Recent Paleolithic field investigations in Bose Basin (Guangxi, China)

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1. Introduction

The Bose (Baise) basin is located in the western region of Guangxi Zhuang Autonomous Region, southern China (23°33′–24°18′ N, 106°7′–106°56′ E). Interestingly, Paleolithic sites are distributed only in sediments of the fourth terrace (T4). The fourth terrace is comprised of 2 units, an upper unit of laterite (thickness of 5–10 m) and a lower unit of gray gravel bed (thickness of 3–15 m). Stone artifacts, associated with tektites, have been excavated from the middle of the upper unit of T4 (Huang, 1990; Yuan et al., 1999; Hou et al., 2000, 2011; Lin, 2002; Pei et al., 2007; Wang et al., 2008; Xie and Lin, 2008, Xie et al., 2010; Huang et al., 2011). The first stone artifacts found in the Bose basin were identified by a petroleum survey team in 1973 (Li and You, 1975). However, it was not until the 1980s when Paleolithic researchers began conducting field research in the basin. By the end of the 1980s, more than 20 Paleolithic sites were found and several thousand stone artifacts were surface-collected by the Ethnological Museum of Youjiang in Bose City and the Guangxi Museum. In the summer of 1986, Huang Weiwen, a Paleolithic archaeologist from the Institute of Vertebrate Paleontology and Paleoanthropology in Beijing, distinguished several bifacial handaxes from Bose from among the thousands of Paleolithic specimens housed in local museums in Guangxi. Between 1987 and 2000, Huang organized a joint international team and carried out a series of surveys and excavations in the Bose basin. As a result, about 30 Paleolithic sites were found. The age of the Bose stone tools was dated to between 730 and 803 ka by the association of Australasian tektites which were also excavated from T4 (Guo et al., 1996; Hou et al., 2000).

Although the previously identified Paleolithic sites are broadly distributed in the Bose basin, a comprehensive archaeological field investigation was never conducted. This paper reports the results of systematic field surveys conducted between 2009 and 2010 that encompassed the entire basin. Findings include 56 new Paleolithic sites and 747 stone artifacts, including 65 handaxes (Fig. 1). Based on this research, Paleolithic sites with handaxes are present in higher densities in the northwest part of the basin, whereas they are rare in the southeast. Utilized raw materials also vary between the two regions within the basin.

2. Method of investigation

Based on what was currently known of the distribution of Paleolithic sites in the basin, this investigation focused on four
areas: Chengbihe, the upper branch of the Youjiang river in the northwest; Bose, in the upper reaches of the Youjiang River in the west; Tianyang, in the central area; and Tiandong, the lower reach of the Youjiang River in the central and eastern parts of the basin. Moreover, previous research indicated that stone artifacts are only present in T4. T4 is fragmented throughout the basin forming various platforms with different elevations. However, it is easy to identify due to the unique red color of the laterite, which results from having been deeply weathered. The current study investigated all of the T4 geomorphological units throughout the basin. Sites were identified where stone artifacts were present. GPS was used to measure the latitude, longitude and elevation of these sites. The condition of each site was recorded and all surface collected artifacts were bagged and labeled. Thickness of the sediment (including the upper laterite unit and the lower gravel bed unit) was measured at the outcrop profile. Exposed stone artifacts and tektites were photographed and then transported to the museum for further study. The raw material and basic linear measurements were recorded for the lithic artifacts.

3. Results

3.1. Chengbihe

Chengbihe area is located in the northwest part of the Bose basin (23°56′–24°1′ N, 106°33′–106°43′ E.), which is separated from the Bose basin by Eocene hills. However, it is still connected to...
the basin by a branch of the Youjiang river. Twenty two Paleolithic sites are distributed in this area. Four are from previous surveys (Linkesuo, Taohudao, Hengshandao and Fengshudao) and 18 are newly identified sites (Yongle-houshan, Yuyezhan, Yachang, Songshudao, Wumingdiao, Chengbilinchang, Songlingdiao–1, Songlingdiao–2, Lucidao–1, Lucidao–2, Nawuxincun, Maluchang, Shipingxipo, Taiyangdiao, Gonglandao, Nangjiandao, Nonghuangdao and Pingbi). The average elevation of these sites is 181.1 m asl. T4 is not directly distributed in this area, with most of the sites sloping and eroded by water. However, many stone artifacts are exposed on the surface. Importantly, these surface collected stone tools include large numbers of handaxes. The density of handaxes in the Chengbihe area is much higher than the other three areas. Because of strong weathering and advanced stages of erosion, preservation conditions of the upper laterite unit of these sites is not good. The areas for these sites vary from 100 m² to 10,000 m². In the Chengbihe area the upper laterite unit is 5–10 m thick, whereas the lower gravel bed is 0.1–5 m respectively. Most stone artifacts are from the upper unit, though a few were found on top of the gravel bed.

A total of 427 stone artifacts were surface collected, including 59 handaxes (Fig. 2), 223 choppers, 36 picks, 25 cleavers, 61 cores, 6 stone hammers, and 6 utilized pieces (Table 1). All of the stone artifacts are manufactured on the large cobbles, presumably from the T4 gravel bed. It is also possible that hominins utilized the locally available river cobbles from the exposed riverbed. Utilized raw materials are sandstone, quartzite, quartz and chert (Table 2).

### 3.2. Bose

Bose is situated in the upper reaches of the Youjiang (23°47′–24°53′N, 106°34′–106°46′E). Fluvial terraces are distinctly developed in this area. The first terrace (T1) appears as a broad plain, formed by upper light brown clay and a low gray gravel bed, 15–20 m in thickness. T1 lies about 20 m above the Youjiang. The second terrace (T2) consists of upper yellow slightly weathered clay and a low gray gravel bed, 10–15 m in thickness. T2 is about 10 m above the first terrace. The third terrace (T3) is formed by an upper unit of thick red weathered clay and a lower yellow–brown gravel bed, 15–20 m in thickness. T3 lies about 30 m above the first terrace. T4 consists of an upper sedimentary unit, 7–10 m thick, of poorly developed latosols underlain by reticul mottled red clay typical of laterites and of a lower unit, 5–20 m thick, of well-sorted cobble conglomerate. Tektites and artifacts are distributed in the upper unit within a zone 20–100 cm thick, which is typically 6–7 m above the top of the lower unit of T4. Paleolithic artifacts are abundant on the surface of T4. A diversity of artifacts were also found during excavations conducted at six different localities in the area between 1988 and 2006 (Hou et al., 2000; Pei et al., 2007; Wang et al., 2008; Xie and Lin, 2008). Thus far, Paleolithic artifacts have not been identified in any of the other terraces. Geomorphologically, T4 appears as large-scale platforms about 160 m asl, and small isolated platforms about 160–290 m asl. The variation in elevations of T4 is due to faulting and differential uplift.

Forty two sites were found in this area, 15 of them north and 27 south of the Youjiang. Twenty two of these sites were previously identified, including Shangsong, Balliniqian, Dawan, Dongzeng, Shazhou, Jiangfeng, Namo, Bogu (Baigu), Dafa, Najiang, Pingpu, Zimu, Yangwu, Nanoshan, Dahuachang, Xiagou, Liu, Nalian, Xiaomei, Liuni, Nambanshan and Damei. Twenty new sites include Donghuai, Nada, Henglong, Liushanjia, Wangpuling, Yanping-1, Shiziling, Nawu, Liusha, Liushashan, Duliushan, Liuqiaishan, Naliao, Nan, Muminshan, Niupuling, Changlingpo, Honghuoshan, Dongyin, and Liula. A total of 172 stone artifacts were collected, including 3 handaxes, 97 choppers, 4 picks, 19 scrapers, 31 flakes, 13 cores, 3 stone hammers, and one utilized piece. Utilized raw materials are sandstone, quartzite, quartz, breccia, and chert (Table 2).

### 3.3. Tianyang

Tianyang is situated in the middle of the basin (23°25′–23°36′N, 106°59′–107°26′E). This area is flat, with largely developed deposits of T1 through T3, and small isolated platforms of T4, the latter yielding stone artifacts and tektites. Twenty two Paleolithic sites have been discovered in this area. Fifteen of them are located south and seven situated north of the Youjiang. Eleven sites were previously discovered, including Laikui, Baihe, Nogeng, Fengfeng, Nanli, Nalai, Nasheng, Changsheling, Naha, Poqengna and Poping. Eleven sites are new, including Pingjiang, Kengkong, Hongtang, Yanfengpo, Nadingpo, Lushapo, Luliaopo, Yanshan, Naji, Baiwu, and Nalai (Fig. 3). The average elevation of these sites is 165.3 m asl. Seventy-five stone artifacts were surface collected, including one handaxe (Fig. 4), 33 choppers, 9 picks, 15 scrapers, 9 cores, 3 stone hammers and one utilized piece (Table 1). Utilized raw materials consist of sandstone, quartzite, quartz and chert (Table 2).

### 3.4. Tiandong

Tiandong is located in the eastern part of the Bose Basin (23°38′–23°46′N, 106°34′–107°05′E). Its geomorphic features are

### Table 1

<table>
<thead>
<tr>
<th>Subarea</th>
<th>Core</th>
<th>Flakes</th>
<th>Scraper</th>
<th>Hammerstone</th>
<th>Chopper</th>
<th>Pick</th>
<th>Handaxe</th>
<th>Utilized material</th>
<th>Total</th>
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<tbody>
<tr>
<td>Chengbihe</td>
<td>11</td>
<td>61</td>
<td>25</td>
<td>6</td>
<td>223</td>
<td>36</td>
<td>59</td>
<td>6</td>
<td>427</td>
</tr>
<tr>
<td>Bose</td>
<td>13</td>
<td>31</td>
<td>19</td>
<td>3</td>
<td>97</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>172</td>
</tr>
<tr>
<td>Tianyang</td>
<td>9</td>
<td>15</td>
<td>4</td>
<td>3</td>
<td>33</td>
<td>9</td>
<td>1</td>
<td>1</td>
<td>75</td>
</tr>
<tr>
<td>Tiandong</td>
<td>13</td>
<td>18</td>
<td>4</td>
<td>3</td>
<td>32</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>73</td>
</tr>
<tr>
<td>Total</td>
<td>46</td>
<td>125</td>
<td>52</td>
<td>15</td>
<td>365</td>
<td>49</td>
<td>65</td>
<td>10</td>
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</tbody>
</table>

### Table 2

<table>
<thead>
<tr>
<th>Subarea</th>
<th>Sandstone</th>
<th>Quartite</th>
<th>Quartz</th>
<th>Breccia</th>
<th>Chert</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chengbihe</td>
<td>58.6% (n = 250)</td>
<td>36.5% (n = 156)</td>
<td>3.3% (n = 15)</td>
<td>1.2% (n = 5)</td>
<td>0.2% (n = 1)</td>
<td>427</td>
</tr>
<tr>
<td>Bose</td>
<td>62.8% (n = 108)</td>
<td>15.7% (n = 27)</td>
<td>16.9% (n = 29)</td>
<td>3.5% (n = 6)</td>
<td>1.2% (n = 2)</td>
<td>172</td>
</tr>
<tr>
<td>Tianyang</td>
<td>45.3% (n = 34)</td>
<td>42.7% (n = 32)</td>
<td>10.7% (n = 8)</td>
<td>0</td>
<td>1.3% (n = 1)</td>
<td>75</td>
</tr>
<tr>
<td>Tiandong</td>
<td>26% (n = 19)</td>
<td>61.6% (n = 45)</td>
<td>6.9% (n = 5)</td>
<td>1.4% (n = 1)</td>
<td>4.1% (n = 3)</td>
<td>73</td>
</tr>
<tr>
<td>Total</td>
<td>55% (n = 411)</td>
<td>34.8% (n = 260)</td>
<td>7.6% (n = 57)</td>
<td>1.6% (n = 12)</td>
<td>0.9% (n = 7)</td>
<td>747</td>
</tr>
</tbody>
</table>
similar to that of the Tianyang area. Twenty seven sites have been identified in this area. Twenty were from previous investigations, including Tanghuai, Gongsheping, Nongle, Xianggu, Liulinling, Bada, Tangfeng, Yanbuling, Dala, Pingma, Ma-anshan, Donghailing, Huanglingpo, Gaolingpo, Bahuai, Nanian, Nawan, Dongda, Baifa, and Silinbei. Seven new sites were also found, including Balong, Pohong, Mafeng, Nawa, Xiapu, Hongtupo, and Lima. The average elevation of these sites is 120.8 m asl. Seventy-three stone artifacts were surface collected, including 13 cores, 18 flakes, 4 scrapers, 32 choppers, two handaxes, 3 hammerstones and one utilized piece (Table 1). Utilized raw materials are sandstone, quartzite, quartz, breccia and chert (Table 2).

4. Conclusion

The patterns of Paleolithic sites and stone artifact distribution in the Bose basin indicate a level of variability not previously discussed (see also Xu et al., 2012). From the upper to lower reaches of the Youjiang, the site densities are reduced. Paleolithic sites are mostly concentrated in the northwest part of the basin, such as the Chengbihe area and the Bose area. Locally available river cobbles were heavily utilized by the Bose hominins. Sandstone and quartzite were the preferred raw materials. Higher quality raw materials (e.g., chert) are not common in the basin. Little evidence of long distance transport of higher quality raw materials currently appears in the archaeological record.

One point that should be clear from this study is that a great deal of variability is present in terms of the number of sites and the artifact distributions (see also Xu et al., 2012). This is a point that was not emphasized in the Hou et al. (2000) study. Bose basin is best known for the presence of Middle Pleistocene handaxes. However, other than the Fengshudao site, which is located in the Chengbihe area (Wang et al., n.d.), the density of handaxes at many of the other Bose localities is actually quite small. This is a pattern observed in many other areas of eastern Asia as well (Norton et al., 2006; Norton and Bae, 2009). Moving forward, more detailed laboratory analyses of the Bose stone tool industries should provide a clearer picture of Middle Pleistocene hominin behavioral variability at one particular spatial-temporal point; albeit a very important spatial-temporal point.

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References


