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THE MELKBOS SITE: AN UPPER PLEISTOCENE  
FOSSIL OCCURRENCE IN THE  
SOUTH-WESTERN CAPE PROVINCE

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(With plates 8-10 and 3 figures)

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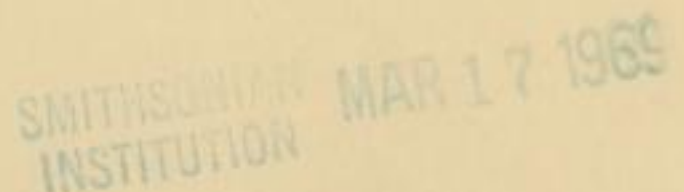
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INTRODUCTION

In the collections of the South African Museum (Natural History), Cape Town, is an assemblage of fossils recovered from a site near the coast north of the town of Melkbosstrand (fig. 1). The first recorded discovery of fossils at this locality was made in 1956 by Mr. J. Rudner of Cape Town. Thereafter small collections were made from time to time, and much of the material recovered found its way to the Anatomy Department of the University of Cape Town. In 1962 this material was presented to the South African Museum and forms the nucleus of the assemblage presently to be described.

The limits of 'the Melkbos site', as it has become known, are not clearly defined, fossil and cultural material having been recovered from an area about 1½ miles long and a few hundred yards wide, beginning about 3 miles north of the mouth of the Sout (Klein Sout) River. The fossils have been exposed by erosion in, and associated with, an horizon of calcareous sandstone ('calcrete') and sand in the area, which forms part of the Sandveld region (Talbot, 1947) (pl. 8A).

Pleistocene fossil occurrences are known from several localities along the Table Bay and False Bay coasts. These include Milnerton and Ysterplaats (Broom, 1909; Cooke, 1955), Paarden Eiland, Strandfontein and Swartklip (Singer & Fuller, 1962; Hendey & Hendey, 1968). The Melkbos site has been one of the most productive of these occurrences, and the South African Museum's collection at present includes over 600 specimens from the site. However, its true wealth can never be accurately assessed, since it is easily accessible and



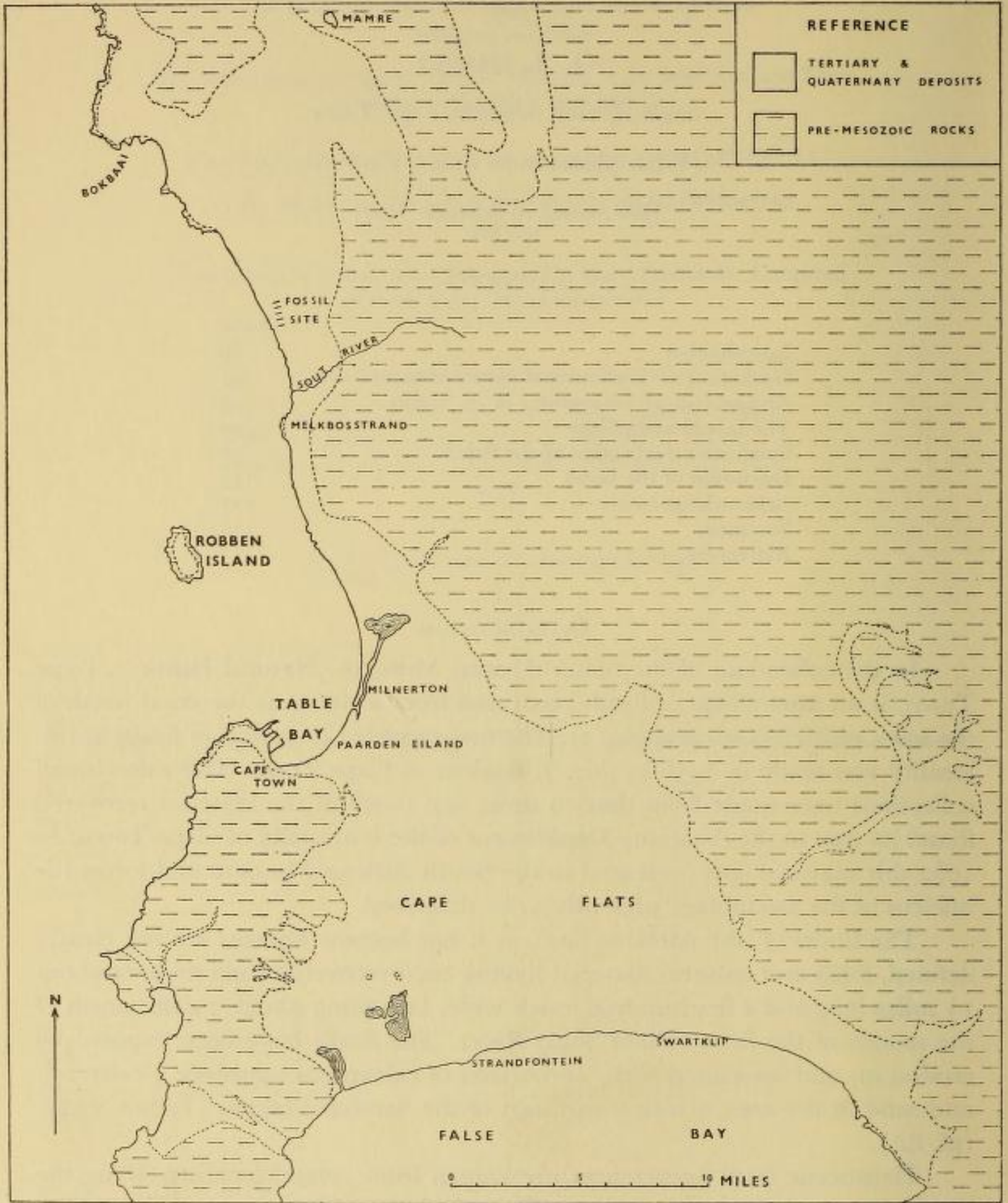


Fig. 1. The location of the Melkbos fossil site.

extensive collecting by visitors to the area takes place. In addition, the fossils are rapidly destroyed by weathering once they have been exposed.

The purpose of this report is to place on record the presence of the site, its relationship to other south-western Cape fossil sites and to give a preliminary account of the more important specimens thus far recovered.

#### GEOLOGICAL ASSOCIATIONS AND NATURE OF THE OCCURRENCE

The deposits in the area can conveniently be divided into two categories.

Firstly, there are Recent aeolian sands, which have resulted from the weathering and erosion of pre-existing deposits. These are, in places, vegetated and fairly stable, but elsewhere are in the form of mobile barchan dunes. Where they have been stabilized they are sometimes found in association with Late Stone Age middens. They are discontinuously developed and clearly post-date the period of fossil accumulation.

The second category of deposits are the Pleistocene sands, calcrete and ferricrete, with which the fossils are associated. They have a long and complex history, the sands probably having been laid down during the Tertiary, and been transported and redeposited several times since. No systematic excavations have been undertaken in the area, and the sequence of events suggested below is based only on surface observations.

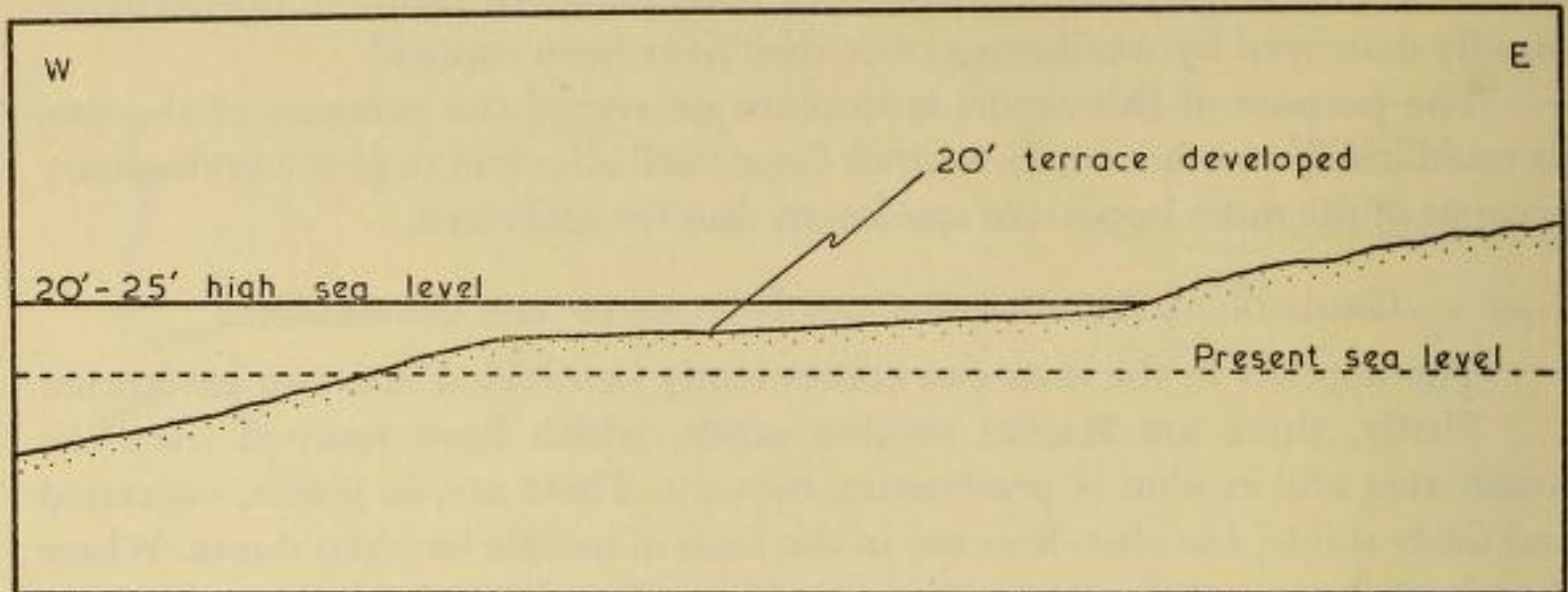
In the area between the fossil occurrence and the sea, a fairly extensive platform is exposed, almost certainly 'wavecut', with an elevation of about 20 feet above sea-level. Krige (1927) refers this platform to his 'Minor Emergence', stating that 'the overgrown flats at Melkbosch Strand suggests a terrace of the right order'. Assuming correspondence to the European Pleistocene sea-level changes, and in the present instance there is no reason to believe that such a correlation is invalid, this terrace is Late Monastirian (= Tyrrhenian III) in age (Zeuner, 1959; Oakley, 1964).

The fossiliferous deposits at Melkbos overlie the 20-foot terrace, and therefore post-date it (fig. 2).

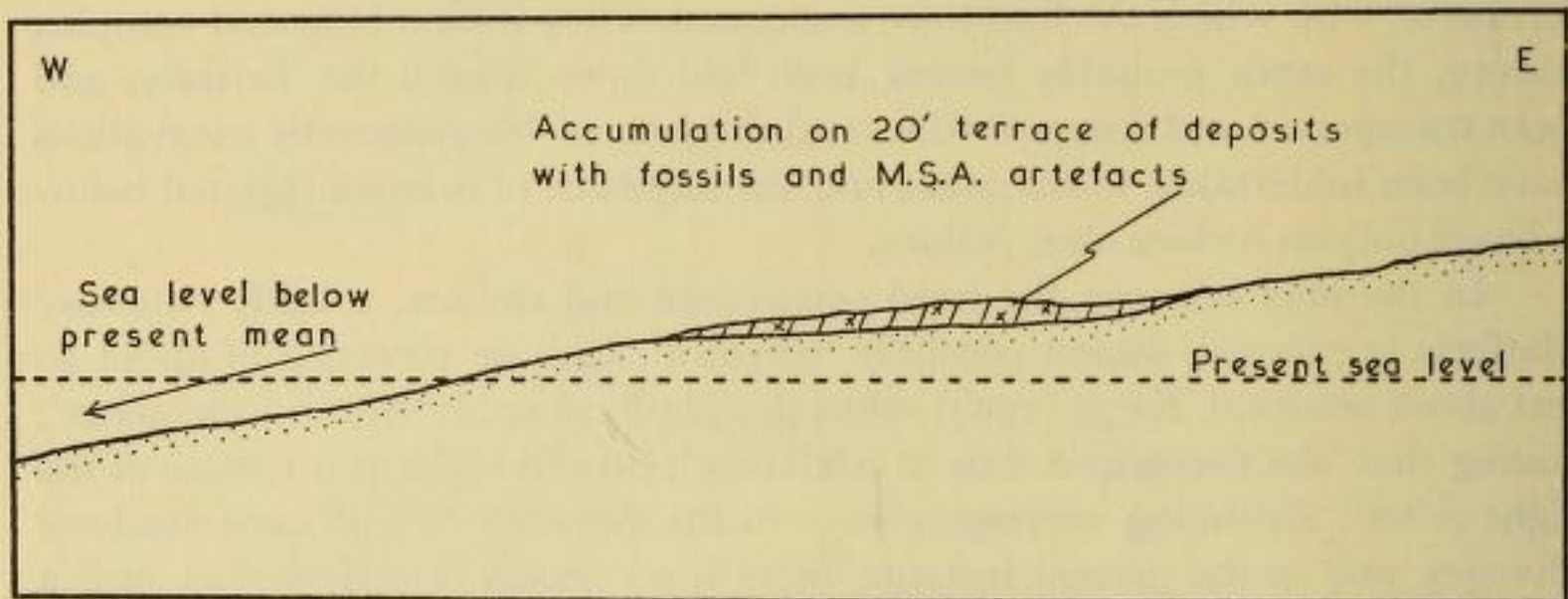
Mabbutt *et al.* (1955) recorded a succession at Bok Baai (fig. 1) which includes a calcrete, almost certainly equivalent to that at Melkbos, overlying 'Minor Emergence' beaches and related cliff slopes.

The Early Würm interstadial, with which the Late Monastirian is correlated (Oakley, 1964), has been assigned a chronometric date of about 40,000 years B.P. (Emiliani, 1961). The Chatelperronian industry of the Upper Palaeolithic of Europe has been related, in time, to this interstadial and the industry has been dated to about 32,000 B.C. at Arcy sur Cure, France (Oakley, 1964). The South African Middle Stone Age/Second Intermediate industries, with which the Melkbos fauna has suggested associations (*vide infra*), has been dated variously between 44,000 B.P. to 2540 B.C., with 'the Middle Stone Age *in sensu [sic] stricto* . . . later than 40,000 years B.P.' (Deacon, 1966).

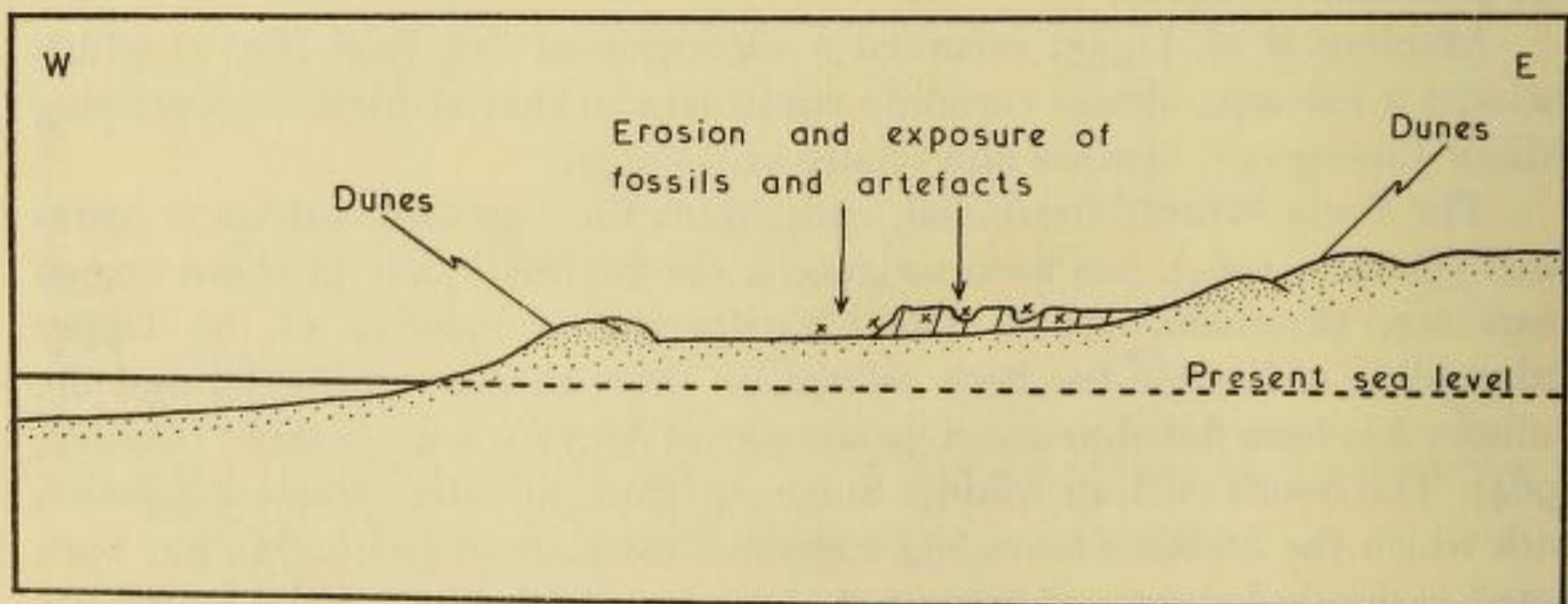
The Melkbos fauna is therefore considered to be no earlier than 30,000 to 40,000 years B.P. No upper age limit was determined, but a date of late Upper



1. Earlier part of UPPER PLEISTOCENE



2. Latter part of UPPER PLEISTOCENE



3. RECENT

Fig. 2. Diagrammatic representation of the suggested sequence of events at the Melkbos site.

Pleistocene is proposed for the fauna. This will serve adequately to place it chronologically, until such time as a more definite chronometric date is established.

It was not evident from the surface observations whether single or multiple fossiliferous horizons exist. The fossils appeared to be preserved only in association with the calcrete, i.e. the original lime-rich horizon of the Upper Pleistocene palaeosol. A few very poorly preserved specimens were found in the more acid horizons of the palaeosol, which are now marked by the exposures of ferricrete.

Gradual concentration of the calcium carbonate in the lime-rich horizon, and induration following its exposure, has given rise to the calcrete in its present form. The outer surfaces of the exposures are extremely hard, but the degree of induration diminishes away from the exposed areas (cf. Du Toit, 1917: 12). The calcrete is, therefore, not strictly speaking Pleistocene in age since some of its characters are still being developed, but it had its beginnings at the time of the development of the soil body overlying the 20-foot terrace and after the fossils were already in place.

The site is exposed to both south-easterly and north-westerly gales which are prevalent in the region in summer and winter respectively, and wind erosion of the area is perennial and severe. The exposed fossils suffer extensive sand-blasting, and develop a deep red or dark brown colour and a very characteristic glazed patination, reminiscent of the 'desert varnish' of rocks in arid regions. Bone fragments litter the site, but diagnostic material is much less common (pl. 8B).

#### ARCHAEOLOGICAL ASSOCIATIONS OF THE FOSSILS

No positive association between cultural material of a known period and the fossils has been demonstrated.

The fossils predate the Late Stone Age middens which often occur on or within the Recent aeolian sands. They have been found in surface association with undoubted L.S.A. artefacts, but this is considered to be fortuitous.

No Early Stone Age material has been recorded from the site.

Undiagnostic silcrete flakes have on occasion been found during the excavation of fossils in the unconsolidated deposits, and on rare occasions there have been 'flakes' of dubious authenticity found embedded in the calcrete. The former, at least, were considered to be genuine archaeological associations. Several finely worked bifacial points of a rather small size, and flakes with prepared striking platforms, all in a silcrete similar to that of the excavated material have been recovered from the surface of the site. This lithic material, undoubtedly dates from the Middle Stone Age or Second Intermediate, and an association between it and the fossils is suggested.

#### THE FAUNAL ASSEMBLAGE

The nomenclature, with a few exceptions, follows that of Ellerman *et al.* (1953).

Class *MAMMALIA*Order **CARNIVORA**Family **Hyaenidae***Hyaena* cf. *brunnea*Family **Felidae***Felis leo* aff. *spelaea*Family **Canidae***Canis* cf. *mesomelas*Order **PINNIPEDIA**Family **Otariidae**? *Arctocephalus pusillus*Order **PROBOSCIDEA**Family **Elephantidae**? *Loxodonta africana*Order **PERISSODACTYLA**Family **Rhinocerotidae***Diceros simus**Diceros bicornis*Family **Equidae***Equus* sp.Order **ARTIODACTYLA**Family **Hippopotamidae***Hippopotamus amphibius*Family **Bovidae***Syncerus* sp.*Tragelaphus* cf. *strepsiceros**Taurotragus oryx**Redunca arundinum*cf. *Hippotragus* sp.*Connochaetes* sp.*Raphicerus* sp.cf. *Antidorcas* sp.Order **RODENTIA**Family **Bathyergidae***Bathyergus suillus*Class *REPTILIA*Order **CHELONIA***Incertae sedis*Class *AVES*Order **STRUTHIONIFORMES**Family **Struthionidae***Struthio australis*

Family **Elephantidae***?Loxodonta africana* Blumenbach

## African Elephant

Three fragments of a cheek tooth (Mb 513 A & B, and Mb 514) are the only elephant cranial remains recorded from the site. Their condition precludes positive diagnosis, but there is no reason to believe that they belong to a form other than *L. africana*.

Two fragments of a right scapula (Mb 78 & Mb 515), belonging almost certainly to the same bone, compare closely in all observable respects to the corresponding parts of scapulae of *L. africana*.

In view of the fragmentary nature of these remains, they are only tentatively ascribed to *L. africana*.

The recently described lower molar of '*Archidiskodon*' cf. *transvaalensis* (Hendey, 1967), recovered near the mouth of the Klein Sout River, has no apparent associations with the main Melkbos fossil site.

Family **Rhinocerotidae***Diceros simus* Burchell

## White Rhinoceros

The White Rhinoceros was identified in the assemblage from a series of upper teeth of a single immature individual.

*Mb 511A*—(table 6)— $LM^2$ , lacking the roots and in which the protoloph and metaloph have been reconstructed. The crochet is slightly worn, but the crista is still below the grinding surface. All the outer cement covering has been lost, but some remains in the medi- and postfossettes.

TABLE 6

DIMENSIONS OF *DICEROS SIMUS* TEETH FROM MELKBOS, COMPARED WITH THOSE OF TWO MODERN SPECIMENS.

	Mb 511A	Mb 511B	Modern <i>D. simus</i>	
			21379	21381
$M_2 \begin{cases} 1 \\ b \end{cases}$	66.1 c45.0	— —	69.0 41.0	71.4 45.5
$M_1 \begin{cases} 1 \\ b \end{cases}$	— —	c67.0 c42.5	69.6 44.5	61.5 43.5

*Mb 511B*—(table 6)— $LM^1$ , lacking the roots and outer cement covering, and in which the ectoloph, protoloph and distal portion of the metaloph have been reconstructed. The medifossette is separated from the prefossette by the uniting of the crista and crochet.

*Mb 511C*— $LP^4$ , very poorly preserved, and either completely unworn or in a very early stage of wear.

*Mb 511D*— $LP^3$ , and least well preserved of the teeth.



In size and morphology this series of teeth corresponds closely to those of two modern *D. simus* specimens, and the degree of wear indicates an order of eruption normally found in the rhinoceros, i.e.  $M^1$ ,  $M^2$ ,  $P^3$ ,  $P^4$  (Cooke, 1950).

A skull fragment (Mb 591) was also tentatively assigned to *D. simus*.

*Diceros bicornis* Linnaeus

Black Rhinoceros

This species is represented in the assemblage by an incomplete mandible (Mb 125). It consists of a large part of the right corpus and the symphyseal region. The right  $P_3$  and  $P_4$  are largely intact, and the  $RM_1$  is partially preserved. Only the roots of the other right molars, and the  $LP_1$  and  $LP_2$  remain. The symphyseal region is of the characteristic *D. bicornis* type and in size (table 7) and morphology the teeth are indistinguishable from those of the modern species.

TABLE 7

DIMENSIONS OF *DICEROS BICORNIS* TEETH FROM MELKBOS, COMPARED WITH THOSE OF A SERIES OF FIVE MODERN SPECIMENS.

	Mb 125	Modern <i>D. bicornis</i>	
		Mean	Range
$P_2$ - $M_3$ alveolar length ... ..	285.0	272.0	253.0-297.0
$P_3$ { 1 ... ..	35.0	37.0	33.0- 39.1
{ b ... ..	c31.0	31.9	30.8- 34.6
$P_4$ { 1 ... ..	42.5	44.6	41.9- 46.9
{ b ... ..	c34.0	35.8	34.3- 38.0

*Diceros* sp.

Two tooth fragments (Mb 179 & Mb 583) and two mandible fragments (Mb 154 & Mb 427) were not identified as to species.

Rhinoceros postcranial remains are abundantly represented in the assemblage, but owing to the difficulty of distinguishing the two extant African species on the basis of their postcranial skeletons, no attempt was made to categorize these specimens specifically.

Family **Equidae**

*Equus* sp.

Equid remains are rare at the site, and only three teeth and five elements of the postcranial skeleton have been recovered.

*Mb 120*—A left  $M^2$ , the best preserved of the teeth, which corresponds closely in size to the  $M^2$  of the *Equus helmei* type specimen (Dreyer & Lyle, 1931), but which does not exhibit the same complexity in the enamel pattern of the occlusal surface.

*Mb 121* & *Mb 137*—Right upper and lower premolars, respectively, and both poorly preserved.

Class *AVES*Family **Struthionidae***Struthio australis*

## Ostrich

The ostrich is represented in the assemblage by two first phalanges (Mb 496 A & B), which are indistinguishable in all observable respects from those of the extant species.

## DISCUSSION OF THE FAUNA

There are a number of sites in the south-western Cape Province which have yielded mammalian fossils, and while the study of the fauna of these sites is still in progress, it is apparent that in time they span the greater part of the Quaternary. Most attention has been focused upon the fossil occurrences at Langebaanweg, Elandsfontein (Hopefield), Melkbos and Swartklip, and the fauna of these sites is now moderately well known (table 15).

The Langebaanweg sites are both the earliest and potentially the most important of them all. They date probably from 'the earliest phases of the Pleistocene' (Boné & Singer, 1965), and have yielded a number of archaic forms, such as *Hipparion*, *Anancus*, *Stegolophodon*, an agriotheriine bear and a nimravine. The fossils have been recovered in the course of the mining of phosphate by the African Metals Corporation (Singer, 1961), and most of the material recorded to date has come from three quarries, viz. Baard's, 'E' and 'C' Quarries. The deposits in Baard's Quarry are apparently largely fluvial, those in 'E' Quarry are estuarine and in 'C' Quarry there is a mixture of marine and estuarine sediments. The mammalian faunas from the three quarries are apparently at least broadly contemporary. The fossils have no known archaeological associations.

The fauna of the Elandsfontein site is the best known in the region (cf. Singer, 1962 for references), and the geology and archaeology of the site have recently been the subject of intensive study (H. J. Deacon and J. Wymer, in preparation). The fauna includes a number of extinct genera and species, but modern forms, or forms only subspecifically distinct from them, are well represented. The date usually used in reference to the fauna of this site is late Middle / early Upper Pleistocene (Boné & Singer, 1965), but it is possible that later elements occur in accidental association with the main body of fossils (Inskip & Hendey, 1966). Artefacts of three industrial complexes have been recovered at the site, with the main faunal element apparently associated with an evolved Acheulian ('Fauresmith') industry (Howell & Clark, 1963; J. Wymer, pers. comm.).

The sites at Swartklip, which are late Pleistocene or Recent in age, have yielded a fauna made up almost entirely of modern forms (Hendey & Hendey, 1968). These sites have no certain cultural associations, but tenuous links with the Late Stone Age and historic times (Post-1652 A.D.) have been suggested.

TABLE 15

THE FAUNA OF THE PRINCIPAL FOSSIL SITES OF THE SOUTH-WESTERN CAPE PROVINCE.

	Langebaan- weg			Elandsfontein (Hopefield)	Melkbos	Swartklip
	Baard's Quarry	'C' Quarry	'E' Quarry			
Class <i>MAMMALIA</i>						
Order ARTIODACTYLA						
Family <b>Hominidae</b>						
				×		
				×		
Family <b>Cercopithecidae</b>						
				×		
Order PHOLIDOTA						
				×		
Order CARNIVORA						
Family <b>Mustelidae</b>						
				×		×
						×
Family <b>Canidae</b>						
Subfamily Caninae						
				×	cf.	cf.
				×		
				cf.		cf.
			×			
Subfamily Simocyoninae						
				×		
						×
Family <b>Ursidae</b>						
Subfamily Agriotheriinae						
Family <b>Viverridae</b>						
				×		×
Family <b>Felidae</b>						
Subfamily Felinae						
				×		cf.
				×		
						×
				×	×	
Subfamily Machaerodontinae						
				×		
Subfamily Nimravinae						
				×		
Family <b>Hyaenidae</b>						
				×	cf.	×
				×		
Order PINNIPEDIA						
Family <b>Otariidae</b>						
					×	
				×		
				×		

Table 15 — cont.

	Langebaan- weg			Elandsfontein (Hopefield)	Melkbos	Swartklip
	Baard's Quarry	'C' Quarry	'E' Quarry			
<b>Order PROBOSCIDEA</b>						
<b>Family Gomphotheriidae</b>						
* <i>Anancus</i> sp. . . . .			×			
<b>Family Elephantidae</b>						
* <i>Stegolophodon</i> sp. . . . .	×					
* <i>Stegodon</i> sp. . . . .	○	○				
*cf. ' <i>Archidiskodon</i> ' sp. . . . .	○	○				
*' <i>Archidiskodon</i> ' <i>broomi</i> . . . . .				×		
*' <i>Loxodonta</i> ' <i>zulu</i> . . . . .				×		
? <i>Loxodonta</i> <i>africana</i> . . . . .					×	
<b>Order PERISSODACTYLA</b>						
<b>Family Rhinocerotidae</b>						
<i>Diceros</i> <i>bicornis</i> . . . . .	×		×	×	×	
<i>Diceros</i> <i>simus</i> . . . . .	×			×	×	×
*? <i>Diceros</i> sp. . . . .	×					
<b>Family Equidae</b>						
* <i>Hipparion</i> <i>albertense baardi</i> . . . . .	×	×	cf.			
* <i>Equus</i> <i>plicatus</i> . . . . .				×		
* <i>Equus</i> <i>helmei</i> . . . . .	○	○		×		
<i>Equus</i> sp. . . . .					×	×
<b>Order ARTIODACTYLA</b>						
<b>Family Suidae</b>						
* <i>Mesochoerus</i> <i>lategani</i> . . . . .				×		
* <i>Mesochoerus</i> <i>paiceae</i> . . . . .				×		
* <i>Tapinochoerus</i> <i>meadowsi</i> . . . . .				×		
* <i>Incertae sedis</i> (2) . . . . .			×			
<b>Family Hippopotamidae</b>						
<i>Hippopotamus</i> <i>amphibius</i> . . . . .	cf.	cf.		×	×	cf.
<b>Family Giraffidae</b>						
* <i>Libytherium</i> <i>olduvaiense</i> . . . . .	×		×	×		
* <i>Giraffa</i> <i>gracilis</i> . . . . .			cf.	cf.		
<b>Family Bovidae</b>						
* <i>Tragelaphus</i> cf. <i>strepsiceros</i> . . . . .				×	×	
<i>Taurotragus</i> <i>oryx</i> . . . . .				×	×	
*' <i>Homoioceras</i> <i>bainii</i> ' . . . . .				×		
* <i>Syncerus</i> sp. . . . .					×	
<i>Redunca</i> <i>arundinum</i> . . . . .				×	×	
<i>Redunca</i> cf. <i>arundinum</i> . . . . .						×
* <i>Redunca</i> sp. . . . .	○	○	×			
* <i>Hippotragus</i> cf. <i>leucophaeus</i> . . . . .						×
* <i>Hippotragus</i> spp. . . . .			cf.	×	×	
* <i>Damaliscus</i> sp. . . . .	○	○				
* <i>Damaliscus</i> sp. . . . .				×		
cf. <i>Connochaetes</i> sp. . . . .				×	×	×
* <i>Lunatoceros</i> cf. <i>mirum</i> . . . . .				×		
* <i>Megalotragus</i> sp. . . . .				×		
cf. <i>Oreotragus</i> sp. . . . .	○	○				
<i>Raphicerus</i> sp. . . . .				×	×	×

Table 15 — cont.

	Langebaanweg			Elandsfontein (Hopefield)	Melkbos	Swartklip
	Baard's Quarry	'C' Quarry	'E' Quarry			
Family <b>Bovidae</b> (cont.)						
* <i>Antidorcas marsupialis australis</i> ... ..						×
* <i>Antidorcas</i> sp. ... ..				×	cf.	
* <i>Gazella</i> cf. <i>wellsi</i> ... ..				×		
* <i>Gazella</i> spp. ... ..	×		×	×		
* <i>Incertae sedis</i> (+1) ... ..			×	×		
Order <b>CETACEA</b>						
<i>Incertae sedis</i> .. ..			×			
Order <b>LAGOMORPHA</b>						
<i>Lepus capensis</i> .. ..				×		
<i>Lepus</i> sp. ... ..			×			
Order <b>RODENTIA</b>						
Family <b>Bathyergidae</b>						
<i>Bathyergus suillus</i> .. ..				×	×	×
<i>Georychus</i> cf. <i>capensis</i> .. ..				×		
Family <b>Hystricidae</b>						
<i>Hystrix</i> cf. <i>africae-australis</i> .. ..				×		
Family <b>Muridae</b>						
<i>Otomys</i> cf. <i>saundersiae</i> .. ..				×		
<i>Parotomys</i> cf. <i>brantsi</i> .. ..				×		
<i>Incertae sedis</i> (+1) .. ..			×			×
Class <b>REPTILIA</b>						
Order <b>CHELONIA</b>						
<i>Incertae sedis</i> (+1) .. ..	×	×	×	×	×	×
Class <b>AVES</b>						
Order <b>STRUTHIONIFORMES</b>						
<i>Struthio australis</i> ... ..			×	×	×	×
<i>Incertae sedis</i> (+1) ... ..			×	×		
Class <b>CHONDRICHTHYES</b>						
Several genera and species .. ..		×				
Class <b>OSTEICHTHYES</b>						
Several genera and species .. ..		×	×			

\* Extinct forms.

○ Recorded from 'Langebaanweg'; from either Baard's Quarry, 'C' Quarry or both.

The Melkbos fauna has essentially the same 'modern' character as that from Swartklip, but it includes elements such as the lion, hyaena and koodoo, which have affinities to forms from Elandsfontein. In addition, the buffalo and ? hippotragine antelope from Melkbos are extinct forms not represented in the Swartklip assemblage, and it is concluded that the Melkbos fauna predates that from Swartklip. The archaeological associations of these two sites, while too dubious to be of real value, do at least suggest an age difference in the right

order. Since none of the extinct genera of the Elandsfontein fauna (*Simopithecus*, *Mesochoerus*, *Megantereon*, etc.) occur at Melkbos, the fauna of the latter site almost certainly post-dates the main Elandsfontein fauna.

These four sites have yielded widely different numbers of specimens, ranging between about 600 from Melkbos to about 20,000 from Elandsfontein, and they have been studied with varying degrees of thoroughness. Nevertheless, it is concluded that there are sufficient grounds for considering Melkbos to be intermediate in age between Elandsfontein and Swartklip, and that these three occurrences date from the latter part of the Quaternary. The Langebaanweg fauna takes a more isolated position in the earlier part of the Pleistocene.

#### ACKNOWLEDGEMENTS

Over the years many persons have presented fossils they had collected at the Melkbos site to the South African Museum. Without their interest and generosity this report would not have been possible. In this connection I wish particularly to mention Prof. R. Singer of the University of Chicago and Messrs. J. Rudner, H. G. A. Craye, R. R. Inskip and G. Hoehn, all of Cape Town.

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The conclusions reached in this report do not necessarily reflect the views of any of these people.

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#### SUMMARY

The location, geological and archaeological associations, and fauna of a fossil site north of the town of Melkbosstrand, Cape Province is discussed. The remains of eighteen types of mammals, one bird and one tortoise are described or mentioned. It is concluded that the site dates from the latter part of the Upper Pleistocene, that it post-dates that at Elandsfontein (Hopefield), and is earlier than the Swartklip fossil sites.

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