			Transverse.	Antero-posterior diameter.
Teeth.	[Right side]	$\overline{M}_2$	10·5	11
		$\overline{M}_1$	11	11·5
	[Left side]	$\overline{M}_1$	11	12

Cranial Capacity (Lee's formula, employing auricular height), 1275 c.c.

Indices and Angles.		Indices and Angles.	
Breadth index	68	Dental $\overline{M}_1$ (L.)	91·6
Altitudinal index	62·3	Frontal bone index	97·2
Alveolar ,,	98 (?)	Gonio-symphysial (mandible)	110·8
Orbital ,,	85·8	Bregma angle	50°
Nasal ,,	52	Lambda ,,	75°
Palatine	107·4	Facial (Frankfort)	84°
Calvarial height	49·1	Basilar (Broca) No. 1	17°
Dental $\overline{M}_1$ (R.)	95·6	,, ,, No. 2	13·5°
,, $\overline{M}_2$ (R.)	95·4	Foramino-sellar	127°

ON THE IMPORTANCE OF AFRICA IN VERTEBRATE PALAEONTOLOGY

By C. W. Andrews, D.Sc. F.R.S. (British Museum, Natural History).

In the history of the world perhaps no phenomenon is more striking than the rapid growth of our knowledge of the African continent during the last half-century. Within the last few years this advance has been especially marked in the case of Geology and Palaeontology, much light having been thrown on the former physical conditions and inhabitants of this region. It is a remarkable circumstance that although Africa has long been admitted to be one of the oldest land-areas in the world, portions of it not having been submerged since the Permian period or even earlier, nevertheless there has been, until quite recently, a strong and unreasonable tendency among Palaeontologists to deny that this continent had been the centre of origin of any important groups of animals. So recently as 1900 Professor H. F. Osborn referred to Africa as 'the dark continent of Palaeontology, for it has practically no Mammal history.' Although, at the time, this was true in the case of the Mammalia, it was by no means so in the case of the Reptilia, of which a great number of extraordinarily interesting forms had long been known from the Permian and

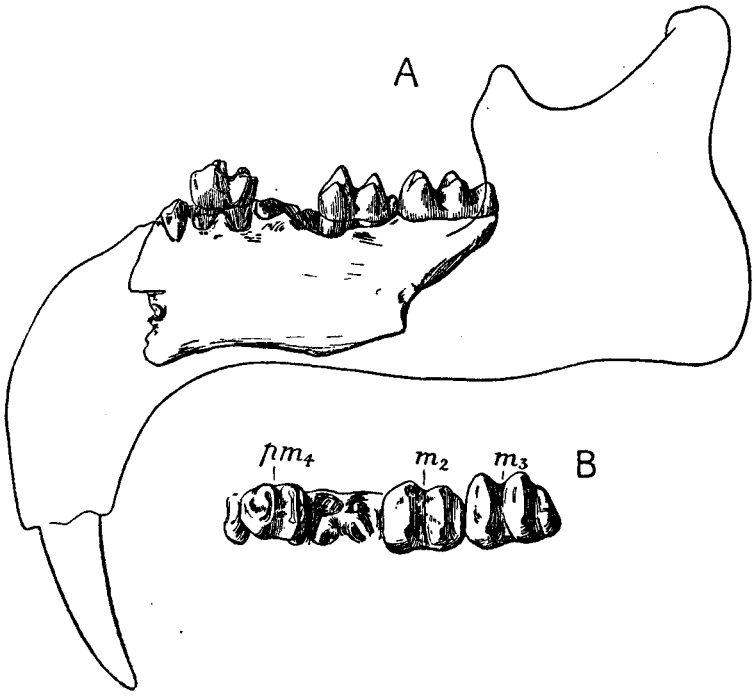
Triassic beds of South Africa. These reptiles are of exceptional importance because they not only include forms which show relationships with the Amphibia, but also give a clue to the manner in which the reptiles gave rise to the mammals. The first detailed account of these remarkable creatures was given by Owen, and more recently their structure and relationships have been discussed by Seeley, Broom, Watson, and others, work which is still being vigorously carried on by the two last-named writers. The fact that the mammals originated from these reptiles may be regarded as demonstrated; this is of particular importance because, if it can be certainly shown that the Mammalia really originated in Africa, and if parts of that continent have been land since this took place, then it is highly probable that somewhere or other there will be found mammalian remains of various periods, linking up the primitive Triassic or early Jurassic mammals with the modern types. Unfortunately, so far, no Secondary mammalian remains have been found, but in German East Africa beds of Cretaceous age containing skeletons of gigantic land Dinosaurs have been discovered, and it is in just such deposits that contemporary mammalian remains might be expected to occur.

When we come to the Tertiary period the case is different, and already much has been done to render Professor Osborn's remark obsolete. He himself suggested that probably Africa would be found to be the centre of origin of the Proboscidea, the Hyracoidea and the Sirenia, a prediction shortly afterwards proved true by the discovery of primitive members of these orders in the rich deposits of mammalian bones in the middle and Upper Eocene beds of the Fayum district of Egypt. These same beds have also yielded remains of animals which show that the Anthropoid apes and Toothed-whales probably originated in the same region. Besides these there are a number of remarkable forms which seem to have died out without leaving any descendants in the fauna of to-day. One of these, *Arsinoitherium*, was a huge hoofed animal carrying a pair of large horns on the nose, and quite unlike anything known elsewhere. Here detailed reference need only be made to the Proboscidea. The earliest member of this group, *Moeritherium* is from the Middle Eocene of the Fayum; it was an

animal about as large as the Tapir, which it must have much resembled in outward appearance. The molar-teeth have only two transverse ridges and the tusks, which are the second pair of incisors, were quite small. In the beds above (Upper Eocene) is found the next member of the group, *Palaeomastodon*, the species of which range in size from about that of a horse to that of a small elephant. In this animal the tusks are much larger and the molar teeth have three transverse ridges. The anterior part of the lower jaw is greatly elongated, so that it projects some distance beyond the skull and must have given the animal the appearance of possessing a short stiff proboscis.

Up to this period Proboscidea are known only from Egypt, but between the Upper Eocene and the Lower Miocene, the next horizon at which they have been found, they had spread over much of the world, having passed out of Africa along some land connexion with Europe or Asia, which broke down the isolation of that part of Africa in which they had originated ; the anthropoid apes, Hyraxes, and other members of the same fauna, no doubt spread north with them. In the lowest Miocene beds of Europe and India the Proboscidea are represented by two distinct types. One, *Tetrabelodon*, is really a Palaeomastodon with its peculiarities exaggerated, the hind molars having acquired more numerous ridges, the tusks being very large and the anterior part of the lower jaw greatly elongated. The other form, *Dinotherium* (see fig. p. 112), is very different and presents peculiarities not found in any other of the elephants ; thus the symphysis of the mandible, or chin, is turned sharply downwards and bears a pair of large recurved tusks. The molar-teeth also remained simple, only possessing two transverse ridges (except the first, which has three). In fact while *Tetrabelodon*, by the gradually increasing complication of its molars and the shortening up of the elongated mandible, leaving behind the flexible proboscis, gave rise to the modern elephants, *Dinotherium*, although continuing to exist till the Pliocene, made no further progress beyond increase in size. These two very different types of Proboscidea are, as already mentioned, found in company in the Lower Miocene beds of Europe and India ; but in deposits of the same

age at Mogara, in Egypt, only *Tetrabelodon* occurs, nor was it known till quite recently that *Dinotherium* had existed in any part of Africa. Last year, however, Mr. C. W. Hobley sent to the British Museum a fragment of a mandible with molars (see text-figure) which undoubtedly belongs to a small species of *Dinotherium*, closely similar to *Dinotherium cuvieri*, a species



Portion of the lower jaw of *Dinotherium hobleyi*. *A* From side with the outline of the whole jaw restored in outline. *B* From above, showing the crowns of the teeth. (About $\frac{1}{6}$ natural size.)

found in the Lower Miocene beds of France. This specimen was collected by the late Mr. Botry Piggot at Karungu, near the south-eastern shore of Lake Victoria Nyanza, and is the first early Tertiary mammal recorded from tropical Africa. It is of the greatest interest because it proves the possibility, and even the probability, of mammalian faunas of various ages occurring in that region, and also shows that the separation

of *Dinotherium* from the rest of the Proboscidean stock most likely took place in Africa, where the intermediate links may therefore be expected to be found. Dr. Felix Oswald has recently collected further material from Karungu, which seems to prove the correctness of the view put forward in the original paper on *Dinotherium hobleyi* that the beds in which it occurs are of Lower Miocene age. Similar faunas have been found at that horizon in Europe, India and elsewhere, and no doubt remains of *Tetrabelodon* and other characteristic forms will eventually be discovered in British East Africa. It should be noted that remains of a larger species of *Dinotherium* have already been collected by a French expedition from beds, probably of Pliocene age, on the river Omo to the north of Lake Rudolf.

The figure shows the type specimen of *Dinotherium hobleyi* together with the restored outline of the whole jaw; the down-turned tusks and the simple two-ridged molars are well shown: it is uncertain whether there were large tusks in the upper jaw or not.

The finding of this specimen shows what great possibilities of the discovery of completely new forms of extinct animals are afforded by British East Africa. An expedition to German East Africa has already found remains of a gigantic Dinosaur, some of the bones of which are about twice the size of those of the well-known *Diplodocus carnegii*, a reptile which was about eighty feet long. Now this discovery of a new mammalian fauna of Miocene age gives great hopes that in the near future important additions to our knowledge of this region may be made. It is greatly to be desired that anyone finding teeth or bones (or even fragments of them) that appear to be in a fossil condition, should send them to the British Museum for determination; for even though the specimens themselves may not be very good, they may be sufficient to determine whether further collecting on the spot would be likely to lead to valuable results.