

## NOTE

# Wood selection for Chinese wood statues preserved in the several museums in the USA

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## Abstract

The author's approach is focusing on wood selection for Chinese statues preserved in several museums, especially in the USA, where many East Asian sculptures are preserved, to get a deeper understanding of the historical background of Buddhist sculptures in East Asia. In general, *Torreya nucifera*, *Chamaecyparis obtusa*, *Cerasus* sp., *Zelkova serrata* were often used for Japanese wooden statues. Our research showed however, that the species selected for wood statues in China were completely different from those in Japan. Of the 62 Chinese wooden statues preserved in several US museums, the following wood species were identified by microscope: *Paulownia* sp. (17 statues), *Tilia* sp. (16 statues), *Salix* sp. (15 statues), *Populus* sp. (3 statues), *Juniperus* sp. (3 statues), *Santalum album* (3 statues), others (5 statues). Continued research will be necessary to understand the cultural exchange and logistics in East Asia.

## 1. Introduction

Wood species for East Asian wooden statues is now in the spotlight. In Japan, wood anatomist, Jirô Kohara, and art historian, Takeshi Kuno, performed wood identifications on over 600 Japanese Buddhist sculptures in the 1950s [1]. Further scientific wood identification of wooden statues from the 8th century in Japan has been systematically conducted by several researchers [2-4]. A hypothesis was proposed that the selection of *Torreya nucifera* for the 8th century statues, is referring to the commentary of a Sutra, that recommends the use of the so-called hakuboku, as a substitute for *Santalum album*, or sandalwood. Compared to that Japanese situation, wood identification of Chinese and Korean wood statues has not been done systematically so far.

The author's approach is focusing on wood selection for Chinese and Korean statues preserved in several museums, especially in the USA, where many East Asian sculptures are preserved, to get a deeper understanding of the historical background of Buddhist sculptures in East Asia. For the wood identification, the conventional microscopic method, and synchrotron X-ray micro-tomography (SRX-ray  $\mu$ CT) [5] were applied. As an interim report, this paper summarizes the wood identification results of Chinese wooden statues in the USA, conducted in cooperation with Drs. Mechthild Mertz (CRCAO-CNRS, France), Takao Itoh (Nara National Research Institute for Cultural Properties), and Junji Sugiyama (Kyoto University).

## 2. Materials and Methods

For wood identification, either optical microscopy, and synchrotron X-ray micro-tomography (SRX-ray  $\mu$ CT) was applied. Small samples were collected by curators or conservators of the museums. The samples were taken

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from the underside of the sculptures and from cracks, without harming the integrity of the sculptures. For the preparation of the microscopic slides, the samples were first soaked in water for softening, and then, thin sections were taken by hand, in cross, radial and tangential directions (20 $\mu$ m to 30 $\mu$ m thick). The sections were heated on a hot plate for removing the air-bubbles inside, and enclosed by the slide-mounting medium Gum-chloral. The slides were studied under the optical microscope (Olympus BX51). Some samples were too fragile and tiny for making preparations, so that SRX-ray  $\mu$ CT at BeamLine20XU in SPring-8 located in Hyogo Prefecture, Japan, was applied. This method provides high resolution (0.472  $\mu$ m/pixel) 3-D image of the anatomical micro-structure enough to identify the wood species.

### 3. Results

Of the 62 Chinese wooden statues preserved in several US museums, the following wood species were identified by microscope: *Paulownia* sp. (17 statues), *Tilia* sp. (16 statues), *Salix* sp. (15 statues), *Populus* sp. (3 statues), *Juniperus* sp. (3 statues), *Santalum album* (3 statues), others (5 statues).

The results of the wood identifications of 28 statues were extracted from published data [6].

Figure 1 shows the results of the wood selection trend in the 62 Chinese wooden statues studied so far.

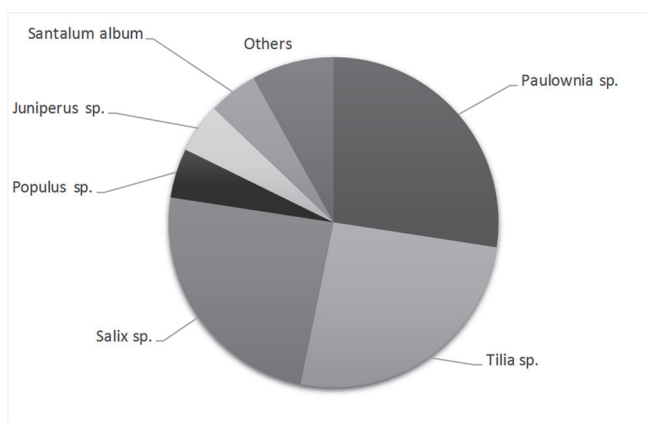


Figure 1. Wood species used for 62 Chinese wooden statues.

### 4. Discussion

In Japan, the following wood species, *Torreya nucifera*, *Chamaecyparis obtusa*, *Cerasus* sp., *Zelkova serrata* were traditionally used for wooden statues. Our research showed however, that the species selected for wood statues in China were completely different from those in Japan. Since this paper only summarizes the results of a limited cases for identifications conducted at several museums in the USA so far, it does not lead to any general trends or conclusions, it is an interesting result because it may show geographic differences on wood usage and also to understand the cultural exchange and logistics in East Asia. Continued research will be carried out.

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## References

- [1] Kohara J, “Nihon chōkoku yōzai chōsa shiryō” (Collection of the Japanese wood statues). *Bijutsu kenkyū* 229, 1964 (in Japanese).
- [2] Kaneko H, Iwasa M, Noshiro S, Fujii T, “Wood Types and Material Selection for Japanese Wooden Statues of the Ancient Period Particularly the 7th–8th Century”, *MUSEUM* The Bimonthly Magazine of the Tokyo National Museum 555:3–54, 1998 (in Japanese with English summary).
- [3] Kaneko H, Iwasa M, Noshiro S, Fujii T, “Wood Types and Material Selection for Japanese Wooden Statues of the Ancient Period (Particularly of the 8th–9th Centuries)”, *MUSEUM* The Bimonthly Magazine of the Tokyo National Museum 583:5-44, 2003 (in Japanese with English summary).
- [4] Kaneko H, Iwasa M, Noshiro S, Fujii T, “Wood Types and Material Selection for Japanese Wooden Statues of the Ancient Period, III: Further Thoughts on 8th and 9th Century Sculptures”, *MUSEUM* The Bimonthly Magazine of the Tokyo National Museum 625:61-78, 2010 (in Japanese with English summary).
- [5] Tazuru S, Sugiyama J, “Wood identification of Japanese Shinto deity statues in Matsunoo-taisha Shrine in Kyoto by synchrotron X-ray microtomography and conventional microscopy methods”, *J. Wood Sci.*, 65, 2019 (open access). <https://link.springer.com/article/10.1186/s10086-019-1840-2>
- [6] Mertz M, Itoh T, “Analysis of Wood Species in the Collection”, *Wisdom Embodied – Chinese Buddhist and Daoist Sculpture in The Metropolitan Museum of Art*, Denise Patry Leidy and Donna Strahan (editors), Yale University Press, pp. 216-225, 2010 (open access). [https://www.metmuseum.org/art/metpublications/Wisdom\\_Embodied\\_Chinese\\_Buddhist\\_and\\_Daoist\\_Sculpture\\_in\\_The\\_Metropolitan\\_Museum\\_of\\_Art](https://www.metmuseum.org/art/metpublications/Wisdom_Embodied_Chinese_Buddhist_and_Daoist_Sculpture_in_The_Metropolitan_Museum_of_Art)

## Profile



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<Biography> Graduated from the Graduate school of Agriculture, Kyoto University in 2007 / Completed the doctoral course at the Graduate School of Agriculture, Kyoto University (Ph.D. in Agriculture) in 2011 / Postdoctoral at RISH in the same year / Assistant Professor at the RISH in the same year (to present) < Research theme > Interdisciplinary research aimed at understanding the diversity of East Asian wood cultures, based on scientific investigations of cultural heritage materials employing both traditional and novel techniques <Hobbies> handicraft.