Arsur Castle Maritime Installation (1241–1265 CE)

Dan Mirkin, Deborah Cvikel & Oren Tal

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The maritime installation, sometimes called the ‘port’ or the ‘military harbour’ of Apollonia-Arsuf, is located at the foot of the cliff on which the Crusader castle of Arsur stands, about 37 km south of Caesarea, Israel. Opinions have differed as to the true nature of the site: was it a real port or harbour? Was it just a mooring basin for small craft? Or was it just an installation designed to prevent an approach from the coast to the cliff on which the castle itself stood? In an attempt to elucidate these questions various investigations have been carried out in the course of the last five years, within the ‘harbour’ itself, as well as outside.

Keywords: Apollonia-Arsuf, Arsur castle, Crusaders, harbour, maritime archaeology

1. INTRODUCTION: CRUSADER ARSUR—A HISTORICAL AND ARCHAEOLOGICAL OVERVIEW

On June 7, 1191, during the Third Crusade, Richard the Lionheart sailed with 25 ships from Tyre to Acre (and defeated Salah ed-Din’s army at the Battle of Arsuf on September 7th). This was only part of his fleet: most of his transports, carrying many barons, their entourages and much of his siege equipment, were detained in Tyre by contrary winds (Gillingham 1999, 159). Ambroise described it as follows: “E li manda que son barnage / Ne s’estoire niert pas venu, / Einz l’aveit uns tens detenu, / Que l’em calme li venz d’Arsur, / E l’avait arrestee a Sur” (Ambroise, 4610–4615). In June 1191, Ambroise called this contrary wind ‘the wind of Arsur’ (Ehrlich 2014; Kedar 2015). The fact that Ambroise described the southern wind as ‘the wind of Arsur’ implies the importance of the site as a stronghold of a focal maritime location.

The Fatimid coastal town of Arsu̇f (or Arsur, and ancient Apollonia) was conquered by King Baldwin I of Jerusalem and his army in 1101. After the wholesale expulsion of its Muslim inhabitants, the town, located on a cliff overlooking the sea, about 37 km south of Caesarea (Fig. 1), was turned into a royal stronghold, ensuring the growing kingdom’s vital sea link to Europe. The first evidence of its new status as a Frankish burgus, now named Arsur, and its occupation by Frankish settlers, dates to a charter of 1152 mentioning two of its Frankish inhabitants—Nicholaus de Arsur and Alain de Arsur—witnessing the sale of the nearby village of Teira. By the 1160s, the fortified town had become the centre of a feudal seigneurie that extended over the southern Sharon Plain under Johannes de Arsur, a close ally and supporter of King Amoury I of Jerusalem (1163–1173). It was now a substantial Frankish burgus inhabited by Crusaders, colonists and pilgrims, possessing its own burgess court and a church. With the occupation of the town by Ayyubid forces between 1187–1191 after the disastrous Battle of Hattin, its Frankish population—as in the case of many other Frankish settlements—seems to have fled. In 1191 the town’s fortified walls were dismantled on orders of Saladin to prevent their use by the advancing forces of the Third Crusade (Roll 1999, 14.
The town returned to Crusader hands after the Battle of Arsuf, an act formalised in the peace treaty signed between the Christians and the Muslims in September 1192. Initially, the town and the surrounding country were returned to the original lords who had ruled the seigneurie before 1187, but within 15 years it had passed into the hands of the powerful Ibelin clan. Testimonies of two early thirteenth-century German pilgrims, though, attest that the town was deserted up to 1220, and probably later (Beyer 1946–1951, 157; Pringle 2012, 86, 109). The repopulation of the town seems to have begun only in the fourth decade of the thirteenth century, closely connected to the Ibelins’ meteoric rise as the most powerful landed family both in Lusignan Cyprus and in the mainland kingdom of Jerusalem (Edbury 1997; Coureus 2015, 63–64). The town’s strategic coastal position, about two days’ sailing from Cyprus, was not lost on the Ibelin lords leading the native aristocracy in Cyprus and the Jerusalem mainland in the ‘War of the Lombards’ (1228–1243) against Frederick II’s claims of Hohenstaufen overlordship of both kingdoms (Tyerman 2006, 725–26). Presumably, the refortification of the town’s walls (1236), and the construction of a concentric castle in its

Fig. 1. Apollonia-Arsuf site plan, showing the Crusader castle and burgus on land and surveyed offshore remains; 1) Arsuf castle maritime installation; 2) Arsuf castle maritime installation entrance; 3) Sheltered anchorage; 4) Sheltered anchorage entrance; 5) Massive conglomerates, large blocks and ashlar stones; 6) Carved and smoothed reef; 7) IAA report 53/95/2; 8) IAA Glassware report 53/95/2 (modified after Grossman 2001, 58, Fig. 40 and E. Galili field reports; drawing: S. Pirsky).
northeastern part (1241), was related to the Ibelins’ successful struggle against the Hohenstaufen forces in Outremer led by Richard Filangieri (Jacoby 1986). Two decades later, in 1261, under the acute threat of the Mamlûk Empire, the castle, the town and the entire seigneurie of Arsur (castellum, civitatem et dominium de Arsur) were leased by the Ibelins to the Order of the Hospitallers, who refortified Arsur. Despite their efforts, on April 26, 1263, after a siege of some 40 days, the large and well-equipped Mamlûk army commanded by Baybars took control of the town and the castle. Its defenders were taken into slavery, but not before being forced to participate in the systematic demolition of their own stronghold. Arsur was subsequently razed and left in ruins, never to be inhabited again, except for squatters.

Extensive excavations at Apollonia-Arsuf (1977–2015) have uncovered imposing evidence of the Frankish castle of Arsur and its burgus. Remains of a large concentric castle built on a cliff overlooking the sea and surrounded by double walls and a dry moat were excavated. Within the Crusader burgus, which covered some 8 hectares, ruins of the town’s walls, paved alleys, domestic structures and various installations were uncovered, many of them dating to the twelfth century (Roll 1999, 33; Ayalon, Tal and Yehuda 2013). Other remains unquestionably belonged to the thirteenth century, such as the late Crusader period dwelling excavated in the centre of the burgus (Area R), and a defense installation near the southern wall (Area P). Within the castle were material remains relating to Frankish-period Arsur, dated mainly to the 1260s—the last stage of its existence (and destruction) under Hospitaller rule. This is graphically attested by the often thick conflagration layers and ruins uncovered in the excavated areas (Tal and Roll 2011; Ashkenazi, Golan and Tal 2013; Jackson-Tal and Tal 2013; Tal, Kool and Baidoun 2013).

A series of underwater surveys were conducted at the seaside remains of Apollonia / Sozousa / Arsufr / Arsur. These surveys (carried out in the late 1980s and early 1990s) show that the site apparently possessed two havens; (i) a sheltered anchorage (Fig. 1: Nos. 2–5) and (ii) an installation, perhaps for maritime use, sometimes called the ‘port’ or the ‘military harbour’, located at the foot of the cliff on which the Crusader castle stands (Fig. 1: No. 1). In the sheltered anchorage opposite the fortified town, south of the Crusader installation, the eastern face of the sandstone reef was apparently carved and smoothed (Fig. 1: No. 5). Massive conglomerates, large blocks (up to 1.5 × 2 m) and ashlar stones (up to 60 × 60 cm) were placed on and near the reef, which may indicate its role as an artificially-improved breakwater (Grossmann 2001, 65). The sheltered anchorage area yielded a large number of stone anchors of various types, as well as sounding leads, and stone and metal objects and vessels. The pottery assemblage found in the anchorage includes sherds from the Persian, Hellenistic and Roman periods, but most are fragments of storage jars and pithoi of Byzantine times (for specific finds, see Grossmann 1993; 1994; Grossmann and Kingsley 1996; Galili, Sharvit and Artzy 1994, 95).

The other suspected haven is what we designated as the ‘maritime installation’ or the ‘port’ of Apollonia-Arsuf. This man-made installation is trapezoidal, measuring about 80 m from north to south and 33 m from east to west. It has massive walls at its northern and southern sides, and the western side is protected by a kurkar (fossilised dune sandstone) ridge, preserving at places one course of ashlars on its top. It has remains of round structures (watch-towers?) at the seaward ends of the northern and southern walls, and an entrance at its southwestern corner. The study of this maritime installation was pioneered by N. Flemming, A. Raban and C. Goetschel, who wrote: “It is not possible to say whether this structure was a landing stage, part of the city fortifications, or a harbour basin. The last-mentioned seems unlikely in view of the small size, shallowness, and lack of entrance” (Flemming, Raban and Goetschel 1978, 66; see also Raban 1993, 964).

The entrances to both havens (the earlier classical-period sheltered anchorage and the later built maritime installation) are open towards the southwest—the direction of the winter storms and the summer moderate breeze, wind and high seas (Meteorological Office 1,
The entrance to the anchorage is a natural opening in the sandstone reef, whereas in the maritime installation it is clearly man-made. This southwest location for the entrances differs from most harbours in the country, both past and present, where the entrance normally faces northwest. It seems that the configuration of the reefs (Fig. 1: No. 2) is the reason for locating the entrance in the southwestern corner of the maritime installation, although it does face the dominant winter storms and the summer high seas.10

2. ARSUR AS A PLACE OF EMBARKATION

Arsur/Arsuf is frequently mentioned in references to the various Crusades. An important Crusader town located near the sea in that area, it had probably established some means of direct contact with the sea in the twelfth century, be it for logistical support, or for maritime communication with other entities having access to the sea. It is known that the Franks attempting to conquer Arsur were assisted by Italian fleets (Asbridge 2010, 123). Indeed, as one of the main and basic problems of fleets in those days was the supply of fresh water, it can be assumed that Arsur’s two coastal springs (one of them active to this day) certainly enhanced the importance and attraction of the town to foreign fleets. One of the springs was described in the 1881 survey by the Palestine Exploration Fund (Conder and Kitchener 1882, 138), and both are depicted in the drawing made by the surveyors (Fig. 2).

In the middle of the last century one could still climb up from the beach to the fortress through a tunnel let into the face of the cliff. The location of the tunnel is still known, although it is now blocked by debris.11 It is therefore suggested that inhabitants of the fortress in the mid-thirteenth century had this or another direct means to gain access to the shore (Fig. 3). The ongoing excavations are still searching for a direct link between the castle and the shore.

Fig. 2. PEF site plan (coastal springs are arrowed; modified after Conder and Kitchener 1882).
It is, therefore, not surprising that sea transport was apparently used to communicate with the thirteenth-century castle, and probably its twelfth century predecessor. One example refers to Baldwin I, King of Jerusalem, in the early stages of Crusader rule. He found refuge in Arsuf after the debacle of the Battle of Ramla in May 1102, when the King’s small force of mounted knights was defeated by a superior number of Egyptian troops. Desiring to join his troops in Jaffa, King Baldwin was rescued from Arsuf by the pirate Goderic, who managed to evade Egyptian ships trying to surround his ship, referred to as a *buza*,12 as recounted by Albert of Aix: “Verum dehinc septem diebus evolutis, rex ab Assur exiens, navem, quae dicitur buza, ascendit, et cum eo Godericus pirata de regno Anglia”.13

There seems to be no other evidence describing the use of Arsuf as an embarkation point. The story does not specify how Goderic entered the water off Arsuf in order to embark King Baldwin: whether the king swam out to meet the *buza* in the open sea, or more likely, the king, or Goderic himself, used a small boat to row him out to the ship.

3. EVIDENCE OF MARITIME USE IN CRUSADER TIMES

This episode spurred us to study the later mid-thirteenth century maritime installation of Arsuf castle, which, if it did serve as a harbour, would have most likely facilitated logistics in loading and unloading people, animals and cargo.

3.1 Sub-bottom sonar survey

In order to trace maritime activity around the installation, it was decided to proceed with an underwater sub-bottom sonar survey. Two experts were engaged to conduct underwater and ground penetrating research in the area surrounding the installation.14 The instrument used was a perpendicular bifrequential sub-bottom sonar. The transducer produces two signals of constant strength, and the reflections were measured. Under most circumstances this allows penetration of the sediment to a certain depth, depending on the nature of the seabed, and the location of all hard objects. The positioning was achieved by a combined DGPS.15 All positions were given in dd.ddddd (decimal points to the fourth place) in WGS 84 (World Geodetic System 84). The scanner itself was mounted on the stern of a small rigid-bottom rubber dinghy with a 10 HP Yamaha outboard engine. The dinghy was launched from the beach, often first having to cross the surf zone, and was usually operated by two people. The primary result of the survey before being deciphered translated into 39 plates (e.g., Fig. 4). Each plate represents a different depth of penetration: when a certain phenomenon repeats itself on the different plates, this may indicate the presence of an item that might require further investigation (‘target’) (Fig. 5). For the convenience of plotting on a marine chart, the coordinates of the various points were then translated from the decimal system to the minutes and seconds
system. At a later stage, water-jetting surveys were carried out in order to clarify the nature of some targets. Targets were located with a GARMIN 550 GPS equipped with a camera. A few targets revealed organic findings such as wood and olive pits.

Date: June 11, 2012. Point: New 3; Lat: 32.19080 N; Long: 034.80360 E; Time: 08:45. Depth of water: approximately 2 m. Depth of sand, approximately 4.5 m. At the depth of 3 m a non-porous piece of wood was found. At 09:45 at the depth of 4.5 m under the sand more porous pieces of wood were found, along with what appeared to be an olive pit. A much eroded jar handle (Hellenistic?) was also found. Exact location of finds: Lat: 32.19089 N; Long: 034.80354 E.

Date: June 11, 2012. Point: New 9; Lat: 32.19650 N; Long: 034.80470 E; Time: 11:00. This point is located seaward of the reef line. Depth of water approximately 5.5 m. Pieces of wood were found under 1 m of sand.

Date: June 18, 2012. Point: New-10; Lat: 32.11832 N; Long: 034.48234 E; Time: 07:45. Depth of water: 5–7 m. The following finds were located on the seafloor after water-jetting the sand to a depth of approximately 2.5 m: The abovementioned olive pit, sharp at both ends, another item resembling an almond, as well as a bigger pit, which looked like a peach stone, were found. In addition, some pieces of wood, including one about 8 cm long, which looked somewhat newer, were found.

3.2 Significant 14C results

After being carefully handled and packed, the finds were sent to the Laboratory of Ion Beam Physics at ETH in Zurich, for radiocarbon dating, accompanied by a list (Table 1; see Fig. 5 for site locations).
The findings represent three different periods, and might indicate the possible location of a shipwreck or shipwrecks at some of the sites.

### Table 1  Sample site, identification and calibrated $^{14}$C dates

<table>
<thead>
<tr>
<th>ID No.</th>
<th>Site</th>
<th>Identification</th>
<th>Calibrated ETH $^{14}$C (at 95% probability)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETH-46902</td>
<td>New 3-3</td>
<td><em>Pistacia</em> sp. (metal impregnated)</td>
<td>1280–1400 95%</td>
</tr>
<tr>
<td>ETH-46903</td>
<td>New 9-1</td>
<td><em>Cedrus libani</em> (a long piece)</td>
<td>1660–1890 78%</td>
</tr>
<tr>
<td>ETH-46909</td>
<td>New 10-1</td>
<td><em>Cupressus sempervirens</em> (piece of wood)</td>
<td>1640–1690 33.7%</td>
</tr>
<tr>
<td>ETH-46910</td>
<td>New 10-3</td>
<td><em>Olea europaea</em> pit</td>
<td>880–1020 95.4%</td>
</tr>
</tbody>
</table>

The findings represent three different periods, and might indicate the possible location of a shipwreck or shipwrecks at some of the sites.

4. **The Underwater Excavation**

In order to determine the nature of the maritime installation at the foot of the cliff on which the Arsur Crusader castle stands, and whether it could indeed have served as a place of embarkation for sea-going vessels, some questions must be answered (Fig. 6). Is the entrance of the
maritime installation practicable, and, if so, under what sea conditions? What was the depth of the maritime installation, assuming that it was free of debris and silt? How were the maritime installation walls built? What kinds of stone were used, and what were their dimensions? Was the sea level in Crusader times substantially different to that of the present day? In order to obtain at least partial answers, the maritime installation would have to be dredged to remove some of the silt, stones that had fallen from the castle and other debris, which would allow its depth to be ascertained. Water-jetting would have to be performed at many points to try to ascertain depths and to locate objects, if any, beneath the seabed.\textsuperscript{18}

The underwater excavation focused on two main topics: one concerned the study and analysis of the massively built northern and southern walls, as well as the western wall, consisting of a natural reef with some remnants of masonry; the second concerned studying and analysing the seabed. A total of 119 dives were performed, and the work included clearing of stones and rubble, excavation of trenches, water-jetting and documenting the constructions on the site in an attempt to understand whether they were indeed meant to be used as breakwaters, protecting an inner maritime installation, or part of the fortifications of the castle and town.

The first stage mainly involved clearing stones and rubble scattered over part of the seabed in the maritime installation, most of which, as noted, had fallen from the castle over the years. This was done to create areas of clear seabed that could later be cleared of silt to explore the foundation of the northern and southern walls and to verify the depth of the installation.

Fig. 6. Aerial photograph of the Arsur castle maritime installation (2009; photo: Skyview).
The stones, generally ashlars typically measuring 40 × 30 × 25 cm, were collected into crates, transported under water and deposited outside the northern wall. When a substantial area of the northwestern part of the maritime installation was cleared of heavy rubble and stones, the excavation commenced, employing two dredgers. It was first decided to try to dredge a deep trench, in order to examine the foundation of the northern wall and the western reef. When the trench reached the depth of about 1.5 m, divers were instructed not to excavate under the wall to avoid danger of collapse. After the foundation of the wall of the northern watchtower was examined, it was decided to extend the trench eastward, toward the shore. At a later stage the trench was extended southward and deepened.

Because much of the area of the maritime installation was covered with large sections of the fallen castle wall, and since the excavated trench proved that the bedrock is much deeper than was first realized (about 2.5 m rather than approximately 1 m), it was decided that better knowledge could be gained by a water-jetting survey in many areas of the site, and then measuring the depths of the seabed. Seventy-four water-jetting probes were carried out, with 2 m intervals between them. Some of the probes were so deep that the probe itself, about 2.5 m long, sank completely into the seabed. Some probes hit rocky bottom (apparently ashlars) at a shallow depth. The water-jetting survey was performed along four lines (marked on Fig. 7). Each water-jetting point was logged, and two figures were recorded: the upper one—the depth of the water at that particular point, and the lower figure—the depth of penetration of the probe when it hit hard bottom, rock, or, in some cases, sank its entire length into the seabottom without encountering resistance.

5. FINDINGS

5.1 The northern sea wall

Until this research was carried out (2013), it was believed that the site was surrounded by masonry and by a natural reef (see above). It was apparent that the northern and southern walls were artificial. The preserved length of the northern wall is some 40 m and its width is 4.5 m on the average. The reconstructed diameter of the round tower on its western end is about 12 m. For comparison, the southern sea wall measures 26 m, and its width is similarly 4.5 m on the average. In both cases, the fragmented nature of the walls, preserving several chunks of wall on the same axis, divided by ‘slots’, seems to be the result of deterioration or earthquakes. The lowest layer of the stones in the northern wall constitutes a protruding ledge, slightly wider than the upper part of the wall (Fig. 8, on left). However, it is not certain that this protrusion was intended to be a ledge or, whether the whole construction was wider, and part of it, above the ledge, has disappeared over the years, leaving the ledge-like wider section. The northern wall was built on a soft kurkar ramp (Fig. 8, on right). This may help to support the theory that the maritime installation was deeper than previously assumed, and that the builders found the need to create a ramp and build a stone breakwater on its upper part to withstand the waves. Our excavation facilitated access to the base of the northern wall. Work then proceeded with direct measurements, drawings and photographing of structures, above and under water (Fig. 9). At the base of the northern wall the trench reached a depth of 2.4 m, disclosing newly uncovered stones, which were ‘clean’, as opposed to the upper courses that were found covered by marine fouling (Fig. 10).

It is difficult to explain why the northern (and southern) sea wall (that may have acted as breakwaters) were built mainly in a quite regular masonry style, with many ashlars laying lengthwise, perpendicular to the western reef (especially in the northern sea wall lower course, Fig. 8), making them vulnerable to attack by waves. It is especially difficult to understand this, because the northern seawall is built in part with ashlars laid in the ‘headers’ style,
Fig. 7. GIS map of the castle and outline of the maritime installation, with indications of points of water-jettings (marked by + in the dashed lines) (completed June 16, 2014; drawing: S. Pirsky).
perpendicular to the wall itself. However, the fact is that both walls stand in the sea to this day and still maintain the relative calm inside the maritime installation even in days of high waves. It may be added that samples of the joints between some stones on the northern sea wall were taken for chemical and petrographical testing for cement residues. Microscopic examination of thin slides prepared from the samples was carried out at the Laboratory for Comparative Microarchaeology, Tel Aviv University, Institute of Archaeology. Our analysis shows that the cement used was hydraulic, made of lime (burnt limestone) mixed with silica/sea sand.

Fig. 8. Protruding ledge in the northern wall, on left, and ‘headers’ on a ramp in the northern wall, on right (Photo: A. Yurman).

Fig. 9. Drawing of a section (A–A on Fig. 7) in the underwater western part of the northern wall, close to its seaward end, looking northeast (drawing: J. Asuli after J. Tresman).
The western seawall consists of a reef that may have acted as a foundation for an artificial wall that had apparently disappeared over the years. Having carefully studied the western wall, which consists of a reef some 80 m long on a roughly south–north axis, it is now certain that it is partly made of natural rock. The builders of the maritime installation apparently made clever use of the natural reef, constructing the northern and southern walls roughly on an east–west axis, connecting the reef and the shore at both the northwestern and southwestern corners of the installation. Round structures presumed to be watchtowers were built at the corners where the southern and the northern walls meet the natural reef. As for the western wall of the maritime installation, in the natural reef there is ample proof that an attempt had been made to enhance its quality as a wall: On the reef itself
is a narrow, shallow trench (Fig. 11, on left), probably man-made, which seems to have served as the foundation for a wall. Some ashlars are still visible in on top of the reef (Figs. 7 and 11, on right). However, since the builders of the northern wall were apparently familiar with the 'headers' style, it is difficult to explain why this breakwater(?) would have been built in regular masonry style, with the ashlars laid lengthwise, parallel to the reef, making them most vulnerable to attack by waves and in an area most exposed to the waves.

Some pottery fragments, including the rim of a Gaza-type jar of the sixth or seventh centuries and other mostly medieval ceramic fragments, were found in the installation basin. These were archaeologically insignificant. A modern piece of jewellery and a modern Israeli coin, were found about 1.5 m under the sandy seabed, slightly to the east of the northwestern corner of the installation, which proves that sand silting at the site has been ongoing over the years.

5.3 Depths

It was generally thought that the maritime installation was too shallow to have been anything but a basin that could be used only in a calm sea, which is quite rare along the open coast of the eastern Mediterranean. The water-jetting survey and the excavated trench proved this to be wrong: the average depth of the sand—except where the probe hit rocks or more probably sunken building stones, was 1.75 m, and often more, and at maximum depth some of the trenches reached hard rock at 1–2.6 m below sea level. The average depth of the water was approximately 90 cm. If indeed the water was as deep as the length of the probe and the excavated trench, viz. approximately 2.5 m, then theoretically small to medium-sized vessels could have been moored in the installation.

Fig. 11. The shallow trench on the western reef, on left, and remnants of stone wall on the reef, on right (photo: I. Roll, D. Mirkin).
However, if the depth of the sand is disregarded and only the depth of the water measured is considered, then the installation was rather shallow, especially if we accept the assumption that the sea level during the Crusader period was approximately 50 cm lower than at present according to the latest measurements (Toker et al. 2012, 56–57). If so, the installation would have been approximately 50 cm deep. However, not only the depth of the water inside the installation has to be considered, but also the depth of the water over the reef and at the entrance.

The Crusaders used various types of vessels, such as *galleys*, *cogs*, or *buses*. The cog for example, was a merchant ship about 30 m long, and had a beam of 7 m and a draught of 3 m (Landström 1961, 70–73). For the Eighth Crusade Louis IX ordered Venetian ships which were about 26 m long and 6.4 m wide (ibid., 83). However, the vessel known as a *taride* was current and, according to various reconstructions it would have measured about 38 m long (18 *canne*), 3.5 m beam (14 *palmi*), and had a draught of about 80 cm (3 *palmi*) (Pryor 1982, 117–18). Such ships could not enter the installation at Arsur, and would have to drop an anchor outside the western line of reefs, not less than 200 m off shore. Still, during the Crusader period, before sediments and building stones had accumulated, the depth of the installation seems to be more reasonable, at least for small craft, such as rowing boats with a very shallow draft not exceeding a few tens of centimetres.

5.4 Entrance

The question of the shallow entrance still needs to be addressed. The shallow entrance, through which the excavation supplies were ferried in small craft to the camp on the seashore, most certainly would have also precluded use of the site by large vessels of any kind. However, a small boat could be walked or rowed in during an exceptionally calm sea, the depth of the water above the reef being about 60 cm at medium tide (Fig. 12).

5.5 Evidence of sea traffic near Arsur

Marine traffic usually leaves some signs, be they shipwrecks or articles, such as utensils or ceramics, fallen from ships. Previous surveys carried out along the shores of Apollonia-Arsuf...
have yielded numerous finds. Unpublished medieval pottery and glass finds may yet be added in this context. These finds came from the underwater surveys carried out by E. Galili et al. on behalf of the Israel Antiquities Authority (Fig. 13). The similarity of these finds to those recovered from the castle of Arsur (cf. Tal and Roll 2011; Jackson-Tal and Tal 2013), which are typical of the Crusader period, may indicate robust maritime Crusader traffic in the vicinity of Arsur. Their find spot across the reef of the maritime installation may perhaps support the idea of ships mooring in a calm, open sea, and the use of smaller vessels for transferring goods and people.

The above may be supplemented by two pieces of a column approximately 40 cm in diameter (Fig. 14), documented in September 2010 about 100 m offshore (Lat: 32° 11’ 36” N; Long: 034° 48’ 15.6″ E). One piece is about 1.5 m long and the other was half buried, which made it difficult to measure. On 10 November 2010, two samples were taken, one of each

![Selected Crusader-period pottery and glass finds](photo: P. Shrago).
column. Microscopic examination of thin slides prepared from the samples was carried out at the Applied Petrography Department, Università IUAV of Venice. It revealed that the samples are Mysian granite originating in Kozak Dag, in the province of Bergama, Turkey. This finding, in conjunction with the pieces of wood and the olive pit found near the installation, tend to confirm that the area in general, and the maritime installation area in particular, were visited by ships. So far it has generally been assumed that granite columns found in Apollonia-Arsuf were imported from Egypt. The fact that the columns analyzed were made of Turkish granite may cast a different light on various thoughts concerning the origin of other stones and pieces of marble from the castle of Arsur.

6. WAS THE MARITIME INSTALLATION A PORT?

It is tempting to call the maritime installation located at the foot of the Apollonia-Arsuf castle a harbour. Indeed, the explanatory sign directing visitors to the castle refers to the installation as a harbour without casting the slightest doubt, in fact, calling it “the Crusader harbour”. In her monograph Grossmann included an artist’s rendering showing sailing vessels moored in the so-called port (2001, 54, Fig. 37 [as appears on cover of Hadashot Arkeologiot 101–102 [1994] / Excavations and Surveys in Israel 14 [1995]). With respect, this seems to venture too far afield. Still, whether the installation was built as a harbour, port or land extension of the castle, its builders were familiar with marine building techniques. The small and difficult entrance notwithstanding, once a boat had managed to find its way into the area protected by the walls, preferably owing to local knowledge, it was relatively safe. The results of the above project show that shallow craft could be ‘walked in’ into the basin, albeit with difficulty, and that it may have been deeper about eight centuries ago, and most probably free of the considerable debris that clutters it today. In conclusion, debate over whether or not the maritime installation actually served as a mooring basin has yet to be resolved, and there are valid points to be made both for and against. However, most probably it could hardly qualify as a harbour.
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NOTES

1 Translation (after Hubert 1941): He sent word thereof to the King / and that fleet, which was to bring / his barons to him still remained / at Tyre, because it was detained / by what is called the Arsur wind.

2 A historical analysis of Crusader Arsur is found in Roll (1999, 11–16), and Tal and Roll (2011, 13[1]–20[1]).

3 For Arsur as an important urban centre, see Kedar (1997, 3–4); for the church of St. Mary situated in the burgus, see Pringle (1993, 60).

4 This was Johannes of Arsur, presumably the male heir of the pre-1187 Lord of Arsur of the same name, killed in a hunting accident in 1198.

5 Wilbrand von Oldenburg (1211–1212) and Thietmar (1217–1218).

6 Seventeen seasons of excavations carried out during 1977–2004 were directed by the late I. Roll and six more carried out during 2009–2015 were directed by O. Tal. The eighteenth season was co-directed, when directorship and responsibility over the future excavations at the site were transferred from Roll to Tal. During these 24 seasons of excavations, focus was fairly equally shared between the classical and medieval period sites.

7 These were made on behalf of two different bodies: E. Grossmann in the framework of a Ph.D. research in Macquarie University, and E. Galili et al. while heading an underwater inspection team of the Israeli Antiquities Authority. For a detailed description, see Grossmann (1995a, 67–176). For accounts on the surveys, see Grossmann (1991; 1992; 1995b; 1995c; 1997); and Galili, Dahari and Sharvit (1992; 1993, 69–94).

8 Its four cardinal points are: northwest corner: 32° 11′ 45.18′′ N; 34° 48′ 21.12′′ E; southwest corner: 32° 11′ 42.45′′ N; 34° 48′ 22.35′′ E; northeast corner: 32° 11′ 44.52′′ N; 34° 48′ 22.27′′ E; southeast corner: 32° 11′ 42.04′′ N; 34° 48′ 21.53′′ E.

9 A more thorough examination was made by E. Grossmann who investigated the installation in her Ph.D. dissertation (1995a) which was later published as a monograph (2001); During Grossmann’s survey, mortar samples from the walls were subjected to chemical tests and analysed. According to Grossmann, these tests show that, although the walls proper date to the Crusader period, their foundations were laid much earlier, in Byzantine times [5th–6th centuries?]. Moreover, the foundation of the northern wall seems to have been built in a way similar to the harbour building method described by Vitruvius (V, 12, 2–6; ed. Fensterbusch 1964, 250–51). It should be added that during our work in the installation we found no support for Grossmann’s observations for an earlier, Byzantine-period construction dating.

10 For example Hohlfelder (1996, 81–83) regards the very existence of such desilting systems in Antiquity as problematic.

11 Interview with D. Jacobson, Tel Aviv University, who says that he used to climb through the tunnel in his early teens, which was considered as an act of havgado.

12 It is not clear whether the buza is a craft known in the Middle Ages as buza, buica or buicus, developed from the Viking long ships. Ray Martin refers to buza nave, buza and buzamnae (Martin 2001, 175) as merchant or transport ships current in the thirteenth century.

13 Albert of Aix, Historia Hierosolymitana, Liber IX, Cap. IX. Translation: After the passage of seven days, the King exited from Assur and boarded a boat called buza, with Godericus a pirate of the kingdom of England.

14 Work was carried out by Klaus Storch (SoSo) and Hanz Günter Martin (Abatones). The survey was performed between September 30 and October 6, 2010, mainly around the installation, partly close to the shore, the ‘inner area’ (Fig. 1, the area between Nos. 3–4) and the area located more to seaward to the north, the ‘outer area’ (Fig. 1, the area around Nos. 7–8). Very little work could be done within the installation itself, since its bottom was almost completely covered with stones and debris that had fallen from the fortress, and effectively blocked the penetrating capacity of the sonar.

15 A regular GPS which uses an additional (‘differential’) antenna emitting a signal, located at some distance from the GPS itself and, in our case, on the cliff top. This allows for more precise GPS data.

16 Water-jetting is a method used to locate archaeological artefacts beneath the seabed. Water is forced under pressure through a metal pipe (about 2.5 cm in diameter), which is pushed into the seabed as far as possible. Objects located under the sand, such as fragments of wood, olive pits or other delicate materials are driven upwards by the water pressure, and either collected underwater or floating on the surface, and then brought to land to be studied and analyzed. Three attempts were made on three different days. The first, on June 19, 2011, failed to reveal any finds. The second and third, a year later, on June 11, 2012, and June 18, 2012, were more successful.
ARSUR CASTLE MARITIME INSTALLATION (1241–1265 CE)

17 Although plotting on marine charts is usually done using the degrees, minutes and seconds system, the readout in the GPS was converted to the decimal system to conform to the Abatonos report, and avoid conversion mistakes, using the international in WGS 84 datum used by GPS.

19 A dredger is typically a 6m-long, 15 cm diameter tube made of aluminum with a narrow venturi section into which sea water is pumped at high pressure through a fire hose from a portable pump installed on a boat. Water flow through the venturi causes suction. A suction hose attached at the low pressure venturi section enables the excavator to dredge sediments and uncover archaeological objects.

20 Similar construction in larger and smaller stones is evident in the castle itself.

21 Building in the ‘headers’ style was a well-known method for building sea walls because this method exposes a smaller surface of each stone to attack by waves, and it is thus more solidly anchored in a wall. The existence of ashlars built in the ‘headers’ style suggests that the builders were aware of this form of construction, though there is no explanation why this method was not used for the entire construction.

22 Compass bearing of the northern wall from the shore seaward is 317°, and that of the southern structure is 259°.

24 The water depth measurements were carried out at low tide. However, in this part of the world, the difference between high and low tide rarely exceeds 40 cm, and that only during the Proxigean Spring Tide, which occurs once every one and a half years. The difference between high and low tide during the research period was approximately 40 cm.

25 In Acre and Dor it is customary to measure the depth of the water and disregard the depth of the sand on the seabed.

26 The entrance seems to have been designed to remain open: no closing or locking apparatus was detected in our survey and measurements.

27 The items were stored in cardboard boxes in the Israel Antiquities Authority’s compound in Caesarea, meticulously numbered and classified.

BIBLIOGRAPHY

Primary sources

References
Coureas, N., 2015. ‘How Frankish was the Frankish Ruling Class of Cyprus?’, Επετηρίδα του Κέντρου Επιστημονικών Ερευνών 37, 61–78.