STONE, TILE AND TIMBER

Commerce in Building Materials in Classical Athens

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In a familiar passage of his essay, *Ways and Means* (I.4) Xenophon lists the natural resources of Attica. He praises the climate and the fruitfulfulness of both land and sea, then continues: “Nature has given her (i.e. Attica) an abundance of stone from which are fashioned beautiful temples and beautiful altars and goodly statues for the gods. Many Greeks and barbarions alike have need of it.” Xenophon was probably writing in the last year of his life (ca. 354 B.C.) and in a strange land. One might be inclined to discount his words as a nostalgic recollection of his homeland. But his assessment of the marble resources of Attica is fully borne out by later and unprejudiced authors. Livy (XXXI, 28, 11) attributes the extraordinary artistic wealth of Attica to the combination of abundant local marble and talented craftsmen—a sound analysis. Strabo (IX, 1, 23) gives high praise to the marble quarries of Pentelikon and Hymettos, and he emphasizes the closeness of the quarries to the city.

We do not have any such explicit literary evidence for the other most important ancient building material, viz. the clay for making brick and roof tiles. But on the outskirts of modern Athens, along the roads that lead to Eleusis and Kaphisia, one sees enormous quarries of red clay still in use; these must be typical of the widespread deposits that furnished the material needed for brick making as well as for the making of pottery in Classical times.

When we turn to the third basic building material, viz. timber, we find Attica sadly deficient. We are all familiar with the passage in Plato’s *Critics* (111) in which a vivid contrast is drawn between the landscape of Attica in the time of the speaker, and in an earlier age; the hills once covered with soil and abundant forests had become so denuded as to look like wasted

skeletons, affording sustenance only for bees. One may question Plato’s belief that Attica had ever been well wooded—the geological formation is simply too young and the rainfall too meager. But there is no reason to doubt that in Plato’s own day real forests no longer existed in that part of Greece. From Aristophanes’ *Acharnians*, to be sure, we know that charcoal was made in the 5th century on Mt. Parnes, and the same mountain may have produced lumber good enough for housebuilding. But in the Classical period the Athenians certainly had to import the better timber needed for heavy construction, for shipbuilding, for ships’ oars, even for props in the silver mines of Lauron.

Before we turn to trade in stone, clay and timber let me remind you of what materials went into Greek buildings of various types. I can do so very briefly because you will find the matter admirably dealt with by R. E. Wycherley in his recent books *The Stones of Athens* (1978).

First, a word about houses. Attic houses of the Classical period whether in town or country were modest by comparison with most of the houses we meet in the handbooks such as those of Olynthus and Delos: walls of sun-dried brick were carried on sockets of rubble stonework; floors were of rolled clay, roofs of the simplest terracotta tiles; the rooms were so narrow that joists and rafters could be cut from quite small trees. The most precious elements were the wooden doors, and the frames for doors and windows. The reader will recall how the country folk of Attica as war threatened in 431 B.C. carried into town “their wives, children and the woodwork of their houses” (Thucydides II, 14, 1). Old doors and boards are prominent in the auction lists of the goods of Alkibiades and the others accused of defacing the Hermas in 415 B.C. Such fittings might well have been made of imported lumber, but the rest of the timber needed for housebuilding, i.e. for joists and rafters, as also the clay and the stone, were all available locally and so do not concern us directly in our present inquiry.

The earliest civic buildings of Athens, such as several that have come to light along the west side of the Agora, were indistinguishable structurally from private houses. It was only toward the middle of the 5th century that substantial buildings began to be put up for civic purposes. Most of the important early civic buildings, e.g. the Old Bouleuterion, the Tholos, the Odeon of Pericles, the Pompeion, had walls of sun-dried brick, a practice which continued in civic architecture at least through the 4th century B.C. Structures like the Stoa Poikile and the Stoa of Zeus Euleutheros with walls of solid poros were exceptional. The Royal Stoa was a curious anomaly with end walls of squared stone masonry and a back wall apparently of brick.

Temple buildings run a different course. This branch of architecture also had its modest beginnings, but already by the turn of the 7th/6th centuries there existed at least one substantial building, presumably a temple, on the Acropolis. This we know from surviving roof tiles of terracotta. Before the middle of the 6th century the Athenians were building temples and treasuries with stone colonnades and walls of solid, cut-stone masonry of poros. The early use of such solid construction in temples was no doubt in honor of the gods, but another concern may have been security: the temple might contain not only
precious votive offerings but also the money bags of the state treasury. About the end of the 6th century the Athenians erected their first building of national importance out of solid marble; I refer to their Treasury in Delphi. This extravagant but splendid practice was resumed, after the lapse caused by the Persian Wars, in the Periclean Parthenon, and it flourished for one glorious generation. A few temples were built in Athens also in the 4th century, but on a more modest scale. Thus even the shrine of Apollo Patroos on the west side of the Acropolis was housed in a small temple, built ca. 330 B.C., with walls largely of polygonal limestone masonry that had to be plastered. Temples were distinguished not only by the use of more prestigious materials in their walls and columns but also by the attention lavished on their upper parts. The Athenian series of painted terracotta roof tiles began ca. 600 B.C., developed through the 6th century under the ubiquitous influence of Corinth, to flower in the 5th century in a distinctive Attic style. But as early as the first half of the 6th century the roofs of the finest buildings on the Acropolis had begun to be highlighted with white marble. It was used for simas, antefixes, akroteria, and eventually even for the roof tiles. Marble was employed concurrently, also to lend distinction, for the metopes of buildings that were otherwise made of poros.

We must have in mind one other important category of public building, viz. fortifications. The defense system of Athens was one of the most extensive in the Greek world. It comprised circuits of the Acropolis, of the city proper and of the Peiraeus, as well as the three long walls connecting the city with the harbor town. At the start of the Solonian War, according to Thucydides (II, 13, 7), the total length exclusive of the Acropolis, was 178 stadia, i.e. ca. 20 km, (12.5 miles). The Acropolis circuit and probably some limited stretches of the Peiraeus emporia were of massive stone masonry. Elsewhere the walls were made of crude brick resting on a socle of stone. The normal thickness was three to four meters; the height may be estimated at seven to ten meters. The amount of stone, and still more of clay, required for one of the major building programs was stupendous. Both the stone and the clay needed for the walls were of local origin, and both were quarried as close as possible to the place where they were to be used. Thus we are not directly concerned with these materials, but I shall have something to say later about the portion added to the walls at the end of the 4th century.

We may now turn to our proper theme, the commerce in building materials into and out of Attica. The evidence, both archaeological and literary, is very uneven. As far as clay is concerned we need consider it only in the form of architectural terracottas. Since terracotta is one of the most usual materials in all major monuments on virtually all ancient sites in Attica those found on the Acropolis were splendidly published by Ernst Buschor (1929, 1933), but adequate publications are still lacking for such major sites as the Athenian Agora and Eleusis, not to mention many minor sites. We also lack analyses and close technical studies of clay and glaze to supplement stylistic criteria in distinguishing the products of various local centers of tile-making. Elizabeth Gehrard and her scientific colleagues are now engaged on intensive research on tiles and tile-making at the Isthmus of Corinth.

Stone and marble have also survived in quantity, and the experienced archaeologist in most cases can distinguish with fair assurance at least between Attic and Island marbles. But here too more precision may be hoped for from further study, especially from such isotopic studies as those now being pursued by Harmon and Valerie Craig in La Jolla, California, and by Norman Herr of the University of Georgia. Most of the major varieties of limestone used in Attica may also be recognized with assurance; nor need there be a question about the principal kinds of poros.
temple of Apollo at Corinth and of Poseidon on the Isthmus of Corinth. Each of these temples, erected within a few years of each other in the first half of the 7th century, was roofed with a set of large and heavy terracotta tiles of a kind that was to be refined and subsequently referred to for hundreds of years as the Corinthian type of tile. The basic design, I am sure, is well known: large, rectangular, flat pan tiles, the joints between them overlaid by angular cover tiles, richly painted antefixes, cavo tiles and simas. Throughout the Archaic and Classical periods the Corinthian product maintained a remarkably high level both technically and aesthetically.

The other most widely recognized type of tile on the mainland was familiar to both the ancients and the moderns as the Laconian. The scheme was much simpler: both pan and cover tiles were segments of tapering cylinders laid one on top of the other without the elaborate jointing of the Corinthian; antefixes were simple disks, and simas were not normally used. After a brief flowering in the 7th century this type of tile ceased to be developed either technically or aesthetically. But its simple, practical design permitted very economical production, and this recommended its wide employment throughout antiquity for houses and unpretentious public buildings. The more monumental, more beautiful Corinthian type soon came to be preferred throughout mainland Greece for sacred and fine civic buildings.

As to why the Corinthians achieved such early and widespread superiority we can only speculate. One reason was perhaps the resumption of monumental building in the region of Corinth and the Argolid sooner than elsewhere in mainland Greece. Good, permanent roofs were needed for the big, new temples, and the local builders were eager to devise suitable roofing. A second factor was undoubtedly the nature of Corinthian clay which permitted heavy objects to be fired with a minimum risk of warping or cracking. Another important factor was surely the wide commercial connections and the business enterprises of the Corinthians in the 7th and 6th centuries B.C., this situation permitted wider sales, more continuous and more economical production, and the development of masterly ‘know-how.’

What does all this have to do with Athens? The answer is that it will explain why the earliest painted architectural terracottas known from Athens are of Corinthian types. Among the earliest antefix designs which seem certainly to have originated there is one which shows a primitive, squat palmette above a single, bold cable pattern. This type spread widely throughout the northern Peloponnesos and south central Greece. It is represented at Athens by a series of antefixes found on the Acropolis. A decorated cavo tile and sima which probably come from the same building as the antefixes are also of early Corinthian types.

Throughout the later 6th and early 5th centuries the Athenian industry continued to be under strong Corinthian influence. In the early 5th century the two schools diverge. One indication is the Athenian shift from dark on light to light on dark technique analogous to the change from black figure to red figure in vase painting. The Athenians were riding the wave of the future. We are in fact now on the threshold of a brilliant period in the Athenian terracotta industry. The combination of new and more sophisticated designs, superb drawing and intricate craftsmanship make these perhaps the most beautiful of all ancient architectural terracottas. For several generations the demand in Athens for painted architectural terracottas of the highest quality could be met by local craftsmen.

What were the mechanisms of the Corinthian influence on Attica in the Archaic period? It would be hard to prove that any piece of architectural terracotta found in Athens was actually made in Corinth. Against that possibility are the formidable difficulties and risks of transporting such large, awkwardly shaped and often delicately painted objects over both land and sea. A more practical procedure, of course, would be to set up a kiln close to the place where the tiles were to be used. We have now excellent examples of this sensible practice in the sanctuaries of Zeus at Olympia and at Nemea. Clay could be transported much more easily than finished tiles, and the procedure could be further simplified by transporting only the very fine and very characteristic Corinthian clay used for thefinishing coat, the body of the tile being made of local clay. The whole operation, however, might be carried out by a Corinthian contractor employing Corinthian craftsmen. Some such modus operandi may have been employed not only at Athens but at other sites, e.g. Thesprotia and Kalydon, where the abundant architectural terracottas show strong Corinthian influence but where there is reason to suspect local manufacture.

Let me refer in passing to a couple of
intriguing though commercially insignificant examples of the complexities that may arise in the study of the tile business. The French scholars who have recently published a magnificent book on the architectural terracottas found at Delphi [1967] have confirmed an earlier identification of terracotta statues which in material appear to be local but to design Athenian. The French scholars go so far as to hypothesize, largely on the basis of this evidence, the existence of an earlier Treasury of the Athenians at Delphi.

My other example concerns Olympia. Dr. A. Malville, in his study of the Workshop of Phidias [1964], attributes to that building a beautiful set of simas and antefixes which are essentially Athenian in design but Corinthian in technique. The Greek scholars conclude that designs were submitted by Athenians, perhaps in the service of Phidias, but that the tiles were fabricated in Olympia by some Corinthian contractor.

However this may be, we must seriously consider the possibility that in some instances roofterries made in Corinth were imported into Athens in the 5th and 4th centuries. According to Pollux (X, 182) both Attic and Corinthian roof tiles were recorded in the auction lists of the confiscated property of the Herms destroyers of 415 B.C. On one of the surviving fragments of these famous inscriptions is preserved an entry for cover tiles of Corinthian make (korinthiourgés) (Hesperia 25, 1956, pp. 281–286). There would seem to be a very strong probability that we are here dealing with actual imports although the date of manufacture is uncertain since the tiles were second-hand.

The construction specifications published in 347/6 B.C. for the Naval Arsenal in the Peiraeus call for Corinthian tiling (IG II1 1660). Forty years later Corinthian tiling is specified for another great public undertaking in Athens, the refurbishing of the city and Peiraeus wall circuits and the Long Walls. The main part of the roofing above the sentry walk was to be of Laconian tile, but the gosses, i.e. presumably the decorated eave tiles, were to be Corinthian (IG II 1362).

In the interval, in the year 329/8 B.C., purchases of both Corinthian and Laconian tiles were entered in the financial accounts of the Sanctuary of Demeter at Eleusis (IG II1 1672). There were two lots of Corinthian tiles, one of 200 pieces brought from Corinth, the other of 100 pieces bought of one Demetrios, apparently a dealer resident in the deme Lakkiadai on the western outskirts of Athens. The comparative costs are interesting. For the lot brought direct from Corinth the price was 5 obols per tile, the freight on the 200 tiles was 6 drachma, 4 obols. For the lot supplied by Demetrios the price was 4 drachma per tile, and the freight on the 100 pieces was 40 dr. Evidently the economical course was to buy the Corinthian rather than locally made tiles, and to purchase them direct from Corinth. (At Eleusis, the architect was paid 100 drachmas per day, while workers received 1 drachma. One drachma equals 6 obols.)

In the Eleusian accounts of the same year (329/8 B.C.) we read of the purchase of 50 pair of Laconian tiles at a unit cost of 4 obols the pair as compared with 5 obols for a single tile straight from Corinth. We may assume that here, as in the roofing of the Athenian walls, the Laconian tiles were used for some utilitarian purpose where appearance didn’t count.

Some scholars have hesitated to believe that there could have been extensive imports of Corinthian-made tiles to Athens in the 4th century. It has been argued that in most cases the term "Corinthian" when applied to tiles had come to designate type rather than place of origin. But the evidence of the Eleusinian accounts points strongly in the other direction. The parallel of the trade in pottery is also to be taken into account. The comprehensive study of a vast body of kitchen pottery of the Classical period found in the excavation of the Athenian Agora shows that a substantial proportion of the heavy utensils are of indubitably Corinthian manufacture; the massive mold-made mortars were actually produced in the same shops as the Corinthian roof tiles. In the case of the roof tiles as of the kitchen ware we may suppose that the Corinthians were able to compete on distant markets through the skilful exploitation of their special natural resources. Comparable situations are not unknown in the modern world.

Let us move on to stone and marble. The one stone for which importation into Attica is specifically attested is Athenian poros. From the Erechtheion accounts we know that this stone was employed for the backing of part of the frieze course in the Erechtheum, presumably in a place where the stone would not have been visible. It is attested epigraphically also at Eleusis; for columns and triglyphs of the Telesterion and for a retaining wall. Although the stone is not strong enough to stand much stress, and when exposed in fine architecture needs plaster, it is superior to the
poros of Poseidonia in various ways: it is remarkably light in weight, easily worked when fresh, and fairly uniform in texture. Then too, many of the quarries on Aegina were close by the water so that the stone could easily be loaded aboard ship for the crossing of only a few miles to the Attic coast. It is little wonder therefore that the Aeginetan poros was used in the Erechtheum. It was well delivered from the quarry; the column drums on the right is ready for setting. [Photo Agra Excavations]

Poros and Thasos marble of excellent quality was more readily accessible than in Attica. It has been recognized for instance in the early Temple of Poseidon at Sounion (early 5th century), in the Stoa of Zeus Eleutherios in the Athenian Agora (late 5th century) and in the great Middle Stoa of the Agora (early 2nd century B.C.). But in all these cases it would be well to consider the alternative possibility of some other, non-Attic source such as the region of Corinth which produces an excellent poros that is known to have been exported in quantity to Delphi and to Ephesus. Here careful comparative studies are needed.

We move on from stone to marble. The Athenians were slow in exploiting the abundant local marbles of Attica. For the extensive use of marble, whether in sculpture or in architecture, they drew both inspiration and material from the Aegean islands. On such islands as Naxos, and doesn't really overtake the imported stone until the time of the Parthenon.

In architecture we find the first significant use of marble in the early building on the Acropolis, the so-called Heitaiomphoton of ca. 570 B.C. Here both local and island marble were employed for highlighting the upper parts: Hymettian for roof tiles, naisos and akroteria, Parian for at least some of the metopes. The main fabric of the building and the sculpture were still of poros.

In the next great temple on the Acropolis, the Temple of Athena attributed to the Peisistratids (ca. 550-520 B.C.), marble was used more freely; for pedimental metopes and sculptures, Parian marble of high quality and beautifully worked. We find a
similar distribution of materials in the Peisistratid Temple of Demeter at Eleusis, the Telesterion.

While the Peisistratids were putting the finishing touches on their temple on the Acropolis the exiled Alcmaeonids were starting on the contract for the rebuilding of the Temple of Apollo at Delphi. We are all familiar with Herodotus’ report (V.62), now fully confirmed by the excavations of the temple, of how the Athenian exiles, although their contract called for the use of poros, proceeded to make the east front of the temple, architecture and sculpture alike, of Parian marble. This is a very instructive incident because it shows us the trouble the Peisistratids had in getting the necessary materials for the temple. The Alcmaeonids were undoubtedly determined to outdo the Peisistratids. They must have been as keen as the Athenians on the new fashion of sculpting in marble rather than in the old speaking material of the town.

A quarter century later the Athenians erected another building in a prominent location at Delphi—a small and elegant stoa for the display of the trophies taken from the Persians. Here again Parian marble was used, but this time it was confined to the bases and capitals of the Ionic columns. The monolithic shafts were of Pentelic marble. To have used Parian marble in such long masses would have been wildly extravagant.

Meanwhile, back home in Athens, Pentelic marble had gained ground. The pre-Persian Parthenon, the one burned while still in scaffolding in the summer of 480 B.C., was to be of marble from the middle step up—the first all-marble building of large scale to be designed in mainland Greece. The marble, at least in its surviving parts (steps, columns, anta base) was Pentelic. This was decisive for the marble trade. As W. B. Dinsmoor observed long ago, the extensive prospecting and quarrying required for this large temple showed the Athenians that they had a vast supply of excellent marble at their back door. Not only was Mt. Pentelikon closer than Paros—it was much cheaper. And larger masses of clear marble could be extracted.

It is not surprising, therefore, that Pentelic marble was the choice for the Pentelic Parthenon, and indeed for the Periclean building program in general. But the use of this beautiful island marble died hard, especially among the sculptors. Thus we find it used for the sculpture and for many of the elaborately carved uppermost parts in the two earliest temples by the Theban Architect, viz. the Temples of Elephiatos in Athens and of Poseidon at Sounion. Parian was chosen also for the sculptured friezes of the Ionic Temple by the Ilissos. In this building, however, the friezes were carved, not as before on massive blocks, but on thin slabs. This suggests that the disparity in cost was now making the use of the imported stone impractical except for very special uses.

In his reference to the marble of Attica Xenophon remarked that it was in demand among both Greeks and barbarians. This implies an export trade in marble. That Pentelic marble was widely exported at least in the 4th century is evident both from surviving specimens and from literary references. The subject had a curious fascination for Pausanias. In the course of his Description of Greece he refers to Pentelic marble perhaps a score of times. Although in more than one instance his information is demonstrably wrong, his attention to the matter implies that a certain cachet attached to Pentelic marble even in the Roman period.

Since we do not allow a comprehensive review of the evidence, let me illustrate with only a few examples. Among the earliest, and most striking instances, is Phidias’ use of Pentelic marble in combination with dark Eleutherian limestone in the setting of the image of Zeus in his temple at Olympia. Since the installation took place in the late 430’s we have here a remarkably illustrative of how even at such a time art transcended national boundaries. Later on Pentelic marble was to be used freely elsewhere in the Temple of Zeus already in the 4th century for the repair of the roof, and in the Hellenistic period for the replacement of three figures in the west pediment.

Pentelic marble was employed also in other Panhellenic sanctuaries. The fine-grained white marble used for the roof tiles of the 5th century Temple of Poseidon at Isthmia is regarded by its excavator, Oscar Bronner, as “probably Pentelic.” The Stèles of the early 4th century at Delphi exhibits a highly sophisticated combination of Pentelic marble and dark Eleutherian limestone. The building accounts of the

Sanctuary of Asklepios at Epidauros attest the use of Pentelic marble in the Temple of Asklepios, Artemis and Apollo Mæstas, and in the Tholos. From the same inscriptions we know that Athenian sculptors and marble workers were active at Epidauros, along with craftsmen from several other cities. Of particular interest for our present topic we read in these building accounts the record of expenses for visits to Athens by various officials of the Sanctuary of Asklepios, one of their duties being to advertise the contracts in Athens. An
Athenian contracted to quarry Pentelic marble, deliver it to the Peiraeus and box it for shipment. At the other end a citizen of Epidauros contracted for the transport of the Pentelic marble from the harbor to the Sanctuary.

In the Sanctuary of the Great Gods on Samothrace the marble normally employed in building was the coarse-grained marble from the neighboring island of Thasos. But in the curious building on the East Hill dedicated by the Macedonian prince, Philip II, the so-called Alexander IV, between 323 and 316 B.C., the hexastyle façade was made of a finer, white marble; this is regarded by the excavator, James McCredie, as almost certainly Pentelic. Some technical features of the building are also strange to Samothrace and, taken in conjunction with the marble, might suggest the work of an Athenian contractor. Perhaps it is not without significance that the time is the opening years of the Macedonian domination of Athens.

Xenophon, remember, spoke also of demand for Attic marble among barbarian, i.e., non-Greek peoples. Let me mention only a couple of instances, both of the 4th century B.C., the problem of Halkis-Parisos are three friezes. Two of them were carved in marble from the Aegian islands. The third frieze, the church frieze, is pronounced Pentelic by Bernard Ashmole, a distinguished connoisseur of marble. Ashmole regards the style of this frieze as Athenian, and perhaps some Athenian sculptor did indeed come to Halkis-Parisos, bringing his familiar marble with him.

This is perhaps the place to note that some of the finest and most marvelous of the royal sarcophagi from Sidon are of Pentelic marble. Such are the "Sarcophagi of the Mourning Women" of the mid 4th century and the so-called "Sarcophagi of Alexander" of the late 4th century. These are generally believed to be the work of East Greek sculptors rather than Athenian, so again one wonders what determined the choice of marble. Perhaps the reason was of a purely practical nature. Huge blocks of very pure marble were needed (the sarcophagi were 2.653 and 3.38 m. long); and perhaps the quarries of Pentelikon were now best able to supply such blocks.

Of the accessory materials needed in stone masonry, just mention iron and lead, which were required for the making and fastening of clamps and dowels. Iron must have been imported, but from where we do not know. It reached Athens in an unfinished state as we infer from the discovery of masses of iron slag on the slopes of Kolonos Aegaeon; this dates chiefly from the 4th century. Athens was presumably self-sufficient in lead, at least in the Classical period, since lead was found in combination with silver in the Marathon area.

Finally we come to timber. Passing over the comparatively modest needs of house-builders, let us consider the timber required for temples, civic buildings and ships: most of this was undoubtedly imported. In the case of temples and civic buildings the great problem was to find timbers long enough and strong enough to frame a roof covered with tiles of thick bitumena or even of marble. Without going into structural details let me draw attention to a couple of incidents which illustrate the gravity of this problem.

An inscription of ca. 383 B.C., records thanks doved by the people of Athens to a man of Etekonarhos (on the eastern Aegean island of Karpathos) to his sons and his community for the gift of a cypress tree for the rebuilding of the Temple of Athena, i.e., the Erechtheum. The tree had been cut in the Sanctuary of Apollo on Karpathos. A man of Lindos, at his own request, was authorized to deliver the tree trunk to the Athenians. The inscription makes no reference to payment, but the donor nevertheless received substantial recompense. Athens granted autonomy to the people of Etekonarhos, and instructed the neighboring states to be helpful to them. One would gladly know more of what lies behind this bland, laudatory statement.

Among the earliest and most famous of the civic buildings of Athens was the Odeion or Music Hall erected by Pericles in the 440's. We are told by Vitruvius (V, 9, 1) that the roof of the Odeion was framed with masts and yards salvaged from the wrecks of Persian ships. This same valuable timber was to be the undoing of the Odeion. In 401 B.C., when Sulla was preparing to storm the Acropolis, the building was burned by the Athenians themselves to prevent its woodwork from being used by the Romans in their siege operations.

I may note in passing that one of the greatest difficulties we encountered in rebuilding the Stoa of Attalos in 1933-56 was the procurement of suitable timber for architraves, joists and rafters. Failing to find what we needed in Europe, we were driven to bring in Douglas Fir from the American Northwest.

The construction of temples and large public buildings was a comparatively rare event even in Classical Athens. The need for good timber was felt more frequently and persistently for ship-building, especially for the making of triremes. The average life of a trireme has been estimated at ca. 20 years so that even to maintain a fleet of several hundred vessels required a constant and very considerable supply of material. The study of ancient shipwrecks in recent years has shown that the hulls of merchant ships, and presumably also of warships, were of edge-joined planking held together by means of close-set mortises and tenons. This type of construction called for craftsmanship of a high order and also for clean, strong timber.

Theophrastus (H.P., v, 21), writing in the 4th or 3rd century, observed that the best building timber coming into Greece in his day was the Macedonian, esteemed because it was "smooth, of straight grain and resistant." There can be no doubt that it was to Macedonia that the Athenians looked chiefly for timber, especially for the high-grade timber needed for the hulls and oars of triremes. We may be sure that it was in the hope of facilitating this traffic that the Athenians made such determined efforts to oust a northern foothold at Amphipolis. This is explicit in Thucydides IV, 108, 1. The timber trade was made difficult not only by the great distances but also by the fact that export was subject to the direct control of the Macedonian kings. This meant that the Athenians had to cultivate the personal goodwill of these rulers in much the same way as with the princes of grain-producing states in the Orvinie. (One is reminded of oil diplomacy in our own time.) The transaction in timber might take on a personal quality on both the Macedonian and the Athenian side as when Andokides in 411 B.C. secured a shipment of oars for the Athenian forces from Samos. King Archelaos thanks to family connections (Andok. II, 11), or when the famous general Timoleon received a gift of timber from King Amyntas although Timoleon was required to pay the freight charges to his own house in Peiraeus (Dem.] against Timoleon 20).

We do not have space to consider individually the several known treaties between the kings of Macedonia, the Athenians and other cities on the subject of the timber trade, but let me note a couple of points that emerge from these documents. At the height of their power the Athenians aimed at a most-favored-nation status as when they persuaded King Perdikkas to allow no one to export oars from Macedonia unless to the Athenians. At times the royal control covered not only shipbuilding timber and poles for oars but also the pitch distilled from coniferous woods that was essential as a preservative for wood on both sea and land.

The timber, mostly fir, imported at great
cost from Macedonia was undoubtedly needed most urgently for shipbuilding, but it might be used for other purposes as well. Thus Macedonian timber figures prominently in the Eleusinian account for 329/8 B.C., some of it being employed for door frames and thresholds. Nor was Macedonia the only source of imported timber. Those same Eleusinian accounts record the importation of ash and elm, i.e. hardwoods, from Corinth, some of the elm going into grille doors for the shrine of Plouto. These accounts also record payment for four logs of cypress wood supplied by a citizen of Knidos. An earlier Eleusinian document, an inventory of 407/6 B.C. (IG I, 314, 11. 109-111), reports 35 squared timbers of the pine (ogis) of Thurii, presumably the Athenian colony in South Italy.

One final word about timber. We may look forward to the appearance, before long I believe, of a book on timber and the timber trade in antiquity. The author is Russell Meiggs of Oxford who has been keenly interested in the subject ever since he served in the timber division of the Ministry of Supply in World War II.

The overall picture that emerges regarding the trade in building materials is, I fear, very sketchy and impressionistic. I would plead that this is due largely to the nature of our evidence which contains very little of a quantitative nature and practically nothing regarding the mechanics of this branch of commerce. But this informal survey may help to demonstrate the strengths and weaknesses of one important department of the Athenian economy.

Homer A. Thompson, of the Institute of Advanced Study in Princeton, was the long-time Director of Excavations in the Athenian Agora. Among his many notable publications is the recent but already classic *The Agora of Athens: the History, Shape and Uses of an Ancient City Center* (with R. E. Wycherley).

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