Chapter 2

Archaeological Investigations in the Niah Caves, 1954–2003

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Introduction [GB]

The purpose of this chapter is to summarize the history of archaeological excavation in the Niah Caves between 1954, the first season of the Harrisson excavations, and 2003, the final season of the NCP excavations, and of the studies undertaken by the latter project on the materials from both sets of excavations, to provide the context for the following chapters integrating the results of these investigations. In 2000, when we embarked on the project, we were faced with a series of large voids, most notably in the West Mouth of the Great Cave but also in many of the other entrances investigated by the Harrissons. To exploit the potential of the hugely rich Harrisson Excavation Archive in order to address the research questions discussed in the previous chapter, we had to try to reconstruct what had once been in those voids and to tie that information to the stratigraphic sequences that we were able to establish from our own studies of the surviving archaeological sections.

As we describe later in the chapter, the principal task of studying the excavation records in the Harrisson Excavation Archive in Sarawak Museum was undertaken for the NCP by PD in 2001 and 2002 and, alongside his studies of aspects of the Neolithic and Metal Age pottery from the Harrisson excavations in the West Mouth, in 2005. Further critical insights into how the Harrisson excavations proceeded, how artefacts were distributed in the spit system they employed, and how that system can be correlated with the stratigraphies that we have detected in the same trenches, were obtained from subsequent analyses of charcoals, fauna, pottery, shells, and other categories of material, notable contributions being by FC, LLS, PP and RR. The total documentary archive consists of: some 400 handwritten school exercise books (Fig. 2.1), some describing the excavations (including some with sketches of sediment sequences and finds), others describing categories of finds; some 3000 black and white photographs in medium format and some 500 in 35 mm (the 1954–65 excavations in the West Mouth of Niah Great Cave are recorded in over 1200 medium-format photographs, for example, including almost 500 recording the burials); *c*. 25 stratigraphic sketches; copies of numerous letters, notes and reports; and draft texts of the many papers on the excavations published especially in *Sarawak Museum Journal* but also in international journals such as *Man*.

The Harrisson excavations in the Niah Caves separate into two major phases. In 1954 and 1957–59 the bulk of the West Mouth sediment was excavated under the direction of Tom Harrisson, especially towards the mouth of the cave (Fig. 2.2). For the first few years after Barbara joined him in the project, she

Figure 2.1. *Notebooks from the Harrisson excavations, in the Harrisson Excavation Archive in Sarawak Museum, Kuching. (Photograph: Graeme Barker.)*

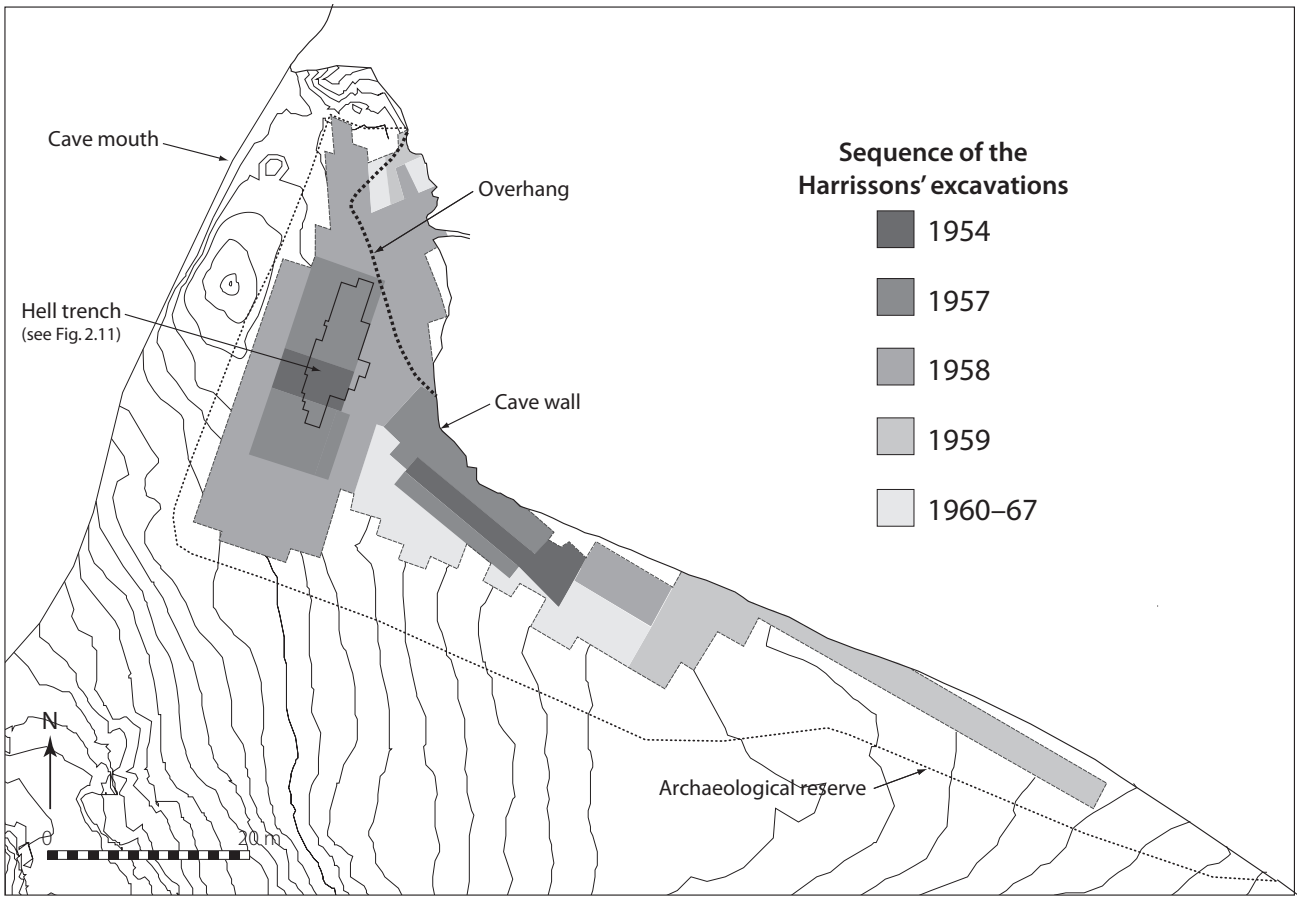

Figure 2.2. *The West Mouth of Niah Great Cave: the principal excavations by Tom and Barbara Harrisson; the locations of the Zuraina Majid and NCP excavations are shown in Figures 2.34 and 2.39. (Drawing: Lindsay Lloyd-Smith.)*

was mainly involved in exploration and excavation in other cave mouths in the Niah complex, though she also directed the work in the West Mouth when Tom was absent, including when the Deep Skull was discovered in February 1958. From 1960 to 1967 Barbara was the driving force in the excavations: whilst Tom was still involved, the archive indicates a significant increase in her influence over excavation strategy and the quality of the recording systems employed. Zuraina Majid conducted further excavations in the West Mouth 1977, and our own fieldwork was between 2000 and 2003.

The Harrisson excavations [PD, FC, GB]

1954

In 1954 Tom Harrisson secured funding and permission from his employers to conduct a small excavation in the Niah Caves. The team consisted of Tom himself, Michael Tweedie from the Raffles Museum in Singapore, Hugh Gibb, a freelance journalist, and some locally-hired workmen. As described in Chapter 1, for the team to gain access to the West Mouth in 1954 demanded Herculean efforts to cross the rainforest and get people and equipment up the steep slopes in front of the cave entrance, and by the time the camp was operational there was limited time left for excavation. The main purpose of the two-week season was to establish the archaeological potential of the site, so quick results were needed if future campaigns were to be justified. Harrisson chose the northwest corner of the West Mouth, the largest of the cave openings, because given the abundance of birds and bats, the unbroken expanse of guano at ground level, and the topography (Fig. 2.3), he suspected — rightly as it turned out — that the deposits towards the opening of this entrance would be very deep.

A trench measuring about 20 ft square (or *c*. 6 m square: see Table 1.1 for metric equivalents of imperial measurements) was laid out about 40 m from the lip of the cave mouth. The excavators came down immediately on burials underneath a thin layer of trampled guano (Fig. 2.3). It was decided to leave the burials on plinths, to be excavated at a later date (T. Harrisson

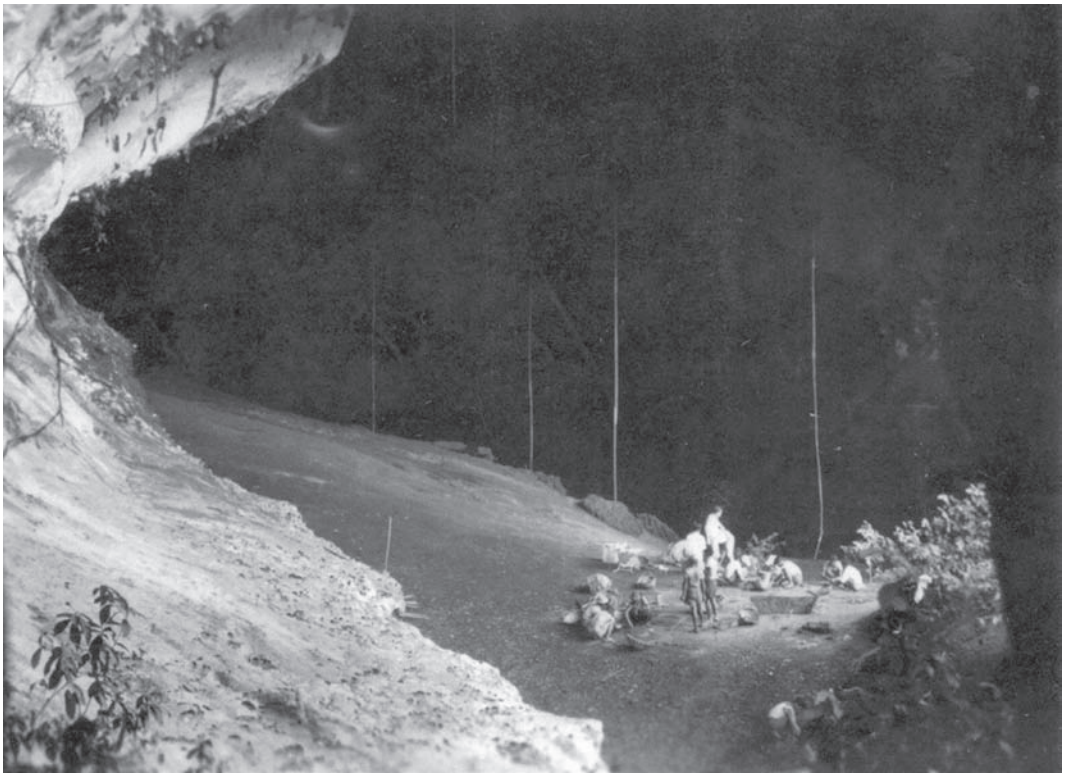

Figure 2.3. *The first excavations in the West Mouth of Niah Great Cave, 1954. The photographer is standing on the roof of the rock overhang shown in Figures 1.18 and 1.19. (Harrisson Excavation Archive photograph na 14, reproduced with permission of Sarawak Museum.)*

Figure 2.4. *The 1957 excavations in the West Mouth of Niah Great Cave: the long thin trench laid out to determine the extent of Neolithic burial and (in the foreground) Trench E, the main trench excavated rapidly to a depth of 8 ft. (Harrisson Excavation Archive photograph na 129, reproduced with permission of Sarawak Museum.)*

Figure 2.5. *World War II tank landing craft used to take the expedition to Pangkalan Lobang, the basecamp on the Sungai Niah, in 1957. (Harrisson Excavation Archive photograph na 109, reproduced with permission of Sarawak Museum.)*

Figure 2.6. *Telephone link established by Tom Harrisson in the West Mouth in 1957, using which he was able to broadcast weekly to the BBC. The photograph is staged — apparently nobody apart from him was allowed to touch the telephone! (Harrisson Excavation Archive photograph na 126, reproduced with permission of Sarawak Museum.)*

1957a). A long thin trench (50 × 5 ft) was then laid out parallel to the cave wall to the east of the first trench, to follow the burials and to try to locate the limit of the cemetery (Fig. 2.4). The sediment (or 'soil' in Harrisson's terminology) was removed in 6-inch-thick 'spits' or horizontal slices to an overall depth of 2 ft or 24 inches below the ground surface. A rectangular trench, Trench E, was also excavated in what was judged to be the likely centre of the archaeological deposit. Measuring 25 by 15 ft, it was excavated in 24-inch- or 12-inch-thick spits, down to a depth of 8 ft, the depth of excavation made easier by the fact that only three burials were found, two 'extended' (the bodies lying prone) at 12 inches deep, and at 24 inches deep a 'flexed' burial (the term used by the Harrissons for a body lying on its side with the knees flexed or in some cases drawn up to the chest in the foetal position: Fig. 2.27). Excavations proceeded rapidly, and recording was rudimentary compared to later seasons: no effort was made to draw sections or make notes about stratigraphic differences in the strata that were being dug through. The inevitable result is that our studies of the materials in the Harrisson Excavation Archive could make little use of the 1954 finds. The animal bones from Trench E, for example, fill a single cardboard box labelled simply 'E'.

Despite its shortcomings, the 1954 excavations yielded a quantity of finds indicative of prehistoric occupation and burial. It was apparent that the West Mouth contained a series of prehistoric burials of, broadly, Neolithic date, along with earlier occupation evidence in the form of sediments rich in ash and charcoal, fragments of animal bone and occasional chipped stone tools. Immediately upon his return to Kuching, Harrisson began publicizing his findings in both academic and popular media (e.g. T. Harrisson 1954**a or b??**), and set about securing funding to enable him to scale up the operation. With the blessing of the Sarawak Government he was able to obtain sufficient funds from a mix of public and private benefactors to return to the cave in 1957 for what was now planned as the first of an extensive series of campaigns.

1957

In 1957 Harrisson made a rather dramatic arrival with his team and equipment using a borrowed World War II tank landing craft to convey the expedition to Pangkalan Lobang, the team's base on the Sungai Niah (the location of the present-day entrance to the National Park) (Fig. 2.5). In preparation for a long-term project, with logistical support from Brunei Sell **Shell??** Petroleum and Sarawak Oilfield Ltd (Shell) and Henry Waugh and Co., the Museum had invested significant resources in establishing an infrastructure, including a 3 km plank walk-way across the forest floor from the river to the Niah Caves (Fig. 1.12); ladders and staircases to gain access to the Traders' Cave and West Mouth; storage and work facilities at Pangkalan Lobang; and, in the Traders' Cave, a camp complete with a badminton court, the faint outline of which is still visible in the trampled guano. Generators were carried up, and a telephone line was run up from the river, as much to keep Harrisson in touch with the outside world (and his Museum duties) as for the sake of the excavation (Fig. 2.6). At one point he was making weekly broadcasts to the BBC. Another innovation was that Hugh Gibb came equipped for cinematography, his film of the excavations and birds-nesting being shown on BBC television on 3 November 1957 and winning the Eurovision Grand Prix at the Cannes Film Festival in 1958 (Harrisson 1958a, 572).

The 1957 field season ran from March to May. A grid was laid out parallel to the cave lip on either side of Trench E, and a second grid was connected to it at a different angle, laid out roughly parallel to the northern cave wall (Fig. 2.7). Efforts were concentrated around the areas investigated in 1954, with a series of trenches measuring between 5 ft and 10 ft wide by 15 ft long, excavated on the grid south (the E/A series) and north (the E/B series) of Trench E, along with several small trenches under the rock overhang. An augur survey by a Shell geologist Dr F.R. van Veen (Fig. 1.15) had previously established that there was archaeological material in these deposits. Most of the trenches in the E series were dug to a minimum of 5 ft (60 inches), whereas the excavations of trenches further into the interior (K, L, M, D/E and D/N) rarely went below 24 inches, largely because of the density of human skeletal remains encountered.

At the beginning of the 1957 season, most spits were dug as 12-inch-thick segments, with others 24 inches and some 6 inches thick. One of the many striking things that emerged from the notebooks that Tom Harrisson kept is the speed at which parts of the excavation progressed (Figs. 1.19 & 2.8). By his own admission, speed and finding things were the driving forces, so that he could gather sufficient results to support the fund-raising he knew he would need to do to sustain large-scale excavations in the future (Harrisson 1958a, 573). He kept track of the amount of sediment removed as a concrete index of progress, and lucky excavators were rewarded for exceptional finds. The 20 ft by 5 ft trench designated E/A1, for example, was dug to a depth of 6 ft (72 inches) during the first three days of excavation, with 600 cubic feet of artefact-rich 'soil' being removed. Screening the excavated soil was now employed as routine practice, but it

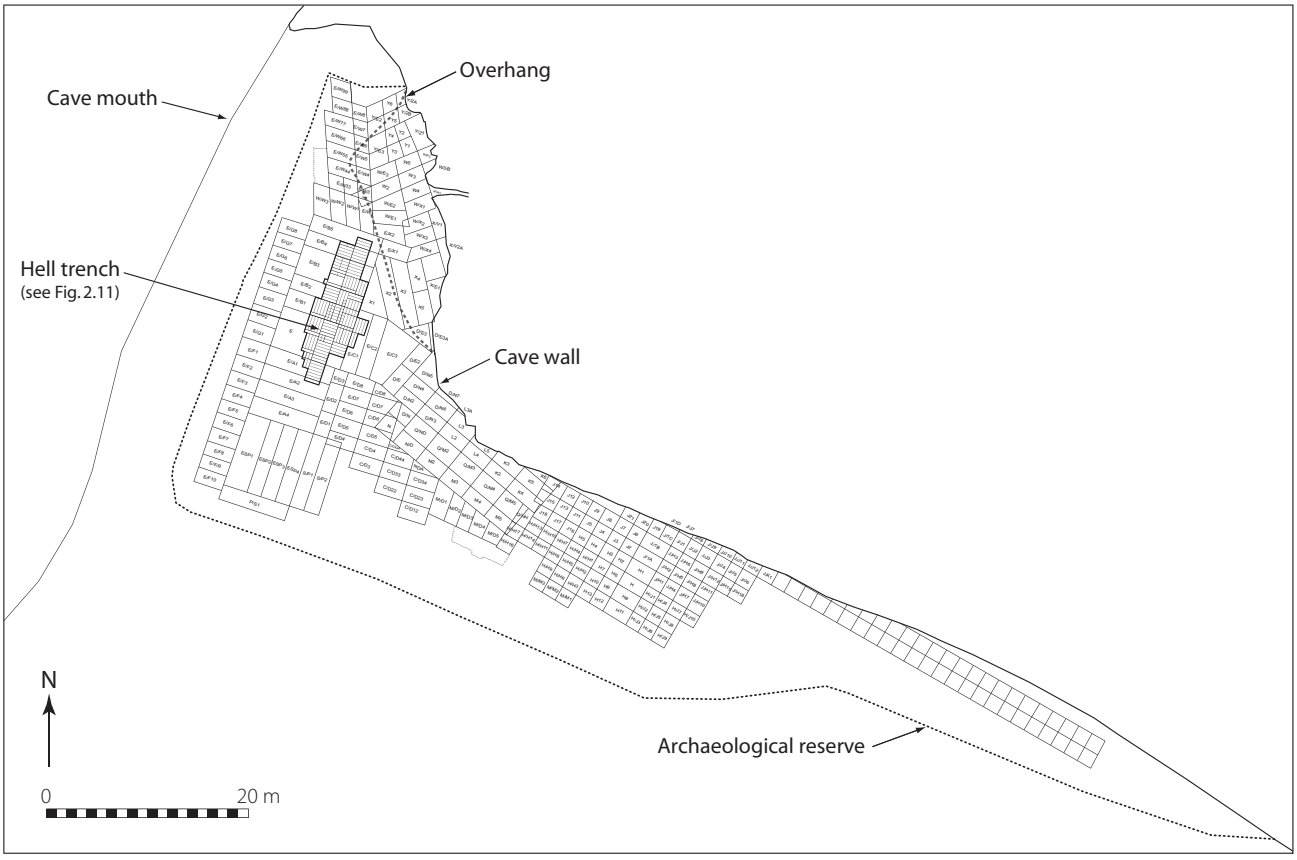

Figure 2.7. *The Harrisson excavation grids in the West Mouth of Niah Great Cave (see also Fig. 2.38). (Drawing: Lindsay Lloyd-Smith.)*

Figure 2.8. *Excavations of the E/A and E/B trenches in the West Mouth of Niah Great Cave in 1957: the speed of excavation is apparent from the two photographs of the same area of excavation, taken a few days apart. The Hell series of trenches were below these. Figure 1.19 shows the walls of this part of the excavation being shored with timber later in the season. (Harrisson Excavation Archive photographs na 142 & 153, reproduced with permission of Sarawak Museum.)*

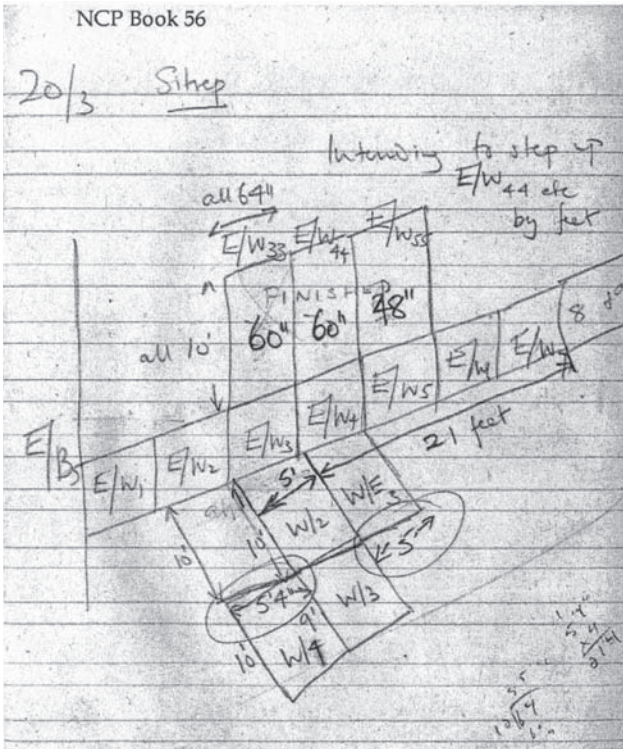

Figure 2.9. *A sketch by Tom Harrisson of the partial trench layout for the area under the rock overhang, with measurements of trench lengths, widths, and depths. (1957 workbook V (4), 18/3/57–24/3/57, reproduced with permission of Sarawak Museum.)*

is clear that the pace of work had a detrimental effect on recovery, reflected in the paucity of records for this season. The excavation notebooks for the period contain fairly accurate, if somewhat haphazard, records in Tom Harrisson's hand of the sizes and depths of each trench excavated and the various thicknesses of spits (Fig. 2.9). When burials were found, digging focused on clearing individual ones regardless of the grid. The practice of digging round things also applied to some of the important artefacts that were recovered, with objects left on plinths as excavation continued (Fig. 2.10).

The excavation of the E/A and E/B trenches close to the cave entrance produced large quantities of bone fragments and stone tools in what Harrisson now began to term the 'habitation zone' or 'frequentation zone' (T. Harrisson 1957a). Unfortunately, it is clear from photographs of the vertical profiles at the edge of the 1957 deep excavations that in the upper sections of the E/A and E/B trenches, for example, where excavations had proceeded apace in the early stages of the 1957 season (Fig. 1.24), the horizontal spits had cut through complex sequences of deposits sloping down from the cave interior towards the entrance, resulting in finds bagged together from a single spit in many cases likely to derive from different stratigraphic units.

Below the first four feet of the E/B1 trial trench, however, and in the lower parts of the trenches dug subsequently around it in the latter part of the season,

Figure 2.10. *The West Mouth of Niah Great Cave: excavating the W series of trenches in 1958. Metal flags mark the grid, and depths below ground surface. The figures on the left are sifting soil. A skeleton ('flexed' burial 87) left on a plinth is visible to the right of the ladder. (Harrisson Excavation Archive photograph na 277, reproduced with permission of Sarawak Museum.)*

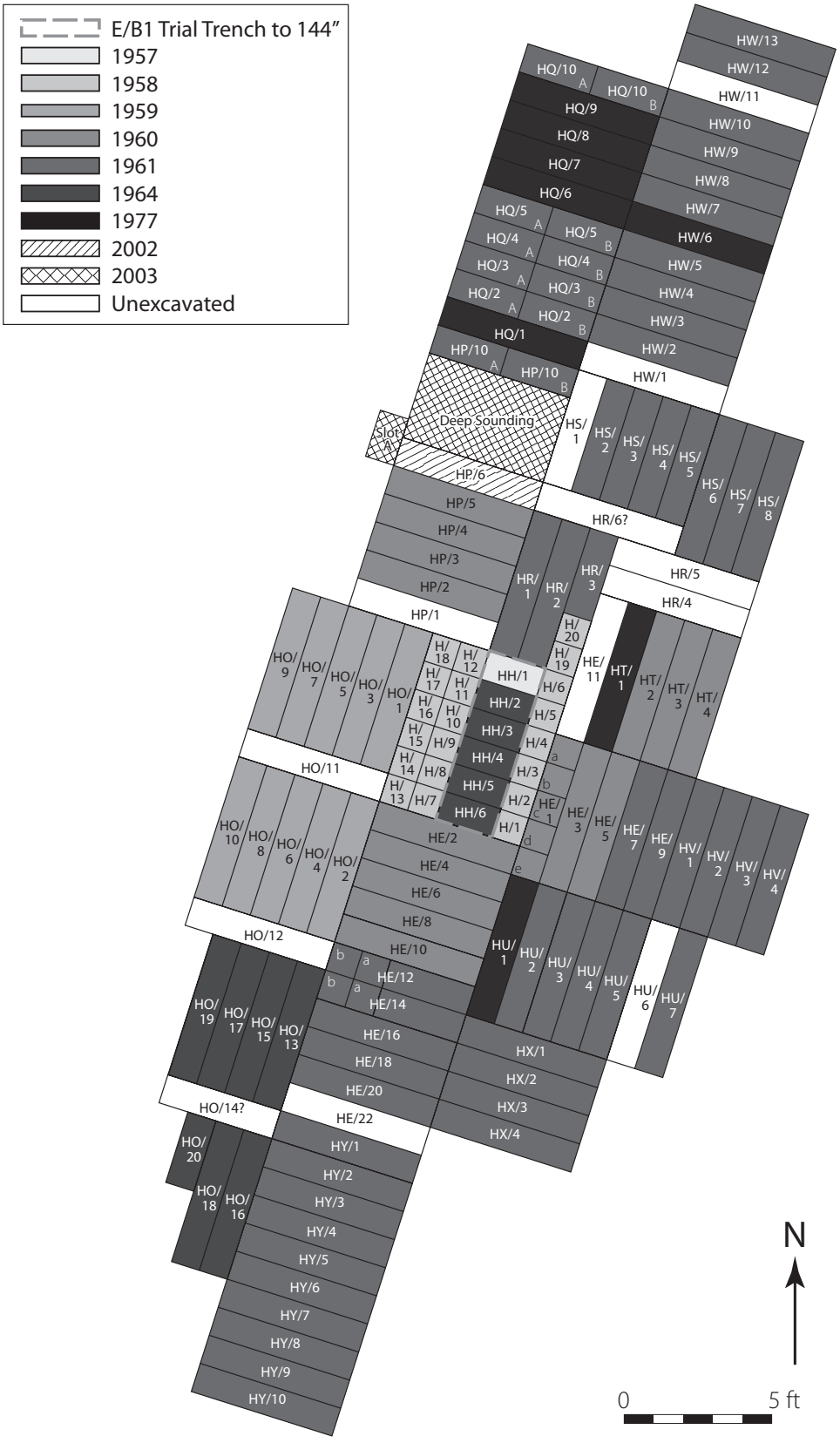

Figure 2.11. *Plan of the 'Hell' series of trenches showing the chronology of excavation (see Fig. 2.7 for location). (Drawing: Ryan Rabett & Dora Kemp.)*

Figure 2.12. *The West Mouth excavations: sieving soil to collect small artefacts. (Harrisson Excavation Archive photograph na 337-1, reproduced with permission of Sarawak Museum.)*

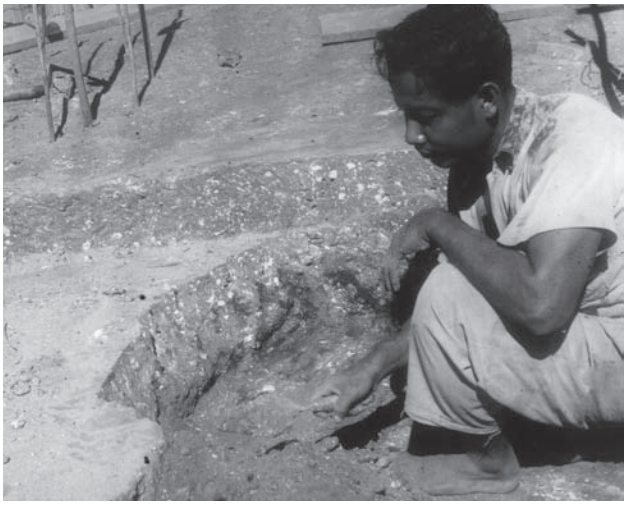

Figure 2.13. *The West Mouth excavations: trowelling the 'pink and white'. (Harrisson Excavation Archive photograph na 271, reproduced with permission of Sarawak Museum.)*

excavation was much more controlled under Barbara's careful supervision. Beginning with a small sondage dug below the E/B1 trench (Fig. 1.15), a series of deep contiguous trenches came to be known collectively as 'Hell' because of the difficult working conditions of direct sunlight in the afternoon. She reduced the size of the excavation units, digging initially in 1 ft by 1 ft trenches and 1 inch spits, before later expanding work to standard 5-ft-long by 1-ft-wide slots dug in 3-inch-thick spits (Fig. 2.11). Great effort was expended in sifting through the excavated sediment (Fig. 2.12) to recover small artefacts and other cultural remains. The success of this strategy is evidenced in the large quantities collected of well-preserved small vertebrate remains such as rats, bats, swiftlets and shrews. The rich deposits discovered by the small sondage below the E/B1 trench were termed by Tom Harrisson the 'bone under ash layer', which the first ^{14}C dates on charcoal samples from the Groningen laboratory suggested were in the order of 40,000 years old (Table 2.1: Gro-1139 and Gro-1338).

As the deep excavations proceeded, one of the critical observations made by Harrisson was that a dominant deposit on the eastern (interior) side was a pinkish sediment with white 'blobs' (amorphous inclusions) in it, which he termed 'the pink and white' (Figs. 1.24, 1.25 & 2.13). He interpreted this 'exceptionally uniform fine-grained material' (Harrisson 1957a, 162) as being formed by a drizzle of 'cave earth' and fragments of rock from the cave roof. When he compared the various depths at which the deposit was being found below the ground surface with the depths of the radiocarbon dates that he was obtaining (Table 2.1), he concluded that the 'pink and white' had accumulated at a constant rate — around 2.5 inches (6 cm) per thousand years — and that, in consequence, the depth below ground surface of cultural materials, whether or not associated with a ^{14}C

Table 2.1. *The first suite of radiocarbon dates from the Harrisson excavations (in uncalibrated years bp) as published by Zuraina Majid (1982, 39). Further dates were obtained later from Neolithic burials (Brooks* et al. *1977). (See Appendix 1 for full details of the Harrisson dates, with corrections in some cases.)*

Depth	Location	Sample	Analysis date	Date (years bp)	Lab. no.
Sub-surface	W/2	?	1957	2460±70	
Sub-surface	W/2	Charcoal	1958	2700±70	
12 inches	?	?	1960	4040±70	
?	Ho/19	Bone	1965	10,110±310	GX-0351
?	Ho/19	Bone	1965	11,030±280	GX-0350
48+ inches	E/1	Charcoal	1957	19,750±190	GrN-1159
c. 72 inches	E	Charcoal	1957	32,630±700	GrN-1158
96–100 inches	E/E	8 charred bones	1957	39,600±1000	GrN-1339
c. 100 inches	E/E	Charcoal	1957	41,500±1000	GrN-1338

Figure 2.14. *Excavating the 'frequentation zone' by the rock overhang, looking east: Trench Y/E3 is visible on the left under the* ***???????****. Workmen are sifting soil to the right of the trench, and Tom Harrisson is supervising the work in the background (see also Fig. 5.6). (Harrisson Excavation Archive photograph na 288, reproduced with permission of Sarawak Museum.)*

Figure 2.15. *Excavating the 'frequentation zone' by the rock overhang: looking south across the top of the E/W trench series from E/W7 to the location of trenches E/W66, E/W55 and E/W44. (Harrisson Excavation Archive photograph na 337-2, reproduced with permission of Sarawak Museum.)*

Figure 2.16. *Excavating the W/X trenches under the rock overhang, looking northeast. The photograph gives a good impression of the speed with which parts of the sediment were removed in the early seasons. (Harrisson Excavation Archive photograph na 275, reproduced with permission of Sarawak Museum.)*

date, could be taken as a reliable guide to their age.

In parallel with the West Mouth excavations, small teams were sent off to survey other cave mouths and in some cases to conduct excavations. In November 1957, for example, four small 1 × 1 ft pits (A to D) were dug in the Gan Kira entrance by two members of the team. These test pits established the depths of the sediments, as well as the presence of cultural material, but excavation ceased once the potential of the site was established.

1958

Spurred on by the success of the 1957 season, an enlarged team of nearly 60 people returned for the 1958 season, which lasted from mid January (when the young Lord Medway, working as a Technical Assistant at Sarawak Museum, arrived with an advance party) to April, Tom himself arriving with Professor von Koenigswald in early February to witness the excavation of the Deep Skull (Chapter 1, p. **00**). In the West Mouth, as well as expanding efforts in the deep 'Hell' excavations, a number of new trenches were opened within the grid extending north of the Hell Trench to the rock overhang, to investigate the northerly extent of the 'frequentation zone' deposits (Figs. 2.14, 2.15 & 2.16). Grid squares were marked out by tin flags attached to bamboo stakes (some of which survive today). A line of small trenches was laid out to the west of the E area (EF, EG), just inside the lip of the cave rampart. The spoil from the 1954 and 1957 excavations had been dumped in this part of the entrance, so experienced workmen were employed to trowel through it to the 1954 ground surface; the material collected was bagged and labeled as 'spill', and the excavated soil was thrown over the cave lip (Harrisson Excavation Archive Notebook 73, 1–20). A 20 × 20 ft area was opened to the northeast of the original 1954 trench in the cemetery area (the H and J series), exposing further Neolithic burials. In the E area, once digging had reached a level surface, a new grid was laid out. Because depths were measured below the 1954 uneven ground surface, the level surface was variously 72 inches, 84 inches and 96 inches below ground surface, a system with great potential to confuse later researchers working on the material, as many effectively equivalent levels at lower depths were assigned different elevations. Nevertheless, the trenches laid out in Hell were among the most orderly and readily reconstructed of any in the Harrisson campaigns (Fig. 2.11). An innovative technique employed in this season was pollen analysis, samples being taken by Professor Jan Müller (of Royal Dutch Shell, Miri)

Figure 2.17. *Shell geologist Jan Muller* ***Dr Schroeder?? or F.R. van Veen (see Fig. 1.15??)*** *taking sediment samples for pollen analysis near the findspot of the Deep Skull (see also Fig. 1.23). (Harrisson Excavation Archive photograph na 561, reproduced with permission of Sarawak Museum.)*

Figure 2.18. *Lord Medway, the project zooarchaeologist, excavating Burial 88a left on a plinth of sediment in the West Mouth, in the area between the Hell Trench and the rock overhang. (Harrisson Excavation Archive photograph na 349, reproduced with permission of Sarawak Museum.)*

close to the findspot of the Deep Skull (Figs. 1.23 & 2.17).

Another major development in the 1958 season was the emergence of the young Lord Medway (the present fifth Earl of Cranbrook) as the project's zooarchaeologist (Fig. 2.18). He meticulously catalogued the numbers of bone fragments collected, the skeletal elements that could be identified to taxon, and even the numbers of bags needed to package the fragments of bone from each spit (e.g. Medway 1958a), a systematic level of recording and analysis rarely found at that time on archaeological sites anywhere in the world. Whilst the quality of the excavation notebooks from the 1958 season is variable, the enterprising Lord Medway, who had no formal training in archaeology, took it upon himself to sketch the stratigraphic sections, especially in the Hell area and under the rock overhang. Eleven of these drawings survive in the Harrisson Excavation Archive, all of which we were able subsequently to relate to both the excavation grid and to surviving sections, giving us confidence in the importance of another series of his section drawings from 1965 relating to sediments that were entirely removed (Fig. 3.3). It was fortunate that it was within the area of enhanced control and smaller-scale excavation units directed by Barbara Harrisson (excavation was at a rate of thirteen hours per cubic foot, compared with an overall average speed of one hour per cubic foot) that the remains of the Deep Skull and several long-bone fragments, along with stone tools, were found at the 106 inches (2.6 m) level on 7 February (Fig. 1.16). The quality of the excavation is further evidenced by the fact that an assemblage of macro- and micro-vertebrate remains well in excess of 165,000 bone fragments was recovered from the 'bone under ash layer' in which the Deep Skull was located.

During this season, work continued at other cave entrances, with

Barbara Harrisson leading survey and excavation teams and Lord Medway undertaking a preliminary survey of the many smaller caves along the edges of the Gunong Subis (Medway 1958c).

Barbara led one of these teams to continue investigations at the Gan Kira cave entrance on the 4 and 7 of March. The team laid out a 20 × 5 ft trench, subdivided into four sections, incorporating two of the 1957 test pits. They dug through the upper 6 inches of sediment across the trench, finding a large amount of material including fragmentary human remains (Fig. 2.19), animal bones, beads, metalwork and earthenware and imported stoneware ceramics, mostly within the compacted upper inches of sediment. In Tom's absence, Barbara was charged with simultaneously running excavations at Gan Kira and in the West Mouth, and her own survey of Lobang Tulang, so she was largely absent from the initial excavations by workmen at Gan Kira, which were supervised by Ewa Kraszewska. The findings confirmed that Gan Kira warranted a greater investment of time and attention. Barbara was anxious to proceed with great care, as the indications were of a stratigraphic sequence of burials, with secondary burials (burials of parts of individuals collected up from where they had been buried somewhere else first) near the surface, associated with finds including metalwork, and 'extended' burials lower down. As a result, she decided to close operation until it was possible to supervise the excavations herself. The trench was covered with sacking and a roof erected to provide further protection for the burials that had been part-exposed.

Following her earlier survey, Barbara led a small team to the Lobang Tulang cave entrance, from the 17–21 March. The cave consists of three main chambers and smaller chambers connected by chimneys and passages (Fig. 8.14). Access in 1958 was difficult, involving a steep

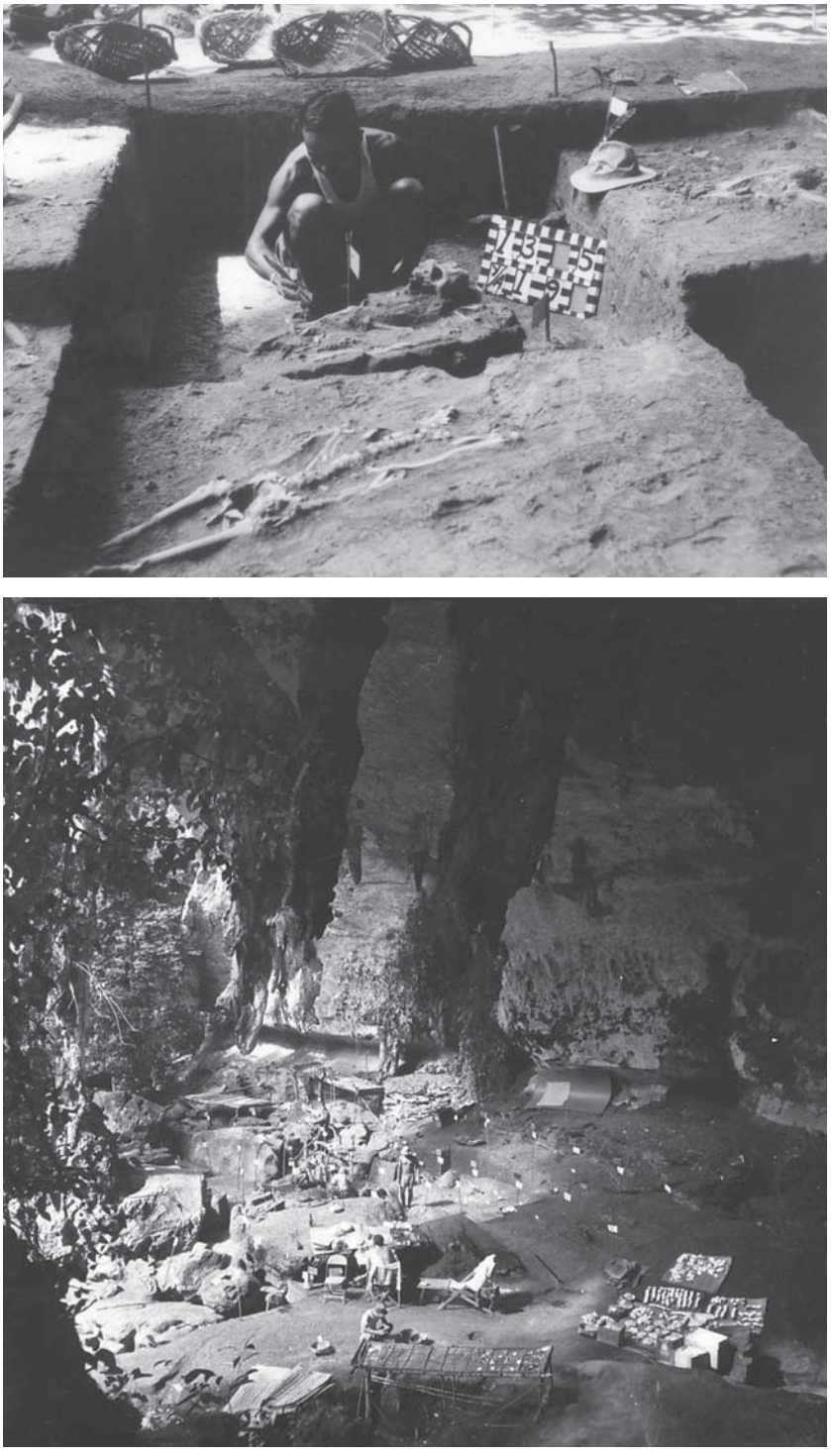

Figure 2.19. *(above) Human remains (Burials 3* ***and ??****) found in the 1958 excavations in the Gan Kira entrance; (below) the Gan Kira entrance during excavations in 1959. (Harrisson Excavation Archive photographs* ***nc 58??*** *and nc 10, reproduced with permission of Sarawak Museum.)*

Figure 2.20. *Excavations in the West Mouth of Niah Great Cave, 1959: the end of excavation in the Hell series of trenches. The surface of the small trenches HO/2, HO/4, and HO/6 has been covered with protective matting. (Harrisson Excavation Archive photograph na 474, reproduced with permission of Sarawak Museum.)*

climb up a vine ladder and a chimney. The surface of the cave floor was littered with human bones and pottery, the latter including Chinese stoneware identified as belonging to the T'ang and Sung dynasties, and most time was expended on collecting this material. A series of test trenches was also excavated to evaluate the depth of the deposits. Over 8000 items were collected on the surface and in the trenches: pottery; glass beads and fragments of glass bangles; numerous iron objects such as *parangs* (jungle knives), smaller knives and fishhooks; worked bone, teeth, shell, wood and stone; and fragments of textiles (see Chapter 8). The excavations and the key finds were described in a prompt interim report (B. Harrisson 1958a). Bones of an estimated 50 individuals were found in the surface collecting and excavation. Dateable finds indicated the primary use of Lobang Tulang for burial between about AD 600 and AD 1000, differences in the skeletal material and associated finds being interpreted in terms of two distinct populations of varying wealth, one 'Mongoloid' (Chinese settlers) and one 'Melanoid' (local proto-Dayak people), both relying on birds-nesting for their livelihoods.

The Harrisson Excavation Archive includes eleven notebooks on excavations that were undertaken at this time in the 'camp cave' (CC), the Traders' Cave where the team had its base (Fig. 1.9). There was no follow-up work in later seasons, and nothing was published on the 1958 investigations. A team also visited the Lobang Hangus entrance (referred to as 'Lobang Angus' in the excavation notes and interim publications; the name was changed by Tom Harrisson to Lobang Hangus later) and dug a 1 × 1 ft pit, finding enough evidence of an intact stratigraphy to justify planning a proper excavation for the following year. Lord Medway and Sarawak Museum staff visited a series of other caves including the Lobang Jeragan cave system (Fig. 7.1), where they dug a 1 × 1 ft pit adjacent to the cave wall, finding 'fine-quality' earthenware pottery and a 'human skull and limestone tool at 12" depth' (Medway 1958c, 3).

1959

Excavations continued in the West Mouth in May, June and July 1959, with the Pleistocene deposits in Hell being dug fairly briskly in 5 × 1 ft blocks, in 3-inch spits (Fig. 2.20). In one of the notebooks Tom Harrisson wrote a memorandum to brief William Solheim (Fig. 2.21) at the beginning of June. Describing the work in May, he noted that he had been able to expand the scale of operations this season because he had been able to train up a group of local people (Malays and Punan) so that they could undertake all of the different kinds of work from fine excavation

Figure 2.21. *Bill Solheim and Tom Harrisson at their excavations in the West Mouth of Niah Great Cave, 1959. (Harrisson Excavation Archive photograph na 551, reproduced with permission of Sarawak Museum.)*

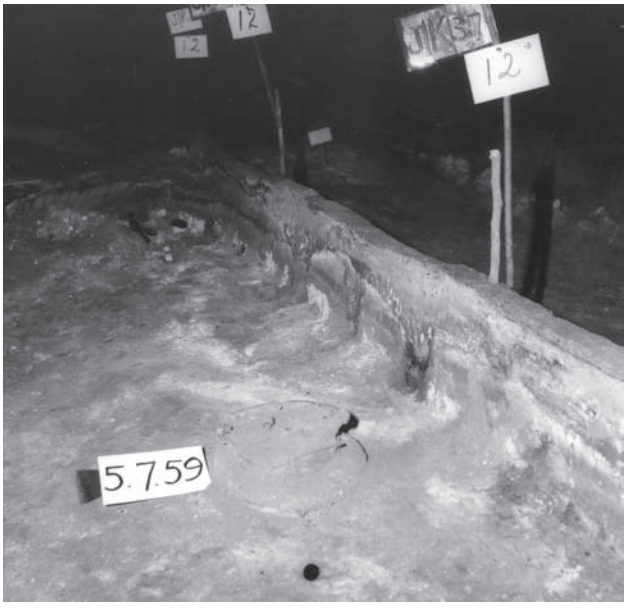

Figure 2.22. *Excavations in the West Mouth of Niah Great Cave, 1959: the long narrow JK series of trenches in the cemetery area. In the foreground is a partially exposed jar of a jar burial, alloted burial number 233 by the NCP. (Harrisson Excavation Archive photograph na 490, reproduced with permission of Sarawak Museum.)*

Figure 2.23. *Excavations in the West Mouth of Niah Great Cave, 1959* ***1958??****: looking east into the cemetery zone from the Hell Trench. Partially exposed burials have been protected with wooden boxes. (Harrisson Excavation Archive photograph na 251, reproduced with permission of Sarawak Museum.)*

to sorting finds, whereas in previous seasons he had brought Museum staff and Malays from Santubong to undertake the specialized work, using local labour just for the heavier work. One of the main objectives of the West Mouth excavations was to track the extent of the 'bone under ash layer', with digging generally stopping when the excavators had found and dug through this horizon, resulting in the step-like appearance of the Hell trench complex today (Fig. 1.23). The pattern and alignment of the 5 × 1 ft trenches reflect the efforts of the excavators to locate the culturally-rich 'bone under ash layer' situated on the entrance side of the West Mouth and avoid the almost sterile 'pink and white' deposit on the interior side.

Attention shifted increasingly to the 'cemetery' area further into the interior from the Hell Trench, the H and J trenches from 1958 being expanded and the HJ, JH and JJ series being opened. A long narrow trench (the JK series) was also excavated to a depth of 12–18 inches along the cave wall, right into the dark cave interior where excavation could only take place with artificial light, to determine the edge of the cemetery. Burials found, including jar burials protruding above the surface (Fig. 2.22), were protected by timber planking for later excavation (Fig. 2.23). The main effort, though, was now concentrated on the other cave entrances.

A large team of about thirty people spent May at Gan Kira. Excavations commenced under the supervision of Barbara: a new 5 × 5 ft trench system was laid out, and over fifty 5 × 5 ft squares within the grid were excavated in 6-inch spits, the deepest down to 36 inches. In total *c*. 4500 cubic feet of sediment were removed. Tom Harrisson summarized the discoveries in his note to Solheim as 'no Neolithic proof whatsoever, exceptionally rich Iron, some remarkable Bronze, then a break, and quite strong Meso-Palaeolithic indications'. Three main stratigraphic units were recognized in his notes, directly overlying bedrock (though in most squares only the first two were found). Uppermost were 6–8 inches of a compact brown guano-rich deposit containing evidence for both habitation — charcoal, numerous fragments of animal bone, 'food shell' (shells of edible molluscs) and so on) — and also secondary burials associated with pottery, glass beads and other artefacts (see Chapter 8). The material found in the upper spits was interpreted as evidence of a campsite where people had suffered violent deaths, perhaps in a night attack on a sleeping group. Next was a looser brown deposit with extended burials. The evidence appeared to confirm the burial sequence observed in the small-scale excavations the previous year. Underneath the burials was the third layer, in some places described as a sterile marl but in others found to contain food bone, shell and occasional quartzite flakes. Radiocarbon dates later indicated that this basal occupation was probably Late Pleistocene in date. The upper layer yielded some 8000 sherds of pottery including 150 fragments of Chinese stoneware, the earliest of which dated to early Sung, *c*. AD 900. The excavation notebooks were maintained by Barbara and are full of detailed records of the activities and finds, interspersed with Tom's hand giving instructions for the day, one of his typical entries being 'Sella, Che, and Mandor Chi to stay at cemetery … Sensible men properly supervised to make a really good path to Kain Hitam, across the valley and up the cliff (ladders etc.). Others to go on excavating Gan Kira as follows: Y/A9 – 30", Y/A11 – 36", not Y/A3 or Y/A – 10".

Nyandoh, a Sarawak Museum archaeological assistant, returned to Lobang Tulang in May, excavating over 200 square feet of deposit in four days. He found brown guano overlying a dark sediment that continued to bedrock at 18–24 inches. Almost 2500 sherds were collected, most of them earthenware interpreted as of local manufacture, together with glass beads, fragments of glass bangles, iron tools, and worked bone, shell and stone, much as in the previous season. It was clear that there had been elaborate mortuary rituals conducted at the site, including the deposition of parts of deliberately broken pots and stone tools (B. Harrisson 1959**a, b, c or d??**).

In June 1959 work was undertaken in the western entrance of Kain Hitam, the 'Black Cloth' cave, following the construction of the walkway to it (by those 'sensible men'!). This cave, located in a separate limestone outcrop from the Great Cave, has two main entrances, one on its western side and one at a lower elevation on its eastern side. Barbara had visited the cave in 1958 and discovered a remarkable series of paintings of boats on the walls near the western entrance (Fig. 1.22), along with human remains scattered around wooden canoe-shaped coffins further into the interior. The assumption was that the boat paintings and boat burials were components of a shared funerary practice. The burials and other artefacts scattered on the cave surface were plotted and collected, and an excavation undertaken in front of the paintings. This work uncovered human remains associated with artefacts of glass, bronze and iron, together with pottery including Chinese stonewares, with hints of a Late Pleistocene occupation below much as at Gan Kira, though these were not explored extensively.

The largest excavation of the 1959 season was in the Lobang Hangus cave entrance. Here, Tom Harrisson hoped that the lack of obvious burial evidence on the surface, and the apparently undisturbed sedi-

ments found in the small pit dug the previous year, might mean that any Palaeolithic occupation evidence there would be free of Neolithic disturbance (Lobang Hangus Notebook 1, 12/6/59). The main area of interest was the entrance platform, which slopes into the cave interior for about 50 m, up to a vertical rock drop-off that today requires a ladder to access the rest of the cave (Fig. 2.24). Harrisson laid a grid of 10 × 10 ft squares over the platform, four squares wide and eight squares deep. The excavation proceeded rapidly, with four squares being excavated down to 24 inches by the end of the first week (Fig. 2.25). The depth of sediment increased with distance into the cave entrance from the cave lip, excavation ceasing when the excavators reached bedrock, flowstone, or an archaeologically-sterile light yellowish-brown silty clay.

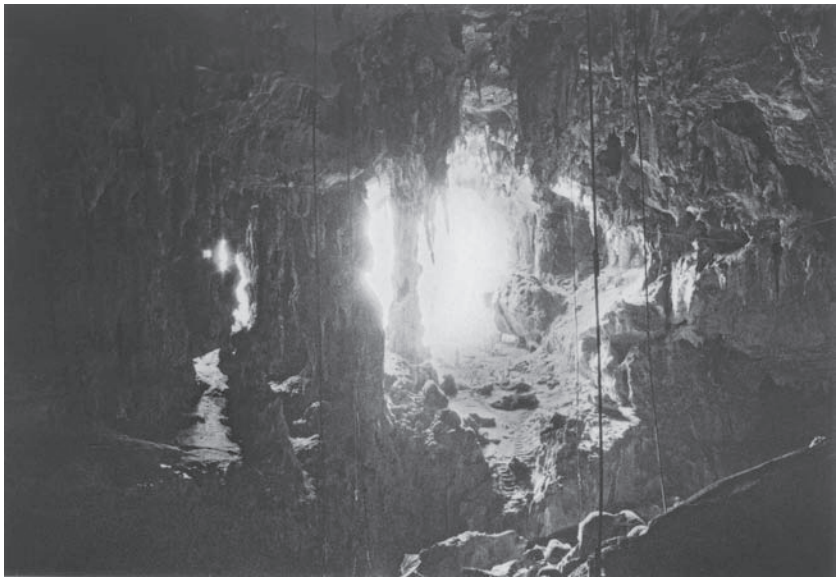

Figure 2.24. *Looking east to the Lobang Hangus cave entrance from the interior. Steps can be seen leading up to the entrance platform. (Photograph: Graeme Barker.)*

Figure 2.25. *The 1959 excavations in the Lobang Hangus entrance, showing the main row of trenches on the entrance platform, and finds tables on the left. Looking east. (Harrisson Excavation Archive photograph LA 33, reproduced with permission of Sarawak Museum)*

The excavation started on the 2 July, and by the end of August the team had removed almost half the sediment on the entrance platform, including the baulks left between the excavated squares. Among the material collected were over 13,000 fragments of animal bone and over 24,000 shells (Harrisson 1966b; Medway 1966a). Tom made sketchy records in his notebooks of the progress of the excavation and the sediments excavated, and in greater detail the depth, location, morphology, and typology of stone, metal and shell artefacts. The most detailed observations of the stratigraphic sequences were made (again) by Barbara. Her notes were accompanied by sketches of one of the baulk faces in each grid square before their removal (Fig. 2.26). She defined the layers with archaeological evidence as a 'uniform loose dark brown deposit', usually overlying a 'uniform loose light brown deposit', both disappointingly poor in charcoal. Many of her section sketches also have a dotted line (or rather, a row of small circles or ovals) drawn across them, which appear to delineate the boundary between a ceramic and a pre-ceramic occupation, a critical piece of information for our studies of the material from the excavations.

1960, 1961

The excavations continued in the West Mouth in March and April 1960, and further limited work took place in 1961, though there is little record of what was done. (One of the main issues faced by the NCP team in its reconstruction of the Harrisson excavations is that, although the Hell Trench excavation was the most meticulous, associated documentation is patchy: some

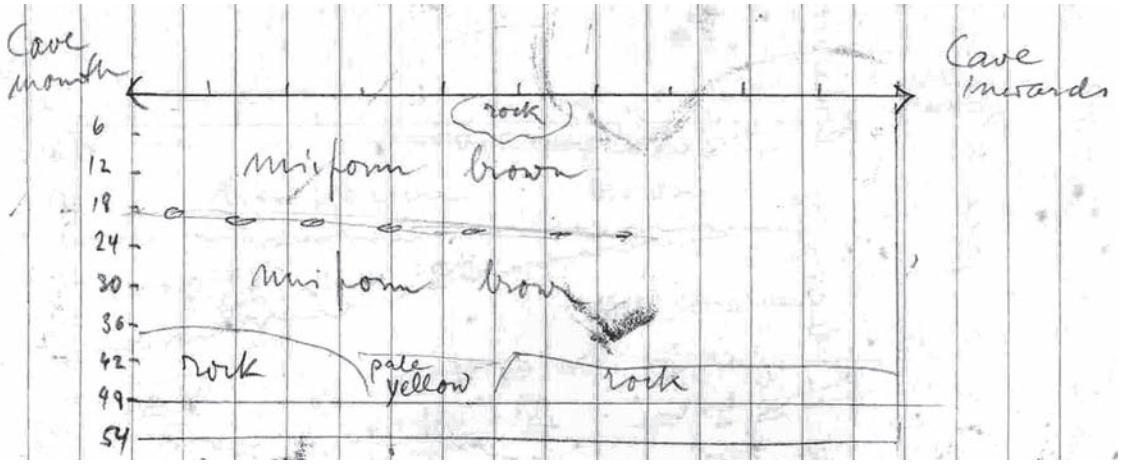

Figure 2.26. *One of the section sketches made by Barbara Harrisson during the 1959 excavations in the Lobang Angus entrance, with a dotted line marking the boundary between the non-ceramic and ceramic horizons. (Reproduced with permission of Sarawak Museum.)*

books, drafts, and photographs survive, but there are significant gaps in the record, leading us to suspect that parts of the archive may be incomplete.) The main focus of work, especially in 1960, was the Hell Trench, which continued to proceed under Barbara's close direction, with significant expansions north and south of the initial investigation area (Rabett *et al.* 2006, fig. 5). She probably authored one of the few surviving exercise books from Hell in the Harrisson Excavation Archive (NCP108), which is filled with detailed notes on the 'pink and white' sediments that were being encountered during this part of the deep excavation.

During this time she also directed the excavations of Lobang Jeragan, the burial cave on the western side of the Gunung Subis, first surveyed by Lord Medway in 1958 (Fig. 7.1). The team spent three weeks at the site in July 1961, digging in 6-inch spits down to a maximum depth of 30 inches, within a grid of 5 × 5 ft squares. Burials were left on pedestals for subsequent recording and lifting, the system used in the West Mouth: 55 burial numbers were allocated (Fig. 7.3). The material was sent to Dr Calvin Wells in England for osteological analysis, and was donated on his retirement to the University of Bradford, where it is currently curated in the Biological Anthropology Research Centre. Barbara Harrisson wrote up the draft report promptly (B. Harrisson 1962), which remains unpublished.

The other significant event of the year was in November, when Tom and Barbara released three of their home-reared orangutans into the Bako national forest reserve near Kuching. The animals were kept in cages at a jungle camp for a month, and then encouraged to go into the forest but with the camp guardians continuing to put food out for them. Tom's interests were increasingly moving from archaeology to animal conservation.

1962, 1963, 1964

Work continued in November and December 1962 in the two Kain Hitam cave entrances, and in Gan Kira. Barbara both excavated and undertook cave surveys south of Lobang Jeragan. Jack Reavis, a US Peace Corps volunteer seconded to Sarawak Museum between 1964 and 1966, surveyed the cliffs above the Sekaloh river, identifying the caves of Magala (a large cave system with seven mouths) and Upiusing (or Upi-Using) as being of particular archaeological potential (Fig. 8.3). On December 9 Barbara left the Great Cave for the *kubu* (government administrative station) at Kampong Niah to make her weekly telephone report to Tom in Kuching and found the lines cut by some Indonesian-backed local communities. This action was the outcome of the tensions that led to the formal announcement of the *Konfrontasi* ('Confrontation') by Indonesia against Malaysia in January 1963. Tom was actively involved (with relish!) advising the British armed forces that were stationed in the border zones to resist Indonesian infiltration and helping to train local 'Cross-Border Scouts' to work with them and take the conflict into Indonesian Borneo. Despite the fraught atmosphere (Indonesian paratroopers crossed into Sarawak in early 1964, for example), fieldwork continued at Niah in 1963 and 1964. Reavis continued the Sekoloh survey and made test excavations in Upiusing, while Barbara excavated at Lobang Magala 'E' with Michael Chong, a Sabah Museum trainee. Much of the Magala 'E' excavation

was left to him because of Barbara's responsibilities at Kait Hitam, Gan Kira, and Upiusing. The Magala 'E' excavations found extended burials similar to the Neolithic burials of the West Mouth cemetery, and extensive tradeware ceramics in Magala 'D' and Kayu Malam (T. Harrisson & B. Harrisson 1968). In November 1964 she excavated with Reavis at Upiusing, finding Metal Age burials with pottery including imported Ming Dynasty ware (B. Harrisson 1965a). Because of her other commitment she was largely absent from further excavations undertaken by workmen at Gan Kira supervised by Ewa Kraszewska. Tom then dug there briefly, and later work was supervised by Sharifudin. Reavis excavated one of the Sekaloh sites he had discovered, Batu Parang, and dug test pits in ten others. The excavation of so many caves by different people, some with limited prior experience, inevitably led to uneven recording. Indonesia's *Konfrontasi* with Malaysia was formally declared at an end in August 1966.

1965

The team returned to Niah from August to November 1965, the second most extensive season of the Niah campaigns, with work starting in earnest in the cemetery area of the West Mouth, directed by Barbara Harrisson, who was also responsible for most of the (excellent) field recording of the burials. A new section of trenches was opened to link the cemetery area and

Figure 2.27. *Burial B25 in the West Mouth of Niah Great Cave: an example of a tightly flexed burial, with the body laid on its right side. (Photograph: Shelaigh and Richard Brooks, reproduced with permission of Sarawak Museum.)*

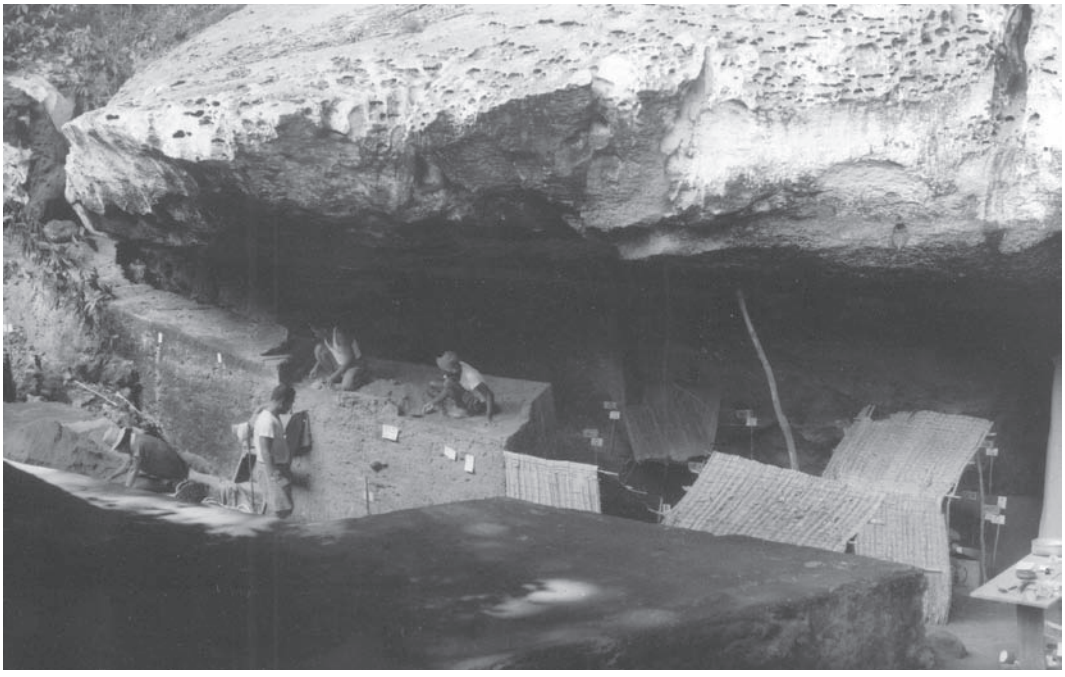

Figure 2.28. *Excavations in 1965 in the West Mouth of Niah Great Cave, looking northeast into the rock overhang. The two crouching excavators are on the Y/E3 block of sediment. (Harrisson Excavation Archive photograph na 868, reproduced with permission of Sarawak Museum.)*

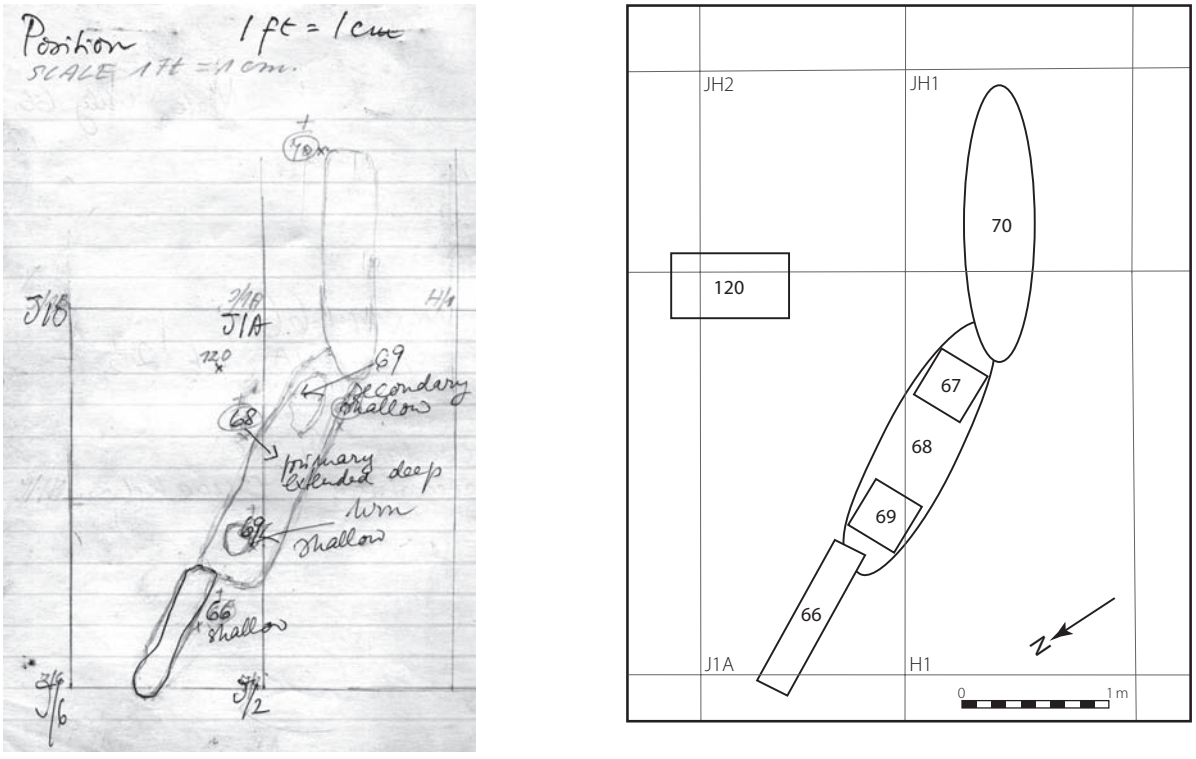

Figure 2.29. *(Left) A typical example of the notes and sketches made by Barbara Harrisson for the West Mouth burials, and (right) the rectified plan of the same burials by Lindsay Lloyd-Smith. (Scan of notebook reproduced with permission of Sarawak Museum.)*

Figure 2.30. *The 1965 excavations in the Lobang Hangus cave entrance, looking north (compare with the site today, Fig. 3.32). (Harrisson Excavation Archive photograph LA 52, reproduced with permission of Sarawak Museum.)*

the deep excavations at the front of the cave (the ED and CD series). Attention was also turned to the area under the rock overhang, where a number of substantial baulks from the previous work were investigated, and some existing trenches dug deeper, discoveries including some deeply stratified flexed burials (Fig. 2.27). The W/E and Y/E baulks were seen as of especial importance because they provided a partial cross-section of the 'frequentation' area (Fig. 2.28). The detailed field notes demonstrate the explicit consideration of stratigraphy, the archive for the 1965 work including 26 well-drawn stratigraphic sections with scales and legends. Where spit digging was used, the spits were not more than 6 inch thick. When human remains were encountered, the 'graves' and their immediate surroundings were excavated separately, an understandable system but one that caused us complications in the later studies because of its potential to obscure complex processes of artefact deposition associated with secondary burials by dividing material between finds in the assumed 'grave' area, and finds in the 'normal' sediments beyond it. However, each burial in this season and in the 1966 and 1967 seasons was excavated with exception care and recorded to a high standard of detail in a separate notebook, under standard headings, with detailed descriptions of the burial (*situation*), its physical relationship to other burials where appropriate (*burial association*), stratigraphic details (*stratification*), and material found (*material associations*), the text accompanied by sketches and cross-referenced to detailed photographs (Figs. 2.29 & 7.37). Scale drawings were eventually made of 132 burials. The archive contains 457 photographs of burials in the West Mouth cemetery.

The other main focus of work in 1965 was Lobang Hangus, under the direction of Jack Reavis (Fig. 2.30). His archaeological expertise is apparent in his detailed notes on the excavations and finds, and photographs and section sketches showing, for example, that the sediments being excavated sloped from the cave walls down to the middle of the platform. He confirmed Barbara Harrisson's observations that a thin layer of deposit (a 'limestone horizon' in his terms) separated the ceramic and aceramic phases of cultural activity, and describes and sketches a pit filled with cultural material within the aceramic sediments (Fig. 2.31). The records suggest that the archaeological deposits had accumulated in a natural hollow in front of the cave lip, rather like the Hell Trench sediments in the West Mouth. Faced with the logistical problems of transporting the large number of finds from Lobang Hangus and the West Mouth to Kuching at the end of excavation season, one of the understandable but unfortunate decisions taken by Tom Harrisson was to

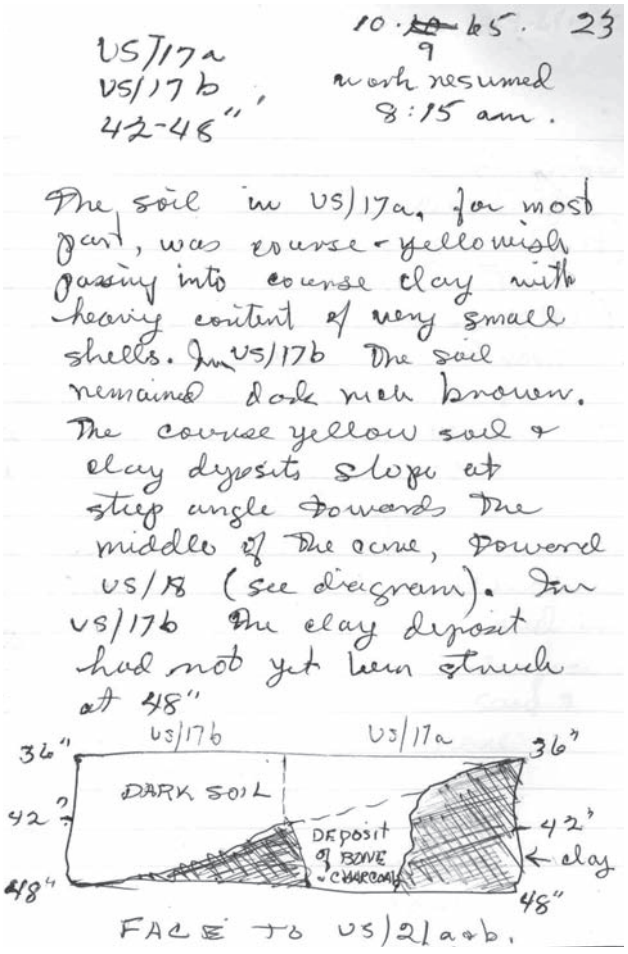

Figure 2.31. *A sketch by Jack Reavis, excavation supervisor at Lobang Hangus in 1965, of the east-facing section of the baulk between US/17 and US/21 grid squares, showing the slope of deposits towards the centre of the site and a later pit or similar archaeological feature truncating the earlier clay sediments. Lobang Hangus notebook 10, 10/9/65. (Reproduced with permission of Sarawak Museum.)*

select for transport to Sarawak Museum those skeletal elements of different animals that he considered could be identified by Lord Medway at a later date, discarding the rest after counting and weighing them.

There was a further short excavation of a single trench in November 1965 at the base of the limestone cliff below the Lobang Hangus entrance. This trench (UT/1) extended 17 ft 1 inch along the wall and 32 ft from the rock face. It took the team four days to dig just 6 inches through the soggy dark brown silty clay soil they encountered, recovering 1519 fragments of pottery, two lbs of animal bone, 2836 shells and 'quite a few stones' in the process (Reavis Workbook UT1, 13/11/65). Below this layer, which appears to have been

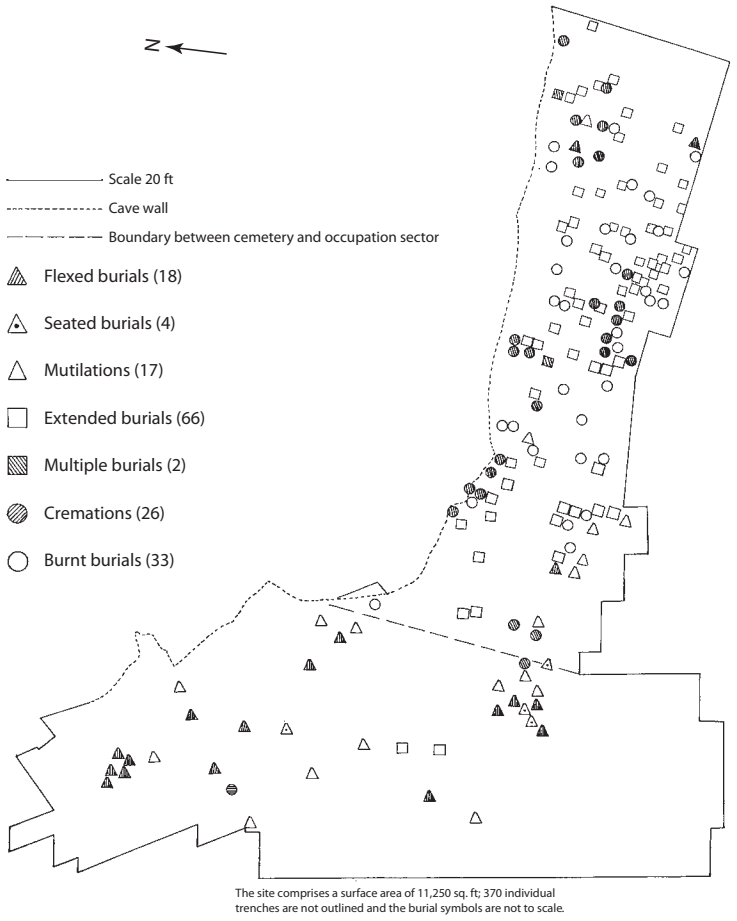

Figure 2.32. *Barbara Harrisson's schematic plan of burials investigated in the West Mouth of Niah Great Cave up to 1967. (After B. Harrisson 1967, fig. 2.)*

Table 2.2. *Barbara Harrisson's classification of burial types in the West Mouth of Niah Great Cave. (After B. Harrisson 1967.)*

Burial type	Description
Flexed	Primary burials with arms and legs bent, with ankles often under pelvis
Seated	Primary burials with legs crossed, torso collapsed over pelvis as if deposited in a sitting position
Mutilations	'Mutilation that has taken place prior to decomposition of flesh and ligaments surrounding the bones, preserving articulation — for instance as parts of spinal columns, extremities, and other body parts involving joints or small bones in perfect alignment *in situ*.' (B. Harrisson 1967, 140)
Extended	Primary burials, usually in supine position, laid in wooden log and plank coffins, bamboo biers, and some with leaf or wooden pillows
Multiple	Discrete multiple burials of several types within a single coffin
Cremation	Fully cremated secondary burials in wooden caskets, baskets and ceramic jars
Burnt	Partially burnt secondary burials contained in wooden caskets, baskets and ceramic jars

dug as a single spit, was an archaeologically-sterile light yellowish-brown clay. No plan has been found in the Harrisson Excavation Archive to indicate the distribution of the finds within the trench, which was recorded as a single unit.

In total, the 30 days of fieldwork at Lobang Hangus during the 1959 and 1965 campaigns excavated some 5000 cubic feet of sediment from 21 trenches, each measuring 10 × 10 ft. Because of the paucity of charcoal Harrisson never attempted to date the occupation levels, though Lord Medway proposed a Mid Holocene date on the basis of mollusc frequencies that suggested sea levels closer to the cave than today (Medway 1966a). Our own ^{14}C dates indicate the use of this cave entrance in the Late Pleistocene and terminal Pleistocene, in addition to the Holocene occupation that Lord Medway identified.

In November and December 1965 Reavis extended his survey of Sekaloh, mapping the southern and eastern cliffs of the Subis. He identified more than 40 caves, collecting surface material and excavating test pits in ten of them, and undertaking small-scale excavations in Batu Parang, Lobang Kemembang and Lobang Pagi. He found human remains in all three caves, and fragments of double-spouted vessels in Batu Parang and Lobang Kemembang (T. Harrisson 1971).

1966, 1967

Most of the West Mouth burials were excavated during the last two seasons (June–August 1966, and February–April 1967), by which time Shelaigh Brooks of the University of Nevada at Las Vegas (UNLV) had joined the project as its physical anthropologist. Assisted by her husband Richard she made detailed osteological records of the burials prior to their excavation; their archive today consists of seven notebooks and almost 200 black and white photographs. By the end of the 1967 season over 200 burial numbers had been assigned and 181 burials had been fully excavated, of which 37 were classified as 'disturbed fragments'. Barbara's intention was to return for one final season to complete the excavation of the remaining burials that had been located and part-exposed, but this was not possible for the reasons described in Chapter 1, and 33 burials were left *in situ* in the Neolithic cemetery.

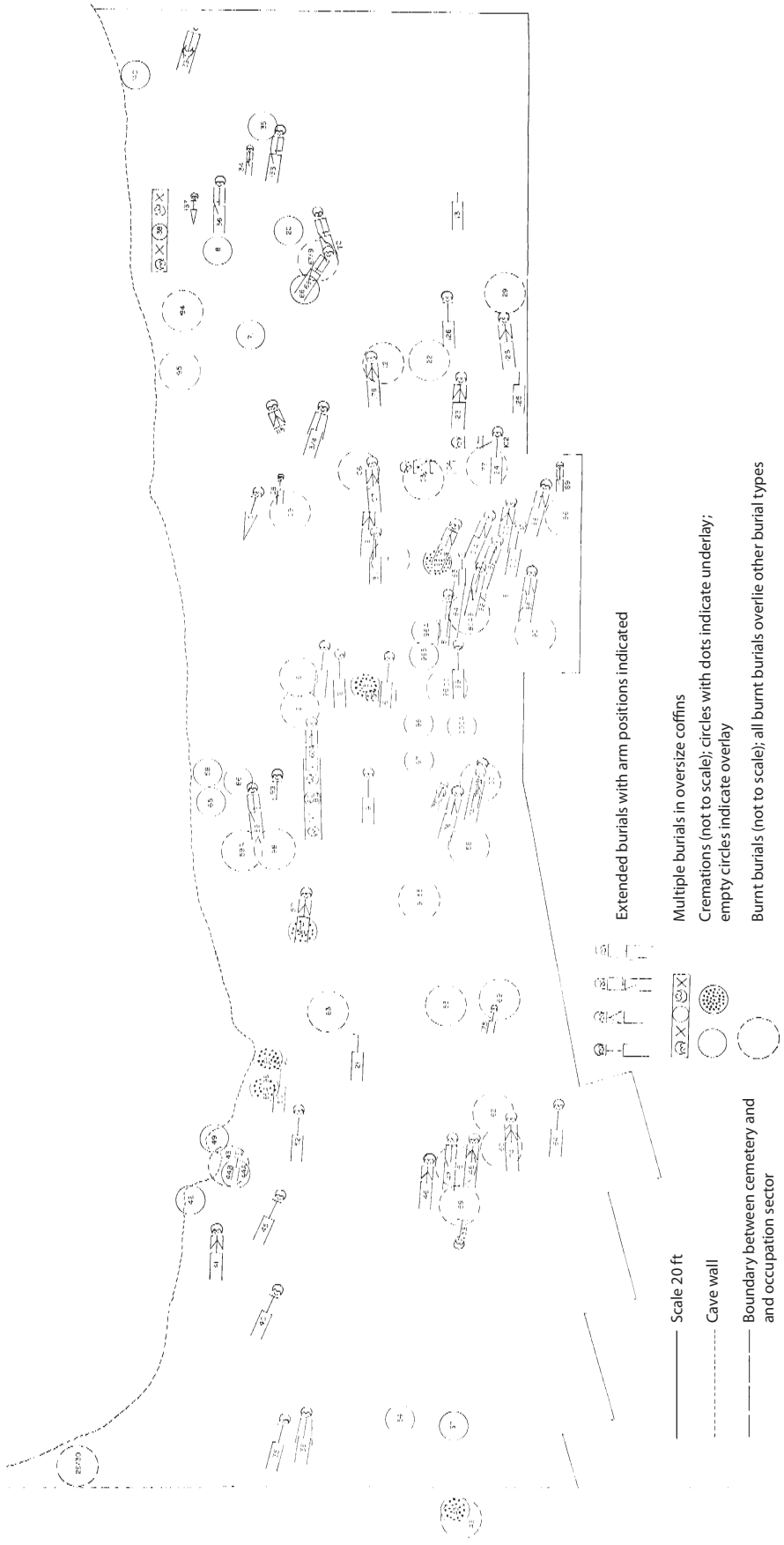

Figure 2.33. *Barbara Harrisson's plan of the Neolithic cemetery in the West Mouth of Niah Great Cave.* (*After B. Harrisson 1967, fig. 3.*)

At the end of the excavation the bones from 112 burials were sent to UNLV on loan for analysis (Brooks & Brooks 1968; 1972; Brooks *et al*. 1977), where they still remain; the other 70 are stored at Sarawak Museum.

In 1967 Barbara also published an extremely detailed study of 166 burials exposed by the end of the 1967 season (B. Harrisson 1967; Figs. 2.32 & 2.33), in which she defined seven burial types on the basis of how the body was treated or positioned for burial (Table 2.2; and see Chapter 7). The burials were located through a depth of 9 ft of deposit, spanning more or less 40,000 years from the Deep Skull to the burials with dateable imported pottery of recent centuries, with the majority of 'Neolithic' burials being found in the upper 15 inches of ceramic-bearing strata. She concluded from the evidence of depth in particular (a uniform accumulation of cave sediment was assumed) and some overlapping burial types that a general sequence in mortuary practice could be observed in the West Mouth, with 'flexed', 'seated' and 'mutilated' burial being practised in the Pre-Neolithic period (broadly defined as both Late Pleistocene ['Upper Palaeolithic'] and Early Holocene ['Mesolithic']), and 'extended' burial being practised in the Neolithic, followed by 'cremations' and finally 'burnt' burials.

The Zuraina Majid excavations, 1977 [GB]

In 1977 Zuraina Majid, a graduate of the (then) University of Malaya, undertook further excavations in the West Mouth as part of PhD research at Yale on the early prehistory of Island Southeast Asia. Her principal focus was on the pre-ceramic layers, her stated goal being to put together a holistic interpretation of pre-Neolithic settlement and subsistence at Niah by clarifying the stratigraphic uncertainties relating to the Late Pleistocene and Early Holocene (i.e. 'Pre-Neolithic') occupation, obtaining new ^{14}C dates, analysing the stone tools from the original excavations, and ideally (if preserved) by collecting plant remains to add to the faunal material studied by Lord Medway. 'It was hoped that pits in a few key areas would provide the required data. The information thus derived would be used as a sample of the underground context in which material excavated earlier could be viewed' (Zuraina Majid 1982, 38). She concentrated her test pits at the front of the cave mouth around the overhang and in the lower levels of the Hell Trench (Figs. 2.11 & 2.34). She also exposed eleven burials in the Neolithic cemetery area, though few details were published in the 1982 report given the focus of the thesis. One of these skeletons was congenitally deformed with both radii missing; excavated after the completion of our fieldwork, it was published by Zuraina Majid *et al*. (2005).

Immediately below the lip of the rampart, two 5 × 5 ft trenches (77/1 and 77/2) were excavated in 6-inch spits down to a depth of 12 inches, but were abandoned as culturally sterile. Further trenches (77E/X1 and 77E/X2) were excavated along the cave wall behind the Neolithic cemetery down to a depth of 48 inches, finding animal bones. The third excavation (77D/N4) was of a 10 × 4 ft Harrisson trench in the cemetery area, already excavated to 24 inches, which her team excavated to 48 inches, finding ash and animal bone, some of it burnt. The fourth area investigated (77E/X2) was near the rock overhang, where one of the deep Harrisson trenches was taken down another 12 inches and a plinth on which an exposed burial had been excavated in 1966 removed, in both cases finding animal bones and charcoal but no stone tools or other artefacts. In the Hell Trench, work concentrated in the Harrisson trenches near where the Deep Skull had been found (HT/1, HU/1) and where the earlier excavations had found a few stone tools (HQ/1, HQ/6, HQ/7, HQ/8, HQ/9). Here, the sediment was removed in 3-inch-thick spits and the specific locations of any stone artefacts and well-preserved bones were measured.

The shortage of water at the site meant that flotation techniques could not be used to wash excavated sediment to recover carbonized plant remains, so charcoal and other carbonized material were picked out with tweezers by hand from sediment during dry sieving. In general rather little such material was found in the Hell Trench pits, in part because the bone located was extremely soft, though fragments of the toxic but edible *Pangium edule* nut (Malay = *kepayang*) were found in the HP/7 trench near the location of the Deep Skull (Zuraina Majid 1982, 45). The pits in the Hell Trench were excavated in both the 'pink and white' sediment on the interior side of the trench, which was found to be more or less sterile of cultural material (as the Harrissons had found), and in the sediments on the cave mouth side, which were described as 'moist and clayey, hard and dirty brown in color' (Zuraina Majid 1982, 45).

Five ^{14}C dates were obtained on charcoal samples taken at different depths (Table 2.3). Zuraina observed that the dates from her D/N4 trench on the edge of the cemetery showed that the rate of deposition was not constant through time as Harrisson had suggested, at least away from the Hell Trench area. In the latter, the two dates she had obtained did not correlate well with Harrisson dates from similar depths (Table 2.4), leading her to conclude (1982, 49) that it was impossible to construct a reliable chronometric chronology from the two sets of dates. She therefore developed a broad cultural sequence of five phases based in particular

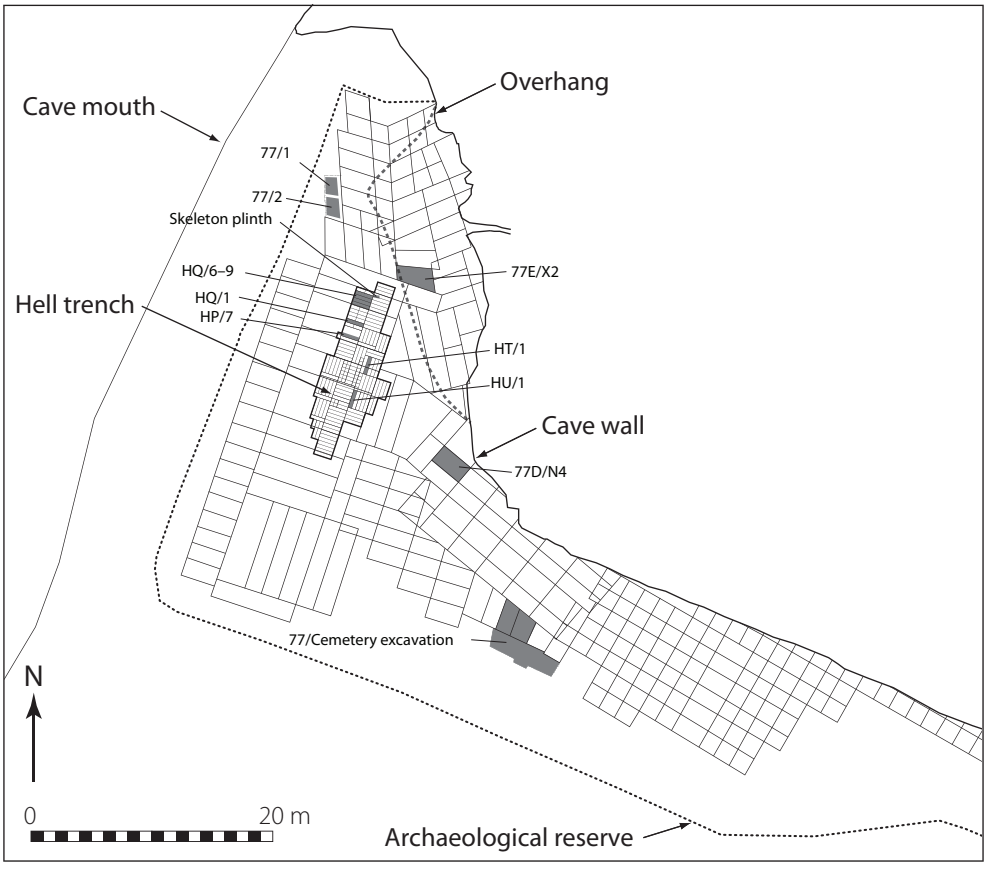

Figure 2.34. *Plan of the archaeological reserve in the northwest corner of the West Mouth, showing in summary form the 1977 Zuraina Majid and 2000–2003 NCP excavations in relation to the Harrisson excavations. (Illustration: Lindsay Lloyd-Smith.)*

on her studies of the stone tools in the Harrisson Excavation Archive and from her own excavations, integrating these with a review of the animal bones and shells from the site (largely the material from the earlier excavations studied by Lord Medway) along with new evidence such as the plant remains she had recovered. The phases were equated with sediment blocks at different depths from the ground surface, pegged to ^{14}C dates where possible, following the Harrisson system but refining it considerably (Table 2.5).

Zuraina suggested that Phase 1, the earliest occupation at the site in which the Deep Skull was located, probably dated to between about 40,000 and 20,000 years ago. The first inhabitants were equipped with stone flake tools and, she argued, probably also an array of tools made of organic materials as well. The subsistence data (mainly the faunal material from the Harrisson excavations studied by Lord Medway) suggested that, in an environment of more open forest than today, and with the sea further away as proposed by Peterson (1969 **Petersen IN REFS**), these foragers hunted a variety of lowland animals including the now extinct giant pangolin *Manis palaeojavanica*, and collected shellfish and caught fish in the local rivers, as well as collecting plant foods such as *Pangium edule*. This way of life continued much the same in a short Phase II, which she dated to *c.* 20,000–15,000 years ago. This phase was largely defined on the basis of new tool types (choppers and axe-adzes) and was associated with the 'pink and white' sediment at 84–72 inches below the present surface.

Phase III was correlated with sediments at a depth of 72–48 inches and dated loosely to the end of the Pleistocene on the basis of the ^{14}C date she had obtained of 14,930±460 bp (GX-4839) on charcoal at a depth of 54–52 inches (calibrated, this would be 16,994–18,926 BP: Table 2.3). Numbers of stone and bone artefacts increased compared with the earlier phases; the quantity, variety and size of animals hunted decreased; the amount of shell increased; and there were several charred 'hearthstones'. These observations led her to conclude that there were probably significant lifestyle changes in the terminal Pleistocene, perhaps relating to increased pop-

Table 2.3. *Radiocarbon dates (in uncalibrated years bp) from the West Mouth 1977 excavations, as published by Zuraina Majid (1982, 48). The full details, with calibrations, are listed in Appendix 1.*

Trench	Level	Sample	Date (years bp)	Lab. no.	Remarks
77D/N4	24–30 inches	charcoal	9885±175	GX-4836	Hearth — bones and seeds
77D/N4	30–36 inches	charcoal	17,195±510	GX-4838	Below hearth — some bones
77D/N4	36–42 inches	charcoal	17,520±730	GX-4918	Few bones, most of charcoal from upper half
HQ/6	84–90 inches	charcoal	21,410±760	GX-4834	Few bones; seeds at 92 inches
E/B4	52–54 inches	charcoal	14,390±460	GX-4839	Below Burial 83, bones

Table 2.4. *Comparison of the Harrisson and 1977 radiocarbon dates (in uncalibrated years bp), showing different ages for sediments at the same depth below ground surface. (After Zuraina Majid 1982, 49.)*

1957 tests	Date (years bp)	1977 tests	Date (years bp)
E/1 48 inches	19,750±190	E/B4 52–54 inches	14,930±460
E 72 inches	32,630±700	HQ/6 84–90 inches	21,410±760
E/E 96–100 inches	39,600±1000		

Table 2.5. *Zuraina Majid's proposed cultural sequence in the West Mouth of Niah Great Cave, based on changes in artifact types correlated with spit depth below ground surface. (After Zuraina Majid 1982, 73.)*

Tradition	Phase	Stratigraphic unit	Assemblage characteristics
Ceramic	Niah V	5 (0–24 inches)	Ceramics and a decreasing use of pebble and flake. Significant increase in charred stones and ironstone.
Preceramic	Niah IV	4 (24–48 inches)	Increase in all artefacts and the end of two earliest flake types.
Preceramic	Niah III	3 (48–72 inches)	Pebble implements and distinct flake types.
Preceramic	Niah II	2 (72–84 inches)	Pebble tools.
Preceramic	Niah I	1 (below 84 inches)	Flake artefacts of indistinguishable types.

ulations and/or improved hunting and/or cooking/storing technologies. With lowland rainforest much like that of today occurring around the caves in the Early Holocene, Phase IV was marked by the hunting of smaller animals, collecting *Pangium edule* nuts and the fruit of the *Elaeocarpus stipularis* tree (Malay = *kusap*), and a large increase in shellfish collecting, both riverine and estuarine species, though the lithic technologies showed little change. Phase V (24–0 inches) was marked by the introduction of pottery, though she noted that the similarities in lithics suggested that this was probably not accompanied by population replacement.

Her synthesis of the Niah cultural sequence was a remarkable achievement, full of insights which remain valid today, but — as she acknowledged — it was still based on the Harrisson age/depth model, which she herself critiqued as unlikely to reflect the actual complexity of sedimentation processes in a cave environment such as that of the West Mouth.

The Niah Caves Project excavations, 2000–2003

[GB, LLS, PP, RR, KS]

2000

The first season of fieldwork by the Niah Caves Project, funded by the Arts and Humanities Research Board (now the Arts and Humanities Research Council) took place in September 2000, with a team of eleven archaeologists and seven environmental scientists drawn from eight universities and research institutions, together with nine Sarawak Museum staff. Two key roles in that fieldwork, as in the project throughout its development, were the coordination of the archaeological excavations by Tim Reynolds (at that time the County Archaeologist for Cambridgeshire, but who had extensive research experience on the Palaeolithic of Southeast Asia), and the coordination of the parallel work on palaeoenvironmental reconstruction by David Gilbertson, by this time based at the University of Bournemouth.

Before the work began, we defined four main zones in the fenced-in archaeological reserve in the West Mouth entrance of the Great Cave (Figs. 2.38 & **2.39??**). The area in and around the rock overhang at the western edge of the excavated area we termed Area A (Fig. 2.35). To the south of this was the Hell Trench (our simplified term for the Hell series of trenches, as explained earlier), under its protective roof. Immediately upslope of the Hell Trench roof was a series of standing sections or walls left from the earlier excavations, which we called Area B (Fig. 2.36). Further into the interior was the area of the Neolithic/Metal Age cemetery (generally termed the 'Neolithic cemetery' for convenience), which we termed Area C, marked by the series of burials partly exposed by Barbara Harrisson at the end of her campaigns, each protected by plank walling (Fig. 2.37). Later on we

Figure 2.35. *Looking north into the area of the rock overhang (Area A) prior to the new fieldwork in 2000, looking past the roof covering the Hell Trench. The tourist walkway past the reserve is immediately beyond the fence on the left. (Photograph: Graeme Barker.)*

Figure 2.36. *Looking east into the archaeological reserve in the West Mouth entrance of Niah Great Cave. In the bottom left is the roof covering the Hell Trench. Beyond this is Area B: the first ranging pole is by Section 2.1 and the second ranging pole by Section 8.1, sections discussed in detail in Chapter 3 and later chapters. The third ranging pole is in Area C, the Neolithic cemetery; burials on plinths, protected by planks, are visible to the right of the ranging pole. Area D was in semi-darkness beyond Area C. The ranging poles are each 1 m. (Photograph: Graeme Barker.)*

Figure 2.37. *(On left) Neolithic burials (Burials 185 and 190) partially exposed in the Harrisson excavations, as found in 2000. Scale: 1 m; looking west. (Photograph: Graeme Barker.)*

identified a further major area of study, Area D, in the twilight zone behind the Neolithic cemetery.

Although very much a pilot exercise, the 2000 fieldwork succeeded in demonstrating the extraordinary potential of the West Mouth archaeological zone, and of the Niah Caves more generally, for addressing the project's research questions (Barker *et al*. 2000). A start was made on an accurate topographic plan of the earlier excavations, as no single master plan existed; the Harrissons used a series of overlapping grid plans, but as Zuraina Majid found, the grids were difficult to reconcile with each other and none was fixed with real precision on the ground (Figs. 2.38 & 2.39). Over 150 m of the Harrisson sections were cleaned and recorded, enabling us to create a 'running section' (a composite section) that established the principal stratigraphic relationships linking the Hell Trench to the geomorphic sequence around and under the rock

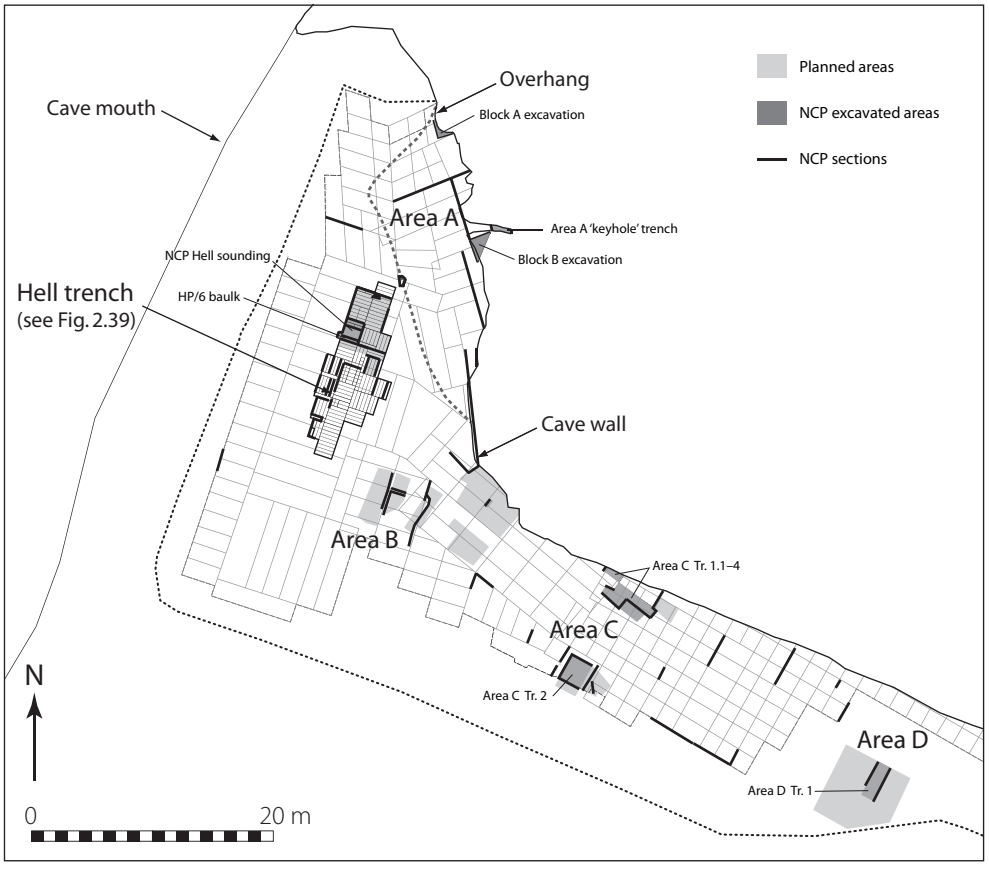

Figure 2.38. *The location of the NCP sections and excavations in the West Mouth archaeological reserve in relation to the Harrisson grid. (Illustration: Lindsay Lloyd-Smith.)*

IS IT POSSIBLE TO NUMBER THE SECTIONS - DORA

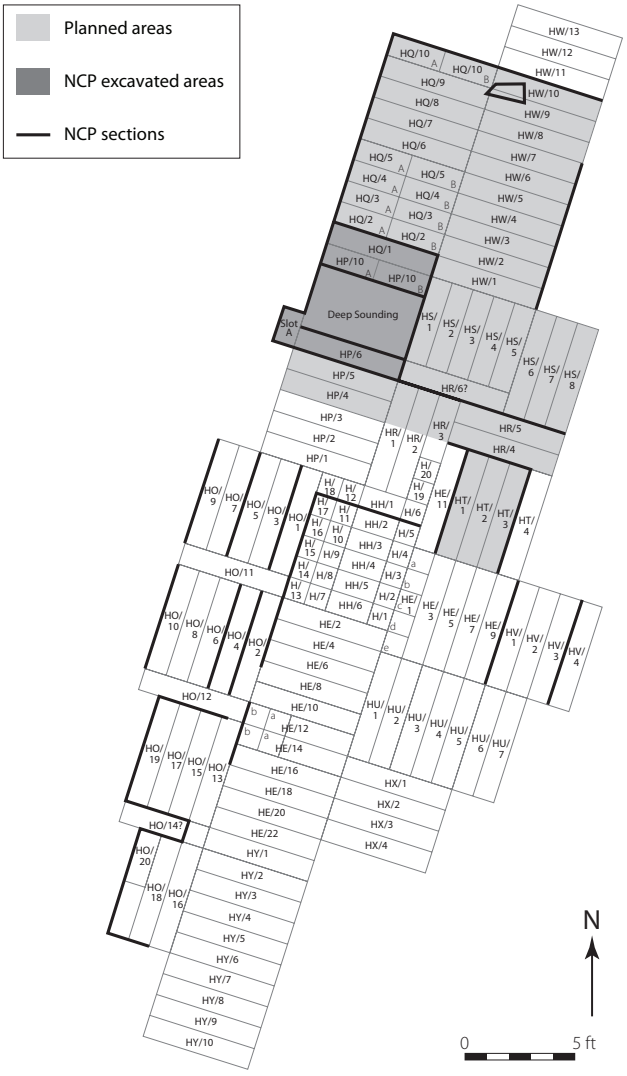

Figure 2.39. *The location of the NCP sections and excavations in the Hell Trench, in relation to the Harrisson grid. (Illustration: Lindsay Lloyd-Smith, Ryan Rabett & Dora Kemp.)*

Figure 2.40. *Chris Hunt taking a monolith or sediment block for pollen analysis from the Hell Trench in 2000. (Photograph: Graeme Barker.)*

overhang immediately to its north. This work immediately indicated that the stratigraphic sequence here was far more complex than envisaged by the earlier excavators (see Chapter 3). Sediment samples including monoliths or blocks (Fig. 2.40) were taken from each major stratigraphic unit for laboratory analysis to establish their depositional environments from their physical and chemical properties, and to extract proxy indicators of climate and vegetation such as pollen, and charcoal was collected for ^{14}C dating.

The areas likely to have significant archaeological potential were defined, and small-scale excavations were undertaken of two remnant plinths of sediment at the back of the rock overhang (Figs. 2.41 & 3.16), in part to trial systems of on-site screening and off-site flotation to recover artefacts, fauna and macroscopic plant remains. (As noted earlier, sufficient water was not available in the caves, so sediment samples for flotation were bagged up and carried back at the end of each day to the project's base, the Museum on the eastern side of the Sungai Niah at Pankalan Lobang.) Initial work was undertaken by Brian Pyatt (Nottingham Trent University) on the present-day cave environment to start to elucidate cave taphonomy (Fig. 2.42), the processes liable to form, move and mix cave sediments today and in the past (the effects of burrowing insects, for example).

Sediment cores were also taken by Chris Hunt and Bernard Maloney (Queens University Belfast) in the rainforest near the caves (Fig. 2.43), and in Loagan Bunut, the largest lake in Borneo, about 50 km away (Fig. 6.2), in the hope that the (likely) fragmentary pollen record from the West Mouth sediments could be compared with the anticipated better-preserved

Figure 2.41. *Excavating Block B under the rock overhang, West Mouth, 2000, looking southeast. The fissure that is likely to be above the sink-hole discussed especially in Chapters 3 and 4 is to the left of the excavator, and Block A (Fig. 3.16) is just off the photograph further to the left (see Fig. 2.38 for location of Blocks A and B). (Photograph: Graeme Barker.)*

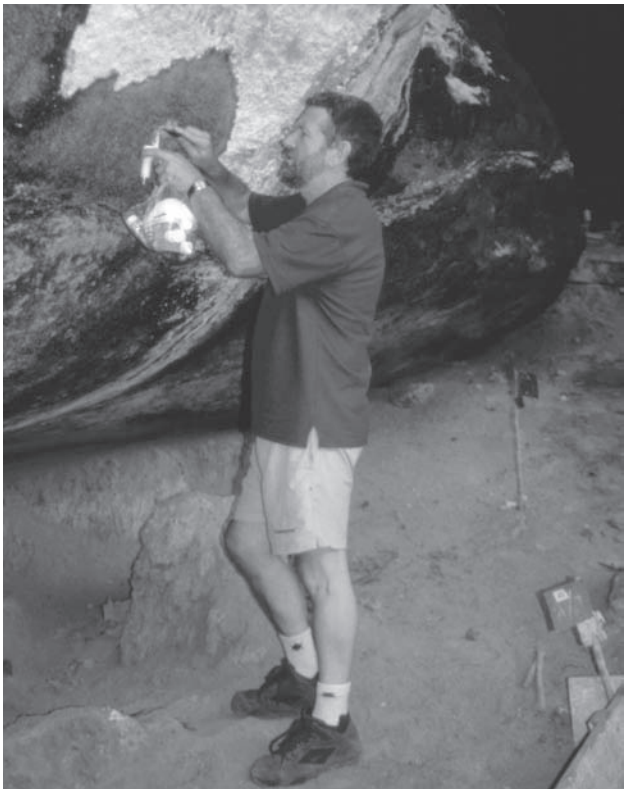

Figure 2.42. *Brian Pyatt sampling lichens on the rock overhang, West Mouth, 2000, looking east. (Photograph: Graeme Barker.)*

and fuller vegetation histories from waterlogged sediments in the landscape. It was originally intended that the pollen in the cave sediments would be studied primarily by Chris Hunt and those in the landscape cores primarily by Bernard Maloney (Fig. 2.44), but Chris Hunt took on both tasks following Bernard Maloney's sudden and sadly premature death a few weeks after the 2000 field season. The other significant development was that Professor Jim Rose (Royal Holloway College, University of London), was able to secure additional funding from Royal Holloway to add to the AHRB funding he was receiving from the Niah Caves Project for various analytical work, sufficient to fund a PhD by Mark Stephens (who had been a member of the 2000 team as a Masters student) on aspects of the West Mouth geomorphology, in particular the micromorphology of the sediments and isotope studies of palaeotemperatures, as well as OSL dating (Stephens 2004).

The original application to the AHRB had included a request for funding for research assistance. Although the AHRB excluded this from their award, they suggested we make a follow-up application explaining what was needed in greater detail, once the initial season of fieldwork had been undertaken. This application was successful, providing funding for two tasks in particular. The first, allocated to PD, at that time a DPhil student at the University of Oxford, was

Figure 2.43. *Chris Hunt (right) and Garry Rushworth extracting a sediment core for pollen analysis near the West Mouth: the KI core near the modern Penan longhouse settlement of Rumah Chang (as marked on maps) or Kampong Irang (as now termed by local residents), on the main alluvial wetland adjacent to the Niah river. The vegetation is dominated by Pandanus. (Photograph: Graeme Barker.)*

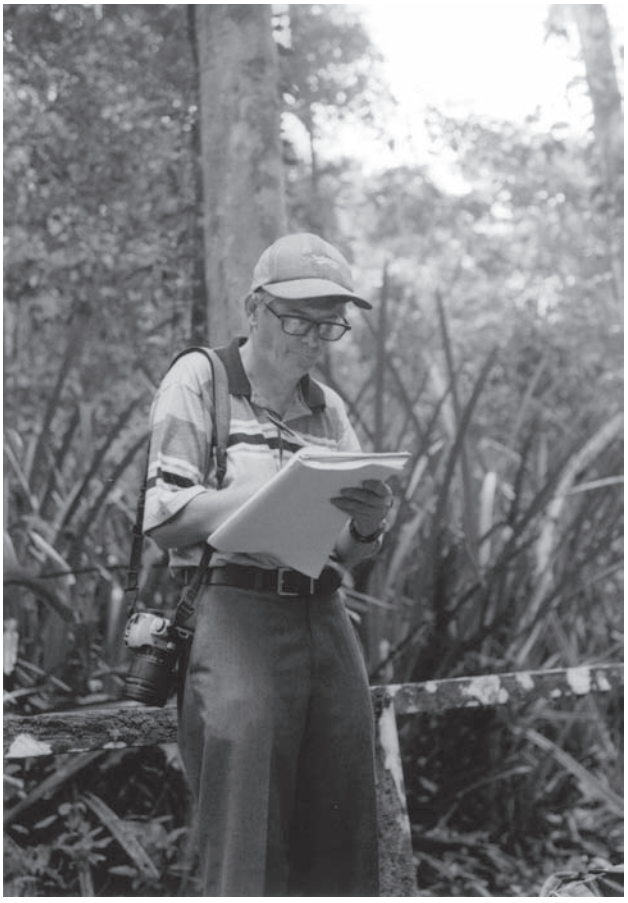

Figure 2.44. *Bernard Maloney, whose tragic death shortly after his participation in the 2000 fieldwork at Niah deprived the project of an acknowledged expert in Southeast Asian palynology. (Photograph: Graeme Barker.)*

to work on the Harrisson Excavation Archive in Kuching, to address the challenging task of reconstructing their excavations in detail from the many notebooks, photographs, and drawings — how the spits fitted together both horizontally and spatially, what finds were associated with each spit, and what could be gleaned about their likely sedimentary characteristics — so that the new and old work could be correlated.

The second request was for funding for Huw Barton (Fig. 2.50), who had just completed his PhD at the University of Sydney and had also been a member of the 2000 team, to transfer to the University of Leicester (where GB was based at that time) to apply to the sediments from the new excavations at Niah the techniques he had developed as part of Professor Robin Torrance's research group at Sydney Museum on the extraction of starch grains from sediments and from residues attached to artefacts such as stone tools (Barton & White 1993). Until very recently, our understanding of the archaeology of plant use in the tropics has lagged far behind that of temperate and desertic regions where seed plants such as wheat, barley, sorghum and millet are the norm, because carbonized seeds generally survive well. In contrast, the starchy tuberous plants so important in the tropics such as sweet potato, taro and yams were archaeologically invisible until it was discovered that starch grains could survive for thousands of years, like pollen grains (Loy *et al*. 1992). Clearly the technique held great promise for investigating the use of such plants by people inhabiting the Niah Caves, and the demonstration of the importance of the work from

the first two years of funding was the basis of a further successful application to the AHRB in 2002 for funding Huw Barton's work under their Innovation Awards Scheme. The other major breakthrough for studying the archaeology of tropical plant use was the development in the years before our project of techniques for recovering and identifying the plant tissues or parenchyma of tuberous plants (Hather 2000). Victor Paz had recently completed a Cambridge PhD on this topic, and funding was secured for him to work on the Niah botanical materials in parallel with Huw Barton.

2001

The programme of section recording and sampling in the West Mouth continued in the second fieldwork season, in April 2001 (Barker *et al*. 2001). The growing geoarchaeological team (David Gilbertson, Chris Hunt, Sue McLaren [University of Leicester], Mark Stephens, and Jim Rose on the UK side, Michael Bird from the Australian National University Canberra, and Dana Badang from the Department of Minerals and Geosciences, Malaysia) was able to establish the principal features of the Pleistocene sedimentary sequence. It became clear that the principal Pleistocene deposits, which the Hell Trench had cut into, had accumulated in a natural basin situated between the cave rampart (a jumble of speleothem towers and weathering products) and the immense cone of guano that fills the West Mouth interior behind the archaeological reserve (Fig. 1.18; and see Chapter 3). The 'pink and white' deposit was identified as likely to be the result of a sudden collapse of the interior guano mound rather than a long-developing sediment as the previous excavators had assumed, making estimates of antiquity based on assumptions about sediment accumulation rates and depth below surface (e.g. Table 2.5) clearly unreliable. The 'pink and white' deposit frequently overlay reddish silts or waterlain deposits on the interior side of the Hell Trench (Fig. 2.45). The clays on the exterior side of the trench described by Zuraina Majid as 'moist and clayey, hard and dirty brown in color' were identified as colluvial sediments, sediments formed by soils slipping down from the cave lip. We were able to establish with reasonable confidence the probable location and antiquity of the Deep Skull within the sedimentary sequence (within the red silts, in fact), demonstrating that it was securely within the Pleistocene sediments and not, for example, a Neolithic intrusion (Fig. 2.46). During the 2000 season Michael Bird had taken charcoal samples from cleaned faces in the Hell Trench and, using the ABOX pre-treatment that he had developed at ANU that increased

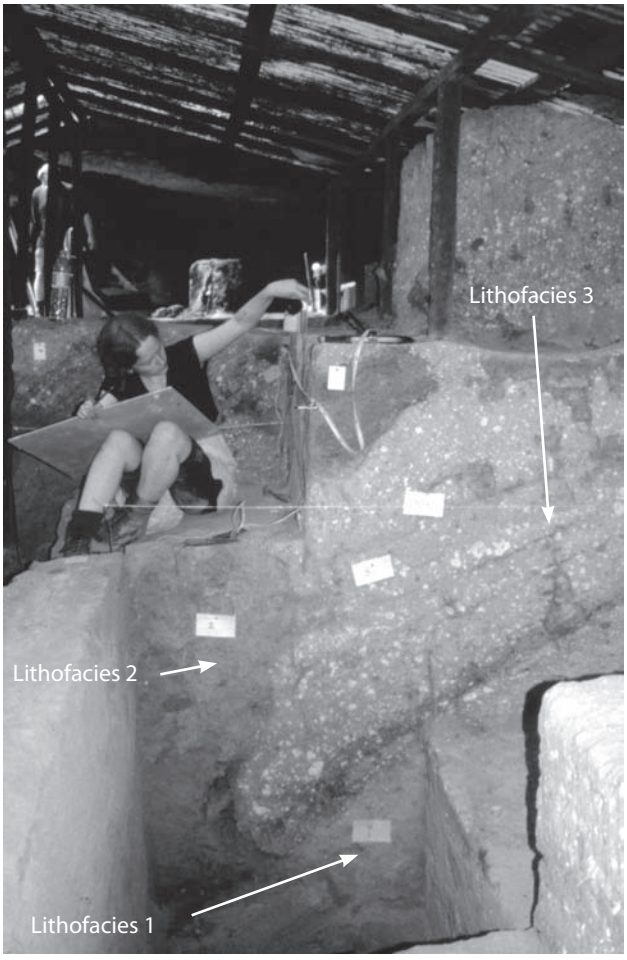

Figure 2.45. *Lucy Farr recording a cleaned section in the Hell Trench. The sediments are explained in Chapter 3 (Section 1.2, the section facing the viewer, shows Lithofacies 1 bottom right, the red silts of Lithofacies 2 below her feet, and the contact with them of Lithofacies 3, the 'pink and white' on the right). Looking north. (Photograph: Graeme Barker.)*

the accuracy of radiocarbon dating of old samples near the limits of the method's applicability (Bird *et al.* 1999), he obtained dates of *c*. 43,000–42,000 uncal. bp for samples taken near the calculated location of the Deep Skull (Appendix 1: Niah-310 and Niah-311), suggesting that it was likely to be of the kind of antiquity that the Harrissons had suggested.

Cleaning the Harrisson standing sections in Area B (Fig. 2.47) also revealed that they contained important clues to the stratigraphic sequence post-dating the Hell Trench sediments and underlying the Neolithic burials, including complex sequences of intercutting pits that at the time we thought were likely to be Early Holocene in date, but which subsequent radiocarbon dating showed dated to the Late

Figure 2.46. *Looking north across the Hell Trench. We calculate that the Deep Skull was found approximately where the vertical ranging pole intersects the two horizontal strings, which mark the spit depth in which it was found. On the northern side, the strings are attached to Section 1.3, near where the top monolith was taken (the vertical groove) for the pollen diagram shown in Figure 4.6 (see also Fig. 4.4). The Harrisson HP/6 baulk was behind the two baulks visible on the left-hand side of the trench. Scale: divided into 20 cm sections. (Photograph: Graeme Barker.)*

Figure 2.47. *Mike Morley and Paula Whittaker recording the pits in the cleaned Section 2.1 in Area B of the West Mouth archaeological reserve. Looking northeast. (Photograph: Graeme Barker.)*

Pleistocene (they are discussed in Chapters 3 and 5). Small targeted excavations in the cemetery zone by LLS confirmed the broad sequence of burials published by Barbara Harrisson (1967) but also indicated unexpected complexity in mortuary behaviour, as reported in Chapters 6 and 7. Exploratory excavations behind the cemetery in Area D led by PP found a series of post-holes associated with Chinese trade beads, identified as evidence of scaffolding associated with birds-nesting in the Metal Age (Chapter 8). By the end of the 2001 season it was clear that we had identified sediments spanning the human occupation or use of the West Mouth from at least *c.* 40,000 years ago to recent centuries.

2002

Refining our understanding of the West Mouth geomorphological sequence continued in the third field season, in April 2002 (Barker *et al*. 2002a), considerably aided by the initial results of Mark Stephens's studies of the micromorphological characteristics of the major sedimentary units. Helen Lewis (at that time a Post-doctoral Research Fellow at the University of Oxford) embarked on a parallel programme of micromorphological sampling with a particular focus on sedimentary signatures of human activity, such as indications of burning and trampling. Professor Richard (Bert) Roberts of Wollongong University, Australia, worked with Mark Stephens on taking a series of targeted OSL samples from key locations in the Pleistocene stratigraphy, though in the event the method proved unsuitable for Niah's guano-rich sediments (Stephens *et al*. 2007). Excavation was also undertaken of one of the surviving Harrisson baulks on the western (entrance) side of the Hell Trench (HP/6 in their grid: Figs 2.11 & 2.38), which previous section cleaning had showed consisted of a series of layers with notable quantities of ash and charcoal associated with butchered fragments of animal bone and occasional stone tools, interspersed between the colluvial sediments that were less rich in cultural remains (Fig. 2.48). The third of Michael Bird's three ABOX dates, of *c*. 40,000 bp (Appendix 1: Niah-312), was from charcoal collected from near the top of this baulk. The analyses of the sediment samples and cultural materials obtained from the excavation of the HP/6 baulk, which was completed in the following season, provided some of the best data recovered by the project for addressing its second research question relating to the behaviour of anatomically modern humans at Niah (see Chapter 4).

Alongside the work in the Hell Trench, excavations were expanded in the cemetery zone to explore a sample of each main burial type, whilst occupation deposits, which subsequent ^{14}C dating showed were Early Holocene in date, were found in Area D below the medieval birds-nesting evidence (see Chapter 6). We also embarked on the same programme of section recording and sampling in the Lobang Hangus entrance that we had employed in the West Mouth, and undertook rapid survey of the Kain Hitam entrance. By this time, alongside the laboratory studies of sediments, pollen, starch, parenchyma, and so on, a range of studies of the cultural materials we were excavating was in train in the project base at Pangkalan Lobang and in Sarawak Museum in Kuching, including the pottery by Chris Doherty and FC, the latter at that time a freelance conservator; the stone tools, by Tim Reynolds and Huw Barton; and the human bones, by Jessica Manser, a doctoral student at New York University undertaking a morphological and morphometric analysis of the West Mouth Neolithic burials (Manser 2005; Fig. 2.49). A summary paper on the 2000–2002 work was published in the *Proceedings of the Prehistoric Society* (Barker *et al.* 2002b) and in September 2002 our interim results were presented in detail in seven papers at a symposium organized by GB and David Gilbertson on 'The Human Use of Caves in Southeast Asia' at the Taipei meeting of the Indo-Pacific Prehistory Association, subsequently published as a special number of *Asian Perspectives* (Barker *et al*. 2005).

2003

In the final field season, in March/April 2003 (Barker *et al*. 2003), the geomorphologists concentrated on linking the stratigraphic sequence as now understood for the West Mouth with the spit sequences of the Harrissons' excavations reconstructed from their archive by PD. The interior guano was also studied by Alan Dykes (at that time at the University of Huddersfield) for its stability and slippage properties, given the earlier findings about the origins of the 'pink and white' sediment. A small sounding was excavated under where the HP/6 baulk had been (Fig. 4.14), to investigate whether human activity pre-dated the cultural layers found in that baulk, and further work was undertaken in the cemetery zone, in Area D, and in the other cave entrances. Other work took place, as in previous seasons, on the present-day environment of the caves and of the landscape outside, including the collection of fresh guano samples in different locations in the West Mouth and sediment samples from different landscape types in the vicinity such as swamp, mountain forest, lowland forest and agricultural land, so that the characteristics of the pollen rain today could be used to inform the interpretation of the fossil pollen (Hunt & Rushworth 2005a).

Figure 2.48. *Ryan Rabett excavating the HP/6 baulk in the Hell Trench (looking south). The visible face is Section 26.1. He is trowelling one of the ash- and organic-rich layers associated with human occupation that form part of the overall body of colluvial sediments (Lithofacies 2C) that dip east into the cave from the cave rampart. A similar organic-rich layer is visible as the white smears in the baulk behind him. (Photograph: Graeme Barker.)*

Figure 2.49. *Osteologist Jessica Manser making a preliminary study of human bones from the NCP excavations. (Photograph: Graeme Barker.)*

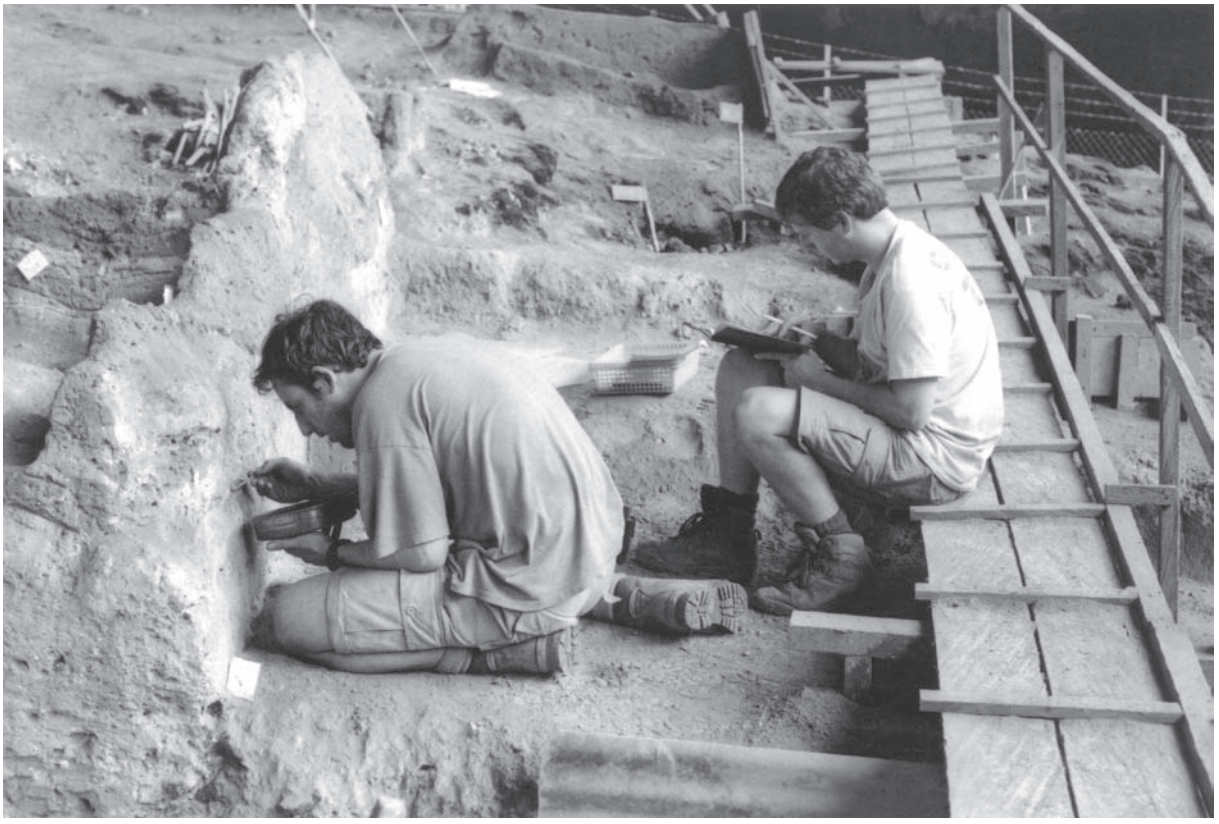

Figure 2.50. *Tom Higham and Huw Barton collecting charcoal samples from the pits in Section 2.1, for the programme of ^{14}C dating comparing three pre-treatment methods undertaken by the Oxford Radiocarbon Accelerator Unit (Higham* et al. *2008). Looking south. (Photograph: Graeme Barker.)*

One of the main priorities, though, was to select charcoal samples for radiocarbon dating, as we had been awarded 50 AMS (accelerator mass spectrometry) determinations by the Natural Environment Research Council's ORADS committee (now the NERC Radiocarbon Facility) for analysis at Oxford University's Radiocarbon Accelerator Unit. The ORAU was keen to use the Niah Caves Project as a test case for comparing age determinations from charcoal from tropical sequences using different pre-treatments: each sample was sub-divided into three, one then being untreated, one being treated by an acid-base-acid (ABA) protocol and one by acid-base-wet oxidization with stepped combustion (ABOX-SC), the latter being the method developed by Michael Bird at ANU. Tom Higham, the ORAU's principal archaeologist, participated in the 2003 field team to oversee the sampling programme (Fig. 2.50), the results of which provided the critical dating framework for the Pleistocene and early Holocene sequences described in the later chapters as well as an important contribution to the refinement of radiocarbon methodologies more generally (Higham *et al*. 2008).

NCP archive and laboratory studies, 2004–2010
[GB, FC, LLS, PP, RR, KS]

In the years following the fieldwork, analytical studies have continued apace on the materials both from our own excavations and from the earlier work. A third substantial award from the AHRC in 2003 was particularly critical to the project, because it enabled two Post-Doctoral Research Fellows, PP and RR, to spend two years (based with GB first at Leicester, then Cambridge) working on the immense sample of vertebrate fauna in the Harrisson Excavation Archive, as well on the material from the NCP excavations. Their studies continued afterwards funded by the Leverhulme Trust (for PP, at the University of York) and the Templeton Foundation and Cambridge University's McDonald Institute for Archaeological Research (for RR, at the McDonald Institute). This AHRC grant also funded a series of other analyses of materials from the old and new excavations including of plant phytoliths (silica components of plants) by Lisa Kealhofer (Santa Clara University, USA), charcoal by Gill Thompson (University of Bradford), plant parenchyma by Victor Paz (by

then at the University of the Philippines) and micromorphological sediment sections by Helen Lewis (by then at Trinity College Dublin). The zooarchaeological work stimulated a series of further specialist studies of the vertebrate fauna, including by the Earl of Cranbrook (who as Lord Medway of course had worked as Harrisson's zooarchaeologist), some of which have been brought together in a special issue of the *International Journal of Osteoarchaeology* (Piper & Rabett 2009a). U-series dating by Alisdair Pike (University of Bristol) of a fragment of the Deep Skull held in the Natural History Museum, London, was a critical contribution to a paper by the team summarizing our findings on the antiquity and context of the Deep Skull, and the associated Pleistocene archaeology (Barker *et al*. 2007; and see Chapter 4).

The study of the vertebrate fauna by PP and RR also greatly increased our understanding of the Harrisson spits and how they correlated with our excavation stratigraphies, building on the work of PD (Piper & Rabett 2009b; Rabett *et al*. 2006; 2009). Their conclusions arising from their detailed taphonomic studies of this material — over 150,000 fragments — regarding for example hunting systems, butchery and discard practices, and the effects of burial processes such as erosion and slope slippage, are discussed where appropriate in later chapters and are presented in full in Volume 2 Chapter 20. What is important to note here is that, as discussed in Chapter 4, they were able to map the distributions of fauna within the Harrisson system of trenches and pits, including the extent and depth of the 'bone under ash layer'. They showed that the basal deposit had accumulated in a sinuous line of shallow 'hollows' interpreted as an old natural drainage channel that flowed across the Hell Trench area into the rock overhang, draining through a sinkhole there (Chapter 3; Fig. 4.9).

Comments on the sediments in the excavation notebooks, and sediment samples surviving in the Harrisson Archive, showed that the bone distributions on the eastern side of the Hell Trench and under the rock overhang were located especially within the red fluvial silts, with those on the western side within the yellow colluvial sediments. The vertical distributions of the faunal material on the western side of the channel, in both the Hell Trench and under the rock overhang, indicated that the 'bone under ash layer' was in fact a sequence of horizons rather than a single deposit (Fig. 4.12). This evidence for the episodic nature of bone discard and accumulation, that was mirrored in the spit distributions of charcoal samples in the Harrisson Archive studied by Gill Thompson, correlated with the stratigraphic evidence we had found in our excavation of the HP/6 baulk, and in studies of the basal Harrisson sections under the overhang, of culturally-rich layers interspersed between culturally-poor colluvial clays sloping down from the cave rampart (Chapters 3 & 4). It was thus possible, in broad outline at least, to link the Harrisson spits and our own stratigraphies (Fig. 2.51). A similar exercise was undertaken at Lobang Hangus (Piper & Rabett 2009c). Knowledge of how the Harrisson spits and NCP stratigraphies in the West Mouth relate to one another has been further enhanced by Chris Stimpson in his NERC-funded Cambridge PhD on the microfaunal component of the faunal assemblage (Stimpson 2010).

On the basis of the results of the new faunal studies, a successful second application was submitted in 2006 to ORAU to date a series of charcoal samples in the Harrisson Excavation Archive, selected from key spits. This exercise yielded a sequence of ^{14}C dates from the West Mouth and Lobang Hangus to tie in with the ^{14}C chronology provided for the NCP stratigraphies by the first ORAU series. The correlations are reassuringly strong, the lower dates all being in the 40,000–45,000 bp range (Appendix 1). One striking feature, though, is that there are the same date reversals in the sequence from the Harrisson spits at the northern end of the Hell Trench as in our own excavated HP/6 baulk series, the possible significance of which is discussed in the next chapter.

Further insights into the likely ages and character of occupation in the caves have come from the ongoing analysis of the shells in the Harrisson Excavation Archive by KS (whilst at ANU Canberra, and now at Wollongong Univesity). Most of this material represents food refuse, but shell artefacts are also present, both ones identified by the Harrissons and ones found by KS within the 'food shell'. Owing to the quantities of shell found, Tom Harrisson set up an on-site classification and coding system:

> we use a checklist of 31 shell species regularly found at Niah. All shell is preliminarily classified and bagged into these categories for each trench layer.... type specimens [are] checked against Museum collections; it should be subject to correction only on points of taxonomic detail (Harrisson 1959d, 7).

Thus, a series of notebooks accompanied every excavation, assigning on-site quantifications to particular shell 'numbers'. For some sites, such as Lobang Hangus, the shell was retained, allowing KS to cross-check physical samples with on-site records to 'crack' the taxonomic coding system, but for other sites, including the West Mouth, all or most of the shells were discarded by Harrisson after their recording.

Although the checking of the shell codes against the shell samples retained in the Harrisson Excavation

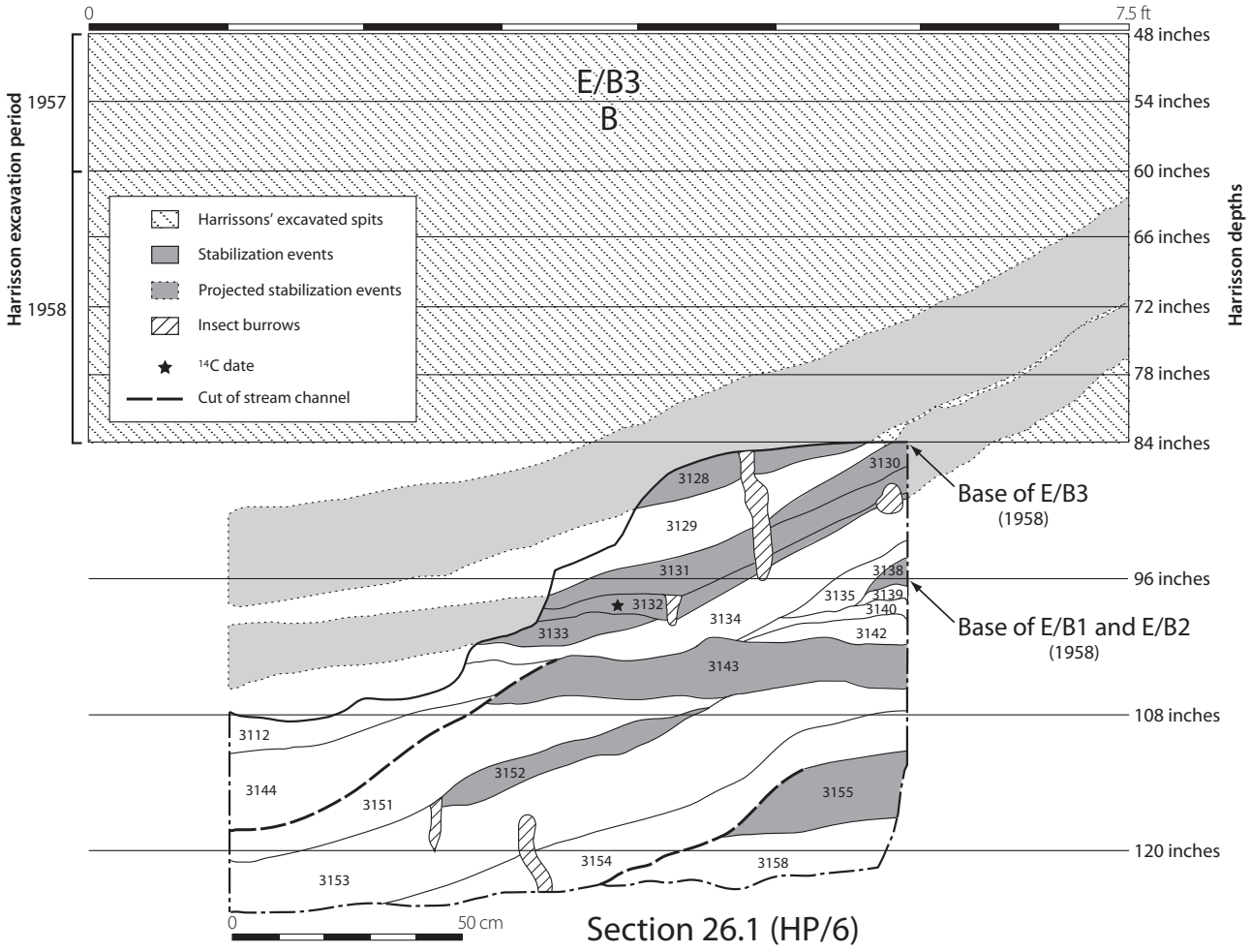

Figure 2.51. *A schematic model of the likely relationship of Section 26.1, the northern side of the HP/6 baulk in the Hell Trench, to Harrisson spits. (Section 26.1 drawn by Ryan Rabett and Paula Whittaker; data calculated by Phil Piper and Ryan Rabett.)*

Archive revealed that Harrisson's assertion that the lists should be 'subject to correction only on points of detail' was rather an overstatement (various species, either closely related or broadly similar in terms of morphology, were conflated), the process of translating and logging the records and reanalysing the extant material indicated that there were distinct shell assemblages associated with different time periods. As well as providing information about changing palaeoenvironments, the general sensitivity of freshwater shells to local hydrology allowed KS to generate a molluscan biostratigraphy from the tracking of selected marker species in the West Mouth, Lobang Hangus, and Gan Kira in particular. For example, the gastropod *Paludomus everetti,* an inhabitant of flowing, pure freshwater, was found to be characteristic of the Pleistocene deposits, while a brackish assemblage composed of various members of the Neritidae (*Neritodryas subsulcata, Neritodryas dubia* and *Neritina petitii*) signalled the rising of sea levels with the transition into the Holocene. Sedimentation and the slowing of various watercourses around the Gunong Subis was signalled in the shell by the sudden dominance of the gastropod *Cipangopaludina* cf. *chinensis* with the onset of the Metal Age, or perhaps slightly earlier in the late Neolithic (see Chapter 8). This molluscan biostratigraphy has helped clarify depositional sequences, acting in some cases as a broad chronological proxy in the absence of absolute dates, and has also highlighted cases of stratigraphic mixing caused by the spit excavation method, as exemplified in the changing proportions of indicator taxa through the Late Pleistocene, Early Holocene and Metal Age deposits in trench Y/B1 in Gan Kira (Fig. 2.52)

In terms of the Holocene use of the caves, our understanding of the chronology and complexity

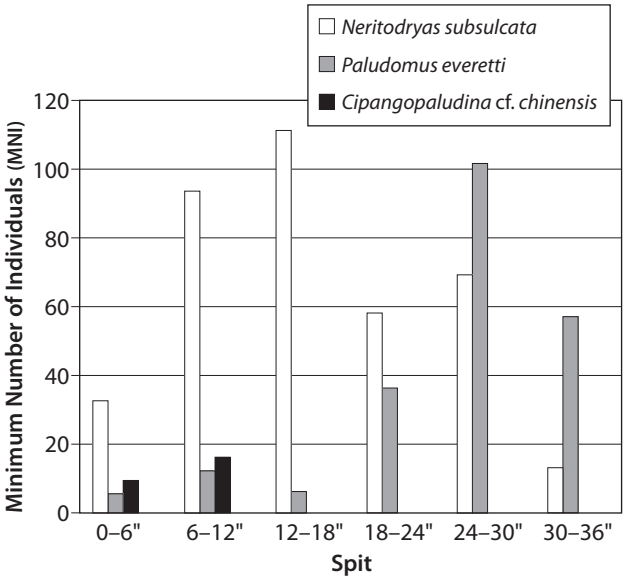

Figure 2.52. *Changes in the proportions of molluscan indicator taxa in Trench Y/B1 in Gan Kira, illustrating the general biostratigraphic trends but also mixing of deposits caused by the spit method of excavation.* Paludomus everetti *is characteristic of Pleistocene deposits,* Neritodryas subsulcata *was associated with the rising sea levels with the transition to the Holocene, and* Cipangopaludina *cf.* chinensis *is associated with sedimentation and slowing watercourses later in the Holocene. (Analysis by Katherine Szabó.)*

of Holocene burial practices has been enormously enhanced by LLS's reanalysis of burials in the West Mouth and Lobang Jeragan for an AHRC-funded PhD (2008), aided by a further ORAU grant for AMS dating (Appendix 1), Barbara Harrisson's immaculate notebooks, and her direct input and advice on this project (Chapters 6 & 7). A survey of the Neolithic and Metal Age pottery in the Harrisson Excavation Archive undertaken by PD during a British Academy Reckitt Fellowship in 2005 has been augmented by FC in her Cambridge MPhil (2007) and her PhD (2011) studying Neolithic mortuary practice at Lobang Jeragan, Lobang Magala 'E' and Lobang Batu Parang, and Metal Age mortuary practice in Lobang Tulang, Lobang Magala 'E' and Kain Hitam. A British Academy Visiting Fellowship to the McDonald Institute in 2006–7 helped fund KS to work on the shell artefacts and food shell from the Harrisson and NCP excavations in the West Mouth and Lobang Hangus. The British Academy also funded intensive work by Chris Hunt (by now at Queens University Belfast) in 2007–8 on the Loagun Bunut pollen cores along with methodological studies of rice phytolith identification, a study with significant implications for our understanding of the beginnings of rice agriculture in Island Southeast Asia, as reported in Chapters 6 and 7. An Australian Research Council grant funded a study of the textiles from the Niah cemetery by Judith Cameron (ANU Canberra). John Krigbaum has continued and extended his isotope work, his Masters student Benjamin Valentine exploring the exciting potential of strontium isotopes to elucidate mobility patterns in the Neolithic communities who buried their dead in the Niah Caves (Valentine *et al.* 2008; and see Chapter 7). In 2007 and 2008 Stephen Chia of the Universiti Sains Malaysia has excavated extended burials and occupation deposits rich in vertebrate fauna and molluscs in Kain Hitam (Bujeng & Chia 2009). In short, new findings are continuing to generate new questions, and in turn new work, on the extraordinarily rich suite of material from the various Niah Cave excavations.

In the following chapters we bring together the NCP team's findings on the changing character of the human occupation of the caves from some 50,000 years ago to the present, as we presently understand it, and the implications of these findings for the major regional debates we set out in Chapter 1 that provided the research context for the new work. Fundamental to this process of reconstruction was the establishment of the geomorphological development and infill sequences of the major cave entrances, particularly those of the West Mouth, the subject of the next chapter.