Ulu Leang Cave, Maros : A Preliminary Sequence of post-Pleistocene Cultural Development in South Sulawesi

Ian C. Glover

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IV. 1. Ian C. Glover (Institute of Archaeology, London) supplies a detailed, illustrated, report on the excavations which he undertook in 1969 and 1973 in a cave near to Maros (South Sulawesi), bringing to light a lithic tool complex, fragments of pottery and bones emanating roughtly from a period stretching from 8000 to 3000 B.C. It is a site important for the study of the prehistory of Sulawesi and, in a wider sense, for the prehistory of the whole of Eastern Indonesia.

ETUDES - RECHERCHES

ULU LEANG CAVE, MAROS: A PRELIMINARY SEQUENCE OF POST-PLEISTOCENE CULTURAL DEVELOPMENT IN SOUTH SULAWESI

by Ian C. GLOVER

Introduction and research problems

The province of South Sulawesi has seen more systematic research into its prehistory than any comparable region of Indonesia but for various reasons it is not yet an opportune moment to evaluate the resulting data in order to construct a broadly synthetic account of the culture history of the region.

Starting with the expeditions of the Sarasin brothers in 1893-96 and 1902-03 a succession of naturalists and archaeologists have investigated its caves, prehistoric villages and burial grounds with splendid results. The work of the Sarasins, van Stein Callenfels, Noone, Cense, McCarthy, Willems, Franssen, Dammerman, Hooijer, and above all H. R. van Heekeren provides a basic description of the material remains of prehistoric man in South Sulawesi and we are now in a position to ask specific questions about chronology, economic development and cultural relationships for many periods between the late Pleistocene and the early metal age.

But little of this work was undertaken with the rigorous application of field methods already developed in Europe and little of that has been adequately published (excepting, of course, the work of the Sarasins and van Heekeren).

A good summary of the state of research up to the mid 1960's is already available in van Heekeren's two books, *The Bronze-Iron Age*

of Indonesia (1958) and *The Stone Age of Indonesia* (2nd ed. 1972), and since these books are widely available, there is little point in duplicating the information here.

In 1968 and 1970 three archaeologists, van Heekeren, Soejono, and Bartstra, the geologist T. Soeradi and the palaeontologist D. A. Hooijer again undertook research on the Pleistocene Cabenge finds (van Heekeren 1972 : 64-72) but their report is not yet complete. And in 1969 a joint Indonesian-Australian expedition led by R. P. Soejono (L.P.P.N. Jakarta) and D. J. Mulvaney (Australian National University), and of which I and my wife Emily Glover were members, continued the investigation of cave deposits near Bantaeng and Maros. The preliminary results of that expedition have already been published in two reports by Mulvaney and Soejono (1970a and b). A principal aim of the expedition was to investigate possible contacts between Sulawesi Selatan and Australia in prehistoric times, to obtain stratified artifact and faunal collections, to collect samples for radiocarbon dating, and to assess the future archaeological potential of the region. It was soon apparent that many of the sites investigated by earlier Dutch prehistorians were either largely exhausted (Panganreang Tudea, Leang Pattae, Karassak, Saripa), or too mixed for worthwhile re-excavation (Batu Ejaja). New prehistoric sites were found (Batu Ejaja 2, Leang Burung, Ulu Leang 1 and 2, Ulu Wae) but even at these sites digging, either by porcelain hunters, for mineral-rich soil for nearby sawah, or for *batu Hongkong* (bedded limestone for the manufacture of lime and whitewash) had, to a greater or lesser extent, disturbed the deposits.

During the excavation of Leang Burung another cave was found some 2 km. to the north, locally called Ulu Leang, which had been less affected than most by predatory excavation and a small trench was opened there between 29th July and 5th August, 1969. It was clear that this site contained a good sequence of stone, pottery and bone remains which would answer some of the problems concerning the cultural sequence in the post-Pleistocene period.

The antiquity of these deposits was confirmed by two subsequent C-14 dates, ANU-394 3790 ± 230 B.C. for a sample from about 50 cm. below the surface in square C2, and ANU-606 5220 ± 650 B.C. for a small sample from squares C6-7 at about 1.10 m.

A sequence of cultural materials was obtained from Ulu Leang which seemed provisionally, to confirm the schema proposed by van Heekeren (1972 : 113-4) on the basis of his study of van Stein Callenfels' 1938 excavation of Panganreang Tudea ; an early phase in which thick scrapers form the only diagnostic artifact (van Stein's 'pedunculated' blades are believed by the present author to be

accidentally broken flakes, not pre-formed tools), followed by the appearance of long, asymmetric backed blades, then geometric forms together with pottery and hollow-based bifacial 'Maros' points. However, our sample was small, about 5,300 flakes, of which less than 10% were retouched or obviously utilized, and 140 sherds from the top layers only. Nevertheless, this sequence appeared to contradict another provisional one obtained at Leang Burung by Mulvaney and Soejono (1970b: 170-2). Further excavation was required to obtain an adequate sample on which to build a more solid case.

During the excavation of Ulu Leang our attention was drawn to another cave (Ulu Leang 2), some 20 m. higher in the cliffs on the south wall. On investigation this turned out to be a burial cave, perhaps an urn-burial site of the early metal age. Samples were collected from this cave, which was badly disturbed by illegal digging, but we had no time to investigate it thoroughly.

Preliminary results from Ulu Leang 1 were so promising that further excavation was clearly required. Unfortunately, this could not be undertaken earlier because of my moving from the Australian National University to London in 1970, and various factors which also delayed the shipment of excavated material from Ujung Pandang to Australia, and subsequently to London.

In 1973, thanks to the support of the Lembaga Purbakala dan Peninggalan Nasional and funds obtained from London University, the British Academy, the Evans Fund in Cambridge, and the Gordon Childe Fund of the Institute of Archaelogy, University of London, the opportunity came to continue the work at Ulu Leang.

I would like to take this opportunity of thanking those supporting bodies and the many people in Jakarta, Ujung Pandang, and Maros and Kampong Tompokbalang who helped me to undertake this work. *)

The caves of Ulu Leang

The caves are situated about 40 km. north-east of Ujung Pandang, within the area of Kampung Tompokbalang (Desa Kalabirang, Kecamatan Bantimurung, Kabupaten Maros). They lie about 4 km. north

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*) Mrs. E. A. Glover, Drs. Hadimuljono, Bahru Kaluppa, Andi Ipong, Andi Abubakar Punagi, Bupati Let. Kol. H. M. Kasim D. M., H. Tato Wowo, Issudjud, Ridet, Beddu Gassing, Pajala, Arek, Duppa, Lippa, Drs. R.P. Soejono, Drs. Tegu Asmar, Basoeki, Professor D.J. Mulvaney, Dr. Campbell Macknight.

of Pasar Pakalu (where an unsealed road leaves the Maros to Camba road, crossing the Maros canal towards Kampung Leang Leang) and about 500 m. to the east of that road from which they are visible. The caves occur within the massive limestone formations (Plate 1) of Eocene-Miocene age, which skirt the western edge of the Western Divide mountains (fig. 1) These are now weathered into tower-karst forms typical of the humid tropics ; hills with nearly vertical sides, rounded summits at between 150-200 m., clad in dense vegetation and full of fissures and caves. Although the structural and erosional history of this area bears directly in the problem of the consolidated deposits discussed below, the subject is to complex to be discussed here.

Ulu Leang (pl. 2 and fig. 2, 3) is a cave about 15 m. wide by 20 m. deep with a clear 5-8 m. roof space over much of the 250 m^2 of open floor. A small stream (from a spring rising at Ulu Wae, 2 km. to the north-east) flows directly in front of the cave and beyond this the floor rises in a gentle slope to the back, which is about 1.90 m. above the stream level. The 1969 excavation showed that the deposit consisted, to a large degree, of fresh water gastropods, earth from sub-aerial erosion of the walls and roof, interspersed with occasional fallen boulders. The occupational deposits were stratified, although layers were not easy to see or follow during excavation, and were about 1.30 m. deep, lying on apparently sterile yellowish-red clay.

Ulu Leang 2 is an expanded solution fissure, about 20 m. above the floor of Ulu Leang 1. It opens from the south wall, and is linked by other small passages to the outer face of the hill. This cave was evidently used as a burial, but not occupational site, at some point in prehistoric time, for the floors of the main chambers were ankle-deep in loose broken human bones, sand and potsherds. The red earth of the cave floor proper, however, appears to be sterile.

The 1973 excavation procedure

In order to realise the broad aims of the research project, the following excavation strategy was planned.

To extend the area of the 1969 trench.

To investigate other areas of the cave and to link these stratigraphically.

To control more precisely the horizontal and vertical location of finds by excavating within units no greater than 25 x 25 cm^2 by 5 cm deep and matching these, during excavation, to observed changes in soil stratigraphy.

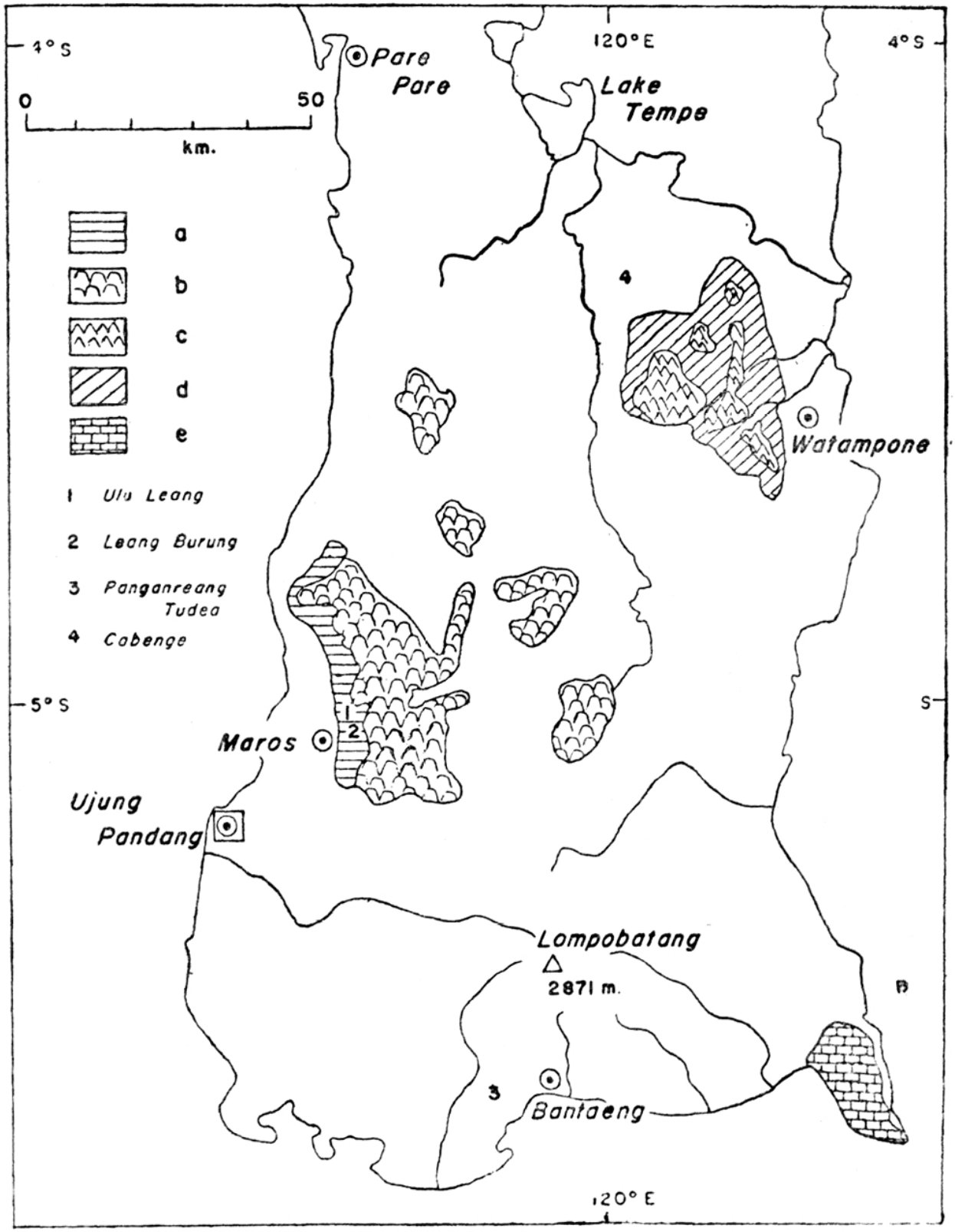


Fig. 1. The distribution of limestone formations in South Sulawesi, with the location of archaeological sites discussed in the text.
a. Karst border plains. b. Steep-sided cone karst. c. Cup-karst. d. Corrosion plains (Korrosionsebenen). e. Pleistocene coral reef terraces.
Geomorphological data from Sunartadirdja and Lehman 1960.

To screen all excavated material in ¼" and ⅛" sieves and to wash material in the sieves after preliminary sorting, unless unwashed samples were required.

To collect better C-14 samples from the topmost and lowest levels in order to produce a more complete chronology.

To use newly developed techniques of froth flotation in a high density medium in order to recover carbonised botanical remains, and to complement the rich bone collection of 1969.

Apart from myself and Mrs. Glover and the periodic help of Drs. Hadimuljono, no trained archaeologist was regularly present on the site. Excavation procedure, therefore, had to be relatively straightforward, following a regular schedule while providing basic training for the L.P.P.N. Branch IV officers in surveying, photography, drawing, trowelling, sorting and recording.

The procedure of excavation was that each trench was assigned a number of buckets and sieves of the same colours, with one man digging, one engaged in sorting, and one sieving and washing. The earth was scraped with small handtrowels into a hand-shovel (Pl. 3), buckets were filled to a consistent level and the number from each excavated unit recorded. Each metre square was subdivided into four quadrants A-D, and the artifacts from each 25 cm^2 bagged separately. Quadrants were excavated to a depth of 5 cm or less if stratigraphic changes were seen. After each 1 m^2 had been dug, the surface levels were recorded with a dumpy level and staff and recorded in the day book. All excavated material was screened in ¼" and ⅛" sieves, and washed. Finds were sorted at the site only into bone, stone and pottery, then bagged and labelled for later washing and sorting. Charcoal was collected directly from in-place hearths if this was possible ; failing this disseminated fragments were taken from the soil and from the sieves before washing.

Various areas within the trenches were tested for possible botanical remains by passing the excavated earth, after coarse sieving into the froth flotation unit (Pl. 4). Where positive results were obtained, several successive spits were passed through flotation unit. Generally, it seems that the cave earth in Ulu Leang 1 was to wet for good botanical preservation, but some carbonised seeds were recovered, many from deep in the deposit, and should be identifiable in the laboratory. Potential seed samples were sun-dried and bagged for transport in uncrushable containers. Preliminary examination of these in London shows that more seeds were recovered than we realised at the time of collection.

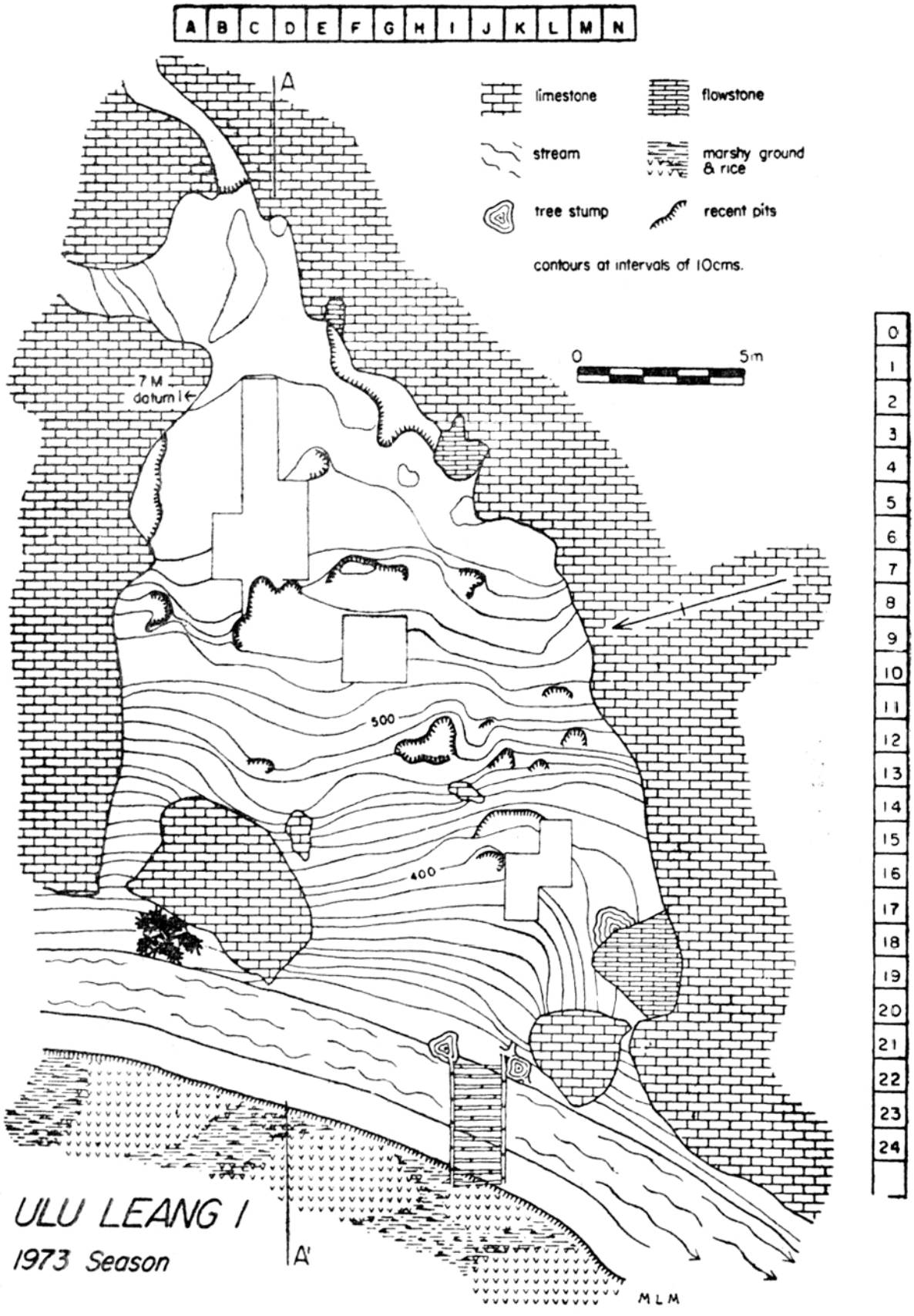


Fig. 2. Plan of Ulu Leang I showing the location of excavated trenches, and recent surface disturbances.

During excavation, important features were photographed, measured-in and drawn, and virtually all soil sections were drawn and photographed at the conclusion of excavation. Column samples of soil were taken to complement those obtained in 1969, and finally the entire trench was backfilled from the spoil heap in order to minimise any further damage.

In 1969 only six 1 m. squares (C2, 5-7, D6-7) were excavated with a total volume of about 5.9 m^3. This season a further 14 squares were opened (B6-7, C3-4, D5-6, F9-10, G9-10, K16-17, L15-16) and, very approximately, 15-20 m^3 excavated. Since Ulu Leang 1 has a floor area of over 200 m^2 suitable for exavation it can be seen that only a small part (about 10%) of the whole has been excavated, leaving a more than adequate *témoin* for future archaeologists. In order to anticipate future excavation a more permanent bench mark at + 7.0 m. was carved deeply into the north wall of the cave where the rock intrudes into square A2 (fig. 2).

In general the cultural sequence proposed after the 1969 season seemed to hold good in 1973, but specific details must wait further analysis. A summary of the 1969 artifact sequence is presented in tables 1-4.

Stratification.

The general nature of deposit was similar in all areas of the excavation, grey-brown earth mixed with shells, stone and cultural debris. But the degree of stratification depended on whether fires had regularly been lit in a particular area, and the relative humidity of the soil. Generally the squares B, C, D were dry, lacking in fire places and had weakly developed visible layers (fig. 4). In F-G fires had been regularly located throughout the occupation of the site and finely interleaving shell lenses and hearths were easily recognisable. In K-L the wetter soil near the stream and extensive disturbances (mentioned below) made separation of the layers a barely feasible task. Areas B-D and F-G can be linked stratigraphically, but K-L can only be related to these areas in an indirect and general way.

Some superficial disturbance had taken place following the 1969 visit, but in 1973 we realised that more serious and extensive digging had taken place at some time in the past, especially in the south-west section of the cave (area K-L) where most of the upper layers had been stripped off (for *sawah* fertiliser?) leaving mixed deposits overlying a seemingly intact occupation phase (layer II) resting on the underlying yellow clay. This disturbance made it impossible for us to link in detail

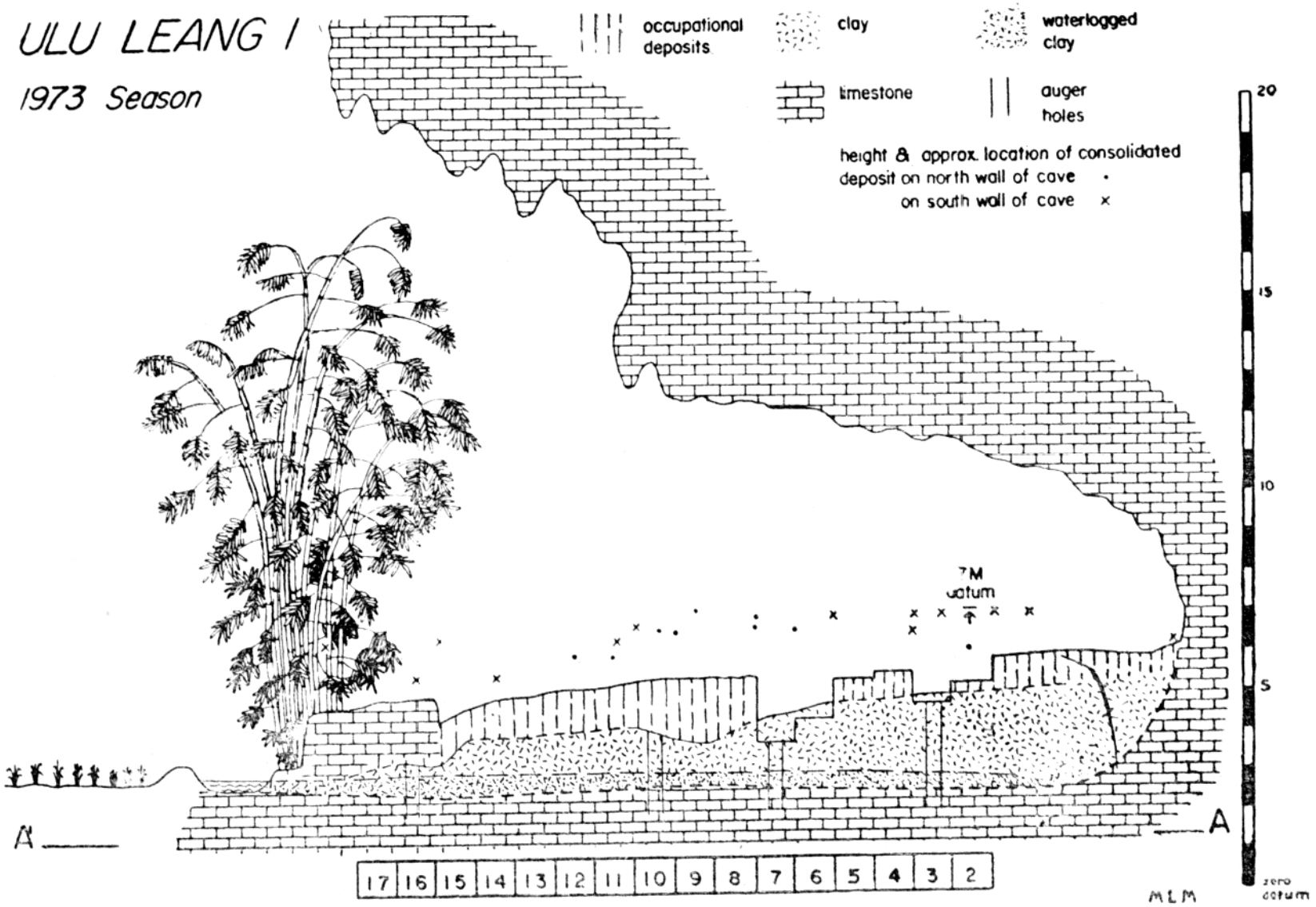


Fig. 3. East-west section through Ulu Leang I, along A-A[1] in figure 2.

the sequence in trench K-L with that in F-G and B, C, D, except to say that a distinctive flaked stone assemblage (see below) from the top of the clay layer in K-L is earlier than anything in trenches F-G and B-D.

In areas B-D and F-G, the same sequence of artifacts was observed, and the shell midden occupation layers lay on a sticky, yellowish-red clay (Munsell 10YR 4/4 dry — 5/8 wet) which proved to be archaeologically sterile. Maximum depth of the midden occupation was about 1.5 in F9. The clay was tested by excavation to 70 cm in sq. D7 in 1969 and in 1973 by drilling with a soil auger in five places. It was 2.14 m thick in square C3, and 1.40 m in F10 and lay directly on rock at 2.51 m above our assumed zero in C3 and 2.57 m in F10, without any intervening layers of gravel, breccia, or substantial limestone rubble. Since this was 50 cm below the level of the stream in front of the cave it was not unexpected to find that the lowest 40 cm of clay was waterlogged (fig. 3). It is thought that seasonal variations in this water level contributed to the poor preservation of plant remains.

In area K-L a slightly different stratigraphic and cultural sequence was found. As mentioned, layers II1-IV1 were disturbed, with irregular pits and tip lines, and occasional finds of quite recent artifacts such as glass, iron slag and glazed ceramics confirmed the visual impression. Below these disturbances layers II-I represent undisturbed deposit, and correspond to the lowest levels of the midden in B-C and F-G. Through layers II-I the flaked stone contains an increasing proportion of a patinated, chalky white chert, not found elsewhere in the cave.

This lowest, and earliest, flaked stone at Ulu Leang shows considerable typological as well as petrological differences from the finds at other phases in the site's occupation, and represents an industrial phase not previously described from Sulawesi. It is discussed later in the article.

Burials

No prehistoric burials were found during the excavation and any casually occurring human bones were too fragmentary to be recognised on the site. Identification of these must await receipt and sorting of all the bones from both seasons' excavations. However, one inhumation burial of quite recent times was found in squares C4-5. The lower part of this burial had already been found at the very end of the 1969 excavation, when the positions of the leg bones were

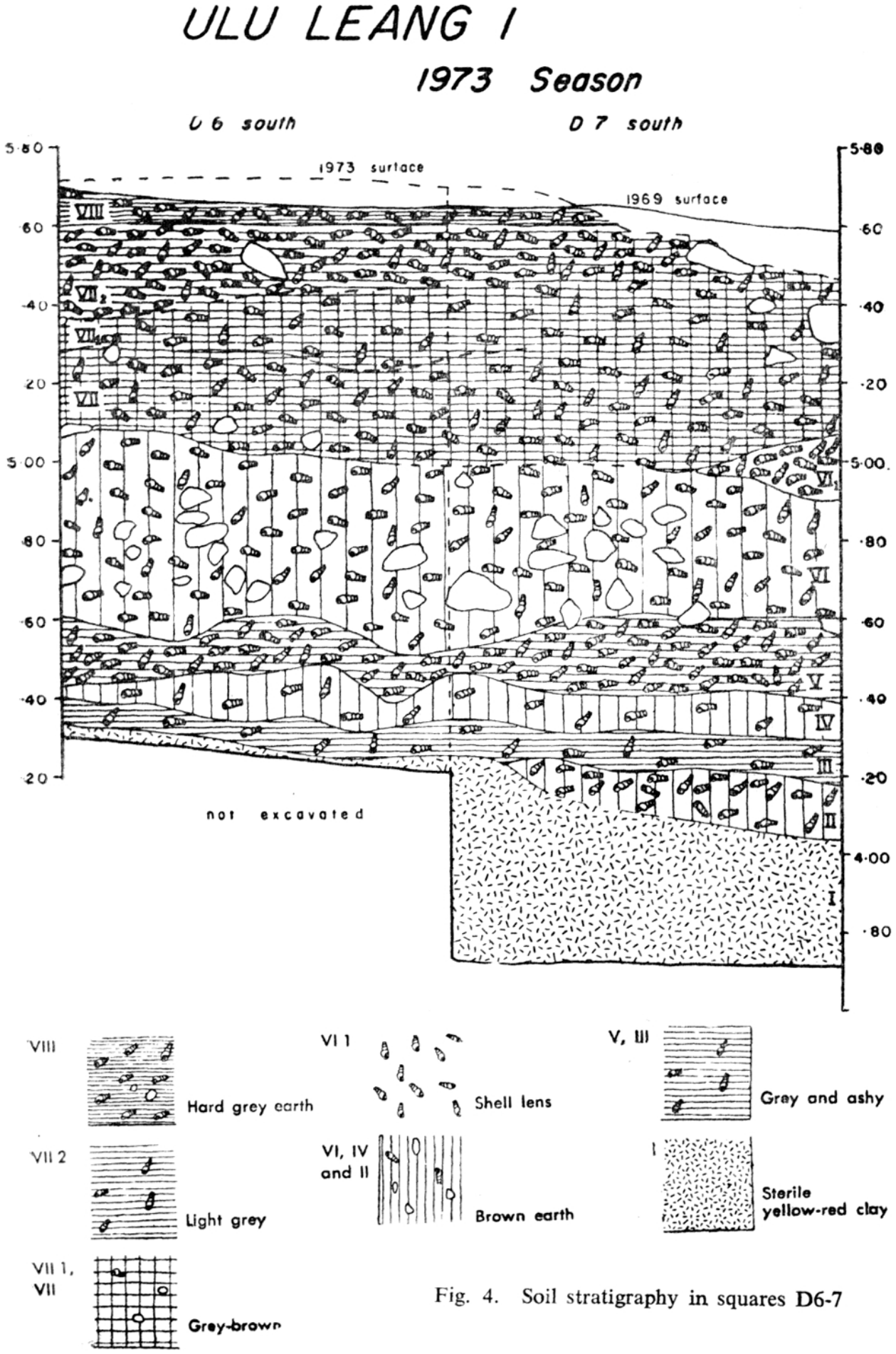


Fig. 4. Soil stratigraphy in squares D6-7

recorded, and after consolidation, they were lifted. It was clear then that this was an intrusive, perhaps very late, burial into the prehistoric deposit. This year, the outlines of the trench were carefully sought, the fill removed to reveal the torso in a grave about 35 cm deep, oriented exactly eastwest, with the head to the east (Pl. 5). A single stone-ware bowl had been placed on edge covering the face (Pl. 6), which was turned to the south. The bowl, (fig. 5), 16.2 cm in diameter by 6.5 cm high, is described by Abu Ridho of the Museum Pusat Jakarta, as 'semi porcelainous stone-ware', probably from Battrang, Than Hoa province, Vietnam, and dated to the second half of the 15 th century. It is a type said to be particularly common in East Java, South Sulawesi and the western Lesser Sunda Islands, although not unknown elsewhere in Indonesia. The perfect condition of the bowl suggests that it had not been in circulation for a long time before burial.

Under the left arm of the body was a badly corroded iron blade. Its shape suggesting a tanged digging-stick blade rather than a knife or sword. On the undersurface of the blade, the iron corrosion retained clear marks of woven matting with a mesh about 1 cm. sq. which matches closely that of the present day pandanus leaf sleeping mats. Presumably the body was placed on such a mat in the shallow grave. On the upper surface of the iron, the corrosion had preserved traces of a loosely woven cloth. Because the textile was preserved only throught contact with the iron, it is not possible to say whether the material was part of the normal clothing or belonged to a burial shroud. Adjacent to the textile impressions was an area of black corrosion, perhaps the remains of a bracelet.

Because of the poor condition of the bones, it was not possible to ascertain on site the sex of the skeleton, but burial with an iron blade suggests a male, and the tooth wear indicated a fully mature adult.

Pottery and small finds

Small fragments of glazed stonewares, earthenwares and porcelain were widely scattered on the surface of the cave deposit and occasionally embedded in the top 2-3 centimetres. But only in squares K-L were they found below this. On other grounds, also, disturbance in this area could be recognised, and it seems clear that the type of occupation of the cave which had led towards the accumulation of the shell midden, long preceded the arrival of imported glazed ceramics. The identification of the glazed ceramics must await the analysis of the excavated finds, but it is possible to say that the majority of sherds are blue and white porcelain from small bowls or cups, and

of probably 18th-19th century age. There are also a few 'celadon-coloured' stonewares which may be older. The few pieces of broken glass, iron nails and other obviously recent industrial artifacts were also confined to the surface except in area K-L.

Locally-made, low-fired earthenwares were found in all the excavated squares and, from the evidence presently available, confined to the top 40-50 cm. In one of the two preliminary reports (Mulvaney and Soejono 1970a : 32) the statement that, 'plain potsherds occurred throughout most of its (Ulu Leang 1) depth of well over one metre', is mistaken. This pottery is nowhere numerous : from the six 1 metre squares dug in 1969 only 138 sherds were recovered. In the 1973 season, sherd numbers were rather higher, sufficiently so for us to be confident that pottery is genuinely associated with the last phase of prehistoric occupation in the cave. The majority of earthenware sherds are undecorated and unslipped, from what appear to be globular cooking pots with round bases and everted and thickened rims. The sherds are generally small and well scattered rather than concentrated in, or near, hearths, suggesting a fair degree of prehistoric 'scuffage and treadage'. A few sherds with incised and impressed designs were found in 1973 only on or close to the surface, except in area K-L where they were more common. The designs match closely some of those from the Ulu Leang 2 burial cave, and as area K-L lay almost directly below the main entrance to this cave, it is a reasonable assumption that they had fallen, or were thrown, sometime in the past from the upper cave. One sherd in particular, with an incised rectangular meander pattern is almost certainly from a vessel deposited in the upper cave.

A few green and blue glass beads were also found near the surface of Ulu Leang 1, and they are also thought to have been derived from the upper cave.

The flaked stone industry

As mentioned earlier, the sequence of flaked stone recovered in 1973 conformed quite well to that obtained in 1969, and which was in general agreement with that proposed by van Heekeren (1972 : 113-4) for the Panganreang Tudea cave near Bantaeng to the south. The most diagnostic artifacts were the hollow-based bifacial Maros points (fig. 6), and varieties of backed blades. Other commonly recurring forms are bone bi-points (fig. 8), and in stone, bipolar scalar cores (fabricators or outils écaillés), denticulated bladelets and flakes, flakes with silica gloss on their unretouched margins, and side scrapers (fig. 7). The stone used can all be termed chert, an opaque amorphous silicious rock, variously coloured from brown to grey and creamish

white, and sometimes containing fossils. The immediate source or quarry for these cherts is not known. From the appearance of some of the cores, stream-rolled pebbles provided the raw material for the knapper, but nearby streams, including the Leang Leang river seem to lack any similar material, and the local villagers could offer no suggestions ; rather they denied that *batu api* (any stone suitable for strike-a-lights) could be obtained locally. Dr van Heekeren, however, informs me that chert could be obtained from the bed of a small stream in front of Karassak cave on the Maros to Camba road.

The 1969 sequence

Since a detailed description of the sequence of assemblages from Ulu Leang requires much more analysis and time, a preliminary description is given below of the flaked stone finds from the 1969 season only (Squares C 2-5 and D 6-7), followed by four tables illustrating the distribution of the main types through the deposit. In table 1, the numbers from each spit are given for the principal categories of finds. For the preliminary report, the finds from equivalent spits in all the squares are grouped together. In table 2, a preliminary analysis is given of the main stone and bone artifact types. In table 3, these totals are converted into density figures, or the number per m^3 in each spit. Finally, in table 4 the category of blunted-back flakes is broken down into five clearly recognisable and distinct formal types. In subsequent publications, the finds will be presented within the general stratigraphic units recognised throughout the excavation, but since the layers in the 1969 trench tended to be horizontal, rather thick, and homogenous, the presentation given here does not seriously distort the sequence.

Table 1 : UL 1, numbers in main artifact categories per spit from all squares combined, 1969 season only.

Spit	All flaked stone	Earthenware sherds	Glazed ceramic sherd	Metal glass ragments
1	751	99	6	4
2	877	26	—	—
3	761	13	—	—
4	363	—	—	—
5	553	—	—	—
6	656	—	—	—
7	365	—	—	—
8	192	—	—	—
9	101	—	—	—
10	178	—	—	—
11	265	—	—	—
12	118	—	—	—
13	105	—	—	—
14	8	—	—	—
	5293	138	6	4

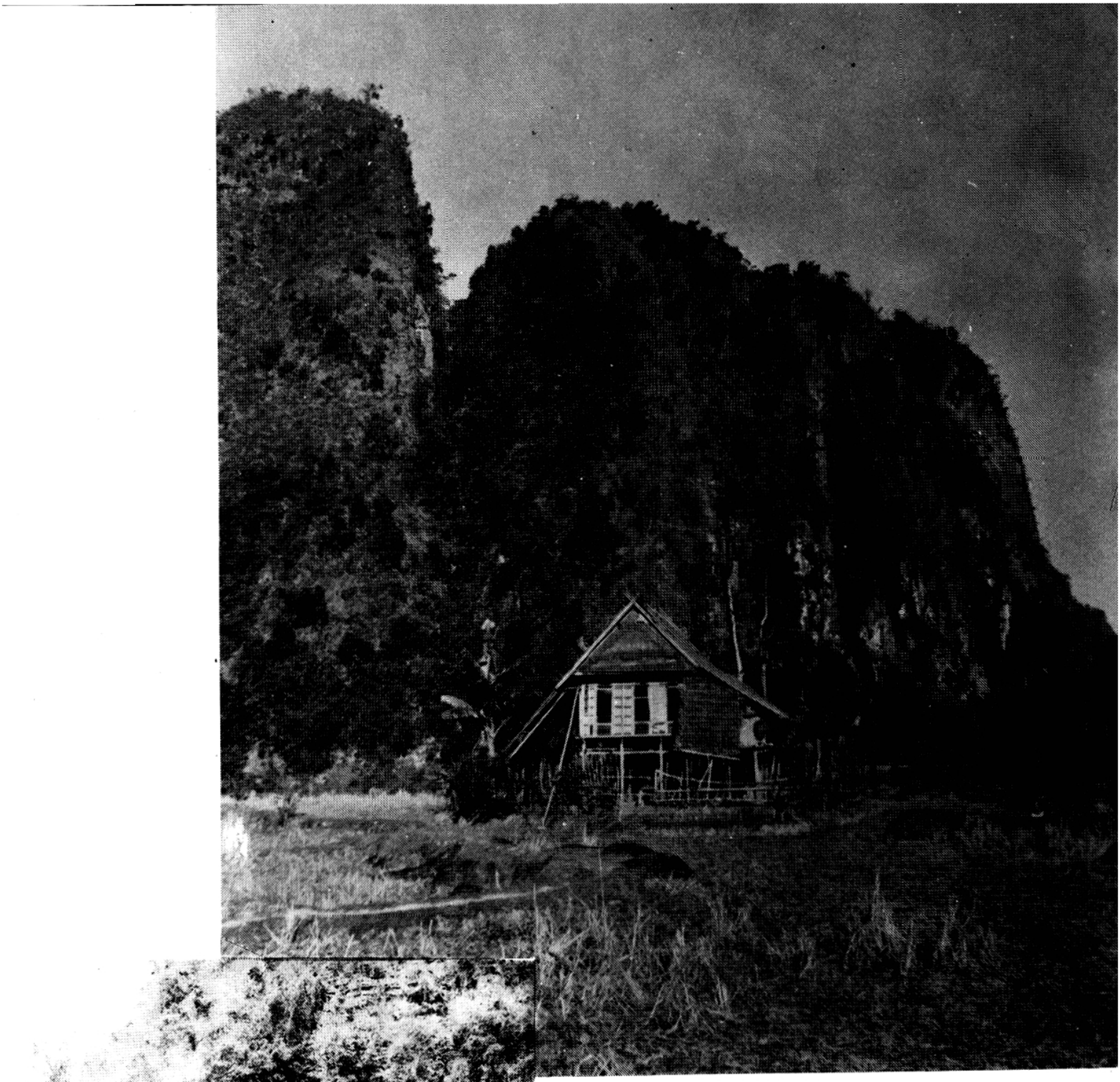
Table 2: UL 1, preliminary analysis of main artifact types

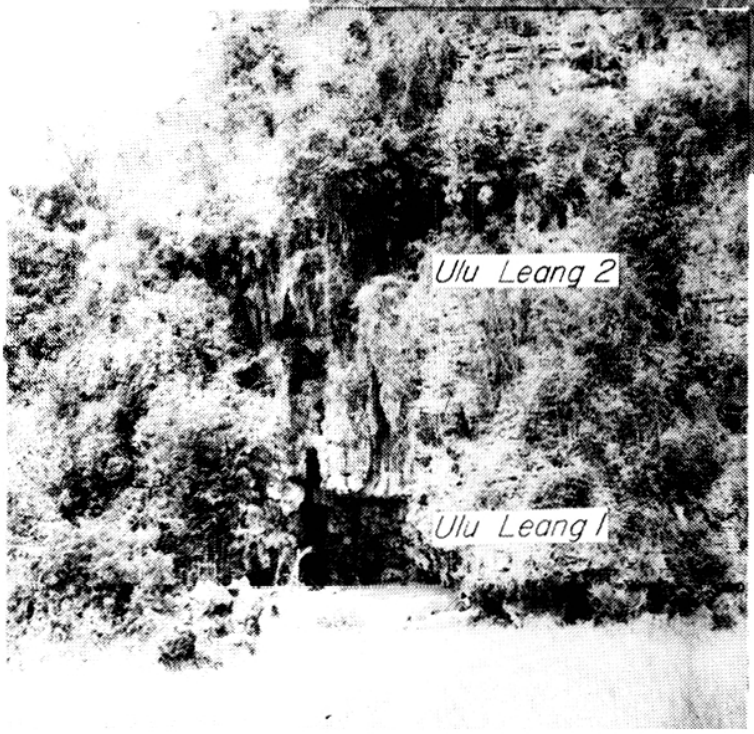
Spit	Maros points	Blunted-back flakes	Scrapers	Fabricators / Cores		Flakes with gloss	Utilized flakes	Other worked pieces	Waste flakes	Bone points
1	13	9	14	15	8	13	46	22	611	2
2	26	8	15	20	14	8	33	17	736	5
3	10	7	9	13	8	17	32	20	645	5
4	3	6	12	4	10	3	22	16	287	—
5	1	25	20	6	4	12	21	20	444	3
6	—	45	24	6	10	17	17	20	517	9
7	—	13	14	—	1	5	7	2	323	6
8	—	2	12	—	1	2	9	2	164	2
9	—	1	2	—	3	—	8	—	87	2
10	—	4	4	1	2	2	6	4	155	—
11	—	—	6	4	1	—	6	3	245	1
12	—	—	6	1	3	—	4	1	103	—
13	—	—	6	—	—	—	6	—	93	—
14	—	—	1	—	—	—	—	—	7	—
	53	120	145	70	65	79	217	127	4417	35

Table 3 : UL 1, main artifact types expressed as numbers per m^3.

	Vol. excavated	Maros points	Blunted-back flakes	Scrapers	Fabricators	Cores	Flakes with gloss	Utilized flakes	Other worked pieces	Bone points
1	0.47	27	19	30	32	17	27	96	47	4
2	0.59	44	14	25	34	24	14	56	29	8
3	0.68	15	10	13	19	12	25	47	29	7
4	0.51	6	12	24	8	20	6	44	32	—
5	0.53	2	47	38	11	8	23	40	32	6
6	0.73	—	62	33	8	14	23	23	27	12
7	0.33	—	39	42	—	3	15	21	6	18
8	0.27	—	7	44	—	4	7	33	7	7
9	0.33	—	3	6	—	9	—	24	—	6
10	0.27	—	15	15	4	7	7	22	15	—
11	0.33	—	—	18	12	3	—	18	9	3
12	0.31	—	—	19	3	10	—	13	3	—
13, 14	0.54	—	—	2	—	—		—	—	—
	5.89									

Planche ci-contre : voir légende p. 154




Ulu Leang 2
Ulu Leang 1

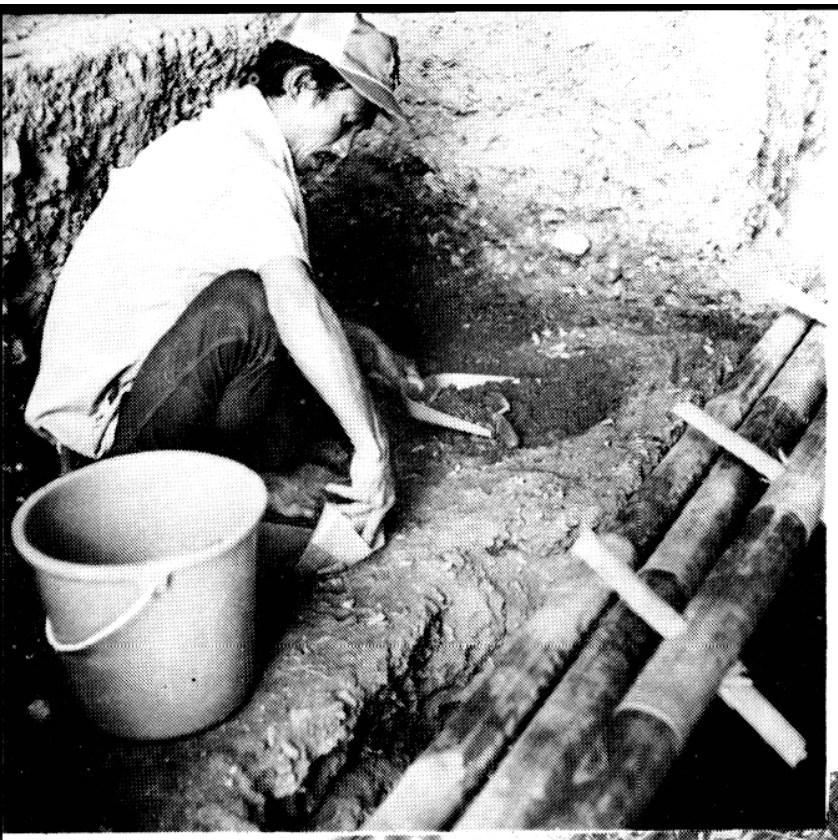


Planche ci-contre : voir légende p. 154

Table 4 : UL 1, typological analysis of blunted-back flakes.

Spits	Geometrics	Oblique blunting	Elongated, blunted on one margin only	Elongated, blunted on both margins at butt	Tranchets	Broken and unfinished pieces	Totals
1	6	—	1	—	—	2	9
2	—	—	2	—	1	5	8
3	1	—	—	—	—	6	7
4	—	—	3	2	—	1	6
5	1	2	7	6	3	6	25
6	1	2	17	12	3	10	45
7	1	—	5	1	1	5	13
8	—	1	—	—	1	—	2
9	—	—	—	—	—	1	1
10	—		1	—	—	3	4
	10	5	36	21	9	39	120

The stone and bone artifact types

Maros points (fig. 6 a-b) I am following Mulvaney and Soejono (1970b) : 171) in applying this name to a small, hollow-based point usually with saw-tooth margins, which is so common in cave deposits of South Sulawesi and especially around Maros. This is the same type earlier described by van Heekeren (1949 : 92) as "gevleugeld" or "getande pijlpunten" — winged or toothed arrowheads. The points are commonly between 1.5 — 2.5 cm long, 1 — 1.5 cm wide, and 0.2 — 0.5 cm thick. Flakes are often selected having one, or two converging median ridges, the butt is thinned and hollowed bifacially, totally removing the striking platform. A high proportion of points have delicate saw-tooth margins worked from both faces, and converging to a fine, sharp point. Apart from near the margins and base, both dorsal and ventral surfaces are not retouched. A few points, forming perhaps a discrete sub-type, have abrupt blunted, rather than denticulate margins. Whether this is a functional difference relevant to intended purpose of the point or reflects a stylistic development from bluntedback points to the fully denticulate Maros point, cannot yet be determined. But since the present distributional evidence is that Maros points, within Southeast Asia at least, are a form peculiar to South Sulawesi, we must be prepared to recognise its indigenous development there. The Sarasins, van Stein Callenfels and perhaps van Heekeren (1949 : 93) believed that Maros points were the result of migration or the diffusion of techniques to Sulawesi from Japan where somewhat comparable forms exist (See Monro 1911 : figs. 25 and 58). As table 2 shows, Maros points were confined to the top of the deposits, most of them occur in spits 1-3. The implications of this are discussed below.

Blunted-back flakes (fig. 6 c - l)

This term is used to refer to flakes where one or two margins are abruptly retouched from one or both faces. It it preferred to the more common 'backed blades' because of the absence at Ulu Leang of a true blade technique. Several varieties, or sub-types of these tools are provisionally recognised even in this small sample (81 excluding the small broken pieces), and these are listed in table 4.

a. geometrics (c - d)

These are ten more or less regular triangular or crescentic tools, six of which are in spit 1. The three artifacts in spits 5, 6 and 7 are all slightly doubtful pieces, being triangles with backing on only one side and could just be broken tips off larger points. With this in mind it

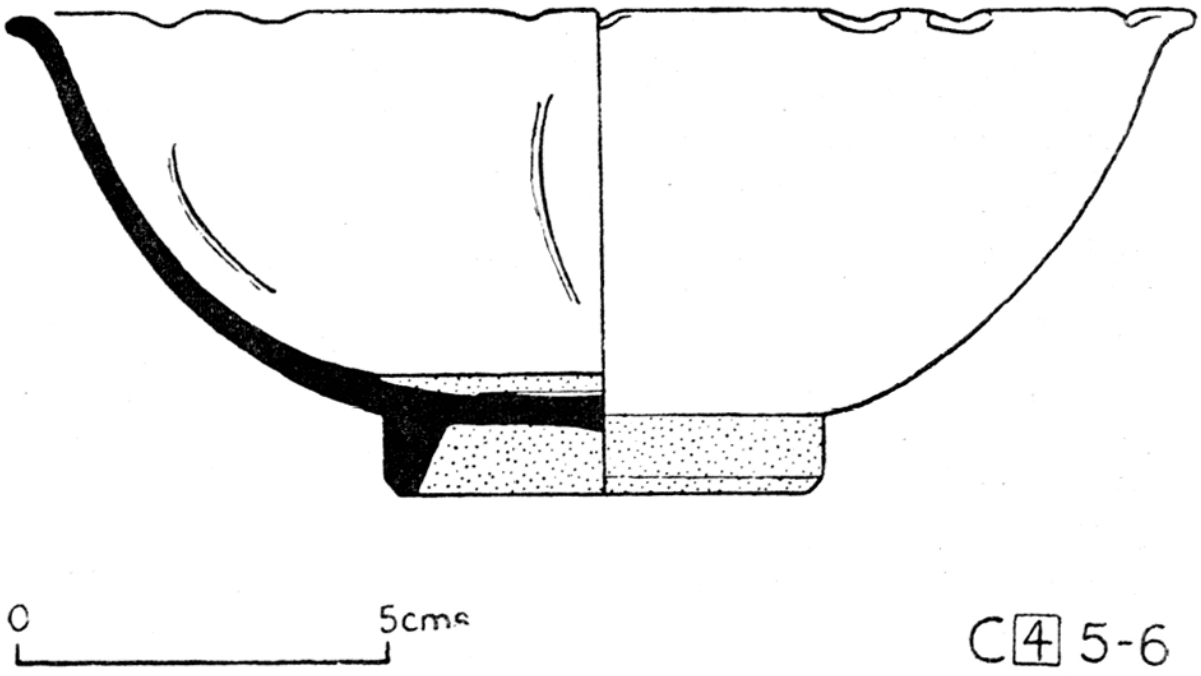


Fig. 5. Stoneware bowl from recent burial in squares C4-5. Believed to have been made in Than Hoa province, North Vietnam, in the late 15 th century A.D. The bowl is mould-formed, with a coarse, cream body with a putty-like texture, and has a light grey-green slip except for a reserved circle in the bottom of the bowl, and on the base-ring.

appears as if geometric forms are a late development at Ulu Leang and are certainly contemporary with the Maros points. This may be an important point in reconciling the apparent conflict, which is discussed later, between the sequences obtained from Leang Burung and Ulu Leang. The geometrics in spits 1 and 3 are all close to 1.8 cm long, 1.1 cm wide, and 0.3 cm thick.

b. oblique blunting (j)

In spits 5, 6 and 8 there are five flakes with blunting retouch from the bulbar face only, making an oblique truncation on one margin. Obliquely truncated points are reported also from Leang Burung (Mulvaney and Soejono 1970b: 171) where they are more frequent in trench A than in the older trench B. The reverse seems to be the present case at Ulu Leang. On the other hand, oblique points were one of the more common tool types in Batu Ejaja (Mulvaney and Soejono 1970b: 166-7) which must be a more recent deposit than at Ulu Leang. Oblique points here are 2.3 — 2.8 cm long by 1.2 — 1.5 cm wide.

c. elongated backed flakes (f - i)

Most common, and especially in the middle levels of the site, about spit 6, were longer tools occasionally with an asymmetric curve on the backed margin, and which resemble the so-called 'penknife blades' of older literature, and the Australian Bondi point. Only two subdivisions have been made within this group at present, between those blunted on one margin only and those blunted also on the opposite margin at the butt end only. Sometimes the bulb and striking platform survive in the first group, but it is entirely removed in the second group. In all, backing is predominantly but not only from the bulbar face, and the sharp cord, or cutting edge opposite shows few traces of use. Otherwise these artifacts are quite variable and in a larger sample more subdivisions might reasonably be made. Length varies from about 2.0 — 4.8 cm, width 0.8 — 1.6 cm and thickness 0.5 — 0.7 cm.

d. blunted on both margins (k-l)

There are a few, rather variable forms blunted on all or most of both margins which converge leaving an oblique or *tranchet* point. In some the bulb has been removed by secondary flaking, in others only the middle portion of a large, perhaps broken flake is selected. On some artifacts, one end is slightly hollowed and the tool looks transitional between a blunted-back flake, and a Maros point. Whether or not this proves to be the case when a bigger sample is analysed, we must recognise the *tranchet* as a newly recorded and distinctive type at Ulu Leang. In size they are roughly 2.5 x 1.2 cm.

e. other backed forms

A few flakes have so little blunting, and that only at the distal end, that I regard them as unfinished pieces, discarded as inappropriate or merely dropped and lost.

Scrapers (fig. 7 a - g)

Scrapers at Ulu Leang are rather varied and more difficult to classify into discrete formal types than the points and blunted-back flakes. In a very large collection perhaps it will be easier to recognise regular patterns of variation. However, my impression is that larger flakes (up to 7 x 5 cm) were used opportunistically as scraping and cutting tools for the preparation of wood, bone, and perhaps bark fibre and palm leaf tools, weapons and containers and that with the exception the type illustrated in fig. 7 a - b they were not pre-formed by secondary working before such use. Any regular variation in cutting edge position, angle, length and curvature therefore comes from patterns of use and resharpening of flakes particularly

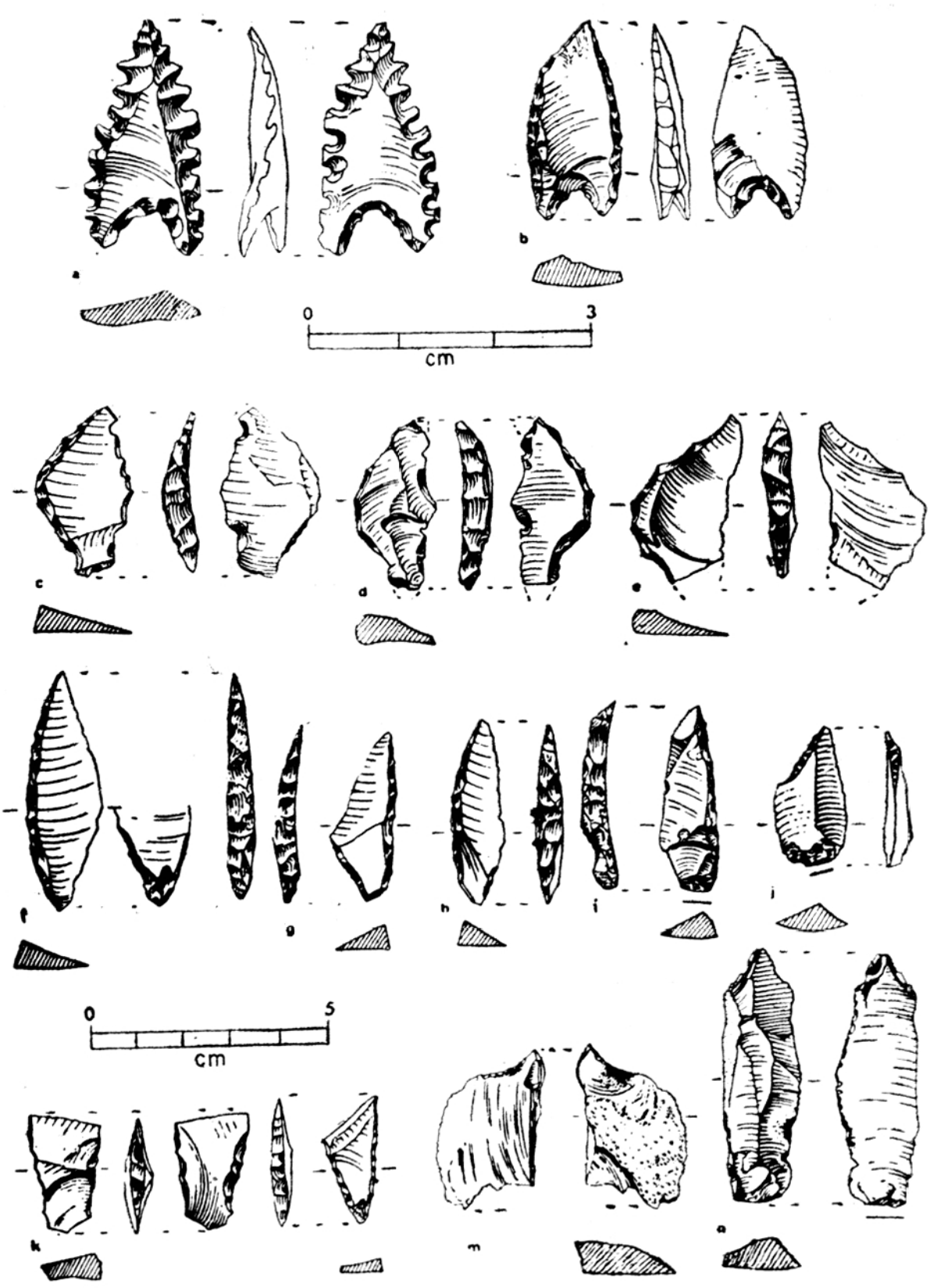


Fig. 6. a. Denticulate Maros point. b. Blunted-edge Maros point. c-e. Geometric blunted-back flakes. f-h. Elongated backed flakes, blunted on both margins. j. Obl'quely-blunted flake. k-l. Tranchet points. m-n. Flakes with silica gloss, indicated by stippling.

appropriate for certain activities, and would not reflect inherited stylistic traditions to the extent that the points and backed tools do.

Scrapers are rather evenly distributed throughout the sequence from the 1969 season (tables 3-4) and continue to the base of the deposit, whereas the other secondarily worked tools are restricted to the upper levels (Maros points), or to the middle and upper levels (blunted-back flakes).

Fabricators (fig. 7 h - i)

These are medium sized flakes (about 3 x 2 cm) rectangular in shape, and rather thin (about 0.8 cm), with negative scars on both faces and bruised, very thin striking platforms at both ends suggesting that a hard hammer was used with the flake resting on a stone anvil. I believe these are cores for the production of small, thin flakes and similar to the bipolar, scalar cores, fabricators, or *outils écaillés,* well known in other stone industries (e.g. White 1968 : 658-66). They are rather more common in the upper four spits, but occur sporadically down to spit 12 (table 3).

Cores

Apart from the fabricators, only sixty-five cores were found, rather irregulary distributed down to spit 12. I have already commented on the absence of a regular blade technique and the cores generally had two or three working platforms at varying angles to each other, and were sometimes worked down to small, irregularly-rounded lumps. Many complete and broken hammerstones of volcanic rocks were found, and at this stage of analysis, it appears that only hard stone hammers were used. The distribution and description of hammers and a few anvils will be made in a later report. The pattern of core working was quite regular and systematic despite the rather primitive flaking techniques, and together with the small number of cores, suggests that chert was not so readily available.

Flakes with gloss (fig 6 m - n)

Primary flakes with silica gloss are being increasingly recognised in the flake industries of island Southeast Asia. They were first reported from Timor (Glover 1969, 1971) and were recognised by me in collections made in Sulawesi in 1969 and among material in the Museum Pusat, Jakarta from Panganreang Tudea and other sites excavated by earlier Dutch archaeologists. Scheans, Hutterer and Cherry (1970 : 180) report very similar finds from Buad and Daram islands in the Samar Sea, Philippines.

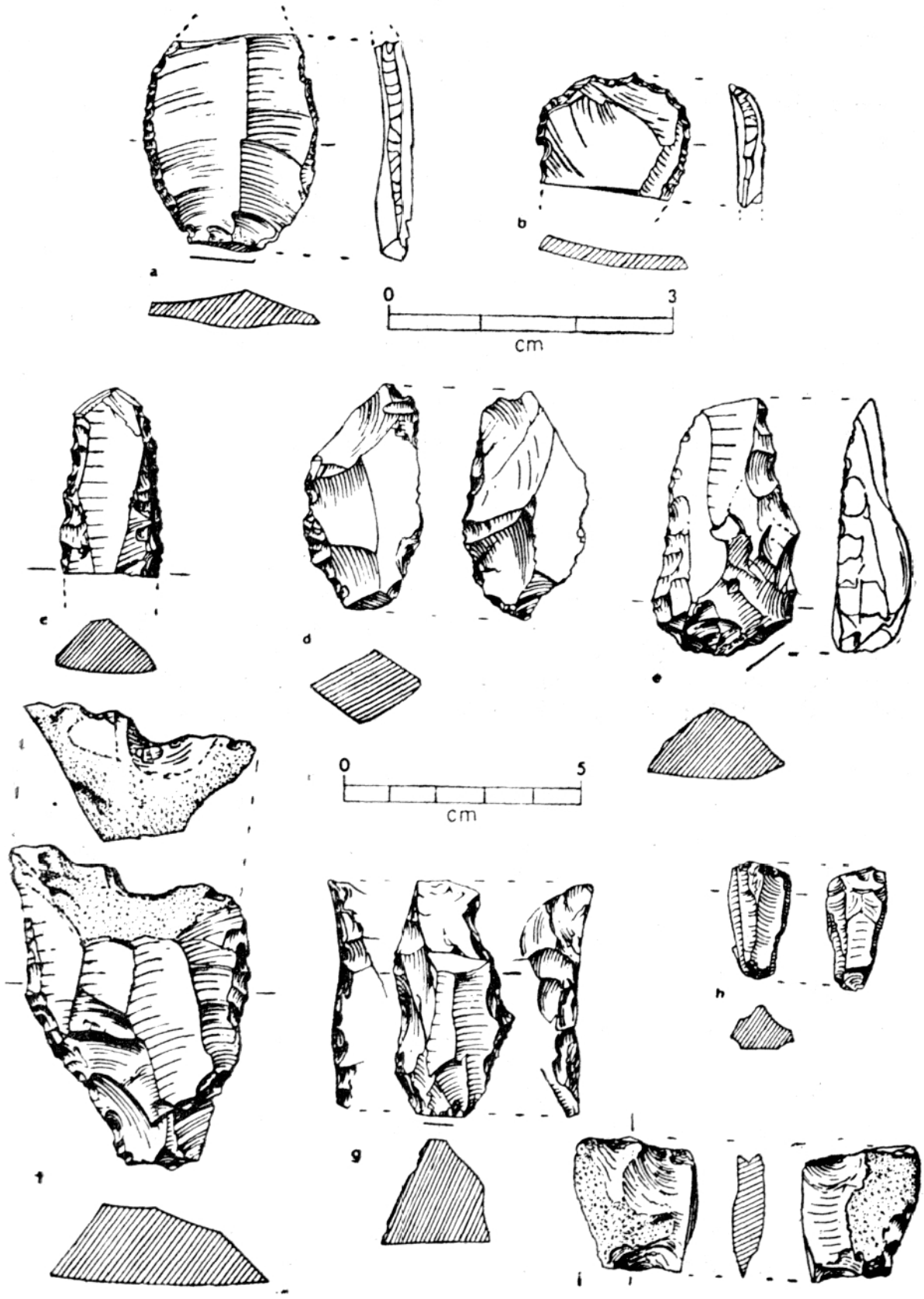


Fig. 7. a-b. Thin-flake scrapers with steep, finely retouched margins. c-g, Scrapers and adze flakes. h-i. Fabricators.

The 1969 season at Ulu Leang yielded a small sample of 79 flakes with gloss which occur mainly in the upper levels (spits 1-6) with occasional pieces as low as spit 10 (table 2). They are thin, medium-sized primary flakes, approximately 2.5 — 6.0 cm x 1.5 — 3.0 cm, with areas of gloss on one or two margins, and predominantly on the dorsal flake surface, where the edges are thin and sharp. Gloss is concentrated in small patches rather than being extensive along most of an edge as is the case with most Near Eastern and Northern European sickle blades which I have examined, and fine flake scars, made before or after the formation of gloss seem to follow the same distribution. As noted on the Buad finds, there is a smaller and less intense, reciprocal patch of gloss on the bulbar surfaces, but again, in contrast to most western sickle blades the cutting edges are still fresh and sharp, and not rounded and abraded.

The gloss on these flakes represents, I believe, silica deposition rather than polishing of the surface, although definite proof of this is still lacking. Microscopic examination of artifacts from Timor (Glover 1972 : 375 and Pl. 9 : 9) showed flow lines and comet-shaped depressions characteristic of silica deposition (Whitthoft 1967 : 384), and Cherry tells me that the Buad material also represents free silica from plants deposited on the flake surface. Many tropical plants including grasses (especially the bamboos), palm and other tree leaves contain substantial quantities of opaline phytoliths (Jones, Milne and Sanders 1966 : 464) which could be transferred onto flakes cutting these materials. One small experiment in the field, cutting and scraping green bamboos, produced traces of a similar-looking gloss on chert flakes, and more experiments will be conducted later.

Utilized flakes, 217 specimens : many small flakes were evidently used without secondary working to pre-form artifacts, not resharpened after use, and used on materials which did not produce the gloss characteristics just described. As might be expected, these are found throughout the sequence, but increase steadily towards the upper levels (table 3).

Other worked pieces, 124 specimens : this group includes small broken fragments of tools which cannot be put into other categories, as well as a few complete but unusual forms which, in a larger sample might represent discrete types. These include various points, one or two of which have rudimentary worked tangs, some simple burins-on-a-break, and borers.

Bone points (fig. 8), 35 specimens : only three are complete, and two more substantially so. With such a small sample it is not possible to

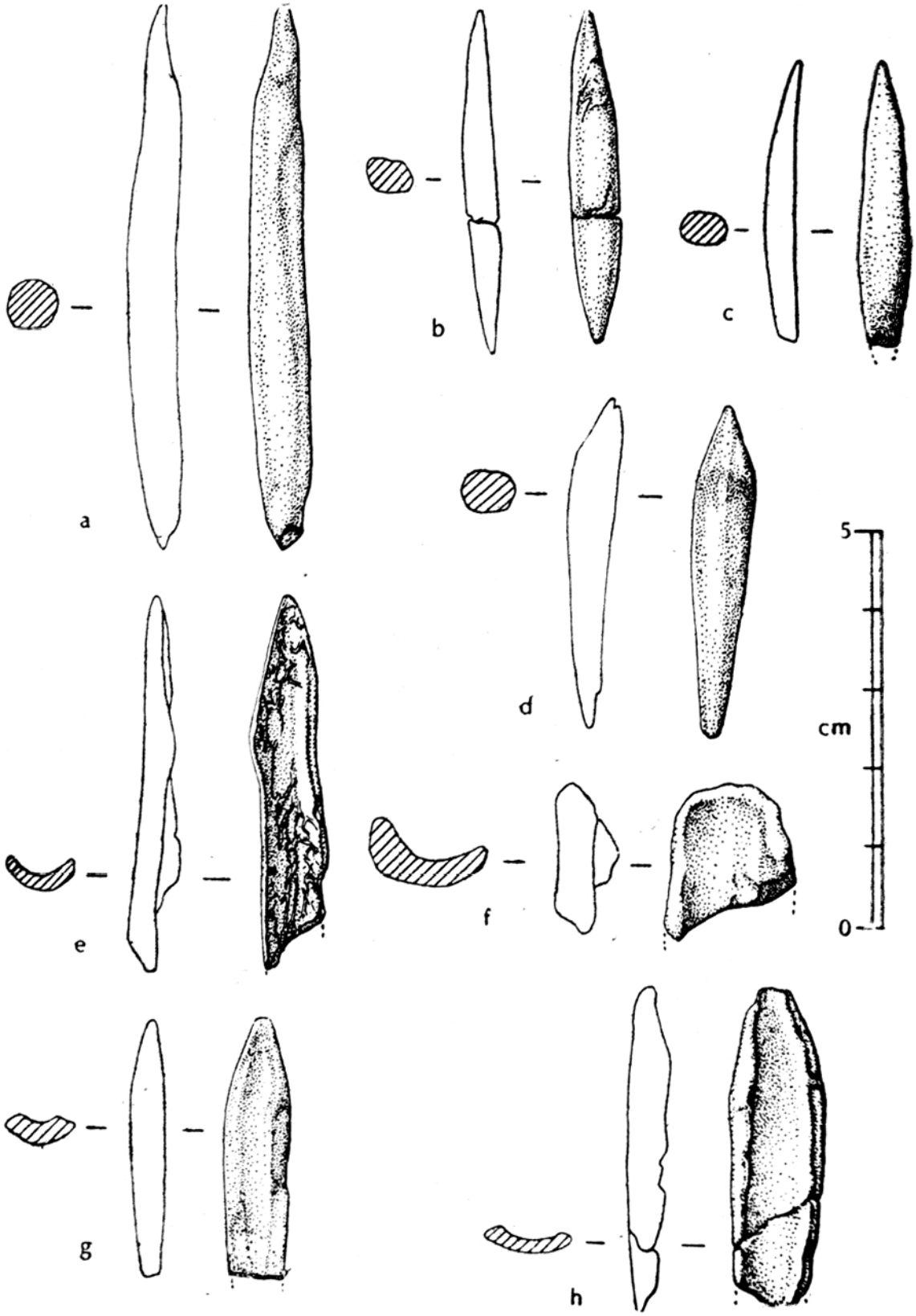


Fig. 8. Bone points from the 1969 and 1973 season. a. C 6 2 ; b. D 7 6 ; c. F 10 7 ; d. D 6 6 ; e. C 7 8 ; f. K 16 15 ; g. K 16 16 ; h. G 10 30a.

see any change in type or proportion through the sequence, but provisionally, three varieties can be recognised. a-c) solid bi-points with a more or symmetrical taper, d) bi-points with the thickest part near one end, and e-h) points with a hollow section, some of which have a more spatulate end. van Heekeren (1949 : 101) also found more than one variety of bone point at Bola Batu. With one or two exceptions, the points appear to have been cut from the shaft bones of a large mammal — perhaps one of the Suidae.

Shell scrapers. A species of bivalve shell described by van Heekeren as *Cyraena* is commonly found in Indonesian cave deposits and appears to have been used as a scraper, perhaps for cleaning vegetable roots (Willems 1939). Many were found in Ulu Leang as in other Sulawesi caves, and details of these will be presented in a late report.

Provisional as the figures in tables 1-4 are, they do confirm the impression that the Panganreang Tudea sequence is not a local phenomenon, and that blunted-back flakes generally precede as well as coexist with Maros points in South Sulawesi, that long backed flakes are earlier than the more regular 'geometric' forms, and that pottery is an integral part of the last cultural phase at Ulu Leang. Some of these points directly contradict generalisations about the Toalian Culture which have been made by earlier writers.

Mulvaney and Soejono (1970b : 171) have already explicitely claimed contemporaneity for pottery and a microlithic assemblage at Leang Burung, and at the same time put forward an argument that most of the finds from Trench B at that site are earlier than most of those from Trench A. Pottery was apparently found throughout both trenches, but Trench A contained about 170 geometric and other backed pieces and only 13 Maros points, whereas Trench B contained only 4 geometrics and 32 Maros points. On this reckoning, it appears that, by and large, Maros points *precede* backed flakes at Leang Burung, although pottery is found with both. This is quite contrary to the results from Ulu Leang which, as already stated, conform better to the Panganreang Tudea sequence and to the one proposed by van Heekeren for Leang Pattae (1952 : 25-6). (1)

Obviously clarification of this must await the full publication of Leang Burung as well as the completed analysis of the finds from Ulu

(1) Mulvaney (pers. comm. 24.3.75) tells me that another C-14 result of 4880 ± 480 BP (ANU-1264) from Leang Burung Trench B, although in reversed date order with a result of 3420± 400 BP (ANU-390) from an adjacent square and a slightly higher level in the deposit, does in his opinion, confirm the greater antiquity of Trench B over Trench A

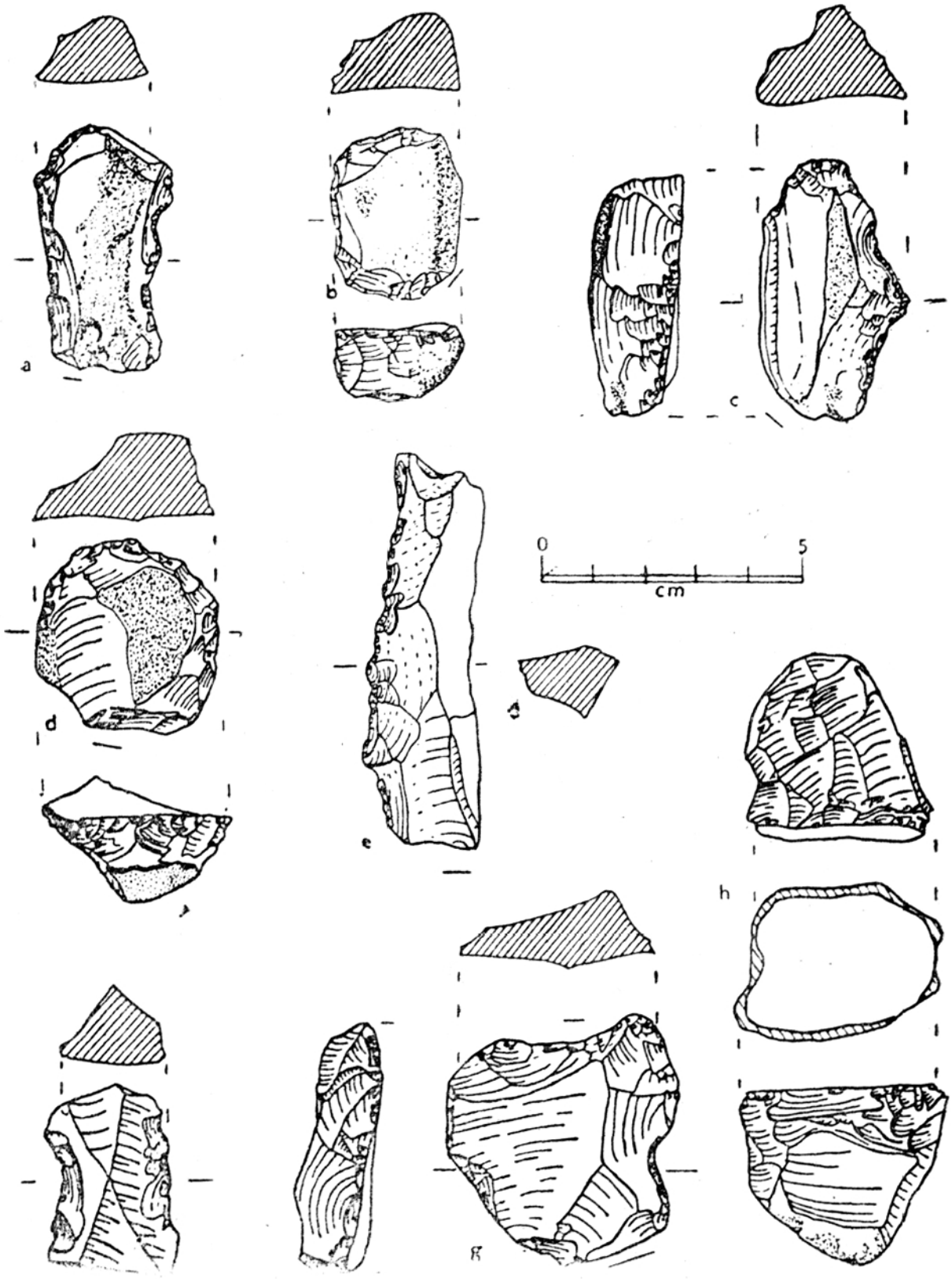


Fig. 9. Flaked stone tools in white chert from squares K and L, 1973 season.
a. double side scraper L 16 13a ; b. double end and side scraper, L 16 cl ; c. nosed side scraper L 16 17c ; d. end scraper K 16 22c ; e. double side scraper on alternative faces, K 16 12a ; f. double side scraper L 15 6d ; g. flat side and end scraper K 16 16d ; h. domed core-scraper L 15 9c.
The position of the striking platform is indicated by a short line below each artifact.

Leang. The matter is raised here only to make more explicit the problems and contradictions which already exist in the published literature, and I agree with Mulvaney and Soejono (1970b: 175) when, speaking of the present state of knowledge in South Sulawesi, they write: 'correlations between sites are difficult, and it is rash to use any one site as a yardstick of culture-sequence'.

A new flaked stone assemblage (fig. 9).

The lower layers in area K-L yielded a flaked stone assemblage not found elsewhere in the cave, and to my knowledge new to Indonesia. The following brief description of this material is based on only 30 pieces brought back by air, and a proper assessment of its nature and affinities must await classification of all the excavated finds.

The material used contrasts strongly with the cherts found within the shell midden, and is a creamy white stone, mottled with black and red mineral stains. Some flakes have areas of light brown cortex on the dorsal surfaces but all flaked surfaces are patinated (or incipient corticication) and one or two small flakes which were broken during excavation showed a dark core. Some pieces, even carefully retouched flakes, are also very soft, breaking easily during cleaning, which suggests a loss of silica since the tools were abandoned. One long backed flake in this white chert was noticed during excavation, but the majority of retouched pieces in this assemblage can be regarded as scrapers. Within this group there is considerable variation and I believe that several distinct types of scraper will be found when the full collection is analysed. There is one group of core scrapers, single platform, pyramidal in shape with steep, often overhanging margins, and with bruising or crushing from use around most, if not all of the base (fig. 9h). Single-platform, pyramidal cores with fresh, unbruised platform margins also occur.

Then there are a number of flatter, broader scrapers with less steep and often sinuous margins, concave and convex on a single scraper edge (fig. 9g). More or less straight-edge, single and double side scrapers also occur as well as round, steep-edge scrapers, but without the height and overhanging edges of the core-scrapers (b&d). Finally, among the small sample presently available, there are a number of more elongated, side-struck side scrapers with straight or concave margins, quite steep, often showing step-flaking (a, c, e, f). Tools similar to these are also found towards the base of the shell-midden occupation in areas B-D and F-G, and since on present observations, they seem to be found towards the top of the undisturbed levels in K-L, they may provide a link between apparently quite

distinct stone working traditions. They can also be compared with the dominant scraper type found during excavations in East Timor (Glover 1972 : 81-8).

Another new industrial element found at this level, and in the very base of area F-G, are a number of small bone spatulas (fig. 8 f - g). Unlike the bone bipoints so common throughout the shell midden layer, these tools have a single, broad open spatula end, sightly worn, or polished. Most are broken and indeed only a few were recognised during excavation since when dirty they look no different from other small broken bones. More will probably be found when all the excavated bone is thoroughly cleaned and sorted.

It is premature to compare this new material from Ulu Leang with other stone industries in Southeast Asia, but since there is, inevitably, a long gap between discovery and final publication, a few observations might be made.

Within Indonesia, to my knowledge, no similar industry is yet known, with two possible exceptions discussed below. However, G.J. Bartstra of the Biologisch-Archaeologish Instituut, Groningen, saw the material briefly in Jakarta in September 1973, and immediately compared it with surface finds from the Cabenge area (formerly Tjabengé) near the Wallanae river in central South Sulawesi ; not with the rolled and derived Pleistocene Cabenge Industry reported by van Heekeren (1972 : 64-72) but with fresh, unrolled specimens collected from the river terrace surfaces. Proper comparisons can be made when these collections are published. And R.P. Soejono, seeing the pieces briefly in London in November 1973, was of the opinion that they closely resembled the finds made in a series of cave excavations in the island of Flores, by Father Th. Verhoeven and by H.R. van Heekeren (1972 : 140-8). He commented especially on the round, steep-edge scrapers, but pointed out that a type of thinned-butt point noted in Flores, was not among the material from Ulu Leang. I would like to thank Bartstra and Soejono for this advice.

In the Philippines there are possible parallels with what Fox calls the Liwanian Flake Industry of the Cagayan Valley (Fox 1973 : 19-20). Fox's description of "chunky, high domed scrapers with flat bases — also with high-angled, steep trimmed edges around most of the circumference of the base' fits our new material exactly. And Fox, seeing the Ulu leang finds during a brief visit to London in September 1973, confirmed the resemblance, pointing out only that artifacts of Liwanian Industry were generally larger. Fox describes the Liwanian as Middle Palaeolithic (*ibid.* : 14) since the tools are regularly found with a fossil fauna of presumed to Late Middle Pleistocene age (*ibid.* :

17). I will not suggest a comparable antiquity for the Ulu Leang finds; at present I can say merely that they are older than the shell-midden deposit which starts perhaps 8,000-9,000 B.P. However, quite good fauna was found with this material (although no charcoal) and radiometric dating may be possible.

Fox (*ibid.*: 19) notes that the Liwanian horsehoof cores are 'remarkably similar to those of Australia' which are the most diagnostic artifacts of the old Australian core-tool and scraper tradition, and that such tools were previously unknown in Southeast Asia. We must provisionally make the same comparison with the finds from Ulu Leang and thus contradict a statement of my own, barely in print when these finds were made, that 'it is at present very dificult to relate these (Island Southeast Asian) traditions to the oldest Australian material' ..... and 'in looking for undeniable and demonstrable links between the material remains of the first Australians and their ancestors in Indonesia, archaelogists may be pursuing an unattainable goal' (Glover 1973: 127).

Ulu Leang 2, a burial cave

The burial cave, Ulu Leang 2, which had been investigated briefly during the 1969 season (Mulvaney and Soejono 1970b: 175-6), appeared to have suffered some further disturbance since that time, and it was decided to recover, as completely as possible, the numerous though scattered fragments of pottery and human burials in the cave; an account of this work and the preliminary results follows.

Ulu Leang 2 is a complex series of interconnecting solution fissures which open from the south wall of Ulu Leang 1, about 21 m, and more or less directly above the trench K-L. Another, narrower entrance opens onto the cliff above the stream to the south of Ulu Leang 1 (Pl. 2) and provides slightly easier access, although both entail a moderate climb up a near vertical face on limestone eroded into sharp points and ridges.

The cave is about 16 m deep, about 5 m wide near the entrance, narrowing to 1 — 2 m at the back. There are many tunnels and holes at all heights, not all of which could be mapped, but the more accessible ones were examined for material from the disturbed burials.

When we found the cave in 1967, there were obvious signs of recent disturbance; holes dug into the cave floor, freshly scattered bone and pottery, and we felt it necessary to collect some of the pottery before everything was destroyed. Some of the decorated sherds acquired then are illustrated in Plates VII-XI in Mulvaney and Soejono

1970b. Our work then, however, was less than systematic, for no record was kept of the location of these sherds. Some deposit was also carried from the rear to front of the cave for screening which disturbed further the already scattered finds.

In 1973, more careful examination of the site suggested that not all contextual information was lost and that by more careful recovery, some useful data could be obtained. In the first place it was clear that the pottery and bones had not been buried, but had been resting on the cave floor. Subsequent digging by villagers in the search for porcelain had confused the distribution, but wherever we examined it the undisturbed red cave earth appeared to be archaeologically quite sterile. Then, although sherds and bones were scattered throughout the main cave, and into small holes, ledges and tunnels, the bulk of the finds remained towards the front of the main chamber, in what we termed Areas 1 and 2 (Pl. 7).

Despite the wide scatter of material we found a strong concentration of bones and sherds in Area 2 as shown in the table below, and we concluded that this had been the principal area of deposition.

Area	Sherd weight	Bone weight	Beads
1	16	11	—
2	71	57	60
3	2	1	10
4	1	1	44
5	1	(<1)	17
6	7	8	—
	98 kg.	78 kg.	131 beads

Many, though not all, of the finds from Area 1 came from our 1969 spoil heap, which itself had been brought from further back in the chamber. As expected, there were relatively few decorated sherds in this, and no beads. Area 6 was a narrow, slopping tunnel, below the level of Areas 1 and 2, from which most of the finds there had fallen.

The distribution of beads does not closely follow that of pottery and bone, and I believe that these beads, come from more than one burial, or burial urn, at least one in Area 2 and one further back; perhaps in Area 4. The nature of burial is far from clear, but most likely seems to have been secondary disposal of bones in urns which were placed on the cave floor as in the Palawan caves in the Philippines (Fox 1970 : 105-11). However, other modes of burial, even more than one, may have been used; primary or secondary deposition in mats, cloth or even wooden coffins with pottery grave furniture. The size of some of the vessels, however, does sugest that some secondary disposal in funerary urns may have been practised.

Another line of evidence supporting this might come from a study of the frequent gnaw marks on the long bones. Some of these have evidently been attacked by rodents, and yet others show traces of carnivore dentition, from quite a large animal, perhaps dog-size, impressed into what must have been still green bones. This probably occurred during some primary disposal in a place other than in a cave so difficult of access.

Apart from some samples retained for possible dating, all the bones have been left in the care of Dr. Teuku Jacob, Gajah Mada University, Jogjakarta where work on this material is in progress.

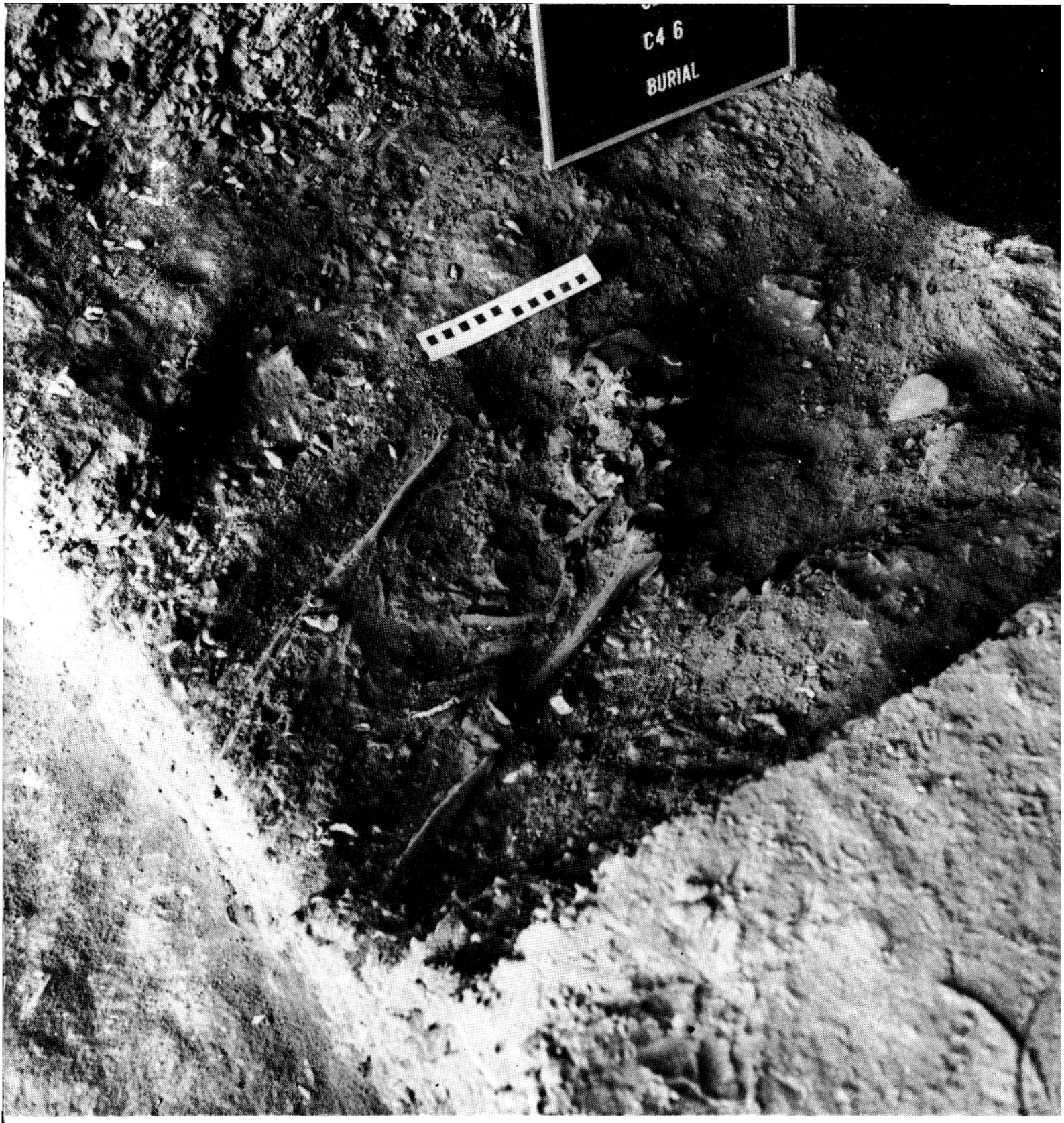
The beads range in size from 3 to 7 mm diameter and are basically round or cylindrical in shape, with a single longitudinal perforation. All appear to be glass with the single exception of one copper, barrel-shaped bead formed by rolling a strip of copper round a rod. The glass beads also appear to have been formed by rolling a rod in glass paste and then cutting into short sections. Each one is of a single colour, and a preliminary sorting (colours are rather variable) gives the following distribution :

Dark blue	7
Green	8
Aquamarine	92
Yellow	9
Red	11
Uncertain	3
Copper (metal)	1
	131

Two or three fragments of iron, all highly corroded but evidently from handmade, laminated blades, were found in Area 2, and are probably to be associated with the burials since no sign of subsequent occupation or use (other then the quite recent treasure hunting) was found. This is not a certain association, but with glass one expects to find iron in Indonesia.

Out of the 98 kg of pottery recovered, only a small proportion is decorated ; perhaps 200 - 300 sherds recovered in 1973, and a roughly similar number in 1969 (these are now in Australia at the A.N.U.). Within this small number there is quite a range in designs and techniques of decoration (fig. 10). We have burnished red slip, painting on unslipped surfaces, incisions, impressions, channelling, appliqué, all both singly and in combination. Designs include *arca* shell impressions, chevrons, triangles, herringbone, and meander

Planche ci-contre : voir légende p. 154.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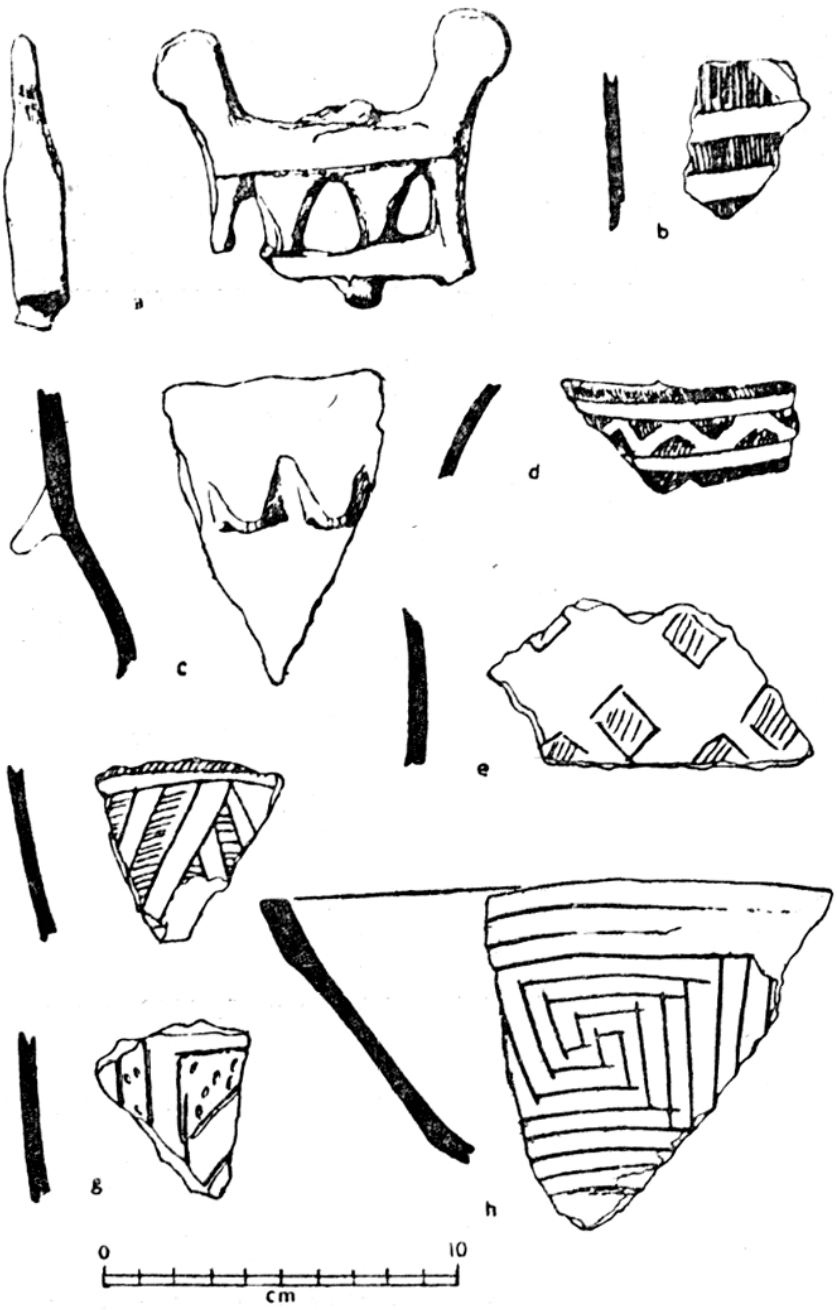

Fig. 10. Decorated sherds from Ulu Leang 2, 1973 season.

Planche ci-contre : voir légende p. 154.

patterns. Some of the designs are shown in Mulvaney and Soejono 1970b: Pls. VIII-XI. Notably absent are the curvilinear incised rosette, semi-circular, or running spiral motifs as at Batu Edjaja (Mulvaney and Soejono 1970b: Pls. III-IV) and elsewhere in Southeast Asia, or the carved stamp designs we found at Ulu Wae (Leang Paja) (*ibid.* Pl. XII). This might support an argument that the material is relatively homogenous, and does not represent a very long time period. Among unusual pieces should be mentioned the small (2.5 cm) pottery turbaned head (fig. 11) — perhaps a pot lid handle, and an open 'fretwork' decorative piece (fig. 10a). Some vessels were obviously large and elaborate, with *appliqué* crenelations near the rim and base,

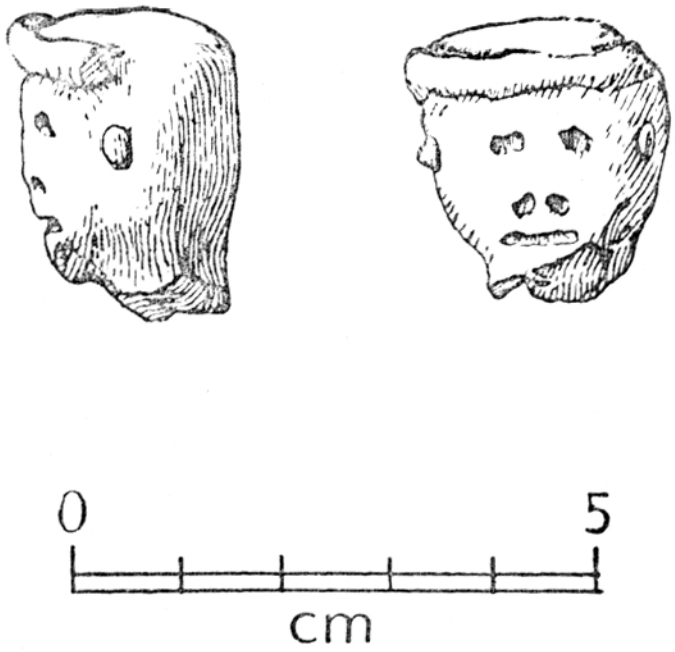

Fig. 11. Pottery head from Ulu Leang 2, 1973 season.

incised designs painted red and black after firing, and with multiple feet. When all the material is received from Indonesia and from Australia, there is a good chance to reconstruct these vessels. Until that time, it is perhaps better not to make detailed comparisons with finds from other sites and regions.

One piece of evidence suggests that not all the disturbance is recent. There are two sherds from the same vessel and which can be conjoined, one of which is coated over the entire surface with a thin layer of calcium carbonate, probably from a water drip. The other is quite clean; obviously this is quite an old break and the sherds had lain apart for a considerable time.

Dating of these burials presents problems not easy to solve with our present knowledge. The presence of glass and perhaps iron, and the absence of any imported glazed ceramics suggests approximately bracketing dates of roughly 500 B.C. — 1,000 A.D., with the simplicity of the beads favouring earlier rather than later.

The consolidated deposits

Writing of his explorations in the Maros region in 1949-50, van Heekeren (1952 : 26, 32) commented on the presence of a cemented band of shells, bones, and stone flakes about 1.5 metres above the floor of the Burung cave in the Lea Leang valley (not the Leang Burung excavated in 1969, but nearby). This feature had first been noticed by a geographer, Mr. N. Heyning who had extracted part of the mandible and teeth of *Sus celebensis* from this cemented deposit. Ir. W.F. van Beers gave his opinion that the shell bands are remnants of an ancient intact deposit cemented to the rock wall by the percolation of calcareous ground water. The softer parts of this have at some time been eroded by stream action, and sorted and redeposited. The soft deposit, such as the ones excavated by the archaeologists, according to the account, are not intact accumulations of habitational refuse, but represent this secondary redeposition. If this were true, it might account for the "shallowness", the "homogeneity" and "lack of stratification" in so many Sulawesi cave deposits ; comments which are repeatedly made by van Heekeren (e.g. 1972 : 108 111, 112, 123). Van Heekeren discusses, in detail, only the cemented band at Burung Cave, but in his latest publication he implies that they are not uncommon, "on the walls of caves we sometimes saw cemented shell banks 50-100 cm above the present surface..... caused by water containing lime dripping..... this layer contained mineralized shells, bones and sometimes stone artifacts..... the best example was observed in the Burung Cave and traces of it in the Leang Kerassa" (van Heekeren 1972 : 123).

Remembering Dr. van Heekeren's interesting observations we were not too surprised to see these cemented deposits at his Burung Cave in 1969, and recorded them also at Ulu Leang at six places around the walls of the cave. At the rear a substantial column of shell and bone breccia rose from below the soft cave deposit to 69 cm above it. Nearer the front of the cave smaller patches of cemented deposit remained on the walls high above the floor. The presence of bone fragments among the cemented shells, and occasional chert flakes was convincing proof that this was not a natural beach deposit, but habitational refuse. The problem we faced in 1973 was to

understand the relationship of these cemented deposits to the existing cave fill ; were they the truncated remains of a more ancient and separate cave deposit ,and had they been reworked by stream action to produce the deposit which we had been excavating ?

In an attempt to answer this problem we plotted more exactly the location and height of the cemented deposits at Ulu Leang, took samples from them, examined more closely those places where the two deposits were in contact, and searched in other localities for comparable deposits. Without being able to answer all the problems we could eliminate some possibilities and suggest a possible origin for the cemented deposits.

At Ulu Leang in 1973 we recorded thirty separate patches of cemented deposit including the six we had recorded in 1969 (fig. 3). These varied from a few shells cemented in a crevice to substantial lumps, one and a half metres wide by one metre thick, overlain by flow-stone well above the present floor level. By linking the top of each patch of deposit we could reconstruct a floor about one metre above the present one at the back and in the middle of the cave, 1.66 higher at front of the north wall, and just over 2 metres on the south wall. Such a floor would have had a slope of only 50-60 cm from back to front and about 10 cm across the cave from north to south. Either the talus slope woud have been much steeper than at present, falling 3 metres to the stream in only 4-5 metres, or the deposit, and the cave, must have extended much further to the west than it does presently.

Samples of cemented deposit were cut out with a cold chisel, some examined on the spot, and most brought back for laboratory analysis. A few rather patinated flakes of cream chert, but no diagnostic tools, were obtained with many badly fragmented bones in a matrix of fresh water gastropods which seem to be mainly of the species described by van Heekeren as *Thiara crenulata* and *Brotatia perfecta,* — exactly the same shells which form about half the bulk of the present cave deposit and which still live in the small stream in front of the cave. One sample taken from the back of the cave contained a small sherd, but this was believed to have adhered to the surface of the cemented deposit, and no pottery was found in any other samples examined. The regular stratification with intact hearths, and consistent cultural sequence which we obtained at Ulu Leang were convincing proof that the modern deposits were intact habitational refuse, and not an eroded and redeposited shell midden as van Heekeren seems to suggest. There was no time as I intended, to carry the main trench to the back of the cave where, in had two places, the existing cave deposit abutted against blocks of cemented

deposit. However, the area of contact was examined and it seemed clear that the cemented deposit was quite distinct from the present fill. The latter came away cleanly from the breccia and was not even partly cemented where it was in contact with the cave walls. The impression was that the existing cave deposit had accumulated against an already cemented and eroded ancient occupational deposit.

Nearby caves, fissures and cliffs were examined for traces of cemented deposit and it was soon apparent that this was not a phenomenon restricted to one or two caves, but widespread in the Lea Leang Valley and nearby. At Leang Pattae, excavated by van Heekeren in 1950, substantial remains were found of high level cemented deposits although no mention is made of these in the report (van Heekeren 1952 : 27-30). Between L. Pattae and Ulu Leang, in the small blind valley of Ulu Wae above the spring, shelters and protected rock surfaces preserved extensive bands of cemented deposit about 7.5 metres above the valley floor. In many places the breccia was capped by thick layers of travertine with stalagmites but had been eroded from below by rock falls, subsidence and water action. It was possible to look up at the under surface of the breccia, and at one location a mandible with teeth of some form of pig was exposed. This was later cut out in a block and brought back to London for examination.

Near our house in Kampung Tompokbalang the cliffs lining the west side of the valley contained many examples of ancient cemented cave deposits, and one exposure, nearly 3 metres thick, was found capped by an exceptionally deep layer of travertine. We examined Leang Karassak again where van Heekeren (1972 : 123) had observed these breccias, and found them cemented into the roof 2-4 metres above the present floor level — but this has been very much reduced in building the Maros-Camba road which passes right in front of the cave.

From these notes it must be clear that the antiquity and history of the cemented deposits comprise a major problem in Sulawesi prehistory, and one which we are far from answering. We can be reasonably sure that they represent a widely spread ancient occupation, long preceding the accumulation of the existing cave fills, and which by some natural agency has been largely eroded, surviving only where percolating ground water had cemented the shells, bones and artifacts into a hard breccia and where crevices or overlying flowstone had protected it. We know that the later occupation at Ulu Leang started earlier than about 7,000 ± 600 years ago, and perhaps much earlier

since we now have an archaic flake industry below the shell midden at Ulu Leang : the cemented deposits ought to be late Pleistocene at the latest.

Summary of the most significant results and outstanding problems for the archaelogy of South Sulawesi

Perhaps the most satisfactory result of the 1973 season was the confirmation that it provided for the provisional sequence of change and technological development at Ulu Leang which we constructed on the basis of a very small sample, and from only one week's excavation in 1969. We have a good sample of flaked stone, a rich bone collection and some botanical remains from a well-stratified and not too disturbed site spanning perhaps 8,000 — 3,000 B.P. This will provide a basic framework for future cultural-historical reconstructions for this period in South Sulawesi, and indeed together with earlier results from Timor, for all of Eastern Indonesia for some years to come.

The 1969 sequence has been extended back in time by the discovery of a completely new stone industry in the lower levels at the front of the cave. Dating this may be difficult, but for the first time meaningful comparisons can be made between an Indonesian stone industry and the old Australian coretool and scraper tradition.

Many new occurrences have been observed of the cemented deposits first recorded by van Heekeren, and although we are only a little closer towards understanding the nature and history of these, it has become clear that an explanation of them constitutes a major problem in Sulawesi prehistory.

From Ulu Leang 2 burial cave we now have a total collection of a richly varied ceramic assemblage. This will permit the reconstruction of many vessels so that we have a knowledge of forms as well as the already well known design elements. The many, though disturbed, burials will provide a rich source of data on the human population of South Sulawesi and already work on this material is in progress under the direction of Dr. T. Jacob.

Archaeological problems arising out of the excavation have already been pointed to throughout this preliminary report, but there is one major problem facing future archaeologists in South Sulawesi which must be mentioned again ; that is the matter of destruction.

The overwhelming, and dismaying impression we obtained in 1973 was that a number of factors were combining to single out archaeological sites in Sulawesi for destruction. The most pernicious, because it

affects all sites even remotely suspected of having ancient associations, is the international trade in antique ceramics. South Sulawesi is known to have been a major centre for the network of inter-island trade since the first reliable historical records appear in the early 16th century A.D. But before that large quantities of glazed stonewares were imported from South China, Indochina and Thailand and these were frequently buried on their owner's death. Villages converted to Islam from the 17th century often continued to bury their dead in the old cemetery areas, and notwithstanding the strong influence of Islam among the Bugis and Makassarese people, cemetery areas are regularly pillaged for saleable pottery. Caves with prehistoric occupation deposits occasionally, as we have seen at Ulu Leang 1, contain historical period burials, and will be potholed if any are suspected. Burial caves high up in the cliffs, such as Ulu Leang 2, in my impression rarely contain imported glazed ceramics but these also are readily ransacked in the hope of finding some saleable articles.

Other causes of destruction have been referred to in section 1; digging for mineral rich cave earth with which to replenish exhausted sawah soils, and digging for a variety of bedded limestone *batu Hongkong)* which can be found buried under occupation deposits in the caves. *Batu Hongkong* is the raw material for a local village industry in the Leang Leang valley. The stone is crushed to powder by pounding with hand mauls, usually by women and children working under the pile houses and then sold in Maros or Ujung Pandang to make lime and whitewash. These two activities affect only cave deposits and not all archaeological sites, but cause immense destruction nonetheless.

No prehistoric sites so far seen by us in South Sulawesi have been totally unaffected by these three activities, and in this, Sulawesi contrasts strongly with the situation in Timor. And with the exception of Ulu Leang 1, we have been unable to find a single cave deposit in the Leang Leang valley, near Bantimurung, or on the Pakalu-Camba road, in which there is enough undisturbed deposit to repay the time and expense of a major excavation. For a limestone region rich in caves, and so far little known archaelogically, this is a depressing commentary. Can anything be done about it ?

The uncontrolled export of antiques from Indonesia, even from Sulawesi to Java, is now illegal, and in Ujung Pandang the L.P.P.N. Branch IV are trying to reduce the loss and destruction. But the difficulties are enormous; government officials are too often poorly paid and few yet realise the historical and aesthetic value of the porcelain burials. The local sale of one or two bowls may represent a month's salary. In the villages, during the slack time of the dry season,

pot-hunting can provide a sizeable cash income. Dealers in the city and even from Jakarta, armed with *firmans* from high governement officials organise their own 'excavations' and one can see burial grounds more resembling abandoned battlefields with their eroding pits and trenches, only the spoil heaps with fragments of bones and pots broken by careless digging reveal their purpose. (2)

Although many Indonesians appreciate and like to collect these ancient ceramics, the high prices and motivation for much of the illegal digging, are set by the foreign market. Tourists, airline crews, foreign businessmen locally resident, and above all, foreign diplomats in Jakarta, have money to spend and see no harm, and a future profit, in buying the antiques so freely available.

In order to control this traffic and preserve at least some burials for proper excavation and description will require an enormous effort in education, propaganda and administration by the Indonesian authorities. To restrict the mining of cave earth and *batu Hongkong* would be unreasonable since so many village people depend on these activities for their livelihood. But active site surveys could be undertaken by locally based archaeological officers, and those few sites yet little disturbed, and with a promising archaeological potential, could be scheduled for protection, fenced, notices put up, and regular inspections carried out by local officials of the Department of Education and Culture. As in the Philippines, some sites might be designated as important to the 'cultural heritage of the nation' and real efforts made to save them for scientific examination.

I would like to finish this report by thanking those people who participated directly in this project, or whose support and interest contributed to its success. Some of these are listed on page 115, and to these I should add all the people of Kampung Tompokbalang, whose tolerance and interest made our work in Sulawesi so pleasant an experience. Thanks also to the generosity of the Lembaga Purbakala dan Peninggalan Nasional it was possible to bring all the excavated collections to London for study. This work is now in progress, and when it is completed the finds will be returned to the L.P.P.N. Branch IV office in Ujung Pandang where a museum is being established under the supervision of Drs. Hadimuljono.

March 1974.

(2) *Cf. Archipel* 3, 1972, pp. 202-212.

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PLATE CAPTIONS

Between page 128 and page 129

Plate 1. Tower-karst near Ulu Leang.

Plate 2. Ulu Leang 1 and 2, from the west.

Plate 3. Issudjud excavating in square B 6.

Plate 4. The author operating the soil flotation equipment.

Between page 144 and page 145

Plate 5. Historical period burial in squares C 4 - 5. The lower part of the torso had already been excavated in 1969.

Plate 6. Bahru Kaluppa and Emily Glover uncovering the stoneware bowl with the burial in C 4.

Plate 7. Collecting pottery and bones from disturbed burials in area 2, Ulu Leang 2.