

# New insights on Maritime Akko revealed by Underwater and Coastal Archaeological Research

Galili, E.<sup>1</sup>, Rosen, B.<sup>1</sup>, Stern, E. J.<sup>1</sup>, Finkielsztejn, G.<sup>1</sup>, Kool, R.<sup>1</sup>,  
Bahat-Zilberstein, N.<sup>1</sup>, Sharvit, Y.<sup>1</sup>, Kahanov, Y.<sup>2</sup>, Friedman, Z.<sup>2</sup>, Zviely, D.<sup>2</sup>

<sup>1</sup>Israel Antiquities Authority, [udi@israntique.org.il](mailto:udi@israntique.org.il) Atlit POB 180, 30350.

<sup>2</sup>Recanati Institute for Maritime Studies, University of Haifa, Haifa, 31905, Israel.

## Introduction

During the last decades, Akko (Acre), its harbor and its environment have been intensively investigated by archaeologists. However, some archaeological and historical questions have not been completely solved. Among these are: the exact periods of the harbor's construction and destruction, and the location, size and spatial distribution of the harbor in various periods. The present report summarizes and discusses finds from salvage excavations and surveys that were carried out in the harbor by the Israel Antiquities Authority while it was dredged during the years 1991 to 2004 (Figs. 1, 2).



Fig. 1. Location map of Akko Port; A) The sea-front of the Pisan quarter (insert Fig.6); B) The Western Basin, (insert Fig. 2b)

Akko is a classical model of an historical Mediterranean fortified harbor city which has been functioning for thousands of years as one of the main centers of maritime activity in the Eastern Mediterranean. Akko Bay, which is protected from the north and west winds by the cape, provided a natural anchorage and later a base for one of the three built harbors along the Israeli coast in pre modern times. The harbor which served as a gate-way to Israel for armies, pilgrims and merchants and was visited regularly by ships from the whole Mediterranean is often mentioned in historical documents. The importance of the city as a harbor is

documented by a long tradition starting with Roman coins and continuing from the 14<sup>th</sup> century on, by drawings, charts, maps and written documents (Zviely et al., 2003; Galili, et al., 2004). Such documentation is unknown from other Israeli coastal cities like Atlit, Caesarea, Yafo (Jaffa) and Ashkelon.

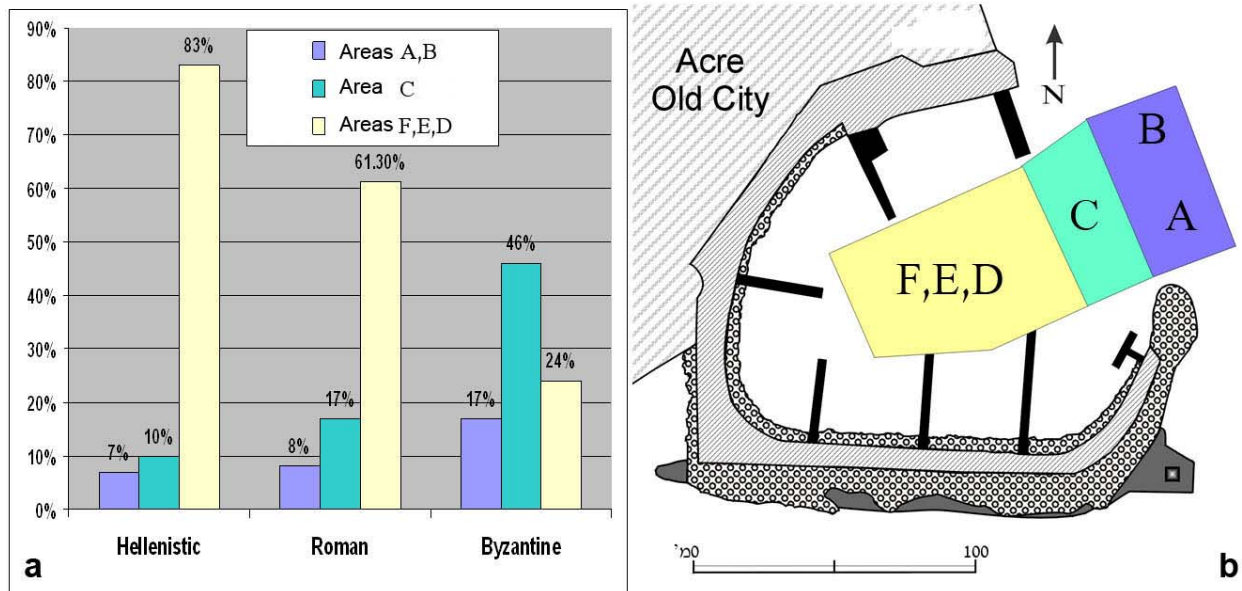


Fig. 2. a) Distribution of the finds in the harbor: b) Excavations areas.

Excavations in Tel Akko revealed imported merchandise and evidence for maritime trade starting from the middle Bronze Age onward (Dotan, 1993). The finds indicate that the site had marine facilities such as anchorage or a harbor. One of the earliest references to Akko as an important city is found in the 15<sup>th</sup> century BC annals of Tuthmosis III, mentioning Akko with Byblos and Tyre. Akko is frequently mentioned in the Bible, as an important coastal city on the border between Israel and Phoenicia. The city was active in the Persian, Hellenistic, Roman and Byzantine, Early Muslim and Crusaders Periods. After the Crusaders Period it was destroyed and then slowly revived.

### Bronze Age, Iron Age and the Persian Periods

Bronze Age finds include two stone anchors and a loaf-shaped bronze ingot. Iron Age finds were completely absent and only a few Persian ceramic shards and two bronze figurines were retrieved.

A suggestion that the Na'aman River served as an inland harbor for sea-going vessels during these periods (Raban, 1985) has not been approved so far by archaeological evidence. The Israeli river mouths were then shallow and impassable for sea-going vessels and were most of the time blocked by sandbars as presently (Galili, 1986; Galili and Rosen, in press b). Underwater research carried out in the last forty years indicate that in Akko, like in other places along the Israeli coast, prior to the building of harbors, anchorages were located in the sea in areas partly protected by small kurkar islands or sunken bars (Galili and Sharvit, 1994). Abundant archaeological evidence exists for widespread trading activity along the Israeli coast during the Iron Age. However there is an absence of remains from that period in Akko Harbor.

Based on a pottery shard, bearing Phoenician inscription (5<sup>th</sup> to 6<sup>th</sup> centuries BC), found out of context west of the harbor, and the headers structure of the breakwater, it was suggested that Akko Harbor was built during the Persian Period to accommodate Cambyses fleet (Linder and Raban, 1965; Raban, 1982; 1983; 1993). Since the excavations of the harbor yielded only meager shards from the Persian Period, the contention that the harbor was built in that period is not tenable. The paucity of finds from these periods attests that the harbor was not yet constructed and that there was no large-scale maritime activity in this place prior to the Hellenistic Period.

### **Hellenistic Period**

Most of the Hellenistic finds were recovered from the Western basin (Figs. 1, 2a, 2b: areas D, E, F). Judging from the wealth of finds and their diversity, maritime activities in the western basin of the harbor underwent a fundamental change during the Hellenistic Period (Galili et al., 2002; Galili and Rosen, in press a). The large amount of pottery, including: amphorae, domestic vessels, and metal objects, points to extensive trade relations with Mediterranean countries and to large-scale import from the Aegean. These finds, as well as the fine silt sediment in the harbor, attesting to a calm sea and good mooring conditions, indicate that the southern breakwater was built during the Hellenistic Period. Archaeological finds retrieved from the sea support the proposal by Jacoby (1979), Flinder et al. (1993) and Gertwagen (1995), that the harbor was built in that period. The Tower of Flies was probably built in the Hellenistic Period, at the same time as the southern breakwater. The harbor of Tyre, which was a major harbor of the Eastern Mediterranean, was demolished by Alexander at the end of the fourth century BC. This may have encouraged the rise of the harbor of Akko, as reflected in the underwater archaeological finds. Most of the identified Hellenistic amphorae recovered (about 80 %) originated in the Aegean; 8 % from the coasts of Syria and Palestine, 5 % from Egypt and North Africa, and a few from Italy (Fig. 3). This attests to intensive economic connections with Greece during the Hellenistic Period.

### **Roman Period**

Finds from the Roman Period include wooden hull of a medium-sized ship, few coins, large number of storage jars and domestic vessels. These include bowls and Western terra sigillata ware, pottery which is found only rarely among the Roman ceramic repertoire of inland sites. Numerous metal objects were also retrieved. Some of the artifacts are decorated with maritime inscriptions and themes (Fig. 4). In addition to the harbor's military role in the Roman Period, the ceramic finds attest that the harbor enjoyed far-flung trade relations with Mediterranean countries. Luxury imports reveal that the harbor of Akko served a society that included wealthy consumers. These finds agree with numismatic depictions of maritime symbols and harbor constructions on Roman coins minted in Akko and other written references mentioning the importance of the Akko Harbor and its installations. Finds from the harbor indicate that in that period the main maritime activities were concentrated in the western basin, which was protected by the southern breakwater and could provide shelter for medium-sized boats with a draft of 2.5 m. About half of the identified Roman amphorae originated from the Aegean and Black Seas, a fifth from Italy and the western Mediterranean, 16 % from the coasts of Syria and Palestine, and 10 % from North Africa (Fig. 3).

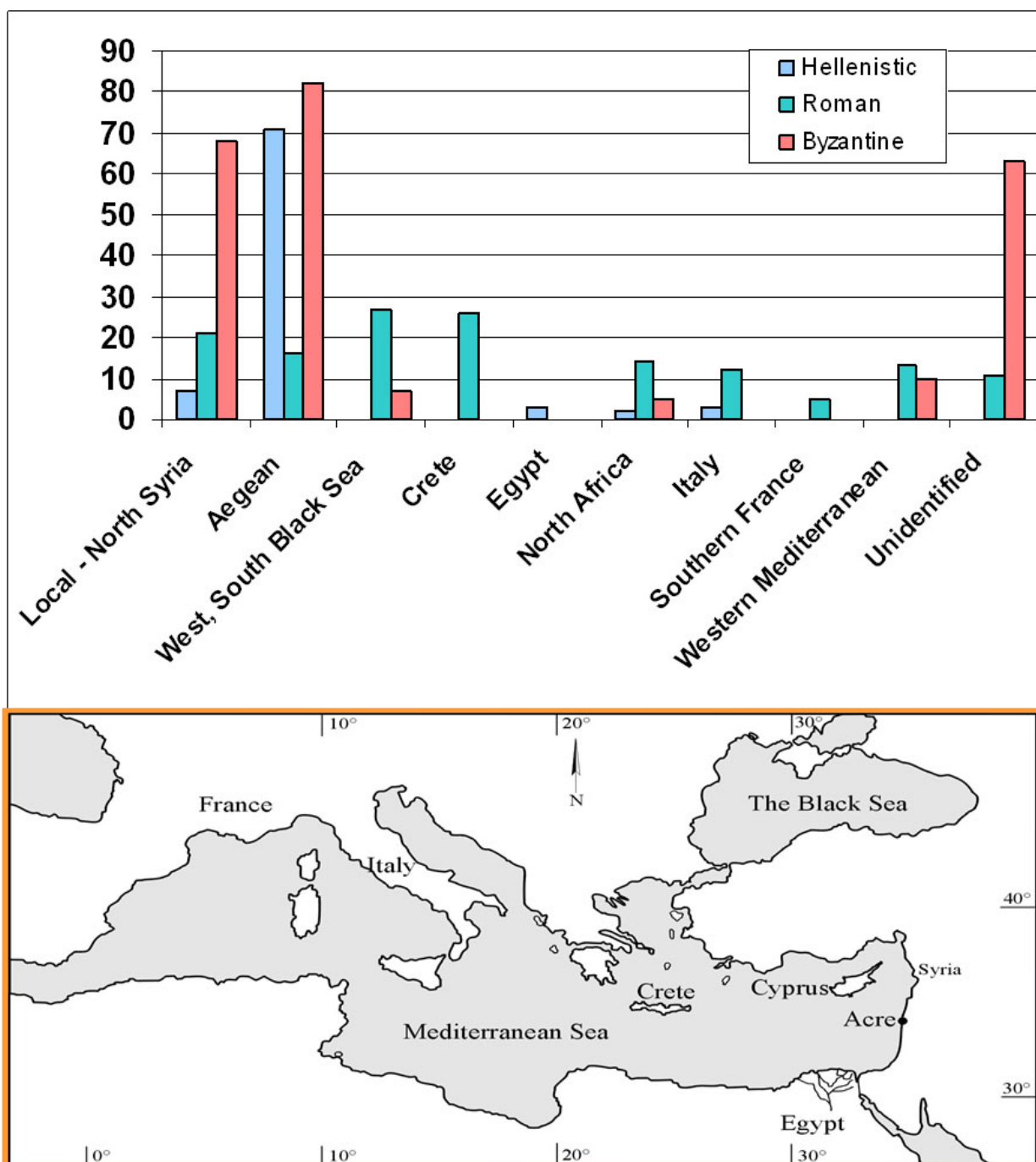


Fig. 3. Distribution and origin of Hellenistic, Roman and Byzantine amphora from Akko Port.

### Byzantine Period

Considerable amount of Byzantine pottery, few pieces of wood, bronze nails, and a number of coins were found near the entrance of the harbor (Fig. 2b: area C). Most of the amphorae belong to three main types and probably originate from a single wreck. Nearly half of the identified Byzantine amphorae originated from the Aegean and Black Seas, 40 % from the coasts of Syria and Palestine, 3 % from North Africa, and 6 % from the western Mediterranean (Fig. 3). Additionally three gold coins were recovered together with the 30 Crusader gold florins discussed below: 1) A solidus of Constans II (641 to 646 AD); 2) Byzantine histamenon nomisma of Basil II and Constantine VIII (1005 to 1025 AD); 3) North



African dinar of Muwahhid ruler, Abu Muhammad 'Abd al-Mu'min b.' Ali (1130 to 1133 AD), minted at the harbor of Bijayah (Bougie) in eastern Algeria (Kool, 2006).



Fig. 4. Terra sigillata plate with a depiction of a ship tied to a tree on the shore (a typical north Mediterranean anchoring).

The finds indicate that the main economical connections during this period were within the Byzantine Empire. Eighth-century amphorae discovered in the remains of the Byzantine wreck indicate that maritime trade by Byzantine sailors continued in the Early Islamic Period. The amount of Byzantine finds from the western basin relative to the amounts of Roman and Hellenistic finds (Fig 2a), and the finding of few broken iron anchors, indicate the unfavorable anchoring conditions in this period. Due to the lack of proper maintenance after the Roman Period, the southern breakwater probably ceased to protect sea craft, compelling sailors to prefer anchoring in the open sea.

### **Early Islamic Period**

The historian Muqaddasi described the construction of Akko Harbor and its closure by a chain. According to Linder and Raban (1965) and Jacoby (1979), the Ibn Tulun and Crusader harbors occupied only the western basin. However, no archaeological remains from the Early Islamic Period were found in this basin. It thus seems that most of the activity in the harbor during that period was in the eastern basin, probably because the western basin was silted. There is also disagreement regarding the chain blocking the harbor. Either the chain closed the entrance to the western basin, a distance of about 70 m. (Gertwagen, 1996) or to the eastern basin, a distance of about 100 m. (Jacoby, 1979; Flinder et al., 1993). Since no Early Islamic Period finds were uncovered in the western basin, the harbor described by Muqaddasi would appear to have been located in the eastern basin, with the chain stretched between the Tower of the Flies and the eastern end of the southern breakwater. To bridge this great distance, the chain was probably floated by a number of beams or wooden barges as mentioned in a contemporary document.

It was suggested that the eastern rampart connecting the Tower of the Flies to the shore served as a breakwater (Gertwagen, 1996). However, the proximity of the eastern shore of the bay to the harbor prevents the easterly winds from generating high waves. Thus the eastern rampart was not used as a breakwater. It could have been built as an approach road to the Tower of the Flies and as a barrier to prevent ships from entering the harbor from the east.

### **Crusader Period**

Crusader Period remains were recovered mainly east of the entrance to the western basin (areas A and B) and only few shards were retrieved from the western basin. Finds include 50 bowls, 24 cooking pots and 31 amphorae. Most of the bowls and the amphorae were imported from the eastern Mediterranean basin. The cooking vessels, however, demonstrate a different pattern, most of them are local and only 25% were imported from Cyprus.

The hoard of thirty gold florins minted in Florence in the second half of the thirteenth century was found near the harbor entrance (Fig 5; Kool, 2006). This discovery fits the historical documents reporting that on May 18, 1291, after a siege of several weeks, Frankish Akko fell to the advancing Mamlukes army. Soldiers and citizens, desperate to escape the enemy, crowded into the harbor. Eye-witnesses testimonies like the anonymous 'Templar of Tyre' and other late accounts indicate that few, mostly noble ladies and merchants, succeeded in escaping by bribing owners of small rowing boats with jewelry and gold to be ferried off-shore to ships sailing for Cyprus and Tyre, many, however, drowned with their precious possessions. Akko Harbor was the country's major harbor during the Crusader Period. Documents contain numerous references to military, economic, and civil activities in the harbor area. Thus, the meager remains found on the harbor bed are surprising. Possibly during the Crusader Period the western basin was silted due to neglect and poor maintenance and most maritime activity was restricted to the eastern basin of the harbor. This basin was not dredged during the present works in the harbor which may explain the paucity of finds from the Crusader Period.

### **The "Pisan Harbor"**

It was proposed that in the south sea-front of the Pisan quarter was an external anchorage and that there was a gate to an inner Pisan Harbor located in Khan Esh-Shuna (Raban, 1982; 1993). Recent underwater surveys have indicated that the Crusaders sea-wall was built on top of ancient breakwater remnants (Fig. 6). These remnants and the Crusader sea-walls, which were built on top of them, blocked the entrance to the Pisan quarter from the south. Thus there could not have been any anchorage or entrance to an inner harbor in this area (Kesten, 1993). An ashlar-built arch partially sunk in the sea is visible in a section of the sea-wall that was built on the ancient breakwater remnants in the southern sea-front of the Pisan quarter. The arch was used several times to indicate that sea level during the Crusaders times was lower by 1 to 2 m. relative to the present one (Flemming et al., 1978; Neev et al., 1987; Gertwagen, 1989; 1996). Recent underwater research indicated that this arch was designed and built to bridge the gap between two blocks, remaining from the ancient breakwater, used as foundations for the Crusaders sea-wall. Foundations of Buildings were laid underwater already in antiquity as can be seen in the tower of flies, the south breakwater in Akko and the breakwater in Caesarea. Thus the partially sunken arch in Akko does not indicate a rise in sea level or tectonic subsistence (Galili and Sharvit, 1998; Sivan and Galili, 1999).



Fig. 5. Hoard of Crusader gold Florins recovered from area C.

### **The Templars tunnel and its association with the harbor**

Excavations conducted in 1993-4 exposed an arched stone-built tunnel leading from Khan Al-Umdan near the harbor to the Templar fortress on the west coast of Akko (Fig 1). The tunnel is ca. 200 m. long and few m. wide. At a distance of 100 m. east of the Templars fortress it splits into two parallel tunnels, 1.5 m. wide each (Avisar and Stern, 1996). The floor of the tunnel is presently under about 0.5 m. of water. It was suggested that the tunnel served as a strategic subterranean passage (Stern, E., pers. comm.). Several vertical grooves on the walls of this tunnel probably served to hold wood partitions intended to cut off and seal portions of the tunnel. The tunnel could have been used to covey supplies, goods and passengers from the harbor area, to the Templar Quarter on the western shore of Akko. Additionally it could have served as a sewer. The lower part of the tunnel was excavated in the kurkar rock on a level that assured partial flooding by groundwater mixed with sea water on which rafts or boats carrying goods could have been floated. The wooden partitions enabled digging, quarrying, and maintenance below sea level. Thus the flooded tunnel floor indicates that during the Crusaders Period, the sea level was similar to the present one. Underwater and coastal surveys carried out on the western sea- front (Sharvit and Galili, 2002) provide no indications that the arched tunnel reached the sea on its western edge. A 13<sup>th</sup> century drawing made by Matteo Paris depicts a massive sea-wall on the western sea-front of Akko (Dichter, 1973: 14). There is no indication for a gate or an entrance to a channel or tunnel in the west sea-wall in this



drawing, neither in late 13<sup>th</sup> century maps of Akko associated with Marino Sanudo (Jacoby 1979). It thus seems that the arched tunnel was not connected to the sea on its western edge.

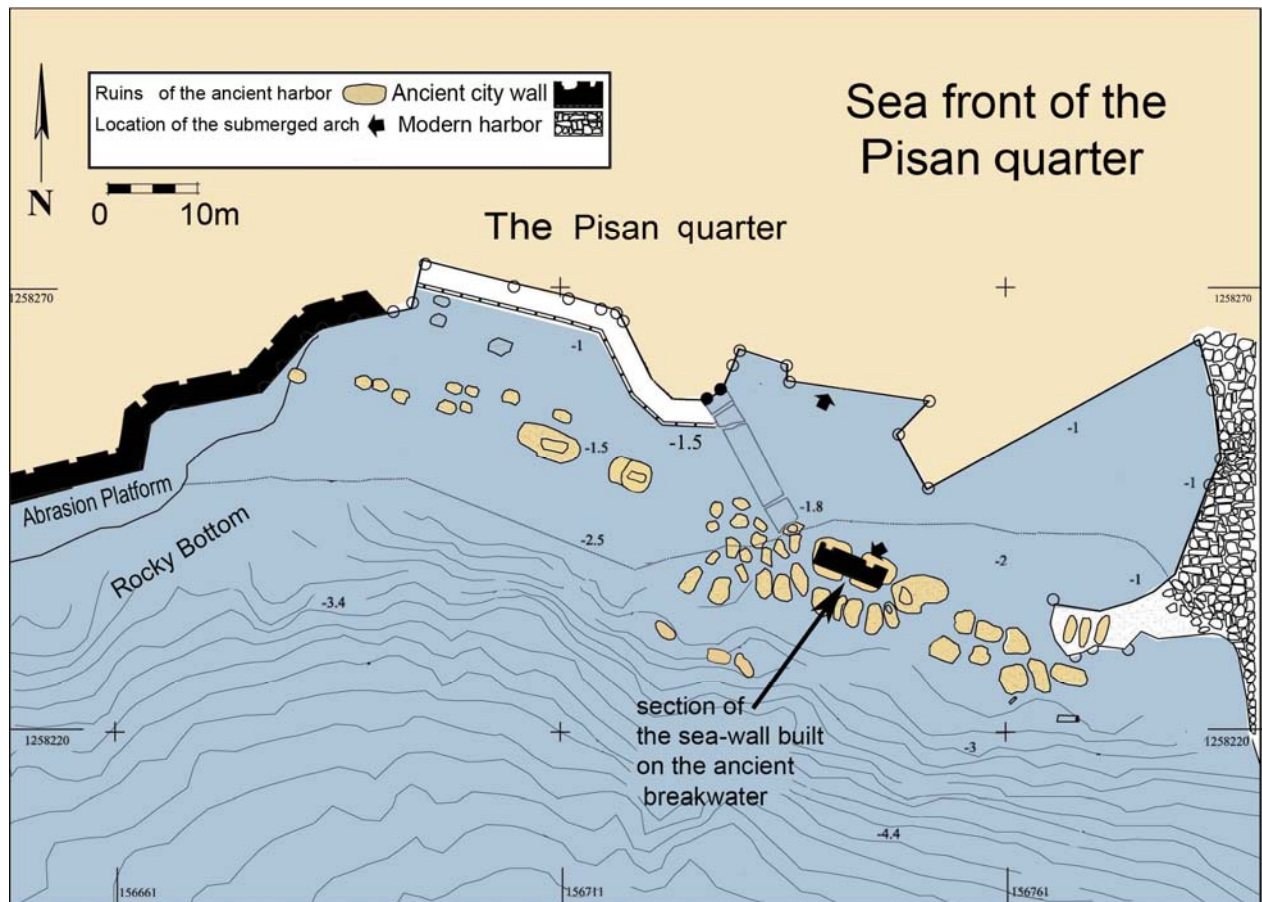


Fig. 6. Archaeological remains in the sea front of the Pisan Quarter.

### The Mamluke and Ottoman Periods

Numerous finds from the Ottoman Period were uncovered at the entrance of the western basin and to its east (Fig. 2b: areas A, B). In these periods it appears that large vessels with deep drafts anchored east of the western basin, and merchandise were transported from the ships to the shore by small boats. The ceramic finds point to trade relations with Turkey, Syria, Lebanon, and Egypt. Several Mamluke pottery vessels dated to the 14<sup>th</sup> to 17<sup>th</sup> centuries were imported from Italy. Near the entrance to the western basin (Fig. 2b: area A), a group of eleven upright wooden pillars with a rectangular cross section was found. C<sup>14</sup> tests dated the columns to the fifteenth century. The wood was identified as European pine, which is not a local tree. This construction probably served as a quay or pier built on pillars and used for the mooring of large vessels (with a draft of 2 to 3 m) near the entrance to the harbor, but still in an area of relatively deep water. It may have been connected by a wooden bridge to the shallow rampart at the end of the southern breakwater, or completely detached from the shore (Galili and Rosen, in press a).

In 1291, Akko was razed by the Mamlukes and abandoned and the city's harbor was destroyed and blocked to prevent the return of Christians. Nevertheless, testimony by travelers and pilgrims who sailed from the harbor of Akko in this period, indicate that despite the destruction, the harbor continued to be used during the fourteenth and fifteenth centuries (Shur, 1990). The abandoned city contained warehouses of Venetian traders who had arrived



from Damascus and exported cotton to Europe through this harbor. The wooden pillar construction was probably built in this period for the cotton trade and for the local business activities of unloading and loading merchandise and transporting passengers. This wooden pier probably replaced harbor facilities destroyed by the Moslems. The post Crusader Italian pottery found in the harbor, and similar pottery found in Tel Yassaf north of Akko (Stern, 1999) also indicate that trading activity from Akko Harbor continued after the destruction of the harbor by the Moslems.

### **Stratigraphy and distribution of the finds in the harbor**

The distribution of the finds from different periods in the harbor reveals a withdrawal from the western basin (Fig. 2b: areas D, E, F) to the entrance of the modern harbor (Fig. 2b: area C) and outside it, to the eastern basin (Fig. 2b: areas A, B) (Figs, 2b, 7). Most of the finds from the Hellenistic and Roman Periods were uncovered in the Western basin (Fig. 2b: areas D, E, F). Numerous Byzantine finds at the entrance to the marina may indicate intensive marine activity in area C during that period, or may simply come from a single shipwreck. Crusader remains were retrieved mainly in areas A, B, near the entrance to the western basin. This distribution attests to fundamental changes in the anchorage conditions inside the harbor, such as sand accumulation, which prevented deep draft ships from entering the western basin. The archaeological finds indicate that the breakwater was constructed during the Hellenistic Period creating the western basin, which reached the peak of its prosperity in the Hellenistic and Roman times. The Byzantine Period saw a worsening of anchoring conditions and the southern breakwater seems to have become ruined at that time. After the Byzantine Period the western basin was probably silted and only small vessels were able to use it. At the end of the Umayyad Period and during the Abbasid Period (end of the eighth to end of the eleventh centuries AD), the area of the harbor was expanded to the east and the eastern rampart was constructed. A drawing from 1686 shows the southern breakwater as a line of low bars around a closed basin. In illustrations and maps from later periods, a number of tall buildings are depicted on the southern breakwater. It seems that at the end of the seventeenth century, large buildings, which did not survive long, were erected on the southern breakwater (Galili et al., 2004).



- Galili, E., Sharvit, J., Dahari, U., Bahat-Zilberstein, N., Finkielsztejn, G., Stern, E.J., Kool, R., Kahanov, Y., Rosen, B., 2002.** Akko Port, underwater surveys. *Hadashot Arkheologiyot*, 114, 13-16 and 12-15 (Hebrew / English).
- Galili, E., Zviely, D., Rosen, B., 2004.** Akko Port and its surroundings in coins and graphic depictions. *Horizons in Geography* 62, 113-130. (Hebrew, English abstract).
- Galili, E., Rosen, B., (in press a).** Akko harbor: new finds reviled while deepening the port. *The New Encyclopedia of Archaeological Excavations in The Holy Land*, Vol. 5.
- Galili, E., Rosen, B., (in press b).** Marine archaeology in Israel-recent discoveries. *The New Encyclopedia of Archaeological Excavations in The Holy Land*, Vol. 5.
- Gertwagen, R., 1989.** The southern shore of the Old City of Akko - 'The Pisan Harbor'. *C.M.S News*, Rep. No. 16, University of Haifa, Center for Maritime Studies.
- Gertwagen, R., 1996.** The Crusader Port of Akko: Layout and Problems of Maintenance. *Autour De la Première Croisade, Actes du Colloque de la Society for the Study of the Crusades and the Latin East*, Clermont-Ferrand, 22-25 juin 1995, Publications de la Sorbonne, 553-582.
- Jacoby, D., 1979.** Crusader Akko in the Thirteenth Century: Urban Layout and Topography. (Estratto dagli Studi Medievali, 3<sup>a</sup> Serie, XX, I), Centro Italiano Di Studi Sull'alto medioevo Spoleto.
- Kesten, A., 1993.** The Old City of Akko, reconsideration, criticisms, Akko (Hebrew).
- Kool, R., 2006.** A thirteenth Century Hoard of gold Florins from the Medieval Harbour of Acre. *The Numismatic Chronicle* 166, 301-320 and plates 57-61.
- Lindner, E., Raban, A., 1965.** Underwater survey of Akko Harbor, in the western Galilee and The Galilee Coast, The 19<sup>th</sup> convention for Yediat Haaretz, Jerusalem, 193-180 (Hebrew).
- Neev, D., Bakler, N., Emery, K.O., 1987.** Mediterranean coasts of Israel and north Sinai. *Holocene Tectonism from Geology, Geophysics and Archaeology*. Taylor and Francis, New York.
- Raban, A., 1982.** Akko Harbor, in: *Akko and its sites*, Kadmuk 24-25, 141-146 (Hebrew).
- Raban, A., 1982.** The Harbors of Akko. In: Yeda'ia, M., (ed.) *The Antiquities of the west Galilee*, Tel-Aviv, 180-207 (Hebrew).
- Raban, A., 1985.** The ancient harbors of Israel in biblical times. In: Raban, A., (ed.) *Harbour Archaeology, Proceedings of the first international workshop on ancient Mediterranean harbors*, Caesarea Maritima, Publication No.1, Haifa University, BAR International Series 257, 11-44.
- Raban, A., 1993.** Maritime Akko. In: Stern, E., Lewinson-Gilboa, A., Aviram, J., (eds.), *The New Encyclopedia of Archaeological Excavations in the Holy Land Vol. 1*, 29-31.
- Sharvit, J., Galili, E., 2002.** Akko west - coastal and underwater surveys. *Hadashot Arkheologiyot* 114, 11-13 and 10-12 (Hebrew/English).
- Shur, N., 1990.** The history of Akko, Tel-Aviv, 161-163, (Hebrew).
- Sivan, D., Galili, E., 1999.** Holocene tectonic activity in the Galilee coast and shallow shelf, Israel: A geological and archaeological study. *Israel Journal of Earth Science* 48, 47-61.
- Stern, E.J., 1999.** The pottery of the Thirteenth - Fifteenth Centuries from Giv'at Yasaf (Tel Er-Ras), *Atiqot* 37, 174.
- Zviely, D., Galili, E., Rosen, B., 2003.** Akko Port in modern nautical maps. *Horizons in Geography* 56: 62-77 (Hebrew).