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Species Identification and Tree-Ring Dating of Wooded Boxes Excavated from Shinan Shipwreck, Korea

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1. Introduction

The Shinan Shipwreck, which was excavated at the south-western sea of Korea in 1970s, has been known as a Chinese trade ship traveling from China to Japan in the early 14th century (A.D.1323). Some tens of wooden boxes (Fig. 1 and Fig. 2) carrying Chinese porcelains had been identified as *Cunninghamia* spp., presumably produced from southern China. We reanalyzed the species of the boxes and shipboards. We also conducted tree-ring dating of box woods using Japanese master chronologies. The woods of main ship body were made from hard pines, which had window-like pit and dentate ray tracheids.

![Fig. 1. Chinese porcelains in wooden boxes](image1)

![Fig. 2. Wooden boxes of Shinan shipwreck](image2)

Fig. 1. Chinese porcelains in wooden boxes. Fig. 2. Wooden boxes of Shinan shipwreck (Korea National Res. Institute of Maritime Cultural Heritage, 2006). About 60cm(W) x 45cm(D) x 50cm (H)

2. Species of wooden boxes

We found the anatomical features of wood boxes are more close to those of the Japanese cedar (*Cryptomeria japonica*). The large taxodioid cross field pits of boxwoods had horizontal axis. Those of *Cunninghamia* woods have more or less vertical axis (Fig. 3).

![Fig. 3. Cross-field pit of modern Cunninghamia spp. (left) and Cryptomeria japonica (right : Shinan box wood).](image3)

3. Tree-Ring Dating

We analyzed 28 panels of wooden boxes and shipboards of Shinan shipwreck for tree-ring dating. Usually they had more than 100 rings (Fig. 4). The rings were measured with the LINTAB measuring machine by direct observing the radial surface of the panels.

![Fig. 4. Tree-ring dating](image4)
We could date 24 panels among 28 measured using the master chronology of Japanese cedar (Fig. 5). The ring patterns of three pairs were identical, indicating that they were made from the same trees. The outermost ring of two panels (sample number 8 and 9), which had sapwood portion of about 3-4cm, were dated to A.D. 1316 and A.D. 1304, respectively. These dates appeared to be very close to the cutting dates. Others with no clear heartwood-sapwood boundaries possessed outermost rings earlier than A.D. 1316.

Two shipboards, which protect the wood structure by covering the main body of the ships were dated together with box panels.

4. Conclusion
The results of the species identification and tree–ring dating indicated that the wooden boxes and shipboards of the Shinan Shipwreck were made from *Cryptomeria japonica* woods of Japan, not from *Cunninghamia* pp. of China.

References