

## Notes

### The Kelenderis Ship: A Lateen Sail

In *IJNA* 35.1, 108–16 is an article entitled ‘Kelenderis Ship—Square or Lateen Sail?’, about the study and interpretation of a sailing-ship in a harbour scene which decorates a mosaic discovered in excavations between 1989 and 1992 at Kelenderis, in Turkey (Fig. 1). In their conclusion, the authors, Professor Zoroglu of Konya Selçuk University, Turkey, director of the excavation and finder of the mosaic, and Dr Zaraza Friedman of Haifa, Israel, in charge of the nautical interpretation, state without doubt that ‘The sail of the Kelenderis ship is a common quadrilateral sail of traditional vessels from the 4th to 6th centuries or earlier’. Six months earlier, on 27 August 2005, I presented a paper entitled ‘Un nouveau témoignage sur la voile

latine: la mosaïque de Kelenderis (v. 500 ap. J-C.; Turquie)’ at the 9th International Symposium on Ship Construction in Antiquity held in Agia Napa, Cyprus. This oral presentation is being published in the *Tropis IX* proceedings, edited by H. Tzalas.

At that time, although the topic was new and outstanding, the mosaic published by Zoroglu (1993; 1994; 1995; 1996) had never been addressed from a nautical point of view apart from that developed by Zaraza Friedman in her PhD (2003). The main points of her study which remained unpublished are reiterated in the *IJNA* paper. Strangely, although this paper is later than the Agia Napa Symposium, which Dr Friedman attended, it does not refer to my oral presentation.

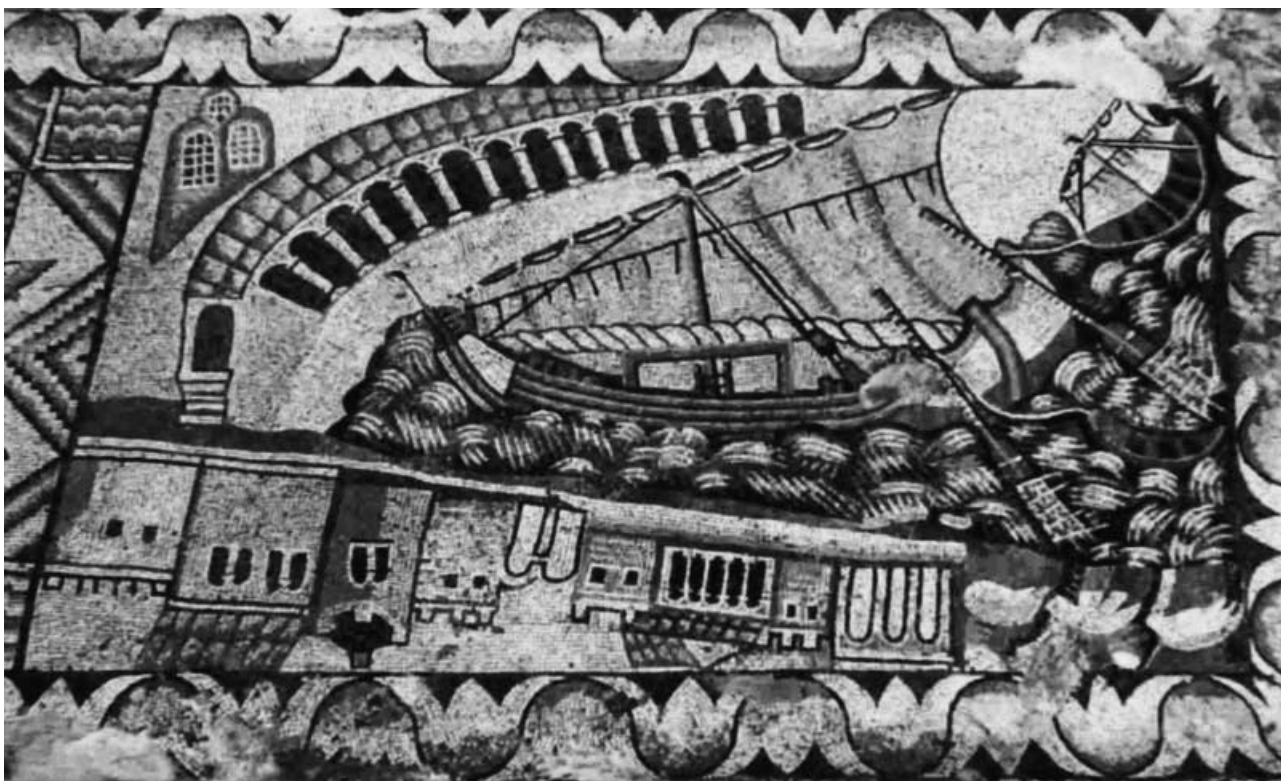


Figure 1. Kelenderis harbour scene. (Levent Zoroglu, reproduced with permission)

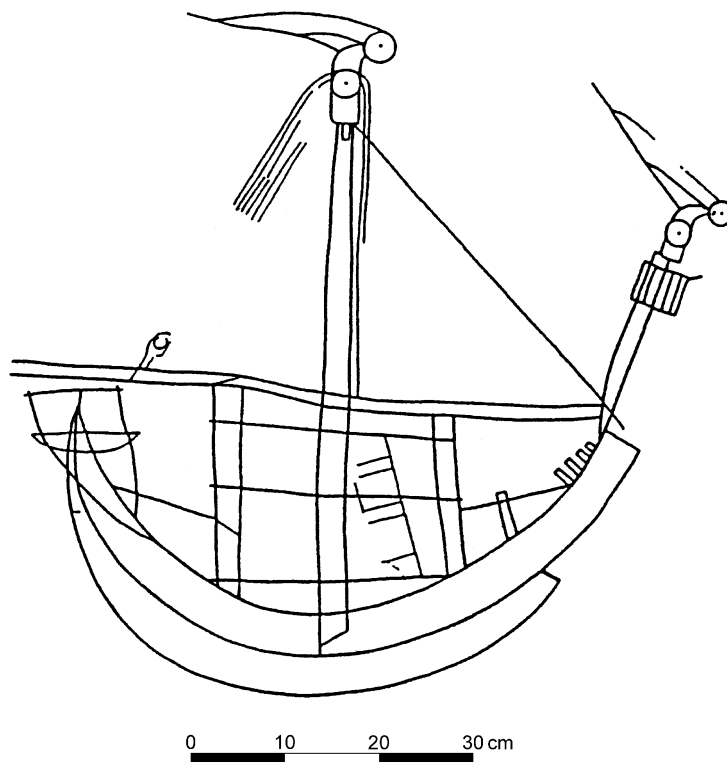


Figure 2. Graffito of a Byzantine ship from Corinth. (Lucien Basch, reproduced with permission)

As a matter of fact, it must be underlined that my conclusions were opposite to those expressed by Friedman, that is to say mine considered the sail of the Kelenderis ship as unquestionably of the lateen type, in whose evolution from the ancient square sail it represents an outstanding milestone. For this reason, before my study is published in *Tropis IX*, I will underline here the main characteristics of the ship, the interpretation, and the differences between our studies.

First, I will not comment on the interpretation of the ship's position in the *IJNA* paper as 'static' and 'at anchor' while, in my interpretation, all the details dynamically show a ship sailing into the harbour. Likewise, the reasons which led Dr Friedman to consider the small boat without oars or sail to be illogically towed by the stern remain unclear. More interesting is the very interpretation of the ship, its type and its background. It is obvious that Friedman does not know Lucien Basch's article about a 5th–6th-century graffito of a Byzantine ship at Corinth (Basch, 1991a) (Fig. 2), and that about a 'dipinto' of a 7th-century lateen-sailed ship from Kellia, Egypt (Basch, 1991b) (Fig. 3). These two remarkable documents are fundamental comparative elements

which help understand the Kelenderis ship, so many are the similarities with this ship.

They have the same rectangular central structure, which Basch identified not as a cabin but as a *xylokastron* characteristic of Byzantine ships (Kelenderis, Corinth, Kellia). And the same fastening system for the mast-foot by means of vertical stays (*parastatai* in ancient texts). This system is perfectly compatible with a lateen rig, as shown by the Kellia ship, contrary to Friedman's statement. They have the same row of small bits near the bow (Kelenderis, Corinth, Kellia), totally different from 'a smaller structure with four arched openings and probably a barrel-roof' identified by Friedman. And the same rudder-system of two large lateral steering-oars arranged on each side near the stern and with a trident-shaped blade supplied by the extension of both edges and central axis (Kelenderis, Kellia and other Byzantine examples, cf. Basch, 1991a). Lastly, some similarities must be underlined as regards the rounded shape of the hulls of the Kelenderis and Corinth ships, plus the same strange figuration of the bow on which both sides of the hull are visible. These similarities are quite as remarkable as regards the rigging, with which we are peculiarly concerned.

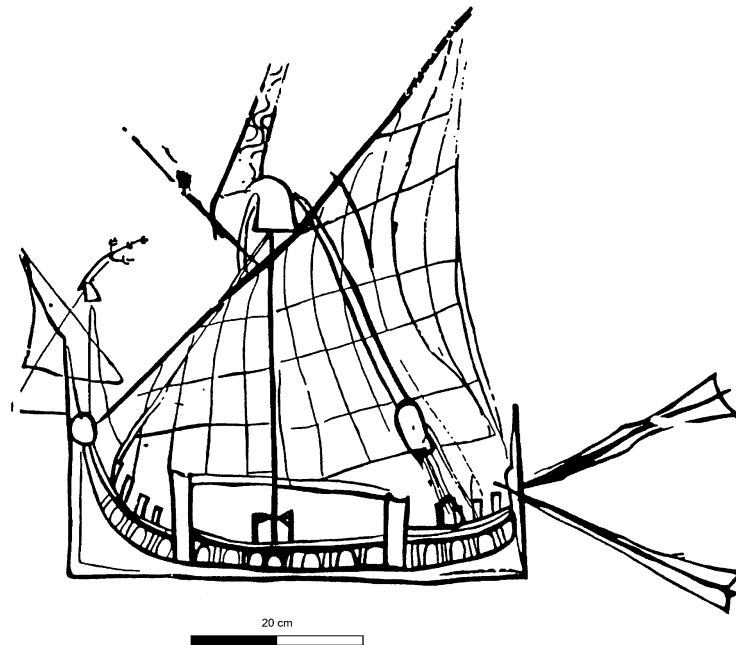


Figure 3. 'Dipinto' of a lateen-sailed ship from Kellia. (Lucien Basch, reproduced with permission)

Thus the cross-shaped pattern facing the front and associated with a disk located at the top of the mainmast and of the small bow-mast of the Kelenderis ship is also observed at the top of the mast of the Kellia ship, and at the top of the mainmast and the foremast of the Corinth ship. In the latter case the function of the pattern is evident. It is a representation of a mast-head with the sheaves for the halyard. The cross-shaped pattern of the mast-head facing the front appears as a characteristic of Byzantine ships (Basch, 1991a) and seems unknown earlier. In no case it is a question of 'a small flag or banner ... to indicate the wind direction, or for festive occasions' nor 'the bird's-head stempost decoration' as interpreted by Friedman. Also remarkable is the representation, clearly visible in both the Kelenderis and Kellia ships, and suggested in the Corinth ship, of the double halyard which goes back down from the masthead to a strong halyard-tackle with two blocks (upper and lower) called in French 'tailles guindereuses'. This tackle is characteristic of the lateen sail with which it is clearly associated in the Kellia ship. It is not a question of a backstay as stated by Friedman. The mainmast is maintained by a forestay which is fixed at the bow (Kelenderis, Corinth, Kellia). In the case of Kellia, Basch suggests that this forestay would be rather a runner-stay typical of lateen rigging (Basch, 1991b).

All these analogies, some of which refer to a lateen rig, clearly assign the Kelenderis ship to

a Byzantine background, and beyond doubt to a Byzantine merchant ship of the 5th–7th century, as could be concluded from the origin of the mosaic. Therefore the sail of the Kelenderis ship must be addressed in that context. First let us note that the mast is set with a slight forward rake and not a 'backward rake' as stated by Friedman, according to her drawing probably achieved from a photograph distorting the angles. Let us note also that the yard largely lowered on the bow is at least as long as the ship. It is also noticeable that the yard is off-centre compared to the mast, and that the aft part is significantly longer than the fore part. That is never the case with a square sail, but is a key characteristic of the lateen sail.

Although largely dipped to the bow, the yard holds a trapezoidal sail which shows a short luff to the forward edge. But the lower edge of the sail is clearly rolled up, which indicates that it has been reduced, and also that the forward luff is larger when the sail is totally spread. Given the position of the sail and of the tack and sheet, the yard is represented in a longitudinal position and the ship is sailing with the wind from the port side (or from the port quarter). Therefore the sail offers its windward side, the aft part, to the wind. That explains why the mast, the forestay and the double halyard are visible. Only the lower part, rolled up, appears in front of the mast because of a mistake in the perspective made by the mosaic artist. Therefore it is not possible to agree with

the Friedman's interpretation that 'the wind blows from astern or the port quarter' and the sail 'is viewed from its lee face'. Besides this contradiction, it leads her to consider that the mast is seen 'as a shadow on the lee side of the bunt', which would be quite enigmatic.

But the most original detail is the reef-band orientated diagonally in the upper part of the sail. Its diagonal position is characteristic of lateen sails. This indisputable reef-band cannot be mistaken for ancient square-sail brails as Friedman suggests. These brails are absent on the Kelenderis sail, and a similar reef-band does not appear in ancient square-rigging. But it is true that, until now, its use was only attested from the Middle Ages onwards, which makes this mosaic absolutely outstanding. We can deduce from the rolled-up lower edge of the sail that there is a second horizontally-located reef-band. It is noticeable that the rigging of the boat towed under sail is roughly similar to that of the large ship but with the sail fully open. In all, the sail of the Kelenderis ship is a longitudinal trapezoidal sail of which many examples are well known in the Byzantine period (cf. Alexandria, Basch, 1993), and which belongs to the family of lateen sails. It cannot be mistaken for a classical square sail with such different characteristics. That is why it is not possible to agree with Dr Friedman's interpretation of the Kelenderis ship, which contains several errors. In addition to that, it is not possible to agree with her opinion about the development of the lateen sail, which is based on irrelevant or debatable data. Again, we regret that the remarkable synthesis addressed by

Lucien Basch (1997; 2001) about the issue of the appearing of the lateen sail in the Mediterranean did not receive Friedman's attention.

To conclude, far from being 'a common quadrilateral sail of traditional vessels', on the contrary the sail of the Kelenderis ship definitely belongs to the family of lateen sails of which it represents an interesting developmental stage. By its trapezoidal shape it evokes the ancient square sail which it comes from. By other details, it represents a well-advanced step in the transitional process from the square sail to the fore-and-aft sail, a process which probably began a long time before. That is why, because of its shape and its characteristics, according to François Beaudouin's (1990) terminology, we propose to name it an 'Eastern lateen sail'. Given its dating, the term 'Arabic sail' would make no sense. Within a Byzantine background, the Kelenderis ship confirms the key role played by the Eastern Mediterranean in the early development of the lateen sail which appeared already well advanced in the 5th century, as attested by the reef-band so far exceptional and unique. Last, I suggest to interested readers to refer for further information to the forthcoming publication of my study in *Tropis IX, 9th International Symposium on Ship Construction in Antiquity, Agia Napa 2005 Proceedings*.

Patrice Pomey

Centre Camille Jullian, CNRS-Université de Provence,  
Maison Méditerranéenne des Sciences de l'Homme,  
5 rue du Château de l'Horloge, 13094 Aix-en-Provence,  
France

## References

- Basch, L., 1991a, Un navire marchand byzantin à Corinthe, *Neptunia* **181**, 14–21.
- Basch, L., 1991b, La felouque des Kellia. Un navire de mer à voile latine en Egypte au VIIe siècle de notre ère, *Neptunia* **183**, 2–10.
- Basch, L., 1993, Navires et bateaux coptes: état de la question en 1991, *Graeco-Arabica V* (Athènes), 23–62.
- Basch, L., 1997, L'apparition de la voile latine en Méditerranée, in D. Garcia and D. Meeks (eds), *Techniques et économie antiques et médiévales. Le temps de l'innovation. Colloque d'Aix-en-Provence*, 214–23. Paris.
- Basch, L., 2001, La voile latine, son origine, son évolution et ses parentés arabes, in H. Tzalas (ed.), *Tropis VI, 6th International Symposium on Ship Construction in Antiquity, Lamia 1996 proceedings*, Hellenic Institute for the Preservation of Nautical Tradition, Athens, 55–85.
- Beaudouin, F., 1990, *Bateaux des côtes de France*. Paris.
- Friedman, Z., 2003, Ship iconography in mosaics—An aid to understanding ancient ships and their construction. Unpublished PhD dissertation, Faculty of Humanities, Department of Maritime Civilizations, University of Haifa.
- Zoroglu, L., 1993, Kelenderis 1992 Yili Kazi ve Onarim Çalışmaları, XV, *Kazi Sonuçları Toplantısı II*, 189–209. Ankara.
- Zoroglu, L., 1994, Bir Mozaik Üzerinde Kelenderis Betimlemesi, 1993 Yili Anadolu Medeniyetleri Müzesi Konferansları, 31–40. Ankara.
- Zoroglu, L., 1995, 1994 Yili Kelenderis Kazi ve Onarim Çalışmaları, XVI, *Kazi Sonuçları Toplantısı II*, 263–76. Ankara.
- Zoroglu, L., 1996, Kelenderis Mozaigi, *Çağlar Boyunca Anadolu'da Yerleşim ve Konut Uluslararası Sempozyumu, 5–7 Haziran 1996, (International Symposium on Settlement and Housing in Anatolia Through the Ages, 5–7 June 1996)*, 514–24.

## The Rig of the Kelenderis Ship Reconsidered

The description by Z. Friedman and L. Zoroglu in *IJNA* 35.1 (2006) of the wonderfully-detailed mosaic of sailing vessels in the harbour at Kelenderis is marred by serious misunderstanding of the rig and other nautical details. Suggesting that the ship is at anchor surely misses the artist's intention of no more than linking the magnificence of the harbour with the fine ships which belonged to its merchants. The stream-lines from the rudder-blades show the flow of water, and are the artist's method of indicating that the ship is under way. The perspective used in the mosaic is naive. However, it was a mistake to straighten out the scene as is attempted in Friedman's Fig. 3. The hull's sheer is not exaggerated in the mosaic. The mosaicist has tried to gain a depth of view only from abaft the port rudder where the remainder of the scene curves upwards into the distance. Consequently the interpretative drawing flattens the sheer while trying to adjust the sternpost. Inevitably the mast becomes raked aft so that the realistic setting of the sail is lost together with that of the deck details.

The other important lost detail is the method of hanging the rudders within the up-curving ends of the heavy wales fitted parallel to the sheer line. It is possible to see these disappearing on the port side into the damaged area of the mosaic. Within the wales' high, projecting ends would be the upper bearing for the rudder and the means of swinging the rudder aft in shallow waters. This is not so clear on the starboard side since, due to the naive perspective, one is looking into the gap between the hull side and the curved-up wales. The light-coloured hull surface shown both forward and aft is hull-planking over which the wales are fitted to strengthen the shallow hull and be a support for oars. The stern would be approximately quadrantal in profile from the top of the stempost to the keel. Is it possible that the Kelenderis Ship could be identified as a version of a *dromon* from the early 6th century AD (Bass, 1972: 134–5)?

Despite the authors' discussion about the sail the mosaic shows a settee or settee-lateen rig with its first broad reef tied-in, not a lateen as is initially suggested and certainly not a square sail as concluded. The details are clear. The head is

laced or bent (tied) on with robands to the yard, not with *brail-fair leads* as described incorrectly. How is a sail to be hoisted by its reef-points (p.111)? The yard dips to the stem because the sail, reefed or not, is built shorter at its leading edge, its luff, than at its trailing edge or leech. Two reef-bands and points are fitted, one starting from below the throat (to use a gaff-rig term) of the sail (seen also in the towed boat with a sail), and one set well above the foot. Both are roughly parallel to the sail's foot. The lower reef is tied in to suit the strong winds demonstrated by the waves. The long sausage-like bundle at its foot is the reefed sail. **By mistake the middle of the reefed sail is shown the wrong side of the mast.** Friedman has not corrected this when drawing her Fig. 3. There is no evidence of brails since all their falls, which would be abaft the sail and hanging from the yard, are missing. The shadows on the after surface of the sail depict strain on the seams or the rubbing of gaskets when the sail is stowed. The sail is shown incorrectly as longer than the ship, due to the mosaicist's inaccurate perspective aft. However, the mast should project much higher than the yard due to the reefs reducing the sail.

When changing tack the sail may have been shifted by bringing the yard vertical and swinging the sail around the fore-side of the mast while passing the *stern* through the wind (Moore, 1925: figs 131 and 134). The mast is raked forward correctly in the mosaic, so that the crane at the head of the mast from which the yard is suspended would hold the latter clear. The crane is the bird-like fitting at the mast-head. That shown in Fig. 4 (Ballard and Ward) had possibly had a cast-bronze crane's squared tenon fitted into its mortised end. Perhaps the rope identified as a parrel was actually a lashing to prevent the mast-head splitting since without beads or rollers it would grip the mast unless exceptionally slack. The mosaic's fore-stay (there would be one per bow) is the current weather one, while the back-stay, probably only one and the haliard, ends as a massive collection of blocks and knight-heads set well aft, as is to be seen even now on the large dhows sailing the coast of east Africa (Jewell, 1976: 21–8), and of course, in the Kelenderis ship.

The authors seem not to understand that a settee-lateen sail is trimmed to use the wind in a way similar to that of the square sail. As shown in the mosaic it is in its close-hauled position. However, nothing prevents the sail being set across the hull if the wind is free. The authors' experiences aboard *Kyrenia Liberty* should not persuade them that the Kelenderis ship set a single square sail. *Kyrenia II* as she was named then, when this writer sailed in her in 1985 soon after researching and designing the rig for the interpretative trireme *Olympias*, could not be made to sail on any point other than down wind.

The later raking of the mast aft, still in the original step position which was too far forward for a single square-sail rig, shifted the sail's drive aft sufficiently to allow reaching courses to be sailed. From later photographs it seems that some judicious ballasting forward has also helped. Is it possible that the first *Kyrenia* ship had set a settee-lateen of some form, as is clearly to be seen in the Kelenderis Ship mosaic?

Owain T. P. Roberts  
'Penrallt', *Pehrhyd, Amlwch, Ynys Mon LL68 9TN,*  
Wales

## References

- Bass, G. F., (ed.), 1972, *A History of Seafaring based on Underwater Archaeology*. London.  
 Friedman, Z. and Zoroglu L., 2006, Kelenderis Ship—Square or Lateen Sail?, *IJNA* 35:1: 108–116.  
 Jewell, J. H. A., 1976, *Dhows at Mombasa*. Nairobi.  
 Moore, A., 1925, *Last Days of Mast and Sail*. Oxford.

*The International Journal of Nautical Archaeology* (2006)  
 doi: 10.1111/j.1095-9270.2006.00119.x

## Which End is Which?

**A** propos of the paper by Z. Friedman and L. Zoroglu in *IJNA* 35:1, 108–16, 'Kelenderis Ship—Square or Lateen Sail?', I should point out that the small rowboat described on p.112 (and visible in figs 2 and 3) is not being towed backwards but is an example of a blunt-prowed skiff (see my *Ships and Seamanship in the Ancient World*, 3rd edn 1995, p.331 and fig. 144): 'Representations of ancient skiffs show ... unusual features. The most striking ... is a blunt prow, appearing in quite a few pictures of Roman

Imperial times' (for example, the ship's boat in fig. 144 of a c.200 AD relief in the Torlonia Museum, Rome). 'In the boats in question, the stern ... is well rounded, whereas the prow ends in what looks for all the world like the transom of a modern rowing boat. Possibly its purpose was to enable a skiff to moor, head on, flush to a dock'.

Lionel Casson  
 100 Bleecker Street, New York, NY 10012, USA

## Kelenderis Ship—Square or Lateen Sail?

Zaraza Friedman

4A Pua Street, Haifa 35311, Israel

Levent Zoroglu

Selçuk University, Department of Archaeology at Konya, Turkey

The Kelenderis ship appears in a harbour scene frame that forms one-third of a mosaic floor (the other two-thirds are decorated with geometric patterns). The name of the ship indicates its location, the town once called Kelenderis, in Turkey. The large sailing ship is depicted with a fully-open quadrilateral sail. No anchor or mooring line is indicated, but its static position suggests that the vessel is at anchor. The purpose of this paper is to clarify the intricate type of sailing rig. The Kelenderis ship was researched in detail for the first time by Zaraza Friedman in her 2003 PhD dissertation.

© 2006 The Authors

*Key words:* sail, square-sail, lateen, merchantman, mosaic.

**K**elenderis, known today by the name Aydıncık, is a port in the province of İçel, on the Mersin-Antalya D400 highway (Fig. 1), located in a bay enclosed by the Taurus Mountains. In antiquity it served as a harbour for the Cilicia area. The modern town was named Aydıncık only in 1965. Its previous name was Gilindire, derived from the ancient name Kelenderis. Pliny (*NH*, V.xxii.92) mentioned ‘*regio Celenderitis cum oppido*’—a district including a town of the same name’.

### The harbour scene

Excavations carried out in 1989 near the harbour revealed an area with continuous occupation from the archaic period to late antiquity (late Byzantine period). On this occasion a beautiful mosaic was unearthed in Square K I.111, where the stratigraphy revealed the whole history of Kelenderis (Zoroglu, 1994). The pavement is situated on the top level, and measures nearly 12 m long and 3 m wide. A floral border (lotus buds) surrounds the entire mosaic, while the field is divided into two parts, one-third (3.1 × 3.1 m) comprises the harbour scene, and the other two-thirds are decorated with geometric patterns.

The harbour panel is depicted in a combined low-perspective and bird’s-eye view with the main focus on the large sailing-ship anchored within the port (Fig. 2). The harbour comprises a long, straight quay (lower edge) and a curved colonnade following the shape of the shore (upper edge). On the lower quay are shown different buildings (lying downwards), enclosed by crenellated city walls. The building in the lower right corner with a tall, arched facade probably indicates a shipshed, and the black trapezoidal surface at the edge of the quay may indicate a slipway. Other buildings include a tavern with propylon façade and pitched tiled roof, two structures with crenellated tops, a double-arched gate, a square tower with crenellated top, and an additional structure with a pitched roof. The colonnade (*stoa*) is reached from the quay, to the left, by five steps and an arched entrance. Behind the *stoa*, in the top left corner, is a three-arched structure with large windows.

The function of the building complex within which the almost-intact mosaic pavement was found is not clear, and Professor Zoroglu has been unable so far to identify it. The mosaic probably dates to the 5th or 6th century AD, based on comparison of the Kelenderis harbour scene with other mosaics depicting similar subjects, and the archaeological stratigraphy. It may be assumed

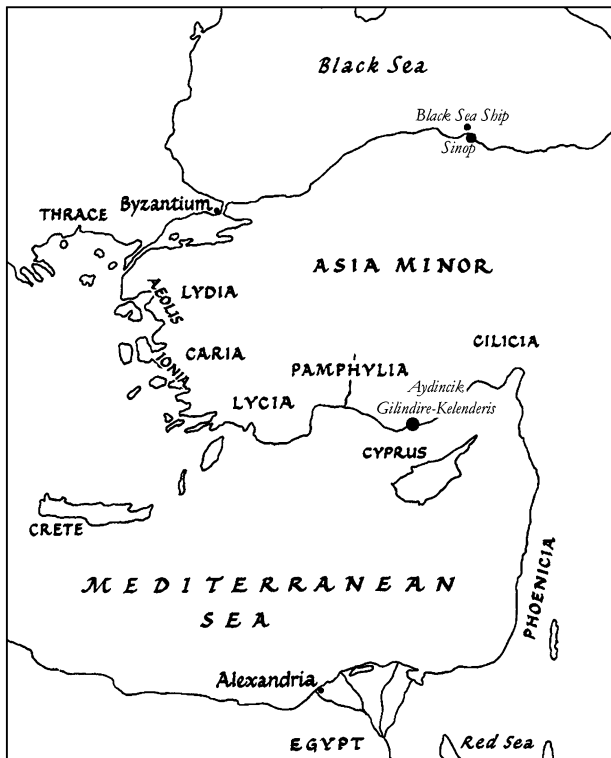


Figure 1. Location of Kelenderis. (Zaraza Friedman)

that the mosaic depict the harbour of Kelenderis. The baths near the harbour, of which remains are almost intact, resemble the structure with the three-arched windows at the top left of the mosaic. The topography of the harbour seems to be the same.

### The sailing-ship

Within the semi-circular bay is depicted a very large sailing-ship and two smaller vessels, one of which is rigged with a fully-open quadrilateral sail while the other is a rowing-boat, minus its oars. Both smaller vessels are towed or moored astern by a rope looped on either side of the large ship's stern. The sailing-ship and the small sailing-boat are seen from their port side, while the rowing-boat shows its starboard side. The large sailing-ship (Figs 2 and 3) has a long and broad hull, as evidenced by the full stern. The ship is depicted in a distorted perspective, seen from below the port quarter. The bow is facing the shore and appears close to it. The mosaicist turned the prow towards the port side, thus appearing in the same plane with the port hull. The raised stempost is outlined with one row of black tesserae and the field is made with ochre stones. A short vertical thin black spar topped by

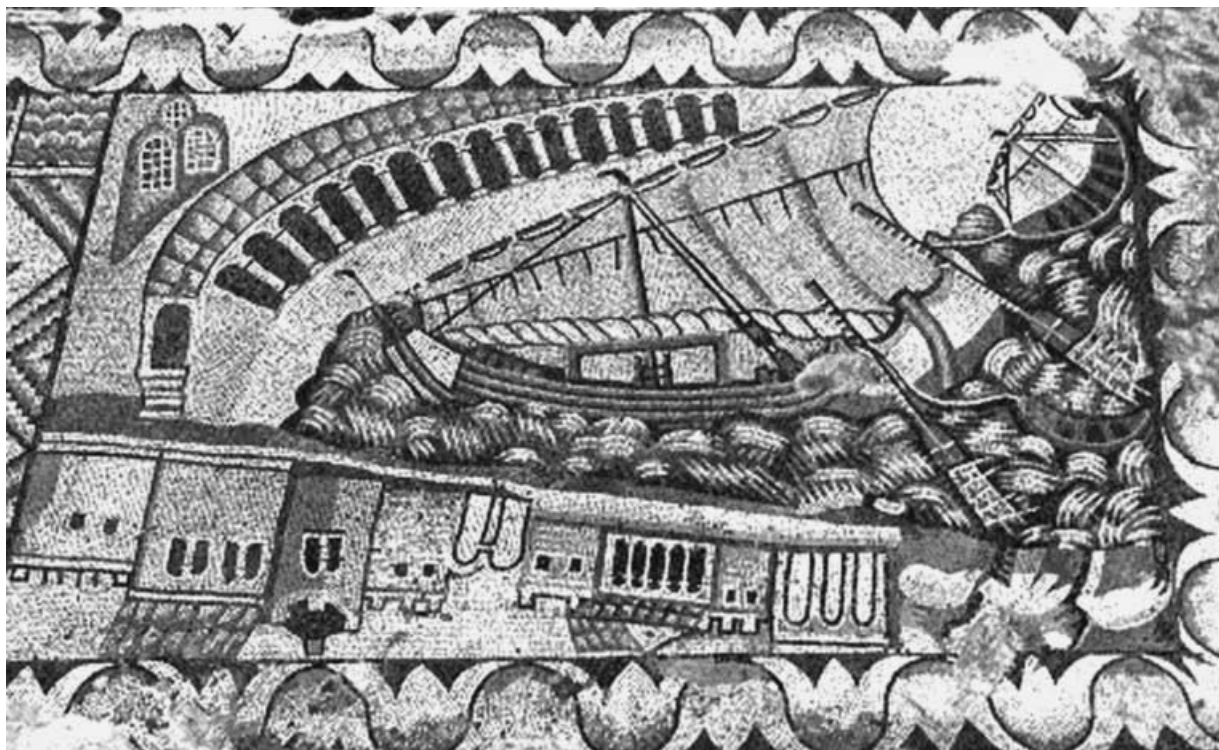


Figure 2. Kelenderis harbour scene. (Levent Zoroglu)



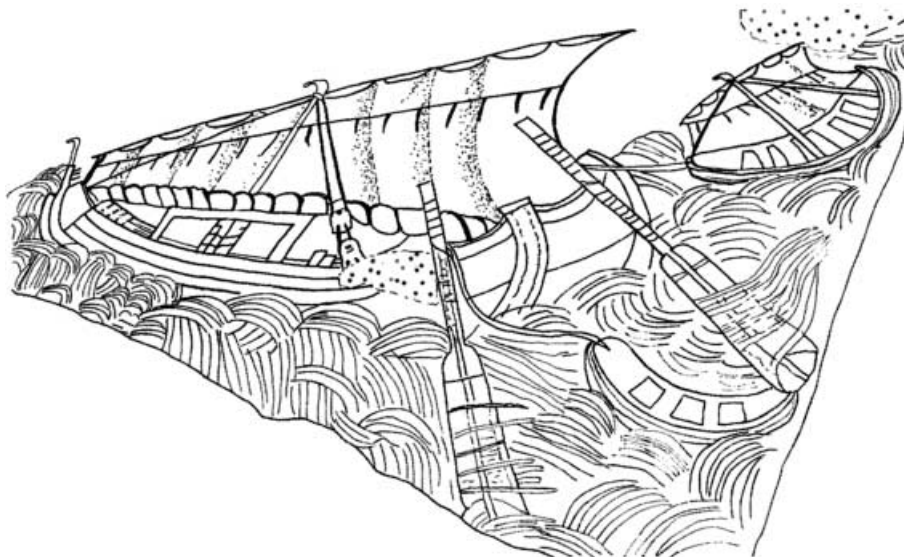


Figure 3. Kelenderis ship and boats. (Zaraza Friedman)

a bird's head is attached to the tip of the stempost. On the port side of the hull are depicted four parallel long strakes made with white, ochre and dark brown tesserae, while the seams are made with black stones. On either side of the stem there is a white trapezoidal plank. A strip of dark brown tesserae represents the gunwale. The dark brown tesserae colouring the lower part of the hull may indicate the pitch coating to make the vessel watertight.

The top port aft strake seems to widen to form a wing-like aft extension that houses the port steering oar. The distorted broad stern is depicted with yellow, white and dark brown tesserae. The wide sternpost seems to divide the stern into two parts, each with an almost straight board. The starboard side of the stern seems to be ended by an additional post. This post-like border was probably meant to indicate the edge of the starboard aft wing extension. The tow or mooring line of the small sailing-boat is looped around the aft edge of this wing. On the mid deck there is a large rectangular cabin, made with yellowish, dark brown, black, white and pink tesserae. Between this cabin and the bow there is a smaller structure with four arched openings and probably a barrel-roof. This structure is outlined with black cubes and the field is made with dark brown stones.

The ship is rigged with a very large quadrilateral fully-open sail, attached by brail-fairleads to a long thin yard (Figs 2 and 3). The yard is outlined by a row of black stones on its upper part and the lower part is made with light brown cubes. Its

length appears to equal the length of the ship; the port yard-arm is lowered on the bow, while the starboard one is raised above the stern. The yard is attached to the aft side of the mast-head by a parrel. The lifts are missing. The mast-head is adorned with a conical cap and a ball-like tip. Usually at the tip of the mast-head of ancient ships a small flag or banner was attached to indicate the wind direction, or for festive occasions. There are many examples of ship iconography showing such elements, as for example many of the vessels on the floors of the offices at Piazzale delle Corporazioni at Ostia, Italy. The looped parrel seen on the Kelenderis ship is reinforced by the unique surviving evidence of the preserved rope loop close to the tip of the mast of Shipwreck D, in the Black Sea (Fig. 4); an almost intact ship discovered, buried in silt, by Bob Ballard and Cheryl Ward in 2000. This vessel was identified by using an ROV system, at a depth of 320 m, and about 25 km north of Sinope, Turkey (Ward and Ballard, 2004: 6). On the tip of the mast there is a cavity which is supposed to have fitted the mast-head, now missing.

The tapered vertical mast of the Kelenderis ship is stepped a bit forward, with a slight backward rake. Only the lower part of the pole is visible between the port gunwale and the side of the mid-cabin. The rest of the mast, seen as a shadow on the lee side of the bunt (a distorted depiction), is rendered by hues of white and light brown tesserae, while the right side is outlined by one continuous row of black stones. On the lower



Figure 4. Parrel of Wreck D, Black Sea. (Robert Ballard and Cheryl Ward)



Figure 5. Bracing timber at the mast of wreck D, Black Sea. (Robert Ballard and Cheryl Ward)

part of the mast there are two black vertical and horizontal lines, probably indicating two lateral stanchions, and ropes to brace the timbers to give extra support to the lower pole (Figs 2 and 3). This element is also confirmed by the Black Sea ship, which still carries the intact vertical mast stepped amidships. Near the lower part of the mast was revealed the upper part of the bracing timber, with probably some rope coiled around (Fig. 5). Radiocarbon dates and the shape of the jars carried aboard indicate that the ship dates to

the end of the Roman period or beginning of the Byzantine period (Ward and Ballard, 2004: 12), namely the second half of the 4th century AD.

The tip of the mast-head and the bird's-head stempost decoration of the Kelenderis ship are made with black tesserae; the beak of the bird with ochre cubes. Two lines made with black stones, stretching between the mast-head and the port quarter, indicate a double-line backstay. Their lower ends go through a block or dead-eyes, one attached to the ends of the lines and the second found above the quarter gunwale (Figs 2 and 3). The angled line stretching from the mast-head to the tip of the port stem is the forestay. Both stays form the standing rigging to secure the mast in place. Due to the distorted depiction of the quarter and the stern, it appears that the backstays may represent the shrouds, but the opposite is the case. The sail billowing forward is viewed from its lee face, and has the same width as the yard. The head is attached to the yard by fairleads set on top of the spar. The port leech is made with brownish and black stones and the starboard one only with black tesserae. On the lee face of the sail are depicted several longitudinal lines with light reddish-brown stones, probably indicating the shadows of the brails stretching on the fore face of the bunt. On the upper part of the sail, beneath the yard, is depicted a long black almost-horizontal line with sixteen short vertical ones attached beneath it. The line indicates a reef-band sewn on the lee face of the sail. The reef-points were used to hoist the sail when it was furled to the yard. A substantiated example is found on the sail of a ship depicted on a mosaic from Carthage (Fig. 6). Beneath the foot of the Kelenderis sail are depicted 17 short arching black strips which represent the lower ends of the brails.

The steering gear consists of two large steering oars, one mounted on each quarter. The right side of both shafts is outlined with a row of black tesserae while the field is made with dark brown stones. The shaft of the port oar seems to go behind the aft wing extension, while the starboard shaft is laid against the inner side of the starboard aft wing. Their lower ends cross the blades longitudinally. The oars have elongated blades, with rounded shoulders, while the lower ends of the wings angle towards the shafts. Beneath the shoulder of both blades is depicted a single horizontal white strip, probably indicating a horizontal reinforcement or some decoration, as was the fashion on the oars of Pharaonic Egyptian ships since the Middle Kingdom. The blades are submerged in the rough



Figure 6. Sail with reef-point in a mosaic from Carthage. (Zaraza Friedman)

sea, indicated by horizontal white strips on their faces. The white single tesserae depicted within the white strips on the blades may indicate the foam of the waves breaking on the submerged oars.

Astern of the large sailing-ship two small boats are towed or moored. The upper boat is a sailing-boat, as indicated by its fully-open quadrilateral sail, while the lower one is a rowing-boat, though the oars are not shown. A tow or mooring line secures each boat to the stern of the sailing-ship. The sailing-boat is seen from above, while its open sail is viewed from the lee side. The elongated hull has a banana shape, with its pointed stem facing the stern of the sailing-ship. The gunwale is outlined by a strip of yellow tesserae. The fore and aft ends of the vessel are partly covered by a deck at the gunwale level. In the boat are depicted four thwarts, set above the gunwale (outlined with one row of light yellowish tesserae). The thwarts and the decks are made with very dark brown stones. Due to the top view of the hull, not much is visible of the boat's sides. The top strake, visible on the port side, is depicted with dark reddish-brown cubes and the lower strake with black stones. The rigging comprises a fully-open quadrilateral sail viewed from its lee face. The rounded vertical mast stepped amidships is made with light and dark brown tesserae. The forward inclination of the pole probably resulted from the mosaicist's desire to give a three-dimensional view to the scene, or it represents a boat known to the artist. There

are many depictions of boats where the mast is shown with a slight forward rake, including some of the ships on the 3rd-century mosaic floors at Piazzale delle Corporazione in Ostia. The mast of the Kelenderis small sailing-boat is secured by a forestay stretching from the mast-head to the tip of the bow, and a double-line backstay, stretching from beneath the yard to the port quarter gunwale. The tip of the mast-head projecting above the yard seems to be covered by a black conical cap with a bent, rounded tip, similar to the mast-head decoration of the large sailing-ship. A slightly downward-curving yard is attached to the mast-head by a parrel, as indicated by the white loop. The lifts are missing. The length of the yard and the hull are almost the same. The tip of the starboard yard-arm and the upper corner of the sail are slightly damaged. The head of the sail is attached to the yard by fairleads. The port leech is outlined with black tesserae. The tack of the starboard sheet, pulled backwards, seems to coil around the tip of the sternpost. The sail is made with white and light brown stones. The foot of the sail is hidden by the starboard gunwale, due to its billowing over that side. On the upper part of the sail is a horizontal black line with nine short vertical strips attached beneath it. Similar to the larger sail, this line indicates the reef-band, while the short bands are the reef-points used to hoist the furled sail to the lowered yard.

The tow or mooring line of the small rowing-boat is looped around the upper end of the port steering oar and the tip of the port aft wing. The lower end of the line is attached to the rounded end of the boat. The hull is very similar to that of the small sailing-boat. It appears that the rounded end is the stern, facing the stern of the large ship, and the pointed stem is turned towards the right side of the frame. The starboard gunwale is outlined with one row of dark ochre tesserae. The bow and the stern are partly decked above the gunwale. There are two thwarts in the boat, placed across the hull. The decks and the thwarts are made with dark brown stones. The boat is seen from above. Due to this view, only the upper part of the starboard side is visible, indicated with the same hues as the thwarts and decks. The boat is slightly shorter than the sailing-boat. Both appear to be the ship's boats towed astern, as they lack steering gear. The water within the harbour is not calm, as indicated by the short curving strips, depicted in a criss-cross pattern. The white strips crossing the blades of the rudders also emphasize a rough sea.

## Lateen sails

The first sail to be used by men since they chose to use the sea was the square-sail, which apparently was in fact oblong; it has been in use since the 4th millennium BC, and is still set in small sailing-vessels today. With favourable winds this type of sail was set athwartship thus offering its full surface to the wind from anywhere behind. When a sail (square or triangular) is fastened to the mast in a way that it does not sit athwartship but fore-and-aft parallel to the sheer of the vessel, it is known as a fore-and-aft sail (Casson, 1966: 43–4). This type of sail is less efficient before the wind than the conventional square-sail, but more efficient when sailing into the wind. The possibility of setting a sail in the fore-and-aft manner had been followed by the triangular adjustment of the sail that later developed into the lateen type. Some ship iconography from the 6th Dynasty in ancient Egypt (*c.*2350 BC) may suggest the origin of the triangular sail. Three examples, one from the tomb of Asa at Deir al-Gebrawi (*c.*2350 BC, Sleeswyk, 1987: 382, fig. 7), the second from the tomb of vizier Mehu at Saqqara (*c.*2330 BC, Schultz and Seidel, 1998: 98 bottom), and the third from the 18th Dynasty (*c.*1450 BC, Sleeswyk, 1987: 382), show vessels with inverted triangle sails. This type may have resulted from canting a square-sail with a free foot, where the sheets were tight or brought around the mast. Continuity of use of an inverted triangle sail is evidenced by two ship graffiti in the Necropolis of Anfouchy (Alexandria), dated to 270–210 BC and not later than the reign of Augustus. There are five hypogea or vaults with many graffiti that depict ships. Two ships are very detailed; both of them are shown with three-branched rams, similar to the Atlit ram (3rd–2nd century BC), and are rigged with a raked yard and inverted triangle sail (Basch, 1939: 328, 331, figs. 1 and 8). Both yards are hoisted to the mast-head and are missing their lifts. It is assumed that the parrel collar gave some freedom to the yard in its manoeuvrability to allow it to angle as was needed for the sail to take in the optimal wind, while the tacks were brought around the mast. Later depictions of sailing-ships with inverted triangular sails are found in the 1st century AD, as for example the ‘Glycera ship’ at Pompeii (Basch, 1939: 330, fig. 6). The examples discussed above may be considered as the intermediate stage between the square and the lateen sail.

When we speak about lateen rig we refer to a roughly triangular sail of the Mediterranean type,

while the Near-Eastern version, widely used among the Arabs, is known as the ‘Arab’ lateen; it is a settee-lateen, having a short luff to the forward edge of the sail, thus having a trapezoidal shape (Kemp, 1988: 466). This type of sail is common in the Mediterranean from the 13th century, as evidenced both by literature and iconography (Brindley, 1926: 10). Scattered visual evidence indicates that the lateen rig may have been known in the Mediterranean at least from the 2nd century AD. On a gravestone found at Piraeus is shown a ship with an elongated and narrow hull, and rigged with a sail like the ‘Arab’ lateen. Casson assumed that this relief could be taken as conclusive evidence of use of lateen sails in the Mediterranean, at least by mariners from the Northern Aegean in the 2nd century AD (1954: 48, 58). Additional evidence, also from a tombstone, is a relief of a fisherman with his son standing in a boat with fully-open sail; the left-hand yard-arm is dipped to the bow. Casson said that this vessel had a fore-and-aft rig that may suggest a lateen sail (1956: 5, fig. 5 bottom). Another example of a lateen sail dated not later than the 4th century AD comes from a graffito on the handle of an amphora, revealed by the French archaeologists who worked at Thasos (Casson, 1966: 49). The pronounced rake of the yard, missing the lifts, and the triangular shape of the sail may suggest a lateen rig.

Literary evidence of use of lateen sails in the 6th century AD is suggested by Procopius of Caesarea, more specifically in 533, when Justinian sent an expedition of three vessels under the command of Belisarius from Byzantium to Africa. The ships were rigged with sails and yards that could angle, thus forming a lateen. The upper third of these sails was painted red (Sottas, 1939: 229). It appears that Procopius referred to a dipping lug sail rather than to its colouring (Bowen, 1956: 242). In modern days, at least in the first part of the 20th century, Alan Moore recorded that at Port Said, in Egypt, fishing boats rigged with a lateen sail had the peaks of their sails painted a reddish colour (Sottas, 1939: 230). Bowen’s argument that the Arabs using the proper triangular lateen sail is not a conclusive proof that this type of sail (short-luff dipping lug) was used in the Indian Ocean area before the arriving of the Portuguese (1956: 241). He also indicated that the Arab and the Mediterranean lateen have many similarities, which indicate a common development from the square-sail. The eastern type with a boom at the foot of the lateen sail seems to originate from ancient Egypt, where all square-sails were depicted

with a boom, as evidenced by reliefs, wall paintings and models. Lateen sails with a boom are seen today in the feluccas sailing on the Nile, and vessels from the Red Sea and the Indian Ocean. Bowen assumed that the dipping lug with short luff was introduced in the western Indian Ocean during the Roman era by Greek Alexandrian merchantmen trading from the east to the Roman Empire. The Egyptian lateen sail is lashed to the yard (*firman*) with a series of robands which are passed around the spar-like reef points. This type of sail is never reefed (Dimmock, 1946: 37).

The iconography of the 2nd century and literary evidence from the 6th century suggest that the lateen sail evolved in the Mediterranean before the 7th–8th century AD. The examples cited above show that the lateen sail evolved in the Mediterranean since the 2nd century AD and spread eastward via Alexandrian merchantmen. In a true lateen rig no forestay could be fitted and the mast usually had a pronounced rake forward; its yard was held to the mast by a form of easily-released slip-knot. Two bow tackles were used to haul down the forward end of the yard, while the after end was checked by braces, thus producing a curving yard (Kemp, 1988: 466). The triangular lateen in the Mediterranean developed from a dipping lug of a quadrilateral sail. When dipping lug with short luff, the tack is set forward and then the sail appears to be triangular from a distance (Bowen, 1956: 241). Such a sail could be copied by any artist or anyone else as being almost triangular, an indicative of a lateen sail.

## Discussion

The static view of the Kelenderis ship suggests that it is anchored rather than sailing, although no anchor or mooring line is shown. The harbour scene and the vessels are shown in a combined lower perspective and bird's-eye view. To give depth, the mosaicist made some attempts at foreshortening that resulted in quite distorted representations. The distortion is emphasized by the frontal view of the prow seen in the same plane with the port hull. The misinterpretation of the starboard aft-wing edge and the distorted representation of the full stern result in a representation that any viewer would see a transom stern with two sternposts.

The ship is depicted with an intricate sail. The billowing bunt, forward of the mast or slightly towards the starboard side, may indicate that the wind blows from astern or the port quarter. The

shortened port side and the fully open starboard side of the large sail apparently point to the mosaicist's intention to show the scene in perspective. The pronounced lower rake of the port yard-arm to the bow may also suggest a lateen sail. The angled reef-band with the 16 reef-points is thought to be a lateen rig,<sup>1</sup> especially as not much is known about lateen rigging in the 5th–6th century AD. The sail of the Kelenderis ship, however, seems to be an elongated rectangle set diagonally to the hull and not parallel as would be expected in a vessel rigged with a lateen sail; the port sheet is attached to the port gunwale stem while the starboard sheet is attached to the gunwale of the starboard quarter. The angled reef-band on the sail of the Kelenderis ship was intentionally made thus by the mosaicist to emphasize the perspective of the scene.

Reef-band and reef-points sewn on square-sails were used at least from the beginning of the 4th century AD. A sail depicted with free-hanging reef-points on its fore-face that is in the process of furling appears in a mosaic from Carthage, showing the embarking of exotic animals captured in Africa and brought to Rome (Fig. 6). Eastern lateen sails are never reefed and there is no reef-band or reef-points sewn on the bunt (Dimmock, 1946: 37). The Kelenderis sail is not attached to a boom, as seen in Egyptian fishing boats rigged with a lateen sail and a boom. The foot of the sail is free and beneath project the lower ends of the brails (Fig. 2). The angled yard and shortened port leech, suggesting a dipping lug with short luff, are the result of the mosaicist's intention to show the scene in perspective. In a lateen rig the yard on which the sail is set is often longer than the ship's length, on occasions by as much as one-third (Kemp, 1988: 467). In the Kelenderis case the distorted hull does not indicate its real length.

The short arched black lines beneath the foot of the sail represent the brails. The most distinctive elements in a sailing-ship with a quadrilateral sail are the brails that are definitely depicted by any artist, whether working in stone or mosaic or paint (Casson, 1966: 51). In square rig the mast is always stepped amidships and secured by fore-and-back stays. The Kelenderis ship shows clearly the function of its standing rigging and the visible bracing timber at the lower end of the mast (Figs 2 and 3), do not indicate a lateen rig. We may assume that the mast was stepped amidships or slightly forward. The distorted perspective of the ship gives the impression that the mast is stepped forward. The mast in a lateen rigging

could not fit a forestay; it had a pronounced forward rake, whereas is not the case with the Kelenderis mast.

At the end of August 2005, I was fortunate to participate in the trial sailing of the reconstructed ship *Kyrenia Liberty* (Kyrenia merchantman, 4th century BCE) in Larnaka harbour. During the trial I took some pictures of the way the square-sail was manoeuvred. The sail could be easily moved in any direction to take the optimal wind. I observed that from afar the sail with one shortened leach could appear as a kind of lateen sail (Fig. 7), in the way mentioned by Bowen (p. 241) and the depiction of sail of the large Kelenderis sailing-ship.



Figure 7. *Kyrenia Liberty*, trial sailing. (Zaraza Friedman)

## Conclusion

The Kelenderis ship is unique and provides us with significant details that are very relevant to be considered when we deal with ship iconography in any art form and especially in mosaics. Due to the complex harbour scene depicted in the mosaic, the artist used two kinds of perspective, lower perspective and bird's-eye view, which resulted in some distortions in depicting the large sailing-ship and especially its sail. The angled yard and reef-band with the 16 reef-points, shortened port leech and fully open starboard leach of the sail is thought to suggest a lateen rig. The evidence presented above shows the opposite. In the discussion it was deduced that the angled reef-band could not be taken as a conclusive evidence for a lateen rig. This element is typical for the square rig when the sail had to be reefed thus to take the optional wind. The yard and the sail in the Kelenderis ship and the billowing bunt are set diagonally to the sheer of the vessel and not parallel as expected in a lateen rig. Upon the evidence mentioned above, we may conclude that the Kelenderis ship is rigged with a traditional large quadrilateral sail

and not the eastern/Egyptian lateen type. Bowen (1956: 241) mentioned that when dipping lug with short luff, the tack is set forward and then the sail appears to be triangular from a distance. Such a sail could be copied by any artist being almost triangular, thus an indicative of a lateen sail. The Kelenderis sail is similar to Bowen's observation as also indicated by the trial sailing of the *Kyrenia Liberty*. The mosaicist's intention was to show a common merchantman with a full rounded stern and quadrilateral sail true to the period of the mosaic (5th–6th century AD). The reef-band on the sail of the small sailing-boat is parallel neither to the yard nor to the head of the sail. Its angle seems to be the same as the reef-band on the large sail of the sailing-ship. Here also is emphasized the artist's intention to give a three-dimensional view to the scene. If considering the angled reef-band as a conclusive element of a lateen sail<sup>1</sup> then we may have expected that the small sail would also be a lateen, but it is the opposite. The sail of the Kelenderis ship is a common quadrilateral sail of traditional vessels from the 4th–6th centuries or earlier.

## Acknowledgements

Zaraza Friedman expresses her deepest thanks to Professor Michal Artzy of the Department of Maritime Civilizations, University of Haifa, for bringing to her attention the Kelenderis ship mosaic and also being her adviser for the PhD dissertation. Both writers express their gratitude to Dr Bob Ballard, from the Institute for Exploration, Mystic CT/Institute for Archaeological Oceanography, URI/GSO, and Dr Cheryl Ward from the Department of Anthropology, Florida State University, USA, for giving us permission and two of the original pictures from their research of the Black Sea Shipwreck D.

## Note

1. Personal communication (June/July 2004) between Zaraza Friedman and Cheryl Ward, Department of Anthropology, Florida State University. She pointed out an example of lateen sail with reef band and points: <http://www.all-model.com/wolfram/PAGE109.html>. It does not approach the Kelenderis large sail.

## References

- Basch, L., 1939, The way of the Lateen, *Mariner's Mirror* **25**, 328–32.
- Blanchard-Lemée, M., Ennaifer, M., and Slimm, H. and L., 1995, *Sols de la Tunisie Romaine*. Paris.
- Bowen LeBaron, R., 1956, The Earliest Lateen Sail, *Mariner's Mirror* **42**, 239–42.
- Brindley, H., 1926, Early Pictures of Lateen Sails, *Mariner's Mirror* **12**, 9–22.
- Casson, L., 1954, The Sails of the Ancient Mariner, *Archaeology* **7**, 214–19.
- Casson, L., 1956, Fore-and-Aft Sails in the Ancient World, *Mariner's Mirror* **42**, 3–5.
- Casson, L., 1966, Studies in Ancient Sails and Rigging, *American Studies in Papyrology: Essays in Honor of C. Bradford Welles*, vol. 1, 43–58. New Haven, Connecticut.
- Casson, L., 1971, The Origin of the Lateen, *The American Neptune* **31**, 49–51.
- Dimmock, L., 1946, The Lateen Rig, *Mariner's Mirror* **32**, 35–41.
- Friedman, Z., 2003, Ship Iconography in Mosaics—An Aid to Understanding Ancient Ships and Their Construction. Unpublished PhD Dissertation, Department for Maritime Civilizations, University of Haifa.
- Kemp, P., 1988, *The Oxford Companion to Ships and the Sea*. Oxford.
- Morrison, J., Coats, J. F., and Rankov, N. B., 2000 (2<sup>nd</sup> ed.), *The Athenian Trireme*. Cambridge.
- Pliny (trans. E. Rackham), 1962, *Natural History*, II. Loeb Classical Library, Cambridge, Mass.
- Schulz, R. and Seidel, M., 1998, *Egypt the World of the Pharaohs*. Köln.
- Sleeswyk, A. W., 1987, The origin and the development of the triangular sail and the gaff sail in the seventeenth century, *Mariner's Mirror* **73.4**, 377–83.
- Sottas, J., 1939, An Early Lateen Sail in the Mediterranean; *Mariner's Mirror* **25**, 229–30.
- Torr, C., 1964, *Ancient Ships*. Chicago.
- Ward, C. and Ballard, B., 2004, Deep-water Archaeological Survey in the Black Sea: 2000 Season, *IJNA* **33.1**, 2–13.
- Zoroglu, L., 1994, Bir mosaik üzerinde Kelenderis Betimlemesi; 1993 Yili, *Anadolu Medeniyetleri Müzei; Konferanslari*. Ankara.
- Zoroglu, L., 2005, <http://www.Kelenderis.org>.