

Ancient Grain Storage and Transport by C. Mundigler

Any investigation into ancient agriculture as we have attempted to do in the previous issues of *Labyrinth* magazine would not be complete without also looking into what happened to some of those agricultural products after they were harvested. Perhaps the most important staple agricultural product of all time has been grain and its production and cultivation have already been looked at, but once you have the product in your hands, what do you do with it?

Once harvested, threshed, winnowed and dried, grain in ancient times, as today, was either stored, traded or milled for subsequent use as food. If farmers were to reap a harvest in the next growing season, part of the grain would, of necessity, have to be safely stored away as seed for that next crop. To be used as food, on the other hand, the grain would generally be dried by some method to keep it from germinating, whether in fire-heated kilns or sun-baked under a desert sky. This was especially important if it was to be transported and stored in a damp climate such as that in Europe. Drying the grain also helped in making the kernels more brittle and therefore much easier to grind into flour, a necessary procedure if you want to make the grain edible in the form of a meal or bread.

There is some physical evidence that natural caves and underground silos were used throughout ancient times in many parts of the Eastern Mediterranean for the storage of grain. This took advantage of the cool, dry conditions that these granaries afforded in the hot climates there.

Most of the literary and archaeological evidence we have for grain storage, transport and milling comes to us from the Greek and Roman worlds. There is evidence from Greece and Italy that granaries with adequate ventilation on the second and third stories of buildings could maintain a low humidity and temperature range to keep the grain dry and cool as well as away from any pests which might infest it if they were on the ground-floor. The Romans especially were very careful and particular in the construction of their grain storage facilities to ensure proper, long-term storage and

protection of their precious grain supplies. Marcus Vitruvius Pollio, a Roman architect writing in the first century BC, tells us that "rooms for grain should be set in an elevated position and with a northern or north-eastern exposure" enabling them to be cooled by the wind and thus preventing excessive heating which could be detrimental to the grain. "Other exposures produce the corn weevil and the other little creatures that are wont to spoil the grain." (Vitruvius, *Ten Books on Architecture*, Book VI.6.4). We are further told by Pliny of another method by which "some people recommend building elaborate granaries with brick walls a yard thick, and moreover filling them from above and not letting them admit draughts of air or have any windows", thereby excluding any dampness or temperature variations (Pliny, *Natural History*, 18.72-73). In the same passage, however, Pliny supports Vitruvius' view and the archaeological evidence by telling us that "in other places, on the contrary, they build their granaries of wood and supported on pillars, preferring to let the air blow through them from all sides, and even from below." Pliny even goes so far as to inform us of some of the folklore involved in the storage of the precious grain—"Some people tell us to hang up a toad by one of its longer legs at the threshold of the barn before carrying the corn into it" to ensure proper storage and protection.

While Pliny mentions that some granary walls were made to be "a yard thick", he does not detail the architectural method of buttressing used to counteract the outward thrust of all that stored grain on the walls of the silos and granaries. Archaeology, from sites such as Ostia near Rome, has helped to fill in the descriptive gaps in some of these first-hand accounts, uncovering the structural reinforcements that were necessary to deal with some of these architectural problems. Roman *horrea* or warehouses such as those at Ostia were built mainly as granaries and their design facilitated the storage, access and distribution of Rome's vital grain supply which passed mostly through Ostia.

Predating this Roman archaeological evidence, we have physical examples of grain storage facilities at ancient Greek sites such as Olbia near the Dnieper River, in what is now called the Ukraine. Herodotus, writing in his *Histories* Book IV, mentions the richness and productivity of this area and archaeology backs this up with the discovery of at least a dozen large grain storage pits and a drying

kiln for processing the grain. The Ukraine, of course, was a principal source of Greek and Roman grain, so necessary especially in later Roman times with increasing population and decreasing domestic food production. From about 500 BC on, the transport to and from Olbia of grain played a major role in the economy of not only the Ukraine region, but of Greece and Rome as well.

With this kind of importance laid on the storage and transport of grain in the ancient world, it is not surprising to find that both underwater archaeology and ancient official documents support the fact that the average grain ship running between Alexandria and Rome weighed in with a 340 ton load and some ships from Syracuse from 240 BC, for example, were purported to have run with as much as 1800 tons!

The transport of grain to the ancient Greek cities was as important as it would later be to the Romans. Greece could supply very little of its own grain and so if virtually any quantity of grain from its three main sources of Egypt, Sicily or southern Russia was blockaded, as it was in the Peloponnesian War, Greece could very quickly be starved into submission. Philip of Macedon employed the same tactic, with similar results, by closing the grain supply through Byzantium. Vespasian in the Eastern Roman Empire planned to do the same thing to Rome in AD 69. Athens needed some 100,000 tons of grain a year, while later Rome would need in the neighbourhood of 400,000 tons a year, and so it is clear that any short-cutting of the supply from the three major sources could be devastating, if not fatal, to the population. It is easy to see why the storage and transport of grain in the ancient world played such an important role in the economy and well-being of the major cultural centres.

The shipping of grain through Byzantium or Alexandria or Rhodes was usually done in large clay jars or *amphorae*. The final destination for the grain would either be small private granaries within the *villa rustica* of a larger villa such as Sette Finestre near Cosa, Italy, the large public granaries of Ostia near Rome itself or the legionary granaries of frontier forts such as Lejjun in Jordan. At these Roman forts, the grain, which formed the staple diet for the Roman soldier in the form of soup, porridge and pasta, was stored in camp granaries, each soldier's allotted one-third of a ton per year

occupying about one-half of a cubic yard, according to recent archaeological evidence.

Once the grain was brought to either the villa, the public warehouse or the Roman fort and safely stored against humidity, heat and vermin, it had to be processed and milled before it could be used as a foodstuff. It is this processing, both on a large scale and on an individual basis, which we will look at in the next issue of *Labyrinth*.