

***Korynochoerus palaeochoerus* FROM THE UPPERMOST MIOCENE OF ALCOY**

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ABSTRACT

The lignite mine of Alcoy (Alicante, Spain) is a classic macro mammal locality that was already known before 1845. This locality was placed in the Upper Miocene by several authors, but it was placed in the Pliocene by others.

The fauna includes a suid, that helps to date the locality. During the long period that the suid was known it has been determined as *Hyotherium soemmeringi*, *Korynochoerus palaeochoerus* and *Sus arvernensi*. It also might represent *Korynochoerus provincialis*. The material studied by us belongs to *Korynochoerus palaeochoerus*.

There are four species of importance for dating Alcoy: *K. palaeochoerus*, *Dicerorhinus schleiermacheri*, *Hipparion gromovae* and *Hipparion crassum*. The first three species are thought to have their last occurrence in MN 13, the last species is thought to have its first occurrence in MN 13. Alcoy is placed in MN 13 - the Upper Miocene.

Keywords: Alcoy, Suidae, Suinae, Dicoryphochoerini, *Korynochoerus palaeochoerus*, Mio-Pliocene limit.

RESUMEN

La mina de lignito de Alcoy (Alicante, España) es uno de los yacimientos clásicos de macromamíferos y es conocido ya desde antes del 1845. Este yacimiento fue datado por algunos autores como Mioceno Superior y por otros como Plioceno.

La fauna incluye un suido que nos ayuda a datar el yacimiento. Durante el largo lapso de tiempo en que el suido fue conocido, fue determinado como *Hyotherium soemmeringi*, *Korynochoerus palaeochoerus* y *Sus arvernensis*. Pero también podría representar *Korynochoerus provincialis*. El material estudiado por nosotros pertenece a *Korynochoerus palaeochoerus*.

Cuatro de las especies de Alcoy tienen importancia para la datación de este yacimiento: *K. palaeochoerus*, *Dicerorhinus schleiermacheri*, *Hipparion gromovae* y *Hipparion crassum*. Se piensa que las tres primeras especies tienen su última aparición en MN 13 mientras que la última especie tiene su entrada en MN 13. Por tanto se data el yacimiento de Alcoy como MN 13, Mioceno Superior.

Palabras Clave: Alcoy, Suidae, Suinae, Dicoryphochoerini, *Korynochoerus palaeochoerus*, límite Mio-Plioceno.

INTRODUCTION

The locality

The lignite mine of Alcoy is one of the oldest known spanish vertebrate localities.

The locality of Alcoy was first mentioned by Ezquerro del Bayo (1850) and Gervais (1852) was the first to describe and figure material from Alcoy, but the locality is a lignite mine (Alcoy-mina) and was known

at least from 1845, see Bosca (1911). This author is the first to mention a second locality in this area, Concentaina. Jiménez de Cisneros (1919) published *Elephas antiquus* from a Cuaternary locality near Alcoy. Thaler, Crusafont & Adrover (1965) described micromammals from a different locality in a valley near the lignite mine of Alcoy (Alcoy barranco) and considered it to be Upper Pliocene. Later it was placed in MN 13 - Upper Miocene (Mein, 1975). Esteban y Lacombe (in prep.) described rodents from a new locality near Alcoy: El Puntal and place it in MN 15.

Near Alcoy there are the following localities:

Alcoy - mina - macro mammals
 Alcoy - barranco - micro mammals - MN 13
 Concentaina - macro mammals
 a locality from the Cuaternary - macro mammals
 El Puntal - micro mammals - MN 15

Alcoy-mina has been placed alternately in the Upper Miocene and in the Pliocene. Since the discovery of micromammals in Alcoy-barranco both faunas are frequently put together as if they are one fauna. But they are two different localities, that may be in the same lignite bed, or not (Morales, 1984). If we speak of the locality Alcoy we mean Alcoy-mina, the classic locality.

Material from Alcoy - mina is dispersed over various collections:

Muséum National d'Histoire Naturelle, Paris.
 École des Mines, Paris.

Collection Visado in the Museu Arqueològic Municipal.

"Camil Visado Moltó", Alcoy.

Museo Nacional de Ciencias Naturales, Madrid (MNCN).

Instituto Tecnológico GeoMinero de España, Madrid (ITGE).

Collection Villalta, the Alcoy material is temporarily stored in the Museo Paleontológico Municipal, Valencia.

Alcoy mina: faunal list

Gervais (1852) described and figured material from Alcoy as: "*Hyaenarctos*, *Mastodon longirostris* ("auquel repond en gran parte *Mastodon angustidens*", p. 154), *Hipparion*, *Rhinoceros*, *Antilope Boodon*, un Ruminant de la tribu des Antilopes ou de Moutons, une autre espèce de Ruminant à peu près grande comme le Mouton, *Sus palaeochoerus*". He also described and mentioned material from Concud and material from San Isidoro including "*Cervus*, espèce indéterminé". In his abstract he put all Spanish Miocene species discussed together. This caused later some misunderstanding. Species or genera that Gervais (1852) mentioned from San Isidoro or cited from literature entered later in faunal lists for Alcoy. For instance *Palaeomeryx* and *Anoplotherium* (Royo Gómez, 1922).

Collection Visado contains material of a rhino, a mastodon, *Hipparion*, a suid, *Parabos? boodon* and a radius of a smaller ruminant accompanied by a note "*Cervus (Apreolus) australis*". Visado (1920) stated that this material comes from the mine.

The material collected by Villalta contains *Parabos? boodon* and a suid.

In the ITGE material of *Parabos? boodon* and a small ruminant is stored and in the MNCN a last upper molar of the suid.

The collections we saw seem to have the same species as were described by Gervais (1852) and we assume all material represents one fauna, that was collected from the mine. Nothing can be said about whether the material was collected from one or from several distinct lignite beds.

Since this publication of Gervais many faunal lists have been published for Alcoy. A recent one is by Morales (1984). It is based on the plates of Gervais and some material studied by this author. He mentioned: *Agriotherium* sp., *Anancus arvernensis*, *Hipparion crassum*, *Hipparion gromovae*, *Parabos? boodon*, Cervidae indet. and *Sus minor*.

H. gromovae is based on one tooth. Alberdi (1974) gave two possibilities, either: a) the tooth might be from a different stratigraphical level, or b) the tooth really belonged to *H. gromovae*. The presence of *H. crassum* in Alcoy is doubted by Sondaar (com. pers.); the Alcoy material should resemble the *Hipparion* from Concud. Crusafont y Villalta (1955) mentioned *Capreolus austriacus*. Citations of cervids from Alcoy are probably based on the radius in the Collection Visado. Morales (1984) omitted the rhino and the smaller ruminant material figured by Gervais. Guérin (1980, 1982) identified the rhino as *Dicerorhinus schleiermacheri*. Gervais mentioned a smaller bovid species and a third ruminant based on dentition and two astragali of different size. The smaller astragalus has 78 % the size of the larger astragalus. It is well possible that the two astragali represent two different species. In a following section we will show that the suid is *Korynochoerus palaeochoerus*.

The faunal list for Alcoy is:

Agriotherium sp.
Anancus arvernensis
 ? *Hipparion crassum*
Parabos? boodon
Dicerorhinus schleiermacheri
Korynochoerus palaeochoerus
 Bovidae indet.
 Ruminantia indet.
 ? *Hipparion gromovae*

The problem of the suid of Alcoy

Various authors have determined the suid from Alcoy different, the suid was determined as species that are now thought to belong to different tribes or even different subfamilies. Ezquerro (1850), Prado (1864) and Jimenez (1919) (in Golpe, 1972) and Gervais (1852) thought the suid from Alcoy to be *Sus palaeochoerus* (= *Korynochoerus palaeochoerus*). Bosca (1911) thought it to be *Hyotherium soemmeringi*. And Gomez Lluca (1944) cited both *Hyotherium palaeochoerus* and *Sus palaeochoerus*. Crusafont y Villalta (1955) and Thaler, Crusafont y Adrover (1965), Golpe (1972) and Morales (1984) considered the material from Alcoy to represent *Sus minor* (= *S. arvernensis*). Hünemann (1971) thought the suid from Alcoy to be probably

S. minor (= *S. arvernensis*) and Faure et Guérin (1982) mentioned the suid from Alcoy as *Sus*.

There is only little material, and although it is often mentioned in the literature, a good description and figures are given only by Gervais (1852).

Alcoy was mentioned as the last occurrence of *K. palaeochoerus* (V. d. Made y Moyà Sola *in press*, V. d. Made *in press* a y b). If it is *Sus arvernensis* it is the oldest occurrence of this species. Other European Turolian and Ruscinian suids are: *Microstonyx major*, *Korynochoerus provincialis* and two endemic island species, which are of no importance to us now (V. d. Made y Moyà Sola *in press*). *K. provincialis* is a species that has a dentition that is close in morphology to *K. palaeochoerus*, but there are some size differences. *M. major* is far superior in size. *Hyotherium soemmeringi* is an Aragonian species and is much smaller.

The material from Alcoy will be compared with *K. palaeochoerus*, *K. provincialis*, *S. arvernensis* and *H. soemmeringi*.

THE SUID MATERIAL FROM ALCOY

Material

Collected by Villalta, presently stored in the Museo Paleontológico Municipal, Valencia:

- a left M_3 $30.6 \times 16.1 - 14.5 - 11.1$
- a left M_3 anterior part DTa = 15.0
- a right M_1 $15.9 \times > 10.1 - 10.6$
- a right M^1 $15.3 \times 14.1 - 14.6$
- a right M^1 $17.7 \times - 17.1$
- a left I^1

Stored in the Museo Nacional de Ciencias Naturales:

- a left M^1 $29.3 \times 18.5 - 17.0 - 12.9$

Collection Visado:

- a right M^1 $26.8 \times 18.1 - 16.0 - 10.2$
- a left calcaneum

(measurements in mm: length $\times$ width of first lobe - width of second lobe - width of third lobe)

Description and comparison

The molars have the typical morphology of primitive Suinae. The $M1$ and the anterior parts of the $M3$ do not differ much from the same parts in *Sus scrofa*, save for the M^3 having the labial cusps with fairly flat walls, whereas in *Sus* and *K. provincialis* these surfaces tend to be more rounded. The talon of the M^3 is simple. Also the third lobe of the M_3 is simple; it consists of only one cusp placed near the axis of the tooth, preceded by a small cusp, which is comparable to the central cusp between the first and second lobe. At both

sides of this third lobe there is a cingulum formed by two series of small cusps.

In figure 1 diagrams are given that show the length and width of the molars. Here the specimens from Alcoy are compared to molars of *Korynochoerus palaeochoerus* (data from Hünemann, 1968), *K. provincialis* from Casino, Motpellier, Ptolemais-Kardia and Venta del Moro, *Sus arvernensis* from Bra, Gorafe IV, Hjánácka and Ivanovce (data from Hünemann 1971), Perpignan, Piedrabuena, Trévoux and *Hyotherium soemmeringi* from Sandelzhausen. In the graph for the M^1 also the M^2 of *S. arvernensis* are plotted. It can be seen that the M^3 , M_3 and M_1 are clearly smaller than the same molars in *K. provincialis*. In the M^1 this size difference is not that clear: only one of the two specimens is clearly smaller. The $M3$ and M_1 from Alcoy are as large as the largest $M3$ and M_1 of *Sus arvernensis*, one of the M^1 is clearly larger, but smaller than the M^2 of *S. arvernensis*. The $M3$ and one of the M^1 have the same size as the same molars in *K. palaeochoerus*, but the M_1 and the other M^1 are slightly smaller.

The shape of the I^1 is like that of primitive pigs like *Conohyus* or recent peccaries, save for the presence of a distal talon. For this talon the lingual cingulum is not straight; in the middle it is directed labially, more distally it is roughly parallel to the labial side of the tooth. The I^1 is also labially more hipsodont. The crown height is some 2.5 cm, measured along the curvature of the tooth. At the lingual side the cingulum has a height of about 4 mm. There is a small, but well individualized cusp at the place where the labio-distal corner of the crown would be, if there was no talon. The occlusal surface of the tooth is not flat, but undulates. This incisor has the same morphology as the first upper incisor of *K. palaeochoerus*. *K. provincialis* has an incisor that is very close in morphology, it only differs in not having a well separated distal cusplet. We do not know the I^1 of *S. arvernensis*. The same tooth in recent species of *Sus*, in *S. stozzii*, *S. brachygnatus* and *S. arvernensis* (a descendant of *S. arvernensis*, V. d. Made, *in press*) is more hipsodont. I^1 of *Sus* also tend to have a flat occlusal surface and they are relative smaller compared to the cheek teeth. The I^1 of *H. soemmeringi* has a lower crown and the distal cusp is usually much larger. The greatest length of the crown, measured along the occlusal surface is 21.8 mm. The greatest diameter perpendicular to the axis of the tooth is 15.8 mm and the perpendicular diameter is 9.6 mm. The calcaneum has the same morphology as in *Sus scrofa*; in size it matches well with the teeth.

DISCUSSION

Determination of the suid

The measurements of the incisor and its morphology indicates *K. palaeochoerus* or *K. provincialis*. The distal cusplet of the I^1 indicates *K. palaeochoerus* in

particular, but given the limited number of incisors studied the reliability of this character is not certain. The canine and palate with the two last molars from Alcoy figured by Gervais (1852), plate VI, figs. 7 and 8) may very well be *Korynochoerus*. Also a mandible is figured (plate VI, fig. 9), it is likely to be from Alcoy, but this is nowhere indicated. It is not well possible to judge from the plate the P_4 of the mandible is of the "Dicoryphochoerini-type" or of the "Sus-type" (V. d. Made & Moyà Solà *in press*). The incisors have a lower crown than the species of *Sus* of which we know the incisors. We do not know the incisors of *Sus arvernensis*. The incisors might indicate that the material described by Gervais represents *Korynochoerus* and not *Sus*. The measurements of the molars are not given however. The measurements of the molars studied by us indicate that the suid from Alcoy is either *Sus arvernensis* or *Korynochoerus palaeochoerus*.

The combination of these data singles out *Korynochoerus palaeochoerus*.

Dating Alcoy mina

By some workers Alcoy is assigned to the Upper Miocene or MN 13 (Gervais, 1852; Bosca, 1911; Jimenes de Cisneros, 1919; Royo, 1922; Mein, 1975; Guérin, 1980 y 1982; Alberdi y Morales, 1981, Morales, 1984) whereas it is assigned to the Lower Pliocene or MN 14 by others (Depéret, 1909; Crusafont y Villalta, 1955; Thaler, Crusafont y Adrover, 1965; Alberdi, 1974 y 1986).

The presence of *Anancus arvernensis*, *Parabos? boodon*, *Agriotherium* sp., Bovidae indet. and Ruminantia indet. is of no use for dating Alcoy.

Anancus arvernensis ranges MN 12 to MN 16 (Alberdi *et al.*, 1984). *Parabos? boodon* from Alcoy was studied by Gromolard (1980). She concluded that the bovids from Alcoy and Rousillon are different species. She did not mention any other locality with the same species as Alcoy. Depéret (1885, as cited by Gromolard, 1980) thought the species from the Rousillon and Alcoy identical. This has been one of the reasons why Alcoy has been placed in the Ruscinian. *Agriotherium* is present in Venta del Moro (MN 13) and in Montpellier (MN 14) (Morales, 1984). The small ruminant is not of use because it is indeterminable.

The supposed presence of *Gazella borbonica* would be an indication for placing Alcoy in the Pliocene, as the species enters in MN 15 (Heintz, 1975). But, as we have argued above, there is no sufficient proof of the presence of this species in Alcoy.

Hipparion often is used for stratigraphical purposes, but in this case its use is problematic for two reasons. Firstly there are doubts about the species present, for the time being, we assume the species to be *H. crassum* and *H. gromovae*, and secondly because of the ranges of these species. *Hipparion crassum* is possibly

present in MN 13 (Casino?), it is certainly present in MN 14 and MN 15; Alcoy is the oldest locality where this species is present and is placed in MN 14 (Alberdi, 1986).

The species would range MN 13 to MN 14, Alcoy being the only MN 14 locality (Alberdi, 1986) or would be restricted to MN 13, Alcoy being dated as MN 13 (Alberdi y Morales, 1981).

If Alcoy is placed in MN 13 the entry of *H. crassum* is MN 13 and the last occurrence of *H. gromovae* is also in MN 13 as in Alberdi y Morales (1981). If Alcoy is placed in MN 14 (as done by Alberdi, 1986) the entry of *H. crassum* and the last occurrence of *H. gromovae* are in MN 14. It is not clear why Alberdi (1986) transferred Alcoy from MN 13 to MN 14.

The two pachyderms from Alcoy help us to choose whether to extend the range of *H. gromovae* to MN 14 or to extend the range of *H. crassum* to MN 13.

Dicerorhinus schleiermacheri ranges MN 10 to MN 13 (Guérin, 1980 & 1982; Cerdeño, 1988). This would imply that Alcoy is Upper Miocene or MN 13).

Korynochoerus palaeochoerus ranges MN 8 to MN 13, the presence in Alcoy representing the only certain occurrence in MN 13 (V. d. Made y Moyà Solà, 1989; V. d. Made (a) *in press*). If Alcoy is placed in MN 14 the ranges of *D. schleiermacheri*, *K. palaeochoerus* and *H. gromovae* have to be extended to MN 14. If Alcoy is placed in MN 13 only the range of *H. crassum* is extended to MN 13. The last solution is the simplest and the one adopted here.

ACKNOWLEDGEMENTS

We thank Dr. J. F. Villalta, who put material from Alcoy at our disposal and Dr. J. Morales, Dr. J. M. Segura and Dr. J. Esteban who allowed us to study the material from Alcoy stored in the Museo Nacional de Ciencias Naturales, the Museo Arqueológico Municipal "Camil Visedo Moltó" and the Instituto Tecnológico Geominero de España. We thank Dr. J. Agustí, Dr. F. Campanino, Dr. C. Guérin, Dr. H. Mayr, Dr. A. Mazo, Dr. S. Moyà Solà, again Dr. J. Morales, Dr. Ricci and Dr. P. Y. Sondaar for allowing us to study material that was used for comparison. Dr. Sondaar and Drs. M. van Oudheusden read the manuscript.

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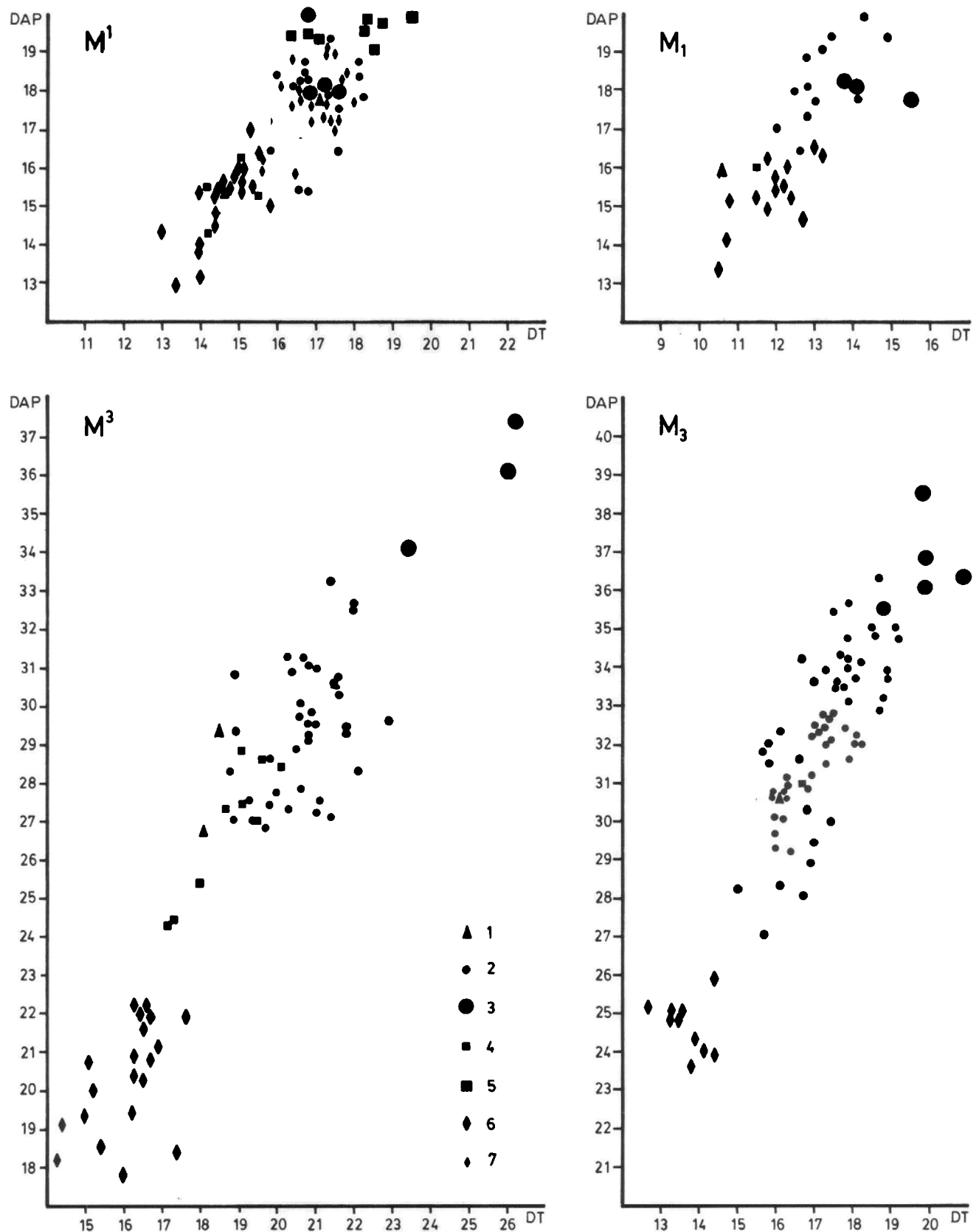


Figure 1. Length (vertical) and width (horizontal) of the cheek teeth of Suidae (in mm.). 1) *Korynochoerus palaeochoerus*, 2) *Korynochoerus provincialis*, 3) *Sus arvernensis*, 4) *Sus arvernensis* M^2 in the graph of the M^1 , 5) *Hyotherium soemmeringi*, 6) suid from Alcoy, 7) suid from Alcoy.

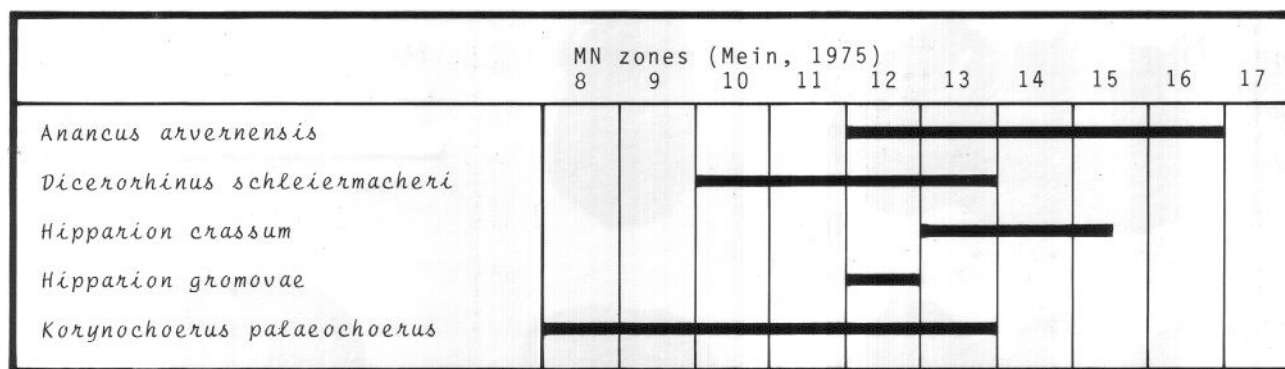


Figure 2. Ranges of some of the species from Alcoy.

Plate I

Korynochoerus palaeochoerus from Alcoy:

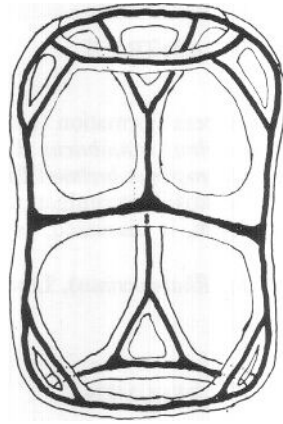
1. M₃ (Collection Villalta).
2. M₃ (MNCN).
3. M³ (Collection Villalta).
4. M₁ (Collection Villalta).
5. M¹ (Collection Villalta).
6. M¹ (Collection Villalta).
7. M_x (Collection Villalta).
8. I¹ (Collection Villalta).

Note added in proof

Since the paper was in press, I have had the opportunity to study the holotype of *H. meisneri* in the Naturhistorisches Museum Bern (NMBe).

The type is still smaller than the cast in the NMB: P₄, DAP 12.1, DTa 7.4, DTp 7.6; M₁, DAP > 12.0, DTa > 9.3, DTp > 8.5; M₂, DAP 14.6, DTa 11.5, DTp 11.4. The difference is probably due to the fact that the cast is painted. These smaller measurements show that the holotype of *H. meisneri* is even closer to the material from Cetina and even smaller than *H. major* from St.-Gérard and the fossils from Ulm-Westtangente.

I thank Dr. E. Büttiker allowing me to study fossils in the NMBe.

**CORRECCIÓN DE ERRATAS**

J. van der Made and M. Belinchón, 1991. *Korynochoerus palaeochoerus* from the uppermost Miocene of Alcoy. *Revista española de Paleontología*, n.º Extraordinario, 173-180.

There are some errors in the text, those which may hamper understanding are the following.

p. 173 bottom, first column: "... but the locality was a lignite mine ..." should be "... but the locality was known already before.

The locality is a lignite mine ...".

p. 174: instead of "*Apreatulus*" read "*Capreatulus*".

p. 175: second column, eleventh line above "Discussion": instead of "and *S. arvernensis*" read "and *S. nanus*".

The legend of Figure 1 should read:

1) Suid from Alcoy, 2) *Korynochoerus palaeochoerus*, 3) *Korynochoerus provincialis*, 4) *Sus arvernensis*, 5) *Sus arvernensis* M² in the graph of the M¹, 6) *Hyotherium soemmeringi*, 7) *Hyotherium soemmeringi* M² in the graph of the M¹.

The legend of Plate I should read:

1. M₃ (Collection Villalta). 2. M₁ (Collection Villalta). 3. M¹ (Collection Villalta). 4. M¹ (Collection Villalta). 5. I¹ (Collection Villalta). 6. M³ (MNCN). 7. M³ (Collection Visiedo). 8. M_x (Collection Villalta).