MAN AND MAMMALS IN SOUTH AFRICA

(With special reference to Saldanha Man)

RONALD SINGER

Anatomy Department, University of Cape Town

ABSTRACT—At Florisbad, near Bloemfontein, and at Hopefield, near Cape Town, are fossil-bearing sites which are unique in South Africa in that they have produced primitive Man, his stone implements and his contemporaneous fauna. An overall picture is given of the two sites, and the general types and species of Pleistocene mammals found there are outlined. There is a superficial similarity in these. The problem of the evolutionary position of the incomplete Florisbad Skull is briefly discussed, and the description of the main features of the Saldanha Skull is given.

Many of the extinct mammal forms of the two sites, and especially those which may be referred to a Mid-Pleistocene age, have similar countertypes in Asia, particularly those fossils recovered from the Siwalik Hills of India.

INTRODUCTION

At present there are only two sites in South Africa where the fossilized remains of Pleistocene Man have been found associated with his implements and contemporaneous animals. In both instances the majority of animals identified are mainly extinct mammal forms. The two sites are about 800 miles from each other, the one being inland at Florisbad in the Orange Free State, while the other is situated on the Cape Province coastline near Hopefield, which is about 90 miles north of Cape Town.

FLORISBAD

In 1932 part of a primitive human fossil cranium was discovered by Professor T. F. Dreyer during the course of excavations at Florisbad, a lithium spring of constant temperature situated about 25 miles north of Bloemfontein. The circumstances of the discovery of the Florisbad Skull (beneath 20 feet of alternate sand and peat layers—Pl. 17) were described by Dreyer (1935) who proposed the name *Homo* (*Africanthropous*) *helmei* for it. The reconstructed maximal length is 199 mm., but when I studied the original recently[1], Professor Dreyer agreed with my suggestion that this length should be 3-5 mm. less, this estimation being based on my unpublished data on the average lengths and ratios of the various parts of the cranial vault sutures of several hundred skulls, both modern and fossilized. This and other new observations will cause the nuchal plane to be altered and the foramen magnum to be shifted. The relevant measurements of the skull are contained in Table I.

The incompleteness of the skull (Pl. 20) and its unusual combination of morphological features have made its ultimate diagnosis difficult. The squat rectangular orbits separated by a broad flat nasal bridge, the low facial part of the maxilla, the fairly low braincase, and the remarkably wide and the backward-sloping frontal bones continuous with rounded projecting supraorbital ridges with the obvious lack of a 'true' ophryonic groove are the essential general features. The width of the nasal bridge may be more apparent than real as it appears to have been "squashed", probably when the skull was originally fragmented. A detailed re-appraisal of the Florisbad skull is being prepared, and it will suffice to state here, in this brief general survey, that although arguments have been made in favour of the Florisbad Man being "an African variant of the Neanderthal race" (Drennan, 1937), it is more plausible to attempt to equate its status directly in terms of the known African racial types. Dreyer (1947) rather favourably compared it with the lowest skull

[1] For this purpose, travelling expenses were partly met by a grant from the Wenner-Gren Foundation for Anthropological Research, New York.

TABLE I

Measurements (in mm.) (after Weidenreich, 1943).	Saldanha Skull	Rhodesian Skull	Florisbad Skull	Neanderthalians (incl. Rhodesian)	*Sinanthropus*	*Homo Soloensis*	Modern Man
Maximum length (g-op).	200	208 (cast: R.S.)	?199	183–210 (198.4)	188–199 (193.6)	193–219.5 (209)	158–203 (185.6)
Glabella-lambda line.	192	196	—	174–196 (184.7)	169–183 (176.8)	174–198 (182.8)	154–194 (181.3)
Bregma position projected to g-op line (bregma ht.).	84	83 (cast: 85)	87	63–83 (73.2)	74–81 (77.3)	68–84.5 (77.7)	57–84 (71.6)
Maximum breadth.	?144	144.5	147	138–156 (147.9)	137–143 (141)	138–156 (146)	124–157 (133.6)
Minimum frontal breadth.	102	97.5	120	97.5–113 (102.9)	81.5–91 (87.2)	—	—
Distance between temporal lines.	82	83	142(R.S.)	83–112 (?)	86–104 (93.5)	106–119 (112.8)	77–135 (98.6)
Calvarial height.	90	85	88.5	70–100 (82.5)	67–82 (74.6)	77.5–84 (74.6)	80–98 (87.4)
Frontal profile.	61°	60°	69°	50°–73.5° (63°)	56°–63° (60.5°)	54°–66° (62°)	72°–96° (83.2°)
Inclination of frontal squama to g-op line.	47°	45°	49°	38°–51° (45°)	38°–45° (42.5°)	41°–54° (45.8°)	42°–57° (49.2°)
Occipital inclination II.	?75°	68°	—	59°–74° (67°)	57°–68° (62.7°)	59°–73° (62.8°)	67°–80° (75.9°)
Length-breadth index.	?72	69.4 (69.9 : R.S.)	75	68.2–76.3 (73.3)	71.4–72.6 (72.2)	66.2–76.7 (72)	65.2–89.3 (72.8)
Calvarial height/g-op line index.	45	40.5	45.2	33–52 (40.9)	34.8–41.2 (38.5)	36.8–42.6 (39.5)	41.4–57.0 (47.5)
Bregma height/g-op line index.	42	40.5	44.3	33.9–41.6 (36.7)	34.4–40.2 (37.6)	34.9–41.7 (37.8)	41.6–53.7 (45.2)

Table 1:—Some significant measurements of the Saldanha Skull compared with other fossil types and modern man. The latter data is taken from Weidenreich, 1943, except where indicated. Minimal and maximal figures are given for the European and Asiatic material, while the mean is bracketed ( ). The Saldanha and Florisbad measurements are my own.

(M. R. 1) found in the Matjes River excavations (in the Cape Province). Found at about a 30-feet depth below the cave floor, the latter appears to have some Cromagnon as well as Bushman affinities, and thus he claims that the Florisbad Skull is the progenitor of the Bushman series. This theory is not totally acceptable, especially as the coronal (frontal) view of M. R. 1 indicates a typical Hottentot-type vault. Just how the Florisbad Man, as an "African Neanderthalian", (in which case he must somehow be related to the Rhodesian Man, and now to the Saldanha Man as well) and Florisbad Man, as a pre-Bushman, will eventually be correlated is difficult to state; much depends on finding further fragments of this or another similar complete skull. One's opinions must be conservative unless one has a complete skull and mandible. Galloway (1937) linked this extinct African type with a living Australian type, and concluded that Florisbad Man was a link between the proto-Australian Wadjak skull and the (so-called) Boskop type of skull. His conclusions therefore basically agreed with Dreyer's as the Boskop shows a relationship to both Bush and Bantu types, though it is an ancestral form of doubtful status. It is quite likely that the Florisbad variety of Man in Africa was living contemporaneously with the European Neanderthalians. It is generally agreed that the Florisbad Man lived during the Mid-pleistocene or early Upper Pleistocene period. Radioactive carbon dating methods indicate that the Skull is older than 41,000 years (Hoffman, 1935a), this being the minimal age attributed to the peat layer from which it was recovered. (Pl. 17).

The Florisbad site contains early Levalloisian implements. Dreyer (1953) sees in the Florisbad implements the development of one of the constituents of the later Faure-smith Culture.

A remarkable number of well-preserved fossil bones of various animals have been unearthed during three major excavations. The specimens include :—

1. *Equus lyeli* (Dreyer, 1941) : Although Wells and Cooke (1942) referred these teeth to *E. burchelli*, the specimens are now recognized as belonging to a specific species, Nevertheless, most of the specimens from the type and neighbouring areas are close to the lower limit of the range of variation in size of the living species of *E. burchelli.*

2. *Equus helmei* Dreyer: These massive teeth appear to be within the range of variation (upper limits) of *E. capensis* Broom, which has been regarded as belonging to the Middle Pleistocene and coincides approximately with the existence of the late Stellenbosch industry. The latter point is borne out by the Hopefield material too.

3. *Hippopotamus* sp. : A number of skeletal fragments and teeth were described by Dreyer (1931). Much of the material which has subsequently been excavated belong to *H. amphibius*, but recently *pygmy Hippopotamus* has also been recognized.

4. *Phacocoerus helmei* Dreyer : This new species closely resembles the living *P. africanus.*

5. *Peloroceras helmei* Lyle : The big-horned Hartebees. A full account was recently published by Hoffman (1953b).

6. *Cobus venteri* Broom: Fragments of the lower jaws with molars and premolars found.

7. *Connochaetes antiquus* Broom : A number of upper and lower teeth of the Wildebees differing from the living species.

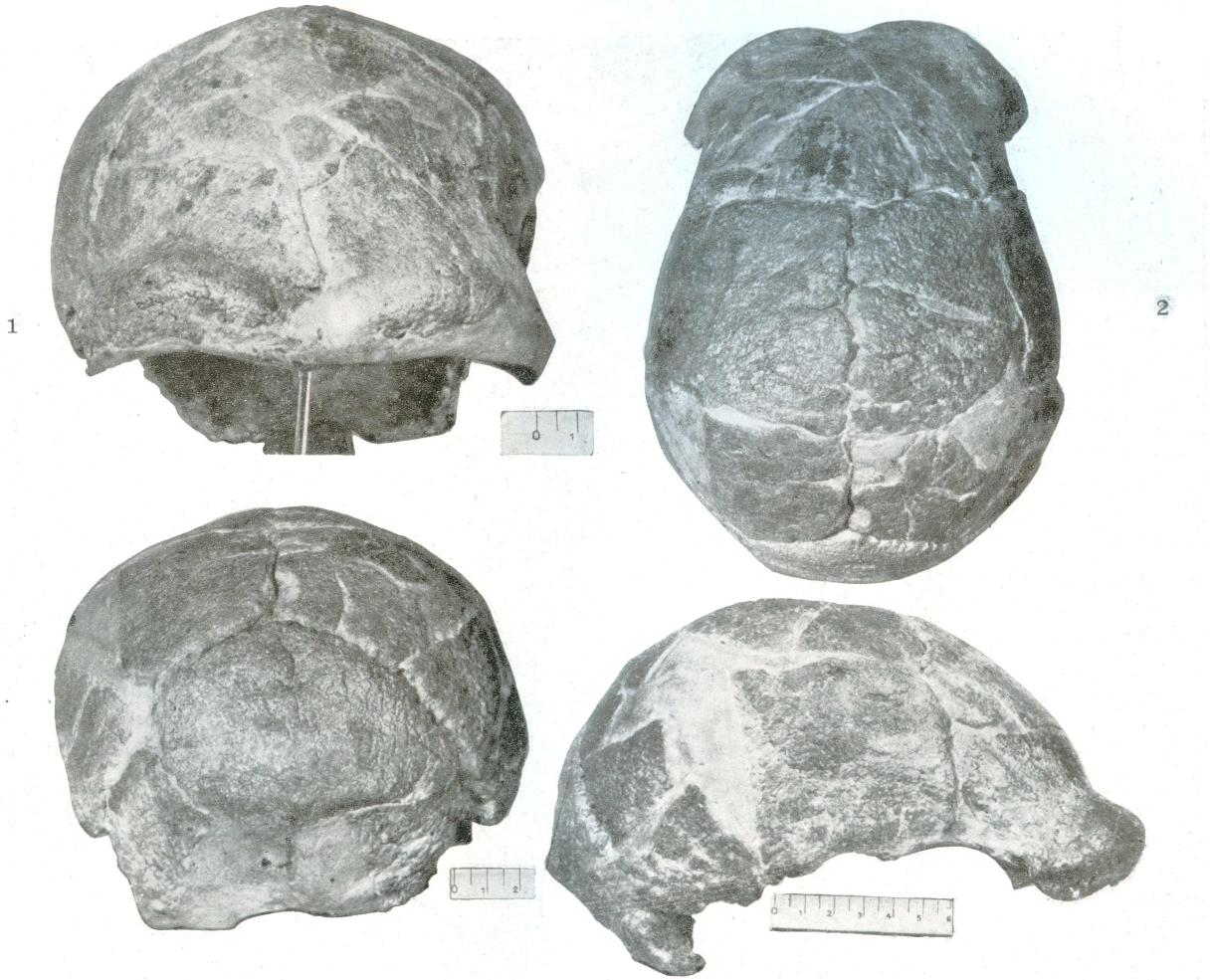
8. *Aonyx robustus* Lyle : A fragment of the lower jaw of a new species of rodent with the last premolar and a molar in position as well as the upper premolars and upper and lower canines indicate marked simi-similarity with *Aonyx capensis* differing only in that they are larger. It is doubtful whether one should attribute these specimens to a new species only on the basis of robustness.

9. *Pedetes hagenstadti* Lyle : Here again the 8 molars found vary only slightly from the living species and it is difficult to accept

EXPLANATION OF PLATE 17

Section of 1952 excavation at Florisbad. The Skull was discovered at another site about 20 yards nearer the camera in Peat I layer. Total depth of excavation-21′ 6″. Photo: The Friend News papers Ltd.

SINGER : EXCAVATION AT FLORISBAD, S. AFRICA.



1 2

3 4

SINGER : SALDANHA SKULLS.

the scanty material as a new species as suggested by Lyle (1931).

10. *Sivatherium* sp. (Dreyer, 1953) : It is unfortunate that the teeth attributed to this giraffid are not available for study in South Africa. The National Museum (Bloemfontein), where the collection is now housed, only contains an incomplete plaster cast of a worn molar, while the other teeth were sent to Cambridge University and to Professor von Huene in 1926. In addition, however, I have now identified two teeth in the collection as those of a giraffid. These and the cast are lower molars, and they may well be the lower teeth of a *Griquatherium*, this genus being established by Haughton in 1922 on an upper second molar. The Florisbad specimens are very similar to *Hydaspitherium*, a fact which strengthens my view, originally propounded by Bohlin (1927) and Colbert (1935), that *Griquatherium cingulatum* Haughton should be referred to *Hydaspitherium magnum* which is a member of the Sivatheriinae. The Florisbad specimens, however, are not *Sivatherium* as suggested by Dreyer.

11. *Bubalus bainii* Seeley : The type specimen described by Seeley in 1891 was a skull which had no associated dentition. Bate (1949) renamed it *Homoioceras bainii*. The several specimens of an extinct African buffalo found at Florisbad in 1952 resemble the type specimen, but, in addition, they include farily complete dentitions. In comparison, the numerous teeth and complete dentitions of a *Bubalus* found at Hopefield compare quite favourably with those from Florisbad. But the striking differences in the skulls from the two sites are so radical as to suggest a new species from Hopefield. The latter skulls have a broad convex frontal bossing with widely separated horn cores. The occipital aspects, too, differ markedly. The cores from Florisbad are more rounded and not as massive, and have faint circular rings or ridges at right angles to the direction of the horn, as compared with marked longitudinal grooves (especially on the inner concavity) on the cores from Hopefield. There are complete dentitions, a range of 6 skulls, as well as vertebrae and long bones of this *Homoioceras* sp. nov. which will thus be almost completely reconstructed.

HOPEFIELD

In May 1951 I discovered[1] the extensive fossil site on the farm "Elandsfontein" about 10 miles from Hopefield. Here, in the middle of the sandy veld between the Sout River and the Langebaan-Saldanha Lagoon (and about 12 miles from the sea), situated 300 feet above sea level, is a veriable Solutrean-like mint of fossilized material lying on the floors of wind-scoured kloofs or depressions formed by vegetated and stationary 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 limestone. Softer. cellular calcretes are found in certain places at the lowest parts of the depressions. This site was probably at one time a large vlei or lagoon continuous or contiguous with one of the mouths of the large rivers that open into the sea nearby.

The rich collection of stone implements indicate the presence of Man on the site from the period of the late stage of the Chelles-Acheul (Stellenbosch V) Culture until the period when the Bush races were developing their culture. The occupation was 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

EXPLANATION OF PLATE 18

FIG. 1. Saldanha Skull: norma frontalis.
2. Saldanha Skull: norma verticalis.
3. Saldanha Skull: norma occipitalis. The large central segment of occipital squama is '1. T' in text. The angle formed by the two arms of the lambdoid suture is more acute (130°) than in the Rhodesian (160°), yet the lambda-inion distance is greater in the latter (59.5 mm. compared with 54.5 mm. in the Saldanha Skull). The 'bun-like' bulge below the lambda, so obvious in the Rhodesian Skull, is hardly noticeable in the Saldanha Skull.
4. Saldanha Skull: norma lateralis, Oriented in glabella-inion (opisthocranion) plane.

[1] The presence of sites in the Hopefield-Darling districts of the Cape Province had been known for a few years, but no scientist had previously taken the trouble to investigate them.

choppers and bola-like stones. In addition, there are examples of the Middle Stone Age Still Bay Culture (unmixed, however, with tools of the Howiesons' Poort Development). In contrast, no hand-axes were found at Florisbad, though one of the predominant implements there is a rounded, sinuous-edged "chopper" (of which a small percentage is found at Hopefield) which Dreyer compares with the Choukoutien implements described by Pei. In general, the collection of stone implements at the coastal site of Hopefield differs quite markedly from the inland assemblage at Florisbad. Furthermore, at Hopefield some unique specimens of worked bone implements have been recovered by us (for illustrations, see *Illustrated London News*, Sept. 26, 1953).

The large amount of palaeontological material collected thus far is only in the initial stage 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, a detailed description of which we have in the press (*Ann. S. A. Mus.*, XLII, pt. 3, 1955). There is an impressive collection of the teeth of various species of horse, among which are numerous specimens of the extinct *E. capensis*. Our classification of the dentitions would indicate a wider variability within a species than has hitherto been accepted here, and will probably allow the merging of several described species.

The 8 giraffid teeth thus far discovered consist of upper and lower molars, as well as a premolar and an incisor not previously described in Africa. This series appear to belong to a single species and seem indistinguishable from *Sivatherium*, as described by Colbert (1935).

There are numerous molar teeth and long bones of *Palaeoloxodon*; both black and white rhinoceros (*Diceros* and *Ceratotherium*); and probably two varieties of one species of *Hippopotamus*. Among the many antelopes identified are the black and white wildebees (*Connochaetes*) blesbok (*Damaliscus*), grey duiker (*Sylvicapra*), hartebees (*Peloroceras*), steenbok (*Raphiceros*), lechwe (*Onotragus*), and a number of specimens of reedbuck, springbok, gazelle, kudu, eland, bushbuck, and the roan and sable antelope. Of particular interest are the lechwe, unknown in the Cape Province in historic times, and the *Peloroceras*, some of the specimens of which are identical to *Peloroceras helmei* found at the same level (Peat I) as the Florisbad Skull. Represented scantily are the carnivora *Thos*, *Lycaon* and *Crocuta*. A few fragments of birds and numbers of fossilized tortoise carapace segments were recovered.

Thus the general faunal picture of Hopefield resembles that of Florisbad superficially only, and, although it suggests an Upper Pleistocene date, many specimens are highly indicative of a late Middle Pleistocene period in terms of current African chronology. The results of fluorine estimations, obtained through the courtesy of Dr. K. P. Oakley of the British Museum, on a wide range of specimens from Hopefield do not support the idea that specimens of widely differing age have been mingled in the collection. Leakey (1953) commented that in East Africa no specimens of *Mesochoerus* have been recovered from Upper Pleistocene deposits, his specimens being Mid-Pleistocene; thus, if one tends to be conservative about the dating at Hopefield, the presence of *Mesochoerus olduvaiensis* represents the survival of an isolated species which had become extinct further north. Further fluorine tests revealed that the *Mesochoerus* at Hopefield lived contemporaneously with Saldanha Man.

SALDANHA MAN

On the first field trip after my return from the U.S.A. in January 1953, Keith Jolly, a young archaeologist employed as a field research assistant for the Hopefield project, and I discovered and identified respectively eleven 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 exocranial surface uppermost and some with the endocranial surface uppermost. One fragment was later discarded as not human. The fragment (1.A) which drew attention to the others was part of a right frontal bone with a massive supraorbital torus (extending almost to the midline) from which a marked temporal ridge extended back to bifurcate

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 (Pl. 19), 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. A quadrilateral-shaped fragment (1.B) belonged to the right parietal bone, ish fragment (1.C) fitted accurately opposite these forming part of the left partietal bone, and providing anteriorly the left side of the coronal suture for, approximately, its medial two-thirds. Fragment 1.F fitted in juxtaposition to 1.C, and also gave the posterior extent of the left parietal bone as the lambdoid sutural line was obvious. Thus the sagittal suture and the 'vault' of the skull was more-or-less complete. The other important fragment (I. J) found on this first

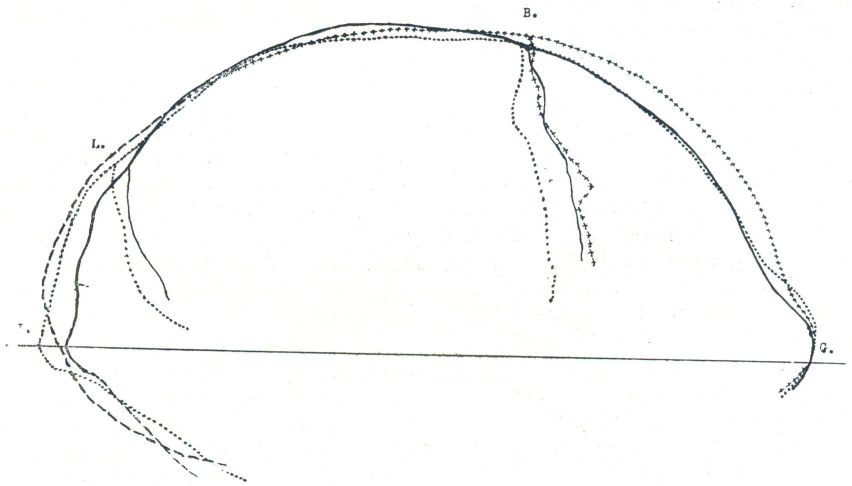


FIG. 1—Sagittal diptographs in glabella-inion plane to illustrate relationships between Saldanha Skull———; Rhodesian Skull.....; and Florisbad Skull******. B—Bregma; L—Lambda. Positions of sutures indicated – – – – – – indicates reconstruction of missing fragments. Outline of Rhodesian Skull obtained from a cast.

the lower edge of which exhibited the wedge shape and striated pattern of the temporoparietal suture. Its anterior border was the edge of the coronal suture where it articulated with 1.A. Two other fragments (1.D and 1.E) fitted each other at a clear straight-edged break, and they accurately aligned with the inner edge of 1.B, thus completing the right parietal bone as far as the sagittal suture. The endocranial aspect was grooved by two large branches of the middle meningeal vessels, the posterior one bifurcating around a small, irregular oval erosion situated an inch above the temporoparietal sture. Fortunately, another squaroccasion was a triangular-shaped central section of the occipital bone providing an apex for the lambda, and on the left side about 1½ inches and on the right side about 3 inches of the lambdoid suture. On the left side this fitted against 1.F while two other fragments, 1. H and 1. G, provided the other parietal components of most of the right lambdoid suture. It was thus possible to reconstruct accurately the maximal height and length of the skull.

On two subsequent visits, Jolly and I retrieved more fragments (numbered '3' on Pl. 19) 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. On the fourth field trip. Jolly recovered a left frontal supraorbital tours which appears to fit the right one 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 has a slight bulge on the left. This is probably a normal variation.

On our third visit, I recovered 2 fragments about 500 yards away from the original site of discovery. The one is a fragment of the posterior part of the right parietal bone which fits accurately into the reconstruction of the lambdoid stuure; the other, is the upper end of the ascending ramus of a mandible (Pl. 20, fig. 3).

Thus the Saldanha Skull, reconstructed by Professor M. R. Drennan, assisted by Dr. E. Keen and myself, at present consists of a farily complete 'cap' or vault. There is a striking resemblance between it and the Rhodesian Skull (Broken Hill Skull) in general outline and measurements (fig. 1 and table 1). On the other hand, there are also features of similarity between it and the *Sinanthropus-Pithecanthropus-Homo soloensis* group (fig. 2). The discussion by Weidenreich (1943) on their relationships with the Rhodesian Skull holds good, by and large, for the Saldanha Skull. The latter is characterized by a moderately low braincase (but greater than any skull in the Far East group) with its greatest breadth apparently near its base (Pl. 18, fig. 3), a relatively flat forehead separated from massive supraorbital ridges by a distinct ophryonic groove. The fracture just below the protuberant occipital torus prevents any conclusive opinion as regards the position of the foramen magnum, 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 (1953).

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 frontal bone is 10 mm. centrally and 6 mm. laterally; the parietal bone averages 10.5 mm. darasagitally and 7 mm. near the temporoparietal 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.

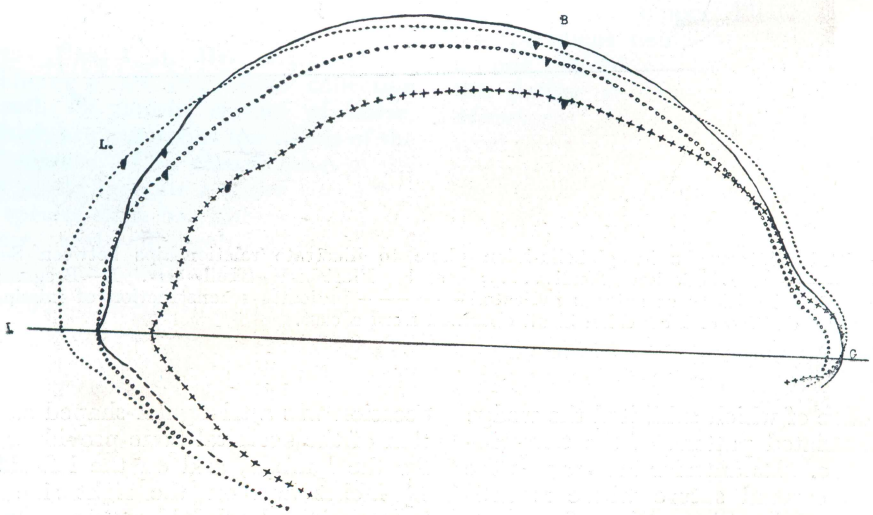
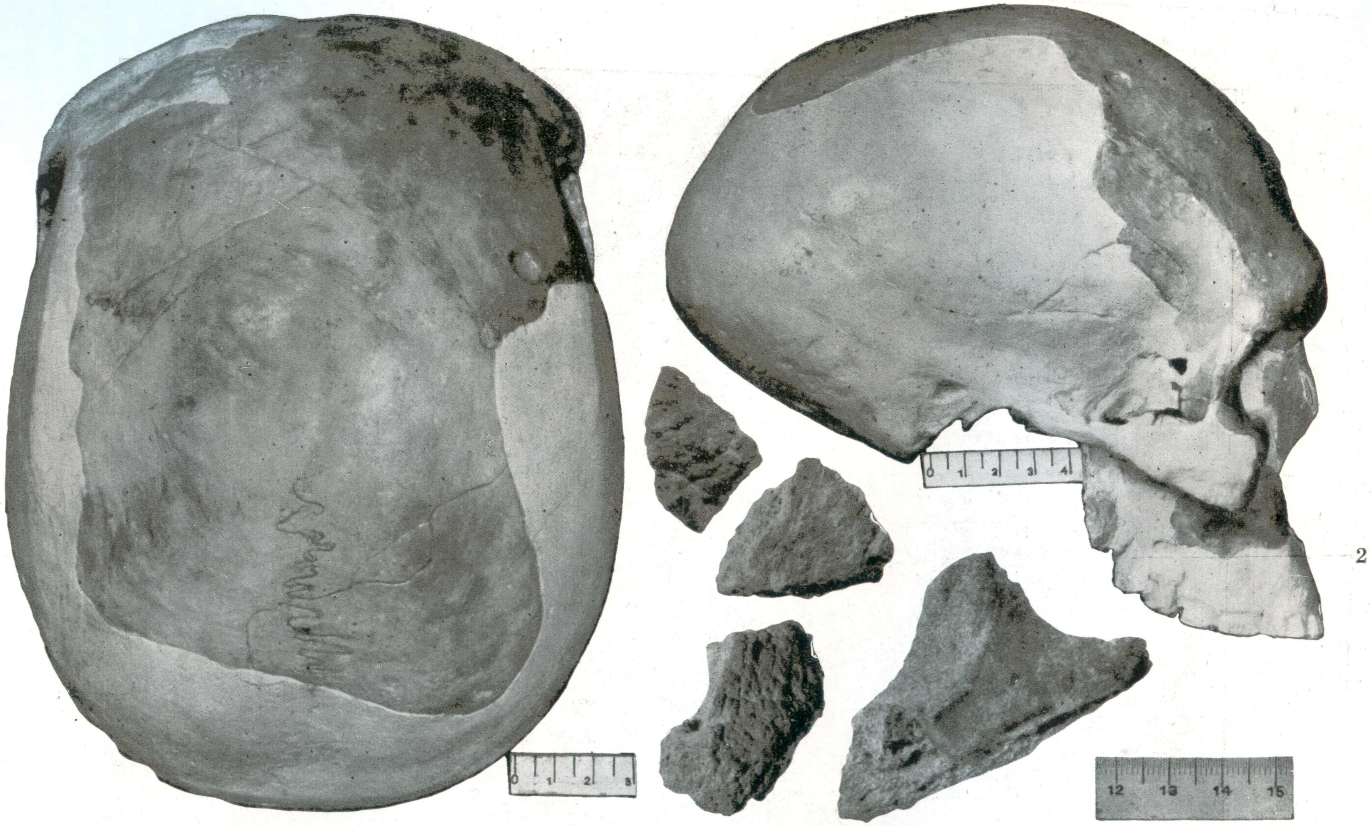


FIG. 2—Sagittal dioptographs in glabella-inion plane of Saldanha Skull————; La Chapelle aux Saints Skull.....; Sinanthropus, Locus E (after D. Black)****** and Sinanthropus XXII (skull 1, locus D) (after Weidenreich) 0000000000. Positions of bregma and lambda indicated.

EXPLANATION OF PLATE 19

Saldanha Skull: endocranial aspect. Note large and assymmetrical frontal sinuses.

SINGER : SALDANHA SKULL.



SINGER : FLORISBAD AND SALDANHA SKULLS.

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 1943); and 20 mm. and 20 mm. respectively in the Rhodesian Skull. In the latter there is a bulge over the centre 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 directly outward with the convexity upwards in one plane (Pl. 18, fig. 1), while in the latter the convexity is less accentuated and the anterior surface has a tortuous appearance, so that medially it is in a vertical plane while laterlly it is in a semi-horizontal plane with the anterior surface looking outwards. The maximum breadth of the supraorbital ridges is 122 mm. in Saldanha, 136 mm. in Florisbad, and 139 mm. in Rhodesian Man.

The inclination of the frontal bone differs markedly between the Saldanha and Florisbad Skulls (Table 1), 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 the bregma well ahead of the other two skulls.

A detailed description of the Saldanha Skull and endocranial cast is yet to be completed. Finally, to save space on academic discussion on our incomplete skull, I wish to quote two phrases of Franz Weidenreich's (1940) 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 or the *Homo soloensis* of Java, has produced certain regional variations which are equivalent to racial differences of today". And, "while Man was passing through different phases, each of which was characterized by certain featuers 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".

ACKNOWLEDGEMENTS

Mr. Goosen of the Department of Surgical Research in the University of Cape Town, kindly took the photographs.

Dr. M. R. Drennan, Professor of Anatomy at the University of Cape Town, and Director of the Hopefield Research Committee, kindly permitted the presentation of this paper for publication.

REFERENCES

BATE, D. M. A., 1949, A New African Fossil Long-horned Buffalo. *Ann. Mag. Nat. Hist.*, Ser. 12, Vol. 2, pp.396-398.

BOHLIN, B., 1927, Die Familie Giraffidae. *Pal. Sin.*, Ser. C, Vol. 4, Fas. 1, pp. 1-179.

COLBERT, E. H., 1935, Siwalik Mammals in the American Museum of Natural History. *Trans. Amer. Philos. Soc.*, n.s. Vol. 26, pp. 1-401.

DRENNAN, M. R. D., 1937, The Florisbad Man and Brain Cast. *Trans. Roy. Soc. S. Afr.*, Vol. 25, (pt. 1), pp. 103-114.

——, 1953, A preliminary note on the Saldanha Skull. *S. A. Journ. Sci.*, Vol. 50, pp. 7-11.

DREYER, T. F. and LYLE, A., 1931, New Fossil Mammals and Man from South Africa. Grey Univ. College, Bloemfontein.

DREYER, T. F., 1935, A Human Skull from Florisbad, Orange Free State, with a note on the endocranial cast by C. U. Ariens Kappers. *Proc. Acad. Sci. Amst.*, Vol. 37, pp. 119-128.

EXPLANATION OF PLATE 20

FIG. 1. Florisbad Skull: norma verticalis. Note tremendous frontal width and the light ophryonic groove.
2. Florisbad Skull: norma lateralis.
3. Cranial fragments (of Saldanha Skull) not yet included in the reconstruction. On the right is the upper end of the ascendng ramus of a mandible (medial aspect).

1. The Rhodesian Skull was discovered at Broken Hill, which is in Rhodesia, *not* South Africa.

——, 1947 Further observations on the Florisbad Skull. *Soologiese Navorsing van die Nasionale Museum*, Vol. 1 (pt. 15), pp. 183-190.

——, 1953, The Origin and Chronology of the Fauresmith Culture. *Researches of the Nasionale Museum*, Vol. 1, (pt. 3), pp. 57-76.

GALLOWAY, A., 1937, The nature and status of the Florisbad Skull as revealed by its non-metrical features. *Amer. J. Phys. Anthrop.*, Vol. 23, (no. 1), pp. 1-15.

HAUGHTON, S. H., 1921, A note on some fossil mammals from the Vaal River Gravels. *Trans. Geol. Soc. S. Afr.*, Vol. 24, p. 11.

HOFFMANN, A C., 1953a, Personal Communication.

——, 1953b, The Fossil Alcelaphines of South Africa—Genera *Peloroceras*, *Lunatoceras* and *Alcelaphus*. *Researches of Nasionale Museum*. Vol. 1 (pt. 3), pp 41-56.

LEAKEY, L. S. B., 1953, Personal Communication.

SEELEY, H. G., 1891, On *Bubalus Bainii* (Seeley). *Geol. Mag.*, Decade 3, Vol. 8, n.s., pp. 199-203.

WEIDENREICH, F., 1940, Some Problems dealing with Ancient Man. *Amer. Anthropol.*, n.s. Vol. 42, (no. 3), pp. 375-383.

——, 1943, The Skull of *Sinanthropus pekinensis*; a comparative study on a primitive hominid skull. *Pal. Sin.*, n.s. D, no. 10, p. 1-298.

WELLS, L. H., COOKE, H. B. S. and MALAN, B. D., 1942, The associated fauna and culture of the Vlakkraal Thermal Springs, O. F. S. *Trans. Roy. Soc. S. Afr.*, Vol. 29, pp 203-233.