

The genus *Prososthenia* Neumayr in Italy (Gastropoda: Prosobranchia: Hydrobiidae)

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KEY WORDS – Non-marine Gastropods, Hydrobiidae, Systematics, New taxa, Pliocene, Pleistocene, Italy.

ABSTRACT – Three new species of the genus *Prososthenia* Neumayr, 1869, are identified in Pliocene sediments of Umbria (Central Italy): *P. augusti* n. sp., *P. paulae* n. sp. and *P. tassoì* n. sp. Their treatment offers the opportunity for a short review of Italian occurrences of this extinct genus.

RIASSUNTO – [Il genere *Prososthenia* Neumayr in Italia (Gastropoda: Prosobranchia: Hydrobiidae)] – Sono state identificate tre nuove specie del genere *Prososthenia* Neumayr, 1869, in depositi pliocenici dell'Italia centrale: *P. augusti* n. sp., *P. paulae* n. sp. e *P. tassoì* n. sp. La loro descrizione offre l'occasione per una breve rassegna delle presenze in Italia di questo genere estinto.

INTRODUCTION

Prososthenia is an extinct Neogene and Quaternary genus, its several species are distributed in various basins of Europe. Eleven or twelve are recorded from Italian deposits of Piedmont, Tuscany, Umbria, Latium and Campania. Among them, six come from the continental Tiberino Basin and from its heteropic Chiani-Tevere and Monte Mario Formations: most of the lithostratigraphic units laid down in this paleogeographic domain yield representatives of *Prososthenia* (Ciangherotti *et al.*, 1998). Three of those six species are described here for the first time, but they have been already mentioned in previous papers as *Prososthenia* sp. n. or sp. or sp. A, B, or C (see the various synonymies below). Their distribution is so far restricted to the outcropping area of two formations: 1) the lacustrine Fosso Bianco Formation (Middle-Upper Pliocene) ending at the top with a lake-shore facies and a swampy facies, in which the fossil forest of Dunarobba grew; 2) the alluvial-fan Ponte Naja Formation, Late Pliocene in age (Abbazzi *et al.*, 1997; Ambrosetti *et al.*, 1995; Basilici, 1995, 1997).

The stratigraphic range of *Prososthenia* covers a rather short time span, Late Miocene-Early Pleistocene, and some of its species are limited to shorter intervals of stage rank (Tab. 1). As a whole, most of the representatives of this genus are endemic forms confined to certain basins.

The studied material is inventoried under two acronyms: M.P.U.R. indicates the depository of the Paleontological Museum of the University of Rome

"La Sapienza"; SMF indicates the depository of the Senckenberg Museum of Frankfurt.

SYSTEMATICS

Genus PROSOSTHENIA Neumayr, 1869

PROSOSTHENIA AUGUSTI n. sp.

Pl. 1, figs. 1-4

2001 *Prososthenia* sp. C - PETRONIO *et al.* (in press).

Diagnosis – Shell small, strong, ovate, imperforated, with 5 1/2 whorls, the last one exceeding the 3/4 of the height of the spire; aperture oblique, round-ovate, columellar lip expanded and callous; apex small and prominent.

Description – The shell is small and strong, ovate, imperforated, with 5 1/2 slightly convex whorls separated by a shallow suture, the last one exceeds the 3/4 of the height of the spire; the apex is small and prominent; the surface is smooth and shows barely visible growth lines; the aperture is oblique and round ovate, inferiorly rounded and superiorly slightly angulated, columellar side rather concave, external side protracted in the middle; the peristome broadly expanded and strongly thickened on the columellar side, forming a clear callus, which is more developed angularly. Mean size: H = 6 mm; D = 3 mm.

Dimensions of the holotype – H = 6 mm; D = 3.2 mm.

Holotypus – M.P.U.R.-7-1446/1.

Paratypes – M.P.U.R.-7-1447/1 - 1448/1 - 1449/1 - 1450 - 1451 - 1452/1 - 1453/2; SMF 321181.

Locus typicus – Todi (Umbria, Central Italy): Toppetti quarry.

Stratum typicum – Alluvial fan deposits of the Ponte Naja Formation (Late Pliocene) (Basilici, 1995).

Derivatio nominis – This species is dedicated in honour of Professor Augusto Azzaroli.

Observations – This species is well represented in channel sediments of alluvial-fan deposits of the Ponte Naja Formation at the type locality. No other records are known. The shell morphology is highly variable, being more or less strongly ovate; often the development of a new peristome is visible in the aperture; juvenile specimens show a more thickened peristome in relation to adult specimens.

Stratigraphic range – Late Pliocene.

PROSOSTHENIA PAULAE n. sp.
Pl.1, figs. 5-7

- 1975 *Prososthenia ovata* - ESU & GIROTTI, p. 234 (*partim*, non Bronn).
1991 *Prososthenia* sp. - ESU & GIROTTI, p. 142.
1995 *Prososthenia* sp. - CIANGHEROTTI *et al.*, p. 499, fig. 22c.
1995 *Prososthenia ovata* - CIANGHEROTTI *et al.*, p. 499 (non Bronn).
1997 *Prososthenia ovata* - GLIOZZI *et al.*, p. 378, fig. 3 (tab.) (*partim*, non Bronn).
1998 *Prososthenia ovata* - CIANGHEROTTI *et al.*, p. 493 (non Bronn).
2001 *Prososthenia* sp. B - PETRONIO *et al.* (in press).

Diagnosis – Shell small, ovate-elongate, imperforate or slightly umbilicate; spire acute with 5 ¹/₂ slightly convex whorls; last whorl exceeding half of the height of the spire; apex small, acute and prominent; aperture small, oblique, half-ovate, elongated, superiorly angulated, externally protracted in the middle-lower part; columellar margin straight oblique, adherent or slightly detached, external margin simple.

Description – The shell is small, slender, ovate-elongate, imperforate or slightly umbilicate; the spire is acute with 5 ¹/₂ slightly convex whorls, separated by shallow sutures nearly perpendicular to the axis; the last whorl exceeds half of the height of the spire; the apex is small, acute and prominent; the aperture is small, oblique, half-ovate, elongated, superiorly angulated and externally protracted in the middle-lower part; the columellar margin of the peristome is straight oblique, slightly thickened, adherent to the last whorl or somewhat detached, showing an umbilical slit; the external margin is simple; the apical angle is slightly thickened; thin growth striae are present on the surface of the shell. Mean size: H= 5.5 mm; D= 2.5 mm.

Dimensions of the holotype – H= 6.5 mm; D= 3 mm.

Holotypus – M.P.U.R.-7-1454/1.

Paratypes – M.P.U.R.-7-0239/5, 1455/1, 1476/1, 1477; SMF 321182

Locus typicus – The former lignite mine of Dunarobba (Avigliano Umbro, Southern Umbria, Central Italy).

Stratum typicum – Lignitiferous silty clays at the former lignite mine of Dunarobba. The site is now occupied by a brick farm and the outcrop is no longer exposed. Nevertheless, the stratigraphic position is well established: in fact, the stratum typicum belongs to the section of the fossil forest of Dunarobba, which is Late Pliocene in age (Ambrosetti *et al.*, 1995; Basilici, 1997).

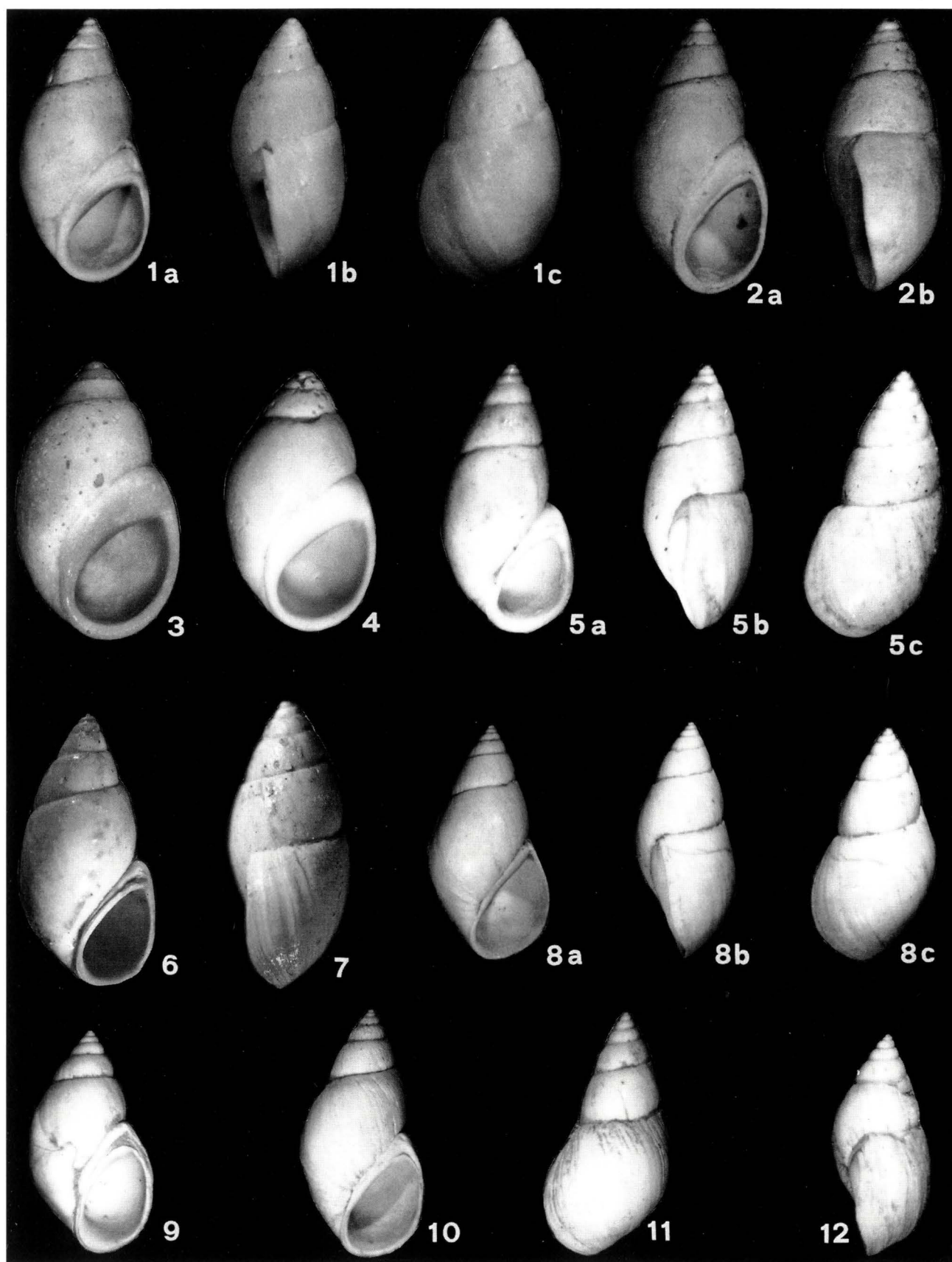
Derivatio nominis – The species is dedicated to the wife of one of the authors.

Occurrences – Dunarobba (Umbria, Central Italy), former lignite mine (M.P.U.R.-7- 0239/5; 1455, 1476/1, 1477); Dunarobba, a population of small specimens at the new quarry above the little lake (Petronio *et al.*, in press) (M.P.U.R.-7-1456); Dunarobba, at the fossil forest, lower quarry (M.P.U.R.-7-1306/1; 1457/4).

EXPLANATION OF PLATE 1

- Figs. 1-4 - *Prososthenia augusti* n. sp., Todi (Umbria, Toppetti quarry), Ponte Naja Formation, Late Pliocene, 1) Holotype, M.P.U.R.-7-1446/1, (x 8). 2) Paratype, M.P.U.R.-7-1448/1, (x 8). 3) Paratype, juvenile form, M.P.U.R.-7-1447/1, (x 14.5). 4) Paratype, juvenile form, M.P.U.R.-7-1449/1, (x 16).
Figs. 5-7 - *Prososthenia paulae* n. sp., Dunarobba (Umbria), former lignite mine, Late Pliocene, 5) Holotype, M.P.U.R.-7-1454/1, (x 8.3). 6) Paratype, M.P.U.R.-7-1455/1, (x 7.8). 7) Paratype, M.P.U.R.-7-1476, (x 7.8).
Figs. 8-12 - *Prososthenia tassoi* n. sp., Todi (Umbria, Toppetti quarry), Fosso Bianco Formation, Middle Pliocene, 8) Holotype, M.P.U.R.-7-1458/1, (x 4.6). 9) Paratype, M.P.U.R.-7-1459/1, (x 5). 10) Paratype, M.P.U.R.-7-1460/1, (x 5). 11) Paratype, M.P.U.R.-7-1461/1, (x 5). 12) Paratype, M.P.U.R.-7-1462/1, (x 5).

The material is kept in coll. Esu-Girotti, M.P.U.R. (Paleontological Museum of the University of Rome).



Observations – This species differs from *P. augusti* in being smaller, rather more cylindrical, with a smaller aperture; the columellar margin is more straightened, the external one less expanded; the peristome is not so thickened. The numerous references to *Prososthenia ovata* (Bronn) in the synonymy of this species are due both to the similarity between the two species and to the fact that up to now little material existed of the new taxon. *P. paulae* differs from *P. ovata* in being slender with a narrower and more angulated aperture, a more thickened peristome; furthermore the columellar side is more straightened and the apex is more pointed.

PROSOSTHENIA TASSOI n. sp.
Pl.1, figs. 8-12

- 1991 *Prososthenia* sp. - ESU & GIROTTI, p. 140.
1993 *Prososthenia* sp. n. - ESU *et al.*, p. 106, 109, tab. 3.
1997 *Prososthenia* sp. n. - GLIOZZI *et al.*, p. 377-378, fig. 3 (tab.).
1998 *Prososthenia* sp. A - CIANGHEROTTI *et al.*, p. 492.
1998 *Prososthenia* sp. B - CIANGHEROTTI *et al.*, p. 493.
2001 *Prososthenia* sp. A - PETRONIO *et al.* (in press).

Diagnosis – Shell small, strong, conic-ovate, elongate, imperforate; spire acute, 6 slightly convex whorls; last whorl enlarged and exceeding the half of the height of the spire; apex small, acute and prominent; aperture half-ovate, oblique, superiorly angulated and externally slightly expanded and protracted in its lower half; peristome more or less strongly thickened on the apical angle and on the columellar side; a very slight swelling occurs in the middle of the columellar region; thin growth striae crossed by very faint spiral striae.

Description – The shell is small, strong, conic-ovate, elongate, imperforate; the spire is acute with 6 whorls, slightly convex, separated by shallow sutures which are nearly perpendicular to the axis; the last whorl is enlarged and exceeds the half of the height of the spire; the apex is little, acute and prominent; the aperture is half-ovate, oblique, superiorly angulated and externally slightly expanded and protracted in its lower half; the peristome is more or less strongly thickened on the apical angle and on the columellar side; a very slight swelling occurs on the middle of the columellar region; thin growth striae cover the surface of the shell and are crossed by very thin spiral striae; the shell is shiny on the whole. Mean size: H= 8.5 mm; D= 4.5 mm.

Dimensions of the holotype – H= 9 mm; D= 4.5 mm.

Holotypus – M.P.U.R.-7-1458/1.

Paratypes – M.P.U.R.-7-1459/1, 1460/1, 1461/1, 1462/1; SMF 266805/5.

Locus typicus – Lacustrine clays of the Toppetti quarry, at Todi (Umbria, Central Italy).

Stratum typicum – Middle Pliocene lacustrine clays, lower beds of the Fosso Bianco Formation (Basilici, 1995; Abbazzi *et al.*, 1997).

Derivatio nominis – The species is dedicated to the husband of one of the authors.

Occurrences – This species occurs in the stratum typicum (Middle Pliocene) (M.P.U.R.-7-1458/1, 1459/1, 1460/1, 1461/1, 1462/1, 1463, 1467, 1468/8; SMF 266805/5) and in the Ponte Naja Formation (M.P.U.R.-7-1464/3, 1466/2), which crops out at the same quarry and is believed to be Late Pliocene in age on the basis of vertebrate evidence and magnetostratigraphy (Abbazzi *et al.*, 1997); it was also found at 62 m in the Fosso Bianco stratigraphic section (upper part of the Fosso Bianco Formation) (M.P.U.R.-7-1465/57), which age is Late Pliocene (Basilici, 1992; Ciangherotti *et al.*, 1998).

Observations – Excluding its swampy and lake-shore facies, which are rich in fossil plants and molluscs, the Fosso Bianco Formation is generally scarcely fossiliferous. At Toppetti quarry no vertebrates were found; ostracods are abundant but represented by monotonous oligotypical assemblages (Giampaolo *et al.*, 1999); molluscs are represented by the new species here described (formerly listed under provisional names, see synonymy) and by *Choerina todina* Esu & Girotti (Esu *et al.*, in press). *P. tassoi* is the most abundant. In fact, we have collected more than one hundred specimens scattered in the lacustrine clay levels of the type-locality. Some material comes from the upper beds of the Fosso Bianco Formation at 62 m of the Fosso Bianco stratigraphic section (Basilici, 1992; Ciangherotti *et al.*, 1998, p. 493, listed as *Prososthenia* sp. B, in fig. 2); other specimens were found in the Ponte Naja Formation. *P. tassoi* shows a certain degree of variability concerning the thickening of the peristome and the length of the spire. On the other hand, the slight swelling on the columellar region of the aperture and the pointed apex appear to be consistent features.

Stratigraphic range – Middle Pliocene-Late Pliocene.

CONCLUSIONS

Taking into account the new species here described and a further species still under investigation, the representatives of *Prososthenia*, known so far from the Italian Neogene and Quaternary deposits and not from outside Italy, increase to twelve (Tab. 1):

- P. augusti* n. sp.,
P. etrusca (De Stefani),
P. incipiens Pantanelli,
P. meneghiniana (De Stefani),

?*P. minuta* Pantanelli,
P. oblonga (Bronn),
P. ovata (Bronn),
P. pantanellii Brusina,
P. paulae n. sp.,
P. subcarinata (Michelotti),
P. tasso n. sp.,
Prososthenia sp.

Prososthenia incipiens, ? *P. minuta* and *P. pantanellii* are restricted to the Messinian of Tuscany (Wenz, 1926).

P. subcarinata comes from Messinian deposits of Piedmont (Sacco, 1895), other records (Wenz, 1926) are doubtful. Moreover, some specimens labelled as *P. subcarinata* (Sismonda) (sic!) from Fango Nero (Siena) are kept in the Senckenberg Museum of Frankfurt: they have no inventory number and the label was written by Semper (Janssen, personal communication). But it deals with *P. meneghiniana*. Sacco's form "*Nematurella oblonga persuturata*" (Wenz, 1926), coming also from the Messinian of Piedmont, is, in our opinion, synonymous with *P. subcarinata*.

P. etrusca is known from the Pliocene-Early Pleistocene of Tuscany, Umbria and Latium according to Esu & Girotti (1975), but its distribution also extends further South. In fact, we have specimens collected from Upper Pliocene brackish sediments, alternating with *Cerastoderma* beds, from the Irpinia territory near Valle Saccarda (C. Barbera, personal delivery and communication).

P. meneghiniana comes from the Messinian-Early Pliocene of Tuscany and the Early Pleistocene of Umbria and Latium (Esu & Girotti, 1975).

Together with the previous species, *P. ovata* seems to cover the longest time span: Late Miocene (Messinian) of Tuscany (De Stefani, 1880), Middle/Late Pliocene of Tuscany in the Val d'Elsa

(Sandberger, 1875), and Montecarlo in Valdarno (Ciangherotti *et al.*, 1998), Early Pleistocene of Umbria and Latium (Rome) according to Esu & Girotti (1975). These authors included in *P. ovata* material from France (p. 234), believed to be Pliocene by Delafond & Depéret (1893) and Wenz (1926). This statement is erroneous because the French material, which age is Late Miocene, is attributed to *Tournouerina ludgunensis* (Tournouer) (Schlickum, 1971, p. 163 and foot-note 5).

P. oblonga ranges from the Middle/Late Pliocene of Tuscany (Ciangherotti *et al.*, 1998) to the Early Pleistocene of Tuscany and Umbria (Esu & Girotti, 1975; Caredio *et al.*, 1995; Benvenuti *et al.*, 1998).

The three new species are recorded so far only from Umbria. *P. tasso* ranges from Middle to Late Pliocene, whereas *P. augusti* and *P. paulae* are found in Upper Pliocene deposits.

A twelfth species of *Prososthenia*, coming from Early/Middle Pliocene deposits of Val di Pesa (Tuscany), is still under investigation.

Schütt (1988, p. 146) describes *P. lakonica* Schütt from the Early Pliocene deposits of Githion (Greece), commenting on similarities with the Italian species. We also compared our material with *P. lakonica* in the Senckenberg Museum collection, which, although showing some affinities, does not correspond with any of the Italian species.

The genus *Prososthenia* appears in the Late Miocene of East Europe, Germany and Italy (Wenz, 1926) and it does not extend into the Middle Pleistocene. It was believed (Schütt, 1988) that all species of *Prososthenia* died out in the Pliocene, even though Esu & Girotti (1975) already reported on Late Villafranchian species. Benvenuti *et al.* (1998) confirmed this point by recording *P. oblonga* from sediments of the Mugello basin, which contain mammals of the Farneta F.U. (Gliozzi *et al.*, 1997; Benvenuti *et al.*, 1998). Moreover, Krolopp (1976) and Fuköh (1995) record a *Prososthenia* sp. from the Early Pleistocene of Hungary. The Quaternary occurrences of *Prososthenia* in basins of Central Italy represent, together with some other genera, a survival of archaic and endemic forms in rather isolated intramontane basins of the Tyrrhenian slope of the Apennine (Esu *et al.*, 1993).

We agree with Schütt's opinion (1988, p. 146) about the tendency shown by *Prososthenia* to develop endemic species. In fact, all the Italian representatives are restricted to well identified paleogeographic domains, such as the Piedmont Neogene basin and the neoautochthonous basins of the Tyrrhenian side of Central Italy.

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Chronostratigraphy	Late Miocene		Pliocene				Pleistocene		
	Messinian	Early	Middle	Late			Early		
Species	Piedmont	Tuscany	Tuscany	Tuscany	Umbria	Tuscany	Umbria	Campania	Latium
<i>P. subcarinata</i>	x								
<i>P. incipiens</i>		x							
? <i>P. minuta</i>		x							
<i>P. pantanellii</i>		x							
<i>P. meneghiniana</i>		x	x					x	x
<i>P. ovata</i>		x				x		x	
<i>Prososthenia</i> sp.			x	?					
<i>P. etrusca</i>			?	x		x	x	x	x
<i>P. tasso</i> n. sp.					x				
<i>P. oblonga</i>						x		x	x
<i>P. augusti</i> n. sp.							x		
<i>P. paulae</i> n. sp.						x			

Tab. 1 - Chronostratigraphic and geographic distribution of the Italian species of the genus *Prososthenia* Neumayr.

Bologna for the loan of material of comparison; finally to an anonymous and patient referee.

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