

II. MESOLITHIC

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INTRODUCTION.

he late Quarternary history of the Indonesian Archipelago is complex since volcanic activity and uplift are likely to have continued after the last retreat of the ice in Northern Europe. A general rise in sea-level occurred in South-East Asia during this period and communications with the Continent of Asia must have become more sporadic. The Asian landbridges must have become inundated, if this had not already taken place, though it is notable that at least one of the Mesolithic industries described below has direct connections with the Continent. The topography and climate of Indonesia appear to be similar to those of the present, and there is a recent fauna, though many individual species appear to have been larger than those extant to-day.

The colonization of Indonesia by different races of *Sapiens* took place during this period and *Homo soloensis* is not present. The new races have been differentiated as Australoids, Palae-Melanesoids, Veddahs and Negritos, and are presumed to have spread throughout the Archipelago by means of rafts and primitive canoes (Fig. 13). Three different industries have been recognized and are described below. They are respectively the Hoabinhian Pebble Tool Industry, the Sampung Bone Culture, and the Toalean and allied flake and blade industries.

1. THE HOABINHIAN PEBBLE INDUSTRY.

The Hoabinhian Industry of Indonesia is confined to Sumatra, though certain discoveries in Java and Celebes have been ascribed to Hoabinhian influence and will be briefly mentioned in this section. The industry is native to Indo-China and Peninsular Malaya where it is found in numerous cave sites in the interior, normally in association with shell middens formed at the mouth of these caves. Coastal middens associated with some Hoabinhian tools have been found in Province Wellesley, Malaya, where they are believed to represent a late industrial stage.⁸⁰

⁸⁰ Earl; 1860; 119—29. According to Huxley; 1863, 265—66, the human remains excavated by Earl in the Province Wellesley shell mounds, display Australoid and Melanesian characteristics.

Mijsberg; 1940, 100—18. The skeletal remains found by Van Stein Callen-

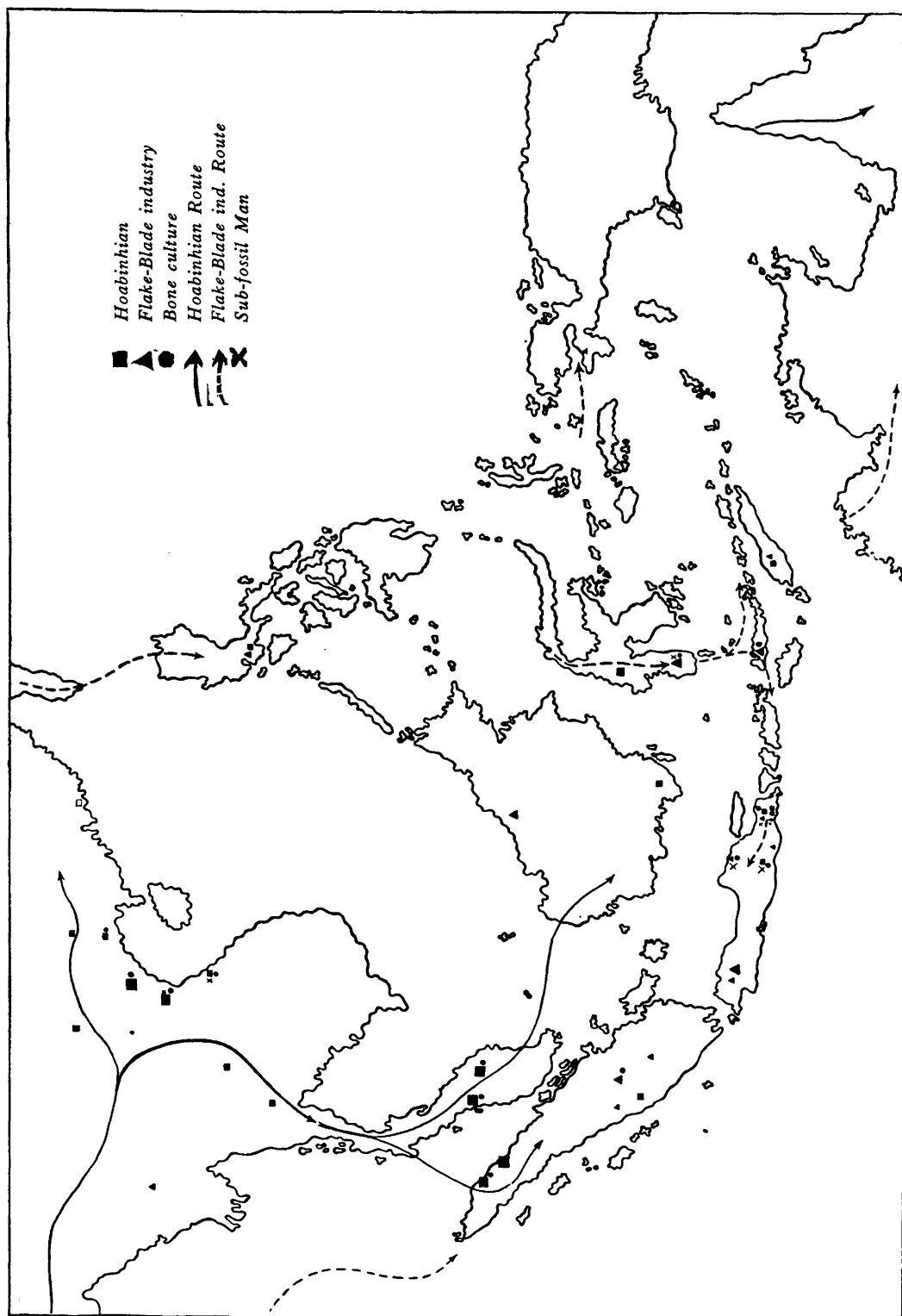


Fig. 13. Mesolithic cultures.

In Sumatra the distribution of the Hoabinhian is confined to the coastal region facing the Malay Peninsula, where it is represented by extensive middens (East Coast Sumatra and Langsar) and large surface stations (Atcheh and North Coast Sumatra). The principal tool type forming 90 % of the industry is an elongate oval unifacial pebble known as the 'Sumatralith' to previous investigators. (Pl. 20, 21).

Unifacial pebble-tools of many different types are known from the Hoabinhian collections in Malaya and Indo-China⁸¹ but it seems likely that the 'Sumatralith' is an Indonesian development, and it is certain that no industries from the Peninsula or Asian sites show a dominant percentage of unifacial tools like those found on the coastal sites of Sumatra.

fels in shell heaps in the same province show definite traces of burial; the parts — a face part and a mandible — were well covered with ruddle. The mandible in question was studied by Mijsberg who points out that it resembles in every detail the lower jaw of recent Palae-Melanesians.

- ⁸¹ Tweedie; '53, 10—18. "The Hoabinhian is the only one of the Mesolithic cultures that is extensively developed in Malaya. The associated fauna is of recent date since all the species are members of the existing fauna. Occasionally flexed burials are discovered (Gol Ba'it, Sungei Siput, and Gua Kerbau)".

Tweedie; '55, 2—5. "From some time after 10.000 years ago until about 4.000 years ago, Malaya was inhabited by a race of men having physical characters suggesting affinity with the present day Melanesians. They lived in caves and rock-shelters and were hunters and food-gatherers, and possibly cannibals. They cooked their food at fires in the caves and sometimes buried their dead in the floors of their dwelling places. They made rather rough, but quite easily recognisable, stone tools by chipping a river pebble to produce a jagged cutting — or scraping — edge all around it; sometimes the end of the tool was ground to make an edge. They collected iron oxide or Haematite, a soft red stone and ground it to a powder, probably to make a kind of red paint to simulate blood for ritual purposes".

Snell; '49, 1—25. Snell studied two skulls from Gol Ba'it, Sungei Siput and found that the skulls in question belong to the Melanesian racial group.

Colani; '27, '30, 299—422.

Starting excavations in 1906, E. Patte and H. Mansuy discovered the so-called Bacson-Hoabinhian Culture in 37 caves in the Bacson Massif, north of Tonkin. There were numerous 'Sumatraliths', crude scrapers and unworked pounding stones; furthermore pebbles with ground cutting-edges. These tools were named Proto-neoliths. All layers contained gravel stones, mostly of slate with two parallel grooves which served as grinding stones.

South of Tonkin, separated by a delta, 120 kms. wide, lies the massif of Hoabinh where Madeleine Colani examined a great number of caves. The 'Sumatraliths' here were generally fashioned of oval or more or less flat pebbles. Semi-circular or ellipsoid stone axes with straight cut butt-ends were named 'short-axes'. Bifacial axes were mainly found in the middle layers of the cave deposits.

Human skeletons belonged to three different races: Australoids, Palae-Melanesians and Mongoloids. The Palae-Melanesians are predominant.

Sumatra.

The first Hoabinhian biface was found in 1924 by Neumann at Batu Kemang, Deli and Serdang District on the East Coast of Sumatra. Subsequent research showed that the implement was not found *in situ*. This biface is made of weathered andesite and flaked from both faces giving it a characteristic wavy or zig-zag profile. It has a typical almond-shape, part of the point being broken off, and measures 15½ cm. long and 7 cm. wide. (Pl. 18). The attribution of this tool to the Post-Glacial period was confirmed by the subsequent discovery of an identical tool during the excavation of a kitchen midden at Medan, Sumatra.⁸²

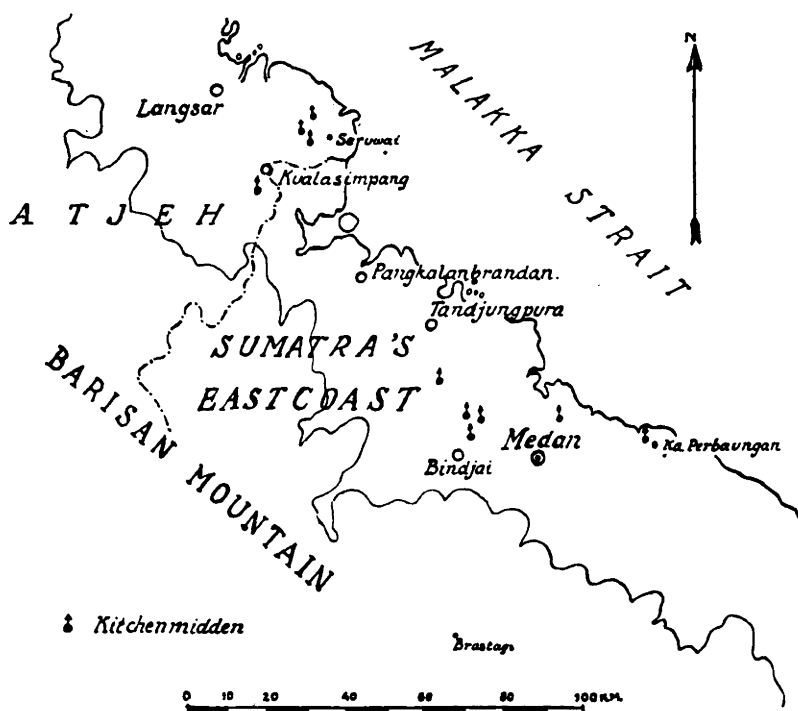


Fig. 14.

Large shell mounds were reported near Seruwai, East Sumatra, on the lower course of the Tamiang River in 1917.⁸³ These mounds were

⁸² Van Stein Callenfels; '24, 127—33.

⁸³ Yearbook 1917 of the Mining Department at Bandung.

30 metres in diameter and 4 metres high. In the opinion of the discoverers they had been formed by a plague raging among the shell fish. Witkamp⁸⁴ was later able to show that their presence was due to human activity. The distribution of these middens has since been found to extend along the North East Coast for approximately 130 kms. and all these sites are now about 10 to 15 kms. inland (Fig. 14). These middens are believed to have been formed on an old strand line isolated inland by a subsequent isostatic emergence of the ground and some of these have been submerged more than a metre in the swamps formed behind the present beach.

Excavations have been carried out by van Stein Callenfels near Medan, East Sumatra, and by Schürmann in Atcheh.⁸⁵ The former excavated a site on the Saentis Estate northeast of Medan (Pl. 19; 21). No report was published and the following information has been extracted from his field notebooks.⁸⁶ The shell mound contained 92 % *Meretrix meretrix* L. and 6.5 % of *Ostrea* shell according to this source. A number of worked stone implements were recovered from a matrix of marine shells *in situ*. These were all unifacial Hoabinhian tools of the common Sumatran type, with the exception of one broken bifacial tool of the type known as hache courte (or short-axe) in Indo-China (Pl. 20 nr. 922). Crude pestles and mortars of Hoabinhian type and a large quantity of Haematite were also found during the excavations.

A further description of these middens can be obtained from the excavations of a shell mound at Bindjai-Tamiang, Atcheh by Schürmann. This site lies about 15 kms. inland and is 10 metres above the present sea-level. The upper portion of the midden has been removed for economic purposes and the excavation was confined to the eastern central portion of the remaining mound. The midden appears to have been excavated in spits of even size and the stratigraphy was recorded from top to bottom in the following manner:

- 30 cm. shells mainly *Meretrix*.
- 30 cm. Ash layers with *Haematite*, pebbles, artifacts and bones.
- 20 cm. Shells mainly *Meretrix*.
- 20 cm. Ash layer containing *Haematite* and bones.
- 20 cm. Shells mainly *Meretrix*.

⁸⁴ Witkamp; '20, 572—74.

⁸⁵ Schürmann; '31, 905—23.

⁸⁶ Also from an illustrated article in one of the numbers of the Illustrated London News.

- 10 cm. Ash layer containing Haematite, pebbles, artifacts and bones.
- 60 cm. Sand, shells (*Meretrix*), pebbles, a few bones, wood.
- 50 cm. Greyish-blue to yellow marine clay without shells.
- 100 cm. Yellow clay and sand without shells.

Schürmann records that the Artifact bearing layers dipped 10° eastwards. This shows that the ash layers were nearly horizontal, and probably represent true hearth deposits. The lowest layers of the shell mound were continued in a natural depression below sea-level. Oysters and Algae adhered to the flaked surface of some tools showing that these had been submerged.

Human skeletal material recovered from this excavation included a cranium, with occiput and temporal bones, fragments from three other skulls and about 30 fragments of limb bones and other bones. Several of the human limb bones had been split, evidently to remove the marrow, which suggests that cannibalism was practised by these groups of Hoabinhians. The cranium has a slight browridge, and the human remains were interpreted as short of stature, dolichocephalic and belonging to a Melanesian racial group.⁸⁷

The fauna from this site included:

1. Midden shells. Besides *Meretrix meretrix* L. there were *Ostrea virginica* Gmelin, *Placuna placenta* Linné, *Arca* (*Scapharca*) *granosa* Linné, *Cyraena* cf. *coazans* Gmelin, *Conus* (*Dendroconus*) *figulinus* Linné.
2. Bivalve Molluscs and Gastropods showing possible marks of utilization.
3. Fishes, crabs and tortoises.
4. Vertebrates of recent type including Elephant, Deer and Bear.

The tools recovered from the excavation are manufactured from stone pebbles, presumed to be of local origin, including andesite, liparite, quartzite, quartz, chert and sandstone.

Mühlhofer⁸⁸ divides these unifacial tools into three groups in order of importance:

1. Large broad unifacial tools; 12.5 x 8.5 cm. and 5 cm. thick.
2. Large narrow unifacial tools of similar length.
3. Small unifacial tools; 9.5 x 7.5 cm. and 4 cm. thick.

Further surface finds in Sumatra may be briefly summarized:

⁸⁷ Wastl; '39, 181—85.

⁸⁸ Mühlhofer; '38, 30—34. Küpper; '30, 318—25.

Heyting (1927) reports the discovery of crude stone axes of the unifacial 'Sumatralith' type in the Upper Serdang region. One of the implements, almond-shaped, measured 13 x 9.3 cm. and was 4.2 cm. thick. H. Küpper describes a number of similar sites on the North Coast of Sumatra and the Langsar region of Atcheh, Lho' Seumaweh being the most prolific. The region where these sites were discovered is one geographical unit characterised by a range of barren limestone ridges covered in some parts by a thin layer of quarternary gravels, which contain the raw materials used in the manufacture of the industry. Practically all the implements, and there are thousands of them, can be classified as 'Sumatraliths'. They are manufactured of pebbles, mostly of a fine-grained quartzite. Lebzelter has described the collection in some detail.⁸⁹ He finds that the industry can be divided into oval, disc-shaped and elongated pick-like pebble tools, flakes from pebbles, and broad faceted flakes. The majority of the first class are unifaces of the Hoabinhian Sumatra type. Lebzelter has divided the industry into the following types:

1. Triangular, pointed monofacial tools. No marginal retouches. Measurements: 84 x 85 x 45 mm., 88 x 86 x 45 mm., 104 x 60 x 46 mm.
2. 'Asturiashauer'. Both point and butt-end retouched. The upper face slightly convex, the under surface unworked, and flat. These artifacts as well as the ones mentioned under 1. were used to strike the shells off the shell-banks and had therefore to be large and heavy. Measurements: 134 x 74 x 53 mm., 138 x 70 x 35 mm., 90 x 66 x 28 mm.
3. Disc-shaped scrapers made by crudely flaking the more or less round pebbles. The unflaked under surface is always slightly convex with marginal retouches. Measurements: 100 x 82 x 29 mm., 86 x 62 x 32 mm., 94 x 78 x 40 mm.
4. Flat disc-shaped scrapers, fashioned from flakes. The under surface slightly convex, the upper surface chipped. The edges are alternatively flaked.
5. Tabular scrapers; large, thin manufactures with one, sometimes both surfaces flaked. Measurements: 92 x 76 x 37 mm., 114 x 75 x 30 mm., 85 x 75 x 30 mm.
6. High-backed core-scrapers. The under surface has sometimes concavities or notches at the point. They are supposed to have been used for the straightening of spear and arrow shafts. Measurements: 70 x 60 x 40 mm., 80 x 47 x 27 mm.

⁸⁹ Lebzelter; '35, 318—25.

7. Core-sidescrapers. The under surface convex. Retouching along one edge only. On the upper surface shallow facet-flaking. Measurements: 134 x 60 x 50 mm.
8. Monofacial pebbles. They are of a great frequency and typical for this stone culture. There are small pieces among them. Mostly oval-shaped, their upper surface usually displays marginal retouches. Measurements: 63 x 43 x 12 mm., 66 x 37 x 18 mm., 90 x 53 x 27 mm.
9. Bifacial hand-axes, mostly large-sized, measuring 95 x 25 mm., 61 x 21 mm. or 72 x 26 mm. Both under and upper surface show longitudinal flaking.
10. An unique type of the bifacial axe showing traces of polishing.
11. Pick-like scrapers with flat under surface and steep retouched point. Measurements: 87 x 44 x 30 mm., 68 x 36 x 22 mm.

From the above it will have become clear that on the East Coast of Sumatra once flourished a vigorous Mesolithic Pebble Culture, the remains of which have come to us from shell mounds and open-air sites on the flat ridges of limestone hills. It is very striking, therefore, that this form of culture is so rare in other parts of the Archipelago, and that up till now there is no report of kitchen middens along the shores elsewhere. It is obvious that there is only little information concerning their distribution. (Fig. 14).

The stone tools which have been collected by J. Bosscha during the excavation on a hill at Sakang, Western Borneo, were described by van Stein Callenfels as pebble-tools, but the examples the present author has examined in the Djakarta museum look more like unfinished neoliths. In Java this Pebble Culture is obviously secondary and in my opinion it is a late offshoot of the Hoabinhian which has penetrated the Sampung Bone Culture which will be described in the next paragraph.

In the Gua Lawa this culture is represented by pestles and mortars; in the Betpuruh Cave near Pradjekan by pounding stones with grip-marks and rubbing stones; in the Sodong Cave by a few primitive 'short-axes' and small Sumatraliths, in the Mardjan Cave by a number of 'short-axes' and a single rectangular scraper. All these caves and rock-shelters are situated in East Java. These faint traces of the Hoabinhian in Java are always associated with a bone industry, displaying bone spatulae of two kinds, awls and digging tools and daggers of antler, and besides red Haematite, human skeletal remains of a megalodont race with Papua-Melanesian and Veddoid affinities.⁹⁰

⁹⁰ See next §

P. V. van Stein Callenfels, in view of a Palae-Melanesian skull which was found associated with the Hoabinhian in Eastern Sumatra and of reports from Malaya and Indo-China, even went so far as to speak of a "Melanesian Civilization" with regard to the Hoabinhian. Collings,⁹¹ MacCarthy⁹² and Evans,⁹³ however, are definitely opposed to this qualification which they consider as premature at the least.

In some places in Australia 'Sumatraliths' are still in use and reveal to us that, at least in this area, such tools are attached to a forked wooden haft, which makes it highly probable that they have been used in the very same way in other regions during prehistoric times. Therefore the term 'hand-axe' which is sometimes used, should be understood only in a technical sense, viz. that of core-implement in view of the fact that in this case the core is the pebble. As regards their technical workmanship and variety of types, the tools of the Hoabinhian are relatively poor.

2. THE SAMPUNG BONE INDUSTRY.

In January 1926, L. J. C. van Es, the geologist, visited the Southern Mountains near Ponorogo, East Java. On this occasion he was informed that employees of the sugar factory Patogan during World War I had obtained phosphates from the Lawa Cave near Sampung and in the course of this had encountered animal bones. As there was a chance that they were fossil vertebrates, van Es sent an assistant to this cave with instructions to collect fresh material. The bones then obtained were forwarded to Bandung for examination. They had not become fossilized, but apparently belonged to animal species which still exist in Indonesia. Several bones, however, appeared to have been worked and artificially polished. It was decided to perform a preliminary excavation in the northeastern part of the cave. The deposit was dug away to the rock-bottom and proved to consist of the following layers: immediately covering the bottom, a layer of brown sand, 4 m. thick, containing small pebbles of fluvial origin; upon this a stratum of volcanic ash and sand, approximately 75 cm. thick; next a sediment, 4½ m. thick, consisting

⁹¹ Collings; 38a, 122—23.

⁹² MacCarthy; 40a, 38.

⁹³ Evans; '38, 141—46. Von Koenigswald; 52, 96—98.

According to some scientists, large teeth are no racial characteristics, but the fact stands that Javanese caves yielded nearly exclusively human remains with exceptionally large teeth, in contrast with the Celebes caves which produced human teeth of normal or small size. This phenomenon will strike anyone who has occupied himself with the excavation of caves both in Java and in Celebes.

of sand and mud, and containing algae. The sediments has most probably been deposited in a pool or small lake which had afterwards become completely silted up. Only after this place the cave had been inhabited by men, who used it as a home and shelter. These men were no Indonesians as yet, as we will see presently.

In some places the cultural layer was more than 3 m. thick, a phenomenon never seen before or since in Java. It yielded several cultural elements such as a few neolithic polished adzes, a large amount of implements manufactured of bone and antler, and a number of bifacial stone arrow-heads with concave-shaped butt-ends. There was no difference between the stratigraphy of the various elements.⁹⁴ Van Es discovered a human skeleton *in situ*, lying on its left side, the legs bent, the head resting on the left shoulder and the right hand upon the face.

From 1928 to 1931 systematic excavations were undertaken by van Stein Callenfels. The artifact-bearing deposits were more than 3 m. thick and offered a good opportunity to obtain a stratigraphical view of the various cultural elements.⁹⁵ Van Stein Callenfels stated that in the upper, youngest layers a few iron and bronze objects had been found with some Neolithic Quadrangular Adzes and some pestles and mortars. The next layer contained exclusively implements fashioned of bone and antler, such as awls, daggers, fishing hooks and sticks for digging up edible yams and roots. Furthermore, there was quite a number of two kinds of spatulas, the first of the concave-convex type made of a long bone, split lengthwise and polished to a round cutting-edge. The second type is made of a flat oblong polished bone with a rounded cutting-edge, in fact the scraper used for cleaning and scraping of tubers and roots (Pl. 23; Fig. 15). The third layer yielded Neolithic, bifacial arrow-heads with concave but-ends; among these were a few very small pieces probably used for fowling. No potsherds occurred in the central stratum, the third layer on the other hand produced some fragments of cord marked pottery. In my opinion, this stratigraphy is far from convincing.

During the excavation, several human skeletons were found; some of them not complete. Among these was the skeleton of a child showing the cutting of the milk-teeth. Round the neck was a necklace of perforated shells, apparently used as a funerary gift. One of the shells proved to be a *Nerita chameleon* L., the others *Naticae*. Similar perforated shells

⁹⁴ Van Es; '26, 468. 74. '29, 329—40.

⁹⁵ It is therefore all the more regrettable that the method of projection for the drawing in of finds (this being done by projecting them on two or three assumed planes) has not proved very suitable for the purpose.

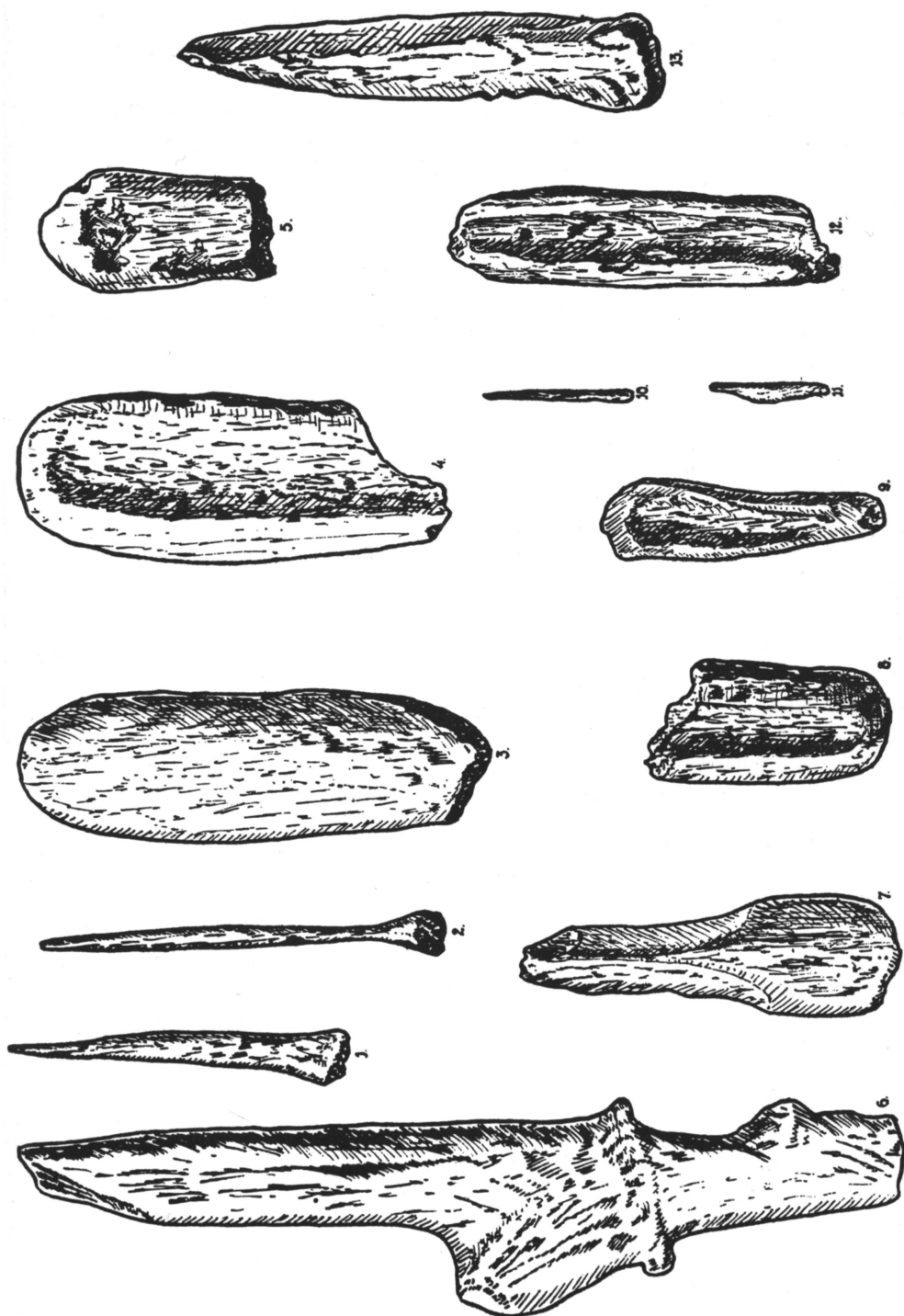


Fig. 15. Mesolithic Bone Culture, Java.

have afterwards been found scattered in the cultural layers; among these were larger shells such as *Natica mamila* L. There were other ornaments, too: perforated teeth of carnivores (*Paradoxurus hermaphrodites*), two small perforated plates of mother-of-pearl, four fragments of an amulet made of bone and showing traces of incised concentric squares near the edge, and many pieces of ruddle.⁹⁶

Several skeletons of adults were dug up, but they were in no condition to be reconstructed. More than once a skeleton had been covered by a rock to keep away the animals or to prevent the deceased's spirit from leaving the body. (Pl. 24).

The skeletal material was forwarded to W. A. Mijsberg, who has been able to reconstruct one of the skulls (Pl. 25a, b). It has been measured accurately and described.⁹⁷ Besides, various teeth from the cave in question and from other caves near Bodjonegoro where a similar culture was encountered afterwards, have also been examined. The examination of the Sampung skull disclosed the following indices:

A. Cranial Breadth x 100	
_____	78.2 (mesocephalic)
Cranial Length	
B. Auricular-Bregma Height x 100	
_____	68.8
Cranial Length	
C. Auricular-Bregma Height x 100	
_____	88.0 larger than minima of
Cranial Breadth	Javanese.
D. Minimum Frontal Diameter x 100	
_____	68.4
Cranial Breadth	
E. Total Facial Height x 100	
_____	45.5 smaller than minima of
Bizygomatic Diameter	Javanese.
F. Orbital Height x 100	
_____	72.1 smaller than minima of
Orbital Breadth	Javanese.

⁹⁶ Van Stein Callenfels; '31, 16—32. Dammerman; '34, 229—35.

⁹⁷ Mijsberg; '32, 39—54.

G. Nasal Breadth x 100	
	56.7
Nasal Height	
H. Bizygomatic Diameter x 100	
	100.8
Maximum Cranial Breadth	
I. Minimum Frontal Diameter x 100	
	67.9
Maximum Bizygomatic Diameter	

Of the teeth we only give the measurements that are larger than the maxima of the Javanese:

The third left lower molar with a length of 13.0 and breadth of 12.5 mm.
 The first right upper molar with a length of 12.8 and breadth of 13.4 mm.
 The first left upper molar with a length of 12.3 and breadth of 13.1 mm.
 All these molars are from the Bodjonegoro Caves.

From the Sampung Cave came a first right lower molar with a length of 13.1 mm. and a first left lower molar with the same length.

Mijsberg has pointed out that the Sampung skull is higher vaulted than the average Javanese skull and he concluded from the strongly-built teeth which surpass the maxima of the Javanese more than once, that they do not belong to Javanese, but to a megalodontic race, resulting from the interbreeding of Papua-Melanesian and Australian races.

The animal remains were sent to K. W. Dammerman⁹⁸ for examination and they belong to the species mentioned below:

UNGALATA:

Bos (Bibos) banteng Raffl.

Bos (Bubalus) bubalis L.

Cervus hippelaphus Cuv.

Cervus eldi.

Muntiacus muntjak Zimm.

Sus vittatus Temm.

Elephas maximus L.

Rhinoceros sondaicus Desm.

Tragulus kanchil Raffl.

PRIMATES:

Macaca irus Cuv.

Pithecus pyrrhus Horsf.

Nycticebus coucang Bodd.

⁹⁸ Dammerman; '32, 30—31.

CARNIVORA:

Felis bengalensis Kerr.*Neofelis nebulosa*.*Paradoxurus hermaphrodites* Pall.*Cuon javanicus* Desm.*Lutra cinerea* Ill.

RODENTIA:

Hystrix javanica Cuv.*Petaurista petaurista* Pall.*Ratufa bicolor* Sp.

Among this sub-recent Indo-Malayan fauna *Elephas maximus*, *Bos bubalis*, *Neofelis nebulosa* and *Cervus eldi* are extinct in Java. *Rhinoceros* still exists in the westernmost part of Java. Bone and antlers had been used for the manufacture of implements, teeth of carnivores had sometimes been perforated in order to serve as magical decoration.

Van Es also discovered a similar culture about 100 km. north of Sampung in the Northern Limestone Hills near Bodjonegoro. The cultural deposits were not so thick as those in the Sampung Cave. Van Stein Callenfels afterwards performed excavations in three caves in this area, but only two, the Kramat and the Lawang Cave near Dander have been reported on.⁹⁹ Neolithic adzes were not found here, only two kinds of bone spatulas like in the Sampung Cave and the bifacial hammerdressed stone arrow-heads. Among these very small pieces occurred also here. The deposit of the two caves was too thin to be stratified; finds of varied type were mixed together.

W. J. A. Willems visited the hills in the Semanding district in the neighbourhood of Tuban and examined two caves, the Gedeh and the Kandang Cave (1938). The first cave is 20 m. long and the finds occurred from the entrance up to a point deep in the interior. Furthermore, preliminary excavations have been performed in the Ketjil, Bale, Pawon, Bagong, Peturon, Butol and Pangang Caves, caves and rock-shelters, all of which are situated in the same mountain ridge extending southwest to northeast near Tuban. They yielded the same prehistoric stone and bone objects as those at Sampung and Bodjonegoro; two kinds of bone spatulas (Pl. 26a) and bifacial stone arrow-heads. However, Willems reported the presence of great numbers of shell artifacts, in particular of arched scrapers with fine marginal retouches. Due to his sudden departure to Europe and the outbreak of World War II, Willems unfortunately did not have the opportunity to work out his notes. In the Annual Report 1938 of the Archaeological Service in the Netherlands Indies, mention has been made of his findings: "Unfortunately the ex-

⁹⁹ Van Stein Callenfels; '31, 25—26.

plorations have not been wholly satisfactory in that it has not been possible to gain a true insight into the stratigraphy of these cave deposits. Variation in the ground profile showed up only in places where a kind of stratum could be established by means of a sediment of phosphate and other compounds. Since no humus formation takes place in such caves and rock-shelters, it stands to reason that methods other than those used in Europe have to be followed. As regards the cultural stratigraphy, all artifacts of bone, stone and shell were intermingled in the upper and the lower layers. No more than in the Celebes caves were there separate horizons like the ones van Stein Callenfels thought to have discovered in the Sampung Cave. The shell artifacts were in the majority". The present author recently examined these finds and found that the stone arrow-heads had not always been chipped on both surfaces and that there are unifacial arrow-heads among them. Furthermore, some of the bone spatulas and daggers differ from the Sampung ones in that they display the condyle. Finally I discovered many stone implements among these which belong to the 'Flake and Blade'-category.

More than 200 km. east of the above-mentioned caves, the present writer found traces of the Sampung bone industry in three different places in Besuki. In the spring of 1933 the Betpuruh Cave was discovered during an exploration of an isolated limestone massif in the Beser Mountains, north of Pradjekan. The outermost chamber, only illuminated by some diffuse light, was excavated, but no finds were made except near the entrance and in the adjoining small rock-shelter. The deposit on the rock-bottom was very thin and nowhere exceeded one metre. Five concave-convex spatulas have been found, quite identical with those of Sampung. There were also small and narrower spatulas, bone awls, a flat spear-head of polished antler and a small point of animal tooth. Associated with the bone industry were some elements of the Hoabinhian Culture such as pounding stones with gripmarks, some stone flake implements and one stone arrow-head with convex butt-end. The only ornament to be discovered was a small ring of mother-of-pearl.¹⁰⁰

In the westernmost part of the rock-shelter, approximately one metre from the upright wall, beneath an overhanging ledge of rock, quite on the rock-bottom were various sub-fossil human remains. The root system of a tree growing in the vicinity had penetrated and disturbed the deposition in the whole area. Among the skeletal remains was a skull from which the following parts have been recovered:

¹⁰⁰ See: 'Oudheidkundig Verslag' 38. Van Heekeren; '35, 123—29.

1. Fragment of the frontal bone with *glabella* and an adjoining part of the upper rim of the right orbit. Attached to it was a small fragment of the right wall of the brain-case;
2. A small fragment of the frontal bone with the lateral portion of the upper rim of the left orbit;
3. The foremost part (about half of it) of the left parietal bone;
4. A fragment of the lower border of the left orbit with the greater part of the left nasal bone attached to it;
5. A great part of the lower wall of the right orbit; the right upper jaw bone was relatively complete and showed the canine, two premolars and three molars;
6. A mandible which lacked the upper part of the right *ramus* and the whole left *ramus*, while the angle was damaged; on the right all elements from canine to last molar were present, on the left the second and third molar;
7. Isolated first and second incisor. On the right, in the upper jaw the alveolae are visible in which perhaps the roots of these teeth were embedded;
- 8—11. Four small fragments of the skull cap.

Reconstruction of the skull has not been possible. Mijsberg states: "In general the fragments seem to correspond with the Sampung finds. Over the eyes is a ridge like that seen in the Sampung skull, but less well defined. This eminence is absent in Javanese skulls, on the other hand it frequently occurs in Australian skulls (it is said as much as 72%). The Pradjekan *glabella* is, as a matter of fact, strongly developed; the adjoining upper rim of the right orbit to the *incisura orbitalis* is swollen to an *arcus superciliaris*. From this incisura runs the lateral and ascending border between the just-mentioned arcus and the lateral part of the upper rim of the orbit which represents no swelling. Lateral to the *incisura supraorbitalis* at some distance from the rim of the orbit is the extension of the *arcus superciliaris*. The mandible is strongly built and possesses a chin eminence. The measurements agree with those of Javanese males, but taking into account the following measurements: a. length of the row of the molars; b. length of the row of the molars and two premolars; c. breadth of the dental arch between the most external points of the molars, it appears that among the Javanese males which have thus far been examined, there is not one which in all measurements agrees with those of our fragments. So the fragment of this mandible possesses dental elements of a notable size which makes it probable that its owner

belonged to a megalodont race. All things considered, the cranial fragments of Pradjekan disagree with those of modern Javanese, but resemble those of Sampung, and both taken together bear likeness to the skulls of Australoids, Papuas and related races".

The animal remains from Pradjekan have been forwarded to G. H. R. von Koenigswald. Apart from the relics of *Varanus*, tortoise and numerous molluscs, he mentioned the following mammals:

PRIMATES:

Pithecus pyrrhus Horsf.; fragments of two skulls.

UNGALATA:

Bos (Bibos) banteng Raffl.; teeth, tarsus, fragment of the humerus and other remains.

Bos (Bubalus) bubalis L.; milk teeth, a number of large canines, the condyle of a large femur and other fragments, dug up from the lowest layers.

Muntiacus muntjak Zimm.; fragments of the antlers, mandible, tarsi.

Sus vittatus Temm.; an incisor from the mandible with transverse section typical for this pig, canines and an incisor from the maxilla.

This small fauna comprises species which, with the exception of *Bos (Bubalus) bubalis* L., still exist in Java, and they are mentioned also in Dammerman's list of the Sampung fauna. The state of preservation in both sites is nearly the same.

The second excavation in Besuki was started in 1931 and continued till 1935, the remaining section being excavated by Willems and the author in 1938.¹⁰¹ The activities took place near the South Coast at the northern border of the Watangan Limestone Mountain, east of the Puger village. Here, too, the Sampung types of spatulas and bone awls were excavated, but in association with a flake and crude blade industry of a semi-microlithic character and shell artifacts (Pl. 26b). Furthermore, there were isolated human teeth, strongly-built and resembling those from the Sampung, Pradjekan and Tuban Caves. Right on the rock-bottom was the skeleton of a pygmy (Pl. 27). Finally there was an amulet of mother-of-pearl, perforated in three places. The fauna in this cave reads as follows:

¹⁰¹ Van Heekeren; '36, 187—93.

UNGALATA:

Cervus hippelaphus L.
Bos (Bibos) banteng Raffl.
Bos (Bubalus) bubalis L.
Muntiacus muntjak Zimm.
Rhinoceros sondaicus Desm.
Sus vittatus Temm.

PRIMATES:

Pithecus pyrrhus Horsf.
Macaca sp.

The near-by Mardjan Cave also yielded some bone spatulas of the Sampung type besides a few primitive 'short-axes' and other rather small stone tools of Hoabinh type. Animal remains were scarce; on the other hand there occurred many human skeletal remains, but only one appeared to have been buried; it was lying on its back in eastwest direction, the head towards the east, and it was covered by three limestone rocks. The skull was fractured and lacked some parts of the facial region, but otherwise this thick-walled skull was in a relatively good condition. Its index measured 77.7, quite in agreement with that of the Sampung skull, and therefore mesocephalic. The mandible was massive and strongly-built, too, indicating that the owners must have belonged to a megalodontic race. The measurements of the teeth tallied with those of the Sampung and Dander Caves. Furthermore this small cave was littered with sub-fossil human skeletal remains like fragments of ulnae, skulls, isolated teeth and jaws. In some instances the ulnae had been split lengthwise and presented traces of burning, indicating cannibalism. This small cave has, in my opinion, never been inhabited, and was only used as a burial-place for a prominent individual. Whatever has further happened there, can only be guessed. The material from both the Sodong and Mardjan Caves was lost in wartime before an expert had the opportunity to examine them.¹⁰²

In a cave in South Celebes some bone spatulas have also been found. The Sampung Bone Culture, up till now, has been encountered on a large scale in East Java; to be exact in seventeen caves or rock-shelters. This culture mainly consists of artifacts made of bone and antler. It has produced awls, arrow-heads and spear-heads, daggers of antlers and digging tools to dig up yams and roots, and two types of spatulas both with a polished rounded cutting-edge, the first of a concave-convex shape, the second flat and sometimes tempered by fire and polished, it having been used as a scraper for the cleaning of roots and such. Bone fish-hooks are

¹⁰² Van Heekeren; '37b, 269—77.

rare. All caves displayed a great quantity of red pigment, this having been used to smear the body and face during ceremonial festivities. The dead were interred in caves and lain down either on one side or on the back, the legs bent and the hands folded on the face. Buried with them were funerary gifts such as necklaces of perforated shells and animal teeth. Small mother-of-pearl rings and plates of the same substance, pierced in two or three places, served as ornaments or amulets. The cave-dwellers were apparently not able to make pottery. Though still living on edible molluscs and wild vegetables, they had become increasingly competent in hunting big and small game. The Sampung Bone Industry in Java was accompanied by a sub-recent Indo-Malayan fauna, a fact that definitely establishes its Post-Glacial age.¹⁰³ The position this industry occupies and the presence of northern Neolithic bifacial, hammerdressed stone arrow-heads, make it probable that this culture is younger than the Hoabinhian. In that period there were still Papua-Melanesians in Java, and there existed *Elephas maximus*, *Neofelis nebulosa*, *Bos (Bubalus) bubalis* and *Cervus eldi*, the last-named still living in Indo-China and Siam.

Beyond Java, this culture has been found in Japan, China, Indo-China and in one place in the Malay Peninsula. In the oldest layers of the artifact-bearing deposits of the caves in Indo-China this bone industry is absent. They yielded only rather primitive artifacts of bone and horn. More southwards, in the Hoabinh Province, they were met in a rather great number and variety, though they are never predominant. But a shell mound at Da-But (North Annam) displayed a bone culture which, though associated with Hoabinh implements, in many respects resembles the Sampung Industry, and what is more, produced bone implements which have not been found in Tonkin, but in Sampung. Van Stein Callenfels, therefore, is of the opinion that it originated and developed south of Tonkin and gradually superseded the use of stone, until it reached the pure form as produced by the central layer of the Sampung Cave, unaccompanied by stone implements.

¹⁰³ No traces of fossil men and other fossil mammals have been encountered in caves in Indonesia. Many if not all of the caves may have been formed in Post-Glacial times.

3. THE FLAKE AND BLADE INDUSTRIES.

A. The Toalean of South Western Celebes.

The well-known Swiss naturalists Fritz and Paul Sarasin were the first to discover a blade industry of a semi-microlithic and microlithic character in Indonesia during their second expedition to Celebes which lasted from March 1902 to April 1903. Twice they visited the rather isolated limestone mountain-range near Lamontjong, east of Chamba in the southern region of what was then the principality of Bone. After much trouble and privation they finally came into contact with the so-called Toale who still lived in the forests and partly dwelt in caves. The Sarasins excavated four caves near Lamontjong; during these activities they discovered a mesolithic flake culture which was essentially founded on blades. The presence of barbed and winged stone arrow-heads betrayed Neolithic influences of northern origin. The caves which were excavated are known as the Tjakondo, Ulelebá and Balisao Caves. The first one, consisting of a rock-shelter and a cave, is situated between the villages of Bakunge and Lapankanru. The rock-shelter is called the Upper Tjakondo Cave. It is about 20 m. broad and lies above a dry watercourse about 430 m. above sea-level. Its deposit was not stratified and consisted merely of a greyish ashlayer mixed with limestone cinders in which a number of stone and bone implements were found. The pre-historic horizon was only 80 cm. thick and passed abruptly into a sterile, yellow stone layer which ended right at the rock-bottom. At 10 cm. below the ground-level occurred many animal bone fragments and stone and bone artifacts; the richest level reached a depth of only 10 to 40 cm. Many of the bones appeared to be fractured and calcined. Among the artifacts were implements like blades, three single-edged and double-edged knives, scrapers, points and numerous waste products. Moreover, stone arrow-heads and other stone flakes with serrated edges, typical for the Upper Toalean, were found. All objects had been manufactured of andesite, chalcedony or sometimes even of limestone. Then there was a ground incisor of a boar, the point of a wooden stick and a fragment of a human skull which appeared to be perforated. It had perhaps been used as a charm or worn by the relatives as a memento. But this point will be discussed presently.¹⁰⁴ Potsherds were found mainly in the upper layers and could not be distinguished from the Buginese earthenware; most probably pottery came to the cave-dwellers by means

¹⁰⁴ Sarasin; '05a and b. '35, 127—33.

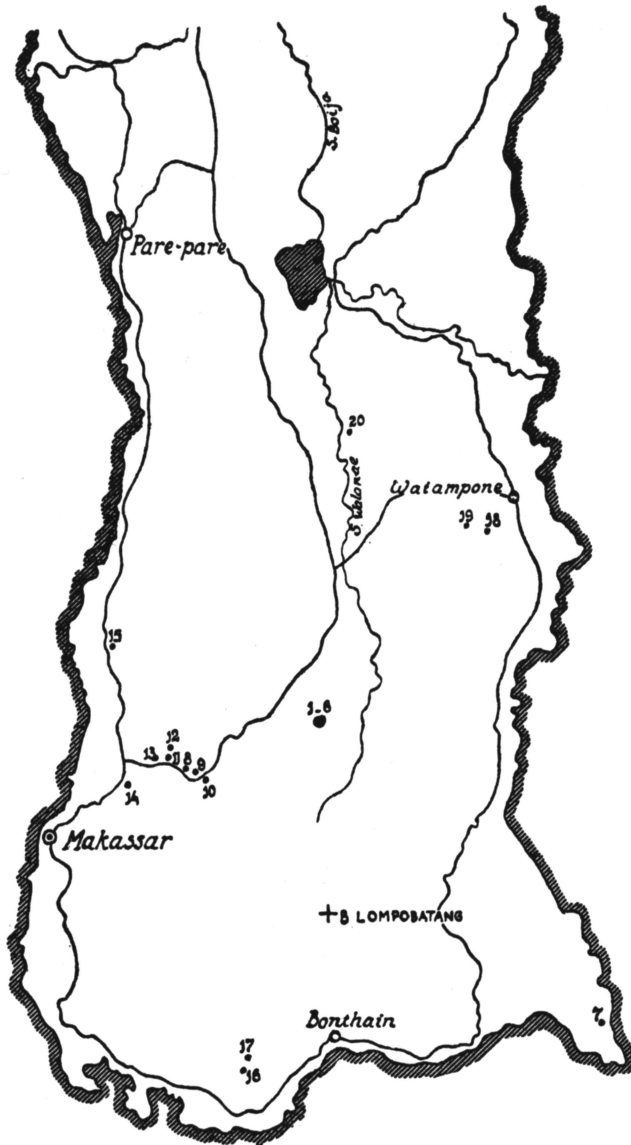


Fig. 16. Distribution of the Toalean sites in Sth. West Celebes.

- | | |
|------------------------------------|---------------------------------|
| 1. <i>Leang Tjakondo I</i> | 11. <i>Leang Burung</i> |
| 2. <i>Leang Tjakondo II</i> | 12. <i>Leang PattaE</i> |
| 3. <i>Leang Ulelebá</i> | 13. <i>Leang Lampoa</i> |
| 4. <i>Leang Balisao</i> | 14. <i>Mandai</i> |
| 5. <i>Leang Tomatua Katjitjang</i> | 15. <i>Leang Panameanreanga</i> |
| 6. <i>Leang Sebang</i> | 16. <i>Batu Edjaya</i> |
| 7. <i>Leang Ara</i> | 17. <i>Panganreang Tudea</i> |
| 8. <i>Leang DjariE</i> | 18. <i>Bola Batu</i> |
| 9. <i>Leang Saripa</i> | 19. <i>Panisi Ta'buttu</i> |
| 10. <i>Leang Karassa'</i> | 20. <i>Leang Tjadang</i> |

of barter in later times. There were no traces of domestic animals, except a dog's tooth.

In the second or Lower Tjakondo Cave the 40 cm. thick ashlayer contained many stone blades, double-edged knives, pedunculated scrapers, arrow-heads and a few animal remains. There were also the charred remains of a crudely knotted sack.

The Ulelebá Cave yielded artifacts and the remains of two human individuals which were rather fragmentary. They comprised twelve cranial fragments, a fragment of the right part of a maxilla with two premolars, five isolated molars, four milk teeth and one incisor. These fragments belong partly to an old male adult and partly to a young individual. There was also a comparatively intact humerus which pointed to a race of small stature with some primitive characteristics.

The Balisao Cave contained an ashlayer of 40 to 45 cm. thickness, which yielded stone artifacts, animal bones and some potsherds. It covered a barren yellow, stony layer.

The mammal remains from these caves indicate a fauna which still exists in Celebes, establishing therefore a Post-Glacial age.¹⁰⁵

The same area was visited by van Stein Callenfels in 1933 accompanied by H. D. Noone and A. A. Cense. In November-December of that year they performed successful excavations in the Leang Tomatua Katjijang (Cave of the Lonesome Old Man). This cave was situated north of Tjani. Apart from flakes, blades and barbed arrow-heads, he found two bone points with serrated edges, a stone bark-beater, a bone spatula of the Sampung type, a few bone spear-heads of Muduk type¹⁰⁶ and two fragments of green glass bracelets, triangular in cross-section. One of these was found at a considerable depth, a fact which made van Stein Callenfels decide to fix the absolute age of the Toalean at 300—100 B.C. No report was published on this excavation or on that of the Sebang Cave in the same area.¹⁰⁷

In 1933 Cense on one of his official tours discovered a new Toalean site at Ara; the site is situated on the most southern point of South-West Celebes opposite Salayar Island. Its geological formation consists

¹⁰⁵ Sarasin; '08.

¹⁰⁶ MacCarthy; '40b, 313—19. A Muduk point is a double-pointed piece of bone, oval or flattened-oval in section, usually flat on the inner side, convex on the outer side, and shaped (usually on both sides) by grinding so as to produce a fusiform shape. The grinding often extends all around both ends contiguous to the points. They are bone barbs mounted in wooden spears, mostly used for spearing fish.

¹⁰⁷ Van Stein Callenfels; '38b, 138—44.

of recent coral reefs which have been uplifted in the Quarternary and partly cover the effusa of the Lompobatang near Kadjang. Several ancient beaches can be pointed out here; some geologists think that there are seven of these, beach III lies 30 m., beach IV 50 m. and beach V 100 m. above sea-level. The prehistoric Ara site is situated on beach III. In July 1936, Cense invited me to visit Ara; we were accompanied by the septuagenarian Mr. Nurudin Magassing who had, as early as 1902, escorted the Sarasins to Lamontjong. During my visit it appeared that a district-officer had already made investigations so there was not much left for a closer examination. What had been left was excavated then and yielded the following objects: 29 micro stone arrow-heads and other small implements with serrated edges, among which was a single arrow-head with a concave, winged butt-end, two scrapers, a large triangular stone-point, a peculiar spatula-shaped bone object, seven bone points of the Muduk type and a fragment of a sting-ray. The only ornament was a light blue glass spiral. The deposit was only 40 cm. thick. The barbed objects were dominant in contrast with similar finds in other Toalean caves. The implements are small-sized, even for the Toalean. The teeth of the serrated tools are rather strongly developed in some cases, relatively blunt and cut perpendicular to the axis of the object instead of backwards. In my opinion, such tools can only have been used for the spearing of fish. The bone spatula was made of an ulna which had not been split and only worked at the distal end. Potsherds occurred mostly near the surface. There were no human remains except for a small but strongly-built mandible with the small teeth *in situ*. This mandible probably was worn as a memento. I suppose that the Ara site may be considered as one of the latest Toalean sites, dating well up into historical times.¹⁰⁸

Next followed the excavation of the Leang Karassa' (Ghost Cave) on the Chamba Road in the limestone mountains east of Maros, near the village of Patanuang AsuE. More Toalean sites were afterwards discovered in the same hills and the last investigations in 1950 led to the discovery of cave-paintings and negative hand-stencils in these regions.

The Karassa' Cave is a spacious rock-shelter which partly inclines over the road;¹⁰⁹ its deposit consisted mainly of sand, fresh-water molluscs and ashes. The shells themselves formed a real kitchenmidden one metre thick, cemented only directly against the rock wall. It yielded

¹⁰⁸ Van Heekeren; '37a, 30—33.

¹⁰⁹ Van Heekeren; '37—38, 263—67, 281—85.

quite a number of prehistoric artifacts, made of andesite, chalcedony and bone. Chalcedony was found cemented as lumps in the limestone riverbed at some metres distance from the cave. The shellbank which contained the artifacts was not stratified. Numerous blade-tools, scrapers, points and bladelets as well as 23 stone implements with serrated edges were found. There were some remarkable bone points as well, and a number of stone tools which differed from the Toalean proper by their patina and archaic forms. There were tools of a more or less Mousterian-like type and notched artifacts. Winged arrow-heads were not found, and potsherds occurred only in the uppermost layers. Although the Karassa' Cave should be considered as one of the oldest Toalean sites, the accompanying fauna did not appear to comprise fossil animal remains which means that this site is also of Post-Glacial age.¹¹⁰

This cave also yielded a small, but strongly-built human mandible; the teeth were missing.

In 1937 I continued the investigations in South Celebes, the main purpose being to gain more data concerning the structure of the Toalean complex and to increase our knowledge of its geographical dispersal. This time I examined the Panameanreanga Cave in the Matampa Mountains near Pankadjene, which is a continuation of the Maros limestone mountain-range. In this cave, the Toalean did not show up until 1.05 m. below ground-level, under a bank of marine shells. This trial excavation was followed immediately by one of the Saripa Cave near the Chamba Road near km. 46 on the right bank of a small river which cuts through the limestone. On the opposite bank, a few kilometres further, lies the before-mentioned Karassa' Cave. The Saripa Cave proved to be a rich Toalean site, and yielded thousands of primary flakes and blades which were found throughout the whole stratum which started immediately below the ground-level and reached only as deep as 40 to 50 cm. Beneath this stratum was a sandy layer containing shells and a few stone implements. At a depth of 1.10 m. the rock-bottom was struck. The implements are conspicuous by their fine workmanship and abundance in types. They were mostly made of chalcedony and a similar hard and brittle stone. There were a large number of arrow-heads, about 80 % of which possess a concave butt-end and show a Neolithic habitus.¹¹¹ Nearly half of these were neatly serrated along the edges. Perfectly symmetric pieces were rare. In some instances the points of the arrow-

¹¹⁰ Van Heekeren; '41, 229—37.

¹¹¹ Van Heekeren; '39b, 112—18.

heads had been made with painstaking care and had been skillfully retouched all over, other pieces had been provided with the sharpest of points. There were two small stone saws and two peculiar borers of the 'perçoir sur lame' type which, if found in Europe, might well be taken for Aurignacian-Solutrean implements. Other types encountered were: blades, double-sided knives, borers, awls, tanged points, gravers, core-scrapers, some true microliths and a few crude stone flake-tools. Some bone points had been hardened by fire and entirely polished afterwards. Finally, there was a number of small and round, dark-brown pellets or marble-like stones with a smooth and shining surface. It is not clear what they are. Human skeletal remains were completely absent.

In the same year van Stein Callenfels resumed his investigations into the Toalean Culture in South Celebes. He was assisted by W. J. A. Willems and F. D. MacCarthy.¹¹² It appears that four caves or rock-shelters were examined. The activities started with the excavation of a rock-shelter known as the Panisi Ta'butt, situated at the Salo Parusi about 11 km. southwest of Palakka in Bone. Here, too, as was the case with most caves in south Celebes, the deposit proved to be too shallow to be stratified. Mention was made for the first time of the presence of tanged tools; the cave also produced 16 serrated artifacts, a number of stone and bone points, some of which of the Muduk type, blades, knives, shell scrapers and a few bone spatulas.

Next followed the excavation of the Tjadang Cave near Tjita on the Wallanae River in the Soppeng district by Willems and MacCarthy. This steep-sloping cave produced potsherds, a few metal objects, scrapers made of shell and twelve barbed stone artifacts. In addition, three fragments of human mandibles, one with two, the other with three molars, and a great number of isolated teeth and some human bones were found.

Resident ter Laag had drawn attention to two caves on the south coast in the vicinity of Bonthain. Both caves were examined by van Stein Callenfels. One of these caves presented a stratum as thick as 3 m. No report has been published.¹¹³ The first cave, Batu Edjaya (Red Stone Cave), still receives worship from the population in the form of rites which include the setting free of a chicken. The upper layer contained objects of a comparatively recent date, e.g. 1-cent pieces and old Dutch coins. Next followed a compact layer of potsherds between 18 and 40 cm. below the ground-level; the sherds were decorated with comb-like

¹¹² Van Stein Callenfels; '38b, 138—44.

¹¹³ Van Stein Callenfels; '38a, 579—84.

patterns, scrolls, spirals, leaves and rosettes. Among the potsherds were small stone implements, a few polished stone adzes and fragments of bronze bracelets. Van Stein Callenfels dates this layer 300 B.C. He found that bone points of the Muduk type were abundant in this layer. The excavation of the second cave, Panganreang Tudea, produced not only the typical Toalean with its barbed stone tools, but also an older layer, clearly distinguished stratigraphically, containing implements resembling those which were discovered by Bühler in Timor and Roti¹¹⁴ and by the present author in Besuki, Java, and by Willems in the Tuban Caves. Characteristic in this lower, older layer are tanged implements and scrapers of a characteristic shape. Apparently we are dealing with an industry which represents the forerunner of the Toalean proper and which van Stein Callenfels therefore named the Proto-Toalean. It so appeared that the Toalean is a mixed culture displaying two elements: a. The Proto-Toalean with the tanged elements and b. the northern element with barbed stone implements (well-known in Japan, Korea and the Philippines, but not in Java or in Sumatra. (Pl. 28, 29).

Lately the present writer had the opportunity to re-examine the finds of this cave and to study the cultural stratigraphy as well, with the assistance of van Stein Callenfels' field record book. The most important feature was the great abundance of true microliths, such as battered-back points, trapezes, crescents and triangular bladelets. My preliminary drawing of a stratigraphic scheme resulted in the recognition of three different cultural layers (Fig. 17):

Toalean I or Upper Toalean, with serrated arrow-heads, bone Muduk points, scrapers made of shell, and potsherds;

Toalean II or Middle Toalean, comprising beautifully struck blades and warped blade-points, arrow-heads with rounded butt-ends and numerous true microliths;

Toalean III or Lower Toalean, containing larger and crudely chipped flakes, some plain blades, flake-tools with notches and pedunculated blade-implements. The latter have been found in the upper level of the third layer only.

In May 1939, Willems excavated some caves in the neighbourhood of Makale and made some preliminary excavations along the Mandar Gulf without results.

¹¹⁴ Van Heekeren; '49, 89—108.

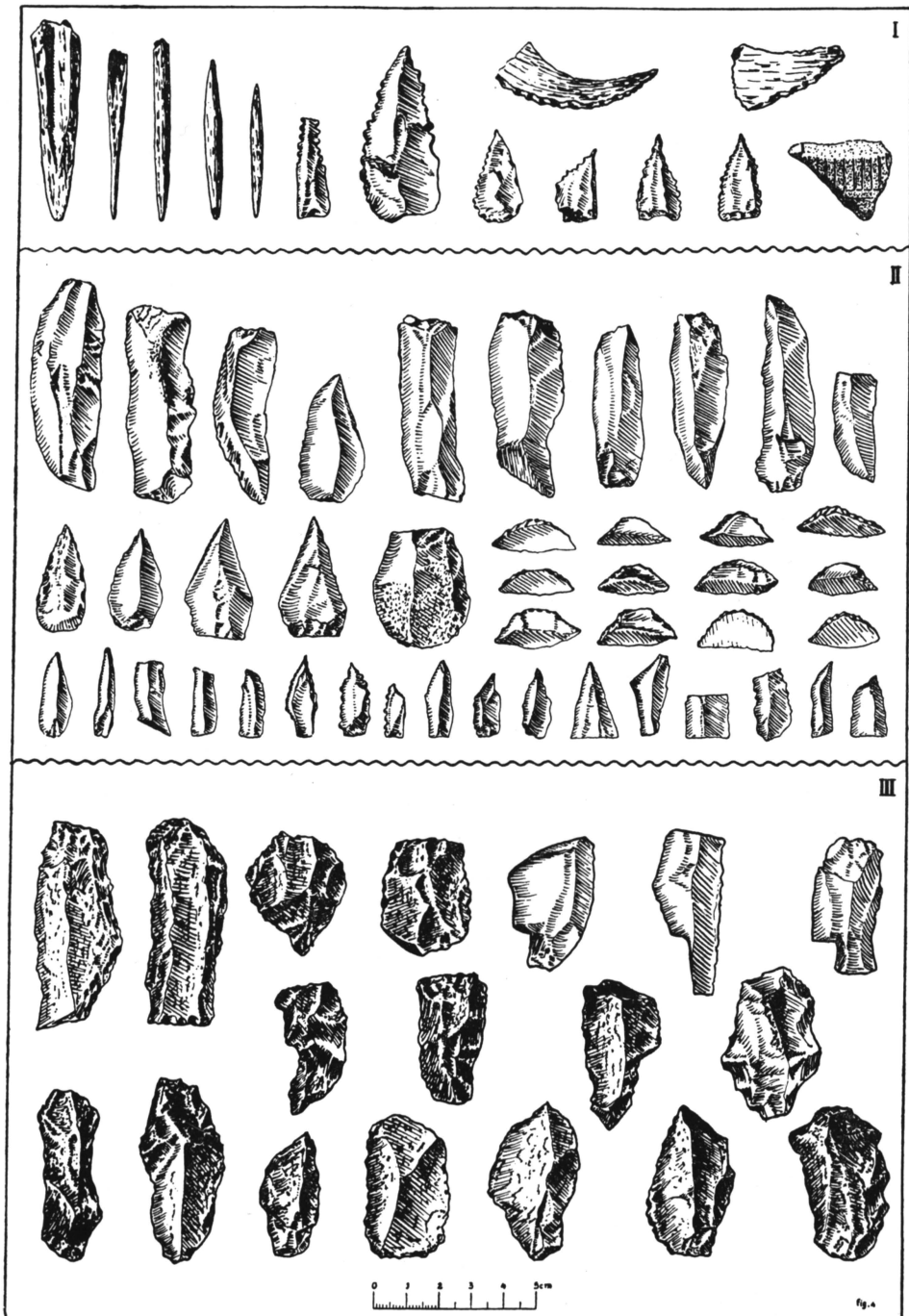


Fig. 17. Panganreang Tudea Cave, Sth. Celebes.
I. Upper Toalean; II. Middle Toalean; III. Lower Toalean.

From March 11 till July 8, 1947, I undertook a systematic excavation of the Bola Batu Cave (Stone House Cave), a cave in the upper part of a dome-shaped limestone hill, about 191 m. above sea-level, near the village of Badjo in the Barebo district of the State of Bone and about 20 km. southwest of the capital Watampone. The cave is illuminated by some diffuse light penetrating through two entrances and a large hole in the ceiling. Apart from 240 stone implements which represent 73.6 % of the total finds, 43 bone artifacts and 141 shell tools were found. Also a few slightly mineralized human calvarium fragments, a mandible with molars, some isolated teeth, the relics of killed game and numerous molluscs. No winged arrow-heads or other Neolithic relics have been found, except for a fragment of a round axe among the Toalean layers. In the upper layers a number of barbed stone arrow-heads were found and some tanged blade-tools in the lower layers. Among the blade-tools were scalene triangles of a semi-microlithic character, Pirri-points, convex-based stone points and core-scrapers in the lower stratum of the excavation. Some glazed potsherds of Chinese origin were recovered at a rather great depth.

From February 17 till April 5 1950, I excavated the Leang PattaE (Cave of the paintings). It is situated 30 m. above sea-level at the foot of the Maros Limestone Mountains, in the vicinity of Leang-Leang in the Turikale district. About 100 m. farther runs a small, apparently nameless river. The examination could not be finished due to the riots which broke out in South Celebes. Potsherds occurred only immediately below the ground-level, serrated and winged arrow-heads exclusively in the upper layers. Most artifacts were made of stone such as chalcedony and jasper. Blades of varying measurements were frequent; they varied from 25 x 7 to 66 x 33 mm. Many of these blades must have been hafted and used for several purposes. The stone implements are small but, with some exceptions, not entitled to the name 'microlith', the less so because real geometric forms are almost absent. Among the finds, however, occurred some very small points with careful retouching along one edge; they resemble similar points of the Eurafrian Capsian and the Bondi points of South Australia. The finds are as follows:

Neolithic:

16 winged and barbed stone arrow-heads, 5 barbed arrow-heads, 1 tanged, barbed arrow-head, 1 stone, bearing traces of sawing, 1 perforated stone, 3 potsherds.

Mesolithic:

6 tanged points, 19 round-based points, 6 obliquely truncated points, 6 battered-back points and crescents, 5 gravers, a great number of blades, 12 cores, 14 shell points, and 1 polished bone point.

In studying these data it has to be emphasized that only sector I has been completely excavated, while of the sectors II and III only the upper layers had been removed when the work had to be interrupted. The data just given can therefore not give a correct ratio of the younger and older elements. In addition to thousands of *Brotia* and *Thiara* shells, there were also remains of killed game. Traces of hearths and charcoal were found in several places at different levels. All layers yielded red Haematite. In this cave, for the first time, rock-paintings were discovered.¹¹⁵

From the previous pages it is clearly to be seen that the so-called Toalean has been found in 19 different caves. It appeared that the people who introduced this culture lived mainly on edible fresh-water molluscs as well as from hunting small and big game, fishing, and gathering edible wild plants. Several caves in the Maros Limestone Mountains possess a bank of cemented molluscs against the rock wall, and more than one of these contains calcined vertebrates and artifacts. These banks lie from one to three metres above the level of the cave's deposit. We found this phenomenon in the Karassa', Saripa and PattaE Caves, but it was most distinctly developed in the Burung Cave. (Fig. 18).

During our excavation of the PattaE Cave, Mrs. Dr C. H. M. Palm discovered on February 26th 1950 a number of negative hand-stencils on a red background in the innermost part of the cave. On the ceiling about two metres above the floor-level were 7 hand-stencils standing out against a red background; against one of the hands was a small crescent-shaped figure. There was another figure with five strokes, probably representing another hand. It appeared that the left hand had been spread against the ceiling, the space between the fingers and the surrounding area had then been splashed or spat at with a red pigment or paint, a procedure showing that the stencils had been made one hand after another as splashes from one hand could be traced on another. The red mineral has peeled off in several places and has caused the loss of many details. With one exception, all stencils are of left hands. The hands in this cave are slender with well-shaped fingers, and of

¹¹⁵ Van Heekeren; '52, 22—35. '55, 34—37.

normal size. Next day, I myself discovered in the same portion of the cave but in a niche, a fine contourdrawing of a leaping boar in red brown striped line technique (Pl. 31). On its back and neck are a series of five or six tufts of hair. Its head shows two horns giving the impression of tusks, but they are drawn behind instead of before the eyes and are bent the concave side forwards, not backwards. It is probable, therefore, that the supposed horns are really two bristles. The clumsy body and the thin legs are reminiscent of *Babyroura*, but this animal has practically no hair or mane. The cardiac region displays an object that can be taken for a spear-head, a sympathetic magical sign, aiding the hunter in hitting the animal in its most vulnerable spot.

On March 5th we discovered a distinct hand-stencil on the ceiling of a practically inaccessible niche cut in a steep rock wall of the Burung Cave (a few kilometres east of the PattaE Cave), about 8 m. above the ground-level. In examining the niche we found traces of two other hand-stencils; all three stencils are negatives and made against a red background. One of them was that of a right hand (Pl. 32). In the same rock wall is a high tunnel which after a few metres curves to the right and debouches into the open air. On the ceiling near the entrance we discovered traces of several hand-stencils, but the red paint appeared in such a state of weathering and was so blistered, that the stencils were hardly recognizable; their number and details could not be established. Near the exit of the tunnel were two hand-stencils; one is made on the ceiling and is the negative print of a right hand, the other on the side-wall and badly preserved.

C. J. H. Franssen had found a number of hand-stencils in a cave complex which we have named the Leang DjariE (Cave of the fingers). The site consists of a complex of tunnels, halls and fissures. Just inside the entrance we noticed on the ceiling of a small niche two groups of respectively seven and five hand-stencils on a red background. Though they could easily be discerned, many of their details have vanished owing to the weathered condition of the pigment. Deeper in the cave on a spot where the entrance narrows, are four negative hand-stencils; one of these had four, another only three fingers, while a third displayed fingers tapering in the same way as one of the stencils in the PattaE Cave. At a higher level of the rock wall is another small cave which can only be reached by means of a ladder. Though its ceiling is covered with a greenish film of moisture, two groups of respectively four and five stencils could be distinguished. From the second group the thumbs are all absent. Finally, we found in a fissure four hand-stencils which were

in a bad condition as a result of the weathered red ochre. The hand-stencils in this cave complex amount to twenty-nine.¹¹⁶

Many caves contained human skeletal remains, but no complete skeleton or skull has ever been found in the true Toalean deposits; the remains found in the caves were parts of the skull, some of which had been perforated artificially, mandibles, isolated teeth, fragments of the extremities being scarce. Therefore, the Toaleans buried their dead outside the caves or practised tree-burial. The bones were gathered in course of time and distributed among the deceased' relatives who adorned themselves with them and wore them as mementoes. It reminds one of the burial rites of the Andaman Negritos, the Melanesians and some Australian tribes. The Kurnai of Southeastern Australia for instance make it their habit to wear the lower jaws on their breast. According to A. R. Brown¹¹⁷ the Negritos of the Andamans dig up the bones or take down the bones of the deceased and the skulls and jaw-bones are worn round the neck either in front or behind. The other bones are also preserved, but not treasured like the skull and lower jaw; they are often mislaid. These Negritos did not generally use stone tools, but employed arched scrapers of shell like the ones found in numerous caves in Java, Southern Celebes and Flores. Their only stone tools were quartz chips for hair-cutting, tattooing and sacrifice. These sharp flakes were used only once and then thrown away on rubbish-dumps.

The skeletal remains in the Toale caves indicate peoples with a small stature and small teeth. Those of the Bola Batu Cave have been minutely examined by Dr D. A. Hooijer;¹¹⁸ there were skull fragments, a lower jaw and isolated teeth from four different individuals. The human skeletal fragments of the Lampoa Cave¹¹⁹ were also examined. Hooijer has published the following results:

1. The skulls show no characters that are typically Veddah-like; the frontal bone is larger than the average in Buginese and Macassars, and the mandible is high in relation to its width, falling above the Veddah range in this respect.
2. The permanent teeth *in situ* are small compared with those of Buginese and Macassars, but this is most probably due to the sub-fossil teeth having belonged to a female, and the recent Celebean skulls

¹¹⁶ Van Heekeren; '52, 22—35. Heyning; '50, 21—30.

¹¹⁷ Brown; '33.

¹¹⁸ Hooijer; '50a, 7—160. '55, 153—63.

¹¹⁹ Franssen; '49, 331—39.

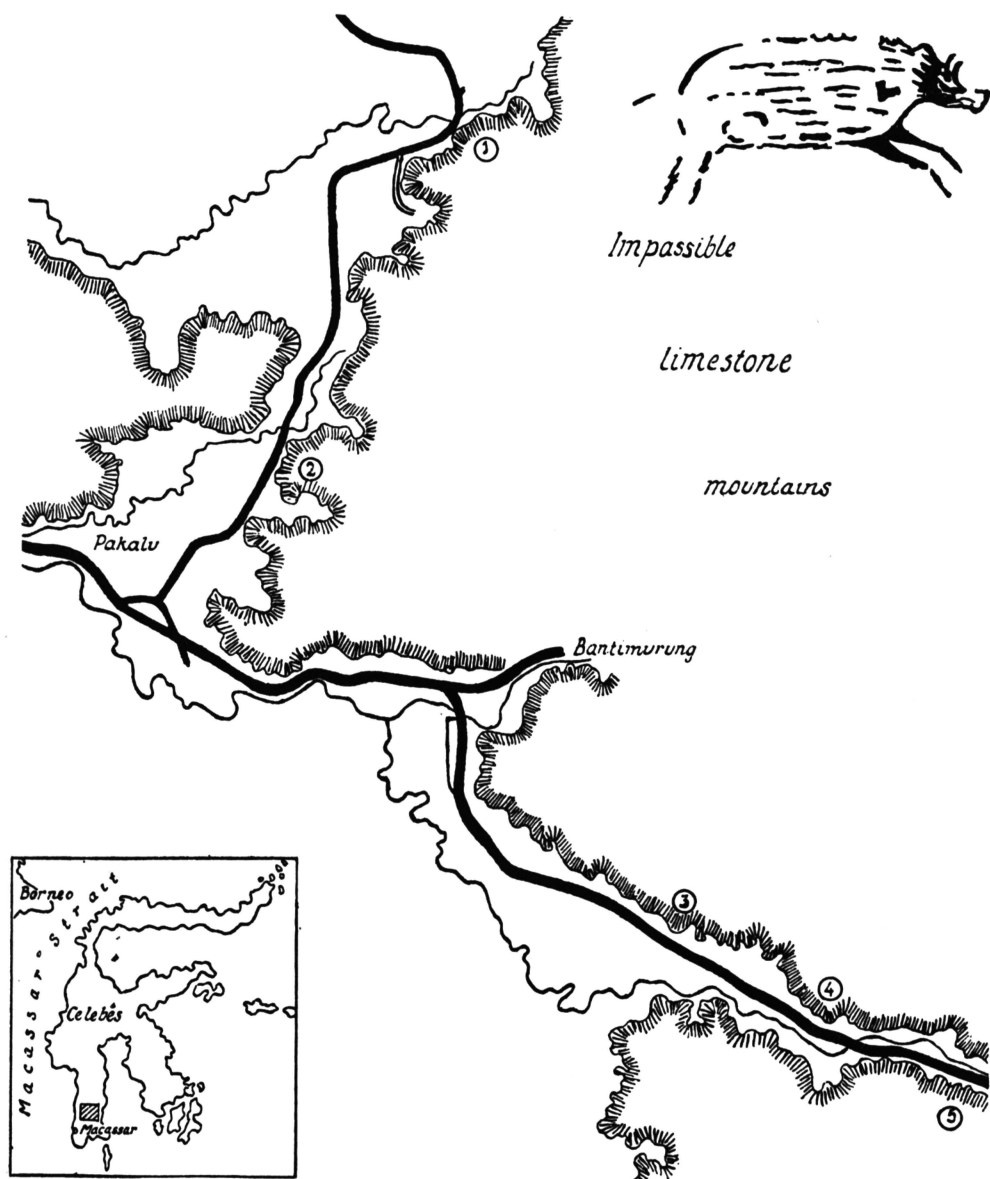


Fig. 18. Toalean sites East of Maros, Sth. Celebes.

1. PattaE Rock-shelter; 2. Burung Cave; 3. DjariE Cave; 4. SariPa Cave;
5. Karassa' Cave.

used for comparison to male individuals. Some of the isolated teeth are not particularly small, however.

3. The milk dentition is large, some elements are at, or even over, the maximum size recorded for all living races of Man.
4. In the post-cranial skeleton, though primitive, no special Veddah characteristics are apparent either, and the structure of its ulna points to the sub-fossil Toalean Cave Man as a form more advanced than the living Veddah. The robusticity of the humerus is very low. The tibia is not shown to be mesocnemic. The astragalus and the calcaneum exhibit primitive characters, judged by European standards, and conform well with the corresponding Veddah bones.
5. The remains in the Bola Batu Cave point to four to seven individuals; those of the Lampoa rock-shelter partly belonged to an individual, the stature of which was probably only 142 cm., but one larger individual, at least, was present too.

The anthropometric studies of Mijsberg¹²⁰ on the living Toale, and of Hooijer on sub-fossil skeletal fragments, suggest that the Toale and their ancestors do not differ significantly. The Sarasin's view that they represent impure Veddah relics is untenable.

The associated fauna of the Toale Industry is, geologically speaking not very old since all species belong to a recent fauna. This has recently become known by Hooijer's outstanding monograph.¹²¹ Even a mineralized lower jaw in the cemented bank of the Burung Cave is that of *Sus celebensis*. Hooijer describes the fauna which has been excavated from the Bola Batu, Tomatua Katjitjang, Sebang, Panisi Ta'butt, Panganreang Tudea and Batu Edjaya Caves and indicates its distribution over the Toalean sites.

MARSUPIALIA:

Phalanger ursinus Temminck. Rare; represented only by some mandibles and teeth. In some caves larger than the present day species.

Phalanger celebensis Gray. Found in various caves.

Phalanger celebensis callenfelsi. A large new form, discovered in the basal layer of the Panganreang Tudea Cave.

¹²⁰ Mijsberg; '41, 1279—1309.

¹²¹ Hooijer; '50a, 7—160.

DISTRIBUTION OF THE SPECIES OVER THE TOALEAN SITES
ACCORDING TO DR D. A. HOOIJER.

	Sarasn 1905	Caves Nth. of Tjanj	Panisi Ta' buttu	Panganreang Tudea A-B layer	Idem C-D layer	Batu Edlaja Cave	Tladang Cave	Lamboa Rock-shelter	Bola Batu Cave	Karassa' Rock-shelter	Saripa Rock-shelter	Pattae Rock-shelter
<i>Phalanger ursinus</i> Temminck	×		×	×	×	×			×	×	×	×
<i>Phalanger celebensis</i> Gray	×			×	×	×			×	×	×	
<i>Suncus murinus</i> L.									×			
<i>Macaca maura</i> Geoffr. et F. Cuv.	×	×	×	×	×	×	×		×	×	×	×
<i>Homo sapiens</i> L.	×			×	×	×	×	×	×	×		
<i>Lenomys meyeri</i> Jentink	×			×	×	×			×			
<i>Rattus dominator</i> Thomas				×	×	×			×			
<i>Rattus cf. xanthurus</i> Gray			×	×					×			
<i>Rattus cf. rattus</i> L.			×			×			×			
<i>Rattus cf. coelestis</i> Thomas									×			
<i>Macrogalidia musschenbroekii</i> Schlegel							×		×			
<i>Sus celebensis</i> Müller et Schlegel	×	×	×	×	×	×	×	×	×	×	×	×
<i>Babryrousa babyrussa</i> L.	×		×	×	×	×		×	×	×		×
<i>Anoa quarlesi</i> Ouwens	×	×	×	×	×	×	×		×	?		
<i>Anoa depressicornis</i> Smith		×		?	?							

INSECTIVORA:

Suncus murinus L. Only a calvarium, excavated from the Bola Batu Cave.

PRIMATES:

Homo sapiens L. Skull fragments and mandibles in various caves.

Macaca maura Geoffr. et F. Cuv. of frequent occurrence in several caves.

Macaca maura majuscula. A large new subspecies from the Bola Batu Cave.

RODENTIA:

Lenomys meyeri Jentink.

Rattus dominator Thomas.

Rattus sp. cf. *xanthurus* group.

Rattus sp. cf. *rattus* group.

Rattus sp. cf. *coelestis* group.

CARNIVORA:

Macrogalidia musschenbroekii meridionalis. For the first time discovered in this area; still existing in the Minahassa.

ARTIODACTYLA:

Sus celebensis Müller et Schlegel. Oldest remains in caves belong to a species smaller than the present-day Celebes wild pig; the increase in size was gradual.

Sus celebensis sarasinorum. Found in the Bola Batu Cave.

Babyrousa babyrussa L. Now vanished from the southwestern part of Celebes. Oldest examples in caves larger than the *Babyrousa* still living in Central Celebes.

Babyrousa babyrussa bolabatuensis. A new subspecies from the Bola Batu Cave.

Anoa quarlesi Ouwens. Oldest remains in caves are slightly larger than the present-day species.

Anoa depressicornis Smith, rare in the Toalean caves.

During his examination Hooijer noticed that the present fauna possesses reduced measurements in comparison with the remains from the caves. Only *Sus celebensis* makes a notable exception. This pig which still exists in Celebes is larger than its prehistoric ancestor.

In 1948 Franssen performed a small excavation in the Lampoa Cave, situated on the Chamba road, East of Maros.¹²² He exposed a culture related to the Toalean Industry in which barbed or winged stone arrowheads were not present; Hooijer stated that the mammalian remains from this cave belong exclusively to *Babyrousa*. A human skull which was put together inexpertly by the finder is now at Surabaya. There were numerous molluscs which have been examined by Mrs. W. S. S. van der Feen Jutting at Amsterdam. The most frequent were *Brotia perfecta* Mousson, *Neritina pulligera* and *Neritina iris* Mousson. Next *Thiara crenulata* Deshayes. These species had formerly all together been called *Melania*. Oysterlike molluscs are *Batissa violacea* Lamarck and *Polymesoda suborbicularis*. The latter had formerly

¹²² Franssen; '49, 331—39.

been named *Cyraena*. The shells of these molluscs in particular have been used by the cave-dwellers for the manufacture of shell scrapers. All above-mentioned species are fresh-water molluscs. Finally there were a few examples of two kinds of land-snails: *Hemiplecta rugata* Martens and *Cyclotus fasciatus* Martens.

B. J a v a.

Flake and blade industries allied to those of South Celebes have been found on Java, Sumatra, Flores, Timor, Roti and Borneo. A. C. de Jong and G. H. R. von Koenigswald in 1930 made a great number of surface-finds of obsidian flakes and blades. The artifacts from the Bandung Plateau came from twenty-three different places, most of which are situated about 723 m. above the sea-level, and mainly centre around a lake which has now entirely vanished (Fig. 21). East of Dago in particular are four rich sites which together yielded 10.000 primary and chipped obsidian flakes. They were all collected from the surface, on tops of hills and in some instances from road cuttings, where they have mainly been found in the upper level. The raw material must have been supplied from the neighbourhood of Nagreg, a small village where numerous obsidian bombs lie on the surface. Von Koenigswald¹²³ also mentioned the presence of neolithic adzes and large quantities of Haematite. The implements are small-sized, but nevertheless I hesitate to qualify the entire industry as microlithic as has been done by some who studied the material. The percentage of true microliths which are not only small in size, but also geometrically shaped, is proportionally small. And, in my opinion, this industry is not Neolithic either. 95 % of the Bandung flakes are made of obsidian, the remaining percentage of chert and andesite. It is not known where the extensive collection of von Koenigswald is now; a very small part of it has been deposited in the Djakarta Museum. From a very recent publication by Georg Bandi,¹²⁴ it appears that J. Krebs also started a collection principally in Dago in the years 1932 and 1933. He donated this collection to the Basel Museum in 1936. The same museum received collections of similar obsidian flakes from W. Mohler and W. Rothpletz, both of whom founded their collection during the Japanese occupation in the years 1943—45.

¹²³ Von Koenigswald; '35, 394—417.

¹²⁴ Bandi; '51, 127—61. The theory that the sites are strictly limited to places round the ancient Bandung lake is, however, not tenable. This was proven by recent explorations by Mr. Rothpletz; findspots with obsidian implements were found as far as over 1300 m. above the sea-level.

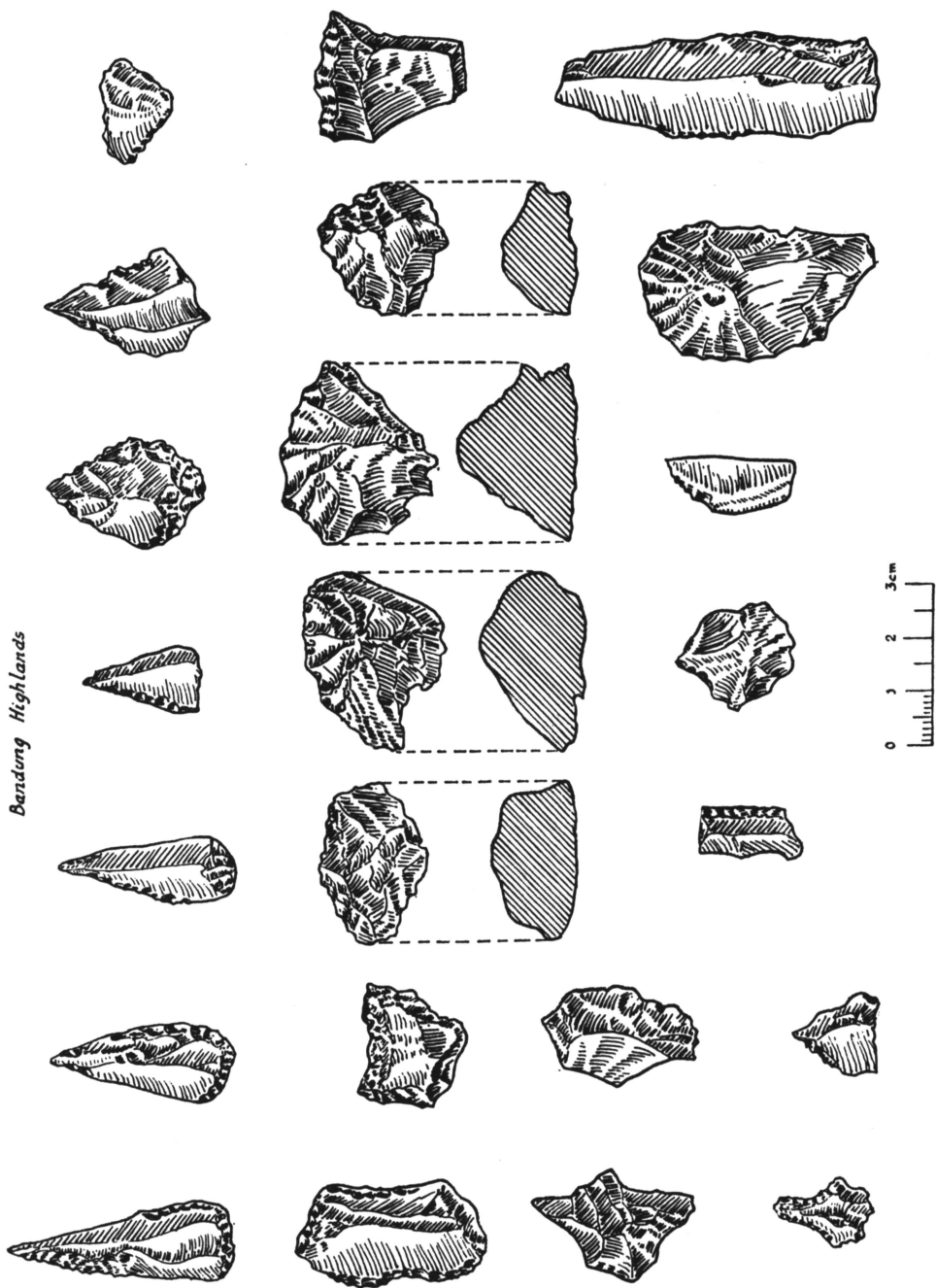


Fig. 19. Obsidian implements from the Bandung Highlands.

Bandi states that the material shows a lack of uniformity; the majority of the objects consists of primary obsidian flakes and waste products. True blades are scarce. Among the well-worked and minutely retouched flakes are 291 flakes with edge chipping as a result of use, 159 flakes with marginal retouches; moreover, there are 238 typical implements such as arrow-heads with obliquely truncated edges, side- and core-scrapers, graters and knives (Fig. 19). Marginal retouches are nearly always on the upper surface of the object, whereas alternate retouching is rare. The arrow-heads which mostly possess a chipped butt-end and point are retouched along the long margin; the butt-end is often convex and seldom straight. There are also irregular-shaped trapezes. The Bandung collection comprises 889 flakes which have been divided as follows: 49 arrow-heads, 46 shouldered scrapers and end-scrapers, 9 shouldered core-scrapers, 25 core-scrapers, 62 side-scrapers and end-scrapers, 21 graters, 11 borers, 5 knives and 10 special forms. Furthermore 159 flakes with retouches, 291 flakes with retouches as a result of use and 201 flakes without retouches.

In two caves in Besuki, East Java, the present writer found a related stone industry, but associated with the Sampung Bone Culture. The caves in question are the Betpuruh Cave near Pradjekan (examined in 1933) and the Sodong Cave near Puger on the Southcoast (examined in 1931—35). In the first rock-shelter, the Bone Culture was predominant, the flakes and blades of secondary importance.¹²⁵ But the Sodong rock-shelter yielded better results. It is situated on the northern edge of the Watangan limestone massif. The rock-shelter is divided into two terraces, displaying a difference in level of two metres, and separated by a large stalagmite. In the first terrace was a deposit thick enough to be stratified. The upper layer yielded only potsherds, Chinese coins and a few bricks but no prehistoric objects. The next layer, at present 20 metres above sea-level, consisted of a marine deposit of shell and corals, but was barren of cultural objects. The third layer produced a Vertebrate Fauna including a large human molar; the bones showed traces of calcination. The fourth layer contained the prehistoric stone and bone culture; the implements comprised 6 bone spatulas, 12 bone points (including *Muduk*-types), 4 small Sumatraliths, points and scrapers of shell, 67 stone flakes and blades, including double-sided knives, graters, points, scrapers and 8 *Pirri*-points. They were made of chalcedony, jasper, obsidian and andesite (Pl. 26b, 30). There were no potsherds. The fifth layer was

¹²⁵ Van Heekeren; '35, 123—29. '36, 187—93.

stone-hard and contained nothing of importance, but the sixth and lowest layer, three metres below the ground-level, produced a few slightly mineralized bones; the lower part of a tibia of a sub-fossil banteng and the lower part of a fore-limb of a prehistoric waterbuffalo.¹²⁶ The stone artifacts are small-sized, but the number of true microliths is relatively small; there were many pieces of red Haematite. The upper terrace was a deposit only one metre thick. It yielded many arched scrapers of shell with marginal retouches and a mother-of-pearl amulet with three round holes in it, besides some isolated human teeth which were little worn and equaled the Sampung teeth in size. Right at the bottom of the lower terrace was the skeleton of an adult pygmy, its stature being estimated approximately at 142 cm. Unfortunately the skull was missing with the exception of the right side of the lower jaw, in which the badly-worn teeth were remarkably small. The wisdom-tooth was present. The upper part of the body was on the back, the ribs and the remains of the spinal column between them, clearly visible. The lower extremities lie crossed over each other; the right upper and lower leg lie with their posterior surface flat on the ground. The left leg was found in a position showing that the knee projects a little laterally from the middle of the right upper leg. The right leg is also bent in the hip and more still in the knee. Above the cranial part of the right femur, part of the pelvis is to be seen. Right tibia and fibula lie parallel, the fibula slightly behind and cranially in regard of the tibia. Both are broken in several pieces. The left tibia and fibula lie not as fully parallel as the right ones. The condyles are slightly crossed, fibula on top, the cranial parts diverging about 6 cm. Left femur, broken in five pieces, lies closer to the surface. (Pl. 27). The skeleton was lost due to the war before it was properly examined by an expert.

When classifying the material from the Tuban Caves which had been excavated by Willems in 1938, I found many flakes and blades which had been discovered in association with artifacts of shell, bone daggers, bone spatulas of the Sampung type, and also winged bifacial and mono-facial arrow-heads; the Muduk bone point also occurs. But it is better to wait for a full description of the material before going further into the matter.

Finally Franssen collected a series of waste products and implements of obsidian, jasper and silicified limestone in the eroded valleys of a

¹²⁶ Described by von Koenigswald.

reddish brown lateric soil on the edge of a young volcano-mantle of the Salak Mountain at Leuwiliang, Bogor, in 1939.¹²⁷

C. S u m a t r a.

In 1913 August Tobler from Switzerland did an exploratory excavation in the Ulu Tjangko Cave in Djambi, up-stream between the Maringin and Batang Tabir Rivers. The cave is situated in the limestone mountain which in some places is intersected by volcanic intrusions. In addition to 12 cores, the finds comprised 3 arrow-heads, 4 core-scrapers, 13 scrapers, 6 graters, 2 borers, 14 retouched flakes, 123 flakes with edge chippings as a result of use and 118 flakes with marginal retouches. All implements were of obsidian and show remarkable likeness to the obsidian items of the Bandung Plateau. The very few human skeletal remains from this cave are cranial fragments, small-sized teeth, a fragment of the lower jaw with chin eminence, fragments of humerus, tibia and femur, perhaps showing a human race of small stature. The fossa olecrani of the humerus was perforated. Sarasin thought that they were the remains of short Veddoid ancestors of the Kubus who lived in the mountains. The finds are now in the Ethnological Museum in Basel, Switzerland.

Some years later, J. Zwierzycki¹²⁸ dug up a similar industry in a cave near Ngalan in the same area during the Palaeobotanic Djambi Expedition. The artifacts were made of obsidian and other stone. These finds are kept in the Geological Museum at Bandung.

In July 1939 Van der Hoop collected obsidian artifacts of the same type in the Danau Gadang Estate near Lake Kerinchi, Eastcoast of Sumatra. The lake's level lies 783 metres above the sea-level. Although Van der Hoop himself remarks: "The large size of many of these microliths is remarkable. Geometric forms as presented by the Tardenoisean were not found",¹²⁹ he maintains the terms 'microliths'. Reports on the presence of similar stone cultures from the other Indonesian islands are scanty.

D. B o r n e o.

Borneo, so difficult to travel, has attracted only a few explorers. But A. H. Everett discovered as early as 1878—79, what is probably a Mesolithic Flake Industry in caves in Serawak. The implements were made of quartz. I. H. N. Evans found numerous flakes of quartz and chert on the mountain ridge in the Tempassuk region.¹³⁰

¹²⁷ Franssen; '41, 531—45.

¹²⁸ Zwierzycki; '26, 63—67.

¹²⁹ Van der Hoop; '40, 200—4.

¹³⁰ Evans; '38, 141—46.

E. The Lesser Sunda Islands.

Little is known from these islands. A. Bühler carried out excavations in seven places on Roti Island and scored success in two of them. Roti is a small island southwest of Timor, mainly consisting of raised limestone reefs. Caves are rare here. But in Western Roti, in Dénka, is an area with caves one of which, the Lua Neoal, yielded flints at a depth from 20 cm. to one metre below the ground-level. They have to be classed among the flake industries and show secondary chipping on the upper surface. The implements are rather primitive, but among them are a few good knives and points of yellow jasper and borers of red-brown and yellow jasper and a 11 cm. long and 6 cm. broad scraper. Vertebrates do not occur, but there were many shells of molluscs and a small tanged scraper of tortoise-shell.¹³¹

The artifacts excavated by Bühler and later by Willems in caves in Timor can probably only partly be classed among the flake industries. According to Sarasin mainly we are concerned here with an Early Neolithic culture which has developed from the Toalean. Fine tanged knives and blade-points, strangulated blades and small hand-axes constitute remarkable elements in these caves.¹³² There were also many potsherds.

Lately, Dr Th. Verhoeven discovered a primitive flake and blade industry in numerous caves and rock-shelters in West Flores.¹³³ My own explorations in the same area (March-May 1952) were concerned with the excavation of two small rock-shelters. The first and most important one was called the Rundung Cave, situated near Wangka, Riung district. A great number of flakes and some blades of a semi-microlithic character, with a minimum amount of dressing, made from chert and obsidian, were collected. Many of them showed a distinct bulb of percussion; they have probably been used to cut and sharpen arrows, to bleed, scarify and incise in the way still practised in Melanesia and on the Andaman islands; concave scrapers and notched blades were obviously used to sharpen roundshafted weapons; there were also pointed bladelets, the butts of which are worked on in such a way that they could be inserted in a split bamboo or stick, as arrow-heads. Micro points, made on bladelets, and other similar micro blades have no geometric form whatever. The cores are irregular and flaked in all directions. It is obvious,

¹³¹ Sarasin; '36, 1--59.

¹³² Willems in *Oudheidkundig Verslag* 1938.

¹³³ Verhoeven; '52, 95--98. '53, 597--612.

therefore, that the flakes have been detached rather at random. Ornaments were represented by small pendants of shell, mother-of-pearl, quartzite and obsidian; we found among others a lozenge-shaped pendant of mother-of-pearl and another of shell in the shape of a fish.



Fig. 20. Rock-paintings, Kei Islands.

A similar backward industry was found in the Soki Cave, half-way between Ruteng and Reo. The most surprising find was that of a micro-lith with battered-back of yellow-brown glass. It serves to prove that palaeolithic foodgatherers occupied this cave till very recent times.

On one of the Kei Islands hand-stencils occur next to pictures of masks, human figures with shields, fishes, boats and zoomorphic designs, done in the style with which we are already familiar from New Guinea and Australia (Fig. 20).

F. C e r a m.

On the coast of North Ceram near the village of Rumasokat on Seleman Bay, rock-paintings and series of hand-stencils have been discovered in five different places and on two levels; an older, badly weathered and reddish, and a younger, well preserved and white. Beside hand-stencils there were human figures with raised arms which would represent gods keeping watch over the fishes, and lizards and fish pictures.¹³⁴

All the above-mentioned flake and blade cultures may belong to one large culture group, which spread widely over the Indonesian Archipelago and finally reached the Australian Continent and Tasmania.

¹³⁴ Röder; '38b, 19—28.

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