THE SALDANHA SKULL FROM HOPEFIELD, SOUTH AFRICA [1]

RONALD SINGER [2]
Anatomy Department, University of Cape Town

TEN FIGURES

INTRODUCTION

The site. During the past 25 years a number of fossilized animal skeletal remains had been submitted by farmers and District Surgeons of the south-western coastal area of the Cape Province to the Cape Town Museum and the above department, but no scientist had subsequently investigated those sites. In May, 1951, I was instrumental in locating an extensive fossil site on the farm "Elandsfontein" about 10 miles from Hopefield, which is a small village situated 90 miles north of Cape Town and about 15 miles east of Saldanha Bay [3] (figure 1). Here, in the middle of the sandy veld, situated 300 feet above sea level, is a veritable Solutrean-like accumulation of fossilized material lying on the floors of wind-scoured kloofs or depressions between stationary vegetated or moving sand-dunes. Ridges of ferricrete cut diagonally across the length of the site, and, in places, the dunes are capped by massive calcrete mounds or flat boulders of partly silicified surface lime-

[1] A modified form of this paper was read on behalf of the author by Dr. W. L. Straus, Jr., at the 23rd Annual Meeting of the American Association of Physical Anthropologists, Yellow Springs, Ohio, on March 27, 1954.

[2] I wish to acknowledge the kind permission of Professor M. R. Drennan, head of the Anatomy Department and Director of the Hopefield Research Committee, to present this paper. Mr. Goosen, Department of Surgical Research, kindly photographed the skull for me.

[3] Saldanha Bay was named after Antonio de Saldanha, captain in Albuquerque's fleet which visited South Africa in 1503. "Saldanha" is a Portuguese name, correctly pronounced "Saldanya," but common local usage interprets it as "Saldarn-a."

stone. Softer, cellular calcretes are found in certain places at the lowest parts of the depressions. The tortuous courses of the ferricrete ridges indicate that they are the indurated lower flanks of old sand-dunes now stripped bare of the sand walls (Mabbutt, personal communication). This ferruginisation is

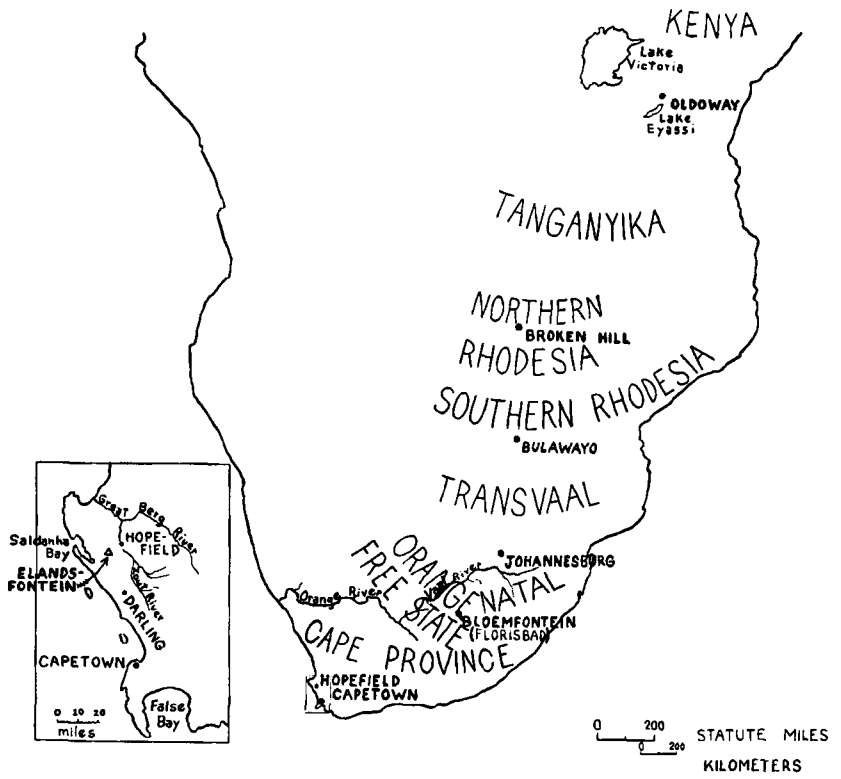

Fig. 1 Map of South Africa, showing sites described.

usually associated with moist ground conditions, a fairly high and stable water-table and an abundance of vegetable acids in the soil. It seems that this fossil site may at one time have been a large vlei or lagoon continuous or contiguous with one of the mouths of the large rivers that open into the sea 12 miles away. The site at "Elandsfontein" which extends over an area of approximately two square miles is not an isolated one, as I

have already explored two similar fossil-bearing locations, one on each side of this farm, lying in series with it parallel to the coastline. It may yet be shown that all these sites are segments of one massive geographical fossil area.

On numerous subsequent visits, various members of the University of Cape Town staff, Doctors M. R. Drennan, J. A. Keen (later replaced by E. N. Keen), Messrs. J. A. Mabbutt and K. Jolly, and I have collected highly fossilized bones and stone implements from the surface of the site.

Stone implements. The rich collection of stone implements indicate the presence of Man on the site from the period of a late stage of the Chelles-Acheul (Stellenbosch V) Culture until the period when the Bush races were developing their culture. This occupation was certainly not a continuous one. The most striking elements of the archaeological collection are the tool types of the Chelles-Acheul, namely, hand-axes (large and pygmy), cleavers, unconventional cutting tools, pebble choppers and bola-like stones. In addition, there are examples of the Middle Stone Age Still Bay Culture, but it is not mixed with implements of the Howieson's Poort Development, which is a more developed stage. Furthermore, some unique specimens of worked bone tools have been recovered by us *(Illustrated London News,* September 26, 1953, page 480, fig. 1). Drennan ('53a, b) stated that the Saldanha skull (described below) belonged to the "palaeoanthropic Man who practised the last stages of the hand-axe culture in South Africa." There is, however, no stratigraphical or direct proof of this yet.

Fossil fauna. The large amount of palaeontological material collected thus far is in the early stages of identification and general description by Dr. E. N. Keen and myself. Already established is a good series of suid teeth which is diagnosed as being almost identical to *Mesochoerus olduvaiensis* Leakey (except in size) and we have a detailed description awaiting publication. There is an impressive collection of the teeth of various species of horse, among which are many specimens of the extinct *Equus capensis* and allied types. Our classification of the equid dentitions would indicate a wider variability

within a species than has hitherto been accepted in this country, and will probably allow the merging of several described species. The 8 giraffid teeth thus far discovered appear to be indistinguishable from the extinct *Sivatherium* (from the Siwalik Hills, India) and also resemble the extinct South African *Griquatherium*. There are numerous teeth and long bones of *Palaeoloxodon*, both the black and white rhinoceros, and *Hippopotamus amphibius*. A large variety of *Bovidae*, extinct and existing, have also been identified by us (to be published in the Indian Journal of Palaeontology). Especially important are complete dentitions, skulls, horn cores and long bones of a long-horned buffalo, *Bubalus* or *Homoioceras*, definitely different from those few specimens previously described from Southern Africa. Generally speaking, in this fossil collection of existing and extinct mammals, the proportions indicate an Upper Pleistocene period, probably from the later part of the Middle Pleistocene onwards, in terms of current African chronology (which is based mainly on the beds at Oldoway in Tanganyika and the Vaal River beds in South Africa). True stratification has not yet been found at Elandsfontein, and it is debatable whether the same mode of dating is to be applied at a site 2000 miles away. Consequently, it has not been decided whether the profusion of extinct species at this one site may suggest an early part of the Upper Pleistocene. Such factors as the tropical climate at Oldoway and the temperate coastal climate at Cape Town will have to be taken into account in making these decisions. Fluorine tests, carried out through the courtesy of Dr. Oakley of the British Museum on a wide range of specimens, do not support the idea that specimens of a widely differing age have been mingled in the collection. Dr. Leakey recently informed us that none of the *Mesochoerus* specimens in East Africa have been recovered from Upper Pleistocene deposits, but that his specimens were found in Middle Pleistocene layers, namely, Beds I and II at Oldoway. Thus if one tends to be conservative about the dating at Elandsfontein, the presence of *Mesochoerus olduvaiensis* represents the survival of an isolated species which had become

extinct further north. However, our *Mesochoerus* teeth are slightly longer, narrower and higher-crowned than the mean of the few recorded specimens of *M. olduvaiensis* Leakey. Thus if our specimens prove to be definitely beyond the range of variation of *M. olduvaiensis* Leakey, then these differences in dental development can best be interpreted as later stages and suggestive of our specimens being offshoots of *M. olduvaiensis*. Fluorine tests also revealed that the *Mesochoerus* and *Paleoloxodon* lived contemporaneously with Saldanha Man at Elandsfontein.

THE SALDANHA SKULL

On the first field trip after my return from the U.S.A. on January 8, 1953, Keith Jolly, a young archaeologist, then employed as a field research assistant at Hopefield, and I discovered and identified 11 fragments of human fossilized cranial bones on the main site. They were lying loose on the sandy surface over an area of about 16 square feet, some with the endocranial surface uppermost and some with the exocranial surface uppermost. One fragment was later discarded as it was not human. The fragment 1 A (fig. 5) which drew our attention to the others was part of a right frontal bone with a massive supraorbital torus (extending almost to the median line) from which a marked temporal ridge extended back to bifurcate almost immediately into two less distinct temporal lines. Posteriorly this fragment tapered to a narrow base of about 1 inch, the border of which was the edge of the coronal suture in the region of the pars pterica. On the endocranial aspect part of the orbital roof was present while the orbital plate had an irregular broken edge, and a portion of the frontal sinus extended into the plate. Another key fragment consisted of most of the occipital squama in the lambdoid suture region, thus providing the posterior occipital curve and opisthocranion (coincident with inion here). Fortunately the remaining fragments (numbered 1.B. through 1.J. on the endocranial part of the reconstruction) had distinct landmarks, and, by making full use of sutural markings, most of the vault in the region of

the major sutures could be juxtaposed, and it was possible to reconstruct accurately the maximal height and length of the skull.

On two subsequent visits in January and February, Jolly and I retrieved additional fragments within a radius of 10 yards of the initial site of the discovery which, when added to the reconstruction completed most of the frontal bone. These fragments were classified 2.A., 3.A. (these two not being found

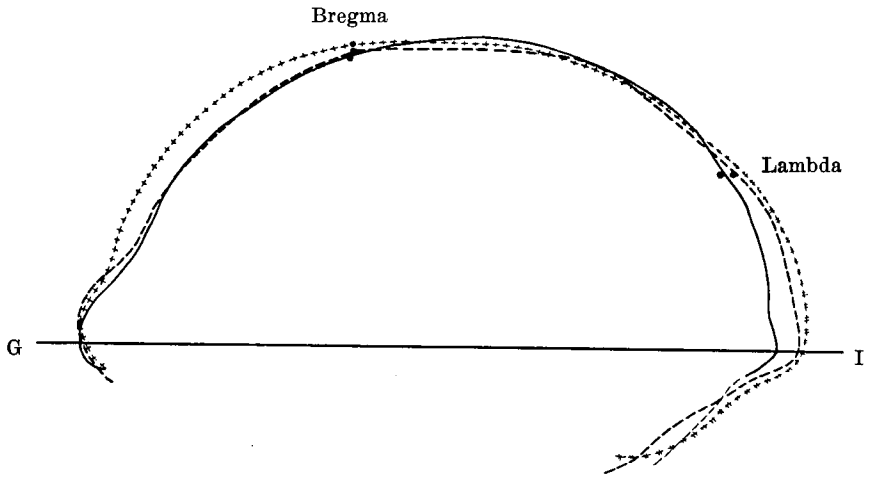

Fig. 2 Sagittal dioptographs, orientated in glabella-inion plane, using glabella (G) as fixed point, indicate relationships between Saldanha Skull ——; Rhodesian Skull — — —; and Florisbad Skull + + +. (# # # indicates plaster reconstruction in Florisbad Skull; — — — indicates plaster reconstruction in Saldanha Skull.)

at the original site — vide infra) and 16 fragments were marked "3." Five of the latter fragments have not yet been included in the reconstruction (fig. 10). On a field trip in July, Jolly recovered a left frontal supraorbital torus (marked "4" in the reconstruction) which appeared to fit the right side and complete the curve of the frontal bone above the orbits. However, the left is not quite symmetrical with the right, as the ophryonic groove bulges on the left, but this may be a normal variation. On our third visit I recovered two fragments about 500 yards away from the original place of discovery. The one

TABLE 1

Comparison of some significant figures: The data for the Rhodesian, Sinanthropus and Homo Soloensis material are from Weidenreich, '43 (except where indicated)

MEASUREMENTS	SALDANHA	RHODESIAN	FLORISBAD	SINANTHROPUS	HOMO SOLOENSIS
Maximum length (g–op)	200	208 (R.S.)	199(?)	188–199 (193.6)	193–219.5 (209)
Glabella-lambda line (g–l)	192	196	..	169–183 (176.8)	174–198 (182.8)
Bregma height (above g–op line)	84	83 (85-R.S.)	87	74–81 (77.3)	68–84.5 (77.7)
Maximum breadth	?144	144.5	147	137–143 (141)	138–156 (146)
Minimum frontal breadth	102	97.5	120	81.5–91 (87.2)	..
Calvarial height	90	85	88.5	67–82 (74.6)	77.5–84 (74.6)
Frontal profile	61°	60°	69°	56°–63° (60.5°)	54°–66° (62°)
Inclination of frontal squama to g–op line	47°	45°	49°	38°–45° (42.5°)	41°–54° (45.8°)
Occipital inclination II.	?75°	68°	..	57°–68° (62.7°)	59°–73° (62.8°)
Length-breadth index	?72	69.4	75	71.4–72.6 (72.2)	66.2–76.7 (72)
Calvarial ht./ g–op line index	45	40.5	45.2	34.8–41.2 (38.5)	36.8–42.6 (39.5)
Bregma ht./ g–op line index	42	40.5	44.3	34.4–40.2 (37.6)	34.9–41.7 (37.8)

fragment (marked "2.A.") is part of the posterior end of the right parietal bone which fits accurately into the reconstruction of the lambdoid suture; the other (marked "3.A.") is the upper end of the ascending ramus of a mandible (fig. 10). Before the numerous fragments were restored I, assisted by Dr. E. N. Keen, made detailed measurements of the size and thickness, and observations on the appearance of each separate fragment. The fragments were classified and marked with India ink on their endocranial aspect.

Thus the Saldanha skull (so styled because Hopefield lies within the greater Saldanha Bay area), reconstructed from 27 fragments by Professor M. R. Drennan, assisted by Dr. E. N. Keen and myself, at present consists of a fairly complete "cap" or vault. There is a striking resemblance between it and the Rhodesian (Broken Hill) skull in general outline and measurements (fig. 2 and table 1). On the other hand, there are also features of similarity between it and the Sinanthropus-Pithecanthropus-Homo soloensis group, especially the latter (fig. 3). It is not necessary in this short paper to repeat what has been said before, because Weidenreich's discussion in his masterly monograph on the skull of Sinanthropus ('43), where he dealt with the relationships between the Far East fossil group and Rhodesian man holds good, by and large, for the incomplete Saldanha skull. The latter is characterized by a moderately low braincase (but higher than any skull in the Far East group) with its greatest breadth apparently near its base (fig. 9), and a relatively flat forehead separated from massive supraorbital ridges by a distinct ophryonic groove (figs. 6 and 7). The occipital crest is prominent and has a downward tilt. The supreme nuchal line is also obvious (fig. 9). The sulcus supratoralis is fairly well marked. However, the torus occipitalis does not seem to have the typically undermined edge which is seen above the nuchal plane of the Ngandong skulls. The fracture just below the protuberant torus prevents any conclusive opinion as regards the position of the foramen magnum or as regards the appearance of the nuchal plane, but there should be little reason to believe that it differs markedly

from that in the Rhodesian skull: a different view is expressed by Drennan ('53a,b) who stated that he considered that the nuchal plane would have been directed posteriorly and that "indications from the attachments of the muscles of the nape of Saldanha man's neck point to his having had the crouching posture of Neanderthal Man, whereas the Rhodesian skull shows that he held his head erect like sapient man." Weidenreich ('43) stated that in the Rhodesian skull the occipital foramen has a distinct central position which is a specific hominid

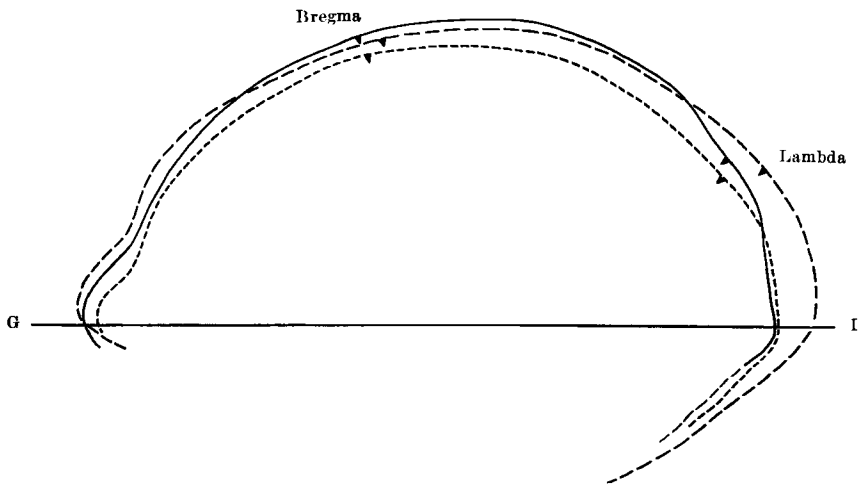

Fig. 3 Sagittal dioptographs orientated in glabella-inion plane, indicating relationships between Saldanha Skull ——; La Chapelle-aux-Saints Skull — —; and Sinanthropus XII (Skull I, Locus D) — — — (after Weidenreich).

character. Furthermore, Sergi ('30, '32) and others indicated that Neanderthalians did not crouch or walk with a "simian stoop," and Schultz ('42) proved that, in the balance of their heads, the Neanderthalians also behave as does modern man and do not approach conditions of the anthropoids. Mainly on the above supposition, Drennan bases his view that "Saldanha man is anatomically a more primitive variety of the Rhodesian race."

The general thickness of the Saldanha skull is interesting, though not nearly as impressive as that of the Sinanthropus

adolescent skull (discovered on December 2, 1929). The average thickness of the Saldanha frontal bone is 10 mm centrally and 6 mm laterally; the parietal bone averages 10.5 mm parasagitally and 7 mm near the temporo-parietal suture; the occipital squama is very thick, averaging 8 mm in each superior cerebellar fossa and 12 mm opposite the internal crest between the fossae. The supramastoid bulge of bone has a maximal thickness of 13 mm.

The maximal thickness of the supraorbital torus is 20 mm medially and 16 mm laterally, as compared with 21 mm and 15 mm respectively in the Florisbad skull; 19.6 mm and 11.2 mm respectively in Sinanthropus II (Weidenreich, '43); and 20 mm and 20 mm respectively in the Rhodesian skull. In the latter there is a bulge over the center of the orbit which gives a thickness of 23 mm. The shape and curvature of the tori differ in the Saldanha and Rhodesian skulls. In the former, the anterior surface curves evenly outward (with the convexity upward) in the same vertical plane, while in the Rhodesian the convexity is less accentuated and the anterior surface has a tortuous appearance, so that medially it is in a vertical plane while laterally it is in a semi-horizontal plane with the anterior surface looking upwards and outwards. The maximum breadth of the supraorbital ridges is 122 mm in the Saldanha (though a small piece is broken off), 136 mm in the Florisbad, and 139 mm in the Rhodesian skull. The left frontal sinus is compartmented and occupies the whole of the supraorbital torus, while the right sinus is very small, loculated and rounded (as seen on X-ray photographs).

The inclination of the frontal bone differs markedly between the Saldanha and Florisbad skulls, but the calvarial height is approximated in them, though the highest point is slightly nearer the bregma in the Florisbad skull. The highest point in the Rhodesian skull is just behind bregma, well ahead of the same point in the other two skulls. The inclination in the Rhodesian and Saldanha frontal bones is almost identical.

A modified frontal chord, using glabella instead of nasion, reads 116 mm for the Saldanha skull, while it is 121 mm in the

Rhodesian; and the median frontal ridge in the latter is more angular and prominent. The parietal chord is 109.5 mm in the former and 113 mm in the latter, and the occipital chord is 54.5 mm in the former and 59.5 mm in the latter. The figures for the occipital chord are particularly interesting because, despite the fact that this is greater in the Rhodesian, the latter also subtends a larger angle at the lambda between the right and left lambdoid suture lines, namely, 160° compared with 130° in the Saldanha. The lengths of the lambdoid sutures in Saldanha, though incomplete, are estimated to approximate those in the Rhodesian, namely 91 mm on the left and 90 mm on the right. Thus the "surface area" of the Rhodesian occipital bone, above the torus occipitalis, is the greater of the two. In norma lateralis, the "bun-like" bulge in this region below lambda is far more marked in the Rhodesian skull (fig. 2), but this does not account for the apparent discrepancy in the surface areas. Moreover, this bulge is a variable feature and noticeable in many modern skulls, and its significance is as yet doubtful. Drennan considers this difference in occipital bulging a feature in favor of "the Saldanha skull diverging morphologically from the Rhodesian type." Furthermore, in *norma occipitalis*, there is a marked difference in appearance between the two skulls. The Saldanha appears to have a degree of parietal bossing which tends to flatten the horizontal plane of the skull in a line taken across vertex (fig. 9), while in the Rhodesian there is a marked sloping or falling away of this plane towards the mastoids. Despite these features, the maximum breadth in the two skulls appears to be in a line across the supramastoid regions and is approximately equal. A true torus angularis is not visible.

In the Saldanha skull the anterior ends of the temporal lines, arising as a bifurcation of the temporal crest or ridge behind the supraorbital tori, are prominent. The left superior temporal line kinks upwards at stephanion producing a high temporal arc which soon fades out. On the right side, the kinking is not obvious. The bregma-stephanion chord is 47.5 mm on each side in the Saldanha skull, while in the Rhodesian the

reading is 58 mm on each side. However, though this figure is conventionally recorded, I have found so much variation in it in series of hundreds of skulls of "known racial" groups that these slightly variable figures here cannot be taken to be of much significance other than to record the position of the two points.

I feel that it is unnecessary at this stage to compare the Saldanha skull with the various Neanderthalians recorded, as only the protuberant supraorbital ridges definitely indicate the Neanderthal "streak" in this specimen. It is considered more logical at this stage to compare the "local" African fossil types, namely Rhodesian and Florisbad. The latter has been dealt with in greater detail in another paper (to appear in the Indian Journal of Palaeontology). The Eyasi skull (misnamed *Africanthropus njarasensis* by Weinert in 1939) has not been compared in this paper as a cast is not available here. Leakey ('47) assigned it to the East African Upper Pleistocene (Gamblian pluvial) period.

A detailed description of the endocranial cast of the Saldanha skull is yet to be completed.

CONCLUSIONS

The importance of the discovery of this incomplete skull may be stated as:

1. It confirms that the Rhodesian skull is no isolated, abnormal or pathological type of primitive man.

2. The Saldanha skull is akin to a similar region of the Rhodesian skull; such differences as have been mentioned in this paper may be regarded to fall within the limits of individual variation. It thus establishes an African Neanderthalian quite different in many respects from the European variety and resembling to some extent the larger specimens of the Asiatic Neanderthalian, Homo soloensis (as far as can be determined from the incomplete material available).

3. It provides a probable South African hand-axe man who was perfecting a transitional stage between the coastal South African Earlier and Middle Stone Age Cultures. This appears

to have taken place during an Upper Pleistocene period, probably an early part, if one accepts the relationship between the fluorine dating of the Saldanha skull and the extinct fossil fauna.

It appears that Weidenreich's original classification (1928 and 1943) of the Neanderthal group into *Homo primigenius europaeus, Homo primigenius asiaticus* and *Homo primigenius africanus* is beginning to bear more weight. In this respect, I would like to quote two appropriate sentences of Franz Weidenreich's ('40) with which I readily concur:

". . . for it proves that the so-called Neanderthal Man of Europe, notwithstanding his uniformity when compared with the Rhodesian Man of South Africa [4] or the *Homo soloensis* of Java, has produced certain regional variations which are equivalent to racial differences of today," and in similar vein, "while Man was passing through different phases, each of which was characterized by certain features common to all individuals of the same stage, there existed, nevertheless, within such community different types deviating from each other with regard to secondary features. These secondary divergencies have to be rated as regional differentiations and, therefore, as correspondent to the racial dissimilarities of present Man."

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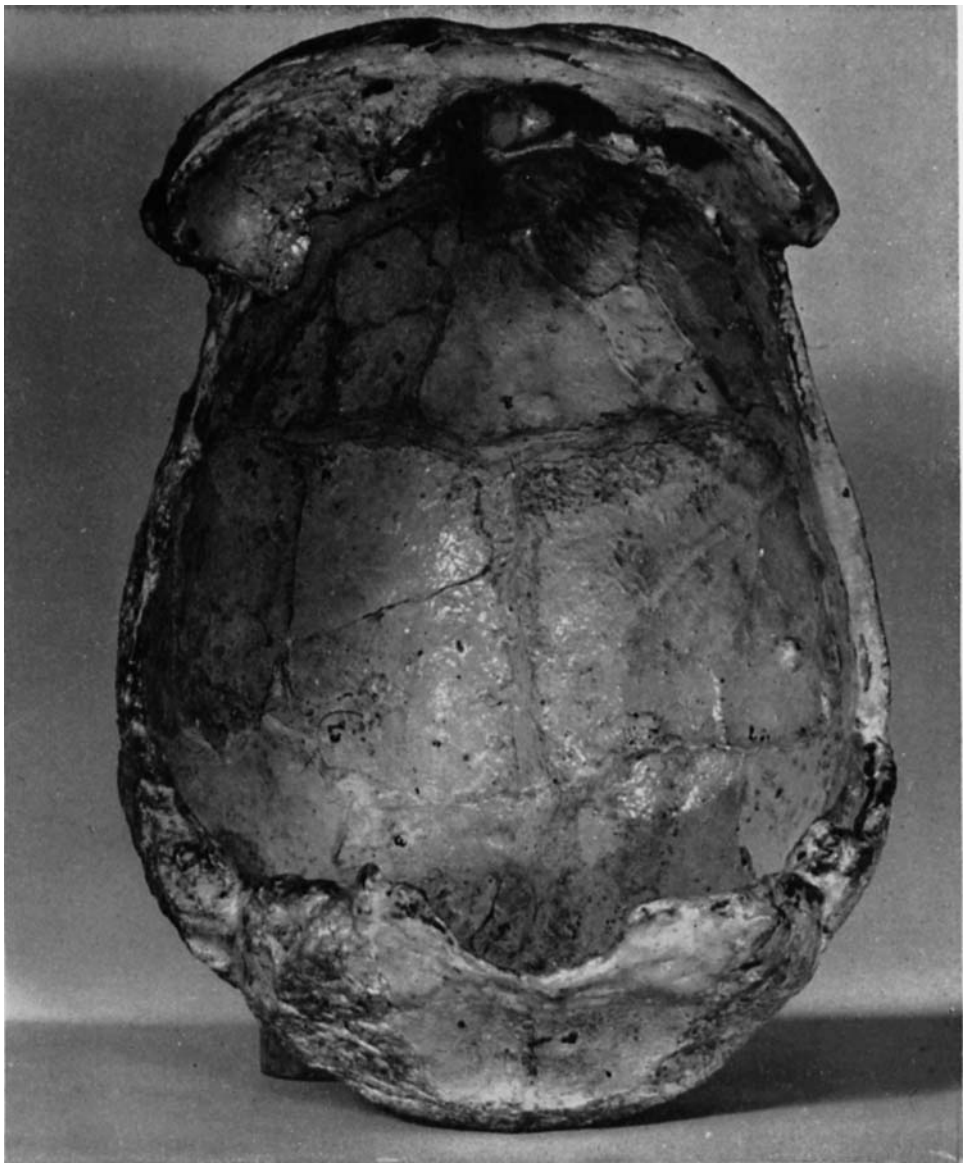
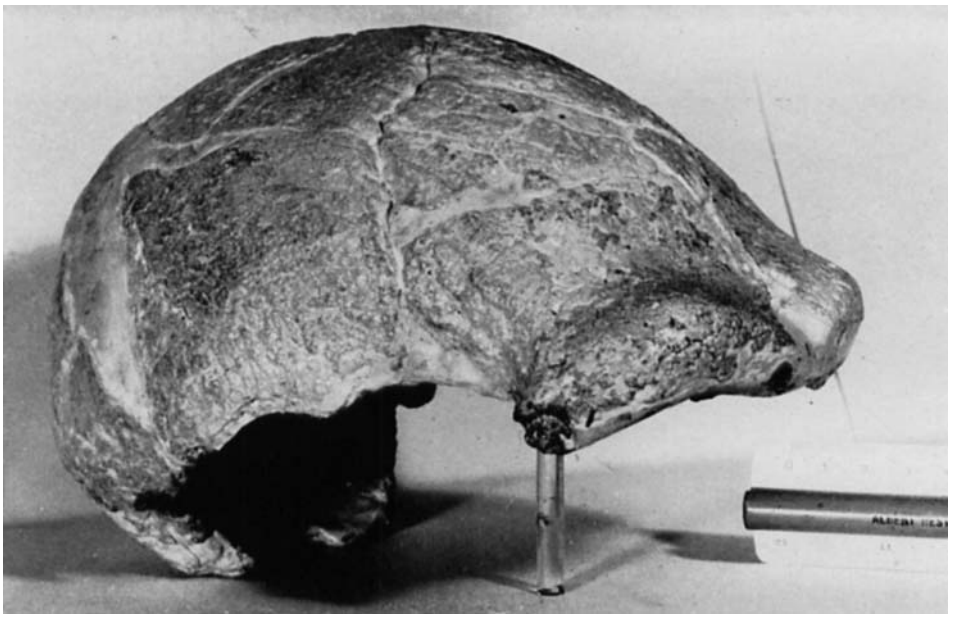
[4] Broken Hill is in Northern Rhodesia, *not* in South Africa.

4 Norma verticalis. Note parietal bossing, and great anterior projection of supraorbital tori with a distinct central "sulcus."



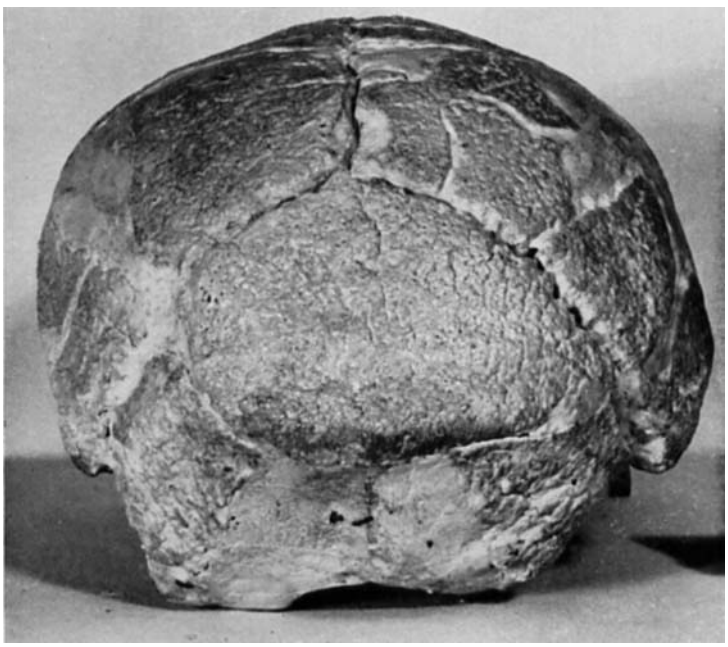
5 Endocranial aspect. Note orbital plate with erosion into right frontal sinus.



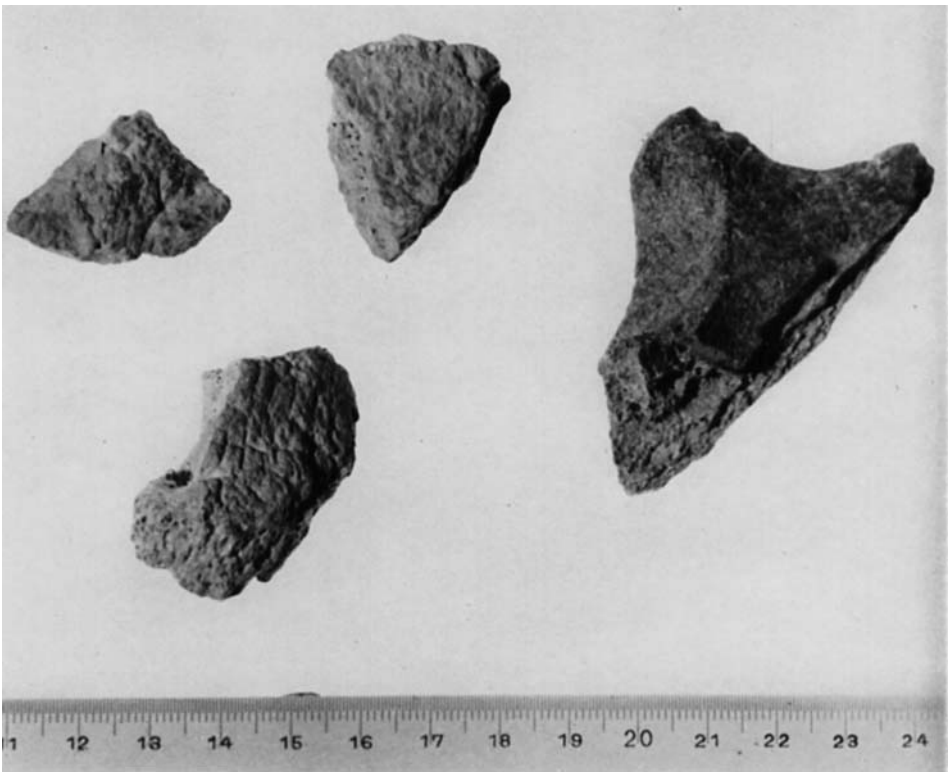
6 Right oblique view. This view emphasizes the "vertical plane" of the anterior surface of the supraorbital torus, and also the ophryonic groove.

Norma lateralis, right.

8 Norma facialis. There is a slight flattening out of the left ophryonic groove.



9 Norma occipitalis. Central area of nuchal plane is plaster reconstruction.



10 Cranial fragments not incorporated in reconstruction with a part of ramus of mandible on the right (lingual aspect).