



On the generic separation of *Ovatella* Bivona, 1832 and *Myosotella* Monterosato, 1906 (Pulmonata: Ellobiidae)

Sobre la separación de los géneros *Ovatella* Bivona, 1832 y *Myosotella* Monterosato, 1906 (Pulmonata: Ellobiidae)

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ABSTRACT

Morphological and anatomical evidence is presented leading to conclude that *Ovatella* Bivona, 1832 and *Myosotella* Monterosato, 1906 must be separated at the genus level. Shell morphology: the punctuations on the first three whorls of the teleoconch and the single row of periostracal hairs, even in the body whorl, in *Myosotella* contrast with the striate aspect of the teleoconch and the whole coverage of the body whorl by periostracal hairs, at least in juveniles, in *Ovatella*. The apertural dentition in *Myosotella* consistently shows the first parietal tooth as definitely strongest, whereas in *Ovatella* the posterior parietal tooth is as strong or even stronger than the anterior one; a callus usually present on the outer lip of *Ovatella* is absent in *Myosotella*. Anatomy: *Myosotella* has a monolithic, compact mandible, which contrasts with the tripartite, fibrous mandible of *Ovatella*. The presence of a well developed pallial gland in *Ovatella* and the morphology of the penial papilla also distinctively separate this taxon from *Myosotella*. Basic similarities between both taxa (hermaphroditic genital opening, short open sperm groove, wide visceral nerve ring) are interpreted as symplesiomorphies, and are in accordance with the trends observed with the remaining genera of the Pythiinae.

RESUMEN

Se aportan datos morfológicos y anatómicos que permiten afirmar que *Ovatella* Bivona, 1832 y *Myosotella* Monterosato, 1906 deben permanecer como géneros separados. Concha: puntuada las tres primeras vueltas en *Myosotella*, una línea única de pelos del periostraco; aspecto estriado en *Ovatella*, juveniles con la vuelta corporal totalmente cubierta de pelos. En *Myosotella* el primer diente parietal es el más desarrollado, en *Ovatella* el diente parietal posterior está desarrollado como el anterior. El callo normalmente presente en el labio externo de *Ovatella* falta en *Myosotella*. Anatomía: la mandíbula de *Myosotella* es monolítica y compacta, la de *Ovatella* tripartita y fibrosa. Glándula paleal bien desarrollada en *Ovatella*, la papila peneal también difiere. Los parecidos básicos se interpretan como simplesiomorfias, y están en concordancia con lo observado en los restantes géneros de Pythiinae.

KEY WORDS: Ellobiidae, *Ovatella*, *Myosotella*, genus, anatomy, systematics.

PALABRAS CLAVE: Ellobiidae, *Ovatella*, *Myosotella*, género, anatomía, sistemática.

INTRODUCTION

Ovatella Bivona, 1832 and *Myosotella* Monterosato, 1906 are two taxa of mostly European halophilic ellobiid gastropods. They have been consistently confused, the

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latter, when applied to the extremely variable *Myosotella myosotis* (Draparnaud, 1801), frequently treated either as a synonym or as a subgenus of the former. The species of both taxa, however, although superficially similar in shell shape and apparently occupying similar ecotopes, exhibit morphological and anatomical differences sufficient to warrant generic separation (MARTINS, 1996a, b). The present work, summarizing and contrasting morphological and anatomical characters in both taxa, intends to justify their taxonomic separation at the generic level.

MATERIALS

Data used in this study were mostly taken from MARTINS (1995a, b). Additional material from the Açores came

from Carapacho, Graciosa Island and from Corvo Island. Specimens not in the author's collection came from the following museums:

- ANSP - Academy of Natural Sciences of Philadelphia, PA, U. S. A.
- BMNH - The Natural History Museum [formerly British Museum (Natural History)], London, U. K.
- MCZ - Museum of Comparative Zoology, Harvard University, Cambridge, MASS, U. S. A.
- MNHNP - Muséum National d'Histoire Naturelle de Paris, France.
- RAMM - Royal Albert Memorial Museum, London, U. K.
- USNM - National Museum of Natural History [formerly United States National Museum], Smithsonian Institution, Washington, DC, U. S. A.

SYSTEMATICS

Ovatella Bivona, 1832

Ovatella Bivona, 1832, *Effemeridi scientifiche e letterarie per la Sicilia*, 1: 58. Type species by subsequent designation of MONTEROSATO (1906): *Ovatella punctata* Bivona, 1832 [= *Auricula firminii* Payraudeau, 1826].

Monica H. and A. Adams, 1855, *Genera of Recent Mollusca*, 2: 247. Type species by subsequent designation of WENZ (1930): *Monica firminii* (Payraudeau, 1826).

Description: Shell (Figs. 1-3): height to 14.2 mm, oval-elongated, moderately solid, pale-yellow to light-brown, faintly banded. Spire moderately high, with up to 8 weakly convex whorls; first half-whorl of teleoconch finely striated longitudinally, glabrous; remaining whorls hirsute in juveniles, becoming glabrous in adults which sometimes retain regularly arranged rows of pits where the periostracal hairs inserted; a marked subsutural furrow. Body whorl about 70-75% of shell height, more or less markedly spirally striated, at least near the suture and around the columellar tip. Aperture oval-elongated, about 75% of body whorl height, rounded at base; inner lip tridentate, with small, oblique columellar tooth, two subequal parietal teeth, anterior one roughly perpendicular to columella, lamellar, continuing

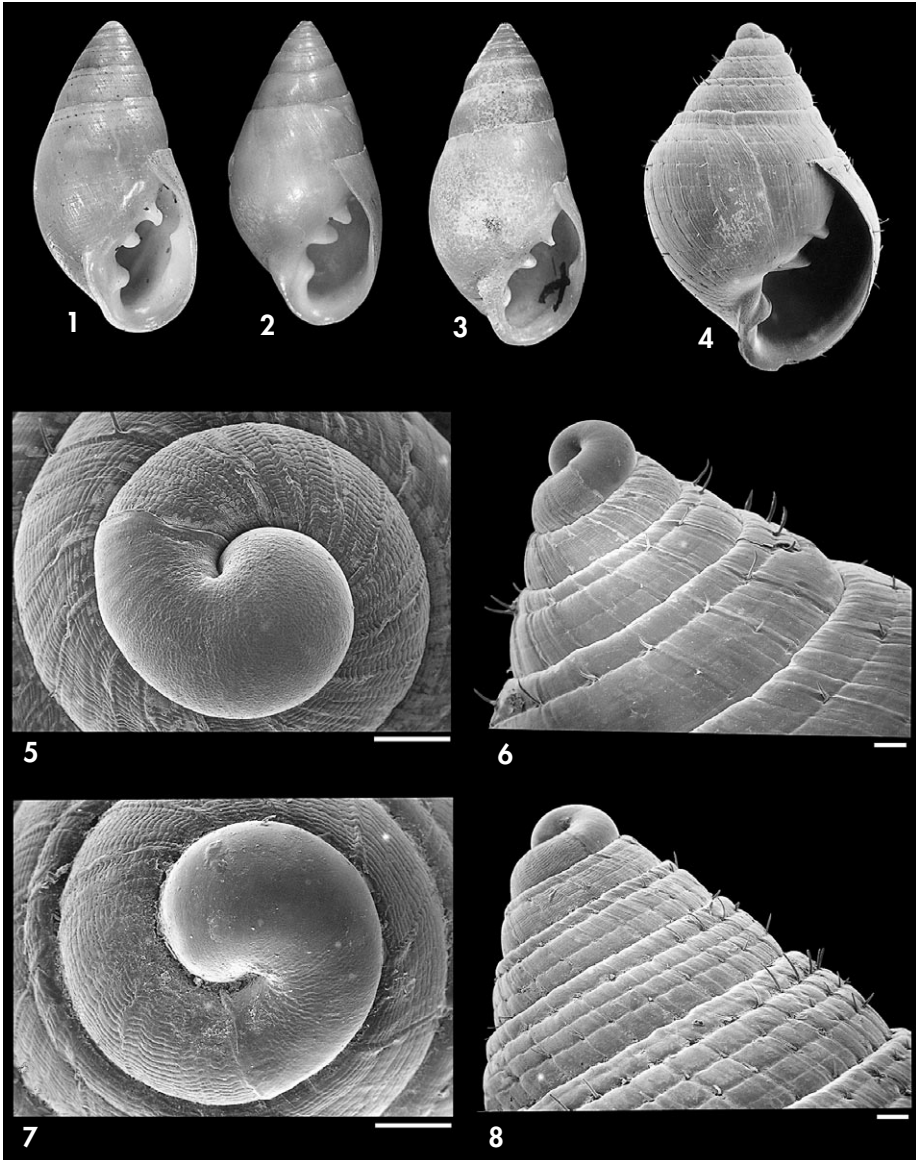
inwards, posterior one oblique, sometimes downcurved, not continuing inwards; outer lip sharp, with one, rarely two inner tubercles, a callous ridge sometimes developing anteriorly.

Juveniles pilose, the hairs arranged along spiral striae over the entire body whorl (Fig. 4).

Protoconch smooth, large, somewhat inflated, about 1.3 whorls, with rounded, slightly reflected peristome (Figs. 5-8).

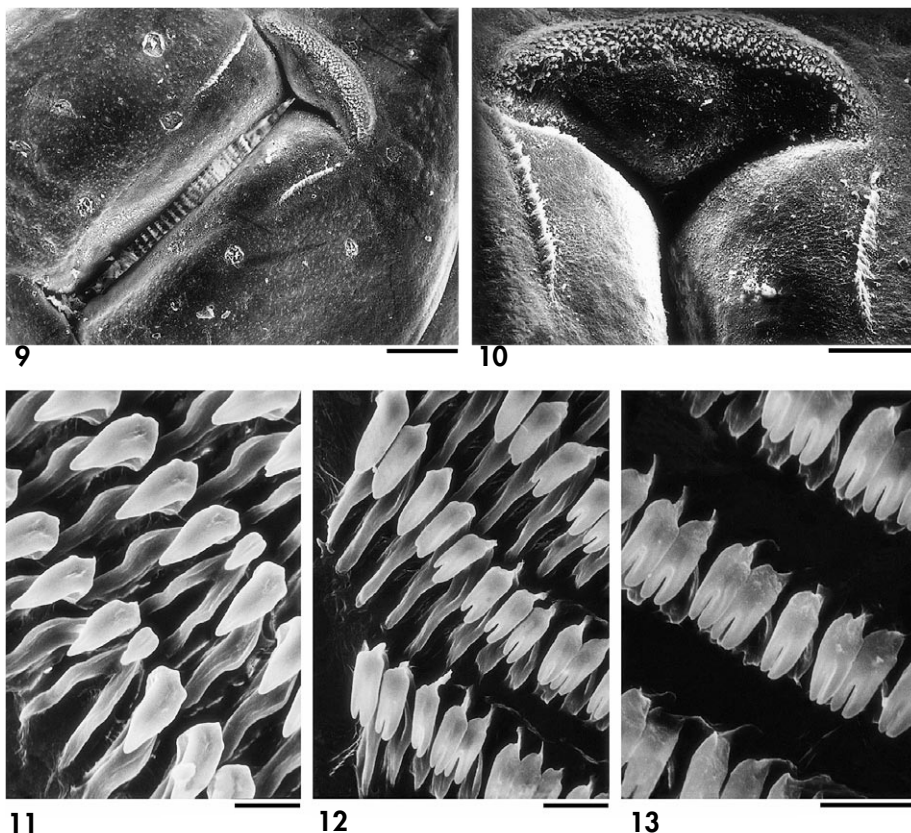
Animal pale-yellow, with two dark spots in front of the head; posterior tentacles subcylindric, black with clear base; rudimentary anterior tentacles not obvious; eyes black, located at inner base of posterior tentacles; mantle border slightly darker than neck; pedal sole entire, rounded posteriorly.

Mandible (Figs. 9, 10) tripartite, central portion nearly elliptic, finely



Figures 1-8. Shells of species of *Ovatella*. 1: *O. firminii*, MCZ 68997, Palermo, Sicilia, 10.4 mm; 2: *Melampus aequalis*, ANSP 97230 [marked 'cotype'], 12.7 mm; 3: *Auricula vulcani*, holotype, BMNH 1893.2.4.816, Pico, Açores, 11 mm; 4: *O. vulcani*, juvenil, Topo, São Jorge, Açores, 2.6 mm; 5, 6: *O. vulcani*, protoconch and early teleoconch, Calheta, Ponta Delgada, São Miguel, Açores; 7, 8: *O. firminii*, protoconch and early teleoconch, USNM 673755, Lebanon. Scale bars 100 μ m.

Figuras 1-8. Conchas de *Ovatella*. 1: *O. firminii*, MCZ 68997, Palermo, Sicilia, 10,4 mm; 2: *Melampus aequalis*, ANSP 97230 [marcada como 'cotype'], 12,7 mm; 3: *Auricula vulcani*, holotipo, BMNH 1893.2.4.816, Pico, Açores, 11 mm; 4: *O. vulcani*, juvenil, Topo, São Jorge, Açores, 2,6 mm; 5, 6: *O. vulcani*, protoconcha y comienzo de teleconcha, Calheta, Ponta Delgada, São Miguel, Açores; 7, 8: *O. firminii*, protoconcha y comienzo de teleconcha, USNM 673755, Lebanon. Escalas 100 μ m.



Figures 9, 10. *Ovatella vulcani*, Calheta, Ponta Delgada, São Miguel, Açores. Mouth and mandible. Figures 11-13. Radular teeth of *O. vulcani*, Ponta de São Pedro, Vila Franca do Campo, São Miguel, Açores. 11: central and first lateral teeth; 12: last lateral and first marginal teeth; 13: marginal teeth. Scale bars, 9: 100 μ m; 10: 50 μ m; 11-13: 10 μ m.

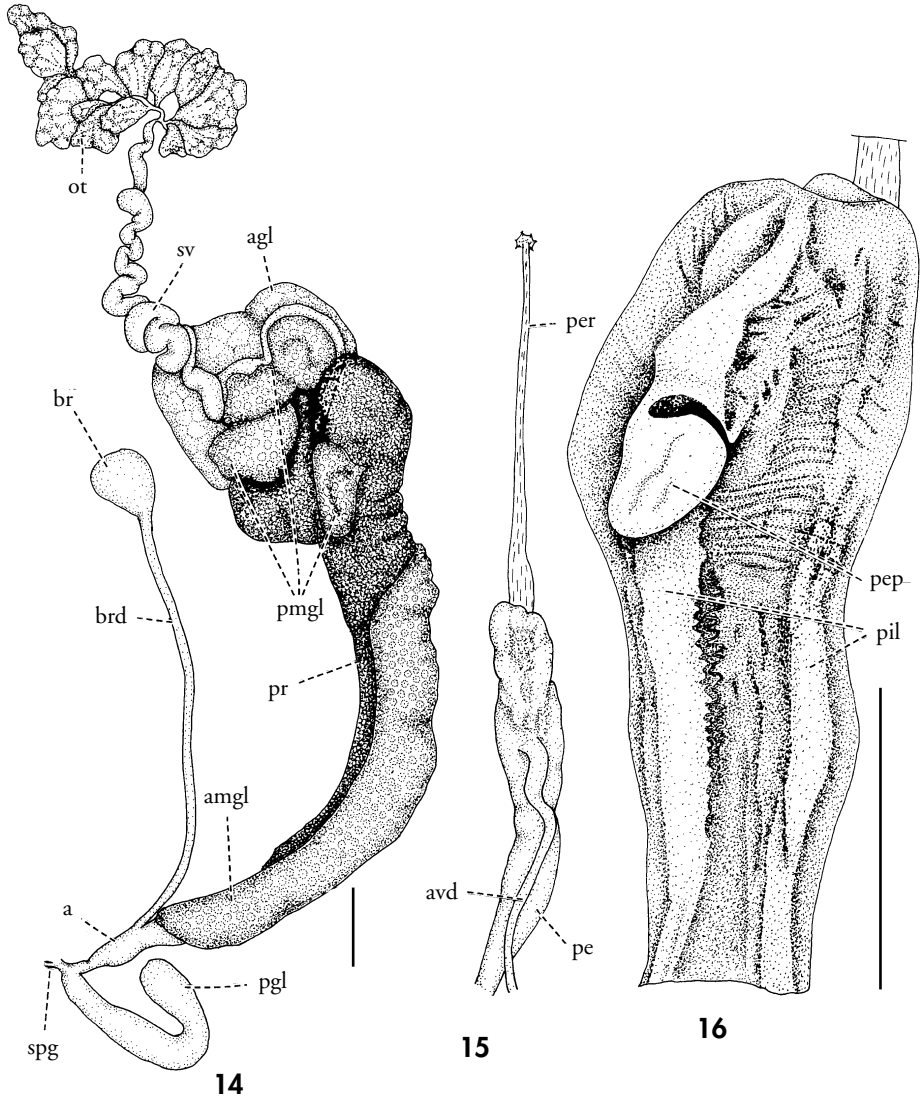
Figuras 9, 10. Ovatella vulcani, Calheta, Ponta Delgada, São Miguel, Açores. Boca y mandíbula. Figuras 11-13. Dientes radulares de O. vulcani, Ponta de São Pedro, Vila Franca do Campo, São Miguel, Açores. 11: diente central y primeros laterales; 12: último lateral y primeros marginales; 13: dientes marginales. Escalas, 9: 100 μ m; 10: 50 μ m; 11-13: 10 μ m.

striated transversely, brush-like; lateral portions thin and long, also striated and brush-like.

Radula (Figs. 11-13): formula (42+21+1+21+42) \times 100. Central tooth about same level as lateral teeth; base elongate, deeply emarginate; crown small, unicuspid, mesocone rounded. Lateral teeth with elongated base, medially bent inwards; crown large, triangular to subquadrangular, unicuspid; mesocone blunt to pointed. Mar-

ginal teeth with gradually diminishing base; crown long, bicuspid; endocone and mesocone equal, rounded.

Reproductive system (Figs. 14-18): ovotestis of several acini embedded in the helicoidal, posterior lobe of the digestive gland; hermaphroditic duct long and convoluted, forming a dilated seminal vesicle; albumen gland apical; posterior mucus gland with several lobes embedded proximally in albumen gland and distally in prostate gland;

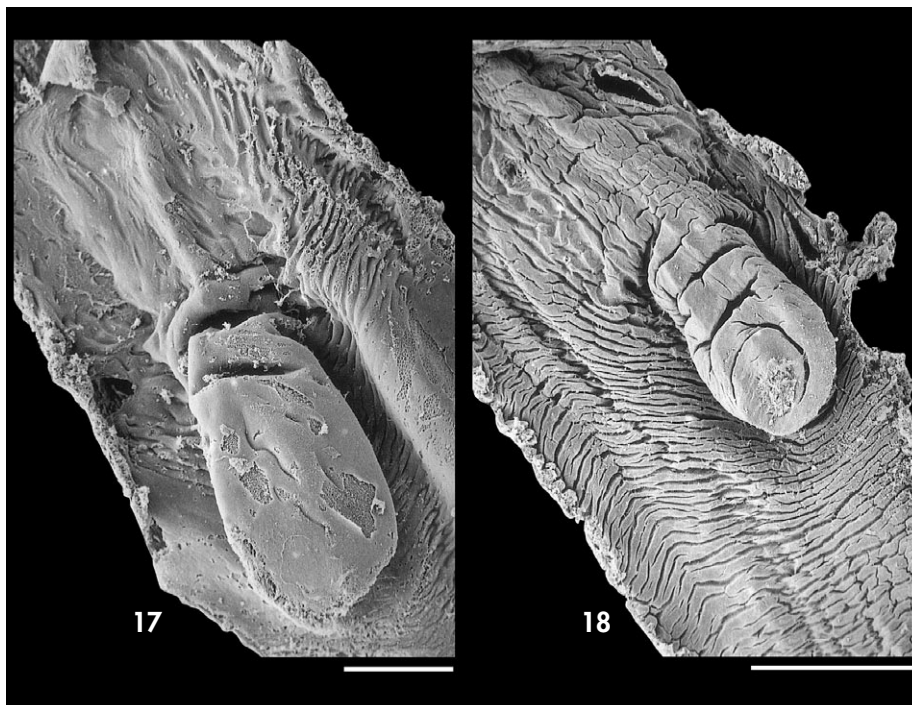


Figures 14-16. Reproductive system of *Ovatella vulcani*, Caldeira do Santo Cristo, São Jorge, Açores. 14: hermaphroditic portion; 15: external view of the penis; 16: internal morphology of the penis. Scale bars 1 mm.

Abbreviations. a: atrium; agl: albumen gland; amgl: anterior mucus gland; avd: anterior vas deferens; br: bursa; brd: bursa duct; ot: ovotestis; pe: penis; pep: penial papilla; per: penial retractor muscle; pgl: pallial gland; pil: penial pilasters; pmgl: posterior mucus gland; pr: prostate gland; spg: sperm groove; sv: seminal vesicle.

Figuras 14-16. Aparato genital de Ovatella vulcani, Caldeira do Santo Cristo, São Jorge, Açores. 14: porción hermafrodita; 15: vista exterior del pene; 16: morfología interna del pene. Escalas 1 mm.

Abreviaturas. a: atrium; agl: glándula del albumen; amgl: glándula mucosa anterior; avd: vaso deferente anterior; br: bursa; brd: conducto de la bursa; ot: ovotestis; pe: pene; pep: papila peneal; per: músculo retractor peneal; pgl: glándula paleal; pil: pilares peneales; pmgl: glándula mucosa posterior; pr: glándula prostática; spg: surco espermático; sv: vesícula seminal.



Figures 17, 18. Internal morphology of the penis of species of *Ovatella*. 17: *O. vulcani*, Calheta, Ponta Delgada, São Miguel, Açores; 18: *O. cf. firminii*, Sagres, Portugal. Scale bars 200 μ m.

Figuras 17, 18. Morfología interna del pene de Ovatella. 17: O. vulcani, Calheta, Ponta Delgada, São Miguel, Açores; 18: O. cf. firminii, Sagres, Portugal. Escalas 200 μ m.

pallial gonoduct monaulic; anterior mucus gland and prostate gland covering, side by side, almost the entire length of the pallial gonoduct; distal end of spermoviduct non-glandular, opening into a hermaphroditic atrium; the male groove continues after the atrium for a short distance as an open, ciliated spermatic groove, soon becoming an enclosed duct, the vas deferens; bursa roundish, embedded in the lobes of posterior mucus gland; bursa duct thin, slightly longer than spermoviduct, opening into the hermaphroditic atrium a little before the confluence with the pallial gland. Pallial gland moderately long, sharply bent at proximal third, emptying into the hermaphroditic genital atrium. Penis elongate; anterior vas deferens loosely adhering to prepu-

tium and entering penis laterally, at about the end of the proximal third; penial papilla arising from a strong pilaster at about the site of entrance of the vas deferens, subquadrangular to cylindrical, cut by deep transverse furrows, with rounded tip; chamber surrounding penial papilla finely striated transversely, distal chamber with two or three strong longitudinal pilasters. Penial retractor long.

Nervous system (Fig. 19): Cerebral commissure short, left cerebro-pleural and cerebro-pedal connectives somewhat longer than right ones; left pleural and parietal ganglia smaller than their right counterparts; pleuro-parietal connectives short, the right one twice the length of the left one; right parietal ganglion giving off a thick pneumostomal

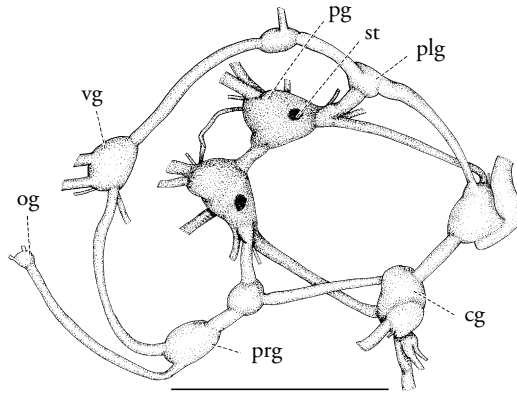


Figure 19. Central nervous system of *Ovatella* cf. *firminii*, Sagres, Portugal. Scale bar 1 mm. Abbreviations. cg: cerebral ganglion; og: osphradial ganglion; pg: pedal ganglion; plg: pleural ganglion; prg: parietal ganglion; st: statocyst; vg: visceral ganglion.

Figure 19. Sistema nervioso central de *Ovatella* cf. *firminii*, Sagres, Portugal. Escala 1 mm. Abreviaturas. cg: ganglio cerebral; og: ganglio del osfradio; pg: ganglio pedial; plg: ganglio pleural; prg: ganglio parietal; st: estatocisto; vg: ganglio visceral.

(connective) nerve to a rudimentary osphradial ganglion; parieto-visceral connectives relatively long, subequal.

Remarks: *Ovatella* was introduced by BIVONA (1832) in the first issue of "Effemeridi scientifiche". Two species were included, *Ovatella punctata* Bivona [= *O. firminii* (Payraudeau)] and *Ovatella polita* Bivona which, according to WATSON (1943), is apparently identical with *Odostomia conoidea* Brocchi. In the second issue of "Effemeridi scientifiche", in April of the same year, Bivona added *Ovatella bidentata* Bivona, later renamed *Ovatella bivonae* by PHILIPPI (1844). KENNARD AND WOODWARD (1919), after examining Bivona's specimens, concluded that *Ovatella bidentata* Bivona was very different from *Auriculinella bidentata* (Montagu) with which the former species has been identified, but did not comment on the systematic position of Bivona's species. GRAY (1847), followed by THIELE (1931), wrongly chose Montagu's species as the type species of *Ovatella*, which Gray misspelled as *Ovatilla*.

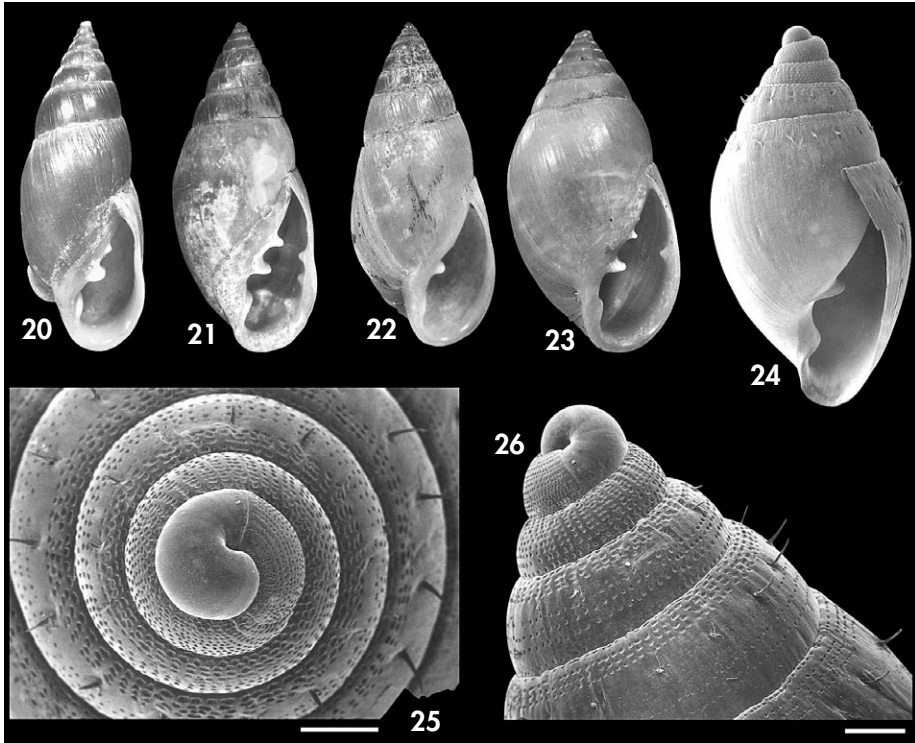
ADAMS AND ADAMS (1855) introduced *Monica* as a subgenus of *Marinula* King, and they included in that

subgenus *Melampus equalis* Lowe, 1832, *Melampus gracilis* Lowe, 1832 and *Melampus firminii* (Payraudeau), the latter selected by WENZ (1930) as the type species of *Ovatella* Bivona. Anatomical characteristics place *Marinula* in the Pedipedinae, whereas the remaining taxa, wrongly placed in *Melampus* by LOWE (1832), belong in the Pythiinae (MARTINS 1996a, b).

The anatomy of the type species of *Ovatella* was briefly looked into by GIUSTI (1973), and MARTINS (1995a) has compared the Açorian and Madeiran species of the genus, concluding for the recognition of *Ovatella aequalis* (Lowe, 1832) and *Ovatella vulcani* (Morelet, 1860), previously considered as synonyms.

Habitat notes: The Macaronesian species of *Ovatella* live among stones, just above high tide up to where sprinkles of splashing waves reach (MARTINS 1980; MARTINS 1995a; MORTON, BRITTON AND MARTINS, 1998).

Range: *Ovatella* is an European genus, present in the Mediterranean and in the Atlantic along the Portuguese coast until north of Lisbon, and throughout the Macaronesia.



Figures 20-26. Shells of *Myosotella myosotis*. 20: *Alexia (Auricula) myosotis* var. *hiriarti* Follin and Bérillon, lectotype, MNHNP, Biarritz lighthouse, France, 10.1 mm; 21: *Voluta denticulata* Montagu, lectotype, RAMM 4100, Devon, England, 8.5 mm; 22: *Auricula bicolor* Morelet, lectotype, BMNH 1893.2.4.822, Pico, Açores, 9.7 mm; 23: *Auricula vespertina* Morelet, lectotype, BMNH 1893.2.4.825, Areia Larga, Pico, Açores, 7.8 mm; 24: juvenile, Calheta, Ponta Delgada, São Miguel, Açores, 3.2 mm; 25, 26: protoconch and early teleconch, Calheta, Ponta Delgada, São Miguel, Açores. Scale bars 200 µm.

Figuras 20-26. Conchas de Myosotella myosotis. 20: Alexia (Auricula) myosotis var. hiriarti Follin y Bérillon, lectotipo, MNHNP, faro de Biarritz, Francia, 10,1 mm; 21: Voluta denticulata Montagu, lectotipo, RAMM 4100, Devon, Inglaterra, 8,5 mm; 22: Auricula bicolor Morelet, lectotipo, BMNH 1893.2.4.822, Pico, Açores, 9,7 mm; 23: Auricula vespertina Morelet, lectotipo, BMNH 1893.2.4.825, Areia Larga, Pico, Açores, 7,8 mm; 24: juvenil, Calheta, Ponta Delgada, São Miguel, Açores, 3,2 mm; 25, 26: protoconcha y comienzo de la teleconcha, Calheta, Ponta Delgada, São Miguel, Açores. Escalas 200 µm.

Myosotella Monterosato, 1906

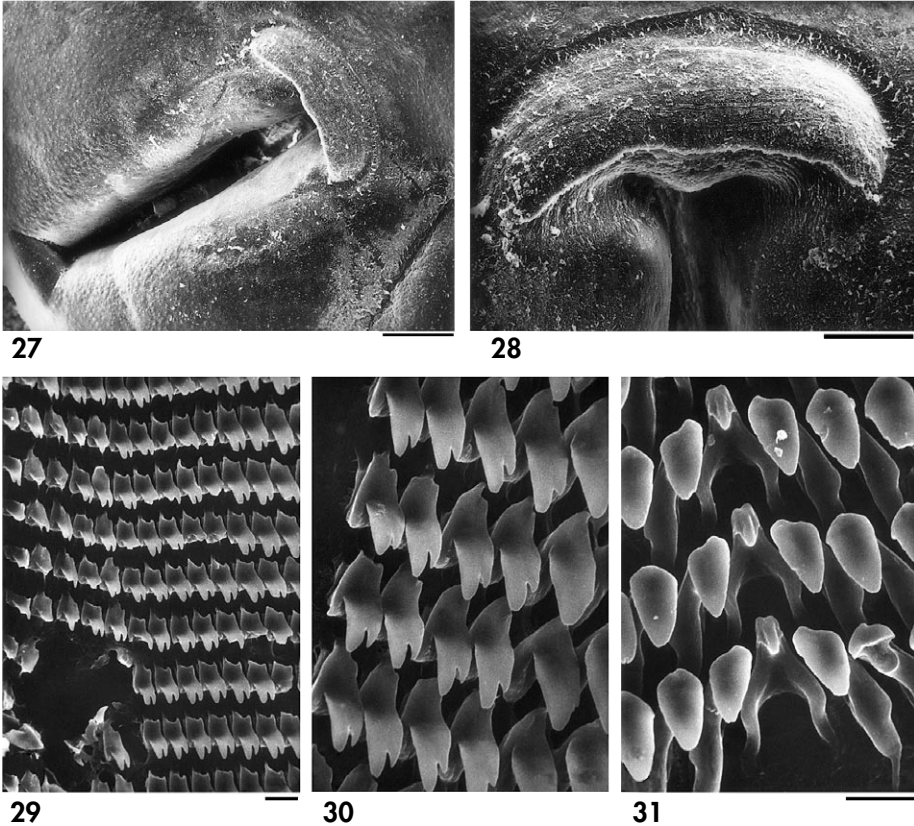
Phytia Röding, 1798. Gray, 1821: 231 [misspelling of *Pythia*].

Phytia Gray. Blainville, 1824: 246 [misspelling of Gray's misspelling of *Pythia*].

Phythya Gray. Deshayes, 1832: 762 [misspelling of Gray's misspelling of *Pythia*].

Jaminia Brown, 1827, pl. 51. Type species by subsequent designation of Gray (1847): *Jaminia denticulata* (Montagu, 1803) [= *Auricula myosotis* Draparnaud]. Non Risso, 1826.

Alexia 'Leach' Gray, 1847: 179. Type species by monotypy: *Alexia denticulata* (Montagu, 1803) [= *Auricula myosotis* Draparnaud, 1801]. Non Stephens, 1835.



Figures 27, 28. *Myosotella myosotis*, Corvo, Açores. Mouth and mandible. Figures 29-31. Radular teeth of *M. myosotis*, Newport River, North Carolina, U. S. A. 29: marginal teeth; 30: last lateral and first marginal teeth; 31: Central and first lateral teeth. Scale bars, 27: 100 μ m; 28: 50 μ m; 29-31: 10 μ m.

Figuras 27, 28. Myosotella myosotis, Corvo, Açores. Boca y mandíbula. Figuras 29-31. Rádula de M. myosotis, Newport River, North Carolina, U. S. A. 29: dientes marginal; 30: último lateral y primeros marginales; 31: central y primeros laterales. Escalas, 27: 100 μ m; 28: 50 μ m; 29-31: 10 μ m.

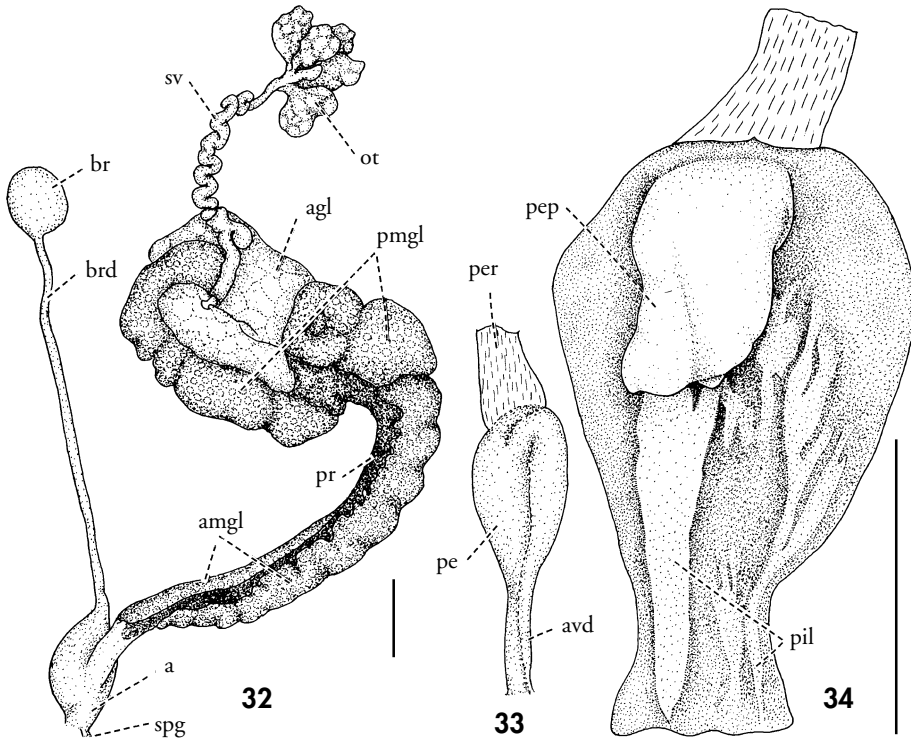
Kochia Pallary, 1900: 239. Type species by subsequent designation of Monterosato (1906): *Alexia* (*Kochia*) *oranica* Pallary, 1900 [= *Auricula myosotis* Draparnaud, 1801]. *Non* Frech, 1891.

Myosotella Monterosato, 1906: 126. Type species by original designation: *Myosotella payraudeaui* 'Shuttleworth' Pfeiffer, 1856 [= *Auricula myosotis* Draparnaud, 1801].

Nealexia Wenz, 1920: 190 [new name for *Alexia* Gray, 1847, *non* Stephens, 1835].

Description: Shell (Figs. 20-25): length to 12 mm, fragile to somewhat solid, pale-yellow to purplish-red. Spire high, with up to 8 weakly convex whorls; first three whorls of teleoconch deeply pitted, with pits regularly arranged in spiral rows which diminish in number and

vanish on the 3rd whorl; only one spiral row of hairs in juveniles. Body whorl about 70% of shell height, smooth, sometimes with a crown of hairs persisting on shoulder in younger, well preserved adults. Aperture about 80% of body whorl height, oval-elongated; inner lip



Figures 32-34. Reproductive system of *Myosotella myosotis*, Carapacho, Graciosa, Açores. 32: hermaphroditic portion; 33: external view of the penis; 34: internal morphology of the penis. Scale bars 1 mm. Abbreviations as in Figure 14.

Figuras 32-34. Genital de Myosotella myosotis, Carapacho, Graciosa, Açores. 14: porción hermafrodita; 15: vista exterior del pene; 16: morfología interna del pene. Escalas 1 mm. Abreviaturas como en la Figura 14.

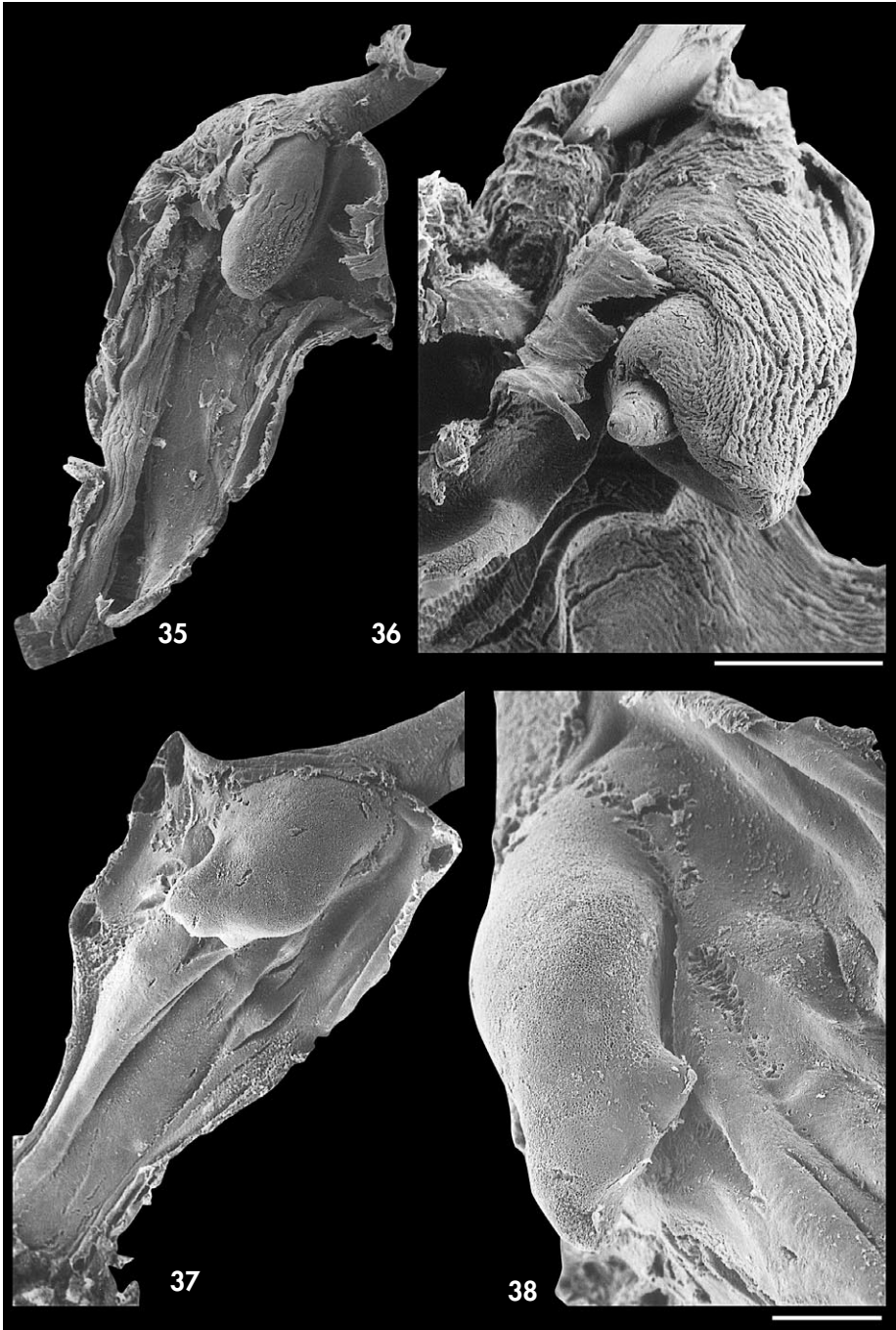
with small, very oblique columellar tooth, strong anterior parietal tooth and usually one, sometimes more parietal teeth decreasing in size posteriorly; outer lip sharp, weakly reflected, commonly with one or more inner tubercles.

Protoconch smooth, large, with 1.5 protruding whorls, leaving umbilicus-like slit in apex of shell (Figs. 25, 26).

Animal greyish-white; neck and posterior tentacles sometimes darkly pigmented; rudimentary anterior tentacles present; mantle border greyish with dark spots; foot entire, yellowish.

Mandible (Figs. 27, 28) compact, subquadrangular, arcuate, inner edge slightly prominent medially.

Radula (Figs. 29-31): formula (20+11+1+11+20) x 80. Central tooth above the level of lateral teeth; base twice that of lateral teeth, with central emargination, anterior portion of arms somewhat sinuous; crown small, posteriorly depressed, unicuspid; mesocone triangular, somewhat rounded. Lateral teeth with base quadrangular, elongate, oblique, with rounded lateral prominence over anterior third; crown cuneiform, about half length of base, posteriorly rounded. Marginal teeth with base becoming reduced anteriorly, projected and square posteriorly; crown pointing medially, bicuspid; endocone smaller than mesocone.



Figures 35-38. Internal morphology of the penis of *Myosotella myosotis*. 35, 36: Sagres, Portugal; 37, 38: Carapacho, Graciosa, Açores. Scale bars, 35, 37: 500 μm ; 36, 38: 200 μm .

Figuras 35-38. Morfología interna del pene de Myosotella myosotis. 35, 36: Sagres, Portugal; 37, 38: Carapacho, Graciosa, Açores. Escalas, 35, 37: 500 μm ; 36, 38: 200 μm .

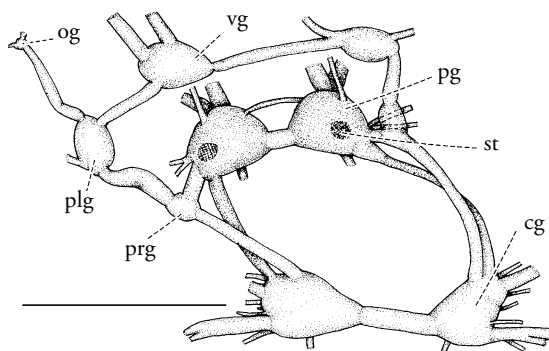


Figure 39. Central nervous system of *Myosotella myosotis*, Carapacho, Graciosa, Açores. Scale bar 1 mm. Abbreviations as in Figure 19.

Figura 39. Sistema nervioso central de *Myosotella myosotis*, Carapacho, Graciosa, Açores. Escala 1 mm. Abreviaturas como en la Figura 19.

Reproductive system (Figs. 32-38): ovotestis of various acini, embedded in the helicoidal, posterior lobe of the digestive gland; hermaphroditic duct convoluted; albumen gland apical; posterior mucus gland convoluted, enveloping albumen gland; pallial gonoduct monaulic; anterior mucus gland and prostate gland cover almost the entire length of the spermoviduct; bursa duct widening into an atrium, into which opens the non-glandular, distal end of the spermoviduct; a sperm groove exits the hermaphroditic atrium and runs briefly open on the neck before becoming the enclosed vas deferens. Penis short, thickened; anterior vas deferens adhering to preputium and entering penis subapically; penial papilla thick, quadrangular to cylindrical, finely grooved longitudinally, bearing at its tip a papillose structure retractable into a wide, transverse slit. Penial retractor thick, short.

Nervous system (Fig. 39): cerebral commissure 1.5 times width of cerebral ganglion; left and right cerebro-pleural and cerebro-pedal connectives of same length; connectives of visceral nerve ring long; right pleuro-parietal connective twice as long as left one; left parieto-visceral connective longer than right one, sometimes with ganglionic swelling on anterior third, from where

internal pallial nerve originates; rudimentary osphradial ganglion coming off pneumostomal nerve.

Remarks: The taxonomy of *Myosotella* Monterosato and of its type species *Myosotella myosotis* (Draparnaud) has been dealt with extensively by MARTINS (1996b) and, for such purpose, we refer the reader to that paper.

Myosotella myosotis is a very variable species, and the monospecificity of the taxon is far from resolved. Two forms have long been recognized: a typical, thicker, paucidentate form, associated with *myosotis* Draparnaud (forma *typica*) (see Figures 20 and 22), and a thinner, denticulate form associated with *denticulata* Montagu (see Figures 21 and 23). MONTEROSATO (1906) considered Montagu's *Voluta denticulata* and Draparnaud's *Auricula myosotis* not only as being different species, but as belonging to different genera. Leaving the former within Gray's *Alexia*, he included the latter within his genus *Myosotella*, which he created for a group of species under PFEIFFER'S (1856: 147) *Alexia* #2; he designated *Myosotella payraudeaui* ('Shuttleworth' Pfeiffer, 1856) as the type species. On the basis of Pfeiffer's description, *Myosotella payraudeaui* is conspecific with *Myosotella myosotis* (Draparnaud). Because previous names are either misspellings of *Pythia* or are

preoccupied (see MARTINS, 1996b), Monterosato's name, then, is the earliest available name for the genus which includes *Myosotella myosotis*.

GERMAIN (1931) accepted both forms as distinct species, whereas WINCKWORTH (1932) treated them as subspecies. WATSON (1943) noted the differences between them but added that there are intermediates, leaving a final decision for a comparative anatomical study; Watson noted the preference of the *denticulata* form for more saline habitats, a characteristic also observed in the Açorian related form *vespertina*, which MORELET (1860) (Fig. 23) described as different species (MARTINS, 1996b). FÉNAUX (1939) and CESARI (1973) also considered the case of both forms unclear, pending a definite anatomical comparison, to the clarification of which

we think a molecular approach should prove determinantly helpful.

Habitat notes: Common in marshes and among rolled stones above the supratidal level, the typical form of *Myosotella myosotis* lives sometimes in nearly terrestrial habitats. The denticulate form prefers habitats nearer the high tide level, frequently in exposed shores (MARTINS 1980; MORTON ET AL. 1998).

Range: *Myosotella* is a monotypic Mediterranean and Eastern Atlantic genus, represented by the highly variable *Myosotella myosotis*. Probably owing to its riparian habitat along marshy coasts, it has spread throughout the world either with ballast or ships riggings, having been recorded from South Africa, both coasts of North America, Western South America, New Zealand and Australia (MARTINS, 1996b).

DISCUSSION

A comparison of the characteristics of species or forms of both taxa, summarized in Table I, although showing inevitable similarities and minor divergences, points nevertheless at key differences, here interpreted as warranting generic separation.

The inevitable similarities, such as those related to the reproductive and nervous systems (hermaphroditic genital opening, short open sperm groove, wide visceral nerve ring) indicate that both supraspecific taxa are primitive; identical situation is found in other genera of the Pythiinae where *Pythia* has an open spermatid groove and all other genera of the subfamily exhibit a wide visceral nerve ring (MARTINS, 1996a). Also, the similarity of protoconchs, with minor differences such as 'globose' and 'protruding', are more indicative of a similar embryonic development than of a disparate structural arrangement.

Minor divergences, such as color of the animal or habitat preferences, can be interpreted as ecologically determined interspecific variations. Similarly, morphological radular differences (except

perhaps for the number of teeth per row), the shape of the penial papilla and the internal morphology of the penial complex, and the length of some particular connectives of the central nervous system are consistent with interspecific variation.

Key differences, however, are shown that preclude a generic fusion:

1. Shell morphology: the punctuate aspect of the first three whorls of the teleoconch and the single row of periostracal hairs in the spire as well as in the body whorl, in *Myosotella* (Figs. 24-26), contrast with the striate aspect of the teleoconch and the whole coverage of the body whorl by periostracal hairs, at least in juveniles, in *Ovatella* (Figs. 4-8).

2. The apertural dentition in *Myosotella*, although very variable in number of teeth and tubercles, consistently shows the first parietal tooth as definitely strongest (Figs. 20-23), whereas in *Ovatella* there is a pronounced tendency for the posterior parietal tooth to be as strong or even stronger than the anterior one (Figs. 1-3); the callus of the outer lip in *Ovatella*, although absent in some cases, is never present in *Myosotella*.

Table I. Morphological and anatomical characters of species of *Myosotella myosotis* (forms *typica* and *denticulata*) (adapted in part from CESARI (1973) and from personal observations).

Tabla I. Caracteres morfológicos y anatómicos de *Myosotella myosotis* (formas *typica* y *denticulata*) (tomado parcialmente de CESARI (1973) y de observaciones personales).

Characters	<i>Myosotella myosotis</i> form <i>typica</i>	<i>M. myosotis</i> form <i>denticulata</i>
Animal		
Color	greyish; neck dark	greyish
mantle border	greyish, dark spots	greyish, dark spots
anterior tentacles	rudiments conspicuous	rudiments conspicuous
Shell		
Protoconch	smooth, protruding	smooth, protruding
first whorls	pitted; 1 row of hairs	pitted; 1 row of hairs
body whorl young	smooth; 1 row of hairs on shoulder	smooth; 1 row of hairs on shoulder
body whorl adult	smooth	smooth
posterior parietal teeth	absent or 1 smaller than anterior	2-4 weaker than anterior
outer lip	weakly reflected; smooth or 1 tubercle	sharp; up to 6 tubercles
Mandible	subquadrangular, arcuate, compact	subquadrangular arcuate, compact
Radula		
central tooth	raised	raised
lateral teeth	± 10	± 10
marginal teeth	± 20; endocone smaller than mesocone	± 20; endocone smaller than mesocone
Reproductive system		
genital opening	hermaphroditic atrium	hermaphroditic atrium
sperm groove	partially open	partially open
pallial gland	absent	absent
anterior vas deferens	enters penis subapically	enters penis subapically
penial retractor	short and thick	short and thick
penial papilla	quadrangular, longitudinal grooves, papillose tip	quadrangular, longitudinal grooves, papillose tip
proximal chamber	longitudinal grooves	longitudinal grooves
distal chamber	thick pilasters	thick pilasters
Nervous system		
cerebral commissure	moderately long	moderately long
cerebro/pedal/pleural	connectives relatively long	connectives relatively long
Habitat	supralittoral-terrestrial	supralittoral-high tide

Table I. (Continuation) Morphological and anatomical characters of species of *Ovatella* (*O. firminii*, *O. aequalis* and *O. vulcani*).

Tabla I. (Continuación) Caracteres morfológicos y anatómicos de *Ovatella* (*O. firminii*, *O. aequalis* y *O. vulcani*).

<i>O. firminii</i>	<i>O. aequalis</i>	<i>O. vulcani</i>
yellowish darker yellowish rudiments present	yellowish darker yellowish rudiments present	yellowish darker yellowish rudiments present
smooth, globose striated; 2 rows of hairs spiral rows of pits with hairs spiral rows of pits 1, same size as anterior, tip curved sharp, callus and 2 thick tubercles	smooth, globose striated; 2 rows of hairs spiral rows of pits with hairs striae on shoulder and on columellar tip 1, same size as anterior, tip straight sharp, smooth or with 1 tubercle	smooth, globose striated; 2 rows of hairs spiral rows of pits with hairs striae on shoulder and on columellar tip 1, same size as anterior, tip straight sharp, smooth or with 1 tubercle
tripartite, brush-like	tripartite, brush-like	tripartite, brush-like
same level as laterals ± 20 ± 40; endocone about same size as mesocone	same level as laterals ± 20 ± 40; endocone about same size as mesocone	same level as laterals ± 20 ± 40; endocone about same size as mesocone
hermaphroditic atrium partially open present enters penis laterally moderately long and thin cylindric; deep transverse furrows	hermaphroditic atrium partially open present enters penis laterally moderately long and thin cylindric, small, in pouch	hermaphroditic atrium partially open present enters penis laterally moderately long and thin quadrangular, deep transverse furrows
transversely grooved moderately thick pilasters	transversely grooved smooth pilasters	transversely grooved moderately thick pilasters
moderately long connectives relatively long	moderately long connectives relatively long	moderately long connectives relatively long
supralittoral-high tide	supralittoral-high tide	supralittoral-high tide

3. The monolithic, compact mandible of *Myosotella* (Figs. 27-28) contrasts drastically with the tripartite, fibrous mandible of *Ovatella* (Figs. 9-10).

4. The presence of a well developed pallial gland in *Ovatella* (Fig. 14) also distinctively separates this taxon from *Myosotella*.

5. The morphology of the penial papilla which, in *Ovatella*, has a round tip bearing the penial pore (Figs. 17-18), differs from that of *Myosotella*, which has a wide apical transverse slit enclosing a retracable papilla bearing the penial pore (Figs. 36, 38).

An overall look at the Pythiinae (see MARTINS, 1996a) shows two morphological groupings, based primarily on the presence/absence of a pallial gland. The first group includes the genera *Pythia*, *Laemodonta*, *Ovatella* and *Allochroa*, whereas the second group includes *Myosotella* and *Ophicardelus* (MARTINS, 1998, has separated *Cassidula* from the Pythiinae into the revived Cassidulinae). Additional evidence for the natu-

ralness of this grouping derives, e. g., from the fact that the first whorls of the teleoconch and the juveniles of *Laemodonta cubensis* and *Ovatella vulcani* are practically indistinguishable (MARTINS, 1996b) and the apertural dentition of *Allochroa* is very similar to that of *Ovatella* (MARTINS, 1995b). On the other hand, the shell morphology of *Myosotella* and *Ophicardelus* seems to be concordant.

It is, thus, our view that the above mentioned differences justify the generic separation of *Myosotella* and *Ovatella*.

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