

A NEW SPECIES OF VULTURE (AVES, AEGYPIINAE) FROM THE UPPER PLEISTOCENE OF SPAIN

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SUMMARY.—*A new species of vulture (Aves, Aegyptiinae) from the Upper Pleistocene of Spain. A new species of vulture (Aegyptius prepyrenaicus nov. sp., Aegyptiinae, Aves) is described from an ulna discovered in an Upper Pleistocene cave (marine isotopic stage 3) from Northeast Spain (Gabasa, Huesca). This new species is characterised by its large size, larger than any known species of the genus Aegyptius. Its morphology resembles recent Black Vultures Aegyptius monachus but differs, mainly, by the lack of pneumatization in depressio radialis proximalis and depressio m. brachialis inferioris and in the shape of the depressio radialis that is long and rounded while in A. monachus it is long and triangulate. The finding of remains clearly belonging to A. monachus from the same period in a site 250 km far from Gabasa points out the probable sympatry of these species during the Upper Pleistocene.*

Key words: Aegyptius prepyrenaicus nov. sp., Upper Pleistocene, Spain.

RESUMEN.—*Una nueva especie de buitres (Aves, Aegyptiinae) del Pleistoceno Superior de España. Este artículo describe una nueva especie de buitres (Aegyptius prepyrenaicus nov. sp., Aegyptiinae, Aves) a partir de una ulna hallada en una cueva del Pleistoceno Superior (estado isotópico marino 3) en el noreste de España (Gabasa, Huesca). Esta nueva especie se caracteriza por su gran talla, superior a cualquiera de las especies conocidas del género Aegyptius. Su morfología presenta semejanzas con la del Buitre Negro (Aegyptius monachus) actual pero difiere, principalmente, por la ausencia de pneumatización en la depressio radialis proximalis y en la depressio m. brachialis inferioris y en la forma de la depressio radialis que es larga y redondeada mientras que en A. monachus es larga y triangular. El hallazgo de restos óseos en un yacimiento de la misma época que dista 250 km de Gabasa y que claramente pertenecen a A. monachus señala que estas dos especies pudieron ser simpátricas durante el Pleistoceno Superior.*

Palabras clave: Aegyptius prepyrenaicus nov. sp., España, Pleistoceno Superior.

INTRODUCTION

The site of Gabasa I is located 2 km north of Gabasa village in the province of Huesca, Spain (42°00'N, 0°25'E). This cave is situated in a limestone outcrop which dominates a river valley and its entrance is orientated towards the south-southeast (Hoyos *et al.*, 1992). The excavations have yielded eight archaeological layers (a-h from top to bottom) in a stratigraphic column about 3 m deep with human artefacts and abundant fossil material (Montes, 1988; Utrilla & Montes, 1989). The lithic tools are assigned to the Mousterian and the human occupation of the cave seems to have been irregular, it probably being used as a seasonal hunter's dwelling place (Montes, 1988). A sedimentological study assigned the archaeological layers to six levels (Hoyos *et al.*, 1992) as follows: I (layer

h), II (layers g and f), III (layer e), IV (layers d and c), V (layer b) and VI (layer a). This study also supplied information about the climatic conditions under which the deposits were accumulated. According to the authors, there is a succession of three cold (I, II and VI) and three warm (III, IV and V) phases. Regarding the absolute age of the deposits, there is a C¹⁴ date of level III (layer e) of 46500 ± 4400-2800 years BP (GrN 12809). This is probably best regarded as a minimum age as it is close to or at the limit of this dating method. Hoyos *et al.* (1992) attempted to correlate the stratigraphic sequence with the marine oxygen isotopic data, and placed the deposit in Marine Isotopic Stage (MIS) 3, between 42000-34000 years BP.

Between the bird remains from level II has appeared one bone of vulture that does not match with any described species. Other bird

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species from this level include Bearded Vultures *Gypaetus barbatus*, Golden Eagles *Aquila chrysaetos*, Kestrels *Falco tinnunculus*, Red-legged Partridges *Alectoris rufa*, Pigeons *Columba livia/oenas*, Great Owls *Bubo bubo*, Ravens *Corvus corax*, Red-billed Choughs *Pyrhcorax pyrrhcorax*, Yellow-billed Choughs *Pyrhcorax graculus* and Magpies *Pica pica* (Hernández, pers. obs.). The aim of this paper is to describe this new extinct species of vulture.

The mammalian fauna is composed of the following taxa: *Ursus spelaeus*, *Canis lupus*, *Vulpes vulpes*, *Cuon alpinus*, *Crocota spelaea*, *Panthera pardus*, *Felis sylvestris*, *Lynx spelaea*, *Meles meles*, Rhinocerotidae indet., *Equus caballus*, *Sus scrofa*, *Bos* sp., *Rupicapra rupicapra*, *Capra pyrenaica*, *Cervus elaphus* and *Capreolus capreolus* (Utrilla & Montes, 1989).

MATERIAL AND METHODS

The holotype was compared with several raptor species (see a list below) housed in the following institutions: Museo Nacional de Ciencias Naturales-CSIC, Madrid (MNCN); Naturhistoriska Riksmuseet, Stockholm (NRM); Institute für Paläoanatomie, Domestikationsforschung und Geschichte der Tiermedizin, München (IPM); Musée Royal de l'Afrique Centrale, Tervuren (MRAC); Institut Royal des Sciences Naturelles de Belgique, Bruxelles (IRSNB); and Natural History Museum of London, Subdepartment of Palaeontology (BMNH).

With regard to vulture classification we have adopted the criterion followed by several authors (Amadon, 1977; Mundy *et al.*, 1992; Howard & Moore, 1994) that consider *Torgos*, *Aegyptius*, *Trigonoceps* and *Sarcogyps* monotypic, merging all these genera in *Aegyptius* since this genus has priority. This taxonomy is supported by morphological (Amadon, 1977; Jollie, 1976; 1977a; 1977b) as well as molecular studies (Seibold & Helbig, 1995; Wink, 1995).

The osteological nomenclature follows Baumel (1993) and, in some respects, Ballmann (1966). The measurements were taken with a calliper to the nearest 0.05 mm following Mourer-Chauviré (1975).

SYSTEMATIC PALEONTOLOGY

Order *Accipitriformes* (Vieillot, 1816)
 Family *Accipitridae* (Vieillot, 1816)
 Subfamily *Aegyptiinae* Peters, 1931
 Genus *Aegyptius* Savigny, 1809
Aegyptius prepyrenaicus, nov. sp.

Holotype: right ulna including the proximal epiphysis and 10 cm of shaft (Figs. 1 and 2). MNCN 37148, Paleontological Collection, Museo Nacional de Ciencias Naturales-CSIC, Madrid.

Type locality: Gabasa I, Gabasa, Huesca, Spain (42° 00' N, 0° 25' E).

Horizon and Age: Level II (Hoyos *et al.*, 1992), Layer g (Montes, 1988; Utrilla & Montes, 1989). Upper Pleistocene, Marine Isotopic Stage (MIS) 3.

Etymology: The name refers to the geographic area (Prepyrenees) where the site is located.

Measurements of holotype: see Table 1 and Fig. 3.

Material examined: The holotype has been compared with the following species: *Aquila chrysaetos* (MNCN 23256), *Haliaeetus albicilla* (NRM A936630), *Gypaetus barbatus* (MNCN 23330), *Neophron percnopterus* (MNCN 25840), *Aegyptius monachus* (MNCN 18497, 18771, 19063, 23119, 23809 and 15 additional uncatalogued specimens), *Aegyptius tracheliotus* (IPM 1, MRAC 31012), *Aegyptius occipitalis* (NRM unnumbered, IRSNB 3039), *Aegyptius calvus* (IPM 1, IRSNB 2189), *Gyps fulvus* (MNCN 23810), *Gyps himalayensis* (IPM 1), *Gyps africanus* (IPM 1, IPM 2) and *Gyps bengalensis* (IPM 1, IPM 2).

Other material examined: *Gyps melitensis* (BMNH 49356).

Diagnosis: Larger than any known species of *Aegyptius* (Table 1, Figure 3).

Description and comparison: The size and morphology of the specimen excludes all the species but the largest vultures. The fossil is attributed to *Aegyptius* because of the following characters: (1) the olecranon is longer in *Aegyptius* than in *Gyps* (Figs. 1 and 2) and (2) the *depressio radialis proximalis* is much deeper in *Aegyptius* than in *Gyps* (Fig. 1).

The morphology of *A. prepyrenaicus* resembles recent *A. monachus* but lacks the pneumatization in the *depressio radialis pro-*



Fig. 1.—Proximal ulna in palmar view. A: *Aegypius prepyrenaicus* nov. sp., B: *A. monachus*, C: *A. tracheliotus* and D: *Gyps fulvus*. Scale bar: 1 cm.

[Ulna proximal en vista palmar: A: *Aegypius prepyrenaicus* nov. sp., B: *A. monachus*, C: *A. tracheliotus* y D: *Gyps fulvus*. Escala: 1 cm.]

ximalis and *depressio m. brachialis inferioris* typical of this species (Fig. 1). The shape of the *depressio radialis proximalis* is long and rounded in the new species while in *A. monachus* it is long and triangulate and in *A. tracheliotus* rounded and short (Fig. 1) This shape is not correlated with size within the genus (*pers. obs.*). In internal view, the edge of the *facies lig. interni* reaches the ventral cotyla more caudally

in *A. monachus* and in *A. tracheliotus* than in the new species (Fig. 2). The morphology of the smaller species of *Aegypius* (*occipitalis* and *calvus*) resembles *tracheliotus* and *monachus*, respectively, for the discussed characters.

Remarks: Some authors have pointed out that the extinct *Gyps melitensis* Lydekker 1890 is a mosaic form between *Aegypius monachus*



Fig. 2.—Proximal ulna in internal view. A: *Aegyptius prepyrenaicus* nov. sp., B: *A. monachus*, C: *A. tracheliotus* and D: *Gyps fulvus*. Scale bar: 1 cm.

[*Ulna proximal en vista interna*. A: *Aegyptius prepyrenaicus* nov. sp., B: *A. monachus*, C: *A. tracheliotus* y D: *Gyps fulvus*. Escala: 1 cm.]

and *Gyps fulvus*, with some bones resembling *A. monachus* counterparts and others elements approaching *G. fulvus* morphology (Jánossy, 1974; 1989; Weesie, 1988). Given these characteristics of *G. melitensis* and its large size (about one fifth larger than *G. fulvus*; Weesie, 1988), it could be argued that the ulna described above might be adscribed to this species. After examining the tibiotarsus (BM

49356) from the holotype series, we consider that *G. melitensis* is well placed in *Gyps* since the morphology of this bone agrees well with other *Gyps* species (which, for this bone, are distinctly different from *Aegyptius*), and the same is true for other appendicular bones of *G. melitensis* described so far (Mourer-Chauviré, 1975). Therefore, the mosaic status of *G. melitensis* might have to be reconsidered in

TABLE 1

Measurements (mm) of the holotype *Aegypius prepyrenaicus* and the other species of *Aegypius* genus (after Mourer-Chauviré, 1975). Means and standard deviations are provided. See Fig. 3 for extreme values. [Media y desviación estandar (mm) de las medidas (según Mourer-Chauviré, 1975) del holotipo de *Aegypius prepyrenaicus* y del resto de especies del género *Aegypius*. Véase la Fig. 3 para los valores extremos.]

	<i>A. monachus</i>	<i>A. tracheliotus</i>	<i>A. occipitalis</i>	<i>A. calvus</i>	<i>A. prepyrenaicus</i> nov. sp.
Sample size [Tamaño de muestra]	20	2	2	2	1
Greatest breadth of the proximal end [Anchura máxima del extremo proximal]	30.18±0.87	29.24±1.05	25.01±2.27	25.00±0.14	32.70
Diameter of the proximal end [Diámetro del extremo proximal]	25.94±1.09	24.58±0.96	19.75±0.63	20.70±0.84	28.30

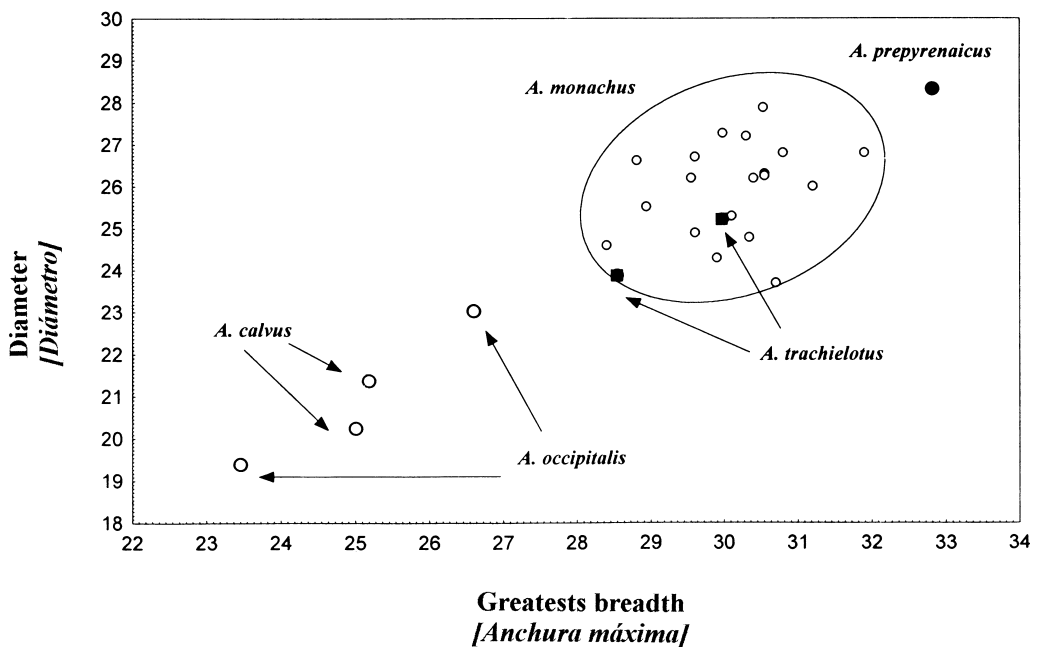


Fig. 3.—Greatest breadth and diameter of the proximal ulna of *Aegypius* spp. The ellipse coefficient for *A. monachus* is 0.95 ($n = 20$). Measurements in mm.

[Anchura máxima y diámetro (mm) de la ulna proximal de *Aegypius* spp. Coeficiente de la elipse para *A. monachus*: 0.95 ($n = 20$).]

the light of the new taxon described herein and, even, it seems possible that the material from *G. melitensis* with *Aegypius* features described from Europe (Jánossy, 1974; 1989; Wesie, 1988) might actually belong to *A. prepyrenaicus*.

DISCUSSION

The fossil record of Vultures in the Old World is fairly good for extant species, but with only one generally recognised species becoming extinct during the Pleistocene (*Gyps me-*

litensis; Tyrberg, 1998). The validity of *Gypaetus osseticus* Burchak-Abramovich 1971 being questionable, as well as *Vultur fossilis* Kerfestein 1834, that has been relegated to *Aves incertae sedis* (Mlíkovsky, 1998). This contrasts with the situation in North and South America, where several species of vultures and other large scavenging birds (Cathartidae, Teratornithidae) disappeared at the end of the Pleistocene together with the mammal megafauna (Steadman & Martin, 1984; Mundy *et al.*, 1992; Feduccia, 1996). Therefore, the occurrence of a new extinct vulture in the Upper Pleistocene of Europe is not completely unexpected.

The four species of *Aegypius* feed primarily on hard tissues (skin and muscles) from large mammal carcasses, although small animals such as rabbits, sometimes actively hunted, are in some cases important in their diet (Hiraldo, 1976; 1977; Mundy *et al.*, 1992). They breed solitarily or, occasionally, in loose colonies, place their nests in trees and are normally resident (Mundy *et al.*, 1992; Donázar, 1993). We might assume that *A. prepyrenaicus* behaved in a similar manner as the rest of the genus. Migratory behaviour may however have been different during glacial periods. While some vultures (particularly *Gyps himalayensis*) can tolerate quite low temperatures, their dependence on thermals for soaring makes it doubtful whether they could survive a glacial winter in Central Europe. Nevertheless, the fossil record indicates that at least *Gypaetus barbatus*, *Gyps fulvus* and *Aegypius monachus* occurred there during the Würmian (Tyrberg, 1998).

The geographical distribution area of *A. prepyrenaicus* is, at present, restricted to the type locality, although there is an ulna from Gibraltar, whose locality is uncertain (J. Cooper, *pers. com.*) housed in the Natural History Museum of London (numbered A 510) that could be tentatively assigned to this species, since its measurements are very close to the holotype (*pers. obs.*).

One interesting question concerning *A. prepyrenaicus* is whether it would have competed with other vulture species, in particular *A. monachus*, living in sympatry. The fossil record of *A. monachus* from the Iberian Peninsula is so far limited to four Upper Pleistocene records (Tyrberg, 1998; M. Elorza, *pers. com.*), although two of them are too fragmented for any measurement to be taken (A. Sánchez,

pers. com.). Other records include the ulna from Gibraltar, that could be tentatively assigned to *A. prepyrenaicus* as discussed above, and a tibiotarsus from Labeko Koba (Mondragón, Guipúzcoa, Basque Country, dated to Würm II/III) that has been assigned to *A. monachus* (M. Elorza, *pers. com.*). This last record is quite interesting since its age is similar to the new species and the distance between the two sites is about 250 km only. Besides, the measurements of this tibiotarsus fall within the smallest recent *A. monachus*, indicating that both species were contemporary. Also, several sites from France have yielded bones from *A. monachus* that apparently do not exhibit any differences, metrical or morphological, with respect to recent populations (Mourer-Chauviré, 1975). Several studies have shown how sympatric species of vultures avoid competition through differences in body size, feeding-related morphology, behaviour and habitat selection (Kruuk, 1967; Houston, 1975; 1988; Hiraldo, 1977). This is especially true for species from the same genus, where the most important differentiating factor is body size (Hiraldo, 1977) since their morphology is similar. The difference in size between *A. monachus* and *A. prepyrenaicus* is not as large as that observed today between sympatric species of *Aegypius*, but they could have contributed to avoid competition, maybe together with some type of spatial segregation like that found today between *G. fulvus* and *G. himalayensis* (Hiraldo, 1977). Also, the large mammal carcasses available at that date could have offered enough resources to support more than one congeneric species of vulture, since Hiraldo (1980) has shown that the number of sympatric species of vultures is correlated with the number of species of herbivores.

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