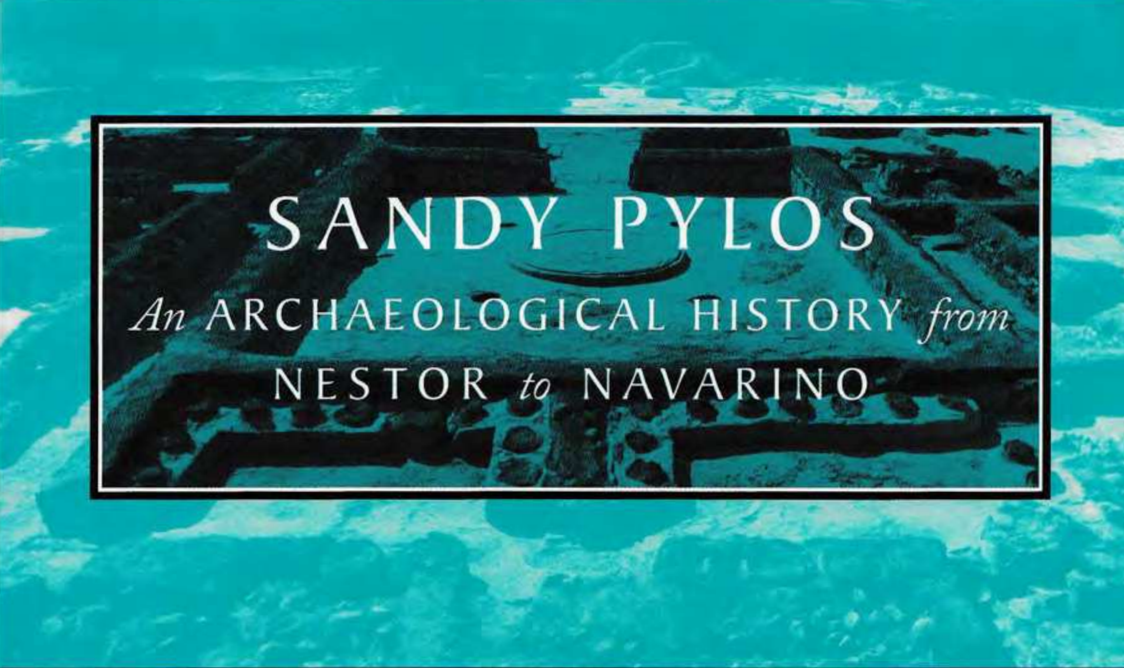

SANDY PYLOS

An ARCHAEOLOGICAL HISTORY *from* NESTOR *to* NAVARINO

EDITED BY JACK L. DAVIS

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FOCUS

The PORT *of* NESTOR

During the course of PRAP's explorations, some of the natural scientific research evolved into a clue-gathering investigation reminiscent of a whodunit detective novel. It all began with an earlier study of the landscape evolution of western Messenia. Almost twenty years ago, our colleagues John Kraft from the University of Delaware and George Rapp and Stanley Aschenbrenner from the University of Minnesota realized that the bed of the Selas River, which passes along the western side of the palace, appears to have been diverted by human interference. A few thousand years ago, the river exited into the Bay of Navarino, but it has since abandoned this old bed and now takes a right-angle turn to the west, thereby avoiding its former floodplain and exiting into the Ionian Sea.

Kraft and his colleagues assumed that this diversion was constructed artificially to prevent the fertile floodplain at the northern end of Osmanaga Lagoon from drowning during annual river floods. They also argued that the most likely period during which this kind of human interference with the hydrological environment might have occurred would have been the Late Bronze Age, because several Mycenaean engineering feats of a comparable character are already known. Among these is a similar river diversion at Tiryns that is still functioning today, over 3,000 years after it was constructed.

These arguments, however, remained on the level of a hypothesis meant to stimulate further research. The close examination of the Selas River consequently became a focal point of the physical scientific work on PRAP—one that kept us busy for five years, until we finally found what appears to be a simple explanation for a complicated system.

During the first season of fieldwork, while trying to collect clues about the peculiar course of the Selas River, I noticed that the stream passes through an alluvial plain of unnatural rectangular shape just a few hundred meters before it exits into the Ionian Sea north of the village of Romanou

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EBERHARD ZANGGER

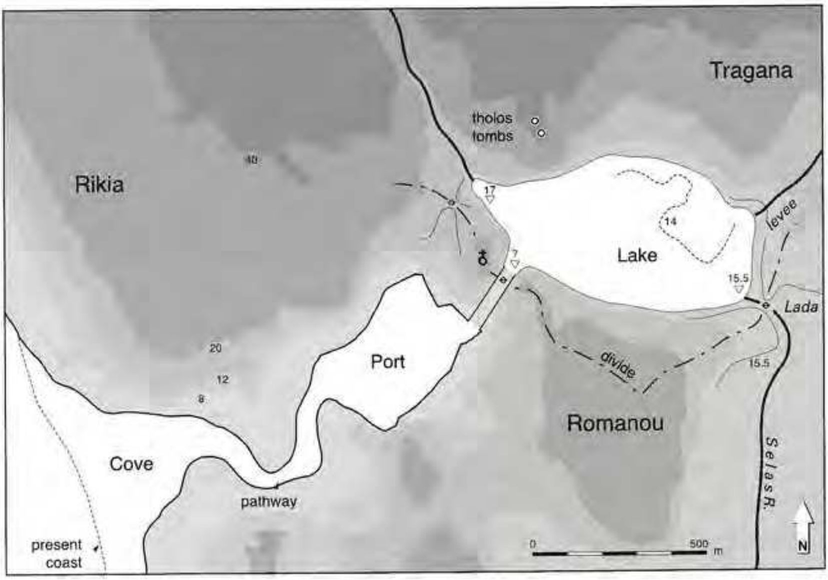

FIGURE 37

Reconstructed prehistoric topography of the area of the Mycenaean port. PRAP Archive. E. Zangger.

(Fig. 37). This rectangular floodplain looks like it might have been a water-filled pool that later became silted up. If this is correct, the remarkably straight boundaries of the floodplain, which measures about 230 by 320 meters, and its location in a dune environment, where natural lakes are unlikely to occur, would have argued in favor of a man-made basin. The only conceivable function of an artificial basin so close to the sea would, of course, be that it served as a protected port. Thus, early on, the working hypothesis was formulated that the rectangular floodplain near Romanou might represent a silted-up port for the Late Bronze Age kingdom.

Determining whether there was once water in the basin is relatively easy—at least in theory. One has to investigate the subsurface deposits to see whether there are sediment layers in the stratigraphy that only form underwater. During the second season of fieldwork, we therefore attempted to take a sequence of cores across the plain using a hand drill or auger. Soon it turned out that theory and practice can be quite different matters. All of our cores terminated at shallow depths in a thick layer of impenetrable gravel. At this stage, we were ready to drop the initial hypothesis and abort the investigation of the basin, but after much encouragement from our archaeological colleagues, who had even secured some extra funding, we returned the following year with a rotary drill truck hired from a local well-driller.

Using this device, we were finally able to reach deeper, despite the continuous threat of collapsing drill holes (Fig. 38). Under the gravel, we discovered a thick layer of clay—a deposit that does indeed only form underwater (Fig. 39). Thus, the initial hypothesis, that the floodplain might conceal a former basin that used to be filled with water, was verified. In the next step, we had to find out whether the water in the basin had been fresh or salty. Microscopic investigations of sediments extracted from the holes revealed shells of many hundreds of organisms that could only have lived in a marine environment. Hence, the water in the basin must have been well connected to the open sea.

This discovery also proved the hypothesis that the basin was—at least in part—constructed artificially, because there is no natural process that would create and keep open this kind of steeply sloping depression so close to the shore. Eventually the basin was filled in, apparently quite rapidly, by the several-meters-thick layer of gravel that had caused us so much trouble. Geologically speaking, the depositional environment changed from one extreme to another. First, the basin had only accumulated wind-blown clay; later, it became quickly filled with coarse gravel carried by the river. These gravel deposits evidently originated after the change in riverbeds. When the Selas River chose its new bed through the basin, it first filled the depression with stream gravel deposits.

Obviously, we wanted to find out when the basin was constructed, how long it was functional, and when the river changed its course, thereby destroying the basin. The well-dated cores taken from Osmanaga Lagoon—mainly to collect pollen samples—aided us in solving this problem. It turned out that the amount of fluvial material deposited in Osmanaga Lagoon dropped to a low rate around 1400 B.C., and then to an even lower level around 1200 B.C. Evidently, Mycenaean engineers did indeed interfere with the course of the Selas River, at first diverting the stream only partially. After 1200 B.C., however, when the palace administration had collapsed, the river permanently chose the shorter course to the Ionian Sea.

Why would Mycenaean engineers want to interfere with the river? This next question turned out to be the most puzzling problem of all, because the port basin and the redirection of the river appeared to us to be mutually exclusive. An artificially constructed basin near the sea that is used as a sheltered port, by itself, makes perfect sense. This kind of construction, called a *cothon* harbor, was even quite popular during the Phoenician dominion of naval trade in the Mediterranean. No engineer, however, should

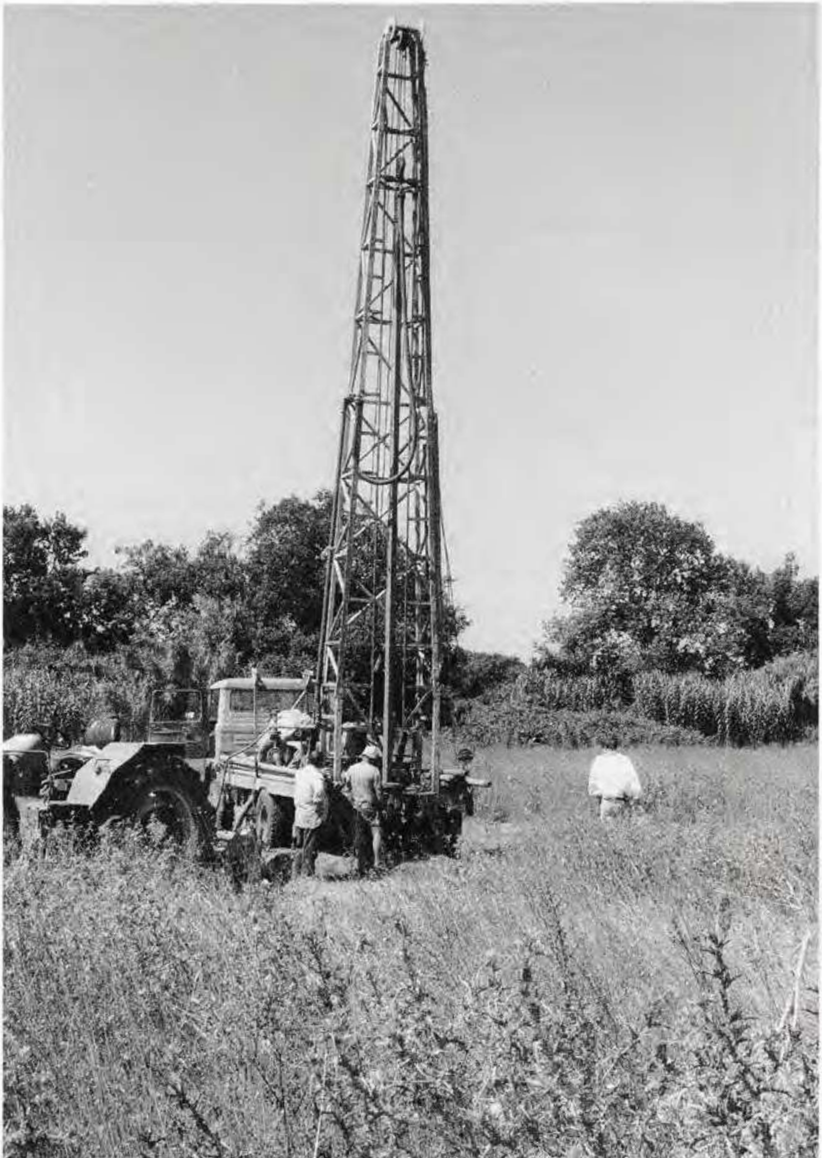

FIGURE 38

Mechanized drilling equipment at the site of the Mycenaean port. Eberhard Zangger on right. PRAP Archive. J. Bennet.

FIGURE 39
Eberhard Zangger (left) examining cores extracted by the mechanized drill. PRAP Archive. J. Bennet.

want to direct a river through such a basin, because the sediment carried by the stream, mainly during its winter floods, would fill up the basin within just a few years.

Since the basin was undoubtedly man-made, we began to doubt that the change in riverbeds was due to human interference as well. But there were many strong arguments in favor of an artificial redirection, probably the most important one being that the new course of the stream traverses the middle of a bedrock knoll. At this point we felt that advice was needed from an expert in Mycenaean hydroengineering, and we therefore invited Jost Knauss from the Polytechnical University of Munich to participate in our project. Knauss has investigated all the known hydraulic systems created by Mycenaean engineers, for instance at Gla, Tiryns, Mycenae, and in central Arcadia, and has written four books and three dozen articles about the subject.

During the fieldwork, Knauss first noticed sediments of an extensive lake that existed inland of the artificial basin. Lake and basin were separated by the knoll; but they were also connected by the narrow channel that cuts through this knoll. But this new revelation did not really explain the system behind the whole construction either. Maintaining a lake above a man-made port greatly increases the risk that the port might become filled in by sediment when the lake spills over its shores after an unusually heavy rain. With the help of the detailed observations, maps, and diagrams made by Jost Knauss—and a hint by his colleague, Daniel Vischer, from the Eigenoessische Technische Hochschule in Zurich—a plausible explanation for the whole system (and its demise) finally materialized after the end of the 1995 field season.

It all has to do with the epithet "sandy" Pylos. Today, deserted sand beaches several kilometers long stretch north of Romanou. Very likely some, or even much, of this sand used to cover the beach, even during the Late Bronze Age. Under these circumstances, it would have been virtually impossible to keep the entrance to the port basin sediment-free. The seawater that penetrated into the basin would have carried sand with it, and this sand would have soon blocked the port entrance. Thus, the whole construction of the port only made sense when it could be kept free of sediment. In order to achieve this, it had to be flushed with a small but permanent flow of clean water. As long as the basin was filled with so much sediment-free water that there was a steady stream of it flowing out to the sea, no sediment-rich marine water could get into the basin.

Hence, the stream had been diverted simply to flush the port basin. Since river water tends to contain even more sediment than seawater, however, the Mycenaean engineers had to construct a sediment trap first—and that is where the lake comes in. When the sediment-rich river water entered the lake, it lost most of its energy and therefore dropped its sediment. Then, a small current of clean water derived from the surface of the lake ran through the artificial canal into the port basin, while the remaining water left the lake through the original streambed that exited at Osmanaga Lagoon. This system obviously demanded that somebody control how much clean water was directed into the basin and how much dirty water was allowed to escape into Osmanaga Lagoon. When this control was abandoned after the Mycenaean demise, the river was left to itself and chose the shorter course through the former port basin.

This port basin at Romanou not only ranks as the first and thus far only known artificial port in prehistoric Europe, it also—for the first time—demonstrates that Mycenaean hydraulic skills were not limited to domestic drainage and irrigation systems, but also applied to naval installations. This discovery sheds a new light on seafaring and naval trade during the Late Bronze Age. Thus far, many scholars have assumed that during Mycenaean times, vessels were simply pulled ashore, probably because this is the procedure described by Homer. Now we know that we have to look carefully for traces of artificial ports—no matter how concealed they might be under several meters of gravel.

EBERHARD ZANGGER