

Preliminary Report of the Excavation of the Veal Svay Kiln in Cambodia: December 2014

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Introduction

The Veal Svay kiln site is one of the newly discovered ancient stoneware kilns located to the east of the Angkor monuments. Although it has been known since the end of the nineteenth century that stoneware kilns existed in Cambodia, all of the kilns identified and excavated in the Angkor area were found to have produced unglazed stoneware or ash-glazed stoneware vessels only. Until quite recently, the kilns responsible for the distinctive Khmer-style brown-glazed stoneware, which is commonly unearthed from Angkorian monuments, were known only around the present Thai-Cambodian border—Buriram and Surin Provinces in northeast Thailand, and Banteay Meanchey Province in northwest Cambodia. It can be said that most of our understandings on Khmer brown-glazed stoneware had been based on these Thai-based studies, and thus, this led to the hypothesis that Khmer brown-glazed stoneware was brought to Angkor from present-day northeast Thailand (Brown 1988: 55). These situations have changed in the past few years. New brown-glazed stoneware kilns along the ancient road—*la voie royale* from Angkor to Preah Khan of Kampong Svay—were found by Mitch Hendrickson (Hendrickson 2008). Following this discovery, the Nara National Research Institute for Cultural Properties (NRICP, Japan) made explorations in this area in 2008 and discovered a brown-glazed stoneware kiln designated the Veal Svay kiln, located in along the ancient road. A joint research project of this kiln was organized by APSARA National Authority (Cambodia), NRICP and Waseda University (Japan), and a full-scale excavation has been conducted since February 2013. This paper will report briefly on the excavation and scientific analysis in 2014.

1. Location of the site

As mentioned above, several ash-glazed and unglazed stoneware kiln groups have been identified and excavated in Siem Reap Province, including Tani, Bankaong, Khnar Po, Sar Sei, and Anlong Thom at present. The kilns in Siem Reap Province all seem to be located in the flatlands east of the Angkor sites, with the exception of Anlong Thom on Phnom Kulen (Fig.1). The distribution pattern of the kilns seems to correspond to the development of this area in the Angkor period (Tabata 2008a, b).

The Veal Svay kiln is part of a large brown-glazed stoneware kiln complex located in Beng Mealea commune, Banteay Srei district, about 15km to the east of Beng Mealea temple (Fig.2). The kiln lies at 13° 26' 2.50" north latitude and 104° 22' 9.20" east longitude. It is nearly 300m south of the ancient road from Beng Mealea to Preah Khan of Kampong Svay (Fig.3). Surrounding the kilns are the rice paddies of Village #103, Beng Mealea commune (Fig.4, 5). Another kiln group, named Veal Trac Chour, is located about 500m south of the Veal Svay kiln. This kiln group consists of at least nine mounds, five of them formerly located on a long dike measuring about 100m in a north–south direction, and four others situated southeast of the dike. Unfortunately, the five mounds on the dike were already destroyed

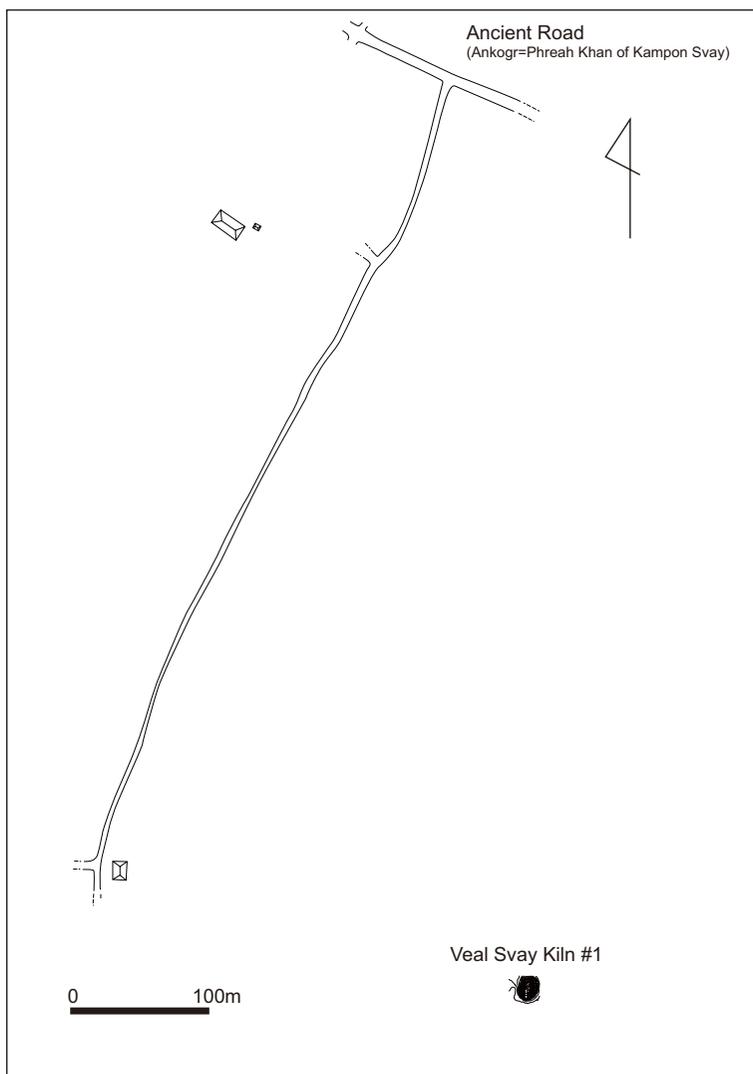


Fig. 3 Veal Svay Kiln and Ancient Road to Phreah Khan of Kampon Svay



Fig. 4-1 Veal Svay and Its Surrounding



Fig. 4-2 Veal Svay and Its Surrounding

by land development. Located approximately 2.5km west-northwest of the Veal Svay kiln, the Torp Chey kiln was excavated by APSARA and National University of Singapore in late 2011 and early 2012. The



Fig. 5-1 Veal Svay Kiln



Fig. 5-2 Veal Svay Kiln

Chong Samraong kiln, excavated by APSARA and the Smithsonian Institution in February-March 2013, is located 2.4km east of Veal Svay (Hein et.al. 2013). This quite small area along the royal road is dotted with significant numbers of kiln groups, and this fact suggests that the area was a large production center of brown-glazed stoneware in the Angkor period.

1. Research

The Veal Svay kiln site consists of two earthen mounds constituting possible kiln bodies. Of these,



Fig. 6 Kiln Mound (Kiln #1 Before Excavation)



Fig. 7 Excavation

the mound located to the west, designated kiln No.1, was selected as the research area for its accessibility. The excavation of 2014 season was conducted from December 22 to 30 for examination of the structure of firebox of Kiln No.1. Test pit No.1 was expanded to the north to clarify the plan of firebox. After the



Fig. 8 Aerial Photography with UAV



Fig. 9 Test Pit (Kiln Body)

excavation, ^{14}C dating and characterization of carbonized wood underrated from wast heap surrounding the kiln (test pit No.9, excavated in 2013) was conducted.



Fig. 10 Excavation (Side Wall of the Kiln)

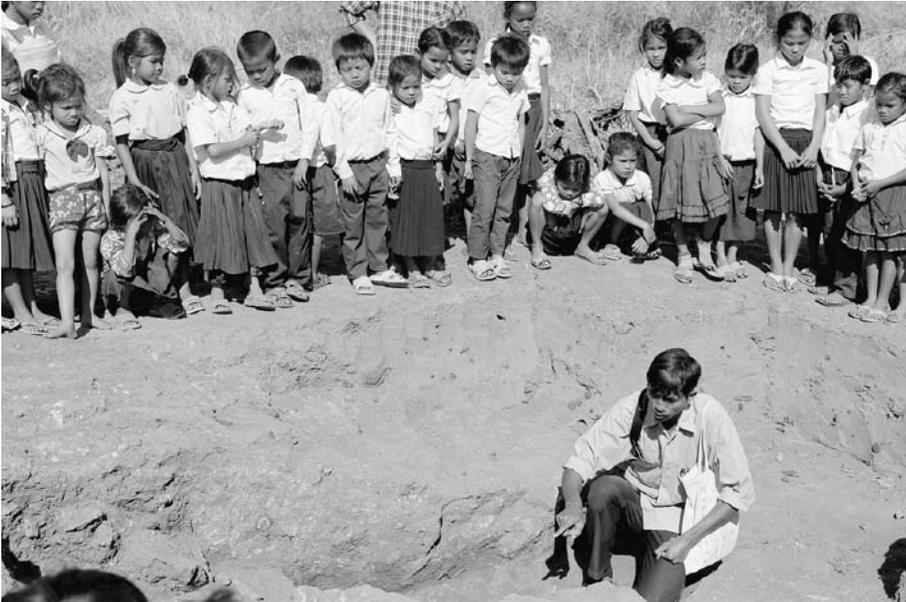


Fig. 11 Kiln Site Visiting by Primary School Students

2. Structure of the kiln

As identified in the last excavation in 2013, kiln No.1 is a cross-draft kiln with a long rectangular plan (Fig.12, 13, 14, 15). In common with other excavated Khmer stoneware kilns in both Cambodia and

Thailand, the Veal Svay kiln was a single-chamber kiln constructed with unfired clay. The kiln consists of a single rectangular-shaped ware chamber, a firebox (north–northeast side), and by inference, an exhaust port or chimney (south–southwest side). The arch did not survive. Judging from the observation of stratigraphy in the test pit on the edge of the mound, kiln No.1 was constructed on an artificial mound made of silty clay and blocks of burnt clay but the origins of those blocks is unclear.

In the ware chamber, clay kiln walls approximately 20cm in height remained on the east and west sides of the chamber. The floor was also made of clay and sloped slightly toward the firebox. At least two traces of columns were identified along the central axis; their function was to support the ceiling. The maximum

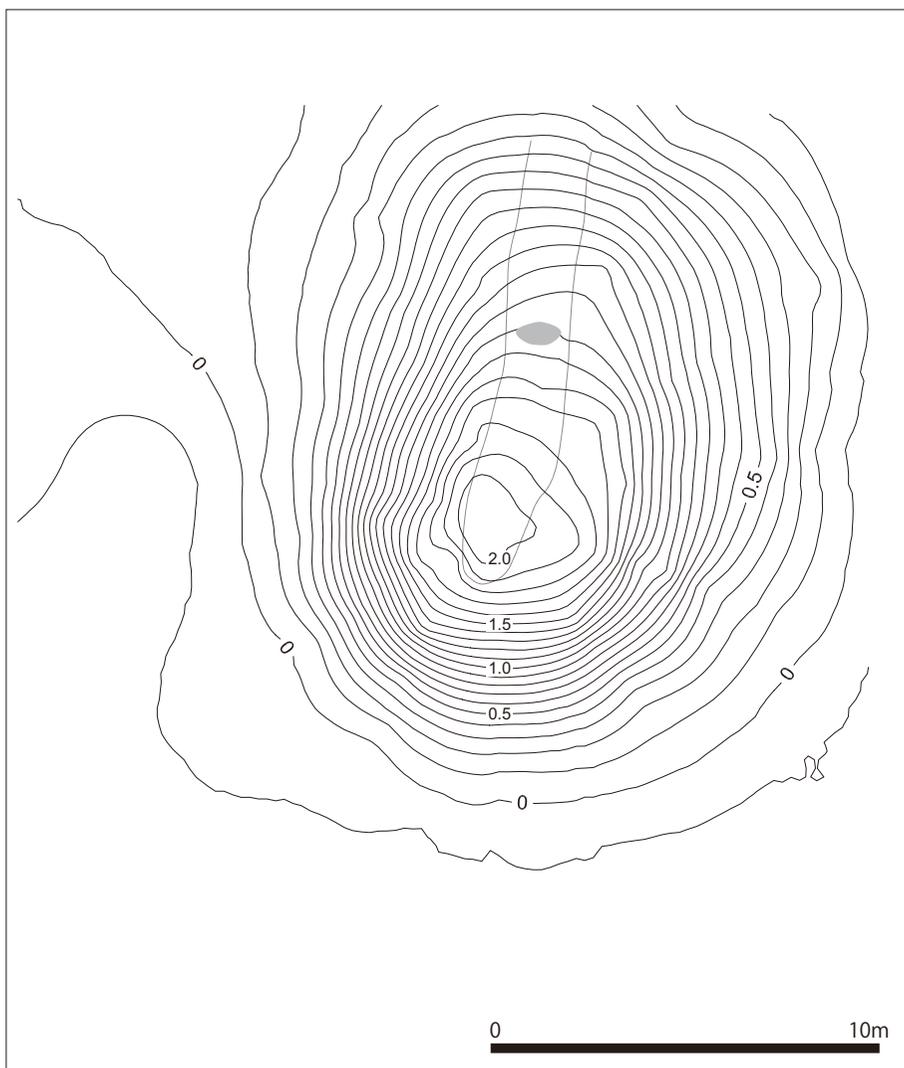


Fig. 12 Topographic Chart of the Kiln Mound



Fig. 13 Fire Box



Fig. 14 Fire Box

width of the ware chamber was nearly 1.8 meters. Finger traces and indentations of blades of grass were visible on the surfaces of the kiln walls. So far the investigations have not identified the presence of lateral trenches (“secondary fire trenches”) in the ware chamber floor like those found in the Torp Chey and

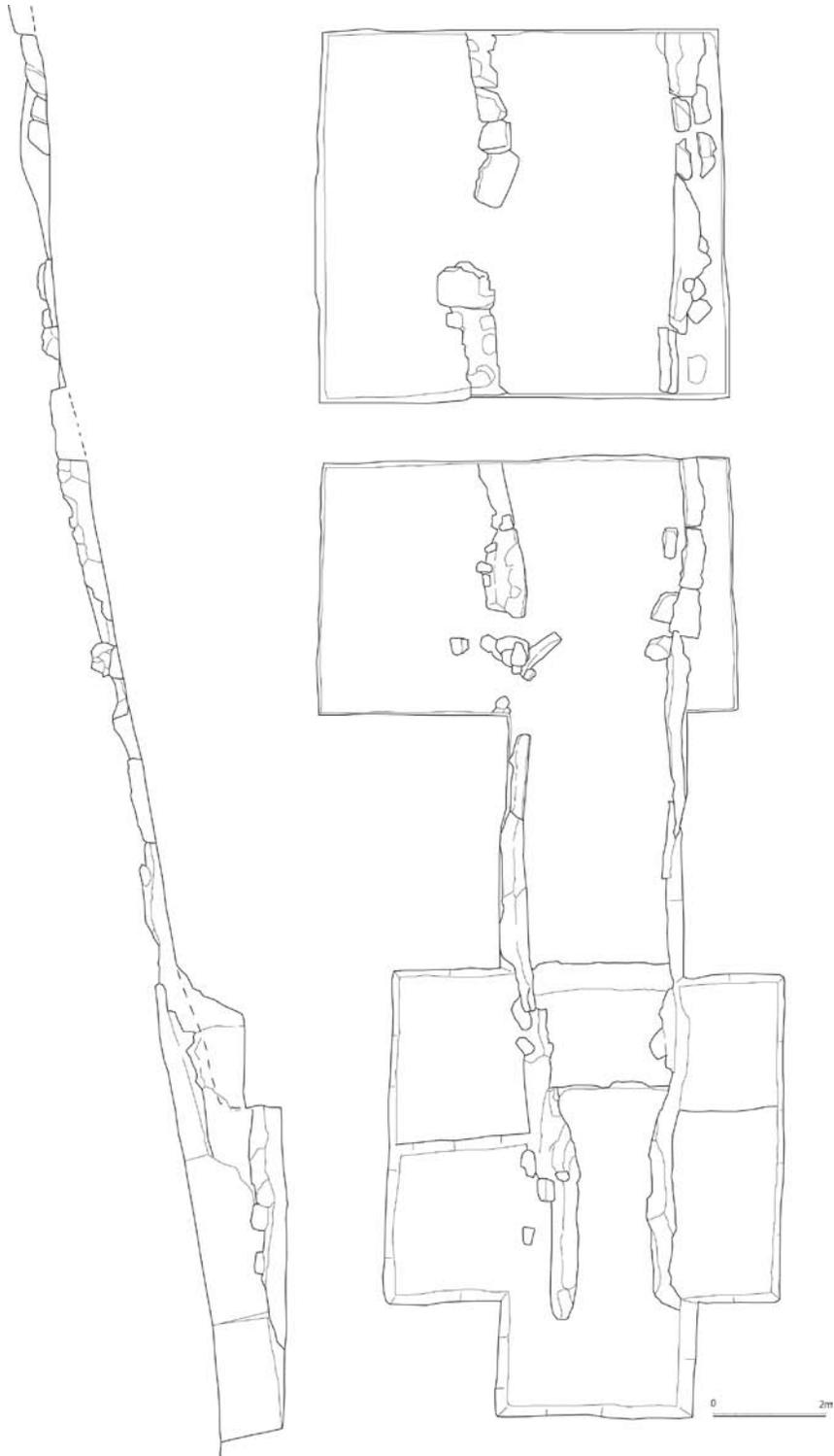


Fig. 15 Plan of the Kiln Body

Chong Samrong kilns.

Compare with the other excavated kilns in Angkor including Tani, Anlong Thom, and Sar Sei, relatively lower and tilted step that separate fire box and ware chamber is observed. Most part of this step was broken. A small rectangular shaped firebox seems to be lacking with the stoke holes or air holes, but due to the time limits, the floor of firebox was not fully examined. Perhaps these holes might be existed under the unexcavated soil of the firebox.

In contrast to other kilns in the Angkor region, no older floor was discovered under the floor of the ware chamber. This means that the kiln was not reconstructed on older kilns. Furthermore, only part of the clay floor was hardened or sintered. It is possible to say that the period of operation of this kiln was not so long.

3. Artifacts

The products of the kiln are roughly classified into two groups. Most of the excavated remains are large-sized brown glazed jar or vats, and a few small-sized wares with uncommon shapes are also seen. No roof tiles such as the ash-glazed stoneware kilns generally produced have been identified (Tabata et.al. 2015).

It is important to remember that a brown-glazed jar with animal decoration is identified. Underglazed incised line represents a running horse or other quadruped (Fig. 16, 17). The image is not brush-worked but this pictorial expression is quite rare to the decoration motive for Khmer glazed stoneware.

4. Scientific Analysis

After the excavation, C14 dating was conducted on a carbonized wood specimen that had been collected at wast heap surrounding the kiln (Test Pit No.9, Fig. 19). The C14 dates were determined by accelerator mass spectrometry (AMS). The measurement and calibration were carried out with the cooperation of Paleo Labo Co. Ltd. Based on the result, C14 have been calibrated into calendar age with OxCal4.2 (Calibration data files: IntCal13). The result of radiocarbon dating analyses calibration are shown in Char 1).

Through the calibration, date of 1281–1312 cal AD (48.0%) and 1358–1388 cal AD (47.4%) are seen on the range of 2σ calendar age (95.4%). The late thirteenth to the early fourteenth century or the middle of fourteenth to the late fourteenth century seems to be matched with the present understanding of the date of Khmer brown-glazed ware (twelfth to fourteenth century). Though, it might have a risk of erroneous dating to determine the actual operation age of the kiln by using only one C14 date. Within the narrow limits of samples, possibility that this kiln dates back to from the late thirteenth to the late fourteenth century is simply pointed out.

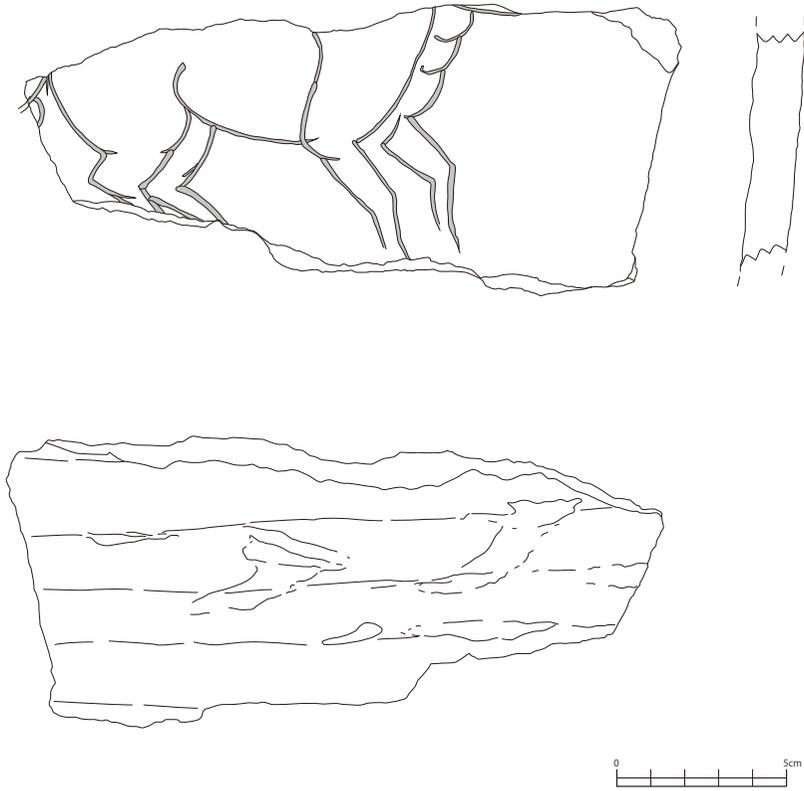


Fig. 16 Brown-Glazed Jar with Animal Decoration



Fig. 17 Brown-Glazed Jar with Animal Decoration

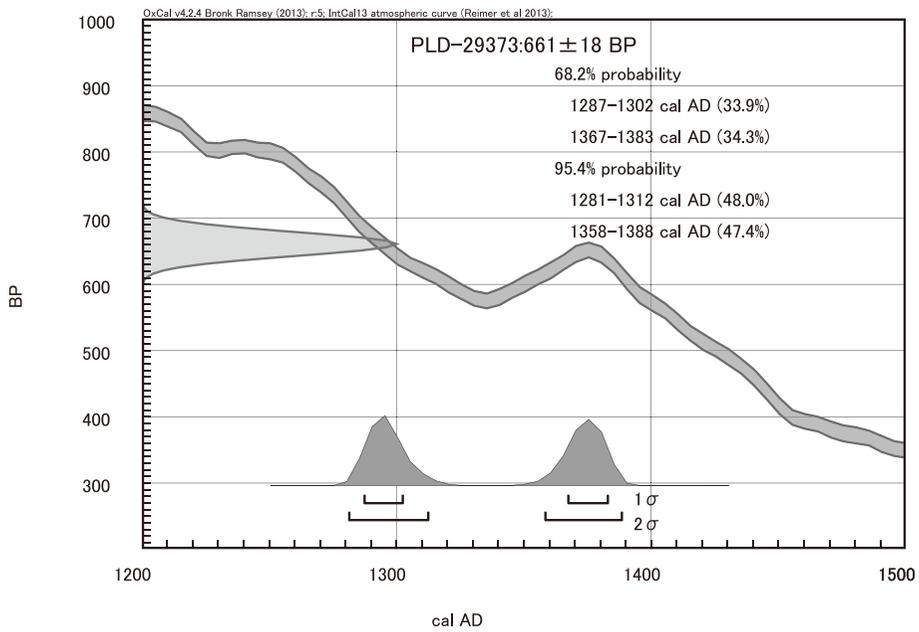


Chart 1 C14 Dating



Fig. 19 Carbonized Wood from Test Pit No.9

To detect the fuel, species identification was also conducted on a same carbonized wood sample. Before the identification, number of the survived growth rings and the diameter was tested. As a result of

preliminary examination, the specimen is botanically divided into three different kind of wood, and species identification was carried on these sub-divided samples. Species were determined by the observations of three kinds of thin sections—cross section, radial section, and tangential section—of wood tissues, using the microscope and the scanning electron microscope. The results are shown in Table 1 and Fig 20.

Because not only carbonized woods but also much of ash was found at the wast heap, these woods were the considered to be used as fuel. As a result of species identification, the *Shorea* or *Hopea* genus of the dipterocarp family (*Dipterocarpaceae*), the *Gluta* genus of the cashew family (*Anacardiaceae*), and unclassified diffuse-porous wood were identified. It means that all samples are classified into different genus and family of broadleaf tree.

Similar results of species identification are reported from the Tani kiln and Anlong Thom kiln (Hashimoto et. al. 2007: 206-208, Tabata 2008b: 72). Once Louise Cort estimated the use of a variety of local wood for firings (Cort 2000: 116-117); the results of identification support her idea. Moreover, the wide variation of the fuel lead us a hypothesis of resource strategy of Khmer stoneware industry. The utilization of miscellaneous trees does not seem to be strictly controlled wooden resources. Ancient Khmer potters probably selected a resource strategy of collecting many species of locally available wood rather than the specific tree planting for fuel that can be observed in East Asia.

5. Remarks

The Veal Svay excavation project 2014 provides us significant data to understand kiln technology in Angkor. Differ from other newly find and excavated brown-glazed kilns including Torp Chey and Chong Samrong, the kiln we excavated undoubtedly has no lateral stoke hole. This difference easily lead us to a hypothesis that Veal Svay might be older than Torp Chey or Chong Samrong and thus its structure bear some resemblance to older ash-glazed stoneware kilns likewise Tani, Anlong Thom, and Sar Sei—their date are considered to be around the tenth century (Tabata 2008a: 148-151). While 14C dating shows the possibility that Veal Svay dates back to from the late thirteenth to the late fourteenth century. With reference to the present understanding of the date of Khmer brown-glazed ware—the twelfth century to the fourteenth century, the late thirteenth century Kiln is difficult to regarded as a prototype of brown-glazed ware kiln or a transitional kiln from ash-glazed type to the brown-glazed type. This problem of the structure of kiln body should be paid more attention in further studies.

Until the last excavation, at the Veal Svay kiln, a tendency to specialize in large-sized ware and special small products such as zoomorphic ware became clear. In addition, whereas the Khmer ash-glazed stoneware kilns are proven to have produced roof tiles and other wares simultaneously, the Veal Svay kiln shows no signs of having produced rooftiles (Tabata et.al. 2015). Besides these significant features, the

Table 1 Result of Species Identification

No.	Identified Species	Diameter of Sample (radial × tangent)	Estimated Diameter of Original Wood	Number of the Growth Ring	Sample Code for 14C Dating
1	<i>Shorea</i> or <i>Hopea</i> genus of the dipterocarp family	4.2 × 3.0cm	approx.4cm	5?	PLD-29373
2	<i>Gluta</i> genus of the cashew family	2.1 × 1.3cm	-	2?	-
3	Unclassified diffuse-porous wood	1.5 × 2.3cm	-	-	-

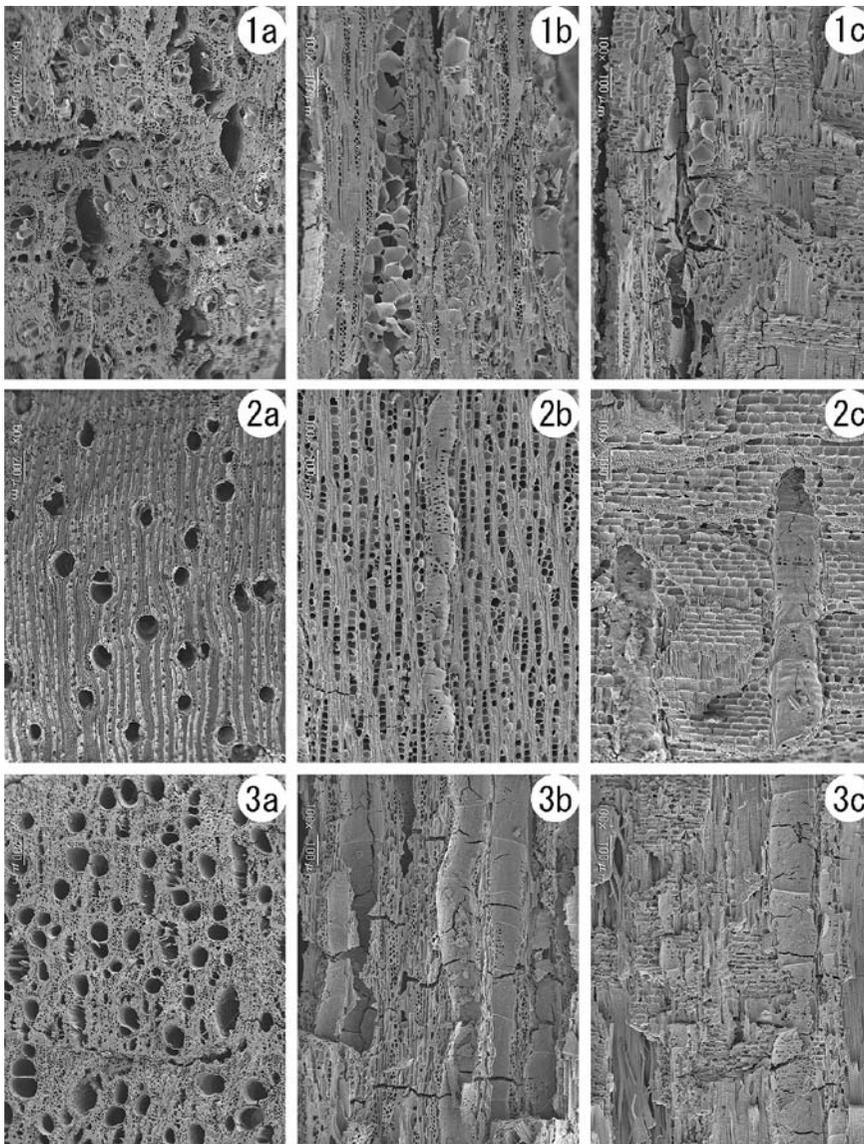


Fig. 20 Carbonized Wood a: Cross Section, b: Tangential Section, c: Radial Section

excavation in 2014 also shows us a unique product of the jar with underglaze engraving of animal. Further investigation will be needed to yield any findings about this kind of pictorial expression.

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