THE RE-EXCAVATION OF THE ROCKSHELTER OF

GUA CHA, ULU KELANTAN, WEST MALAYSIA

by: ADI BIN HAJI TAHA

A sub-thesis submitted in partial fulfilment of the requirements for the degree of Master of Arts, Department of Prehistory and Anthropology, School of General Studies, Australian National University, Canberra.

July 1981
Except where otherwise indicated, this thesis is a result of my own research. The help of specialists in various fields was sought and is acknowledged.

ADI BIN HAJI TAHA
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In preparation for this thesis, two stages of research were involved. The first was the excavation of the rockshelter of Gua Cha in Ulu Kelantan, West Malaysia. The second, longer, stage involved the analysis of the materials obtained from the excavations, which was done mainly in Canberra.

This thesis would not have been successful without assistance from and contributions by various people, both in Malaysia and in Canberra.

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Synopsis

This thesis contains the results of an excavation at the rock-shelter of Gua Cha, in the district of Ulu Kelantan, Malaysia conducted between 29 January and 4 February 1979. Interest in the site began in the 1930s, but the most remarkable results were recovered by G. de G. Sieveking in 1954. However, the exact significance of the site remained obscure until 1979, especially with regard to the relationships between the Hoabinhian and the Neolithic. Sieveking had observed a break in the succession of the two industries, which was in contradiction with the evidence found at the other central Malayan sites. In the 1979 excavation, our findings generally paralleled those of Sieveking, except that no break in the Hoabinhian-Neolithic succession was observed. The archaeological record of the site shows that the Hoabinhians occupied the shelter from about 8–9000 years ago, and by about 3000 B.P. these Hoabinhians had adopted a new lifestyle, probably from the Neolithic inhabitants of adjacent areas of south Thailand. The Hoabinhian industry of Gua Cha is of a late phase as indicated by the well-made stone implements, and the economy was primarily based on hunting and gathering with game ranging from juvenile pigs to animals the size of wild cattle, but no edible plant remains were found. Unlike the Neolithic population, the Hoabinhians lived in relative isolation from their coastal contemporaries as indicated by the absence of marine shell. Carbonised rice dated to about 1000 B.P. was found on top of the Neolithic occupation, probably traced in by the Orang Asli, or brought in by traders. It is finally argued that the prehistory of Gua Cha is concerned mainly with the prehistory of the present Orang Asli population of central Malaya.
It is generally accepted that during the final peak of the last glaciation the sea-level dropped to a minimum of at least 100 metres below the present level, which means that more than three million square kilometres of warm seas were converted to land on the Sunda and Sahul shelves (Verstappen 1975:9-10). This situation would have facilitated the eastward movements of land mammals and possibly man into the islands of western Indonesia, or even movements from the latter to mainland Southeast Asia, without much difficulty. The fossil record for Sundaland, and the traces of human activity on the mainland as well as in insular Southeast Asia, support such a claim (Hooijer 1975:37; Movius 1944; Ghosh 1971).

At the close of the Pleistocene and in the early Holocene the sea-level rose, thus submerging the lower parts of Sundaland. The Malay Peninsula, Sumatra, Java and Borneo today form the major exposed units of this now partly drowned land (Ho 1964:32). As a consequence, restrictions were imposed on the movements of both humans and animals, a situation which has made Malaya a significant potential avenue for any southward migration. Its position at the southern tip of the Southeast Asian mainland is important for any understanding of cultural flows and movements into, within and from Southeast Asia.

1 - The term Malay Peninsula refers to the present political unit of West Malaysia, formerly known as the Federation of Malaya. This term is used here interchangeably with Malaya, West Malaysia and Peninsular Malaysia.
As early as 1932, Heine-Geldern established a framework for a series of southward migrations of peoples, and placed the Malay Peninsula as the last common home of the Asutronesians before their dispersals eastwards (Heine-Geldern 1945:140). This hypothesis had an impact on interpretations of Malayan archaeology, particularly with the arrival of P.V. van Stein Callenfels, whose paper on the Melanesoid civilizations followed this framework. In a report on the excavation of Gua Baik in which Callenfels participated, Callenfels and Noone noted that previous excavations in the Malay Peninsula had revealed traces of migrations through the country, and in order to get a deeper insight into the character of these migrations, they recommended that 'a series of excavations running north to south on both sides of the Main Range should be undertaken' (Callenfels and Noone 1940:119). This view would definitely have influenced later archaeological researches in Malaya, including those by Tweedie and Sieveking.

In 1954, G. de G. Sieveking, then of the National Museums, Kuala Lumpur, with the collaboration and assistance of M.W.F. Tweedie of the Raffles Museum, Singapore, excavated the rock shelter of Gua Cha in Kelantan (Sieveking 1954, 1954a).

2 - The framework formulated by Heine-Geldern has now been demonstrated to be very unsatisfactory. Its weaknesses have been discussed by Al-Attas (1964), and alternatives have been proposed by Solheim (1969, 1970), Dunn (1970), Hutterer (1976, 1977), and Bellwood (1978).

3 - The article on the Melanesoid civilizations by Callenfels is rather misleading and obscure, and has been criticised by Evans (1937) and Collings (1938b).

4 - Gua Baik usually appears in the literature as Gol Ba'it, which does not have any meaning in Malay. Many place names were wrongly spelt by colonial officers, such as Guar Geppah (see Earl 1863) for Guar Kepah.
a site which had been partly excavated earlier by Noone (1939). Sieveking's work represented a new development in archaeological studies in Malaya, since he used systematic techniques of excavation and also attained a high standard in the presentation of his report. Another interesting point is that Sieveking attempted to interpret the sedimentary stratigraphy of the site. However, it was unfortunate that an intended second report on the analysis of the Hoabinhian remains was never published, thus distorting the overall picture of the prehistory of the site.

Despite all the credits, Sieveking has been criticised rather heavily by some other prehistorians (Peacock 1967:48-49; 1971:109; Al-Rashid 1973:70) on the grounds that his interpretations presented an oversimplified, if not misleading, picture of the cultural development of Gua Cha and the Malay Peninsula in general (Peacock 1967:48-49; 1971:109-110; Al-Rashid 1973:70). Sieveking (1954a) had observed a break in the cultural succession between the Hoabinhian and the Neolithic at Gua Cha, based on the stratigraphy of his Cutting 1 and on the different states of preservation of the burials of the two periods. His observations have been contradicted by those made in other cave sites studied more recently, which have shown continuity between the two assemblages (Dunn 1964; Peacock and Dunn 1968; Peacock 1971). To complicate matters further, Collings (1936:10) had suggested earlier that the two assemblages existed contemporaneously, based on the excavated evidence from Gua Debu, Baling, Kedah.
Thus, in the available archaeological literature, three possible interpretations of Hoabinhian-Neolithic relationships in the Malay Peninsula have been proposed:

1. There is a long time-lapse between the Hoabinhian and the Neolithic, as suggested by Sieveking from the stratigraphic break in the industrial succession at Gua Cha. The other site in this category is Gua Baik, Perak, excavated by Callenfels and Noone (1940).

2. The two assemblages formed part of a continuous developmental sequence, as observed by Dunn (1964) in the Gua Kechil site, Pahang.

3. The two assemblages were partly contemporaneous, as suggested by Collings for the Gua Debu site in Kedah (Collings 1936:10). The validity of this view has yet to be supported, although Peacock (1964) found Hoabinhian artifacts lying on the present cave floor in undisturbed positions at Gua Chawan, not far from Gua Cha.

The finds from Gua Cha threw new light on the prehistory of the entire region, and the site remains the most important ever excavated in the Malay Peninsula, although the full significance of the record has remained obscure. Since 1954, new evidence on the prehistory of Southeast Asia has emerged through the use of modern and systematic techniques of excavation. Late Pliestocene dates for the commencement of the Hoabinhian in Thailand (Gorman 1969, 1971) and Vietnam (Peter Bellwood: personnel communication) have been established. In addition, there is now some evidence for the possible practice of agriculture in the context of the Hoabinhian (Gorman 1971).
In view of the emerging new records on the pre-history of Southeast Asia, the need to excavate sites systematically in the Malay Peninsula is growing. Gua Cha was chosen for this exercise because of its richness in archaeological remains. Furthermore, it is the most controversial site ever to have been excavated in Malaya.
A. Geography

It is necessary to present here a summary of the geography of the Malay Peninsula in order to provide a basic environmental background for an understanding of the prehistoric sequence at Gua Cha. However, it will not be necessary to discuss it in detail, for there are a number of excellent sources which can be consulted (Ooi 1976; Dobby 1966; Fisher 1964; Gungwu 1964; and various articles in the Journal of Tropical Geography).

The Malay Peninsula covers an area of 131,794 square kilometres. Geographically and physically it is part of the Asian mainland, yet in many ways is also a part of insular Southeast Asia. Its position in the region is undeniably strategic, lying mid-way on the ancient trade routes between India and China and providing good anchorages while traders waited for the monsoon winds. It has been suggested also that the peninsula was a major land-bridge for early migrations from Asia into Indonesia. In historical times it has been the scene of conflicts between external powers since the Portuguese conquered Malacca in 1511 (Lamb 1964:99).

A.1 Geology

The Malay Peninsula is composed of sedimentary rocks of Palaeozoic and Mesozoic age, together with some igneous rocks, and the Quaternary alluvial deposits of the coastal regions. Palaeozoic sediments occur mainly in the
central and northern parts of the peninsula, while Mesozoic sediments are more prominent in the south. Igneous intrusions occur in large bands, but become less extensive in the south.

A.2 Relief

The Malay Peninsula may be described as an area of low-lying land around a skeleton of mountain ranges. The mountain ranges are generally characterised by relatively low altitude and rounded relief, and their trend is north-north-east to south-south-west in the northern portions of the peninsula. Elevations vary from 1000 to 2000 metres (Gunung Tahan, the highest peak, is 2190 metres).

The Central Range is the highest and longest of all, extending from the Thai border to as far south as Malacca. To the west of the Central Range there are four shorter ranges, none reaching further south than northern Perak. The mountain systems to the east of the Central Range comprise the East Coast Range, the Gunung Tahan Range and the Gunung Benom Range, which are all discontinuous owing to erosion by the drainage networks.

Limestone massifs form a unique characteristic of the Malayan landscape. These formations vary in size and height, and are best developed in the northern and central parts of Malaya (Paton 1964). Most of these limestone massifs have developed shelters and caves as a result of water action. These shelters and caves were used as habitations in prehistoric times, and as stopover places in more recent
periods. Many of the limestone rockshelters in Malaya have been surveyed by Peacock (1965)⁵.

The alignment of the mountain ranges of the Malay Peninsula, and in particular of the main range, provides a major obstacle to east-west movement (Fisher 1964:588). However, it is worthy of note that the altitudinal relief of these ranges is nowhere very great, and thus east-west routes in the interior were feasible in several places⁶.

A.3 Drainage

The Malay Peninsula is drained by a network of rivers which flow into the Straits of Malacca and the South China Sea. The major rivers are the Sungai Perak on the west coast, and Sungai Pahang and Sungai Kelantan on the east. These three all share a common watershed in the Main Range. The north-south trend of the mountain ranges in the Malay Peninsula produces stream courses which are parallel with these ranges in the valleys, while east-west tributaries drain the flanks of these ranges. Another characteristic of Malayan rivers is that in their upper reaches the gradients are steep and currents are rapid, but in the middle and lower courses they are sluggish and swampy.

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5 - Most of the Stone Age sites recorded in the Malay Peninsula are cave sites. The ground conditions in equatorial forest do not easily facilitate the discovery of open sites.

6 - There are numerous cases of movement across the Main Range from east to west, and vice-versa, by the recent Orang Asli, and in earlier periods. For ethnographic accounts see R.O.D. Noone 1974, H.D. Noone 1936, A.C. Baker 1933 (his account of a journey from the Cameron Highlands to the East Coast). Other established trans-peninsula routes are the Kedah-Patani route; the Perak-Patanı route; the Kelantan-Malacca route (via Penarikan); the Pahang-Malacca route (via Penarikan) and the Bernam-Pahang route (Wheatley 1966) (see map 2).
THE MALAY PENINSULA
RELIEF AND DRAINAGE

REFERENCE

- Over 5000 ft.
- 3,000 - 5,000 ft.
- 500 - 3,000 ft.
- Under 500 ft.

THAILAND

SOUTH CHINA SEA

STRAITS OF MALACCA

SINGAPORE

Map 1 - The Malay Peninsula - relief and drainage
RIVERS OF MALAY PENINSULA, AND THE MAIN TRANS-PENINSULA ROUTES AND THE DISTRIBUTION OF HOABINHIAN SITES

THAILAND

SOUTH CHINA SEA

PERLIS

G. Debu

G. Kerbau

G. Kepah

PERAK

PAHANG

PAHANG-MALACCA ROUTE BY WAY OF THE PANARIKAN

KELANTAN

KELANTAN-MALACCA ROUTE BY WAY OF THE PANARIKAN

TERENGGANU

PAHANG

PAHANG-MALACCA ROUTE, BY WAY OF THE PANARIKAN

SINGAPORE

Malay - Rivers of the Malay Peninsula, and the main trans-peninsula routes and the distributions of Hoabinhian sites

REFERENCE

1. KEDAH-PATANI ROUTE
2. PERAK-PATANI ROUTE
3. KELANTAN-MALACCA ROUTE BY WAY OF THE PANARIKAN
4. PAHANG-MALACCA ROUTE, BY WAY OF THE PANARIKAN
5. THE SEMBRONG ROUTE
6. THE BERNAM-PAHANG ROUTE

Map 2 - Rivers of the Malay Peninsula, and the main trans-peninsula routes and the distributions of Hoabinhian sites
Apart from being sources of water and food, these rivers provided routes for cross-peninsula travel. For instance, R.O.D. Noone (1954) identified the routes used in the trading of blowpipes amongst the Orang Asli, while Winstedt (1923:10) mentioned a popular Tembeling-Dungun route, and Rentse (1947) drew attention to the Kelantan-Pahang route.

A.4 Climate

West Malaysia has an equatorial climate which is characterised by heavy rainfall and a constant high annual temperature. Seasonality is quite definite, and is related to the changes in prevailing wind directions. Thus, seasonality is seen mainly in rainfall distribution rather than in temperature. Four seasons are evident in the peninsula; the Northeast Monsoon season between November and March, the Southwest Monsoon between June and September, and another two seasons separating the monsoons. Rainfall occurs at all time during the year, but some seasonal concentration is evident, especially along the east coast and some distance inland. The maximum rainfall occurs during the Northeast Monsoon which brings heavy rain from the South China Sea, and it is during this monsoon that annual floods occur in Kelantan.

A.5 Vegetation

The forests of Malaya fall broadly within the class of tropical rain forest. Three general kinds of vegetation may be distinguished, these being coastal, lowland, and
upland. Characteristic coastal types of vegetation are beach woodlands dominated by casuarina trees, coconut palms and mangrove swamps (mainly the api-api type). Tropical lowland rainforest is found on the plains and hills to a height of 1000 metres, and the virgin forest has little undergrowth. Lowland secondary forests are mainly the results of shifting cultivation. Oaks and other temperate trees occur above 1,500 metres altitude, especially the Pasania species.

A.6 Fauna

The fauna of Malaya belongs to the Indo-Malay zoographic zone, and has more affinity with that of Borneo, Sumatra and Java than with that of the Asiatic continent to the north, a circumstance derived partly from the fact that during the Pleistocene the whole of Sundaland was continuous land. The fauna is very diversified, with forest species predominating. Among the large animals are elephants, rhinoceroses, tigers, panthers and wild cattle (Bos sp.). Primates include monkeys and gibbons, while rodents include flying foxes and flying squirrels. Birds are numerous and varied, and reptiles include crocodiles and snakes, of which there are numerous species.

A.7 Summary

Malaya is generally regarded as the emergent western portion of the Sunda platform and it is now tectonically stable and free from recent volcanic activity. The mountain ranges are dominated by the effects of late Mesozoic folding, and their principal north-south trend forms a major
obstacle for east-west trans-peninsula routes. However, relief is still kind in places and has allowed numerous inland routes since early days.

The Pleistocene environments of the Malay Peninsula would perhaps have been much the same as they are today. The lowland and monsoon forests must have been floristically similar throughout the Pleistocene to what they are now, despite some minor altitudinal shifts in the boundaries between forest zones (Dunn 1975:33). Thus, the only new features are the coastal mangrove belts, which have attained their present extents with the Holocene rise in sea-level, but which undoubtedly occurred during the Pleistocene in locations further towards the edge of the Sunda Shelf.

B. Archaeology in Malaya

B.1 Brief History

The Malay Peninsula can easily claim pioneer status in archaeological work in Southeast Asia, and the first archaeological report on a Malayan site was published over a century ago (Earl 1863). Since then, a considerable number of archaeological explorations and excavations have been carried out, although these researches have been rather sporadic both in space and in time.

The history of archaeological research in Malaya may be summarised into three periods:

B.1.1 Period I

This period marks the first archaeological work by antiquarians, and covers the years between 1860 and 1910.
G.W. Earl (1863) was the first person to mention prehistoric remains in Malaya when he explored the shell mounds of Province Wellesley. L. Wray (1897, 1905), the first Curator of the Perak Museum, pioneered cave explorations and excavations in Perak while collecting for the museum. Further reports on Neolithic implements were published in this period by A. Hale (1885, 1886, 1888) and R.M.W. Swan (1904). Most of the finds were acquired by chance.

B.1.2 Period II

This period began with the appointment of I.H.N. Evans as the Curator of Museums in 1912, and ended with independence in 1957. It was marked by an increase in archaeological research, and by the eventual introduction of systematic excavation techniques. During over twenty years of service (1912-1938), I.H.N. Evans published numerous accounts of excavations in caves and open sites, and partially summarised them in his "Papers on the Ethnology and Archaeology of the Malay Peninsula" (Evans 1927).

The appearance of P.V. van Stein Callenfels on the Malayan scene in the latter half of the 1920s exerted a

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7 - Most of Evans' work was published in the Journal of the Federated Malay States Museums between 1918 and 1931. His research on caves and rock-shelters covered the Gunung Pondok, Gunung Cheroh, Batu Karau and Batu Gajah areas in Perak, and Kota Tongkat, Gunung Senyum, Gua Tok Long and Kota Gelangi in Pahang. Open sites excavated by Evans were Kuala Selingsing in Perak, Nyong in Pahang, and the shell-middens in Province Wellesley. Evans also published numerous accounts of chance finds (see bibliography).

8 - Callenfels, a Dutch East Indies archaeologist, was never officially attached to any institution in Malaya or Singapore. His involvement in Malayan archaeology was basically because of his interest in "attempting to get an insight into the spread of lithic culture from Indochina through the Malay Peninsula into Sumatra" (Callenfels and Evans 1928:150-1), and he served as a professional advisor to "local" archaeologists, for example with Noone at Gua Baik in Perak.
profound influence on archaeological work, and on the interpretation and development of Malayan prehistory as a whole. He undertook the first controlled excavation in Malaya with I.H.N. Evans at Gunung Pondok in Perak, using a method of stripping off horizontal layers of arbitrary thickness, and relating them by vertical measurements from a datum point (Callenfels and Evans 1928:128). Callenfels was also involved in other major excavations; with H.D. Noone at Gua Baik in Sungai Siput, and with Collings and Tweedie at Guar Kepah in Province Wellesley (Callenfels 1936a). In 1935, H.D. Noone first excavated in the rock-shelter at Gua Cha (1939), and in the following year at Gua Baik (Callenfels and Noone 1940).

Within this period the staff of the Raffles Museum in Singapore also began archaeological research in the Malay Peninsula. H.D. Collings concentrated his research on the west coast, whilst M.W.F. Tweedie worked mainly on the east coast. On the whole their work revealed quite a number of important sites, such as Bukit Chuping in Perlis where bone implements were reported (Collings 1938d), Kota Tampan in Perak — the only Palaeolithic site in Malaya (Collings 1938c) — and Gua Madu, excavated by Tweedie (1940). Tweedie published a summary of the Malayan Stone Age in 1953, and has since revised it.

Immediately after the Second World War in 1946, an emergency was declared in Malaya. Only sporadic work by Major P.D.R. Williams-Hunt (1951, 1952) could be undertaken while he was acting as the Director of Museums, but further
excavations were carried out from 1954 by G. de G. Sieveking and A. Sieveking (1960, 1962). G. de G. Sieveking's work at Gua Cha set new standards for archaeological research in the country.

B.1.3 Period III

Malaya gained her independence in 1957, and in many ways this affected the development of archaeological research in the Malay Peninsula. B.A.V. Peacock was appointed Curator of Museums in 1956, and he subsequently joined the University of Malaya. During his thirteen years at the university (1962-1975) Peacock played an active part in the monitoring and motivation of archaeological work in Malaya, by setting up the University of Malaya Archaeological Society in 1964. Though this society survived for only one year, a number of sites were excavated and surveyed under Peacock's direction. This was the first time that local archaeologists could gain formal training.

By the 1960s the standards of archaeological research had improved considerably. F.L. Dunn's (1964) excavation at Gua Kechil in Pahang set new standards of recording and provided detailed information on cultural developments at the site (which were clearly rather different from those at Gua Cha). The deposits at Gua Kechil were one metre deep, with the basal 25 centimetres being devoid of artifacts and with only a few shells and bones. Above this, Dunn distinguished three phases of human occupation. Gua Kechil 1, from 55-75 centimetres, contained Hoabinhian pebble tools and flakes with cord-impressed sherds of simple rim forms. The cord-impressed sherds and Hoabinhian artifacts
continued in Gua Kechil 11, from 35-55 centimetres, but this phase also saw the appearance of plain pottery and polished adzes (of Duff type 2). Bone, shell and pottery counts increased considerably in this phase. The last phase, Gua Kechil 111, saw a change towards a steep decrease in the quantities of bone and shell, but pottery increased in quantity with the introduction of a new red-slipped ware. Hoabinhian tools now gave way totally to polished stone artifacts. The beginning of Gua Kechil 111 has a date of 4800 ± 800 BP (GX-0418) (Dunn 1966) which Dunn interprets as the beginning of the full Neolithic at the site. This last phase also produced evidence which has been interpreted as indirect evidence for the practice of horticulture, and evidence of a similar nature, with a sharp decrease in the quantity of animal bone and a steep increase in sherd counts from bottom to top, has also been excavated at Kota Tongkat (Peacock 1971: 118).

The launching of the National Archaeological Survey and Research unit in 1969 under the Department of Museums increased the volume of archaeological research in Malaya, and for the first time Malaysian archaeologists were able to take charge of excavations. At present, all archaeological work in Malaya is under the supervision of the Museums' Department, under the provision of the Antiquity Act, 1976.

From this survey of the history of archaeological work in Malaya, we can see that there have been differences in approaches towards archaeological problems in the three periods. In period II, for example, research was geared
towards searching for evidence of human migrations through the peninsula, as suggested by Heine Geldern (1945). This approach was the theme of Callenfels' paper on the Melanesoid civilisations (1936b). In the third period, the research problem has mainly been to investigate internal cultural developments rather than migrations, as advocated by Sauer (1952), Linton (1955), Chang (1962) and Solheim (1967, 1972). One problem now of importance pertains to the recognition of early agriculture, and both Dunn and Peacock have claimed evidence for this from Gua Kechil and Kota Tongkat respectively (Dunn 1964; Peacock 1971).

B.2 A synthesis of Malayan prehistory

Malaya is fortunate in having had a long history of archaeological research. From published materials it is possible to trace a succession of industries and cultures, although to date the data have been hazy and frequently inadequate. Tweedie (1953) has presented the only synthesis of the Malayan Stone Age, and attempts to elucidate the Metal Age have been carried by Lowenstein and Sieveking (1956). The cultural sequence discussed here ranges from the Palaeolithic of Kota Tampan through the Hoabinhian to the Neolithic.

B.2.1 Palaeolithic

So far, Kota Tampan, which lies in the Lenggong district of Perak, is the only site in Malaya to have yielded evidence believed to be of Pleistocene date. The site was first discovered archaeologically and excavated by H.D. Collings (1938c). The tools are on pebbles, particularly quartzite, with a minimum of flaking on one side only, and
they appear to fall into functional categories such as choppers, cleavers, picks and scrapers. Collings proposed the term "Tampan culture" to describe the assemblage from this site. On typological grounds Collings felt that the Tampanian tools were comparable to those of the Patjitanian culture of Java (Koenigswald 1936), and thus assigned them to a Pleistocene date, a view which was later supported by Movius (1948:403-4).

The site was later re-excavated by Ann Sieveking (1960, 1962), and more recently the question of its date has been examined by Tom Harrisson (1975). Sieveking (1960:93, 98; 1962:111) suggested a possible date in the late First Interglacial or more probably the early Second Glacial, based on a geological study of the river terraces by D. Walker (1954), thus making the Tampanian one of the oldest Lower Palaeolithic sites in Southeast Asia. Harrisson (1975), however, favours a much younger date, arguing that volcanic ash found in the Ampang district of Selangor, similar to that found at Kota Tampan, has been dated to around 40,000 years ago. (Haile 1971).

B.2.2 The Hoabinhian

In 1927, Madeleine Colani first reported her excavations in the Province of Hoa Binh in North Vietnam. Since then, the term "Hoabinhian" has been in use to refer to a pebble and flake-tool industry widely distributed in Southeast Asia. The definition of the Hoabinhian was first formulated in 1932 at the First Congress of Prehistorians of the Far East in Hanoi. A three-phase division of the
Hoabinhian was then accepted, but has since proved to be unsatisfactory (Matthews 1966).

Attempts to redefine the term "Hoabinhian" have been undertaken by J.M. Matthews (1966:94) and C. Gorman (1971: 300). The former assigned the Hoabinhian of Southeast Asia to a post-Pleistocene date, practising a hunting and gathering economy and exhibiting no evidence for agriculture. However, from more recently excavated and published evidence it is now possible that the Hoabinhians were experimenting with a simple level of plant domestication (Gorman 1969). For the Gua Cha site, Bellwood (1976:163) has suggested that a number of heaps of immature pig bones in the Hoabinhian levels could indicate the possibility of incipient animal domestication.

The Hoabinhian of Southeast Asia covers an immense area, from South China in the north down to Malaya and Sumatra in the south, and it has been reviewed by A.H. Dani (1960: 105-226), J.M. Matthews (1964) and P.S. Bellwood (1978:64-71). In northern Vietnam, Hoabinhian sites were extensively excavated by Colani and Mansuy from 1926 onwards, and in 1960-61 Boriskovsky (1968-71) excavated further sites. Since then, a great deal of work has been done by Vietnamese archaeologists, who have excavated many sites dating back into the late Pleistocene (Thong 1976; Tan 1975). In Thailand, the Thai-Danish expedition excavated two stratified Hoabinhian sites at Sai Yok (Heekeren and Knuth 1967) and at Ongbah Cave (Sorensen 1969), and Chester Gorman (1970) excavated the controversial site at Spirit Cave. In Cambodia a Hoabinhian occupation occurs at Laang Spean (Mourer and Mourer 1970), and
in South China Hoabinhian sites were reported by Cheng (1959). The Indonesian Hoabinhian is confined to the northeast coast of Sumatra (Heekeren 1959:67-115, Brandt 1976), and has not been reported from other islands, except possibly from Pintu Cave in northern Luzon (Peterson 1974).

Both Matthews (1961) and Tweedie (1953) have summarised the Hoabinhian of Malaya. Most of the Hoabinhian sites in this country are found in limestone caves and rock-shelters in the north and central parts of the peninsula, except for the middens of Guar Kepah and the cave of Bukit Chuping (Collings 1938d), which both have coastal locations. The tools collected as a result of open-cast mining in Kuantan district (Collings 1938a) may suggest that the Hoabinhians also inhabited open sites away from the coast.

At least sixteen Hoabinhian sites have been reported from Malaya. Gua Kechil and Kota Tongkat, both in the state of Pahang, were excavated by Dunn (1964) and Peacock (1971) respectively (see above), and both sites produced indirect evidence for the possible practice of agriculture (or horticulture) in the form of a marked decline in the quantities of shell and bone in their top layers. They have also produced evidence for a stratigraphic overlap of pottery sherds and Hoabinhian tools. In contrast, the 1954 and 1979 evidence from Gua Cha shows that the Hoabinhian tools and burials were found below the occupation layers with pottery, with few signs of overlap. At Bukit Chuping, Collins (1938d:114)

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9 - I wish to clarify the name of the shell midden site in Province Wellesley which appears in the literature as Gua Kepah or Guak Kepah. Actually, the standard spelling for the place is Guar Kepah, although the northern Malays normally pronounce a "k" sound for an "r" in "Guar".
suggested that two phases were represented; a flake-tool industry followed by a bone industry. Bone artifacts were also reported from Gua Tok Long (Evans 1920), Gua Baik (Callenfels and Noone 1940) and Bukit Chintamani (Tweedie 1936). Human remains are not uncommon in Hoabinhian sites, and at Gua Baik Callenfels distinguished three modes of burial - flexed, secondary, and extended - which he interpreted to represent three different cultural stages.

Available dates in Southeast Asia place the Hoabinhian between 14,000 and 4000 years BP, though some prehistorians believe the "techno-complex" may go back much earlier (Bellwood 1978:64). However, in Malaya, most Hoabinhian sites appear to belong to a late phase of the industry, and there is good evidence for the occurrence of edge-ground tools at Gua Kerbau in Gunung Pondok and also at Gua Baik. At Gua Kechil a date of 2850 ± 800 BC came from the top of the Hoabinhian deposit, and this suggests a comparatively late termination for the Hoabinhian in Malaya.

At Gua Debu Collings (1936) suggested that the Hoabinhian and the Neolithic were contemporaneous.

Attempts to study Hoabinhian stone assemblages on formal typological grounds have been quite unsuccessful (Gorman 1971:311). Matthews (1964) attempted an attribute analysis of the Sai Yok collection but found it difficult to establish definite types. In Malaya, Collings (1938a) was the first to suggest a typology for a collection of Hoabinhian tools, but the validity of his sample is questionable. Waste flakes are quite numerous in some Hoabinhian sites, and at
Gua Chawan there is evidence that stone tools were manufactured on the spot (Peacock 1964).

B.2.3 The Neolithic

The full Neolithic is characterised by polished quadrangular adzes and axes, and by a great quantity of high quality pottery. Well finished ornaments such as stone bracelets are also found in association with Neolithic burials.

Neolithic sites have been reported throughout the Malay Peninsula, from Bukit Tengku Lembu in the north to the southernmost part of Johore at Tanjong Bunga. Casual finds of Neolithic implements are frequent, but no one has successfully located and excavated an undisturbed Neolithic open settlement. This is mainly due to the difficult conditions for site location in the equatorial rain-forest, and furthermore the Neolithic people most probably lived along river courses which were liable to flooding. At Tui Gold mine, Tweedie (1947:42) reported that Neolithic artifacts were found beneath five metres of alluvial deposits, and at Batu Gajah Neolithic implements were dug out from a depth of about twenty metres below the surface (Evans 1926). The only open site to have been excavated is that at Nyong (Evans 1931), but nothing much could be said about any stratigraphic sequence there.

Neolithic pottery is often of excellent quality in fabric, form and surface treatment (mainly cord-marked), but generally lacks other kinds of decoration. Bukit Tengku
Lembu has produced distinctive pottery types, such as goblet-shaped and trumpet-shaped vessels (Sieveking 1962). Gua Cha has also produced pottery of a comparable standard (Peacock 1959). The Kodiang pottery is unique, and has close affinities with that from Ban Kao (Peacock 1964b). Red-slipped ware is also common in the Malay Peninsula. In general, Neolithic pottery displays very skillful workmanship, as seen in the Gua Musang specimens with three-tier rim shapes.

Neolithic human remains were buried in extended positions, and were often accompanied by varied grave goods. Among the best recorded are those from Gua Cha excavated by Sieveking (1954a).

B.3 Recurrent problems pertaining to Malayan archaeology

From the above discussion, we see that archaeological research in the Malay Peninsula began over a century ago, yet cultural interpretation still remains hazy. Tweedie introduced his 1953 synthesis by remarking that the prehistory of Malaya had not advanced appreciably beyond demonstration of a long succession of cultures, each represented by rich and varied remains; this remark still holds good. Why then, after nearly thirty years since Tweedie's remark, does the situation remain much the same? These problems have been discussed elsewhere (Peacock 1967; Al-Rashid 1972), and only a brief listing of them is offered here:

1. There have been few attempts towards interpretation of the data, and the nature of research has been, until recently, sporadic. Archaeological sites
have also been threatened by development, and with limited staff involved in rescue work, many important sites have been destroyed.

ii. In earlier times the materials were studied according to Western concepts of typology and chronology, and the influences of Eurocentrism, leading to fairly passive interpretations of Malayan prehistory, thus became inevitable.

iii. Most of the work was done on a piecemeal basis, and no efforts were made to relate cultural sequences to specific stratigraphic sequences, except at the sites of Gua Kechil and Kota Tongkat.

iv. Most of the sites excavated have been cave sites, since tropical field conditions have always made it difficult to locate open sites. The record is thus biased.

v. Lastly, problems exist because of the present lack of qualified staff in West Malaysia, both at museums and at universities. Perhaps this problem can be overcome in the near future because of a growing interest in the past among the Malaysian people, and also because some educational institutions have now introduced the teaching of archaeology.

B.4 Summary

The study of archaeology in the Malay Peninsula began earlier than in neighbouring countries, yet its pace gained little momentum until recently. While countries such as Thailand the the Philippines are now increasing their efforts in archaeological excavation, the Malay Peninsula has still a long way to go in this regard.
CHAPTER III

GUA CHA AND ITS SETTING

A. The Choice of the Site

There were few alternatives available to me in the selection of a site to excavate for my M.A. thesis research. One possibility might have been to survey and prospect for a new site (or sites) which might have provided fruitful evidence for the study of Malayan prehistory in general. Areas worth investigating would have been along the banks of the major river systems, such as the Sungai Tembeling in Pahang, which was known as a prime inland route in ancient times. The Sungai Kelantan region had been surveyed by B.A.V. Peacock and F.L. Dunn (1968), and the outcome of that survey was encouraging. However, such surveys take a lot of time, and it was impossible for me to pursue that kind of work.\(^\text{10}\)

The second alternative, then, was to work on a site which had previously been excavated, but which would benefit from reinvestigation. Thus, I decided to undertake partial re-excavation of the rock-shelter of Gua Cha in Kelantan, West Malaysia. This is the most important site to have been excavated anywhere in the Malay Peninsula, a reputation justified by the wealth of Hoabinhian and Neolithic materials recovered from it. Furthermore, Sieveking mentions that one part of the rock-shelter which he did not excavate

\(^{10}\) - The only possible time for me to do fieldwork in Malaysia was during the summer vacation of 1978/79. Since most sites lie in a security area, time is needed to make all the necessary arrangements and preparations before any actual work can commence.
appeared to him to be potentially productive. In addition, Gua Cha is the largest rock-shelter along the Sungai Nenggiri Valley, and both R.O.D. Noone (1954) and Anker Rentse (1947) have identified the inland routes which passed near it. Only a few other sites have so far been identified in the region, and two of these, Gua Chawan and Gua Jaya, are thought to have been specific-function sites; a stone workshop and a kiln site respectively (Peacock 1964).

A detailed sequence of the stratigraphy of Gua Cha has been published by Sieveking (1954). Since the rock-shelter is situated in a security-controlled area, access is restricted except to the Orang Asli who sporadically seek shelter there. Because of this, the deposits and the stratigraphy of Gua Cha are still very well preserved. Therefore, it was felt that it would be possible to obtain a dated stratigraphic sequence for the site, which would be invaluable for an interpretation of Malayan prehistory in its general Southeast Asian context.

B. The site of Gua Cha

Gua Cha has appeared in the literature under different names. Noone (1939), who first excavated the shelter, used the name Gua Menteri, in reference to the massive stalagmite (the Menteri) which stands in its centre. Williams-Hunt (1952:183) noted that this name was derived from an Orang Asli by that name (Menteri) who lived at Kampung Gua.

11 - See page 56 for a discussion of the role of this stalagmite in the archaeological context. (see also plate 3). The word menteri means 'minister' in Malay.
Cha, and that the rock-shelter was on his land. The Temiar refer to the rock-shelter as Gua Chos, which is just another pronunciation of Gua Cha. There is, however, no clue to the meaning of Cha.

Gua Cha lies about sixteen kilometres from the Orang Asli settlement of Kuala Betis. It is situated on the left bank of the Sungai Nenggiri, which eventually joins the Sungai Kelantan via Sungai Galas. On maps, Gua Cha lies exactly opposite the now-abandoned Temiar township and police post of Kampung Gua Cha (see map 3).

One can reach the rock-shelter by various ways, although the most convenient and frequently used today is to travel down the Sungai Nenggiri from Kampung Kuala Betis, which is connected to Gua Musang by a logging track. The other alternative is to travel upstream from Kampung Bertam, a small settlement about fifty kilometres down the Sungai Nenggiri from Gua Cha, but this route may be dangerous because of rapids, and is also more time-consuming.

The rock-shelter is about 108 metres long, and its maximum width is approximately 18 metres. Height at the drip-line is a maximum of 13 metres. The main shelter is almost 90 metres away from the river, but at its northern end there is a small extension of about 15 square metres which runs to the river bank. A small tributary runs into the Sungai Nenggiri north of the shelter, and just beyond the end of the limestone massif.

12 - The town of Gua Musang is the administrative centre for the district of Ulu Kelantan, and is connected to other parts of Malaya by railway only. One can reach Gua Musang from Kota Bharu in Kelantan or from Kuala Lipis in Pahang.
THE LOCATION OF GUA CHA

Map 3 - The location of Gua Cha
Sieveking's 1954 trenches were never refilled and are still very well preserved, with little growth of vegetation or disturbance (Plates 3 and 4). The walls have not slumped, and are only covered by thin moss. The spoil-heaps left by Sieveking have now compacted, and stones discarded from the 1954 excavation are still piled against the back wall of the rock-shelter. A few stone tools were collected from the surface in 1979. There is no sign of any modern habitation refuse on the surface of the main shelter. According to the Temiar, who assisted us in the excavation, the extension at the northern end of the rock-shelter is now the most popular spot for overnight camping because of its nearness to the river (Plate 13).

C. Previous excavations at Gua Cha

The archaeology of Gua Cha was first explored by H.D. Noone in 1935, and his report was published in 1939. The site was then visited in 1951 by P.D.R. Williams-Hunt, who notified his intention of conducting a large scale excavation programme the following year. However, this was never accomplished, and instead, G. de G. Sieveking, then Curator of Museums in Malaya, carried out a major excavation at Gua Cha in 1954. Following this, the site received no further archaeological attention until 1979.

C.1 H.D. Noone

Noone, the Assistant Ethnographer at the Perak Museum, was doing research amongst the Ple-Temiar group of Orang Asli around the Kelantan-Perak border region when he first excavated at Gua Cha. It is not surprising that he
located the site because any ethnographer working with the Temiar would have been aware of its existence.

Noone (1939) spent ten days excavating two trenches located at either end of the rock-shelter (Figure 1). His published report is accompanied by a rough plan and elevation of the shelter, a locational map, and a few photographs. Among his discoveries were stone tools and flakes, pottery and human remains. The lowest layer of the deposits contained tools of Hoabinhian type with many pebble bifaces. No study was made of these tools, except that Noone mentions they showed similarities with those in the collection of G.W. Thomson from the Kuantan district of Kuantan, Pahang. Numerous quantities of flakes were also found between the main Neolithic and Hoabinhian levels, which led Noone to conclude that the site was a workshop at that time. The upper layer produced polished Neolithic implements, and three waisted axes, two of which were found unstratified in the gravel in front of the shelter, while the third was found in the upper excavation layer.

Pottery was abundant, especially in the top layers of the southern trench, but became less common in the lower layers and in the northern trench. Noone associated the pottery with the upper Neolithic layer, and where it was found in the layers containing Hoabinhian artifacts he thought that it was part of the grave furniture, and had been buried down into these layers at a later date (Noone 1939:173). Most of the pottery was found in situ with burials, and this pottery exhibited a wealth of ornamentations in different motifs, though most was cord-marked.
Noone made an attempt to reconstruct a sequence for Gua Cha. The section reproduced in his report appears to represent two main levels: an upper with ash layers, and a lower without ash. The former may be sub-divided into an upper layer in which pottery was common, and a lower layer with less pottery. The lower level with no ash layers produced only Hoabinhian implements. Noone also recognised a developmental sequence for the artefactual remains. The Hoabinhian assemblage showed a development from large crude tools at the base to more symmetrical and finely-made implements at the top. This was then followed by a Neolithic industry which produced large flakes in its earlier phase, and well-finished and polished tools in its later phase.

Although Noone recognised layers in the Gua Cha deposits, his presentation of the sections appears to be oversimplified, and the measurements are only roughly estimated. He incorporated the layers of both trenches into one diagram, thus masking the differences between them. The later excavations have shown that the sequences of the northern and southern ends of the rockshelter are different.

C.2 P.D.R. Williams-Hunt

Soon after the war, Williams-Hunt was appointed as Acting Director of Museums, in addition to his post as Advisor on Orang Asli Affairs. During his term as Director of Museums a considerable amount of archaeological fieldwork
was done, which included a further excavation at Gua Cha (Williams-Hunt 1951, 1952). No full report was published.

Among the materials recovered by Williams-Hunt were Hoabinhian-like tools, numerous flakes, and twelve fragments of pottery, including red-burnished pedestal fragments and cord-marked sherds with heavy chevron patterns. One interesting discovery was a human skeleton laid under thin limestone slabs (Williams-Hunt 1952:183). His tragic death shortly afterwards shattered his intentions to excavate in a more proper way.

C.3 G. de G. Sieveking

Gua Cha was systematically excavated under the direction of G. de G. Sieveking from March 31 to May 10 1954. Three cuttings inside the cave, numbered 1, 2, and 3, were excavated covering an area of 101 square metres (2124 square feet). It is worth noting here that the third cutting, which covered an area of 38 square metres, was excavated to a depth of 1.2 metres in just one week! Sieveking claimed a significant antiquity for the deposits at Gua Cha, and for the first time in Malaya a stratigraphic sequence for a rock-shelter was convincingly established.

The natural deposits and the cultural stratigraphy of Gua Cha were dealt with in detail by Sieveking (1954a), but, despite the standard attained in the report, he was later to be accused of presenting misleading interpretations (Peacock 1967:203). Dispute has arisen concerning a break in stratigraphy which was observed by Sieveking at Gua Cha,
but which did not accord with the evidence from other nearby sites along the Sungai Nenggiri such as Gua Chawan (Peacock 1964).

In his excavations, Sieveking found that the lower levels contained remains belonging to the Hoabinhian cultural complex, including stone tools, human remains and animal bone food refuse, all of which occurred in large quantities. After the Hoabinhian occupation at Gua Cha, Sieveking claimed a break in stratigraphy, indicating a considerable time lapse before the Neolithic occupation of the shelter. The Neolithic remains comprised extended burials, accompanied by grave goods of finely-made pottery, polished stone tools, shell bead necklaces, a shell spoon, and stone bracelets. The pottery ranged in form from simple round-bottomed bowls to sophisticated and highly-developed footed forms, and most was made on slow wheel, as indicated by the horizontal and parallel rills on pot exteriors.

Sieveking suggested an age of at least 5,000 years for the Hoabinhian occupation at Gua Cha, and a duration of occupation of 1,500 years. Following this, he estimated a time-lapse of 2,000 years before the beginning of the Neolithic. No absolute dates were used to substantiate this framework, and carbon-14 dating was not readily available at that time. However, according to Sieveking, these dates accorded well with those originally suggested (early second millennium B.C.) by Heine-Geldern for the migrations of the Late Neolithic Austronesians from continental Asia into Indonesia (Sieveking 1954a:104).
CHAPTER IV

THE EXCAVATION

The results contained in this thesis come mostly from the two small trenches (A and B) excavated in Gua Cha between 30 January and 4 February 1979. In fact, the excavation was originally intended to be longer than this, but due to various unavoidable circumstances it was impossible to extend our stay at the site. As mentioned earlier, Gua Cha is situated within a security area, and for access one needs a special permit from the Security Council of the State of Kelantan. An unexpected delay in getting approval from the Security Council affected our arrangements.

Our arrival at Gua Musang on the eve of Chinese New Year then worsened the situation, particularly in arranging for road transport from Gua Musang to Kampung Kuala Betis. At Kuala Betis, we found to our dismay that the boat which belonged to the Jabatan Orang Asli had broken down, so we had to engage some Temiar men to build four rafts for ourselves and our equipment. Thus, our original permit for a one week stay in the security area eventually gave us only five days at the site, where we worked right through the daylight hours to excavate the two trenches.

13 - I wish to thank Encik Mohamad bin Idris, Field Officer of the Jabatan Orang Asli at Kampong Kuala Betis for assisting us in getting help from the Orang Asli and for making our stay at Kampong Kuala Betis a pleasant one.
A. **Aim of the excavation**

Despite the good work done by previous researchers at Gua Cha, the full significance of the record remained obscure before 1979 for a number of reasons. In the first place, previous interpretations of the geological history of the deposits in the shelter were unsatisfactory, and not based on scientific analyses. Secondly, Sieveking had not been able to publish his second report on the Hoabinhian tools, although the pottery and skeletal materials were treated in considerable detail in the first report (Sieveking 1954a; Peacock 1959; Al-Rashid 1969). Thirdly, the site had not been carbon-dated, since the technique was not easily available in 1954, although, according to Sieveking, charcoal samples were collected for this purpose (Sieveking, field report on Gua Cha in Perak Museum 26/54).

The excavation in 1979 was thus designed to cover these aspects, and to obtain up-to-date evidence for the prehistory of Gua Cha. Since Sieveking's excavation in 1954, new evidence has been revealed through excavations in various parts of Southeast Asia, and a much earlier date than hitherto expected for the Hoabinhian in Thailand has been established (Solheim 1969, 1970; Gorman 1970). Thus the aim of the excavation was to gather new data from Gua Cha, in order to obtain a more definite picture of the prehistory of the site, and to evaluate it in a Southeast Asian perspective.

B. **Layout of the trenches**

Two small trenches, termed Cha 79A and 79B, were laid out adjacent to the much larger 1954 cuttings of Sieveking.
Trench 79A was located between Sieveking's Cuttings 1 and 3, and initially measured 1.5 metres square, but was later extended to 1.5 by 3.5 metres. It was excavated to a depth of 100 centimetres, at which level there was a rock shelf against the back wall, but time precluded excavation of the rest of the trench below this into the main Hoabinhian deposits.

Trench 79B was located at the north end of Sieveking's Cutting 2, where the thickest Hoabinhian deposits were located. It initially measured 1 by 3.5 metres, and incorporated the old trench of Sieveking's burial 14. With the discovery of another Hoabinhian burial (1979 Burial 1) the trench was extended, but was later reduced to a smaller size in the lower levels (see Figure 3). A small pit was finally excavated down to sterile soil at a depth of 165 centimetres from the top of layer 4.

C. Method of excavation

The aim of the 1979 excavation was to recover the kinds of data which were missing from the records of the 1954 excavation. In each trench, the deposits were removed according to the natural layers visible in the 1954 sections, and spits of 10 centimetres were excavated for vertical control within the layers.

All deposits from both trenches were sieved through 2 or 3 millimetre meshes, and all cultural materials were packed in labelled bags for later cleaning and sorting. Samples of sieved soil were then immersed in buckets of river
Figure 1 - Gua Cha, Kelantan - new trenches 79A and 79B (29.1.79 - 4.2.79). Cuttings 1-4 were excavated by Sieveking in 1954, and the dotted trenches were dug by Noone in 1935.
water to float out any carbonised plant remains. This material was dried in the shade, and was brought back to Canberra for inspection.

All finds were labelled according to trench, layer, and 10 centimetre spit. In the laboratory, stone tools were also given serial numbers to assist analysis. It should be noted here that the artifacts from Trench 79A were labelled with levels measured in centimetres from the ground surface of the shelter, whereas artifacts from Trench 79B were labelled with depths measured from the top of each individual layer.

D. Stratigraphy

Most of the archaeological research in Peninsular Malaysia before the Second World War was done by people with no professional training in archaeology, and this circumstance helps to explain the lack of stratigraphic records for Malayan sites. Sieveking was the first to describe in any detail the natural and cultural stratigraphy of Gua Cha, and his descriptions superseded the much briefer account of Noone.

On our arrival at the rockshelter on 30 January 1979, our first task was to clean up the walls of Sieveking's 1954 trenches, which were fortunately very well preserved. This allowed us to inspect the depositional sequence in the shelter and to plan our excavation. We observed no significant differences between the layers visible to us and those recorded by Sieveking, and so before describing the deposits of the 1979 trenches, I will discuss the stratigraphic sequence of the rock-shelter as Sieveking interpreted it.
D.1 The natural stratigraphy, as recorded by Sieveking

Sieveking stated that the depositional history of the rock-shelter was best illustrated in his Cutting 1, where one section was dug right down to the rock floor. Three periods of depositional history were observed in this cutting. The first period involved initial deposition in the newly-cut rock-shelter by the Sungai Nenggiri, when its bed was higher than its present level. The lowest layer of fill comprised a compact yellow clay containing numerous limestone flakes, and this was followed by a packed yellow pebbly deposit, presumably deposited by the swiftly running Sungai Nenggiri. These layers were archaeologically sterile.

The second period of deposition in Cutting 1 was associated with a 1.5 metre thick layer of 'chocolate brown earth', which contained most of the Hoabinhian remains. At the base of this layer a considerable quantity of damp-loving land snails were observed, and there were no archaeological remains below the top one metre. Citing the similarities between the 'chocolate brown earth' and deposits found at cave mouths inhabited by the Orang Asli, Sieveking hypothesised that the former was a product of humus formation, and that it must have been formed over a long period of time in fairly dry conditions (Sieveking 1954a:85). He also believed that the deposits had not been disturbed by stream action. However, the analyses of samples of this layer collected during the 1979 excavation have shown that it is entirely of alluvial origin (see page 54), and thus Sieveking's theory of a humus formation is incorrect.
The third period of deposition was represented by the yellow silts and fine gravel sands deposited over the 'chocolate brown earth', right up to the surface of the rock-shelter. The current-bedded sands deposited at the front of the shelter indicate that these layers were deposited by successive floods (as recognised by Sieveking). These upper silt layers were interrupted between 30 and 70 centimetres from the surface by a 'black and stony layer', which contained the main Neolithic occupation horizon.

In Sieveking's Cutting 2, which was situated at the northern end of the rock-shelter, a slightly different picture emerged. Here, the 'chocolate brown earth' was much thicker, and the silts and current-bedded sands which characterised Period III in Cutting 1 were represented by only a thin layer. However, this sand and silt layer became much deeper in the outer part of the rock-shelter. Two 'hearth layers' were observed in the 'chocolate brown earth'. Sieveking's 'black and stony layer' in Cutting 2 separated the 'chocolate brown earth' from the upper silts, whereas in Cutting 1 it was stratified within the silts.

Sieveking's Cutting 3 was not excavated into the 'chocolate brown earth', and had a sequence similar to the upper part of Cutting 1. The main deposits were the silts and fine yellow sands, with the 'black and stony layer' occurring as in Cutting 1.

D.2 The cultural stratigraphy as interpreted by Sieveking

The earliest traces of human occupation in Cutting 1 were the piles of pig bones which occurred in the middle and
upper parts of the 'chocolate brown earth'. The bones were mainly from juveniles of *Sus scrofa* and *Sus barbatus*. Hoabinhian stone tools were found concentrated at the same level as the bone heaps, and continued to occur upwards into the base of the silt of the third period in apparently undisturbed contexts.

In Cutting 1, Sieveking recorded an archaeologically sterile zone of silt between the latest Hoabinhian and the main Neolithic occupation, although this zone was interrupted by the 'Neolithic flake layer', which contained a compact mass of small stone flakes, and between 15 and 20 roughly-made quadrangular axes. Two burials, namely burials 1 and 2, which were associated with pottery of Sieveking's 'Primitive Tradition', also occurred in this layer, and since there were no Hoabinhian artifacts Sieveking assigned it to the early Neolithic period. It is worth noting that the 'Neolithic flake layer' was a localised phenomenon which occurred only in this cutting and not in the others, with the possible exception of Cutting 3. The layer probably represented a number of flaking floors.

Succeeding the 'Neolithic flake layer' were the bulk of the sterile silts and current bedded sands, and these were then followed by the main Neolithic occupation layer, referred to as the 'black and stony layer'. This layer contained numerous pottery sherds, Neolithic stone artifacts and ornaments, and most of the Neolithic burials were thought to have been cut from it. Above it, separated by another band of sterile silt, was the Chinese hearth layer which
contained green-glazed Chinese stoneware sherds. This layer was followed by a superficial hearth layer with no cultural remains.

In Cutting 2, which was dug in the main Hoabinhian habitation area in Gua Cha, Sieveking observed three separate series of hearths. The earliest, associated with large quantities of Hoabinhian stone tools and animal bones, occurred within the 'chocolate brown earth'. The next also occurred in the 'chocolate brown earth' but was stratified above the first one. Sieveking equated this second one with the 'Neolithic flake layer' in Cutting 1, but no artifacts were found in it and I presume it would be better to consider it stratigraphically with the Hoabinhian. The third hearth layer was the main Neolithic occupation (the 'black and stony layer'), which was found directly above the 'chocolate brown earth' and which contained fragments of pottery and a few broken Neolithic stone tools. Sieveking observed no clear Hoabinhian-Neolithic stratigraphic break in this cutting, but felt that a break did occur in the succession of industries.

Cutting 3 produced similar layers to the upper part of Cutting 1. The 'Neolithic flake layer' was observed in the basal part of the trench associated with only a few stone artifacts. The main Neolithic occupation layer was again the 'black and stony layer'.

D.3 Sieveking's overall view of the Gua Cha sequence

The overall sequence for Gua Cha according to Sieveking may be briefly summarised as follows. The sequence
starts with a sterile layer of deposits which records the pre-human history of the rock-shelter. Succeeding this is a layer of 'chocolate brown earth', initially sterile but later with extensive Hoabinhian remains, comprising large numbers of stone artifacts and burials. After the Hoabinhian, there is a gap in the occupation of the shelter as shown by the sterile silt deposits in Cutting 1, although these are partly interrupted by the areally-restricted 'Neolithic flake layer'.

The earliest Neolithic occupation of Gua Cha is thus the 'Neolithic flake layer', which contained burials associated with pottery of the 'Primitive Tradition'. However, the existence of this layer is in doubt in Cutting 2. There is then a possible further break in occupation before the main Neolithic occupation took place, as evidenced by sterile deposits of silt and current bedded sand. Succeeding the main Neolithic habitation layer is the recent occupation, characterised by a few green-glazed Chinese stoneware sherds.

It is interesting to note that the Hoabinhian occupation was concentrated in intensity mainly at the northern end of the shelter (Sieveking's Cutting 2), while the southern part (Cutting 1) was used for the dumping of pig bones and contained far fewer stone tools. On the other hand, the Neolithic occupation was clearly concentrated at the southern end of the shelter, that is within Cuttings 1 and 3, and by this time this end of the shelter had presumably been raised above the level of frequent floods.
E. The 1979 excavations

In the 1979 excavation we followed the layer names used by Sieveking in order to avoid confusion, and for practical purposes the layers were numbered. In Trench 79A the surface dust was called layer 1, and the yellow silts and sands below became layer 2, with internal subdivisions. The excavation of 79A ceased before the base of layer 2 was reached. In Trench 79B the first two layers were numbered as for 79A, while Sieveking's 'black and stony layer' became layer 3, and the 'chocolate brown earth' layer 4. The 'black and stony layer' did not appear in trench 79A, perhaps because it was too close to the rear of the shelter, but the lower part of layer 2 in that trench is stratigraphically below the position of the black and stony layer as it was recorded in Sieveking's Cuttings 1 and 3.

Soil samples from every layer of the two trenches were collected and taken to Canberra for analysis. Dr Philip Hughes of the Department of Prehistory in the Research School of Pacific Studies kindly rendered his services for this purpose, and my appreciation is hereby acknowledged.

E.1 Trench 79A

E.1.1 Natural stratigraphy (Figure 2, Plate 5)

Since this trench lay between Sieveking's Cuttings 1 and 3 there was little variation from the previously recorded deposits, apart from the absence of the black and stony layer, which may reflect the situation of this trench in the back of the shelter, away from constant roof-fall.
79A was not excavated below the base of Sieveking's Cutting 3, and its inner half was stopped by a rock shelf at a depth of one metre. At the base of the excavation occurred a sandy clayey silt with densely packed limestone fragments, which may equate with the 'Neolithic flake layer' of Sieveking's Cuttings 1 and 3. Above this lies the main part of layer 2 (which presumably also continues below the stony layer), and this runs virtually to the surface of the trench, being basically an alluvial deposit with three internal divisions. Its lower part above the stony layer is a yellowish-brown sandy clayey silt (layer 2C), then follows a clayey sandy silt (layer 2B), and finally a sandy clayey silt (layer 2A). Layer 1 consists of surface dust. The 'black and stony layer' of Sieveking's Cuttings 1 and 3 would appear to equate stratigraphically with layer 2B.

E.1.2 A summary of the 79A cultural remains

Cultural evidence from Trench 79A was found distributed throughout layer 2. Sieveking (1954a) recorded extensive Neolithic occupation in his Cutting 3, and Trench 79A, lying adjacent to it, produced a considerable quantity of Neolithic pottery which was found concentrated between 30 and 50 centimetres below the surface. A few Hoabinhian stone tools, consisting of bifaces and truncated tools, were confined to the bottom of the deposit from a depth of 70 centimetres to the rock floor at 100 centimetres.

Fragments of Chinese stoneware and a piece of iron were also recovered at a depth of 40 and 55 centimetres below the surface respectively. No Neolithic implements were
Figure 2 - Trench 79A - plan of layer 2C, and sections
recovered, except for the drilled-out centre of a stone ring (Plate 7) which was found at a depth of 70 centimetres. A considerable quantity of flakes, some showing signs of use, were found concentrated at the base of this trench, and they may equate the 'Neolithic flake layer' of Sieveking's Cutting 1, although this is not certain.

There is no real break in the stratigraphy of the silt deposits in this trench. However, between 70 and 80 centimetres below the surface Neolithic sherds were found mixed with Hoabinhian stone artifacts, and this situation could reflect re-deposition by occasional floods, presumably ponded in the southern part of the shelter by a huge stalagmite called the 'Menteri' (see page 56). Such disturbance of the 79A deposits could also explain the occurrence of Chinese sherds, the piece of iron, and the stone disc at such relatively deep levels.

A quantity of loose carbonised rice grains was found in layer 2B. This rice may equate stratigraphically with the 'Chinese hearth' observed by Sieveking in his Cutting 1, and also with a hearth with a large quantity of carbonised rice which had been sectioned by the inner wall of Sieveking's Cutting 3. This latter hearth occurred at top of Sieveking's 'black and stony layer', and the rice yielded the carbon date of 930 ± 100 B.P. (ANU-2216). A similar date probably applies to the rice in Trench 79A, layer 2B.

E.2 Trench 79B

E.2.1 Natural stratigraphy (Figure 3, Plate 6)

This trench was simply an extension to Sieveking's
Figure 3 - Excavation plans and section for Trench 79B
Cutting 2, and its layers were identical to those observed in 1954. At the base of the deposit is layer 4, the 'chocolate brown earth' of Sieveking (actually a brown to yellowish-brown clayey sandy silt). The two bands of darkish stony layers observed by Sieveking within the chocolate brown earth in Cutting 2 were also present in this trench. Superimposed over layer 4 is layer 3, consisting of a brown clayey silty sand with many limestone chunks and ash (Sieveking's 'black and stony layer'), which becomes thicker at the back of the shelter, especially near the stalagmite at the north end of the trench. Many fallen limestone rocks occurred in this layer, and some were observed to be embedded vertically. Layer 2 above is very pale brown clayey sandy silt, which seems to equate with layer 2A in Trench 79A. Layer 1 is surface dust.

Quite widespread but discontinuous patches of ash and charcoal were seen throughout the deposits, but there were no clearly surviving hearths. Bands of reddish burnt colouring also occurred throughout.

E.2.2 A summary of the 79B cultural remains

Trench 79B produced a considerable density of Hoabinhian material from layer 4, as did Sieveking's Cutting 2. Pottery was scarce, confined to layer 3, and included two pots from an unexcavated burial, incomplete but still partly intact (Plates 8 and 9).

Only a very marginal overlap was observed in this trench between pottery and Hoabinhian tools, in the top 10
centimetres of layer 3. It seems that the Hoabinhian thus continues to the base of the Neolithic, but the latter is sparse, and the nature of any overlap is unclear. On the other hand, there is no real evidence for a break in the succession of industries between the Hoabinhian and the Neolithic, as was suggested by Sieveking for his Cutting 2 (Sieveking 1954a:91).

Four Hoabinhian burials were discovered in Trench 79B, and the lowest (Burial 3), found at a depth of 110 to 120 centimetres from the top of layer 4, was not removed, but covered and left for future excavation. Burial 3, together with Burial 1, which was found between 10 to 30 centimetres from the top of layer 4, were each covered by a layer of tufa chunks and stone slabs respectively (see Figure 3, Plates 10 - 12, and pages 95-100 for details).

F. A general summary of the 1979 excavation, and the radiocarbon dates

The evidence found at Gua Cha in the 1979 excavation parallels that of Sieveking, except for the absence of a clear break in stratigraphy between the Hoabinhian and the Neolithic. All the deposits are alluvium deposited by occasional floods, which must have been more frequent when the shelter floor was about two metres below its present level.

Four carbon samples, one from Sieveking's Cutting 3 and the other three from Trench 79B, have been dated. A date of 930 ± 100 B.P. (ANU-2216) comes from carbonised rice found in a hearth at the top of the 'black and stony layer' in Sieveking's Cutting 3. Whether this rice was actually cultivated around
Gua Cha is unknown, and the area is remote from any rice-growing areas today.

For Trench 79B there are the following dates:

1) \( 3020 \pm 270 \text{ B.P. (ANU-2217)} \), from charcoal collected from the base of layer 3. This marks the termination of the Hoabinhian occupation, and the earliest possible date for the commencement of the Neolithic.

2) \( 6280 \pm 250 \text{ B.P. (ANU-2218)} \), from scattered charcoal collected between 40 and 70 centimetres from the top of layer 4 (the middle of the Hoabinhian deposits).

3) \( 3790 \pm 290 \text{ B.P. (ANU-2219)} \) for a flotation sample of charcoal from between 120 and 165 centimetres from the top of layer 4 (the base of the Hoabinhian deposits). This date is surprisingly young, and is clearly inverted with respect to ANU-2218. However, the results of Dr Hughes' analysis of a soil sample from the same level as ANU-2219 showed a very high percentage of organic carbon, which may have become concentrated in this part of the profile (see Appendix 1). Such a circumstance would explain the apparent contamination towards a younger date.

G. Soil analyses

Soil samples from the Gua Cha 1979 excavations were kindly analysed by Dr Philip Hughes of the Department of
Prehistory in the Research School of Pacific Studies, and the following sections are abstracted from his report (see Appendix 1).

Samples were analysed from each of the four layers in Trench 79A, and from layers 2, 3, 4 (top) and 4 (bottom) in Trench 79B. All samples consist largely of clear and frosted angular quartz grains with lesser amounts of platy mica taken to be biotite. In addition, there are minor amounts of fresh felspar, and a range of red and yellow coloured mafic minerals which have a more weathered appearance. All the samples contain charcoal fragments, and these are extremely fresh in appearance.

Except for the more weathered mafic minerals, the sediments show little evidence of having been weathered, either during transport or after deposition in the shelter. The biotite is an excellent indicator of this; it weathers readily and normally breaks down quickly to form secondary clay minerals.

The upper silt, layer 2, also contains numerous iron oxide cemented aggregates, but these do not appear to have been formed in situ and presumably were washed in from outside the shelter. Calcium carbonate is poorly represented in the samples, despite the fact that the host rock is limestone, and this also indicates that the deposits must have been derived from outside the shelter. However, soil pH is neutral to alkaline, and this helps to explain the good preservation of shells and bones throughout.
Concerning the origin of all the deposits (except for the limestone roof-fall component, densest in 79B layer 3), the above facts support an alluvial source from top to bottom. The poorly sorted and fine nature of the less-than-2-millimetres fraction in the soil samples is totally consistent with alluvial deposition by floodwaters entering the shelter. The presence of significant amounts of fine silt and clay suggests slowly moving or ponded water. The deposits examined show no evidence of scouring erosion or deposition by fast moving water, although this could have taken place at the front of the shelter (as observed by Sieveking, in areas not examined by the 1979 excavations).

G.1 The geomorphic history of the deposit

From the stratigraphic observations, the radiocarbon dates and the soil analyses, it is possible to reconstruct the depositional history of the Gua Cha sediments. As we saw earlier, the deposits of Sieveking's Cutting 1 and Trench 79A show a sequence of thick upper silts over a relatively shallow 'chocolate brown earth'. On the other hand, Cutting 2 of Sieveking and Trench 79B have a shallow silt deposit over a much thicker layer of 'chocolate brown earth'. Because of these differences, I will discuss the history of the deposits in the two areas separately.

Trench 79B has a well-dated sequence and sharp cultural and stratigraphic changes, which suggest that the deposits have not been disturbed. The accumulation of the 'chocolate brown earth' (layer 4) was largely alluvial, and
the dates suggest that the process of accumulation was fairly slow, from circa 10,000 years B.P. at the base\textsuperscript{14} to circa 3000 years B.P. at the top of the deposit. This means that 150 centimetres of alluvium accumulated in about 7,000 years, an average of about 2 centimetres per century.

The rate of accumulation of layer 3 seems to have been slightly slower, a conclusion reinforced by the higher density of roof-fall limestone in this layer. The dates for layer 3 indicate that 30 centimetres of alluvium (including the very high roof-fall component) was deposited in about 2100 years (circa 3000 B.P. at the base to circa 900 B.P. at the top), and this gives a rate of 1.3 centimetres per century. However, layer 2 above consists entirely of alluvium without roof-fall, and since it is 20 centimetres thick (more in some places), it clearly accumulated at a much higher average rate of about 3 centimetres per century.

It seems likely that the occurrence of flood waters entering the shelter decreased gradually as the actual floor of the shelter rose higher above the river level (the river bed itself has presumably been down-cutting at the same time). However, layer 2 represents a major difference, and the rapid increase in flood deposition here may relate to widespread forest clearance in recent centuries. The implication here may be that forest clearance in this inner region of Kelantan was not very widespread prior to 900 B.P. or thereabouts.

\textsuperscript{14} or less, since the rate of flood deposition at this low level would probably have been at a relative maximum.
The 79A excavation did not penetrate into the 'chocolate brown earth' (layer 4 in 79B), and the upper alluvial layers which were excavated showed signs of disturbance, especially from the stratigraphic mixing of Hoabinhian and Neolithic and other artifacts (see page 48), a situation much less marked in 79B.

It may be important to note that the area of Trench 79B and Sieveking's Cutting 2 is protected on its upstream (southern) side by a large stalagmite known as the 'Menteri'. The thick silt layers on top of the 'chocolate brown earth' in Trench 79A and Sieveking's Cutting 1, upstream of the Menteri, may be a reflection of stronger and more frequent flooding in this area. It is possible that the 'chocolate brown earth' could have been truncated by flood erosion here, but there is no clear geomorphic evidence of this. However, since the rocky layer 3 with its high roof-fall component also occurs through this area (although not against the back wall of the shelter in 79A), this suggests that the slowing of the rate of alluvial deposition took place equally on both sides of the Menteri. It is, therefore, difficult to explain conclusively why the 'chocolate brown earth' should be thicker downstream of the Menteri, and the upper silts thinner.

One explanation might be that the 'chocolate brown earth' is a result of intensive occupation during the Hoabinhian, while the lighter upper silts, although of precisely the same alluvial origin, may owe their visible characteristics to the lack of intensive Neolithic occupation, apart from visits by occasional burial parties. At the end of the
Hoabinhian occupation the upstream (southern) part of the shelter may have been at a lower level than the downstream part, perhaps due to stronger flood erosion. In recent millennia the rock-shelter floor has gradually become more level, as a result of a thicker deposition of silt on the upstream of the Menteri.
CHAPTER V

THE ANALYSIS OF THE STONE ARTIFACTS

Stone artifacts form the major component of the materials excavated at Gua Cha in 1979. Of the total of 662 recovered during the excavation, 534 (or 80%) come from Trench 79B. Most of the stone tools are of Hoabinhian type, ranging from crudely worked implements to well-finished ovates, flaked all over both surfaces. The stone tools do not show any morphological or technological variations with depth, and this is a point of some interest given the time-span involved.

No Neolithic implements or edge-ground tools were found in the excavations, except for a smooth and flat disc of stone, believed to be the drilled-out core of a stone bracelet, found in 79A at a depth of 72 centimetres from the surface. One flaked implement similar to the type termed a "Tembeling Knife" (Tweedie 1953:37) was found, but unlike the Tembeling specimens which were found in association with Neolithic stone tools (Evans 1931), the Gua Cha specimen was found in the Hoabinhian assemblage at a depth of 10-20 centimetres below the top of layer 4 in Trench 79B.

Retouched and waste flakes were the most numerous items, accounting for about 47% and 72% of total stone artifacts in Trenches 79A and 79B respectively. They were found through all layers in both trenches, but in Trench 79A they were most numerous at about 50-60 centimetres below the surface, whereas in Trench 79B they occurred in abundance in the central section of layer 4. River pebbles were quite
numerous, and the high rate of debitage would suggest that the tools were manufactured in the rockshelter, since the raw materials were readily available in the Sungai Nenggiri or from sources nearby.

A wide range of raw materials was employed for the production of these tools, including chert, greenstone, sandstone, basic schist, shale and dark limestone\textsuperscript{15}. The raw materials played a role in the quality of the finished tools, and the finest implements were normally made from dark coloured schistious stone or chert. Most of the pebbles used as pounding and hammer stones were of quartz or vein-quartz. The majority of the stone tools are well preserved.

A. Problems of classification

In Malaya, the only previous typological classifications which could be used as guide lines in analysis or for comparative purposes were those of Noone (1941) and Collings (1938d). Noone attempted to classify the Neolithic implements of Malaya into types, and placed these types in a series of evolutionary stages. Since no Neolithic implements were found at Gua Cha this classification will not be discussed. Collings (1938d) based his analysis on stone tools which were collected between 1921 and 1923 as a result of mining operations in the district of Kuantan, Pahang. 292 stone tools were analysed by him, of which 222 were classified as edge-cutting tools, and the remainder as pounders

\textsuperscript{15} - The identification of the rock-types of the Gua Cha stone implements was done by Mr Liew Tung Chooi of the Research School of Earth Sciences, Australian National University. His assistance is very much appreciated.
and hammerstones. He categorised these tools into five groups, namely 'hand axes', picks, proto-neoliths, hammerstones, pounding and anvil stones, and querns. The 'hand-axes' were further classified into six types, with type IV having three sub-divisions.

The typology formulated by Collings for the 'hand-axe' tools seems to be representative of Malayan Hoabinhian assemblages generally, and the Gua Cha stone tools fit it quite well. However, as Collings remarked, the collection was a mixed lot found scattered over a wide area, and the exact sites, except one, are unknown. In spite of this shortcoming, the collection itself is interesting, and it was extensively cited by Callenfels (1936b) as representative of the oldest stage of his 'Melanesoid' culture yet known from the peninsula. Furthermore, the collection clearly suggests that the Hoabinhian people were settling in the open, and future research towards identifying the locations of the sites could prove beneficial.

More than fifteen sites in Malaya have so far produced Hoabinhian stone tools (Matthews 1961). Except for Gua Madu, most have produced too few artifacts for typological classification (see Table 1). The inconsistent use of terminology has also caused difficulties in constructing an overall typology for Malayan Hoabinhian tools. Furthermore, most of the artifacts stored in the Perak Museum in Taiping and in the National Museum in Kuala Lumpur bear catalogue numbers which are meaningless in the absence of field notes.
Table 1 - Numbers of stone artifacts reported in the literature from Hoabinhian sites in Malaya.

<table>
<thead>
<tr>
<th>Site</th>
<th>Total tools reported</th>
<th>Uniface</th>
<th>Biface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gua Kajang, Perak</td>
<td>5</td>
<td>1</td>
<td>?</td>
</tr>
<tr>
<td>Gua Tok Long, Pahang</td>
<td>6</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>Kota Tongkat, Pahang</td>
<td>2</td>
<td>?</td>
<td>1</td>
</tr>
<tr>
<td>Gua Kerbau, Perak</td>
<td>?</td>
<td>some</td>
<td>some</td>
</tr>
<tr>
<td>Gua Debu, Kedah</td>
<td>32</td>
<td>?</td>
<td>some</td>
</tr>
<tr>
<td>Gua Baik, Perak</td>
<td>?</td>
<td>some</td>
<td>some</td>
</tr>
<tr>
<td>Bukit Chintamani, Pahang</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Bukit Chuping, Perlis</td>
<td>6</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>Gua Madu, Kelantan</td>
<td>500</td>
<td>?</td>
<td>some</td>
</tr>
<tr>
<td>Gua Cha, Kelantan</td>
<td>-</td>
<td>-</td>
<td>some</td>
</tr>
</tbody>
</table>

For Gua Cha, Sieveking (1954) and Noone (1939) mentioned only briefly the stone artifacts recovered in their excavations. Although Sieveking did not include any illustrations of Hoabinhian stone artifacts in his reports, he did mention that the Hoabinhian industry of Gua Cha could be compared on general grounds with that of other Malayan caves such as Gua Kerbau and Gua Baik. At these two sites, the lower levels produced an industry of squat unifacial pebble tools, and flat bifaces occurred mainly in the upper levels. Only one tool of Perak unifacial type was recognised in the Gua Cha industry (Sieveking 1954a:106), and the industry has a typologically late aspect, which was also recognised by Noone (1939).

Neither Sieveking nor Noone constructed typological classifications for the artifacts, but both believed that...
technological differences did exist at Gua Cha, similar to those seen at other sites (Sieveking 1954a:106). Noone (1939:174) suggested for Gua Cha an industrial succession from cruder bifaces to more symmetrical and finer pieces in the final phases. Sieveking (1954a:93) noted that:

> When the typology of the Hoabinhian stone tools is discussed in detail in the second part of this report, it may be possible to attribute certain burials to an early or late Hoabinhian stage, and it is clear from the stratigraphy of the cutting that there are 2 main concentrations of stone tools referable to this culture at different depths.

B. Typological considerations

The ordering and processing of stone artifacts begins with classification (Dunn 1975). Several attempts have been made recently towards typological classification of Hoabinhian stone tools in general (Matthews 1964, Dani 1960: 216, Heekeren and Knuth 1967, Gorman 1970), and of the similar (but not necessarily related) pebble tools of Australia (McBryde 1976, Lampert 1979).

Matthews (1964) conducted an attribute-oriented statistical analysis of the Sai Yok artifacts which failed to reveal any significant groups amongst the unifacially flaked tools. Heekeren and Knuth (1967) divided the pebble industry of the same site into massive high-doomed tools, choppers, and 'Hoabinhian' tools proper, with the latter being subdivided into 4 categories and ten sub-categories. Gorman (1970), realising the difficulties in constructing formal types for Hoabinhian stone tools, chose to analyse the materials from Spirit Cave by using technological and microscopic edge-
damage attributes, but his results have not been published in full.

Therefore, past attempts to classify Hoabinhian assemblages on formal typological grounds have not been universally successful. Van Heekeren's typology for Sai Yok is not applicable to the Gua Cha assemblage, since the latter has several quite distinct forms. In the most usual form found in Malaya, the pebble is flaked on two sides to make a continuous cutting or scraping edge around the periphery, and little or none of the original cortex is left. In some cases, artifacts were also made from large flakes.

White (1969) has suggested for New Guinea that the main aim in producing a stone tool is to provide certain features (especially the working edge) which are appropriate to the intended use, while the rest of the implement may come in a wide variety of forms. Thus, the best way to analyse stone tools is to regard them as records of a series of processes, rather than as products of specific mind-templates of the makers. However, difficulties may arise if there are problems in identifying edge-damage or flake scars. Most of the stone tools recovered from Gua Cha in 1979 were subjected to microscopic examination, but unfortunately they were too coarse-grained for successful recognition of edge wear. It is therefore more appropriate to do a basic attribute study, although I am conscious of the limitations imposed by the small population size, which may unavoidably diminish the validity of the statistical analyses.
C. The attributes chosen for the Gua Cha analysis

In pursuing the analysis of stone artifacts from Gua Cha, twelve attributes were chosen, mostly based on those selected by Roe (1964, 1968), and employed by Matthews (1964) for the Sai Yok assemblage. The observations recorded for each complete artifact are as follows (linear measurements in mm):

1. maximum length
2. maximum breadth
3. breadth at 1/5 of the maximum length measured from the apex.
4. breadth at 1/5 of the maximum length measured from the butt.
5. The position of the maximum breadth, measured from the butt along the longitudinal axis (length) of the artifact. In cases of asymmetry the formula \( PMB = \frac{PMB_1 + PMB_2}{2} \) is used, where \( PMB_1 \) and \( PMB_2 \) are the positions of the maximum breadth on either side (Isaac 1977:118).
6. maximum thickness
7. weight in grammes
8. The extent of flaking and modification on face one (see below) of the artifact.
9. The extent of flaking and modification on face two of the artifact.
10. The ratio of the length of the cutting edge to the total periphery of the artifact.
11. The position of the cutting edge on the periphery of the artifact.
12. The angle of the working edge.

D. Processes involved in the analysis

1. Artifacts were taken directly from the site to Canberra, where all the sorting was carried out.

2. Each artifact was examined individually, and its attributes recorded on a 4" by 9" card.

3. The measurements of length, breadth and thickness (numbers 1-6) were made on a rectangular measuring board with a raised border and scale along two adjacent sides. All measurements were taken in millimetres.

4. The measurements of length, breadth and thickness are maxima taken as the dimensions of a containing rectangle. If the butt of the tool is placed towards the observer, the y-axis is length and the x-axis is breadth.

5. The butt is identified as that end of an artifact which has not been fashioned into a cutting edge. In a case where an artifact was modified around its entire margin so that it was not possible to distinguish a butt, one end was chosen arbitrarily as the 'butt' for purposes of measurement.

6. In the case of unifacially flaked tools the flaked face is referred to as face one. However, with bifaces one face was arbitrarily chosen as face one for purposes of recording.

7. The observations for attributes 8 and 9 were made by dividing the surface of the artifact into four quadrants, and observations for each quadrant were
scored in 3 ways; all, some, or none, using the symbols A, S, and N respectively.

8. The ratio for length of cutting edge to periphery was determined by measuring the length of the cutting edge with a thin piece of string. The formula used is $\frac{\text{length of cutting edge}}{\text{total periphery}} \times 100$.

9. The position of the working edge on the tool was recorded using the codes E = end and S = side, where the side is taken as the margin parallel to the long axis of the tools.

10. The method employed in measuring edge-angles follows Ferguson (1980). This method requires a few ounces of white 'plaster putty', a readily available substance which is produced under several brand names.

Ferguson describes the process as follows:

"To measure edge-angles, a large ball of this substance is moulded over the working edge of an artifact then a knife is used to cut the putty in half at right angles to the centre of the edge. Careful removal of one half of the putty preserves an outline of the tool edge in cross section, and the smooth surface left by the knife-cut is first pressed gently against a well inked stamp pad, and then on to a piece of paper. If care is used, no distortion results and a perfect negative image of the edge is produced. This can be measured with a straight edge and a protractor. A simple check for distortion can be made by slipping the putty back over the edge after the stamping procedure." (Ferguson 1980:59-60)

E. Typological classification

In general, the Hoabinhian assemblage from Gua Cha provides a similar picture to that of most other Hoabinhian
sites, comprising 1) pebble tools, 2) utilised and waste flakes, cores and chunks, and 3) pebble hammer-stones, pounding and grinding stones. There is no indication of a lithic component which may suggest highly specialised activities.

E.1 Pebble Tools

The artifacts in this class may be sub-divided into four main groups, namely bifacially flaked whole-pebble or pebble-flake tools, truncated pebble tools, pebbles worked on one end only, and unifacial pebble tools. In earlier literature the term 'hand-axe' was widely used to refer to the oval-shaped unifacially or bifacially flaked pebble tools which are characteristic of this class. However, this term is now regarded as misleading for it not only suggests a western origin for the Malayan and Southeast Asian forms, but it is also a misleading term employed by archaeologists to group together implements of similar appearances which may have different functions (Roe 1976:66).

E.1.A Bifacially flaked whole-pebble or pebble-flake tools

Artifacts in this group range from crudely worked pebble tools to well finished artifacts worked on both sides by primary and secondary flaking. The well-finished tools are rather small in size and flattened in shape, and most are flaked all over their surfaces leaving little or no cortex. The crudely made tools are usually larger and only the peripheries were worked in whole or in part to provide cutting edges. Most of the tools are made of river pebbles, but a considerable number were manufactured from large
pebble-flakes. With the latter, the bulbar surface of the implement was normally left flat. The shape of the cortex side is largely determined by the shape of the pebble, rather than by any technological, stylistic or functional requisites.

The bifacially flaked pebble tools have various plan shapes. Four variants are observed for the Gua Cha assemblage, namely:

(i) ovate,
(ii) sub-rectangular,
(iii) sub-triangular,
(iv) slightly waisted.

E.1.A.i Ovates (Figures 12-15)

Ovates are the most finely worked stone tools from Gua Cha. They are normally small in size, with cutting edges all round their margins. This group also includes one double-pointed tool (Figure 15).

E.1.A.ii Sub-rectangular forms (Figures 16-21)

In this group the cutting edge occurs mainly on the side margin or on both ends. The type is often classified as a 'side scraper', and size varies.

E.1.A.iii Sub-triangular forms (Figures 22-23)

In this group the cutting edge occurs on one end, with the opposite end acting as a butt. A considerable portion of pebble cortex often remains.

E.1.A.iv Slightly waisted forms (Figures 24-25)

Most of the artifacts in this group are oblong in
shape. The slightly waisted appearance of these tools may be accidental, but it may also suggest intentional flaking for better grip. One implement similar to a 'Tembeling knife' falls in this group (Figure 25).

E.1.B Truncated pebble tools (Figures 26-28)

These are pebble tools which may have been deliberately truncated to produce a flat and thick edge to serve as a butt. The method of truncation, if deliberate, is not known, despite an attempt by Matthews to examine closely such truncated surfaces (Matthews 1964:156). In fact, it is difficult to establish whether these 'truncated' tools were actually deliberately produced, or whether they simply result from breakage of pebble tools. One of the Gua Cha truncated pebble tools has a pebble surface (cortex) butt which suggest that it was intentionally produced with the truncated shape.

Three types of orientation of the truncated surface (butt) can be observed in the Gua Cha material, namely straight, slanting (either left or right) and crescent-shaped. One has an edge which has been smoothed as a result of use (Kamminga: pers comm).

E.1.C Pebbles worked on one end only (chopper-chopping tools)

Artifacts of this group comprise whole pebbles with one end flaked to produce a sharp cutting edge. Some edges show damage as a result of use. They occur only in the top layers of the deposit.

E.1.D Unifacial pebble tool

This group is represented by only one tool fully
flaked on one side, which was found between layers 2 and 3 in Trench 79B. The rarity of this group at Gua Cha is in agreement with its general restriction to the western side of the Malay Peninsula.

E.2 Utilised and waste flakes, cores and chunks (Plate 16)

Utilised and non utilised flakes are quite numerous, and some of the former have signs of retouch. The non-utilised flakes may be further subdivided into primary flakes and chips; the primary flakes possess bulbs of percussion and striking platforms, while the chips are shattered small fragments. However, the distinction between primary flakes and chips depends to a large extent on the raw material, and the way in which the material reacts to flaking pressure. Cores are also present in the site, in small numbers, as are chunks, which can be defined as amorphous flaking debitage without bulbar surfaces.

E.3 Pebble hammerstones, pounding and grinding stones

Utilised pebbles occurring at Hoabinhian sites are normally classified as hammerstones, pounding stones, and grinding stones. The Gua Cha pebbles form two groups: those with haematite stains and those without. The former may be whole or broken, but the stain itself suggests that the pebble was used to grind or pound haematite into a powdery form. Pebbles with no haematite stain may be whole, broken, or showing flakes scars, and some have abraded surfaces.

F. Metrical analysis of the stone tools

The data available on the Hoabinhian stone tools from Gua Cha, or from any other sites in the Malay Peninsula,
are too limited to allow detailed statistical analyses or comparative studies. Fieldnotes are no longer available for the Hoabinhian stone tools excavated by Sieveking in 1954, which are now stored at the National Museum in Kuala Lumpur. From the 1979 excavations the stone tools from Trench 79A are too few in number (only 15 pebble tools) for any effective statistical analyses. Therefore, only the pebble tools from Trench 79B are discussed below, and since these do not show any apparent change in morphology or technology of manufacture with depth, I treat them as a single assemblage.

The distribution of the whole assemblage between the two trenches is shown in Table 2, and Table 3 and Figure 4 show the distribution of the 79B assemblage by depth within the trench. Despite the presences of some peaks, there is no very obvious clustering of stone tools at any particular depth. Table 4 then shows the distribution of the 79B pebble tools alone by depth, and it is these tools which are grouped together as the assemblage to be described metrically below. Although flakes were found in quantity, most were small chips without bulbs of percussion, and they are not included in the descriptive analyses. The presumably result from stone tool production in the site. Primary and retouched flakes account for less than 2% of all flake/chip material found in 1979, and this almost total lack of emphasis on flake tool technology is very typical of the Gua Cha Hoabinhian.
Table 2  Gua Cha - distribution of the stone assemblage between the two 1979 trenches

<table>
<thead>
<tr>
<th>Type</th>
<th>79A</th>
<th>79B</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pebble tools</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bifacially-flaked pebbles</td>
<td>12</td>
<td>32</td>
<td>44</td>
</tr>
<tr>
<td>Truncated pebble tools</td>
<td>1</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>Pebbles with one end flaked</td>
<td>2</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Unifacially-flaked pebble</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>sub-total</td>
<td>15(11.7%)</td>
<td>53(9.7%)</td>
<td>68(10.1%)</td>
</tr>
<tr>
<td>2. Flakes and cores</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flakes utilised</td>
<td>10</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>primary</td>
<td>35</td>
<td>31</td>
<td>66</td>
</tr>
<tr>
<td>waste</td>
<td>15</td>
<td>345</td>
<td>360</td>
</tr>
<tr>
<td>Cores</td>
<td>18</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>sub-total</td>
<td>78(60.9%)</td>
<td>398(74.5%)</td>
<td>476(71.9%)</td>
</tr>
<tr>
<td>3. Pebbles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No haematite stain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>complete</td>
<td>11</td>
<td>20</td>
<td>31</td>
</tr>
<tr>
<td>broken</td>
<td>12</td>
<td>25</td>
<td>37</td>
</tr>
<tr>
<td>abraded</td>
<td>6</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>With haematite stain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>complete</td>
<td>4</td>
<td>14</td>
<td>18</td>
</tr>
<tr>
<td>broken</td>
<td>2</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>sub-total</td>
<td>35(27.4%)</td>
<td>83(15.7%)</td>
<td>118(18%)</td>
</tr>
<tr>
<td>Grand total</td>
<td>128(100%)</td>
<td>534(100%)</td>
<td>662(100%)</td>
</tr>
<tr>
<td>Haematite chunks</td>
<td>21</td>
<td>12</td>
<td>33</td>
</tr>
<tr>
<td>Level</td>
<td>Pebble tools</td>
<td>Flakes and cores</td>
<td>Pebbles</td>
</tr>
<tr>
<td>-----------</td>
<td>--------------</td>
<td>------------------</td>
<td>---------</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>3 (0-10)</td>
<td>9</td>
<td>17.3</td>
<td>21</td>
</tr>
<tr>
<td>4 (0-10)</td>
<td>5</td>
<td>9.6</td>
<td>36</td>
</tr>
<tr>
<td>4 (10-20)</td>
<td>8</td>
<td>15.4</td>
<td>2</td>
</tr>
<tr>
<td>4 (20-30)</td>
<td>4</td>
<td>7.7</td>
<td>15</td>
</tr>
<tr>
<td>4 (30-40)</td>
<td>5</td>
<td>9.6</td>
<td>24</td>
</tr>
<tr>
<td>4 (40-50)</td>
<td>4</td>
<td>7.7</td>
<td>102</td>
</tr>
<tr>
<td>4 (50-60)</td>
<td>-</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>4 (60-70)</td>
<td>6</td>
<td>11.5</td>
<td>61</td>
</tr>
<tr>
<td>4 (70-80)</td>
<td>4</td>
<td>7.7</td>
<td>5</td>
</tr>
<tr>
<td>4 (80-90)</td>
<td>3</td>
<td>5.8</td>
<td>9</td>
</tr>
<tr>
<td>4 (90-100)</td>
<td>-</td>
<td>-</td>
<td>28</td>
</tr>
<tr>
<td>4 (100-110)</td>
<td>4</td>
<td>7.7</td>
<td>24</td>
</tr>
<tr>
<td>4 (110-165)</td>
<td>-</td>
<td>-</td>
<td>65</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>100</td>
<td>398</td>
</tr>
</tbody>
</table>

Table 3 - The distribution of the stone assemblage from Trench 79B according to depth.
Figure 4 - The distribution of the stone assemblage from Trench 79B according to depth
Table 4. The distribution of pebble tools according to depth in Trench 79B.

<table>
<thead>
<tr>
<th>Level</th>
<th>Bifacially flaked pebble tools</th>
<th>Truncated tools</th>
<th>Pebbles with one end flaked</th>
<th>Total assemblage</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 (0-10)</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>4 (0-10)</td>
<td>-</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>4 (10-20)</td>
<td>6</td>
<td>2</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>4 (20-30)</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>4 (30-40)</td>
<td>4</td>
<td>1</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>4 (40-50)</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>4 (50-60)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4 (60-70)</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>4 (70-80)</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>4 (80-90)</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>4 (90-100)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4 (100-110)</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>32</strong></td>
<td><strong>11</strong></td>
<td><strong>9</strong></td>
<td><strong>52</strong></td>
</tr>
</tbody>
</table>
Table 5. Means, standard deviations, medians and ranges for three groups of pebble tools, Trench 79B.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Group A n = 32</th>
<th>Group B n = 11</th>
<th>Group C n = 9</th>
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<tbody>
<tr>
<td><strong>Length</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$X$</td>
<td>94.0</td>
<td>56.8</td>
<td>93.4</td>
</tr>
<tr>
<td>$sd$</td>
<td>16.2</td>
<td>15.7</td>
<td>15.4</td>
</tr>
<tr>
<td>median</td>
<td>89.5</td>
<td>52.0</td>
<td>92.0</td>
</tr>
<tr>
<td>range</td>
<td>69.5-85</td>
<td>36-86</td>
<td>69-116</td>
</tr>
<tr>
<td><strong>Breadth</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$X$</td>
<td>64.3</td>
<td>74.4</td>
<td>65.3</td>
</tr>
<tr>
<td>$sd$</td>
<td>8.8</td>
<td>10.8</td>
<td>12.2</td>
</tr>
<tr>
<td>median</td>
<td>62.0</td>
<td>77.0</td>
<td>68.0</td>
</tr>
<tr>
<td>range</td>
<td>47-85</td>
<td>57-94</td>
<td>50-81</td>
</tr>
<tr>
<td><strong>Thickness</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$X$</td>
<td>18.3</td>
<td>20.5</td>
<td>32.0</td>
</tr>
<tr>
<td>$sd$</td>
<td>5.5</td>
<td>4.1</td>
<td>10.2</td>
</tr>
<tr>
<td>median</td>
<td>17.5</td>
<td>20.0</td>
<td>33.0</td>
</tr>
<tr>
<td>range</td>
<td>8-32</td>
<td>13-26</td>
<td>10-46</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$X$</td>
<td>118.2</td>
<td>87.3</td>
<td>246.8</td>
</tr>
<tr>
<td>$sd$</td>
<td>61.4</td>
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</tr>
<tr>
<td>median</td>
<td>106.5</td>
<td>63.0</td>
<td>228.0</td>
</tr>
<tr>
<td>range</td>
<td>53-318</td>
<td>28-180</td>
<td>75-404</td>
</tr>
<tr>
<td><strong>Edge-angle</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$X$</td>
<td>57.7</td>
<td>60.9</td>
<td>61.3</td>
</tr>
<tr>
<td>$sd$</td>
<td>15.4</td>
<td>13.9</td>
<td>16.8</td>
</tr>
<tr>
<td>median</td>
<td>61.0</td>
<td>61.0</td>
<td>65.0</td>
</tr>
<tr>
<td>range</td>
<td>25-82</td>
<td>31-84</td>
<td>30-88</td>
</tr>
</tbody>
</table>

| $\frac{B}{T} \times 100$ |                |                |              |
| $X$       | 378.0          | 377.0          | 226.7        |
| $sd$      | 114.9          | 96.8           | 129.5        |
| median    | 364.2          | 334.7          | 218.5        |
| range     | 200-712.5      | 280-592.3      | 119.6-500    |

| $\frac{B}{L} \times 100$ |                |                |              |
| $X$       | 69.0           | 137.0          | 70.4         |
| $sd$      | 10.3           | 28.9           | 23.8         |
| median    | 70.9           | 146.3          | 56.6         |
| range     | 49-85.4        | 94-183.3       | 48.1-117.3   |

Group A - Bifacially flaked pebble tools
Group B - Truncated pebble tools
Group C - Complete pebbles with one end flaked
Three of the four groups of pebble tools from Trench 79B are now discussed metrically. These are:

1. Group A - the bifacially flaked whole-pebble and pebble-flake tools
2. Group B - the truncated pebble tools
3. Group C - pebbles with one end flaked to give a sharp edge.

The single unifacially flaked pebble tool is excluded from the analysis.

In doing this analysis, I am aware that the small sample size may diminish the strength of the statistical results. Therefore, the analysis is simply descriptive, and only basic dimensions such as length, breadth, thickness, weight, and other features which might reflect technological tradition or function are taken into consideration.

The basic dimensions of the three groups of pebble tools are shown in Table 5, together with means, standard deviations, medians and ranges. The dimensions are then plotted graphically for each group in Figures 5 to 10. Using these Figures and Table 5, the following observations can be made. The lengths of the bifacially-flaked pebble tools (group A) and the pebble tools with one end flaked (group C) do not show significant differences, although the truncated tools (group B) are naturally much shorter. However, breadths of the truncated tools are a little larger than those of the other two groups. Thicknesses of the bifacially-flaked pebble tools and the truncated tools do
not vary significantly, although the pebble tools with one end flaked are much thicker, and also much heavier, owing perhaps to the relative absence of surface flaking.

In Figure 9 it can be seen that the majority of the edge-angles of all pebble tools fall between 50 and 80°, and means for the three groups are about 60°. However, the edge-angles of the bifacially-flaked tools are slightly bimodal, with peaks at 30-39° and 60-69°. Therefore, the finer edges, possibly better suited to cutting rather than scraping or chopping, are confined to this group.

In Figure 10 it can further be seen that about 70% of the bifacially-flaked pebble tools have sharp edges right around their peripheries, while the truncated pebble tools have sharp edges round only 50-90% of their peripheries (owing to the truncation), and the group C pebbles possess much smaller proportions of edge (under 50%).

Analysis of the extent of flaking on the surfaces of the bifacially-flaked pebble tools showed that about 84% of faces 2\(^{16}\) had been fully worked (leaving no cortex on their surfaces), but only 25% of faces 1 had been so finished. The majority of faces 1 (65%) were flaked over 50 to 99% of their surfaces (see Table 6).

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16 - see page 65 for the definition of faces 1 and 2.
Table 6. The extent of flaking on the faces of bifacially-flaked pebble tools, Trench 79B.

<table>
<thead>
<tr>
<th>Extent of flaking (%)</th>
<th>face 1</th>
<th>face 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n.</td>
<td>%</td>
</tr>
<tr>
<td>100</td>
<td>8</td>
<td>25</td>
</tr>
<tr>
<td>50 - 99</td>
<td>20</td>
<td>62.5</td>
</tr>
<tr>
<td>less than 50</td>
<td>4</td>
<td>12.5</td>
</tr>
</tbody>
</table>

An analysis of the disposition of the sharp edges on the margins of the bifacially-flaked pebble tools was also undertaken. 53% of these tools have sharp edges around their whole peripheries, and another 31% have sharp edges on one end and both sides (see Table 7). Therefore, the bulk of these group A tools were clearly edged around well over half of their peripheries.

Table 7. The dispositions of sharp edges on the bifacially-flaked pebble tools, Trench 79B. (E = end, S = side)

<table>
<thead>
<tr>
<th>Disposition of sharp edge</th>
<th>n.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>2</td>
<td>6.4</td>
</tr>
<tr>
<td>ES</td>
<td>1</td>
<td>3.2</td>
</tr>
<tr>
<td>EE</td>
<td>1</td>
<td>3.2</td>
</tr>
<tr>
<td>ESS</td>
<td>10</td>
<td>31.0</td>
</tr>
<tr>
<td>ESE</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>EES</td>
<td>1</td>
<td>3.2</td>
</tr>
<tr>
<td>ESES</td>
<td>17</td>
<td>53.0</td>
</tr>
</tbody>
</table>
As noted above, it is at present not possible to use these attribute descriptions for the 1979 Gua Cha Hoabinhian assemblage for comparison with assemblages from other Malayan sites, or even from the Gua Cha 1954 excavations, owing to lack of published and unpublished data. However, the Gua Cha Hoabinhian assemblage can be described in general terms as a pebble-tool industry with a negligible flake-tool component, and the pebble tools themselves are predominantly bifacially-flaked river pebbles worked around most of their peripheries. In actual fact, the degree of standardization is very high, although this may reflect little more than selection of pebbles of a restricted size range for manufacturing purposes.
Figure 5 - Lengths of pebble tools from Trench 79B
Figure 6 - Breadths of pebble tools from Trench 79B
Figure 7 - Thicknesses of pebble tools from Trench 79B
Figure 8 - Weights of pebble tools from Trench 79B
Figure 9 - Edge-angles of pebble tools from Trench 79B
Figure 10 - Edge-ratios of pebble tools from Trench 79B
- percentage of the total periphery which was flaked
CHAPTER VI

THE ANALYSIS OF THE POTTERY AND OTHER REMAINS

A. Pottery

Pottery is common in many archaeological sites in the Malay Peninsula, but Gua Cha has yielded by far the greatest number of undamaged vessels from stratified contexts\(^{17}\). The richness of the Gua Cha pottery was first revealed by Noone in 1939, when he excavated 'nests' and 'alignments' of pottery (Noone 1939:173). In the 1954 excavations Sieveking recovered at least one hundred complete vessels, either intact or easily reconstructed from fragments; the majority of these were associated with burials or occurred as 'votive' deposits (Sieveking 1954:121; 1954a:89). Most of the pottery excavated by Sieveking from Gua Cha has been illustrated elsewhere (Sieveking 1954a:109-127; Peacock 1959; Tweedie 1970; Al-Rashid 1969).

The Gua Cha vessels show great diversity of form, and range from simple round-bottomed bowls to more sophisticated and highly-developed footed and carinated forms (Sieveking 1954:121). Some of the Gua Cha pottery differs markedly from that in other collections from the Malay Peninsula, and as Tweedie has noted:

"... the most conspicuous of the Gua Cha forms was a kind of footed dish. The elaborately ornamented beaker is quite

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\(^{17}\) Another important site which has produced a lot of high quality pottery is Bukit Tengku Lembu in Perlis. However, this site was almost destroyed when P.D.R. Williams-Hunt (1952) undertook rescue work. In no way could the pottery be associated with the stratigraphy of the site.
88.

An interesting feature of the Gua Cha vessels is the presence in many of them of perforations just below the rim in pairs or in groups on opposite sides" (Tweedie 1970:17).

Numerous attempts have been undertaken to compare the Gua Cha pottery with that from other regions of Southeast Asia (cf. Sorensen 1972; Solheim 1959; Wall 1962; Sieveking 1963). Although affinities have been demonstrated with the Ban Kao ceramic tradition of central-west Thailand, Gua Cha still maintains some independence, which may be explained through regional development and perhaps chronological difference (Sorensen 1972:470). Wall (1962) has tried with little success to demonstrate affinities between the pottery from Gua Cha and Niah Cave in Sarawak, but even the sherds from the nearby Malayan sites of Gua Kechil (Dunn 1964) and Bukit Tengku Lembu (Sieveking 1962) have certain different characteristics indicating a degree of local development.

The Gua Cha pottery has so much variation in form that it is extremely difficult to summarise it briefly (Solheim 1959:179), but in general the forms present include shallow wide-mouthed bowls, footed vessels, carinated vessels, globular vessels, bucket-shaped containers, beakers, pot stands, jars and perforated cups (Peacock 1959:145). However, in contrast to this diversification in form, surface decoration is much more homogeneous. Over 90% of the pottery excavated by Sieveking has cord-marking, either over the whole pot or confined to the bottom portion, in which case the upper part is left plain, or sometimes burnished or polished. Some vessels are also red-slipped. Surface
treatment other than cord-marking is rare, but includes incision and carved paddle, shell- or comb-impression. Design motifs are simple, except for one beaker which has incised spiral designs and comb-impressed decoration (see Sieveking 1954a:110; text-fig. 9). Rims are in most cases everted, often complex and polished, and may have parallel horizontal grooves indicative of slow-wheel production.

Sieveking made no detailed study of the material excavated by him, apart from illustrating the complete vessels in his report. Peacock (1959) has published a further study of the complete vessels, and Al-Rashid (1969) has analysed the sherds from Sieveking's excavations which are stored in the National Museum in Kuala Lumpur. Other than classification into various types and categories, nothing of significance was derived from these analyses owing to the absence of stratigraphic data (Peacock 1959:127; Al-Rashid 1969:76). However, in spite of these shortcomings, the Gua Cha pottery still has much to reveal on Malayan prehistoric pottery in particular, and on Southeast Asian pottery in general.

From the stratigraphy of the Neolithic burials and the vessels associated with them, Sieveking (1954a:89, 107) distinguished two pottery traditions in the Neolithic occupation of Gua Cha, which he termed Primitive and Advanced. The pottery of the Primitive Tradition associated with burials 1 and 2 was described as irregular in shape, roughly built by hand, and in some cases poorly fired. That of the Advanced Tradition displays a more sophisticated treatment
and greater skill in manufacture. Shapes were elaborated to include the carinated and footed forms and most were produced by using a slow wheel (Sieveking 1954a:89). In addition, one or two cord-impressed vessels of simple design may illustrate continuity between the two traditions.

Unfortunately, the 1979 excavations were too small in scale to answer many of the questions left unanswered by previous analyses. Nevertheless, the new information is useful for the interpretation of the general prehistory of Gua Cha. Over 95% of the sherds recovered in 1979 came from Trench 79A, and very few were recovered from Trench 79B, apart from two almost complete but broken vessels (see Plates 8 and 9). Sherds were found throughout Trench 79A to a depth of 80 centimetres, whereas in Trench 79B they were confined to layers 1 to 3 only. Very slight overlap occurred between pottery and Hoabinhian tools at the top of layer 3 in Trench 79B, but this could easily be due to minor scuffing of the deposits. In Trench 79A, the main concentration of pottery occurred between 30 and 50 centimetres, and some evidence of overlap with the Hoabinhian occurred between 70 and 80 centimetres. However, this overlap is rather unconvincing since only 1.6% of the total of 79A sherds occurred at this level. Furthermore, no sherds occurred below, whereas Hoabinhian tools became quite numerous. As may be noted from the stratigraphy of Trench 79A (see page 46), this slight overlap is probably the result of stratigraphic disturbance of the alluvial deposits.

It is unfortunate that the majority of the 1979 sherds are very fragmentary, and the largest measures only
5 by 6 centimetres. Out of a total of 580 sherds, over a hundred belong to rims and lips. An attempt was made to group sherds from individual vessels using similarities in appearance, consistency and texture, but this did not prove fruitful. Special attention was paid to thicknesses and colours of sherds, although these criteria may not be always reliable (Harris 1979). In hand-made vessels wall thicknesses tend to vary, and colours change according to localised firing conditions on vessel surfaces. Some pots may also have two or more types of surface treatment (e.g. cord-marked base and plain upper parts). Therefore the outcome of this examination of the Gua Cha sherds was not encouraging, and very few rims could be definitely matched to body sherds.

The analysis of the 1979 sherds indicated the presence of a considerable number of vessels in fragmentary form, based on the large number of different rim fragments (see Figure 11). It is also apparent that only one stylistic assemblage is represented, and there are no indications of the two different traditions postulated by Sieveking (1954a: 89). Peacock has also rejected Sieveking's two-phase theory and has stated:

"... close investigation reveals little evidence in support of Sieveking's theory and some in direct contradiction" (Peacock 1959:126).

He also noted that three 1954 fragmentary burials (burials 3 - 6) associated with 'Primitive' pots occurred above the Neolithic flake layer, and one 'Advanced' burial occurred below it (Peacock 1959:127). The 79A trench produced no more burials which could throw further light on this matter, but
Figure 11 - Rims of pottery from Trench 79A and 79B according to depth
all the sherds belong to one stylistic tradition corresponding to the Advanced Tradition of Sieveking. Evidence for use of a slow wheel occurs throughout.

The analysis of the 1979 rim sherds shows that the majority are indirect everted, and the remainder probably direct, although the latter are hard to identify when only lips have survived. Lips are always rounded, and one burnished rim has a hole about one centimetre below its lip. Most rims are externally thickened, but only a few are thickened internally. The larger rim fragments allow measurements of orifice diameter, and it seems that most were about 20 centimetres, the largest being 26 centimetres. Two fragments of a pot-stand were also found in Trench 79A at a depth of 40 - 50 centimetres. This is cord-marked for a height of 2 centimetres from its base, and its diameter is 14 centimetres.

Of the 464 body sherds recovered in 1979, 342 are paddle-impressed, 113 are plain, and 9 are red-slipped. Six pieces have a red haematite stain on their insides indicating that the original vessel(s) might have been used for grinding or storing haematite. The body sherds also indicate that carved paddles and cord-bound paddles were used in surface treatment. The cords differed in size, ranging from fine to coarse, and were applied in parallel or crossed patterns. Carved paddle impressions are usually diamond-shaped. One technique used in the production of the Gua Cha pottery was to cord-mark the body, and then to wipe over the impressions, thus reducing their depth. (see Plate 15).
None of the 1979 pottery sherds were found definitely associated with human burials, and the two complete vessels in Trench 79B could be from a 'votive' deposit, or they could belong to a burial beyond the excavated area. The remaining sherds appear to result from habitation refuse discarded by the Neolithic settlers, and this suggests that the southern end of the shelter, south of the 'Menteri' stalagmite, was the part most extensively settled during the Neolithic period. To the north of the 'Menteri' the evidence for Neolithic habitation is much sparser. One possible explanation for this is that the southern half of the rock-shelter was lower, and possibly closer to water.

Two pieces of Chinese stoneware of apparently recent origin were found at a depth of 40 - 50 centimetres in 79A. Since they occur below the level of the 930 B.P. radiocarbon date from Sieveking's adjacent Cutting 3 there may be some slight stratigraphic disturbance involved. The earliest record of actual Chinese settlers in this region of Malaya dates only from the eighteenth century AD. (Middlesbrook 1933), although evidence for Chinese trade into coastal Malaya is much earlier (Gungwu 1958).

In conclusion, most of the sherds recovered in 1979 are of the types present in the 1954 Sieveking collections. Some slight indications of overlap with the Hoabinhian occur in the southern part of the shelter (Trench 79A), although this is most likely to be due to slight stratigraphic

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18 - The Orang Asli who assisted us in the excavation explained that the main criterion in choosing a habitation place or sleeping area in a rock-shelter is nearness to water, and this criterion may well have applied to the prehistoric inhabitants of Gua Cha.
disturbance. In Trench 79B there is no certain chronological overlap, and the conclusion from the 1979 excavations must be that the Neolithic represents a fairly sharp replacement of the Hoabinhian at Gua Cha at or soon after 1000 B.C. In no sense can it be regarded purely as a local outgrowth of the Hoabinhian. On the other hand, the 1979 excavations produced no evidence for any gap in occupation between the two periods, although such a gap was claimed by Sieveking from his 1954 excavations, particularly from the stratigraphy of his Cutting 1.

B. Human remains

Gua Cha is known to have been used as a major burial ground during the Hoabinhian and Neolithic periods. Sieveking (1954a) excavated 37 burials in all, 23 having Neolithic associations and 14 being Hoabinhian. In addition, Noone (1939) found at least 4 burials. The Neolithic burials were extended and normally accompanied by a rich grave furniture comprising pottery, stone bracelets, shell ornaments, bark-cloth beaters, beaked adzes, and beads of various types. No definite grave goods were reported from the Hoabinhian burials, which were identified according to stratigraphy, posture and condition of preservation, as well as anatomy (Sieveking 1954:127).

Three Hoabinhian burials, plus other skeletal fragments, were found in 1979. Because of time restrictions we were able to clean and remove only two of the burials, and the third was left covered with earth for future excavation. These are numbered burials 1, 2 and 3 in order of finding.
Burials 1 and 2 were taken to Canberra for analysis and some fragments of a fourth burial were identified there by David Bulbeck\(^{19}\) from bones adjacent to burial 1. In addition, four loose teeth belonging to at least three individuals were recovered (see Appendix 2 for a more detailed discussion). No Neolithic skeletal remains were excavated.

Burial 1

This is a young male adult, aged between 17 and 20, buried in a flexed position at a depth of 10 - 30 centimetres below the surface of layer 4 in Trench 79B. The burial is in a fair state of preservation, though slightly fossilised, and partially deformed. The skull was badly crushed and the right tibia and tarsal bones are missing.

The skull was found resting on a stone slab 'pillow', and since it was buried close to the surface the mandible and cranium are damaged (see Plate 12). A layer of white tufa chunks dusted with haematite powder covered the middle part of the body, over a soil cover about 10 centimetres thick. Several other pieces of bone were found a few centimetres in front of the burial and were at first thought to be accompanying grave food (see Plate 12). However, these bones were later identified as human, belonging to a separate individual designated as burial 4. It is interesting to note that burial 1 had its head towards the river (in an east-west orientation).

\(^{19}\) - David Bulbeck is a graduate student in physical anthropology in the Department of Prehistory and Anthropology, Australian National University. He is currently working on human remains excavated in Australia and Southeast Asia, including the 1979 remains from Gua Cha.
Burial 2

Burial 2 is of a female adolescent individual aged 13 to 16, found at a depth of 75-85 centimetres below the surface of layer 4 in Trench 79B. No clear disposition of the remains could be identified at the time of excavation, and it was then thought to be secondary. However, David Bulbeck's analysis indicates that it may have been a primary burial which suffered later disturbance. The face and the left arm are absent.

Burial 3

This is a typical and complete Hoabinhian flexed burial, which was found at a depth of 110-120 centimetres below the top of layer 4 in Trench 79B. Two flat slabs, one of limestone and one of waterworn black rock (see Plate 11) were found covering the burial across the central part of the body. The age and sex of the burial were not ascertained since it was not completely exposed or removed. 2 scapulae and one long bone, probably deer or bovid, were buried close to it in possible association.

Burial 4

This comprised only pelvis, lower limb and vertebrae fragments, and was found at the same level as burial 1 and very close to it. It was thought during excavation to be the remains of animal food buried with burial 1, but later analysis has shown that the bones belong to another human individual. The mode of burial is uncertain.
B.1 Gua Cha burial methods and population

The associations of Burials 1 and 3 are clearly of interest, since a simple ceremony was undoubtedly involved in both cases. The presence of a stone pillow under the skull of Burial 1 (see Plate 12), and the stone 'covers' over both burials clearly demonstrate this claim (see Plates 10 and 11). Less than ten centimetres of earth separated both burials from their respective covers, and this may have infiltrated beneath the stones as the bodies decayed and sank to a skeletal thickness. It is also possible that the bodies were each first covered with a thin layer of earth before their covers were laid in place. Such practices were also reported by Williams-Hunt (1952:183) for Hoabinhian remains at Gua Cha.

Fragmentary burial remains have been reported from all major archaeological sites in the Malay Peninsula, except for Gua Debu and Kota Tongkat (Matthews 1961:vii), and most of these remains have been analysed. Two questions of interest pertaining to the study of these Malayan remains concern the existence of any physical or racial differences between the Hoabinhians and the Neolithic people, and also whether it is possible to assign any of the remains to particular racial groups.

The human remains from Sieveking's excavation at Gua Cha came from both the Neolithic and the Hoabinhian layers. Concerning the former question, Trevor and Brothwell (1962), who examined the materials in detail, remarked that:
"... it is impossible to maintain on the present evidence that any appreciable divergence in physical type exists between the people who were buried in the Gua Cha rockshelter in Mesolithic and Neolithic times" (Trevor and Brothwell 1962:8).

The same result was also obtained from a biochemical analysis of the materials from Gua Cha, in which similarities in nitrogen contents and frequencies of A and B antigens were demonstrated for both groups (Kennedy 1964:78). Callenfels and Noone (1940) also reported a series of burials from Gua Baik, which they claimed represented different stages of Malayan prehistory, but Snell (1949), in summarising the results of his investigation of the burials, concluded that no clear indication of racial difference between the remains from the top and the middle layers was present, and regarded them as belonging to a single racial group.

Concerning the second question of racial affinity, Hunley (1863) was the first to publish an account of any Malayan skeletal remains, namely the samples from Guar Kepah 'excavated' by Earl (1863). He concluded that the material was very fragmentary for racial diagnosis, but felt that it was not Malay or Andamanese and instead attributed it to a Papuan population. Mijsberg (1940) analysed material excavated by Callenfels, Tweedie and Collings (Callenfels 1936) from the same site, and came to the conclusion that Guar Kepah mandible B 183 presented some Melanesoid features; 'one is compelled to admit that this really is a Palae-Melanesian jaw' (Mijsberg 1940:117). However, later studies of the same Guar Kepah material have resulted in the identification of many irregular features, and Jacob concluded that
the Guar Kepah population 'is a mixture of Mongoloid and Austromelanesian races' (Jacob 1967:76-77). Snell (1949) thought that the Gua Baik remains had Melanesian relationships, resembling very much living Melanesians and Papuans. Trevor and Brothwell (1962) also suggested Melanesian affinities for the Gua Cha remains. Duckworth (1934) was the only person to cite similarities with the Dravidian (or pre-Dravidian) Veddoid populations of South India, for skeletal remains from Perlis, Perak and Pahang.

Clearly, much more positive research is needed in order to attain any concrete conclusion pertaining to the study of prehistoric human remains from Malaya. Although certain skeletal features do show relationships with other extra-Malayan populations, 'to venture any definitive opinion regarding their racial status would be premature' (Trevor and Brothwell 1962:11). Unfortunately the human remains from the 1979 excavation were too limited and poorly preserved to allow any further racial comparisons to be made.

David Bulbeck's analysis of the 1979 skeletal remains has revealed similar features to those noted by Trevor and Brothwell for the 1954 Gua Cha materials. The dentition of Burial 1 shows that attrition occurred rapidly, and that caries were common. It also indicates that the Hoabinhian people had a well-balanced diet which included animal protein, fibrous starchy vegetables, and quite a high proportion of sweet food, specifically honey and fruits. As for stature, Bulbeck calculates that the Hoabinhians were a middle-sized people, taller than the present-day Orang Asli of the upland rain forests.
C. **Food remains**

The food remains recovered in the 1979 excavations comprise animal bones and teeth, shells, carbonised rice (*Oryza* sp.) and organic remains obtained through flotation.

C.1 **Animal remains**

The identification of the animal remains was carried out mainly on teeth, which have survived in considerable quantities. Most bones were too fragmentary for definite identification. Twenty-one species and sub-species representing sixteen groups have been identified by Dr Colin Groves and Vernon Weitzel, both from the Department of Prehistory and Anthropology, The Australian National University (see Tables 8 and 9). Their assistance is hereby acknowledged with thanks.

Most of these remains come from the middle levels of both trenches; 40-80 centimetres below the top of layer 4 in Trench 79B, and 40-50 centimetres below surface in Trench 79A, and they tend to diminish in the upper layers. A similar trend in which bone remains decrease in the later levels has also been recorded at Gua Kechil, where it has been interpreted as indirect evidence for the practice of agriculture (Dunn 1964:120). The presence of *Bos*, presumably seladang (*Bos gaurus*), in the collection is of interest here. The distribution of the seladang in Malaya is said to be a result of the spread of shifting agriculture, which involves the development of secondary vegetation such as *lalang* grass, a habitat favourable to these animals, even at high altitudes.
Thus, if the presence of seladang in this region is synonymous with the clearance of forest, then this evidence may reflect early cultivation in the nearby areas around Gua Cha.

Sieveking (1954a) reported that some twenty-five heaps of mainly juvenile pig bones were found in the Hoabinhian layers in his Cutting 1 at Gua Cha. Evidence of this nature could be taken to indicate incipient pig domestication (Bellwood 1978:68), although it does not rule out the possibility of large scale hunting at river crossings during the mass migrations of the bearded-pig (Sus barbatus). According to the 1979 excavations, pigs, including the banded pig (Sus scrofa), formed the main meat supply of the Gua Cha inhabitants from the earliest phase to the top of the site.

Most of the pig bones found in the 1954 excavations at Gua Cha belonged to immature individuals (Sieveking 1954a: 101), and interestingly most of the bones of larger game found in 1979 are of young animals (Colin Groves: personal communication). To cite an example, one upper milk molar and one milk canine were the only bones of the sun-bear (Helarctos malayanus) to be represented. Such evidence may suggest the practice of selective hunting by the inhabitants of Gua Cha, and it may reflect the level of hunting technology. With small groups and a simple technology the hunting of larger and mature game becomes more difficult, although rhinocerous was identified from the remains in the 1954 excavation (Hooijer 1962). The presences of gibbons (Hylobates lar), monkeys (Trachypithecus sp.) and other primates are also of interest, especially in their implications.
Table 8. Distribution of animal remains from Trench 79B.

<table>
<thead>
<tr>
<th>Animal Species</th>
<th>Level 1 (0-10)</th>
<th>Level 2 (10-20)</th>
<th>Level 3 (20-30)</th>
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Table 9. Distribution of animal remains found in Trench 79A

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for hunting methods. Spears are ineffective for hunting these arboreal primates, and blowpipes are thought to be a recently introduced weapon among the Negritos of the Gua Cha area (Endicott 1969). The use of the bow and arrow is a possibility, perhaps with bamboo arrows since there is little evidence for stone projectile points other than those reported by Callenfels (1936), Collings (1938) and Evans (1930, 1931).

Most of the species represented at Gua Cha are typical of those found in other Hoabinhian sites (see Gorman 1970:307, Table 2, for comparisons of faunal remains from other Southeast Asian Hoabinhian sites). All are members of the existing fauna of the region.

C.2 Shell

The shell remains from Gua Cha were identified by John Stanisic, Curator of Molluscs, Queensland Museum, as follows:

Family THIARDAE

Melanoides cf. plicara (Bonn 1980) FW
Brotia costula (Rafinesque 1933) FW
Melanoides granifera (Lamarck 1922) FW
Melanoides cf. tuberculata FW

Family CYCLOPHORIDAE

Cyclophorus cf. pendix (Broderip & Sowerby 1930) T

Family VIVIPARIDAE

Bellamya sp. FW

20 - I would like to express my appreciation to Mr Ken Heffernan for introducing Mr John Stanisic of the Queensland Museum, who had kindly helped to identify the shell remains.
Family CAMAENIDAE
   Amphidromus perakensis (Fulton 1901)  T
Family ARIOPHANTIDAE
   Dyakia ?janus (Beck 1837)  T
Family UNIONIDAE
   Pseudodon sp.  FW

These shells belong to both fresh-water (FW) and terrestrial (T) habitat groups. Melanoides was the most common species in the diet of the inhabitants of Gua Cha. Shells of these and other gastropods have had their apices smashed off, perhaps to enable easy sucking of the flesh from the shell, although such damage can also occur naturally during life (Peter Bellwood: personal communication). In the 1954 excavations Sieveking also found marine shell artifacts, such as bracelets made from Tricadna shells and spoons made from bivalve mussel shells (Mytilus viridis L.), but these were found in association with the Neolithic burials, presumably as part of the grave furniture.

It is quite interesting to note the lack of marine food shells in the Hoabinhian deposits at Gua Cha, indicating that the inhabitants appear to have had little contact with their contemporaries living near the coast.

C.3 Carbonised rice (Plate 14)

Carbonised rice was first detected in 1979 in the section of Sieveking's Cutting 3, in a hearth on the interface between layers 2 (the upper silt) and 3 (the 'black and stony layer'). Sieveking did not mention the finding of rice in his report, so it must have been either not noticed or not
thought significant. The rice was plentiful, and a sample has been radiocarbon dated to 930 ± 100 B.P. (ANU-2216). In the extension part of Trench 79A, more loose carbonised rice was collected, apparently from the same level as that in Sieveking's Cutting 3. The rice was identified by Dr D.E. Yen as *Oryza sativa* L., presumably of the Indica type\(^2\) (see Appendix 4).

C.4 The flotation samples

Flotation samples were taken from the deposits in Trenches 79A and 79B, by floating out organic remains from sieved soil in buckets of river water. The samples were dried on polythene sheets, then examined in Canberra under a binocular microscope. Apart from the rice mentioned above, no other cereal remains were noted, and the samples appeared to consist only of charcoal pieces and fragments of insects.

21 - The service rendered by Dr D.E. Yen is hereby acknowledged with great appreciation.
CHAPTER VII

SUMMARY AND CONCLUSIONS

The 1979 excavations at Gua Cha were very brief, yet the evidence obtained is of considerable importance, since it has helped to elucidate some of the controversial issues raised by Sieveking's report on his 1954 excavations. However, at this point, I would suggest that more detailed and systematic research be done in the near future, in order to get a more complete and definite picture of the prehistory of the site.

The natural stratigraphy of Gua Cha was observed in 1979 to be similar to that recorded by Sieveking in 1954, except that all the soil deposits are now known to be alluvial in origin, including the 'chocolate brown earth', which Sieveking (1954a:103) considered to be a humus formation. During the early period of sedimentation within the shelter the rate of deposition was probably high, but it became more sporadic in the later periods as the ground level rose. The stony horizons in the deposit probably marked long periods when flooding did not occur and roof-fall debris was allowed to become concentrated. However, the upper part of the deposit clearly shows the effects of flooding within historical times, perhaps due to deforestation in the region traversed by the Sungai Nenggiri.

Two main periods of habitation, the Hoabinhian and the Neolithic, occurred in the shelter, with traces of modern and historical evidence in the top layers. The Hoabinhian proved to be an industry of an advanced and late type, as
evidenced by the well-made pebble tools with sharp edges flaked all round their peripheries. The total assemblage of the Hoabinhian has been classified into three main categories, namely pebble tools; flakes, cores and chunks; and unflaked pebbles. The homogeneity of the pebble tools, and the relative lack of flake tools, is typical of the Gua Cha Hoabinhian and most other Hoabinhian sites in the Malay Peninsula.

The Hoabinhians of Gua Cha were hunters and gatherers. A considerable quantity of animal bones was found in the Hoabinhian layers, mainly of pigs, primates and wild cattle, and it has been suggested that the inhabitants practised either selective or mass hunting of pigs (Bellwood 1976:163). Because of the absence of marine shells in the deposits, it is probable that the Gua Cha Hoabinhians foraged only the mountain valleys of the interior of the Malay Peninsula, and had no contact with their coastal counterparts. This is a point of some interest, because during the Neolithic such contacts did exist, as evidenced by the marine shell spoon found in association with a Neolithic burial (Sieveking 1954a:88).

There is no evidence of cultivated plant remains in the Hoabinhian layers at Gua Cha, although the flotation samples have not been studied by a professional botanist. It is worth noting here that taro was seen growing unattended along the bank of the Sungai Nenggiri adjacent to Gua Cha, and this plant may have been a major source of food for the cave inhabitants in the past.
According to the 1979 excavations, the burial practices of the Hoabinhians of Gua Cha included partial covering of the corpse by a layer of flat stone slabs or tufa lumps; such covers were not found on any of the burials excavated in 1954. In one instance the skull (of Burial 1) was placed on a stone pillow, and both complete 1979 Hoabinhian burials were in flexed positions, although extended burials were also found in 1954.

Succeeding the Hoabinhian is the Neolithic, and it was found that there is no real break in stratigraphy between the two occupations, although neither is there any convincing evidence for chronological overlap. This means that there is no evidence to suggest that the Neolithic evolved locally from the Hoabinhian at Gua Cha. Since there are no significant differences in physical features between the Hoabinhian and Neolithic populations of the site (Trevor and Brothwell 1962:8; Kennedy 1964), the change in lifestyle did not apparently involve any major change of population. It is assumed that the evolution from Hoabinhian to Neolithic took place elsewhere, and the Hoabinhians of Gua Cha might have acquired the new types of artifacts, especially pottery, from their contemporaries in southern Thailand.

The relative rarity of Neolithic occupation material at Gua Cha indicates that people at this time did not live constantly in the shelter, but used it mainly for burials. The site has produced a quantity of complete pottery, although in 1979 only fragments were found. Complete pots were found in 1954, either as grave furniture or as votive deposits.
(Sieveking 1954a, Noone 1939), and the assemblage has been related to the Ban Kao Neolithic culture of the second millennium B.C. in southern Thailand (Sorensen 1972).

The occurrence of carbonised rice in the upper layers of the site has been dated to about 900 B.P. It is uncertain whether this rice was actually cultivated in the vicinity of Gua Cha, and it may be that it was either traded in by the Orang Asli, or brought to the shelter by traders seeking forest products. Such situations might also explain the presence of the Chinese stoneware sherds in the same upper levels.

The 1979 carbon-14 dates suggest that the Hoabinhians were already settled at Gua Cha by about 8-9000 years ago. The question now arises of whether any of the present inhabitants of West Malaysia can trace an ancestry back to this period, and it is quite clear that one can rule out the Malays and other Austronesian speakers of the Peninsula on the grounds of linguistic and historical geography. However, Gua Cha is situated on the boundary between two groups of Orang Asli; the Temiar Senoi to the west, and the Semang Negritos to the north and east (see Map 4). Both these groups speak Aslian languages within the Austroasiatic family, and these languages, together with Mon and Khmer, have an ancestry within southern Mainland Southeast Asia which is much older than that of the now-dominant Thai and Malay. Thus, the prehistory of Gua Cha must almost certainly be related to that of the Orang Asli. As Benjamin (1980 - Ms.: see footnote 15) says:
Map 4 - Orang Asli groups of the Malay Peninsula
"Gua Cha is situated at a meeting point of the furthest known geographical extents of the Semang, Senoi and Malay cultures in historical times in that part of Kelantan; while it may be due to pure coincidence or sampling error, it is tempting to see the archaeological findings as evidence of some kind of boundary between foragers (Hoabinhian) and horticulturalists (Neolithic) established already some 3000-4000 years ago. There is little reason to doubt that the Semang and Senoi are the modern descendants of the population that produced the Gua Cha remains".

That the present Orang Asli are the descendants of the Hoabinhians has gained support from many scholars. As Rambo (1979:61) says:

"The links between prehistoric man and the present day inhabitants of the Malaysian rain forest, the Aborigines or Orang Asli, ..., have not yet been traced, but it is probable that the modern day Negrito and Senoi are descended from the Hoabinhians of the late Pleistocene-beginning Holocene period"

This idea is also discussed in greater detail by Solheim (1980), who suggests that the ancestors of the Semang Negritos and the Senoi were two contemporary Hoabinhian groups living in different niches, the Semang being the descendants of the coastal Hoabinhians who produced the Guar Kepah shell mounds, while the ancestral Senoi lived in the interior mountain valleys. Archaeologically, the Hoabinhian culture of the interior developed into the Neolithic archaeological culture, with the additional elements being brought in by water moving people who came looking for metal ore (Solheim 1980:70). The latter people probably also introduced southern Mongoloid genes to the evolving Senoi, thus explaining the different physical and racial features of the Semang and Senoi today. Furthermore, the change from Hoabinhian to Neolithic at Gua Cha took place about 3000 years.
ago, a date which, according to Benjamin (1976), corresponds to that for the final break-up of the mesh of communication linking the northern Aslian (Semang) languages with the central Aslian (Senoi) languages.

The question now arises, in looking at relationships between the Hoabinhian-Neolithic cultures and the present Orang Asli, of the cessation of pottery manufacture. Neolithic pottery has been found in abundance at Gua Cha and other Malayan sites, but when and why its manufacture ceased is unknown. The Orang Asli have no knowledge of pottery making now, and Solheim (1980:72) cites the Polynesian parallel, in which the early Polynesians made good pottery until about A.D. 300, whereupon its manufacture ceased. There is, as yet, no good explanation for this cultural loss in either area.

From the results of the 1979 excavations, it has been observed that there was no apparent lapse in the occupation of the rock-shelter between the Hoabinhian and the Neolithic, as had been claimed by Seiveking in 1954. It has also been argued that the Hoabinhian and the Neolithic cultures of Gua Cha were the products of the same people, and that the prehistory of Gua Cha and other sites with similar remains is basically that of the Orang Asli. The Indianised civilizations and maritime trade of coastal Malaya had no real impact in this part of the Peninsula, and neither had the Malays until very recent times.
Abbreviations:

AP - Asian Perspectives
APAO - Archaeology and Physical Anthropology in Oceania
BRM - Bulletin Raffles Museum
3CPFE - Proceedings of the Third Congress of the Prehistorians of the Far East
FMJ - Federation Museums Journal
JFMSM - Journal of the Federated Malay States Museums
JMBRAS - Journal of the Malaysian Branch, Royal Asiatic Society, or
- Journal of the Malayan Branch, Royal Asiatic Society
JSBRAS - Journal of the Straits Branch, Royal Asiatic Society
MQRSEA - Modern Quaternary Research in Southeast Asia
BIBLIOGRAPHY

AL-ATTAS, S.H.,
1964 - Archaeology, history and the social sciences in Southeast Asia, FMJ 9:21-31

AL-RASHID, M.I.,
1969 - A note on the Gua Cha small sherds, FMJ 14:76-88
1973 - Malaysian prehistory - a review in Agrawal, D.P. and A. Ghosh (eds) Radiocarbon and Indian Archaeology, Bombay, TATA Institute of Fundamental Research, pp.88-95

BAKER, A.C.,
1933 - An account of a journey from Cameron Highlands to the east coast railway and of a visit to the Temiar settlement in the valleys of Sungai Blatep and Sungai Ber, JMBRAS 11(2): 288-295

BELLWOOD, P.S.,
1978 - Man's conquest of the Pacific, Auckland, Collins.

BENJAMIN, G.,
1980 - Semang, Senoi, Malay: Culture-history, kinship and consciousness in the Malay Peninsula, unpublished manuscript

BORISKOVSKY, P.I.,

BRANDT, R.W.,
1976 - The Hoabinhian of Sumatra, MORSEA 2:49-52

CALLENFELS, P.V. van Stein,
1936 - A remarkable stone implement from the Malay Peninsula, BRM (ser.B) 1:38-40
CALLENFELS, P.V. van Stein,
1936a - An excavation of three kitchen middens at Guak Kepah, Province Wellesley, Straits Settlement, BRM (ser.B) 1:27-37
1936b - The Melanesoid civilisation of Eastern Asia, BRM (ser.B) 1:41-51

CALLENFELS, P.V. van Stein and I.H.N. Evans,

CALLENFELS, P.V. van Stein and H.D. Noone,
1940 - Report on an excavation in the rock-shelter Gol Ba'it, Sungei Siput (Perak), 3CPFE:119-125

CAREY, I.,
1976 - Orang Asli - the Aboriginal tribes of Peninsular Malaysia, Kuala Lumpur, Oxford University Press.

CHANG, K.C.,

CHENG, T.K.,
1959 - Archaeology in China: prehistoric China, Cambridge, Heffer

COLLINGS, H.D.,
1936 - Report on an archaeological excavation in Kedah, Malay Peninsula, BRM (ser.B) 1:5-16
1938 - Note on a stone arrow head from Kedah, BRM (Ser.B) 2:121
1938a - A collection of stone tools in the Raffles Museum from the Kuantan district, BRM (ser.B) 1(2):124-137
1938b - Note on a recent paper 'The Melanesoid civilisation of eastern Asia, BRM (ser.B) 2:122-123
1938c - A Pleistocene site in the Malay Peninsula, Nature 142:575-576
1938d - An excavation at Bukit Chuping, Perlis, BRM (ser.B) 1(2):94-119

DANI, A.H.,
1960 - Prehistory and protohistory of eastern India, Culcatta

DOBBY, E.H.G.,
1966 - Southeast Asia (9th edition), London, University of London Press
DUCKWORTH, W.L.H.,
1934 - Human remains from rockshelters and caves in Perak, Pahang and Perlis and from Selingsing, JMBRAS 12:149-167

DUNN, F.L.,
1964 - Excavations at Gua Kechil, Pahang, JMBRAS 37(2):87-124
1975 - Rainforest collectors and traders; a study of resource utilisation in modern and ancient Malaya, Monograph No. 5, Malayan Branch, Royal Asiatic Society

EARL, W.G.,
1863 - On the shell-mounds of Province Wellesly, in the Malay Peninsula, Transactions of Ethnological Society 2:119-129

ENDICOTT, K.,
1969 - Negrito blowpipe construction on the Lebir River, Kelantan, FMJ 14:1-36

EVANS, I.H.N.,
1920 - Cave dwellings in Pahang, JFMSM 9(1):37-52
1926 - A hoard of stone implements from Batu Gajah, JFMSM 12(2):67
1927 - The ethnology and archaeology of the Malay Peninsula, Cambridge University Press
1930 - On a stone spearhead from Kelantan, JFMSM 15(1):1-3
1930a - An ancient kitchen midden in Province Wellesley, JFMSM 15(1):15-18
1931 - Excavations at Nyong, Tembeling River, JFMSM 15(2):51-62
1931a - A stone spearhead from Pahang, JFMSM 15(2):65
1937 - 'Melanesoid' culture in Malaya, BRM (ser.B) 3:141-146

FERGUSON, W.C.,
1980 - Edge-angle classification of the Quininup Brook implements: testing the ethnographic analogy, APAO 15(1):56-72

FISHER, C.A.,
1964 - Southeast Asia; a social, economy and political geography, London, Methuen

GHOSH, A.K.,
1971 - Ordering of Lower Palaeolithic traditions in South and Southeast Asia, APAO 6(2):87-101


1971 - The Hoabinhian and after: subsistence patterns in Southeast Asia during the late Pleistocene and early recent periods, *World Archaeology* 2:300-320


1964 - *Malaysia - a survey*, Melbourne, F.W. Cheshire

1971 - Quaternary shorelines in West Malaysia and adjacent parts of the Sunda shelf, *Quaternaria* 15:333-343


1886 - The Stone Age in Perak, *JSBRAS* 3:62

1888 - Notes on stone implements from Perak, *Journal of Anthropological Institute of Great Britain and Ireland*, 17:66

1979 - Prehistoric pottery from Batu Edjaja, Southwest Sulawesi; a descriptive analysis, unpublished B.A. (Hons.) thesis, Department of Prehistory and Anthropology, Faculty of Arts, A.N.U.

1975 - Tampan - Malaysia's Palaeolithic reconsidered, *MQRSEA* 1:53-70

1959 - *The Stone Age of Indonesia*, 's-Gravenhage

1967 - Archaeological excavation in Thailand, volume 1, Sai Yok: stone age settlement in Kanchanaburi province, Copenhagen, Munksgaard

1945 - Prehistoric research in the Netherlands Indies, in Honig, P., and F. Verdoen (eds) *Science and Scientists in the Netherlands Indies*, New York, pp.129-167

1964 - The Environment, in *Gungwu*, *Malaysia - a survey*, Melbourne, F.W. Cheshire
HOOIJER, D.A.,
1962  -  Rhinoceros Sondaicus Desmarest from the Hoabinhian of Gua Cha rockshelter, FMJ 7:23-24

1975  -  Quaternary mammals, west and east of Wallace's line, MORSEA 1:53-70

HUTTERER, K.L.,
1976  -  An evolutionary approach to the Southeast Asian culture sequence, Current Anthropology 17(2):221-242


HUXLEY, F.W.,
1863  -  Letter on the human remains found in the shell mounds, Transactions of the Ethnological Society, (n.s.) 2:265-266

ISAAC, G.W.,
1977  -  Olorgesailie-archaeological studies of a Middle Pleistocene Lake basin in Kenya, Chicago, University of Chicago Press

JACOB, T.,
1967  -  Some problems pertaining to the racial history of the Indonesian region, Utrecht, Drukkerij Neerlanda

KENNEDY, K.A.R.,
1964  -  A biochemical analysis of human remains from Gua Cha, Kelantan, Malaysia, Man 64:77-78

LAMB, A.,
1964  -  Early history, in Gungwu, W., Malaysia - a survey, Melbourne, F.W. Cheshire

LAMPERT, R.J.,
1979  -  The great Kartan mystery, unpublished PhD thesis, Australian National University

LINTON, R.,
1955  -  The tree of culture, New York

LOWENSTEIN, J.,
1956  -  The origin of the metal age, JMBRAS 29:1-78

MATTHEWS, J.M.,

1964  -  The Hoabinhian in Southeast Asia and elsewhere, unpublished PhD thesis, Australian National University, Canberra
1966  - A review of the 'Hoabinhian' in Indochina, AP 9:86-95

McBRYDE, I., 1976  - Seeland and Sai Yok pebble tools: a further consideration, Australian Archaeology 4:58-73


MIJSBERG, W.A., 1940  - On a Neolithic palae-Melanesian lower jaw found in a kitchen-midden at Guak Kepah, Province Wellesley, Straits Settlement, 3CPFE:100-118

MOURER, C., and R. MOURER, 1970  - The prehistoric industry of Laang Spean, Province of Battambang, Cambodia, APAO 5:128-145

MOVIUS, H.L., 1944  - Early man and Pleistocene stratigraphy in southern and eastern Asia, Papers of the Peabody Museum

1948  - The lower Palaeolithic cultures of southern and eastern Asia, Transactions of the American Philosophical Society N.S. 38(4):329-420


1939  - Report on a new Neolithic site in Ulu Kelantan, JFMSM 15:170-174

1941  - A proposed classification of Malayan polished stone implements, JFMSM 19(2):210-218

NOONE, R.O.D., 1954  - Notes on the trade in blowpipe bamboo in north Malaya, FMJ 1 & 2:1-18

1972  - Rape of the dream people, London, Hutchinson

OOI, J.B., 1976  - Peninsular Malaysia, London, Longman


<table>
<thead>
<tr>
<th>Year</th>
<th>Author(s)</th>
<th>Title</th>
<th>Source</th>
</tr>
</thead>
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<tr>
<td>1964</td>
<td>Recent archaeological discoveries 1962-1963</td>
<td></td>
<td>JMBRAS 37(2):201-206</td>
</tr>
<tr>
<td>1964a</td>
<td>The Kodiang pottery cones</td>
<td></td>
<td>FMJ 9:4-18</td>
</tr>
<tr>
<td>1967</td>
<td>Malaysian prehistory - some current problems, in Alisyahbana, Nayagam and Gungwu (eds) The cultural problems of Malaysia in the context of Southeast Asia</td>
<td></td>
<td>Kuala Lumpur</td>
</tr>
<tr>
<td>1971</td>
<td>Early cultural development in Southeast Asia with special reference to the Malay Peninsula</td>
<td></td>
<td>APAO 6:107-123</td>
</tr>
<tr>
<td>1974</td>
<td>Summary report of two archaeological sites from north-eastern Luzon</td>
<td></td>
<td>APAO 9(1):27-35</td>
</tr>
<tr>
<td>1979</td>
<td>Primitive man's impact on genetic resources of the Malaysian tropical rain forest</td>
<td></td>
<td>Malaysian Applied Biology 8(1):59-65</td>
</tr>
<tr>
<td>1964</td>
<td>The British lower Palaeolithic and middle Palaeolithic: some problems, method of study and preliminary results</td>
<td></td>
<td>Proceedings, Prehistoric Society 31:245-267</td>
</tr>
<tr>
<td>1968</td>
<td>British lower and middle Palaeolithic hand axes groups</td>
<td></td>
<td>Proceedings, Prehistoric Society 34:1-82</td>
</tr>
<tr>
<td>1952</td>
<td>Agricultural origin and dispersals</td>
<td></td>
<td>MIT press</td>
</tr>
<tr>
<td>1960</td>
<td>The Palaeolithic industry of Kota Tampan, Perak</td>
<td></td>
<td>AP 2:91-102</td>
</tr>
<tr>
<td>1962</td>
<td>The Palaeolithic industry of Kota Tampan, Perak</td>
<td></td>
<td>Proceedings, Prehistoric Society 28:103-139</td>
</tr>
</tbody>
</table>
SIEVEKING, G. de G.,
1954 - Gua Cha and the Malayan stone age, Malayan Historical Journal 1:111-125
1954a - Excavations at Gua Cha, Kelantan, part 1, FMJ 1/2:75-138
1956 - The Iron age collections of Malaya, JMBRAS 29(2):79-138
1962 - The prehistoric cemetery at Bukit Tengku Lembu, Perlis, FMJ 7:25-54

SNELL, C.A.R.D.,
1949 - Human skeletal remains from Gol Ba'it, Malay Peninsula, Acta Neerlanida Morphologica 6:1-25

SOLHEIM, W.G.,
1959 - Sa-huynh related pottery in Southeast Asia, AP 3:177-188
1967 - Southeast Asia and the west, Science 157:896-902
1969 - Reworking Southeast Asian prehistory, Paideuma 15:125-139
1970 - Northern Thailand, Southeast Asia and world prehistory, AP 13:145-162
1972 - An earlier agricultural revolution, Scientific American 226:34-41
1980 - Searching for the origins of the Orang Asli, FMJ 25:61-75

SORENSEN, P.,

SWAN, R.M.W.,
1904 - Note on stone implements from Pahang, Man 34:54-55

TAN, H.V.,
1975 - The Hoabinhian in the context of Viet Nam, Vietnamese Studies 46:127-197

THONG, P.H.,
1976 - Our stone age: from the Mount Do industry to the Hoa Binh industry, Vietnamese Studies 46:9-49

TREVOR, J.C. and D.R. BROTHWELL,
1962 - The human remains of Mesolithic and Neolithic date from Gua Cha, FMJ 7:6-22
TWEEDIE, M.W.F.,
1936 - Report on cave excavations carried out in Bukit Chintamani near Bentong, Pahang, BRM (ser.B) 1:17-25
1953 - The stone age in Malaya, JMBRAS 26(2), monograph on Malay subjects No. 1

VERSTAPPEN, H. Th.,
1975 - On palaeoclimates and landform development in Malesia, MQRSEA 1:3-36

WALL, L.,

WALKER, D.,
1954 - Studies in the quaternary of the Malay Peninsula alluvial deposits of Perak and relative levels of land and sea, FMJ 1/2:19-34

WHEATLEY, P.,
1966 - The Golden Khersonese, Kuala Lumpur, University of Malaya Press (reprint)

WHITE, J.P.,

WILLIAMS-HUNT, P.D.R.,
1951 - Recent archaeological discoveries, JMBRAS 24(1):186-191
1952 - Recent archaeological discoveries, JMBRAS 25(1):181-190

WINSTEDT, R.O.,
1932 - The prehistory of Malaya, JMBRAS 13(1):5-12

WRAY, L.,
1897 - The cave dwellers of Perak, Journal of Anthropological Institute 26:36-47
1905 - Further notes on the cave dwellers of Perak, JFMSM 1(1):13-15
APPENDIX 1

A GEOMORPHOLOGICAL INTERPRETATION OF THE GUA CHA ARCHAEOLOGICAL DEPOSIT

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INTRODUCTION

A geomorphological investigation was made of the Gua Cha deposit in order to determine its depositional history and the post depositional changes that have affected it. The interpretations in this Appendix are based on the results of physical and chemical analyses of eight samples of the deposit, on discussions with Adi bin Haji Taha and Peter Bellwood, and on examination of photos and plan and section drawings of the shelter and its contained deposits.

The stratigraphy of the deposit, its depth/age relations and the locations of the samples are as follows:

TRENCH A

Layer 1, sample A1. Surface dust.
Layer 2A, sample A2. Silt with Chinese potsherds. Equivalent to layer 2 in Trench B.
Layer 2B, sample A3. Another layer of silt separated from layer 2A by a sharp boundary: possibly equivalent to the silt deposit stratified beneath the 'black and stony layer' in Sieveking's Cutting 1. This layer has no precise equivalent in Trench B.
Layer 2C, sample A4. Yet another layer of silt whose stratigraphic relationship with Trench B is uncertain, but which still falls within the silt horizon which overlies the 'chocolate brown earth' of Sieveking's Cutting 1. This silt horizon does not occur in Trench B.

TRENCH B

Layer 2, sample B1. The yellow silt containing Chinese potsherds (post 900 B.P.).
Layer 3, sample B2. The very stony roof-fall layer which accumulated between about 3000 and 900 B.P. Equivalent to the 'black and stony layer' of Sieveking.

Layer 4, sample B3. The sample comes from the top 10cm of this layer, which is equivalent to the 'chocolate brown earth' of Sieveking.

Layer 4, sample B4. The sample comes from the base of the excavation where the deepest cultural remains were recovered (about 150cm below B3).

METHODS OF ANALYSIS

The methods used in this study, with the exception of total organic carbon, are described in detail in Hughes (1977, 1980).

1. The particle size distributions of the sediment component of the samples were determined using standard sieving and hydrometer methods whereby the sand and gravel were assessed by dry sieving and the silt and clay fractions by the hydrometer method combined with wet sieving. The grain size scale used is the phi (Ø) scale conversion of the Wentworth scale, as shown in Table 1 (Folk 1974:25).

2. The textural classification used is that which I have devised for archaeological sites in shelters in Australia. The textural name given to a sediment depends on the relative proportions of the different fractions, starting with that fraction present in the smallest amount and ending with the dominant fraction. Any minor fraction that makes up less than 5% of the weight of the sediment is omitted. The modal sub-grade is also included in the name and in the case of samples which have a pronounced secondary mode that sub-grade can also be included. It is common practice in sedimentology to calculate statistical measures of mean size, standard deviation and skewness as an aid to interpreting particle size distributions (see Folk 1974:44-52). However as several of the samples from Gua Cha proved to be bimodal these statistical measures were not determined as they are valid only for normally distributed sediments.
3. The Munsell colour of air dry samples was determined in the laboratory.

4. The pH of the samples was determined in the laboratory using a CSIRO Soil pH Test Kit which measures to the nearest 0.5 of a pH unit. The results must be interpreted with caution because when sediments are sealed in polythene bags for long periods (as with these samples), pH can change markedly from that in field conditions. Despite this, the results from all the samples except A2 (which is acid) are in accord with other lines of evidence concerning the properties of the deposit.

5. The calcium carbonate (CaCO₃) content of the samples was determined using a modified version of the simple gravimetric method described by Bauer, Beckett and Bie (1972), the material being digested in HCl. CaCO₃ in the deposit can be derived from limestone, or from secondary carbonate such as flowstone and shell. Bone, which strictly consists largely of calcium phosphate, is also dissolved in the process and is included in the total CaCO₃.

6. The organic carbon content of the samples was determined by John Head using a micro total combustion technique. This method determines the carbon in the form of humus and finely divided charcoal. It is not possible to estimate total organic matter content from these organic carbon values with any certainty. However a reasonable assumption, based on empirical evidence (Allison 1965: 1367) is that the organic matter in archaeological deposits contains around 60% carbon.

7. The mineral composition of the sand fractions was determined by binocular microscopic examination of unconsolidated samples collected from the sieves.

RESULTS

The physical and chemical characteristics of the samples are summarised in Table 2. The mineral composition of the sand fractions was as follows.
The sand in all the samples consists largely of clear and frosted angular quartz grains with smaller amounts of a platy mica (taken to be biotite) which is very fresh in appearance. In addition the sands contain minor amounts of fresh feldspar and a range of red and yellow coloured mafic minerals showing evidence of having been weathered. All contain in addition charcoal fragments which again are extremely fresh in appearance.

The samples contain other constituents as follows:
1. B1 and A2, both from the silt laid down after 900 BP, contain numerous iron-oxide cemented aggregates which appear to have been brought in with the rest of the sediment rather than to have formed in situ.
2. B2 and A3 also contain aggregates like those described above, but in smaller amounts. These samples also contain limestone fragments.
3. B3, B4 and A4 contain a few iron-oxide cemented aggregates but no limestone fragments.

SOURCE OF THE SEDIMENT

The bulk of the deposit is made up of sand, silt and clay which, as it contains little or no CaCO₃, must be derived from outside the shelter. In contrast, the gravel fraction of the deposit consists of limestone which, like the rocky layers that occur in the deposit, was derived from rock falling from the walls and roof of the shelter. The small amount of CaCO₃ in the fine fraction was also probably derived from that source, either directly through granular disintegration of the rock forming the overhang or through the decomposition of larger rock fragments after they were incorporated into the deposit.

The particle size characteristics of the sediment, particularly its poorly sorted and fine texture (yet which varies from sample to sample) indicate that it consists of alluvium deposited from floodwaters entering the shelter.
The presence of large amounts of fine silt and clay and the fact that the mode is always very fine sand to medium silt, suggests that this alluvium was deposited from very slowly moving or ponded water. This is supported by the absence of any evidence of scour such as disconformable hollows with lags of gravel that would be characteristic of erosion of the deposit by fast flowing water (although Sieveking did report deposits of this type from the front of the shelter, in areas not approached by the 1979 excavations).

GEOMORPHIC HISTORY OF THE DEPOSIT

In this brief account only the deposit in Trench B is considered as there is a well dated sequence and sharp cultural and stratigraphic changes that suggest that the deposit has not been disturbed. The first point to make is that as the source of roof-fall is a large, mostly near-vertical area of horizontally bedded, fissile limestone, the rate of roof-fall might be expected to have been essentially constant (except for seismic events). Therefore concentrations of roof-fall represent periods when the rate of accumulation of alluvium was relatively low and vice versa.

Layer 4 clearly accumulated as a result of the regular (if episodic) deposition of alluvium from sediment-charged flood waters over a considerable period of time. The presence of two thin layers of roof-fall suggest that during this period there were at least two major still-stands in alluvium deposition. Care should be taken however in estimating the age of the base of the cultural deposit by extrapolation of the depth/age relationship established from the C14 dates, as the rate of accumulation may not have been steady over the long time period of accumulation of the deposit. In particular, the rate of accumulation may have been more rapid early in the history of the site, when the flood-waters did not have to reach so high to enter the shelter.

Layer 3 represents a period of relative still-stand in the accumulation of alluvium. A possible
explanation for this was that by this time the deposit had increased to a critical height above the flood level of the river such that floodwaters only rarely reached a height sufficient to enter the shelter.

The onset of sediment accumulation after 900 BP might then reflect accelerated disturbance of the vegetation cover of the catchment, causing more severe floods to occur which once again could over-top the deposit in the shelter.

PRESERVATION OF THE ORGANIC REMAINS

Shell and bone were recovered in good condition from throughout the deposit and this is explained as follows:

1. The deposit throughout is neutral to alkaline, conditions which are consistent with the presence of small amounts of CaCO₃ throughout the deposit and the fact that the host rock is limestone.

2. The extremely fresh nature of the mineral component of the deposit shows that it has never been subject to extensive leaching. Large amounts of water appear to have entered the shelter only during flood events.

On the other hand the absence of large amounts of humus derived from the decay of soft plant and animal remains discarded as food and other debris shows that the deposit is moist enough to allow active biochemical decay to proceed. The high content of organic matter in B4, presumably in the form of humic and other soluble organic substances, suggests that the products of decay have been carried down through the deposit and precipitated towards its base. Such substances would be absorbed by the charcoal in the lower part of the deposit and might well account for the anomalously young C14 date obtained from the base of layer 4.

REFERENCES


Folk, R.L. 1974 Petrology of sedimentary rocks. Hemphills, Austin, Texas


Hughes, P.J. 1980 I dig dirt: geomorphological methods in Australian archaeology. In I. Johnson (ed) Holier than thou, Department of Prehistory, RSPacS, Australian National University
<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>Wentworth size class</th>
<th>$\Phi$ (cm)</th>
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<td>4096.0</td>
<td>boulder</td>
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</tr>
<tr>
<td>1024.0</td>
<td>cobble</td>
<td>-10.0</td>
</tr>
<tr>
<td>256.0</td>
<td>granule</td>
<td>-8.0</td>
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<tr>
<td>64.0</td>
<td>gravel</td>
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<tr>
<td>32.0</td>
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<td>16.0</td>
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<tr>
<td>8.0</td>
<td>silt</td>
<td>-3.0</td>
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<tr>
<td>4.0</td>
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<td>2.00</td>
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**TABLE 1: Grain-size scale**
### TABLE 2. Physical and chemical analyses

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<tr>
<th>Layer</th>
<th>% gravel</th>
<th>% sand</th>
<th>% silt</th>
<th>% clay</th>
<th>Texture</th>
<th>pH</th>
<th>% CaCO₃</th>
<th>% organic carbon</th>
<th>% organic matter</th>
<th>Air dry colour</th>
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<td>A</td>
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<tr>
<td>1</td>
<td>0</td>
<td>50</td>
<td>44</td>
<td>7</td>
<td>Clayey silty sand with a mode in the very fine sand class</td>
<td>7.0</td>
<td>0</td>
<td>1.2</td>
<td>2</td>
<td>10YR7/4 very pale brown</td>
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<tr>
<td>2A</td>
<td>0</td>
<td>8</td>
<td>69</td>
<td>24</td>
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<td>1</td>
<td>1.6</td>
<td>3</td>
<td>10YR6/6 brownish yellow</td>
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<tr>
<td>2B</td>
<td>4</td>
<td>39</td>
<td>42</td>
<td>15</td>
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<td>8.5</td>
<td>2</td>
<td>0.7</td>
<td>.1</td>
<td>10YR6/4 light yellowish brown</td>
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<tr>
<td>2C</td>
<td>4</td>
<td>29</td>
<td>39</td>
<td>28</td>
<td>Clayey sandy silt with a mode in the very fine sand class</td>
<td>8.5</td>
<td>1</td>
<td>0.3</td>
<td>0.5</td>
<td>10YR5/4 yellowish brown</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>2</td>
<td>0</td>
<td>15</td>
<td>74</td>
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<td>8.5</td>
<td>2</td>
<td>0.5</td>
<td>1</td>
<td>10YR7/4 very pale brown</td>
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<td>3</td>
<td>12</td>
<td>45</td>
<td>30</td>
<td>14</td>
<td>Gravelly, clayey, silty, sand with a mode in the very fine sand class</td>
<td>8.5</td>
<td>7</td>
<td>2.3</td>
<td>4</td>
<td>10YR4/3 brown to dark brown</td>
</tr>
<tr>
<td>4(top)</td>
<td>4</td>
<td>38</td>
<td>40</td>
<td>17</td>
<td>Clayey sandy silt with a mode in the very fine sand class</td>
<td>8.5</td>
<td>9</td>
<td>2.5</td>
<td>4</td>
<td>7.5YR4/4 brown to dark brown</td>
</tr>
<tr>
<td>4(base)</td>
<td>14</td>
<td>32</td>
<td>35</td>
<td>21</td>
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<td>8.5</td>
<td>3</td>
<td>10.0</td>
<td>15</td>
<td>10YR5/4 yellowish brown</td>
</tr>
</tbody>
</table>
The 1979 excavation at Gua Cha recovered three burials, (1, 2 and 4, with 3 being left in the site), all of Hoabinhian age, in a condition that could be described as partially fossilised (cf. Sieveking 1954). Burial 1 is a young male, between 17 and 20 years old at the time of death, with a best estimate of 18. Burial 2 is very probably a female, between 13 and 16 years old with a best estimate of 14. Burial 4, though very incomplete, can be confidently identified as a female adult. Combining the present sample with a sample from Sieveking's 1954 excavation (Trevor and Brothwell 1962:6), the presently known demographic decomposition of the Gua Cha Hoabinhians is: one child, one female adolescent, ten adult males, four adult females, and one adult of uncertain sex. Of the fifteen adults, three can be classed as young/probably young, eight as having died in 'middle-life', and two as 'old'.

Burial 1 (see Plate 12 in text) is a typical primary flexed Hoabinhian burial, with the mandible and especially the cranium damaged from being pressed against the stone pillow. Curiously, the right tibia and right tarsals, but not the right fibula or other foot bones, are missing, no doubt due to some very localised disturbance after the corpse had decomposed.

Burial 2 is quite an incomplete skeleton, but analysis of the remains indicates that it had been a primary burial, in its excavated position or close by, and later had suffered disturbance, particularly in the hip and left arm region.

Burial 4 (Plate 12 in text) consists only of fragment of vertebrae, pelvis, and lower limbs. It has been very
disturbed and the mode of burial cannot be gauged.

Four loose teeth, from at least three individuals, possibly belonging to burials from Sieveking's original excavations, were also recovered.

The results of Brothwell's (Trevor and Brothwell 1962) original analysis of the Gua Cha Hoabinhian dentitions are that attrition of the teeth occurred rapidly (p.14), the rate of caries was fairly high for a hunter-gatherer people (9.3% of teeth - p.21), and that periodontal infection was slight to moderate (p.13). The present material fits in with Brothwell's conclusions. A loose incisor, and the dentition of Burial 1, show considerable interstitial and occlusal wear. A single slight carious lesion was found for Burial 1, for Burial 2, and for a loose premolar. Incipient alveoloclasis could be observed on Burial 1. The presence of a fairly high caries rate, rapid occlusal and interstitial wear, and fairly healthy periodontal tissues, appears to be a likely consequence of the kind of diet that the present hunter-gatherer Batek De Negritos extract from the Malay Peninsula uplands rainforest (Endicott 1979: 19, 43-45, 59), namely a well-balanced diet, with animal proteins, considerable fibrous starchy vegetables (especially wild yams), and a relatively large proportion of sweet foods, specifically fruits and honey.

The formulae given by Bergman and The (1955:200) for converting Javanese long bone lengths to living stature are preferred for the Gua Cha Hoabinhians, first because the Javanese are the geographically closest people for whom such data is available, and second because their formulae yield internally consistent results when more than one limb bone is used. On this basis, the living stature of Burial 1 is estimated between 162 and 167cm, with a best estimate of about 165cm. The best stature estimate for the Hoabinhian female described by Trevor (Trevor and Brothwell 1962:7) is 151.5cm, identical with the estimate Trevor made using
different formulae. Snell (1949:359) estimates the stature of a Gua Baik Hoabinhian male as between 150 and 155cm; using Bergman and The's formulae, 155-160cm would be estimated. Jacob (1967:72) estimates the stature of two Guar Kepah Hoabinhian males as 169.2 and 161.3cm, and one female as 152-154cm, from long bone circumferences (Bergman and The 1955:208). So on the limited evidence available, the Hoabinhian people, and specifically those of Gua Cha, were a middle-sized people, taller than the present day aborigines of the Malayan uplands rainforests.

REFERENCES


JACOB, T. 1967 Some Problems Pertaining To The Racial History Of The Indonesian Region. Netherlands Bureau for Technical Assistance, Utrecht


TREVOR, J.C. & BROTHWELL, D.R. 1962 The Human Remains of Mesolithic and Neolithic Date from Gua Cha, Kelantan. FMJ 7:6-22
NOTES ON GUA CHA MAMMALS

Dr Colin Groves, Department of Prehistory and Anthropology, A.N.U.

Echinosorex gymnurus, "Moon-rat". Widespread in Southeast Asia; reaches a length of 450mm (head and body), with 240mm tail, weighs up to 2 kg, long snout full of sharp pointed teeth; shaggy brindled fur and a smell said to resemble ammonia. Live in forest and cultivated areas; nocturnal; live in hollow logs, tree-roots or empty holes; live on fish, crustaceans and insects.

Hylobates lar. Gibbon. Weighs up to 7 kg. Found throughout Malaya, with a common white-handed form in some areas but black-handed "agile gibbon" north of Perak River. Live in a variety of forest types, usually high up in the trees.

Trachypithecus spp. Lutung. Weight up to 9 kg. Leaf-eating monkeys, common in S.E. Asia; in Malaya, T.obscurus (Dusky lutung; has white eye-rings and mouth) is common in forested areas, while T.cristatus (Crested lutung, dark grey with black face) is restricted to low forests along west coast.

Presbytis melalophos. Banded leaf-monkey. Slightly smaller than other langurs, conspicuously white below especially inside thighs; white mouth, white round eyes. Tend to live in lowland forests.

Macaca fascicularis. Crab-eating macaque, kera. Weighs 3 to 6 kg. Brown with long tail. Live in most forest types but rarely at high altitudes; common especially in coastal areas; raid cultivations; swim, climb well.

Macara nemestrina, Pig-tailed macaque, beruk. Much larger, up to 9 kg; dark "cap" on crown of head; short curly tail.
Lives less on forest edge, more in deep forest than Crab-eating Macaque, but often raids crops; spends much time on ground.

Pteropus, fruit-bats or flying-foxes. Many species; the largest weighs up to $1\frac{1}{2}$ kg.

Callosciurus prevostii, Prevost's palm-squirrel. Malaya is the northern end of the distribution of this species. Head and body length about 250mm, tail slightly longer. Lives in dense forest but invades oil-palm and coconut plantations; tend to live in middle-storey of forest, not in the crowns.

Rhizomys pruinosus, Hoary Bamboo-rat. The smaller of the two species of Rhizomys in Malaya; this is the southern end of its range. Weighs 1 to 3 kg, and is up to 350mm long with tail of 100mm; grey-brown brindled fur. Live in hilly forest, especially secondary forest; feeds on roots and young grass - less of a bamboo-feeder than its relative R. sumatrensis.

Arctictis binturong, Binturong or "bear-cat". Weighs 10-20 kg; black with long tufts on ears, and prehensile tail. Lives in trees, comes out mainly at night; eats fruit and small animals.

Helarctos malayanus, Sun-bear. The smallest of the world's bears, the only one in Malaya. Adults weigh 50 kg. Lives in dense forests at all altitudes, climbs well, mostly nocturnal. Eats insects, berries, honey, tree-pith (especially coconut-palms); a very dangerous adversary. The Gua Cha specimen is a juvenile, which obviously would not be so difficult to kill if met with on its own; in fact, they can be kept as pets.

Sus barbatus; Bearded Pig. Weighs up to 350 kg. The migratory species; the huge migrating bands seem to pass irregularly through lowland areas.
Sus scrofa, Common wild boar; Banded Pig. Smaller (up to 200 kg), not migratory; raids crops; found throughout Malaya in moist habitats.

Tragulus, Mouse-deer or Chevrotain (kancil). Two species in Malaya: T.napu (weighs up to 6 kg) and T.javanicus (only 2 kg). Both are nocturnal, live in undergrowth.

Muntiacus muntjak, Muntjac or Barking-deer. Weighs 20-28 kg, live in all types of forest; eat fallen fruit, leaves, frequent clearings and forest edge.

Cervus unicolor, Rusa. Weighs 200-250 kg. Live in forests especially forest edge; feed on grass, shoots, vines; attracted to salt-licks which provide calcium for growing antlers.

Bos spp. In Malaya there are two species: the Banteng (Bos javanicus), weighs 600-800 kg, just enters Malaya in the far northwest (Kedah); and the Seladang (Bos gaurus), weighs up to 900 kg., formerly widespread but now close to extinction. Both prefer forest clearings; their distribution seems to have been modified by human activity, especially by the spread of shifting agriculture which opened up new habitats for them. Seladang, which browse more and can live at quite high altitudes, would have followed the cultivators first and established themselves earlier in Malaya; Banteng, which need open meadows to graze and avoid hilly country, would occur only where sufficiently wide cultivated areas had been opened up, then abandoned, so were presumably still expanding their range in historic times.

Capricornis sumatraensis, Serow, Kambing hutan. Weigh 100-140 kg; black, long-legged, agile with short ribbed horns; frequent steep limestone hills with forested ravines.
APPENDIX 4

RICE SAMPLE FROM GUA CHA

by Dr D.E. Yen, Department of Prehistory, Research School of Pacific Studies, A.N.U.

Description:
Charred starchy endosperm in fire ash, with charred stony material (limestone).

Identification:
Rice: *Oryza sativa* L. supported by structural features of
1. longitudinal "grooves"
   conforming with absent lemma structures
2. position of embryo

General uniformity of size would indicate that the sample is representative of a part of the variation of the tropical race Indica (relatively small size cf. Japonica/Javanica), consistent with its provenience. While this takes no account of the possibilities of significant shrinkage during charring (and perhaps during deposition), it might be considered as a reasonably firm identification.

Speculation

Since grain size appears to be smaller than in the modern commercial varieties of the area, it could be that the sample represents a somewhat "more primitive" selection or series of selections, despite its relatively late dating. However, I wouldn't stress this too much, because of the present day existence of small grained varieties in Southeast Asia among subsistence farmers (see Yen, 1977).

The difficulty attendant on such identifications is that they could refer to "wild rice". Some of my unpublished data show that some present day wild representatives of *O. sativa* are of similar grain size to cultivated
ones (some are larger). It seems to me that the cultural context sways opinion on the wild/cultivated issue.

Reference

Figure 12 - Ovate-shaped bifacially-flaked pebble tool with no sign of cortex

Cha 79B - 4(60-70)
Figure 13 - Ovate-shaped bifacially-flaked pebble tool with cortex
Cha 79B - 4(70-80)
Figure 14 - Ovate-shaped bifacially-flaked pebble tool with cortex
Cha 79B - 4(40-50)
Figure 15 - A double pointed ovate-shaped bifacially-flaked pebble tool

Cha 79B - 4(80-90)
Figure 16 - Bifacially-flaked pebble tool of sub-rectangular form
Cha 79 B - 4(10-20)
Figure 17 - Bifacially-flaked pebble tool of sub-rectangular form - probably used as side scraper

Cha 79A - (90-100)
Figure 18 - Bifacially-flaked pebble tool of sub-rectangular form
Cha 79B - 4(80-90)
Figure 19 - Bifacially-flaked pebble tool of sub-rectangular form
Cha 79B - 4(30-40)
Figure 20 - Sub-rectangular bifacially-flaked pebble tool with a sharp point probably used as side scraper
Figure 21 - Bifacially-flaked pebble tool of sub-rectangular form
Cha 79B - 4(20-30)
Figure 22 - Bifacially-flaked pebble tool of sub-triangular form
Cha 79B - 4(70-80)
Figure 23 - Bifacially-flaked pebble tool of sub-triangular form
Cha 79B - 4(40-50)
Figure 24 - Slightly waisted pear-shaped bifacially-flaked pebble tool
Cha 79B - 4(30-40)
Figure 25 - Bifacially-flaked pebble tool similar to the Tembeling knife
Cha 79B - 4(10-20)
Figure 26 - Bifacially-flaked pebble tool with straight truncation with sign of polished edge as result of use
Cha 79A - (80-90)
Figure 27 - Truncated tool with cortex butt
Cha 79B - 4(70-80)
Figure 28: Bifacially-flaked pebble tool with crescent-shaped truncation
Plate 1 - Drifting to Gua Cha down the Sungai Nenggiri on a bamboo raft, of a kind probably used extensively in the past
Plate 2 - The rockshelter of Gua Cha, viewed from the south
Plate 3 - The rockshelter of Gua Cha, viewed from the north. The Menteri stalagmite is in the background.
Plate 4 - Sieveking's Cutting 1 (background) and 3 (foreground), with Trench 79A between
Plate 5 - The stratigraphy of Trench 79A (eastern wall at rear)
Plate 6 - The north wall (at rear) of Trench 79B
Plate 7 - Drilled-out stone ring centre, as found in Trench 79A over Neolithic Burial 1 (emerging from section in centre) in Trench 79B.
Plate 8 - Broken Neolithic pots (beneath scale) found stratified over Hoabinhian Burial 1 (emerging from section in centre) in Trench 79B
Plate 9 - Base of one of the Neolithic vessels shown in Plate 8
Plate 10 - Tufa lumps (beneath scale) partially covering Hoabinhian Burial 1 in Trench 79B
Plate 11 - Flat stone slabs partially covering Hoabinhian Burial 3 in Trench 79B
Plate 12 - Burial 1 - note the stone pillow, and the bones in front which were later indentified as Burial 4
Plate 13 - A Temiar camp at the northern end of Gua Cha: note the split bamboo beds, and the fire place (foreground)
Plate 14 - Carbonised rice, from the hearth exposed in Sieveking's Cutting 3

A. plain
B. very marked in criss pattern
C. plain prescriptions (diamond shaped)
D. cross-marked in parallel pattern
E. plain with red-stippled
F. cord-marked, and then wiping off the impressions
Plate 15 - Types of body decorations on Neolithic sherds from Gua Cha (Trench 79A)

A. plain
B. cord-marked in cross pattern
C. paddle impressed (diamond shaped)
D. cord-marked in parallel pattern
E. plain with red-slipped
F. cord-marked, and then wiping off the impressions
Plate 16 - Stone flakes from the Hoabinhian level of Gua Cha (Trench 79B)

A. waste flake
B. waste flake
C. Flake with bulb of percussion
D. flake with sign of utilisation