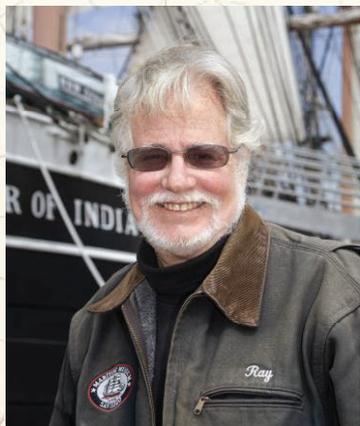


Dear Shipmates:



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It's been a while since the last update and in consequence, well, there's more to report. First of all, the intrusions have continued to provide interesting diversions. One afternoon, an intruder jumped into the water from the Embarcadero, swam to the USS Dolphin and entered the Museum by climbing up its side. Keep in mind that the hull of the Dolphin is encrusted with marine growth, including razor sharp barnacles and mussels, so in effect this was kind of a self-inflicted keel hauling. As the uninvited visitor meandered about until he found his way out, he left a trail of blood that can still be picked out along Museum docks and gangways. Given the likelihood of infection from these kinds of injuries, he probably regretted his adventure for some time and may still be yet. In another episode, a young woman was being photographed on the Embarcadero with her back to HMS *Surprise*, as often happens, when her partner urged her to "take a step back..." Following this instruction, she plunged backward straight down into the bay, but in this instance she was able to swim to a nearby ladder and climb out without the kind of lacerations experienced by the first visitor. It's a good thing they weren't visiting the Grand Canyon.

With happy news, our Museum did receive PPP funding which allowed us to bring back a number of staff and will see us through the next two months. It also means that those of us who have been living at the Museum have been relieved by our regular security department and can go home. All our returned staff are busy catching up on ship maintenance, planning and preparing for our eventual reopening, and working on grant projects.

While these loan/grants and grants are life sustaining, they don't begin to cover the near total loss of operational revenues which has ensued since we were forced to shut down. In keeping, I once again am overjoyed to express our gratitude for the moving generosity in financial support that has come from members and donors. Accompanying many of those donations were heartfelt notes and letters containing expressions of support, appreciation for our organization, and affection for the ships and what they mean to our community. Also keeping us going, is the gradual return of our volunteer maintenance crew. The eerie quiet and stillness at the Museum had become to seem almost normal, so the days since staff and volunteers have been able to return now seem like an ongoing reunion of old friends long separated. That being said, we are taking very seriously our commitment to the newfound array of safe practices: taking temperatures, requiring face masks, keeping personal distance, and avoiding any congestion in spaces down below. And of course, all of us are looking forward to the day when our ships are once again teeming with visitors, school children, and passengers about to embark on under way adventures.

So, as we consider our ongoing experience of a shelter in place directive against a larger context, that question of "opening back up" and returning to some kind of normalcy is a staple of everyday news. But it's not something

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restricted to our times alone. “Shutting down” and “opening up” has ever been a feature of challenges posed by epidemics across time.

What did James Lind know about earlier epidemics?

With the kind of middle-class education that James Lind would have carried with him to sea as a surgeon, he would have been familiar with such issues from Britain’s own recent history as well as from popular classics of the ancient world such as Thucydides’ account of the plague of Athens in *History of the Peloponnesian War*. Probably though, it would not have been until later that Lind would have become familiar with similar dark stories told by less famous historians, not until he began to train as a physician at the University of Edinburgh’s Medical School. It was likely there, for instance, when he would have run across the work of another witness to such events, the 6th century Byzantine Greek historian Procopius.

One of history’s principal sources on the rule of Justinian I (Emperor 527-565), Procopius was a learned legal advisor to the general Belisarius, whom Justinian tasked with the military reconquest of many lost provinces of the western Roman empire and their return to Constantinople’s rule. Procopius’ privileged position as an insider to Belisarius’ general staff on many campaigns as well as his elevated position in the Byzantine political structure gave him the opportunity to observe firsthand and assess qualities and methods of leadership during several episodes of military and social upheaval, among them one of the deadliest plagues of history. In the works he published during his life, his tone in commentary on the competence of his contemporary political masters was understandably measured and positive. In the personal opinions he left for posthumous publication, however, he was scathing, and never more so than when relating how leadership in his day managed a public health crisis. And as it had been with Athens, this time too, death came by sea.

Questions about the origin of pandemic disease have always accompanied news of their outbreak, whether as we today read in the news, perhaps from bats or exotic animals sold in wet markets (or even the accidental escape of virus from some lab), or as often in the past, a conspiracy by dark forces or as God’s retribution, there has always been the sense that something has “escaped” or “jumped” its normal bounds of confinement to wreak sudden devastation on an unprepared society. In fact, epidemic disease *does* sometimes jump from one species to another, sometimes borne by an intermediary species, and whatever form the contagion takes it is always aided and amplified by the movements of humans. Through most of history, the long-distance movement of humans took place almost exclusively by sea.

An expansive arterial network of maritime commerce was just as much an essential ingredient of the Mediterranean world during the Byzantine period as it had been in the Age of Pericles. Like Athens of Thucydides’ day, Constantinople occupied a strategic location, in its case astride the vital



connection between the Black Sea and the Eastern Mediterranean, forming a densely populated and fortified hub which radiated extensive networks of naval and maritime power. Within this network, ships facilitated every form of political and commercial exchange, the principal carriers of goods, people, and information. But ships also almost always carried rats as unwanted passengers, and even in normal circumstances the common “ship” or “black” rats (*Rattus rattus*) ubiquitous in ships and in cities throughout Europe for thousands of years carried fleas, which can transmit a number of deadly diseases including typhus. But the *oriental rat* (*Rattus norvegicus*), now common everywhere but in ancient times more restricted to Asia, unlike its European rival at that time, also sometimes carried the flea species *Xenopsylla cheopis*, which in turn can be infected with the bacterium *Yersinia pestis*, the bacillus of bubonic plague. The two species of rat compete with one another within environments characterized by dense concentrations of humans, and apparently on several occasions in the past it happened that *norvegicus* expanded its range westward into territory dominated by *rattus*, aided by transportation in the holds of ships. When fleas heavily infested with *Yersinia pestis* bite their rat host, they disgorge some of the bacillus back into the bloodstream of the animal, where the bacteria proliferate and promote transmission to additional animals via more flea bites. When an infected flea jumps from rat to human and bites its new host, the infection likewise propagates and symptoms can begin to appear within a few days: nausea, vomiting, and fever, ultimately leading to swollen and painful lymph nodes (buboes) and black skin lesions. If the infection enters the lungs, it takes pneumonic form and becomes extremely contagious in transmission from one human to another without then needing a flea intermediary. Historically the bubonic form was fatal to humans 50%-70% of the time. Pneumonic plague was *always* fatal.

Like almost every large city, Constantinople could not feed itself and required a constant flow of grain across the sea from Egypt, as did many other Mediterranean seaports and cities. These stores were loaded on board ships in Egypt from gigantic granaries that were perpetually infested with rats. But not until the 6th century, evidently, were the Nile granaries home to oriental rats carrying *Xenopsylla cheopis* and *Yersinia pestis*. In his *Secret History*, Procopius recorded the first instance of plague near Suez in 541 and shortly thereafter, it began to appear in other ports and finally Constantinople itself. Because it was realized that whatever was causing the plague, it was spreading by sea routes, the remedy would have been to close ports, “shutting down” the Byzantine Empire until the contagion subsided. This might have stemmed the spread of disease but it would have also brought an immediate decline in all forms of commerce and associated tax revenues. It would also have provoked serious economic hardship, and with the flow of grain suspended, the real possibility of mass starvation, an outcome unacceptable to Justinian and the Byzantine elites. So, Constantinople stayed open for business and predictably the plague took hold. According to Procopius, the

death toll within the walls of the city eventually rose to 10,000 people per day (modern historians have concluded that 5000 deaths per day is probably a more accurate figure), so many that even mass burials could not keep up with the accumulation of bodies everywhere. The horror continued until 40% of Constantinople's population succumbed (Justinian himself caught the plague but survived) and perhaps as much as 25% of the entire population of the Eastern Mediterranean was wiped out. According to Procopius, this immense tide of suffering did nothing to stimulate empathy on the part of Justinian. Farming and merchant communities nearly obliterated were not only required to remit the standard annual tax but the survivors were also required to cover the tax obligations of their newly deceased neighbors. Of course, the construction of ostentatious churches and palaces funded by these revenues continued apace.

Despite extraordinary measures to extract tax revenues as usual from ever shrinking streams of commerce, these efforts failed under a general economic collapse and Constantinople saw the reversal of what had been a growing and successful economy and a chain of impressive military and political victories. The Vandals, Lombards, and Goths, Byzantium's adversaries all but defeated, reinvigorated as the Empire weakened, renewed their assault on the western provinces, and ultimately the reunion with much of the old Roman Empire fell apart. Recurrences of Justinian's plague continued to beset the Mediterranean world for the next two centuries, ultimately killing somewhere between 25 million and 100 million people (the latter equal to half the European population of 550).

With the germ theory of disease many years away, James Lind would not have understood how the complex interaction of animal vectors, aided by human activity, positioned Justinian's plague to deliver such a devastating blow to the prospects of the last seaborne empire of the classic age. But he certainly was aware, if not quite from living memory then surely from cultural memory, of another more recent public health horror yet more breathtaking in scope even than Justinian's plague. To James Lind's knowledge, the Black Death was the single greatest catastrophe ever to befall humanity.

So stay below and stay safe!

Raymond E. Isley



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