An Archaeological Investigation of the Damaoshan Site, Fujian Province

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Keywords: Damaoshan    Neolithic     Fujian

Introduction

Located directly on the west side of the Taiwan Strait, the Neolithic cultures on the coast of Fujian Province, China hold keys for many important issues in the archaeology of Proto-Austronesian migrations. An increasing number of scholars believe that the changes of Neolithic cultures (ca. 6,500–3,500 BP) in coastal Southeast China are associated with the Proto-Austronesian dispersals, and the development of the Neolithic interaction spheres across the Taiwan Strait carry implications for the origins of the Austronesian seafaring. As part of our long-term efforts to study the Austronesian ancestral cultures, we conducted an archaeological excavation at the Damaoshan 大帽山 site, Fujian 福建 Province in 2002. Our investigations documented new evidence for the chronology, subsistence pattern and regional exchange networks on the coast of Southeast China during the period of ca. 5,000 to 4,300 BP.

I. The Setting

The Damaoshan site is located on the northeastern slope of the Damaoshan Hill, Chencheng 陈城 Township, Dongshan 东山 County, Fujian Province (Fig. 1). It was first reported in 1988 and subsequently investigated by the Fujian Provincial Museum.

The Dongshan Island where the Damaoshan site is located is the second largest island in Fujian Province. It is about 17.5 km from west to east, and 27.5 km from north to south, covering an area of about 188 sq m.

The general landform of the Dongshan Island is descending from west to east. There are about 413 hills separated by valleys, plains or streams, making the island landscape quite diverse. The Dongshan Island is within the realm of subtropical oceanic monsoon climate. The annual precipitation is 1000–1200 mm, but the annual evaporation is above 2000 mm. This makes the island part of the semi-arid region in the Fujian coast. The annual average temperature is 20.8°C.

II. Stratigraphy

A metric grid of four units (T1–T4) was established on the site, and the total area
excavated is 62 sq m.

The stratigraphy of the Damaoshan site is shallow, less than 50 cm thick in most cases. Two major layers with cultural components (Layer 2 and Layer 3) were recognizable in the four units.

T1 is in the middle of the excavated area, with T2 to the east, and T4 to the west. Its stratigraphy represents the general depositional events of the site (Fig. 2).

Layer 1. Top soil and reworked cultural deposit. Brown (7.5YR 5/4). Fine to very fine grained loam. Structure generally loose, very friable when moist. It is mixed with decomposed organic materials, small pieces of rounded pottery shards, shells, and animal bones. Thickness: 3–7 cm. Contact with layer 2 gradationally over a zone of 1–2 cm.

Layer 2. Yellowish red (5YR 4/6). Fine grained soft clay. It consists of high density of shells, fish bones, animal bones, pottery, and stone tools. About 50% of the sediments are shells. The ratio between clay and shell is almost 1:1. Most artifacts were found within this layer. Shards in this layer do not exhibit much edge wear. Thickness: 10–20 cm. Depth (below surface): 0–30 cm. Abrupt contact with the layer 2 gradationally over a zone of 1–2 cm.

Layer 3. Yellowish red (5YR 4/6). Fine grained clay. Structure generally dense; very hard when dry. Contains small rocks derived from the underlying weathered bed rocks. Very few shells and artifacts were found within this layer. Discontinuous layer, only found in parts of the unit. Thickness: 0–10 cm. Depth: 15–40 cm. Abrupt contact with the underlying culturally sterile bed rocks.

We observed that the cultural remains from these three layers are homogenous. This phenomenon indicates that after the Damaoshan site was abandoned; there has been no human re-occupation on this location. Therefore, we can conclude that all the artifacts and ecofacts of the Damaoshan site were left by the same group of people during a continuous occupation of this site.

III. Typological Analysis of the Artifacts of the Damaoshan Site

The artifacts found at the Damaoshan site include pottery, stone tools, bone tools, and ornaments.

1. Pottery

More than 5460 pieces of potshards were recovered. Weighing 53127 grams, these potshards constitute the single most abundant category of finds at the site. The sizes of the potshards range mostly from 3–30 cm in length or diameter. The properties of the shards that have been recorded in the field include color, texture, consistency, and forms.

Among all the potshards of layer 2 and layer 3, more than 95% (both count and weight) are made of tempered clay, and only about 5% do not have visible inclusions under a hand lens. Quartz and mica are the two major inclusions, and they usually constitute more than 30% of the core. The grain size of the quartz varies from 0.5–3 mm in diameter. In most cases, quartz is usually mixed with mica in the tempered potshards. The surface of most potshards was smoothed or burnished, but mica is always visible. Most pots were probably hand-made. The rims or the necks of some pots have some spiral lines, indicating they might be re-worked on a slow potter’s wheel. Some ring-feet might be attached to the body. The firing temperature was not very well controlled, as indicated by the uneven color of the potshards.

Three major techniques of decoration were observed: impression, incision, and punctation. Occasionally these three techniques were supplemented with applique and perforation or cut-outs. The impressed decorations include cord-marking and waving-marks. The incised decorations include fingernail incision, zigzags, dentate designs, and ladder-shaped designs. Other designs include cut-outs, ridges, and applique. The frequency of these decorations is different one another. Cord-marks account about 7%–10% of the total samples, and each of other kinds of decorations only accounts for less than 1%. Cord-marks sometimes were combined with applique and ridges.

Four principle types of pottery vessels can be recognized: pot, pedestal bowl, bowl, and lid.
Pot. Most pots are tempered with sand and mica. They usually have round or flat base. On the basis of the shapes of rim, neck, and surface decorations, we divided them into five types.

Pedestal bowls. Most of the pedestal bowls are made of fine-textured clay. The pedestals are usually short, and some looks like a ring-foot. A number of pedestals were decorated with a circle of incised <-shaped designs or parallel lines. Based on the shapes of the bowl, at least four types can be divided.

Spindle whorls. Six spindle whorls were found. On the basis of shapes, they can be divided into four types.

2. Stone tools

The stone tools include adzes, arrowheads, pitted stones, spheroids, and perforated stones.

Stone adzes

Our excavation yields 5 complete adzes, 2 broken adzes, and 10 adze fragments. Our analysis also includes the 5 complete adzes and 3 broken adzes collected in previous surveys. Macroscopic observation on these adzes indicates that they were all heavily used. Most complete adzes were well polished, but the chipped scars are still visible.

Overall these adzes are small. The length varied from 5.3 cm to 18.7 cm, and most of them are 5–7 cm long. The width of the adzes varies from 2.9 cm to 5.9 cm, and most of them are 3–4 cm wide. The thickness varies from 0.7 cm to 2.8 cm, and most of them are 1.6–2 cm thick.

The most prominent characteristic of the Damaoshan adze assemblage is the absence of tanged adzes. No grip or tang or step has been found on any samples. The stone adzes of the Damaoshan site basically fit into Duff’s typological system, but variations are also observed. On the basis of the plan shape and the shape of cross-section, these adzes indicates that they were all heavily used. Most complete adzes were well polished, but the chipped scars are still visible.

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The second type of the Damaoshan adzes has rectangular plan shape with triangular cross-section, which is the same as Duff’s type 2A.

The third type of the Damaoshan adzes has rectangular or trapezoidal plan shape with high plano-convex cross-section (close to triangular). This kind of shape does not match perfectly with any of Duff’s classification, but they are close to Duff’s type 3G.

Type II and Type III account for more than 60% of the Damaoshan adze assemblage, a distinctive feature among the extant Neolithic stone adze assemblages in Southeast China.

Only two arrowheads were found. They were made from slate. Sample T3②:1 is a complete arrowhead with triangular blade and a short cylindrical stem.

Two pitted stones were found. They were both made of metamorphic gneiss, which constitutes the bed rocks of the Damaoshan Hill. Sample 02C:15 had two indented pits on the surface, and sample 02C:16 has three indented pits. All the pits display extensive usewear, indicating they were heavily used.

Only one sample of perforated stone tools was found. It was also made of metamorphic gneiss, and only half of it survived. The hole was perforated from both directions in the middle of the tool.

Hammer stone: rounded pebbles display used traces on the surface, and they are possibly stone hammers. Two samples were found.

3. Other artifacts

In addition to the stone tools, other artifacts of the Damaoshan site include bone arrowheads, bone drills, bone fishhooks, bone spoons, shell spade, and jade ornaments.

IV. Faunal Remains

The faunal remains include marine shells, fish bones, marine and terrestrial animal bones.

1. Marine shellfishes

We identified 30 species of shellfishes from our collected samples, and they can be classified into two classes: bivalvia (pelecypoda) and gastropoda.

The results of our quantification indicate that among the 30 species of shellfishes collected by the Damaoshan inhabitants, each species accounts for different proportions. Two species of bivalvia, Tegillarca granosa and Metrix lusoria, are the two major species, accounting for more than 60% of the total weight (Table 1). This pattern indicates that the Damaoshan inhabitants developed their own strategy in gathering shellfishes. They heavily collected Tegillarca granosa and Metrix lusoria, and only occasionally gathered other species.

The living habitat of Tegillarca granosa is the middle and lower inter-tidal zone and mud flat. Metrix lusoria usually lives in the middle and lower inter-tidal sands or shallow ocean sands. These two species’ habitats are relatively similar. Therefore, we can conclude that the Damaoshan people basically gathered shellfishes in the inter-tidal zones, and occasionally also collected shellfishes living on rocks. The sandunes on the lower foot of the Damaoshan hills were possibly the shell beds.
In order to further study the gathering strategy of these two major species, we analyzed the size ranges of *Tegillarca granosa* and *Metrix lusoria* (Tables 2 and 3). The results demonstrate that the Damaoshan inhabitants selectively gathered different sizes of shellfishes. In layer 2 of T2, the sample of *Tegillarca granosa* consists of 3026 umbones. They can be divided into four size classes on the basis of the valve length: less than 2 cm, 2–3 cm, 3–4 cm, and 4.5–5.5 cm. 51.06% of the samples are 2–3 cm long, and 38.67% of the samples are less than 2 cm long, indicating these two size ranges represent the majority of *Tegillarca granosa*. Only 0.26% shells are 4.5–5.5 cm long, and the samples of 3–4 cm long only accounts for 10.01%. Similar size distribution pattern is also observed in T3 the layer 2. Overall, this pattern indicates that the Damaoshan people preferred to collect *Tegillarca granosa* of 2–4 cm long, and rarely gathered too small (less than 1 cm long) or too big (more than 5 cm long) individuals. *Metrix lusoria* is another major species of shellfishes that the Damaoshan people extensively collected. The analysis of its size distribution can also reflect the gathering strategy of the Damaoshan inhabitants. In the sampling units of T2 layer 2, 1177 umbones of *Metrix lusoria* were collected. They can be divided into five size classes.
Table 2  T2  *Tegillarca granosa* size (valve length) worksheet

<table>
<thead>
<tr>
<th>Valve length</th>
<th>&lt;2 cm</th>
<th>2–3 cm</th>
<th>3–4 cm</th>
<th>4.5–5.5 cm</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>1170</td>
<td>1545</td>
<td>303</td>
<td>8</td>
<td>3026</td>
</tr>
<tr>
<td>%</td>
<td>38.67</td>
<td>51.06</td>
<td>10.01</td>
<td>0.26</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 3  T3  *Tegillarca granosa* size (valve length) worksheet

<table>
<thead>
<tr>
<th>Valve length</th>
<th>&lt;2 cm</th>
<th>2–3 cm</th>
<th>3–4 cm</th>
<th>4–4.5 cm</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>111</td>
<td>253</td>
<td>402</td>
<td>8</td>
<td>774</td>
</tr>
<tr>
<td>%</td>
<td>14.34</td>
<td>32.69</td>
<td>51.94</td>
<td>1.03</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4  T2  *Meretrix lusoria* size (valve length) worksheet

<table>
<thead>
<tr>
<th>Valve length</th>
<th>&lt;3 cm</th>
<th>3–4.5 cm</th>
<th>4.5–6 cm</th>
<th>6–7.5 cm</th>
<th>&gt;7.5 cm</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>535</td>
<td>273</td>
<td>243</td>
<td>112</td>
<td>14</td>
<td>1177</td>
</tr>
<tr>
<td>%</td>
<td>45.45</td>
<td>23.19</td>
<td>20.64</td>
<td>9.52</td>
<td>1.19</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 5  T3  *Meretrix lusoria* size (valve length) worksheet

<table>
<thead>
<tr>
<th>Valve length</th>
<th>&lt;3 cm</th>
<th>3–4.5 cm</th>
<th>4.5–6 cm</th>
<th>6–7.5 cm</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>151</td>
<td>190</td>
<td>243</td>
<td>113</td>
<td>697</td>
</tr>
<tr>
<td>%</td>
<td>21.66</td>
<td>27.26</td>
<td>34.86</td>
<td>16.21</td>
<td>100</td>
</tr>
</tbody>
</table>

on the basis of valve length: <3 cm, 3–4.5 cm, 4.5–6 cm, 6–7.5 cm and >7.5 cm. The percentage of each size class indicates that most of the *Meretrix lusoria* are in the first three classes, and only about 10% of the shells are longer than 6 cm. Similar size distribution pattern is also observed in layer 2 of T3 (Tables 4 and 5). This pattern indicates that the Damaoshan people mostly collected *Meretrix lusoria* of less than 6 cm long. It is not clear whether this pattern reflects the preference of the Damaoshan people or the availability of *Meretrix lusoria* in the shell beds.

2. Shellfish food processing

Based on close observation of the shells and relevant artifacts of the Damaoshan site, at least three shell food preparation methods can be inferred: roasting, boiling and cracking shells on anvils.

V. Dating

The following three dating samples of marine shells were analyzed by the Archaeometry Laboratory of Peking University. Sample BK-2002070 consists of fourteen broken small *Meretrix lusoria* collected from the southwestern corner of T2. Sample BK-2002071 consists of seven broken *Tegillarca granosa* collected from northwestern quarter of T2. Sample BK-2002073 consists of 6 broken *Meretrix lusoria* collected from the southern half of T3. Each sample consists of the smallest shells of the same species. The small size of the shell is an indicator that they did not grow too old in the ocean. All samples were collected in situ during excavation. They are relatively clustered nearby each other, indicating they were possibly discarded in a short period. Therefore, the age of each shell for each sample is expected to be very close or the same.

The age of these three samples ranges from ca. 4,300 BP to 5,000 BP (one sigma). The two samples from T2 are fairly consistent with one another. However, the sample from T3 is slightly younger. It is not clear whether this difference reflects the deposits were accumulated at a different time. These dates suggest that the age of the Damaoshan site is somewhere between 4,300 BP and 5,000 BP.
VI. Summary

Our investigation of the Damaoshan site is the first archaeological excavation in southern Fujian. The excavated materials not only in the first time reveal the cultural and subsistence patterns of this site, they also shed new light on the chronological sequence and regional interactions in coastal Southeast China during the Neolithic period.

The Damaoshan people’s lives were strongly oriented toward sea. Marine fish and shellfish remains constitute the majority of the Damaoshan animal remains, indicating capturing the inshore fishes and gathering shellfishes were the two main activities for the Damaoshan people. The Damaoshan people heavily hunted on two species of deer (*Muntiacus* sp and *Cervus Nippon*). The deer bones were smashed or cut into small pieces, and some of them bear traces for marrow consumption.

The age of the Damaoshan site (ca. 4,300–5,000 BP) determines that it was contemporaneous with the Tanshishan 昙石山 Culture in the lower reach of Min River 闽江 valley and the late Dabenkeng 大坌坑 Culture in Taiwan (see Fig. 1). A comparison of the styles of pottery and stone tools suggests that Damaoshan has both similarity and difference with Tanshishan and Dabenkeng. The difference indicates that Damaoshan has distinctive cultural features in Southeast China, probably representing a regional tradition in the Hanjiang 韩江 delta area. On the other hand, the stylistic similarities of pottery and stone tools indicate that the Damaoshan people had connections with Tanshishan and Dabenkeng. Indeed, our sourcing study of the stone adzes suggests that Damaoshan people engaged in a regional exchange network possibly covering an area as far as the Penghu 澎湖 Archipelago in Taiwan Strait.

References


Note: The original report was published in *Kaogu* 2003.12: 19–31 with 8 figures and 4 tables, and written by Fan Xuechun, Lin Gongwu 林公务, and Jiao Tianlong 焦天龙. The present version, an abridgment from the original, is prepared and English-translated by Jiao Tianlong.