athenians believed that depressing interpretation of the oracle. The Spartans, fearing that they might contract the plague from the Athenians, did not invade Attica in 429, although they returned the next year. But the connection of disease with the gods remained; a temple to Asclepius, the god of healing and son of Apollo, was erected near the Theater of Dionysus below the south side of the Acropolis in 420 BCE (see Fig. 7.5), after the abatement of the plague (Mitchell-Boyask 2008, 1). Sophocles’ play *Oedipus Rex*, written soon after or even during the Athenian plague, opens with a disease devastating Thebes, and although in the play the cause of the disaster is refusal to accept an oracle of Apollo, the

chorus specifically blames the plague on Ares, the god of war. Sophocles' Theban plague was undoubtedly a reference to the Athenian plague he had experienced and the character Oedipus a likely metaphor for Pericles.

A skeptic of religion, Thucydides is also a keen observer of the political and moral behavior of humans in times of crisis. He is the most astute social critic among ancient historians, analyzing the underlying reasons why individuals on different sides of a conflict make the decisions they do. He shows that in times of war and other disasters, they abandon more embracing considerations of community life for narrow personal interest, and society degenerates into partisanship and even anarchy. He portrays this clearly in the case of the plague. Since those who helped friends that had the disease usually caught it themselves, others decided to leave them to suffer. The sacrosanct way in which burial rites were held by the ancient Greeks is illustrated by the character Antigone in Sophocles' play of the same name, who was willing to die in order to give her brother burial. But Thucydides says that facing the ongoing destruction of human life by the plague, the Athenians abandoned the most-hallowed rituals for cremating the dead, even throwing corpses on the funeral pyres of strangers. This is confirmed by archaeological evidence showing the neglect of traditional burial customs, in that skeletons among the 150 found in the plague pit mentioned above that were found at the lower levels were better arranged but in a chaotic state near the top as if they were simply thrown in (pp. xii–xii, Mitchell-Boyask 2008; see also Baziotopoulou-Valavani 2002).

Those stricken by the disease crowded into sacred spaces and surrounded the shrines of springs. Those who cared for others in spite of the risk Thucydides honors with the term *aretê*, a virtue comparable with that of heroes (Allison 1983, 14). Those who survived an attack did not catch the disease again, or if they did, it was a mild case, so many of them thought their lives were charmed and did help the sick. But the majority, he further notes, facing the likelihood of infection and death, abandoned any respect for the gods or the laws and decided to spend their money quickly and enjoy themselves in any way they pleased.

There were also political reactions. The Spartans and their Peloponnesian allies laid waste to the countryside of Attica for a second summer, and the plague returned virulently, while the Athenians remained crowded inside the city walls. At such a time, Thucydides understands people look for someone to blame. In this case, the blame fell on Pericles. He had started the war, so it appeared to his opponents that the way to deal with disaster was to compromise with the enemy, and now, the assembly sent ambassadors to Sparta to arrange for peace, but they failed. Thucydides says that Pericles had anticipated this turn of events and gives what he claims is the speech of Pericles intended to rally the citizens and gain support for a new war effort. Since Thucydides probably heard the speech, and almost all his audience had heard it as well, we can accept it as representing the intent of Pericles on that occasion and the response to disaster that he recommended.

In the speech, Pericles marshals his arguments to urge his fellow citizens to value the greatness and safety of the state higher than their individual interests. This means continuing the war effort, for which the majority of citizens had voted little over a year before. "Your country has a right to your services," he insists, asking that they

not fail their fathers who had brought Athens supremacy on the sea. The emergency calls for courage and united action. “Cease then to grieve for your private afflictions, and address yourselves instead to the safety of the commonwealth” (Thucydides, *Peloponnesian War*, 2.61.4).

The catastrophe of the plague, he recognizes, could not have been foreseen. The exigencies of a war with Sparta had been predictable, but not this. “Before what is sudden, unexpected, and least within calculation the spirit quails; and putting all else aside, the plague has certainly been an emergency of this kind” (Thucydides, *Peloponnesian War*, 2.61). From the perspective of the eyewitness, this is correct; nothing was understood about the cause of the disease, the conditions conducive to its spread, or possible means of moderating its severity. The only way to face the unknown malady was acquiescence. Pericles assigns the origin of the pestilence not to Apollo, nor to “the gods” in general, but to an undefined *ouranos* (“heaven”), which might be understood in various ways by his listeners: “The hand of Heaven must be borne with resignation, that of the enemy with fortitude; this was the old way at Athens, so don’t be the ones who prevent it from being true today” (Thucydides, *Peloponnesian War* 2.64).

The speech had results; he had persuaded the Athenians to give up attempting negotiations and to put their energy into continuing the war. But they did not feel any better about him for telling them what they needed to hear. Thucydides sees these events through the lens of his personal admiration of Pericles and his political support for the leader’s policies:

As a community he succeeded in convincing them; they not only gave up all idea of sending [negotiators] to Sparta, but applied themselves with increased energy to the war; still as private individuals they could not help smarting under their sufferings, the common people having been deprived of the little that they ever possessed, while the upper classes had lost fine properties with costly estates and buildings in the country, and worst of all, had war instead of peace. In fact, the public feeling against him did not subside until he had been fined. (Thucydides, *Peloponnesian War* 2.65)

But they then felt better and reelected him as general.

Pericles offered no predictions about the future course of the plague. That, too, was unforeseeable. But he could try to deal with the losses it had inflicted. To help restore the number of citizens, he sponsored a law to make it easier to gain citizenship: in the past, one had to prove that both his parents were Athenians, but henceforth, only one Athenian parent would be sufficient.³ We can only wonder if he felt he was in danger of it. Two of his sons had caught it and died. His speech indicates that he intended to lead Athens through the rest of the war, but that was not to be. Within a few weeks, he contracted the plague and died from it. Thucydides estimates the total number of plague deaths among the Athenian military as 4,400 heavily armed infantry and 300 cavalry (who were from the upper class), along with “a number of the multitude” (3.87). The worst result of the plague

³Pericles benefited from this new law, since he had a son also named Pericles, whose mother Aspasia was a non-Athenian. The younger Pericles became a citizen as a result.

according to Thucydides was that it killed Athens's best leader at the time when he was most needed. The plague returned in the 2 years after Pericles' death and then slowly disappeared. Athens fought the war for another quarter century, punctuated by a cold war "peace" involving proxy wars and a hubristic but ultimately tragic campaign in Sicily. The generals that succeeded to power were hawks like Cleon, doves like Nicias, and an infamous traitor named Alcibiades who was rehabilitated by his fellow citizens in time to lead Athens into defeat.

7.3 The Eruption of Vesuvius

An image of Mount Vesuvius painted in the quiescent years of the early first century CE represents a mountain robed in the green of vineyards and presided over by a benevolent Bacchus who is at the same time a bunch of ripe grapes, appropriate for the god of wine (see Fig. 7.6).⁴ The artist, and the people who lived in the towns and farms overshadowed by the mountain, had forgotten that it was a volcano. It was not that Romans were ignorant of volcanoes. Mount Etna on Sicily, just across the strait of Scylla and Charybdis, smoked almost all the time and coughed up lava fairly often, and small islands in the Tyrrhenian Sea such as Vulcano and Stromboli put on a good show as well. Silius Italicus writes of a flare-up of Vesuvius in 217 BCE "with flames worthy of Etna" (*Punica* 8.653–655, 12.140–157), which is possibly confirmed by stratigraphy in the local area and ice core evidence from distant Greenland (De Boer and Sanders 2002, 80; Stothers 2002, 182–185). An earlier explosion detected by modern volcanologists is the Avellino eruption of Vesuvius around 1640 BCE, which covered the area that is Naples today (Sulpizio et al. 2010, 559). Diodorus Siculus (*Bibliotheca Historica* 4.21.5), Vitruvius (*De Architectura* 2.6.2), and Strabo (*Geography* 4.5.8), all writing before 79 CE, thought that the rocks and activity on Vesuvius indicated past eruptions (De Carolis and Patricelli 2003, 41). Strabo believed they had ceased, saying, "one might infer that in earlier times this district was on fire and had craters of fire and then because the fuel gave out, was quenched" (Strabo, *Geography* 4.5.8.). Seneca leaves Vesuvius off his list of well-known volcanoes (Seneca, *Quaestiones Naturales* 6.1, 6.27). Pliny the Elder (*Historia Naturalis* 2.110) lists all the volcanoes he has heard of, and other places where fire comes out of the ground, including some near the Bay of Naples but does not include Vesuvius. He must not have recognized its volcanic character or perhaps thought it was extinct and not worth mentioning. It is therefore not surprising that when Pliny the Younger on one day in 79 CE⁵ was called away from his books to

⁴This painting of Vesuvius was discovered in 1879 on a wall in the Casa del Centenario, one of the largest houses in Pompeii. It is now in the National Archaeological Museum, Naples.

⁵The date given in the manuscripts is August 24, but archaeological evidence, including wind direction and the fruits and other vegetable remains found in Pompeii, suggests a date in autumn (Rolandi et al. 2007).



Fig. 7.6 Vesuvius, as it appeared before the eruption, with Bacchus (the god of wine) covered with grapes. The original was found in the House of the Silver Wedding, Pompeii (Source: Downloaded from Wikipedia in public domain)

see what he described as an awesome cloud shaped like a pine tree, with a trunk rising up in the air to a high elevation where it spread out (see Fig. 7.7), what we might call a “mushroom cloud,” he had to guess which place it was coming from. Soon afterward, he learned that it was Vesuvius.

Pliny was 17 years old at the time, son of Roman upper-class parents from the lakeside town of Como in the Alps. His mother, Plinia Marcella, was the sister of Pliny the Elder, renowned author of *Natural History*, a comprehensive encyclopedia of the Roman state of knowledge about every aspect of nature, which is extant, as well as several histories that are mostly lost. Uncle Pliny was in residence as prefect (admiral) of the most important naval base in the Roman Empire at Misenum in the Bay of Naples, within sight of Vesuvius (see Fig. 7.8), and his sister and nephew were staying with him at his villa there (see Fig. 7.9). He had no children, so his will (to be read all too soon) adopted the younger Pliny and endowed him with his



Fig. 7.7 Umbrella pines; Pliny the Younger compared the cloud rising above Vesuvius to the shape of this pine tree (Source: Photographs were taken by J. Donald Hughes)



Fig. 7.8 View of Vesuvius from Naples near Misenum. This is the same general view that Pliny and his uncle Pliny the Elder had of the volcano (Source: Photographs were taken by J. Donald Hughes)



Fig. 7.9 The replica of the Villa of the Papyri at the Getty Museum, Malibu, California. The villa occupied by Pliny the Elder in Misenum may have been similar (Source: Photographs were taken by J. Donald Hughes)

very considerable wealth and extensive properties. Pliny the Younger's father had died when he was young, so he lived with his mother, Plinia Marcella; his uncle and his guardian Lucius Verginius Rufus were with the army on the German frontier most of the time while he was growing up. In the years after 79, Pliny rose rapidly in the *cursus honorum*, the ladder of position and political power. He studied law

under Quintilian, entered the Senate, was chosen Consul (the highest Senatorial office), and became a member of the judicial council of the emperor Trajan. This is the trajectory of a man whose life was dedicated to supporting the political structure of the Roman Empire. Finally, he was appointed imperial legate (governor) of the province of Bithynia and Pontus (between the Sea of Marmora and the Black Sea in what is now northwestern Turkey). We are lucky to have a generous sampling of his copious correspondence, including letters to emperors and literary figures such as Tacitus, writer of the *Histories* (Pliny the Younger, *Epistles* 6.16, 6.20), to whom the letters describing the eruption were written about 25 years after the event.⁶ While we must allow for distortion of memory over the intervening time, Pliny's vivid account conveys the impression of immediacy.

The disaster had hit without any definite warning; Pliny notes that there had been (see Newbold 1982) tremors for many days before the eruption, but no one had taken them seriously because they occur frequently around the area. Indeed, a strong shock in 62 CE, a few months after his birth, had devastated Pompeii and other places, with damaging aftershocks as much as 2 years later, without an eruption. The local people responded with determination to rebuild houses and public buildings and to restore the aqueduct; the damage was still being repaired at the time of the eruption in 79 CE. In the 62 quake, according to Seneca (*Quaestiones Naturales* 6.1.1–2, 27.1.1–4, 28.1–2), gases had killed 35 flocks of sheep near Vesuvius, an indication that the earthquake was stimulated by volcanic activity. Pliny the Elder (*Historia Naturalis* 2.85) connected earthquakes with some eruptions but did not identify them as warning signs of volcanic activity.

The connection of earthquakes with subsequent eruptions of Vesuvius is still being investigated by seismologists today, and it is now possible to distinguish earthquakes that precede a volcanic eruption from other seismic phenomena (Cioni et al. 2000, 138). Most of the epicenters of earthquakes in the region have been in the Apennines, 50–60 km (30–37 miles) northeast of Vesuvius (Nostro et al. 1998). Today, volcanologists also measure the rise and subsidence of the ground level as a result of the swelling of the magma chamber under the volcano before an eruption and its release afterward. This affects the apparent sea level, with flooding during periods of subsidence, which is notable on the columns of temples built near the sea, due to markings left by sea creatures such as shellfish (see Fig. 7.10).

Volcanological investigations south and east of the mountain have found a series of shallow deposits of ash, lapilli, and fine scoria indicating that relatively small eruptive incidents did occur over the years before 79 CE. The eminent Icelandic volcanologist Haraldur Sigurdsson (1999, 61, 67; Sigurdsson et al. 1985) believes that a small explosion occurred in the night or morning before the awesome event at noontime, which may have alarmed some of those closest to the caldera (Sigurdsson 2002). The family in Misenum seems not to have been aware of it, although noises like distant thunder had been heard for a few days (Jashemski and Meyer 2002).

⁶It is not known whether Tacitus made use of Pliny's information in his *Histories*, since his narrative breaks off in 70 CE, 9 years before the volcanic disaster.



Fig. 7.10 These columns show the evidence of past sea levels by the marks left by shellfish during times when the water was higher. The land rose and fell as the magma underground swelled or was released by volcanic activity (Source: Photographs were taken by J. Donald Hughes)

Pliny says that his uncle was intensely interested in the phenomenon the moment his sister told him about it and climbed up to where he could get the best view. His lifelong devotion to natural science asserted itself. He decided to take a small ship across the bay to observe at closer hand, and invited his nephew to join him, but the younger man decided that reading about the past was more important to him than observing the present, so he stayed behind. On leaving the house to board the boat, the elder Pliny was given a letter from his friend Rectina, who was in her villa at the foot of Vesuvius, and could get away only by boat. He decided to try to rescue victims of the eruption and ordered the fleet to assist. Finding that shallow water and debris from the volcano prevented him from landing, he used the wind to cross the bay to Stabiae, where he found that another friend, Pomponianus, had loaded his boats to escape but could not due to the contrary wind and rough waves. Demonstrating unwarranted calm in the face of danger, Pliny the Elder bathed, dined, and took a nap. By then, the stones and ash had piled up so deep that they threatened to trap him in his room. He and his friends realized that if they decided to remain there, they would be buried, so they went down to the shore in total darkness with pillows tied on their heads as protection against falling rocks. Then Pliny, an obese man who had trouble breathing, died overcome by ash, gases,

and overexertion, and the others had to abandon his body. It was found 2 days later, his nephew learned, clothed, and looking more asleep than dead. Experience studying modern volcanic disasters indicates that death in circumstances like this most likely results from asphyxiation due to fine ash filling and plugging the lungs and esophagus, but the reason Pliny died while his companions survived is probably his corpulence, overexertion, and weak constitution.

Meanwhile, the volcanic fallout was approaching Misenum, and the younger Pliny was not only observing the reactions of others to the disaster but also demonstrating them himself. First, denial. Like his uncle, he had a bath followed by dinner and then tried to sleep but was roused when his mother, terrified, broke into his room. They sat on the terrace while Pliny resumed his reading of Livy, rejecting the warnings of a friend of his uncle. Then, since the house was shaking violently and threatening to collapse, they decided to flee from the town, along with a crowd of others. Their carts were thrown around by the earthquakes. They paused, only to see the seawater retreating in advance of a tsunami and the ominous pyroclastic cloud approaching across the bay over Capri to the cape of Misenum itself. He and his mother fled a little further then stopped because absolute darkness overtook them. He heard the vocal exclamations of the refugees:

You could hear women lamenting, children crying, men shouting. Some were calling for parents, others for children or spouses; they could only recognize them by their voices. Some bemoaned their own lot, others that of their near and dear. There were some so afraid of death that they prayed for death. Many raised their hands to the gods, and even more believed that there were no gods any longer and that this was one last unending night for the world. Nor were we without people who magnified real dangers with fictitious horrors. Some announced that one or another part of Misenum had collapsed or burned; lies, but they found believers. It grew lighter, though that seemed not a return of day, but a sign that the fire was approaching. The fire itself actually stopped some distance away, but darkness and ashes came again, a great weight of them. We stood up and shook the ash off again and again; otherwise we would have been covered with it and crushed by the weight. I might boast that no groan escaped me in such perils, no cowardly word, but that I believed that I was perishing with the world, and the world with me, which was a great consolation for death. (Pliny the Younger, *Epistle* 6.20)

Here, as in response to the plague of Athens, people are shown either beseeching the gods for help or denying their existence. Those with a Stoic view might well have thought they had come to the cyclical fiery end and renewal of the universe (Fisher and Hadley 1979, 9–15). Pliny does not report anyone blaming the likeliest gods, Vulcan himself or the malevolent Titans, who were imprisoned under volcanoes according to mythology. And yet the gods were seen as causes of disasters like this. Martial, who was a contemporary of Pliny, lamented the destruction of a rich agrarian landscape (Stefani 2010):

This is Vesuvius, green yesterday with viney shades; here had the noble grape loaded the dripping vats; these ridges Bacchus loved more than the hills of Nysa [his home]; on this mount of late the Satyrs set afoot their dances; this was the haunt of Venus, more pleasant to her than Lacedaemon; this spot was made glorious by the fame of Hercules [Herculaneum]. All lies drowned in fire and melancholy ash; even the high gods could have wished this had not been permitted them. (Martial, *Epigrams* 4.44)



Fig. 7.11 The shape of a man recovered by inserting plaster into the cavity left by his body, in Pompeii (Source: Downloaded from Wikipedia in public domain)

Beside the eyewitness accounts, we have striking evidence of the last moments of the victims of the disaster in the form of hollow impressions in the compacted ash of Pompeii that, filled with plaster and then freed from these molds, reveal the forms of humans and other animals, including clothing, their physical positions, and even in some cases their expressions (see Fig. 7.11). In Herculaneum, the bones of people who had fled to the docks in hope of escape, but were killed instantaneously by the incredibly rapid arrival of heated mud and gases, have been found (see Fig. 7.12). Many more will undoubtedly be discovered as excavations continue.

The immediate reaction of people was to save their lives by any means possible. Some decided to flee, and these at least had a chance, since it seems the majority of residents did survive. Others sought shelter inside their homes, temples, or other buildings, and these mostly died of suffocation by ash or the hot gases accompanying pyroclastic flows.⁷

⁷Pyroclastic rocks are fragmentary volcanic rocks consisting predominantly of pumice and volcanic ash. Pyroclastic flows are hot, turbulent avalanches of pumice, ash, and gases that pour down the slopes of a volcano at high speed, sometimes faster than 100 kph (62 mph).



Fig. 7.12 A colonnade on the former coastline of Herculaneum, where many people fleeing the eruption were overtaken and killed by the pyroclastic flow (Photographs were taken by J. Donald Hughes)

In a sense, the volcano had created a trap; the very lushness of the vineyards and other vegetation was the result of prior eruptions. Volcanic deposits can become some of the richest agricultural lands on Earth because they contain a wide variety of the elements needed for plant growth. In the Mediterranean region, these rich black soils contrast with the meager red and yellow soils that develop on the prevalent limestone base (Fisher et al 1997). They attract farmers to the very places that may be in danger of further eruptions. In addition, the pozzolano ash deposits that were the main ingredient of Roman concrete attracted miners to the region around Vesuvius (De Boer and Sanders 2002, 74–107; Darley 2011, 18). The only effective plan to avoid damage and loss of life from eruptions is to avoid settlement on volcanic soils near an active volcano. Because the length of time between eruptions can be many years, generations, or even millennia, the short-term economic needs of people lead them to bet against a new eruption in their own lifetimes or those of their children. This virtually assures future disaster.

The response of the Roman government after the eruption was to offer aid. The reigning Emperor Titus (see Fig. 7.13), to whom the elder Pliny had dedicated his *magnum opus*,

showed not merely the concern of an emperor but even a father's surpassing love, now offering consolation in edicts and now lending aid so far as his means allowed. He chose commissioners by lot from among the ex-consuls for the relief of Campania, and the property of those who lost their lives by Vesuvius and had no heirs left alive he applied to the rebuilding of the buried cities (Suetonius, *Titus* 3–4).

Fig. 7.13 Titus was emperor during and after the 79 CE eruption. He organized relief efforts for the survivors of the disaster (Source: Downloaded from Wikipedia in public domain)



So says Suetonius, who had served on the staff of Pliny the Younger and was often critical of emperors but gave qualified praise to those like Titus whom he considered to be fair and devoted to government (Sebesta 2006). Titus himself went to the stricken area after the eruption; we know this because he was there when a major fire hit Rome the next year (Scarth 2009, 83). It is probable that his reimbursement for lost property actually worked and that well-to-do Romans were able to rebuild their villas on the shores of the bay, although they may not have been in a hurry to reoccupy them. Survivors could be helped to resettle in nearby towns. However, the restoration of the deeply buried cities soon appeared to be impossible. Repair had always taken place after earthquakes, but the sites of Pompeii and Herculaneum were not reoccupied in ancient times. Residents and looters tunneled into Pompeii, breaking through walls as they looked for treasure. In Herculaneum, the solidified pyroclastics defeated any such efforts. “When this wasteland regains its green, will men believe that cities and peoples lie beneath?” asked Statius (*Silvae* 4.4). Evidently not. Farms were opened above the phantom ruins, but the sterile volcanic ashes were transformed into soil of exceptional richness only after decades (Allison 2010). This favored speculators wealthy enough to acquire land and wait until agricultural development was profitable, while small farmers could not afford to take the economic risk.

In the meantime, Rome had to turn to southern Gaul and Spain to replace the wine from the “vine-covered hills whose liquid produce is famous in every land and ennobles tipsiness” (Pliny the Elder, *Historia Naturalis* 3.60). The area the volcano had devastated was part of Campania, which was also Rome’s most important nearby source of olive oil, wheat, sheep, pigs, and fish (Allison 2002, 110–114). The imports of these products from Gaul to Rome rose sharply.

The land recovered its agricultural richness: as Cassius Dio observed 150 years later, “The elevated parts of this mountain [Vesuvius] are clad in many trees and vines . . .” (*History of Rome*, 66.23), but the buried cities were not restored. It was not until after 1,000 CE that a town named Resina arose, unsuspecting that Herculaneum lurked under its foundations. Cities on the northwest side of the bay, however, soon removed the lighter ash falls that had occurred there and revived as centers of commerce and pleasure. The emperor Hadrian had a resort on the coast of the Bay of Naples but spent little time there; he had a more lavish one at Tivoli and traveled constantly throughout the empire (Scarth 2009, 85).

Vesuvius was not finished. It erupted again in 172 while Marcus Aurelius was emperor, and at least eight more times up to the year 1139 CE, when there was a spectacular eruption with fountains of molten lava, mentioned among others by the Englishman John of Salisbury, then Bishop of Chartres. Then there was a long period of almost non-interrupted quiet until December 15, 1631, when a major eruption killed more than 3,000 villagers and rained ash as far as Istanbul (see, e.g., Dobran 2006). After that, there followed a series of over 20 important eruptions, averaging 13–14 years apart, the last of which occurred on March 1944 during the allied campaign in Italy in the Second World War (see Fig. 7.14), damaging much of an airbase near Pompeii, destroying at least 80 airplanes on the ground, wiping out several villages and killing 28 people (Chester et al. 2007).

The quiescent period since then has lasted 68 years at this writing (2012). In the crater and nearby, there are hot vents of steam and gases that have a sulfurous smell, and sulfur deposits as well, often noted by mountain climbers and confirming that the volcano is still active, but they are seldom seen from afar. I flew over Vesuvius in 1959 and have visited Naples, Herculaneum, Pompeii, and Sorrento several times since and, from that distance, have seen no smoke or steam rising from the volcano. Eruptions occurring in the past after long inactive periods have usually been the most destructive ones, and another eruption is inevitable, according to volcanologists.

About 3,000,000 people live in the possible danger zone around the mountain, going about their daily lives without being preoccupied by the thought of an eruption, except for the few who have the responsibility of preparing disaster plans (Lancaster 2005). Humans are powerless against volcanoes, so the plans have to involve relocation outside the danger area or evacuation before or during an eruption. The Italian government has endorsed both approaches. Relocation is unpopular; the amount offered as a subsidy is small, and only 5,697 families applied in the first 2 years, a number smaller than those who have moved to the slopes of Vesuvius, many illegally, and occupy homes that may not meet

Fig. 7.14 The eruption of Vesuvius in 1944 (Source: USAAF during World War II)



building standards. In 1995, the Italian Civil Protection Agency approved a Vesuvius evacuation plan that assumes a warning of about 2 weeks before an eruption on the basis of seismicity, ground deformation, geochemistry of gas, and gravitometry. These factors are all recorded by the Vesuvius Observatory, founded in 1841 on the mountain by Fernando II, King of the Two Sicilies, as the world's first scientific volcano observatory. The building on Vesuvius is now a museum, while the work of the volcanologists has been moved to Naples. The evacuation plan defines a red zone containing a number of villages around the volcano, with a total population of almost 700,000, to be evacuated by bus, train, and boat to other parts of Italy in advance of an eruption. The plan has been attacked and its implementation stymied by bitter political controversy. A counterplan called Vesuvius 2000 was prepared at a conference of scientists and experts and described the government plan as inadequate, which of course it could well prove to be in an actual event (Dobran 2006). Meanwhile, real estate promoters and others with development interests tell people that Vesuvius is extinct. Scientists, gathering information from benchmarks, gravity stations, seismic stations, tidal gauges, and leveling lines for surveillance of changes and having detected a huge pool of magma under the mountain, disagree.

7.4 Conclusion

The ancient response to disaster in the cases examined here was for the most part uninformed, chaotic, and inadequate. Knowledge of the true causes of disease and volcanic eruptions did not exist. The assignment of responsibility to the gods was only an admission of ignorance, and this was tacitly understood by our learned philosophical eyewitnesses if not by the general public at the time. In spite of their undeniable intelligence and inquisitiveness, Greeks and Romans of the educated classes found it challenging or impossible to explain many natural phenomena. (Vittori et al. 2007, 52)

The victims were caught unaware, although in both cases, there were warnings that were not heeded because they were not comprehended: the approach of the plague from Egypt was ignored, and the earthquakes that preceded the eruption could not be distinguished from those that are commonly felt in the Mediterranean region.

During the actual event, social cohesion broke down, and most individuals tried to save themselves and perhaps also those closest to them without concern for the larger community and also without knowing what was the best course of action. Thucydides believed that care for others and for society provided the cohesion necessary for the state and that war and the plague dissolved this social glue for most people. Pliny reports that those around him when he fled from his uncle's house were disoriented, panicked, and willing to follow anyone who looked as if he knew what he was doing, whether this was true or not. The fact that he tries to portray himself as calm in the midst of storm only protests his own disorientation. His uncle had been calm indeed, but calmness after he had landed at Stabiae only led him to his death.

In the aftermath, those in positions of leadership tried to reestablish the body politic and their own positions at its head, with success that was well intended and at least partially successful. Pericles gave a speech that rallied the people around him after some initial disgruntlement but of course could not stem the plague, which killed him. The pestilence ran its course but weakened the military strength and leadership of Athens. Titus, who had shared imperial power with Vespasian for about 9 years, became sole emperor only 2 months before Vesuvius blew its top. He organized relief efforts intended to prevent anarchy in an essential part of Italy, but full restoration proved impossible, and he perished 2 years later, when power was seized by Domitian, a man ill suited to wield it.

These ancient case studies are worthy of careful study in the modern world, where a rapidly growing and crowded human population offers increasingly fertile ground for the mutation and spread of new diseases analogous to AIDS, SARS, Ebola, and bird flu. Imagining the people of modern Naples trying to cope with a new Plinian eruption offers a horrifying prospect, in which one wonders whether or not our increase of knowledge has improved our social wisdom and ability to cope. As the Roman poet Statius (*Silvae* 4.4) warned, "This summit does not cease its mortal threat."

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