

Research and Restoration of Western Prasat Top

Reassembly of the Central Sanctuary and Scientific Analysis of the Artifacts Excavated from the Northern Sanctuary

1. Research on Western Prasat Top

Western Prasat Top is located in the south-west quadrant of Angkor Thom. It is situated west of the Bayon – about 500 meters down the road and 50 meters south into dense forest. The research and restoration project of Western Prasat Top has been carried out in collaboration with APSARA (The Authority for the Protection and Management of Angkor and the Region of Siem Reap) since 2002. Our discoveries from the central sanctuary and the northern sanctuary have contributed new and important evidence to understand the history of the late Angkor period. We will discuss this unearthed evidence from the perspectives of archaeology, archaeological science and iconography.

2. Reassembly of the Central Sanctuary

In FY2020 the reconstruction of the platform and building frame of the central sanctuary was carried out. Thanks to the efforts of local Cambodian staffs, reconstruction work was able to proceed without major interruption by the COVID-19 pandemic while Japanese experts could not travel there. From March 2020, we completed the upper platform and started to reassembly of the stone pavement of the upper platform, and the building frame in September.

3. The Decorative Stones of the Building Frame

Some of the decorative stones of the façade and pediments of the central sanctuary were stored in Conservation d'Angkor in Siem Reap city to avoid looting after the civil war (1970-1992). In order to reconstruct the site, the stones of the apertures are indispensable, and from the viewpoint of authenticity, it is desirable to reinstate these original stones to their original position. The Cambodian Ministry of Culture and Fine Arts approved the request to return the stones to Western Prasat Top.

As a result of the survey, it was confirmed that the lintels, colonnettes and door frames of the façade are similar, in terms



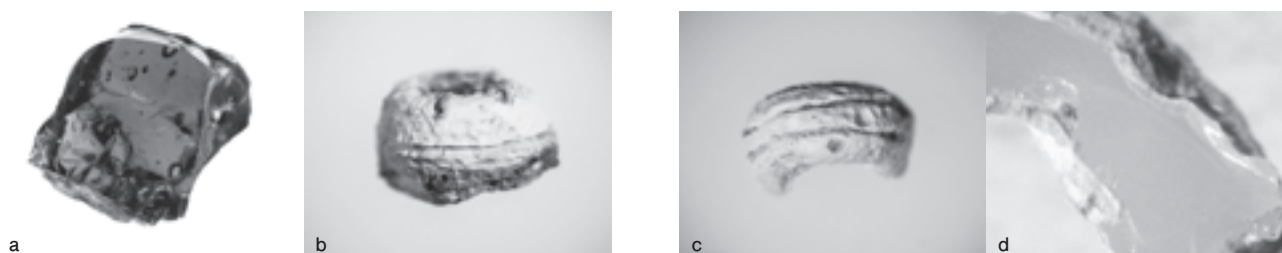
Figure 91 Southern façade of the central sanctuary under the reassembly and the reconstructed southern façade of the northern sanctuary (view from the south)

of their iconography and carving techniques, to those of the Banteay Srei style of the 10th century CE (Figure 91). On the other hand, the iconography of the pediments can be dated from the late Bayon to post-Bayon period (late 13th-15th century CE), in which there are Buddhist and Hindu iconographies respectively. In other words, the decorative stones placed in the central sanctuary, including those of the old Banteay Srei style, are a mixture of Hindu and Buddhist elements. It is known from our research that Western Prasat Top was built as a Theravada Buddhist Temple around the 14th century CE, at a time when Theravada Buddhism was already practiced. However, the fact that Hindu motifs such as Yama and Kala were newly carved at the same time, in addition to Buddhist iconography, is important as it shows the nature and acceptance of faith in Angkor at that time.

4. Analysis on the Unearthed Glass Beads

Materials and Methods As a result of the restoration of the Northern Sanctuary, an underground brick chamber was discovered beneath the Northern Sanctuary (NABUNKEN 2018). We examined glass fragments and glass beads found in the brick chamber. The glass fragments were all dark blue and transparent (Figure 92a). The small glass beads were heavily weathered (Figure 92b, c), but were originally translucent white in color (Figure 92d). They are made with a winding method.

We conducted chemical analysis on one of the fragments and two small beads to identify the compositional type and colorant of glass. Chemical composition was analyzed by energy dispersive X-ray fluorescence spectrometer (EDAX, EAGLEIII). The measurement was performed after removing



(a: 17, b: BW07-1, c: BW07-2, d: BW07-2 cross section)

Figure 92 Glass from Western Prasat Top

Table12 Results of X-ray fluorescence analysis

No.	style	color/ transparency	wt%																				
			Na ₂ O	MgO	Al ₂ O ₃	SiO ₂	P ₂ O ₅	SO ₃	K ₂ O	CaO	TiO ₂	Cr ₂ O ₃	MnO	Fe ₂ O ₃	CoO	Ni ₂ O ₃	CuO	ZnO	As ₂ O ₃	PbO	Rb ₂ O	SrO	ZrO ₂
17	fragment	dark blue/ transparent	18.8	0.8	5.0	68.2	0.1	0.3	1.8	1.0	0.25	0.02	0.05	3.30	0.11	–	0.02	–	0.10	–	0.03	0.03	0.17
BW 07-1	bead	white/ translucent	1.1	0.1	1.0	45.5	1.0	–	10.0	4.1	0.01	0.02	0.04	0.18	0.02	0.01	0.03	0.02	–	36.3	0.04	0.18	0.42
BW 07-2	bead	white/ translucent	0.9	0.1	1.0	46.0	0.7	–	7.0	4.1	0.02	0.02	0.04	0.19	0.02	0.01	0.04	0.02	–	36.3	0.03	0.17	0.40

the weathered layer on the glass surface. The target material of the X-ray tube is rhodium (Rd) and the tube voltage is set to 20 kV, the tube current is set to 200 μ A, and a measuring time (live time) is 300 seconds. The measurements were conducted in a vacuum. The measurement results are normalized by the FP method in a way that the total amount of the oxides of elements detected will be 100%. The FP method was calibrated using glass standard samples.

Results and Discussions The results of X-ray fluorescence analysis are shown in Table12. The results of analysis indicate that the blue glass is a soda glass. In addition, this blue glass has a relatively high amount of Al₂O₃ and low amount of CaO and is presumed to carry on the tradition of Southeast Asian types of glass that has existed since the first millenium BCE - such as Group SIIB (Oga and Tamura, 2013), or m-Na-Al (Lankton and Dussubieux, 2013). However, it is noteworthy that arsenic (As) is detected in addition to cobalt (Co) in this blue glass, and the coloring agent (cobalt raw material) is different from more ancient ones. Since sulfur (S) was also detected, it is presumed that cobalt or cobalt ore (cobaltite, CoAsS) is probably used as the cobalt raw material. Cobalt raw materials containing arsenic are not used in ancient glass. For ancient glass in Southeast Asia, a cobalt raw material with a large amount of manganese (MnO) or a cobalt raw material with a slight amount of copper (CuO) and lead (PbO) was used. The former is thought to be a mineral like asbolite, but the specific minerals for the latter are not known. On the other hand, in the medieval western world, cobaltite (CoAsS) was used as a coloring agent. In Southeast Asia, it is possible that cobaltite

came to be used as a coloring agent sometime after the 8th century CE. It is possible that the blue glass from Western Prasat Top was made of Southeast Asian glass with a cobalt colorant obtained from the West.

On the other hand, the two glass beads were both potash-lead glass. Potash-lead glass is a relatively new glass that was invented in China and appeared in the Song Dynasty at the latest. Potash-lead glass is known in Southeast Asia as a material for “Chinese Coil Beads”, and its distribution volume increased in the late Song Dynasty, surpassing Indo-Pacific Beads in numbers after the 13th century CE (Francis 1989, 1990).

This study provides evidence for foreign influences at Angkor, including the acceptance of Theravada Buddhism, as well as Angkor's links to international trade networks.

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