

**DISSEMINATION OF KNOWLEDGE AND APPROACH – A JAPANESE  
EXAMPLE FOR CONSERVATION  
REPORT ON THE “INTERNATIONAL WORKSHOP ON THE  
CONSERVATION OF URUSHI 2009”**

**VÖRÖS LAKKAL DÍSZÍTETT TÁRGY RESTAURÁLÁSA:  
PÉLDA A JAPÁN RESTAURÁTORI MUNKÁRA.  
A 2009-ES NEMZETKÖZI URUSHI TANFOLYAM EREDMÉNYEIBŐL**

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**Abstract**

*The conservation of Japanese lacquer or (in Japanese) urushi objects is a very special field in conservation practice. Most western conservators use synthetic polymers and other traditional western materials during the treatment of these works of art. The study of the unique Japanese conservation techniques is very difficult for a western specialist. Although there's an increasing need for getting more knowledge about this field, the training possibilities are very limited. The NRICPT (National Research Institute for Cultural Properties, Tokyo) plays a key role in providing a solution for the increasing demand of the west, and takes on a very important task by offering courses and workshops on the conservation of urushi. This article is about a 1 month, special workshop was held in 2009 at the NRICPT in Tokyo, and introduces a joint work of 2 western and 1 eastern specialist on the conservation of a rare type of Japanese urushi or lacquer coated object.*

**Kivonat**

*A japán laktárgyak (japánul, urushi) konzerválása a restaurátori gyakorlaton belül egy rendkívül sajátos területet képvisel. A legtöbb „nyugati” restaurátor műgyantát és más, a sajátos japán laktól idegen anyagot használ ezeknek a tárgyaknak a konzerválására. Az eredeti japán technika alkalmazása ugyanis rendkívül nehéz az ilyen tapasztalatokkal és képzettséggel nem rendelkező szakemberek számára. Az utóbbi években erősödik az igény az eredeti technikák megismerésére és alkalmazására, de nagyon kevés lehetőség nyílik arra, hogy a szakemberek elsajátítsák ezeket a készségeket. A Tokióban működő NRICPT (National Research Institute for Cultural Properties, Tokyo) kulcsszerepet játszik ebben a folyamatban, tanfolyamokat és konferenciákat rendez az urushi restaurálásának tárgykörében. Ez a tanulmány egy ilyen speciális műhelymunka eredménye, amelyet 2009-ben rendeztek a NRICPT szervezésében. 1 hónapon keresztül együtt dolgoztunk, két „nyugati” és egy „keleti” szakember közreműködésével egy ritka tárgytipuson, amelyet japán vörös lakk díszít.*

KEYWORDS: URUSHI, CONSERVATION, JAPAN, LACQUER

KULCSSZAVAK: URUSHI, JAPÁN, LAKK, KONZERVÁLÁS

**Foreword**

The subject of the workshop – the conservation of an incense clock – was exceptional, since western conservators usually don't have the chance to restore Japanese lacquer objects in their place of origin, so it was a great honour for us. Moreover, the treated object was an outstanding piece of its kind and belonged to a famous daimyo (powerful feudal lord) family, so it was not just an honour, but great responsibility for us. The joint work with my German colleague, Mrs. Ursel Adda Gasner from the Herzog Anton Ulrich Museum, Braunschweig was very inspiring and beneficial. The common thinking of different issues with our supervisor teacher Mr. Yoshihiko Yamashita gave answers for several problems and also resulted the arising of important questions too, which indeed helped

widening our knowledge about the Japanese way of *urushi* conservation.

***Preliminary research of the Jou Kou Ban  
– Incense Clock***

**How does it work?**

The incense clock (**Fig. 1**) itself is a considerably rare type of object even in Japan. Its Japanese name is *kou dokei* or more precisely *jou kou ban*. The function is obviously the measuring of time, but in a very special, delicate way. This object is used in shrines by monks, and signals the passage of time by different smell of incenses, which helps the monks in keeping the daily routine of different rituals, ceremonies, etc.



**Fig. 1.:** The incense clock before restoration

**1. ábra:** A tömjén-óra restaurálás előtt

They use special tools to press a few centimetres deep and about 1 meter long, snake-shaped line into the middle of the incense box filled with ashes (**Fig. 2**). The groove is then filled with different type of incenses, in a special order and fired at one end. As the incense line burns through, different smells emerge from the incense clock one after another in different times.

**The origin of the object**

This object is owned by a shrine called Jissouji, which is located in Minato-ku, Tokyo.

This shrine belonged to the Matsudaira family, one of the top daimyo families of the Edo period. The *jou kou ban* was an offering gift, a donation to the shrine. We had the privilege to visit the shrine and study the beautiful interior, the different objects stored and used in the building. As most of the lacquered objects of the shrine, the incense clock was believed to be made in the first half of the 19th century. We could see the incense clock's original place in the shrine, so we could better understand the background of the object and the way it was used.

**The structure of the object**

The incense box consists of five main elements, which can be easily taken apart.



**Fig. 2.:** The snake-shaped line of incense in the ash

**2. ábra:** A tömjén hamuja a kígyó formájú vájatban

This feature of the object helped our work, since the different parts could have been treated and handled more easily. The five units of the incense clock are:

**Shita bako – Bottom box**

It is the lowest part of the object and serves as a stand. In its front drawer different incenses were stored. We believe this part of the object is a later addition, because the quality of the ground layers (*noji shitaji*) and top black lacquer coatings (*roiro urushi*), which are on wooden substrate are inferior to the other parts.

**Kidai – Drawer stand**

The second unit of the object is used for storing special tools, which are used to clean and level the ashes, to deepen the snake-shaped line, apply the incense, etc. (**Fig. 3**). The wooden substrate has red urushi coating.

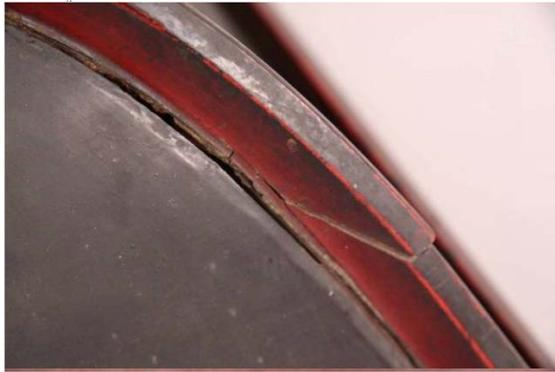
**Kubi – Neck**

The connection element of the drawer stand and the upper incense box.



**Fig. 3.:** The tools from the drawer

**3. ábra:** Az óra fiókjában elhelyezett eszközök



**Fig. 4.:**The split frame of the lid  
**4. ábra:** A fedő hasadt szegélye



**Fig. 5.:** Structural damage of the neck  
**5. ábra:** A nyakrész szerkezeti torzulása

It gives tallness and a slender shape to the object, breaking its massive appearance. It's made of several different pieces of wood. The wooden substrate is coated with red urushi.

#### ***Kou bako – Incense box***

The box containing ashes, where the incense is applied and burnt, is the “heart” of the object. Just like the former elements, the box has a wooden substrate coated with red urushi. The sides are decorated with pairs of family crests on each side, made with *hira maki-e* technique. The wooden box has an inner metal lining.

#### ***Futa – Lid***

The topmost element, which closes the incense box. Through its four circular wholes the incense smoke can fume out to open space. Its structure consists of a wooden frame with inserted metal plates, which has the circular wholes. There's a spherical ornament on the top. The wooden frame is red lacquered; the metal is coated with black urushi. There is one smaller family crest in the middle of each side in *hira maki-e*. The corners are strengthened with pairs of metal bands.

#### **Short condition survey**

Concerning the condition of the object, we could observe several damages. The most severe structural damage was on the lid, where the side of the wooden frame was split and the metal plates partially detached from the frame (**Fig. 4**). The other significant damage was the partial separation and deformation of the bottom board of the neck element (**Fig. 5**), which caused the local flaking of the urushi layers.

In addition to the structural problems of the substrate, deterioration of the urushi layers was also visible. Along the joints of the slightly deformed wooden substrate, small cracks appeared on the *kidai*. These cracks caused the lifting and flaking of the coloured urushi coating on several areas of the incense clock. At the areas of missing urushi coating, the exposed yellowish ground layers and the substrate turned a little bit black, presumably by the effect of incense smoke. These areas were significant on the bottom and corners of the *kou bako*, the sides of the *kubi* and at the edges of the *shita bako*. The foundation layers suffered losses at the top joints of the lid's side elements. This area and other parts of the lid also showed some detachments of the thin black lacquer on the metal plates. The heads of the reinforcing nails were also visible on the top of the *kidai* and the lid. The corrosion products of these nails deteriorated the surrounding foundation and urushi coatings.

On the surface of the urushi coating we could observe different kinds of contaminations. Dust and other contaminations from the air slightly covered the whole object, accumulated in corners and pits. Contaminations of human origin can be the greasy and oily deposits mixed with soot, which are probably originate from the everyday usage of the object, when accidentally incense ash was rubbed to the surface. These spots of alternate size could be observed on all parts of the incense clock. Fingerprints and scratch marks were also visible on the surface. Based on the information received from the shrine where the object is stored, the blackish contaminations and the matte spots mainly found on the side and top of the *kidai* are presumably caused by a cat living around the shrine (**Fig. 6**). The family crests of the *kou bako* was also contaminated, especially the pair on the left side (**Fig. 7**). Water marks were visible in the form of matte, round surface marks, mainly on the top areas and sides. The inside of the lid was covered with soot and burnt contamination, caused by the normal use of the object.



**Fig. 6.:** Black contamination on the drawer stand  
**6. ábra:** Fekete szennyeződés a fiók alján



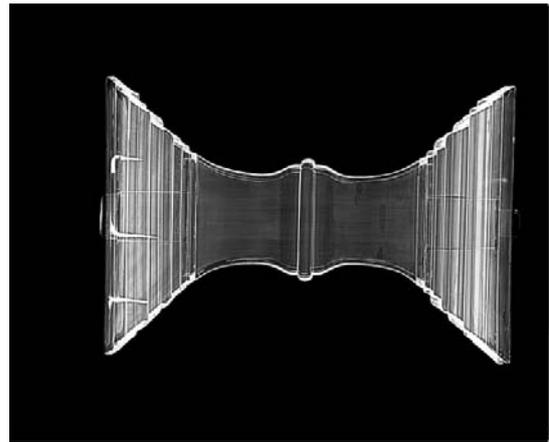
**Fig. 7.:** The soiled family crest  
**7. ábra:** Elszennyeződött családi címer

### **Scientific analysis**

We are very grateful to the NRICPT for providing us different possibilities of scientific analysis. These examinations were essential for establishing our plan of conservation and to get the most information about the structure, manufacture, deterioration and age of the object.

#### **X-ray radiography**

For the X-ray investigation we chose two elements of the incense clock: the lid and the neck, the units with the most severe structural damages. Besides the better visual study of the damaged areas, we wanted to learn more about the joining methods and materials of the different components (like nails in the wood, etc.). The X-ray pictures were taken with the Fuji Computed Radiography system of the institute. Choosing of optimal strength and time of radiation is crucial for getting a clear, evaluable picture. In the case of lacquered objects low radiation is preferable since the presence of wood and lacquer, so for the examined elements 40-45kV, 3mA and 30 seconds were used. On the picture of the lid, we could identify and localize the nails fixing the metals parts to the wooden frame and the damaged parts.



**Fig. 8.:** X-ray radiography of the neck  
**8. ábra:** A nyak-rész röntgen felvétele

The picture of the neck (**Fig. 8**) revealed the multilayer structure of the object and the existence of nails presumably used in a former repair.

#### **Video microscopy**

The closer study of the surface and the different lacquer layers changed some former knowledge about the incense clock. We took macro photographs with a special video microscope, which proved to be very effective for visual investigation. Following the examination of several areas of the object, we could clearly identify the layer structures. On the lower edge of the *kou bako*, the wooden substrate is covered with black ground layer which is presumably *kaki* and *sumi shitaji* (mixture of persimmon tannin and charcoal powder). It is covered with a thin layer of *sabi shitaji* (clay foundation) in order to get a flat surface, and red *bengara urushi* (refined urushi mixed with red iron-oxide) is applied on it (*bengara urushi* has a slightly brownish-yellowish tone, not as vivid as *shu* - vermilion urushi). We suppose that this *bengara* coating was the original surface and colour of the object.



**Fig. 9.:** The different lacquer layers of the incense box  
**9. ábra:** A tömjén-doboz lakkrétegei

Looking through the whole layer structure, we can see that later another foundation layer of *sabi* (clay) and another red urushi coating was applied. The final red lacquer is *shu* (vermillion) *urushi* (Fig. 9).

Observing the pictures taken from the damaged areas of the neck part we can see more or less the same layer structure, but on some areas we found the reinforcing textile (*nunokise*) in the thin foundation layer, which is the characteristic of good quality lacquer ware.

As the main result of our investigation, the repaintings suggest that the incense clock was made much earlier than it was originally thought, presumably in the middle of the 18th century.

### XRF analysis

We had the possibility to carry out XRF analysis of samples taken from the urushi coating of the object. Mr. Kitano helped us in the examinations, which was carried out with a Horiba Mesa-500W type X-ray fluorescence element analyser. The analysis of the ground layer of the black coating on the *shita bako* showed, that the main components are Si, Al and it also contains less than 4% of K, Fe, S, Ca. The upper red layer of the object contains a great amount of Hg, so we supposed, this is *shu urushi*. The layer underneath the *shu urushi* has lot of Fe in it, which means it must be *bengara urushi*. It proved, that our former assumptions –based on visual examinations – were correct.

### Conservation of the object

#### The aim of the conservation

For the conservation work we had a very limited timeframe – only 1 month –, so we had to take it account in establishing our plan of conservation. Since the complete restoration of the object could not be carried out, we decided to concentrate on the overall stabilization of the object using only minimum intervention. Following a complete, slight cleaning we planed to focus on the structurally damaged areas and where the lifted and deteriorated *urushi* film was the most vulnerable for further damage. This way we tried to get an aesthetic, homogenous appearance, preserving the original outlook and authenticity of the object and to insure its long lasting preservation.

#### Cleaning tests

In order to decide the most effective and safe cleaning solution for the incense clock, we tested different solvents commonly used in cleaning of urushi coatings. We made cleaning spot tests with mineral spirit, ligroin, Cleansolv G, water and ethanol on both the red and black urushi surfaces. Finally used for the cleaning of the entire object the mixture of ethanol : water = 1 : 2.



Fig. 10.: The cleaning of red surface

10. ábra: A vörös felszín tisztítása



Fig. 11.: Cleaning of the lid

11. ábra: A fedő tisztítása

#### Cleaning

Prior to wet cleaning, we mechanically removed dust from the surface, using different types of soft brushes. (Small dust particles, left on the surface, can cause the making of scratch marks during wet cleaning). We wetted very fine woven cotton cloth (*meriyasu*) with the above mentioned ethanol/water solution, and cleaned the surface with gentle, elongated movements, always working on larger areas (Fig. 10, 11).

#### Treatment of structural damages

After cleaning we continued the treatment of the most problematic part, the split frame of the lid. Before fixing the lid, we first carefully planned and tested the way and selected the critical points of applying the pressure in a special pressurizing frame (*shinbari dai*) for the refixing of the damaged, deformed structure of the lid.

We readhered the split areas and the partially lifted and detached lacquer layers in several steps. The adhesive was traditional *mugi urushi*, which we made by adding Japanese raw urushi to kneaded wheat flour paste.



**Fig. 12.:** Injection of *mugi urushi*

**12. ábra:** A *mugi urushi* beinjektálása



**Fig. 13.:** Pressurizing in *shimbari* frame

**13. ábra:** A nyomókeret (*shimbari dai*)

The mixture was kneaded and then spread onto the working board to prepolymerize it. We mixed and spread the material in about 20 minutes cycles for about 2 hours to achieve the proper stickiness and so the optimal adhesive properties.

We injected and applied this traditional adhesive with special brushes (**Fig. 12**), and then wiped off the excess material with non-polar solvent (ligroin).

Following the careful application of adhesive we put the object into the pressurizing frame and applied pressure to refix the delaminated areas with wooden and bamboo sticks and special pressurizing sheets (**Fig. 13**).

In the case of the *kubi* and the *kidai* we used the same adhesives for fixing their cracked and separated parts. In addition to *shinbari* sticks (pressurizing sticks), on certain areas the usage of small and long clamps was more convenient and effective (**Fig. 14**).

The treated parts were kept in the pressurizing frames for 4-6 days, for the complete hardening of the adhesive.

We presumed that the lowest part, the *shita bako* is a later addition to the object, since it has different colour and quality of top coating and foundation layers.



**Fig. 14.:** Pressurizing the neck with clamps and *shimbari*

**14. ábra:** A nyakrész felvált rétegeinek visszarángatása szorítók, és nyomókeret segítségével



**Fig. 15.:** Application of adhesive mixture on the bottom box

**15. ábra:** Ragasztó keverék felvitele az alsó doboz felületén

Under the *roiro* (shiny black) coating we found *noji shitaji* (ground made of animal glue and clay) and paper reinforcing. For the readhesion of these partially lifted and completely detached lacquer layers we tested different material mixtures. After testing starch paste, animal glue and different mixtures of them on a sample board, fixing small sheets of filtering paper onto it, we decided to use the mixture of *shoufu nori* (wheat starch): *nikawa* (animal glue) = 1 : 1, because it had the optimal hardness and adhesive properties. Also presumably this kind of binding media was used originally for this coating. For better penetration we added ethanol to the mixture. For application of the adhesive we used *neji fude* (fine brush) and also a thin wooden stick for the gentle lifting of the partially lifted layers to help the penetration of the adhesive mixture under it (**Fig. 15**). For pressure we used *shimbari* sticks and long clamps. We left it to harden for 3 days.



**Fig. 16.:** Test board of different filling mixtures with incense powder

**16. ábra:** A füstölő port tartalmazó, különféle kiegészítő anyagokat bemutató tesztlap

### Filling the missing areas

We used a special type of mixture (*kokuso* in Japanese) for filling the missing areas of the foundation layers. Since the object itself is a special type of incense burner and incense is traditionally used as a repair material in Japan, we tested different types of incense powders as filling material. The mixture of *shikimi* type incense powder with water gave a very good result. Before mixing the incense with water, it was necessary to sift it with 60# mesh, to get a fine and homogenous powder. For binding media, wheat starch paste, animal glue and *urushi* were tested. For colouring and adjusting black tone lamp soot, for red tone vermilion was used (Fig. 16). After examining the results, we selected the mixture of *shikimi makko* (incense powder) mixed with water + *urushi* + lamp soot for the missing black coatings of the lid. On the red areas we used the same mixture, but instead of lamp soot we added vermilion to the mixture. The used pigments were well blended into the original black and red surfaces. We applied the filling material with bamboo spatulas we made for ourselves, and small wooden sticks (Fig. 17, 18). During application we had to take extra care not to apply too much, since in this phase our aim was only to fill in the deep cracks, missing areas but not to fill up completely to the surface.

### Retouching of the lid

The topmost part, the lid of the object was the most contaminated. During the cleaning we faced with a serious problem. The removal of the blackish-greyish dirt layer couldn't be controlled well enough. Even with very careful cleaning the surface of the red lacquered frame showed light red spots, causing a stained surface, sturdily different from every part and the overall appearance of the object.



**Fig. 17.:** Application of filling material on the lid

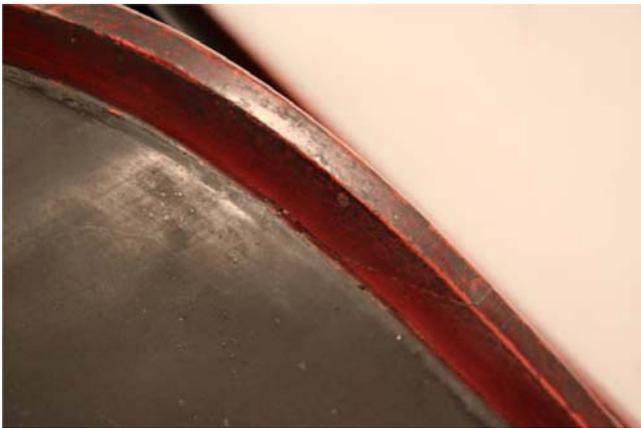
**17. ábra:** Kiegészítő anyag felvitele a tárgy fedelén



**Fig. 18.:** Wiping off the excess filling material on the neck

**18. ábra:** A felesleges kiegészítő anyag visszatörlése a felületről

During the cleaning we tried to keep the authenticity of the object and avoid going beyond our idea of overall cleaning and minimal intervention. So on the areas where we got the light red spots, we decided to stop cleaning process and to restore the dark appearance. For this purpose, we decided to use the European way of retouching. Since the main component of the deposits was the incense smoke, we tried to use this material for retouching. We burnt incense in a porcelain bowl and collected the smoke on the surface of another bowl put above the burning incense. The collected smoke had yellowish-brownish colour so it was not black enough. After testing different pigments and binding media, we added fish glue and Chinese ink with sake (Japanese rice wine) to the collected smoke material. It had the correct shine and tone. We applied this retouching mixture with fine brushes.

**Fig. 19.:** Details of the incense clock after conservation**19. ábra:** A tömjén óra részletei restaurálás után**Fig. 19a:** Drawer stand after conservation**19a ábra:** A fiókos állvány restaurálás után**Fig. 19b:** Bottom edge of the neck after conservation**19b ábra:** A nyakrész alsó éle restaurálás után**Fig. 19c:** Drawer stand after conservation**19c ábra:** A fedő szegélye restaurálás után**Fig. 19d:** Family crest after conservation**19d ábra:** Családi címer restaurálás után

### Conclusion

I think the treatment of the object was successful, since we could achieve our main aim of conservation. During the conservation work the missing areas were filled in and the most vulnerable, lifting lacquer layers were fixed back, and stabilized. The incense clock regained its original, stable structure and following the removal of surface dirt and the strongly adhering black contamination spots, completed with retouching, we could restore its aesthetic, homogenous appearance (**Fig. 19-20**). By these treatments we contributed to the long term preservation of the object.

### Acknowledgements

I'd like to express my deepest thanks to the organizers of this international workshop. I'm very grateful to Mr. Norio Suzuki, the director general of the NRICPT for his invitation, to all the members of the Restoration Techniques Department, to Mr. Wataru Kawanobe who kindly supported our work, to Mr. Nobuhiko Kitano who coordinated our stay in the institute and helped us in many ways during our study and to Mr. Yoshihiko Yamashita, our supervisor teacher who kindly guided our practical work and provided us a lot of invaluable information about the conservation of *urushi*.



**Fig. 20.:** The incense burner after conservation

**20. ábra:** A tömjén óra restaurálás után

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