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Climate in Greco-Roman History

Samuel K. Eddy

I have recently completed some research which originally aimed only at answering a small question. But success in this soon led to conclusions about the causes of the collapse of classical civilization itself. For a long time I had been interested in a series of Greek inscriptions which records the amounts of money paid to Athens each year during the third quarter of the fifth century B.C. by over one hundred subject allies. Two principles clearly governed the exact sums demanded: First, each state paid a round amount of money, such as one talent or some simple fraction of a talent like one-half, which was around three thousand drachms. Second, the obligation did not change, as a rule, during the entire quarter century. If it did, the change took place only at the start of one of the quadrennial periods of assessment and then remained constant for the four years.

How, then, explain the anomalies which existed only in the record of Byzantion? In 432 B.C. she paid eighteen talents, 1,800 drachms. In 429, during the same assessment period, she paid twenty-nine talents, 5,640+ drachms. The next year she sent in fifteen talents, 90 drachms. Her payments violated both cardinal principles.

Of all Athens' allies, Byzantion occupied a site of unique importance, where Istanbul stands today. For the small Greek merchant ships which carried cargoes of grain from southern Russia more than a thousand miles to the overpopulated cities in the Aegean, she was a convenient, even necessary, port of call. Athens alone imported upwards of half her food each year, some four hundred thousand measures of wheat worth over two hundred talents. The Byzantines would certainly have collected a harbor tax of one or two percent *ad valorem* from each ship which called to replenish food, water, and firewood. Nothing would be more plausible than to suppose that the amount of grain carried through Byzantion, and therefore the sum of money she could afford to pay

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Athens, would have varied with the climate of each growing season. The years of high tribute payments would be those with bumper harvests; the years of low payments, those with poor.

Unfortunately, there are no exact statistics on ancient crop production to speak of and only a few scattered references in all ancient literature as to whether this or that harvest was good or bad. There is, however, a reliable record of plant growth for most years after 650 B.C. in the rings of the giant sequoia trees which grew in southern California. Their annual rings are thick in seasons with good rainfall and thin in poor seasons. And, lo, comparison of the payments of Byzantion with the tree rings shows no vague similarity but a surprisingly close fit. Byzantion's payments are proportional to the thickness of the rings (Fig. 1).

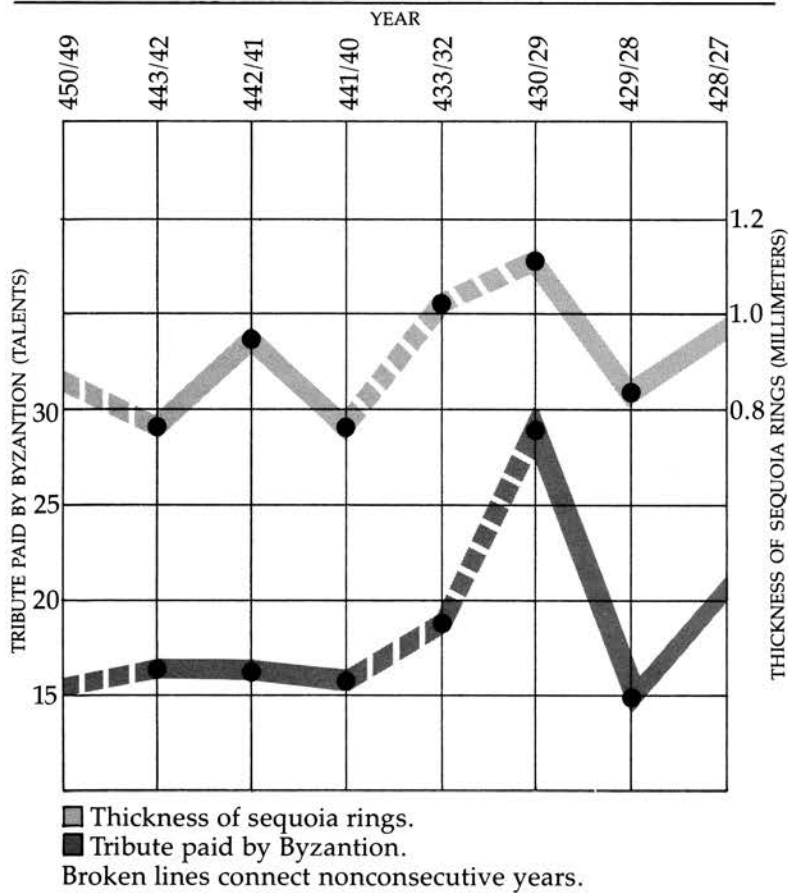
I discovered this unexpected coincidence in 1971 over lunch at a now-defunct downtown restaurant. I hurried home in high excitement to test the trees against years in which I knew the harvest had failed. The worst and most prolonged famine of classical Greek times, attested by both a speech in the Demosthenic corpus and by half a dozen inscriptions, occurred between 330 and 325 B.C. Again, the sequoias were in startling agreement. The deepest and longest dry spell they sustained in the classical Greek period began in 331 and lasted until 322. The differences with the immediate Greek evidence were not significant because the sources actually said nothing of conditions in 331 and 324-322. I later found evidence in the Crimea, which will be mentioned in a moment, confirming that 331 and 324-322 were in fact dry.

I could quickly check one other thing. The revolution of 1789 was immediately preceded in France by a poor harvest. This was the trigger which set fire to deeper sources of resentment. Similarly, the trees show that each year of constitutional crisis at Athens between 632 B.C. and 510 B.C.—the time when democracy was being forced on the aristocracy by threats of violence and occasional outbreaks of civil strife—was preceded also by one or two dry years. This was all very exhilarating.

A patient time of collecting facts on the quality of Greek and Roman harvests followed. When the record was finally complete it showed that we had good eyewitness evidence from fifty securely dated years. For the Greek period (650-252 B.C.) the trees were in agreement with it in 83 percent of the cases, and for the Roman period (30 B.C.-A.D. 400), in 85 percent. (For certain reasons the trees are not reliable between 252 and about 30 B.C.). The quality of a further sixteen harvests was known, but their dates could not be established with certainty, although with good probability. If even half these dates turned out to be correct, the accuracy of the sequoias in California as indicators of crop conditions in the Mediterranean would rise to something like 90 percent, an astonishing figure.

The reason that the climate of the region around the trees is in phase with that of the southeastern Mediterranean has to do with the fact of latitude. This is more important meteorologically than the mere linear distance between two points. The trees were dotted about an area of fifty square miles whose average latitude

Figure 1. Comparison of the thickness of sequoia rings in California and contemporaneous tribute paid by Byzantium to Athens, 450/49 B.C. — 428/27 B.C.



was 36°26' north, which is also the latitude of the southern tip of the Peloponnesos and the island of Rhodes. Southern California, to begin with, has a climate very much like that of Tunisia or Sicily or Greece. The ground on which the trees stood was obviously subject to very much the same kind of fluctuations in the circulation of the atmosphere as the southeastern Mediterranean. The intensity and movement of the winds is the means by which moisture is evaporated from the oceans and brought to the land, to be precipitated as rain or snow. Annual variations in the atmospheric flow are easily detectable. They are thought to have as a primary cause minute variations in the amount of solar radiation received on earth. The sun causes ridges of high pressure constantly to form near the equator and to flow towards the poles. When the sun is most active and radiating large amounts of energy to earth, the ridges are forced farther north than in times of quiet sun. High pressure means cloudless skies and lack of rain. The zone most subject to the variations of northward flow lies between 30° and 40° north latitude, which is exactly the band of territory that includes the southeastern Mediterranean and the trees. The Crimea, where the grain that was shipped through Byzantium was grown, is cut by the 45th degree of latitude.

Nevertheless, it also has a Mediterranean-like climate because it is protected by the Carpathian Mountains against cold, north-westerly winds in winter, and in summer it receives strong southerly breezes from the Persian Gulf.

By themselves, the trees are not accurate enough to make us absolutely sure of climatic conditions in the Mediterranean in any one specific year or in any one small part of it, but they do allow us to be certain of broad climatic trends there decade by decade. This is new knowledge of great value, because climate seriously affected agriculture, and that was by far the most important form of ancient economic life.

When there is good local complementary evidence, the trees can be used to help define the climate of a specific year or place. They have one valuable supplement in Lake Saki in the Crimea. On the sides of many lakes and rivers are recognizable thin layers of sediment called varves, which are laid down each year by runoff from precipitation. Heavy rains leave thick layers, droughts thin ones. Few such records are longer than two or three centuries. Lake Saki, however, is unique, for her long series extends back almost to 2300 B.C. The accuracy of the chronology of the varves of the second millenium B.C. has been challenged, but the dating of those from the period after 650 B.C. appears to be correct because Saki shows the start of the great famine of 331-321 as clearly as the trees. The varves are not, however, usually as accurate an indicator of the quality of the harvest of any year as the trees. The varves show only the amount of runoff, great or small. Plant growth is greatly affected by the *timing* of rainfall. If below-average rain is distributed through the growing season at just the right times, crops larger than normal will be realized. The fact of timing is built into the sequoia rings. It is not built into the varves. The lake, therefore, is most useful in showing long-term trends of precipitation and in identifying certain years of exceptionally heavy or light rainfall.

With, then, what the trees and lake together show, and with what statements certain Greeks made about weather and climate, we can recover some significant facts about the history of climate in ancient Hellas. Until now classicists have thought of the climate of the Mediterranean as existing from Homer's day to the present in a steady state. They have even brought forward some vague and general statements from poets like Hesiod to support this idea. On the other hand, the trees and the lake agree that there has been no steady state at all. Moreover, weather logs kept by Eudoxos, a Greek astronomer of the fourth century B.C., and the famous Claudius Ptolemy in the second Christian century also prove that climate then was not the same as it is now.

The sequoias show that in or about 551 B.C. rainfall abruptly increased, perhaps as much as 10 percent. Lake Saki shows a similar increase beginning in 547. Climatologists established long ago that northwestern Europe was under a relatively warm regime until some time in the sixth century B.C., when heavier precipitation and cooler temperatures set in. The trees and the lake make the date of the transition in the Mediterranean precise.

Evidence from Greece falls nicely into line with the trees.

Herodotus was told that the island of Thera once suffered cruelly from drought for seven years and that the desperate inhabitants forced 200 of their number to emigrate. They founded a colony at Kyrene in North Africa about 631 B.C.. Behold, a series of exactly seven thin rings occurs in the sequoias between 632 and 626 B.C.

Confirmation of wet conditions after 550 exists in the remains of works undertaken during the next half century to control runoff. The edge of the Sacred Lake on Delos was diked, and drains were run under the marketplaces at Athens and Corinth to carry away heavy rains.

Since 1858, when modern records began to be kept, rainfall around Athens has been a meager sixteen inches a year. An increase by as much as 10 percent can only have meant greater security for the food supply. It is therefore probably no mistake that the great colonizing effort of the Greeks, which was intended to find vacant lands for cultivation, ended rather suddenly in almost exactly 550 B.C.

The trees and the lake also make possible a better understanding of certain passages in Herodotus' description of the great Persian attack on Greece. In 480 Xerxes led forth a host of over 100,000 men and 600 warships to force the Hellenes to acknowledge him as overlord. Herodotus remarks that his advance was made difficult by frightful weather. In the winter of 481-480 a gale broke up the remarkable pontoon bridge thrown across the Dardanelles. In March another howled with hurricane force as the king's troops were marching past Mt. Ida. And in August a nor'easter raged for three days and drove a third of the Persian fleet to wreck on the rockbound coast of Thessaly. If one examines modern records to discover the probabilities of violent storms like these occurring at the times and places Herodotus says they did, it becomes apparent that each one was an anomaly, especially the nor'easter. Greek weather in recent periods has been calmer. But times then were cooler and wetter than now, to begin with; and in addition, the trees and lake agree that 480 was the second rainiest year of the entire century. Xerxes unwittingly had chosen for his grand offensive a year which was probably the stormiest for thirty years before or afterward, and the loss of a third of his fleet before serious fighting began was probably decisive for his defeat. The Athenians of the time knew exactly how fortunate they had been. After they had voted honors for Themistokles, their general-admiral-politician, they also voted to erect a temple in honor of Boreas, the North Wind, whom they worshipped in gratitude.

In 30 B.C. Augustus finally established a stable military dictatorship over Rome and her provinces and thus created the peaceful conditions that helped create the prosperity of the next 200 years. But at the end of the fourth century this mighty state suddenly collapsed, and western Europe entered upon the Dark Ages of evil memory. Since the days of Edward Gibbon, the decline and fall of the Roman Empire has posed perhaps the most important single problem which historians have had to solve. It is a matter not only of explaining the passing away of a state structure but also of explaining why a certain way of life was destroyed

— a way which, for the upper classes at least, had been based more or less on principles of humanism and rationality. The Roman upper strata succumbed to the competition offered by peoples equipped with primitive alternatives — the vicious, childlike Germans who lived outside the Empire and the passive, childlike Christians who lived inside it. Why?

During the first four centuries of the Christian Era the sequoias remain in close phase with the climate of the Old World. Tacitus says that the weather over the winter of A.D. 69–70 was so dry that the Rhine sank to the level where the Germans could ford it (an exaggeration?) and that the Roman military authorities had to run a screen of soldiers all along the left bank to prevent parties of barbarians from raiding Gaul. It was the driest year that Tacitus knew when he wrote his *Histories* around A.D. 100. In California, the sequoias at exactly the same time lived through the driest year of the first century. Otherwise their rings are unusually thick between 30 B.C. and A.D. 100, and they show that precipitation was somewhat heavier than the modern—the same sort of regime the Greeks of the classical period had enjoyed. Suetonius and Dio Cassius mention frequent, heavy flooding of the city of Rome by the Tiber during this time, which often forced people to go about the Forum in boats for days on end. Augustus put in handworks to clear the river bed of obstructions and to line its banks with floodwalls, but without obtaining much relief. On the other hand, all this rain was good for the fields of the Empire. The period from the accession of Augustus until the death of Trajan in A.D. 117 was the time of Rome's greatest prosperity and strength.

The trees show that drier conditions began with Hadrian (A.D. 117–38). The literary evidence speaks of a dry spell lasting five years, which exactly matches a five-year stretch of thin rings in the sequoias during the 120s. The circumstances of the people in the countryside here and there were very bad; in Sparta they were reduced to a diet of snakes. There was little the government could do for them except forgive arrears of taxes.

For the relatively small number of people concentrated in the cities, the government could do more. Hadrian had many aqueducts built to maintain their water supply by tapping new sources. And Egypt sometimes could bring relief. Study of Saki's varve record reveals its close relationship to the heights of the annual floods of the Nile, about which a good deal is known for the period of the Roman occupation. The same circulation of the atmosphere which carries moisture from the Indian Ocean to Ethiopia, where it falls in early summer as the rain which ultimately flows down the Nile, also carries moisture northwestward to the Black Sea, where it falls as rain in early summer. The quality of three out of every four known floods in Egypt matches the thickness of the lake's silt—high floods with heavy varves, low floods with light. The inundation of 131, for example, was so unexpectedly high that it washed away farm buildings. The corresponding varve was the second thickest of the second century. Speaking generally, the higher the flood in Egypt, the more land was irrigated, and the larger the harvest. Under Hadrian it often happened that when the rains failed in Asia or Greece, the flood

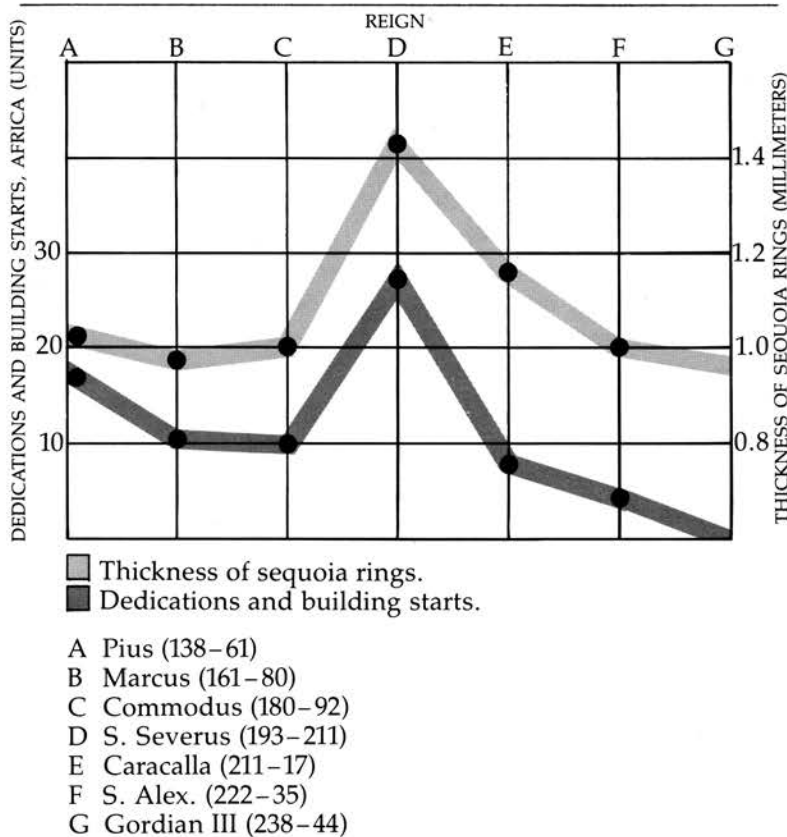
of the Nile was good, and the country produced exportable surpluses. We know that in 129 the emperor saved the city of Ephesos from famine. The Roman government had equipped itself to handle large bulk shipments of grain in vessels nearly the size of our old wooden frigate *Constitution*. The satirist Lucian saw one of them, the *Isis*, sheltering in Piraeus from a storm, and he marveled that her cavernous hull could be steered through a system of pulleys and levers by a single little bald-headed man.

The droughts under Hadrian turned into withering rainlessness in the principate of Marcus (161–80). Roman historians mention three bad periods, which the trees again confirm and make specific. The worst lasted seven years, from 168 through 174. Most unfortunately there were now also low Niles. It may have been 169, when sequoia ring and lake varve were both exceptionally narrow, that saw the terrible incident described by Galen. The proletariat of Rome, mad with hunger, streamed out of the capital into the countryside and stripped the villages of food. The mobs left the peasants nothing to eat but grass and roots, and, Galen concludes somberly, many died.

Meanwhile, the Empire had been attacked by pestilence. Its spread to every province was no doubt made easy by the famines, which had weakened the natural resistance of the population. We are told that in the capital thousands died each day. Then came a wave of invasions by the Germanic peoples, who crossed the Alps into northern Italy and even penetrated the Balkan peninsula as far as salt water in Attika.

Most Romans and Greeks, Syrians and Egyptians, Christians and Jews, agreed on one thing. Disasters like these had supernatural causes and were signs of divine anger. In this century there were general feelings of unease and even of dread, which have been well described by E. R. Dodds in his elegant little book (*Pagan and Christian in an Age of Anxiety*, Cambridge, Eng.: Cambridge University Press, 1965). The triple catastrophe of sustained famine, disease, and barbarian war must be the reason for the outburst of superstitious terror observable under Marcus and his son Commodus (180–92). Many people sought whatever sense of personal safety in this world or the next that religion might hold forth. Oracles sprang up to dispense the bogus security of a happy future. Lucian, in his essay *Alexander the False Prophet*, gives a sarcastic description of the founding and operation of one such in 170 at Abonoteichos in Asia Minor. Perhaps two years later a frenzied priestess named Maximilla proclaimed that the judgment of the nations would very soon take place in Pepuza, one of the many small towns in Asia Minor. She later committed suicide. In the capital a man foretold that the world would end when he climbed a tree and turned into a stork. Up he went into the leaves and released the bird he had hidden inside his tunic. The illusion was unfortunately spoiled when he lost his grip and fell. The authorities disapproved of this sort of thing, evidently because it tended to heighten public terrors. Marcus decreed that persons who preyed on the fears of others were to be relegated to an island. His law evidently did not help very much. Christianity, in spite of relegations and several local persecutions, began to

Figure 2. Comparison of the thickness of sequoia rings in California and the number of contemporaneous dedications and building starts in Africa, A.D. 138–244, according to the reigns of Roman emperors.



spread from the eastern provinces (where it had heretofore been confined) to the western, and to Gaul and Africa (modern Tunisia). The expansion of the church seems to have been closely related to the dry periods; at least, it is a remarkable fact that nearly all the martyrdoms of the second century which can be accurately dated coincided with years of thin sequoia rings. It was as the Christian lawyer Tertullian wrote—persecution was most likely when the Nile failed to irrigate Egypt, or the Tiber flooded Rome, or when drought set in.

Eventually the dryness passed off, so that conditions from 192 to 236 were normal again. It is possible from some hundreds of inscriptions to construct a curve, reign by reign, of the number of honorary dedications and building starts in the province of Africa. It matches the curve of the average sequoia ring, reign by reign, with great accuracy (Fig. 2). After the low under Marcus, a pinnacle of general prosperity was reached about the end of the principate of Septimius Severus (193–211). Material recovery was apparently complete. Emotional recovery from the horrors of the last generation was not. It was being said that people were no longer what they once were. The athletes were weaker and more

cowardly, the upper classes less willing to assume the financial burdens which went with holding public office. The last can be proved.

And then, between 235 and 270, these morally weakened people were subjected to almost continuous disaster, whose cumulative effects were a terrible mortality and a profound failure of nerve. The Empire was spared no evil originating in natural processes or devised by human folly. In the first year the ruling emperor was suddenly murdered by his own troops, and a certain Maximinus, a peasant army officer upwards of seven feet tall, was made Augustus by his men for no better reason, evidently, than his enormous bodily strength. He began a leisurely oppression of the upper classes for their money and of the Christians for their faith. The Senate tolerated these crimes for three years, until its members tried to end them by seizing control of the government. In March of 238, the aged Gordian and his son raised Africa in revolt, only to fall in battle against the seasoned troops of the garrison. In Rome, however, the main body of the Senate was heartened by the Gordians' defiance; it now named two of its members co-Augusti, ordered Italy into a state of defense, and incited the provincial governors to join them. The giant Maximinus hastened south from his camp on the Danube to throttle these perfumed idiots. The sequoias show that the harvest this spring ought to have been diminished by dry weather. Certain it is that Maximinus' legionaries soon grew hungry in their siegeworks and killed him as the cause of their distress.

This was in April. In July, on the ninetieth day of their rule, the joint senatorial emperors were unexpectedly set upon by privates of the guard, dragged from the palace, tortured and mutilated, and finally dispatched. The year had thus far witnessed the deaths of five caesars. As if to add an element of unrelieved surrealism, the Praetorians now named as emperor a near relative of the two slain Gordians, a beardless youth of thirteen.

These upheavals had unfortunate effects. They riveted the attention of men on internal affairs at the expense of danger from the manifest enemies now gathering beyond the imperial frontiers. And, more important, they heightened the fears of an already anxious population. Violent changes of government in the capital were often accompanied by breakdowns of discipline among the soldiers elsewhere. From just this time we hear of parties of them extorting food, money, and lodging from villages in Thrace and Asia Minor. Always lurking in the shadows was the possibility of all-out civil war. The government official Herodian asked if the Empire could withstand its enemies much longer, and the theologian Origen speculated whether the final days of the world itself were not at hand.

No sooner had the tumults of 238 subsided than a series of heavy earthquakes damaged western Asia Minor. The government felt it must make public expiation from one end of the Empire to the other. In 242 the Persians struck in the East and were held in check only with difficulty. Two years later the boy emperor was assassinated by an officer of the army, whom the soldiers promptly saluted as the Augustus Philip. He hurried to

the capital just in time to take the field against the Carpi, a Gothic people who had broken through the Danubian defenses and were ravaging the Balkan provinces. He soon drove them out. In 248, a year later, Philip presided over the Secular Games, which marked the thousandth anniversary of Rome's founding. Herds of animals were led out to slaughter in the imperial arenas. The mint struck a special currency to commemorate the bravery of the emperor and the eternity of the Empire. But people with a memory for ancient wisdom recalled the Sibyl's prophecy that each new *saeculum* brought with it changed conditions. And within only a few years' time the Phoenix was due to return to Egypt; her reappearance would also be a signal of the turning of the hinge between two world ages.

In 249 catastrophe began to overwhelm the Empire. That year the sequoias show that continuous, searing drought commenced, confirmed by a Greek eyewitness. Dust rose from the wheat fields of the Levant. In 253 Lake Saki began to lay down a series of paper-thin varves. Trees and lake together show that the twenty-three years from 249 to 272 were the driest of the entire Greco-Roman period. The drought was caused by a hyperactive sun. Observations of sunspots carried out in China show a decline of solar activity throughout the next century. A mass of geological evidence from most parts of the Mediterranean demonstrates how drastic the lack of rain was. The pattern of stream flow which had prevailed since the mid-sixth century B.C. was changed fundamentally. Rivers which had been building deltas began instead to deposit silt in their upper reaches. The mouth of the Caÿster at Ephesos had advanced several kilometers since 550 B.C.; since A.D. 250 it had advanced only one kilometer more. People did what they could to cope. Huge reservoirs were built to catch and store what rain still fell. The new one at Ptolemaïs in Libya had a capacity fourteen times that of the old. A number of places had to be abandoned altogether. Parts of the coastline of Libya and Egypt were deserted, along with an extensive stretch of the Nile Valley south of the first cataract. The inundations were now so poor that the revenues of the province no longer sufficed to maintain all the garrisons.

In 250, the second year of the drought, panic began to spread. Philip had been killed the year before in battle with Decius, the commander of the troops along the Danube, and the new emperor commanded that all Christians who would not renounce their faith and sacrifice in public to the angered gods of Rome were to be executed.

In 251 the Goths resumed their attacks. Traitors lured Decius into an ambush, where the Germans killed him, the first of the caesars to die fighting the barbarians. Chaos at the center followed. One army commander after another was nominated emperor by his troops and forced to fight the others for supremacy. War spread up the valley of the Danube to Switzerland and down the Rhine to the sea. In the rear of the marching legions, exulting Germans streamed across the frontiers.

In 253 a new and merciless plague began slowly to infect the Empire. Within a few years it had swept away a third of the

population of Alexandria. Men said that the new age was the era of Typhon the Destroyer. Fresh armies of Persians overran the populous province of Syria, destroyed its garrisons, and twice sacked the luxurious metropolis of Antioch. The Goths ransacked the Balkans from north to south and eventually gave Athens to the torch. About 256, the single most important source of silver, the great mines near Cartagena, were suddenly exhausted. The government diluted what little supplies of the metal still came in with copper, so that in 259 the value of the money collapsed. Astronomical inflation followed. Immediately every form of economic life was seriously depressed. The government reacted with harsh regulations for bankers and merchants, invoking the death penalty for disobedience; to no avail. In Egypt, the one-time granary of the Empire, food was so scarce that a system of rationing was begun in the whole province. Normal social discipline broke down. Riots broke out in the cities. Brigands infested the countryside. Notabilities were murdered in their beds. Nobodies ruled wide blocks of territory. "Everything," wrote a historian looking back from the next century, "everything that was highest was brought low, and the lowest things were raised to the heights." And only twelve years earlier Philip had been hailing the eternity of Rome.

So many disasters in so short a time convinced multitudes that the world was approaching its long-suspected end. One of the first to say so was the Christian Pionios, executed at Smyrna in Asia Minor in March 250 for announcing the doom of the earth. The most eloquent was Cyprian, the Bishop of Carthage, who repeatedly warned his churches during the 250s to prepare themselves for Judgment Day. The famines, the pestilence, and the exhaustion of minerals in the earth itself were infallible signs that the aged world was tottering towards its death. All the anxieties which had surfaced in the time of Marcus now reappeared, only on a far more catholic and hectic scale. The institution that benefited from the panic was the Christian Church, which for the first time received huge numbers of converts. Had not Jesus prophesied the exact sequence of catastrophes now unfolding before the eyes of all? Although the city of Rome before 249 had more than half a million inhabitants, the church there could not have had more than thirty thousand members. By 300 they were in the majority. Similar conversions occurred in most other large cities. Even in the rural areas of Asia Minor, Syria, Egypt, and Africa, hundreds of new bishoprics sprang up within a few years of 250.

The conversion of the Empire to the new religion carried with it serious effects. The church of the third and fourth centuries was not the worldly wise, flabby institution we know today. Many bishops then were no-nonsense men prepared to use force to compel observance of Christian doctrines. The unfortunate thing was that most churchmen were interested strictly in salvation and had no interest whatsoever in manufacturing technique or high learning, except for the philology which was useful for maintaining the purity of the text of Scripture. Indeed, many churchmen feared and persecuted Greek philosophy and even medicine.

They rejected much of the knowledge acquired by civilized men through patient centuries in favor of the somewhat limited conceptions evolved in the minor kingdom of Judah. "What," demanded Tertullian brusquely, "has Athens to do with Jerusalem?" The result was that soon after 250, as the Empire was undergoing its conversion, technical competence began to decline. It can be seen everywhere. Engravers who made dies for the mint lost the ability to make realistic portraits, so that the faces of the emperors became mere icons. Papyrus, the paper of the ancient world, which in the second century often had the appearance of fine stationery, by the fourth looked like shirt cardboard. The crucial thing was what happened to the weaponry. By the end of the century few men knew how to make a catapult, and the arrows produced by the armory at Alexandria would not fly straight. Rome had lost one of her main advantages over the barbarians.

Nor, before 400, did churchmen look with favor on service in the army. About 370 St. Basil even wrote that true Christians would not offer resistance to armed robbers. Hence, the number of soldiers from the inner provinces, those first to be converted, dwindled away, so that when Valens was compelled to give battle to the Goths outside Adrianople in 378, the imperial army was made up of other Goths hired for the occasion. Rome was heavily defeated, and the province of Moesia was laid waste — as the burnt ruins of its wrecked villas still testify.

Some Christians even frowned on procreation. It only produced, said Basil, more women to be widowed and more children to be orphaned. The practice of Christian continence was usual enough for outsiders to notice and draw the conclusion that the church was helping to prevent the population from recovering from the terrible losses it had suffered during the famines and plagues of the third century. With few exceptions, the Christianized cities of the fourth century were smaller and poorer places than they had been in the Hellenic second century. Athens had only a tenth of the total area she had occupied then. Hence, after the defeat at Adrianople the Empire was too weak to mount a counterattack sufficient to drive the Germans out. Within one generation more, Alaric held old Rome for ransom, and from his monk's cell in the Holy Land the virginal philologist Jerome could only lament the passing of one of the great ages of human history.

I do not claim to have explained the end of Hellenistic-Roman civilization in all its detail. We need to know more about the way so many Greeks and Romans got into the dilapidated and depressed state of mind described by Dodds. We should also show why the Christian Church had expanded from its small beginnings to most parts of the Empire by 249, and why men chose it in their hour of terror in preference to one of the other great Oriental religions. But for now it seems clear that one fundamental cause of the victory of religious faith over the principles of humanism and rationality was the astonishing series of catastrophes which fell upon the Roman Empire in the few years following on the celebrations of 248.