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ON THE PRESUMED RECORD OF *TROGONOTHERIUM CUVIERI* FISCHER IN THE UPPER VALDARNO (TUSCANY, ITALY)

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Riassunto. Bosco (1899, 1900) descrisse un molare inferiore di un grosso roditore, raccolto nei pressi di Terranuova Bracciolini nel Valdarno Superiore, come appartenente al castoride *Trogontherium cuvieri* Fischer. Il reperto, rappresenterebbe l'unico ritrovamento di questa forma fossile di castoride in Italia, nonché la segnalazione più meridionale della distribuzione di questo genere. Il fossile, conservato presso il Museo di Geologia e Paleontologia dell'Università di Firenze, è stato riesaminato e ne viene precisata l'attribuzione. La determinazione del molare in questione come castoride si è rivelata errata, il reperto risulta infatti un molare inferiore di *Hystrix refossa* Gervais, il grosso istrice presente in Europa durante il Villafranchiano superiore.

Abstract. The lower molar of a large rodent collected near Terranuova Bracciolini in the Upper Valdarno Basin (Tuscany, Italy) and identified by Bosco (1899, 1900) as the beaver *Trogontherium cuvieri* Fischer, instead belongs to the porcupine *Hystrix refossa* Gervais. To date there is no evidence of the occurrence of the large beaver *Trogontherium* south of the Alps.

Foreword.

The Upper Valdarno is one of the largest intermountain basins of the Northern Apennine, and is filled with upwards of 500 meters of fluviolacustrine deposits (Merla, 1949; Abbate, 1983). Since the second half of the XVIII century, abundant vertebrate fossil remains have been collected from the deposits of Upper Valdarno, documenting several faunal units that range from Middle Pliocene to the beginning of the Late Pleistocene (Azzaroli, 1977, 1984; Torre et al., 1992).

When Bosco (1899, 1900) described the rodents from this basin, he recorded the discovery of a lower molar of a large rodent (that he referred to the beaver *Trogontherium cuvieri* Fischer) in sediments located near the town of Terranuova Bracciolini. In this area, sediments of the second depositional phase of the basin are exposed. They are part of the Montevarchi Synthem, which is divided, from bottom to top, into three units: "Terranuova silts", "Ascione clays" and "Oreno silts and

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clays". These sediments date to the latest Pliocene-early Pleistocene (Abbate, 1983; De Giuli, 1983; Benvenuti, 1993).

Vertebrate remains are quite common in these deposits, and belong to two different faunal units. The Olivola faunal unit is represented by fossils collected from sediments at the base of the "Oreno silts and clays" (Matassino local fauna), while fossils from Tasso faunal unit occur in several sites where the uppermost part of the "Oreno silts and clays" is exposed (Tasso, Casa Fratta and other local faunas). Recent magnetostratigraphic studies (Torre et al., 1993) show that the Matassino local fauna (Olivola faunal unit) occurs in latest Pliocene or initial Pleistocene deposits (Matuyama, just above the Olduvai normal polarity subchronozone, or at the short reversal near the top of the subchronozone), while the Tasso local fauna (Tasso faunal unit) occurs in early Pleistocene deposits (Matuyama, above the Olduvai normal polarity subchronozone). Obviously, without knowing the precise location and stratigraphic provenance of Bosco's fossil it is impossible to assign it to a specific local fauna.

Bosco (1900) referred the molar to the beaver *Trogotherium cuvieri*, on the basis of its similarity with the teeth of *Trogotherium cuvieri* from Forest Bed, as illustrated by Newton (1882). Since then, *Trogotherium* has not been included in the faunal lists of the Upper Valdarno by any author, probably following the suggestion of Schreuder (1929, 1931), who, listing the European and Asiatic localities where *Trogotherium* was reported, suggested that the molar described and illustrated by Bosco in 1900 was most probably a tooth of *Hystrix*.

The Bosco specimen.

At the time of his research, Schreuder requested information about the specimen from Prof. Giotto Dainelli (Director of the Florence Museum, at that time called "Gabinetto di Mineralogia e Geologia"), information that Prof. Dainelli was unable to provide, because many collections were packed in cases, waiting to be moved from their previous location to the present day building. As we had the opportunity to reexamine the Bosco sample in the collections of the "Museo di Geologia e Paleontologia" of the University of Florence (where it was still labelled *Trogotherium cuvieri*), we thought it worthwhile to furnish an adequate revision of the Bosco specimen, and confirm the attribution suggested by Schreuder. The specimen consists of an isolated left M₁ (or M₂) that is quite worn and slightly damaged on the buccal side (Fig. 1), and which is cataloged as IGF 945. In his exhaustive paper on the rodents from Upper Valdarno, Bosco (1900) carefully described the morphology of the specimen as follows: "[...] The tooth, 12.5 mm high, has a prismatic form with rhomboidal section. The crown of the tooth consists of an enamel layer, 1 mm thick. A fold is present on the labial side of the tooth, which is deep near the roots, and flattens, disappearing, towards the occlusal surface.

"The occlusal plain is obliquely located with respect to the vertical axis of the molar; thus we can imagine that the tooth was oriented inclined into the alveolus.

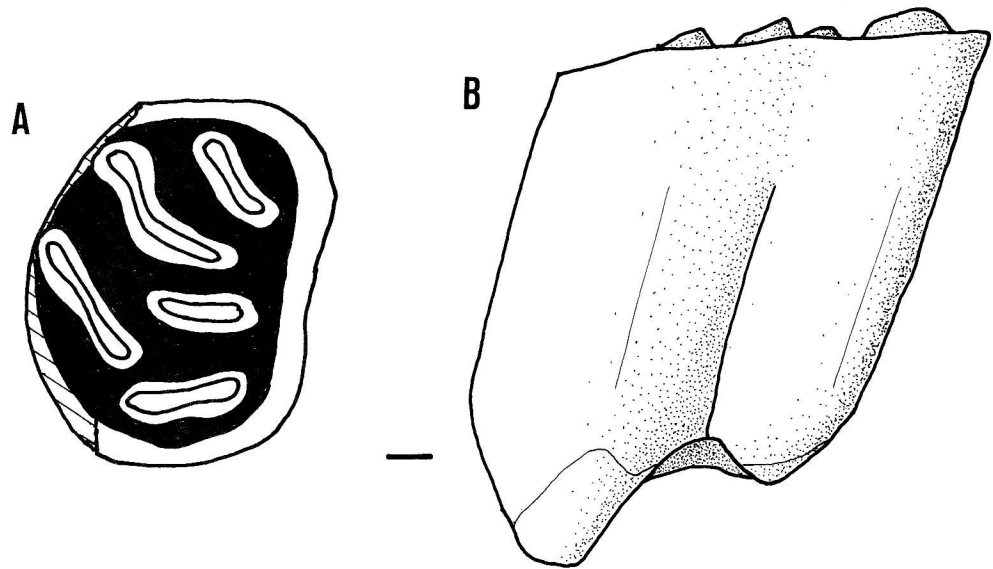


Fig. 1 - *Hystrix refossa* Gervais, from Terranuova Bracciolini. M₁₋₂ (IGF 945): A) occlusal view; B) lingual view. Bar scale is 1 mm.

"On the occlusal surface five enamel islands are present; lengthened and narrow in shape, they are isolated from the crown and obliquely oriented with respect to the longitudinal axis of the tooth. The smallest islet is located near the anterior margin of the occlusal surface; the others are longer, and seem to join in pairs along the longitudinal axis of the tooth. The ivory between the enamel islands is deeply abraded.

"There are four very short roots, located at the corners of the tooth; the posterior one is large, while the others are very small.[...]"

This description (The original Italian text is given in the footnote) (1) is suffi-

(1) "[...]Questo dente, la cui lunghezza comprese le radici è di mm 12,5, ha forma prismatica con sezione romboidale a lati posteriori arrotondati e spigolo anteriore smussato. Uno strato di smalto spesso uniformemente circa 1 mm ricopre all'ingiro tutto il dente, sul quale scorgesi una sola piega, che si trova verso l'esterno a breve distanza dallo spigolo anteriore, disposta verticalmente, discretamente profonda fra le radici ed attenuantesi sensibilmente in alto.

Il piano della corona è tagliato obliquamente rispetto all'asse verticale del dente, in modo da provare che questo quando era impiantato nell'alveolo doveva essere fortemente inclinato in avanti.

Sulla superficie triturante si scorgono cinque isole di smalto, di forma allungata, ed assai strette, tutte disgiunte dallo smalto esteriore, e disposte obliquamente rispetto all'asse antero-posteriore del dente; l'una, corta, presso al vertice anteriore, e le altre quattro, più lunghe, che pare tendano ad unirsi a due a due su detto asse. L'avorio interposto è profondamente corroso.

Le radici in numero di quattro sono disposte in corrispondenza degli spigoli del dente; la posteriore è grossa, e le altre tre piccolissime; ma tutte e quattro sono assai corte.[...]"

ciently detailed, and the illustration is so clear that one can exclude the attribution of the specimen to a beaver. Bosco's misidentification of the specimen is quite surprising, especially considering that, at the same time, he also studied the porcupines from the Upper Valdarno and Olivola Basins (he published his paper on *Hystrix etrusca* n. sp. in 1898).

As mentioned above, Bosco based his determination upon the great resemblance of his specimen with the third lower molar of *Trogotherium cuvieri* as illustrated by Newton (1882; pl. 11, fig. 1 and 12). The outline of the occlusal surfaces and the positions of the enamel islands are very similar, but the two teeth are at different stages of wear, and, furthermore, are different elements. Bosco believed his tooth an M₃, though the presence of a small surface of contact on either the distal or mesial walls of the crown is characteristic of an M₁ (or M₂). The number and disposition of the roots, combined with the presence of an enamel fold near the roots on the lingual side, allows one to exclude this specimen from *Trogotherium* (cf. Schreuder, 1929).

Comparisons of this tooth with fossil porcupines from the Upper Valdarno and the latest Villafranchian locality of Pirro Nord (Southern Italy) allow a different attribution. The specimen is in fact an M₁₋₂ of the large sized *Hystrix* present in the middle to late Villafranchian of Europe.

In European late Pliocene to early Pleistocene deposits porcupines were described under different specific names, *Hystrix refossa* Gervais, 1852, *Hystrix major* Gervais, 1859 and *Hystrix etrusca* Bosco, 1898. The former species was defined by Gervais (1848-1852) on the basis of a P₄ collected at Perrier Les Etouaires (MN 16b), and further described on few specimens from deposits of St. Vallier (MN 17; Viret, 1954). In respect to *H. refossa* Gervais, *H. major* Gervais (from an "Old Quaternary" breccia of the Ratonneau Island, France) and *H. etrusca* Bosco (from the early Pleistocene of Upper Valdarno, Italy) were believed larger sized species, characterized by a more hypsodontic dentition, a stouter mandibular ramus, and stoutly built postcranial bones (cf. Masini & Rook, 1993). Many authors believed these two species (known from several late Villafranchian localities in Italy, Spain, France, and Greece) in synonymy, or at least very close (Viret, 1954; Chaline, 1972; Koliadimou & Koufos, 1991; Masini & Rook, 1993).

After the direct study of the holotype and topo-typical material of *H. refossa* from Perrier Les Etouaires we agree with van Weers (in press) considering *H. major* and *H. etrusca* younger synonymous of *Hystrix refossa*. The topo-typical material in the Bravard Collection (British Museum, N.H.) shows in fact that do not exist differences in size and hypsodonty between these species.

Conclusions.

In conclusion, molar IGF 945 does not represent the southernmost occurrence of the beaver *Trogotherium cuvieri*, but (as already skillfully suggested by Schreuder in 1929) is instead a lower left M₁₋₂ attributable to the Plio-Pleistocene porcupine

Hystrix refossa. At present there is no evidence of the occurrence of the large-sized beaver *Trogontherium cuvieri* south of the Alps.

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B I B L I O G R A P H Y

- Abbate E. (1983) - Schema stratigrafico della successione neoautoctona del Valdarno Superiore e del bacino di Arezzo. *Centro Studi Geol. Appennino, C.N.R.*, Pubbl. n. 132, pp. 1-6, Firenze.
- Azzaroli A. (1977) - The Villafranchian stage in Italy and the Plio-Pleistocene boundary. *Giorn. Geol.*, v. 41, pp. 61-79, Bologna.
- Azzaroli A. (1984) - On some vertebrate remains of middle Pleistocene age from the Upper Valdarno and Val di Chiana, Tuscany. *Palaeont. It.*, v. 73, pp. 104-115, Pisa.
- Benvenuti M. (1993) - Stratigrafia e sedimentologia dei depositi fluviolacustri plio-pleistocenici dell'area nord occidentale del Valdarno Superiore (Toscana). *Riv. It. Paleont. Strat.*, v. 98, n. 4, pp. 467-486, Milano.
- Bosco C. (1898) - *Hystrix etrusca* n. sp. *Palaeont. It.*, v. 4, pp. 141-153, Pisa.
- Bosco C. (1899) - I roditori pliocenici del Valdarno Superiore. Nota preliminare. *Rend. R. Acc. Lincei*, v. 8, n. 2, pp. 261-265, Roma.
- Bosco C. (1900) - I roditori pliocenici del Valdarno Superiore. *Palaeont. It.*, v. 5 (1899), pp. 85-104, Pisa.
- Chaline J. (1972) - Les rongeurs du Pléistocène moyen et supérieur de France. V. of 410 pp., C.N.R.S., Paris.
- De Giuli C. (1983) - Aspetti paleontologici del Valdarno Superiore e del bacino di Arezzo. *Centro Studi Geol. Appennino, C.N.R.*, Pubbl. n. 132, pp. 19-23, Firenze.
- Gervais P. (1848-1852) - Zoologie et Paléontologie Françaises. V. of 271 pp., 1^o éd., Paris.
- Gervais P. (1859) - Sur une espèce de Porc-épic fossile dans les brèches osseuses de l'île de Ratoneau, près Marseille. *C. R. Acad. Sc. Paris*, v. 44, p. 511, Paris.
- Koliadimou K. & Koufos G. (1991) - The hystricidae from the Pleistocene of Macedonia (Greece) and a review of the European representatives of the family. *Bull. Geol. Soc. Greece*, v. 25, n. 2, pp. 453-471, Athens.
- Masini F. & Rook L. (1993) - *Hystrix primigenia* (Mammalia, Rodentia) from the Late Messinian of the Monticino gypsum quarry (Faenza, Italy). *Boll. Soc. Paleont. It.*, v. 32, n. 1, pp. 79-87, Modena.
- Merla G. (1949) - I *Leptobos* Rüttimayer italiani. *Palaeont. It.*, v. 46, pp. 41-115, Pisa.
- Newton T. (1882) - The vertebrata of the Forest-Bed Series of Norfolk and Suffolk. *Mem. Geol. Surv.*, England Wales. V. of 143 pp., London.
- Schreuder A. (1929) - *Conodontes (Trogontherium)* and *Castor* from the Teglian Clay compared with *Castoridae* from other localities. *Arch. Mus. Teyler*, s. 3, v. 6, pp. 99-319, Haarlem.

- Schreuder A. (1931) - *Conodontes, Trogontherium* and other Castoridae. *Palaeont. Zeitschz.*, v. 13, pp. 148-176, Stuttgart.
- Torre D., Albianelli A., Azzaroli A., Ficarelli G., Magi M., Napoleone G. & Sagri M. (1993) - Paleomagnetic calibration of Late Villafranchian mammalian faunas from the Upper Valdarno, Italy. *Mem. Soc. Geol. It.*, v. 49, pp. 335-344, Roma.
- Torre D., Ficarelli G., Masini F., Rook L. & Sala B. (1992) - Mammal dispersal events in the Early Pleistocene of western Europe. *Courier Forsch.-Inst. Senckenberg*, v. 153, pp. 51-58, Frankfurt.
- Viret J. (1954) - Le Loess à bancs durcis de Saint-Vallier (Drôme) et sa faune de mammifères villafranchiens. *Nouv. Arch. Hist. Nat. Lyon*, v. 4, pp. 1-200, Lyon.
- Weers D.J. van (in press) - The porcupine *Hystrix refossa* Gervais, 1852 from the Plio-Pleistocene of Europe, with notes on other fossil and extant species of the genus *Hystrix*. *Scripta Geol.*, Leiden.

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