The Deep Skull of Niah:

AN ASSESSMENT OF TWENTY YEARS OF SPECULATION CONCERNING ITS EVOLUTIONARY SIGNIFICANCE

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ENTHUSIASTIC to establish the fossil evidence of human evolution in Asia, Thomas Henry Huxley proposed in the pages of the *Natural History Review* of 1864 that a scientific expedition be organized to explore cave sites in Borneo. These had come to his attention through Alfred Russel Wallace, who had visited the island some ten years earlier and reported seeing natural formations which might have been occupied by ancient man. Huxley wrote Charles Darwin about his recommendation and efforts were made to engage the assistance of Sir J. Brooke in conjunction with the British Consul, as a ship was to sail to Borneo on government business in May of 1864. However, it was not until 1873 that A. E. Everett was appointed to carry out Huxley's plan. During 1878 and 1879 Everett explored the Bau group of caves in southwestern Sarawak and the Niah caves some three hundred miles northward along the coast. The Everett report, made possible through the support of a number of learned societies and published in 1880 by the Royal Society, was disappointing to the human evolutionists. The investigator had failed to make any significant discoveries in Borneo. Discouraged, his patrons did not release additional funds for the study of the island's prehistoric inhabitants, and a bias concerning the futility of further anthropological research being done in this part of Asia persisted until 1945 when Tom Harrisson sought financial backing for exploration and excavation of the places known to Wallace and Everett.[1]

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[1] Between 1880 and 1945 many foreign visitors in Borneo explored the Niah area, some forwarding human skeletal material to England. In 1906 W. L. H. Duckworth described a skull from Niah sent to Jesus College, Cambridge University, by C. Hose as an adult of uncertain sex, poorly preserved and showing frontal and occipital artificial deformation. With this specimen arrived a right half of a mandible and part of a left temporal bone of a six-year-old child. Some thirty-two mandibles

With the cooperation of the Sarawak government, Tom Harrisson began a study of the Bau caves in 1948. There he trained his crew of local investigators and proceeded to explore new sites on the island. By 1954 he had decided to concentrate excavations at the Great Cave of Niah, additional sponsorship now being made available from the Shell group of companies. Work began at Niah three years later with the establishment of a permanent camp at the site. The Niah complex is vast and includes eight main caves and some forty-five lesser caverns; all were investigated in detail by 1970. Harrisson's efforts, enhanced by the special skills of Barbara Harrisson and a number of local and foreign colleagues, revealed how incomplete the nineteenth-century survey had been. Harrisson and his group gave Borneo its rightful place in world prehistory. Along with a rich series of faunal and cultural remains at Niah, skeletons were also present in deposits dating from Upper Pleistocene to protohistoric times. The significance of Niah to the study of the evolution of *Homo sapiens sapiens* is most clearly demonstrated by a discovery made in February 1958 in the excavated trench called "Hell" at the western mouth of the cave. A human cranium (Plate I) was uncovered at a depth of 106 to 110 inches (ca. 2.74 m) and well below the level of the geologically Recent burials (T. Harrisson 1959).

This "Deep Skull" of Niah (Burial no. 73) is not a primary burial but a secondary deposition which may have been incompletely cremated. It is uncertain if the cranium was intact when deposited. It was found oriented with the palate and basalar region facing upward, the specimen being separated from the overlying soil deposit by a large stone. Harrisson, in an appendix to the publication by Barbara Harrisson concerning a classification of the Stone Age burials from upper deposits at Niah, had interpreted this circumstance of the cranium's position underneath the stone to mean that the latter object had been there by a "fortunate accident" but that the cranium had been placed by intent in this deep part of the cave for "it could hardly have been so positioned and preserved intact and in association with long bones in the Niah deposit situation, unless carefully protected at the initial phase" (B. Harrisson 1967: 199). Although long bones would appear to have been present in the same deposit with the cranium, the only other part of the skeleton noted in the formal records of the excavation is a left talus from Area HR1 found 102 to 105 inches from the surface and therefore resting immediately above the locality of the cranium. Hooijer (1963) recorded that this tarsal bone was encountered by the Sarawak Museum field party excavating under T. Harrisson's direction from December 1960 to January 1961. Apart from four teeth remaining in the palate (the right first and second permanent molars and both unerupted third molars) and a root of what may be an upper premolar, no other teeth are preserved. The mandible is not present.

These human remains were found in association with burnt materials of bone and charcoal which have yielded a radiocarbon date of 39,600 $\pm$ 1000 years B.P.

assembled by Hose from Malu Cave, Mount Malu, Fifth District, Sarawak, were received by Duckworth at this period. There are no records existing today but T. Harrisson suggested to their describer, D. R. Hughes (1963), that these might belong to secondary burials from Tabun-Kelabit. It is possible that the orang-utan mandible employed in the Piltdown hoax was selected from among the osteological specimens collected by Everett and housed in the British Museum of Natural History, London (K. P. Oakley, personal communication).

(1957), as given by H. de Vries of the Physical Laboratory, University of Grönigen, Holland, for sample GRO 1339 taken from 100 inches (2.54 m) (T. Harrisson 1958; Solheim 1958). Oakley and Campbell (1975) rendered the radiocarbon date as "A2 > 40,000 years B.P. on basis of radiocarbon dating of charcoal at 2.54 m (100 inches): 39,820 ± 1012 B.P. (GrN-1339)."

Stone implements were found between the level from which charcoal sample GRO 1339 was taken and at a level just above the 100 inch deposit. Charcoal from this implementiferous area gave a radiocarbon date of 32,630 ± 700 years B.P. (1957) for sample GRO 1158. Artifacts encountered at a depth of 50 to 100 inches are identified as Palaeolithic chopping tools made from river pebbles. With these occurred quartzite flakes, of which many are rather nondescript, and various flake blades and faceted flake and core tools which have been compared with the Middle Soan tool traditions of northwestern India and Pakistan. Oakley (1969) conceived of these as a late form of the chopper/chopping tools which had spread from South Asia to Borneo by Upper Pleistocene times, although he was hesitant to assign any closer degree of cultural affinity to a Niah Palaeolithic until more materials have been recovered and examined. It is certain, however, that these tool-bearing levels at Niah are datable by radiocarbon methods to a Main and Late Würmian antiquity. Some bone points were found in this lithic assemblage and a Middle Soan quartzite flake was recovered from beneath the Deep Skull itself (T. Harrisson 1959).

With the exception of the extinct giant pangolin *Manis palaeojavanica,* all faunal materials in association with the Deep Skull are of extant species. In one of his last published works, T. Harrisson (1974) noted that no true fossils relevant to Palaeolithic stages have been found *in situ* anywhere on Borneo, save for those recovered from the deeper deposits at Niah. This is indeed a surprising situation, given the abundant and proved fossil mammal specimens collected from the adjacent islands of Java and the Celebes in beds datable to the Middle Pleistocene. The zoogeographical causes of this situation are outside the scope of this paper, but the presence of a wide range of faunal species at Niah does suggest a continuity of ecological settings in Borneo from the time of the deposition of the Deep Skull to the present day. These fauna include *Manis javanica, Hystrix, Sus* cf. *barbatus, Tragalus napu, Pongo pygmaeus,* and *Presbytis,* plus small mammals of extant species (T. Harrisson, Hooijer, and Medway 1961; Hooijer 1961, 1963).

A published description of the Deep Skull of Niah appeared in 1960, the specimen having been sent to the British Museum of Natural History, London, for anatomical study. Brothwell (1960) noted in his report in the *Sarawak Museum Journal* that the cranium was poorly preserved and in many fragments, but he carried out a metrical and morphological analysis of the larger pieces and made a reconstruction of the cranium. He concluded that the remains were those of an adolescent *Homo sapiens* of 15 to 17 years of age at time of death. Sex could not be established with certainty. Employing a statistical procedure devised by Clark (1952) and applied by Laughlin and Jørgensen (1956) in their study of Greenland Eskimo skulls, Brothwell estimated coefficient of divergence with reference to his metrical data from the Niah cranium and metrical data from various fossil and modern cranial specimens or series of specimens. He interpreted the results of this comparative study as indicative of different degrees of biological affinity between the Niah specimen and his comparative series. The latter included nine sets: the Talgai adolescent, Keilor adult,

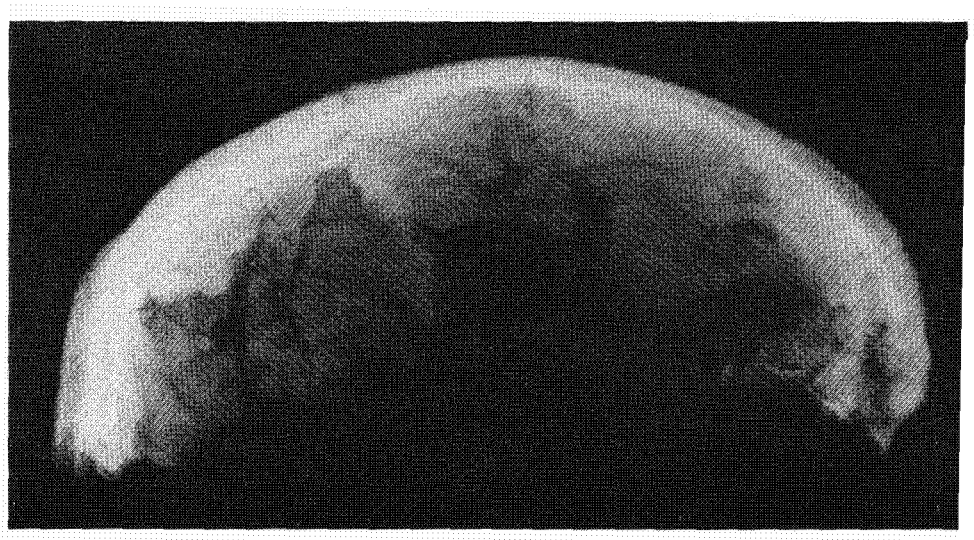

Plate I Radiograph of the Deep Skull of Niah. Courtesy of the British Museum (Natural History), London.

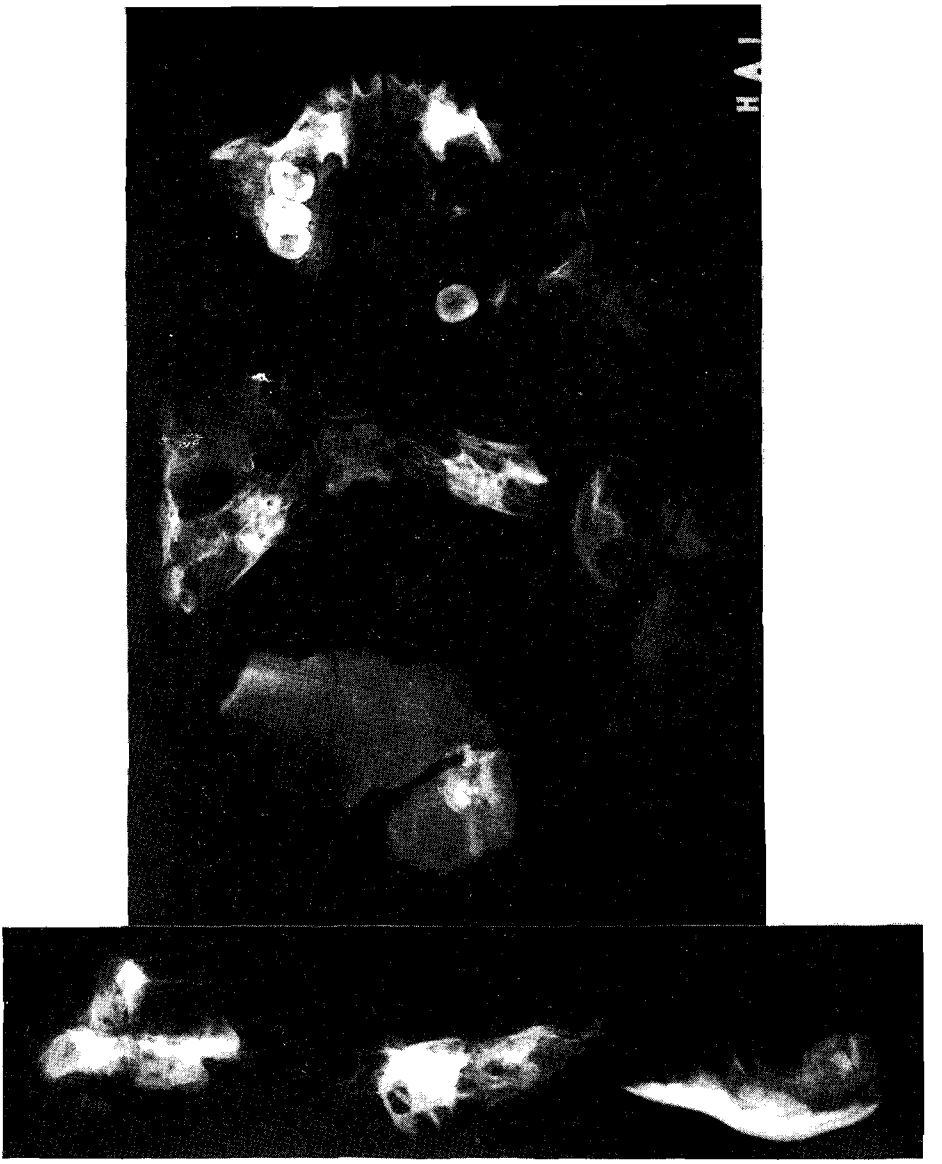

Plate II Radiographs of the cranial portions of the Deep Skull of Niah. Courtesy of the British Museum (Natural History), London.

European Neanderthals, Le Moustier adolescent, recent Borneo adults, recent Australian adults, recent Tasmanian adults, recent Javanese adults, and prehistoric Chinese. Nonmetrical, or morphological, data were compared with the metrical values of the same series for eight physical characters. This was possible by using a scaling method proposed by Cain and Harrison (1958) whereby taxonomic characters are reduced to numerical values. After combining the results of both kinds of data, Brothwell concluded that "the Tasmanian and Australian groups are closer to the Niah skull, followed by Javanese and Borneo groups. The prehistoric Asian types are next, and it may be noted that the Talgai youth is slightly more similar than Keilor man when considering metrical data but has a noticeably greater non-metrical score. Both the Le Moustier youth and the European Neanderthals generally are very different from the Borneo fossil." In summary, while a contemporary of Neanderthals, the Niah youth exhibits biological affinities of cranial structure which are most like those of recent natives of Tasmania and Australia. The ancient inhabitants of this region and of Java were of more robust form, representing one end of a range of variation of cranial robusticity which has persisted in Southeast Asia and Australia since the Upper Pleistocene but is by no means universal today. The Niah specimen would represent therefore "the differentiation of a more lightly built physical type (which) may have taken place at a *much earlier period* than has so far been anticipated" (Brothwell's italics). In this way, the Deep Skull of Niah entered the hominid fossil record—an anatomically modern *Homo sapiens* living in Southeast Asia 40,000 years ago and preserved in a faunal context of presently extant species (save for the extinct giant anteater) and an archaeological context comparable typologically to the Middle Soan of the Indian Upper Pleistocene.

In reviewing reactions of anthropologists to the Niah youth, we find that a few have welcomed him, a somewhat larger number has rejected him, while a majority have been content to tolerate his fellowship in the cloud of witnesses to sapient evolution but refrained from according him any very important place in that hierarchy. Furthermore, we discern that shifts in opinion about the Niah cranium have occurred over time with the result that it holds a more reputable place in our lineage today than it enjoyed in the decade immediately following its discovery. This circumstance reflects a predominance of different and competing theories of hominid evolution prevailing over the past twenty years. In this present evaluation of the Niah cranium, it will be useful to identify some major interpretations of the specimen, then conclude with a discussion of those points of view which have emerged most recently. Anthropologists who have written about the Niah materials mention the following issues.

1. The circumstances of the discovery and excavation of the Deep Skull of Niah were such as to raise some doubt concerning the precise association of the specimen with the burnt materials, faunal remains, and artifacts. Might not the cranium have been intrusive in the deep levels? If not intrusive, is it possible that the cranium of an anatomically modern *Homo sapiens* has an antiquity commensurate with the Middle Soan artifacts and the bones of the extinct pangolin?

2. These questions of possible disassociation of the cranium from the other contents of the deep levels at Niah cast doubt on the significance of the date of

40,000 years B.P. ascribed to the human occupation of this part of Borneo. What has been dated is not the Deep Skull itself but burnt materials in its deposit. This is the method of dating called "A2" or second-order absolute dating by Oakley (1969). There are some anthropologists (Feustel 1976; Pilbeam 1970; Stewart 1974) who do not reject the antiquity of the Niah cranium on the grounds of their phylogenetic theories but question its age so long as its source deposit remains our only clue to its place in the Upper Pleistocene.

3. The fragmentary and distorted condition of preservation of the Niah cranium has led some scholars to regard it as unsuitable for metrical and morphological analysis, a problem which has inhibited the inclusion of the Deep Skull in comparative studies with other fossil specimens (cf. Howells 1976*a*; Stringer 1974, and personal communication; Weiner and Campbell 1964).

4. The existence of an anatomically modern *Homo sapiens* in Southeast Asia some 40,000 years ago has been considered improbable by those anthropologists favoring the unilinear or polyphyletic theories of human evolution. If the Niah specimen were to be accepted in the way it was interpreted by Tom Harrisson and his supporters, it would mean that men of modern aspect were the contemporaries of "classic" Neanderthals of Europe and their "Neanderthaloid" collaterals of Africa and Asia. This proposal wreaks havoc upon the unilinear school advanced by Hrdlicka (1927) and modified by Brace (1964) as well as upon the polyphyletic hypotheses of Weidenreich (1946) and Coon (1962). Scholars who have held onto these older phylogenetic schemes must conclude that either (a) the Niah youth was a post-Neanderthal *Homo sapiens* and not of an antiquity of 40,000 years B.P., or (b) if the dating of the Deep Skull deposit is correct, then the specimen itself was intrusive in that deposit, or (c) by nature of its adolescent age, the Niah specimen was that of an individual who had not lived to develop those mature secondary sexual characteristics of a Southeast Asian "Neanderthaloid," that is, the youth might have grown to adulthood to become a quite respectable representative of a stage or grade along the phylogenetic branch of anatomically archaic hominids already known from Solo, Wadjak, Keilor, and Talgai. To this lineage the Kow Swamp specimens might be added. The immature skull from Teshik Tash, called Neanderthal by some, has been cited as an example of this possibility (Fitting 1969). Coon (1962), who regarded the Niah specimen as female, saw it as a representative of early *sapiens* when the "Australoid subspecies" in Borneo had just crossed the threshold from *Homo erectus,* either by evolutionary shifts or as a result of gene flow from the "Mongoloid" area to the north. Only in this way might followers of the Weidenreich-Coon hypothesis be able to place the Niah cranium on that separate phylogenetic branch leading to the cranially more gracile peoples of major areas of Southeast Asia.

5. Converts to the above-mentioned phylogenetic schemes as well as those who have sought to explain the course of hominid evolution according to the tenets of the pre-Neanderthal (radiation) and pre-*sapiens* theories have perpetuated a bias that anatomically modern *Homo sapiens* evolved in a western sector of the Eurasian landmass. With reference to archaeological materials of the Upper Palaeolithic, they would set the date of earliest appearance of modern-type man in western Europe around 33,000 years B.P. Brose and Wolpoff (1971) claimed that the earliest known

skeletal specimens of anatomically modern *Homo sapiens* are known from the Pavlovean burials at Dolni Vestonice (25,820 ± 260 years B.P.), citing the dates for this deposit as they were given by Oakley (1966). The prospect of a more ancient hominid of modern aspect being found in Borneo does not fit well into this framework, as the authors have made clear: "An early date has been claimed for the Niah cave specimen (Harrisson 1959). However, this specimen represents a burial (Harrisson 1964: 526), and the date does not even come from the level where the specimen was found, but rather was taken at a 'corresponding' area (*Ibid.*: 526). Without further substantiation, the association of the crucial date with the specimen cannot be unequivocally accepted . . ." (Brose and Wolpoff 1971: 1157). The Brose-Wolpoff hypothesis opposes any arguments for a sudden replacement of Neanderthals by *Homo sapiens sapiens* coming westward from some unknown hearth of sapient evolution in Asia, their contention being that local transitions took place in both hominid anatomy and tool technology at various times and places in the Old World during the Würm glaciation as modern-type man emerged from an earlier Neanderthal grade. In this view, Borneo and other parts of Island and Mainland Southeast Asia are peripheral to the main theatre of sapient evolution in Europe and western Asia. Indeed, Brace (1964) ignored those parts of the world outside of Europe, as Howells (1975) has observed.

6. An important element of the Brose-Wolpoff scheme is the assumption of a dynamic relationship between tool technology and anatomical changes of the cranium, correlates which allow the archaeologist and anthropologist to document the transition taking place during the Würm glaciation of the emergence of modern-type man from his Neanderthal antecedents. Because their thesis has enjoyed a certain degree of interest if not general acceptance among anthropologists, its main points merit a brief description here. Using a definition of Neanderthal man as "the man of the Mousterian culture prior to the reduction in form and dimension of the Middle Pleistocene face" (Brace 1964: 18), Brose and Wolpoff include as "transitional specimens" of the Neanderthal-*Homo sapiens sapiens* evolutionary sequence fossil specimens from Arcy-sur-Curé, Kulna, Sipka, Krapina, Tabun, Shanidar, Skhul (V), Djebel Qafza (Quafzeh), Amud, and Omo (I). Apart from the Omo I fossil, all of these are from Europe or western Asia. Disappearance of the characteristic Neanderthal cranial morphology, as the latter has been defined by those writers, is attributed to

> a direct consequence of selection relaxation for the anterior dentition and supporting facial architecture, and resulting change in selection acting on the static and dynamic properties of the nuchal musculature. That succeeding cold-adapted populations did not develop mid-facial prognathism follows from the raised position of the calvarium relative to the nasal passages in anatomically modern *Homo sapiens*. We submit that these considerations are sufficient to account for the association of Early Upper Paleolithic man and Late Middle Paleolithic tools. (Brose and Wolpoff 1971: 1185–1186)

Critical evaluation of these ideas has been treated elsewhere (Howells 1974, 1975; Kennedy 1975), but what is of interest to us with regard to the Niah cranium is the implication of Brose and Wolpoff's thesis that the hallmark of hominid populations of Würmian antiquity, be they Neanderthals or "Neanderthaloids," was the

manufacture of Middle Palaeolithic tools of Levallois/Mousterian traditions. Since these kinds of tools are not found at Niah, or for that matter east of the Indian subcontinent in Southeast Asia, those who adopt the phylogenetic thesis just discussed are forced to reject the Würmian date of the Niah cranium or else take the heretical step of altering the formula that Neanderthal man = Levallois/Mousterian traditions = Early and Main Würmian antiquity = a European/western Asiatic area of sapient evolution. The chopping tools and other lithic materials found with the Deep Skull of Niah have no biological connection with any of these Neanderthal associations beyond their contemporaneity in the Upper Pleistocene, as Tom Harrisson (1964, 1967, 1970, 1972) and others familiar with Southeast Asian archaeology are aware (cf. Movius 1958).

7. There is a venerable and vast anthropological literature about racial migrations of early human populations into and within Southeast Asia. Certain elements of these *Völkerwanderungslehre* persist in the notion of successive waves of Negrito, Australoid, Indonesian, and Mongolian peoples invading the mainland and islands of Southeast Asia and from these regions disseminating into Australia and Oceania. The claim of Upper Pleistocene antiquity for the Niah youth finds no place in these older migration theories, which assume that the earlier invaders were anatomically robust and more primitive than those people of modern anatomical character living in this part of the world today. Niah's fossil man appears prematurely in this story and must, therefore, be out of phase with the idealized order of demographic succession.

8. Because relatively few anthropologists have examined at first hand the original specimens or casts of the Niah specimen, evaluations of Brothwell's analysis have been few. Coon (1962) regarded the specimen as female, as noted above, but Brothwell avoided any decision as to its sex. However, Brothwell did compare it with the male skull of a recent Tasmanian (Aus. 80.446 of the British Museum of Natural History collections). Macintosh (1965) questioned Brothwell's conclusion that the Niah cranium finds its closest affinity with Tasmanians, and the former writer has retained this view in more recent works (Macintosh 1974), concurring with Jacob (1967) that the closest relatives of the prehistoric Bornean are to be found with Keilor, Wadjak, Tabon, and the Sampong skulls from Australia, the Philippines, and Java. There is one point of agreement among most anthropologists who have viewed the cranium from Niah: it is that of *Homo sapiens sapiens*.

Reevaluation of these eight points of debate concerning the Niah Deep Skull indicates that some earlier interpretations require revision on the basis of new phylogenetic theories emerging since 1958, while other points of view remain valid or, at least, do not appear to merit modification at this time. The extreme caution exercised by Tom Harrisson and his staff in their treatment of the Deep Skull and other materials recovered from Niah has not been appreciated sufficiently by many of his critics, few of whom are familiar with the primary published sources. In order to have independent verification of the important find, the cranium was left *in situ* until its removal could be undertaken in the presence of von Königswald, who had come to Niah from Holland. On the advice of the elder scholar, the cranium was forwarded to the British Museum of Natural History where it was

examined by a highly qualified physical anthropologist. Because of his desire to obtain outside opinions about the Deep Skull, Harrisson refrained from announcing the specimen's importance to students of human evolution until some two years after its date of discovery, although minor and preliminary reports were becoming available in that interim (B. Harrisson 1967). Along with the distinguished guest from Holland, Lord Medway and Barbara Harrisson were at hand on the occasion of the removal of the cranium, and reports of the faunal and archaeological associations appeared over the course of several years. The geological and dating problems of Niah were studied independently by Jee Chin Luke (1959), Hooijer (1963), de Vries (T. Harrisson 1958) and Oakley (Oakley and Campbell 1975). A man of catholic interests and considerable experience in things Southeast Asian, Tom Harrisson recognized the necessity of collaboration with qualified experts. The burden of proof rests with those critics who assume that the Deep Skull was an intrusion in the part of the site where it was first observed.

The question of the antiquity of the Niah cranium will not be established in an absolute sense until a collagen date is obtained from the specimen itself, as Stewart (1974) has suggested. Contemporaneity of the cranium with its deposit is as well established as in those cases of other fossil hominid specimens for which the major chronometric evidence is of Oakley's "A2" or second order of absolute dating. Among the other fossils dated in this way are those of Olduvai MNK II, La Quina XIV, Ehringsdorf, Devil's Tower, Mugharet Tabun, Shanidar I and V, Haua Fteah, Florisbad, Abri Pataud, and Tarforalt. To be sure, the circumstances of direct determination of the age of the source deposit are variable for each of these, but as a valid approach to the problems of determining antiquity "A2" dating has been employed quite widely. Recently Oakley (Oakley and Campbell 1975) has published the results of "R1" or first-order relative dating of the Niah cranial samples and *Chiroptera* bones of the same deposit with the aim of determining percentages of F, $^{100}F/P^{205}$, eU, and N contents. The values obtained for both series are such as to suggest strongly the contemporaneity of the human and faunal materials. Had the Niah cranium been intruded at a later time into the deposit with the animal bones, quite different readings would have distinguished the two series from one another. Shortly before his death, Tom Harrisson (1975) was inclined to accept a somewhat later date of ca. 35,000 years B.P. for the Deep Skull. He advanced this conservative view in an effort to bring the antiquity of the ancient Bornean *Homo sapiens* closer in line with the dates which had been the more acceptable ones for sapient evolution in Europe and western Asia. He could not have made this decision on the basis of revisions in the half-life of C-14 from its earlier determination of 5568 $\pm$ 30 years to 5760 $\pm$ 30 years (or of other revised half-life values), as these would have suggested a still earlier date. This palliative for the comfort of his detractors does not seem either significant or necessary to the present writer. Another mark of Harrisson's concern to determine the antiquity of the Deep Skull is his caution against using the *Manis palaeojavanica* fossils, recognized prior to his work at Niah as a contemporary of *Homo erectus* in Java, as an index fossil of Middle Pleistocene antiquity in Borneo. Rather, he concluded, the extinct pangolin had survived into Upper Pleistocene times and perhaps until rather recently in parts of Borneo "in somewhat the same way as the chopper tools carried on! On the other hand, such survival itself once more underlies the need for caution in using

any such 'extinct animal' to date a horizon archaeologically unless there is other adequate supporting data" (1975: 33).

Any discussion of the anatomical features and phylogenetic status of the Niah cranium must take into account its fragmentary and distorted condition, even though this specimen is better preserved than certain other fossil hominid remains known to us, namely, Fontéchevade, Swanscombe, Ehringsdorf, or the mandibles without crania from Heidelberg and Ternifine. In his concise and careful description of the Niah fragments, Brothwell (1960: 323) emphasized the incomplete nature of the specimen and stated that with respect to the reconstruction "my attempt to determine the affinities of the Niah skull in relation to ancient and modern populations in South-East Asia must be regarded as only very tentative." This admonition must be taken to heart by future investigators of the Deep Skull of Niah of which the original fragments have been returned to the Sarawak Museum at Kuching. The British Museum of Natural History owns casts of the six large fragments of the vault and face as well as a cast of Brothwell's reconstruction. The original reconstruction, no longer existing, was composed of casts of the large fragments held in place with Plasticine and other supporting materials. Some areas of this model, such as the zygomatic processes of the temporal bones, were reconstructed entirely of Plasticine and the relevant bone fragments were missing. The facial fragments do not articulate directly with the vault. Similarly, observations of cranial morphology which make use of the cast of Brothwell's reconstructed cranium and of the cast fragments should be made with these factors in mind. Those scholars fortunate enough to examine the original specimen which is now in Borneo will find that not all pieces of bone salvaged from the cave deposit were included in Brothwell's reconstruction for the sound reason that their minute size and fragility precluded their incorporation. Finally, in reconstructing the cranium an effort was made to reorient into their proper anatomical relationships some of the more warped and distorted fragments, a feature which is not obvious in the examination of the casted materials available for study in London.

Within the past few years, a new approach to hominid phylogeny has emerged which reconciles or renders obsolete many problems imposed by older schools of thought. The data from Niah and other sites containing anatomically modern *Homo sapiens* fossils of comparable or even greater antiquity are better accommodated in this recent interpretation of the pathways of sapient development. In the same year that Tom Harrisson found the Deep Skull of Niah, Weiner (1958) outlined the major points of his "spectrum hypothesis," although it was not until several years after this that his ideas enjoyed general recognition when presented again in his study of the calvarium from Swanscombe (Weiner and Campbell 1964). Recognizing a "continuity both temporal and morphological, between the various fossil populations," Weiner conceived of "a spectrum of varieties of early *Homo*" which, in the Upper Pleistocene, represented intergradations of *erectus* and *sapiens* features. Just as there had been pre-Neanderthal, pre-Solo, and pre-Rhodesian populations of *Homo* some 200,000 to 300,000 years ago, so had there been pre-*sapiens* groups emerging at this time as well. With the isolation of many of these hominid populations by climatic and other factors as well as by blending of gene pools, only some populations evolved as anatomically modern man. "Intermediate" forms are represented by the fossils from Mount Carmel and Krapina as the

spectrum broadened toward Upper Pleistocene times. Early examples of modern-type man are recognized in the fossils of Cro-Magnon and Niah. The latter specimen is represented in Weiner's phylogenetic tree along that stem which follows the descent from Steinheim and Swanscombe 200,000 years ago to Ehringsdorf 100,000 years later and just before the appearance of Combe Capelle around 30,000 years ago. This branch Weiner entitled "Modern Man," and it joins the parental trunk of Peking-Solo, Rhodesian, and Neanderthal populations as far back as Mindel I/II of 400,000 years ago. Weiner's scheme succeeds where earlier phylogenies seem weakest in its avoidance of a strict taxonomy of the various kinds of Pleistocene hominids, in its refusal to derive specific geographical "races" from fossil specimens through a single and isolated line of descent, and in a theory of population extinction which stresses integration and isolation rather than proposing that the main agent of evolutionary change was natural selection operating within restricted temporal and geographical limits and upon specific anatomical features.

The "spectrum hypothesis" is elegant in its simplicity and complements Howells' (1976*a*) classification of ancient *Homo sapiens* into (a) those of Würmian antiquity which are identifiable with later peoples of the appropriate region (Fish Hoek and "Old Melanesians"), (b) those of anatomically modern character but more difficult to relate to modern populations and existing before 35,000 years ago (Qafza, Border Cave, Omo I, and Luikiang), and (c) anatomically archaic *Homo sapiens* (Skhul V and Florisbad). Some of the latter populations may overlap with western European Neanderthals but perhaps not with hominids of nonmodern aspect elsewhere. Although Niah is not discussed in this study, Howells (1976*a*: 493) referred to its importance when he stated that "there are signs of Australo-Melanesian morphology up to 40,000 years ago in 'Old Melanesia', comprising Australia-New Guinea, all of Indonesia including the Philippines and part of the present mainland of (South-east) Asia."

Pertinent to the question of the Niah cranium's antiquity and geographical situation in the broad spectrum of sapient evolution are the recent data from Africa, western Asia, and the Americas which are interpreted as evidence of early *sapiens* existing at a much earlier period of time than the period of the Late Würm, than had been supposed formerly. Day's (1973) discriminant function analysis of Omo I and II, using cranial specimens from comparative populations, led him to conclude that of these skulls from the African Upper Middle Pleistocene or Early Upper Pleistocene, as dated by T/U methods of their source deposit, the Omo I specimen of 100,000 to 130,000 years ago shares many anatomical features with *Homo sapiens*. The Omo II specimen finds closer affinities with *Homo erectus*. There are mixed features in each of these two individuals despite the closeness of their geological age, and Day assigns both to *Homo sapiens* to distinguish them from the Solo specimens. Although assigning Omo II to a "*Pithecanthropus* intermediate" group, Day (1973: 94) observed that "it is possible that the Omo I skull will also fall into place beside Skhul and Amud as an Ethiopian representative of this sapient radiation." Vallois and Vandermeersch (1972) have noted the anatomical similarity of these last-mentioned specimens from western Asia to the Qafza VI skull found just south of Nazareth many years ago. Despite the Levallois/Mousterian tools associated with this specimen and suggesting contemporaneity with European Neanderthals, these anthropologists assessed its *Homo sapiens sapiens* characters to

be more obvious and sigificant than any characters it shares with Neanderthals. In these and other anatomical traits the Qafza specimen resembles the Middle Palaeolithic fossil from Mugharet el-Zutiyeh as well as the Niah Deep Skull of comparable antiquity. This evidence of *sapiens* populations existing at a much earlier period of time than had been thought possible by most anthropologists only twenty years ago finds further support in Vandermeersch's (1972) continuing study of the Israeli skeletons. An up-to-date review of the population relationships of later Pleistocene hominids which is based upon a multivariate study has been written by Stringer (1974). (Brothwell [1961] notes that the relative contemporaneity of the Deep Skull from Niah with the advanced forms of *sapiens* from Skhul in Israel may bear out the views of A. Keith and F. Clark Howell that Asia was the home of proto-*sapiens* man.)

The question of the presence of early *sapiens* in the Americas has been raised in recent years, although the absence of any skeletal data with a proven antiquity as great as that proposed for Niah and the western Asiatic and African fossils just described makes many aspects of this topic highly speculative. The oldest known human bone which has been dated in the New World is from the Los Angeles site; it is assessed by Berger and his colleagues (1971) to be slightly older than 23,600 years B.P. A date of 38,000 years B.P. ascribed to the Lewisville site in Texas is based on samples of charred vegetal matter which is not associated with bone or cultural remains and was accepted with caution as evidence of human activity by Krieger (1964). Stewart (1974) favored the view that man entered America and Australia from Asia before 20,000 years ago, perhaps at the time of the existence of the Bering Land Bridge which formed at successive periods at 10,000 to 14,000 years ago and at 15,000 to 25,000 years ago. However, man's settlement of the New World may have been as early as 50,000 years ago when the Bering Land Bridge was present. The American settlement problem has been discussed by Bryan (1969), who placed confidence in the date of the Niah cranium. He thought it highly possible that the Deep Skull was that of *Homo sapiens* of the Upper Pleistocene and contemporary with the European Middle Palaeolithic. Furthermore, since Neanderthals do not appear in the fossil record of the New World, it is likely that the early immigrants to the Americas were of modern type, crossing the Bering Land Bridge not much before 26,000 years ago. This is the date of the Woronzagian transgression which flooded the connecting piece of land during the Middle Wisconsin interstadial. The presence of modern-type man in Borneo 40,000 years ago suggested to Bryan that Neanderthals were not representative of a universal stage of human evolution. Rather, from the sapient stock of Asia the New World was populated, not from some Neanderthal forebear. The claims of L. S. B. Leakey and colleagues (1968) regarding a great antiquity for man at the Calico site in California and the report of 70,000-year-old artifacts from the Catskill Mountains of New York, as announced by Raemsch and Vernon (1977), reflect this current trend to push back the date of the entry of man into the New World. The validity of these more extravagant proposals awaits verification by the discovery of more convincing data than is now available, but if we are correct in thinking that *Homo sapiens* of anatomically modern form existed in Africa and western Asia at a time during and even before the appearance of Neanderthal Man, the possibility that humans like ourselves settled the New World during the earlier phases of the Upper Pleistocene

must not be ruled out. These speculations render the antiquity and phylogenetic status of the Niah cranium much more credible than seemed possible twenty or even ten years ago.

The absence of strict correlations of Mousterian industries with Neanderthal populations or of Upper Palaeolithic industries with populations of *Homo sapiens sapiens* places a strain upon the proposals made by Brace and those other anthropologists who continue to define Middle Palaeolithic man of Europe and western Asia in a simple anatomical/cultural equation. Their concepts seem inappropriate to this part of the Old World upon which their attention has been concentrated as well as to areas of sub-Saharan Africa, the Far East, Southeast Asia, the Americas and Australia. The presence of tools of Middle Soan type in the Deep Skull deposit at Niah reveals nothing about the taxonomic status of the tool manufacturers of 40,000 years ago in Borneo. Nor should it surprise us either that chopping tools and flake implements similar to those found in India and Pakistan occur in deposits of this age and in this more eastern sector of Asia. These tools were compared to the Soan complex by Paterson in 1958 when Tom Harrisson (1959) showed samples of the collection to him in the presence of Oakley at the Glasgow meeting of the British Association for the Advancement of Science. Harrisson (1957) had already considered the lithic remains to be like South Asian tools, observing this in 1957 when the first stratified deposit of Palaeolithic tools was found in Southeast Asia at the Niah Cave. In South Asia chopping tools appear in deposits which have been dated to 100,000 years, if not earlier, but their manufacture persisted into late prehistoric times in some areas of the subcontinent and Southeast Asia. A re-examination of this lithic material from the lower levels at Niah would be valuable, but any new interpretations of the technology and palaeoecology of the toolmakers which might arise are unlikely to lead anthropologists to taxonomic statements or to conjectures as to the origin, anatomical features, and geographical distribution of early *Homo sapiens sapiens*.

Most important for an understanding of the place of the Deep Skull of Niah in the broader picture of hominid evolution are the recent palaeontological, archaeological, and anthropometric/genetic data obtained from the Philippines, southern China, Australia, and New Guinea. Since 1958 the fossil record of this portion of the globe has been increased by the discovery of human skeletal remains from the Tabon Cave in the Philippines which are dated to 22,000 to 24,000 years B.P. (Fox 1970), from the 25,000 to 40,000-year-old deposit of Luiching in southern China (Aigner 1973), and from the Australian sites of Kow Swamp and Mungo Lake which are dated to the end of the Pleistocene and to 25,000 years B.P. respectively (Kirk and Thorne 1974; Macintosh 1972; Thorne and Macumber 1972; White 1974*b*). These new fossil finds have antiquities which embrace the dates of the older known specimens from Keilor (12,900 $\pm$ 120 years B.P.) and from Talgai (14,000 to 16,000 years B.P.). Although ancient hominid skeletal remains have not been encountered as yet in New Guinea, White (1974*a*) has shown that archaeological materials in the highlands of the island are datable to 26,870 years B.P. With the exception of the Kow Swamp fossils which are considered by Thorne (Thorne and Macumber 1972) to be an isolated survival of *Homo erectus* populations to 10,000 years ago, all of the other above-mentioned hominid specimens are recognized by

those anthropologists familiar with them at first hand to be anatomically modern *Homo sapiens*.

In a brilliant summary of the physical variation and biological history of man in Australia and Melanesia, Howells (1976*b*) has proposed that these areas were being settled by men of modern but phenotypically variable features well before 30,000 years ago. He regards the differences of robust and less robust skeletal constitutions not as a consequence of adaptation and selection but as resulting from a reversible phenotypic shift on an unchanged genetic basis toward larger size and related allometric effects, particularly of the face and mandible. Such changes would have produced in some smaller-brained individuals the unusual flattened and narrow frontal morphology so obvious in certain skulls from Kow Swamp. (Currently there is disagreement among anthropologists concerning the *erectus* status of the Kow Swamp material. Brothwell [1975] notes that there is slight frontal deformation of the sort ascribed to cultural practices in recent New Britain skulls.) This thesis offers a resolution to the time problem of demonstrating change in degree of robusticity from the Mungo Lake population to present-day peoples of Australia and Melanesia. Furthermore, it does not conflict with his hypothesis that the sapient populations of "Old Melanesia" were sufficiently diverse before 30,000 years ago to give rise to a range of populations as different from one another as robust Australians and gracile Negritos. The Niah and Tabon skeletal materials are regarded by Howells as the early stages of "Old Melanesia" population complexes, all of which became modified in post-Pleistocene times by the entry into this part of the world of the Mongoloid horticulturalists. To this latter group he assigns the ancestors of the Ainu, Japanese, Filipinos, Indonesians, southern Chinese, and American Indians as well as the prehistoric people of the Upper Cave of Choukoutien. Howells' study is a valuable addition to the work recently undertaken by anthropologists describing the living populations of Australia and establishing new estimates of biological distance from their analysis of anthropometric and single-gene variables (Brown 1973; Kirk 1973).

Competent as Brothwell's study of the Niah cranium is, the examination of the specimen by other anthropologists trained in skeletal biology and human palaeontology is desirable. Not only do new questions arise from this exercise of reevaluation but new information may come forward as well. The Niah cranium has been seen by several visitors to the British Museum of Natural History and to the Sarawak Museum, but no independent analysis of the Deep Skull has appeared since 1960. In my examination of the original Niah material in 1961 and of the casts and Brothwell's reconstruction in 1977, some specific points of the 1960 report were noted. It is appropriate here to set out certain features of observation which, it is hoped, will be of value to future investigators. Because the facial fragments do not articulate with the large piece of cranial vault, any conclusions as to the height of the upper face, orbital form, nasal height, and degree of upper facial projection would be dubious. The metrical value for the breadth of the nasal cavity can be obtained with accuracy, however. Brothwell has reconstructed the cranium as having a short and prognathous face with small square orbits and a marked depression of the nasal root. The loss of the glabellar regions makes tenuous the estimation of the degree of frontal pneumatization as the radiograph indicates. What the radiographic plate reveals is the limited extension of the frontal sinus into

the forehead region of this part of the vault, as Brothwell had observed from his study of bone fragments. There is no suggestion that the supraorbital region was marked by a large torus. The relative thinness of available bones of the vault is obvious from a study of the radiographs, although in a mature subject these might have developed to a slightly greater degree. While this feature is characteristic of *Homo sapiens sapiens,* Brothwell notes quite correctly that modern ranges of vault thickness had been reached by Neanderthals. The Gibraltar child's skull was exceptionally thick in the frontal region. Radiographic analysis of the Niah specimen reveals an absence of taurodonty, modern form of the dental roots, and the relatively thick enamel of the teeth, although the latter are more severely worn than is the case for the majority of fossil and living hominid series compared for this trait (Plate II). There is some interstitial wear on the occlusal surfaces of the right first and second molars. It is doubtful if measurements taken on teeth as severely abraded as these have any value in comparative studies. The mandible was not found with the Niah specimen, but given the moderate development of the temporal lines and the small size and gracile form of the palate it may be assumed that the lower jaw was not of large size or of great robusticity. The vault, as reconstructed by Brothwell, is rather flat for modern-type man, but this is likely to be an artifact of the condition of preservation of the cranium. The direction of pressure on the specimen was vertical as it was resting *in situ*. The parietal bosses, naturally large, seem exaggerated in size as a consequence of this kind of distortion and warping of the bone. This circumstance throws doubt on metrical estimates of cranial height, cranial breadth, and cranial length. The morphological study of the specimen tells more about its individual anatomical features and its taxonomic status than do anthropometric measurements based upon the reconstruction. Brothwell's assignment of the Deep Skull as an adolescent of anatomically modern aspect is borne out by the present writer's study of the specimen. Space does not permit a fuller treatment of the Niah remains, both original and casts, although these have been studied again in considerable detail and a typescript copy of these observations may be made available to interested persons (Kennedy n.d.). The question of the Niah specimen's biological affinity to Tasmanians and other Australian-New Guinean-Southeast Asian populations awaits confirmation by students of hominid evolution who are prepared to carry out a thorough comparative analysis of this specimen in conjunction with living and fossil series. This would involve the employment of a number of currently available statistical procedures for multiple anatomical characters which are not modified by natural agencies that distort bone. Brothwell's statistical and anatomical comparative studies have pointed us in the right direction.

A survey of attitudes about the Deep Skull of Niah demonstrates that the gradual acceptance of this specimen as a genuine fossil representative of anatomically modern man of the Upper Pleistocene has been achieved as a consequence of changing ideas about the course of sapient evolution and not as a consequence of new data coming from Borneo. The major work at Niah came to a close by 1970, although the anatomical and palaeoserological study of the skeletons from the upper layers of the cave has been conducted since that date by S. T. Brooks. This anthropologist and her husband, R. H. Brooks, had excavated mortuary deposits at Niah in 1966 (see paper by Brooks, Heglar, and Brooks in this volume). The Niah Deep Skull no longer seems exceptional in its antiquity or geographical situation; since

its discovery even more ancient fossils of anatomically modern *Homo sapiens* have been recovered from elsewhere in Asia as well as in Africa. This circumstance is especially true now when anthropologists have come to recognize the very broad range of phenotypic variability within and between human populations of earlier times as well as of the present. In the same way we have moved from conceiving of a European-western Asiatic focus of sapient evolution as new hominid discoveries are made which supplement and advance our thinking about human diversity over time. More traditional phylogenetic theories and recent efforts to modify them are tending to disappear. At the same time, we have gained as much from recent studies of biological variability and comparative distance of human populations living today in Southeast Asia, Australia, and Melanesia as we had acquired from the more traditional sources of human palaeontology. The Niah cranium will continue to make its contribution to this area of inquiry, especially when it is compared with the larger series of adolescent crania of comparable antiquity which are more readily available now than was the case a decade or two ago. Twenty years from now, if not before, the Niah cranium will be worth reevaluating once again, but our debt as anthropologists to its discoverer and his colleagues at Niah will remain over the years.

Addendum

Tom Harrisson's final publication about Niah (1976) appeared at the time this paper was being prepared for press. He writes that this colloquium paper was an extension and updating of publications about Niah written since 1957 and motivated "especially in the light of discussions at the Montreal (1973) and Gröningen (1975) Palaeolithic-Pleistocene conferences, the latter inter-disciplinary." While reporting a date of around 35,000 years B.P. for the Deep Skull which "has many features of the contemporary Borneo 'Dayak' population," he observed elsewhere in his paper that "nothing yet discovered in the four territories of Borneo at present appears inconsistent with a presence of modern man from c. 40,000 years ago without earlier ancestors. . . ." Harrisson concludes that speculations about any single origin and flow for any kind of human development in and about the island in particular and Southeast Asia generally must be regarded as inadmissable on the data presently available.

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