The Awakening of a Tanbur

REPORT OF RESTORATION
AND RESEARCH INTO THE 18TH CENTURY
TANBUR BELONGING TO HIS HIGHNESS

Sheikh Hamad bin Abdullah Al Thani

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Summary

This paper presents a comprehensive report of restoration and research into the tanbur belonging to His Highness Sheikh Hamad Bin Abdullah Al Thani.

It reveals historically the most important and oldest surviving musical instrument of its kind whose existence brings to light valuable information on the development and evolution of an almost forgotten but much loved instrument of Ottoman court music.

This research was conducted by luthier and restorer Karim Othman-Hassan who simultaneously undertook and recorded the instruments' complete restoration.

He first presents a historic account of the tanbur as a musical instrument, tracing its development through historical references; from its first mention by philosopher and music scholar Al-Farabi in 940 AD through to its position at the Ottoman court.

A chronological account of its iconography follows, in particular the many depictions of the tanbur appearing between 1700 and 1800, revealing the many changes it underwent in structure and appearance over this time and presenting for the first time an illustrated account of the evolution into the instrument we recognize today.

A full description of the appearance and condition of the tanbur subject to this report – that belonging to His Highness Sheikh Hamad Bin Abdullah Al Thani – is then recorded, including a thorough analysis of its condition before any restoration work had begun.

Every detail of the extensive process of its restoration is then meticulously recorded, including a complete methodology of the restoration itself, registering an account for future generations of every action taken and the precise reasons for doing so.

Comparisons are then made to other tanburs and these used, alongside an iconographical analysis, to date the instrument to the first half of the 18th century and to

confirm it, together with a strikingly similar example belonging to the Victoria & Albert Museum, as the oldest surviving still in existence.

This fact is used to illustrate how this tanbur is a unique link into the history of the instrument's evolution. It enables us to trace its ancestry and reveals complex details of construction which were discarded soon after in favor of far simpler methods, which in turn simplified its form and sound.

Finally taking guidance from depictions of the period to confirm 18th century configurations, including fret positioning and string types, enabled the tanbur to be reset to its original settings. This allowed its sound to be heard once again, revealing a tone perfectly balanced with a slight preference towards middle frequencies and trebles and quite unlike any other tanbur playing today.

The Tanbur

A Brief History

Among plucked chordophones, long-necked lutes are without question the family with the richest variety of form and those most widely distributed. Despite differences of form, stringing and material, they all share one feature: a much longer ratio of neck to body. This characteristic distinguishes them from short-necked lutes where the neck is generally shorter than the body, or at most the same length.

There is no certainty as to which instrument was the precursor of the first long-necked lute. It can be assumed however that the *pandor* which achieved wide popularity during pre-Islamic times and later called the *tanbur* or *tunbur*, produced a series of descendants which quickly spread throughout the Islamic world.

In around 940 AD the famous philosopher Al Farabi described a *tanbur al Baghdadi*; an instrument much loved in Mesopotamia, particularly Baghdad. It was also known as the *miziani* and most likely known to the region before 9th century AD. Al Farabi describes the strings of the instrument as divided by bound frets into 40 equal lengths and suggests the resultant scale pre-existed Islam. In passing Al Farabi also mentions the *tanbur a khurasani*, an instrument played in Khorasan with a similar form, although tuned differently. He suggests the fret binding of this *tanbur al khurasani* as likely introduced by Al Kindi (died 874 AD) and based on the modified pythagorean system which remained subsequently for hundreds of years both the theoretical and practical basis for positioning frets along long-necked lutes.

We then learn from the Timurid court composer Abd el Qadir ibn Ghaibi al Hafiz al Maraghi (died 1435 in Herat) through his monumental 'Cami al Alhan' about instruments considered to belong to the tanbur family. According to this source the so-called *sharwinian tanbur* had a bellied, pear-shaped body, strung with two silk strings and tuned a whole-tone apart, evidently plucked with the right hand.

Also according to Maraghi another type of tanbur was the *Turkish tanbur* which had a smaller resonating body than the *sharwinian* though with a longer neck and three playing strings tuned into quarters spanning a tonal range of two octaves. Maraghi further mentions a *tanbur ruh i afzay* which had a body shaped like 'half an orange' (sic) and strung with six strings, two of wound copper and four of silk, with a likely range of two octaves.

Almost two hundred years go by before we hear of the tanbur again, this time from an Ottoman source. Up until the beginning of the 17th century, musical instruments such as the *cheng*, *sheshtar*, *kopus*, *kemane* and the *oud*, alongside its cousins the *oud i buzurg* and the *shehrud,* dominated stringed instruments at the Ottoman court. Indeed one could suggest that early Ottoman court music was dominated by Safavid taste, in as far as a significant number of musicians were of Iranian origin, and treatises prove some of these instruments were in use during the course of the earliest Islamic eras, such as those mentioned by Al Kindi and Al Farabi.

However around the middle of the 17th century the tanbur begins to take prominence within palace music of the Ottoman court and had soon completely replaced the time-honored stringed instruments of the Persians. An interesting testimony to this displacement is given by Ewliya Chelebi (1611–1699): travel-writer, historian and musician at the court of Murad IV (1612–1640). He describes a number of instruments having the name tanbur, in addition to informing us of the number of players these instruments had in Istanbul: around 500 musicians played on the so-called *tanbur-i türky*, a two stringed lute supposedly invented by a certain Muzawwir Ahmad; 100 musicians played on the *tanbur-i shirwinan*, another two stringed lute, and 100 musicians played the *tel tanbur*, which was strung with three metal (probably double-coursed)

strings, popular due to its unique tone. By way of comparison the *oud,* once the most prominent stringed instrument, was now being played by just 8 musicians.

Then between 1688 and 1710 the Moldavian crown prince Dimitrie Cantemir (1673–1723) was held in Istanbul as a hostage. Recognized as a true virtuoso on the tanbur he was also a genuine connoisseur of the music of his day. Not only did he write an extensive work on the theory of Ottoman music, he also transcribed over 350 instrumental compositions in a notation system he devised especially to ensure their survival for future generations. For these transcriptions Cantemir chose as a basis the instrument he played himself and of which he maintained:

"*The instrument called tanbur is the most perfect and complete instrument which we know or have seen because it performs completely and without fault all the sounds and melodies which appear by means of the breath of men.*"

He is also the first Ottoman to have provided us with a depiction of his favorite instrument, details of which are revealed in the following section, Iconography (fig. 1).

Towards the end of the 17th century these instruments of the tanbur family acquired a new member, the 'new' *tanbur-i turkey* - probably a hybrid of its various predecessors but due to become the only plucked stringed instrument used in Ottoman court music. It is from this time to which the tanbur we investigate here belongs.

Iconography

Just how much the tanbur changed in external appearance from the first decades of the 17th century, mainly through refinements to its body, is illustrated by the frequent depictions appearing in a number of important musicological treatises between 1700 and 1800 in the form of paintings, miniatures and sketches.

A consistent feature of the Ottoman tanbur (which from now on is known as the *Turkish tanbur*, *buzurg tanbur* & *tanbur al kebir*) is the long neck which has persisted up until this day and which accommodates more than two octaves on a single string so that, as Cantemir mentions, the entire repertoire of tones occurring in Ottoman court music could be covered. On a drawing quite possibly composed by Cantemir himself around 1710, one sees a five-stringed (treble-coursed) tanbur with a gourd-like body which no longer match previous descriptions of the instrument (fig. 1).

What is important about this drawing is the relatively exact positioning of the frets alongside their names and corresponding phonetic abbreviations (these latter being used in Cantemir's notation). Accordingly the tanbur had 33 different intervals and a range of D-e' with the open string giving the deepest sound and forming the basis of the scale. Cantemir divided the intervals into two sorts, the first consisting of a series of basis steps, the so-called *Taman Perdeler Steps*, indicated by rows of horizontally arranged dots; and the *Nim Perdeler Steps* (erroneously known as halftone intervals), designated by a zigzag pattern of dots.

However Cantemir was not the first to depict a tanbur, an accolade belonging to the now almost forgotten Flemish painter Jean-Baptiste Vanmour who visited Constantinople in 1698. Here he was highly productive and soon the upper echelons of society were meeting in his studio within the city's Pera district, among them the famous English travel-writer Lady Mary Montagou who, together with her son Edward, is immortalized

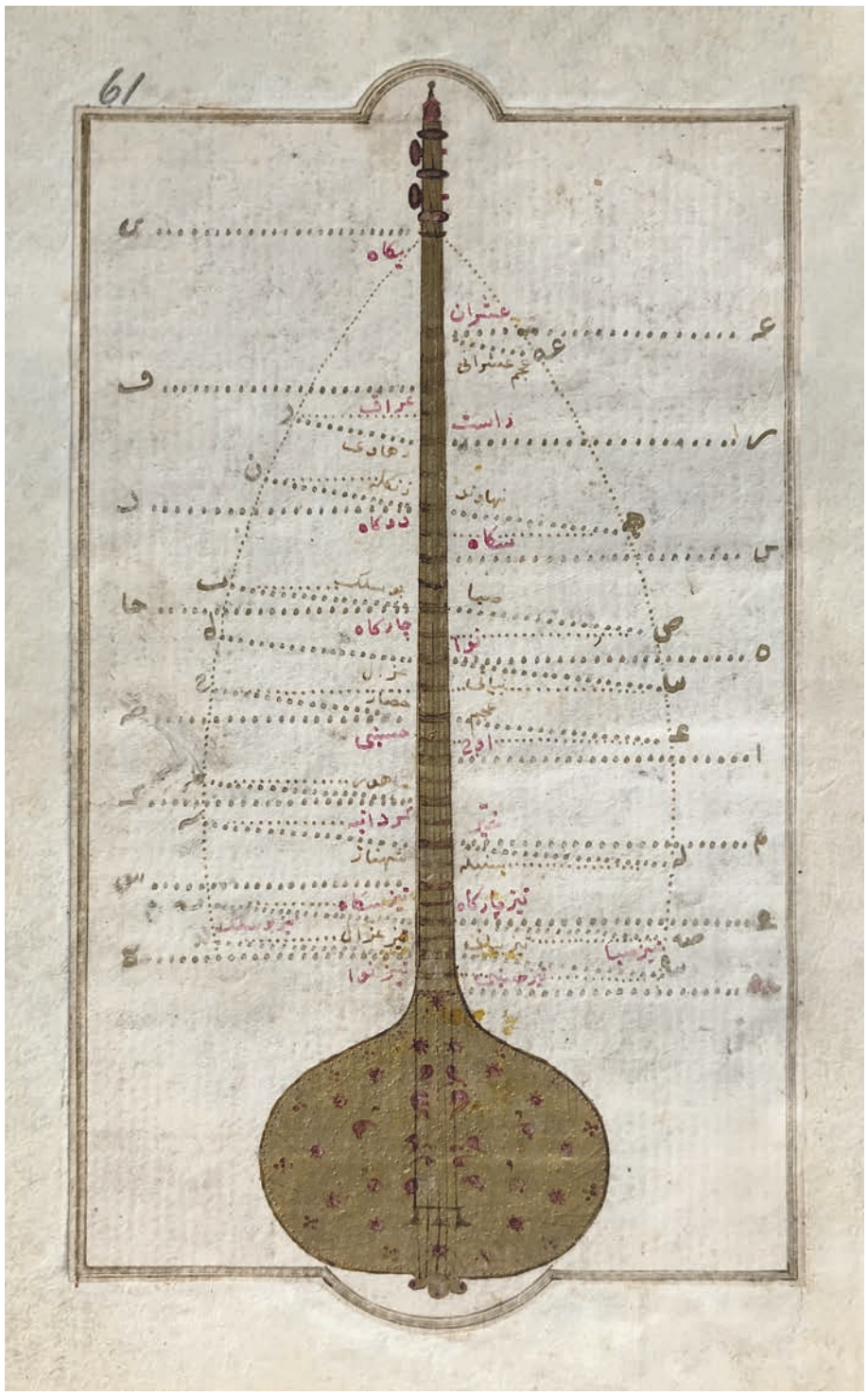


fig. 1

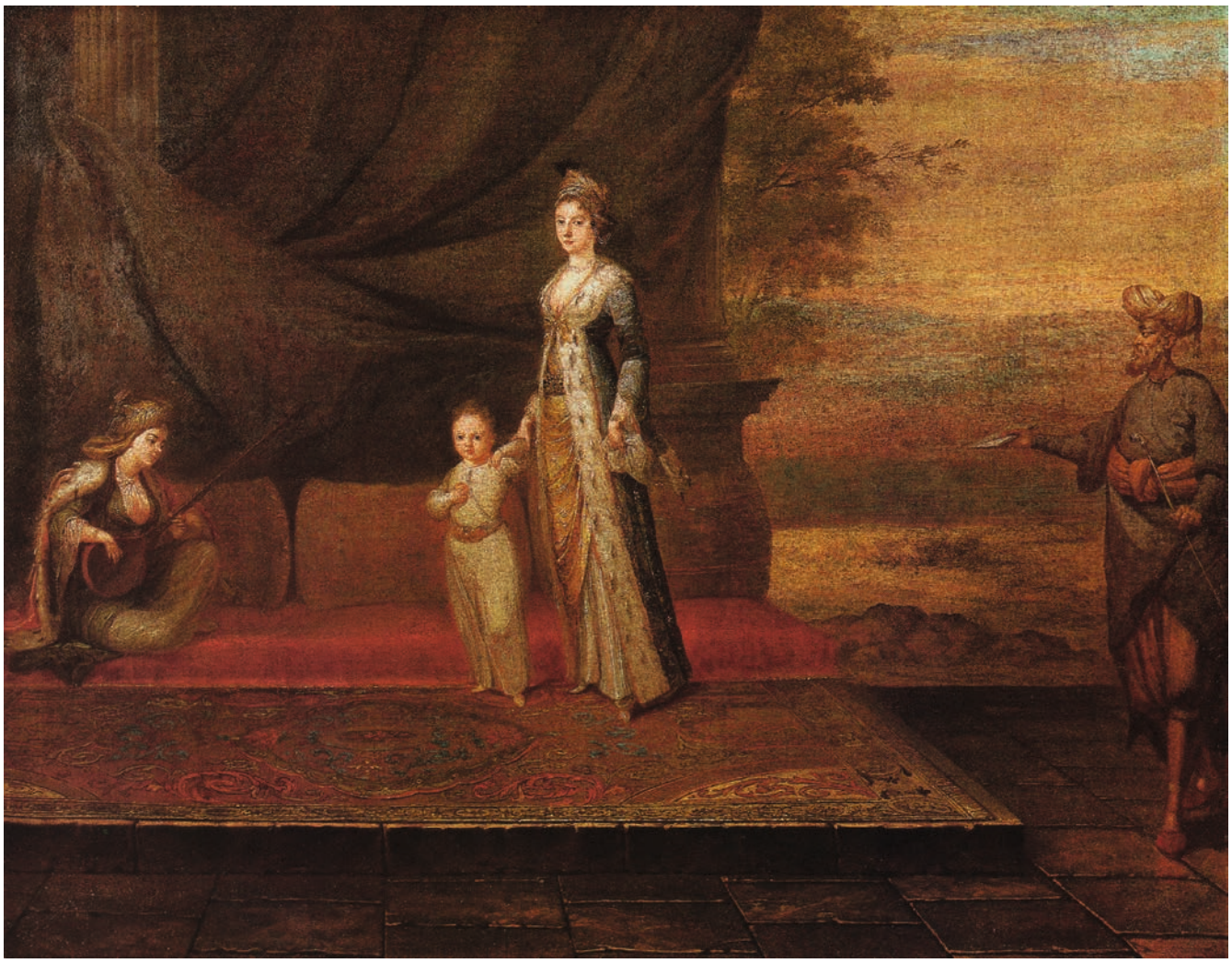


fig. 2

in the impressive painting 'Lady Montagu', painted in Istanbul around 1710. (fig. 2)

Next to Lady Montagu and her son a woman sits on a divan playing a tanbur with an almost round body out of which, via a bottle-neck curve, a long neck extends. Even though the painting is not very naturalistic it suggests the visible part of the instrument (mainly the soundboard) was unlikely to have been made with strips of lightly colored softwood. The actual number of strings of Vanmour's instrument is difficult to judge although it can be surmised that it is of the 4–6 string type. Similar instruments can be found in other works by Vanmour, particularly his steel-plate engravings which proved popular across Central Europe such as (fig. 3), completed in 1751.

fig. 3

fig. 4

From the size of the tanburs depicted, we can safely assume that at this time a range of varying sized instruments existed, out of which a single and almost unvarying type emerged by the mid 18th century. Initially it appeared as if the tanbur with an almost tear-drop or bottleneck-like graduation from body to neck would become standard, as shown by a number of miniatures executed between 1720–1730 by Abdülceli Çelebi (died 1732 and also known as Levni) for Ahmed III's (1673–1736) 'Book of Festivities', the *Surname-i Vehbi* (fig. 4).

These depictions show tanbur players next to *surna, zilli deff* and *miskal* (panpipe) instrumentalists. An interesting detail clearly depicted here are the 'cheeks' that flank the soundboard, probably made of a hardwood. This construction appears to have been in use since the 14th century and there are only a few depictions of lute-like instruments where this is not the case, though exceptions can be found during the Timurid and Safa-

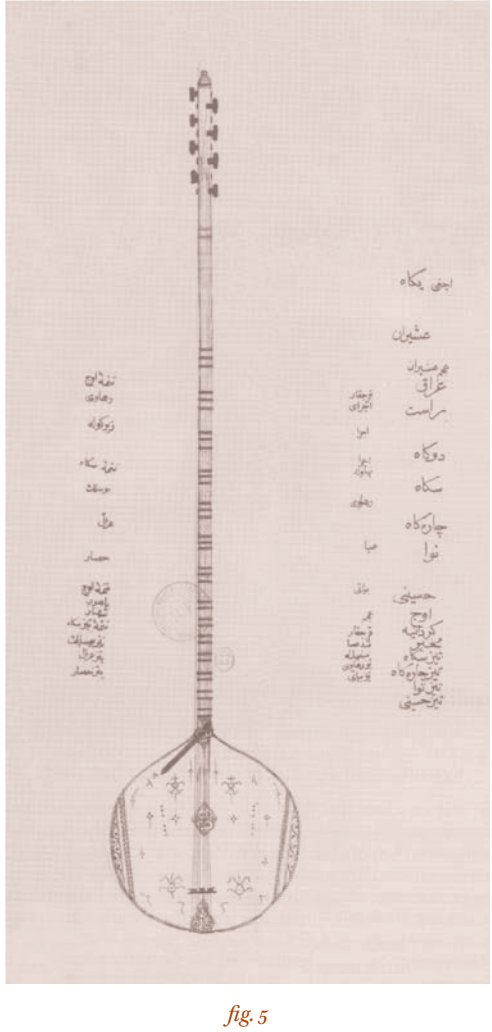


fig. 5

vid periods (we speculate later on the purpose of these 'cheeks'). The tanburs in the *Surname-i Vehbi* were evidently strung with either five or seven strings, these being possibly three or even four-coursed.

Shortly after in 1750 musicologist Charles Fonton was in Constantinople and wrote a relatively comprehensive entry on Ottoman music in which he described some of the most important instruments, including the tanbur:

"*The material of this instrument is ordinary wood. The sound-box, in the shape of a hollow hemisphere, must be only of fir, well seasoned and sonorous. It is covered on top with two planks glued together and without any opening. The length of the neck is commonly about 3 feet and the diameter of the sound-box 10–11 inches. If one desires to ornament this instrument, one covers it with mother of pearl, ivory or gold.*"

Alongside this description he supplies a reliable illustration of a tanbur with similarities to the miniatures of the *Surname-i Vehbi*, where one also recognizes the inclusion of 'cheeks' (fig. 5).

Evidently Fonton's instrument belonged to the ornamented variety, although it is unlikely the ornamentation was in fact mother-of-pearl, ivory and gold; one has the impression rather of it being a painted-on form of decoration. However the important information is the labelling of the 36 frets together with the Ottoman names of each tone, as well as the inclusion of instructions on how this four-coursed instrument with eight strings was to be tuned.

At a similar time, we once again turn to a central European, Swiss artist Jean-Etienne Liotard, who provides us with a depiction of a tanbur from the 18th century. Travelling in 1737 via a circuitous route to Constantinople he quickly became the most sought-after painter among the European fraternity, supplying exactly painted, naturalistic oil paintings alongside a huge number of highly diverse sketches. As far as the tanbur is concerned the painting entitled 'M. Levett and Mlle. Glavany on a Divan' is both his most impressive and informative, painted in 1740 (fig. 6).

It shows a merchant and friend of Liotard, M. Levett, dressed in Turkish clothes and smoking a *tschibuk* as he contemplatively listens to the sound of a tanbur played by the daughter of the French ambassador to the Crimea, Mlle Glavany, herself dressed in Tartar costume. She holds the tanbur slightly tilted with the body of the instrument supported by the players lap. This time the body features an almost round soundboard which can with certainty be said to have been mounted on a semi-spherical bowl. The soundboard itself is probably made of softwood (most likely spruce) and once again flanked by cheek-like strips of wood, though of a different type. It is these parts of the

fig. 6

soundboard that come into contact with the knee or – as is the case here - the upper leg of the player, and on the other side the right arm as it rests upon the upper edge of the instrument. It is possible that 'cheeks' added at these points with verneers of darker wood were to protect the soundboard from abrasion. At the neck, the soundboard ends with an abrupt but not inelegant curve made of a brownish wood and embellished with circular and rhomboid-shaped pieces of bone, ivory and mother-of-pearl. One can even make out the 32 black dyed frets and the eight T-shaped brown pegs also used on Turkish long-necked lutes at the beginning of the 20th century.

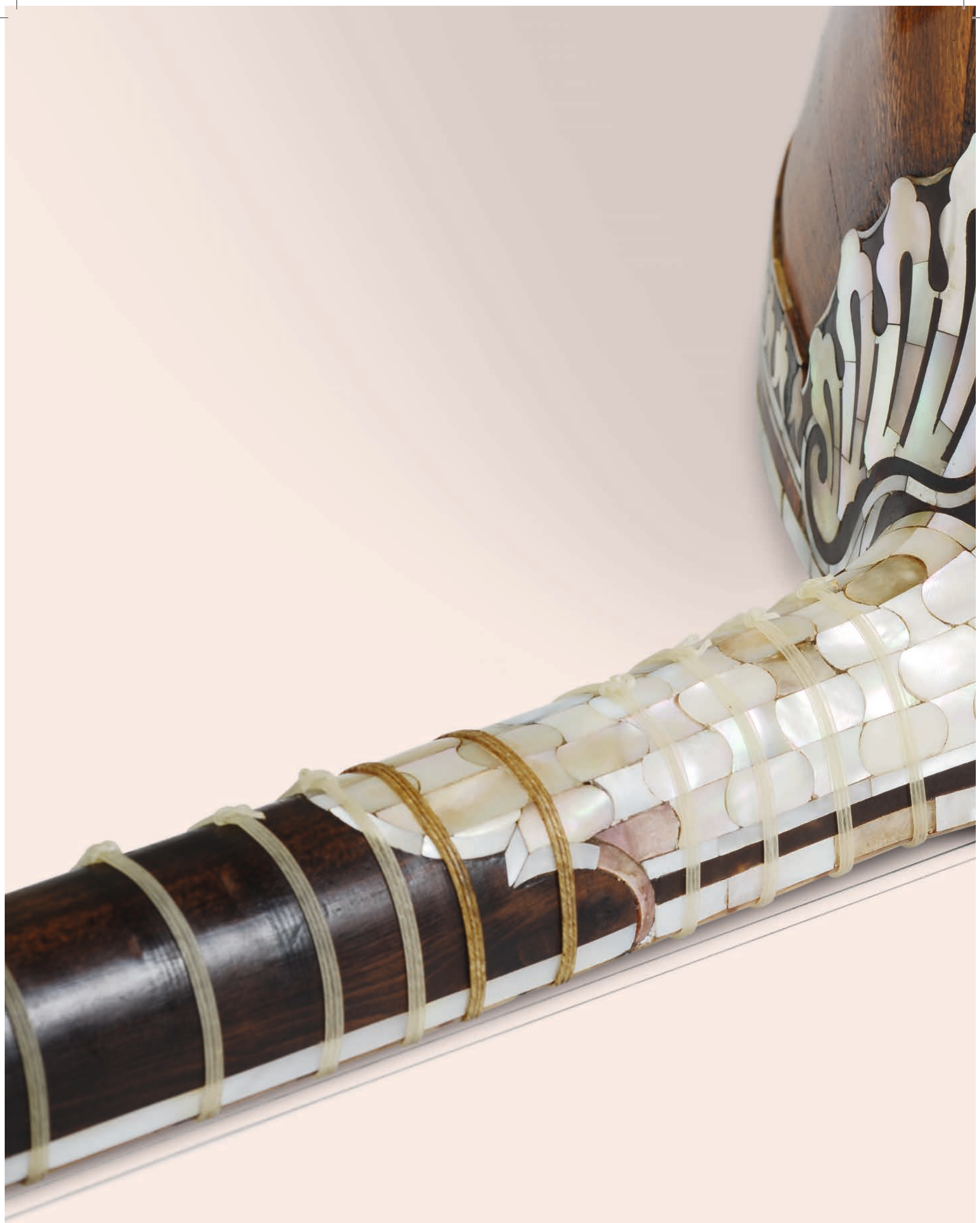
Just how precisely Liotard painted this picture can be seen in the minutely detailed recording of Mlle Glavany's pose: her index finger and right thumb hold the thin but hard tortoise-shell plectrum (*mizrap*) at an angle of 90° to the strings and soundboard, with the remaining fingers shown to be resting on the latter. The neck is held so as to be pointing only slightly upwards, a classical playing posture only admissible for a tanbur. Such detail is given that one even has the impression the index finger of the left hand has just taken its position on the dugah-fret, whilst the middle and ring fingers are playing a typical tanbur arpeggio.

In 1750 a short but particularly important treatise on music was written by Kemani Hizir Aga (died 1760) called 'Tefhimü`l Makamat fi Tevlid-in Negamat' (The Comprehension of the Makamat in the Generation of Melodies). Hizir Aga was a court musician, close friend of Sultan Mahmud I (1696–1754) and active both as composer and theoretician. In his treatise he names the tones according to which the tanbur was tuned and the division of the frets. There is also a colored depiction of a tanbur player with a musician dressed in 18th century fashion holding a tanbur which looks similar to the Liotard tanbur, though much heavier decorated (fig. 7).

The neck and upper part of the soundboard appear to be decorated with pieces of mother-of-pearl resembling fish scales, complementing the impressive wave-like decoration around its edge. The T-shaped pegs are labelled with notes of the strings when open, again these are double-coursed and one can identify the 34 frets which appear to be correctly distributed over the length of the neck. Again the tanbur is held diagonally, although this does not accord with contemporary records of playing practice.

fig. 7

Tanbur Belonging to His Highness Sheikh Hamad bin Abdullah Al Thani



Restoration

Condition and Description Prior to Restoration

DIMENSIONS & MATERIALS

Body and Soundboard

The entire length, from the lower edge of the string-holder to the upper end of the neck, measures exactly 137.8 centimeters. At its maximum the soundboard is 29 centimeters wide, mounted on a 17 centimeter deep, semi-spherical bowl made of eleven ribs. Nine of these ribs are of very fine plane tree wood and those on the edge of the bowl, which carry the soundboard, of juniper heartwood (fig. 8).

Measured from the mid-points, the maximum width of the plane tree wooden ribs is 51 millimeters. The ribs of juniper wood that flank these are at this point only 35 millimeters wide, though these increase as they approach the neck and in the other direction the string-holder, accordingly increasing to a width of 60 millimeters.

The string-holder is made from rosewood and features a veneer of 1.5 millimeter thick ivory (fig. 9). At the point where it joins the bowl it is 60 millimeters wide. Away from the bowl it curves inwards, decreasing to a width of 45 millimeters. In it, eight holes have been drilled, each approximately one millimeter in diameter. Two of these have been sealed with ivory or bone dowels, plugging up the holes along their entire length. The string-holder is 10 millimeters thick and along its lower edge, leading away from the soundboard, a semi-circular ornament with a radius of 27 millimeters has been affixed to the bowl. This is of tortoise-shell, inlaid with floral forms and leaves made of mother-of-pearl, surrounded by a mother-of-pearl border that is approximately three millimeters wide.

At each side the semi-circle is flanked by an inlay of mother-of-pearl and tortoise-shell that continues the floral theme. This border continues, running along the length of the two outer ribs until the upper end of the bowl is reached, where it ends in an area of extensive ornamentation (fig. 10). Parallel to this, both above and below, the floral bor-

figs. 8, 9, 10

fig. 11

der is enclosed by a frame. On the under (or inner) side the frame is a plain mother-of-pearl band 0.6 millimeters wide and on the side that leads towards the bowl's edge, bands of tortoise-shell and mother-of-pearl of different thickness alternate before culminating in a fifth and penultimate band made of buffalo horn 0.3 millimeters in thickness. Many parts are missing and some have unfortunately been incompetently replaced.

The extensively ornamented area where the floral border ends is diametrically opposed to the string-holder and is thus in the immediate proximity of the instrument's neck (fig. 11). Like the ornamentation that adjoins the string-holder, the ornamentation here consists of intricate marquetry of mother-of-pearl and tortoise-shell that overlies the bowl. Unfortunately what was probably dampness has caused the marquetry to swell significantly at this point so that it is now no longer entirely in contact with the substance of the bowl that is its base. While the form of the whole graduates towards the neck, the floral marquetry leads the eye towards a fish-scale-like overlay of mother-of-pearl.

fig. 12

Soundboard

The light convex soundboard, made of four joined-up parts, is contained within the ring of buffalo horn by a 5-millimeter wide band of mother-of-pearl (fig. 12). Then, on both sides of the instrument, parallel to each other and the axis formed by the neck, there are 'cheeks' of tortoise-shell with flowers of mother-of-pearl (fig. 14). At the widest points these cheeks measure 30 millimeters and are in addition enclosed by a line of 0.6 millimeter-wide tortoise-shell strips, followed by a beautifully formed border of merlons made from mother-of-pearl. Where there are no cheeks, this border follows the plain border of the instrument's edge; this 7-millimeter-wide merlon border is then in turn enclosed by a 1.5 millimeter-wide line of mother-of-pearl.

On the lower side, directly above the string-holder, there is a crown (in arabic, *taj*) with floral motifs made of mother-of-pearl and set into tortoiseshell (fig. 15). A flowing, double row of mother-of-pearl lines defines the crown's outline. Above this, on the other side of the bridge, there is a very similar crown ornament which, inverted, flows down from the neck with its base being suggested by an indentation made as the merlon border of tortoiseshell and mother-of-pearl which frames the soundboard, link up with the design (fig. 13).

Here the otherwise almost round soundboard curves steeply upwards. After turning through almost 90° it straightens out so that after 70 millimeters the line taken is continued by that of the instrument's neck. As is to be expected at the point where bowl and neck meet, there is a structural element which is hidden but of great importance.

figs. 13, 14, 15

fig. 16

fig. 17

fig. 18

Neck

The neck is made of a single piece of extremely hard but beautiful brown-red juniper tree, measuring 97.5 centimeters (fig. 16). On its front the entire fingerboard is decorated with a fish-scale-like layer of mother-of-pearl and framed by a strip of 0.6-millimeter ebony, a row of 3-millimeter strips of mother-of-pearl and finally the same band of horn that surrounds the soundboard (fig. 17). This band ends with a nut made from bone, with a distance from the nut to the base of the neck of 73.8 centimeters. At this point the neck is 37 millimeters wide and 28 millimeters deep but as the nut is approached the width and depth decrease to 26.2 millimeters and 27.4 millimeters respectively.

fig. 19

fig. 20

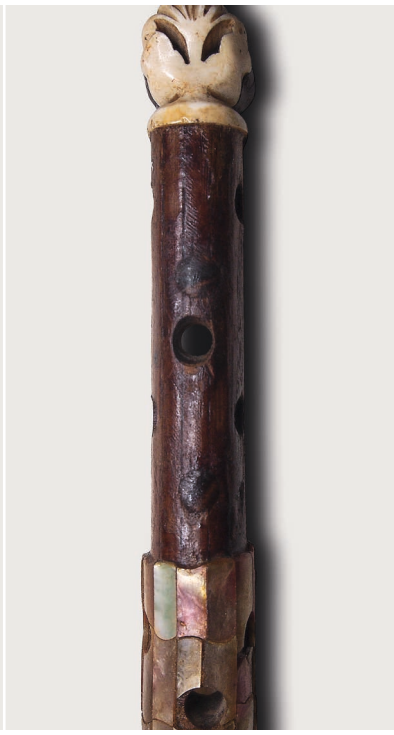


fig. 21

Peg-box

Not separately mounted the peg-box continues the fish-scale pattern. Unfortunately a number of pieces have been lost and at some point in the past the decision was made to cover the front over with a veneer of mahogany (fig. 18). At its upper end the peg-box features a 30 millimeter long decorative head consisting of a background layer of ivory (fig. 19) with two layers of rosewood (fig. 20) of differing quality, giving the impression of it representing a bud just about to flower.

On the reverse of the peg-box over half the mother-of-pearl inlays are missing and, as on the front, attempts have been previously made to replace the missing pieces with different material (fig. 21).

fig. 22

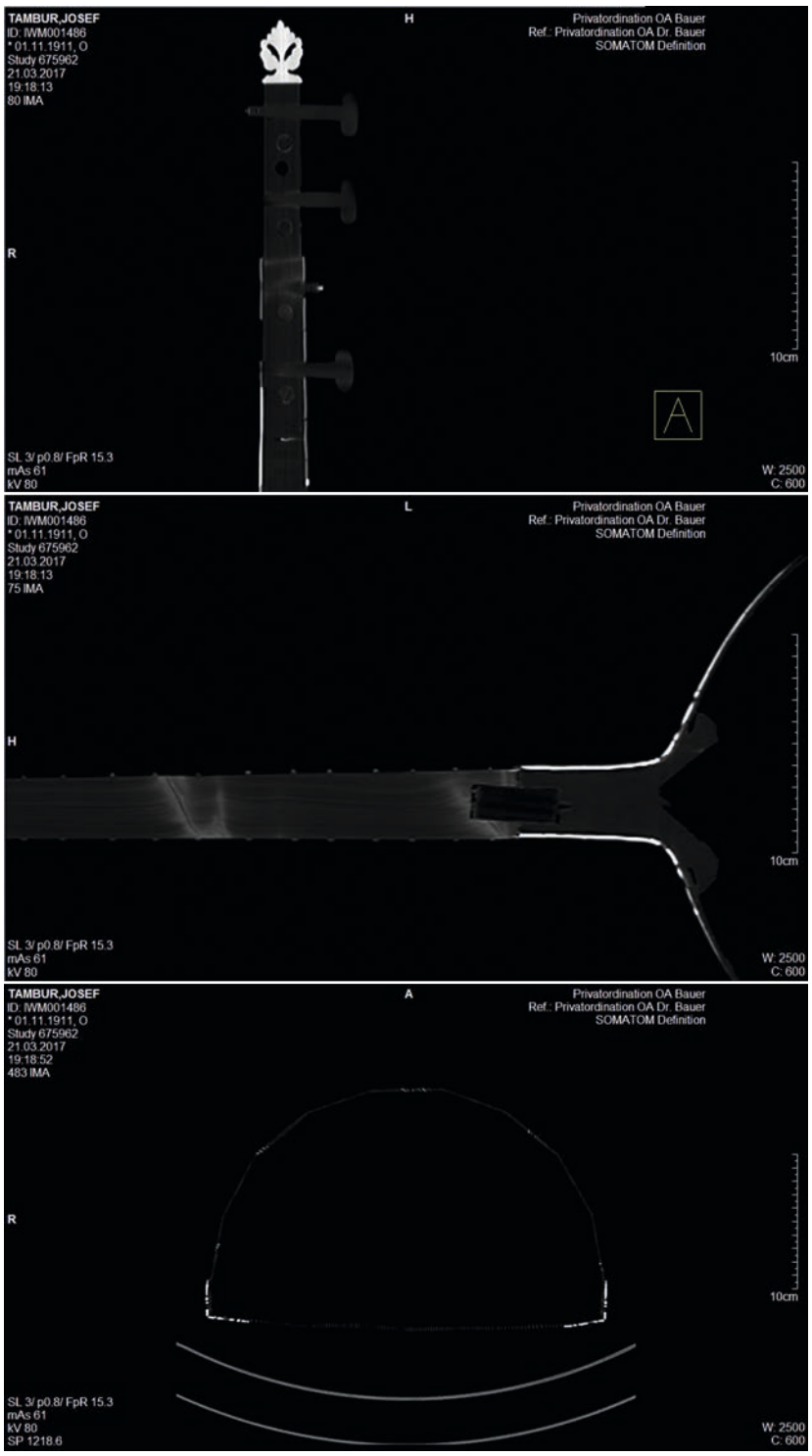
Pegs

Six of the eight pegs have survived. They are T-shaped and have been very finely made from walnut wood (fig. 22). The maximum diameter of the shafts inserted into the holes of the peg-box is a uniform 80 millimeters; the positioning of two of the holes is certainly not original.

figs. 23, 24

Bridge

The bridge is carved from rosewood and is 71 millimeters long, 15 millimeters wide and 5 millimeters high. As they spiral inwards, both ends are decorated with small eyes of ivory. Noticeable is a significant 42 × 5 millimeter area on the bridge that probably served as the base for an upper part (fig. 23), though there is the possibility that the bridge was reduced in size. Another feature is a small 1.5-millimeter thick and 3 millimeter long pin that has been glued into the bridge (fig. 24), which fits exactly a hole drilled at the corresponding point into the soundboard. It should be mentioned that the underside of the bridge is curved inwards so as to exactly match the outward bulge of the soundboard. The distance from the upper edge of the bridge to the nut gives an oscillation length of 103 centimeters.



figs. 25, 26, 27

COMPUTED TOMOGRAPHIC ANALYSIS (CT)

From the absorption patterns of x-rays passing through the instrument's body the CT produces a series of cross-sections which can be reconstructed with digital evaluation. In the CT image the relative permeability of a material is shown as a grey tone; air is shown as black and water appears as white, with all other materials lying somewhere in between according to their density. The image obtained is a transversal section along the length of the object with the viewer looking from underneath onto the transversal section. CT was used so as to obtain precise information from inside regarding the condition of the instrument and the state of its components. The risk incurred of encountering unforeseen difficulties and undesirable surprises when opening the instrument was thus minimized, if not excluded altogether.

In the scan through the peg-box one can clearly recognize the very light mother-of-pearl inlays and the underlying, more darkly represented wood with its vertical and slightly irregular grain.

In places within the wood of the neck, more densely shown beginnings of branches can be seen (fig. 25).

On the neck, under the very lightly represented mother-of-pearl, there are occasionally dark layers that hint at the possibility of there being cavities between the marquetry and its ground. The clearest result concerns the junction between the neck and bowl. As previously mentioned, due to ornamentation the underlying structure can only be guessed at without CT, which shows the so-called 'upper block' onto which the ribs of the bowl are glued. Over this there is the mother-of-pearl and tortoiseshell marquetry covering the glued joint that affixes the neck to the upper block (fig. 26). Unfortunately this joint is no longer in an intact state and as is easy to see, the dowel that stabilizes the broken bond is not in a vertical position.

From the scan of the sound box or body one can recognize that the wood of the soundboard is not of uniform thickness with a bulge on the right-hand side (fig. 27). Here too, under the easily identifiable row of mother-of-pearl there is a dark layer that may represent air between the marquetry and its ground.

At the lower end the lower block can be seen that once again serves as a footing for the glued-on ribs.

BIOCHEMICAL ANALYSIS OF THE GLUE

Particles of glue from the detached mother-of-pearl inlays and from between the soundboard and bowl were collected and conserved separately. Using trypsin, the proteins in a powdered milligram of each of the samples were broken down into smaller proteins whose differing masses enabled mass-spectrometer readings to be taken.

Unfortunately the analyses gave very differing results. Nevertheless the samples taken varied in porosity and smell in such a manner that the use of bone glue for the gluing of the marquetry and the use of rabbit-skin glue for the gluing of wooden parts could be safely assumed.

An exact analysis of the instrument's inner and outer state lead to the following observations:

There are a number of partly glued cracks in the soundboard. The right side is significantly bulged, suggesting this area was later worked over and made thinner by sanding or stripping down.

Numerous pieces of mother-of-pearl are either missing or no longer properly joined to their base; occasionally missing pieces have been replaced by pieces that do not match either in form or color.

Near the ornamentation that surrounds the string-holder, the bowl has a small crack that has been previously glued.

The band of buffalo horn that forms the final edge of the soundboard is in places missing and as a consequence the adjoining marquetry has become loose. The CT shows that the soundboard is only partially affixed to the bowl and the bond between the neck and upper block is broken. Here the mother-of-pearl marquetry is so loose that it is only held on by virtue of the gut string frets (fig. 28).

The gut string frets are in good condition. They are however not located in positions where one would expect to find them, it would appear that they have been moved so as to give a chromatic scale, perhaps for central European use.

For the purpose of tightening strings, the bone nut is no longer useable. The marquetry on the peg-box is badly damaged, while the peg-box itself shows signs of having been incorrectly adapted, there being holes in the wrong places (figs 21 and 25).

Only six of the eight original pegs have survived and these have been drilled so as to enable threading through of the strings. This is certainly a later adaptation to the traditional technique of winding and binding where T-shaped peg holes are unnecessary.

fig. 28

Considering its impressive age, the instrument is in an otherwise good state of preservation, albeit in much need of repair. The mother-of-pearl marquetry has been executed to such a standard that no seams or holes are visible – testimony of true craftsmanship.

figs. 29, 30

Restoration Process and Methodology

RESTORATION

In order to rectify the main defects, those of a broken bond between the neck and bowl in addition to damage to the soundboard; detaching the neck and removing the soundboard from the bowl was unavoidable. Due to the missing rectangles of mother-of-pearl at the edge where soundboard and bowl meet, it was possible to examine the bonding of these two elements in detail (fig. 29). In order to gain complete access to this bonding, the entire circle of mother-of-pearl was removed, these rectangles of mother-of-pearl easily removed with a scalpel, though required dampening and warming first before detachment.

Before this, all parts were numbered and their positions recorded photographically (fig. 30), thereafter cleaned and sorted so as to enable exact re-positioning.

During cleaning, the crumbling state of bone glue gave rise to suspicion that this might pertain throughout the instrument. However the stability of the glued-on marquetry was easily checked by tapping the inlays with a small wooden hammer. Places where the glue was unstable emitted a dampened sound and, after being numbered and photographed, these pieces too were removed and put to one side.

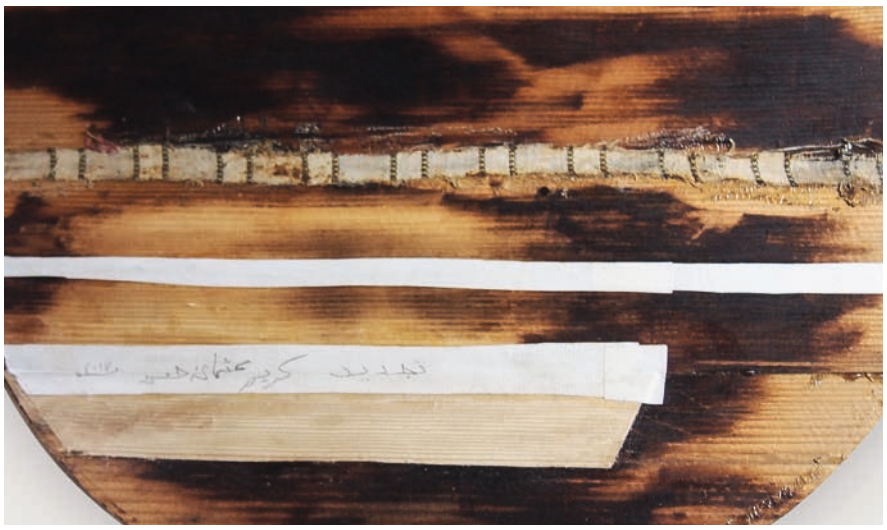
figs. 31a, 31b, 32

Dissolving the joint between neck and body

Prior to removing the soundboard it was decided to dissolve the damaged upper-neck block dowel connection first. Here the information provided by the CT analysis was invaluable and enabled the separation to be carried without hitch. First the neighboring gut string frets were removed, followed by the loose mother-of-pearl and tortoiseshell plates which were no longer held on by the frets (fig. 31a,b). Thereafter the join was wrapped in a damp cloth and after two hours warmed slightly so as to make the remaining glue fluid. The neck was then eased away from the upper block so as to make enough space for the dowel to be sawn through without causing damage to the fabric of the instrument (fig. 32).

The CT analysis had given rise to suspicion that the dowel and hole bored for it were not original, these were now confirmed. The superfluous and decayed cylindrical dowel made of pine was found to be completely inadequate for the purpose of joining the neck and upper block and was removed with relative ease. It was 18 millimeters in diameter and had been inserted to a depth of 15 millimeters into both the neck and upper block. At the foot of the hole were surprisingly many traces of a centralizing screw and these were diagnosed as being the result of the original hole being drilled with a twist drill. Transferred to the neck, the incorrect orientation of the dowel would have resulted in the neck having a left cast which would have made the instrument unplayable.

figs. 33, 34, 35



figs. 36

Soundboard

The already exposed glue between the bowl and soundboard was dampened using small strips of damp paper and after two hours lightly warmed. The remaining glue thus rendered fluid, along with the patches where it had already crumbled as a result of age, meant that the soundboard was easily raised. On its inner side the soundboard, probably made of Anatolian spruce, exhibits clear signs of scorching and even charring (fig. 33). Evidently the outward bulge was achieved by bending the soundboard over a hot iron, perhaps even an open fire. The central join is strengthened by a very fine 9 millimeter-wide strip of linen (fig. 34). On the inside the soundboard is framed on both sides by two 'cheeks' made of juniper wood with ebony and bright strips of hardwood, these latter very reminiscent of the cheeks shown on the tanbur in the famous Liotard painting (fig. 35).

One sees a number of clear traces of previous attempts at repair. At a split that has been glued together, the hidden step shows how much the soundboard's thickness varies. At this point the difference between the two levels is 1.3 millimeters. Evidently at some point in the past a dent and split were equalized out by applying glue to the crack and evening the soundboard out on its outer surface. This approach at repair avoided the currently unavoidable position of needing to open the soundboard.

In the bowl, drops of very old glue are visible, these were made fluid through dampening and a number of such 'frozen' drips were removed. In this way the part of the soundboard that had become thinner was made ready to receive a spruce

backing. For this a thin spruce veneer was coated with sturgeon bladder glue and affixed to the soundboard, then the parts standing reduced with a scraper. Old cracks were strengthened by gluing over with strips of paper soaked in hide glue (fig. 36).

The numerous numbered inlay pieces from the soundboard were glued back into their original positions and the edge of the soundboard was freed of old glue by means of a damp cloth.

The soundboard, now ready to be stuck back onto the bowl was first left to dry for three weeks so as to ensure there would be absolutely no moisture present in the sealed, inner space of the instrument.

Bowl

On its inside the bowl also showed signs of charring: the use of very hot irons in rib bending is recorded early on, with luthiers thereafter removing any signs of scorching with scrapers. Not following this example, the places where the ribs join one another were not strengthened with strips of cloth or paper as the bonds created by the 3-millimeter thick ribs are clearly more than sufficient (fig. 37).

The turned, bottle-neck-shaped upper block is probably made of light oak and measures at its widest point 72 millimeters. On it, the upper ends of the eleven ribs are glued, spread over a length of 40 millimeters. On the back of the bowl, a layer of fine marquetry work covers this sensitive place. The inner side of the upper block is slightly hollow, on the one hand so as to reduce weight and on the other so as to prevent the building up of tension that threatens to split the wood (fig. 38).

The lower block is likely made from the same wood (fig. 39). This half round disk is 80 millimeters wide, 10 millimeters thick and it is to this structure that the lower ends

figs. 37, 38, 39

of the ribs are affixed. Apart from a small crack, already repaired in the past as noted, some of the ribs have become slightly detached from the lower block. These irregularities were easily dealt with by freeing the gluing areas of dust and dirt and then dripping a slightly diluted mixture of warm hide glue into the cracks and pressing the ribs down onto the lower block. Superfluous glue was wiped away with a warm damp cloth.

The edge of the bowl was freed of diverse particles of dried-out glue. This was also done at the end of the upper block where a particularly deep layer of crumbling glue was found. On the part of the upper block where loose mother-of-pearl inlays had been removed, the glue was in an even worse state and had in the past become moldy.

The glue on the peg-box was found to be in a similar condition. A further point to note is the light rose-red coloring of the mother-of-pearl there, which also occurs on some of the mother-of-pearl rows in the area of the lower neck and upper block, probably due to contact with wool or similar material that had been dyed red and repeatedly attracted humidity over the years. It is conceivable that a ribbon was bound to the peg-box and lower part of the neck so that the instrument could be hung on the wall. Possibly damp attracted by the fabric aided and abetted the decay of the glue at these points with the result of inlays falling out.

fig. 40

Neck and Peg-box

Fortunately the neck, made of a very stable and hard juniper wood, was not bent and the fingerboard also was straight, it was therefore possible to leave this part of the instrument for the most part in its original condition.

Only the frets, after being carefully measured, had to be removed. During the course of this process, darker areas on the buffalo horn edge of the fingerboard became visible. This was at first interpreted as an abnormality but on closer inspection it was found that these areas were the original color of the buffalo horn, protected from fading by the gut string frets. Though it is difficult to say how long the frets were in this position it can be assumed it will have been for at least 100 years.

The nut was 26 millimeters wide, 3 millimeters thick and 3.5 millimeters high and so badly damaged as to be unusable. It was therefore removed and exchanged with a replacement of similar dimensions. The original gut string frets and nut were put to one side.

As previously mentioned, mother-of-pearl inlays were missing on the upper part of the peg-box. The glued-on mahogany veneer that took their place was removed and so the original holes of two further pegs were brought to light. In one of these holes there was the remains of what was probably the shaft of a peg that had got stuck (fig. 40). This was removed. More recent holes, though still drilled some time ago and not original,

were sealed with rods of juniper wood. In order to replace the missing mother-of-pearl fish scales, stencils of some of the original pieces were transferred to paper, cut out and then stuck onto mother-of-pearl.

Prior to this however, the raw mother-of-pearl had been soaked for a week in tea so as to give it a light brown tone that would not stand out too much against the original. Using a file and with reference to the stuck on stencils, the pieces of mother-of-pearl were worked into the required shapes and glued on with generous amounts of bone glue. Missing pieces of tortoiseshell and buffalo horn were also replaced.

In the replacing of all missing pieces, great care was taken to ensure the replacements were different enough from the original inlays so that they could not be confused with them.

It was also seen as important that lightly worn parts were not discarded but instead returned to their original places so as to conserve as far as possible the original state of the instrument.

Two replicas of the original pegs were fabricated from walnut wood, made so as to fit the original holes, then dyed and waxed.

Remounting the Soundboard

Using a paintbrush, a fluid and warmed mixture of hide glue was applied to the upper edge of the bowl, this mixture applied twice and the same done to the corresponding part of the soundboard. The two units were then brought relatively quickly into contact with one another and bound with damp hemp, this being wound about fifty times around the whole. Then the bonding was briefly held over a flame of methylated spirits in order to make the glue that had solidified fluid once again, thus ensuring an even and completely stable bond. The body was then left to dry for several days.

In the meantime the hole at the end of the neck was closed with a peg of damson wood and held in place with glue. After drying for a day, a properly centered hole was drilled, running parallel to the neck and into which a new cylindrical beech-wood peg was glued.

As had been done on the neck, once the body of the instrument was dry and the bands of hemp removed, a new hole was bored into the upper block.

Everything was now ready for the difficult task of re-uniting the neck and body. As apart from cleaning absolutely no changes had been made to the areas that needed joining, the two parts therefore fitted together seamlessly with everything correctly aligned. After the application of hot hide glue, the neck with its peg was inserted into the upper block and following a further application of glue, fixed into place.

After a generous drying period the large number of smaller pieces such as the mother-of-pearl and tortoise-shell inlays, all of which had been catalogued and kept aside, were affixed into their original positions with warm bone glue. In addition, missing parts were replaced with replicas as above, such as the lengths of missing buffalo horn along the edge of the soundboard.

At some stage in the past the soundboard had been treated with shellac. As this was not an original feature it was removed using a mixture of ethanol-isopropoanol (1:1) and

done so as to lighten the resonance of the soundboard. With the aid of damp cloths, the instrument was freed from remnants of glue and other foreign matter.

The aged patina of the polish on the bowl was conserved by polishing with a mixture of benzoe and sandalwood resin (1:1) dissolved until saturation at room temperature in ethanol. This was applied and polished fifteen times. The polishing was carried out using a ball of linen which had been immersed into the mixture, the subsequent rubbing following a circular motion. Additional lubrication was provided by a few drops of olive oil, this then removed once the polish had dried by means of a cloth moistened with a solution of 70% ethanol.

Frets and Strings

The very worn gut string frets were exchanged for new 0.7-millimeter thick catgut threads. Their positioning was carried out with reference to the information provided by Cantemir and this was concluded with information given in later treatises.

When held and played the frets give the following tones, with the European names corresponding to Ottoman names as follows:

D	Yegah = open string	e ↓	Hisar = e minus 23–46 cent
E	Ashiran	e	Hüseyni
F	Acemashiran	f	Acem
F#	Irak	f#	Evic = f♯ minus 23–46 cent
F♯	Rehawi	f♯	Mahur
G	Rast	g	Gerdaniye
G#	Zirgüle	g#	Shehnaz
A	Dügah	a	Muhayyer
B♭	Nihavent	b♭	Sünbüle
B ↓	Segah = B minus 23–46 cent	b ↓	tiz Segah = b minus 23–46 cent
B	Buselik	b	tiz Buselik
C	Chargah	d♭	tiz Saba
D♭	Saba	d ↓	tiz Uzzal = d minus 23–46 cent
d ↓	Uzzal = d minus 23–46 cent	d	tiz Neva
d	Neva	e♭	tiz Bayati
e♭	Bayati	e	tiz Hüseyni

The exact positioning of the frets was determined through application of the system of circle of fifths. The frets for microtones such as segah, uzzal, evic etc are not specifically defined in any of the 17th or 18th century treatises studied, however since today they are usually tuned with an interval of a Pythagorean comma less than the next higher fret, at these points the above listing is only approximate. Only at the beginning of the early 20th century does the work of the brilliant musicologist and musician Rauf Yekta Bey provide us with exact frets positions along with their corresponding tonal pitches, achieved through complicated numerical ratios.

Tuning

As can be clearly surmised from the work of Hizir Aga, Charles Fonton, Guillaume Villoteau's treatise on the Turkish tanbur (*description de l'Egypte*) and the works of Rauf Yekta Bey; up until the end of the 19th century the tuning of the tanbur remained relatively unchanged. Following these sources, the tuning was almost uniformly as follows:

Playing string (double-coursed) Yegah D
1st resonance string (double-coursed) Yegah D
2nd resonance string (double-coursed) Chargah C
3rd resonance string (double-coursed) Dugah A–A

Bearing in mind the instrument's age, in attaining this tuning a great deal less tension was used than is currently usual.

As no original strings survive from the eighteenth and nineteenth centuries it was decided to use historically accurate replicas still made for harpsichords. These are made of special alloys that are equivalent to those used during the 18th century.

The playing double strings (course) and the first resonance course are of a steel alloy with a diameter of 0.25 millimeters, the third course is 0.27 millimeters in diameter and the fourth course 0.3 millimeters in diameter. An octave lower down however this single brass string widens to 0.6 millimeters in diameter.

Comparisons

Part of the research process for this report entailed contacting every known major collection of instruments in an attempt to source tanburs of similar age. Alongside a major find in the vaults of the Victoria & Albert Museum this process also enabled comparisons to later tanburs and offered insight into how the instrument evolved after the 18th century example studied here.

18th century Tanbur at the Victoria & Albert Museum, London

Bought by the then South Kensington Museum in 1871 from well-known Nuremberg art dealer Abraham Pickert and catalogued as a *'tambura'*. It resembles the tanbur which is subject to this report in a surprising number of details, just its marquetry layout and materials used – such as ivory, red tortoiseshell, bone and the choice of wood chosen for the bowl and neck – differ slightly.

This tanbur (fig. 41) is thought to have been made between 1700–1800, although who this dating is ascribed to or how it was carried out is not known. However the instrument not only resembles the instrument subject to this report but also that shown in the depiction of a tanbur by Hizir Aga from the year 1750. (fig. 7)

Details such as the wave-like cheeks, its crown-formed inlay on the soundboard, their dimensions and the form of the body would even suggest a very similar instrument was used as model for this painting. The neck and its fingerboard, which is in the hand of the palace musician, show striking similarities with the fish scale fingerboard of the tanbur subject to this report, it is quite possible they were all carried out by the same workshop.

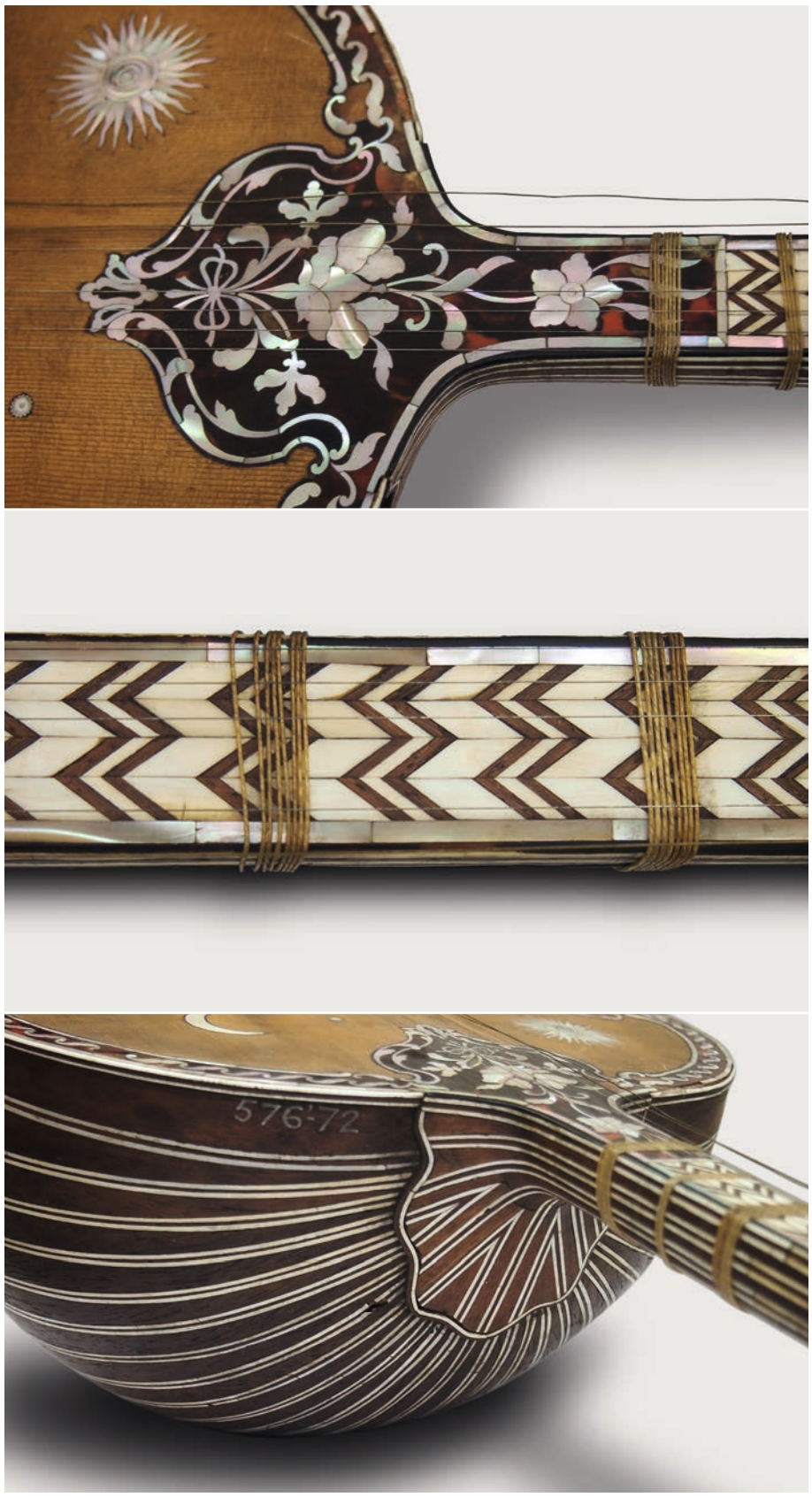


fig. 41

Early-mid 19th century Tanbur at German National Museum, Nuremberg

Examination was also made to an early to mid 19th century tanbur currently held at the German National Museum, Nuremberg which from its construction would appear to be seen as a bridge between the older (18th c.) tanbur and the modern (late 19th c.) kind.

Thus, for example, the curvature of the soundboard made up from 6 pieces of medium grained spruce or pinewood is only slight convex and without 'cheeks' (fig. 43). The bowl consists of 19 ribs, probably made of mahogany wood and separated by thin strips of ebony (fig. 42). The upper end of the soundbox, which also forms the lower part of the neck, is no longer bottle-neck shaped.

It is fortunate the original gut frets remain in their original position along the neck.

fig. 42

fig. 43

20th Century Tanburs

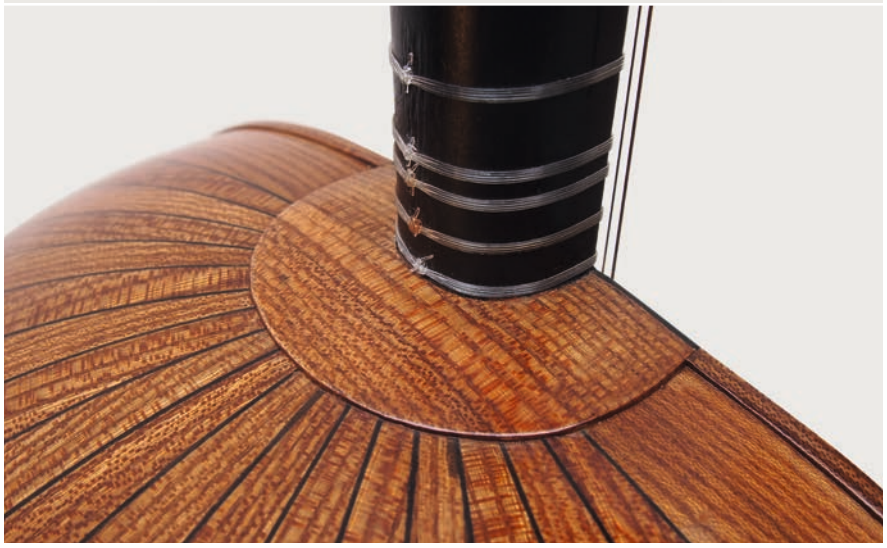
fig. 44

fig. 45

From around 1880 a great many tanburs have survived in more or less their original condition, all of which show a much simpler construction than their 18th - mid 19th century ancestors as illustrated by Osman Hamdi Bey (1842–1910) in 1880 (fig. 44).

In the early 20th century the tanbur bowls made from very thin ribs became flatter and this resulted in lighter instruments. (fig. 45)

Another obvious difference is the concave soundboard, consisting mostly of 2 planks of spruce glued together, with a notable absence of cheeks. This grade of concavity suc-



figs. 46, 47

cessively increased during the 20th century and whilst the soundboards of earlier examples sink due to the vertical pressure caused by string tension, concavity on recent tanbur soundboards is achieved by pressing the soundboard before it is glued onto the bowl.

A further difference is the neck to body joint which consists of a dove-tail connection (fig. 46) being directly sawn into the lower end of the neck, this then fits into its counterpart on the more flattened upper block of the bowl. Also unlike the 18th century construction the upper block is completely hidden by the ribs and a semi-circular plate or veneer (fig. 47).

An increase of fret numbers up to 64 happened during the first half of the 20th century in order to adopt the tanbur to a modernizing Turkish music which saw changes to playing techniques and a broader range of microtonal pitches (fig. 48).

fig. 48

Results & Discussion

A date can be confidently assigned of early to mid 18th century for this instrument. Together with an example at the Victoria & Albert Museum in London, they are the oldest known surviving tanburs in existence.

No indications were found on the instrument itself as to who or when the tanbur was made. Due to the lack of information concerning the origins of the wood that was used a dendrochronologic analysis, which compares preserved and datable timber collected in various databases across the world, was not possible.

Only comparisons to Ottoman marquetry from the 18th century, combined with analysis of iconographic and musicological documents from the period, enabled a dating of the instrument to the 18th century. This theory was confirmed by a similar instrument belonging to the Victoria & Albert Museum in London, whose decoration can be dated to the first half of that century.

Intricate marquetry is thought to have been added to the instrument at a later date to its construction, with simple cheeks of verneer still existing under those inlays, resembling those depicted in detail by Liotard in 1740.

Following a comprehensive search amongst the world's great instrument experts and collections, it was confirmed that no other tanburs of this age are known of. There has been great speculation about why this is so, much attention pointing to the fact instruments were not usually inherited after the death of an owner, rather discarded. This was probably due to the fact that they were constantly being developed, optimized and modernized according to the latest musical trends and fashions.

An opportunity to open the tanbur offered a unique insight into the more complex construction techniques of early 18th century tanburs compared to their successors.

Since Oriental musical instruments prior to the end of the 19th century are exceptionally rare, our knowledge about their construction has been limited. Therefore the opportunity to study and restore this tanbur revealed valuable insight into 18th century lutherie, differing significantly in a number of details compared to its successors.

18th century tanburs were made with a round soundboard which then curved outwards with bottle-necked tapering as its body approached the neck, a feature inherited from Anatolian, Caucasian or perhaps even Middle Eastern long necked lutes. The lower parts of these necks are in most cases part of an upper block onto which the ends of the ribs are glued, this also the case for many Uzbek, Uyghurian lutes, and some examples from Anatolia and Persia.

The highly evolved details of construction witnessed remained best practice until at least the end of the 18th century, as is illustrated in the detailed description of a tanbur offered by Villoteau's *Description de l'Egypte*, included in the appendix in its entirety both for its precision and the many similarities in findings matched here. From 19th century on, tanburs were built with much greater simplicity, most being plain in both shape and decoration.

Early or mid-19th century tanburs such as the Nuremberg example still kept the circular shape of their soundboard in addition to the upper-block to neck joint construction. However its shape was no longer bottle-necked, a feature which appears to have been given up by tanbur makers by the end of the 19th century in favor of a simple dovetail joint.

The convexity of the soundboard increased during the 19th century, eventually being turned to a concave soundboard which offered a much higher bridge, suitable for changing techniques and sound.

Iconographical studies allowed the tanbur to be configured back to its original settings, revealing a tone unique to that era due to differences in fret positioning, string types and soundboard construction.

Only in the last few decades have musicologists discovered unique sources of early 18th century musical notations which both enhanced interest in historical Ottoman music and also led to diverse speculations about the playing techniques and sound of instruments used in this era.

Through careful restoration using detailed reference to the iconography of 18th century tanburs, it was possible to confidently return this instrument back to its original condition. Fret positioning and string types all conformed to the standard of the time, allowing the unique opportunity of listening to a tanbur as it would have sounded in the 18th century.

Due mainly to the different methods of tuning, wider distribution of frets, in addition to a more stable construction of its soundboard, this tanbur has a very different sound to modern tanburs. It presents a perfectly balanced and transparent tone - focused, clear, projective; with a slight preference towards middle frequencies and trebles.

This sound is also a result of the tendency towards more convex soundboards as compared to its successors, whose concave construction tended to produce such a high bandwidth of tone that some pitches produce on occasion dissonant resonances. Convex soundboards are tighter in construction and act like membranes, suffering none of the fluctuation in tuning due to humidity and/or temperature changes.

The 18th century tanbur belonging to His Highness Sheikh Hamad Bin Abdullah Al Thani is not only the most historically important and oldest surviving instrument of its kind, its very existence brings to light an almost forgotten sound from the famous tulip-period of Ottoman music.

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Istanbul University, Research Institute of Turkology for their kind permission to reproduce Cantemir's tanbur.

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Appendix

Excerpt 1 from M. Villoteau, (in d'Escription de l'Egypt), translated by Danyel Franke:

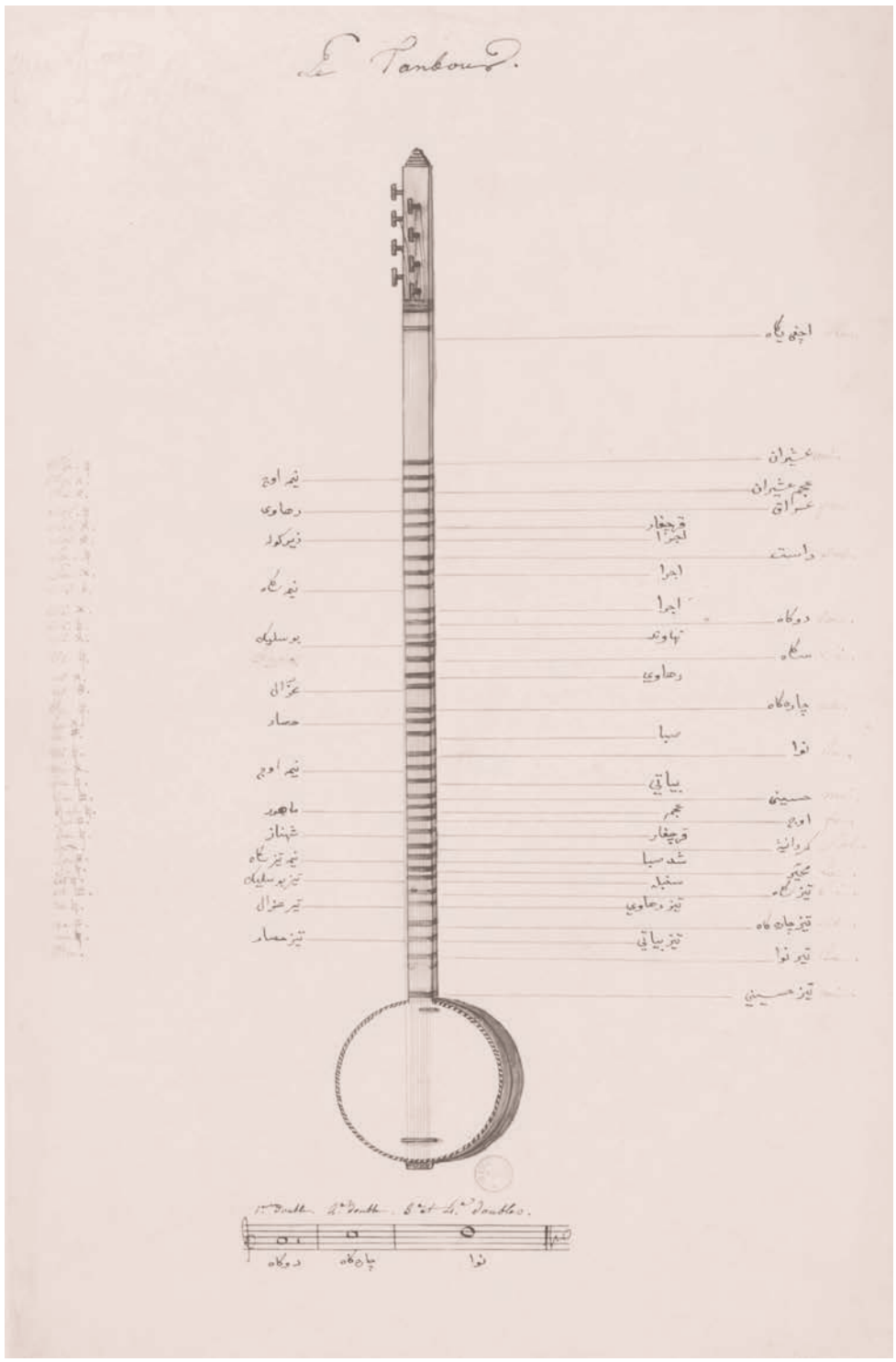
Excerpt from:
Description/ Historical, Technical and Literary,/
Of Musical Instruments/ Of the Orientals/
First Part/ *String Instruments known in Egypt*/
Chapter II, Article II (p.862ff):
On the *Tanbour kebir Tourky* (large Turkish tanbur), it's parts, shape, it's measurements and proportions, it's use and the tuning of this instrument.

The *tanbour kebir Tourky*, or large Turkish mandolin, is an instrument 1.340 m tall (134cm), of which the neck and pegbox alone 1.015 m: the body of the instrument and its string holder making up the rest, i.e. 325 mm (cf. Plate AA, fig. 5).

One may consider the body of the instrument as of two different sides: one that is convex and more than hemispherical, which is the back side, called *dahar* in Arabic (‹ظهر›, 'back' this part not being visible in the engraving); the other being flat, this being the front side or belly, called ougeh in Arabic (‹وجة›, 'face' this is the part shown in the engraving).

The *Qaça'h* (cf. fig. 6), or rounded and more than hemispherical part of the *tanbour Tourky*, is made from a very nice reddish timber, with a silky finish and figured, with numerous dark brown, almost black ('towards scorched') veins forming a pleasant pattern. This part is made firstly [i.e. not including the two extra ribs mentioned later] of nine large ribs (these ribs are called *bârât*, بارات 'bars' cf. fig. 6), stretching from below the neck joint towards the other, diametrically opposed end of the body Ω where they

Plate AA, fig. 5



Fretting and tuning of a late 18th century tanbur

converge and meet in a single point, the latter being hidden by the string holder's tip of the tail (cf. fig 6, T). Their length thus comprises the entire curve of the body's circumference in its depth (lit. 'height'), from A to Ω: each of them is 54 mm wide on the cusp of the curve which they describe, and they taper gradually towards the upper and lower ends. Right next to those nine ribs (mentioned above), and close to the belly, there are two others, one on each side (of the belly): they are made from the same timber as the others; yet, unlike those they are less wide at the cusp of their curve than at the ends, on the contrary they are widening to meet with the belly's level. The latter (two extra ribs) measure about 41 millimeters at their widest and about 27 millimeters at their narrowest point. Like the former (first nine ribs) they also emerge from underneath the neck joint and they reach under the large part of the string holder which extends beneath the body (of the instrument), where they converge.

The front side, called *ougeh*, what we refer to as the belly, is perfectly circular in what forms the top of the body. Its diameter is 318 mm: it is solid ('full'), without sound holes, and slightly convex; which gives reason to believe that it is supported internally by a small pillar (which we call the sound post) that accounts for the arching [lit.: make it bulge—this is a rather confusing statement, firstly as it is inconceivable how such a post, in the absence of soundholes, should have been fitted, secondly as there are no known examples of convex bellies (in liras, violins, viols, yayli-tanabîr or modern arch-top guitars) where the sound post, if any, actually pushes it out. Rather, they all—including the tanbur opened recently by Karîm Usta—feature either a construction bent over heat in one piece (Linarol), of pre-bent ribs (English viols) or carved (lira-, violin- or later viol-types, arch-top guitar): commentary df]. This side consists of four boards of spruce, which go all the way in height but, all four together, in the broadest point, don't add up

to more than 253mm in width; the missing bit is completed by a small board of mahogany wood on each side, decorated along the longest line, i.e. the side furthest from the rim (the inside), by two strips of veneered mother of pearl, each 6 mm broad and 180 mm high. The two central spruce boards end in tip that stretches over the neck joint over A to a distance of 86 mm. On this part is a mother of pearl decoration inlaid in the wood in a layer of 'Spanish wax' (i.e. sealing wax, cf. "Fabrique de la cire d'Espagne ou à cacheter," *Encyclopédie ou Dictionnaire raisonné des sciences, des arts et des métiers,* vol. 3 (plates) Paris, 1763, cf. also: Alphonse Chassant, Pierre Jean Delbarre. Dictionnaire de sigillographie pratique: contenant toutes les notions propres à faciliter l'étude et l'interprétation des sceaux du moyen âge. J.-B. Dumoulin, 1860) which also fills the gaps left in the ornament pattern. On the opposite end of the belly, right above the string holder there is another ornament in the shape of half an ellipse 'divided by its small diameter with the cusp of its curve terminated by an angle' (i.e. cut mid way at a right angle): it's made of a single piece of mother of pearl, 43 mm in width, pierced with eight polygonal holes, also filled with molten sealing wax.

Underneath the latter ornament and on the joint between the rim of the belly and the last rib of the hemispherical part, the string holder T is glued, called in Arabic *koursy* ‹كرسي› (chair), i.e. 'the seat': it is made of two pieces: one tapering to a point, which we shall call the string holder's tail; this is made of mahogany wood painted black and 63 mm wide at its base: the other forms a covered [sic! s.b.] protrusion on the bottom of the instrument, at Ω, a small piece of ebony veneer, through which are drilled four pairs of holes, in order to put through and fasten the strings; the remainder of the string holder is flat, cut at the edges, extends over the hemispherical part of the body and ends in the exact spot where the nine large ribs join. It is likely that this part of the string holder

Plate AA, fig. 6

serves to bolster the ribs by strengthening the point in which they joint; the protruding ridge of the string holder, which is pierced by four pairs of holes is covered by a small strip of tortoise shell, equally pierced by the same number of holes through which the strings are drawn.

A strip of reed covers the joint between belly and outer ribs from the string holder to the neck joint on both sides of the belly, over its entire length, which prevents this joint from coming apart (this strip is to be found on every other oriental (eastern) tanbour as well).

The neck M (plate AA, fig. 6) is flat on the front (the finger board) and rounded on the back. It is 41mm broad at the joint with the belly and 25mm in the area of the nut. A small groove runs on its right side, 11 mm from the fingerboard, over its entire length and part of the peg box too. This is also found on all other types of tanbour. The neck is constructed mainly of three parts: one (B) of beech wood on the base, which laps over the corpus. Its visible part is 90 mm high. On the front side are glued the two pointed boards of spruce from the belly's centre piece. On this part is also the mother of pearl decoration mentioned above. The latter marks the maximum height [i.e. length, Vil. implies a frontal, upright view on the tanbûr as depicted on his plate AA fig. 6] of this piece, the neck's base. The other piece comprises the whole rounded part of the neck including the peg box (C). This is made of one large piece of rock cherry wood [*prunus mahaleb*], 917 mm high [i.e. long] and 'grafted' [jointed/glued?] on the base. The frontal, flat side is carved out 9 mm deep [how does he know that?], all over the neck from *s* to B. This void is filled with the third part, also of rock cherry, flat and just as long as the carved out space mentioned above. It fills the the whole depth of the void up to the height of the peg box and the surface of the base (B). On each side of this third piece towards

the second is a little strip of spruce. Maybe this strip even stretches through the inside of the neck underneath the third piece which merely covers it. Only removing the latter by unglueing—which we didn't consider apropriate—could establish this.

Over the entire space from the nut to the belly the neck is divided unequally by frets called مواضع الدساتين *mouâda'ed-desâtyn* in Arabic ["place of the fingering", from Persian دست *dast*, 'hand']. Each of these frets consists of five turns of a thin gut string, wound very tightly and close to each other around the neck: there are altogether 36 such ligatures [Fonton: also 36]. Besides those there is another fret made from a hard and thin stub of an eagle's quill, glued on the belly 29 mm from the last gut-string fret on the neck. Thus the total number of frets is 37 [not in Fonton].

[p. 865] A little piece of mahoganny wood serves as nut. It is positioned and fitted between the third piece of the neck and the pegbox. On this nut are four pairs of small, very lightly carved notches, receiving the strings.

We already mentioned that the peg box, called بنجاك *bengâk* in Arabic, is merely the prolongation of the rounded part on the underside of the neck; yet, if we consider this pegbox seperately we find it to be 207mm high including the pointed piece of ivory on its end. Five mm under the latter is a small circle, also of ivory, inlaid in the wood. Eight small notches/groves [hoches], stretch longitudinally 29mm above the nut, designed to receive the strings and facilitate their transition under a ring we might call a capodaster. The latter consists of 13 rounds of very thin brass wire. It's function is to press the strings on the peg box or rather to keep them in the small groves which they are fed into in order to keep them low and by this means being carried over the nut. For otherwise the cordes, which are attached to the pegs outside the pegbox, would stray too far from the neck and would not cross the nut. That would render it most difficult to finger them.

There are eight pegs made of mahogany wood, called اوتاد *aouatâd*, stakes in Arabic. In the beginning of this chapter we have described their shape and place and there is nothing more to say.

On Ottoman pitches (sketch):

No pitch-forks or anything like it are extant. Closest thing: Ney.

Fonton (ms p. 99 ff): They tune after the ney, which comes in 3 sizes, about a minor or major second apart in pitch. Lowest note: râst=g. All notations are based on râst=g. Is this the 'chah-mansour' pitch? Unfortunately the length of the ney is given as between 24" and 25" (ca 60–63 cm)! This would be more like râst=c#. The cembalo cannot be tuned after the ney, "lest it would be utterly destroyed"—indicating that the actual pitch was very different from dugâh=a on the cembalo='amila' (the contemporary French civil pitch standard of about 415 Hz).