

CLASSIFICATION OF THE BROKEN HILL SKULL

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Abstract: The species change from large faced, heavily ridged, and platycephalic Homo erectus into Homo sapiens is clear-cut in terms of morphology and is datable at about 40,000 years ago. The Broken Hill (Rhodesian) skull shows all the traits of the erectus design and should be so classified, instead of being included in our species as is usually done. This opinion was tested by sawing the face from a plaster cast of this skull and finding its braincase was indistinguishable, by the usual criteria, from other, accepted erectus specimens.

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Since its discovery in 1921, the Broken Hill skull (Rhodesian Man) has been something of an enigma in that it has proved difficult to classify. Various schemes based on other known fossil crania simply leave no obvious pigeon-hole for this specimen. The most that can be agreed upon is that it somehow fits into an evolutionary sequence in African prehistory. What it descended from, who it may be ancestral to, and especially just what "stage" of evolution it represents--these are all debated.

Currently, most text-book writers classify Broken Hill within our species as Homo sapiens rhodesiensis, and this article is directed mainly to such writers. This practice has developed in spite of the fact that Weidenreich (1951: 227) described it as being anatomically much closer to the erectus group than to modern sapiens. Since then, Coon (1962:399) has been even more emphatic in showing that its cranial architecture is clearly that of erectus and not of sapiens. In general, most workers whose expertise lies in skeletal anatomy continue to see a predominance of erectus characteristics in this skull. In spite of this, most beginning students in anthropology are being taught that it is a specimen of early sapiens.

The origin and continuation of this contradictory classification may result, in part, from the fact that Broken Hill still has its face attached to its braincase. This fact alone gives the skull a very different "feel" and visual orientation from the more usual erectus braincases. This permits the observer to see it as representing a different anatomical type, provided he has some other reason to do so.

A simple experiment appears to confirm this suspicion. From a plaster cast of the reconstructed Broken Hill skull I sawed off the face and painted the remaining braincase a uniform color. This change caused considerable visual disorientation among students who were otherwise quite familiar with the specimen in its original condition. They did not recognize the specimen, and unhesitatingly classed it as an erectus skull.

Figs. 1, 2, 3, and 4 show four views of the Broken Hill braincase compared with those of OH9 (Chellean Man), Peking II (Sinanthropus), and Solo V.

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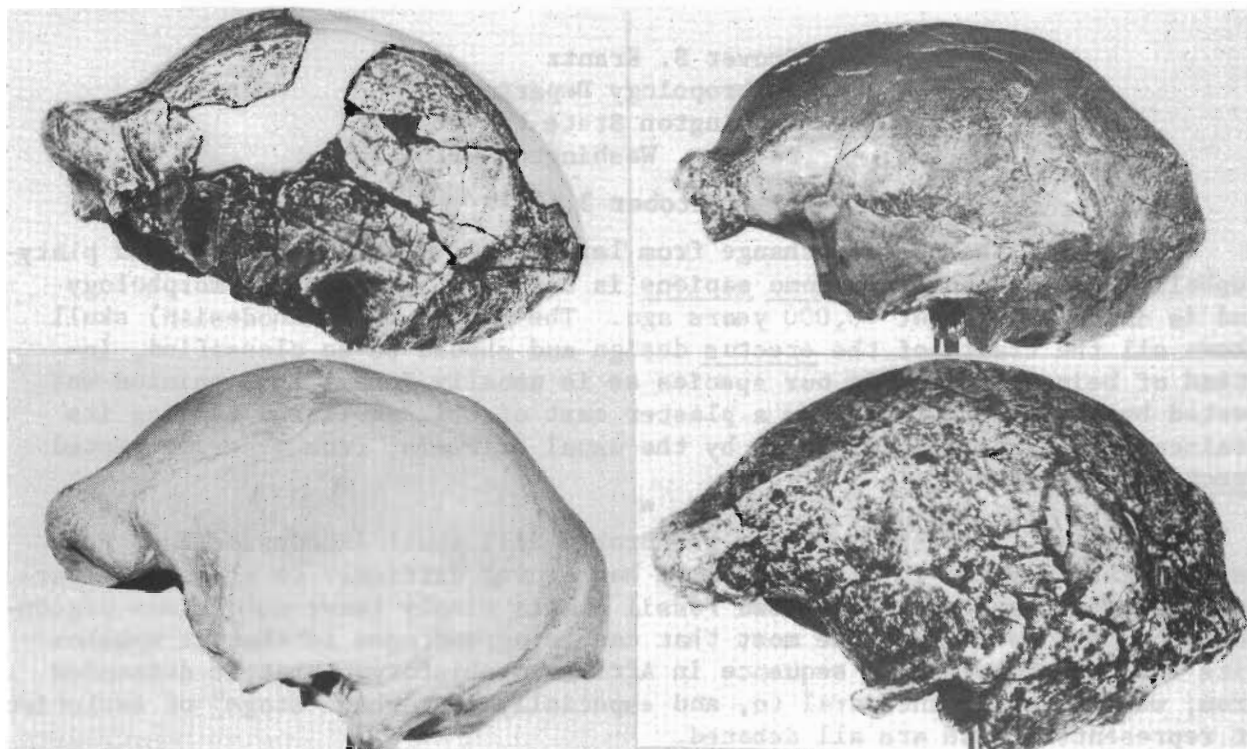


Fig. 1. Casts of four hominid braincases seen from the left side in approximate Frankfort plane. OH9 (Chellean Man), upper left; Peking II (Sinanthropus), upper right; Broken Hill, lower left; and Solo V, lower right.

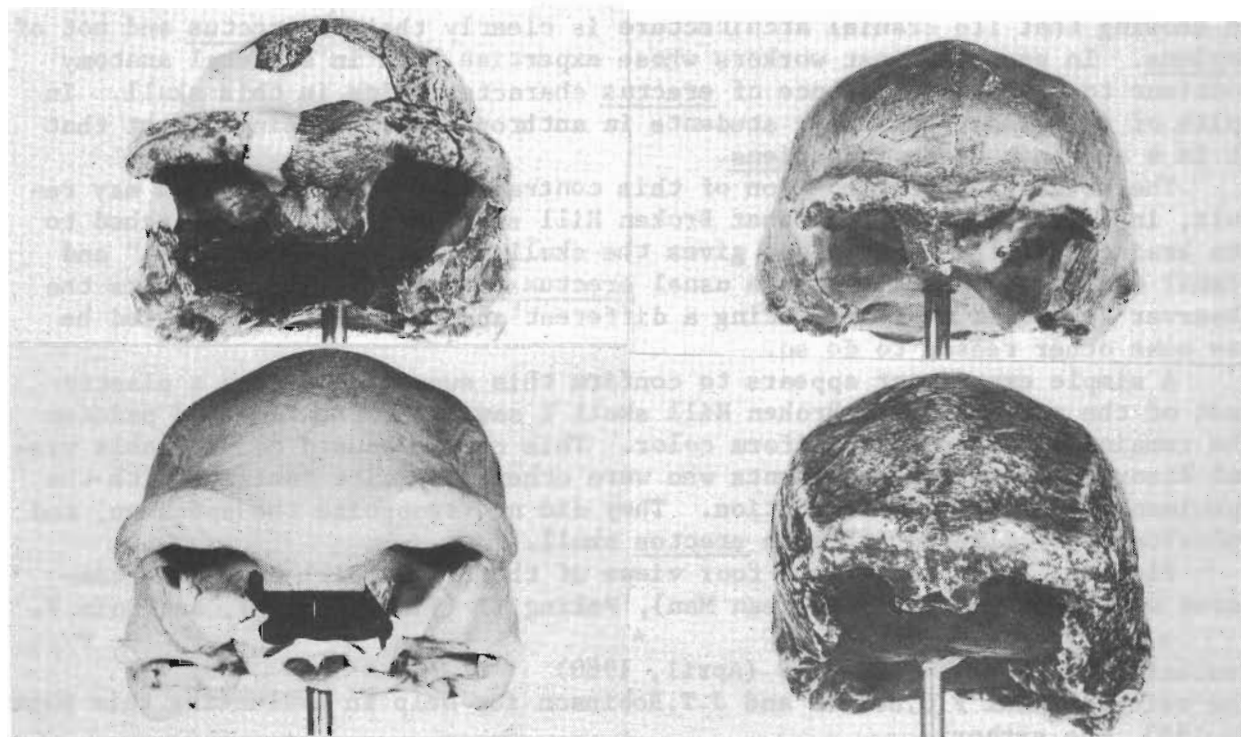


Fig. 2. Casts of same four hominids as in Fig. 1., front view.

Broken Hill skull

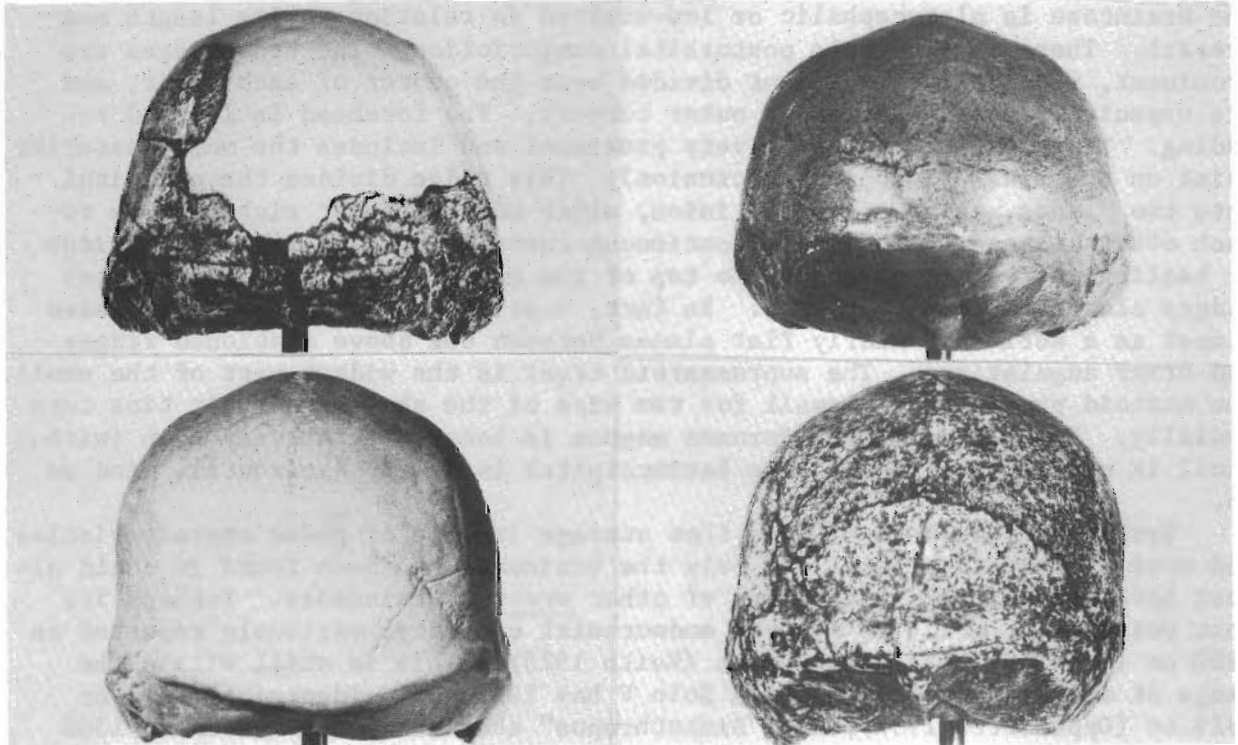


Fig. 3. Casts of same four hominids as in Fig. 1., rear view.

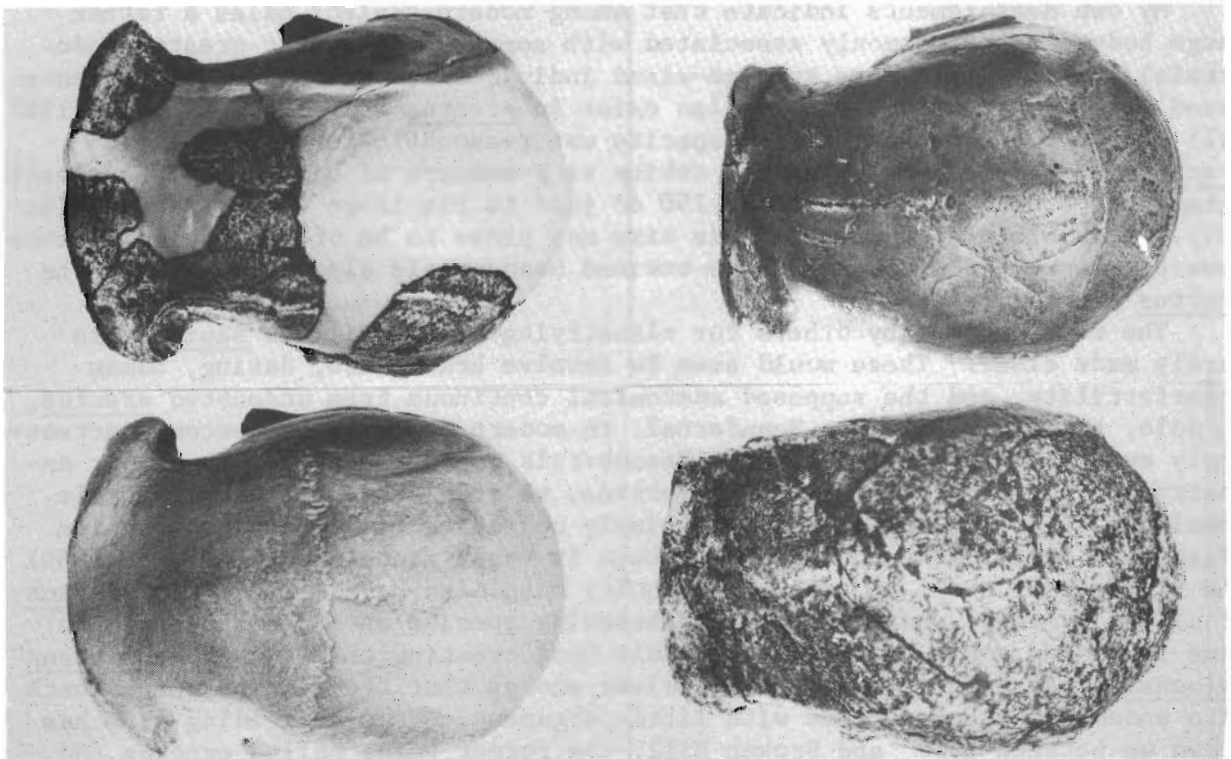


Fig. 4. Casts of same four hominids as in Fig. 1, top view.

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The usual morphological traits of erectus are evident in all these specimens: The braincase is platycephalic or low-vaulted in relation to its length and breadth. There is a notable postorbital constriction. The brow ridges are prominent, vertically thick, not divided over the center of each orbit, and are especially massive at their outer corners. The forehead is low and receding. The occipital ridge is very prominent and includes the most posterior point on the skull (inion=opistocranium). This ridge divides the occipital into two planes, above and below inion, which meet at about right angles to each other instead of forming a continuous curve. There is a sagittal ridge or keeling (not a crest) along the top of the head. There are parasagittal ridges along the temporal lines. In fact, most of the braincase can be seen almost as a series of nearly flat planes between the above mentioned ridges and other angulations. The supramastoid crest is the widest part of the skull. The mastoid processes are small for the size of the skull and their tips turn medially. The region of the foramen magnum is located relatively high (with skull in upright position). The basioccipital is nearly horizontal. And so on.

Broken Hill is less extreme than average in some of these characteristics and more extreme in others. If only the braincase had been found it could almost have been "lost" in a series of other erectus braincases. Perhaps its most outstanding trait is a large endocranial capacity, variously reported as 1280 cc (Coon 1962:621) or 1305 cc (Keith 1925). This is still within the range of accepted erectus because Solo V has 1255 cc (Weidenreich 1951) or 1316 cc (Oppenoorth 1937), and "Sinanthropus" skull V was estimated at 1300 cc by Weidenreich (1943) who tended, if anything, to estimate low. These particular erectus individuals certainly owe much of their large brain sizes to their large bodies.

My own measurements indicate that among modern sapiens males a rather large body size is commonly associated with some 200 to 300 cc greater endocranial capacity than more average-sized individuals. That such a difference based on body size alone should also exist in erectus was argued by Coon (1962:341) and he found Broken Hill's capacity was reasonable for a very large erectus individual. By using the orbits as a measure of body size I have estimated that Broken Hill owes about 250 cc just to his large body (Krantz 1971:109). This whole question of brain size may prove to be of minor significance, however, because the clearly large-brained Neandertals also show most of the erectus cranial traits.

The reasons used by others for classifying Broken Hill as sapiens are rarely made clear. These would seem to involve brain size, dating, human interfertility, and the supposed anatomical continuum from undoubted erectus, to Solo, to Broken Hill, to Neandertal, to modern man. It has become increasingly evident in recent years that Neandertals cannot be ruled out of our ancestry. Since they also have large brains, we then avoid the uncomfortable proximity of a subhuman ancestor by simply upgrading him to our own species. Given this classification (which has been in vogue since about the year 1960) the Broken Hill skull of similar antiquity must also be admitted into sapiens if all of humanity was a single interbreeding species at any one time. The same reasoning could be extended to Solo Man, creating the taxon Homo sapiens soloensis, but here the dating is unclear enough that they can be pushed back into undoubted erectus times with little argument. Thus a dividing line has grown up between Solo and Broken Hill, the former being called erectus and the latter being called sapiens.

Broken Hill skull

The test of this supposed morphological gap between the two temporal species was completed by attaching Broken Hill's face onto the braincase of Solo XI. Just as the Broken Hill braincase was "lost" among erectus braincases, the Solo skull with this face is remarkably similar to the original Broken Hill specimen (see Figs. 5, 6, and 7). The fitting of this face was easy except that the malars of Broken Hill were a little too widely spaced and set too far back for a perfect match. The partial face on a recently discovered Solo-type skull (Sangiran 8) has not been described; it is of large size but evidently somewhat differently designed. These are differences of geographic line, however, and not of evolutionary grade.

Dividing lines between temporal species may be somewhat arbitrary, but to put such a division between Solo and Broken Hill is morphologically the worst possible choice. I have long pitied naive instructors who have tried to justify this dividing line to their students on anatomical grounds. As I have found out, almost none of them are able to pick out the Broken Hill braincase from the Solo series. There are, of course, clear differences such as the contour contrasts as seen in the rear views (Fig. 3). Certainly, anyone who is very familiar with the fossils can recognize it from the braincase alone, but they can also identify any individual Neandertal as well. The main question is not whether the Broken Hill skull can be recognized as an individual, but rather whether it is assigned to the correct type (erectus or sapiens) according to the criteria given for each.

The search for a species dividing line based on morphology might now be approached from the other direction, that of greater antiquity. From Middle Pleistocene erectus it is but a small step to Upper Pleistocene Solo man of larger average size and with a lower placed occipital ridge. Broken Hill is the next step as it is a geographical variation of the Solo type. With the exception of just a few traits, mainly relating to brain size, the Neandertals also show the erectus design. The most obvious dividing line then follows after the large-faced, platycephalic skulls and before the modern type of man. The essential erectus to sapiens transition may then be a temporal as well as a morphological one, and it is centered on about 40,000 years ago. In many parts of the inhabited world the same set of morphological changes occurred at this time.

From Neandertal to Cro-Magnon, from Tabun to Skhul, from Broken Hill to Florisbad, from Chou-kou-tien to Upper Cave, and from Solo to Wadjak, in all these cases the second member of each pair showed the following changes, where applicable: Endocranial capacities increase to at least 1500 cc. Braincases become relatively taller and lose the ridge and plane design. Cranial bases are reduced so the widest part of the brain case is on the parietals, and inion is now tucked under the upper part of the occipital. Facial bones reduce and pull back leaving the chin projecting, and the brow ridges are largely incorporated into the now vertical forehead. Foramen magnum margins are lower and tip the opening forward, and the basioccipital slope greatly increases. Mastoid processes become relatively larger and descend more vertically.

In terms of the above traits, the Broken Hill skull is clearly not of the sapiens design, but instead it shows the erectus characteristics enumerated earlier. If morphology is to mean anything this specimen should be reclassified. Whether it proves to be 40,000 years old (Oakley 1964) or over 100,000 years old (Klein 1973) is of less importance as both dates are on the erectus side of the line as used here.

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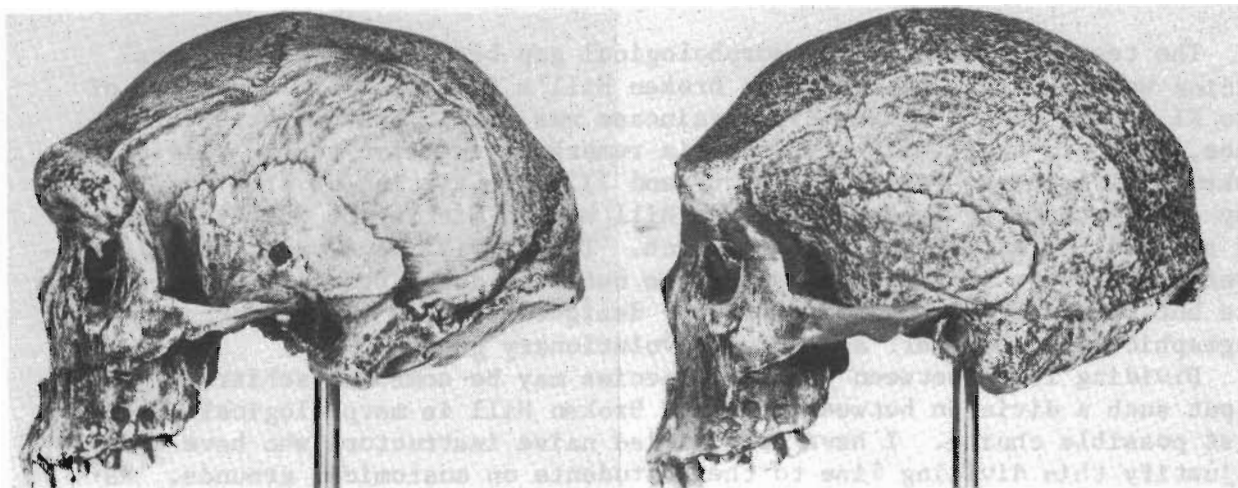


Fig. 5. Cast of Broken Hill skull (left) compared with Solo XI (right) to which Broken Hill face has been attached with clay, side view.

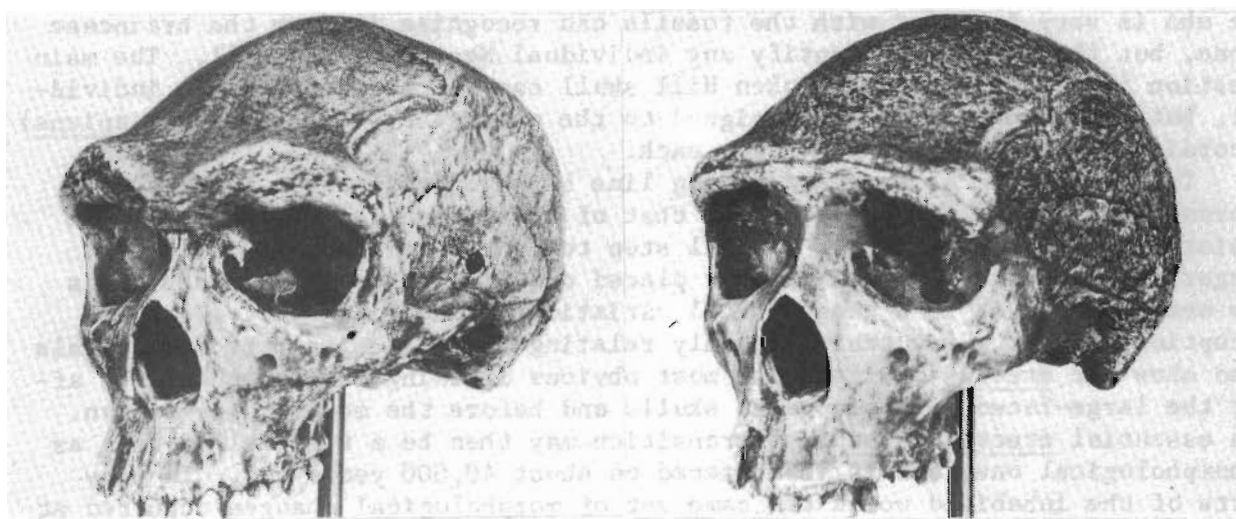


Fig. 6. Broken Hill and Solo XI as in Fig. 5., three-quarter view.

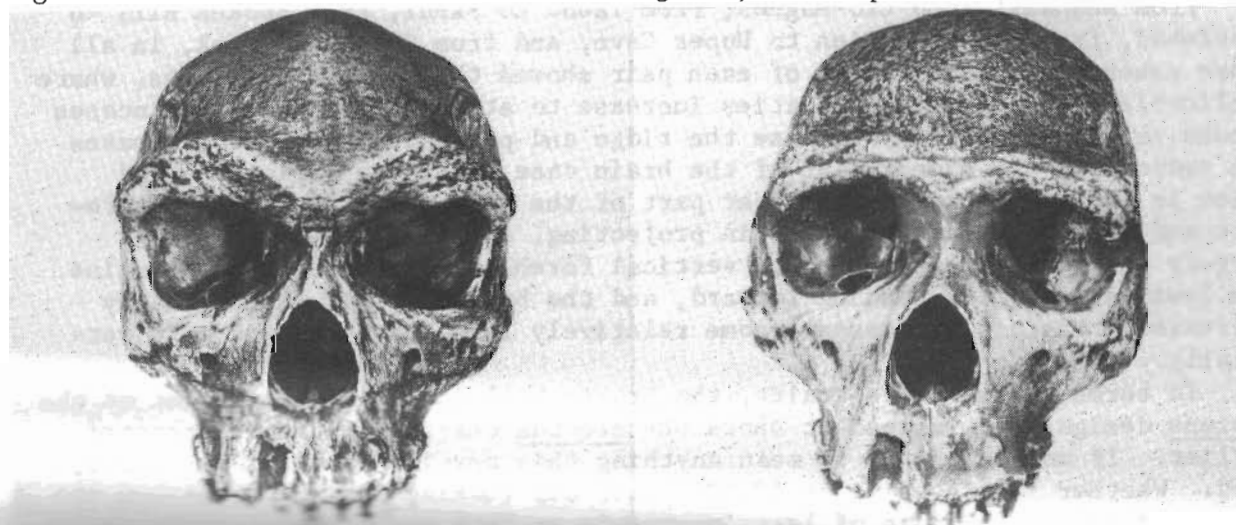


Fig. 7. Broken Hill and Solo XI as in Fig. 5., front view.

Broken Hill skull

The basic morphological changes from erectus to sapiens evidently occurred in a rather short time, possibly as little as 10,000 years. In contrast, the last 30,000 years or more of sapiens involved virtually no changes. Likewise, the long history of erectus prior to the transition is almost an evolutionary plateau for a million years or more. During erectus times there was some endocranial expansion and associated changes, especially in the northern parts of the Old World. There are other differences in details, but these are as often between geographical lines as they are from one evolutionary grade to another. The amount of change that occurred in a million years of erectus seems to have been less than what occurred in the short time between Broken Hill and the appearance of modern types.

One could describe two or three temporal subspecies (grades) within erectus as well as geographical subspecies (lines). Although both would be given the same taxonomic status they cross-cut one another and are based largely on different traits. In contrast, the very abrupt and pronounced change from erectus to sapiens could be elevated to the level of a species change of grade, but one without any corresponding, cross-cutting species difference in line.

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