REPORT OF THE UNDERWATER EXCAVATION AT CAPE GELIDONYA

George F. BASS

A Late Bronze Age merchant ship sank between two islands of the Beş Ada group, just off Cape Gelidoya, pro- bably during the thirteenth century B.C. I t was discovered recently by Bodrum sponge-divers who reported its position to Peter Throckmorton and Mustafa Kapkın who had spent several summers lo- cating wrecks along the Turkish coast.· Its excavation provided the first material evidence for the construction of a ship of that date in this part of the Medi- terranean; Egyptian ships, ofa basically different design, have been preserved on land. The ship's cargo, including a very large group of objects from different countries, will considerably improve our knowledge of second millennuim trade. The excavation also provided an oppor- tunity to improve methods of underwater archaeology, putting it on a truly scien- tific hasis.

The Gelidonya wreck was excavated by the University Museum of the Uni-versity of Pennsylvania between June 14 and September 13, 1960, with the collab-oration of the London Institute of Arch-aeology and the Council for Underwater Archaeology in San Francisco. Divers and technicians constituted an international group representing England, France, Germany, Turkey and the United States. Hakkı Gültekin, Director of the Izmir Museum, and Lutfi Tuğrul, of the Epi-graphical Museum in lstanbul, repre-sented the Turkish government as commis-sioners. Members of both the Izmir and Istanbul diving clubs participated in the work.

In mid-September, the party also made exploratory dives on two Byzantine wrecks just off Yassi Ada near Bodrum. üne of these was measured, photographed and studied for any special problems that might arise in its future excavation.

The Gelidonya shipwreck lay at a depth of 30 meters on a sandy, rocky bottom. Most of the hull had disinteg-rated, but the cargo, found *in situ,* stre-tched over eight meters, suggesting the approximate lenth of the ship. The portion of hull which was preserved affirmed Homeric descriptions of ships; small planks (average width ıocm. thickness ıomm.) lay side by side, with wooden dowels (average diameter 2cm.) running through them, presumably into ribs which have since disappeared. Over these planks laid a pile of short sticks,still preserving their bark, which could have cushioned the thin hull against the cargo,or which may have been only firewood. Small fragments of rope could be from rigging, but could equally have been used to tie up baskets of cargo.

The major part of the cargo consis ted of copper ingots; forty of these, inclidung ten preserving only half, were of the so-called "ox-hide" shape (Figure ı) (average Length 60 cm. average width

45 cm., average weight 20.5 kg, but varying between 16 and 27 kgs.), and more than twenty were round " bun" ingots (average diamenter 20 cm., aver-

age thickness 2.5 cm., average weight 4 kg.). Twenty-seven of the ox-hide ingots bore foundry marks, most, if not all, of which indicate a Cypriot origin. The whole ingots were stacked in piles, but intact ingots (figure 7). At the western end of fragmenst were found in small groups that were probably held together in bags or baskets; bits of matting were found running over some ingots, and part ofa basket, which contained several tools, was well-preserved (figure 2).

With the copper ingots was found a number of piles of white, powdery material, indentified by Turyag Laboratories of lzmir as tin oxide. Thus the merchant ship was carrying the raw mater- ials for mak.ing bronze: copper, almost certainly from Cyprus, and tin perhaps from Byblos, Greece, or even Spain. (Copper ingots of our type have been found as far west as Sardinia, indicating that merchant ships of this time knew the western Mediterranean).

Bronze implements were abundant: chisels, knives, hoes, flat and double -axes (figure 3) ,axe-adzes, picks (figure 7), spear- heads, bracelets, awls, bowl rims and handles, and a mirror, hammer, spade an kebab iron; several of the tools bore marks which seemto be Cypro- Minoan. Some of these objects were in- tact, but many were broken and found in groups with ingot fragments, indi- cating that they were being transpor- ted not for their functional use but for the metal of which they were made.

A number of whetstones were found with some of the tools.

A cabin or some living quarters seems to have been in the eastern end of the wreck. Here were found traces of the crew's food (olive pits, an astragal, fish bones, and a possible bird bone) near what may have been firewood. This was also the area that contained almost all of the personel objects: five scarabs (figure 5), afinely-carved cylinder seal (figure 6), polished stone mace-heads, pieces of *crystal,* a pottery lamp, and most of the forty-eight small weights of various size and shape (9.3 gms..to 501 gms.) (figure 7). At the western end of the wreck was found, however, a *jar of glass beads of three types.* Pottery was scattered throughout the wreck, some sherds having dirfted quite some distance away. The pottery is still under study, but some seems certainly Cypriot.

in addition to its cargo, the ship was carrying approximately 1 16 kgs. of ballast stones.

Method of Excavation

Divers worken with both Aqua- lungs (compressed-air tanks) and narghile (airhose to surface). Helmet divers could be used to great advantage where heavy work was required, but were too comb- ersome to do any work in the delicate interior of the ship. We usually dived in groups of two or three, each group for forty minutes in the morning and halfan hour in the afternoon, with appr- opriate decompression stops to prevent divers' diseases.

A complete drawn (figure 8) and photographic (figure 9) record was kept of each stage of the work. Divers, writing on plastic sheets with ordinary pencils, surveyed the wreck after driving in pitons for fixed triangulation points. Details were photographed daily, but on several occasions we were able to make "aerial' surveys of the wreck; a series of pictures, taken at a fixed height by an absolutely level camera, could be glued together to make a most useful photographic map. A number of two-meter ranging rods served as scale in these larger pictures. Most of the cargo was completely covered by a thick concretion of lime. It was dangerous for fragile objects, as well as unduly time-consuming, to attempt to free individual pieces from this deposit. The- refore, large lumps of concretion, some-

times weighing etween r oo and 2ookgs., were broken loose with hammers and chisels; these were raised to the surface both with cable and winch (figure ro), and with plastic balloons (figure r r). Smaller lumps, and loose objects,were raised in a large wire basket (figure r 2) ; all were tagged on the sea-bottom with plastic labels.

The lumps were reassembled at our camp and cleaned of concretion, pre- serving the position of the objects as they were stored on the ship (figure13). After being recorded in this position they were put into a fresh-water basin to begin the slow process of washing salt out. Pieces of wood basketry were stored airtight plastic bag tô prevent their drying and warping; a plastic coating was tried on some pieces with varying degrees of success.

For cleaning sand from areas the wreck, we used an air - lift (figure 14). An air-lift is a large, flexible tube to whose lover end air is pumped through a smaller hose. As this air enters botton of the large tube it rises, sucking water and sand after it. The sand can either be caught in a large bag underwater or pumped to the deck of the boat, where it can be

sifted later for beads and other small objeets that might have been swept away from the wreck.

A second searching device was an underwater metal-detector, which loc- ated several deposits of metal that were completely concreted and might ot- erwise been overlooked. A third such device was an underwater core-sampler, which would theoretically locate bits of hull under mud and sand; we used this only at Yassi Ada and feel that it is generally too time-consuming for the results it gives. (figure 15).

This is only a beginning. Working time underwater is extremely limited and we are devising mechanical aids to give the maximum efficiency to divers. The first of these is a plotting frame to be constructed over any wreck, allowing objects to be accurately plotted by sliding members, making slow triangulation un- necessary. A similar device for a camera holder would allow a constant and stan- dard photographic record, regardless of curent. Methods of searching for and lo- cating other wrecks, perhaps dectronically must be found. Finally, and somewhat farther in the future, methods of excava- ting much deeper wrecks must be found.