

***Contributions to the Eocene palaeontology and stratigraphy of Beira Alta, Portugal***

***II — New Late Eocene mammalian remnants from Côja (Portugal) and the presence of Palaeotherium magnum Cuvier***

M. T. ANTUNES \*†

\* Academia das Ciências de Lisboa

†Centro de Estratigrafia e Paleobiologia da UNL, Faculdade de Ciências e Tecnologia,  
Quinta da Torre, P-2825 Monte da Caparica, Portugal

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#### RESUMO

*Palavras-chave: Mamíferos—Eocénico superior—Côja—Portugal.*

É registada a ocorrência de *Palaeotherium magnum* na fauna de Côja, presença que é concordante com a prévia atribuição ao nível de Montmartre (Ludiano). Observações de campo, conjugadas com a identidade da fossilização de todos os exemplares conhecidos e a compatibilidade de todos os táxones de vertebrados, indicam proveniência de idêntico nível da mesma unidade litostratigráfica, as "Arcoses de Côja".

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#### RÉSUMÉ

*Mots-clés: Mammifères—Eocène supérieur—Côja—Portugal.*

La présence de *Palaeotherium magnum* est signalée parmi la faune de Côja. Elle est en accord avec l'attribution, faite auparavant, au niveau de Montmartre (Ludien). Des observations sur le terrain, la compatibilité avec les autres taxons de la faune et la fossilisation identique de toutes les pièces montrent que les vertébrés fossiles proviennent du même horizon de l'unité lithostratigraphique dénommée "Arcoses de Côja".

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#### ABSTRACT

*Key-words: Mammals—Late Eocene—Côja—Portugal.*

The presence of *Palaeotherium magnum* in the fauna from Côja is recorded. It is well in agreement with the earlier reporting to the Montmartre level from the Ludian stage. Field data as well as compatibility with the remaining taxa and the identical fossilization of all the specimens indicate that all the vertebrate fossils come from the same horizon in the lithostratigraphic unit "Arcoses de Côja".



## INTRODUCTION

The clay exploitation by Empresa Cerâmica da Carriça Lda. at Côja (Coimbra District) is the only portuguese site that yielded a significant late Eocene (Ludian) mammalian fauna. Hence its paramount importance as a stratigraphic reference for the deposits on the huge platform, North of the Iberian Central Mountain Range.

Furthermore, it represents the westernmost occurrence of the "Gypse de Montmartre" classical fauna, as it was firstly recognized by ANTUNES (1964). Some papers followed (see ANTUNES, 1986, which includes a bibliography on this subject).

No collecting was successful after our August 1964 researches. Meanwhile, development of mechanical exploitation rendered even more difficult to look for fossils. However some bones from the same site stored long ago at the Museu Mineralógico e Geológico of Coimbra University were rediscovered (December 1988) by Mr. P. Proença e Cunha. This led to further study of the Côja fauna, presented here.

## NEW DATA AND DISCUSSION

The fossils here reported were collected in 1956 by the geologist P. Martins de Carvalho, who sent them to Professor M. Montenegro de Andrade, then at Coimbra University. Mr. Carvalho was carrying out field work for the Empresa Cerâmica da Carriça Lda. under demand from Mr. L.S. Filipe, Director.

A few years earlier, fossil bones were collected at the same site. They were reported by G. Zbyszewski in 1953, but their true paleontological and chronological significance was not realized then.

According to Mr. Carvalho (who recently informed Mr. Proença e Cunha) these fossils would have been found in some clay prospection pits in the same greenish sediments where in April 1964 workers collected (in a prospection pit about one hundred

meters North of the exploitation front) a *Diplobune secundaria* hemimandible, and M.T. Antunes found in August of the same year a *Peratherium cuvieri* maxillary.

The fossilization pattern of the white and very fragile bones in a greenish clayey matrix is always the same. This holds for the 1953 and subsequent samples as well. Available field data also point out to a single origin of the vertebrates, the lenticular greenish clays referred to before (ANTUNES, 1967, text-fig. 1, pl. I).

All the identified taxa are indeed compatible and do not suggest even slight differences in age among them. For these reasons we regard the Côja vertebrate fauna as a coherent assemblage from but one and same horizon of the stratigraphical unit known as "Arcoses de Côja" formation.

This corroborates and is corroborated by observations at another site at the clay exploitation from Cerâmica da Beira, Lda. at Naia (about 30 kilometers North), in beds correlative of those from Côja (ANTUNES & DE BROIN, 1977, p. 184): white bones were often seen and sometimes collected in greenish clays, but never in an underlying unit of darker, grey carbonaceous clays with trunks from Gymnosperms and tree ferns (and some pollen and spores as well), accounted for by J. Pais (see Part III).

## DESCRIPTION

Most of the collection consists of poorly preserved, small and uncharacteristic bone fragments. Only three specimens seem to be identifiable: (a) a rear caudal vertebra that may perhaps be ascribed to *Anoplotherium*; (b) an *Anoplotherium* caudal vertebra close to another one, probably a 14th, previously described (ANTUNES, 1986), possibly from the same individual; and (c) the distal part of a metacarpal or metatarsal from a rather large-sized mammal, representing a hitherto unknown taxon.

The latter specimen is the only one that really justifies a closer look. Its symmetrical shape is enough to exclude the larger artiodactyls of those times, the anoplotheres. Hence the only remaining possibility is that it belongs to a quite large perissodactyl. As there were then no rhinoceroses nor any other large representatives of this order, it may undoubtedly be ascribed to *Palaeotherium magnum*.

The specimen under study is a median (III) metapodial. However one cannot be sure whether it is a metacarpal or a metatarsal, since the lack of the proximal part, some deformation and the loss of bony material do not let much room for speculation.

### THE LARGE PALAEOOTHERID: DISCUSSION AND IDENTIFICATION

Comparative work took into account published data but was based mainly on direct examination of collections at the Institut de Paléontologie, Muséum National d'Histoire Naturelle de Paris. We also observed some specimens at the Département des Sciences de la Terre, Université Claude-Bernard (Lyon I), and in particular the *Palaeotherium magnum* skeleton from Mormoiron, Vaucluse.

Comparisons have been attempted with other *Palaeotherium* species, the middle-sized *P. crassum* Cuv. and *P. medium* Cuv. Specimens from the Montmartre Gypsum were checked against the one under study, i.e.:

— left Metatarsale III number GY 511 e, at the Galerie de Paléontologie, figured by DE BLAINVILLE (1839-1864, pl.IV) and ascribed to *P. crassum*.

— left Metatarsale III number GY 410 f, also

figured by DE BLAINVILLE (*ibid.*) and reported to *P. medium*.

Regardless of morphological differences, size alone is enough to eliminate the medium-sized *Palaeotherium* species and, with even stronger reasons, the lesser Palaeotherids.

The only remaining possibility is the largest species *P. magnum* Cuv. At Paris Museum, all the third metacarpals and third metatarsals from the spectacular Vitry skeleton are poorly preserved. Size is about the same as that from the Côja specimen but useful measurements cannot be taken. The metatarsal III from the Mormoiron skeleton is rather crushed and apparently is broader than it should really be. It may be somewhat larger than the Côja specimen, even if such eventual differences is not really significant.

One recognizes that in general there is a good compatibility in shape and size with *Palaeotherium magnum*. In a revision of the Palaeotherids, FRANZEN (1968) showed that there are significant intraspecific variation, justifying the distinction of several forms (or subspecies). The largest are the last ones, from the Frohnstetten level, latest Ludian, uppermost Eocene. A few even cross the "Grande coupure" (*sensu* Stehlin) boundary into the lowermost Oligocene.

Uncomplete as it is, the specimen under study offers no definite proof of a post-Eocene age, and does not point out in that direction. The trend seems indeed to be the reverse, for it looks closer to earlier, less large forms. The size is apparently that of *Palaeotherium magnum girondicum* from the lower Ludian of La Débruge (cf. FRANZEN, *idem*, pl.10, fig.7). Summing up, classification at the subspecies level does not seem to be possible. In conclusion, we ascribe the Côja metapod to *Palaeotherium magnum* Cuvier ssp.

Table I  
Upper Eocene Vertebrates from two sites in Beira Alta

| <u>Empresa Cerâmica da Carriça Lda., Côja</u> | <u>Cerâmica da Beira Lda., Naia</u>                     |
|---|---|
| MAMMALIA                                      |   |
| Metatheria                                    |   |
| <i>Peratherium cuvieri</i> (Fischer 1829)     | Undet. mammals, among them maybe a <i>Palaeotherium</i> |
| Theria  |   |
| <i>Palaeotherium cf. crassum</i> Cuvier 1805  |   |
| <i>Palaeotherium magnum</i> Cuvier 1805 ssp.  |   |
| <i>Anoplotherium cf. commune</i> Cuvier 1804  |   |
| <i>Diplobune secundaria</i> (Cuvier 1822)     |   |
| REPTILIA                                      |   |
| Testudines                                    |   |
| <i>Geochelone</i> (s.gen. indet.) sp.         | <i>Geochelone</i> (? <i>Cheirogaster</i> ) sp.          |

## THE CÔJA VERTEBRATE FAUNA AND ITS AGE

The presence of *Palaeotherium magnum*, another common element of the classical fauna from the Montmartre Gypsum, late Eocene, does not change the previously recognized age for the CÔja site and correlative ones including that of Naia (see ANTUNES, 1986, p.104-105). The CÔja fauna probably indicates the 4 (Montmartre) level in the Ludian (RUSSELL *et al.*, 1982). The vertebrate checklist is now as follows (table I).

## CONCLUSIONS

This study leads to the following conclusions.

- The presence of *Palaeotherium magnum* ssp. is recorded for the first time among the CÔja fauna and in Portugal.
- This occurrence is compatible with the other

taxa previously known at CÔja and with the ascribed age, upper Ludian, 4 level (Montmartre), late Eocene; or MP 19 Standard level (Escamps) according to tables 1 and 2 (see SCHMIDT-KITTLER, ed., Internat. Symposium Mammal. Biostratigraphy and Paleocol. European Paleogene, Mainz, 1987).

- The identity of fossilization and matrix as well as field data clearly indicate that vertebrate fossils come from the same horizon from the "Arcoses de CÔja" Formation.

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