

# THE GUA CHA BURIALS - CONCORDANCE, CHRONOLOGY, DEMOGRAPHY

*by*

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## INTRODUCTION

Gua Cha is a large, spacious limestone rockshelter located at about 100 metres above sea-level on the Sungai Nenggeri, fairly close to the geographical centre of West Malaysia. Gale Sieveking's excavation in 1954 demonstrated two cultural phases, Hoabinhian and Neolithic. Radiocarbon samples from the 1979 re-excavation of Gua Cha by Adi Haji Taha and Peter Bellwood suggest that the Hoabinhian and the Neolithic respectively date to approximately 10,000-3000 BP and 3250-1000 BP, at the outer limits (Adi, 1985). The Hoabinhian levels contain unifacially and bifacially flaked pebble tools, numerous waste and retouched stone flakes, and faunal refuse (Adi, 1991); though long term, occupation probably occurred only sporadically (Sieveking, 1987:81), and likewise the average rate of Hoabinhian burials would also have been very low. During the Neolithic, Gua Cha appears to have functioned as a cemetery, with evidence of mortuary rites, and the burial of fine pottery and other grave goods assigned to the Ban Kao culture (Sieveking, 1987:82-84).

This famous site has provided the largest quantity of human skeletons recorded in the Malay Peninsula. Four burials were found during H.D. Noone's original excavation in 1935, Gale Sieveking recovered approximately 14 Hoabinhian and 23 Neolithic burials, and the 1979 excavation exposed a further four Hoabinhians (Adi, 1991:367). Unfortunately, the seeming prospect of a substantial sample of 45 burials boils down to a much smaller sample which is available for osteological study. The whereabouts of the Gua Cha skeletons recovered by Noone are unknown. Sieveking (1954) published sketches and photographs of rows of parallel articulated Neolithic skeletons, as well as a large number of more isolated burials, but when he forwarded the remains to the Duckworth Laboratory at Cambridge University, only a much reduced complement of predominantly fragmented material was received. Only one registered skeleton was at all complete, and its postcranial bones later disappeared without recorded trace. Finally, Adi and Bellwood only had sufficient time for a limited excavation and so were forced to cover over one of their burials and leave it unexcavated in the site (Adi, 1985).

Fragmentary though it is, the Gua Cha sample is still the single most important testimony to human biological change in the Malay Peninsula during the Holocene, but it has to be used with great care. In particular, the labels attached to the specimens in the Duckworth Laboratory do not always directly correspond to Sieveking's labels. The laboratory's labelling system distinguishing Hoabinhian and Neolithic specimens is sometimes incorrect owing to labelling mishaps and, on other occasions, unreliable because Sieveking's original cultural classification is open to doubt. The 1979 re-excavation of the site could not confirm Sieveking's original report of a sterile deposit sealing in the Hoabinhian levels (Adi, 1985) and, without this layer, there is no stratigraphic record to register the quite numerous cases of Neolithic burials dug into the Hoabinhian layers (cf. Sieveking, 1987:76-77). The purpose of this paper, therefore, is to provide a concordance between the excavated burials and the specimens available for osteological study, and to assign the latter to Hoabinhian and Neolithic samples, as a first step in my forthcoming description and analysis of the remains. It will also be possible to review the evidence on change in mortuary customs at Gua Cha, and to summarize the demographic profile of the Hoabinhian and Neolithic samples.

Some background on the condition and treatment of the Gua Cha specimens is appropriate. Sieveking (1954:92, 104) recognized a qualitative distinction between the partly fossilized Hoabinhian bones covered by a calcareous skin, and the relatively fresh Neolithic bones retaining their undenatured whitish colour. Cleaning and reconstruction by Trevor and Brothwell included the occasional use of a dilute solution of acetic acid to remove the calcareous deposit covering the Hoabinhian teeth (Trevor and Brothwell, 1962:11), reconstruction of the more complete crania which were then coated with varnish, and the occasional use of plaster of Paris to fill in missing gaps (personal observation). I furthered the process of cleaning and cross-mending fragments within my limited time available to study the material in October 1996. As regards the 1979 burials, Adi (1985) assigned the label Gua Cha 3 to the burial left in the site, and Gua Cha 1, 2 and 4 to the excavated specimens. The latter were sent to the Australian National University in 1979 where I confirmed Sieveking's observation that the Hoabinhian bones are partly fossilized and covered by a calcareous skin. To remove the skin without damaging the underlying surface

relief, I bathed the bones and fragments in a 3% concentration of acetic acid for 16 to 20 hours, before hardening them with five to ten coats of polyvinyl butyral diluted in ethanol.

Reconstruction of the original skeletons was then carried as far as possible, but the only complete skeletal parts are the mandible and an assortment of postcranial bones from Gua Cha 1 (Bulbeck, 1982:471-72). After examination the material was returned to the Muzeum Negara in Kuala Lumpur.

## **CONCORDANCE**

Sieveking originally labelled the burials serially within his A, B, H and S cuttings for their shipment to the Duckworth Laboratory (Table 1). Upon their arrival in 26 wooden boxes, the technician Mr C.B. Denston described the fragments which had survived the trip, and related them to Sieveking's labels. Then, in his excavation report, Sieveking (1954) rationalized his labels by enumerating them as Burials 1 to 33, with the new number linked to the old label in a chart on p.130 (forgetting Burial 19 which would, however, correspond to H.8). After the report was received in Cambridge, Denston penned in Sieveking's new labels, and also assigned the accession numbers "As.33.5.1+" for those burials which he took to be Neolithic, and "As.33.6.1+" for those he thought were Hoabinhian. Five specimens, whose labels Denston read as B.2, H.1, H.5, H.9 and S.8, did not receive accession numbers. In the early 1960s Kenneth Kennedy sacrificed samples from nine of the specimens, identified by Denston's record of Sieveking's burial labels, for nitrogen and blood-group assays (Kennedy, 1964).

From my inspection of the human remains and documentation at the Duckworth Laboratory, and comparison with Sieveking's excavation report and Kennedy's paper, I have been able to identify some burials apparently lost during shipment, and some further specimens which were received but are no longer extant. I have also detected some apparent mistakes in Denston's accessioning which then render Sieveking's original labels ambiguous. Hence future studies should use Sieveking's revised labels when referring to the burials, and the Duckworth accession number when referring to the specimens, whereby the "revised Duckworth label" in Table 1 would show the Gua Cha burial apparently referred to.

As.33.5.4 comprises a tightly flexed right tibio-femoral joint, much of the right foot, a left foot bone and an iliac fragment. It supposedly refers to H.2 (Burial 11) but this cannot be true of the tibio-femoral joint and pelvic fragment, for Burial 11 totally lacked pelvis and legs (Sieveking, 1954:Plate 3(1)). Only the foot bones would seem to belong to H.2, as Denston's description of the H.2 remains specifically mentions them, and H.2 did have feet (Sieveking, 1954:111). If we combine the tibio-femoral joint and pelvic fragment from As.33.5.4 with the femur head and tibia shaft which Kennedy (1964) acquired from H.5, which Denston originally recorded but did not accession, we have a good matchup with Denston's original description of H.5 as fragments from a skull, innominate, long bone shafts, femur heads and other bones. Further, the flexed tibio-femoral joint visually resembles the tibio-femoral joint shown in the photograph of the flexed Burial 14, GC-H.5 (Sieveking, 1954:Plate 11(1)) so it, along with the iliac fragment, and the fragments sacrificed by Kennedy, can be matched up with Burial 14.

Denston assigned As.33.6.2 to the foot and hand bones, and fragments of long bones, ribs and mandible (but no cranium) which he understood to represent S.6 (Burial 15). However, the latter consisted of leg bones only (Sieveking, 1954:118). There may well have been a simple misreading or misinscription of the label which could have been A.6, i.e. Burial 30, a fragmentary burial with broken jaw, leg and foot bones (Sieveking, 1954:121), a description which matches the As.33.6.2 registered remains very well. (Denston had not registered any remains attributed to A.6.) In addition, the As.33.6.2 remains are in virtually mint condition, which agrees with the Neolithic affiliation of Sieveking's Burial 30.

A similar misunderstanding would also seem to apply to As.33.6.3, attributed by Denston to S.7 (Burial 16) but which would appear to be A.7 (Burial 31). Denston's description of fragments from nearly all the skeletal bones, including cranial fragments from two different individuals, fails to match Sieveking's (1954:118) description of Burial 16 as a contracted burial with its arms and head missing. Burial 31, "Extended burial in poor condition. Skull badly compressed..." (Sieveking, 1954:121), is a much more plausible fit. Hence the humerus head and calcaneum which Kennedy sacrificed would not be from S.7 (Burial 16), as Kennedy understood, but from A.7 (Burial 31).

There is yet a third case where A had apparently been misread for S. Denston ascribed a

small package of useless-looking fragments to S.9 and registered them as As.33.6.6, even while noting that Sieveking did not have any burial number for S.9. To compound the complications, H.9, represented by a few fragments of cranial and other bones, was not given its own accession number, but clearly came to be lumped under As.33.6.6 over time. This produces the anomalous situation where a partly reconstructible face and one of the best-preserved of the Gua Cha set of jaws are accessioned under "As.33.6.6, S.9", even though no S.9 was ever excavated. Now, there is no reason not to attribute the received H.9 remains to Burial 20, "Skull and two isolated arm bones" (Sieveking, 1954:118). What became of the "S.9" (A.9) package of fragments, indeed what they consisted of, is presently unknown.

The final problem involves A.1 (Burial 25) as Denston read the label, and whose remains he accessioned under As.33.5.7. The consist of the partial jaws of a 2-3 year old child, whose corpse could not have been large enough to accommodate the seven pots distributed from the shoulder to the legs as described by Sieveking (1954:121) for Burial 25. The simplest solution here is to propose that the original label had read A.4 (Burial 28, with two pots at the feet).

Note that B.2 (Burial 2) and H.1 (Burial 10) were apparently received in part, but not registered (Table 1). Taking these into account, we can note a pattern in which Burials 3 to 6, 9, 15 to 16, and 24 to 26, though presumably dispatched by Sieveking, were never received at Cambridge. We can also see that every other specimen appears to have suffered badly during transport, except Burial 8 (B.8); also that the postcranial remains generally fared much worse than the cranium and mandible, and in many cases would appear to have been dispatched separately from the skull.

Table 1. Concordance between Labels in Sieveking (1954), Excavation Labels and Duckworth Laboratory Accession Numbers

Sieveking Labels			Duckworth Labels		
Revised	As Excavated	Recorded Burial	Denston's	Revised	Registered Remains
Burial 1	B.1	Complete Extended	As.33.5.1	As.33.5.1	Skull
Burial 2	B.2	Complete Extended	-	-	Long bone fragments
Burial 3	B.3	Incomplete Extended	-	-	Not received
Burial 4	B.4	Fragmentary Extended	-	-	Not received
Burial 5	B.5	Fragmentary Extended	-	-	Not received
Burial 6	B.6	Fragmentary Extended	-	-	Not received
Burial 7	B.7	Complete Extended	As.33.5.2	As.33.5.2	Skull
Burial 8	B.8	Complete Extended	As.33.5.3	As.33.5.3	Complete skeleton
Burial 9	B.9	Complete Extended	-	-	Not received
Burial 10	H.1	Incomplete Extended	-	-	Long bone fragments
Burial 11	H.2	Incomplete Extended	As.33.5.4	As.33.5.4	Foot bones
Burial 12	H.3	Fragmentary Skull	As.33.6.1	As.33.6.1	Squashed calvarium
Burial 13	H.4	Complete Extended	As.33.5.5	As.33.5.5	Fragmented skeleton
Burial 14	H.5	Complete Flexed	-	As.33.5.4	Leg, pelvis, other frags
Burial 15	S.6	Leg bones of >1 people	As.33.6.2	-	Not received
Burial 16	S.7	Flexed torso + legs	As.33.6.3	-	Not received
Burial 17	H.6	Complete Flexed	As.33.6.4	As.33.6.4	Fragmented skeleton
Burial 18	H.7	Complete Flexed	As.33.5.6	As.33.5.6	Skull + limb fragments
Burial 19	H.8	Skull + Extended	As.33.6.5	As.33.6.5	2 skulls + other frags
Burial 20	H.9	Skull + two arm bones	As.33.6.6	As.33.6.6	Skull + other fragments
Burial 21	H.10	4 mixed flexed burials	As.33.6.7	As.33.6.7A	Skull
" "	" "	" "	As.33.6.7	As.33.6.7B	Mandible
" "	" "	" "	As.33.6.8	As.33.6.8	Skull
" "	" "	" "	As.33.6.9	As.33.6.9	Skull
Burial 22	H.11	Complete Extended	As.33.6.10	As.33.6.10	Fragmented skeleton
" "	S.117	Unexplained			
Burial 23	H.12	Skull + upper torso	As.33.6.11	As.33.6.11	Skull + upper torso
Burial 24	H.13	Complete Extended	-	-	Not received
Burial 25	A.1	Incomplete Extended	As.33.5.7	-	Not received
Burial 26	A.2	Appendicular bones	-	-	Not received
Burial 27	A.3	Complete Extended	As.33.5.8	As.33.5.8	Skull + humeri
Burial 28	A.4	Incomplete Extended	-	As.33.5.7	Skull
Burial 29	A.5	Secondary Burial	As.33.5.9	As.33.5.9	Cranium + femora
Burial 30	A.6	Fragmentary	-	As.33.6.2	Fragmentary
Burial 31	A.7	Complete Extended	-	As.33.6.3A	Fragmented skeleton
			-	As.33.6.3B	Jaws
Burial 32	A.8	Complete Extended	As.33.5.10	As.33.5.10	Skull (+ loose frag)
Burial 33	A.9	Complete Extended	-	As.33.6.6	A few fragments

Table 2. Burials Excavated at Gua Cha

Excavation Label	Burial Mode	Material Culture	Cultural Association	Status
Burial 1 (B.1)	Complete Extended	Jewelry, pots, spoon	Neolithic	Male adult
Burial 2 (B.2)	Complete Extended	Jewelry, pots, spoon	Neolithic	Male adult
Burial 3 (B.3)	Incomplete Extended	Pots	Neolithic	Unknown
Burial 4 (B.4)	Fragmentary Extended	Pots	Neolithic	Unknown
Burial 5 (B.5)	Fragmentary Extended	Pots	Neolithic	Child
Burial 6 (B.6)	Fragmentary Extended	Pot	Neolithic	Unknown
Burial 7 (B.7)	Complete Extended	Chisels, pots	Neolithic	Male adult
Burial 8 (B.8)	Complete Extended	Jewelry, pots, spoon	Neolithic	Female adult
Burial 9 (B.9)	Complete Extended	Jewelry, pots, spoon	Neolithic	Male adult
" " 10 (H.1)	Incomplete Extended	Pots	Neolithic	Unknown
" " 11 (H.2)	Incomplete Extended	Pots	Neolithic	Male adult
" " 13 (H.4)	Complete Extended	Jewelry, pots, chisels	Neolithic	Male adult
" " 22 (H11)	Complete Extended	None	Neolithic	Male teenager
" " 24 (H13)	Complete Extended	Axe, pots, beater	Neolithic	Male adult
" " 25 (A.1)	Incomplete Extended	Jewelry, pots, chisels	Neolithic	Unknown
" " 26 (A.2)	Fragmentary Extended	Chisel, pots	Neolithic	Unknown
" " 27 (A.3)	Complete Extended	Chisel, pots, spoon	Neolithic	Female adult
" " 28 (A.4)	Incomplete Extended	Axe, pots, chisels	Neolithic	Child
" " 30 (A.6)	Fragmentary	Chisel, pots	Neolithic	Male adult
" " 31 (A.7)	Complete Extended	Adze	Neolithic	Male adult, + child
" " 32 (A.8)	Complete Extended	Jewelry, pots?	Neolithic	Male adult
" " 33 (A.9)	Complete Extended	Chisels, pots	Neolithic	Unknown
" " 12 (H.3)	Isolated cranium	None	Hoabinhian	Male adult
" " 14 (H.5)	Complete Flexed	Hoabinhian tools	Hoabinhian	Male adult
" " 15 (S.6)	Leg bones cluster	None	Hoabinhian	Unknown (male adult?)
" " 16 (S.7)	Incomplete Flexed	None	Hoabinhian	Unknown (male adult?)
" " 17 (H.6)	Complete Flexed	None	Hoabinhian	Female adult
" " 18 (H.7)	Incomplete Flexed	Hoabinhian tool	Hoabinhian	Female adult
" " 19 (H.8)	Skull + Supine	None	Hoabinhian	1 male, 1 female adults
" " 20 (H.9)	Skull + arm bones	None	Hoabinhian	Male adult
" " 21 (H10)	Four Mixed Flexed	None	Hoabinhian	3 male, 1 female adults
" " 23 (H12)	Skull + upper torso	None	Hoabinhian	Male adult
" " 29 (A.5)	Ritual redeposition	None	Hoabinhian	Male adult
Gua Cha 1	Complete Flexed	Stone pillow?	Hoabinhian	Male adult
Gua Cha 2	Incomplete	None	Hoabinhian	Teenager
Gua Cha 4	Redeposited	None	Hoabinhian	Female adult

N.B. The two Hoabinhian "male adult?" assessments are explained below.

Table 2 lists the burials excavated at Gua Cha by Sieveking (1954), along with the three burials recovered by Adi and Bellwood in 1979, sorted into Neolithic and Hoabinhian groups. The individual's status is generally based on my anatomical observations, as detailed elsewhere (Bulbeck 1982:Appendix B) for the three 1979 burials, or as I recorded them at the Duckworth Laboratory. Exceptions are: Burial 2, whose male adult status is clear from Sieveking's Plate 4(3); Burials 9 and 24, which would seem to be adult males from their relatively large skeleton lengths of 158 and 164 cm, respectively, recorded by Sieveking (1954:111, 119); and Burial 5 which Sieveking (1954:108) observed to be of a child.

Sieveking (1954:118) treated the more complete of the Burial 19 individuals as a (Hoabinhian) fragmentary extended burial, even though it would then be a unique Gua Cha extended burial in that one arm reportedly lay across the body. Its supine position probably reflects postdepositional disturbance, especially as Sieveking noted the burial's legs were missing and, indeed, he excavated it very close to where Adi (1985) recovered the pile of leg bones labelled Gua Cha 4 (see further discussion below). Sieveking also treated Burial 22 as an extended Hoabinhian individual, but the virtually mint condition of the teeth and mandible implies it is more recent, and, although it was stratified beneath a flexed burial (Sieveking 1954:118), this may merely reflect a deep burial pit which managed to avoid any already present burials. (If the lack of Neolithic grave goods is taken to mean a non-Neolithic status, then Burial 22 would be post-Neolithic.) On the other hand Burial 29, treated by Sieveking as Neolithic, would appear to be Hoabinhian given its status as a secondary burial of three calottes and other fragments enclosed by two femora (no other Neolithic burial would be secondary), its position beneath the the Neolithic layers, its lack of grave goods (cf. Sieveking, 1954:95-96, 121), and the advanced fossilization of the extant remains (personal observation).

Kennedy (1964) sacrificed ten fragments for nitrogen assays and expected lower nitrogen levels among the Hoabinhians, as nitrogen content decreases in buried human bone over time. Instead Kennedy found the Hoabinhian and Neolithic concentrations comprehensively overlapped. My preceding analysis explains why. First, Burial 16 as registered at Cambridge actually corresponds to Sieveking's Burial 31 and, second, Burial 29 should be treated as Hoabinhian rather than Neolithic. With these two adjustments a clear distinction emerges between

the Neolithic bones, whose nitrogen percentages range between 0.22 and 0.25, and the Hoabinhian bones with a range between 0.11 and 0.20 (Table 3). Further, the small range of Neolithic values is commensurate with a relatively brief period of burials, while the wide Hoabinhian range corresponds with the expectation that several millennia of burials are involved.

Table 3. Nitrogen Concentrations in Gua Cha Bone Samples (adapted from Kennedy 1964)

Burial No.	Association	% Nitrogen	Stratigraphic Position	Type of Burial
31 [16]	Neolithic	0.25	Buried into Hoabinhian layers	Extended
8	Neolithic	0.24	Buried into Hoabinhian layers	Extended
10	Neolithic	0.22	Neolithic layers	Extended
14	Hoabinhian	0.20	Hoabinhian layers	Flexed
21	Hoabinhian	0.20	Lower Hoabinhian layers	Flexed
19	Hoabinhian	0.18	Lowermost Hoabinhian layers	Incomplete primary
23	Hoabinhian	0.17	Uppermost Hoabinhian layers	Incomplete primary
29	Hoabinhian	0.11	Below Neolithic layers	"Ritual deposition"

N.B. The burial number in square brackets is Kennedy's label which, as shown above, cannot be correct. Archaeological data taken from Sieveking (1954) except where reinterpreted above.

Finally, Table 4 lists the Gua Cha specimens which I have recorded, comprising the three 1979 Hoabinhian burials, and most of the bones received at the Duckworth Laboratory, less the postcranial fragments acquired by Kennedy and the missing postcranial skeleton of As.33.5.3.

Table 4. Osteologically Recorded Gua Cha Sample

Specimen	Cultural Association	Status	Observed Remains
Gua Cha 1	Hoabinhian	Male adult	Teeth, jaws, cranial + postcranial frags
As.33.6.11	Hoabinhian	Male adult	Complete skull
As.33.6.5A	Hoabinhian	Male adult	Teeth, jaws, cranial fragments
As.33.6.6	Hoabinhian	Male adult	Teeth, jaws, cranial fragments
As.33.6.7A	Hoabinhian	Male adult	Teeth, jaws, partial face
As.33.6.7B	Hoabinhian	Male adult	Teeth, partial mandible
As.33.6.8	Hoabinhian	Male adult	Teeth, jaws, cranial fragments
As.33.5.9	Hoabinhian	Male adult	Fairly complete calvarium
As.33.6.1	Hoabinhian	Male adult	Partial calvarium
As.33.5.4	Hoabinhian	Male adult	Right knee joint area
As.33.6.4	Hoabinhian	Female adult	Teeth, jaws, partial face
As.33.6.9	Hoabinhian	Female adult	Teeth, jaws, facial fragments
As.33.5.6	Hoabinhian	Female adult	Calvarial fragments
As.33.6.5B	Hoabinhian	Female adult	Teeth, mandible, cranial fragments
Gua Cha 4	Hoabinhian	Female adult	Pelvis and leg bone fragments
Gua Cha 2	Hoabinhian	Teenager	Teeth + postcranial fragments
As.33.5.1	Neolithic	Male adult	Complete skull
As.33.5.10	Neolithic	Male adult	Teeth, jaws, face, calvarial fragments
As.33.6.3A	Neolithic	Male adult	Teeth, jaws, facial + postcranial fragments
As.33.5.2	Neolithic	Male adult	Teeth, mandible, calvarial fragments
As.33.6.2	Neolithic	Male adult	Teeth, mandible
As.33.5.4	Neolithic	Male adult	Foot bones
As.33.5.5	Neolithic	Male adult	Teeth, jaws, cranial fragments
As.33.6.10	Neolithic	Male teenager	Teeth, mandible, calvarial fragments
As.33.5.3	Neolithic	Female adult	Complete skull + Trevor's postcranial data
As.33.5.8	Neolithic	Female adult	Teeth, jaws, partial cranium, humerus frag
As.33.6.3B	Neolithic	Child	Teeth, jaws
As.33.5.7	Neolithic	Child	Teeth

## CHRONOLOGY

Table 2 indicates a marked distinction between the burials in an extended position, almost always associated with a Neolithic repertory of pots, polished stone, shell spoons and/or jewelry, and the flexed burials which are either associated with Hoabinhian stone tools or with no grave goods at all. 20 extended burials have Neolithic grave goods (the fragmentary child's jaws associated with Burial 31 are excluded from this count), but only one authenticated extended burial lacks these grave goods, while the nine flexed burials (including the four mixed together in Burial 21) all lack Neolithic associations. To estimate the probability of the null hypothesis, that the apparent association between burial position and grave-good associations could be due to chance, we use the Fisher Exact Test (Startup and Whittaker, 1982:137-38). The calculated

result, 0.0000008, proves that the possibility of a chance association is negligible. The dichotomy between extended burials with Neolithic grave goods, and other burials (including secondary burials) which lack Neolithic grave goods, is just as apparent, as also shown in Table 5. Here we can use the Chi-square test to reject the null hypothesis of no association (Chi-square = 35.33, 1 degree of freedom,  $p \ll 0.005$ ). Cramer's V, derived from the Chi-square result (see Shennan, 1988), equals 0.93, proving the very strong relationship between extended burials and Neolithic grave goods on the one hand, *versus* other burial modes and the lack of Neolithic grave goods on the other hand.

Table 5. Comparisons of Burial Mode and Grave Good Associations

	Extended Burials	Flexed Burials	Total
Neolithic Grave Goods	20	0	21
No Neolithic Grave Goods	1	9	10
	Extended Burials	Non-Extended Burials	Total
Neolithic Grave Goods	20	1	21
No Neolithic Grave Goods	2	18	20

Across Thailand north of the peninsula, numerous Neolithic to Bronze Age cemeteries of extended inhumations are dated between approximately 4000 and 2500 BP (Higham, 1989:Chapter 3). These include Ban Kao, the type site for the archaeological culture to which the Gua Cha Neolithic items are assigned, and Khok Phanom Di which has strikingly similar pottery and other Neolithic grave goods. Within West Malay, small numbers of Neolithic extended burials have been excavated in the upper layers of Gua Baik (van Stein Callenfels and Noone, 1940:120) and Gua Harimau (personal observation) in Perak, and possibly Gua Peraling in Kelantan (Bulbeck, 1997). So although Gua Cha is still unique as the only documented **cemetery** of Neolithic extended burials in the Malay Peninsula, West Malaysia clearly participated in a geographically widespread transition to extended burials during late Holocene prehistory. As discussed by Bellwood (1993:46-47) from pottery comparisons and the available published dates, the transition may have occurred slightly later in the Malay Peninsula, e.g. around 3000 BP at Gua Cha, than in Thailand further north. However, it would also be worth pointing out that the complete absence of metals, glass beads or Indian pottery among the Gua Cha grave goods

would suggest that these burials are all earlier than 2000 BP (cf. Glover and Syme, 1993:63; Bellwood, 1993:52). The limited range of nitrogen concentrations in the Neolithic extended burials, 0.22-0.25% (Table 3), would also be commensurate with a short time span, no more than a millennium. Hence it may be inferred that Gua Cha served as a Neolithic cemetery between *circa* 3000 and 2000 BP. In fact, the very low frequency of disturbed or redeposited Neolithic burials (Table 2) indicates their positions were marked with wooden or other perishable grave markers, so the site's use as a Neolithic cemetery was probably only in the order of centuries.

The contrast with the enormous range of Hoabinhian burial representations could not be greater (Table 2). It should be obvious that the use of the site for occupation over millennia, during which time the deceased were occasionally buried in the site, would have resulted in two major forms of disturbance. First, burials near the surface would have been susceptible to disturbance from human trampling and digging activities such as building hearths. Second, as the Hoabinhian burials were apparently not marked, they could have been disturbed by more recent burials as long as the depth of the grave cutting was deeper with the later burials. There are at least two cases where different burials as recognized by Sieveking can be fitted back into one original burial. Burial 20 (H.9, skull and arm bones) complements Burial 16 (S.7, flexed torso and legs), and the two are horizontally close together (Sieveking, 1954:Text-fig. 4) with Burial 16 overlying Burial 20 (Sieveking, 1954:Text-fig. 6). In the same vicinity of the site, the isolated cranium Burial 12 (H.3) could belong with Burial 15 (S.6, cluster of leg bones) even though these remains are separated horizontally by several metres (Sieveking 1954:Text-fig. 4). (Unfortunately S.6 and S.7, along with most of the postcranial material, did not arrive at the Duckworth Laboratory to allow confirmation of these suspected match-ups.) Still in the same vicinity of the site, Sieveking's Burial 19, which included a female adult (Table 2) and which was found without its leg bones (Sieveking, 1954:118), would appear to match up with Gua Cha 4 excavated nearby in 1979. Gua Cha 4 is a female adult which consists only of its tibiae and fibulae, some of the femora, and other fragments including a piece of pelvis (Bulbeck, 1992:473-74) - precisely what Burial 19 lacked.

As burials necessarily place the corpse in horizontal alignment with older materials, to a degree that reflects the depth of the grave cutting, the stratigraphic position of an undisturbed

burial tells us only that the rockshelter floor was higher at the time of burial. So for instance Gua Cha 1, a virtually undisturbed flexed burial excavated near the top of the Hoabinhian levels, must be very late Hoabinhian, in the order of 3-4000 BP as dated by Adi (1985). The prognosis for disturbed burials is even less reliable because if later burials cut through older burials, the disturbed remains should be redeposited as grave fill above the more recent burial. If the process is repeated several times, old human remains may be moved well up the deposits. I suggest that this consideration explains why nitrogen content of the sampled Hoabinhian burials bears no evident correlation with the burials' vertical position (Table 3) but, instead, appears to suggest a progression from "ritual deposition" as the oldest practice, to incomplete primary burial as the intermediate practice, and primary flexed burial as the latest Hoabinhian practice. The earlier burials have simply been susceptible to disturbance over a longer period of time, hence the pattern whereby the lower a burial's nitrogen concentration (i.e. the older the burial), the less complete it is. As Sieveking does not present definitive evidence for intentional secondary burial of any of the Gua Cha Hoabinhians - evidence such as a haematite covering of the bones - then from the available data, it is possible that all the Gua Cha Hoabinhian burials were originally flexed.

There would seem to be little doubt that flexed burials were practised in West Malaysia during most if not all of the early to middle Holocene. The flexed Hoabinhian burial from Gua Gunung Runtuh, in Perak's limestone karsts, is associated with a radiocarbon date between 9500 and 10,100 BP from freshwater shell (Zuraina Majid, 1994). The flexed burials from Gua Kerbau, Perak, were excavated at a depth of three metres or more (van Stein Callenfels and Evans, 1928), and may be equally as old or older. A flexed burial was found at over two metres depth in Gua Baik, below the site's "secondary" Hoabinhian burials (van Stein Callenfels and Noone, 1940:120) although, as I have suggested for Gua Cha, this vertical relationship at Gua Baik may reflect postdepositional disturbance rather than chronological changes in burial practice. These apparently early Holocene flexed burials link up with clearly late Holocene flexed burials at Gua Cha (such as Gua Cha 1 and, apparently, Burials 14 and 21), to demonstrate continuity of the practice over millennia.

It would be an extreme view to hold that all Malay Peninsula Hoabinhians were disposed

of as primary flexed burials upon their decease, and the haematite coating of bones at Guar Kepah (van Stein Callenfels, 1936) and Gua Peraling (Bulbeck, 1997) proves that secondary burials also occurred. My point is that at Gua Cha, stratigraphic position of a Hoabinhian burial is not necessarily a guide to its age. For instance Gua Cha 2, whose lumbar and lower thoracic vertebral discs were in correct anatomical position at the time of excavation, showing it had probably not moved much from its original primary burial locus despite the loss of much of the skeleton (Bulbeck, 1982:472-73), may be significantly younger than the *circa* 6000 BP dating suggested by Adi (1985) on the basis of its depth. Accordingly there is currently no alternative to treating the Gua Cha Hoabinhian remains as an indivisible sample covering an unknown number of millennia between the early to middle Holocene and 4000-3000 BP.

## **DEMOGRAPHY**

From the preceding discussion we can infer that every Neolithic burial can be unproblematically treated as a separate individual, or two in the case of Burial 31, whereas some of the Hoabinhian corpses as originally buried could conceivably be represented by more than one excavated burial specimen. To demonstrate that any two Hoabinhian burials are from distinct individuals we need duplication of the same anatomical part, or signs of different age or sex status, or evidence that the two burials were excavated too far apart to have come from the same buried corpse. As explained above, we should probably recognize Burials 12/15, Burials 16/20 and Burials 19/Gua Cha 4 as three severed individuals, but I cannot see any other plausible match-ups.

The other preliminary consideration is that in most cases age and sex have to be determined from the skull because the postcranial skeleton is unavailable. Stage of dental development is the best criterion for assessing the age of sub-adults (Hillson, 1996), and here I recognize infancy as the stage prior to the eruption of the full set of deciduous teeth, childhood as the stage up to the eruption of the permanent second molars, and the teens as the stage up to the eruption of the permanent third molars (except in cases where their development has been delayed). Adult age will be assessed primarily by Miles' method which estimates an individual's rate of molar wear from the differential wear between the first, second and third molars, to

calculate how many years of wear are present on the molars since the time they came into occlusion (see Hillson, 1996:239-42). Advanced loss of teeth and alveolar resorption can also be taken as an indication of physiological senility. Detailed assessments are being prepared and, for present purposes, a rough division of the adults between young adults (approximately in their twenties), middle-aged adults (approximately in their thirties) and old adults (more than 40 years old) is sufficient. The much reviled method of ageing by closure of the cranial sutures will be invoked only when no teeth are preserved, as in the cases of As.33.5.9 (whose lack of cranial suture closure suggests a young adult), and As.33.6.1 (whose moderate cranial suture closure suggests a middle-aged adult). My age categories follow those of Trevor and Brothwell (1962) and, indeed, our assessments of the Hoabinhian and Neolithic demographic profiles are very similar even though I have re-assessed the cultural affiliation of quite a few of the specimens.

The Neolithic composition shown in Table 2 includes three children, one male teenager, two female adults and ten male adults. Young Neolithic adults are here assessed as As.33.6.2 (A.6), As.33.5.1 (B.1), As.33.5.3 (B.8), and As.33.5.5 (H.4). Middle-aged Neolithic adults are assessed as As.33.5.8 (A.3), As.33.5.10 (A.8) and As.33.5.2 (B.7), while the only old adult would be As.33.6.3A (A.7). Hence the eight Neolithic adults whose age can be assessed comprise four young adults (three males, one female), three middle-aged adults (two males, one female), and one old male. Interestingly, the sole teenager is the only Neolithic burial unaccompanied by grave goods (Table 2). The child incorporated with Burial 31 could possibly be a sacrificial victim in what is the only multiple Neolithic burial. The other two children, being buried with fine grave goods, are strongly suggestive of a ranked or stratified society with ascribed status (cf. Carr, 1995). The low proportion of "old" individuals also suggests that social status did not depend on increasing age, while the predominance of males suggests that men were preferentially buried at Gua Cha, and may well have enjoyed higher status over women.

As noted above, the list of 18 apparent Hoabinhians in Table 2 can be reduced to 15 when plausible match-ups are considered. These 15 individuals consist of one teenager, four adult females and ten adult males. Young adult Hoabinhians are assessed here as Gua Cha 1, Gua Cha 4/As.33.6.5B (H.8), As.33.6.7A (H.10A1), As.33.6.8 (H.10B), As.33.6.11 (H.12), and As.33.5.9 (A.5). Middle-aged Hoabinhians are assessed as As.33.6.1 (H.3), As.33.6.4 (H.6), As.33.6.5A

(H.8), As.33.6.6 (H.9) and As.33.6.9 (H.10C), while the only old adult would be As.33.6.7B (H.10A2). In sum, excluding As.33.5.4 (H.5) whose age at death cannot be estimated more precisely than adult, we have six young adults (five males, one female), five middle-aged Hoabinhians (three males, two females), and one old male. The Hoabinhian age distribution is similar to the Neolithic composition except that no children are represented, and the Hoabinhian imbalance towards identified males is slightly less prominent than with the Neolithic series. The paucity of grave goods suggests minimal status distinctions, although it may have been a special honour to have been interred at the Gua Cha site.

A low proportion of adults living beyond middle life, and a low representation of adolescents and post-weaning children, regularly characterize prehistoric mortuary assemblages (Acsádi and Nemeskéri, 1970). Neither is the absence of infants unusual, which can be attributed to the common cultural custom of withholding full burial treatment from infants (e.g. Carr, 1995), as well as the difficulty of recovering infants' fragile bones and deciduous teeth during excavation (cf. Trevor and Brothwell, 1962:7). The male:female ratio is also problematical as the female bones, being less robust, will tend to preserve less well, and the criteria used in assigning sex result in a systematic bias against recognizing females (Donlon, 1993). Whether these factors can explain the statistically significant preponderance of 21 males over six females (chi-square = 4.56, one degree of freedom,  $p < 0.05$ , Cramer's  $V = 0.29$ ), or whether Gua Cha was culturally preferred for male burials during both the Hoabinhian and Neolithic phases, is not as yet clear (cf. Trevor and Brothwell, 1962:7).

## CONCLUSIONS

From my review of the available evidence, 15 distinguishable Hoabinhian burials have been excavated at Gua Cha, less than the 23 recorded Neolithic burials. All 15 Hoabinhians are represented by some part of their skeletal anatomy either at the Duckworth Laboratory or at the Muzeum Negara, whereas only 12 Neolithic individuals are represented (at the Duckworth). The age-at-death and sexual compositions of the Hoabinhian and Neolithic series are similar, with a concentration on young to middle-aged adults, especially males. The Hoabinhians were buried over several millennia between the early or middle Holocene and 4-3000 BP, while the site's use as a Neolithic cemetery may have lasted only centuries, during the third millennium BP. Grave-

good associations indicate a major change between the Hoabinhian phase when differences in social status were apparently minimal, and the Neolithic phase when there existed significant differentiation in ascribed social status. Nonetheless the unusually large number of interments in both phases, by West Malaysian standards, suggests that Gua Cha was perceived as a ritually important site during both burial phases.

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