

Excavations at Banyan Valley Cave, Northern Thailand: A Report on the 1972 Season



TIMOTHY E. G. REYNOLDS

BANYAN VALLEY CAVE was discovered in early 1972 during a site survey led by the late Dr. C. F. Gorman to north Thailand (Fig. 1). This work followed up earlier research by Gorman that included the excavation of Spirit Cave. Excavation there resulted in the formulation of a hypothesis that the Hoabinhian economic sequence in this region of Southeast Asia showed a trend toward the development of agriculture (Gorman 1969*a*, 1969*b*, 1971*a*, 1971*b*, 1972, 1977). At Spirit Cave, the cultural sequence revealed new technological elements with implications for economic change, such as edge ground reapers, adzes, and so forth. The recovery and identification of plant remains associated with these technological features of Spirit Cave suggested that the domestication of certain plants occurred within the context of the Hoabinhian tradition (Yen 1977). Although much of this work has appeared in a series of papers (Gorman 1969*a*, 1969*b*, 1971*a*, 1971*b*, 1972, 1977), a site report for Spirit Cave was never published.

Subsequent surveys in northern Thailand recognized many more sites, two of which, Steep Cliff Cave and Banyan Valley Cave, were excavated. These two caves were similar in terms of both cultural material and cultural sequence to Spirit Cave, although Banyan Valley Cave also yielded a unique, bifacially worked, tanged point. Gorman's death in 1981 prevented the publication of site reports; the present paper is the first stage of a project intended to publish Gorman's survey and excavation work. This effort involves the reanalysis of the material from Banyan Valley Cave and the synthesis of the available field documents, plans, and photographs. That the present paper could be prepared so rapidly reflects Gorman's fastidious recording. The material described here is held in the anthropology section of the University Museum of the University of Pennsylvania. Eventually, I intend to publish a monograph on all the survey and excavation work in north Thailand carried out by Gorman.

BANYAN VALLEY CAVE

The cave site lies some 50 m above a small stream near Ban Mai Hang village at the extreme western end of the Banyan valley, above the point where the stream

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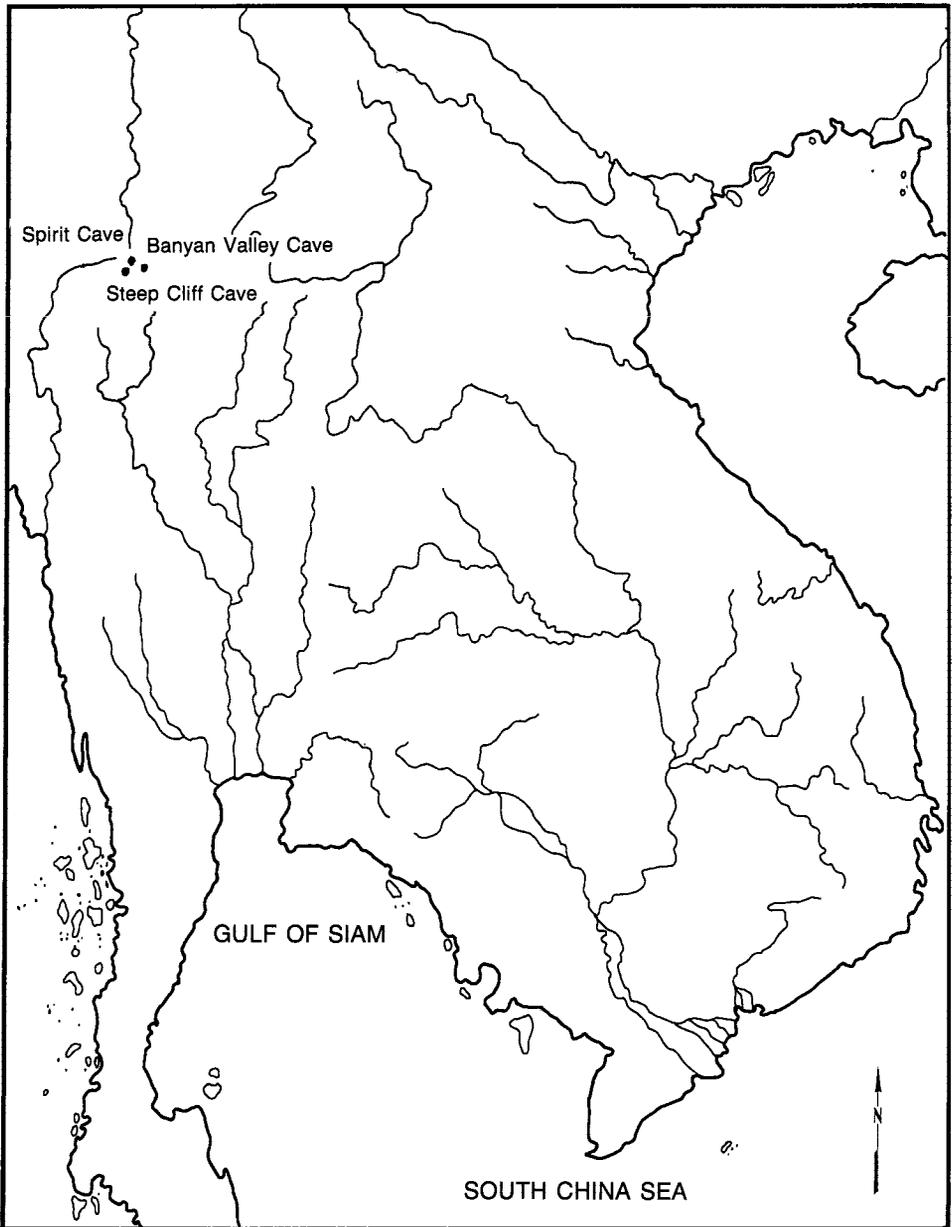


Fig.1. Map of Thailand and Southeast Asia showing locations of Banyan Valley Cave, Spirit Cave, and Steep Cliff Cave sites.

enters a sinkhole in the limestone. It is located at approximately $19^{\circ}68'N, 98^{\circ}14'E$, in Mae Hongson Province. The site was discovered in March 1972 during general survey work when two caves were identified, a lower and an upper, both being described as large (some 24×14 m). The lower cave had travertine, gravel, and ashy deposits variously exposed over its surface, while the upper cave was drier and so lacked the travertine exposures. Prehistoric cultural material was exposed on the

surfaces of both caves, including cord-marked potsherds and flaked stone implements. A test pit covering 1.5 m² was excavated over a period of three days.

A DESCRIPTION OF THE TEST EXCAVATION

The loose surface layer, which had been disturbed, was removed to reveal a compacted reddish surface on which lay cord-marked and burnished pottery, flakes, and flaked pebbles. This was believed to be an old occupation surface; resting on it was a hearth filled with white ash and bounded by three retaining stones. On the second day of excavation, difficulties arose in interpreting the stratigraphy as a result of considerable horizontal variation in the sediment. Smaller test cuts were made into this to clarify the situation. The northeast corner was shown to have red-brown earth with ash lenses containing charcoal, wood, and mollusk shells, while the western part of the square had redder sediment. It was decided to excavate the square in spits as a result of this unclear stratigraphy, for the discovery of ash lenses argued that the excavations had encountered *in situ* deposits. The first spit (A) cut through a generalized red-brown layer that contained flaked river pebbles and cord-marked sherds with black burnished surfaces. Only some of the stone tools were collected. Below this general red-brown level was a harder ashy deposit that was more red in color. The excavated spits were 10 cm each in depth. Spit digging continued on the following day, and it was noted that, while the frequency of potsherds decreased with depth, the frequency of flaked river pebbles increased. Some disturbance of material by rodent burrowing was observed, and further excavation on the final day showed that this was quite extensive in the red layer. At a depth of about 1 m from the surface, a yellow-red sediment began to appear; the soil was sterile of cultural remains below this depth. A total of seven layers had been designated, of which two were cultural: (1) the red-brown layer immediately below the surface, which was 3–5 cm thick; and (2) a general horizon comprising parts of layers designated 3, 4, and 7. Digging ceased when a hard sterile deposit varying from red to yellow was encountered at a maximum depth of about 1 m.

THE MAJOR EXCAVATIONS AT BANYAN VALLEY CAVE

Later in 1972, the cave site was mapped using an alidade and a grid of 2 m squares laid out. This covered the front 20 m of the cave's long axis and spread 12 m across it (Fig. 2). A central 2.25 m² pit within each square would be excavated first and then intervening baulks removed to give a continuous section. Nine 2 m squares were excavated in addition to the test square, which was not aligned with the overall site grid, but slightly canted to the west. The main excavated area lies in the front and center of the cave, where daylight was available and where the floor of the cave was fairly flat and clear of obvious rockfalls.

The floor of the cave sloped across the chamber from east to west, and the amount of moisture in the sediment influenced the coloration of the sediments, probably as a result of chemical changes. This was not, however, recognizable until a large area had been excavated. Once the grid had been laid out, excavations of 1.5 × 1.5 m squares began. In each square, excavation ceased when the relatively hard red-yellow sediment was exposed. In the eastern part of the site, deposits were as shallow as 25 cm; other areas had cultural deposits extending up to 2 m in depth.

Numerous disturbances from one layer into another were recorded, so the stra-

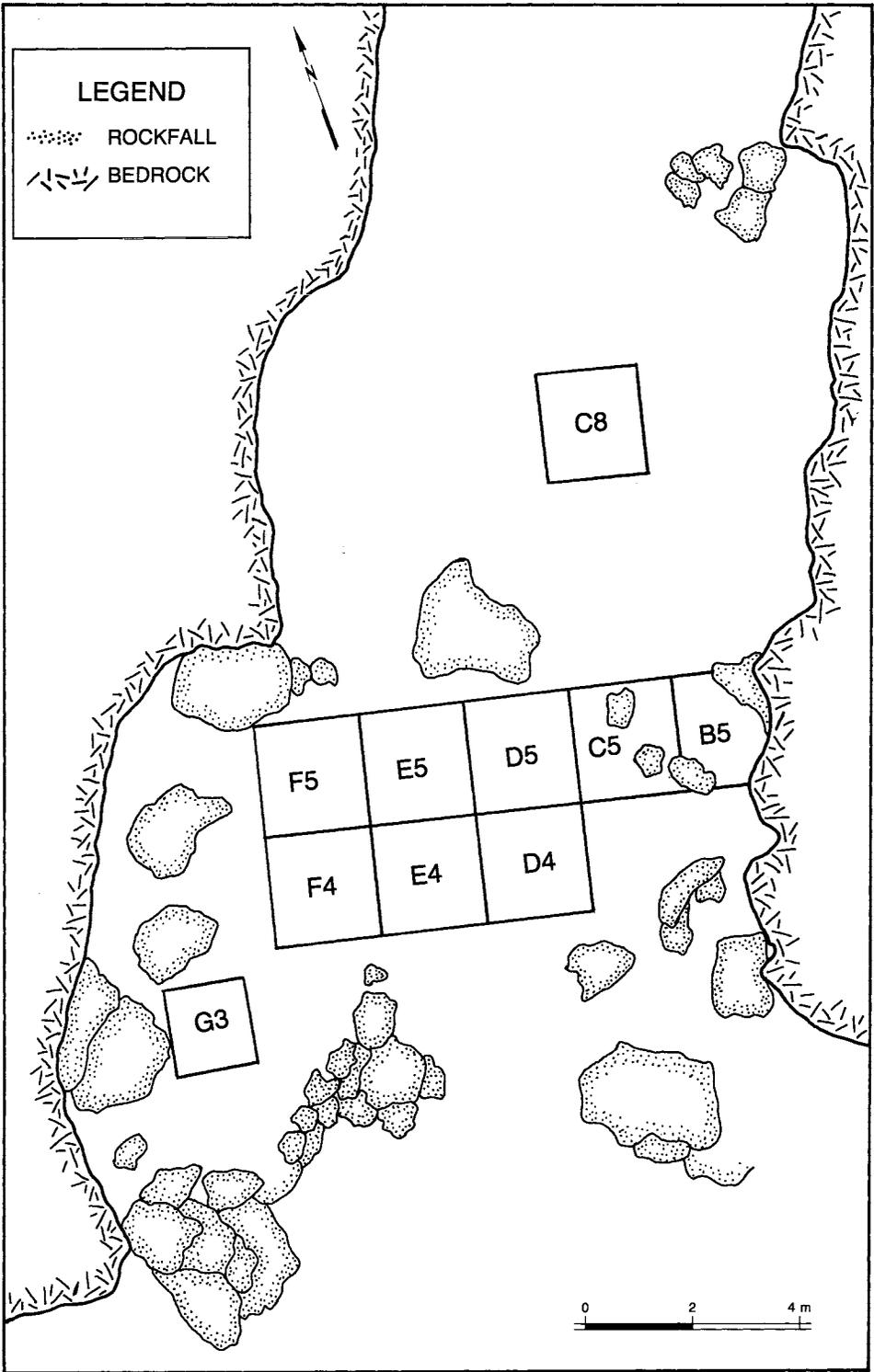


Fig. 2. Plan of Banyan Valley Cave showing excavation squares.

tigraphy referred to general levels. Spit digging was resorted to when no stratigraphic distinctions could be observed and to subdivide larger layers. Smaller trial pits were dug beyond spits to attempt to gain some understanding of the stratigraphy where colors of sediment varied and disturbance had occurred. Correlations between the different sections of a single square and between different squares has subsequently been difficult. A number of clearly in situ ash lenses and hearths were noted, but more commonly rodent and termite activity and later occupation accounted for the considerable horizontal and vertical sediment variability.

Excavation techniques tended to exacerbate these problems, for spit digging occasionally mixed materials from in situ and disturbed contexts, while recording was not undertaken in three dimensions for most artifacts and few plans or sections exist in the available documentation. The reliance on color to differentiate layers was clearly problematic, for coloration seems to relate to postdepositional factors, such as moisture content. Absolute depth measurement were also rare, so drawing together the stratigraphic evidence is a difficult task. Toward the end of the excavation some haste was needed, and as a result some spits were overdug. Certain reservations about the evidence from this site must be held, but these criticisms could apply equally to other excavations where these problems may not have been made known. Thus no particular criticism of the Banyan Valley Cave project is intended, for this account benefits from hindsight. The criticisms noted are intended to be helpful in assessing what can and cannot be said of the evidence from the site. In the succeeding discussion of cultural materials from the Banyan Valley Cave, it should be borne in mind that only material clearly attributable to a given general level has been included. The site was complex, with much disturbance and archaeological material packed into a relatively limited depth of deposit. Wisely, Gorman attributed material to general levels rather than specific horizons or contexts. Occupation units such as hearths did occur, and later work will be directed to attempting a higher resolution of the archaeological materials.

Sediment from the site was troweled and sieved, and the recovery of small chips and flake fragments less than 0.5 cm in maximum dimension indicates a good level of recovery of the smaller artifact fraction. Additionally, charcoal and faunal and floral remains were recovered, permitting an assessment of economy and environment. Samples were taken for radiocarbon dating and sherds sent for thermoluminescence dating.

STRATIGRAPHY

A total of ten 4 m² pits or 40 m², were excavated at Banyan Valley Cave. Because the stratigraphy was confused, Gorman used a series of general levels. The first general level was the surface—a dry and dusty loose red cave earth incorporating animal dung and leaves.

General level 1 (GL1) has a reddish brown, very homogeneous and finely textured matrix. It forms a compact surface just beneath the surface level. It contained small pieces of charcoal, limestone, and organic material, cord-marked and burnished potsherds, and a flaked stone element. Larger pebbles are rare.

General level 2 (GL2) appears to be the product of the most intense occupation of the site. It is of variable thickness, only a few centimeters in the eastern portion of the excavated area, but up to 30–40 cm in the west. It is generally light gray, but

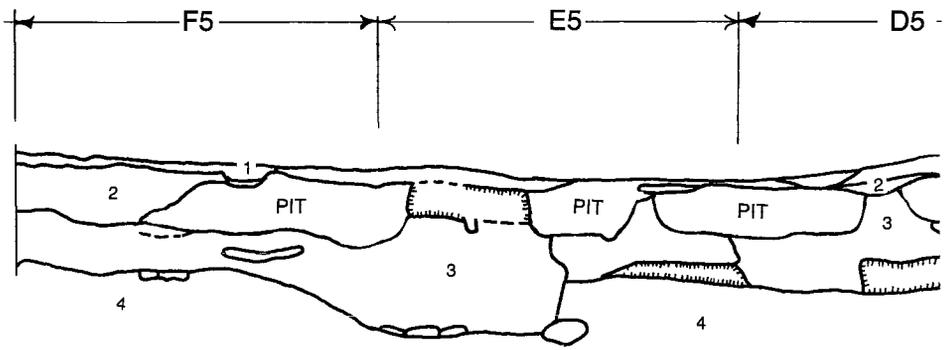
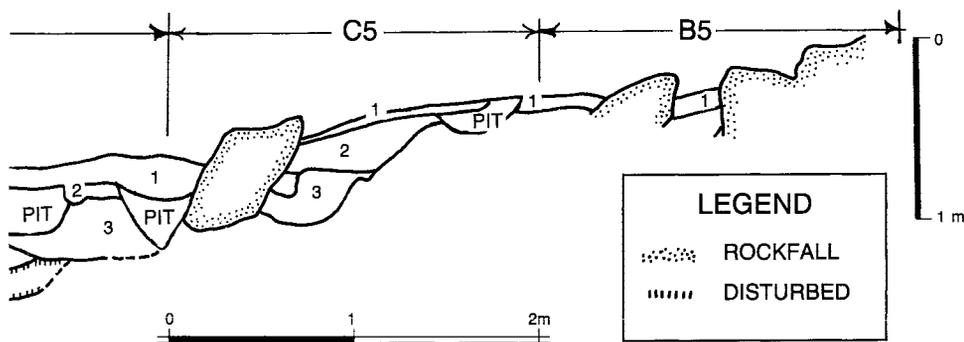


Fig. 3. Transverse section profile of Banyan Valley Cave along north wall from excavation unit to Gorman's general levels 1–3. Level 4 is the layer devoid of cultural material.

with red areas too. The main occupation within this level seems to have been located in the well-lit areas in the west of the excavated area. The original cave floor was more sloping than the present one, and the western area was then the lowest, warmest, and best lit area. The sediments of GL2 are less homogeneous and less finely textured than those of GL1. GL2 contained numerous broken stones, cores, and flakes. The remains appear to indicate a more intensive occupation than in GL1 and GL3, while the frequency of hearths suggests that the western portion was the area most heavily used for cooking. The density of lithics from this area indicates that knapping took place here. Numerous disturbances were cut from GL2 into GL3.

General level 3 (GL3) is deep red-brown, in places lensed with more yellowish material. The surface is uneven and very disturbed, mostly undermined by animal and insect burrowing. Again, the western part possesses the most hearths and the thicker sediments. There seems to be a level of hearths between 80 and 90 cm deep that represents one of the earliest occupational phases. Farther down, GL3 becomes sterile of cultural remains.

The successive occupations at Banyan Valley Cave did leave relatively distinct and clear traces, but these have been blurred by the disturbances of animals and later occupations. Excavation technique added to such problems, for sections rarely matched up between boxes, and only one section is available across the entire site (Fig. 3). This section is a composite of individual excavated-square sections, and some simplification was necessary. The general levels described above reflect the most accurate cultural stratigraphy it is possible to employ at the present time. Much more detailed work using site photographs and limited reexcavation would be needed to obtain higher stratigraphic resolution. The thickness of the sediment varied, with thicker deposits on the west of the site; the heights of the individual general levels across the site also varied considerably. The range of sediment depth varied between 2.2 m and 0.29 m. GL2 was at 30–40 cm in the main occupational area, and GL3 lay at 80–90 cm in the same area. The control and recording of depths at the site was not good, and no final depths are provided for the overall site section (Fig. 3). This is due in part to the varying degree to which GL3 was dug—different heights would be attained even within individual squares. Bedrock was not reached, so the “sterile” part of GL3 might repay further investigation.



F5 to B5. This section is a composite from individual section drawings. The numbered layers refer

FEATURES

Several pits were identified during the excavations, mostly dug from the top of the layer underlying the surface deposit (GL1) down into the underlying grayer levels that were the richest in cultural materials. Numerous hearths were recovered in all the general levels.

Other features include two postholes: one in the topmost layer that had a diameter of 5 cm and a depth of 18 cm, and a second in the underlying layer that was 6 cm in diameter. Unfortunately, no depth was recorded for it.

A "floor" was noted, defined by a series of flat stones all found at the same level and not the result of a roof-fall. These stones were associated with both potsherds and flakes lying flat. A charcoal concentration was also associated with this feature, from which came a rock with crystallized material adhering to it. The unique tanged projectile point also came from this "floor," which is part of GL1. Additional stone features included a concentration of large cobbles in the western part of the excavated area and a series of large stones placed over a charcoal concentration, both from GL2.

At least six pits were discovered. They were generally asymmetric but rounded, with vertical or nearly vertical walls. A pit in the western part of GL1 is important because it yielded carbonized rice grains and was associated with a hearth and a polished adze made of a fine-grained white stone. In GL2 a large pit was associated with ash lenses. The remaining four pits are cut from GL2 into GL3. None of the pits could be related to human burial.

In addition to features described as hearths, numerous ash lenses occurred and at least two series of stratified hearths were noted, but the actual number of superimposed hearths was not recorded. It may be inferred from the site notebooks that each series comprised at least three hearths.

There are three types of hearth noted: (1) a general charcoal or ash concentration; (2) a concentration of ash and charcoal in a small depression of c. 15–20 cm in diameter; and (3) a stone-bounded concentration of burned materials. There were two examples of the third type, and an uncounted number of hearths in depressions (this form is associated with the superimposed series), while by far the majority were simple concentrations of burned material. Bones and occasionally mollusk shells were found in association with the hearths. Several carbonized bamboo frag-

ments were found with two different hearths; two pointed wooden implements were also found in association with hearths. At least 24 single hearths were excavated, mostly from GL2 and GL3. Charcoal flecks occurred widely in the deposits. One charcoal lens is believed to have resulted from the deliberate smothering of a fire before much ash had accumulated, by burying it with the surrounding sediment. The majority of hearths were located in the western area.

CHRONOLOGY

On typological grounds (both lithic and ceramic) Banyan Valley Cave was considered younger than Spirit Cave, and subsequent dates obtained by radiocarbon and thermoluminescence methods have confirmed this hypothesis. Two radiocarbon dates were obtained, one on wood (Gak 4340) from square F4, in the main occupation area in GL1, which gave a date of 930 ± 80 B.P. (A.D. 1020, using the 5570 half-life). The second date, derived from charcoal (Gak 4341) from GL2 in square D4, was 5360 ± 120 B.P. (3410 B.C.). (Neither date has been calibrated.) Thermoluminescence dates on sherds collected from the baulk between F4 and E4 in GL1 gave a range of dates between 500 and 900 B.C. (from five dates). A rough date of 2000 B.C. was obtained for a sherd derived from the baulk between the same squares in a layer that appears to be part of GL2.

These estimates suggest that occupation within GL2 dates to 3410–2000 B.C., while GL1 falls within the last millennium B.C. and the first millennium A.D. No stratigraphic hiatus is visible between the two general levels, and sporadic occupation is likely to have occurred throughout the period 3000 B.C.–A.D. 1000, with certain times being marked by more intensive site use. The date of the occupations in GL3 presumably is earlier than 3000 B.C. but given the thickness of deposit, the similarity in materials between GL2 and GL3, and the proximity of dates for GL1 and GL2, it is unlikely that GL3 is much older than 4000 B.C.

CULTURAL SEQUENCE

Stone Artifacts

An examination of the lithics from Banyan Valley Cave is presented elsewhere (Reynolds n.d.), so these will not be discussed in detail here. Analysis of the stone material held in the University Museum of the University of Pennsylvania permitted the recognition of four assemblages representing the surface material, GL1, GL2, and GL3. The results of the analysis are presented in Tables 1 and 2. There is clear break between GL1 and GL2 with material from GL2 and below having a clear Hoabinhian character. The assemblages above this lack the pebble tool element, flakes are thinner, and they have fewer step-flaked dorsal surfaces. A polished stone adze, a flaked quadrangular adze, and the bifacially flaked, tanged projectile point all come from GL1 or above. A series of chips and bladelets, presumably from a ground quadrangular adze, occurred in GL1 and above but the adze itself, or rather the worked-out remnant of it, was not recovered. No deliberate or systematic manufacture of blades or bladelets was identified, and all cores recovered were informal. Cortical and plain platforms dominated the platform types, but crushed platforms also occurred with some frequency. All technological attributes of the Hoabinhian

TABLE 1. COMPOSITION OF THE ASSEMBLAGES FROM BANYAN VALLEY CAVE BY GENERAL LEVEL

ARTIFACT CLASS	SURFACE	GL1	GL2	GL3	MIXED
Manuports	1	1	0	0	0
Local natural stones	109	294	605	114	510
Hammers	0	0	3	5	2
Edge-ground pieces	4	2	1	0	0
Single platform and direction cores	3	3	6	1	3
Single platform and two-direction cores	0	0	1	0	0
Double platform and two-direction cores	0	0	0	1	1
Unifaces	0	0	1	0	0
Steep-edged pieces	0	0	5	0	2
Retouched flakes	1	1	3	0	1
Utilized flakes	1	0	4	2	3
Plain flakes	48	126	365	76	312
Axes	0	0	2	0	1
Miscellaneous	0	0	1	0	1
Retouched pebble fragments	0	0	0	2	0
Utilized pebble fragments	0	0	2	0	0
<i>Debris</i>					
Plain broken cores	0	0	1	0	1
Retouched broken-core tools	0	0	1	0	1
Utilized broken-core tools	0	0	2	0	0
Plain broken flakes	9	37	111	26	96
Broken pebbles	30	43	119	48	92
Total	206	507	1233	275	1026

industry (GL2 and GL3) showed hard-hammer, direct percussion using relatively heavy hammers. Shatter and crushing occurred commonly, while occasional flakes with double bulbs of percussion also were present.

In the overlying non-Hoabinhian industry, the frequency of double-bulbed and sired flakes was lower despite similar raw materials being used. Indeed, the finer grained raw materials were most common in the Hoabinhian levels.

The Hoabinhian industry contained sumatraliths (unifacially flaked discoids), short axes, steep edged pieces, and axes, all of which are characteristic of the Hoabinhian technocomplex in Thailand (Figs. 4–6). These occurred in low frequencies but were completely lacking in the overlying levels. Retouch and utilization on flakes, where present (which was rarely), were often inverse. A single flake with the bulb *enlevé* (broken off) was recovered from the Hoabinhian of GL2.

A single fragment of an edge-ground slate knife was recovered from the Hoabinhian-associated deposit of GL2, while a further three pieces came from GL1 (Fig. 7). None of the edge-ground pieces fits any of the others. The fragment from GL2 could be intrusive from above, but such artifacts are believed to come from Spirit Cave in Hoabinhian contexts, so this association may be valid (Gorman 1969a).

A single fragment of a Marque Bacsonienne was discovered in levels associated with the Hoabinhian, but not clearly attributable to either GL2 or GL3 (Fig. 8). This is a shaly stone fragment with two grooves smoothed along it, running parallel

TABLE 2. COMPARISON OF ASSEMBLAGE CHARACTERS AT BANYAN VALLEY CAVE
BY GENERAL LEVEL

ARTIFACT CLASS	SURFACE	GL1	GL2	GL3	MIXED
NUMBER (%)					
Core	3 (0.9)	3 (0.4)	7 (0.4)	2 (0.5)	4 (0.4)
Core tools	1 (0.3)	1 (0.1)	8 (0.4)	2 (0.5)	4 (0.4)
Whole flakes	50 (15.8)	127 (15.8)	372 (20.2)	316 (27.6)	316 (27.6)
All flakes	59 (18.7)	164 (20.4)	483 (26.2)	104 (26.7)	412 (35.9)
Broken pebbles	30 (9.5)	43 (5.4)	119 (6.5)	48 (12.3)	92 (8.0)
Unworked rock	139 (43.9)	337 (42.0)	724 (39.3)	162 (41.7)	602 (52.5)
Hammers	0 (0)	0 (0)	3 (0.2)	5 (1.3)	2 (0.2)
RATIOS					
Cores:flakes	1:17	1:42	1:53	1:52	1:79
Cores:core tools	1:0.3	1:0.3	1:1	1:1	1:1
Core tools:flakes	1:50	1:127	1:47	1:52	1:79
Tertiary:primary flakes	1:0.6	1:0.6	1:0.3	1:0.5	1:0.3
PERCENTAGES					
Fine-grained rock	7.91	6.98	4.72	12.85	5.58
Large cobbles	45.3	42.1	39.5	43.4	52.7
Sherds	8.2	2.0	1.5	0.8	10.4
Total number of artifacts of all classes in assemblage	316	802	1842	389	1146

down its main axis. Such an artifact could have served for polishing small stone tools, for grinding the edges of slate knives, or for smoothing wooden or bone tools.

One final stone artifact that should be noted is a water-worn sandstone cobble with two parallel black lines on one side (Fig. 9). These run from one edge toward the center of the piece at a distance of about 3 cm apart. Each line is more than 5 cm long and at least 2 mm thick and appears to have been deliberately produced. Whether this piece should be regarded as an art object or a by-product of an activity is unclear, but it is certainly of human origin. No other piece like it was found at the site.

Ceramics

Pottery became a more significant component in assemblages with time, from a negligible 0.8 percent of the total number of artifacts in GL3 to 8.2 percent in the surface assemblage (Table 3). Overall numbers of sherds are small, however, and a very small number of vessels may be represented. GL1 yielded a single rim sherd, which was plain and had a simple rounded cross-section; the remaining specimens were all body sherds. Almost all the pottery was fired black or gray; shell or possibly limestone temper was used in some sherds. The majority were either plain or cord-marked. The cord-marking showed a variety of designs and was associated with burnishing of the interior of the sherd. A single piece had a pinched band running

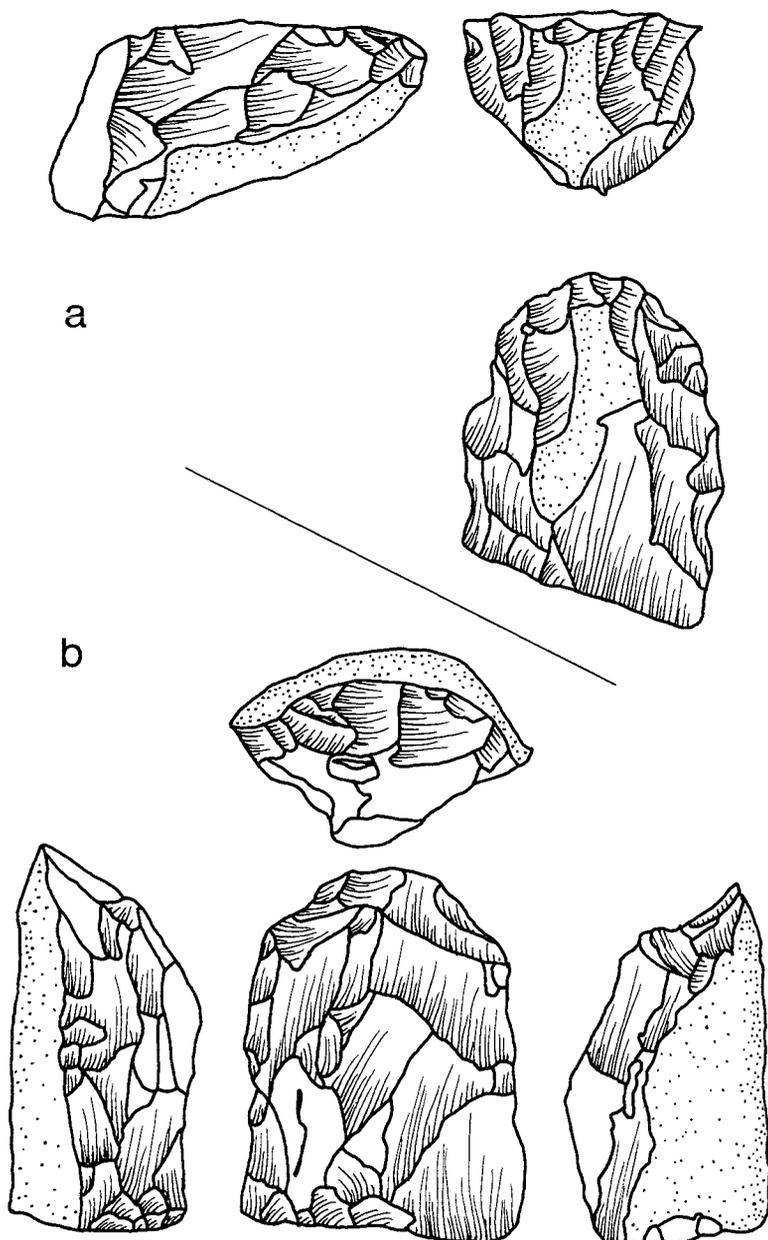


Fig. 4. Hoabinhian artifacts from Banyan Valley Cave: a, short axe; b, sumatralith.

across it, and a single painted sherd came from GL1. This was painted red on the outside and was black but unburnished on the inside. The majority of sherds were well fired, but eight heated clay fragments were recovered. These may be deteriorated pot fragments, clay heated by proximity to hearths, or clay plugs from bamboo cooking vessels. There is a possibility that GL3, which yielded three sherds, was

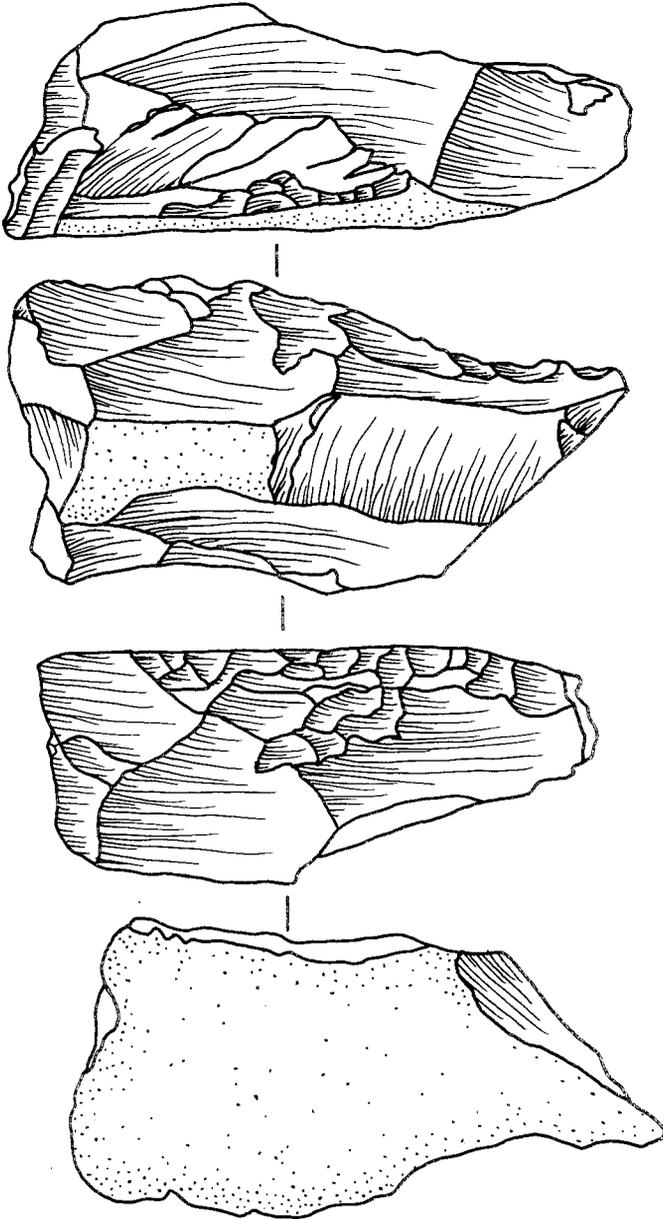


Fig. 5. Additional Hoabinhian artifact from Banyan Valley Cave, a steep-edged retouched piece.

in fact aceramic, and that these pieces are intrusive from above. It was noted during excavations that at the topmost surface of both GL1 and GL2 sherds were lying flat, but otherwise little comment can be made on the distribution of sherds. The plain and cord-marked sherds from all levels are similar in degree of firing, thickness, temper, and treatment or decoration where this is present. There do not seem to be any significant chronological changes in these pottery forms.

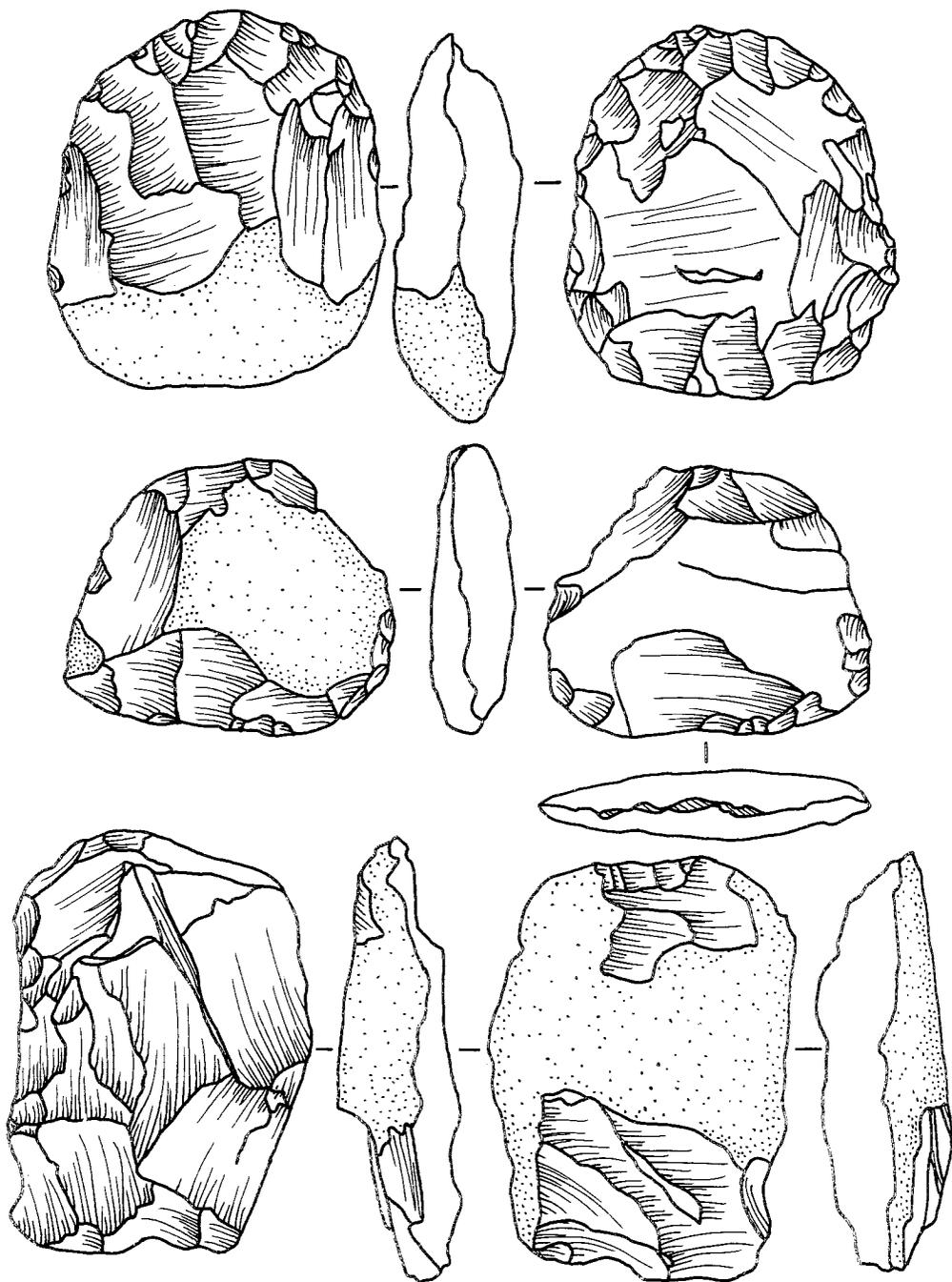


Fig. 6. Three Hoabinhian axes from Banyan Valley Cave.

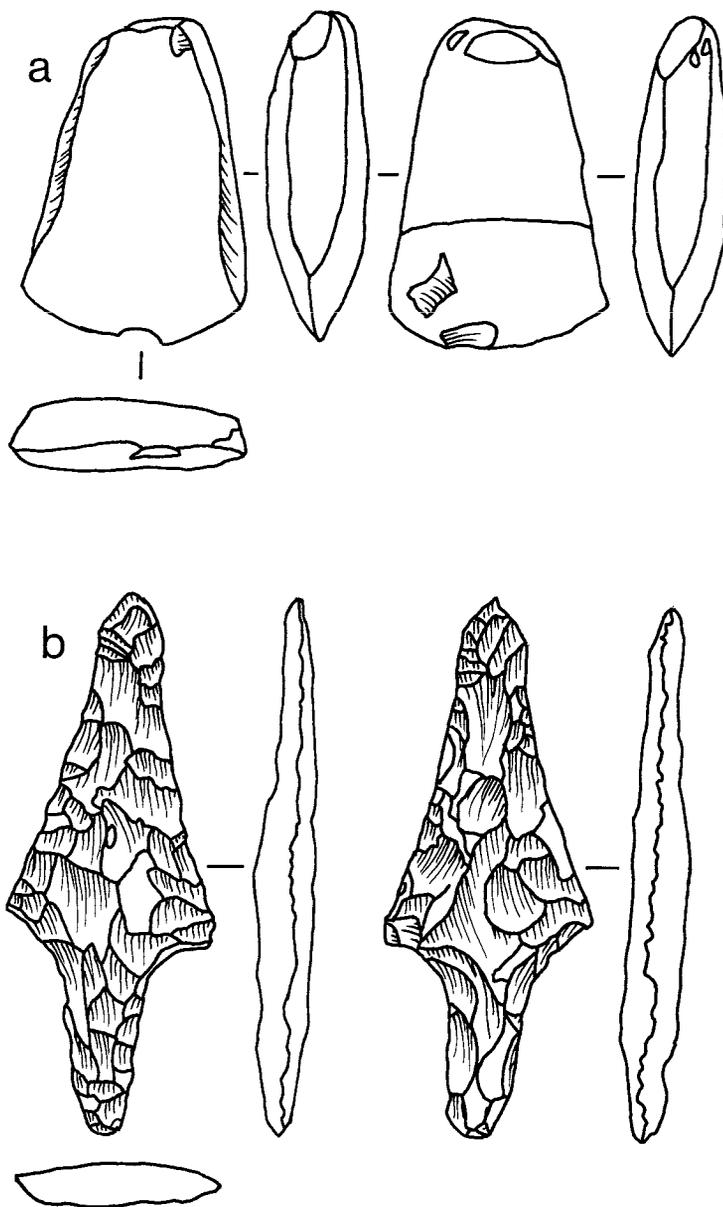


Fig. 7. Distinctive artifacts from general level 1 of Banyan Valley Cave: *a*, ground lenticular adze; *b*, tanged bifacially retouched point.

Wood, Bone, and Metal

A series of sharpened wooden (bamboo) sticks were found associated with a hearth in GL2, and numerous carbonized wood and bamboo fragments were found with other hearths, particularly on the surface and in GL1. These probably represent firewood, but an unspecified number of pointed bamboo tools occurred in the top of

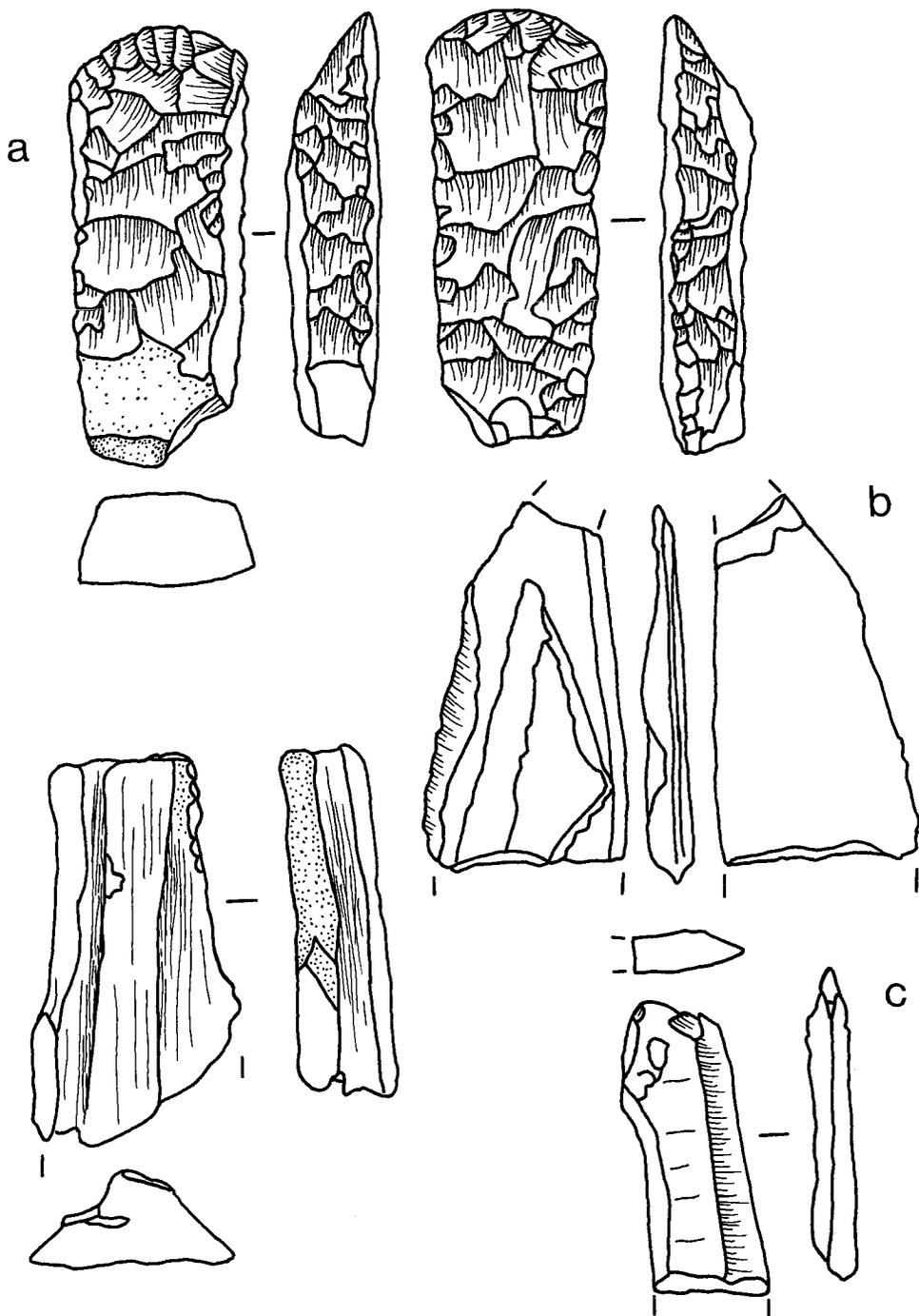


Fig. 8. Additional artifacts from general level 1 of Banyan Valley Cave: *a*, flaked quadrangular adze; *b*, edge-ground knife; *c*, Marque Bacsonienne.

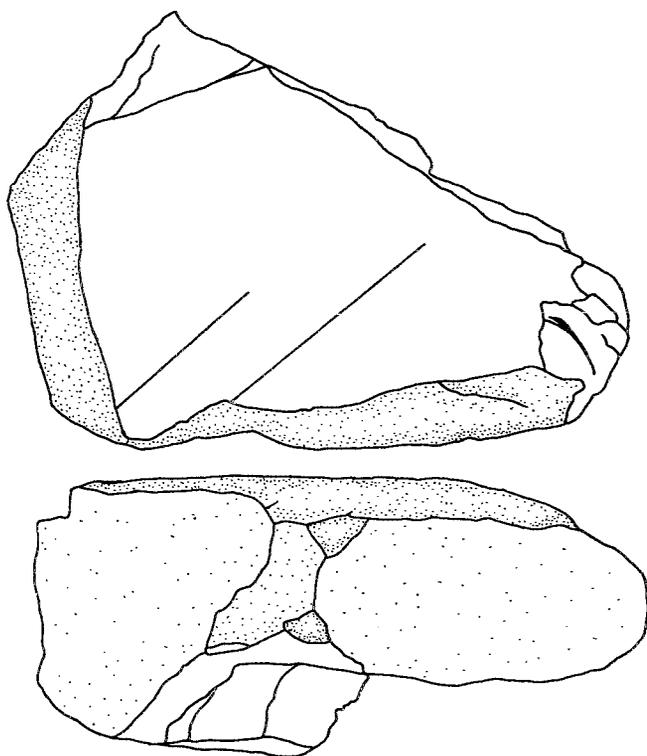


Fig. 9. Possible decorated stone from Banyan Valley Cave.

F4 at a depth of 10–17 cm while another was in overlying sediment. The total number of these pieces is unknown, for only two could be found in the museum collection.

A single bone tool was recovered. It represents a bone point or graver with a ground surface. This tool was discovered while sieving material from the baulk between squares F4 and F5 in GL1. It was associated with a charcoal concentration in approximately the same location where the tanged point was found.

TABLE 3. COMPOSITION OF CERAMIC ASSEMBLAGES OF BANYAN VALLEY CAVE
BY GENERAL LEVEL

DECORATION TYPE	SURFACE	GL1	GL2	GL3	TOTAL
Plain	9	8	10	1	28
Cord-marked	16	7	17	1	41
Painted	0	1	5	1	1
Other	1	0	5	1	7
Percentage of total assemblage	8.2	2.0	1.5	0.8	
Total	26	16	32	3	

TABLE 4. FAUNAL LIST FOR BANYAN VALLEY CAVE BY GENERAL LEVEL

SPECIES	GL1	GL2	GL3
Artiodactyla			
<i>Sus scrofa</i>	—	x	—
<i>Bos gaurus</i> or <i>bos javanicus</i>	—	—	x
<i>Muntiacus muntjak</i>	x	x	—
<i>Axis porcinus</i>	x	—	x
<i>Tragulus sumatrensis</i>	—	x	—
<i>Capricornis sumatrensis</i> or <i>nomorhaedus goral</i>	—	x	x
<i>Cervus unicolor</i>	x	x	—
Perissodactyla			
<i>Didermocerus sumatriensis</i>	x	—	—
<i>Rhinoceros sondaicus</i>	—	x	—
Primates			
<i>Presbytis</i> sp.	—	x	—
<i>Macaca</i> sp.	—	—	x
Carnivora			
<i>Selenarctos thibetanus</i>	—	—	x
<i>Arctonyx collaris</i>	—	x	—
<i>Lutra</i> sp.	—	x	—
Rodentia			
<i>Hystrix</i> sp.	—	x	x
<i>Rattus</i> sp.	x	—	x
<i>Callosciurus</i> sp.	—	x	—
Chiroptera			
<i>Megaderma</i> sp.	—	x	—
Cyprinidae			
<i>Acrossocheilus</i> sp.	—	x	—
<i>Emydidae</i> sp.	—	—	x
<i>Potamonidae</i> sp.	x	x	x

Note: Other species are recorded but not identified to general-level context; such species are listed in Gorman (1971). Key: x = present; — = absent.

A small piece of metal, probably iron, was recovered from within GL1. It is not clear whether this piece was derived from the surface layer above or was in situ.

Fauna

The fauna from Banyan Valley Cave (Table 4) was originally examined by Charles Higham, who produced lists of species for specific contexts from within the cave but did not have the information available to permit chronological considerations. Higham noted that the faunal lists indicated a broad-spectrum exploitation system using mammals, reptiles, fish, shellfish, birds, and crustaceans. Many of the bones of the larger species had been subject to “persistent and heavy battering,” and bones of all species had been burned. It is likely, therefore, that the game recovered was processed and cooked within the cave itself. There was no evidence for selected parts of carcasses having been introduced into the cave. The occupants of Banyan Valley Cave obtained fish, shellfish, and turtles from riverine environments, and bats from the caves, while from the forest they obtained small arboreal species. From the forest floor they gained deer and rhinoceros. The serow and goral prefer

limestone outcrops and wooded slopes, and the gaur is usually confined to grassy clearings and well-grassed forest margins or river banks (Higham 1977:393).

Genera important to the discussion of domestication, such as bovids and suids, are not common and do not seem to have received special treatment. Indeed, both are absent from GL1 when domestication was under way elsewhere in Southeast Asia (Higham 1989). The greater variety of species in GL2 is probably a reflection of more intensive occupation of the site. Hog, deer, and rat are present in GL1 and GL3 but not in GL2, while Tibetan bear, macaque, and turtle occur only in GL3. Unique to GL1 is the rhinoceros (*Didermocerus sumatrensis*). The significance of these data concerning presence and absence is difficult to determine.

In addition to these game species, two human teeth were recovered from the talus test square (G3) in a level equated with GL1, and a further two human teeth plus three phalanges came from the spit beneath it. There is no evidence for deliberate human burial in the cave.

Flora

The flora (Table 5) was originally analyzed by Douglas Yen (1977); as in the case of fauna, stratigraphic information was not available to permit discussion of changes in plant use through time. The lists of identifications made, however, were on file at the University of Pennsylvania, and they can now be attributed to general levels.

It can be seen at once from Table 5 that the carbonized rice husks, of genus *Oryza*, is restricted to GL1; it derived from two places within this level, a pit cut in GL1 in the main occupation area, and another in an isolated square farther back in the cave. This rice is wild and may be associated with dates between 900 B.C. and A.D. 1000, so it cannot assist in the debate on the Hoabinhian background to the origins of rice agriculture.

GL3 is characterized by grasses from an elephant coprolite, beans, and possibly peas, while GL2 has a broader spectrum of genera, including *Canarium* nut, gourd, *Prunus*, and possibly *Palmae*. GL1 had clear remains of bamboo, in addition to

TABLE 5. PLANT IDENTIFICATIONS FOR BANYAN VALLEY CAVE BY GENERAL LEVEL

PLANT TAXA	GL1	GL2	GL3
<i>Calamus</i>	x	?	—
<i>Canarium</i>	x	x	—
Cucurbitaceae	—	x	—
Gramineae	x	—	—
Lagenaria	—	x	—
Leguminosae	x	—	—
<i>Lotus/Calamus</i>	—	?	—
<i>Oryza</i>	x	—	—
Palmae	—	?	—
<i>Pisum</i>	—	—	?
<i>Phaseolus/Glycine</i>	—	—	x
<i>Prunus</i>	—	x	—

Note: Other identifications were made but these are not attributable to general level. Key: x = present; ? = possibly present; — = absent.

legumes, rice, and *Canarium* nut. Once again, little significant chronological change is visible except for the appearance of rice at the top of the sequence.

DISCUSSION

Banyan Valley Cave shows two distinct phases of occupation: an early, Hoabinhian one, with pebble tools, large numbers of flakes, and broad-spectrum exploitation of plants and animals; and a later one in which the Hoabinhian pebble tools are absent, and new forms occur, such as ground lenticular and quadrangular adzes and the ranged point. This later occupational phase is associated with significantly later radiocarbon and thermoluminescence dates and the presence of wild rice. The edge-ground slate knives, often compared to rice reapers, came from this level of occupation, with the single exception of a fragment of one in GL2. The later occupation also possesses the only painted pottery from the sequence and is marked by greater frequencies of pottery. The pottery does, however, largely continue the forms and decoration of earlier levels. The single iron fragment found in GL1 could be in situ, so this later phase could be Metal Age. No satisfactory industrial label suggests itself for this later set of assemblages, and such a labeling will be reserved until after a further investigation of the sequences at Steep Cliff and Spirit caves.

The Hoabinhian lithic complex at Banyan Valley Cave is clearly associated with pottery in GL2, both cord-marked and plain, and also with a Marqué Bacsonienne. Given these facts, and the fact that a fragment of an edge-ground knife occurred, it may be that this particular grouping of material should be considered as a Thai version of the Bacsonian, taking the Bacsonian to be a late facies of the broader Hoabinhian technocomplex. The Banyan Valley sequence shows many interesting similarities to that at Spirit Cave, also in northern Thailand and also excavated by Gorman. At Spirit Cave, Gorman again identified general levels rather than specific occupations and noted the introduction of new cultural elements into what was regarded as a Hoabinhian sequence. The new elements included edge-ground slate knives and pottery, paralleling changes at Banyan Valley Cave but appearing earlier. The new elements were regarded as intrusive to Spirit Cave general level 2. The results of this reanalysis of Banyan Valley Cave make further investigation of the cultural sequence at Spirit Cave a very important desideratum. The Spirit Cave evidence has not yet been presented in detail, and the correlation of material with stratigraphy and dating certainly needs to be clarified. This is especially true given the importance of this site to the hypotheses presented, which argue for economic intensification within the Hoabinhian leading to horticulture and agriculture (Gorman 1971a, 1977; Yen 1977). It must be determined whether at Spirit Cave a clear distinction between Hoabinhian and later assemblages can be made, as has been done for Banyan Valley Cave. The use of general levels without cautious attribution of material may lead to homogenization of the cultural sequence. Although Spirit Cave was not apparently occupied earlier in time, it shows very similar cultural and chronological patterning to Banyan Valley Cave, where a clear disjunction in certain elements occurs after GL2. This would support Gorman's argument that at Spirit Cave, the same elements are intrusive to the Hoabinhian—but is a chronological distinction also present, as is the case at Banyan Valley Cave?

Banyan Valley Cave is important in showing a sequence from the Hoabinhian to what is probably the Metal Age in northern Thailand. Spirit Cave parallels some of

this sequence, but the details are missing and so the nature of the succession there must remain somewhat uncertain. Despite the presence of rice at the top of the sequence at Banyan Valley Cave, the general exploitation pattern present at the site remains the same over time. It is probable, therefore, that sites such as Banyan Valley and Spirit caves served as specialized sites for the exploitation of upland and forest products, which could be exchanged or simply transported down to the larger village sites in the plains. Whether this involved different ethnic groups or units within a single group is debatable. This upland karstic exploitation, however, has clear predecessors in the Hoabinhian of Southeast Asia and probable Pleistocene origins. It represents some continuity of exploitation systems for a considerable length of time.

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REFERENCES

- GORMAN, C. F.
 1969a Hoabinhian: A pebble-tool complex with early plant associations in Southeast Asia. *Science* 163: 671-673.
 1969b Hoabinhian transformations in early Southeast Asia: A cultural-chronological sequence ca. 10,000-5,000 B.C. Paper presented at 68th meeting of the American Anthropological Association, New Orleans, 23 November.
 1971a The Hoabinhian and after: Subsistence patterns during the late Pleistocene and early Recent periods. *World Archaeology* 2: 300-320.
 1971b Prehistoric research in northern Thailand: A cultural-chronological sequence from the late Pleistocene through to the early Recent period. Ph.D. diss., University of Hawaii, Honolulu.
 1972 Excavations at Spirit Cave, north Thailand: Some interim interpretations. *Asian Perspectives* 13: 79-107.
 1977 A priori models and Thai prehistory: A reconsideration of the beginnings of agriculture in southeastern Asia, in *Origins of Agriculture*: 321-355, ed. C. A. Reed. The Hague: Mouton.
- HIGHAM, C. F. W.
 1977 The prehistory of the Southern Khorat Plateau, north Thailand with particular reference to Roi Et Province. *Modern Quaternary Research in Southeast Asia* 3: 103-142.
 1989 *The Archaeology of Mainland Southeast Asia*. Cambridge: Cambridge University Press.
- REYNOLDS, T. E. G.
 n.d. Techno-typology in Thailand 2: Banyan Valley Middle Cave. Unpublished manuscript. Department of History, University of Dar es Salaam.
- YEN, D. E.
 1977 Hoabinhian horticulture? The evidence and the questions from northwest Thailand, in *Sunda and Sahul: Prehistoric Studies in Southeast Asia, Melanesia, and Australia*: 567-599, ed. J. Allen, J. Golson, and R. Jones. London: Academic Press.

ABSTRACT

With the field records and artifactual materials recovered from Banyan Valley Cave in northern Thailand, it is now possible to reliably correlate lithic, ceramic, and other cultural materials with the general stratigraphic layers from which they derive. An earlier Hoabinhian occupation at the cave was replaced by a later occupation associated with neolithic elements, including pottery and rice. There is some overlap among the elements through time, a pattern also noted at Spirit Cave in the same general area. This suggests that there is some continuity in the expression of Hoabinhian throughout the Holocene in parts of Thailand. **KEYWORDS:** Southeast Asian prehistory, Hoabinhian, Holocene cultural chronology.