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WOODS OF THE OLD GALLEYS OF YENIKAPI, İSTANBUL

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ABSTRACT

One of the largest medieval shipwreck excavations has been performed in Yenikapı since 2004 and resulted with 37 ships from Byzantine Period. Four of them (YK13, YK16, YK25, YK36) were galleys. Wood of thirteen different plant species was identified using anatomical identification of 619 wood pieces that were collected from the site. In building of planking *Pinus nigra* Arnold., *Cedrus libani* A.Rich., and *Castanea sativa* Mill were used. *Platanus orientalis* L. and *Ulmus* L. sp were preferred as floor timber. Keels were *Platanus orientalis* L. and *Quercus* L. sp., and treenails were *Spartium junceum* L. and *Quercus* sp. Because of wide distribution of these tree species within and northern of the Mediterranean Basin, and also having a common trade of wood of these tree species, the origin of the galleys could not be determined exactly.

KEYWORDS: Yenikapı shipwrecks, galleys, wood identification, Byzantine galleys

INTRODUCTION

Since 2004 one of the greatest archaeological excavations has been being continued at Yenikapı. The excavated site covers an area of 58.000 sq.m. and concentrated on four points which further developed into the most comprehensive archaeological excavations in the history of Istanbul. The site has been known as vegetable and fruit gardens for centuries and in the Ottoman period it was called Vlanga. After the excavations, this area was understood to have housed the Theodosian Harbor, the largest in the Byzantine period of İstanbul. This harbor, known as Theodosian Harbor, was built in the 4th century by Theodosius I (r.AD 379-395) in order to answer the growing demand of the new capital city of the Roman Empire. Its location was on the Marmara coast to the south of where the Lycos Stream flowed into a deep natural inlet and a breakwater was built in the east – west direction. Theodosian Harbor was a big commercial harbor for grain imports from Alexandria and unloading of construction materials brought from elsewhere (Kızıltan, 2008). The Harbor was extended several times from 5th century to 11th century (Per. com. with Prof. Dr. Peter Ian Kuniholm).

These archaeological excavations brought to light 36 shipwrecks dated to the 5th to 11th centuries AD. They are considered as the largest medieval shipwreck collection of the world, these wrecks have survived probably due to the sedimentation of the Theodosian Harbor caused by the Lycos Stream. Kinds of the shipwrecks were galley and trade ships (open seas freight ships and coastal seafaring ships) (Kocabaş, 2008). The in situ recording of Yenikapı shipwrecks has been performed by Istanbul University (Kocabaş, 2008; Özsait-Kocabaş, 2008). Initial examinations of wood material were conducted by Liphschitz and Pulak (2007). The authors identified plane (*Platanus orientalis*), calabrian pine (*Pinus brutia*) and poplar (*Populus nigra* or *Populus alba*) from planking in YK01. Turkey oak (*Quercus cerris*) was used in all parts of YK05. For YK02 Black pine (*Pinus nigra*), Plane (*Platanus orientalis*) and Elm (*Ulmus campestris*) woods were used.

Among the 37 shipwrecks found, 28 were excavated by Istanbul University. Four of them (YK13, YK16, YK25, and YK36 (TEIAS)) were identified as galleys and the remaining were trade ships. The purpose of the study is to present the wood identifications of these four galleys. This information may contribute to archaeology world to understand the ship technique and wood trade in Byzantine time.

MATERIAL AND METHODS

The wood samples from four galleys (Table 1; Figure 1) were collected by Ufuk Kocabaş and his team by giving a code number for each ship and ship parts. The approximate dimensions of the galleys are about 15-22.5 m in lengths and 1.5-2.8 m in widths (Table 1). Because most parts of YK36 were distributed, we could not give the estimated dimensions of this galley. Total 619 wood pieces were collected from these four galleys. Dimensions of the wood samples taken for identification were approximately 0.5-2 cubic cm.

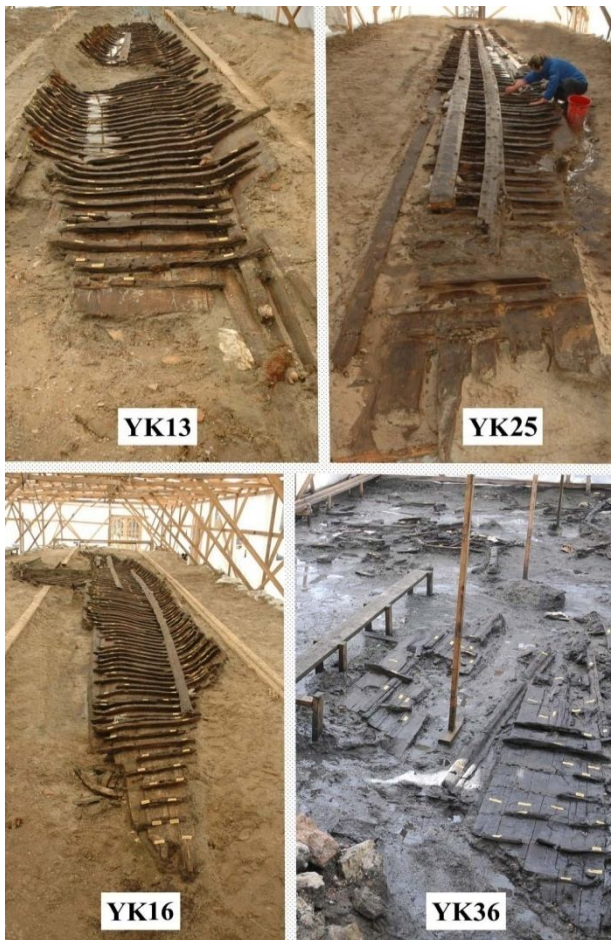

Figure 1. The galleys excavated in Yenikapı with numbers YK13, YK16, YK25 and YK36

Table 1. The approximate ages and dimensions of the galleys.

Galleys	Ages	Length (m)	Width (m)
YK13*	7.-9.centuries	15.00 m	2.80 m
YK16*	8.century	22.50 m	2.40 m
YK25	8.-10.centuries	19.00 m	1.50 m
YK36**	unknown	--	--

*C14 datings were performed by Oxford University
**Remains of this galley were found scattered to an area about 400 m²

Three sections cross, tangential and radial sections, from each wood sample were taken by using sharp razor blades. For identification, a reference collection at the laboratory and wood anatomical references (Greguss, 1955; Jacquoit, 1955; Fahn et al., 1986; Schweingruber, 1988; IAWA Committee, 1989 and 2004; Merev, 1998 and 2003; Bozkurt and Erdin, 1995, 2000) were used.

All wood identification process was performed at the Wood Anatomy Laboratory of the Department of Forest Botany, Faculty of Forestry, Istanbul University. The criteria of IAWA Committee (1989 and 2004) were adopted for identification and following features were used during analysis:

- Gymnospermae wood: growth ring border, resin canal, features of resin cells, wood parenchyma, ray parenchyma cells, cross-field pits, bordered pits, ray heights, end walls of wood parenchyma, horizontal and end walls of rays.
- Angiospermae wood: growth ring, porosity, vessel arrangement, vessel number per square millimeter, vessel grouping, diameter of vessels, late wood vessels, type of intervessel pits, type of perforation plates, helical thickening, ray heights, type and widths of rays, features of axial parenchyma etc.

RESULTS AND DISCUSSION

Identification results revealed that woods of 13 different plant species given below were used in constructions of the galleys:

<u>*Gymnosperms*</u>	
Pine (*Pinus* L.)	Black pine (*Pinus nigra* Arn.)
	Stone pine (*Pinus pinea* L.)
Fir (*Abies* L.)	
Cedar (*Cedrus* L.)	Taurus cedar (*Cedrus libani* A.Rich.)
<u>*Angiosperms*</u>	
Chestnut (*Castanea* Mill.)	Sweet chestnut (*Castanea sativa* Miller)
Walnut (*Juglans* L.)	Common walnut (*Juglans regia* L.)
Plane (*Platanus* L.)	Eastern plane (*Platanus orientalis* L.)
Hornbean (*Carpinus* L.)	Common hornbean (*Carpinus betulus* L.)
Elm tree (*Ulmus* L.)	
Spanish broom (*Spartium* L.)	Spanish broom (*Spartium junceum* L.)
Oak (*Quercus* L.)	Section Quercus (White oak group)
	Section Cerris (Red oak group,*Q. cerris* L.)
	Section Ilex (Evergreen oak group, *Q. ilex* L.)
	In some samples, groups could not be observed because of being not in good condition or having too narrow rings.

The used places of the woods in the galleys and their numbers were given in Table 2. The main trees used in the galleys are *Pinus nigra, Cedrus libani, Platanus orientalis, Ulmus sp* and *Castanea sativa.*

Table 2. Distribution of the genera/species within the ships together with the sample numbers (in parenthesis) and their used places in the ships.

Used Places of Samples	YK13	YK16	YK25	YK36
Starboard Side Planking	*Pinus nigra* (3)	*Pinus nigra* (20) *Abies* sp. (2)		*Castanea sativa* (20) *Quercus*-White oak (2) *Quercus* sp. (2)
Port Side Planking	*Pinus nigra* (16)	*Pinus nigra* (4)	*Pinus nigra* (8) *Cedrus libani* (7)	*Pinus nigra* (2) *Castanea sativa* (1)
Dislocated Planking				*Quercus*-White oak (1) *Pinus nigra* (4) *Castanea sativa* (1) *Platanus orientalis* (1)
Starboard Wale		*Abies* sp (3)		
Port Wale	*Pinus nigra* (1) *Abies* sp. (1)			
Starboard Garboard Strake	*Pinus nigra* (3)	*Pinus nigra* (3)		
Port Garboard Strake	*Pinus nigra* (3)	*Pinus nigra* (2)	*Pinus nigra* (1) *Cedrus libani* (1)	
Stringer		*Abies* sp. (2)	*Abies* sp. (4)	*Pinus nigra* (2)
Floor Timber (Frame)	*Platanus orientalis* (62) *Ulmus* sp. (43) *Juglans regia* (2) *Abies* sp. (1) *Carpinus betulus* (1) *Quercus* sp. (2)	*Platanus orientalis* (83) *Ulmus* sp. (80) *Pinus* sp. (3) *Pinus nigra* (1) *Abies* sp.(1)	*Platanus orientalis* (71) *Ulmus* sp. (1)	*Platanus orientalis* (13) *Quercus*-White oak (6) *Pinus nigra* (1) *Castanea sativa* (1)
Floor Timber				*Pinus pinea* (1) *Quercus*-White oak (1) *Queurcus*-Evergreen (1) *Pinus nigra* (1)
Keel	*Quercus* sp (1) *Platanus orientalis* (1)	*Platanus orientalis* (4)		*Platanus orientalis* (1)
Keelson		*Platanus orientalis* (1)		
Thwart			*Pinus nigra* (1)	
Treenail	*Spartium junceum* (14) *Quercus* sp. (10)	*Spartium junceum* (14) *Quercus* sp. (4) *Platanus orientalis* (1)	*Spartium junceum* (17) *Quercus* sp. (32)	
Dislocated Member	*Pinus nigra* (1) *Ulmus* sp. (3)	*Platanus orientalis* (4) *Ulmus* sp. (2)		
Unidentified Member				*Pinus nigra* (5) *Quercus*-White oak (3) *Castanea sativa* (3) *Carpinus betulus* (1)
Dislocated Ceiling Strake				*Quercus*-White oak (1)
Total	**167**	**234**	**143**	**75**

The features of the woods identified were given below together with their main distributions:

- *Abies* Mill.: Growth ring boundaries distinct and wood with no resin canal. Traumatic resin canal seen in tangential rows. Transition from earlywood to latewood mostly gradual. Heights of rays mostly 10-20 cells, uniseriate, very rarely partly biseriate. Rays homogeneous. Tangential and horizontal walls of rays distinctly pitted. Cross-field pits generally taxodiod, sometimes cupressoid and 2-4 per cross-field (Figure 2:1-4). It has two species in Turkey (Akkemik and Oral, 2011). First species, *Abies nordmanniana* has a wide distribution area through the Black Sea Region, and second one, *Abies cilicica*, grows throughout the Mediterranean Region. It should be noted that wood anatomy of this two fir species is almost indistinguishable.
- *Cedrus* Trew. (*Cedrus libani* A. Rich.): Growth ring boundaries distinct. No resin canal. Traumatic resin canals in tangential rows common. Height of rays 10-20 cells. The typical feature of this genus is that bordered pits are with scalloped tori. Prismatic crystals seen in ray tracheid. Rays heterogeneous (Figure 2:5-7). There are three species of this genus at the eastern Mediterranean basin and Atlas mountains in south of Mediterranean Sea: *Cedrus libani* (Taurus cedar), *Cedrus atlantica* (Atlas cedar), *Cedrus brevifolia* (Cyprus cedar). However, the common and widely used species is Taurus cedar. This is the main species of Taurus Mountains of southwestern Anatolia.
- *Pinus nigra* Arnold: Growth ring boundaries distinct. Transition from earlywood to the latewood mostly abrupt. Resin canals with thin-walled epithelial cells present. Tracheid pitting in radial walls uniseriate. Cross-field pits are windows like (fenestriform). Ray heights are 10-15 cells and heterogeneous. Ray tracheids with distinctly dentate walls. The main difference of this species from *Pinus sylvestris* L is that transition from earlywood to latewood is more abrupt as indicated in Schweingruber (1988) (Figure 2:8-9). This species has a very wide distribution area through Europe and Anatolia. In Turkey, it distributes on the high mountainous areas in the western part of a line between Kahramanmaras and Gümüshane (the Anatolian Diagonal) (Davis, 1965). Wood of this species is used widely in various industries.

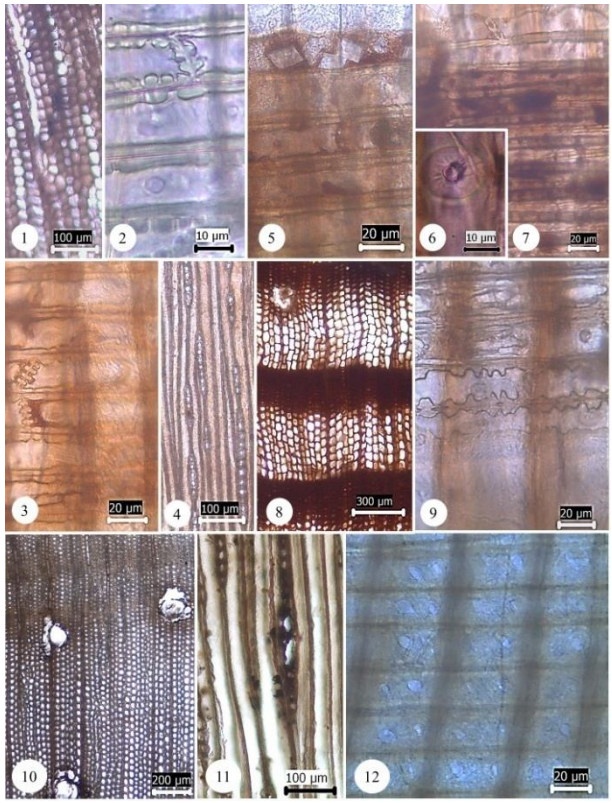

Figure 2. The gymnosperm woods identified. 1-4) *Abies* sp., 5-7) *Cedrus* sp., 8-9) *Pinus nigra*, 10-12) *Pinus pinea*.

- *Pinus pinea* L.: Growth ring boundaries mostly distinct. Transition from early to the latewood mostly gradual. Resin canals large and with thin-walled epithelial cells. Wood similar to some pine species. It has only one difference in its rays. Ray heights are 10-15 cells and heterogeneous. Ray tracheids with smooth and thin walls. Cross-field pits pinoid to taxodioid type and 2-4 (mostly 2) pits per cross-field (Figure 2: 10-12). This species has also a wide distribution area through the Mediterranean basin, and is widely cultivated.
- *Carpinus betulus* L: Wood diffuse-porous. Vessels mostly in radial groups. Axial parenchyma common and apotracheal and diffuse. Growth ring boundaries mostly indistinct. Aggregate rays common. Rays uni- to biseriate, rarely triseriate, mostly 2-4 seriate in aggregate rays. Rays generally homocellular.

Perforation plate simple (Figure 3: 1-4). Two species of *Carpinus* L. that grows in Turkey are difficult to separate to species level. However, *Carpinus orientalis* Mill. is a shrub-by tree whereas *Carpinus betulus* produced a tree trunk that provides use in construction thus is widely used.

- *Castanea sativa* Miller: Wood ring-porous. Transition from early to the latewood abrupt. In wide rings latewood pores with oblique to dendritic pattern or diffuse (Figure 3: 5). Tyloses common in earlywood pores. Axial parenchyma common, apotracheal and paratracheal. Rays homocellular, uniseriate, rarely partly biseriate, up to 30 cells in height. Perforation plates simple. This species is widely distributed throughout Europe and Black and Aegean Sea Region of Turkey and is also widely planted. Because having very resistant wood, it was widely used in constructions and ship-buildings throughout the history.

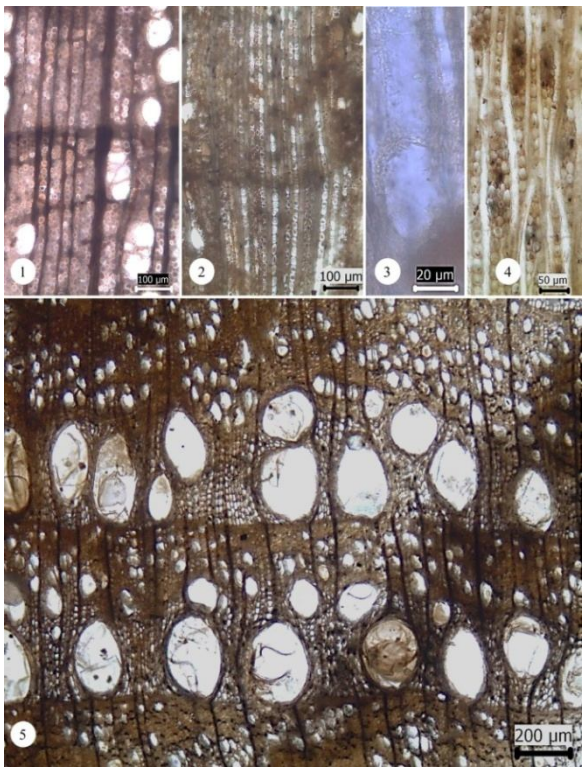

Figure 3. The angiosperm woods identified: 1-4) *Carpinus betulus*, 5) *Castanea sativa*.

- *Juglans regia* L.: Wood diffuse-to-semi-ring porous. Pore infrequent and large. 4-5 pores per mm^2. Pores solitary and in radial rows of 2-5 cells.

Axial parenchyma diffuse and in short uniseriate tangential bands. Rays homocellular, 1-4 seriate, mostly 3-4 seriate. Ray height up to 30 cells in the samples. Perforation plates simple. Axial parenchyma strands generally large (Figure 4:1-3).

- *Platanus orientalis* L.: Wood diffuse-to-semi-ring porous. Growth ring boundaries distinct. Pores very numerous. Growth ring boundaries often festoon-shaped. Rays multiseriate, very wide and can visible with naked eye. Rays generally homogeneous, 4-15 seriate in width.

Perforation plates both scalariform and simple. Pits in vessel walls in horizontal rows (Figure 4: 4; Figure 5: 1-3). Only one species is found throughout Turkey and Aegean Basin. This species grows through rivers and in humid areas in the eastern Mediterranean Basin.

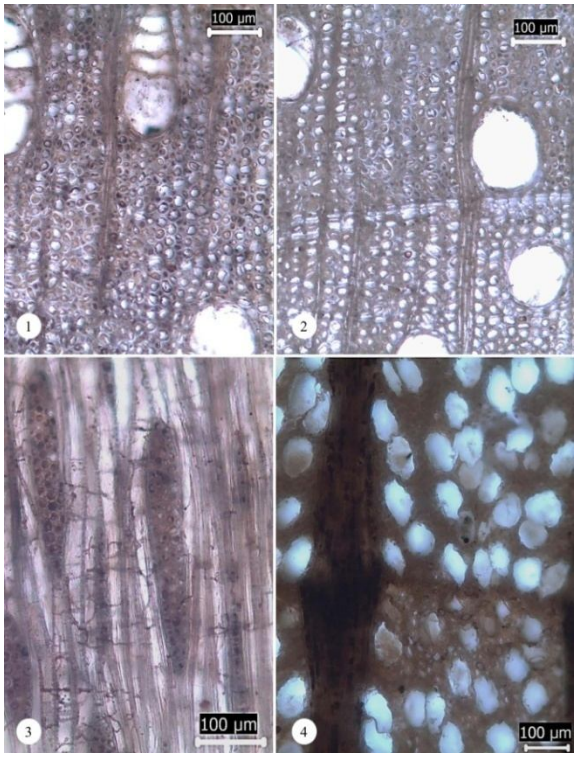

Figure 4. The angiosperm woods identified: 1-3) *Juglans regia*, 4) *Platanus* sp.

- *Quercus* sp.: This genus is divided into three sections in Turkey (Yaltırık, 1984). Woods were identified as to belong to one of the groups. The features of these groups are as follows:
- *Section Quercus (White oak group):* Growth ring boundaries distinct. Wood ring-porous.

Earlywood vessels wide, abruptly being narrower in latewood. Transition from earlywood to latewood abrupt (Figure 5: 4). Vessels of latewood in radial to dendritic pattern. Intervessel pits opposite and alternate. Perforation plates simple. Mean tangential diameter of vessel lumina 100-200 μm and ≥200 μm in earlywood, ≤ 50 μm in latewood. 5-20 vessels per mm^2 in earlywood, 40-100 vessels in latewood. Axial parenchyma commonly diffuse, in narrow and short tangential bands and scanty paratracheal. Rays of two distinct sizes. Ray uniseriate and multiseriate. Multiseriate rays more than 10-seriate, and ray height in multiseriate >1 mm. All ray cells procumbent. Rays per milimetre 4-12. Storied structure absent. Tyloses common in vessels of earlywood. Turkey is represented with 10 species in this group and common ones are *Quercus petraea* (Mattuchka) Liebl., *Q.frainetto* L., *Q.pubescens* L., *Q.infectoria* in western Turkey.

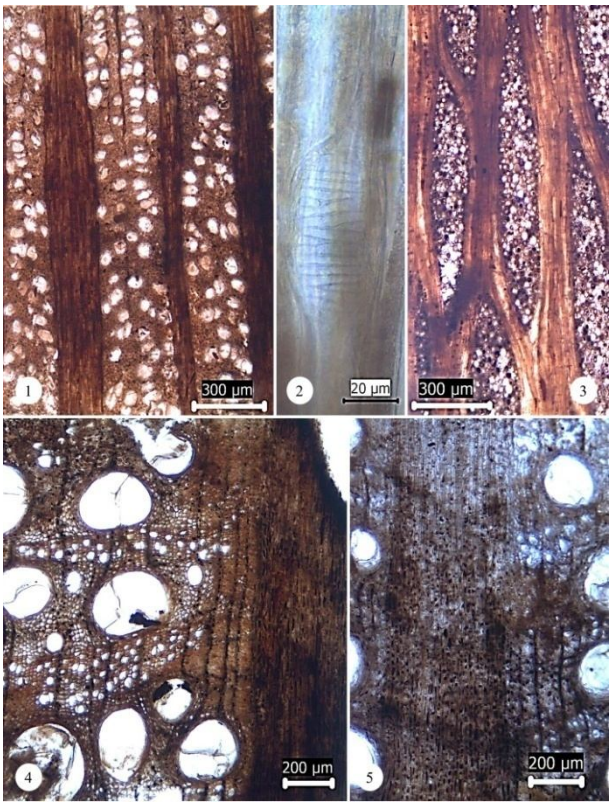

Figure 5. The angiosperm woods identified: 1-3) Platanus sp., 4) *Quercus* sp. from white oak group, 5) *Quercus* sp., a sample of oak with narrow ring. The exact identification of the groups in the samples with narrow rings like this is almost impossible. For that reason, they were identified as *Quercus* sp.

- *Section Cerris:* Wood very similar to white oak group. The main difference is that transition from earlywood to latewood gradual, and the number of vessels in latewood much less than those of white oak group (Figure 6: 1). This feature can be seen in wide rings. Turkey is represented with 5 species in this group. The common species is *Quercus cerris* L. and is widely used in constructions.
- *Section Ilex (Evergreen oak group):* Wood diffuse-porous. Growth ring boundaries indistinct. Pores solitary and sparse in more or less long radial files (Figure 6: 2). Axial parenchyma apotracheal and in many tangential bands. Multiseriate rays were extremely wide. Turkey has three species in this group. *Quercus ilex*, common in Marmara region and has a tree form; *Quercus coccifera* is mostly shrubby, and *Quercus aucheri* is sparse and endemic species, growing in the Mediterranean region of Turkey. Merev (1998) stated that vessels are mostly with one row on radial direction from one ring to the next. Because the samples from the ships show the similar features, we can identify the evergreen oaks as *Q. ilex*. This species is common in Marmara Region.

In the ships because some oak samples have only narrow rings it was also difficult to identify at the group level. These samples were identified as *Quercus* sp. (Figure 5: 5). Because oak species inside a group have very similar wood characteristics which form in very different growing conditions, it is impossible to identify oak trees as species level. Although Merev (1998) stated some differences between oak species, because of being from unknown condition and having limited amount of wood material it was not possible to identify to species level. It was also not clear which part (e.g. stem *vs*. big branches) the sample came from. In addition, ecological factors also affect diameter of vessels and tree-ring widths. The difficulty of separating oak species based on wood characteristics is also noted by Schweingruber (1988).

- *Spartium junceum* L.: Growth ring boundaries distinct. Wood ring-porous or semi-ring porous, rarely diffuse porous. Mostly vessel in dendritic pattern. Earlywood vessels 2-4 seriate in ring border and mostly in groups.

Mean tangential diameter of earlywood vessel lumina ≤50 μm. Vessels in two distinct diameter classes in early wood. Latewood vessels in dendritic pattern with axial parenchyma (Figure 6: 3). Helical thickening present in vessel elements. Perforation plates simple. Axial parenchyma commonly diffuses, banded in marginal with 1-4 seriate, and paratracheal. Parenchyma in dendritic to net-like groups with vessels. Ray 1-5 (mostly 3-4) seriate. Rays mostly homocellular. In heterocellular one body ray cells procumbent with mostly 1-2 rows of upright and/or square marginal cells. Storied structure present. Axial parenchyma and vessel elements storied. This species grows through the Mediterranean, Marmara and Black Sea coasts, and especially very common throughout the Bosporus, Istanbul.

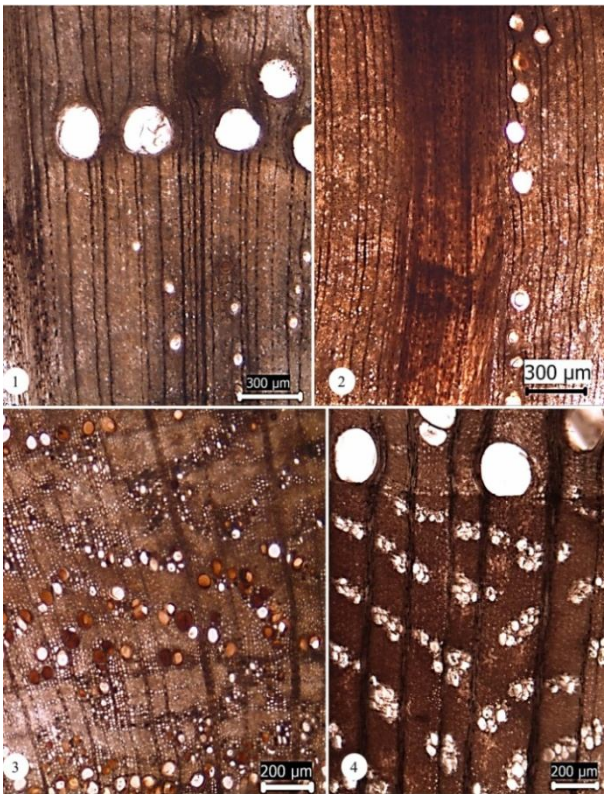

Figure 6. The angiosperm woods identified: 1) A wood of red oak group, 2) A wood of evergreen oak group, 3) Wood of *Spartium junceum*, 4) Wood of *Ulmus*.

- *Ulmus* L. sp.: Wood ring porous. Earlywood pores wide, 1-3 seriate and latewood pores grouped in more or less long, wavy tangential bands with 1-8 seriate together with vascular tracheids (Figure 6: 4). Tylosis common in earlywood pores. Axial parenchyma paratracheal and common. Rays generally 3-5 seriate, homocellular, height of ray up to 40 cells. Perforation plates simple. Helical thickening seen in narrow vessels. Three species of this genus (*U.minor*, *U.glabra*, and *U.laevis*) grow naturally in Turkey. In *U. laevis* earlywood vessels are mainly in one row. Because the samples identified have earlywood parts having 1-3 seriates in tangential direction, and being very common in Turkey, they can be *Ulmus minor*.

DISCUSSION AND CONCLUSION

The wood samples used in the four galleys show that the wood usage in YK13, YK16 and YK25 is about the same, whereas in YK36 planking it is mostly chestnut. Main tree genera/species used in the main parts of the galleys:

Planking:	*Pinus nigra* Arnold, *Cedrus libani* A. Rich., *Castanea sativa* Mill.
Floor timber:	*Platanus orientalis* L., *Ulmus* L. sp.
Keel:	*Platanus orientalis* L., *Quercus* L. sp.
Treenail:	*Spartium junceum* L., *Quercus* L. sp.

In planking *Pinus nigra* Arnold was used widely. When all planking samples were identified as *Pinus nigra* Arnold in YK13, two more *Abies* samples were identified together with *Pinus nigra* in YK16. *Abies* has not a resistant wood to sea water and is not used in planking. These two *Abies* samples were probably used in a repair. In YK25 Black pine and Taurus cedar were used and it is similar to YK13 and YK16. Cedar trees are very resistant to water and probably they were used as main parts of planking.

On the contrary some differences were observed in YK36. In this last galley, chestnut, oak, black pine and plane trees were used. The wide range of samples in planking may show several repairs. The main tree species in planking of this ship is chestnut. This species, chestnut, is not the main wood in the other three galleys. This result can reveal that building technique or place of this ship (YK36) could be different than other three, and repaired several times. Maybe YK36 was used longer time than other three galleys.

In the construction of floor timber mainly plane and elm woods were used. However, in

YK13 several tree species including walnut, fir, hornbeam and oak woods were also used. One possible reason behind this could be that during the repairs all this different species were utilized. In YK16, total 185 floor timbers were identified. About half of these 185 floor timber is plane, and other half is elm tree. The rest 5 are fir and pine woods. These 5 different samples could also be from a repair job. In YK25, all floor timbers, except one (elm wood), were plane wood. Finally in YK36, the main wood used in floor timber is plane wood. However oak and black pine woods were also used.

For construction of treenails, mainly Spanish broom (*Spartium junceum* L.) was used. Plane and oak were also found in construction of treenails. The last ones might be branches of the trees. Because diameters of pores were also narrower than those of other oak samples used in planking and keels.

Plane and oak woods are the main woods used in the keels. Although plane woods are sensitive to harmful effects and sea water, it was more preferred, because of having flexible, weightless (not heavy) and easy processed woods. Bozkurt and Erdin (2000) stated that eastern plane trees had sensitive woods to insects and fungi, for that reason it is not recommended to use in the ships today. We also observed that the woods of plane trees were decomposed more than oak, elm, chestnut, pine and cedar woods.

All wood species used in the galleys have wide distribution areas in the Mediterranean Basin, and was a major commodity throughout the history. Therefore it is extremely difficult to reach a clear result about the exact origin of the galleys. However, most of the tree species identified here are native to Marmara and Western parts of Turkey. Based on this result, we can conclude that the origin of the galleys might be mainly the Marmara Region or western part of Anatolia. Today some woods such as teak used in the ships are imported from much more distance. Dendrochronological studies on oak woods from the ships are needed to give more exact construction places of the ships. However, because of having too soft and decomposed woods and being impossible to take big discs for dating, no material could be taken for dendrochronological studies on the ships.

The identifications revealed that the well-known tree species, except plane trees, were mainly used in ship constructions. The most interesting findings are the usage of plane trees and Spanish brooms. People who built the ships during Byzantine time preferred Spanish broom for making treenails, probably not to waste much energy. Because this species is very common on the slopes around Marmara, Aegean and the Mediterranean Seas and the Bosporus, and can easily be taken samples, and no need to make thinner for treenail production. Moreover, Doğu et al. (2011) identified the woods used in construction of the harbor as *Castanea sativa* L., *Quercus ithaburensis* Decne, *Quercus pontica* L. and *Cupressus sempervirens* L. The oak species determined by Dogu et al (2011) were not common in the forests and also one (*Quercus pontica*) is a shrub or small tree from the high mountainous areas of Eastern Black Sea Region. Although Doğu et al (2011) gave oak identifications as species level, as we stated before based on our findings and references, oak woods can only be identified as group level.

Woody materials, found in archaeological excavations provided valuable information about the different living times of the archaeological sites. In Turkey, Aytuğ (1970) identified woods as Scots pines from Gordion Midas I Tumulus. Kayacık and Aytuğ (1968) also determined the woods of yew tree (*Taxus baccata* L.), Taurus cedar (*Cedrus libani* A.Rich.), Scots pine (*Pinus sylvestris* L.) and juniper (*Juniperus foetidissima* Bieb.) from Gordion. Şanlı (1988 ve 1989), investigated Mediterranean cypress (*Cupressus sempervirens* L.), Black pine (*Pinus nigra* Arn.), Yew tree, Fir (*Abies nordmanniana* Spach.), English oak (*Quercus robur* L.), Common walnut (*Juglans regia* L.), Alder (*Alnus glutinosa* (L.) Gaertn.) and Cornelian cherry (*Cornus mas* L.) from different excavations in Turkey. Akkemik et al. (2004) found the woods of Section *Quercus* (White oak group) in the graves with three stairs within Ilgarini Cave. Recently, Erdin and Tırak (2009) identified Scots pine used in Ishak Paşa Palace. Yaman (2011) identified the woods of evergreen oak and pine woods used in charcoal from Bronze Age of Gökçeada. Akkemik and Metin

(2011) stated that the woods of coffins from Ankara-Çayırhan Necropolis were *Juniperus foetidissima*. With all these studies, important information was revealed. None of these studies has given information on utilize of plane trees and Spanish broom during the time.

Wood identification and knowing wood species are also extremely important for wood conservation in the ships. In chemical treatments to protect the woods, kind and amount of the chemicals are very changeable depending on the kind of the woods such as wood with diffuse-porous, ring-porous, wood with wider pores or narrower pores. One of the main parameters is to know the kind of the woods for selection appropriate chemicals in wood conservation of the old ships of Yenikapı. The information given here may be used in conservation processes of the woods.

Our project on the old ships of Yenikapı has also revealed that the trade ships were built by using mainly oak and chestnut trees. The results will be the subject of another paper.

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