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Identification of Wooden Objects in Ishak Pasha Palace

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Abstract

In this study, macroscopic–microscopic properties were identified and confirmed in samples taken from the wooden materials used on door–window lintels and from animal figured wooden sculptures that belong to Ishak Pasha Palace, construction of which was completed in 1784, and that have survived until today.

Macroscopic investigations and microscopic analyses revealed that the wood samples brought from Ishak Pasha Palace belonged to scots pine

Keywords: Ishak Pasha Palace, wooden lintel, wooden sculpture, scots pine, *Pinus sylvestris*.

1. Introduction

Ishak Pasha Palace and its social complex are one of the few historical palace samples specific to Turkish culture that have managed to survive until today. The palace was constructed on the rocks of a hill that is 5 km east of Agri county, Dogubeyazit city and it is the last sizable monumental building in the Tulip Period of the Ottoman Empire. The palace is one of the most distinctive and distinguished examples of 18th century Ottoman architecture and it is of great value in terms of art history.

Because of the fact that the palace was built at the time that castles had lost their characteristics and firearms had been used, it was built on a hill, three (north, west, and south) sides of which sloped steep down towards the valley to facilitate its defense, and its front entrance door in the east direction opens towards a plane (Figure 1).

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Figure 1. General view of Ishak Pasha Palace from the northeast direction (Erdoğmuş, 2006).

Şekil 1. İshak Paşa Sarayı'nın kuzeydoğu yönünden genel görünüşü (Erdoğmuş, 2006).

It has been reported that the palace, which has architectural characteristics of Ottoman, Persian, and Seljuk civilizations, was built by Colak Abdi Pasha on the Silk Road close to the border of Iran in 1685 and it acquired its final form in 1784 by Ishak Pasha the Second of Cildirogullari. The only written source on who had the palace built is the epigraph of eight lines located on the Harem Arch Gate that sees the second courtyard. According to the epigraph, the construction date of the palace is 1199 with respect to the Islamic calendar and 1784 with respect to the Gregorian calendar (Bingöl, 2007; Gündoğdu, 2007; Kılıç, 2007). The following sections are present in the Ishak Pasha Palace that is built from ashlars: (1) Exterior façades, (2) First and second courtyards, (3) Men's quarter (selamlık), (4) Mosque building, (5) Soup kitchen (Darüzziyafe), (6) Turkish bath, (7) Women's quarter (Harem Section), (8) Hall for ceremonies and entertainment, (9) Arch gates, (10) Rooms for ammunition and supplies, (11) Mausoleum, (12) Bakery, (13) Dungeon, and (14) Various sections in its interior architecture (doors, windows, closets, serbetliks (a kind of inset paneled wardrobe), hearths, etc. (Gündoğdu, 2007; Kılıç, 2007; Kültür ve Turizm Bakanlığı, 2009). The Ministry of Culture and Tourism has applied for this important architecture to be included in the list of UNESCO World Heritage and it has been approved to be included in the Tentative List (Kültür ve Turizm Bakanlığı, 2008).

Ishak Pasha Palace is a two–storey building and it is understood from the cavities present in its stone walls that it has a central heating system (Kültür ve Turizm Bakanlığı, 2009).

Six different types of stones supplied from the area are used in the construction of the palace and wood are used on its roof and pillars. Since the palace was close to the Russian and Iranian borders of the Ottoman Empire, it had been exposed to severe damages during the wars started with the Russian siege in 1828, and at this period most of the wooden roof structure had disappeared. In 1963, a campaign was started by the General Directorate of Museums and Monuments for the conservation of the area, a general cleaning of the site and excavation works were done, and in 1966, conservation of east and south façades was realized (Archnet, 2008).

Although there had not been any conservation studies regarding the wooden material in the palace, the wooden remains (for example; beams, door-window lintels, and human-animal figured wooden sculptures located in open spaces) that have managed to survive until today are in considerably good condition (Figure 2).

Figure 2. Wooden beams of Ishak Pasha Palace. (Erdoğmuş, 2006)
Şekil 2. İshak Paşa Sarayı'nda ahşap hatıllar. (Erdoğmuş, 2006)

Wood, which could not find an area of use in the decorations of the palace as large as stone, was only used as a decorative material to build a four-row cantilever that overhung as a loggia in one of the men's quarters that see the northern façade. Three dimensional wooden decorations of sculpture style that overhung by 140 cm outside from the wall carry the symbolic meanings in Turkish Art. Human, lion, and eagle figures are used together on the wooden sculptures and they are designed in such a manner that it is impossible to find similar sculptures in Seljuk and Ottoman buildings (Gündoğdu, 2007). Since these sculptures, of which the similar ones are not found in

other structures, were exposed to the effects of open air for long years; some parts of them have jadedly survived until today (Figures 3-5).

Figure 3. 1st animal figured wooden sculpture in Ishak Pasha Palace.
Şekil 3. İshak Paşa Sarayı'nda hayvan figürlü 1. ahşap heykel.

Figure 4. 2nd, 3rd, and 4th animal figured wooden sculptures in Ishak Pasha Palace.
Şekil 4. İshak Paşa Sarayı'nda hayvan figürlü 2.,3. ve 4. ahşap heykeller.

Figure 5. Detailed images of wooden lion sculpture in the 2nd order in Ishak Pasha Palace.
Şekil 5. İshak Paşa Sarayı'nda 2. sıradaki ahşap aslan heykelin detay görüntüleri.

The aim of the study is to identify of four wooden samples brought from Ishak Pasha Palace and to provide information for restoration studies.

2. Material and Method

The research material was obtained from Istanbul University, Faculty of Letters, Department of History, Section of Prehistory (Figure 6).

Figure 6. Wooden samples brought from Ishak Pasha Palace. A sample of lintel (on the left), a sample of animal figured wooden sculpture (on the right).
Şekil 6. İshak Paşa Sarayı'ndan getirilen ahşap örnekler. Lento örneği (solda), hayvan figürlü heykel örneği (sağda).

Four samples having sizes of approximately 5x10 mm were initially analyzed macroscopically and then the material prepared by obtaining sections via a microtome was analyzed by an Olympus BX51 photomicroscope (Olympus DP71 camera) having five digital imaging solution programs and measurement, imaging operations, and wood type identifications were realized. In the analyses conducted in three anatomical sections, (1) in transversal sections annual growth ring widths and earlywood, latewood tracheid diameters, wall thicknesses, lumen widths, vertical resin canals tangent-radial diameters, (2) in tangent sections ray heights-widths horizontal resin canal tangent diameters, and (3) in radial sections bordered pit diameters, cross field pit diameters are measured and the structure of ray tracheids was analyzed. Moreover, tracheid lengths were measured by macerating small wooden parts.

IAWA criteria were used in the terminology and classification of anatomical characteristics (Richter ve ark., 2004)

3. Results

It is observed in the macroscopic analyses of samples brought from Ishak Pasha Palace that the growth ring borders are distinct, transition from earlywood to latewood is fast, resin canals exist, and wood is lusterless.

It is observed in the microscopic analyses that in the transversal section latewood tracheids are flattened towards radial direction and walls are thick, lumens are small, vertical resin canals exist, epithelia in resin canals have thin walls, longitudinal parenchyma cells do not exist; in the radial section there are 1-2 cross field pits and they are of window-like type, rays are in heterogeneous structure and ray tracheids are dentate; in the tangent section rays are uniserie and fusiform, and resin canals encircled by thin walled epithelia exists (Figure 7–10). In microscopic analyses, average lengths of tracheids, their radial–tangent diameters, diameters of bordered pits on their radial walls, heights of their uniserie rays were also measured in number and as μm, and heights of their rays carrying resin canals were measured as μm.

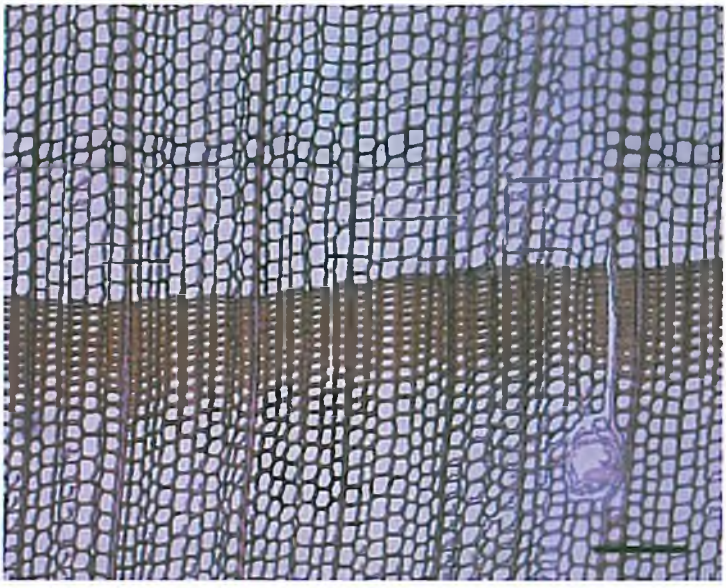

Figure 7. Transversal section of the samples brought from Ishak Pasha Palace. (Scale 200 μm)
Şekil 7. İshak Paşa Sarayı'ndan getirilen örneklerde enine kesit (ölçek 200 μm).

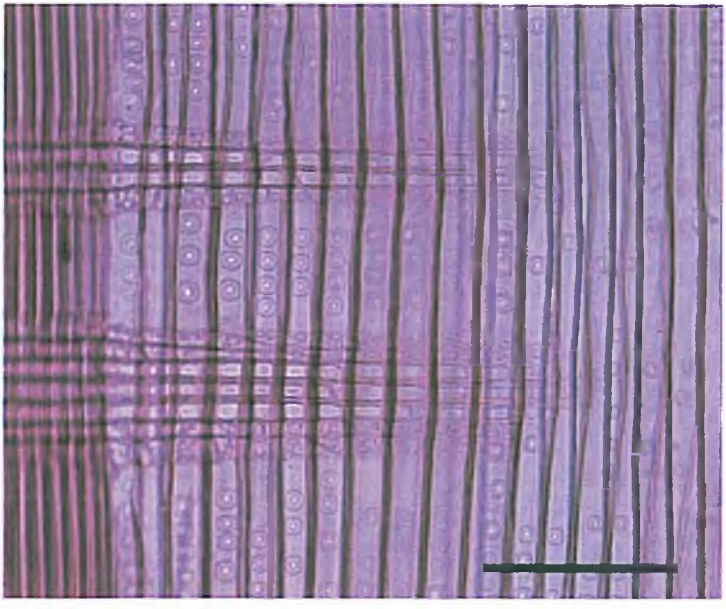

Figure 8. Radial section of the samples brought from Ishak Pasha Palace. (Scale 200 μm)
Şekil 8. İshak Paşa Sarayı'ndan getirilen örneklerde radyal kesit. (ölçek 200 μm)

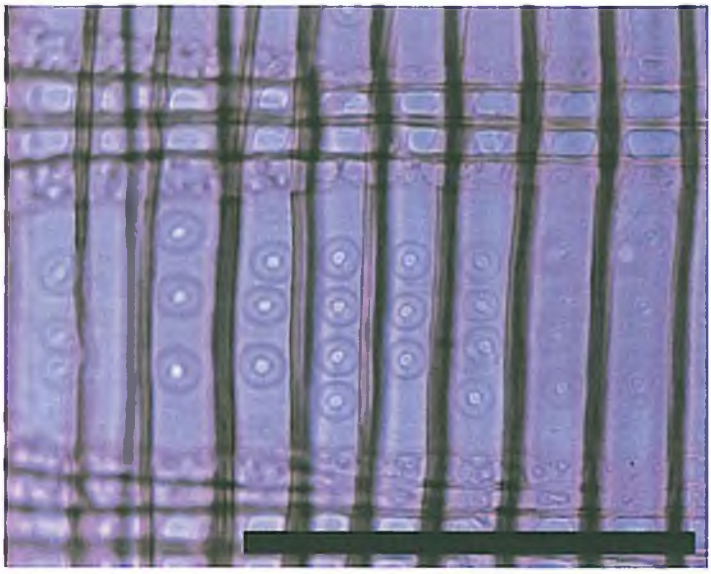

Figure 9. Ray tracheids dentate and ray parenchyma cross–field pits window–like, usually 1 or 2 per cross field (Radial section, scale 200 µm).

Şekil 9. Dişli öz ışını traheidleri ve pencere tipi karşılaşma alanı geçitleri, çoğunlukla 1 ya da 2 tane (Radyal kesit, ölçek 200 µm).

Figure 10. Tangent section of the samples brought from Ishak Pasha Palace (Scale 200 µm).

Şekil 10. İshak Paşa Sarayı'ndan getirilen örneklerde teğet kesit (ölçek 200 µm).

Microscopic analyses revealed that the wood samples brought from Ishak Pasha Palace belonged to scots pine (*Pinus sylvestris* L.) and all values determined are given in Table 1. Several values obtained as a result of the microscopic analyses were compared to the values today's scots pine wood in Table 2

Table 1. Microscopic properties of scots pine (*Pinus sylvestris*) wood used in wooden sculptures and door-window lintels of Ishak Pasa Palace.

Tablo 1. İshak Paşa Sarayı kapı–pencere lentoları ve ahşap heykellerinde kullanılan sarıçam odunu mikroskopik özellikleri.

Anatomical Properties	N[a]	X[b]	S[c]	S_x[d]	Min.	Max.
Growth ring width (μm)	5*	1582.506	(-)	(-)	1175.975	2161.720
Tracheids						
Tracheid number in per mm^2	20	593.500	145.210	32.4702	332.000	876.000
Tracheid length (μm)	50	2417.374	664.899	94.031	1059.600	4302.896
Earlywood tracheid radial diameter (μm)	50	36.836	7.189	1.017	25.013	49.198
Earlywood tracheid tangential diameter (μm)	50	35.531	10.040	1.420	16.666	57.905
Earlywood tracheid double wall thickness (μm)	50	5.206	1.620	0.229	2.227	11.562
Latewood tracheid radial diameter (μm)	50	19.792	4.768	0.674	9.996	30.104
Latewood tracheid tangential diameter (μm)	50	28.875	8.563	1.211	13.419	46.422
Latewood tracheid double wall thickness (μm)	50	10.952	3.240	0.458	4.226	17.977
Resin Canals						
Vertical resin canal diameter (μm)	14	125.587	(-)	(-)	56.505	195.396
Horizontal resin canal diameter (μm)	12	45.167	(-)	(-)	40.212	50.842
Rays						
Uniserial ray cell number	50	8.260	3.331	0.471	3	16
Uniserial ray height (μm)	50	177.879	64.818	9.1668	75.050	309.458
Uniserial ray width (μm)	50	29.017	43.748	6.187	14.837	331.161
Fusiform ray height (μm)	35	316.134	68.929	11.651	176.817	516.752
Fusiform ray width (μm)	35	55.460	4.066	0.687	49.316	66.474
Pits						
Bordered pit diameter (μm)	50	19.405	2.390	0.338	15.282	24.588
Cross field pit diameter (μm)	50	17.813	5.230	0.739	4.700	27.881

([a]) Number of measurements, ([b]) Mean value, ([c]) Standard deviation, ([d]) Standard error of mean

(–) Because the sample size is very small, less than 20 measurements were made and statistical properties are not calculated

Table 2. Comparison of anatomical characteristics of scots pine samples from Ishak Pasha Palace and recent scots pines.

Tablo 2. İshakpaşa Sarayı ve günümüz örneklerinde sarıçam anatomik özelliklerinin karşılaştırılması.

Anatomical Properties	Ishak Pasha Palace Samples	Recent Samples	
		Values	Reference
Tracheid length (μm)	1059,6–4302,9	1800–4500	Bozkurt/Erdin, 1998
Earlywood tracheid Tangential diameter (μm)	16,7–57,9	10–50	Bozkurt/Erdin, 1998
Vertical resin canal diameter (μm)	107,4–150,5	100–150	Bozkurt/Erdin, 2000
Uniserie ray cell number	1–16	1–12 (>15)	Bozkurt/Erdin, 1998

4. Conclusions

As a result of the anatomical analysis of the wooden samples brought from Ishak Pasha Palace, it was found that the woods used in door–window lintels, and human, lion, and eagle figured sculptures were produced from scots pine (*Pinus sylvestris* L.).

When the natural spread of scots pine in Northeastern Anatolia Region is inspected today, it is observed that they are located in the north, in the precipitation shelter of Black Sea coastal mountains and in south exposures which are drier and more appropriate in terms of competition. Beyond the Caucasus and in northeastern Anatolia which has connection with the Caucasus, spread areas of *Pinus sylvestris* separate from each other are more frequently encountered. For example; in the high steppes of East Anatolia (Ardahan, Kars, Sarikamis), at altitudes of 1900–2750 m they constitute high steppe forests growth of which is at low or medium level (Mayer/Aksoy, 1998). Moreover, they go down to Agri in small clusters and they go down further (Gökmen, 1970).

Scots pine wood has a low tendency to crack or curve while drying and it is a material that is easy to process with hand tools (and machines). Although the essential wood of scots pine has moderate natural resistance against fungi and insects in the reliability classification conducted for the tree types naturally growing in our country, its existence in Ishak Pasha Palace, construction of which was finalized in 1784, until today is important in terms of demolishing the wrong ideas on the service life of wooden material.

İshak Paşa Sarayı Ahşap Objeleri Teşhisi

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Özet

Bu çalışmada; yapımı 1784 yılında tamamlanan İshak Paşa Sarayından günümüze kadar ulaşan ahşap kapı–pencere lentolarından ve ahşap heykellerden alınan örneklerde makroskopik–mikroskopik özellikler belirlenerek, teşhisleri yapılmıştır.

Araştırma materyali, 2008 yılında İstanbul Üniversitesi Edebiyat Fakültesi Tarih Bölümü Eskiçağ Tarihi Anabilim Dalı'ndan temin edilmiştir (Şekil 6). Yaklaşık 5x10 mm boyutundaki dört örnek öncelikle makroskopik olarak incelenmiş, daha sonra mikrotomla kesitler alınarak hazırlanan preparatların analysis five digital imaging solutions programlı Olympus BX51 fotomikroskopta (kamera Olympus DP71) ölçüm, görüntüleme işlemleri ve ağaç türleri teşhisi gerçekleştirilmiştir. Anatomik özelliklerin terminolojisi ve sınıflandırılmasında IAWA (2004) tarafından hazırlanan ölçütlerden yararlanılmıştır.

İshak Paşa Sarayından getirilen örneklerin makroskopik incelemelerinde yıllık halka sınırlarının belirgin, ilkbahar odunundan yaz odununa geçişin hızlı olduğu, reçine kanalarının bulunduğu ve odununun mat olduğu görülmüştür.

Mikroskopik incelemelerde enine kesitte: yaz odunu traheidlerinin radyal yönde yassılaşmış ve çeperlerinin kalın, lümenlerinin küçük olduğu, boyuna reçine kanalları bulunduğu, reçine kanallarında epitel hücrelerinin ince çeperli olduğu, boyuna paranşim hücrelerinin bulunmadığı, radyal kesitte: karşılaşma yeri geçitlerinin 1–2 adet ve pencere tipinde olduğu, öz ışınlarının heterojen yapıda ve öz ışını traheidlerinin dişli olduğu, teğet kesitte: öz ışınlarının tek sıralı ve fusiform olduğu, ince çeperli epitel hücrelerinin çevrelediği enine reçine kanallarının bulunduğu görülmüştür (Şekil 7–10). Mikroskopik incelemelerde ayrıca, traheidlerin ortalama uzunlukları, radyal-teğet çapları, radyal çeperleri üzerindeki kenarlı geçitlerin çapları, tek sıralı öz ışınlarının yüksekliği adet ve µm olarak, reçine kanalı taşıyan öz ışınlarının yüksekliği µm olarak ölçülmüş, tespit edilen tüm değerler Tablo 1'de verilmiştir.

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Yapılan incelemeler sonunda İshak Paşa Sarayı'ndan getirilen ahşap örneklerin sarıçam (*Pinus sylvestris* L.) odununa ait oldukları saptanmıştır. Mikroskopik incelemeler sonucunda belirlenen bazı değerler, literatürde bulunabilen günümüz sarıçam değerleri ile Tablo 2'de karşılaştırılmıştır.

Sarıçam odunu, kurutulması sırasında çatlamaya ve dönüklüğe eğilimi az olan, el aletleriyle (ve makinelerle) kolay işlenen bir malzemedir. Ülkemizde doğal olarak yetişen ağaç türleri için yapılan dayanıklılık sınıflandırmasında mantar ve böceklere karşı sarıçamın öz odununun doğal dayanıklılığı orta derecede olmasına rağmen, yapımı 1784 yılında biten İshak Paşa Sarayı'nda hâlâ varlık gösterebilmesi, ağaç malzemenin hizmet ömrü hakkında yanlış düşünceleri yıkmak bakımından önemlidir.

Anahtar Kelimeler: İshak Paşa Sarayı, ahşap lento, ahşap heykel, sarıçam, *Pinus sylvestris*.

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