	No. of specimens
Homotherium sp.	1
Megantereon eurynodon	6

All specimens were from faunal zones 1 and 2 which date from approximately 2,6 to 1,3 million years (Maglio 1972). The oldest beds of Olduvai Bed I are dated at 1,85 million years before present (Kurten 1963, Leakey 1967, Cooke 19[illegible]).

Koobi Fora has also yielded a large robust australopithecine that resembles *Australopithecus robustus*, which allies it to Swartkrans. This gives Swartkrans an age of 2,6 million years (Cooke 1970). Sterkfontein and Taung, with their *A. africanus* fossils would seem closer to Makapansgat (also the source of *A. africanus* specimens) and therefore considerably older. An elephant tooth showing affinities with the *Elephas recki* lineage, which is dated in East Africa at 3,0 million years, was found at Sterkfontein (Cooke 1970).

In North Africa, the primary Quaternary fossil sites are centred on the Mediterranean coast of Algeria and Morocco. Their ages range from lower Villafranchian to Middle Pleistocene, the lower Villafranchian being marked by the association of a mastodont *Anacus osiris* with a primitive elephant, *Elephas africanavus* (= *Loxodonta africanava*). The same kind of association is found in the lower Villafranchian of Perrier and other European localities (Cooke 1968). *Machaerodus* sp. is recorded from this level and also from the Middle Pleistocene of Ternifine (Cooke 1964).

Correlation with other parts of the world, namely Europe, India and China is a little difficult when one considers the question of the source of the genera and their consequent migration. Kurten considers a Eurasian origin for most Pleistocene genera, while Cooke holds that Africa, being the most stable continent climatically, offered the most suitable source, and that the presence of species in European deposits does not necessarily have any bearing on their African counterparts (Cooke 1964).

In Europe, India and China, there was a continuous stratigraphic sequence from Pliocene through to Pleistocene times, and it has been possible to synchronise the various faunal assemblages and draw up an approximate correlation (Wadia 1951). A composite correlation for these countries is taken from Stirton (1951) and is included in table I.

The many European localities yielding Villafranchian fossils have been listed and placed in chronological order, according to their faunal assemblages. The oldest is at Etouaires (Perrier) which contains many archaic types, gradually lost in the younger horizons. Megantereon megantereon and Homotherium crenatidens are found together throughout the Villafranchian up to the highest levels of Seneze and Val d'Arno (Kurten 1963[a]).

Kurten places the Plio-Pleistocene boundary for Europe at a much more recent date than does Cooke for Africa. Cooke places Kaiso and Kanam, a little older than 4,0 million years, at the base of the Villafranchian. Kurten on the other hand dates the base of the Pleistocene at 2,0 to 1,6 million years. This is based on evolutionary rates for Mammalia and Mollusca (Kurten 1963[a]). If the latter opinion is taken as correct, the deposits at Makapansgat and Sterkfontein, as well as Omo and Laetolil in East Africa are Pliocene in age. In Ewer's (1956) opinion, the fauna of the Transvaal caves is typically "an ancient one, with modern species beginning to appear" (p.44), but still Villafranchian in character. She does, however, mention the difficulties in dealing with incomplete faunal assemblages, and of differing opinion regarding taxonomy. Because of this, the above date was only a tentative one.

Recently, a geomorphological approach for South African chronology has been suggested by Partridge (1973). This is based upon the fact that the opening of the caves was a result of an uplift of the land surface which is calculated to have occurred about 20 million years ago. Subsequent erosion rejuvenated valleys and gorges into the escarpment, gradually advancing inland. Nick points and waterfalls mark the present extent of erosion, and the time elapsed since the uplift can be calculated. The position of the caves in relation to the nick-points thus indicates their age. The dates for the opening of each cave suggested by this technique are as follows: Makapansgat 3,7 million years, Sterkfontein 3,2 m.y., Swartkrans 2,5 m.y. and Taung 0,8 m.y.

Table III shows an estimated chronology for the South African deposits and a tentative correlation with other parts of the world.

	D. diastemata (Piveteau 1948)	D. diastemata (Hendey in press)				D. barlowi (Cooke pers. comm.)			D. piveteaui (Ewer 1955)	D. abeli (Zdansky 1924)
		L.2674	L.20685	L.20284	L.20702	A	B	C		
C $\frac{w.}{l.}$	0.54	-	0.54	0.63	0.61	0.59	0.51	0.64	0.59	0.65
$\frac{l.P^3}{l.P^4}$	0.72	0.59	-	-	-	0.52	0.59	-	0.50	0.63
$P^4 \frac{w.}{l.}$	-	0.48 (cal.)	-	-	-	0.44	0.48	-	0.31	0.38
$\frac{w.M^1}{l.P^4}$	-	0.31 (cal.)	-	-	-	0.29 (cal.)	0.15 (cal.)	-	0.11 (cal.)	-
$\frac{l.P_3}{l.M_1}$	0.69	-	-	0.61	-	-	-	0.51	-	0.54
$M_1 \frac{w.}{l.}$	-	-	-	0.48	-	0.55	0.47	0.45	-	0.45

TABLE I

A comparison of tooth proportions of known species of Dinofelis.

w. = width
l. = length

	C $\frac{w.}{l.}$	$\frac{l.P^3}{l.P^4}$	$\frac{w.M^1}{l.P^4}$	P^4 $\frac{w.}{l.}$	$\frac{l.P_3}{l.M_1}$	M_1 $\frac{w.}{l.}$
Machaerodus catocopis						0.42
Machaerodus aphanistus		0.54	0.25		0.67	
Machaerodus palanderi	0.37	0.57	0.25	0.33	0.52	0.41
Machaerodus tingii	0.41					
Machaerodus maximilliani	0.53	0.56	0.34	0.46		
Megantereon megantereon	0.51	0.50		0.45		0.50
Megantereon? falconeri		0.37	0.24	0.37	0.30	0.50
Megantereon eurynodon	0.50	0.39	0.22	0.31	0.31	0.46
Megantereon nihowanensis	0.53	0.45		0.48		
Megantereon inexpectatus	0.40	0.45		0.37		
Homotherium crenatidens	0.42	0.25/ 0.28			0.25	
Homotherium nestianus	0.45	0.25	0.26	0.33		
Homotherium ultimus	0.40	0.13	0.10	0.24		0.37
Homotherium ethiopicum				0.45		0.47
Homotherium sp.						0.34
Homotherium "problematicus"	0.40	0.20		0.16? (worn)	0.35	0.35

TABLE II.

A comparison of the more important tooth ratios between different species of Machaerodontinae.

Data from various authors.

w. = width

l. = length

	N. America	Europe	N. Africa	E. Africa	S. Africa	India	China
UPPER PLEIST.	Wisconsis	Wurm.	Neolithic	Neolithic & Mesolithic cultures	Stone Age cultures	Boulder Conglomerate	
	Sangamon	Eem					
					Florisbad		
	Illinovian	Riss-Saal	Lac Karar	Peninj	Hopefield		
		Holstein		Olduvai IV			
	Yarmouth		Ternifine				
		Mindel-Elster			Cornelia	Pinjor	
MIDDLE PLEIST.		Cromer		Olduvai III	Vaal Gravels		
		Erpfingen					
		Val d'Arno	Ain Hanech		Taung?		Choukoutien
		Seneze					
VILLAFRANCHIAN	Irvington	Chilhac	Bel Hacel	Olduvai II			
		St. Vallier					
		Olivola	Koro-Toro			Tatrot	
		Pardines	Lac Ichkeul				
		Villaroya	Aim Brimba				
		Rocceneyra		Olduvai I			
		Vialette	Fouarat				
2.0 m.y.		Etouaires		Laetolil			

	N. America	Europe	N. Africa	E. Africa	S. Africa	India	China
					Kromdraai		
2.6 m.y				Koobi Fora	Swartkrans		
3.0 m.y.					Sterkfontein		
					Makapansgat		
				Omo			
				Kaiso			
				Kanam			
PLIOCENE	Blancian	Astian				Dhok Pathan	Nihowan

TABLE III

A tentative correlation for Pleistocene deposits.
Data from Stirton (1957), Kurten (1963[a], 1964) and Cooke (1964, 1970).
(Not to scale)

2. LIST OF MATERIAL.

	Specimen No.	Description	Identity	Level in cave breccia	Locality and association in cave
1.	Breccia block A	Post cranial fragments	*Dinofelis* sp.	Basal Red Breccia	All were associated, near "ancient entrance" Block B found in situ, the other two specimens from loose lying breccia.
2.	Breccia block B	Post cranial fragments	*Dinofelis* sp.	Basal Red Breccia	
3.	16202M	Right manus and part of left.	*Dinofelis* sp.	Basal Red Breccia	
4.	M8358	Part of large, crushed skull.	*Dinofelis barlowi*	Basal Red Breccia	All were associated, but separated from the above, and at a higher level in the breccia.
5.	Breccia block C	Fragments of large mandible and manus.	*Dinofelis barlowi*	Basal Red Breccia	
6.	16201M	Left ankle joint.	*Dinofelis barlowi*	Basal Red Breccia	
7.	16196M	Isolated distal femur.	*D. barlowi*	Grey breccia	All found close together and in situ.
8.	M259	Upper and lower jaw symphysis.	*D. barlowi*	Grey breccia	
9.	M256	Naso-frontal region of skull.	*D. barlowi*	Grey breccia	
10.	M607	Right mandibular ramus.	*D. barlowi*	Grey breccia	
11.	M8357	Crushed left mandibular ramus.	*D. barlowi*	Lower Phase I	From cone, above level of grey breccia. About same level as crushed skull, M.8358.

	Specimen No.	Description	Identity	Level in cave breccia	Locality and association in cave
12.	M2136	Part of right mandibular ramus	<u>Dinofelis</u> sp.	Upper Phase I	From considerably higher level. Amongst baboon material.
13.	Breccia block D (sp. 16192M)	Humerus, radius and ulna in articulation Young animal vertebral epiphyses	? Hyaenidae	Basal Red Breccia	) Associated) near "ancient) entrance, close) to breccia blocks) A and B.
14.	Breccia block E	Vertebral epiphysis with rodent post crania	? Hyaenidae	Basal Red	

2 METHODS OF PREPARATION

All the material was prepared mechanically. This was initially with a hammer and chisel to clear large amounts of matrix, while the bones were extracted using a vibro tool. If the bones broke, they were glued together with Glyptal.

In a few cases, where the specimen was particularly fragile, or where the matrix was very hard, the acetic acid method was used. The exposed parts of the bones were first painted with diluted Glyptal which was allowed to dry, then put in a solution of one part acid to ten parts water. After one to two hours they were removed and washed in tap water for at least four hours, and allowed to dry. The loosened matrix was cleared away and the operation repeated as often as was necessary.

A disarticulated leopard skeleton was used to help identify some of the bones (B.P.I. 258). Photographs were taken of all the specimens, natural size, the outlines traced, and the illustrations completed from the specimens themselves. Measurements were made with a sliding steel caliper, and, where the reading was too large, an angled caliper. All measurements are in millimetres.

3 DESCRIPTION OF MATERIAL

3.1 Skulls

For comparative purposes, illustrations of skull A from Bolts Farm are included in this study (figs. 1, 2 and 3).

Specimen M256

Specimen M256 is the middle portion of a skull belonging to a large felid. The entire nasal region is missing, as is the occipital region. The jugal arch is only partially present on the right side, while on the left it is completely missing.

On the roof of the skull (fig. 4a) the bones present are the dorsal portion of the maxilla and the frontal. Laterally, the frontal extends downwards to contribute to the walls of the braincase between the orbits. The lacrimal bone is preserved on the right side (fig. 4b) and is well indicated. The jugal extends out from the lacrimal, but is broken at about midway along the jugal arch. On the left side, the lacrimal and jugal are absent and the lateral walls of the braincase are clearly visible, although sutures between the bones are obscure. Anteriorly, the frontal extends downwards to meet the palatine, where there are the two internal orbital foramina. The postero-ventral portion of the palatine, with the pterygoid, is missing, but a small portion of the alisphenoid is visible in front of the broken edge of the fragments. The orbit on the right side is partially filled with a hard calcareous matrix.

Ventrally and laterally (fig. 4c) the surface of the right jugal arch has been sheared away. Not much of the palatal portion of the maxilla is preserved. On the left, the broken edge of bone occurs along the suture between maxilla and palatine. On the right side, there is a deep round posterior palatal depression, but none of the teeth are present. There is a well defined suture between the pala-