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# ULUBURUN – THE DISCOVERY AND EXCAVATION OF THE WORLD'S OLDEST KNOWN SHIPWRECK

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The oldest and most exciting shipwreck ever discovered is that of a 15 metre Syro-Palestinian trading vessel whose cargo was sighted on the sea-bed by a sponge diver off a promontory called Uluburun, near Kas, on the south Turkish coast. The ship dates from about 1300 BC. According to Wachsmann (1998:xi) "The Uluburun shipwreck is without doubt the single most significant key to understanding Bronze Age seafaring", and Bass (1998:49) adds that "few if any Bronze Age excavations in the past 50 years have been more important than the Uluburun shipwreck."

## 1. Background

The mainstream of nautical development that was to flow throughout ancient history arose not in the river-oriented civilisations of Mesopotamia or Egypt but in the open waters of the Eastern Mediterranean around the beginning of the second millennium BC (Casson 1971:30). Men had ventured beyond the shelter of their shores long before this date, in log rafts, perhaps, or some form of reed bundle boat, followed by dugouts with planks added on both sides to give a bigger freeboard (Johnstone 1980:58).

By the third millennium the Egyptians had learned to build craft with edge-joined planks sewn together with twine, as has been shown by the discovery of 12 wooden boats buried beside the funerary enclosures of the earliest kings of Egypt at Abydos, dating to c. 3000 – 2700 BC (Haldane 1992:12), and the famous Cheops ship of c. 2650 BC, discovered in pieces buried alongside the Great Pyramid of Giza. She was reassembled and now lies, 45 metres long and painstakingly restored (*Fig. 1, right*), in a special museum next to the pyramid (Vinson 1994:21f.)

*Fig. 1: Cheops ship*

But these were river craft, too fragile to withstand the pressures of the open sea. At some later period a great advance was made when shipbuilders developed the

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mortise and tenon method of joining planks, a method described later in this article (see p. 15-16). The discovery of the Uluburun wreck by a team of underwater archaeologists has provided the earliest evidence of a ship constructed by this method.

## 2. Underwater archaeology.

Underwater archaeology is a nascent discipline which has become increasingly important for the study of ancient seafaring. Written and artefactual sources are of great value, but it is only recently that a genuine primary source has emerged – the excavated wreck of an ancient ship.

George Bass, founder of the Institute of Nautical Archaeology (INA) at Texas A&M University, is regarded as the "Father of Underwater Archaeology". Since its creation the INA has carried out much valuable work. This was specifically demonstrated with their first major project, the excavation in the 1960's of a wreck off Cape Gelidonya, also in southern Turkey. As this was the first shipwreck to be completely excavated by diving archaeologists, this excavation became a milestone in the development of nautical archaeology as a new discipline (Pulak 1998:188). During this project it was first shown that it was possible for archaeologists to work on the sea-bed, even in 30 metres of water (Muckelroy 1978:14).

Since 1945, in the Mediterranean alone, more than 1000 pre-medieval wrecks have been located in widely varying states of preservation, with various countries actively involved in their excavation (Parker 1990:335). The latest discovery is that of a 2,300-year old wreck picked up by sonar at a depth of 3 000 m, the deepest ancient shipwreck ever found (Phaneuf 2001:1)

At the INA headquarters in the Mediterranean at Bodrum, Turkey, the work has gone from strength to strength, with new shipwreck evidence turning up almost every season, and the restoration and conservation of artefacts continuing all the time. The discovery of a wreck as unique as the Uluburun marks the peak of their achievements so far.

## 3. The Uluburun wreck

The first hint of a wreck at Uluburun came in the summer of 1982. A young sponge diver called Mehmet Cakir told his captain that he had seen strange "metal biscuits with ears" on the sea-bed while working at a depth of about 45 metres. The captain, who had attended INA briefings in Bodrum, realised that Cakir's description was that of a Bronze Age "ox-hide" shaped copper ingot.

He reported the find to the museum at Bodrum and a team including INA archaeologists hastened to the site to confirm the discovery. They found the wreck on a steep slope between 44 and 51 metres deep and raised one copper ingot from among the dozens visible. A full inspection of the site showed 84 copper ingots exposed in rows, with many more buried beneath, as well as a stone weight anchor visible at the eastern deeper end. A few terracotta artefacts, after being noted on the plan, were raised as samples. These included a jar, a pilgrim flask, a wall bracket and a discoid

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copper ingot, all seemingly of Syro-Palestinian and Cypriot origin. This suggested a tentative date for the wreck as being in the early 14th century BC, which would place the ship in the age of the Syro-Palestinians: an exciting discovery, indeed.[1]

*Fig. 2: A diver studies the initial find of ingots.*

*Fig. 3: Stone anchors from the Uluburun ship*

*Fig. 4: A diorama in the exhibition hall shows the sea-bed at the Uluburun site as the divers would see it. At the bottom of the picture are two typical Syro-Palestinian jars. At the same site several small two-handled jars were found. Since their shape made them convenient to carry on long journeys, they came to be called "pilgrim flasks" (Bass 1987: 729).*

[1] After 14 years of painstaking excavation experts have finally ascertained, with remarkable precision, exactly when the Uluburun ship sank. Tree ring dating methods applied to firewood believed to have been stowed aboard on leaving show that she sailed some time about 1300 BC. This date was confirmed by the find of the Nefertiti scarab (see p. 14).

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*Fig. 5: A collection of* amphorae *soak in water in a storage basin to prevent them from cracking while a member of the team empties a Syro-Palestinian pilgrim flask. Several other* amphorae *of Syro-Palestinian design were found on the wreck of the Uluburun ship.*

## 4. Historical background – the Syro-Palestinians

The merchants who developed the most extensive shipping network in the Eastern Mediterranean were the Syro-Palestinians, the forerunners of the Phoenicians, a Semitic speaking people who already lived on the coastal plain of Syro-Palestine during the third millennium BC. With plentiful timber at their disposal from the fir and cedar forests of the mountains of Lebanon, they were able to construct large merchantmen capable of carrying diverse cargoes.

Their "round ships", mainstay of the merchant fleets of the ancient world, were developed in the period from about 1500 to 1200 BC. Over the years building traditions had mingled to such an extent that Syro-Palestinian ships, whilst retaining many Egyptian features such as rounded, spoon-shaped hulls, straight stem posts and broad, square sails, had done away with the hogging truss[2] indicating that these ships now had some form of internal bracing.

*Fig. 6: Model of a round ship*

## 5. The excavation

Excavation of the Uluburun wreck began early in July 1984 and continued until the end of August. It was carried out by a team from the INA led by George Bass and

[2] A cable that could be continuously tightened ran from bow to stern to keep the ends drooping is called hogging, and the cable is called a hogging truss.

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Cemal Pulak. During the first season half the staff lived in a camp built into the inhospitable face of the rocky promontory against which the ancient ship almost certainly had met her fate, whilst the other half lived aboard the 20 metre INA research vessel *Virazon* moored above the wreck.

*Fig. 7: The Virazon*

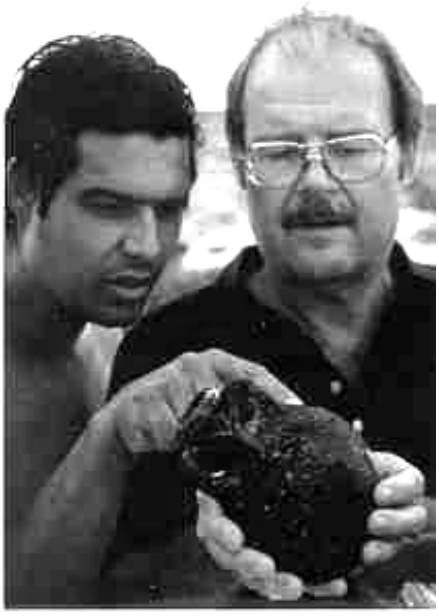

*Fig. 8: Pulak (left) and Bass*

The Virazon, fitted out specially for underwater surveys and excavations, was equipped with generators, air compressors, a recompression chamber for divers with "bends", oxygen and air banks, a photographic dark room, a fresh-water maker, balloons for lifting artefacts to the surface, cameras, hoses and personal diving equipment as well as welding and other tools. An underwater telephone booth was placed on site as well as essential air lifts for the removal of overburden, the sand or rubble on top of an archaeological deposit. Diving twice daily for six days a week the team completed 1259 dives at varying levels (Bass 1986:272).

The final excavation campaign took place in 1994 when the INA completed its 11th and final year on the site. The number of dives had now reached 22,413 totalling 6613 hours of excavation time (the equivalent of more than nine months under water without coming up for air) and made the project the longest and deepest excavation ever conducted by the Institute (Pulak 1994:8). The Uluburun ship has offered the most culturally diverse ancient cargo ever recovered, representing a microcosm, "a reflection in miniature" (Cline 1994:100), of the international trade as a whole in the Eastern Mediterranean during the Late Bronze Age. It could therefore perhaps be considered one of the most important archaeological events of the century, even equalling that of the Cheops ship and Tutankhamen's tomb. It was in fact voted one of the ten greatest archaeological discoveries of the 20th century by the journal *Scientific American* (Bass 1999:40).

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During the first season of excavation one of the team members was heard to remark: "This is an archaeologist's dream." So it proved to be as more and more priceless treasures came to the surface.

## 6. The finds

The ship's principal cargo was copper ingots, of which no less than 345 have been recovered. Three hundred and seventeen of these were "ox-hide" shape with four legs or handles for easy lifting. The rest were similar two-handled ingots as well as a few flat, pillow-shaped and oval "bun" ingots.

*Fig. 9 (left): A diver, removing an amphora from the site, stepping over a staircase of ox-hide ingots.*

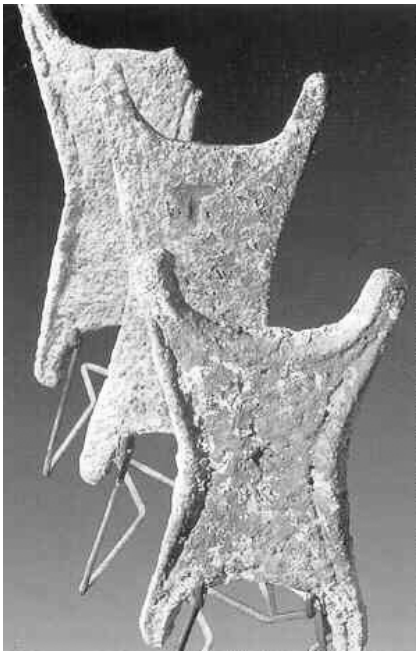

*Fig. 10 (right): Ox-hide ingots found on the Gelidonya wreck.*

Each of the ox-hide ingots (similar to those found on the Gelidonya wreck), weighed about 23 kilograms, equivalent to an ancient talent. The ore for the ingots came from Cyprus (ancient Alashiya) though the only known casting mould for such shapes was one excavated near the city of Ugarit (modern Ras Shamra) on the North-Syrian coast. A letter in the form of a clay tablet from the king of Alashiya to an Egyptian pharaoh found at Amarna in Egypt dated around 1370 BC reads: "I will bring to thee as a present 200 talents of copper". Was this the promised shipment, a gift that ended up on the sea floor off the point known today as Uluburun? We can only speculate (Bass 1987:709).

That the ship called at Cyprus may be gleaned from information obtained by analysing the clay of a shallow bowl shaped like a wishbone: it was unmistakably Cypriot and dated from the Late Bronze Age.

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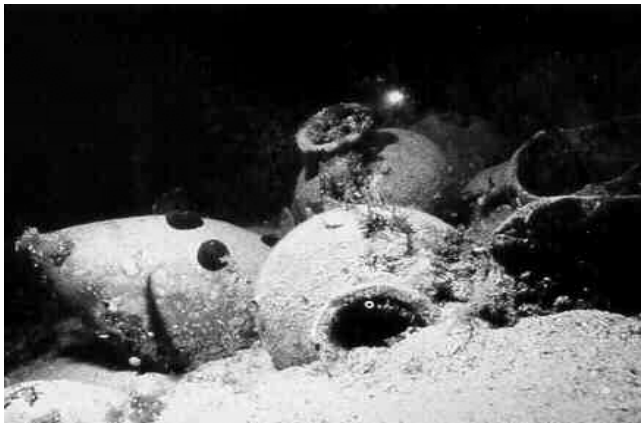
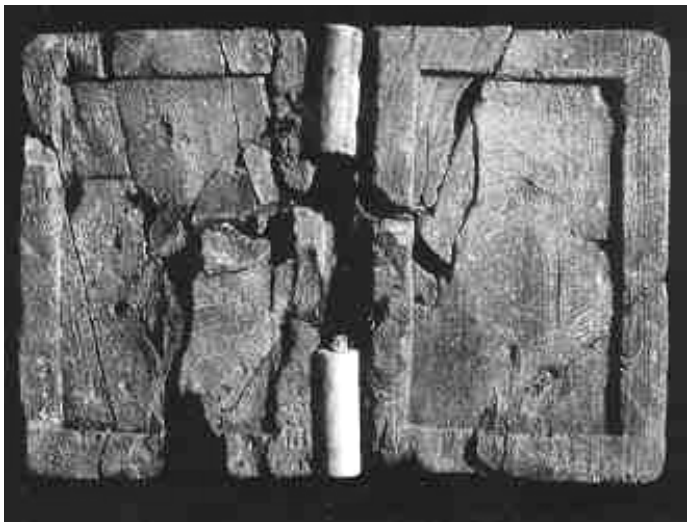


Among the first items to be excavated were six enormous storage jars (each large enough for a person to hide in). These *pithoi* (*Fig. 11, right*) were found to be filled with pottery objects. One large *pithos* , besides finding in its sediment the remains of pomegranates, bronze implements and some ballast stones, was found to hold a small hinged writing board in 25 fragments, dating from the late second millennium BC. When reassembled this was identified as a *diptych* consisting of two rectangular wooden leaves joined by three ivory hinges (a similar writing tablet is mentioned by Homer in *Iliad* 6.169 and was found at Nimrud in Iraq). Both interior sides were recessed to a depth of about a tenth of an inch (0,25 cm) to hold wax, leaving a raised margin about half an inch (1,25 cm) wide.



The waxed surfaces would have been inscribed with a stylus. This type of stylus has been found at Bogazköy in central Anatolia, site of the Hittite capital Hattusa, and was most likely used for writing Hittite hieroglyphics rather than cuneiform characters. This discovery could well be the "world's oldest book". Sadly none of the wax, thus none of the text, has survived (Symington 1999: 31-37).

*Fig. 12: The world's oldest book*

During the early stages of the excavation a grayish, brittle material was discovered – samples showed it to be pure tin. Tin ingots were also found later. It is possible that the tin could have come from modern-day Afghanistan. The approximately one ton of tin eventually excavated is the oldest ever discovered in its raw form. Alloyed with copper this would yield 11 tons of bronze.

*Fig. 13: Tin ingot*

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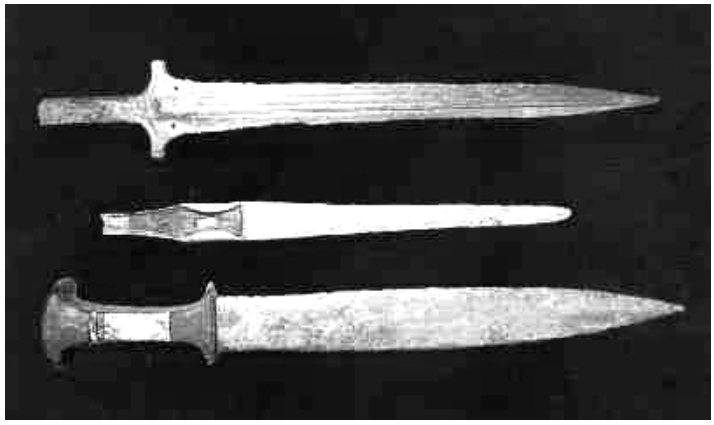
Many exciting discoveries are made, not on heavily encrusted objects on the seafloor, but later in the conservation laboratory, where much of the work of an expedition takes place *(Fig. 14, left)*. The daggers illustrated in Fig. 15 *(below*) are an example.

After clearing encrustation, the dagger *(middle right)* was interpreted to be of Syro-Palestinian origin, as did a sword, with ivory and ebony inlaid hilt *(bottom right);* it is here displayed with a Mycenean sword *(top right)*. The two swords are nearly identical in size and were found together beneath a *pithos* where they were probably hidden.



By the end of the 1992 season excavation of the Uluburun ship's cargo had revealed masses of glassware including a pair of opaque, cobalt blue glass disks *(Fig. 16, left)*, the first of more than a hundred such ingots. These ingots (each 15 cm wide), sent from Tyre to Egypt during the 14th century BC, were called *mekku-stone*. Chemical analysis of the ingots revealed them to be identical to Egyptian and Mycenean glass of the same era. The ingots are also mentioned in the Amarna tablets: "The king, my lord, has written to me about the *mekku-stone* that is in my possession, but I have already given one weighing one hundred (units) to the king, my lord." So wrote Prince Abi-Milki of Tyre to the Egyptian pharaoh Akhenaten in about 1370 BC (Bass 1987: 716). It is clear that these ingots were an important commodity in the Late Bronze Age and that, when molten, they could have been used in several glass-making techniques.

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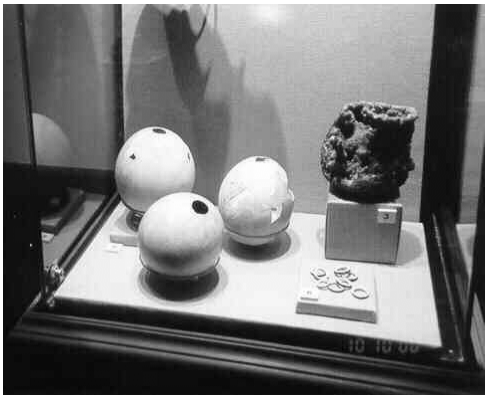
*Fig.17: Gold cup*

One day diver Robin Pearcy phoned the Virazon from 45 metres below, shouting "Tell George (Bass) I've something really interesting here." When Robin surfaced he told exhibition members (all leaning over the rail to hear the news) that he had found a large gold cup. "This is no tramp steamer we are dealing with," exclaimed Bass. The cup was shaped like a chalice, formed of two gold cones. With the chalice was a common terracotta stemmed cup known as a *kylix*. This find was in fact of greater historical value as its distinctive shape dated it to the end of the reign of the Egyptian pharaoh Amenhophis III (c. 1417-1379 BC), the approximate date of the Amarna tablets (Bass 1987:720).

The distinctive shape of the Mycenean *kylix* (*Fig. 18, right*) is an important indication that the Uluburun ship probably sank during the early 14th century, or shortly after.

Other exotica discovered were a length of elephant tusk, logs of African ebony and ostrich eggshells (*Fig. 19, bottom left*) and hippopotamus teeth (*Fig. 20, bottom right*).



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The first distinctively Egyptian artefact to be landed was a scarab of bone or ivory framed in gold and carved with ornamental hieroglyphs on its base. (A scarab is an image of the Egyptian sacred beetle, used as an amulet.) Tufan Turanli, a Turkish member of the team, made an even more exciting find: a solid gold scarab (*Fig. 21, left*). The hieroglyphic inscription on the base of the golden beetle reads "*Nefertiti*". This was the name of the pharaoh Akhenaten's great and beautiful queen whose famous bust from Amarna has made her face recognisable world-wide (Bass 1987:732).

Egyptologists confirmed that not only was this the first object naming either Akhenaten or Nefertiti found in this area of the ancient world, but it was in fact one of the few late 18th dynasty Egyptian objects ever excavated in the region of western Asia Minor and the Aegean (Weinstein 1989:17). The fact that this golden scarab (rarely found outside Egypt) can be linked to a historical person, confirms the dating of the ship as early 14th century BC (see again note 1).

Other remarkable treasures found in the holds of the Uluburun wreck include vast quantities of *pistacia* resin (a valuable substance probably used as incense) stored in the Syro-Palestinian amphorae, Baltic amber beads carved in typical Mycenean shapes, two duck-shaped ivory cosmetic containers (*Fig. 22, right*), pottery from Cyprus (*Fig. 23, bottom left*), several gold and bronze pendants (*Fig. 24, bottom right*), and a variety of other artefacts.

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Of particular interest is a 16,25 cm high bronze Syro-Palestinian-like figurine of a woman with gold plating on her hands, feet and head. The statuette was probably a votive figure intended to protect the ship, but could have been cast in the likeness of the wife or a daughter of a Near Eastern king, being sent as a gift to another king. Although it does not show that the cargo of the ship was a royal shipment, the value of this figurine, considered with the find of the unique gold scarab of Nefertiti as well as the golden chalice, strenghtens the belief that the ship had been more than just an ordinary trading vessel. The wreck in fact carried cargo from at least seven cultures, including Mycenean Greek, Syro-Palestinian, Cypriot, Egyptian, Kassite, Assyrian and Nubian.

*Fig. 25: Bronze figurine*

The Gelidonya ship had carried 34 four-handled copper ingots and some scrap bronze, all together weighing no more than a ton. In comparison, the estimated six tons of copper on the Uluburun ship was enough (when mixed with tin) to manufacture a total of 300 bronze helmets, 300 bronze corselets, 3000 spearheads, and 3000 bronze swords (Bass 1987:719-720).

For students of early seafaring the hull and anchors were the most important discoveries from the site. The ship was built according to the so-called shell-first technique with mortise and tenon joints held fast with two wooden pegs.

## 7. Ship construction: the shell technique

Ancient ships were constructed according to the shell technique with planks joined together to form the shell of the boat before the frames were inserted for strengthening. This is in direct contrast to the skeleton-first technique, the more modern method with the keel and frames set up first to which the planks are then fixed.

In applying the shell technique the planks can be joined by two different methods (Casson 1994:152), either by overlapping the edges or joining them edge to edge. The second method was the more common in antiquity and was also the stronger. The planks may be joined edge to edge in different ways: by clamps, nails, by tying and by tenons, mortises and dovetails. The mortise and tenon technique involves cutting each plank with a series of small slots, the mortises (see *Fig. 26* on page 16). Flat tongues of wood – the tenons – were set in these slots so that each tongue protruded. Wooden pins were then driven at right angles into the ends of each tongue, locking them in place (Severin 1985:46).

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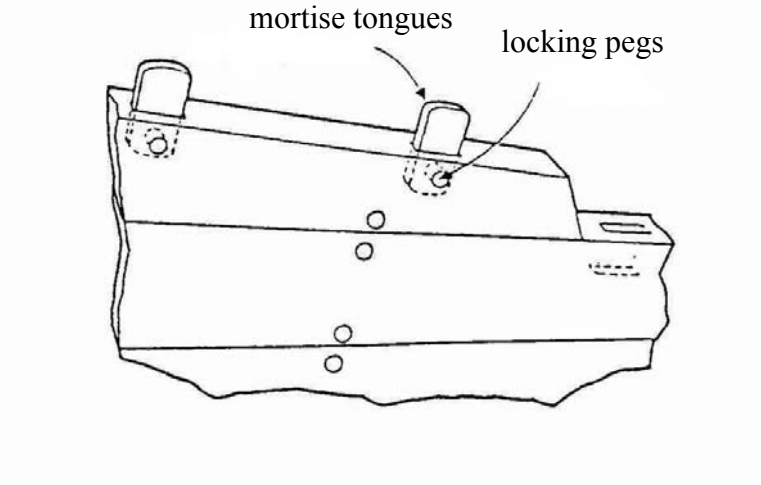


*Fig. 26: The mortise and tenon method used to build the Uluburun ship*

By the third millennium BC the Egyptians had learned to build craft with edge joined planks as has been shown by the discovery of the Cheops ship whose planks were joined together with twine with pegs added at various points along the edges. At some later date a great advance was made when shipbuilders developed the mortise and tenon method of joining planks, a method so refined that it resembled cabinet work rather than carpentry. The Uluburun ship is the earliest example of a sea-going ship built in this manner.

Based on an examination of the cargo disposition - copper ingots in tidy rows traversing the ship's hold, as well as the stone weight anchor found at the eastern deeper end - it was estimated that the Uluburun ship was about 15 metres long. The hull was of cedar but the tenons and pegs were of a species of hardwood, probably oak. When completely restored it is expected that she will probably prove to be similar in design to the Syrian merchant ships unloading their cargo at a Nile port as depicted on a 14th century wall painting in the tomb of Ken-Amun at Thebes, dating from roughly the same period. Ken-Amun was mayor of Thebes and superintendent of the granaries of Amun, probably during the reign of the pharaoh Amenhopis III (1404-1367 BC).

The ship carried 24 stone anchors lying in rows across the vessel, varying in size but not in type: all are weight anchors. They are the first Bronze Age anchors ever to be found in association with a ship: similar anchors were found built into the walls of temples, perhaps as offerings, at Kition in Cyprus, at Ugarit and at Byblos.

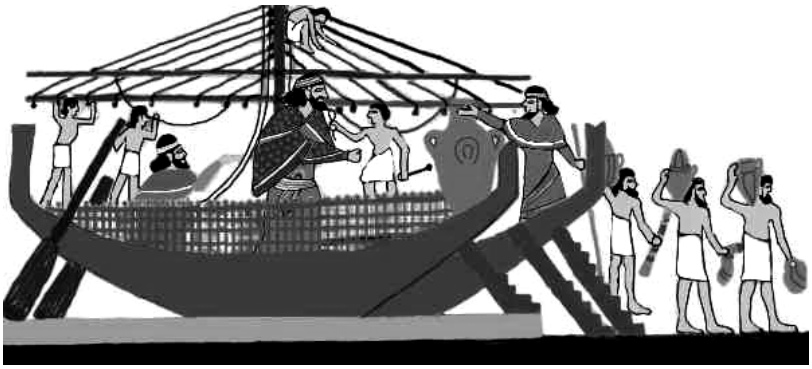

*Fig. 27: Merchant ship from Syria*

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During the 1993 excavation the team discovered that the ship had a rudimentary keel, probably more of a keel plank than a keel in the traditional sense, which could lead to a better understanding of Late Bronze Age ship construction – with possible implications for sailing capabilities and the nature of trade in the period.

## 8. The Uluburun exhibition

In July 2000 the Turkish Ministry of Culture and the Director of the Bodrum Museum opened a display of the Uluburun finds to the public in Bodrum's ancient castle. The extraordinary cargo of the ship is superbly displayed, enhanced by the dramatic setting of the museum itself.

*Fig. 28: Display of the Uluburun ship and her cargo in the Bodrum Museum*

In the 1960's, as the excavation of the Bronze Age ship at Cape Gelidonya progressed, it was becoming essential that a place to store and preserve artefacts be found. The castle at that time was little more than a ruin, barely accessible by road from the town. At Bass's urging the Turkish authorities were approached, permission to use the castle was given, and in 1962 the official museum was born.

*Fig. 29: Castle of St Peter*

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The 15th century AD crusader Castle of St Peter would seem an unlikely home for the world's foremost museum of underwater archaeology. For centuries, however, the small Turkish town known in Classical times as Halicarnassus, and birthplace of the famous Greek historian, Herodotus, was also the home of Turkish divers who combed the local sea-bed to gain a meagre livelihood searching for sponges, usually in small boats with primitive and antiquated diving equipment. As a result they knew every metre of the seas surrounding their base (Frey 1998:22).

"Long experience has taught us," wrote Bass (1987:702) "that the best sources of information about ancient shipwrecks in Turkey are the divers in sponge boats. They are far more valuable than the most sophisticated sonar equipment in existence." It is therefore entirely apt that Bodrum should house the magnificent artefacts first located by the divers. (Sadly, the sponge trade has been reduced to a trickle in recent times.)

The castle itself has a history as fascinating as its present contents. In the 14th century AD the military monastic order known as the Knights Hospitaller of St John of Jerusalem were forced to flee the Holy Land to the island of Rhodes. To maintain a foothold in Asia they also built a castle at Smyrna (modern Izmir). Forced out in 1402 by the armies of Tamerlane the Tartar they decided to make Bodrum their stronghold and built the formidable Castle of St Peter which they occupied for more than a century until 1523 when both Bodrum and Rhodes became part of the Ottoman Empire and the knights were forced to flee once more, this time to Malta. Bodrum and its castle sank into obscurity for more than four centuries until its recent magnificent restoration and revival by the INA and the Turkish Directorate of Museums and Antiquities (Frey 1998:22).

## 9. Conclusion

More than 18,000 complete and fragmentary artefacts have been raised during the INA excavation of the Uluburun shipwreck between 1984 and 1994. As every three month season of excavation requires at least two years of conservation and study, it could take as long as the year 2007 to complete! With the enormous amount of information gleaned from the Uluburun wreck, Bass has been able to trace the ship's possible route. From a study of the diversity of her cargo it seems likely that Bronze Age ships such as this sailed the Mediterranean on a circular trade from Syro-Palestine to Cyprus, thence to the Aegean, and occasionally as far west as Sardinia, then back home via North Africa and Egypt (Bass 1987:699), proving the establishment of a vast trade network throughout the Eastern Mediterranean.

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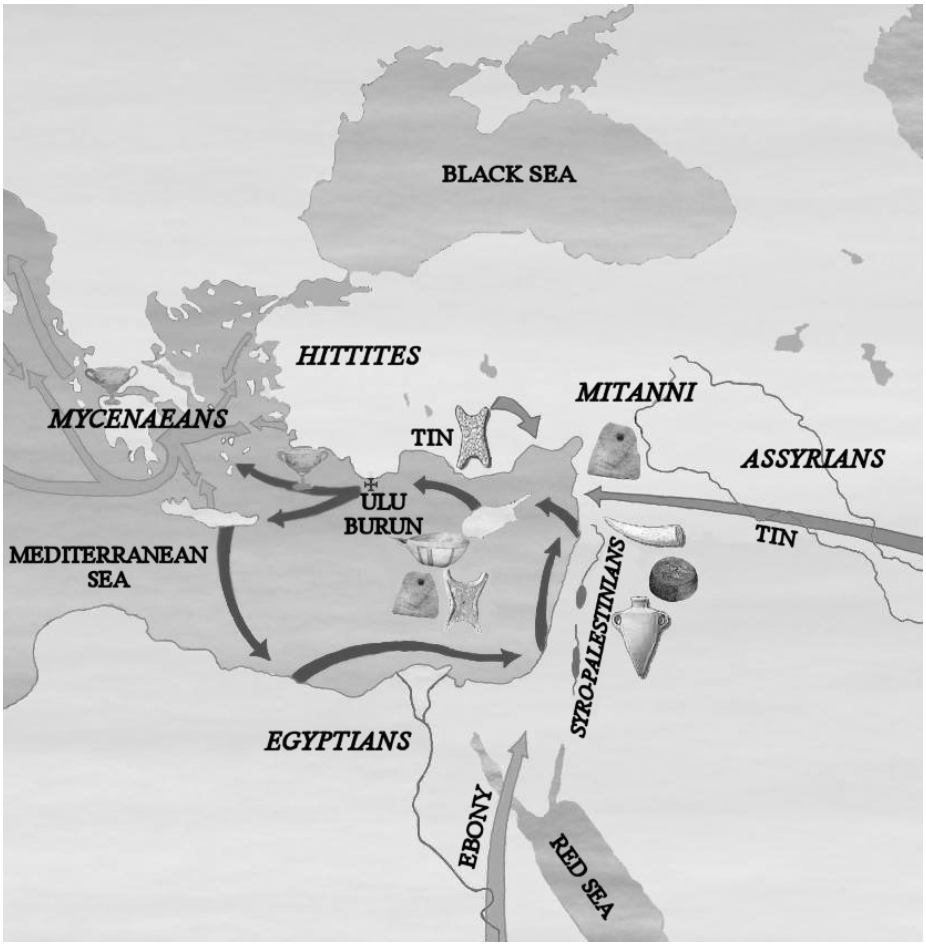


*Fig. 30: Trade routes in the Eastern Mediterranean*

Until every possible artefact is recovered and analysed and every aspect of the wreck explored, speculation will continue as to her true nationality and age. Even so, the site has already provided an abundance of information on the past, supplying the modern scholar with information across such seafaring disciplines as ship building, sea routes and trading practices. For the student of maritime history, the Uluburun is one of the most important and fascinating sea wrecks ever discovered.

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