

SHORT NOTE – NOTA BREVE

**A NEW LOOK TO *PROLAGUS* (OCHOTONIDAE, LAGOMORPHA)
FROM THE LATE MESSINIAN OF CIABÒT CAGNA (PIEDMONT, NW ITALY)**CHIARA ANGELONE¹ & ORESTE CAVALLO²

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Abstract. Ciabòt Cagna (Piedmont, NW Italy) is a post-evaporitic Messinian fossiliferous locality. According to the literature, in Ciabòt Cagna was recorded the ochotonid *Prolagus michauxi*, but the present revision led to: 1) ascribe it to *Prolagus sorbinii*, a species present since the beginning of Messinian in continental Italy; 2) exclude a W Europe immigration source of ochotonids into continental Italy during Messinian; 3) and modify the geographical range of *P. sorbinii* and *P. michauxi*, which boundary should be W Alps.

Riassunto. Ciabòt Cagna è una località fossilifera del Messiniano post-evaporitico del Piemonte (Italia nord-occidentale). Secondo quanto finora affermato in letteratura, a Ciabòt Cagna era presente l'ochotonide *Prolagus michauxi*. Il presente studio ha avuto come risultato: 1) l'attribuzione sistematica dell'ochotonide a *Prolagus sorbinii*, una specie presente in Italia continentale dall'inizio del Messiniano; 2) l'esclusione di una via di immigrazione dall'Europa occidentale verso la penisola italiana per gli ochotonidi durante il Messiniano; 3) la modifica degli areali di distribuzione delle specie *P. sorbinii* e *P. michauxi*, il cui limite dovrebbe quindi essere rappresentato dalle Alpi occidentali.

Introduction

Ciabòt Cagna (Piedmont, NW Italy; Fig. 1) is one of the extremely rare Messinian local faunas in Italy bearing non-marine vertebrates. The small vertebrate fossil content is rather scanty, though extremely interesting (affinity with W European and African coeval assemblages and one of the two records of a gerbillid in continental Italy; Cavallo et al. 1993; Abbazzi et al. 2008).

The lagomorph from Ciabòt Cagna, an ochotonid of the genus *Prolagus*, was classified as *P. michauxi* in the only paper focused on the vertebrate fauna (Cavallo et al. 1993) and all later papers followed this attribution (see synonymic list). A revision of the lagomorph from Ciabòt Cagna led to a different systematic ascription, here illustrated and bearing important palaeogeographical consequences.

Geological setting

The Ciabòt Cagna fossiliferous horizon (a level rich in organic matter of the approximate thickness of 20 cm) is included in the beds known in Piedmont as “facies a *Congerina*”, that represent the lateral equivalent of the Conglomerati di Cassano Spinola Fm. (post-evaporitic Messinian). The stratigraphic position of the fossiliferous level suggests that its age may be close to the Mio-Pliocene boundary (Cavallo et al. 1993 and references therein).

Material and methods

Published dental specimens of *Prolagus* from Ciabòt Cagna and unpublished material recovered in the residuals of the original sample studied by Cavallo et al. (1993) have been analyzed. All the specimens are curated in the Museo civico archeologico e di scienze naturali “F. Eusebio” of Alba (Piedmont, Italy).

The nomenclature and the measurements used in this paper follow Angelone & Sesé (2009).

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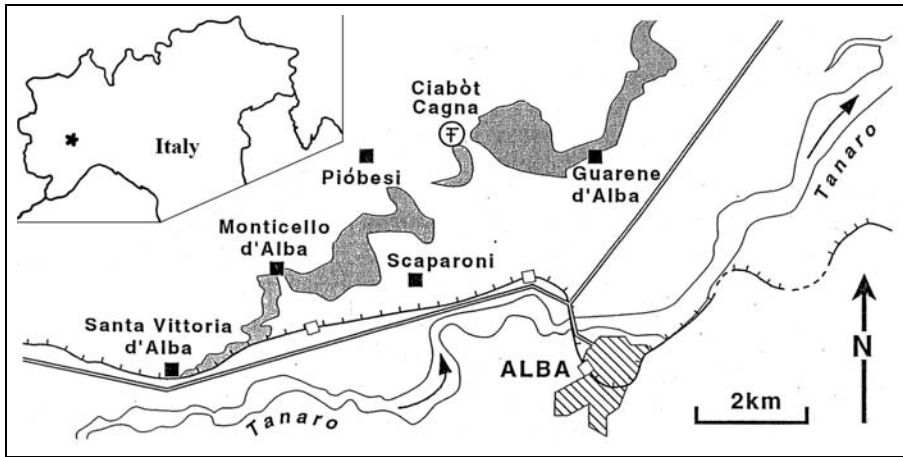


Fig. 1 - Geographical localization of the Ciabòt Cagna fossiliferous site; Messinian outcrops are dotted (modified from Cavallo et al. 1993).

The teeth occlusal surface has been drawn by means of a camera lucida mounted on a binocular microscope.

Systematic paleontology

Order **Lagomorpha** Brandt, 1855

Family Ochotonidae Thomas, 1897

Genus *Prolagus* Pomel, 1853

Prolagus sorbinii Masini, 1989

Fig. 2

Synonymies (Ciabòt Cagna only):

1993 *Prolagus michauxi* López Martínez - Cavallo et al., p. 3-4; p. 12-15; p. 13, fig. 6 B, C, D, E; p. 19.

1997 *Prolagus michauxi* López Martínez - Kotsakis et al., p. 438.

1999 *Prolagus michauxi* López Martínez - Rook et al., p. 145, tab. 10.2.

2007 *Prolagus michauxi* López Martínez - Angelone, p. 412, tab. 1; p. 414; p. 415, fig. 7 (a, b, c, d); p. 417, fig. 10; p. 418; p. 420.

2008 *Prolagus michauxi* López Martínez - Angelone, p. 130, fig. 1; p. 131; p. 133; p. 134, fig. 6; p. 137.

2009 *Prolagus michauxi* López Martínez - Angelone & Sesé, p. 85; p. 86, fig. 8.4.

Material: D4 sin: CC6 (L: 0,89); P2 sin: CC2 (L: 1,30; W: 2,05); P4 sin: CC3 (L: 1,39; TH: 0,75); M2 sin: CC4 (L: 1,38); M2 dx: CC7 (L: 1,37); p3 sin: CC1, CC5.

Remarks. The direct observation of *Prolagus* specimens from Ciabòt Cagna evidenced that they show the typical features of *P. sorbinii*: p3 with labially indented anteroconid, variable crochet, sometimes isolated metaconid; P4 with verticalized parafossette; M2 with round, small mesofossette. The measurements of *P. sorbinii* from Ciabòt Cagna fall in the range of the species (Angelone 2007).

Differences with the original description. In the original paper about the vertebrates of Ciabòt Cagna (Cavallo et al. 1993) the ochotonid was classified as *Prolagus michauxi* due to the following inaccuracies in the drawings that led to an incorrect taxonomical assignment (Fig. 2):

- 1) P2 (CC2): the width of the tooth has been exaggerated; the fracture on the mesial hyperloph has been drawn as an enamel hiatus;
- 2) P4 (CC3) and M2 (CC4): in both cases the tooth width has been exaggerated as the hypercone fractures have not been recognized; in P4 the parafossette is horizontal instead of verticalized; in M2 (originally identified as M1) the fossette is C-shaped instead of round.
- 3) p3 (CC1): the original drawing does not represent the occlusal surface of the tooth, but its "radical" side. In the actual occlusal surface: anteroconid, proto-

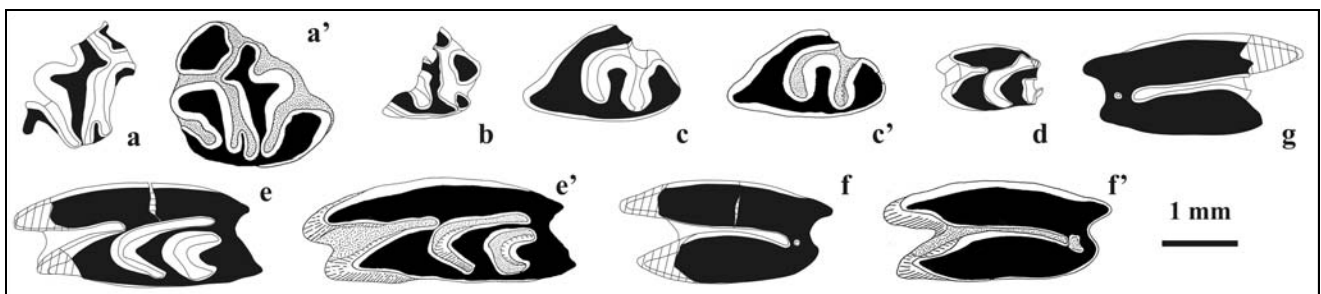


Fig. 2 - *Prolagus sorbinii* from Ciabòt Cagna: a)-a') p3 sin CC1; b) p3 sin CC5; c)-c') P2 sin CC2; d) D4 sin CC6 e)-e') P4 sin CC3; f)-f') M2 sin CC4; g) M2 dx CC7. Images a', c', e', f' from Cavallo et al. (1993).

conulid, metaconid and hypoconid are broken, and the entoconid and the posterior part of the tooth are lacking; the anteroconid lingual indentation is more marked than in the original drawing; the protoconulid is less verticalized and slightly wider; the junction between protoconulid and protoconid is less “hooked”; the enamel of the lingual side of the metaconid is slightly wavy; the centreflexid and the crochet are straight; the crochet does not occupy a central position but is displaced towards the labial side of the tooth; the protoflexid is deeper and more curved in its distal portion; the protoisthmus is shorter.

Discussion and conclusions

A chain of mistakes

Based on the original drawings of Cavallo et al. (1993), later papers (see synonymy list) followed the incorrect taxonomical assignment of the ochotonid sample to *Prolagus michauxi*.

Indeed, the mistaken original drawing of the p3 from Ciabòt Cagna closely resembles Pliocene French populations and the holotype of *P. michauxi* (as remarked by Angelone 2007). Additional taxonomically significant characters observed in other tooth positions figured in Cavallo et al. (1993) were never observed in *P. sorbinii* (e.g.: a C-shaped fossette on M1-2) or are extremely rare (e.g.: the presence of enamel hiatus in P2), thus confirming the erroneous attribution to *P. michauxi*. The only incongruence was the long parafossette on P4, that should be an exclusive trait of *P. sorbinii* (Angelone 2007). Angelone (2007) remarked that in the original drawing the parafossette of P4 did not appear verticalized as should be in *P. sorbinii*; however, such observation was considered a detail of secondary importance compared to the data obtained from the p3. Direct observation of *Prolagus* from Ciabòt Cagna highlighted that the parafossette of P4 is more verticalized than reported in fig. 6D in Cavallo et al. (1993), and the mesofossette in M1 is not C-shaped but almost round, resulting in misleading taxonomical information.

The measurements reported in Angelone (2007, tab. 1, p. 412; fig. 10, p. 417) extrapolated from Cavallo et al. (1993) are wrong too, and the fracture in the hypercones of P4-M2 was not signalled, leading to an incorrect estimation of the width values. The wrong mea-

surements of P4 were reprised in Angelone & Sesé (2009, fig. 8.4, p. 86), and they resulted compatible with *P. michauxi* size range. However, an estimation of width values of P4 (actual width values can not be measured as hypercones are broken) indicates that they would fit best in the range of *P. sorbinii*.

Prolagus from Ciabòt Cagna was also included in the Fourier Analysis applied to the systematics of genus *Prolagus* performed by Angelone (2008). The shape of the anteroconid of p3 taken from the original picture in Cavallo et al. (1993) was included as unclassified specimen in a Canonical Discriminant Analysis that took into account populations of the Messinian-Pliocene species *P. sorbinii*, *P. italicus* and *P. michauxi*. The aim was to obtain additional indications about its taxonomic attribution and to verify the discriminant power of the newly introduced analysis in the systematics of *Prolagus*. Such quantitative analysis made on the wrong picture gave additional weight to the attribution of the ochotonid from Ciabòt Cagna to *P. michauxi*. A new analysis using updated data from this paper is not possible as p3 anteroconid is partly broken in both available specimens.

New systematic attribution and palaeobiogeography

In spite of the scarcity of available material, the morphologic characters exclusive of *P. sorbinii* observed in the ochotonid from Ciabòt Cagna (highlighted in the section “Systematics”), indicate that this material should be referred to this species, a probable descendant of *P. crusafonti*, recorded in Italy and Greece during Messinian and Pliocene (Angelone 2007 and references therein). This implies that *P. michauxi*, a western European Messinian-Pliocene species, probably did not enter the Italian peninsula (as stated by Angelone 2007). Thus a Messinian NW passage from W Europe into continental Italy can be excluded for ochotonids. Western Alps probably represented the boundary between the geographical ranges of *P. michauxi* and *P. sorbinii*.

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