

An Interpretation of Ban Chiang Rollers

EXPERIMENT AND SPECULATION

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THE POTENTIAL of experimental archaeology is particularly obvious when anomalous objects of unknown function are identified in a site. The ceramic cylindrical rollers from Ban Chiang will be discussed here to test assumptions that have been made about these artifacts.

The site of Ban Chiang, Udorn Province in northeast Thailand is presently being excavated by the Thai Fine Arts Department and the Museum of the University of Pennsylvania. Although site reports are not yet available, enough is known about the site to say that it could be one of the most important and interesting Asian sites excavated during this decade. Information on the site is based on the following sources in English: Gorman and Charoenwongsa (1976), Higham (1975), and Van Esterik (1973, 1976, 1978).

The site is a cemetery mound, occupied from 3600 B.C. to 250 B.C., with several different burial patterns, each exhibiting a wide range of grave offerings, including "bronze axes and moulds, crucibles, bracelets and wire necklaces, iron implements, pottery vessels, animal and human figurines as well as substantial quantities of animal bone" (Higham 1975: 247). The cylindrical ceramic rollers, of concern in this brief study, were found in the upper layers of the excavations, associated with human burials (Gorman and Charoenwongsa 1976: 24).

These rollers range from 3–10 cm in length and from 2.5–4 cm in diameter. Patterns cut on the surface of the rollers include parallel lines, wavy lines, zig-zags, spirals, and other geometric designs. There is a hole bored lengthwise through each roller (Plate I). Kanchanagama (1975: 175) shows that the holes are not always centered.

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VAN ESTERIK AND N. KRESS: The Ban Chiang Rollers 53

Those who have examined the rollers from Ban Chiang have hypothesized about their function. Kanchanagama first speculated on the use of the rollers:

Many tend to think that the rollers might have been used as tools for making designs on hand painted vessels or as neck or waist ornaments. Since some small pieces of cloth were found on metal tools I hypothesize that they might have been used as design-making tools for fabric printing instead. The printing technique probably called for smearing the roller with paint and, for convenience, a piece of wood was inserted through the hole for handling the roller before rolling it over the cloth. (Kanchanagama 1972: 175)

In his book (in Thai) on Ban Chiang, Charoenwongsa agreed that the rollers were used as a means of printing fabric, and demonstrated, in a photograph, cloth printing with the rollers from the site (Charoenwongsa 1973: pl. 1).

After more extensive work, the excavators of Ban Chiang reported:

In the upper layers of both years' excavations we found a number of curious clay rollers deeply carved with patterns of geometric and/or curvilinear designs. When these are rolled over a flat surface they produce complex, often interlocking, curvilinear designs. Some bear traces of red or blue pigment, supporting our assumption that these were used to print patterns on woven or matted textiles. (Gorman and Charoenwongsa 1976: 24)

They further suggest that the fabric printed was silk (Gorman and Charoenwongsa 1976: 23, fig. 3).

Van Esterik also assumed that the rollers were associated with fabric manufacture or decoration, but suggested that they may have been used with a stenciling technique similar to the method used for decorating bark cloth (Van Esterik 1973: 176).

Most published reports emphasize that the rollers could not have been used to apply painted designs to pottery, and since we could not expect any evidence concerning their possible use in skin painting or tattooing, the most reasonable and testable hypotheses about the function of the rollers center on their use in the decoration of fabrics.

In 1961, Ascher suggested that imitative experiments duplicating artifacts and processes in which they could have been used was a productive way to test beliefs about past cultural behavior (Ascher 1961: 793). Experimental archaeology, then, may be a valuable way of testing the hypotheses concerning the use of the rollers in fabric decoration. Accordingly, four ceramic rollers were made to duplicate the Ban Chiang examples.

Assuming that the rollers were used to print fabric, three alternative techniques were tested:

1. The direct application of paint to roller before printing on cloth
2. The wax-resist method to produce batik designs on cloth
3. Printing roller designs on cloth using a relief or stencil technique

In the first method, the rollers were dipped in paint and then rolled over a strip of cotton cloth. The paint adhered well to the cloth, but after one or two revolutions the roller lost its paint and had to be recoated. The overall effect was too sloppy to reveal clear designs, and the constant reapplication of paint was quite inefficient. This, of course, could be due to the kind of paint used and the crudeness of the rollers compared to the rollers from the site. Note that using printer's ink produces very clear designs, judging by Charoenwongsa's illustration (1973: pl. 1).

The second alternative, batik or wax resist, was considered because this technique has such a long history in Southeast Asia. The wax would prevent much paint from adhering to the surface of the roller, and the wax coating would account for the absence of wear on the edge of the rollers. After paraffin was melted, the rollers were immersed in the melted wax and rolled onto cotton cloth, with the wax from the raised area of the roller then being transferred to the cloth. After the cloth was dyed with the wax designs in a solution of vinegar and food coloring, the cloth was dried and the wax ironed out.

Results from this method varied. If the roller was applied to the cloth as soon as it was removed from the melted wax, a puddle of wax formed on the cloth. If the wax was brushed lightly onto the roller, no puddle of wax appeared on the cloth, but the design was unclear. As with the first method, the direct application of paint, the roller had to be frequently recoated with wax. The design produced on cloth by this technique is the reverse of the design produced by the method of direct application of paint.

Experimenting with this second technique, we suggest that the rollers could have been used for producing designs by the batik method. But the pressure of the roller on the cloth forces the wax to spread out, making it difficult to produce a clear design, particularly considering that some of the designs are quite intricate (see Plate I, also Charoenwongsa 1973: pl. 1, Gorman and Charoenwongsa 1976: pl. 3).

An interesting combination of the first two techniques produced surprisingly good results. The waxed rollers were painted and rolled directly over the cloth, producing clear designs and retaining the paint for more revolutions (Plate IIa). Using this process, little paint would adhere to the rollers and their edges would not be worn down. The wax or a similar substance would protect the edge of the roller.

A final alternative, the relief process, was suggested by Kooijman's description of bark cloth decoration in Fiji. The roller used to decorate the cloth is similar in form to the Ban Chiang rollers (see Kooijman 1972: figs. 329, 330). The process is explained by Kooijman:

The markers are placed under the outlined parts of the tapa. A wad made of strips of the leaf of a Pandanus species is dipped first into the vessel holding the medium made from Aleurites bark and then into the dye, after which it is rubbed over the cloth. The parts of the cloth lying over the ribs take on an even dark color; the parts over the grooves, where less dye reaches the cloth, appear as lighter, rather vague stripes. (Kooijman 1972: 359-360)

In testing a similar process with the duplicate Ban Chiang rollers, a piece of heavy material was soaked in dye, squeezed, and laid on a piece of cotton cloth which was resting on a roller. The cotton cloth was then pulled and the design of the roller was

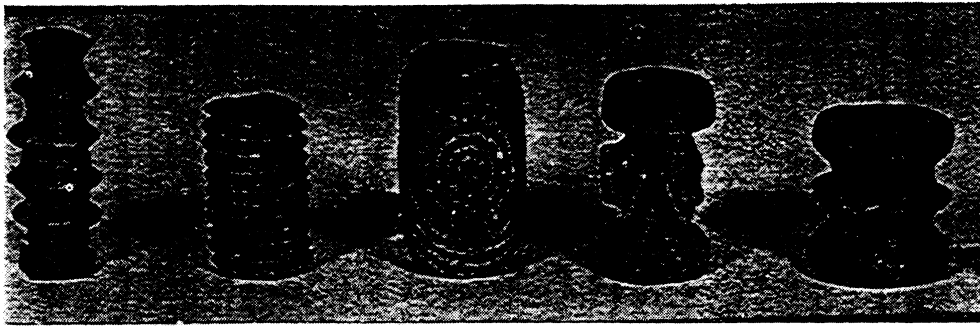


Plate I Five "Ban Chiang" rollers from a private Thai collection.

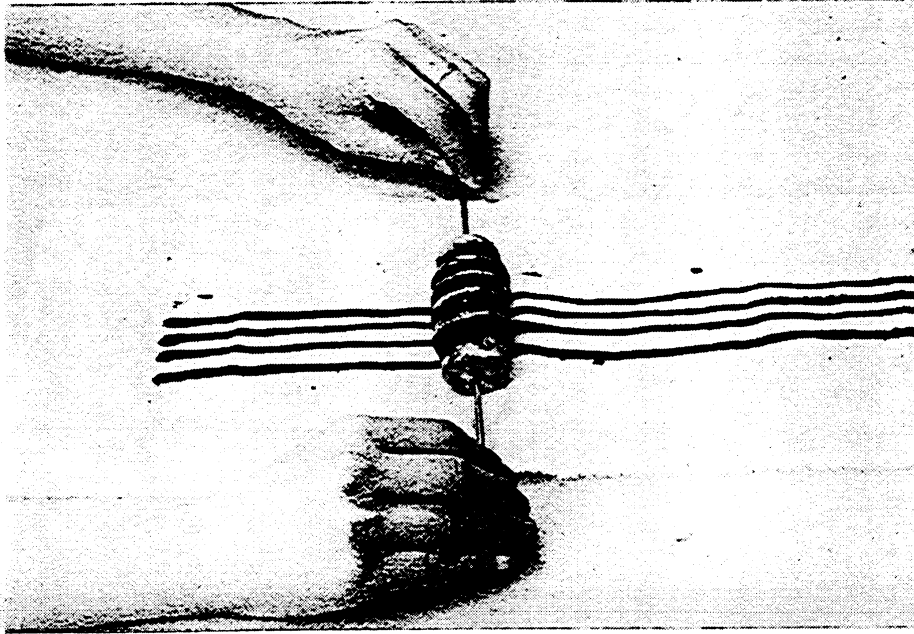


Plate IIa A duplicate roller illustrating direct printing with a waxed roller on cotton cloth.

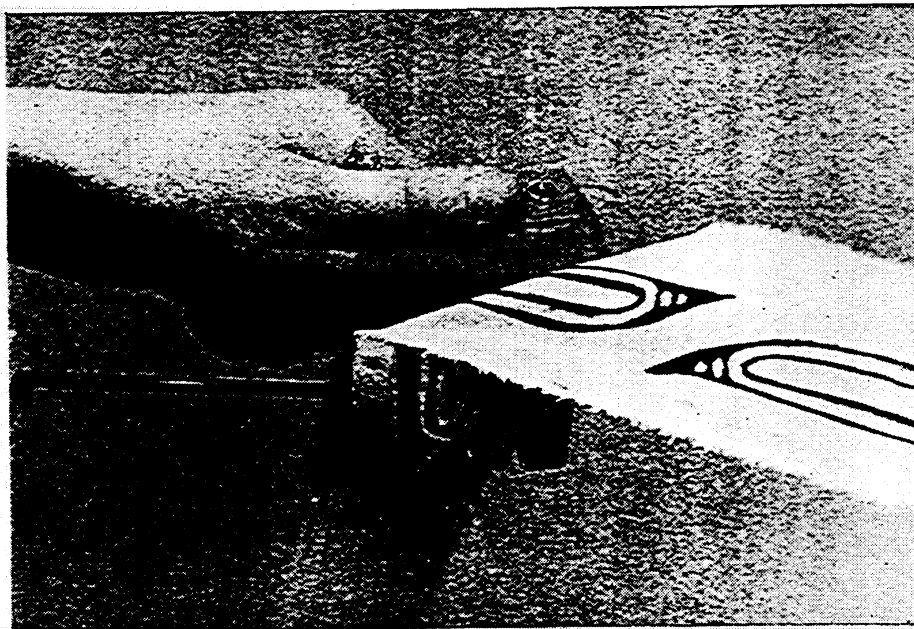


Plate IIb A roller from Ban Chiang (courtesy W. G. Solheim II) illustrating the relief process on cotton cloth.

VAN ESTERIK AND N. KRESS: The Ban Chiang Rollers 55

transferred evenly and clearly to the cloth (Plate II*b*). Although this is technologically a clumsy process for one person unless the feet could be used to support the dye or the roller, two people could easily have worked together to produce fine results. Another advantage of this technique would be the fact that a continuous design could be produced by repeated revolutions of the roller without stopping to apply paint. Since the rollers are sized to fit conveniently in a person's hand, the rollers could have been secured with a wooden skewer, for example, while the dye source or the cloth was moved. This technique would produce a design identical to that produced by the direct application of paint to roller. Also, the heavier the material containing the dye and the more consistent the pressure on the roller, the better the design transfer will be.

In summary, experimental evidence suggests that the rollers could have been used for fabric printing, although there are several features which suggest that this was not their sole or primary purpose. These include the fact that the holes through the rollers do not always appear centered. This would make design transfer difficult in the direct application method, but it would not be a handicap in the relief method. In addition, rollers illustrated in photographs often appear slightly convex in contour, a condition which would result in a clear design transfer only from the center part of the roller.

Before continuing with this line of argument, much more information would be necessary concerning textile remains from the site and available sources of fibers in the area. Using natural dyes available in the northeast of Thailand would be of critical importance. Finally, these tests should be made using rollers from the site, if possible, instead of the rather crude duplicates made for testing purposes.

There is some limited value in determining where other objects like these rollers have been found and how they have been interpreted. The point of such comparisons is not to develop a diffusionist explanation for the occurrence of a particular artifact, but to propose more interesting hypotheses about the possible function of these rollers from Ban Chiang. A broken roller with longitudinal perforation was found at Non Nok Tha (Solheim, personal communication), and very similar limestone rollers were found in Samron-Seng, Cambodia (Mansuy 1902: 20). Although the author acknowledges that their function is unknown, they are described under the heading of ornaments. We have already mentioned the modern use of bamboo rollers in Fiji for the decoration or printing of bark cloth (Kooijman 1972).

Further afield, pre-Columbian clay stamps and rollers from Puebla, Mexico were used for decorating pottery, cloth, and skin. In addition to these decorative functions, rollers served as amulets (cf. Weaver 1972: pl. 5*b*). In Western Asia, cylindrical stamps or rollers have a long history. Although probably used as individual seals, in the Diyala region of Iraq, for example, they were also used as amulets or commemorative medals, strung as a pendant or around the waist. (Frankfort 1955: 4; Ward 1910: 5).

More important than testing whether or not rollers could have been used in the decoration of cloth would be to suggest how fabric decorators would fit into a cultural complex. Arguments about the meaning of artifacts are risky and ultimately untestable. A model based on historical and ethnographic evidence might be useful in this case, however. We are suggesting that the rollers might figure in a system of individual ranking. This a priori model of social structure is explained more

extensively elsewhere (Van Esterik 1978). The model is constrained by factors such as the ecological diversity of northeast Thailand, the interdependence between these ecological niches, a low population density, a complex exchange system based on subsistence goods, and valuable but widely dispersed resources such as minerals.

Textiles fit into this proposed model, since they are widely used in upland and valley Southeast Asia to mark differences in sex, rank or class. Complex rules for the use of batik, *ikat*, and embroidery reflect and validate social structure in these communities, and the importance of textiles is documented in the sumptuary laws of the historic Hindu-Buddhist Kingdoms. Textiles, then, carry a great deal of symbolic meaning in Southeast Asia. If textiles were of similar importance in the first millennium B.C. on the Khorat plateau, the rollers might be part of an identity system that becomes particularly critical at a person's death. Although the rollers could have been used for marking cloth or for body painting, these activities might have primarily ritual functions. Worn as amulets in certain ritual contexts, rollers would be necessary grave furnishing. Rollers may indicate personal identity by representing accomplishments such as success in trading, headhunting, or hunting expeditions; wealth; or superior artistic skills. These accomplishments might have been socially acknowledged by the right to wear certain designs. An individual might accumulate a variety of such designs in a lifetime. Rollers with simple parallel lines (Plate Ia, b, e; Gorman and Charoenwongsa 1976: pl. 3) are most numerous in collections and may signify more widely distributed identity traits.

Certainly, the rollers from Ban Chiang were significant enough to be buried with the dead and were, by implication, part of a cultural complex that included more than just fabric decoration. Testing such hypotheses will require a consideration of historical, ethnographic, and archaeological evidence in Southeast Asia.

In conclusion, these and future experiments will be useful in determining the technological limits of the rollers. This report has suggested a range of decorative processes possible with the rollers, and the limitations and advantages of each. We conclude that a multifunctional explanation is most consistent with the evidence at hand, and speculate that the symbolic system of which rollers are a part centers around individual differences in rank.

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VAN ESTERIK AND N. KRESS: The Ban Chiang Rollers 57

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