**Pleistovultur nevesi** gen. et sp. nov. (Aves: Vulturidae) and the diversity of condors and vultures in the South American Pleistocene

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**Abstract.** *Pleistovultur nevesi*, a new genus and species of a large Vulturidae is described from the Upper Pleistocene or beginning of the Holocene, based on a complete and well preserved right tibiotarsus from the Cuvieri cave deposits, one of the hundreds of caves of the Lagoa Santa region in Minas Gerais state, Brazil. Also described here is a distal half of a left tibiotarsus from Gruta dos Brejões, a cave in Morro do Chapêu, Bahia state, Brazil, which probably belongs to another not-yet-known genus and species of the Vulturidae. The described material, added to prior literature, is proof of the appreciable diversity of the Vulturidae during the Pleistocene in South America.


**Introduction**

Condors and vultures constitute the family Vulturidae with five extant genera and seven species, restricted to the Americas.

At least one extinct genus (*Breaegyps* Miller and Howard, 1938) and four extant genera (*Gymnogyps*, *Sarcoramphus*, *Cathartes*, and *Coragyps*) are recorded in the Pleistocene of North America, whereas two extinct genera (*Geronogyps* Campbell, 1979, and *Winogyps* Alvarenga and Olson, 2004) and the five extant genera (*Vultur*, *Gymnogyps*, *Sarcoramphus*, *Cathartes*, and *Coragyps*) are recorded for the Pleistocene of South America (Miller, 1910; Howard, 1962; Brodkorb, 1964, Campbell, 1979; Tonni and Noriega, 1998; Tambussi and Noriega, 1999; Alvarenga and Olson, 2004).

Several authors claim that the fundamental difference between condors and vultures is the greater size of the former, but this division is mainly based on cranial osteology (Miller and Howard, 1938; Fisher, 1944; Emslie, 1988; Alvarenga and Olson, 2004) apparently with phylogenetic basis. The earliest records for this family are in the Middle or Upper Eocene of France (Mourer-Chauviré, 2002), whereas in South America the earliest representative is *Brasilogyps* Alvarenga, 1985, from the Upper Oligocene or Lower Miocene of southeast of Brazil. In North America, the earliest records for this family date from the Pliocene, although there are contradictory references for Eocene records (Olson, 1985; Emslie, 1988; Mourer-Chauviré, 2002). It is possible that the family originated in the Old World, to later become fixed only in the Americas, especially in South America.

It is perfectly plausible to think that the diversity of the Vulturidae could have been much greater dur-
ing the Pleistocene in South America in the context of its megafauna, as occurs in Africa currently with Old World vultures (Accipitridae). In corroboration of this hypothesis, we herein describe a new genus and species of a large Vulturidae from the Upper Pleistocene or Lower Holocene of Brazil, based on a complete right tibiotarsus, collected in a cave of the Matozinhos region, Minas Gerais state, Brazil (figure 1). We also describe and compare another incomplete tibiotarsus from the Gruta dos Brejões, in Morro do Chapéu, Bahia state, reinforcing the diversity of these birds during the South American Pleistocene.

Material and methods

One of the studied specimen is a complete right tibiotarsus, from the Cuvieri cave, Matozinhos, Minas Gerais State, Brazil, initially broken and covered by carbonatic crust; it was previously treated with acetic acid and afterwards mechanically cleaned under a stereomicroscope, and then restored (figure 2.2). The bone is relatively well preserved, apparently from an adult individual, based on the bone surface texture when observed through the microscope, without any indication of a thick periosteum. Erosion is present on the edges of the proximal joint surfaces and on the lateral and medial edges of the condyles, which compromise a sharp precision in the measurements of the proximal and distal width. It is housed in the Museu de História Natural de Taubaté (MHNT-VT-5238). It was compared with homologous bones of extant skeletons of all species of the South American Vulturidae (appendix 1), especially with the genera *Vultur* and *Sarcoramphus* because of their similar size. Comparisons to *Gymnogyps* were done through high resolution photographs, from several views, taken by one of the authors (H.A.) in the Los Angeles County Museum, California (specimen B 1372). Comparisons with *Breagyps* were done only from the descriptions and illustrations of Howard (1974) whereas comparisons with the genus *Gerono- gyps* were undertaken by means of the photographs and descriptions of Campbell (1979). We also examined and compared a slightly damaged distal half of a left tibiotarsus, that was collected by Castor Cartelle in the cave of Brejões, Municipality of Morro do Chapéu, Bahia, Brazil (figure 1), housed as MCL-1795 in the Museu de Ciências of the Pontificia Universidade Católica, Minas Gerais, Brazil; this material came from the same locality as that of the type of *Wingegyps cartellei* (Alvarenga and Olson, 2004). The terminology used herein is mainly according to Howard (1929) and, in some cases, Baumel and Witmer (1993). The measurements were done with 0.1mm/precision Mitutoyo calipers.

Systematic paleontology

**Family VULTURIDAE**

*Pleistovultur* gen. nov.

**Type species.** *Pleistovultur nevesi* sp. nov.

**Diagnosis.** Tibiotarsus with an almost oval-shaped articular surface for the head of the fibula, similar to *Sarcoramphus* (different from that of *Vultur* distally expanded); there is a crest between this joint and the fibular crest (similar in *Breagyps*, absent in *Vultur*, and tenuous in *Sarcoramphus*). The distal part of the outer cnemial crest is sharp (similar in *Vultur, Gymnogyps,* and *Breagyps*) and reaches the level of the fibular crest whereas in *Sarcoramphus* it is thick, rounded, and shorter. The distal opening of the tendinal groove is rounded (similar in *Vultur, Gymnogyps,* and *Breagyps*; oval in *Sarcoramphus* and *Gerono- gyps*). The lateral condyle in anterior view is very high and its axis is parallel to the diaphysis (it is much shorter in *Sarcoramphus;* in *Vultur, Gymnogyps,* and *Breagyps* the lateral condyle is wider and oblique to the lateral side of the diaphysis). There is no fora-
Figure 2. The right tibiotarsus of *Vultur gryphus* MHNT 591; *Pleistovultur nevesi* gen. et sp. nov. holotype MHNT-VT-5238; *Sarcoramphus papa* MHNT 1787 respectively, in anterior view (1, 2 and 3); the proximal end in medial view (4, 5 and 6); the distal end in anterior view (7, 8 y 9). Scale bar 2 cm.
men proximal to the lateral condyle (in anterior view, and at the same level of the tendinal bridge); all Vulturidae show a foramen at this place, but it is more conspicuous in *Vultur*. In lateral view, the lateral condyle of *Pleistovultur* appears to be more rounded than in *Vultur* and *Sarcoramphus*, however important erosion at its edges may give a false impression.

**Etymology.** Pleisto from Pleistocene + vultur.

**Pleistovultur nevesi** sp. nov.

Figures 2.2, 5, 8

**Holotype.** A complete right tibiotarsus; MHNT-VT-5238 (figure 2.2).

**Type locality.** Brazil, Minas Gerais State, Municipality of Matozinhos, Gruta Cuvieri (19°28'36''S, 44º00'41''W), elevation ca. 812m (figure 1).

**Horizon and age.** The holotype of *Pleistovultur* was discovered inside the Gruta Cuvieri, Municipality of Matozinhos, Minas Gerais, Brazil, one of the hundreds of caves in the region north/northeast of the city of Belo Horizonte, many of which were explored and studied in the first half of the 19th Century by the Dane Peter Wilhelm Lund. Unfortunately, due to previous work done in this cave, the taphonomic conditions of the tibiotarsus holotype of *Pleistovultur nevesi* could not be duly defined, thus making it difficult to precisely determine its age. Nevertheless, the knowledge of the associated fauna, present in several adjacent caves and previously dated (Laming-Emperaire *et al.*, 1975; Cartelle, 1999), permits attributing an Upper Pleistocene or Early Holocene age for this entire fauna, including *Pleistovultur*. In the same Cuvieri cave, Neves and Pilo (2003) dated a ground sloth Scelidodon cuvieri, and obtained a radiocarbon age of 9.990 ± 40ybp; also, from the same cave, a second specimen of *Scelidodon* was dated of 12.510 (70ybp (Neves, pers. com.).

**Etymology.** *Nevesi* is in honor to Walter Neves, anthropologist from Laboratório de Estudos Evolutivos Humanos of the Departamento de Genética e Biologia Evolutiva, Instituto de Biociências, Universidade de São Paulo, responsible for collecting and forwarding the material for our study.

**Diagnosis.** The same for the genus.

**Description.** A large Vulturidae with a tibiotarsus about 25% larger than that of *Sarcoramphus papa* and about 11% smaller than that of *Vultur gryphus* (figure 2.1, 2.2 and 2.3). Measurements of the holotype in table 1.

**Vulturidae** gen. et sp. indet.

Figure 3

A distal half of a left tibiotarsus (MCL-A-1795), from the Gruta dos Brejões, Bahia, Brazil (figure 3) (11°00'30''S, 41°26'07''W), the same locality of the type specimen of *Wingeegypsw. cartellei* (Alvarenga and Olson, 2004), also was studied and compared; unfortunately the condyles are quite damaged, thus prejudicing a better diagnosis. The very wide supratendinal bridge, the oval distal opening of the tendinal groove, and the very straight line of the medial border of the linea ex-

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**Table 1.** Measurements of the tibiotarsus of *Pleistovultur nevesi* gen. et sp. nov. compared to Pleistocene and extant large vultures (mm)

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<tr>
<td><strong>Length</strong></td>
<td>235 - 233</td>
<td>214</td>
<td>-</td>
<td>214 - 233</td>
<td>-</td>
<td>211</td>
<td>166 - 176</td>
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<tr>
<td><strong>Proximal width</strong></td>
<td>30.0 - 29.9</td>
<td>28.7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>about 23.6</td>
<td>20.6 - 20.6</td>
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<tr>
<td><strong>Least width of shaft</strong></td>
<td>14.3 - 14.4</td>
<td>14.7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>13.1</td>
<td>10.3 - 10.4</td>
</tr>
<tr>
<td><strong>Distal width</strong></td>
<td>24.0 - 24.7</td>
<td>25.1</td>
<td>24.8</td>
<td>23.7 - 25.7</td>
<td>24.1</td>
<td>20.5</td>
<td>18.6 - 18.0</td>
</tr>
<tr>
<td><strong>Depth of internal condyle</strong></td>
<td>24.8 - 24.8</td>
<td>22.5</td>
<td>22.8</td>
<td>-</td>
<td>22.5</td>
<td>19.2</td>
<td>17.2 - 17.3</td>
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tensoria, exclude this specimen from *Pleistovultur*, *Vultur*, *Gymnogyps*, *Breagyps*, and *Sarcoramphus*, even though by size it is very near to *Pleistovultur*. When compared with the illustration of *Geronogyps* (in Campbell, 1979), the supratendinal bridge and the proximal and distal openings are very different. So, we believe that this vulture cannot be assigned to any known genus of *Vulturidae*; however, better material is needed in order to merit a new name.

**Discussion**

During the Pleistocene, South America possessed a rich mammalian megafauna, comparable to that living in Africa today. Carrion-eating birds, represented by the family Vulturidae, analogous in the food pyramid to the Old World vultures (*Accipitrinae*), almost certainly needed to feed on large carcasses. Thus, the disappearance of the megafauna certainly leads to extinction for many of the Vulturidae. We believe it to be absolutely foreseeable that there were an appreciable number of genera and species of the Vulturidae in the South American Pleistocene, which appears to be confirmed by recent reports. Campbell (1979) described the presence of the genera *Gymnogyps* and *Geronogyps* on the coast of Peru, and also reported another possible of the genus *Sarcoramphus* (*Sarcoramphus? fisheri*). Tonni y Noriega (1998) and Tambussi and Noriega (1999) described the presence of *Geronogyps* and *Vultur gryphus* from the Pleistocene of the south of Buenos Aires Province. Alvarenga (1998) identified the presence of *Vultur gryphus* in the Pleistocene/Holocene from the caves of Minas Gerais, Brazil. Alvarenga and Olson (2004) described *Wingegeyx*, a small condor from the Pleistocene/Holocene from caves in Bahia and Minas Gerais, Brazil. The tibiotarsus MCL-A-1795 certainly represents an additional genus, which awaits better material in order to be described. Winge (1888), who studied numerous birds from caves of the same region as *Pleistovultur*, described (from Lapa Escrivania) fragments of humerus, ulna and coracoid of “a much bigger Vulturidae than *Gypargus papa* (= *Sarcoramphus papa*)” besides other bones attributed to the extant *Sarcoramphus papa* from the Lapa do Bau. These bones belonging to a Vulturidae larger than Sarcoramphus, have been recently cleaned and re-prepared by Olson and Emslie (pers. com.); unfortunately they do not present structures for a good taxonomic diagnosis; it is possible that this material can be attributed to *Pleistovultur*. Oluf Winge also perceived the distinction of the fossil specimens that Alvarenga and Olson (2004) subsequently described as *Wingegeyx cartellei*. The general panorama of vultures from the South American Pleistocene now seems to begin to be understood.

**Acknowledgements**

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**References**


Appendix 1. List of skeletons of extant Vulturidae used to compare with Pleistovultur nevesi gen. et sp. nov.: MHNT= Museu de História Natural de Taubaté; AZ= Collection of birds of the Departamento de Zoologia, Instituto de Biotecências, Universidade de São Paulo / lista de los esqueletos de buitres vivientes que se usaron para comparar con Pleistovultur nevesi gen. et sp. nov.: MHNT= Museu de História Natural de Taubaté; AZ= Collection de birds of the Departamento de Zoologia, Instituto de Biotecências, Universidade de São Paulo.

Vultur gryphus: two skeletons: MHNT- 591 and AZ-579.

Sarcoramphus papa: four skeletons: MHNT-775, 804, 903 and 1787.

Cathartes melanopterus: one skeleton: MHNT-1213

Cathartes aura: three skeletons: MHNT-97, 790 and 794

Cathartes burrovianus: one skeleton: MHNT-714