

SHIP CONSTRUCTION IN CYPRUS, 1325-6

Introduction

Our knowledge of ship construction in the Middle Ages has been widened considerably since underwater archaeology became a scientific discipline¹. Nevertheless, the data supplied by wrecks and other material evidence, such as illustrations, coins and seals, are hardly matched by the written sources, as is the case also regarding ship construction in the ancient world². Only in the later Middle Ages, from the 15th century on, may we start to rely on written material. In the case of warships, the situation is almost the reverse. While very few ancient and medieval warships have been discovered and studied, the historical documentation is much more plentiful than in the case of merchantmen³.

On the grounds of existing data for Mediterranean shipping, there are many questions we could not even hope to answer with any certainty: How much did it cost to build a ship? How long did it take? What were the relative costs of labour and materials? How many people were involved and in what capacities?

A group of documents, published in 1962 by J. Richard⁴, answers exactly this kind of questions. These documents constitute a part of miscellanea concerning the island of Cyprus under the rule of the Lusignans. Being ecclesiastical in nature, they found their way into the Vatican archives. The editor has also elaborated on various aspects of life on the island during that period⁵, but it seems these documents deserve further treatment, as they shed a rare light on naval construction at the beginning of the 14th century A.D.

The relevant material forms an inclusive list of expenses, concerning the construction of two boats⁶. We may regard the list inclusive because the boats were ordered by the papal emissary to the lands overseas, Geraud de Veyrines, who, in 1327, on becoming bishop of Paphos, had to settle his accounts with the Apostolic Chamber. The lists and receipts of his expenses on the boats should therefore be complete. They constitute a collection of many entries, in chronological order but under separate parallel lists, of various expenses. The aim of my study is to disentangle the entries according to different headings - materials, labour, other costs - and present the clearest possible picture of the process of building the ships: duration, timetable, procurement and relative cost of materials, amount of work put in, the socio-economic profile of the labourers, overhead costs.

The importance of the documents lies also in the fact that they deal with a type of boat little known to us. The boats constructed here are called *taforesie* (*tafforisiae* or *transforatae*, also *taforee*, *taforeye* and the like). The traditional description of these boats, as special horse-transporters⁷, seems to give too much weight to this particular function, with misleading results. In one local and most informed source they are described simply as "small boats"⁸. A Luttrell notes that this type of boat is mentioned as a component of the *carovanna magiatri*, the fleet of the master of the Knights Hospitallers in Rhodes⁹, which included also a *griparium* and a *cathphoré*, all cargo ships. It was operated through the *Servitio Marina*, a tough and hated duty of the local population of Rhodes. They were definitely sea-going vessels of moderate size, probably not exceeding 100 metric tons in capacity, which may have been propelled by both sails and oars¹⁰. An armed escort was hired for their short sailing to Armenia (see below),

so they could not have been sufficiently armed. Nevertheless, it should be emphasized already at this point that the documents cannot help us much in clarifying the features of this particular kind of boat.

Before discussing the documents in detail, a brief resume of the historical background is in order¹¹. The two boats were part of a papal grant to the kingdom of Lesser Armenia, which had been attacked by the Mamluks of Egypt in 1322. The bulk of the grant was spent in repairing fortresses, chiefly in the port of Ayas (Layazzo), an important international emporium after the fall of the Crusader Kingdom in 1291. The exact use of the boats in the circumstances cannot be ascertained. They could have served as a general means of transportation in the local waters, plying between the ports and forts and collecting information.

Duration.

The first negotiations for construction and materials are listed in January 1325¹² - reference to a trip to Armenia, and in May¹³, but the actual work started in August 1325. It lasted for five months, and was carried on intensively. By December very little remained to be done, and this was left to the beginning of the sailing season, March 1326. During March and April 1326 the boats were finished, caulked and rigged, and then provisioned with everything needed for the journey from Cyprus to Armenia, about 100 miles, which took place in May 1326.

It seems that shipwrights did not work during the rainy season, probably because of the difficulties in transportation, since materials and men had to arrive from inland. The docks must have been very rudimentary, as were other port installations in the Middle Ages, and inconvenient to use in winter¹⁴. In the winter, the most they would probably do was repair work. Consequently, the labourers were not laid-off sailors, for the sailing season coincided with that of shipbuilding.

Following are the classified lists of expenses on the boats.

I. MATERIALS

a. Timber

| | | |
|-------------------|--|------------------------|
| Aug. 1325 — | 90 curved logs (<i>ligna curva</i>), each 1b. 16d. | — 120 b. ¹⁵ |
| | 34 great logs (<i>ligna magna</i>) about 6.6d on average, made to order (<i>ex conventione facta</i>) | — 225 b. |
| | 20 big strakes or wales (<i>filyeri magni</i>) | — 50b. |
| (another receipt) | | |
| | 69 pieces of timber (<i>pecia lignaminum</i>) | — 100 b.30d. |
| | 21 pcs. of timber | — 30 b.18d. |
| | 23 pcs of timber | — 23 b. |
| | timber from Limassol | — 75 b. |
| | 34 great planks for making benches, each 10 b. (<i>trabes magne pro tabulis faciendis</i>) | — 357 b. |
| Oct. 1325 — | 15 pieces of timber (<i>lignamina in peciis</i>) | — 58 b. 3d. |
| | timer from Limassol | — 55 b.30d. |

| | | | | |
|------------|---|--|---------------|--------------|
| Dec. 1325 | — | 1 great plank (trabs) | — | 8.5 |
| | | Wood for making pegs, treenails (cavilli) | — | 17 b. |
| March 1326 | — | 26 pieces of pine wood (lignus pinus sive zapinus) | — | 37 b. |
| | | 9 pieces of elm wood (de ulmo) | — | |
| | | | | 1158 b. 6d. |
| May 1326 | — | 20 oars (remi) ¹⁶ | about | — 163 b. 1s. |
| | | | TIMBER, total | 1321 b. 18d. |

The timber suited for ship construction was notoriously scarce in the Levant during the Middle Ages¹⁷. In Cyprus, however, the Troodos mountains have always been an excellent source of wood, which made the docks of Paphos famous since antiquity.

It is impossible to estimate the amount of wood put into the construction of the boats, or how the various woods listed were used. But, if our understanding of the terms is correct, we can draw some conclusions about the mode of construction.

The 90 curved logs were probably used for frames, stem, and stern posts, each log being cut to several pieces of the required curvature. The 34 great logs may have been for the straight constructional parts of the boats, such as keel, keelson, and deck beams. The fact that they were "made to order" or prefabricated is significant: this no doubt lowered costs and cut down the duration of the work.

The 69, 21, and 23 pieces of timber ordered would have sufficed for the outer planking, the first being the main order and the two others complementary. Or perhaps the three orders represented three different types of planks.

The 34 "great beams for making benches" may be interpreted as shelves or stringers for internal hull arrangements. Or they may have been some heavy, "stable like" fittings for carrying horses. They may, of course, have been benches for rowers, but we have no conclusive evidence that the ships were fitted with oars. In December one more great beam was ordered, presumably to fill out shortages in the preceding orders¹⁸. The order of wood for pegs and treenails in December could not have been connected with the boats in question, since their construction should have been finished by then. It was probably meant to replenish the yard's stocks, as treenails had to be well dry and seasoned when used.

The order of March 1326 was certainly for the superstructure, made of *zapinus*, the Aleppo pine, and elmwood, still popular in these parts to this day.

Some of the timber was bought where grown and transported by the builders, while some was procured from dealers or by the carpenters themselves. Most of it was paid for during the first months of work. In later months only "pieces of wood" - short planks for finishing - were ordered, as well as the traditional pine and elm for the superstructure. The heavier logs must have been oak or even cedar, then as now quite prevalent in Cyprus (although from replanted trees).

Part of the wood needed sawing - in September 1325 for 12 days and in October for 3.5 days and then 4 other. The cutters (*secatores*) were specialists who worked in pairs¹⁹: the brothers Romaniti (Theodorus or Thodorinus and Georgius, Michaelis and Manolis), the brothers Romathi (Costa and Michelis)²⁰. Their pay was equal to that of the master carpenters.

The masts (arbores) are listed in May 1326, together with a long list of other finishing materials. This point remains unclear. The omission of any steering device is puzzling too. The 20 oars mentioned at the end of the list may have been intended for the *barca* — the ship's boat. Or the oars could have been simple sweeps to manoeuvre the ships in harbour and during calms.

b. Metal parts

| | | |
|------------|--|--------------|
| May 1325 | — Nails for a chest (clavi pro arca) ²¹ | — 30 b. |
| Sept. 1325 | — nails, pledge and security (arra et caparium) | — 122 b. |
| Oct. 1325 | — 50 tacks (scoparoli) ²² | — 2.5 |
| Nov. 1325 | — 40 rotl ²³ big nails (clavi magni) | — |
| | 2050 small nails (clavi parvi) | — 90 b. 6d. |
| | 400 tacks | |
| | — 16 rotl 4.5 ounces nails (10 ounces per besant) | — 19 b. 31d. |
| Dec. 1325 | — 33.5 rotl nails | — 50 b. 1s |
| | 450 small nails | — 2 b. 39d. |
| | 50 nails of medium size | 21d. |
| | 25 other nails | 18d. |
| | 50 other nails | 16d. |
| March 1326 | — 14 rotl 6.5 ounces nails | — 21 b. 39d. |
| | 15 small iron nails (parvi ferrei) | — 5 b. |
| | 750 iron tacks | — 3 b. 3s. |
| | 1 rotl 3.5 ounces nails | — 2 b. 17d. |
| | 4 rotl 4 ounces nails | — 5 b. |
| May 1326 | — 2 anchors, 68 rotl both | — 83 b. 3s. |
| | 2 hooks (rampitoni sive ancori) | — — |
| | | <hr/> |
| | METAL, total | — 440 b. 7d. |

As was the case with the wood, it is difficult to calculate accurately the quantity of nails that were used on these two boats, but it definitely reached hundreds of kg.

Most of the nails must have been copper or bronze, since the iron ones are specified as such. The wooden nails, or tree-nails, were specified separately too, and made on site (see Timber). There were several different sizes of nails, as well as tacks, and they were bought either by weight or by number. They were made by a specialist artisan, a *clavarius*, and bought directly from him, or through the carpenters.

As was stated above, the main body of the vessels was finished by October, so the September purchase represented most of the framing or planking nails. The November order, as well as that of December, were intended for fastening the lighter parts, such as decking. In March some more nails were bought, for the corresponding finishing timber.

The anchors were light and their number (one to each boat) does not match the shipping codes and general usage, whereby there should have been several anchors on board²⁴.

c. Tow and other caulking materials.

| | | |
|----------------|---|--------------|
| Oct. 1325 | — 14 rotl tow, oakum (stuppa) | — 10.5 b. |
| | — linseed oil and wax (sepum) | — 3 b. 15s. |
| | — 1 quintal 83 rotl tow | — 25 b. 30d. |
| (another list) | | |
| | — 4 rotl tow, 1 heavy cloth (rista) ²⁵ | — 5.5 b. |
| | — 1.5 rotl tow | — 1 b. 3d. |
| | wax | 14d. |
| Nov. 1325 | — 1.25 rotl tow | — 1 b. 3d. |
| | wax | — 14d. |
| May 1326 | some tow and heavy cloth ²⁶ | |
| | | |
| | CAULKING, total | — 47 b. 28d. |

The caulking was done mainly in October-November, by a group of specialist - calafati, organised in a guild in many other places²⁷. There were around nine of them, headed by one Michael the Rhodian. Like the wood-cutting specialists, they got paid the same wages as master carpenters. It is noteworthy that on several occasions a cauldron (calderia) had to be rented for them²⁸. They must have been refugees (see Labour) or working away from their regular places.

The large amount of tow — 264.12 kg — is a clear indication that the ships were built skeleton first, a fact which is not surprising at this date. A coat of pitch was usually added for further protection²⁹.

d. Sail cloth.

| | | |
|-----------|---|------------------------|
| Nov. 1325 | — 9 measures of canvas (rods - canne) | — 18 d. |
| May 1326 | — Cotton cloth and canvas for making 2 sails (tele cotonine) | — 640 b. ³⁰ |

The first order, 9 measures³¹, is very small. The sails must have been made at the last moment, or even bought ready-made, although another entry, in April 1326, tells us of a fee of 7.5 b. paid to 2 men and 7 women who sewed the sails. Usually, more than one sail would be kept on a boat, even a small one³². This is especially true if the sail was of the lateen type, which was probably the case³³.

e. Rope.

| | | |
|------------|--|----------|
| Sept. 1325 | — 2 coils of plain rope, each 2 quintals (agumena sive corde plane) ³⁴ | — 220 b. |
|------------|--|----------|

The cord industry was essential to ship-construction, for example at Venice, where it was part of the arsenal³⁵. There was no problem in getting new rope in Cyprus, another advantage that made this island a preferred port of call for international shipping. In January 1325 canvas ropes or cables, costing the huge sum of 1000 b., were bought by the papal emissary for fitting the war-machines and other armament sent to Armenia.

II. LABOUR (Man-power)

| Aug. 1325 | days ³⁶ | pay | Sept. | days | pay |
|--------------|--------------------|-----------------|--------------|------------|-----------------|
| | 25 | 41 b. | (6 x 6) | 36 | 27.5 b. |
| | 25 | 20 | (2 x 25) | 50 | 72 |
| (5 x 25) | 125 | 120 | (2 x 12) | 24 | 24 |
| (2 x 6) | 12 | 12 | (4 x 12) | 48 | 48 |
| (2 x 6) | 12 | 9 | | 25 | 45 |
| | 3 | 3 | | 25 | 30 |
| | 1 | 1 | | 25 | 15 |
| | 6 | 6 | | ? | 4 |
| | 6 | 6 | | ? | 8.1 s. |
| | 6 | 4 | | 5 | 5 |
| | 6 | 4 | | ? | 13.5 |
| | 6 | 3 | another list | | |
| | 6 | 3 | (3 x 6) | 18 | 18 |
| | 25 | 36 | | ? | 1 |
| another list | ? | 40 | | 3 | 12 |
| (3 x 6) | 18 | 18 | | 12 | 12 |
| (2 x 6) | 12 | 18 | (3 x 12) | 36 | 36 |
| | 6 | 3 | | 25 | 22 |
| | 3 | 4.5 | (3 x 25) | 75 | 120 |
| | 3 | 3 | | 25 | 36 |
| (2 x 6) | 12 | 14 | (2 x 6) | 12 | 12 |
| | <u>312</u> | <u>365.5 b.</u> | | <u>469</u> | <u>561 b.1s</u> |

| Oct. 1325 | days | pay |
|-----------|-----------|-------------|
| | 4.5 | 4.5 b. |
| | 4 | 9 |
| | 11 | 24 b. 3 s. |
| | 3.5 | 7.5 |
| | 7 | 11 b. 1 s. |
| | 11 | 12 b. 18 d. |
| | 3 | 3 |
| | 9 | 9 |
| | 4 | 4 |
| | 8 | 8 |
| | 4 | 4 |
| | 2 | 3 |
| | 2 | 2 |
| | 2 | 2 |
| | 4 | 4 |
| | 4 | 4 |
| | <u>83</u> | <u>111</u> |

| Nov. 1325 | days | pay | Dec. 1325 | days | pay |
|-----------|------|----------|------------------|------------|---------------------|
| | 3.5 | 5 b. 1s. | | 2.5 | 2.5 |
| | 3.5 | 3.5 | | 2.5 | 2 b. 9d. |
| | 3.5 | 3.5 | | 2.5 | 4 |
| | 3.5 | 2.5 | | 2.5 | 2.5 |
| | 1 | 2 | | 2.5 | 3 3s |
| | 3.5 | 3.5 | | 2.5 | 2.5 |
| | 3.5 | 3.5 | | ? | 3s |
| | 5.5 | 8 b. 1s. | | 4 | 4 |
| | 5.5 | 5.5 | | 4 | 4 |
| | 5.5 | 5.5 | | ? | 4 |
| | 4.5 | 4.5 | | 3 | 2 30d. |
| | 3 | 3 | | 4 | 6 |
| | 3 | 3 | | ? | |
| | 3 | 5.5 | | | |
| | 5.5 | 11 | | <u>30</u> | <u>39 b. 15 d.</u> |
| | 4.5 | 6 | | | |
| | 4.5 | 4.5 | (con. Nov. 1325) | | |
| | 4.5 | 4.5 | | 4 | 6 |
| | 4.5 | 4.5 | | 3 | 2 1s |
| | ? | 43d. | | 18 | 30 1s. |
| | ? | 2 | | | |
| | 4 | 5 21d. | | <u>136</u> | <u>169 b. 15 d.</u> |
| | ? | 1 | | | |
| | 4.5 | 39d. | March 1326 | | |
| | 1.5 | 1 6d. | (9 x 24) | 216 | 324 |
| | 4 | 4 | (9 x 24) | 216 | 324 |
| | 3 | 3 | | | |
| | 4 | 4 | | | |
| | 4 | 3.5 | | | |
| | 4 | 4 | | | |
| | 1 | 1 | | | |

TOTAL DAYS — 1246; TOTAL PAY — 1582 b. 42 d.

Around 1246 working days were put into the construction of the boats. An average of 20 persons a month were on the pay-lists. About one half of them were described as master carpenters, who got a monthly pay. The others were *proto magistri*, apprentices, plain labourers and even slaves.

In August, 8 men were paid on a monthly basis,
 5 - 7 men were paid weekly,
 2 - 4 men were paid daily.
 In September, 7 men were paid monthly,
 8 men were paid weekly,
 7 men were paid daily.

In October and later, all worked on a daily basis.

Usually, the experts were paid weekly, while the others were paid by the day. Most of the men did not work the whole month. Among these, many were sons, servants and slaves of the masters³⁷.

The masters got 1 to 1.5 besant per day, as did the cutters and caulkers. One besant per day was definitely the average fee. The apprentices and simple labourers got half a besant and down, and the slaves about 4 besants a month.

The slaves were a common feature in Cypriote life, as in the Levant generally³⁸. In our documents, a much respected consultant was a slave of the king himself, who held the high position of "Head of the Royal Arsenal" in Famagusta ("Hazono, guardiano del tersena", or "Hassan Sclavo Regis"). He was apparently a Moslem or a Syrian (i.e., belonging to an eastern Christian community), who came with two slaves of his own. During the months of October, November, he worked 21 days on the boats.

Most interesting is the ethnic composition of this labour force, already expounded on by the editor of the documents. Many were refugees from the Crusader Kingdom in the Holy Land, people from Tripoli, Tyre, Sidon (Sageta), Haifa, etc. They were mostly Syrians or oriental Christians³⁹. The majority of the labourers were naturally Greek Cypriots, but there were some "Franks" too — newcomers from Catalonia, France and Italy.

There was one person — Giorgio Zavari — who seems to have been a contractor (Rais), like the caulker Michael from Rhodes. Several men were paid through him, and in October 1325 he got 12.5 b. for his services, apart from his salary as a carpenter⁴⁰.

III. ADDITIONAL COSTS

a. Various

| | | |
|--------------|--|-------------|
| 1. Aug. 1325 | — 1 barca (ship's boat) | — 125 b. |
| 2. Aug. 1325 | — transportation of carpenters from Nicosia to Famagusta | — 5 b. |
| | — transportation of wood from Nicosia to Famagusta | — 10 b. |
| | — transportation of wood from Nicosia to Famagusta | — 1 b.33 d. |

| | | | |
|---------------|---|---|-----------|
| | — Transportation of wood from Nicosia to Famagusta | — | 6 s. |
| Sept. 1325 | — transportation of carpenters back to Famagusta | — | 8 b. |
| 3. Oct. 1325 | — renting a cauldron (calderia) for tow | — | 12 d. |
| | — renting a cauldron for tow | — | 3 b. 1 s. |
| Nov. 1325 | — renting a cauldron for tow (that belonged to one of the carpenters) | — | 12 d. |
| | — renting a cauldron for tow | — | 12 d. |
| 4. Sept. 1325 | — cutting the wood, 12 days | — | 24 b. |
| Oct. 1325 | — cutting the wood, 3.5 days | — | 7.5 |
| 5. April 1325 | — Sewing the sails, a work done by 2 men and 7 women | — | 7.5 |
| | | | <hr/> |
| | | | 194 b. |

These various additional costs were already referred to under different headings (timber, tow, sails), but are grouped here for the final account.

b. Organization

| | | | |
|----------|--|---|--------|
| May 1326 | — Coordinator's fee (in Famagusta) | — | 48 b. |
| | — Coordinator's fee | — | 100 b. |
| | — To another clerk who worked on the project for 3 monts | — | 50 b. |
| | | | <hr/> |
| | | | 198 b. |

IV. FITTING AND SAILING

a. Salaries

| | | | |
|------------|---|---|-----------|
| March 1326 | — Salaries of the sailors who took the boats to Armenia | — | 160 b. |
| April 1326 | — Salaries of the commanders and captains of the escorting oared ship (comites et nuclerii) | — | 65 b. 3s. |
| | — Salaries of two Pisan pilots, for conducting the boats to Armenia (pro ducendo) | — | 50 b. |
| | | | <hr/> |
| | | | 275 b. |

b. Escort

| | | | |
|------------|---|---|--------|
| April 1326 | — Fitting an oared ship (52 oars) as escort | — | 592 b. |
|------------|---|---|--------|

The payment for an escort may, in a way, be regarded as an equivalent of insurance.

c. Biscuits

| | | |
|------------|-------------------------------------|----------|
| Aug. 1325 | — 5 quintalia biscoti pro Armenia | — 100 b. |
| Sept. 1325 | — 14 quintalia biscoti (25 b. each) | — 350 b. |
| April 1326 | — 8 quintalia biscoti and 81 rotl | — 83 b. |

533 b.

Ship biscuits were a staple food on boats until the last century⁴¹. They were made of hard wheat (*durum*) and stored in every important port of call. Cyprus, like the other big Mediterranean islands such as Crete and Sicily, could produce the necessary quantities. The first two entries are provisions for Armenia, which was in constant need of imported grain.

Total sailing expenses 950 b.

Some other data included in the documents are worth quoting:

| | | |
|-----------|--|-----------|
| Jan. 1325 | — The emissary's trip to Armenia | — 800 b. |
| | — Fitting a boat for a trip to Armenia | — 769.5 |
| | — Fitting a galley for a trip to Armenia | — 1500 b. |
| | (The papal emissary could not go because of infirmity, but expenses were not reimbursed) | |
| Aug. 1325 | — A messenger's trip to Armenia | — 40 b. |
| May 1326 | — A messenger's trip to Armenia | — 315 b. |

Note that the Bishop's trip to Armenia cost 700-800 b., while a lesser dignitary travelled for 315 b., and a messenger sailed for only 40 b. Note, too, that the charter of a galley cost twice or thrice as much as a round ship or a small warship (1500 b. compared to 769 or 592 b.), and once contracted, could not be cancelled.

Conclusions

From the preceding analysis of the documents, the following table emerges⁴², showing the total expenditure on the construction of the two boats:

| I. Materials | amount | percentage of total cost of materials | percentage of total cost of ship |
|------------------|---------------------|---------------------------------------|----------------------------------|
| a. Timber | 1321 b. 18 d. | 49.5 | |
| b. Metal | 440 b. 18 d. | 16.5 | |
| c. Tow | 47 b. 28 d. | 1.8 | |
| d. Rigging | 640 b. 18 d. | 24 | |
| e. Ropes | 220 b. | 8.2 | |
| | <hr/> 2669 b. 17 d. | <hr/> 100 | <hr/> 57.5 |
| II. Labour | 1582 b. 42 d. | | 34 |
| III. Other costs | 392 b. | | 8.5 |
| | <hr/> 4644 b. 11 d. | <hr/> | <hr/> 100 |

The materials used in construction amounted to over half of the expenditure. Among them, timber was the most expensive (almost 50%), with the rigging coming next (24%) , and then the metal fittings (16.5%). The ropes, although essential, cost only 8.2%, and the price of the tow was negligible, although over a quarter of a ton of it was used.

The expenses for labour (carpenters' and caulkers' fees) were 34% of the total, with about 1250 work-days of various specialists spent on the job. Additional costs, like transportation and the hire of equipment (calderie), payments for coordinators and inspectors all added up to some 8.5% of the total. As the emissary was not an expert, and stayed in Nicosia while the boats were built in Famagusta, there was need of mediators, who were responsible for a share of the expenses.

The Taforesie sailing cost was about a fifth of their construction costs, a very low sum compared with the costs of sailing for dignitaries, as well as the costs of fitting other vessels, as quoted above. Finally, each Taforesia cost about 2322 besant blanc of Cyprus, or 387 florin, a mere fraction of the huge sum of 30.000 florin granted in support of the Kingdom of Lesser Armenia.

The availability in Cyprus of all the materials needed for ship construction, of both the professional and untrained labour force, which included many immigrants, as well as Cyprus' location on the international trade routes, presumably made the island an ideal ship yard for the whole eastern Mediterranean. Yet, as already pointed out by J. Richard, the documents reveal that the docks in Famagusta at the time did not carry on boat building as their routine work. They may well have been busy doing repairs and equipping boats in transit, but, even for the limited project of building the two boats, people and materials had to be fetched from far and wide.

From the point of view of ship construction, the boats were probably typical of the sort used in local Levantine trade and naval operations through the whole of the Middle Ages, between Cyprus, Lesser Armenia, Southern Armenia, Southern Anatolia, Rhodes and Crete. Although we are left in the dark concerning many important topics, such as the size of the boats, their exact type, rigging, etc., we are given a great deal of detailed information on a subject little known and dealt with — the socio - economic aspects of ship construction in the Levant in the first quarter of the 14th century.

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NOTES

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1. For a general view on the state of research, see: Bass, G., ed., *A History of Seafaring based on Underwater Archeology*, N.Y. 1972; Muckleroy, K., ed., *Archeology Under Water, An Atlas of the World's Submerged Sites*, London, 1980; Gianfrotta, P.A. and Pomey, P., *Archeologia Subacquea*, Milano 1980.
2. Casson, L., *Ships and Seamanship in the Ancient world*, Princeton 1971, esp. ch. 10; Basch, L., *Le musée imaginaire de la marine antique*, Athènes 1987.
3. See: Friel, Ian, "Documentary sources and the Medieval Ship", *International Journal of Nautical Archeology* 12/1983, 41-62; idem, "The documentary evidence for shipbuilding in England, 1294-c. 1500" in Villain-Gandossi, C., Busuttill, S. And Adam, P., eds., *Medieval Ships and the Birth of Technological Societies. Vol. I: Northern Europe*, Malta 1989, pp. 139-149; and the old articles by Anderson, R.C., "English Galleys in 1295", *Mariner's Mirror* 14/1928, 220-241, and Tinniswood, J.T., "English Galleys, 1272-1377", *ibid*, 35/1949, 276-315. A comparative study of this material is underway.
4. *Chypre sous les Lusignans, Documents Chypristes des Archives du Vatican, XI^e et X^e siècles*, publiés par Jean Richard, Paris 1962 (Institut Français d'Archeologie de Beyrouth, Bibliothèque Archéologique et Historique, tome 83), pp. 33-49.
5. On Cyprus generally, see Hill, sir George, *A History of Cyprus*, 4 vols., Cambridge 1972.
6. I would like to express here my deepest gratitude to Prof. Richard Steffy, who has generously shared with me his thoughts concerning this material.
7. Jal, A., *Glossaire Nautique*, Paris 1848. Second edition in preparation by the International Commission for Maritime History, under the direction of M. Mollat, started Paris 1970.
8. Pegolotti, F.B., *Pratica della Mercatura*, ed. A. Evans, Camb. Mass., 1963, p. 17; quoted by Richard, p. 38, n.4
9. Luttrell, A., "The Servitudo Marina at Rhodes 1306-1462", reprinted in *The Hospitallers in Cyprus, Rhodes, Greece and the West, 1291-1440*, Variorum Reprints, London 1978, IV, p. 63.
10. In this respect, the Taforesia is similar to the Tarida and other hybrid types. See: Heers, J., "Types des navires et specialization des trafics en Mediterranée à la fin du Moyen Age", *Le navire et l'économie maritime*. Travaux du 2e Colloque International d'Histoire Maritime, Paris 1958, pp. 107-112; Mollat, M., "Problèmes navals de l'histoire des Croisades", *Cahiers de Civilization Médiévale* 10/1967, 345-359; Pryor, J.H., "Transportation of horses by sea during the era of the Crusades", *The Mariner's Mirror*, 68/1982, 9-27, 103-125; and "The naval architecture of crusader transport ships", *ibid*, 70/1984 pp. 171-219, 275-292, 363-386; idem, *Geography, Technology and War, Studies in the Maritime History of the Mediterranean, 649-1571*, Cambridge 1988, ch. II, "The Ships".
11. See Richard pp. 36-3, and Boase, T.S.R., ed., *The Cilician Kingdom of Armenia*, Edinburgh 1978.
12. Certainly the main timber orders were put in by then.
13. See below, metal parts and note 21.
14. See Richard pp. 40-41. Even today, most of the small shipyards in the Eastern Mediterranean are uncovered.
15. b = besant, s = solidus, d = denier. See J. Richard pp. 16-21 (Système monétaire et système de mesures). See also: Desimoni, C., "Observations sur les monnaies, les poids et les mesures cités dans, Les actes du notaire genois Lamberto di Sambuceto", *Revue de l'Orient Latin*, Paris 1895, t. 3, 1-25.
16. The price includes also some light ropes (cordes subtiles).
17. Lombard, M., "Arsenaux et bois de marine dans la Méditerranée musulmane, VII^e - XI^e siècle", *Le Navire* etc. (see note 9), pp. 53-106. Also in *Annales: Economies, Sociétés, Civilisations*, 1959, 234-254, quoted by Richard p. 39, n. 4.
18. It is interesting to note the equal number of "great logs" and "great beams" (Richard pp. 41, 46). All the inner hull arrangements suggested above may correspond to the number of frames, but the latter seem to have been ordered in a greater number (90, see above). The single great plank was bought from the *portarius* of Famagusta, the harbour-master.
19. They probably used the large frame-saw, often seen in contemporary illustrations of construction work.
20. Richard pp. 41-43.
21. This may have been the safe used to keep the papal money.
22. The editor of the documents thinks these might be axes (p. 43), but the price does not allow this. They are quite cheap and different from nails. I suggest tacks.
23. The rotl equals 2.264 kg., the ounce - 188 gr., the quintal - 226.4 kg., the cane of cloth - 2.20 m. See the works cited in note 16.
24. Jacoby, D. - "Venetian Anchors in Crusader Acre", *Mariners Mirror*, 71/1985, 5-12, with references.
25. Richard p. 43, n. 7.

26. The last amount of caulking materials was listed together with other items, such as the masts mentioned above (p. 6).
27. Lane, F.C., *Navires et constructeurs à Venise pendant la Renaissance*, Paris 1965, ch. 4.
28. See further, "additional costs".
29. Richard p. 43.
30. The lump sum of 640 b. should be considered as covering general rigging expenses, including masts, sails, hooks, and some caulking material as well. It could be listed under timber, as the exact cost of each item was not specified. See also note 26 above.
31. The Canna or measuring rod for textiles in Cyprus equalled 2.2 m. See note 15.
32. Lane, Navires, pp. 10, 19f.
33. Ibid, p. 33f. Anderson, R. and R.C., *The Sailing Ship*, N.Y. 1963, ch. 6.
34. See note 23 above.
35. Lane, F., "The rope factory and hemp industry in the 15th - 16th centuries", *Venice and History*, Baltimore 1966, pp. 269-284. Originally in the *Journal of Economic History*, 4/1932, 830-847.
36. In these tables, a month's work was calculated at 25 days, and a week as 6 days. I aim to arrive at an estimate of the total of working days put into the construction of the boats.
37. Some of the following information concerning the labour force was deduced already by J. Richard (p. 39-40).
38. See for example *Nicola de Boateris, Notaio in Famagusta e Venezia, 1355-65*, a cura di A. Lombardo, Venezia 1973; *Pietro Pizzolo, Notaio in Candia 1300*, a cura di S. Carlone, Venezia 1978.
39. Richard p. 40; Jacoby, D., "L'Expansion Occidentale dans le Levant: les Venitiens à Acre dans la seconde moitié du treizième siècle", *Journal of Medieval History* 3/1977, 245-250; and "Citoyens, sujets et protégés de Venise et de Gênes en Chypre du 13e au 15e siècles", *Byzantinische Forschungen*, 5/1977, 159-187; both reprinted in his *Recherches sur la Méditerranée Orientale, XIIIe-XVe siècles*, Variorum Reprints, London 1979, Nos. VI, VII; also "The rise of a new emporium in the Eastern Mediterranean, Famagusta in the late 13th century", *Meletae kai Hpomnemata, Hidryma Archiepiskopou Makariou III*, vol. I, Nicosia 1984, pp. 145-179, reprinted in his *Studies on the Crusaders' States and on Venetian Expansion*, Variorum Reprints, Northampton 1989, No. VIII.
40. Richard pp. 43-45.
41. Lane, F. Ch., "Salaires et régime alimentaire des marins au début du XIVe siècle: Vie matérielle et comportements biologiques", *Annales: Economies, Sociétés Civilisations* 1963, 133-138; translated and reprinted as "Diet and wages of seamen in the early 14th century", in *Venice and History, The collected papers of F.C. Lane*, pp. 263-8.
42. In calculating the totals, only expenses directly connected with the two boats were taken into consideration.