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PART I

PREEXISTING
CONDITIONS

Around the Mediterranean lies the continents far and wide, pouring an endless flow of goods to Rome. There is brought from every land and sea whatever is brought forth by the seasons and is produced by all countries, rivers, lakes, and the skills of Greeks and foreigners. So that anyone who wants to behold all these products must either journey through the whole world to see them or else come to this city. . . . So many merchantmen arrive here with cargoes from all over, at every season, and with each return of the harvest, that the city seems like a common warehouse of the world. One can see so many cargoes from India, or, if you wish from Arabia. . . . Clothing from Babylonia and the luxuries from the Barbarian lands beyond arrive in much greater volume. . . . Egypt, Sicily, and the civilized parts of Africa are Rome's farms. . . . All things converge here: trade, seafaring, agriculture, metallurgy, all the skills which exist and have existed, anything that is begotten and grows. Whatever cannot be seen here belongs in the category of non-existence.

—AELIUS ARISTIDES'S ORATION "TO ROME" (OR. 26.11–18),
MID-SECOND CENTURY AD

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I

ROME'S FRAGILE PEACE

Rome of the Pax Romana seemed replete with the bounty of the entire known world. Eastern trade boomed. Egyptian grain poured into city storehouses each summer. Greece sent her marbles, and Dacia her silver and gold. Tens of thousands of slaves from every known land walked the city streets. Many were the fruits of conquest and hegemony—a grand harvest that inspired the orator Aelius Aristides to boast in AD 155, ten years before the Antonine plague swept through the Empire, that “all things converge here: trade, seafaring, agriculture, metallurgy, all the skills which exist and have existed, anything that is begotten and grows. Whatever cannot be seen here belongs in the category of non-existence.”¹

On the eve of the Antonine plague, the literature of the Empire's elite suggests they lived in the greatest time in not just Roman history but all human history. English historian Edward Gibbon in his *History of the Decline and Fall of the Roman Empire* famously reached this same conclusion: “If a man were called to fix the period in the history of the world, during which the condition of the human race was most happy and prosperous, he would, without hesitation, name that which elapsed from the death of Domitian [AD 96] to the accession of Commodus [AD 180].”² Yet in the intervening centuries since Gibbon published those quotable lines, archaeologists and historians have uncovered a trove of evidence that suggests the abundance of the Pax Romana came at tremendous

cost. And although prosperity had its price, Rome's nobility—the senators and equestrians with their vast estates, moneylending networks, and control of the imperial state—rarely had to pay it.

Instead, much of the pain that produced Rome's gain was borne by those plundered and even slaughtered at the Empire's margins, both geographic and social. Universal empires in all periods promise “peace” once there are no more external enemies to fight; but inevitably, the violence previously exported merely consolidates inward in the form of oppression and control.³ Those subject to Rome's mechanisms of compulsion were too numerous and diverse to categorize. Many lived among the various foreign peoples subject to brutal martial law, forced enslavement, or crushing expropriations. Others were indirect victims. Roman taxes, conscription, and other forms of coercion alienated farmers from ancestral lands, driving them into filthy and unwelcoming cities. Even the Empire's own soldiers paid dearly in both blood and treasure so members of the ruling class might wallow wanton in riches and repose. But at the noble heart of Rome, these costs of empire were out of sight, and therefore out of mind. Aristides's oration unwittingly captured the freeriding elite's most subtle entitlement: ignorance. “Wars . . . no longer seem real,” the orator beamed, “stories about them are interpreted more as myths by the many who hear them.”⁴ For a precious few like Aristides, the peace of the Pax Romana seemed a gift that would continue to give into eternity.

But the Roman social order was more than just exploiters and the exploited; there were shades of gray. The hues, however, are difficult to distinguish, as elite perspectives dominate our sources. The senator Tacitus, for example, divided the commoners in the city of Rome into two distinct classes: the respectable clients and freedmen attached to noble houses, and the “dirty” plebs who were “addicted” to the circus and theater.⁵ The senator generalized from his lofty position of political, social, and economic privilege. Modern historians also observe ancient Rome from a distance, but with new inscriptions, accounting tablets, and other archaeological material bringing some areas into focus. It seems that middling inhabitants—wealthy merchants, local landlords, professional artisans, and even some smallholder farmers—escaped the

typical preindustrial traps of scarcity and autarky. Recent archaeological surveys of rural sites in southwest Tuscany, for example, have turned up numerous small but specialized farming and production operations. Not all non-elites were helpless victims of oppression; some used markets and other institutions to mitigate the challenges of preindustrial life in a tributary empire.⁶

Was this society capable of withstanding the world's first major pandemic? Rome was about to find out. The question demands we inspect the Empire's social and economic foundations, especially the extent to which the inhabitants of the Roman world were already teetering on the brink of poverty. Poverty on any scale—whether for individuals or whole societies—interacts with and affects many of the basic elements of human health and wellness: nutrition, labor, stress, and the environment. At the level of the general population, poverty reduces what social scientists call “resilience.” In simple terms, resilience is the capacity for a society to retain its essential functions, structures, identities, and feedbacks amid or in response to disasters.⁷ Massive exogenous shocks—unpredicted events that originate from outside a system—alone do not transform human societies; endogenous institutions and human choices play a crucial role in determining the significance and lasting effects of systemic crises. Resilience depends in large part on what Scheffer calls “adaptive capacity”—that is, “the degree to which a system is capable of reorganization, learning, and adaptation.”⁸ Resilience is, therefore, neither monolithic nor simplistic. Different shocks and different societies interact in unique and often unforeseen ways. Causality does not merely move one way—from disaster to social crisis. Widespread poverty, for instance, injects stress into the social fabric of societies before any cataclysmic acts of God. A society already struggling to adapt to endogenous stressors is more likely to undergo a transformative crisis in the face of a sudden and significant burden of parasitic microbes.

Few familiar with Roman history would pick the Pax Romana as a moment when the Roman Empire crossed the threshold of resilience.⁹ The Roman Empire of the mid-second century seemingly reached the pinnacle of preindustrial prosperity and resilience—a golden age of the ancient world. Elites like Aristides propagate such perceptions plainly.

So too do the numerous victory arches, columns, and monumental buildings of the Pax Romana that still stand tall in the Eternal City. But Nobel Prize–winning Austrian economist Friedrich Hayek wisely alluded to the deceptions of imperial monumentality: “Nothing is more misleading,” he said, “than the conventional formulae of historians who represent the achievement of a powerful state as the culmination of cultural evolution: it has often marked its end.”¹⁰ In fact, another Austrian—ancient historian Walter Scheidel—has gone further, arguing that only when Rome’s super state ended was Europe finally free to achieve lasting prosperity.¹¹

Similarly, I believe it is an open question as to whether the highest achievements of the Pax Romana sufficiently buffered the Empire’s population against the novel pandemic that swept across Eurasia in the AD 160s. In fact, paradoxically, it may be in part *because* of Rome’s apparent successes—its ability to wage protracted wars, its remarkable road network, its Egyptian breadbasket, its internal urban immigration, its maritime trade links with Africa, India, and East Asia—that such a large part of the preindustrial world so suddenly succumbed to global pestilence and suffered major institutional shifts in the pandemic’s wake. The story of the Antonine plague therefore does not begin with the disease but with an essential exploration of its contexts—a thorough autopsy of the surprisingly weak foundations which struggled to bear the Pax Romana’s glorious facade.

And so this opening chapter penetrates beneath the veneer of Roman self-aggrandizement and hubris to examine key factors of resilience on the eve of the Antonine plague. To what extent did the inhabitants of the Roman Empire, whether they lived in the cities or the countryside, experience many of the key markers of extreme poverty: high infant mortality, low life expectancy, low literacy rates, and a subsistence diet deficient in basic nutrients? Could most people obtain reliable housing, and this on a permanent basis?¹² Monumental marvels like aqueducts and bathhouses evoke awe, but did urban sanitation infrastructure make a practical difference to public health? Did elites effectively manage and redistribute resources in the face of local and regional crises? Subsequent chapters go deeper—probing the Empire’s ecological con-

text and its food supply, as well as its exposure to new pathogens via trade and military movements. The Pax Romana may have been an economic and cultural high point in the overall story of Rome and its empire, but, as we shall soon see, ancient Rome remained mired in its preindustrial limits.

The Rubbish of Empire

Even two thousand years after it was built, the house of the Vettii stands as a stunning marvel of elite opulence. Situated in northwest Pompeii, guests entering the atrium of the magnificent two-story home would have been struck by the intricate wall paintings, the refracted natural light cascading through an open rectangular skylight, and the shallow pool in the center of the atrium. If it happened to be raining, the water would have gently poured through the skylight into the pool below—perhaps catching the sunlight just right, casting vivid rainbows in the mist. Through the vapor glaze, guests caught hints of the Vettii's manicured garden in the background—its fountains and statues imposing serenity upon all who entered. The house's other rooms held similar marvels and luxuries: additional domestic pools and fountains, bright murals, gardens, statues, reception rooms, colonnades, numerous bedrooms, and even a shop to provide rental income from a local artisan.¹³ And this was one of many such houses in one of many such cities in the Roman world.

But intermingled with the wealthy were the progressively less affluent. These, by necessity, left far fewer traces of their presence. Citizens of modest incomes dwelt in much smaller, moderately outfitted homes.¹⁴ Like glue squished between the carpenter's wood, their crammed residences occupied the spaces between the larger homes of the elite. Others dwelt in tenement blocks (*insulae*) with cramped rooms, basic furniture, and without in-home access to running water or bathing facilities.¹⁵ Multiple families might occupy a single apartment, or even a single room. But at least these people had walls and a roof. No small number of Pompeii's ten thousand or so inhabitants lacked access to permanent housing. These slept in the shadows: in alleys, sewers,

tombs, and bushes.¹⁶ Their bones are now ash and dust. But we know they were there, even if we will never know who they were.

Pompeii's homeless and transients—some of whom undoubtedly huddled against the walls of the house of the Vettii itself during the cold of winter—begged for handouts from passersby. These unfortunates could be of any age and condition—from the old and weak to the young and tough. By day, the beggars crowded the streets in search of a spare coin or two. Those young enough might earn their bread by offering their bodies for the gratification of others. Around 150 surviving graffiti in Pompeii refer to individual prostitutes, advertising prices for a range of sexual acts.¹⁷ Adolescents sold themselves; so too did children.¹⁸ The old, the disabled, the sick, however—those whose bodies lacked value under the cruel accounting of preindustrial poverty—simply made a nuisance of themselves at public festivals, sacrificial ceremonies, and even private weddings, demanding a small ransom to depart in peace. In fact, the very senator who first termed his age the *Pax Romana*—Seneca, advisor to the emperor Nero (AD 54–68)—begrudged such alms-seekers as “flocks of half-dead creatures.”¹⁹ The religiously sensitive Romans feared evil omens on otherwise cheerful days and so obligingly paid the beggars for a few hours' peace.

Unlike in many modern cities, where the middle and upper classes pay good money to thoroughly segregate themselves from the urban poor, poverty was inescapably rampant in Roman cities. Even atop Rome's famed hills—where the grandest houses of the rich cast shadows on the malarial slums below—shoddily built apartment complexes tilted in the sky, overflowing with immigrants, day laborers, and the semi-transient. But structures of stone and brick were luxuries. Both inside and outside of cities, the barely unhoused dug cave-like rooms into the sides of hills, fashioned crude wood hovels, or lay in huts of brush, reed, or even refuse. Ventilation in such dwellings was poor, and the constant intake of smoke from oil lamps and fires hung about ancient neighborhoods, accumulating in the lungs of even the wealthiest citizens. Poverty, therefore, suffocated aloof aristocrats as well as the poor. It is no wonder that Seneca claimed that his health improved dramatically after leaving Rome and its “awful odor of reeking kitchens

which . . . pour forth a ruinous mess of steam and soot.”²⁰ Under such conditions, even routine respiratory viruses must have transformed into serious killers.

But those who secured an indoor sleeping-spot—potentially in the hallway of some patron or master—endured perils invisible to the naked eye. Inside ancient dwellings, pests of all sorts left fecal matter and carcasses to taint the bodies of any who slept on floors. House owners and their families likely ate well; their servants and slaves, however, dined on kitchen scraps, including undercooked and rotten food teeming with bacteria. Household workers drank unboiled water, contaminated with colonies of parasites. Servants and slaves frequented the parts of the property where refuse of all kinds was disposed and stored. Even in luxurious houses equipped with cesspits and chamber pots, garbage and waste were frequently chucked out into the street, regardless of the quality of the neighborhood or its population density.²¹ The ancient city’s bustling winepress then went to work—trudging the rotten food, blood, urine, feces, vomit, insects, rodents, bacteria, and all other forms of waste into an ever-present coating of sludge that glogged onto any who ventured outside. In some quarters of Rome, for example, the bacterial muck was so thick that the poet Juvenal’s legs (not merely his feet or ankles) were often “caked with mud” from the city streets.²²

Ancient Rome was a shithole. Its roughly one million inhabitants produced around 45,000 kilograms of feces and 1.3 million liters of urine each day.²³ Where did it all end up? Graffiti in Pompeii suggests that the Empire’s privileged urbanites defecated just about everywhere, and even saw fit to sign their names to mark the occasion—a way for the literate to pass the time while they vacated their bowels against some alley wall.²⁴ In a futile attempt to keep the streets around their establishments clean, some property owners put up signs to discourage defecators. Two bright red inscriptions in an alley between apartment buildings in Pompeii warn: “defecator, watch out for what might happen to you!”²⁵ But with so many people in such scarce space, piles of human and animal waste on the streets were as common as cobblestones.²⁶ Accepting the inevitable, some property owners merely encouraged

would-be defecators to go elsewhere: “If you must defecate, pass by this place for good luck.”²⁷ Other notices pointed out more inviting public locations: “Defecator, continue on to the wall [of the city]. If you are caught [here], you will suffer punishment. Watch out!”²⁸ In and around Rome, similar inscriptions warn against dumping everything from feces to bodies.²⁹

In theory, Rome should have been less rife with offal compared to other ancient settlements. The Eternal City enjoyed top-of-the-line infrastructure, basic sanitation services, and legal rules aimed at regulating its million-worker feces factory.³⁰ Laws prohibiting the on-street disposal of human waste and corpses, however, went ignored.³¹ Near Rome’s Esquiline Hill, a stone’s throw from surviving inscriptions prohibiting dumping corpses and sewage, excavators noted their discovery of around seventy-five pits filled with “a nauseating mixture of the corpses of the poor, animal carcasses, sewage and other garbage.” The two-thousand-year-old “black, viscid, pestilent, unctuous matter” was so putrid that those digging up the site had to be granted frequent breaks.³² Rome’s public latrines—some of which still survive to the present—presumably funneled at least some waste into the sewers rather than the streets. But Rome’s sewers were in fact never intended for waste disposal. Rather, they were designed to alleviate flooding and drain standing water.³³ Rome was, after all, built on a swamp. In fact, sudden or severe floods—such as the one which occurred in Rome just before the Antonine plague—backed up the sewers and vomited months-worth of sickly soup up into the city’s streets.³⁴ Far from cleaning Rome, the sewers were a constant source of rodents, pests, and noxious gases. Clogged sewers quickly became stinking cesspits.³⁵ And sewers were prime dumping ground for bodies. In the drain below a bathhouse in the coastal city of Ascalon in Palestine, archaeologists found the remains of nearly one hundred newborn babies.³⁶ In Greek cities Athens and Messene, hundreds of infant corpses as well as dog skeletons were found dropped down wells.³⁷ But the sewers did not merely absorb the corpses of the unwanted or anonymous masses. Even a dead emperor or two was stuffed down the tunnels.³⁸ It is no wonder that most Roman homeowners refused to install in-home sewer access.³⁹

Corpses occasionally clustered in Roman cities. The normal body count in mid-second-century AD Rome alone must have hit triple digits most days, with seasonal spikes in the summer.⁴⁰ While some of these cadavers received proper burial or cremation outside the city, Rome's many transient and impoverished were afforded the same respect in death as they had been given in life: none. When these died, the fortunate ones were burned on a communal pyre or simply cast into a mass grave (if one was open and nearby).⁴¹ But many human bodies ended up in the sewers or the Tiber, or even kicked to the side of the road or in an alley to rot or be eaten by animals. Aged, sick, or disabled slaves were tossed out even before they died—left to slowly expire alone in the slimy streets. Some made it to the island in the Tiber before expiring; at least these withered away in the presence of the physician-god Asclepius. The numbers of dying slaves forsaken to a lonely and painful death became such a nuisance to the free living that emperors enacted laws to curb slave abandonment.⁴²

Romans also abandoned their unwanted infants—many still alive—to refuse piles, alleys, sewers, or on the streets. The wailing of forsaken babies must have been a constant noise amid the urban background bustle. Passersby occasionally rescued these helpless ones, raising them as “foundling” slaves and selling them later for profit—often into prostitution. But many infants died cold, hungry, alone, and in searing agony—crying for days until their breath failed, and they simply expired. But there were worse fates. The Jewish philosopher Philo of Alexandria leaves little to the imagination:

[Some parents] do the deed with their own hands; with monstrous cruelty and barbarity they stifle and throttle the first breath which the infants draw or throw them into a river or into the depths of the sea, after attaching some heavy substance to make them sink more quickly under its weight. Others take them to be exposed in some desert place, hoping, they themselves say, that they may be saved, but leaving them in actual truth to suffer the most distressing fate. For all the beasts that feed on human flesh visit the spot and feast unhindered on the infants, a fine banquet provided by their sole guardians, those who

above all others should keep them safe, their fathers and mothers. Carnivorous birds, too, come flying down and gobble up the fragments, that is, if they have not discovered them earlier, for, if they have, they get ready to fight the beasts of the field for the whole carcass.⁴³

The Empire's cities were impossible to cleanse. The Roman government employed slaves to perform the grim work of body removal. Additional help was provided by roving animals—dogs, carrion, and pigs; these feasted on the decaying flesh before it putrefied.⁴⁴ The poet Martial terrified his readers with such a fate. He wrote of a destitute man on the edge of death “hearing around him the howling of dogs for his body, and driving away birds of prey by shaking his rags.”⁴⁵ Human remains could turn up just about any time or any place. Even the emperor Vespasian (AD 69–79) sat down to breakfast one day, only to have his meal interrupted by a dog carrying a human hand in its mouth.⁴⁶ Routine body removal was probably manageable; corpses hardly rotted on every corner. But the numerous anecdotes in literary sources about bodies on the street only work in an environment where death was not only highly visible but could at times inject its gruesome presence in the daily routines of the living.

Aqueduct water flushed out some of Rome's inexhaustible filth. In the age of the Antonine plague, ten working aqueducts supplied Rome with millions of liters of fresh water from rural Italy each day. The famous Pergamese doctor Galen—our most reliable eyewitness to the Antonine plague—was certainly impressed: “In Rome . . . there is the goodness and abundance of fountains and the water of none of them is smelly, toxic, muddy, or hard.”⁴⁷ And as Scheidel says: “a counter-factual Roman world without aqueducts would have been (even) worse.”⁴⁸ But Rome's aqueducts, like its sewers, served more as monuments to elite vanity than as a practical means of sanitizing the city. Aqueducts exemplified Roman self-presentation of political power; only the lords of an expansive and wealthy empire could construct such wonders.⁴⁹ These practical, applied works of engineering, according to the Roman water specialist Frontinus, were superior compared to the “idle Pyramids or the useless, although famous, works of the Greeks.”⁵⁰

In aggregate terms, Rome's aqueducts may have brought more than one hundred liters of water per person per day. Undoubtedly many Romans relied upon aqueduct water. However, drinking such water was not without risks. Unbeknownst to the Romans, their groundwater contained excessive fluorine due to local volcanoes. Also, while Romans understood the dangers of lead, their use of lead for pipes, tools, weapons, jewelry, makeup, and even food seasonings exposed them to hemolytic anemia and lead poisoning.⁵¹ Galen observed that the Aqua Alsentina, an aqueduct that brought water to Rome from several freshwater lakes, caused diarrhea if drunk.⁵² Rome appointed officials to nominally oversee the provision of drinking water, but maintaining clean water seems to have been beyond Roman capacities.⁵³ And around 40 percent of the water that came into the city via aqueduct was not drunk at all; instead, it went to various public and ornamental uses in meeting places, baths, barracks, arenas, display fountains, and so on.⁵⁴ Another 20 percent of the flow was reserved for the personal enjoyment of the emperor. Emperors doled out the remaining 40 percent of waters to those wealthy enough to pay a hefty "water tax," and who carried enough political and social clout to earn the emperor's favor.⁵⁵ So while Roman aqueducts were indeed a marvel to behold, such marveling was in fact their *raison d'être*—to evoke awe. Aqueducts' improvements to overall health and sanitation—and of course there would be some benefits—are contested at best.⁵⁶

Similar could be said of the Empire's many public baths. While bathing may indeed have washed some contaminants and parasites off Roman bodies, it is nevertheless an open question as to whether a trip to the bathhouse made one more or less clean on net.⁵⁷ The emperor Marcus Aurelius used ancient Rome's most pristine bathing facilities, and yet, even he quipped: "What is bathing when you think of it? Oil, sweat, filth, greasy water, everything revolting."⁵⁸ The bathwater in ancient bathhouses contained no sterilizing chemicals. It was never disinfected or cleaned. Rather, bath patrons marinated in tepid, stagnant water infused with the dirt, grease, and bacteria added hour by hour, day by day, by hundreds of other bodies—not all of them human. No evidence survives to suggest any rules for changing out bathwater, and

scholars believe that the water cycled through a slow process of overflow.⁵⁹ Ancient peoples also engaged in the timeless tradition of urinating in their own bathwater.⁶⁰ Contemporary writers discuss how bathers washed the fluids, excrement, and feces off their private parts in the baths.⁶¹ Doctors like Galen and Celsus sent many sick people to the public baths for a lengthy soak. People with sores and illnesses were such a common sight among bathers that the emperor Hadrian (AD 117–138) mandated that the sick be given exclusive rights to bathe in the first half of the day.⁶² We know that people with open wounds used the baths because medical sources observe cases of gangrene following public bathing.⁶³ Prostitutes of all kinds, and their patrons—all presumably rife with cocktails of untreated sexually transmitted diseases—not only bathed but conducted their most intimate business dealings in and around the foul waters.⁶⁴ Of course, the prostitutes and clients most likely to fornicate in the public baths were those who lacked more permanent premises.⁶⁵ Non-human residents also copulated near bathwater. In his *Natural History*, Pliny the Elder observed that the main breeding ground for Rome's cockroaches was “in the damp warmth of bathhouses.”⁶⁶ Even invisible vermin—parasites such as roundworms and whipworms—found the baths replete with hosts.⁶⁷

Rome's sanitation infrastructure, therefore, not only failed to mitigate disease and infection, it actively aided and abetted the dispersion and evolution of the parasites and pathogens brought to the cosmopolis from all corners of the known world—like pilgrims to a microbial mecca. A recent comprehensive study of fecal remains from sites across the Roman Empire shows that despite (or maybe because of) the aqueducts and bathhouses, human parasites thrived in the Roman Empire at similar if not greater levels than in previous eras.⁶⁸ Disease was everywhere, but especially in Rome. Galen, for example, guessed that ten thousand Romans suffered daily from jaundice and another ten thousand from dropsy—invented numbers, but still suggestive of widespread poor health.⁶⁹ The most persistent killer in Rome and several other ancient cities, however, seems to have been malarial parasites. Several species, but especially *Plasmodium falciparum* and *Plasmodium vivax*, seem to have been endemic in Rome.⁷⁰ Ancient sources are re-

plete with malarial symptoms: fevers, chills, impaired brain function, seizures, and faints.⁷¹ Those who survived a bout with malaria, however, were then prone to additional maladies such as pulmonary tuberculosis and gastroenteric infections.⁷² Those with *P. falciparum* often died. Malaria was especially bad in the low-lying areas of cities. Much of Rome had been marshland. The poet Horace jibed that spending time in the Roman forum would bring on “fevers and opened wills.”⁷³ Living near the top of Rome’s hills may have allowed some relief from the malarial mosquitoes of the lowlands, but unchlorinated baths and pools, street refuse, vermin, and lead poisoning all did their part to make life miserable for even wealthy Romans. Simply living and working away from malarial lowlands could have conceivably added years to one’s life expectancy.⁷⁴

Even as Roman cities attained their highest levels of population, prosperity, and wealth during the Pax Romana, the inhabitants of those cities suffered increased biological stress. A recent study of more than ten thousand skeletons from throughout the Roman world shows a serious dip in stature—an indicator of poor physical health—from the first century BC through the end of the fourth century AD.⁷⁵ Romans were a good ten centimeters shorter than their Classical and Hellenistic Greek counterparts, Iron Age Celts, and even early medieval Italians.⁷⁶ Despite the varied urban diet and higher standard of living relative to the countryside, Roman bones testify that prosperity required a biological price.⁷⁷ Who exacted the toll? According to researchers, the microbes that thrived in the high-density low-sanitation cities—viruses, bacteria, parasites—wracked those well-fed Roman bodies.⁷⁸ Isotope signatures also show an urban Roman diet low in animal proteins. Romans were simply ill-equipped for the adverse biological jungle that surrounded them. Still, Roman skeletal evidence tends to come from cities; we don’t know whether rural Romans enjoyed statures more comparable to those of their ancestors and descendants.⁷⁹

Grinding poverty, poor sanitation, malnutrition, and disease ensured that a person born in the city of Rome could expect to live around twenty-five or thirty years at most. Even elites suffered from the low life expectancy common throughout the preindustrial world.⁸⁰ Infant

mortality tips the statistics, however. If a person was fortunate enough to live past age five, they likely reached their forties or fifties. Results varied, of course, based on several factors—some of them ecological, some behavioral. Seasonal water quality, for example, was a primary factor in infant mortality, as water supplies blossomed with deadly pathogens in the warm weather.⁸¹ For most Romans, including the elite, the grim prospects for life expectancy placed extreme pressures on young women to reproduce early and often to maintain the population.⁸² The math seems insurmountable. Each Roman woman needed to birth at least three daughters and three sons to keep the population stable.⁸³ Obviously, such birth rates were unrealistic on the aggregate—so how did Pax Romana Rome and other ancient cities preserve and even grow their populations? A steady stream of immigrants and refugees swarmed in from the surrounding countryside. Scholars rightly call ancient Rome a “population sink.”⁸⁴ Genetic analysis of bodies buried near Rome shows that the city received net immigration from the Near East, Europe, and North Africa.⁸⁵ But immigrants’ immune systems were unprepared for the biological onslaught that awaited them. No doubt many new arrivals to Rome and other ancient cities succumbed to the pathogens and parasites teeming in their midst.

Above the routine din of death resounding throughout ancient urban streets, the Antonine plague would rise into preeminence in the mid-160s. This epidemic was clearly more than a sudden surge of one of the Empire’s familiar pathogens.⁸⁶ It was something new, and this is why the disaster caught the attention of elites, city officials, soldiers, and medical professionals. Once the disease took hold, elites and commoners alike suffered similar fates. In a sense, the disease was a perfect match for the ancient city of Rome: it was no respecter of persons.

Disaster Unpreparedness

Before the Antonine plague struck, Rome was home to around one million people—the most populous European city in all of human history prior to the industrial revolution. The wider Empire was also flush with people. Of the global human population in the era of the Pax

Romana, perhaps as many as one out of every four souls—fifty-five to seventy million people—resided in territory directly administered by Rome.⁸⁷ Such high population numbers represented a powerful resource, but these were also a tremendous responsibility, especially when disaster struck. To what extent did the governing structures of the Pax Romana protect populations before, during, and after disasters like plagues and food shortages? The answer to this question hints at how the epidemics associated with the Antonine plague would have been handled on the local level. Anecdotal evidence suggests many governing officials were passive, corrupt, and even predatory during calamities. What roused them to pro-social action in challenging times? Mass violence.

The administration of the Roman Empire was simultaneously simple and yet sophisticated. On the one hand, one man—the emperor—enjoyed absolute and even at times capricious authority. He was the *paterfamilias*—the patriarch and patron—of a household of millions. Emperors, therefore, usually focused on grand matters of state: warfare, diplomacy, major infrastructure projects, founding new cities and colonies. Surviving imperial rescripts of the Pax Romana—direct edicts from the emperor given in response to petitions—nevertheless record imperial interventions in even the most tedious local disputes.⁸⁸ Emperors often used their dictatorial power to alleviate disasters. When a plague struck Rome under the emperor Titus (AD 79–81), for example, the imperial biographer Suetonius tells us that “there was no aid, human or divine, which [Titus] did not employ, searching for every kind of sacrifice, and all kinds of medicines for curing the plague and reducing the epidemic’s force.”⁸⁹ But some imperial interventions exacerbated calamities. Nero allegedly used the Great Fire of Rome (AD 64) as a pretext for expropriating “vast sums from private citizens as well as from whole communities,” even “depriving the Romans of the free dole of grain.”⁹⁰

Roman officials—emperors included—lacked a vision for public health. Practical aid during plagues was instead narrowly focused: mobilizing corpse removal, distributing food, freezing prices, or even issuing direct payments to citizens.⁹¹ Emperors may have also adopted measures like those taken by authorities in Republican Rome during

epidemics: suspending festivals, markets, political meetings, and even elections. Such measures were not aimed at mitigating disease transmission; rather, people were just too sick to carry on with business.⁹² Shut-downs simply gave official recognition to existing behavior.

Prior to the Antonine plague, the Roman Empire had never encountered a pandemic. Or at least no previous pandemic spread so rapidly and widely as to be identified as such in the sources. In the pre-pandemic age, pestilences were perceived as local phenomena, usually limited to individual cities or regions. Somewhere between 10 and 20 percent of the population of the Empire lived in urban environments.⁹³ These cities were probably not all as filthy as Rome, but they were nevertheless crowded and, during disasters, chaotic. Local nobility ruled these cities, although always answerable to imperial governors. These elites were duty-bound to care for the crowds—especially in times of plague and famine. But the source material is rife with examples of local rulers exploiting their people more often than not, even when calamities struck. Routine and otherwise “official” exploitation—through taxing citizens’ meager surpluses, and thus keeping living standards low—was augmented by the mismanagement and wastage of such surpluses, often on self-aggrandizing status enhancement. Even Roman euergetism—elite gift-giving to communities—was not motivated for public welfare nor did it often accomplish such in practical terms.

The Empire featured several “aqueducts to nowhere,” for example. Sometime around AD 110, the emperor Trajan sent his friend Pliny (nephew of the elder Pliny) to the city of Nicomedia as governor of the province of Bithynia in northern Asia Minor. The town council of Nicomedia had dropped millions of sesterces on several aqueducts with no serious plan for completion. Fiscally, the province was a shambles. Pliny did not mince words about the thriftless Nicomedians—tattling to Trajan in a letter that local elites were “throwing away money.”⁹⁴ In his reply, Trajan was furious, and expected Pliny as governor to solve the problem. The emperor fumed: “I swear that it is also part of your diligent duty to find out who is to blame for the waste of such sums of money.”⁹⁵ But governors like Pliny were sent out with few if any staff or specialists

to accomplish their tasks. Instead, they were granted *imperium*—the right to command and expect automatic compliance.⁹⁶ It came down to the governor's *auctoritas* to put this theoretical power into practice and co-opt locals in the business of governance. Local officials could and did passively resist. Councillors of the town of Apamea, for instance, kept their accounting logs back from Pliny despite his official station and (theoretically) grave powers.⁹⁷ Rome may have had an expansive territorial empire, a strong military, and a dominant culture, but the Pax Romana was administered more like a household than a modern government bureau.

Pliny's financial problems in Bithynia were soon profligate throughout the Empire. By the mid-second century AD, civic treasuries—meant to be filled by contributions from wealthy local elites (sometimes voluntary, sometimes coerced)—were in a state of chronic insolvency.⁹⁸ The emperor Hadrian toured the Empire with money pouring from his pockets—revitalizing declining towns and cities with new public buildings and grants-in-aid.⁹⁹ His successor, Antoninus Pius (AD 138–161), granted even small towns rights to levy additional taxes to fund their shortfalls.¹⁰⁰ Of course, more taxes did not solve the systemic problems of mismanagement and outright corruption; if anything, giving corrupt and wasteful officials more money only encouraged them. The Roman Empire, like many predatory systems, was both wealthy and impoverished at the same time. By this, I mean that resources abounded, but they did not consistently reach the multitudes at the margins—a terrible position for a society to be in just prior to a pandemic.

What then kept Roman cities from descending into chaos when disaster struck? A volatile combination of ad hoc elite benefaction and mob violence.¹⁰¹ Food crises elicited the most extreme reactions. Emergency aid in Roman cities was fairly simple: elites collected in-kind taxes in cereals, some of which they held in reserve for redistribution in key times: for celebrations, holidays, and festivals but also during shortages. Whether as emergency relief or regular entitlements, such redistributions were a matter of basic morality to ancient peoples: the produce of the land was for everyone; landowners were caretakers of

community supply, and thus obligated to keep prices low and grain flowing to the general population.¹⁰²

Such social and moral pressures can be powerful regulators, but greed is often more powerful still. Many of the same elites responsible for distributing grain also owned significant patrimonial estates that produced cereals as cash crops. If elites had grain in the storehouse, then famine was good for their bottom line. Shortages brought price spikes, and high prices meant high profits. High profits funded elites' conspicuous consumption and enhanced their social status against their elite peers. It was a thin line to walk, and famines strained the system by disrupting the flow of entitlements. Rioters may have lacked food, but they were full of moral outrage. So it is unsurprising to see scenes like those during a famine in the city of Aspendus in Pamphylia (southern Asia Minor) where, according to the third-century AD Greek sophist Philostratus:

People lived off anything that gave sustenance, as the upper classes were keeping the grain stored up to create a shortage in the territory. People of every age were infuriated with the chief magistrate, and had begun to light torches to burn him alive, even though he clung to the statues of the emperor.¹⁰³

Fortunately, as the crisis was about to boil over, a wandering philosopher named Apollonius intervened. He shamed and threatened grain-holders in public until they relented and “flooded the market with grain, and the city revived.” Sometimes the coercion of the masses was enough to prick elite consciences.

Ammianus Marcellinus, a soldier and historian writing in the fourth century AD, called rioting “a thing which constantly happens in Rome.”¹⁰⁴ Earlier under the Pax Romana, mass violence was also endemic.¹⁰⁵ Emperors were especially mindful of the threat. Riots might blossom into insurrection. Ironically, the terror of insurrection competed with emperors' duty to mitigate crises. Hence Pliny, after a massive fire destroyed parts of Nicomedia, sought Trajan's approval to draft a three-hundred-man fire brigade—a moderate and practical proposal. But the emperor offered this paranoid reply:

Societies of this sort have greatly disturbed the peace of the province in general, and of those cities in particular. Whatever name we give them, and for whatever purposes they may be founded, they will not fail to form themselves into factious assemblies, however short their meetings may be.¹⁰⁶

Fear of out-of-control street violence was so strong that officials even sacrificed their elite peers to appease mobs. The emperor Gallus in the mid-fourth century AD looted grain stores in the city of Antioch (in modern southeast Turkey) to feed his army on the way to Persia. The resulting food shortage, exacerbated by a local drought, spawned a furious rabble. As the violence threatened to overwhelm the city, the emperor blamed the shortage on the provincial governor, telling the unruly crowd: “no one could lack food if the governor did not wish it.” It was not only classic blame-shifting but an unveiled authorization for targeted violence. According to a contemporary account, the mob assailed the governor “with kicks and blows, and trampling him under foot when he was half-dead, with awful mutilation tore him to pieces.”¹⁰⁷ Why do the difficult work of dealing with the disaster itself when scapegoating is so much easier?

Crises created crowds, and crowds sustained and spread diseases. The Antonine plague was looming on the horizon, and the festering disorder in cities in the mid-second century was a menacing omen. But the situation was even worse. Recall from earlier in the chapter: where did many of the crowds in Rome, Antioch, Ephesus, and other large cities come from in the first place? They were not born in the cities.¹⁰⁸ Rather, they were refugees and migrants from the countryside. In the hinterlands of the Empire, when food shortages degraded into famines, peasant farmers had to make terrible choices: take flight or starve to death. For some, relocation might be only temporary, but the truly desperate sold their possessions and land and moved elsewhere. Severe famines would depress land values in affected regions; some victims no doubt had to practically give away their land and family heirlooms. Anything that could not be carried was let go at bargain prices. The patrimonial rich, however, not only could weather the bad years but often

prospered during short-term crises. Elite landowners bought up the lands of the poor, and might even employ the former owners as tenant farmers. This drop in status for the dispossessed—which was usually permanent—was not always a desirable outcome for peasants. Besides, some tenant farmers could expect to be treated worse than the slaves working in the fields with them.¹⁰⁹ Slaves represented long-term investments for their owners; tenant farmers were expendable. And so to avoid such a fate, migrants flocked to the cities—seeking patronage or occasional labor.

The refugees entering the cities, therefore, were often not the strong but the weak, the hungry, the malnourished. Having few if any contacts in their new city, they would have concentrated in the worst areas and in the most filthy and unhealthy conditions in the already unsanitary context of the preindustrial urban environment. Their naive and fragile immune systems would have suddenly faced the onslaught of novel diseases and microbes battle-hardened in the urban arena.¹¹⁰ For the pathogens endemic to the Empire's cities, such migrants were fresh meat.

During the Pax Romana, immigrants from the countryside drowned the cities. The numbers are unknown, but population estimates suggest immigration was high enough to sustain or even grow urban populations despite infant mortality and the horrid conditions of ancient cities.¹¹¹ As Antioch faced famine in the fourth century AD, for example, one contemporary observed “crowds of squatters everywhere,” noting that “the governors resent the migrations, but in the uncertainty about the future, they cannot stop them.”¹¹² In fact, elite spending, seasonal or ad hoc job opportunities, and public grain distributions offered migrants good reason to move.¹¹³ But as the hungry flooded the cities, already limited urban supplies were put under increased strain. And hopeful *perceptions* of life in an ancient city may have far outstripped the harsh reality migrants discovered once they arrived.¹¹⁴ Rome, for example, clamped down on handouts to non-citizens and migrants. Other cities likely imposed similar barriers. And yet many perceived that it was better to go hungry and even homeless in the cities than to face certain death when famine struck the countryside.

Some migrants turned their transience into an advantage. They worked different jobs in different places at different times. The populations of ancient cities thus ebbed and flowed with the seasons. Spring and summer brought artisans who worked in the open air, dockworkers who arrived into ports with the opening of safe sailing around late March or early April, construction works, shipbuilders, brick makers, and others. At the same time, fieldworkers and farmers exited cities in preparation for the harvest.¹¹⁵ In the hottest months, the wealthy escaped the city swelter for cooler country villas. Those who worked for these elites—directly and indirectly—may have followed in their train.¹¹⁶ In the autumn and winter, the reverse occurred. The urban centers of the Empire—especially Rome, the Empire's heart—pumped hundreds of thousands of people in and out each year.

When it finally arrived in Roman territory, the Antonine plague pathogen attached itself to these circulating mass movements of migrants. Moreover, as the following chapter shows, the stresses of the mid-second century swelled these movements at exactly the wrong time. According to numerous proxies, food shortages in key localities ramped up in the decades prior to the Antoine plague. It is reasonable to assume internal migrations increased in response, reducing resilience, especially in urban areas. The Empire's once vibrant and dynamic cities—*islands of Roman civilization*—suddenly transformed into an archipelago of infection. Elite writers took notice, and the old era of local pestilence gave way to something new: an age of pandemics.

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