

## THE GENUS *ARVERNOCEROS* HEINTZ, 1970 IN ITALY: PRELIMINARY REPORT

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ABSTRACT: Petronio C. & Pandolfi L., *The genus Arvernoceros Heintz, 1970 in Italy: preliminary report*. (IT ISSN 0394-3356, 2011)

The first occurrence of the large-sized deer *Arvernoceros* in the Early Pleistocene of Italy is reported. This genus was found in the sites of Madonna della Strada and Selvella (Central Italy). The considered remains have morphological and biometrical characters similar to those of the species *A. giulii* and are quite different from those of the genus *Eucladoceros* and of the genus *Praemegaceros*.

RIASSUNTO: Petronio C. & Pandolfi L., Il genere *Arvernoceros* Heintz, 1970 in Italia: rapporto preliminare. (IT ISSN 0394-3356, 2011)

Viene riportata la prima presenza in Italia del cervo di grande taglia *Arvernoceros* durante il Pleistocene Inferiore. Questo genere è stato rinvenuto nei siti di Madonna della Strada e Selvella (Italia Centrale). I resti considerati presentano caratteri morfologici e biometrici simili a quelli della specie *A. giulii* e sono abbastanza differenti da quelli dei generi *Eucladoceros* e *Praemegaceros*.

Key words: *Arvernoceros*, Italy, Early Pleistocene

Parole chiave: *Arvernoceros*, Italia, Pleistocene Inferiore

We report here findings constituting some fossil remains of a large-sized deer. They have been discovered in the Late Villafranchian deposits (late Early Pleistocene) outcropping in the Chiana river valley at Selvella and in the wide intra-Appennine basin of L'Aquila, in locality Madonna della Strada. Both the sites are localized in Central Italy and are referred respectively to Farneta and Pirro Faunal Unit (GLIOZZI *et al.*, 1997). Basing on morphological and biometrical characters, the considered remains can be referred to the genus *Arvernoceros*: these represent the first records of this genus in Italy. In fact, before the present description the most common large-sized deer of the late Early Pleistocene of Italy were *Eucladoceros* and *Praemegaceros* (AZZAROLI & MAZZA, 1992; GLIOZZI *et al.*, 1997; ABBAZZI, 2004). A limited number of specimens of the genus *Cervalces* was also reported in Northern Italy (AZZAROLI, 1979a). The genus *Arvernoceros* includes medium and large-sized species. It is characterized by a rather conservative specific variability of antler morphology and primitive morphology of dentition, with simple P/4 and relatively long premolar series (HEINTZ, 1970; CROITOR & KOSTOPOULOS, 2004). The systematic position of *Arvernoceros* is still unclear. HEINTZ (1970) included the genus in the Megacerini tribe, and thus assumed a phylogenetic relationship with *Megaloceros*. DI STEFANO & PETRONIO (2002) included *Arvernoceros ardei* in the genus *Axis*, and suggested, with morphological considerations, that the latter was related to a strictly similar, but more specialized form of *Axis shansius*. CROITOR & STEFANIAK (2009) noticed

strict phylogenetic relationships with the modern genus *Rucervus*, while MADE & TONG (2008) noted a similarity with the genus *Sinomegaceros*. Before the 1997, in Europe, two species are ascribed to *Arvernoceros*: the medium-sized *A. ardei*, reported in France, Spain and Poland during the Early Villafranchian (HEINTZ, 1970; CROITOR & STEFANIAK, 2009) and the large-sized *A. verestchagini*, described by DAVID (1992) and reported in Moldova and probably in Apollonia (Grecia) (DAVID, 1992; CROITOR & KOSTOPOULOS, 2004). In the 1997, KAHLKE indicated the remains of a large-sized deer in Untermassfeld (Germany; about 1 Ma) in reference to the new species *Eucladoceros giulii*. According to CROITOR & KOSTOPOULOS (2004), the hypothetical reconstruction of the antler, reported by KAHLKE (1997), was based on scant fossil fragments belonging to individuals of different ontogenetic ages. The large-sized deer from Untermassfeld should be ascribed to the genus *Arvernoceros* based on teeth, bones and some antler morphology (CROITOR & KOSTOPOULOS, 2004). The considered remains of the large-sized deer from Madonna della Strada consist of one upper molar (M1-/M2/) (MSG<sup>n°</sup>376), two astragali (MSG<sup>n°</sup>395 and DESSR s.n.) and one metatarsus (DESSR s.n.), while the remains of Selvella consist of one complete metatarsus (IGF14158) and one astragalus (IGF14158). The upper molar shows, in occlusal view, a marked parastyle and the paracone profile has rounded central fold and a less marked metacone style. These features are different from *Eucladoceros*; in this genus the upper molars have sharp ribs of paracone and metacone. In the upper

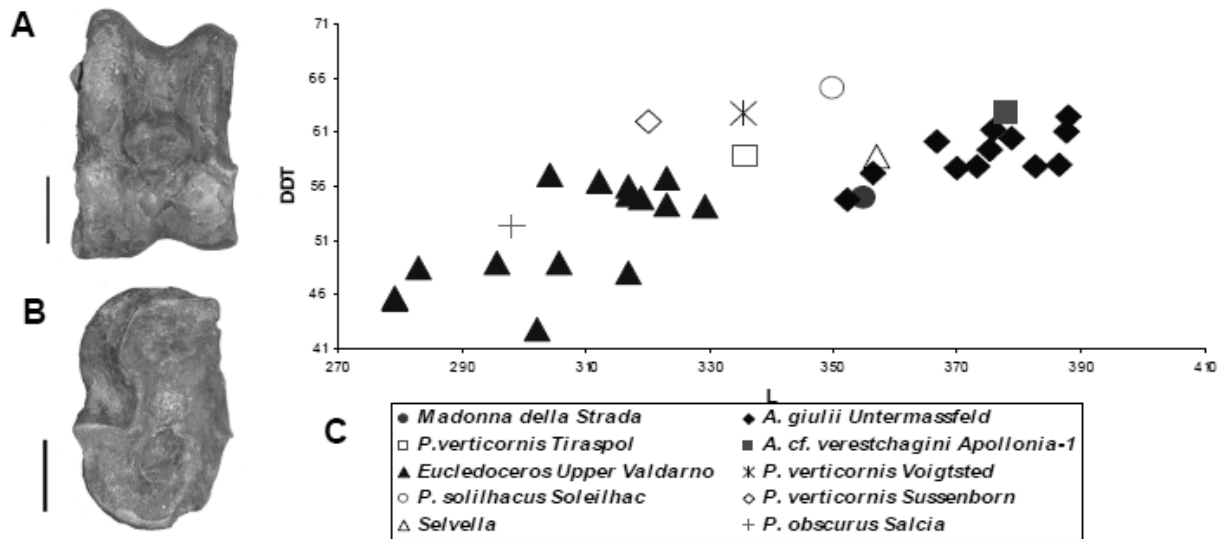


Fig. 1, A, B: Astragalus (DESSR s.n.) from Madonna della Strada in frontal view (A) and in medial view (B), the bar is of about 2 cm; C: Bivariate diagram of metatarsi from Madonna della Strada (estimated minimal length) and Selvella and *A. giulii* from Untermassfeld (data from KAHLKE, 1997), *Eucladoceros* from Upper Valdarno (data from AZZAROLI & MAZZA 1992), *Praemegaceros* from different sites (data from AZZAROLI, 1979b; KAHLKE, 1965, 1969, 1971; ABBAZZI *et al.*, 1999) and *A. cf. verestchagini* from Apollonia-1 (data from CROITOR & KOSTOPOULOS, 2004). L = absolute length, DTD = distal transversal diameter.

A, B: Astragalo (DESSR s.n.) da Madonna della Strada, in visione frontale (A) e mediale (B), la barra è di circa 2 cm; C: Diagramma biviato dei metatarsi di Madonna della Strada (lunghezza minima stimata), Selvella e *A. giulii* di Untermassfeld (dati da KAHLKE, 1997), *Eucladoceros* del valdarno Superiore (dati da AZZAROLI & MAZZA 1992), *Praemegaceros* da differenti siti (dati da AZZAROLI, 1979b; KAHLKE, 1965, 1969, 1971; ABBAZZI *et al.*, 1999) e *A. cf. verestchagini* da Apollonia-1 (dati da CROITOR & KOSTOPOULOS, 2004). L = lunghezza massima, DTD = diametro distale trasverso.

molar of Madonna della Strada, the protoconal fold is weakly observable; this fold is not present in *P. verticornis*, but is well marked in *Eucladoceros* and *P. obscurus*. The posterior wing of the hypocone in Madonna della Strada is not bifurcated, unlike the genus *Eucladoceros*, and the hypoconal enamel fold is not present, yet is observable in *P. obscurus* (AZZAROLI & MAZZA, 1992; CROITOR & KOSTOPOULOS, 2004; CROITOR, 2006). Weak lingual cingula are present on the upper molar of Madonna della Strada while cingula are generally absent in the genus *Praemegaceros* (CROITOR, 2006). In the three considered astragali the distal end of the lateral lip of the proximal trochlea, in anterior view, bends inward, forming a sort groove (Fig. 1A). This feature is present in *A. giulii*, and is absent or less clear in *Eucladoceros* from the various locality of Upper Valdarno and *P. obscurus* from Pirro Nord. Also, the proximal end of the medial lip of the proximal trochlea, in medial view (Fig. 1B), extends at the posterior through a long and straight edge, as in *A. giulii*. In all the specimens of *Eucladoceros* from the various locality of Upper Valdarno, including Poggio Rosso, *P. obscurus* from Pirro Nord and *P. verticornis* from different locality it extends through a short and curved edge. Also, the considered remains are dimensionally larger than *Eucladoceros*; they are comparable with *A. giulii* and are smaller than *A. cf. verestchagini* from Apollonia

-1. The two metatarsi are slender than the different species of the genus *Eucladoceros*; the diaphysis are smaller, while the distal epiphysis almost overlaps the largest *Eucladoceros* from Upper Valdarno. Proportionally, the considered metatarsi are comparable with the specimens of *Arvernoceros* from Untermassfeld. In the bivariate diagram of maximal length/transversal distal diameter (Fig. 1C) the remain of Selvella is comparable with the values of the large-sized deer from Untermassfeld and is well-separated from the values of *Eucladoceros* and *Praemegaceros*. Also, morphological features distinguish the considered metatarsi from the specimens of *Eucladoceros* from Upper Valdarno. In particular, the proximal epiphysis is more developed dorso-plantarly and the lateral articular surface is more elongated. Furthermore, in dorsal view, the lateral portion of the proximal epiphysis seems to be higher than the medial one and the gap between the trochlea in the distal epiphysis appears more enlarged. According to the previous analysis, the remains of the large-sized deer from Madonna della Strada and Selvella have dimensions and morphology comparable with the genus *Arvernoceros* and in particular are similar to the specimens of *A. giulii* from Untermassfeld; this last is larger than *A. ardei* and relatively smaller than *A. cf. verestchagini*. The presence of *A. giulii* in the Madonna della Strada and Selvella sites are the

first sure records of this mammal in the Pleistocene of Italy and the earliest in Western Europe. The dispersal of *A. giulii* from Asia is probably caused by Early Pleistocene transformations in Eastern Paratethys (CROITOR, 2009) and its occurrence in Italy can be favoured by the geographical position of the Peninsula and the climate change of the late Early Pleistocene. *Arvernoceros* was reported in different sites of South-Eastern Europe and low stands of Adriatic sea level could have played a decisive role in the dispersal of this species when the climate turned progressively drier during the considered time span. However, a more detailed analysis is needed to verify this hypothesis and to better investigate the presence of this genus in Italy and its relationships with the other late Villafranchian deer.

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