

A study of polished stone tools from Samrong Sen, Cambodia: the French Museum collections

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Abstract

The prehistoric site of Samrong Sen has been discovered in the late 19th century and has yielded many polished stone tools, but no proper excavation has ever been conducted on the site. These stone tools are now scattered in different museums, especially in Europe. The present paper concerns 289 polished tools from different collections. They have been studied under different aspects like the lithology, the morpho-typology, the technology, the microwear observation, the residue analysis and the ethnographic comparisons. The target of this study is to collect and record the maximum data for characterising the assemblage from Samrong Sen as a reference for further study of the polished stone implements of the Cambodian and Southeast Asian prehistory.

Le site préhistorique de Samrong Sen a été découvert à la fin du 19^e siècle et a livré un grand nombre d'outils en pierre polie, sans qu'aucune véritable fouille n'ait été réalisée. Ces objets sont maintenant dispersés dans plusieurs musées, en particulier en Europe. La présente étude porte sur 289 outils polis, issus de diverses collections. Ils ont été envisagés sous différents aspects comme la lithologie, la morpho-typologie, la technologie, l'observation des micro-traces d'utilisation, l'analyse des résidus, les comparaisons ethnographiques. Le but de cette étude est de rassembler et enregistrer le maximum d'informations pour caractériser l'assemblage de Samrong Sen, afin de les utiliser comme référence pour l'étude future des outils de pierre polie de la préhistoire cambodgienne et sud-est asiatique.

Keywords: Samrong Sen, Cambodia, Polished stone tool, Neolithic and Bronze Age

The prehistoric site of Samrong Sen has been discovered in the late 19th century. The site is situated around 22 km East of the provincial port of Kampong Chhnang (Vanna 1999). It lies on the east bank of the Steung Chinit, a tributary of the Tonle Sap (Fig. 1). The objective of this study is to record and document maximum information of cultural assemblages from the prehistoric site of Samrong Sen that are now kept in European museums, particularly in France.

The main target focuses on polished stone implements occurring in these collections.

Large quantities of stone tools were recorded from Musée de l'Homme, Paris; Musée

d'Histoire Naturelle de Lyon; Musée d'Histoire Naturelle de Toulouse; Musée des Antiquités Nationales, Saint-Germain-en-Laye; Institut de Paléontologie Humaine, Paris and a few currently on display at the Museum of Far-Eastern Antiquities, Stockholm (Tab. 1).

Polished stone tools show a remarkable homogeneity (Allchin, 1962). In dealing with such a large amount of specimens from different localities of the same site, it is impossible to make a complete and detailed analysis of all features for every tool. We may notice at this time the method in which the collections were acquired. There is no clear confirmation of

N°	Localities	Collections	Years	Amount of Items
1	Département de Préhistoire, MNHN, Paris (Musée de l'Homme)	H. Mansuy	1902	142
2	Musée d'Histoire Naturelle de Lyon	L. Jammes	1897	71
3	Musée d'Histoire Naturelle de Toulouse	J. Moura, F. Régnauld, C.C.Rousseau	1876 ? ?	18 11 15
4	Musée des Antiquités Nationales, Saint-Germain-en-Laye	L. Jammes Vitout Corre	1889 1912 1905	6 4 1
5	Département de Préhistoire, MNHN, Paris (Institut de Paléontologie Humaine)	Vésigné	1906 ?	18
6	Museum Far-Eastern Antiquities, Stockholm	J.G. Andersson	1936- 1938	3
7	Total			289

Tab. 1. List of stone implements within the different collections.

excavation, and as far as it can be supposed all was casual surface collection or unsystematic excavations during shell exploitation for production of hydrated lime by villagers and often handed over to the missionaries. There can be little doubt that some groups of tools come from particular localities, generally from workshops. At least this is the impression that can be gained from closely related groups of tools made of distinctive raw materials, but for all of this we lack key information. We should point out that the archaeological field, and thus the area from which the objects derived, is the floodplain of the Tonle Sap. Although, this coincidence is accounted for by the method of collection, it may also have a much more profound and interesting significance. This, however, is a topic which can only be studied after further field campaigns.

Stone tools have been divided into eight categories base on their morphological characteristics (adzes, axes, shouldered adzes, shouldered axes, gouges, chisels, along with a burnisher and a tool used as a hammer). Axes and shouldered axes are very rare at Samrong Sen as we can see in the collections, while adzes are the most common tool (Fig. 2). Chisels and gouges are present but in lower frequencies than adzes (Fig. 3). Flakes, debris, pre-forms and unfinished tools are very rare or eventually were

not recorded within the collections (Mansuy, 1902; Vanna, 1999).

Due to the lack of this evidence, for the moment it is impossible to reconstruct the operation chain of tool manufacturing at Samrong Sen. However, careful observation of tool surfaces, reveals that they were first shaped by picking or flaking and then finished either by partial grinding or edge grinding, or full grinding. Sawing techniques may also have been utilised, but probably for the later periods.

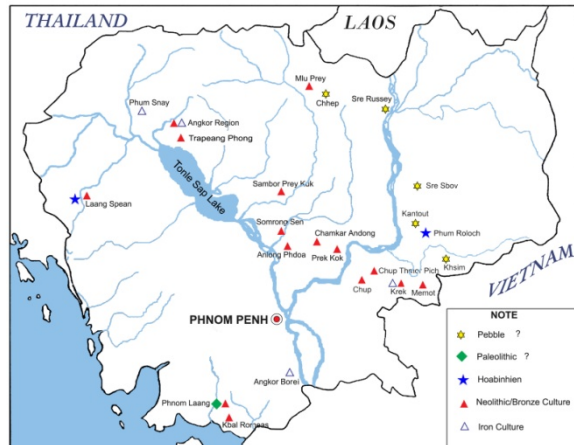


Fig. 1. Prehistoric sites in Cambodia, discovered before and after Khmer Rouge (modified from Mourer, 1994 and Albrecht *et al.*, 2001).

On the basis of the raw materials recorded in the inventories, the tools from Samrong Sen are made from several types of stone that include: phtanite, quartzite, schist, rhyolite, diorite, porphyry, chalcedony, sandstone, hornfels, as well as basalt. Phtanite is present more frequently than other types. To confirm this information we selected some of the tools for Raman and Infrared Spectroscopy analysis.

Unfortunately, Raman Spectroscopy did not provide any results because of pollution and fluorescence on tool surfaces. Infrared Spectroscopy is providing reliable results. IR spectra for most of the tools that we have examined indicated chemical compositions corresponding to the type of rocks mentioned in the inventory. But some of the attributions had to be corrected. For this reason a more complete study of raw materials employed for tool manufacture, and their sources, is obviously needed. Regrettably, this is not easy task, as the collections include a wide range of rocks and local comparative material is not at hand and dangerous to collect. The interest in determining the sources of some of the uncommon stones is



Fig. 2. Variety forms and sizes of polished stone adzes shouldered adzes from Samrong Sen.



Fig. 3. Variety forms and sizes of polished stone gouges and chisels occurring in the collection of Samrong Sen.

obvious. For the moment, the suggestion that stone tools from Samrong Sen were made from local material is still questionable.

Micro-wear analysis of several tool types of Samrong Sen showed that they are multi-purpose tools used in heavy and light wood or bamboo working. The adzes perhaps were used to fell trees and chop wood or bamboo and for more delicate tasks, like planning or smoothing wood.

Gouges and chisels possibly were employed for carpentry like grooving, smoothing or carving wood decoration, art objects as well as for making ornaments. This is only a very limited example that we obtained from preliminary micro-wear analysis. This technique of examination is time consuming and requires concentration on many technical details. The methodology behind any good micro-wear study must be particularly constructed and carefully implemented. Further micro-wear studies should

help in understanding the full range of activities that were conducted at the settlement. The microscopic examination of Samrong Sen tools must be complemented by ongoing replication experiments and ethno-archaeological fieldwork if we wish to reconstruct the ancient human behaviour in the Samrong Sen area during the transition from Neolithic to the beginning of the Metal Age.

Hafting of the tools was not clearly proved, but at least suggested by resin remains that have survived on the surface of one adze. It can be considered as glue for binding adze blade with wooden shaft. Chemical analysis through chromatography and comparison with natural resins utilised nowadays by some people showed that it is a mixture of these natural resins. For the rest of the material, lack of hafting evidence does not mean that all of the tools were used without hafting.

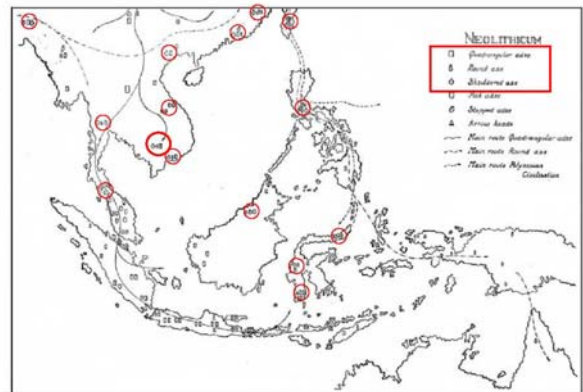


Fig. 4. Map showing the distribution of polished stone tools in Southeast Asia and other islands in the Pacific Ocean (after Heekeren, 1957).

Samrong Sen is a most important site exhibiting close relationships with other Neolithic sites in Southeast Asia and many islands in the Pacific Ocean. Stone tools from Samrong Sen, particularly adzes having quadrangular sections, are comparable to those found in Indo-China, southern Thailand, Burma/Myanmar and as far as India, Malaysia, Indonesia, Philippines, Melanesia, Micronesia, and Polynesia (Heine Geldern, 1932; Loewenstein, 1957; Heekeren, 1957 and Duff, 1970) (Fig. 4). More interestingly, stone gouges from Samrong Sen are strongly linked to stone gouges found at the Marianas, the Fiji-Lau areas of Melanesia (Duff 1970). Duff considered that the gouge from Samrong Sen is one of the oldest

types on grounds of distribution in Oceania. It is possible that this was the predecessor of an important class of Micronesian and Melanesian adzes (Duff, 1970). The diffusion and origins of stone tools is also a main topic for further study by comparison with recent discoveries.

Polished stone tools from Samrong Sen were appropriate tools for a wide range of wood-working activities. The Samrong Sen inhabitants produced them at a time when pile houses and boat constructions were essential for settlement in the flooding zone. The Samrong Sen stone tools and pottery industry is very standardized as well, and it has been suggested that the production of pottery vessels and lithic artefacts was then in the hands of craft specialists

(Mansuy 1902, Mourer 1994, Demeter *et al.*, 1998 & Vanna, 1999 & 2002). The use of standardized tools may also be an indication of greater efficiency towards natural resources. Polished stone tools were used by Neolithic communities but they still played an important role at the beginning of introduction of metal in order to exploit the nature (Yerkes *et al.*, 2003). Semi-sedentary agricultural societies could not function efficiently without stone tools (Yerkes *et al.*, 2003). Standardization in polished stone tool forms and functions was one of the socio-economic changes experienced by the societies that lived in the floodplain zone of the Tonle Sap during the transition of Neolithic and Metal periods of Cambodia.

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