



The Pleistocene porcupine *Hystrix vinogradovi* Argyropulo, 1941 in Italy

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KEY WORDS - Pleistocene, Italy, *Hystrix vinogradovi*, Mammals, Palaeobiogeography, Palaeoecology.

ABSTRACT - *Hystrix vinogradovi* remains have been identified within the Late Pleistocene vertebrate assemblage from Avetrana (Taranto, Southern Italy). These data provide new information about the palaeobiogeography and ecology of this Pleistocene porcupine in Italy and Europe. The dental morphology of this species is quite conservative (a characteristic of the entire genus *Hystrix*) and simple, its size is smaller than the living *Hystrix cristata* and than other extinct species such as *H. refossa*, distributed in the Plio-Pleistocene sites of Europe. Despite some Authors claimed the synonymy between *H. vinogradovi* and *H. brachyura*, in this paper we maintain a separate specific name. At present, *H. vinogradovi* from Avetrana can be considered as the latest occurrence in Italy and, together with the fossils from Bolomor (Valencia, Spain), the southernmost presence in Europe.

RIASSUNTO - [L'istrice *Hystrix vinogradovi* Argyropulo, 1941 nel Pleistocene italiano] - La presenza di alcuni denti isolati di *Hystrix vinogradovi* Argyropulo, 1941 nel deposito del Pleistocene superiore di Avetrana (Taranto, Italia meridionale) fornisce nuovi dati e spunti di riflessione sulla distribuzione e l'ecologia della specie nel Pleistocene italiano ed europeo. La morfologia della struttura dentaria è piuttosto semplice (caratteristica tipica del genere *Hystrix*) e le dimensioni sono sensibilmente inferiori di quelle riscontrate sia nella specie estinta *Hystrix refossa*, presente nel Plio-Pleistocene europeo, sia nella vivente *H. cristata*, specie di origine nordafricana importata in Italia in epoca storica. Alcuni autori hanno proposto per *H. vinogradovi* la sinonimia con *H. brachyura*. In questo lavoro, non essendo ancora affatto certo che le due forme siano conspecifiche, il nome *H. vinogradovi* viene provvisoriamente mantenuto. Allo stato attuale delle conoscenze *H. vinogradovi* di Avetrana è la segnalazione più recente in Italia e, con i fossili di Bolomor (Valencia, Spagna), la più meridionale in Europa.

FOREWORD

Few isolated teeth referable to *Hystrix vinogradovi* Argyropulo, 1941 have been recently found in a karst filling deposit at Avetrana (Taranto, Apulia, Southern Italy; Sardella et al., 2005; Petronio et al., 2008). Such a discovery provides new data on the geographical distribution and ecology of this Pleistocene species in Italy and Europe.

At Avetrana the porcupine is part of a diversified vertebrate assemblage including *Perdix perdix*, *Otis tarda*, *Columba livia*, *Athene noctua*, *Pyrrhocorax graculus*, and *P. pyrrhocorax*, among birds, *Erinaceus europaeus*, *Terricola savi*, *Lepus* cf. *europaeus*, *Oryctolagus cuniculus*, *Canis lupus*, *Vulpes vulpes*, *Meles meles*, *Crocota crocuta*, *Lynx lynx*, *Felis silvestris*, *Panthera leo*, *Stephanorhinus hemitoechus*, *Hippopotamus amphibius*, *Sus scrofa*, *Dama dama dama*, *Cervus elaphus elaphus*, and *Bos primigenius*, among mammals; such an assemblage suggests an early Late Pleistocene age for the deposit (Sardella et al., 2005; Petronio et al., 2008).

The taxonomy of Hystricidae is quite controversial due to different factors, such as the marked intra-specific variability in size, shape, and enamel pattern of the occlusal surface, particularly in cases where the stage of attrition is not clearly known. In particular, size, shape and the occlusal surface morphology is closely related to the wear stage of the teeth (Weers, 1990, 1994). Recently, a methodology has been developed to analyze the wear stages of the Hystricidae jugal teeth, both for the living and for the extinct forms (Weers, 1990, 1994).

Such an analysis method enables to avoid possible confusion due to intra-specific variability in the *Hystrix* jugal teeth and has been used in several recent studies (Weers, 1990, 1994, 2003a, b, 2005; Weers & Rook, 2003; Rook & Sardella, 2005).

THE AVETRANA PORCUPINE

The porcupine material found at Avetrana consists in few isolated teeth: one left P⁴, two left M¹⁻² and one right M₃.

The teeth morphology in the Avetrana porcupine is quite simple (Fig. 1), and their size (Tab. 1) is sensibly smaller than that of the extinct *H. refossa* Gervais 1852, which characterized the Plio-Pleistocene faunal assemblages in Eurasia and Africa (Weers, 1994, 2005; Weers & Rook, 2003; Rook & Sardella, 2005), and also smaller than in the living *H. cristata* Linnaeus, 1758, a species of African origin imported in Italy in historical times (Kotsakis et al., 2003; Petronio et al., 2007).

DISCUSSION

Some Authors (Baryshnikov, 2003; Weers, 2005) claimed *H. vinogradovi* to be synonym of the small-sized porcupine *H. brachyura* Linnaeus, 1758, recorded in the Asian Pleistocene deposits and still living in South-eastern Asia; nowadays this species lives in the tropical forests (both in plains and in the hills), but can also be found in cultivations where it feeds on fruits and roots.

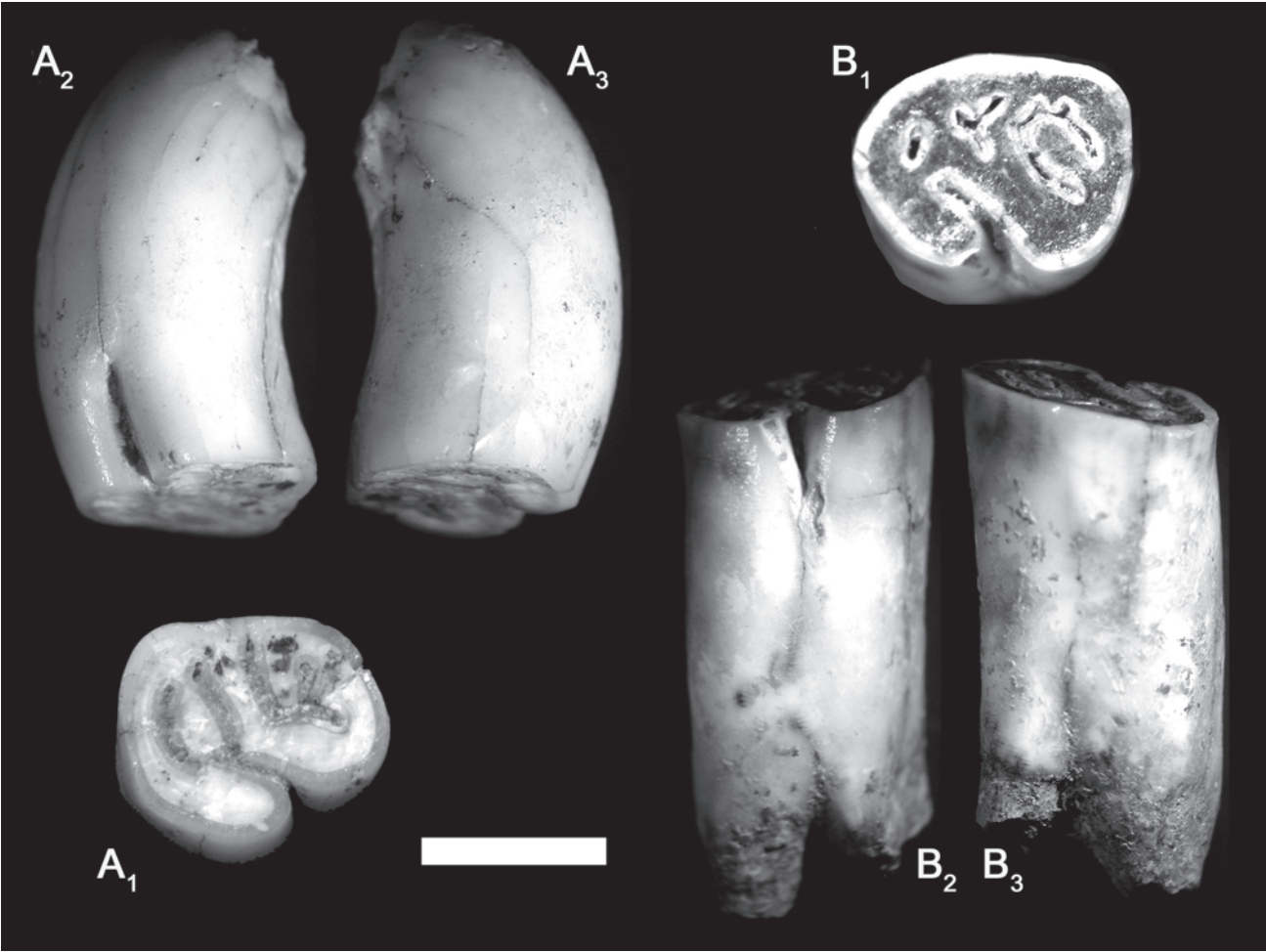


Fig. 1 - *Hystrix vinogradovi*: A) left upper P4: A₁) occlusal view, A₂) lingual view, A₃) labial view; B) right lower M3: B₁) occlusal view, B₂) lingual view, B₃) labial view. Scale bar = 5 mm.

Fossil remains of *H. brachyura* were found in deposits related to the Late Pleistocene and the Early Holocene in China and Indonesia (Weers, 2003a, b, 2005).

H. brachyura and *H. vinogradovi* show clear affinities, especially if the teeth structures are compared, although we claim cautions in stressing similarities on tooth morphology, given the conservative feature of dental traits typical of the family Hystricidae. In addition further comparison between the two species is not evidenced on the post-cranial skeleton, for which there are very few

statistical data. Moreover, also the comparison of the skull provides evidence of different morphometric features: in the study carried on by Baryshnikov (2003) on the porcupine of Mokhnevskaya, referred to *H. brachyura vinogradovi*, only one of the four cephalic indexes (Postorbital breadth/Basilar length) shows similarities with recent *H. brachyura*, while the Height/Basilar length index are closer to recent *H. javanica* Cuvier, 1823 and Occipital height/Occipital breadth index are closer to recent *H. indica* Kerr, 1792 and *H. cristata*;

	<i>Avetrana</i>	<i>H. vinogradovi</i>	<i>H. refossa</i>	<i>H. cristata</i>	<i>H. brachyura</i>
P ⁴ - length					
n.	1	4	11	33	32
mean	6.6	6.9	10.1	9.2	7.4
M ₃ - length					
n.	1	2	2	33	31
mean	7.2	6.5	~9.5	~8.3	6.7

Tab. 1 - Teeth measurements (in mm) of *Avetrana* porcupine compared to fossil and living *Hystrix* (measurement of *H. vinogradovi* from Del Campana, 1909, Sesé & Gil, 1987, Rustioni et al., 1999, and Baryshnikov, 2003; others from Weers, 1994, 2003b, 2005, and Rook & Sardella, 2005; M¹⁻² not measurable).

in addition the Frontal length/Basilar length index provided by Baryshnikov for Mikhnevskaya porcupine has no affinities with any of the considered taxa.

For the uncertainty in the taxonomy of these porcupines we prefer to maintain here the name *H. vinogradovi*. In our view, the taxa that have to be considered synonyms of *H. vinogradovi* are: *H. schaubi* Brunner, 1954, *H. cristata minor* Malez, 1963, *H. vinogradovi atavus* Janossy, 1972, *H. vinogradovi kudarensis* Baryshnikov & Baranova, 1982 (see Weers, 1994), and *H. brachyura vinogradovi* Baryshnikov, 2003.

In Italy *H. vinogradovi* has been recorded in the Middle Pleistocene bone breccia of Monte del Cros (Piedmont) (Giacobini et al., 1980; Kotsakis et al., 2003),

and at Montignoso (Tuscany, late Middle Pleistocene) (Rustioni et al., 1999; Kotsakis et al., 2003). A left mandible (length $P_4-M_3 = 27.7$ mm) referred to *Hystrix* sp. (Del Campana, 1909) has been recorded from a Late Pleistocene deposit described as Monte Tignoso (an old term for Montignoso); moreover this specimen is identical (and specular) to the right mandible from Montignoso attributed to *H. vinogradovi* (Rustioni et al., 1999). Many Pleistocene fossils recorded in Peninsular Italy and in Sicily, previously referred to porcupine are recently considered of uncertain stratigraphic position (see Bartolomei, 1969; Kotsakis et al., 2003; Bonfiglio et al., 2004) or wrongly determined (Capasso Barbato & Gliozzi, 1995); in addition, other specimens instead have been referred to *Hystrix* sp. or to *H. cristata*, such as



Fig. 2 - Distribution of *Hystrix vinogradovi* finds : 1) Valdegoba; 2) Atapuerca - Galería; 3) Bolomor; 4) Gegant; 5) Chênélaz; 6) Burgtonna; 7) Roten Berg; 8) Fuchsloch; 9) Prodbata; 10) Ostrov; 11) Repolusthöhle; 12) Veternice; 13) Kiskevélyi; 14) Köhāti and Lambrecht; 15) Osztramos; 16) Brassó; 17) Ilinka; 18) Tarkhankut; 19) Kudaro 1 and 3; 20) Binagady; 21) Mikhnevskaya; 22) Monte del Cros; 23) Montignoso (Monte Tignoso); 24) Avetrana. 15, 16, and 18 are Early Pleistocene sites; 2, 3, 7, 20, and 22 are Middle Pleistocene sites; 19 and 23 are Middle and Late Pleistocene sites; the other localities are referable to Late Pleistocene.

those from Fumane (Veneto) (Cassoli & Tagliacozzo, 1994), could possibly be referred to *H. vinogradovi*.

In Eurasia this porcupine is distributed during all the Pleistocene: fossils have been recorded from the Iberian Peninsula (Valdegoba, Burgos) to western Siberia (Razboinichiya, Altai), in Spain (Sesé & Gil, 1987; Díez et al., 1988/89; Cuenca Bescós et al., 2001; Sarrión Montañana, 2006; López-García et al., 2007), France (Schweitzer, 2002), Germany (Brunner, 1954; Maul, 1994; Weers, 1994; Kolfschoten, 2000), Czech Republic (Zazworka, 1944; Weers, 1994), Austria (Mottl, 1967), Croatia (Malez, 1963; Weers, 1994), Hungary (Jánossy, 1972; Jánossy & Kordos, 1977; Weers, 1994), Romania (Kormos, 1933; Weers, 1994), Ukraine (Topachevsky, 1973; Baryshnikov, 2003), Georgia (Baryshnikov, 1987, 2003), Azerbaijan (Argyropulo, 1941; Baryshnikov, 1987, 2003), and Russia (Baryshnikov, 2003; Kosintsev, 2007) (Fig. 2).

CONCLUSIVE REMARKS

At present, *H. vinogradovi* from Avetrana is the latest occurrence in Italy and, together with the fossils from Bolomor (Valencia, Spain), represents the southernmost presence in Europe. The northernmost presence is that of Mokhnevskaya (Perm, Russia; Fig. 2).

Taking into account the geographical distribution of the living *H. cristata*, and its ecology, porcupines are generally considered as indicating warm and dry climate conditions (Bartolomei, 1969; Cassoli & Tagliacozzo, 1994). Among the Eurasian Plio-Pleistocene Hystricidae such a condition can be accepted for *H. refossa* (Rook & Sardella, 2005), but not for *H. vinogradovi*. The record of *H. vinogradovi* is not consistent with such ecological/climatic conditions picture.

H. vinogradovi fossils have been collected associated together with *H. refossa* (at Osztramos 8) and *H. indica* (at Kudaro), and with species considered of temperate warm conditions such as the Barbary macaque (at Bolomor and Kudaro). Testifying a more complex or wider ecological preferences, *H. vinogradovi* is also recorded associated with taxa indicating cold climate conditions as marmots (at various sited like: Valdegoba, Atapuerca - Galería, Chênélaz, Montignoso, Repolsthöhle, Kudaro) and *Ursus thibetanus* Cuvier, 1823 (at Bolomor, Kudaro, and Mokhnevskaya). In addition, its geographical distribution suggests that *H. vinogradovi* ecological attitudes were possibly more complex than extant Hystricidae or other fossil *Hystrix* species, showing adaptations to a wide range of climatic and environmental conditions.

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