

BOURLIÈRE, F., and J. VERSCHUREN

1960. *Introduction à l'écologie des Ongules du Parc National Albert*. Bruxelles: Institut des Parcs nationaux du Congo et du Ruanda-Urundi.

COLLINS, W. B.

1959. *The Perpetual Forest*. Philadelphia, New York: Lippincott.

DASMANN, R. F., and A. S. MOSSMANN

1961. "Commercial Utilization of Game Mammals on a Rhodesian Ranch." Paper presented at the annual meeting of the Wildlife Society, California Section, Davis, California, January 1961. Mimeographed.

GRZIMEK, M. and B.

1960. "Census of Plains Animals in the Serengeti National Park, Tanganyika," *J. Wildlife Management*, 24:27-37.

LAMPREY, H. F.

1960. In: *Annual Report of the (Tanganyika) Game Department*. Dar es Salaam, pp. 1-17.

LOWE, V. P. W.

1961. "A Discussion on the History, Present Status, and Future Conservation of Red Deer (*Cervus elaphus* L.) in Scotland," *La Terre et la Vie*, 108:9-14.

MONOD, TH.

1960. *Patrouille Majabat 1959-60. Rapport préliminaire* (mimeographed). Dakar: Institut français d'Afrique noire.

PETRIDES, G. A.

1961. "Ecological Research as a Basis for Wildlife Management in Africa." Paper presented at the CCTA/IUCN Symposium on the Conservation of Nature and Natural Resources in modern African States, Arusha. Mimeographed.

PIRLOT, P.

1956. "Recensement de grands Mammifères dans la plaine de Luama," *Bulletin agricole du Congo Belge*, 47:341-66.

RATTRAY, J. M.

1960. "Tapis graminéens d'Afrique." *Etudes Agricoles*, No. 49. Rome: United Nations Food and Agriculture Organization.

STEWART, D. R. M., and L. M. TALBOT

1961. "Loita-Mara-Serengeti Aerial Survey." Departmental Report. Mimeographed.

TALBOT, L. M., H. P. LEDGER, and W. J. A. PAYNE

1961. "The Possibility of Using Wild Animals for Animal Production on East African Rangeland, Based on a Comparison of Ecological Requirements and Efficiency of Range Utilization by Domestic Livestock and Wild Animals." Report presented at the Lake Manyara Conference. Mimeographed.

TURCEK, F.

1953. "Ecological Analysis of the Bird and Mammalian Population of a Primeval Forest on the Pol'ana Mountain (Slovakia)," *Bull. Intern. Acad. Tchèque Sci.*, 53:81-105.

CONTINENTAL VERTEBRATE FAUNAS OF THE TERTIARY OF NORTH AFRICA

C. ARAMBOURG

OUR KNOWLEDGE of the successive faunas of the continental vertebrates of North Africa during the Tertiary is far from being as advanced as that concerning Europe or America. This is a result of the scarcity of fossil strata, a direct consequence of the geological history of this region of Africa.

For the most part, this area is made up of marine formations which largely overlapped the edge of the African continental shelf until relatively recently, and which, in consequence, created few conditions favorable to the formation of continental vertebrate fossil sites.

We shall see, however, that sites do occur in two kinds of areas under very different conditions.

The first, which I shall call the *Atlas Zone*, corresponds to the broad zone of Pyrenean-Alpine folds, which make up the largest part of the Maghreb, extending from the north of Mauritania to the Tunisian edge of the Gulf of Syrte. Con-

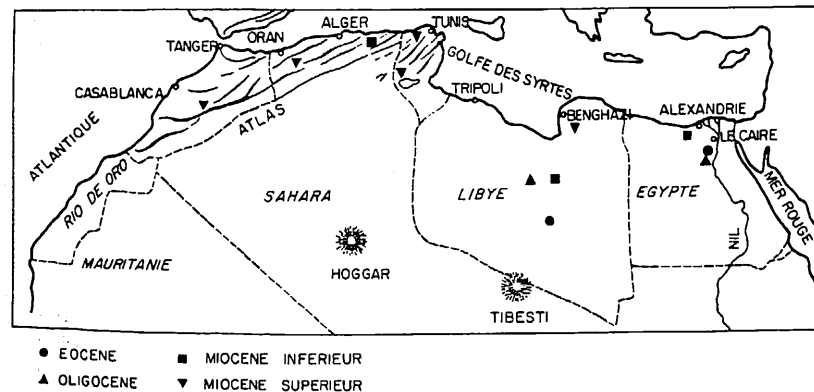


FIGURE 1
Sites of Tertiary Vertebrates in North Africa.

continental vertebrate sites appear only sporadically and are limited to a few rare lacustrine formations which are relatively recent and hardly extensive.

The second, the *Nilotic-Sabarian Zone*, corresponds to the flat region extending from the south end of the Atlas Mountains to the Red Sea and includes all of Libya, Cyrenaica, and the northern Nile Valley. In this region the continental formations are spread over a considerable expanse, and they have supplied the major part of the known African continental vertebrate fossils.

I. THE ATLAS ZONE

No site of Paleogene age is known in this region, where the entire stratigraphic series is marine.

LOWER AND MIDDLE MIOCENE

For a long time, certain continental "red" formations in Algeria, subsequent to the Eocene were attributed to the Aquitanian, but with no traces of corresponding fossils. Recently, at least a part of these "Aquitanian" deposits have been recognized as belonging to the Upper Miocene, a much more recent era. Nevertheless, it would seem, according to certain scattered finds, that many of these "red beds" are a little older and go back to the beginning of the Miocene. This at least is the case for those of the Isserville region (Kabylie). Deperet (1897) describes a *Mastodon (Trilophodon) pygmaeus* from there which was recently found in the Burdigalian of Libya.

Finally, in the south of Tunisia, the Cherichera region long ago provided some fossil remains of mammals coming from a "Miocene" level of indeterminate age, among which Gaudry described (1891) under the name of "*Mastodon angustidens*" a Proboscidian mandible which appears to belong to *Rhynchotherium Spenceri*, cited by Fourtau (1918) as from the Burdigalian of Moghara in Egypt.

UPPER MIOCENE

Apart from these few indications, one must go to the end of the Miocene for some adequate paleontological evidence.

THE OUED EL HAMMAM SITE (ALGERIA)

The best known site is that of Oued el Hammam (department of Oran) where I recently found (1959) a *Hipparion* fauna which recalls that of the classical Pontian of Eurasia. But the continental levels that enclose it are covered over by many hundreds of meters of marine formations with *Ostrea crassissima*, containing an abundant fauna of mollusks of the tortonian type. In turn, the marine

Pliocene of Astien facies, with its characteristic molluscan fauna, covers this formation. That is to say, the fauna of Oued el Hammam belongs to the last part of the Miocene and clearly prior to the classical Pontian fauna. In fact, all the elements of the former, although close to those that characterize the Pontian fauna, are nevertheless distinct.

Another site, that of Marceau in the region of Algiers, is contemporary with that of Oued el Hammam and complements its fauna.

The following is a list of the elements coming from these two sites:

Proboscideans: <i>Turicius</i> sp., <i>Mastodon</i> sp.	<i>Cephalophus</i> sp.
Perissodactyles: <i>Dicerorhinus primaevus</i> , <i>Hipparion africanum</i> .	Carnivores: <i>Hyaena algeriensis</i> .
Artiodactyles: <i>Palaeotragus Germaini</i> , <i>Samotherium</i> sp., <i>Damalavus Borocoi</i> ,	Rodents: <i>Hystrix</i> sp.
<i>Gazella praegaudryi</i> , <i>Tragocerus</i> sp.,	Tubulidentates: <i>Orycteropus mauritanicus</i> .
	Primates: <i>Macaca Flandrini</i> .
	Birds: <i>Struthio</i> sp.

The genus *Hipparion* is the oldest fossil equid known in Africa, because no known earlier sites, Burdigalian or Paleogene, have provided fossils of this group. We are therefore dealing with an eastern migration, but one which reached the African continent during the Upper Miocene and hence was earlier than in Europe. This fact considerably modifies—as I have already had occasion to stress—the ideas maintained by certain geologists and paleontologists about the correlation between the continental formations of the Old World and the New, and about the definition and the limit of Neogene stages of these two hemispheres.

THE BENI MELLAL SITE (MOROCCO)

Here we have a travertine deposit, located east of the *meseta* and near the junction of the Middle and High Atlas mountains.

Its fauna is mostly composed of micromammalia, the relations of which are difficult to establish. However, the presence of certain genera, such as the *Cricetodon* and a Hyracoid, militates in favor of an Upper Miocene or Pontian Age.

THE PONTIAN STAGE (?)

The presence of a Pontian fauna has been noted in a few rare parts of North Africa: by Dalloni (1915) near Nemours in the department of Oran; in Morocco, in the argil of Camp Bertheaux, by Bourcart (1937), and Choubert and Ennouchi (1946), following the discovery of *Hipparion* teeth. But, as we have just seen, other data will be necessary to determine the age of these layers with certainty.

Also, Gobert in 1907, found in the Tozeur region of Tunisia, a few elements of a fauna that included the genus *Merycopotamus* with various antelope, which P. Thomas and Solignac attributed to the Upper Miocene. Boule (1910), then

Solignac (1931), placed these *Merycopotamus* beds in the Pontian stage. But it must be noted that this Indian genus appeared in India well before the Pontian, and its presence is in no way characteristic of this stage. The same is true of the genus *Hipparion* recovered later by Passemard (1928) from the Tozeur beds, a genus which appeared in Africa, as we know (see page 57), before the end of the Miocene.

More recently (1934) Roman and Solignac noted the existence, near Douaria (Tunisia), of a Pontian fauna site, including, with *Merycopotamus*, a rhinoceros (*Rh. pachygnathus*) and a sivatherine (*Helladotherium Duvernoyi*); but these records have never been subjected to a detailed description.

PLIOCENE

The Pliocene period is, for all North Africa, an almost complete paleontological gap.

Only a few lacustrine formations of the Constantine-setiferous plateaus can reasonably be attributed to it: limestone of the St. Arnaud Cemetery and from Ain el Bey (department of Constantine), as well as that from around Mascara (department of Oran). The only important fossil coming from these sites is a small *Hipparion*, well defined by Pomel (1897) under the name *Hipparion sitifense*.

II. THE NILOTIC-SAHARIAN ZONE

PALEOGENE FAUNAS

The first discoveries made in this zone were those from the Fayum, in the Nile Valley, which brought to light the oldest continental fauna thus far recognized in Africa. But the levels containing this fauna correspond to those already elevated in the Paleogene, and, in consequence, all the African fauna from the beginning of the Tertiary remains unknown to us. Until recent years, the Fayum sites appeared to be unique in Africa; but recently (1960-61) the search for oil of the T. O. T. A. L. Company has uncovered new sites of the same age in the Libyan desert.

A. THE FAYUM SITES

Numerous classic studies have been dedicated to these sites, so that only a summary of the data will be given. It is a question of concordant fluvio-marine and fluvial-lacustrine formations, but in which the succession of vertebrate faunas at various levels permits the determination of a certain number of subdivisions.

1. *Eocene*. The base of the sites is formed by marine levels which appear to correspond to a part of the Eocene prior to the Lutetian. Above, there are fluvio-marine beds showing:

a. a lower zone rich in cetaceans (*Prozeuglodon isis*, *Protocetus atavus*, *Eocetus Schweinfurthi*), in sirenians (*Protosiren Fraasi*, *Eotheroides aegyptiacum*, *libycum*, *abeli*, *majus*, *Trichechus Coulombi*), in crocodiles (*Tomistoma kerunense*), and fish;

b. an upper zone which corresponds to the end of the Lutetian and constitutes the horizon of Qasr-el-Sagha. It contains, with certain of the preceding species, other cetaceans (*Zeuglodon Osiris*) and various terrestrial mammals (*Moeritherium Lyonsi*¹), primitive ungulates allied both to proboscideans and to sirenians, and *Barytherium grave* (another ungulate with proboscidean tendencies), and reptiles and fish.

2. *Oligocene*. The rest of the Fayum series belongs to the Oligocene and includes a fauna essentially characterized by the appearance of true proboscideans, by the abundance and the differentiation of hyracoids of which some are giant forms, by the abundance of the anthracotheres, and by the presence of catarrhine primates. The essential elements are the following:²

Insectivores: *Metolbodotes Stromeri*.

Bats: *Vampyravus orientalis*, *Ptolemaia Lyonsi*.

Rodents: *Phiomys Andrewsii*, *Metaphiomys Beadnelli*.

Carnivores: *Sinopa aethiopia*, *Metasinopa Fraasi*, *Apterodon altidens*, *macrogathus*, *minutus*, *Pterodon africanus*, *leptognathus*, *phiomensis*, *Hyaenodon brachycephalus*.

Primates: *Moeripithecus Markgrafi*, *Apidium phiomense*, *Parapithecus Fraasi*, *Propithecus Haeckeli*.

Proboscideans: *Moeritherium Andrewsii*, *Palaeomastodon Beadnelli*, *Barroisi*, *intermedius*, *parvus*, *Phiomia serridens*,

minor, *Osborni*, *Wintoni*.

Embrithopodes: *Arsinoitherium Zitteli*.

Hyracoids: *Pachyhyrax crassidentatus*,

Sagbatherium antiquum, *annectens*, *euriodon*, *macrodon*, *sobrina*, *Gemiohyus mirus*, *diphyucus*, *gigas*, *magnus*, *micrognathus*, *subgigas*, *Bunohyrax fajumensis*, *affinis*, *major*, *Megalohyrax eocaenus*, *minor*, *niloticus*, *pygmaeus*, *suillus*, *Titanohyrax palaeotherioides*, *Andrewsi*, *Schlosseri*, *ultimus*.

Artiodactyles: *Mixtotherium mezi*, *Rbagatherium aegyptiacum*, *Brachyodus Andrewsii*, *Fraasi*, *Gorringei*, *parvus*, *rugulosus*.

To this mammalian fauna must be added a bird (*Eremopezus eocaenus*), some reptiles (*Crocodylus articeps*, *megarhinus*, *Tomistoma gavialoides*, *Testudo ammon*, *Beadnelli*, *Isis*, *Podocnemis fajumensis*, *Stereogenys libyca*), and fish.

There is no need to stress the uniqueness of the fauna of Fayum, which distinguishes it from its contemporaries in other parts of the world.

1. Other species of this genus have been described from the same sites, but the taxonomic value of these forms is disputable.

2. This list corresponds to what has been described. Taxonomic value of species attributed to a particular genus is debatable.

B. THE LIBYAN DESERT SITES

For a long while, the Fayum fauna was known only in the Nile Valley. The first indication of its extension toward the west came about in 1951 following the discovery by Kikoine of a few *Moeritherium* teeth (Arambourg, Kikoine, Lavocat 1951) in an Eocene layer near Gao in the Sudan. But recently (1959-60) the geologic research carried on by T. O. T. A. I. Company, uncovered important sites in the Libyan desert with Eocene and Oligocene vertebrates (Arambourg and Magnier 1961).

1. *Eocene*. The Eocene sites are about 520 kilometers south of Syrte Major. They belong to a thick subhorizontal formation much cut by erosion, running between 18° and 19° longitude and 26° latitude for nearly 100 kilometers. This outcrop, unnamed on the maps, has been designated by T. O. T. A. L. geologists as "Djebel Coquin."³

This series rests on Paleocene marine beds. Its lower part, marine, includes only fish remains (Shark teeth) and a sea serpent of the genus *Pterospheenus*. This level is overlain by a thick clay series, sometimes gypsiferous, the upper part of which is rich in vertebrate remains. The whole is covered by sandstone attributed to the Oligocene containing only plant fossils, with a profusion of silicified wood.

The fauna of Djebel Coquin corresponds to that of the horizon of Qasr-el-Sagha of Fayum. It is a fluvio-marine fauna which also includes the typical association *Barytherium grave*, in relative abundance, and *Moeritherium Lyonsi*. The other fossils are fish of the genera *Pristis*, *Fajumia*, *Lates*, etc., crocodiles of various forms, a short-snouted Nilotic type, the others of the long-snouted type (*Tomistoma*) and *Dyrosaurus*, as well as palustral tortoises and one sea serpent, *Gigantophis*.

2. *Oligocene*. The presence of terrestrial vertebrates in an Oligocene level was discovered by Magnier, in the environs of the Zella oasis, south of Syrte Major (Arambourg and Magnier *loc. cit.*). This involved an estuarine deposit the outcrop of which, unfortunately limited, did not permit more extensive investigation. Nevertheless, a few characteristic forms were found: *Palaeomastodon*, *Phiomia Wintoni*, *Megalohyrax palaeotherioides*, *Brachyodus* cfr. *Gorringei*, carnivore, paludal turtle, and crocodile.

This typical fauna is sufficient to indicate the extension of the Oligocene beds of Fayum into Libya.

3. It is probably the same layer which was noted by Bellair, Freulon, and Leftane (1954) under the name of Dor-et-Talha.

THE NEOGENE FAUNA

A. THE BURDIGALIAN SITE OF MOGHARA

The first elements of Miocene fauna of North Africa were discovered (Fourtau 1920) in Egypt, in the Moghara oasis 150 kilometers southwest of Alexandria. The Burdigalian marine beds there are associated with continental levels where Fourtau collected numerous vertebrate remains. The list follows:

Mammals: *Schizodelphis* cfr. *sulcanus*,
Delphinus van Zelleri, *Teleoceras* Snowi,
Aceratherium sp., *Brachyodus africanus*,
Moncyi, *Moneyi* var. *sricidentatus*,
Mastitherium Depereti, *Mastodon*
angustidens var. *libyca*, *Mastodon*
(*Rhynchotherium*) *Spenceri*, *Hyaena* sp.,
Dryopithecus mogharensis, *Pliopithecus*
Tandyi.

Reptiles: *Crocodylus Lloydii*, *Tomistoma*
Dowsoni, *Gavialis* sp., *Podocnemis*
egyptiaca, *Bramlyi*, *Trionyx*
Senckenbergianus.

Fish: *Pristis* sp., *Myliobatis* aff. *angustidens*,
M. aff. *meridionalis*, *M.* sp., *Sphyrna*
prisca, *Synodontis* sp., *Lates* sp., *Silurides*
indet.

B. THE BURDIGALIAN SITE OF ZELTEN (LIBYA)

This site, discovered in 1960 by Magnier, is in Cyrenaica, 150 kilometers south of Syrte Major. It extends over a considerable area to the east from Djebel Zelten, where it rests on Oligocene marine beds and is overlain by Helvetian marine beds.

It is remarkable for its abundant silicified wood, whole tree trunks, sometimes complete with branches, and which, lying in the same direction in certain places, suggest the idea of a flood deposition. The vertebrates collected are as follows:

Mammals: *Mastodon pygmaeus*, *Mastodon*
(*Triphodon*) sp., *Brachypotherium*
Snowi?, *Brachyodus* sp., *Hyobooops*
africanus, *Prolibitherium Magnieri*,
Libycochoerus Massii, *Afrocyon Burolletii*,

etc.
Reptiles: *Tomistoma africanum*, *Euthe-*
codon?, *Crocodylus* cfr. *niloticus*?
Fish: *Silurides*, *Lates*
Birds: *Aepyornithidae* (*Psamornis*?).

This fauna complements and adds significantly to that of Moghara. *Prolibitherium*, notably, is a generalized Sivathere, the existence of which is related to that of another giraffid of the Burdigalian of eastern Africa, *Climacoceras africanus*, each of them apparently found at the base of two giraffid phyla—on the one hand *Sivatherinae*, on the other *Giraffidae*—indicating the African origin of the giraffids.

Moreover, the genera *Afrocyon* and *Libycochoerus* are related to the fossil forms of India rather than with those of other regions.

C. THE PONTIAN (?) SITE OF SAHABI

To the north of the above, in the neighborhood of Benghazi in Cyrenaica, this fluvial-marine site probably belongs to the end of the Miocene. Its fauna, although abundant, has unfortunately been only very incompletely described; it is noteworthy that it includes a long snouted mastodon, *Stegotrabelodon syrticus* and *St. libycus*, along with *Stegolophodon sababianus*, *Stegodon syrticus*, *Pentalophodon sivalensis*, *Merycopotamus*, some bovids, some crocodiles, and fish typical of the Upper Miocene.

The Pliocene

The only fossiliferous place of this age currently known is Ouadi Natroun, in the Nile Valley; it has supplied only rare elements, among which a hippopotamus (*H. protamphibius Andrewsii*) and an antelope (*Hippotragus* (?) *Cordieri*).

CONCLUSIONS

In spite of the considerable gaps which yet remain in our knowledge, it is nevertheless clear that the Tertiary fossil fauna of North Africa—just as that of the rest of the continent—are characteristically endemic, which clearly distinguishes them from those of Europe, and even more so from those of America. The presence in the Upper Eocene of large proboscidiiform ungulates, and, since the Oligocene, of true proboscideans, highly diversified hyracoids, various suiformes and catarrhine primates—some already oriented in the anthropomorphic direction—are indications of the role Africa probably played as the center of evolution for numerous groups, particularly for the hominids. What we know of Neogene faunas only corroborates these first data and demonstrates, in the absence of the late-immigrating equids, the importance in Africa of the artiodactyl group.

Furthermore, if the mesogean rifts were an obstacle to the exchange of fauna between Africa and Eurasia during the major part of the Tertiary, it is evident that territorial connections between Africa and the Indian regions brought about the establishment of an Ethiopian-Indian biogeographic block which, until a relatively recent epoch, dominated the faunal relations between these two continents.

Finally, it should be noted that since the Eocene the successive faunal associations of the North African regions present a remarkable ecological similarity. The mammals in general belong to tropical savanna types of Sudanese character. The aquatic animals, fish and reptiles, are of Nilotic character. But among the crocodiles must be noted the association, since the Eocene, of African types with

broad, short snouts (*niloticus* type) or with narrow snouts (*cataphractus* type), with the true long snouted gavialoids (*Tomistoma* or *Eutbecodon* genera) which persisted in Africa up to the Villafranchian.

Thus it is known, and I have so indicated in another symposium, on "Early Man and Pleistocene Stratigraphy in the Circum-Mediterranean Regions," that this endemic African characteristic is preserved, in its essential aspects, until the time of the Quaternary, and that it is only toward the end of that period that certain Eurasian elements penetrated to North Africa, probably by way of the Near East and Suez.

BIBLIOGRAPHY

- ARAMBOURG, C.
1959. "Vertébrés continentaux du Miocène supérieur de l'Afrique du Nord," *Publ. Serv. Carte Géol. Algérie* (Alger), N.S. Paléontologie Mémoire No. 4.
- ARAMBOURG, C., J. KIKOINE, and R. LAVOCAT
1951. "Découverte du genre *Moeritherium* Andrews dans le Tertiaire continental du Soudan," *C. R. Acad. Sci. (Paris)*, 233:68-70.
- ARAMBOURG, C., and P. MAGNIER
1961. "Gisements de Vertébrés dans le bassin tertiaire de Syrte (Libye)," *C. R. Acad. Sci. (Paris)*, 252:1181-3.
- BELLAIR, P., J. FREULON, and J. LEFRANC
1954. "Découverte d'une formation à Vertébrés et Végétaux d'âge tertiaire au bord occidental du désert libyque (Sahara occidental)," *C. R. Acad. Sci. (Paris)*, 239:1822-4.
- BOULE, M.
1910. "Sur quelques Vertébrés fossiles du Sud de la Tunisie," *C. R. Acad. Sci. (Paris)*, 150:812-13.
- BOURCART, J.
1937. "Sur la découverte de molaires d' *Hipparion* à la base de la série lacustre à argiles smectiques de Camp-Berteaux (Maroc Oriental)," *C. R. S. Soc. Géol. France* (Paris), No. 8, pp. 79-80.
- CHOUBERT, G., and E. ENNOUCHI
1946. "Premières preuves paléontologiques de la présence de Pontien au Maroc," *C. R. S. Soc. Géol. Fr. (Paris)*, No. 11, pp. 207-8.
- DALLONI, M.
1915. "Le Miocène supérieur dans l'Ouest de l'Algérie: couches à *Hipparion* de la Tafna," *C. R. Acad. Sci. (Paris)*, 161:638-41.
- DEPÉRET, C.
1897. "Découverte de *Mastodon angustidens* dans l'étage cartennien de Kabylie," *Bull. Soc. Géol. Fr. (Paris)*, Sér. 3, 24:518-21.

FOURTAU, R.

1918 and 1920. "Contribution à l'étude des Vertébrés miocènes de l'Égypte" (1st and 2nd eds.), *Geol. Surv. Egypt* (Le Caire), 2nd ed.

GAUDRY, A.

1891. "Quelques remarques sur des Mastodontes à propos de l'animal du Cherichera," *Mem. Soc. Géol. France* (Paris), Mém. 8.

POMEL, A.

1897. "Les Equidés," *Publ. Serv. Carte Géol. Algérie* (Alger), Monogr. Paléont.

ROMAN, F., and M. SOLIGNAC

1934. "Découverte d'un gisement de Mammifères pontiens à Douaria (Tunisie septentrionale)," *C. R. Acad. Sci.* (Paris), 199:1649-50.

SOLIGNAC, M.

1931. "Le Pontien dans le Sud Tunisien," *Annales Univ. Lyon (Sc. et Médecine)*, n. s. 1, Fasc. 48.

PLEISTOCENE MAMMAL FAUNAS OF AFRICA,
WITH PARTICULAR REFERENCE
TO SOUTHERN AFRICA

H. B. S. COOKE

INTRODUCTION

THE FOSSIL MAMMALS of Africa were virtually unknown until the latter half of the nineteenth century when a number of French scientists, notably Thomas and Pomel, began to describe material from the northwest African coastal region. At this time the equatorial and southern parts of the continent were paleontologically unexplored and it was not until the first two decades of the present century that systematic descriptions of mammal fossils from this region started to appear. The valuable bibliography of the fossil mammals of Africa by Hopwood and Hollyfield (1954) lists almost 450 living and extinct species and subspecies of Pleistocene mammals recorded up to 1950; the writer has records of a further 59 names to the end of 1960. The dates on which each variety was first mentioned have been analyzed in the histogram given in Figure 1, which thus presents some idea of the activity of paleontological description, decade by decade.

Of these 500 records, about 180 are not separated from living types and the remainder are ascribed to forms supposedly extinct. Although Hopwood and Hollyfield effected some revisions in their lists there are many obvious synonyms amongst the Proboscidea, Equidae, and Suidae, some of which have been dealt with since their account appeared. Omitting these and also the listed subspecies, the number of reasonable records to 1960 is reduced to 350, of which 130 are not separated from living species.

It is clear that the criteria employed for the evaluation of the fossil species varies greatly from authority to authority and from region to region so that a good deal of co-ordinated revision is necessary before effective interregional comparisons can be made. It is also apparent that each of the various major sites has furnished only a partial fauna whose character has been controlled by the local environment of preservation and is not representative of the whole spectrum of contemporary life. Families or even orders which are common at

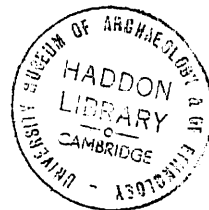
VIKING FUND PUBLICATIONS IN ANTHROPOLOGY

Number Thirty-Six

AFRICAN ECOLOGY
AND
HUMAN EVOLUTION

Edited by

F. CLARK HOWELL and FRANÇOIS BOURLIÈRE



Subscribers edition

distributed through

CURRENT ANTHROPOLOGY

for the

WENNER-GREN FOUNDATION FOR ANTHROPOLOGICAL RESEARCH, INCORPORATED

1 9 6 3