

A revision of the genus *Alzoniella* Giusti & Bodon, 1984 (Gastropoda, Caenogastropoda, Hydrobiidae) on the Iberian Peninsula and its implications for the systematics of the European hydrobiid fauna

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The genus *Alzoniella* Giusti & Bodon, 1984, is reviewed for the Iberian Peninsula. This revision includes both the nominate subgenus *Alzoniella* (A.) and *A. (Navarriella)* Boeters, 2001, as well as the genus *Guadiella* Boeters, 2003, since its type species, *G. andalucensis* (Boeters, 1983), was formerly regarded as belonging to *Belgrandiella* A. J. Wagner, 1928, together with *A. cantabrica* (Boeters 1983) and *A. edmundi* (Boeters, 1984), which are now classified in *Alzoniella*. Most of the newly reported localities enlarge known distribution areas. Various new data on anatomical aspects are presented. Photographs of shells and the protoconchs of nearly all the species discussed are included. Two new species are described and three insufficiently known taxa of *Alzoniella* are mentioned, but without assigning any specific name.

Key words: Gastropoda, Caenogastropoda, Hydrobiidae, *Alzoniella*, *Navarriella*, *Guadiella*, distribution, anatomy, species key, Iberian Peninsula.

INTRODUCTION

Although many Iberian Peninsular hydrobiids have been described in recent years (Rolán, 1993; Arconada, 2000; Ramos et al., 2000; Arconada & Ramos, 2001, 2006; Boeters, 2003), a large number of species still need to be studied in greater detail. The most general review to date was published by Boeters (1988). The first species of the genus *Alzoniella* Giusti & Bodon, 1984, on the Iberian Peninsula, *A. (Navarriella) elliptica*, was described in the 19th century as *Paludinella elliptica* (Paladilhe, 1874). It took over a century for another species of the genus to be discovered, viz. *Alzoniella (A.) cantabrica* (Boeters, 1983). Since then, and in a short time, the number has considerably increased, 10 more species being known now for the Iberian Peninsula and one for the Balearic Islands (Boeters, 1983, 1984, 1986; Boeters & Rolán, 1988; Rolán, 1993). It should be noted that up to 2001 species of *Alzoniella* had always been understood as belonging to the genus *Belgrandiella* A. J. Wagner, 1928.

Apart from papers on new taxa, there have been very few studies on the biology of these species (Rolán, 1989). The Iberian species of *Alzoniella* are basically distributed in the North of the Iberian Peninsula (Rolán, 1993). In previous studies, SEM photographs of shells, protoconchs and radulae were shown as well as some anatomical features, particularly of the loop of the rectum in the pallial cavity, which can be seen by transparency, and the penis (Boeters, 1983, 1986; Boeters & Rolán, 1988; Rolán, 1993). However, the female genital system was seldom studied, except for some schematic drawings by Boeters (1983, 1986, 1988) and Boeters & Rolán (1988). For the sake of completeness, it

should be mentioned that Boeters (2000, 2001) revised *Alzoniella* for France.

Aims of this work are (1) to give a review of the species of *Alzoniella* and *Guadiella* that inhabit the Iberian Peninsula, (2) to present new information on shell, protoconch and radular characters, (3) to describe anatomical features that may be relevant for the systematics of the taxa, and (4) to establish the areas where these species occur.

MATERIAL AND METHODS

In recent years, we investigated the malacological freshwater fauna of the Iberian Peninsula, collecting samples from more than 1500 springs and water sources. Some aspects of the collecting methodology and investigations have already been explained (Rolán, 1993). The sampling was carried out by direct observation of specimens on stones, by washing dead leaves, mosses and other kinds of aquatic vegetation or by sieving mud and vegetation. Live snails were drawn to make a preliminary classification by examining shell characters and external morphology such as the penis and rectum shape. They were later fixed in 70 % ethanol. Dissection methodology is described in Ramos et al. (2000). Scanning electron microscope (SEM) photographs were made with a PHILLIPS XL30. Shells were cleaned by removing the periostracum through immersion in 5 % commercial Chlorox, cleaned in an ultrasonic 50 W Raypa apparatus and then coated with a gold layer and fixed to the stub by means of a graphite paste.

Since no significant differences were observed between the opercula of the *Alzoniella* species investigated, only some of them have been represented graphically. Spire whorls are counted following Verduin's method (1977).

Locality names and UTM references are from the official map of the Army Geographical Service, series 1:200.000 to 1:25.000. Only new localities are listed in this order: province, UTM number, locality. Distances in km are measured along the road. Maps were done with Mapgrafix GIS for Macintosh. Only collecting localities are illustrated on the maps, each point representing a 10 km-square grid.

ABBREVIATIONS

Abbreviations for anatomical characters: Ag, albumen gland; Bc, bursa copulatrix; Cc, cerebral commissure; Cg, capsule gland; Cgl, left cerebral ganglion; Ct, ctenidium; Oes, oesophagus; Ov, oviduct; P, penis; Pgl, left pleural ganglion; Pl, penial lobe; Po, pallial oviduct; Pr, prostate; R, rectum; Sbo, suboesophageal ganglion; Spo, supraoesophageal ganglion; SR1, seminal receptaculum 1; SR2, seminal receptaculum 2; Ss, style sac; St, stomach; L, length; W, width.

For collections: BOE, H.D. Boeters, Munich, Germany; BOURG, J.R. Bourguignat, Muséum d'Histoire Naturelle, Genève, Switzerland; CER, E. Rolán, Vigo, Spain; CZL, Centro de Zoología de Lisboa, Portugal; MHNS, Museo de Historia Natural of the University of Santiago de Compostela, Spain; MNCN, Museo Nacional de Ciencias Naturales, Madrid, Spain; PAL, A. Paladilhe, Faculté des Sciences, Montpellier, France; SMF, Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt am Main, Germany; ZMA, Zoölogisch Museum Amsterdam, The Netherlands.

SYSTEMATIC PART

Family Hydrobiidae Troschel, 1857

Key for the species

(not included are *Alzoniella* (*A.*) *murita* and *A.* (*A.*) *onatensis*)

- 1 - Balearic species *Alzoniella* (*A.*) *edmundi*
 - Iberian species 2
- 2 - Species from the South of the Iberian Peninsula *Guadiella andalucensis*
 - Species from the North of the Iberian Peninsula 3
- 3 - Rectum loop not curved 4
 - Rectum loop is marked 5
- 4 - Penial lobe is smaller than the penis and has no papillae *Alzoniella* (*A.*) *rolani*
 - Penial lobe is as long as the penis and has several papillae 11
- 5 - Rectum loop is simple and its curved concavity is perpendicular or slightly points towards the anterior part of the body *Alzoniella* (*A.*) *lucensis*
 - Rectum loop is markedly curved and its concavity points towards the anterior part of the body 6
- 6 - Rectum loop is U-shaped 7
 - Rectum loop is S-shaped 8
- 7 - Shell under 2 mm, cylindrical; unpigmented or black pigmented penis *Alzoniella* (*A.*) *cantabrica*
 - Shell over 2 mm, almost ovoid outline; pink pigmentation on the penis *Alzoniella* (*A.*) *ovetensis*
- 8 - Shell length under 1 mm; shell ovoid *Alzoniella* (*A.*) *asturica*
 - Shell over 1 mm; shell ovoid-elongated to cylindrical 9
- 9 - Shell with almost cylindrical outline *Alzoniella* (*A.*) *galaica*
 - Shell with different outline 10
- 10 - Body pigmented; shell ovoid with a deep suture *Alzoniella* (*A.*) *marianae*
 - Unpigmented body; shell ovoid-elongated with a not very deep suture *Alzoniella* (*A.*) *montana*
- 11 - RS1 and RS2 of the same length *Alzoniella* (*Navarriella*) *elliptica*
 - RS2 remarkably smaller than RS1 *Alzoniella* (*Navarriella*) *pellitica*

Genus *Alzoniella* Giusti & Bodon, 1984Type species: *Alzoniella finalina* Giusti & Bodon, 1984.Subgenus *Alzoniella* (*Alzoniella*) Giusti & Bodon, 1984

For the characteristics of this subgenus, see Giusti & Bodon (1984) who described *Alzoniella* and compared it with some other closely related European genera such as *Avenonia* Nicolas, 1882, *Belgrandia* Bourguignat, 1869, *Belgrandiella* A. J. Wagner, 1928 (not 1927; see Gittenberger & Uit de Weerd, 2006: 131), *Bythinella* Moquin-Tandon, 1856, *Bythiospeum* Bourguignat, 1882, *Phraetica* Velkovrh, 1970 and *Pseudavenionia* Bodon & Giusti, 1982.

According to the original description, the shell is small, whitish-transparent, conical

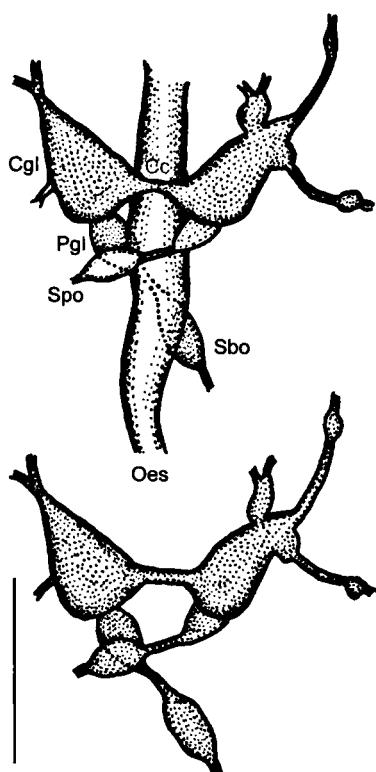


Fig. 1. Partial nervous system of an *Alzoniella* species: A. (*A.*) *lucensis* (Rolán, 1993), from Lugo, Castillo de Doiras towards Ancares (PH63). Scale bar: 250 µm (for abbreviations, see the text).

oviduct. The bursa protrudes posteriorly beyond the proximal end of the albumen gland. The capsule gland is generally smaller than the albumen gland.

Alzoniella (A.) cantabrica (Boeters, 1983)
(figs 2, 15C, 23-24, 72-74, 93-94; map 3)

Belgrandiella cantabrica Boeters, 1983: 18. Type locality: Santander, UN99: "Graben rechts der Straße von Treceño nach La Revilla bei San Vincente de la Barquera ... ", [UN99].

Type material: see Boeters, 1983.

Localities (see Boeters, 1988; Rolán, 1993). – New records (i to xxxii). **Asturias:** (i) UP70, 1 km W. Noriega, spring near river. **Cantabria:** (ii) UN79, 2 km from Piñeres just before turn-off to Roda, torrent; (iii) VN29, Presillas, spring; (iv) VN29, Aes, spring at chapel "Virgen de Gracia"; (v) VN68, 3 km SSW. exit from Ramales de la Victoria, old spring; (vi) VN68, at Valnera before the turn-off to Concha (Karrantza), brook; (vii) VN59, 4 km S. Arredondo, Cueva de Coventora; (viii) VN49, 1.5 km N. Linto at

or cylindrical-conical, with 3-4 spire whorls, quite convex, with an obtuse apex. The aperture has a simple peristome, an umbilicus that is slightly open or reduced to a slit-like fissure. Operculum thin, corneous, paucispiral, slightly yellowish at its centre, with an excentric nucleus and without internal outgrowths. The intestine surrounds the style sac. Stomach lacking caecum. Radula typically taeniaglossan, the central teeth are butterfly-shaped, generally with one or two basal cusps. The lateral teeth have one big denticle and 4-5 more on each side. Internal marginal teeth with 23-28 small and uniform denticles. Ctenidium not very developed, with 5-11 lamellae. The nervous system (fig. 1) is typically hydrobiid and has a long supraoesophageal and a short suboesophageal connective. The oesophagus runs straight along the cerebral ganglion. The right pleural and the supraoesophageal ganglion are of the same size. The left pleural ganglion is more rounded than the suboesophageal ganglion. The penis has generally one penial lobe located at its concave side but, exceptionally, it can have more than two. The prostate is typically bean-shaped. The anterior female genital system has an ovoid bursa copulatrix varying from medium to large, a long, unpigmented renal oviduct and two seminal receptacles. The renal oviduct makes an open circular loop that leans over the bursa and the pallial

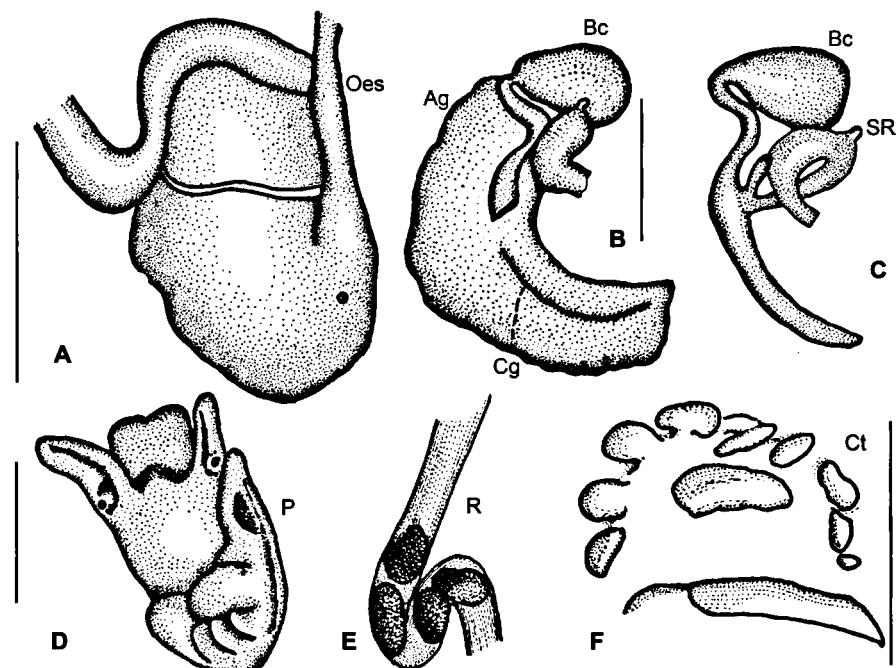


Fig. 2. Anatomical features of *Alzoniella* (A.) *cantabrica* (Boeters, 1983); Santander, Cobrices (UP90). A, digestive system; B, C, female genitalia; D, penis; E, rectum loop; F, osphradium and ctenidium.

Scale bar: 500 µm (see abbreviations in text).

crossroad to Miera, torrent; (ix) VN49, S. La Vega, several waterfalls. **Burgos:** (x) VN33, S. Escalada, near Tubilla del Agua, brook on mountainside; (xi) VN33, N. of Covana, large spring; (xii) VN33, Covana, "Pozo Azul"; (xiii) VN32, S. exit of Tubilla del Agua, springs in rocks; (xv) VN34, E entrance to Orbaneja del Castillo, spring; (xiv) VN45, between Areba and Hoz de Areba, brook alongside river; (xvi) VN45, 1 km NW. Incinillas, channel going under road; (xvii) VN57, N. exit of locality "Río de Lasia"; (xiii) VN47, between locality "Río de Lasia" and Puerto de Pas, between 4 and 6 km N. Río de Trueba, springs; (xix) VN57, 3 km N. locality "Río de Lasia", spring; (xx) VN84, exit of San Zadornil towards Villafría, spring; (xxi) VN84, about 3 km behind San Zadornil towards Villafría; (xii) VN84, 1.5 km behind Villafría, "La Fuentefería", spring. **Alava:** (xxiii) VN96, Aguiñiga, spring; (xxiv) N94, Entrance to Astúlez, brook; (xxv) VN94, entrance to Nograro, spring with pool; (xxvi) VN84, turn-off to Quejo, spring at side of brook. **Vizcaya:** (xxii) VN78, Ambasaguas, near turn-off to Concha, spring. **Palencia:** (xxviii) UN75, W. exit of Lebanza, spring alongside river. (xxix) UN65, not far W. of Santibáñez de Resoba, spring. **León:** (xxx) UN45, about 5 km W. of Valverde de la Sierra, spring; (xxx) UN56, Llesca pass 5 km W. border with Cantabria, under bridge; (xxxii) UN57, downhill Puerto de San Glorio, between km 131 and 133, wet rocks. **Santander:** (xxxiii) UP90, Cobrices [Cobreces], spring La Marrana.

Morphology. – Shell (cf. Boeters, 1983: figs 37-41; 1988: figs 194-197; Rolán, 1993: pl. 1 fig. 2, pl. 2 figs 3-4). Some shells of this species are illustrated by figs 23-24 and protoconchs by figs 72-74. Operculum not examined.

Anatomy (after 5 females and 2 males from locality ii, 2 males from locality v, 3 females and 2 males from locality xxxiii and 2 males from locality xviii). – There is a well-

developed ctenidium (fig. 2F) with 10-11 large lamellae. The intestine, when leaving the stomach forms the usual Z-shaped loop (fig. 2A). The rectum (figs 2E and 14E) is U-shaped, usually pointing towards the anterior part of the body. (cf. Boeters, 1983: figs 7-8; 1988; Rolán, 1993: pl. 4 fig. 2).

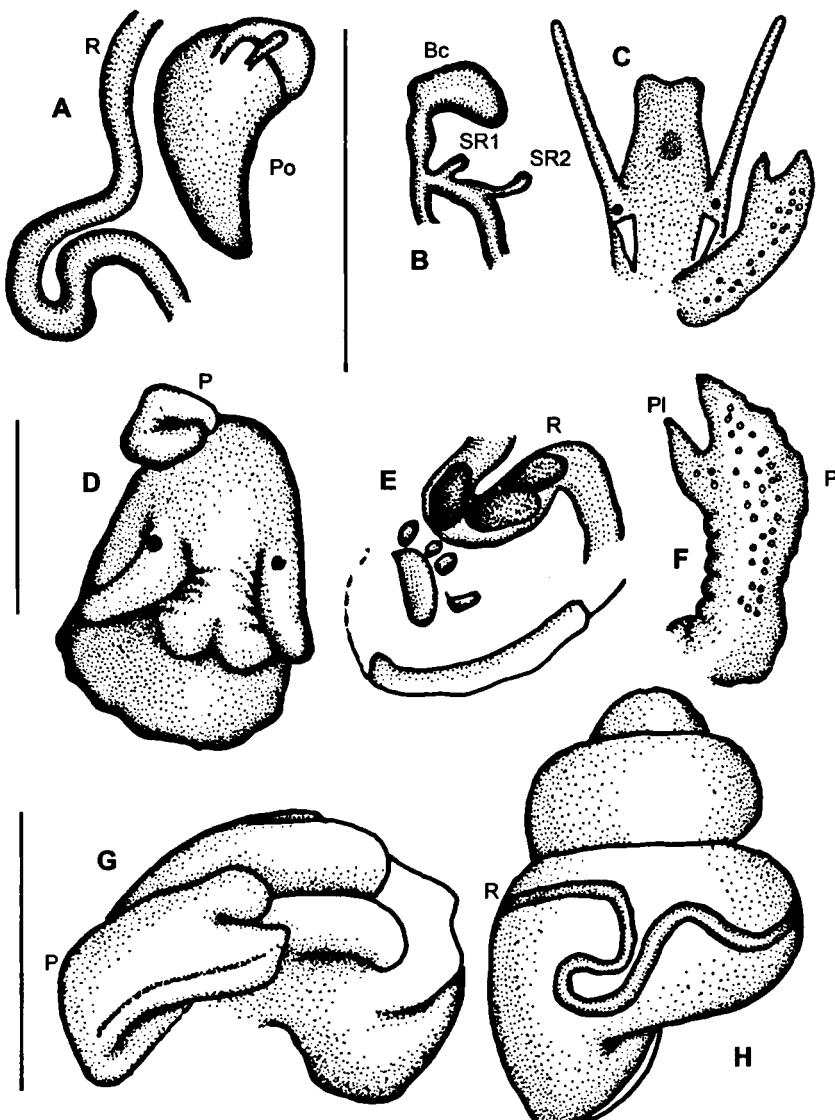


Fig. 3. Anatomical features of *Alzoniella (A.) edmundi* (Boeters, 1984); Majorca, Valldemossa (DD59). C, F, penis from a live specimen; A, B, D, E, G, H, female genitalia. Scale bars: 500 µm

The radula has the general characteristics of the genus (figs 93-94) although in one of the studied populations (Cobrices), the central teeth have three basal cusps on each side (fig. 94), the third being very small. In this population, the upper border of the central teeth seems to be more excavated. (cf. Rolán, 1993: pl. 6 figs 1-3).

Genital system (table 3). The ovoid bursa copulatrix is well-developed and has a long and curved duct (fig. 2B-C). The SR1 is longer than the SR2 which, in a natural position, leans over the bursa copulatrix (fig. 2B). The albumen gland is larger than the capsule gland (fig. 2B) (cf. Boeters, 1983: figs 28-30, 1988: figs 210, 224, 227). The penis (figs 2D, 15C) is long and wide and has a rounded lobe located in a medial position. Sometimes there is a pigmented area distally behind this lobe (cf. Boeters, 1983: figs 15-22; 1988: 208-227; Rolán, 1993: pl. 4 figs 10-16).

Distribution (map 2). – This species has a wide range comprising some northern Spanish provinces such as the eastern part of Asturias, Cantabria, the Basque Country, the North of León, Burgos and Palencia.

Remarks. – The number of new localities greatly increases the known range of *Alzoniella* (*A.*) *edmundi*, which can be found sometimes sympatric with *A.* (*A.*) *ovetensis* (Rolán, 1993) (UP70) or *A.* (*A.*) *montana* (Rolán, 1993) (UN57, VN68). Female genitalia show little variability. On the contrary, males of this species show greater variability as regards penis shape and pigmentation (Boeters, 1983; Rolán, 1993).

Alzoniella (*A.*) *edmundi* (Boeters, 1984)
(figs 3, 25-28, 76-77, 95; map 1)

Microna saxatilis (Reynies, 1843); Moolenbeek, 1980: 101.

Belgrandiella edmundi Boeters, 1984: 10, fig. 3, pl. 1 fig. 9a-b. Type locality: Baleares, DD69: Majorca, Valldemossa, Font de S'Aiqueta.

Type material: see Boeters, 1984.

Localities.– Two new localities increase the number of known localities: Majorca: (i) DD59, Estellenchs, spring; (ii) DD59, S. exit of Valldemossa, Font S'Aigueta.

Morphology. – Shells (cf. Moolenbeek, 1980; Boeters, 1984: 10) are illustrated by figs 25-28 and protoconchs by figs 76-77. Operculum not examined.

Anatomy (after 2 females and 2 males from locality i). – Live specimens (fig. 3C) are completely unpigmented so that the pink radular sac can be seen by transparency. The eyes are black spots and there is a posterior area with white spots. The ctenidium (fig. 3E) is barely developed and has about 3-5 lamellae situated near the S-shaped rectum loop (fig. 3H), which points towards the anterior part of the body.

The radula (fig. 95) has the usual characteristics of this genus. The central teeth have two basal cusps on each side and tapered denticles.

Genital system (table 4). The females have a small pink pseudopenis originating in the right part of the head, posterior to the right cephalic tentacle, with a similar shape to that of the males (fig. 3D). The bursa copulatrix (fig. 3A) is sacciform and has a medium sized straight duct. The SR1 (fig. 3B) is shorter and wider than the elongated SR2 which, in its natural position, leans over the bursa copulatrix (fig. 3A). The renal oviduct posterior to the RS2 is slightly widened and is pearl-coloured due to the accumulated sperm inside. The penis (figs 3C, 3F, 3G) is very large, broad and longer than the head. Its roundish penial lobe is located near the pointed tip. In fixed specimens, the penis is completely unpigmented, but the penises of live specimens present several white spots.

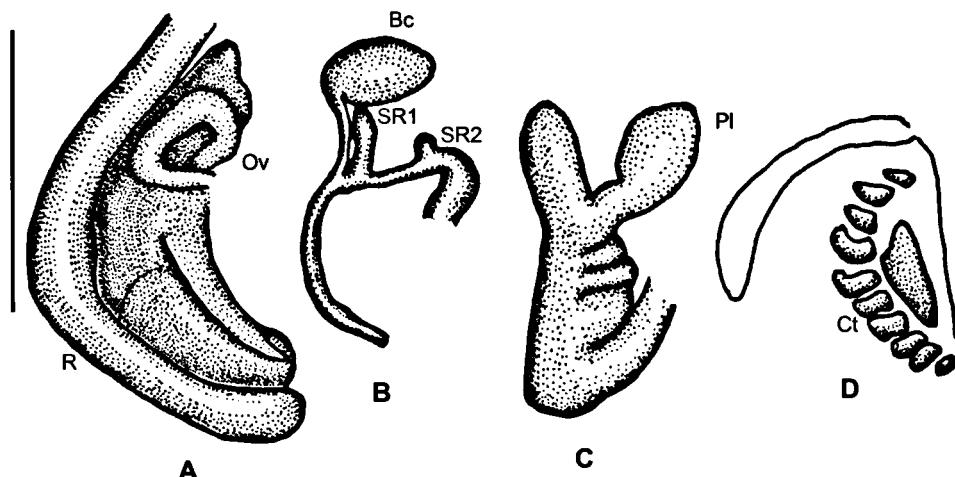


Fig. 4. Anatomical features of *Alzoniella (A.) rohani* (Boeters, 1986); Pontevedra, Rasas, Gondomar (NG25). Drawings after live specimens. A-B, distal female genitalia; C, penis; D, osphradium and ctenidium.

Scale bar: 500 µm.

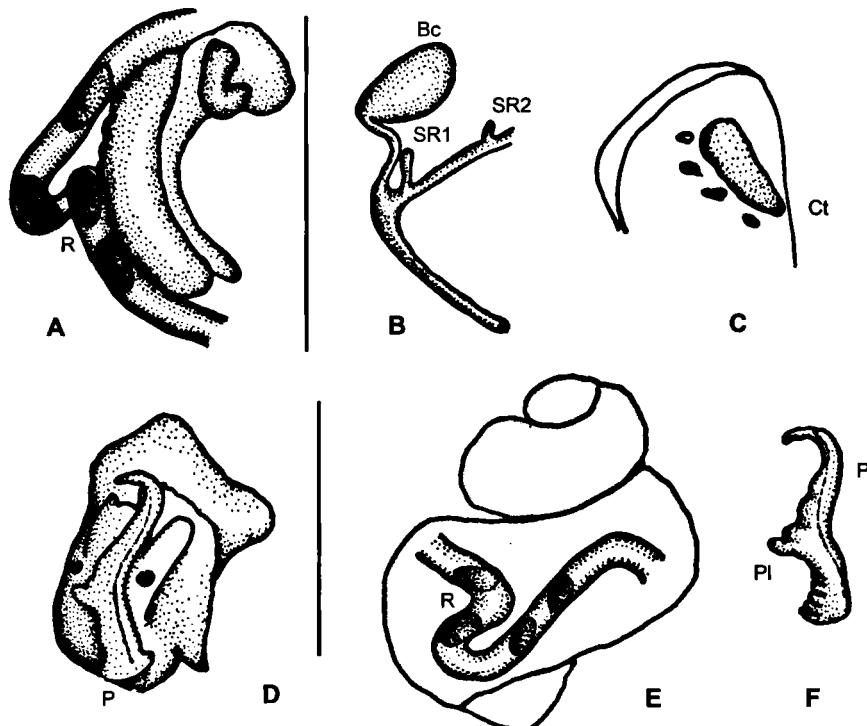


Fig. 5. Anatomical features of *Alzoniella (A.) asturica* (Boeters & Rolán, 1988); Asturias, Grado, La Fontona (QJ30). Drawings from fixed material. A, B, distal female genitalia; C, osphradium and ctenidium; D, E, penis; F, rectum loop. Scale bars: 500 µm.

Distribution (map 1). – This species is only known from the island of Majorca (Balearic Islands).

Remarks. – Anatomical data were unknown until now and only shells had been described. This species can be found sometimes together with *Pseudamnicola* spec. (DD59).

Alzoniella (A.) rolani (Boeters, 1986)
(figs 4, 14A-B, 29-32, 58-60, 78-79, 96-97; map 1)

Bythinella brevis; Rolán, 1983: 120.

Belgrandiella rolani Boeters, 1986: 127, pl. 18a fig. 3. Type locality: Pontevedra, NG07: Islas Cies, S. Martin.

Type material: see Boeters, 1986.

Localities. – Localities (i), (iii) and (v) can be added as new (cf. Rolán, 1989, 1993). **A Coruña:** (i) GA98, at Feira do Tres, spring known as O Plumar. **Pontevedra:** (ii) NG25, Mill 2 km S. of Gondomar. (iii) NG29, Carballeira de San Xusto, springs near old sulphur baths. **Portugal:** (iv) NE25, Beira Baixa, near Rebordosa; (v) NF62, Douro Litoral, highway from Fafe to Póvoa do Lanhoso entering via turn-off 5 km from Serafao to Vilarielho, about 2 km from Lugar de la Igreja, spring; (vi) NF95, Douro Litoral, Serra do Marão.

Morphology. – Shell. Several shells are illustrated by figs 29-32. Two of these (figs 29-30) are characteristic for this species, while the shells from the Serra do Marão (locality vi; fig. 31) and Rebordosa (locality iv; fig. 32) are atypical (cf. Boeters, 1986; Rolán, 1989, 1993). The operculum (figs 58-60) is characteristic for this genus.

Anatomy(after 5 females and 2 males from locality ii and 2 males from locality vi). – See also Boeters (1986). The ctenidium (fig. 4D) is well-developed and has approximately 8 to 13 lamellae. The rectum describes a smooth curve in the pallial cavity (figs 4A, 14 A) and the anus does not end close to the edge of this cavity (cf. Boeters, 1986; Rolán, 1989, 1993).

The radula (figs 96-97) has the overall shape of the other species of this genus. It has a wide single cusp at each side of the central teeth.

Genital system (table 5). The capsule gland (fig. 4A) constitutes almost 50% of the length of the pallial oviduct, which completely covers the rectum loop. In some females, the pallial oviduct is less developed. The bursa copulatrix (fig. 4B) is sacciform, well-developed and has a medium-sized straight duct. The SR1 is long and wide; in natural position it is hidden by the loop of the renal oviduct. The SR2 is roundish and very small. The penis (fig. 4C) is small and has a blunted tip. The penial lobe is located in a medial position; it is very long and roundish, sometimes longer than total penial length (cf. Boeters, 1986; Rolán, 1993).

Distributon (map 1). – This species is known from the four provinces of Galicia and from northern Portugal southward to Coimbra.

Remarks. – The new records do not modify the distribution area known for this species (Rolán, 1989, 1993). The shells (figs 31-32) from the marginal populations of the southern part of the range differ conspicuously from those of the other populations, which have a consistently uniform shell. Nevertheless, no anatomical differences have been found for those conchologically deviating populations. This widely distributed species shows a certain amount of variability in some anatomical features. Boeters (1986) describes the penis as "intensely black pigmented". There are also specimens with completely unpigmented penises however, indicating that this pigmentation is variable. As regards the bursa copulatrix, Boeters did not mention any seminal receptaculum. The rec-

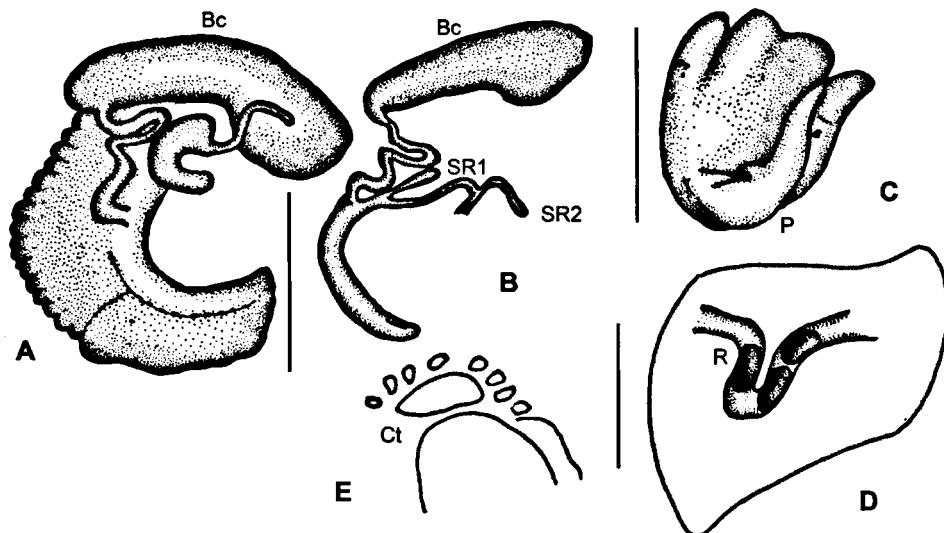


Fig. 6. Anatomical features of *Alzoniella (A.) galaica* (Boeters & Rolán, 1988); Lugo, Peares dam (PH00). Drawings from fixed material. A, B, female genitalia; C, penis; D, rectum loop; E, osphradium and ctenidium. Scale bars: 500 µm.

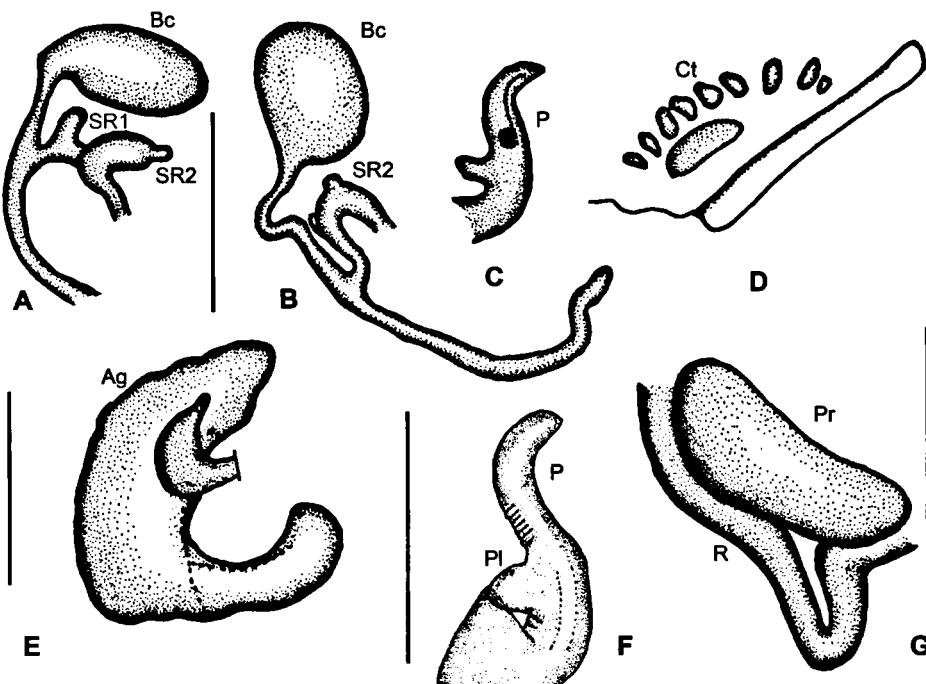


Fig. 7. Anatomical features of *Alzoniella (A.) lucensis* (Rolán, 1993); Lugo, Castillo de Doiras (PH63). A, B, E, female genitalia; C, F, penis; D, osphradium and ctenidium; G, prostate and rectum. Scale bars: 500 µm.

tum studied in live specimens always describes a smooth curve, but in the fixed material it is more curved.

Alzoniella (A.) asturica (Boeters & Rolán, 1988)
(figs 5, 14 H, 33-36, 80-81, 98-99; map 1)

Belgrandiella asturica Boeters & Rolán, 1988: 200-201, figs 14-16. Type locality: Asturias, QJ30: Grado, Borondes, near the Bascones river in a fountain called La Fontona.

Type material: see Boeters & Rolán, 1988.

Localities.— Localities (ii) and (iii) can be added as new (cf. Rolán, 1993). Asturias: (i) QJ30, Grado, Borondes, Fuente La Fontona; (ii) QJ 30, 6 km SW. Grado, spring of Villagarcía; (iii) QJ 30, Grado, Báscones, between church and 6 km river.

Morphology.— The shells are represented in figs 33-36 (cf. Boeters & Rolán, 1988; Rolán, 1993). Operculum not examined.

Anatomy (after 2 females and 3 males from locality i). — The ctenidium (fig. 5C) may be totally absent or hardly developed, with only 4-5 small lamellae. The rectum (figs 5A, 5E, 14H) is U-shaped and points slightly towards the anterior part of the body (cf. Boeters & Rolán, 1988; Rolán, 1993: pl. 4 fig. 7).

The radula (figs 98-99) has two long sharp basal cusps at each side of the central teeth. The denticles of the central teeth are very tapered.

Genital system (table 6). The bursa copulatrix (fig. 5B) is oval and has a long curved duct. The SR1 is long and narrow. However, the SR2 is very small and appears as a protuberance on the renal oviduct (cf. Boeters & Rolán, 1988). The penis (fig. 5D, F) is long, slender and completely unpigmented. Halfway it has a very small lobe (cf. Boeters & Rolán, 1988).

Distribution (map 1). — This species was found in a very small area near Grado, Asturias.

Remarks. — Sometimes this species is found sympatric with *Alzoniella (A.) ovetensis* (Rolán, 1993) (QJ30) or *Neohoratia azarum* Boeters & Rolán, 1988 (QJ30). In the original description only the shape of the bursa copulatrix and its duct are mentioned, but nothing is said about the shape of the seminal receptacles. The shape of the renal and pallial section of the female genitalia of this species is similar to that in *A. (A.) cantabrica* although the SR2 is proportionally larger. This species may be considered threatened with extinction because the few springs where it has been found are highly vulnerable.

Alzoniella (A.) galaica (Boeters & Rolán, 1988)
(figs 6, 14F, 37-39, 63, 82, 100; map 2)

Belgrandiella galaica Boeters & Rolán, 1988: 200, figs 9-13. Type locality: Lugo, PH40 [corrected: originally indicated as PJ40]: O Courel (Caurel).

Type material: see Boeters & Rolán, 1988.

Localities.— A new record is: Lugo, PH00: 2.3 km in front of Peares dam (with *Alzoniella (A.) rolani*).

Morphology. — Shells from the two localities (figs 37-39) and a protoconch (fig. 82) are illustrated (cf. Boeters & Rolán, 1988; Rolán, 1993). The operculum is similar to that in

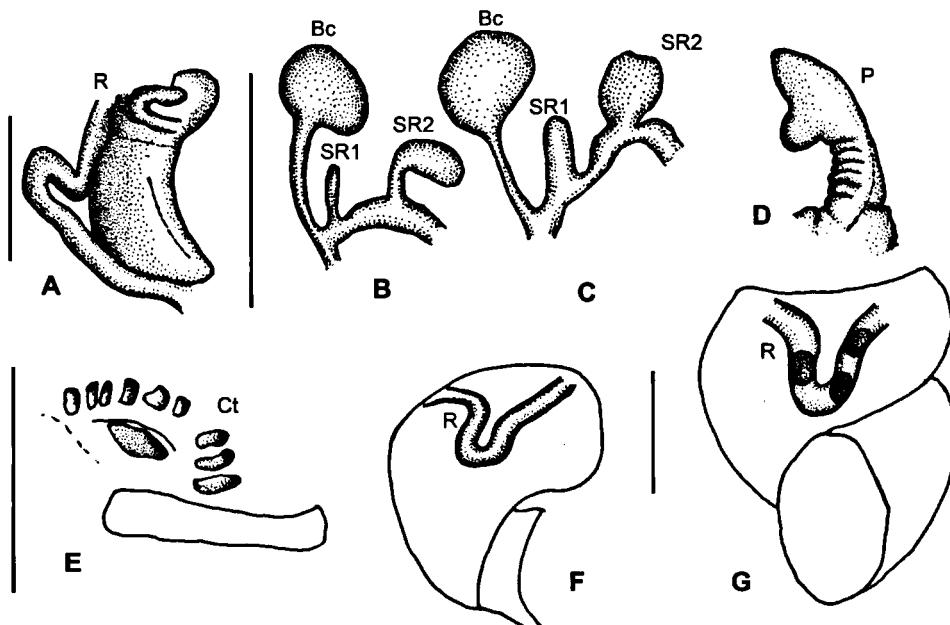


Fig. 8. Anatomical features of *Alzioniella* (A.) *ovetensis* (Rolán, 1993); Asturias, Barcena, San Martín fountain (QJ20). A-C, female genitalia; D, penis; E, osphradium and ctenidium; F, G, rectum loop. Scale bars: 500 µm.

other species of this genus (fig. 63).

Anatomy (after 2 females and 2 males from both localities). – The ctenidium (fig. 6E) has c. 9 small, roundish and dispersed lamellae. The rectum loop is markedly U-shaped (figs 6D, 14F) (cf. Boeters & Rolán, 1988; Rolán, 1993).

The radula is similar to that of congeneric Iberian species (fig. 100). At the base of the central teeth, there are two basal cusps; the second one is very small.

Genital system (table 7). The genital system is very characteristic. The bursa copulatrix (fig. 6A-B) is very large, narrow, elongated, and slightly widened in its distal part. The bursal duct is longer and more sinuous than in other *Alzioniella* species. Both the SR1 and the SR2 are long and narrow. The capsule gland size (fig. 6A) can vary from one third to more than half the length of the pallial oviduct (cf. Boeters & Rolán, 1988: fig. 13). The penis (fig. 6C) is long, unpigmented, and has a small lobe on its middle and concave side (cf. Boeters & Rolán, 1988: fig. 12).

Distribution (map 3). – Known from only two localities in the province of Lugo (NW. Spain).

Remarks. – Sometimes this species is found sympatric with *Alzioniella* (A.) *rolani* (Boeters, 1986) (PH00). Both the size of the bursa copulatrix and the SR2 of the here studied population are significantly larger than reported in the original description. A recent visit to the type locality confirmed its total destruction. The species may be extinct since the new locality (PH00) is a wet rock face on private property and, therefore, not formally protected. Recently, it was impossible to find any specimen there.

Alzoniella (A.) lucensis (Rolán, 1993)
 (figs 1, 7, 14D, 15B, 40-42, 83-84, 101-102; map 3)

Belgrandiella cf. cantabrica; Boeters & Rolán, 1988: 201, figs 7-8.

Belgrandiella lucensis Rolán, 1993: 105, pl. 1 figs 7-8; pl. 2 fig. 6; pl. 4 fig. 4; pl. 5 figs 1-9; pl. 6 figs 4-5. Type locality: Lugo, PH40: in the town council of Quiroga, Carrozo de Vilaboa, near Quiroga River, in a small stream in a shady area.

Type material: see Rolán, 1993.

Localities. – Except for localities xii and xxvi all localities are new (cf. Rolán, 1993). **A Coruña:** (i) NH26, 4 km N. of centre of Bembibre [Buján]. Lugo: (ii) PH19, 2 km SW. Ourol, torrent; (iii) PH40, O Courel [Caurel], from Quiroga to Fisteus, shortly after the turn-off to Fisteus, spring; (iv) PH44, N. Saa, 2.8 km before the turn-off to Tricastela; (v) PH51, O Courel [Caurel], Ferreiros de Abajo, brooks; (vi) PH52, O Courel [Caurel], between Folgoso and Seoane, wet rocks near river Lor; (vii) PH52, O Courel [Caurel], a little SW. Seoane, wet rock; (viii) PH51, between Quiroga and Besarredonda, wet rocks and running water; (ix) PJ52, entrance to A Devesa, at turn-off to Noceda (2.9 km), rocks; (x) PH55, San Martín de la Ribeira, La Viarega spring; (xi) PH56, N. Seoana 4 km before turn-off to Cereixido and Cuiñas, torrent; (xii) PH 63, E. exit of Castillo de Doiras towards Ancares, spring; (xiii) PH66, N. of Navia de Suarna at turn-off to Vilarquende, wet rocks; (xiv) PH66, 2 km behind Navia de Suarna on Roa road, Fonte do Cruceiro, in springs nearby. **Asturias:** (xv) PH79, between San Martín de Oscos and Navia, before crossing River Lixou, wet rocks; (xvi) PH79, between San Martín de Oscos and Navia, 1.4 km from Illao (Eilao), wet rock; (xvii) PH99, S. of Pola de Allande, water running down rock; (xviii) PJ61, Penzol, spring with washing place; (xix) PJ61, E. entrance to Añides, spring; (xx) PJ61, between Boal and Vegadeo, 600 m from the turn-off to Meredo and Molejón, wet rocks; (xxi) QH06, between Monasterio de Hermo and Narcea springs, wet rocks; (xxii) QH 07, between Cangas de Narcea and Puerto de Leitariegos, 1 km from turn-off to Palacio and Naviego; (xxiii) QH08, S. exit of Cangas de Narcea at the beginning of highway to Cobos, springs; (xxiv) QH08, between Pola de Allende and Cangas de Narcea, 4 km from Puente del Infierno, wet rocks; (xxv) QJ12, E. of Soto de Luiña, 1 km before Castañedas, waterfall. **Ourense:** (xxvi) PH00, between Monforte and Ourense, 300 m at road to Frean, near Peares dam, wet walls.

Morphology. – Shell (cf. Boeters & Rolán, 1988: figs 7-8; Rolán, 1993). Shells from three localities are illustrated (figs 40-42) and protochonchs (figs 83-84). Operculum not examined.

Anatomy (after 7 individuals from 3 localities: 2 females and 1 male from locality i, 2 females and 1 male from locality xii and 2 males from locality xxiv). – There is a well-developed ctenidium (fig. 7D) with c. 9 lamellae. The rectum (figs 7G, 14D) is markedly U-shaped and points slightly towards the anterior part of the body (cf. Rolán, 1993).

The radula (figs 101-102) is similar to that in other species of *Alzoniella*. The central teeth have long, tapered denticles; a third minute basal cusp may be discernible (cf. Rolán, 1993: pl. 6 figs 4-5).

Genital system (table 8). The bursa copulatrix (fig. 7A-B) is large, ovoid or roundish. The bursal duct can be long or medium sized and straight or curved. The SR1 is wide and the SR2, which is smaller, is clearly visible, situated over the bursa copulatrix. In some females, the SR2 is rather obsolete. The capsule gland (fig. 7E) is about 1/3-1/2 the pallial oviduct length (cf. Rolán, 1993). The penis (figs 7C, 7F, 15B) is long, slender, and has a small gland halfway. Usually it is black, but in some populations the penis is unpigmented. The prostate is narrow and elongated (fig. 7G) (cf. Rolán, 1993).

Distribution (map 2). – *Alzoniella (A.) lucensis* is located in the western part of the provinces of Lugo and Orense and extends towards the western part of Asturias. Few localities were found in the provinces of A Coruña and León.

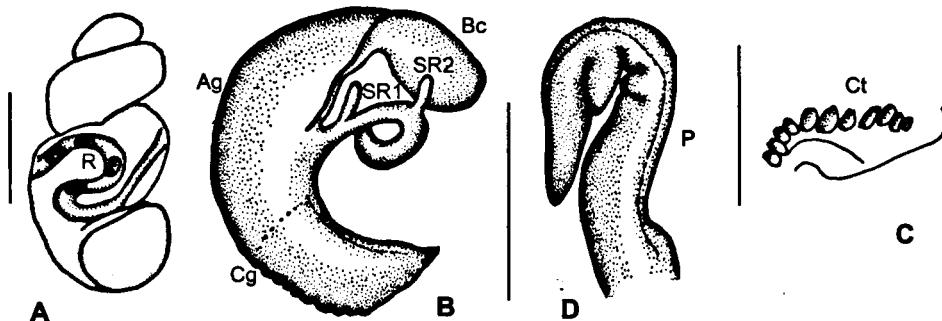


Fig. 9. Anatomical features of *Alzonella (A.) montana* (Rolán, 1993); Santander, Unquera, La Escalera fountain (UP70). A, rectum loop; B, female genitalia; C, osphradium and ctenidium; D, penis. Scale bars: 500 µm.

Remarks. – The population of *Alzonella (A.) lucensis* which was discovered recently in the province of A Coruña might result from an artificial introduction, since it is quite separated and located within the distribution area of *A. (A.) rohani*. However, this population differs slightly from the other known populations. Intraspecific variability for this species concerns the absence of penial pigmentation in some of the studied populations, or the occasional presence of a rounded bursa copulatrix and the relative size of the SR2.

Some populations are completely parasitised by flagellate organisms (Rolán, 1993).

Alzonella (A.) ovetensis (Rolán, 1993)
(figs 8, 14G, 15D, 43-46, 85, 103; map 2)

Belgrandiella ovetensis Rolán, 1993: 108, pl. 1 figs 5-6; pl. 3 fig 1; pl. 4 fig. 5; pl. 5 figs 10-19; pl. 6 fig. 6. Type locality: Asturias, QJ30: Baselgas, in the town council of Grado.

Type material: see Rolán, 1993.

Localities. – With the exception of localities i and ii all localities are new (cf. Rolán, 1993). Asturias: (i) QJ20, Puente de San Martinen, spring; (ii) QJ30, town council of Grado, Baselgas; (iii) UN80, SE entrance to Campo de Caso, spring with trough; (iv) TP50, N entrance to San Andrés, spring with trough; (v) TN59, about 500 m S. uphill Villamejín, spring; (vi) TN59, Pedroveya, brooks and springs between 100 and 900 m away; (vii) TP72, N. entrance to Tabladiello, brook; (viii) TP81, 6.5 km N. of Berrón, spring with trough; (ix) TP81, between Balbordón and Quintana, 1.2 km from La Colla, trough; (x) UN80, S. entrance to Campo de Caso, spring with trough; (xi) UP11, S. entrance to Liberdón, spring with pool; (xii) UP70, between Puertas and Colombres, 1 km from Noriega, spring near river. León: (xiii) TN64, between La Magdalena and Barrios de Luna; opposite electricity station, on wet rock.

Morphology. – Shells from two populations are represented (figs 43-46) and a protoconch (fig. 85) (cf. Rolán, 1993). Operculum not examined.

Anatomy (after 3 females and 1 male from locality i and 2 males from locality ii). – The ctenidium (fig. 8E) is barely developed and has about 8-10 lamellae. The anus is located close to the edge of the pallial cavity. The rectum in the pallial cavity (figs 8F-G, 14G) is U-shaped and points slightly towards the anterior part of the body (cf. Rolán, 1993).

The radula (fig. 103) has two basal cusps on each side of the central teeth, the smallest one sometimes being difficult to distinguish. The denticles of the central teeth are long

and blunted (cf. Rolán, 1993, pl. VI fig. 6).

Genital system (table 9). The bursa copulatrix (figs 8B-C) is medium-sized, roundish, and has a long straight duct inserted centrally. The SR1 is large, elongated and in its natural position hidden by the renal oviduct loop. It is usually narrow, but may be wide. The SR2 is larger than the SR1 and either elongated or roundish. Capsule gland length is more than half that of the pallial oviduct (fig. 8A). The penis (figs 8D, 15D) is long, wide and has a well-developed roundish lobe. In live specimens, the penis is pink near the tip (cf. Rolán, 1993).

Distribution (map 3). – This species was found in the central and eastern part of Asturias, and with several populations in Leon. At some localities it is sympatric with *Alzoniella* (A.) *montana* (UP11) or A. (A.) *cantabrica* (UP70).

Remarks. – *Alzoniella* (A.) *ovetensis* is very widespread in the province of Asturias. It is not currently threatened with extinction.

Alzoniella (A.) *montana* (Rolán, 1993)
(figs 9, 14K, 15A, 47-49, 55-56, 86-87, 104; map 2)

Belgrandiella montana Rolán, 1993: 111, pl. 1 fig. 4; pl. 4 figs 6, 8-9; pl. 6 fig. 7. Type locality: Cantabria, VN 18: Las Fraguas.

Type material: see Rolán, 1993.

Localities. – With the exception of localities i and iii-iv, all localities are new (cf. Rolán, 1993). Santander: (i) UP70, Unquera, Fuente La Escalera. Asturias: (ii) UP11, W. entrance to Liberdón [Libardón], spring with pool; (iii) UP20, 1 km SE. Las Rozas. (iv) QJ 30, Grado, Puebla Lasniella, spring El Banzao. Cantabria: (v) VN68, 3 km SSW. exit from Ramales de la Victoria, old spring. Vizcaya: (vi) WP00, about 5 km E. of Mendiondo, brook with spring; (vii) WP10, about 4 km W. of Artigas, old spring and running waters nearby; (viii) WP20, 2 km SW. Artigas, on wet rock with springs nearby; (ix) WP20, Artigas to Busturia highway, brook near road; (x) WN19, about 2 km NE. Alday, torrent. León: (xi) UN57, WSW. Puerto San Glorio between km 131 and 133, on wet rocks and soils.

Morphology. – Shell. Several shells (figs 47-49) and protoconchs (figs 86-87) are illustrated. Some shells (figs 55-56), which could belong to this species, located on the eastern and western borders of its distribution area, have a slightly different shell shape (cf. Rolán, 1993). Operculum not examined.

Anatomy(after 2 females and 3 males from locality i, 1 male from locality iii, and 1 female from locality iv). – The ctenidium (fig. 9C) has ca. 9-11 well developed lamellae. The rectum is strongly curved or S-shaped in the pallial cavity (fig. 9A). The anus ends close to the edge of the pallial cavity (fig. 14K) (cf. Rolán, 1993).

The radula (fig. 104) has two well developed basal cusps at each side of the central teeth. Its denticles are short and blunt (cf. Rolán, 1993: pl. 6 figs 7-8).

Genital system. – The bursa copulatrix (fig. 9B) is large, oval and has a long straight duct. Both seminal receptacles are long and slender. Capsule gland length (fig. 9B) is about a third of the pallial oviduct. The penis (figs 9D, 15A) is long, narrow and completely unpigmented. It has a small lobe located in its concave middle part (cf. Rolán, 1993).

Distribution (map 3). – *Alzoniella* (A.) *montana* is located in the western part of the province of Asturias, Cantabria, the Basque Country and in a few localities in the province of León. At some localities it occurs sympatric with A. (A.) *ovetensis* (UP11), A. (A.) *cantabrica* (UN57, VN68), A. (*Navarriella*) *pellitica* (WN19, WP00, WP10, WP20) or *Bythinella*

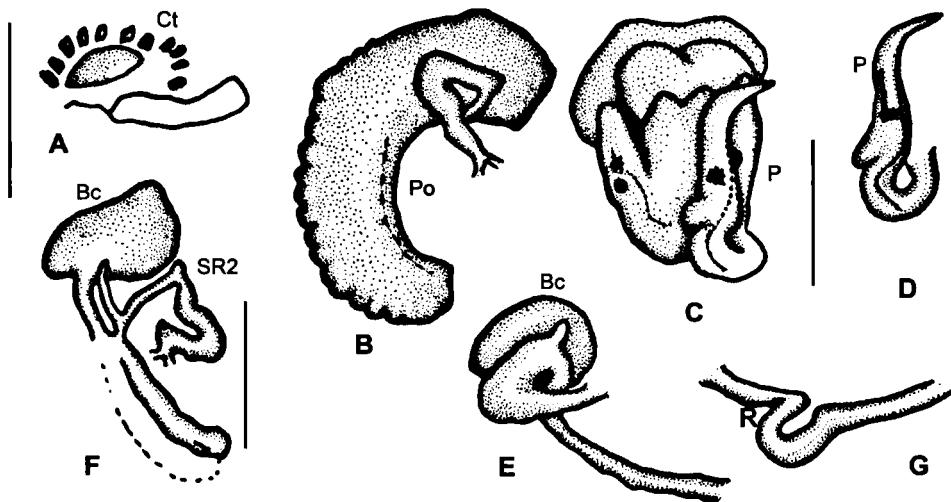


Fig. 10. Anatomical features of *Alzoniella (A.) mariana* spec. nov.; Asturias, Salas, Villazón (QJ21). A, osphradium and ctenidium; B, D, F, female genitalia; C, E, penis; G, rectum loop. Scale bars: 500 µm.

spec. (WN19, WP00, WP10, WP20).

Remarks. – The shell of *Alzoniella (A.) montana* is similar to, but smaller than, that of *A. (A.) cantabrica*. Therefore, although both species often live in sympatry, it is easy to differentiate them.

(?) *Alzoniella (A.) murita* Boeters, 2003
(fig. 108)

(?) *Alzoniella murita* Boeters, 2003: 24, figs 39, 104. Type locality: Burgos, VN 951532: Berberane, Murita, Cueva de Murita 1 (temporal effluent cave), 620 m.

Type material: see Boeters, 2003.

Morphology. – Shell elongate cylindrical-conical, with 4 1/2 moderately convex whorls, separated by a pronounced suture. The aperture is clearly slanted ovoid, its border (especially the columellar section) is rather broadened. The last quarter of the body whorl does not touch the shell wall. In frontal view, the palatal border of the aperture is in line with the second to last whorl. Height 1.4 mm, diameter 0.56 mm ($n = 1$). Operculum unknown.

Anatomy. – Unknown.

Distribution. – Known only from interstitial water at a single locality in the province of Burgos.

Remarks. – The shell is more clearly cylindrical than in all other species dealt with here. Its whorls are more prominently convex and separated by a deeper suture.

The classification of this species with *Alzoniella* is preliminary since no anatomical data are available yet. Maybe it belongs to *Guadiella* Boeters, 2003. However, the type

locality of (?) *A. murita* is far away from the well established range of *Guadiella* in the drainage area of the Guadalquivir in the provinces of Jaén and Sevilla. It has not been overlooked that (?) *Guadiella arconadæ* Boeters, 2003, has already been reported from the province of Burgos but its generical position has also not yet been clarified.

Alzoniella (A.) onatensis Boeters, 2003
(fig. 109)

Alzoniella onatensis Boeters, 2003: 25, figs 47, 104. Type locality: Guipuzcoa, WN 4863: Oñate, 0.25 km S. of Berezano, man-made spring, 360 m.

Type material: see Boeters, 2003.

Morphology. – Shell. Shell with 4 1/4 whorls which are separated by a moderately strong indented suture; the initial 3 whorls are well vaulted whereas the last whorl is slightly flattened. In frontal view, an imaginative straight line can be drawn along the initial 3 whorls, forming a cone; the profile of the last whorl does not reach this line then, although the last whorl is slightly broader than the foregoing one. This gives a slightly convex total impression of the shell shape. The last whorl neither ascends nor descends. The aperture is about circular; only the columellar border is very slightly broadened, touching the shell wall over a very short distance and leaving an umbilical slit open. Height 1.8 mm, diameter 0.96 mm. Operculum unknown.

Animal. – Unknown.

Differentiating features. – With a shell height of 1.4 instead of 1.8 mm, *Alzoniella (A.) murita* is smaller *A. (A.) cantabrica*, described from Asturias, Cantabria, the Basque Country and the North of León, Burgos and Palencia, and *A. (Navarriella) elliptica* (Paladilhe, 1874) from Navarra and Basses-Pyrénées, differing conchologically by a more ovoid shell shape (cf. Boeters, 1988: pl. 3 figs 44-45). *Alzoniella (A.) pyrenaica* (Boeters, 1983) is quite similar; its only known population is separated by about 125 km. In *A. (A.) pyrenaica* the initial 3 whorls do not form a cone, but contribute to an ovoid shell shape. Furthermore, in *A. (A.) pyrenaica*, the apical two whorls are more rounded and the first whorl does not protrude as in *A. (A.) onatensis*.

Habitat and distribution. – Presumably subterranean waters; collected in a captated spring fitted up for water supply. Only known from one locality in the province of Guipuzcoa.

Alzoniella (A.) marianae spec. nov.
(figs 10, 50-52, 66-67, 88-89, 105; map 2)

Belgrandiella cf. cantabrica; Boeters & Rolán, 1988: 202.

Type material. – Asturias, QJ21: (i) Villazón, Salas, Fuente Caliente (MNCN 15.05/33300/holotype [fig. 50], 50 paratypes), Rolán leg. 28.vi.1998; (ii) Villazón, Salas, cemetery washing place (CER/25 paratypes), Rolán leg. 31.iii.1988 & (BOE 1392/30, CER/many paratypes), Rolán leg. 25.ix.1988).

Morphology. – Shell (figs 50-52), height 1.30-1.73 mm, width 0.79-0.93 mm (n=10). Shell small, elongated oval, with c. 3 spire whorls. Suture deep; outline of the spire whorls clearly convex, without any peripheral angle on the last whorl. The protoconch (figs 88-89) has c. 1 whorl and a pitted microsculpture. The teleoconch whorls increase quickly in

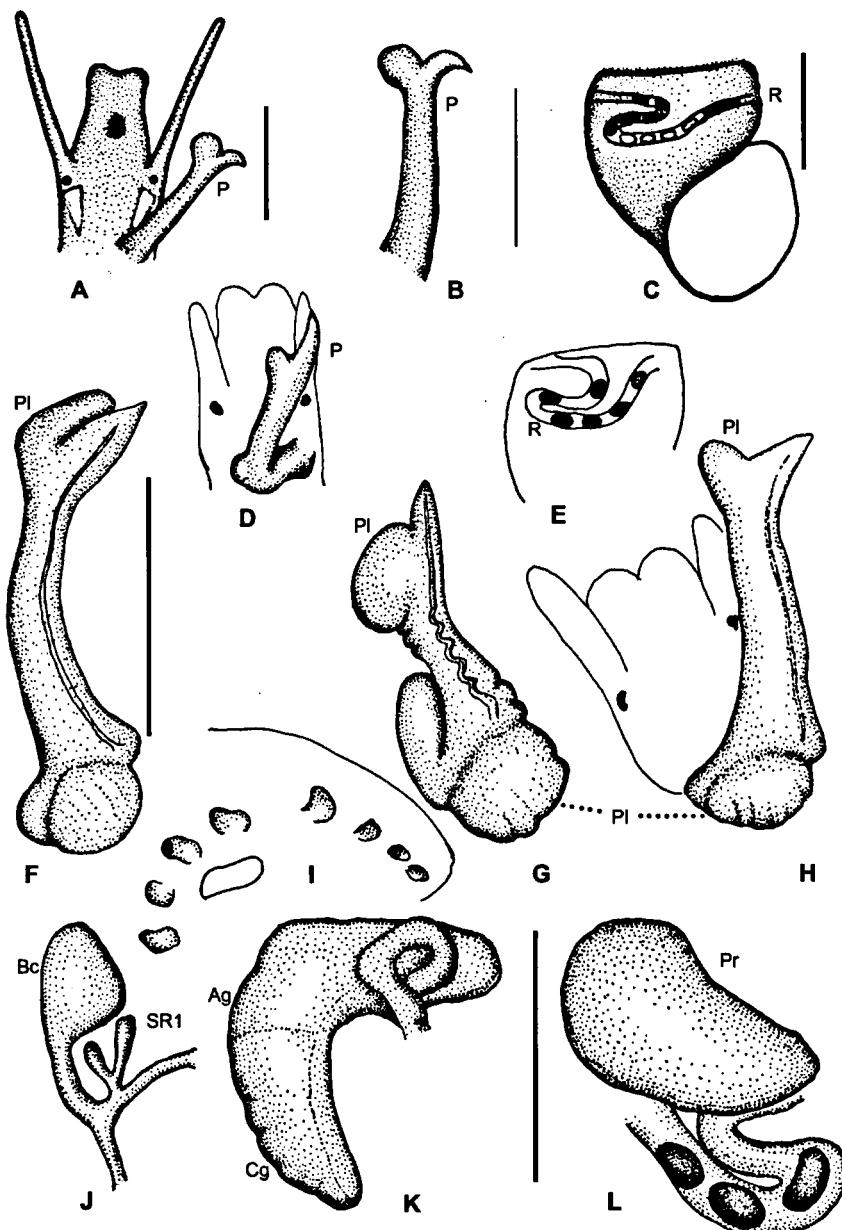


Fig. 11. Anatomical features of *Alzoniella (A.) iberopyrenaica* spec. nov. A-C, Navarra, Tolosa, Leiza (WN87): digestive and male genitalia. D-E, Vizcaya, Ereño, Arieta (WP30): penis and rectum shape in the pallial cavity (drawings from field notes in living animals). F-L, Vizcaya, Ereño, Arieta (WP30): osphradium, ctenidium, female and male genitalia, prostate and rectum (drawings from fixed material).

Scale bars: figs A, B, F, K, 500 µm; fig. C 1, mm.

size. The body whorl measures c. 3/4 of the total shell length (for the type locality) or around 2/3 (for the other population). The aperture is slightly oval, with a continuous peristome and a narrow umbilicus. Seen from the side, the aperture border is straight. Operculum (figs 66-67) corneous, paucispiral, whitish, translucent, slightly oval, with an excentric nucleus without any internal outgrowth. The internal callus is oval.

Anatomy(after 4 females and 1 male from locality ii and 1 female and 2 males from locality i). – Ctenidium with 6-11 small roundish lamellae (fig. 12A). The rectum is U-shaped and points towards the anterior part of the body (fig. 10G). The anus ends near the edge of the pallial cavity. There is black pigmentation distributed along the cephalic tentacles. Behind the eyes, there are white spots and a slender black strip (fig. 10C). Apart from that, the head is unpigmented. The rest of the body is intensely black, but it is usually possible to distinguish the rectum loop from the external part of the pallial cavity.

The radula (fig. 105) is characteristic for the genus. The central teeth have two wide basal cusps at each side and its denticles are very small and blunted.

Genital system (table 11). The bursa copulatrix (fig. 10E-F) is large, oval and has a medium-sized straight duct. The SR1 is very long, narrow and covers the bursa copulatrix. The SR2 is very small and roundish, and sometimes difficult to distinguish. The capsule gland (fig. 10B) occupies more than half the pallial oviduct. The penis (fig. 10C-D) is long, narrow, pointed and has a small lobe located halfway the concave side. Near the tip and above the penile lobe, there is a black area.

Differentiating features. – *Alzoniella (A.) mariana* differs from the Iberian congeneric species as follows. In *A. (A.) rohani* the shell usually has a subsutural furrow and always a different protoconch microsculpture, whereas the animal has a straight rectum and a prominent penial lobe. In *A. (A.) edmundi* the shell has deeper and more oblique sutures, a more regular protoconch microsculpture, a smaller SR1, a broad, unpigmented penis, and a distal penial lobe. *Alzoniella (A.) asturica* has a smaller, more rounded shell, an unpigmented body, a smaller and unpigmented penis, a ctenidium with fewer lamellae and a smaller SR1. *Alzoniella (A.) galaica* has a more elongated shell with flatter spire whorls, a larger bursa copulatrix with a longer and more sinuous duct and longer and narrower seminal receptacles. *Alzoniella (A.) lucensis* has a larger and more elongated shell with a less deep suture, a smoother rectum loop, a longer bursal duct and a smaller SR1. *Alzoniella (A.) ovetensis* has a larger and broader shell, an unpigmented body, a broad penis that is pink near its tip, and a bigger SR2. *Alzoniella (A.) montana* has a cylindrical, narrower shell, no pigmentation and two seminal receptacles of similar size and shape. *Alzoniella (A.) iberopyrenaica* has a more elongated shell, a penis with two well-developed lobes and a common origin for both seminal receptacles. *Alzoniella (Navarriella) pellitica* is larger, has fewer, convex spire whorls, a smooth rectum loop and a penis with a big penial lobe and several papillae near the penial base.

Distribution (map 3). – This species is only known from Asturias, Salas, Villazón.

Remarks. – Several dissected specimens of *Alzoniella (A.) mariana* have a few small lamellae. This species was referred to by Boeters & Rolán (1988) as a population probably belonging to *A. (A.) cantabrica*. In that study, only one specimen was dissected and no SR1 was distinguished, probably due to its proximity to the bursa copulatrix duct, which may cover it. Anatomically, *A. (A.) mariana* shares some characters with *A. (A.) cantabrica*. There are also conchological similarities, but in most *A. (A.) cantabrica* populations, the shell is larger. The differences between both species are evident in pigmentation, rectum loop, length and shape of the bursa copulatrix duct and SR1 length.

Derivation nominis. – This species is dedicated to Dr. María de los Angeles Ramos of the Museo Nacional de Ciencias Naturales, Madrid, for her dedication to the study of Iberian Hydrobiidae fauna.

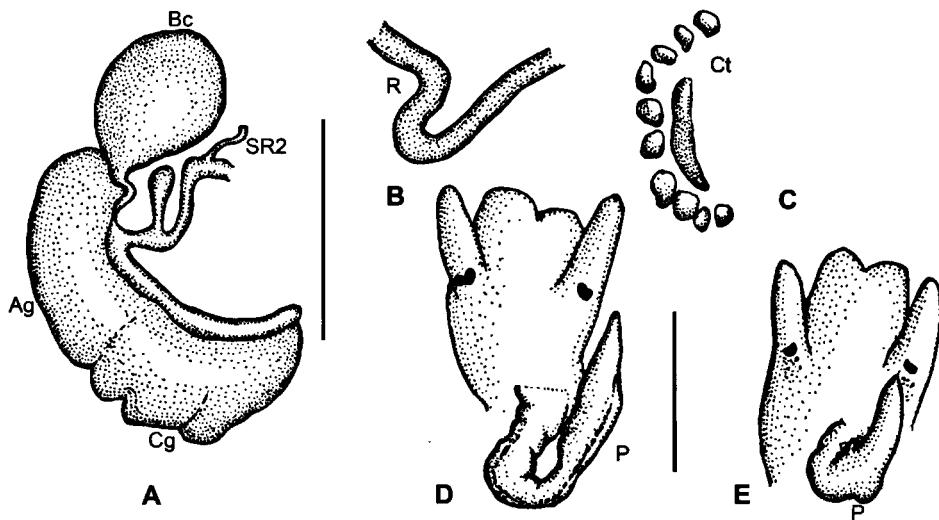


Fig. 12. Anatomical features of *Alzoniella* (A.) spec. 1; Lugo, 200 m in front of Puente Castro (QH19). A, female genitalia; B, rectum shape in the pallial cavity; C, osphradium and ctenidium; D, E, penis. Scale bar: 500 μ m.

Alzoniella (A.) iberopyrenaica spec. nov.
(figs 11, 20, 71; map 3)

Alzoniella pyrenaica; Rolán, 1993: 114, pl. 7 figs 6-9.

Type material. – Vizcaya: WP30, Ereño, neighbourhood of Arieta (with *Alzoniella (Navarriella) pellitica* and *Bythinella* spec.) (MNCN 15.05/holotype [fig. 20], 1 paratype; BOE 2814/1 paratype, CER/5 paratypes).

Morphology. – Shell. Shell (fig. 20) sub-cylindrical, with 4 1/4 whorls, separated by a rather shallow suture; height 1.40 mm, width 0.67 mm ($n=1$). Last whorl flattened; aperture slanted ovoid, with sharp border, which is broadened only at its basis and below the slit-like umbilicus. Height 1.40 mm; width 0.67 mm. Protoconch (fig. 71) with a delicate microsculpture. Operculum not examined.

Anatomy (after 4 males and 1 female from Ereño; it was not possible to study more females). – The ctenidium has 8-11 dispersed lamellae (fig. 11I). The rectum (figs 11C and 11E) in the pallial cavity describes a Z-like loop (cf. Rolán, 1993: pl. 7 fig. 7). The anus ends close to the anterior edge of the mantle cavity.

Radula not examined.

Genital system (table 2). The capsule gland (fig. 11K) occupies approximately half the length of the pallial oviduct. The roundish bursa copulatrix (fig. 11J) has a medium-sized, straight duct. The species shows a unique feature in comparison to the congeneric taxa: two seminal receptacles of similar size and shape located in a proximal position, with a common origin at the renal oviduct. The presence of the usual receptaculum RS2 remains to be confirmed. The penis (figs 11A-B, 11D, 11F-H) is not pigmented, it is longer than the head and has a roundish lobe near its tip. At the base of the penis, there is another, well-developed whitish lobe. The prostate (fig. 11L) is typically bean-shaped and slightly widened in its posterior part (cf. Rolán, 1993: pl. 7 figs 8-9).

Differentiating features. – *Alzoniella* (*A.*) *pyrenaica* (Boeters, 1983), is conchologically the most similar species, differing by somewhat larger dimensions mainly (cf. figs 18-19 versus 20). In the former species the bursa copulatrix is more rounded and RS1 and RS2 are separate.

Distribution (map 2). – This species is known from Navarra, northern Spain.

Remarks. – The locality where this species was first discovered was published by Rolán (1993), but the material from there got lost. This study was done with specimens from the new locality, i.e. the type locality (Ereño).

Alzoniella (*A.*) spec. 1
(figs 12, 53-54, 61-62, 90-91, 106-107; map 2)

Material. – This species is only known from two localities. Lugo: (i) QH19, a few km N. of Puente Castro; (ii) QH19, about 200 m in front of Puente Castro, spring.

Morphology. – Shell. Shell small, subcylindrical (figs 53-54), with a rather shallow suture and planispiral spire whorls, whitish; with an oval aperture and a continuous peristome, without an umbilicus. For the protoconch, see figs 90-91. Operculum (figs 61-62) oval, thin, slightly yellowish in its centre, with an excentric nucleus without any internal outgrowth.

Anatomy (after 2 females and 1 male from locality i and 2 females and 2 males from ii). – The body is unpigmented except for the eyes and some bright white spots along the tentacles and behind the eyes (fig. 12D-E). The ctenidium (fig. 12C) has c. 7 small lamellae. The rectum loop (fig. 12B) in the pallial cavity is U-shaped and points slightly towards the anterior part of the body. The anus ends near the edge of the pallial cavity.

The radula (figs 106-107) is typical for *Alzoniella* species. The central teeth have two basal cusps, the first of which is very wide and sharp, the second is very small and generally hidden behind the first cusp. The remaining denticles of the central teeth are tapered.

Genital system (table 12). The wide bursa copulatrix (fig. 12A) is roundish or pyriform. Its duct is long, narrow and curved. In a natural position, the renal oviduct makes a complete loop and it is possible to distinguish the SR2 leaning over the bursa copulatrix. The SR1 is pyriform, long and wide. The SR2 is longer, narrower and has a rounded tip. The capsule gland length is almost half that of the pallial cavity. The penis (figs 12D-E) is long, slender, unpigmented and has a roundish tip. There is a minute penial lobe located in the middle concave part of the penis. The penial duct runs straight along the penis.

Distribution (map 3). – This species was found in only two springs of a small mountain area that is part of Puente Castro.

Remarks. – The populations are located within the range of *Alzoniella* (*A.*) *lucensis*. The shells are somewhat similar to shells of that species but smaller. The rectum loop is very similar. Nevertheless, there are some characters that make it possible to differentiate the two forms. For example, *A.* (*A.*) *lucensis* is usually pigmented black, even its penis. Its penis has a bigger lobe, and the bursa copulatrix and seminal receptacles are proportionally smaller. Taking into account the great anatomical variability among *A.* (*A.*) *lucensis* populations, the distribution, and the similarities in both forms, we prefer not to introduce a new species until new data confirm its specific identity.

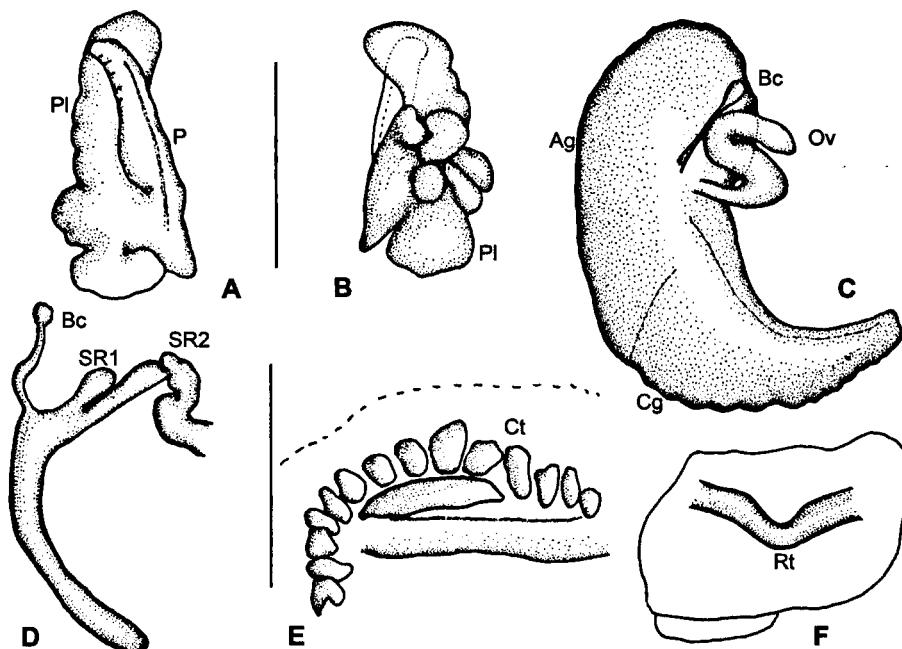


Fig. 13. Anatomical features of *Alzonella (Navarriella) pellitica*; Alava, Arriola (WN36). Figs A-B, penis; C-D, female genitalia; G, osphradium and ctenidium; H, rectum in the pallial cavity. Scale bar: 500 μm (see abbreviations in the text).

Alzonella (A.) spec. 2
(fig. 57; map 2)

Material. – Asturias: QJ30, road from Grado to Baselgas, Varas River.

Morphology. – The oval-conical shell (fig. 57) is small, narrow, and whitish. The operculum is unknown.

Animal. – Unknown.

Distribution (map 3). – This form is only known from the Varas river, Asturias.

Remarks. – Due to the restricted number of specimens available for study, anatomical investigations were impossible. The problematic population is located within the range of *Alzonella (A.) ovetensis*, and close to that of *A. (A.) asturica*, but the shell looks very different from these two species. Differences with *A. (A.) cantabrica*, *A. (A.) mariana* and *A. (A.) spec. 1* are also evident. However, more material is needed for the description of a new species.

Subgenus *Alzonella (Navarriella)* Boeters, 2001

Type species: *Paludinella elliptica* Paladilhe, 1874.

Navarriella is characterized by the definition by Boeters (2001), which may be complemented as follows. (i) While leaving the stomach, the rectum first forms a Z-shaped loop and after that a U-shaped bend. In *Alzoniella* s. s. the rectum forms two Z-shaped loops. (ii) In *Navarriella* the distal end of the oviductus is about three-times as far from the mantle edge as the anus. In *Alzoniella* s. s., the relative positions of the end of the oviductus and the anus vary, so that these may be situated at the same level or not. (iii) In *Navarriella* the penial lobe is provided with several papillae.

Two species of this subgenus are known, viz. *A. (Navarriella) elliptica* (Paladilhe, 1874) and *A. (Navarriella) pellitica*.

***Alzoniella (Navarriella) elliptica* (Paladilhe, 1874)**
(figs 110-112, 113-114, 118-119, 121-122)

Paludinella elliptica Paladilhe, 1874: 33-34, pl. 3 figs 11-12. Type locality: "les environs de' Ascain" [Pyrénées-Atlantiques, XP10].

Microna elliptica; Boeters, 1970: 132, pl. 9 fig. 34.

Lithabitella elliptica; Boeters, 1974: 90, figs 5-7.

Belgrandiella elliptica; Boeters, 1988: 227, figs 198, 232-234, pl. 3 fig. 45.

Alzoniella (Navarriella) elliptica; Boeters, 2001: 151, figs 1-7, 11.

Type material: see Boeters, 1970.

Material. – **Navarra:** XN37, S. entrance to Valcarlos, pipe with trough (BOE 1444).

Morphology. – Shell. A specimen, probably a syntype was dealt with by Boeters (1970: pl. 9 fig. 34; 1988: pl. 3 fig. 45). Shell ovoid, with 3.5-4.0 whorls, suture moderately indent-ed; last whorl forming c. 75% of the total shell height. Aperture slightly slanted, egg-shaped; its border slightly thickened, especially at the columellar side. Umbilicus closed. Operculum chestnut brown.

Anatomy (after Boeters, 1974, 1988, 2001). – Mantle, head and foot strongly pigment-ed blackish. Eyes are present. The ctenidium has about 11-13 lamellae. The rectum in the pallial cavity makes a slight curve that leans over the pallial oviduct in females. The anus ends very close to the anterior edge of the mantle cavity (cf. Boeters, 2001: fig. 6).

Radula not examined.

Genital system. The bursa copulatrix with its pedunculus is somewhat kidney-shaped. The SR1 usually leans over the renal oviduct. The shape of both RS1 and RS2, quite separate from each other, resembles a fist with forearm. The distal end of the oviductus is about three-times as far from the mantle edge as the anus (cf. Boeters 1974: 87, fig. 5). Penis with a lobe-shaped appendix; the lobe and the base of the penis with wart-like papillae. A large transverse gland at the base of the penis seems to be a constant feature, whereas other wart-like structures can be either absent or fused.

Differentiating features. – Size and shape of SR2 of *A. (Navarriella) elliptica* (Boeters, 1974: fig. 5; 2001: fig. 6) differ from those of *A. (Navarriella) pellitica* since in the former species RS1 is not simply small but provided with a long duct.

Distribution. – In France in the Pyrénées-Atlantiques and in Spain at least in the adja- cent province of Navarra.

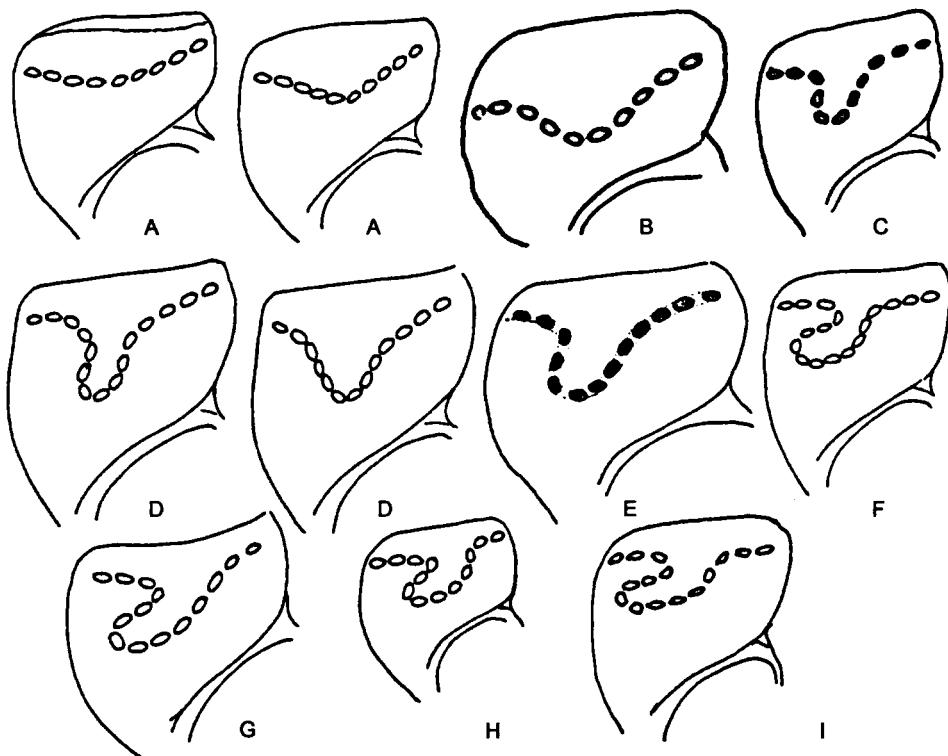


Fig. 14. Rectum shape. A-B, *Alzonella (A.) rohani* (Boeters, 1986) (after Rolán, 1993: 119, pl. 4 figs. 1-1); C-D, *A. (A.) lucensis* (Rolán, 1993) (after Rolán, 1993: 119, pl. 4 fig. 4); E, *A. (A.) cantabrica* (Boeters, 1983) (after Rolán, 1993: 119, pl. 4 fig. 2); F, *A. (A.) gallica* (Boeters & Rolán, 1988) (after Rolán, 1993: 119, pl. 4 fig. 3); G, *A. (A.) ovetensis* (Rolán, 1993) (after Rolán, 1993: 119, pl. 4 fig. 5); H, *A. (A.) asturica* (Boeters & Rolán, 1988) (after Rolán, 1993: 119, pl. 4 fig. 7); I, *A. (A.) montana* (Rolán, 1993) (after Rolán, 1993: 119, pl. 4 fig. 6).

Alzonella (Navarriella) pellitica spec. nov.
(figs 13, 16-17, 64-65, 68-69, 92, 115-117, 120; map 1)

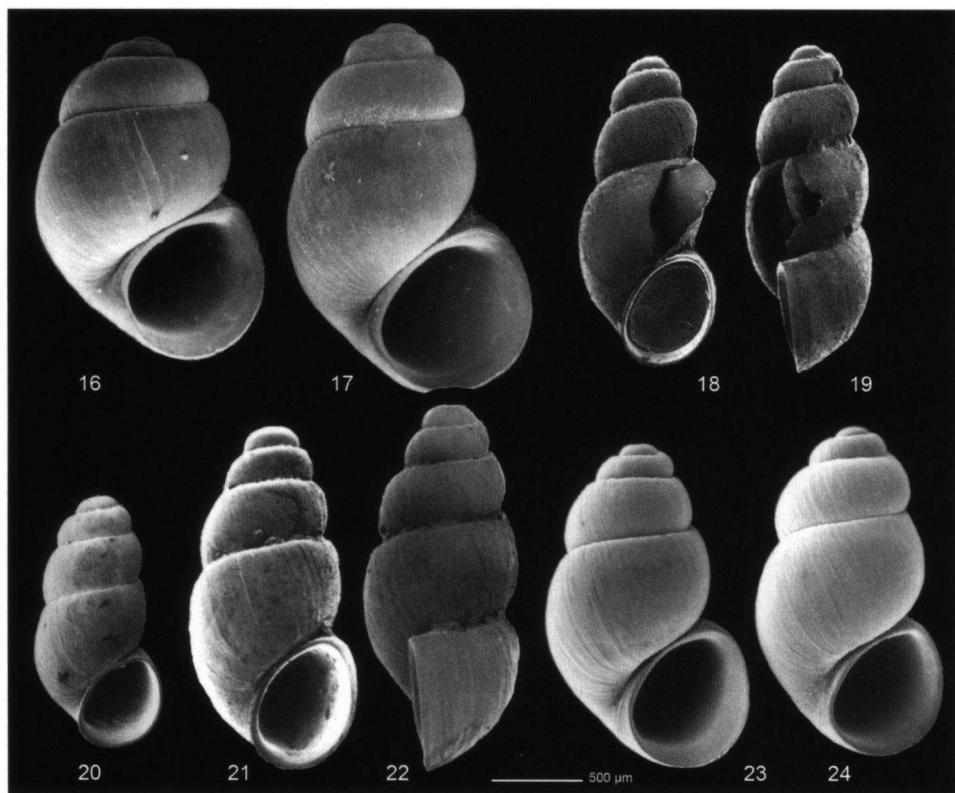
Belgrandiella elliptica; Rolán, 1993: 112, pl. 7 figs 1-5.

Type material. – Holotype (fig. 17) and 10 paratypes MNCN; paratypes also CER and BOE 2748 (from (i)), 2749 (from (iii); type locality) and 2751 (from (ii)).

Material. – (cf. 11 localities in Rolán, 1993). The following localities (i) to (x) can be added as new:
Alava: (i) WN36, N. of Olaeta, running water near a spring; (ii) WN36, 5 km W. of Mondragón, springs;
(iii) WN36, Santa Agueda area, Arriola, spring about 250 m from the houses at brook (type locality).
Vizcaya: (iv) WP00, about 5 km E. of Mendiondo, brook with small spring; (v) WP10, about 4 km W of Artigas, spring and running water nearby; (vi) WP20, 2 km SW. Artigas, on wet rock face; (vii) WN19, 2 km NE. Alday; (viii) WP30, Ereño, neighbourhood of Arieta, spring near restaurant. Guipúzcoa: (ix) WN66, about 3 km W. of Garín, spouting spring; (x) WN68, about 4 km SSE. Azpeitia, waterfall with pools.



Fig. 15. Anatomical details of live specimens of several *Alzoniella* (A.) species. A, *A. (A.) montana* (Rolán, 1993) (after Rolán, 1993: 119, pl. 4 figs 8-9); B, *A. (A.) lucensis* (Rolán, 1993) (after Rolán, 1993: 120, pl. 5 figs 1-9); C, *A. (A.) cantabrica* (Boeters, 1983) (after Rolán, 1993: 119, pl. 4 figs 10-18); D, *A. (A.) ovetensis* (Rolán, 1993) (after Rolán, 1993: 120, pl. 5 figs 10-19).

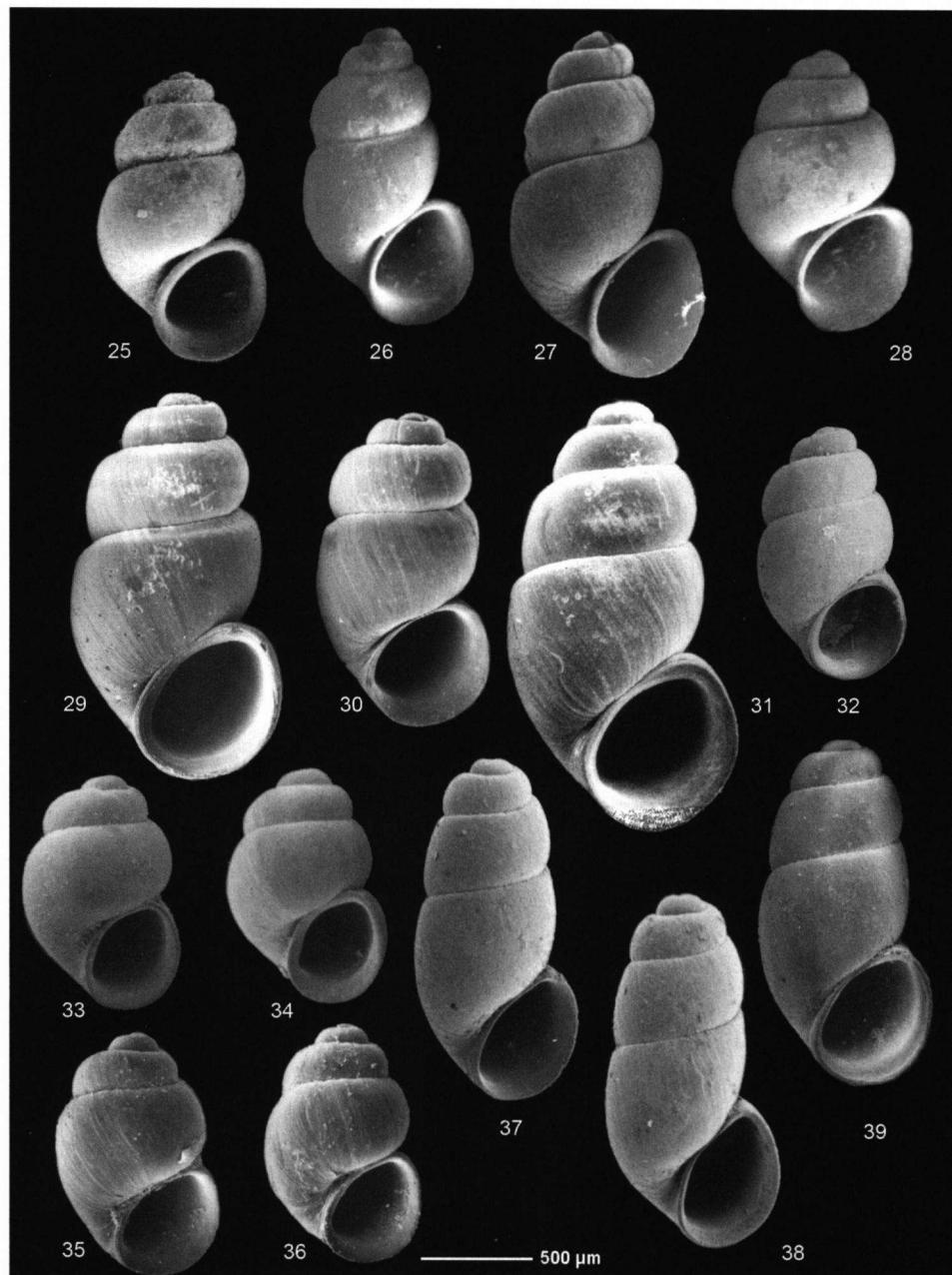


Figs 16-24. *Alzoniella* and *Guadiella* species. 16, 17, *A. (Navarriella) pellitica* spec. nov. (holotype), Alava, Arriola (WN36); 18, 19, *A. (A.) pyrenaica* (Boeters, 1983) (SMF 253578/holotype), France, Pyrénées-Atlantiques, Tardets (XN77); 20, *A. (A.) iberopyrenaica* spec. nov. (holotype), Navarra, road from Leiza to Tolosa (WN87); 21, 22, *G. andalucensis* (Boeters, 1983) (SMF 256210/holotype), Jaén, Úbeda (VG89); 23, 24, *A. (A.) cantabrica* (Boeters, 1983), Asturias, Covadonga, Fuente el Escoliu (UN39).

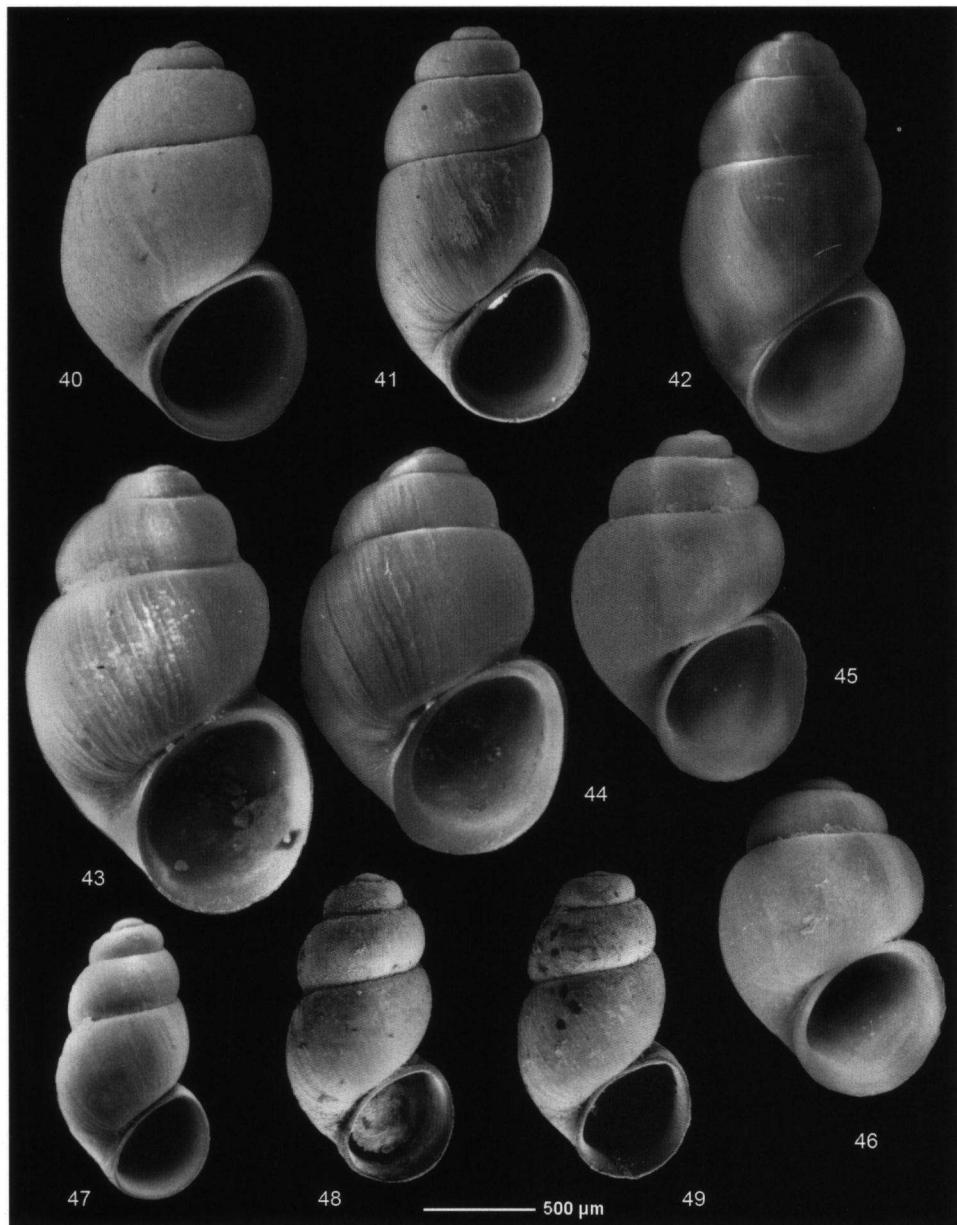
Morphology. – Shell (figs 16-17, 68-69 [protoconchs]; Rolán, 1993: pl. 7 figs 1-2). Shell ovoid with rounded or flattened conical apex; in frontal view the profile of the last whorl is slightly flattened and the parietal border of the aperture is in alignment with the profile of the two preceding whorls. Suture pronounced. Aperture slightly slanted ovoid; its edge sharp but somewhat thickened at the corner; columellar border touching the last whorl but not fused, forming a funnel-like slit beneath the closed umbilicus. Umbilical border slightly broadened. Height 1.90 [1.50-2.20] mm, width 1.23 [1.19-1.30] mm ($n = 10$; type locality). Operculum characteristic for this genus, pale yellow (figs 64-65).

Anatomy (after 4 females and 2 males from localities i and iii). – The ctenidium has a variable number (12-14) of well-developed lamellae (fig. 2E). The rectum in the pallial cavity makes a slight curve that leans in females over the pallial oviduct (fig. 2F). The anus ends very close to the anterior edge of the mantle cavity (cf. Rolán, 1993: pl. 7 fig. 2). The radula (fig. 92) is shaped as usual in the genus. The central teeth have blunted denticles and two basal cusps on each side.

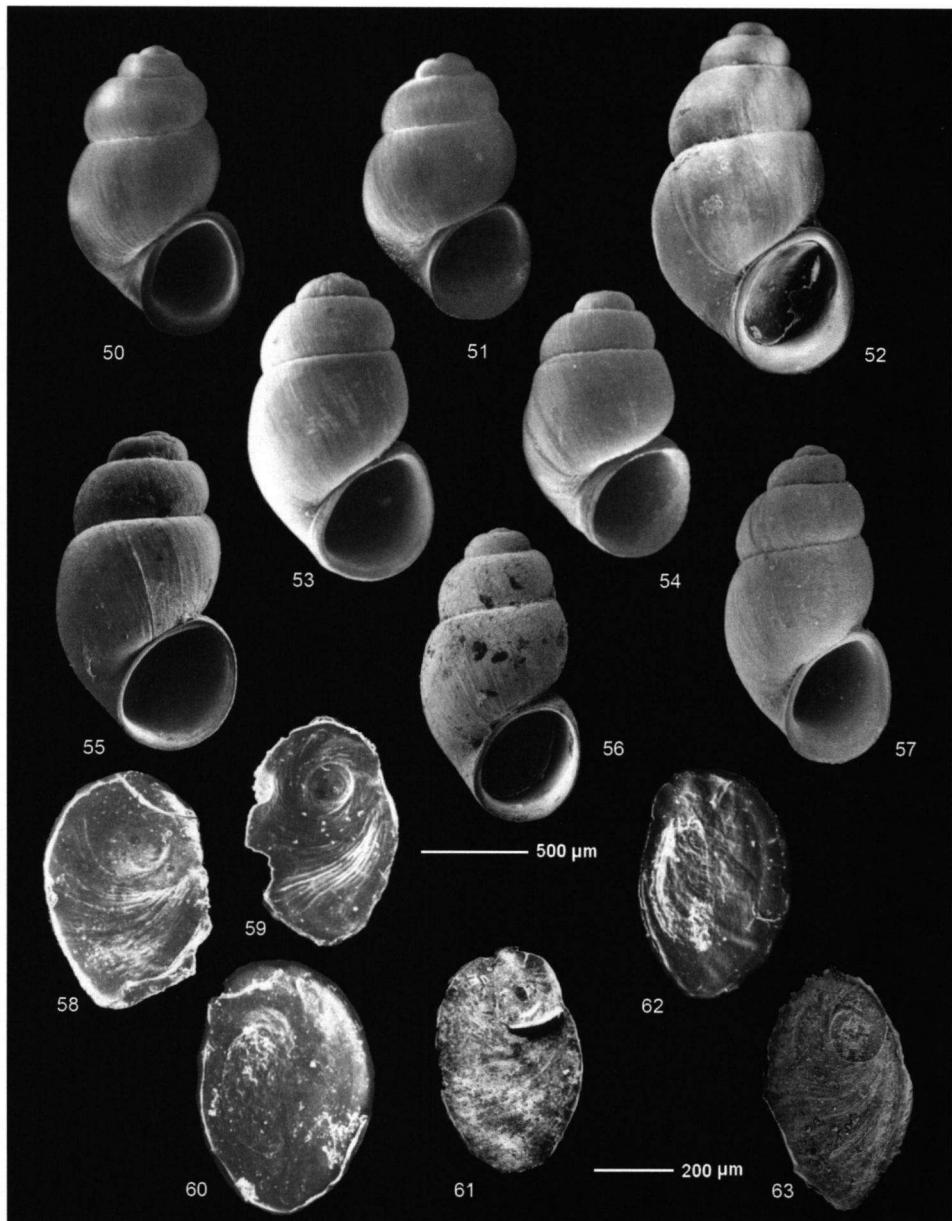
Genital system (table 1). The capsule gland constitutes less than half of the well devel-



Figs 25-39. *Alzoniella* species. 25-28, *A. (A.) edmundi* (Boeters, 1984), Majorca, road from Andraitx to Valldemossa (DD59). 29-32, *A. (A.) rolani* (Boeters, 1986); 29-30, Lugo, Peares dam (PH00); 31, Portugal, Douro Litoral, Serra do Marao (NF95); 32, Portugal, Beira Baixa, road from Penacova to Coimbra, near Rebordosa (NE25). 33-36, *A. (A.) asturica* (Boeters & Rolán, 1988); 33-34, paratypes (CER), Asturias, Borondes, La Fontona (QJ30); 35-36, Asturias, Grado, highway to Tameza (QJ30). 37-39, *A. (A.) gallica* (Boeters & Rolán, 1988); 37-38, paratypes (CER), Lugo, O Courel (PH40); 39, Lugo, road from Monforte to Ourense, near Peares dam (PH00).



Figs 40-49. *Alzoniella* (*A.*) species. 40-42, *A. (A.) lucensis* (Rolán, 1993); 40, Lugo, Quiroga, O Courel, Carrozo de Vilaboa (PH40); 41, Lugo, road from Monforte to Ourense, near Peares dam (PH00); 42, León, Villafranca del Bierzo (PH72); 43-46, *A. (A.) ovetensis* (Rolán, 1993); 43-44, Asturias, Pedroveya, Trubia to Proaza highway (TN59); 45-46, Asturias, Grado, highway to Tameza (QJ30); 47-49, *Alzoniella* (*A.*) *montana* (Rolán, 1993); 47, Cantabria, Las Fraguas (VN18); 48-49, Cantabria, Unquera (UP70).



Figs 50-63. *Alzoniella* species. 50-52, *A. (A.) mariana* spec. nov; 50, holotype (MNCN 15.05/33300) and 51, paratype (MNCN 15.05/33300), Asturias, Salas, Villazón, Fuente Caliente (QJ21); 52, Asturias, Salas, Villazón, cemetery washing place (QJ21). 53-54, *A. (A.)* spec. 1, Lugo, Puente Castro (QH19). 55-56, *A. (A.) cf. montana* (Rolán, 1993); 55, Vizcaya, road from Sollube to Artigas (WP20); 56, Asturias, Grado, Cuallas river (QJ30). 57, *A. (A.)* spec. 2, Asturias, Varas river (QJ30). 58-60, Opercula, *A. (A.) rohani* (Boeters, 1986); 58, Pontevedra, Gondomar (NG25); 59-60, Portugal, Douro Litoral, Serra do Marao (NP95). 61-62, *A. (A.)* spec. 1, Lugo, Puente Castro (QH19). 63, *A. (A.) gallica* (Boeters & Rolán, 1988), Lugo, O Courel (PH40).

oped pallial oviduct (fig. 2C). The bursa copulatrix (fig. 2C-D) is very small and roundish; it has a sinuous, long, narrow duct. The elongated and wide SR1 usually leans over the renal oviduct. The SR2 is very small and difficult to distinguish, i.e. in the area corresponding to the SR2 there is a spermatic shine and a little protuberance which may correspond to a very small SR2 or to an internal receptaculum that opens into the renal oviduct. The penis (fig. 2A-B) is as long as the head and has a very long lobe which may be longer than the penis. Although the penis is unpigmented, there are some black spots at its base. In the medium and basal part of the penis, there are about 3-6 large papillae on the lobe append- ing to the penis (Rolán, 1993: pl. 7 figs 3-5).

Differentiating features. – Size and shape of SR2 of *A. (Navarriella) elliptica* (Boeters, 1988: fig. 234) differ from those of the new species. In *A. (Navarriella) elliptica* the cusp of the rachidean tooth is much more elongated.

Distribution (map 1). – This new species was previously reported from Navarra and Guipuzcoa (Northern Spain) (Rolán, 1993). In this paper, the distribution area is extended within the Basque Country. At some localities this species has been collected together with *Alzoniella (A.) montana* (WN19, WP00, WP10, WP20), *A. (A.) iberopyrenaica* (WP30) or *Bythinella* spec. (WN19, WP00, WP10, WP20, WP30).

Derivatio nominis. – The epithet *pellitica* is an anagram of *elliptica*.

Genus *Guadiella* Boeters, 2003

Type species: *Belgrandiella andalucensis* Boeters, 1983.

This genus has been described for three species, viz. *G. andalucensis* (Boeters, 1983), *G. ramosae* Boeters, 2003, and (?) *G. arconadae* Boeters, 2003. The type species is discussed here to give a better understanding of features characteristic of *Alzoniella* Giusti & Bodon, 1984.

The shell is narrow, long, cylindrical to slightly conical. The edge of the aperture is sharp; only its columellar border may be slightly broadened. Height 1.40-1.70 mm, diameter 0.55-0.76 mm. The operculum is lemon yellow.

The animal lacks any pigmentation. Eyes are missing. The gill is provided with 7-15 leaflets. Upon leaving the stomach, the rectum forms 2 Z-like loops as in *Alzoniella* s. s. The penis is simple, without any protrusion or appendix, except for (?) *G. arconadae* with a small lateral appendix. The female genital tract has a bursa and a single receptaculum (distal receptaculum = RS1).

In shell shape, representatives of *Guadiella* differ from almost all species of *Alzoniella* s. s. Only (?) *A. (A.) cornucopia* (De Stefani, 1880) and *A. (A.) fabrianensis* (Pezzoli, 1969), both from Italy, also have a comparatively long shell. Males from *Guadiella* differ by a simple penis, with is not provided with any protrusion or appendix or with at most a small lateral one. Females can be differentiated in that the oviductus is equipped with a bursa and a simple receptaculum instead of a bursa and two receptacula. In the coloured operculum *Guadiella* differs from *Bythiospeum* Bourguignat, 1882.

Representatives of this genus inhabit interstitial water of river-beds in the provinces of Jaén and Sevilla and, when *G. arconadae* belongs to this genus indeed, in the province of Burgos.

***Guadiella andalucensis* (Boeters, 1983)**
(figs 21-22, 75; map 1)

Belgrandiella andalucensis Boeters, 1983: 21. Type locality: Jaén, VG89: "Sous-écoulement du Guadalquivir [Peal de Becerro [et] Ubeda]."

Belgrandiella andalucensis; Boeters, 1988: 225, figs 199-200, 228-231, 290, pl. 3 fig. 42.

Guadiella andalucensis; Boeters, 2003: figs 28, 42-45, 75 and 104.

Type material: see Boeters, 1983.

Morphology. – Shell. SEM photographs of the holotype are shown in figs 21-22; for the protoconch, see fig. 75 (cf. Boeters, 1983, 1988, 2003). Operculum with pale orange nucleus.

Anatomy. – See Boeters (1983, 1988, 2003). Gill with about 7 to 17 leaflets; intestine with 2 Z-like loops behind the stomach. Female genital system: renal oviductus with a kidney-shaped bursa and a single receptaculum. Male genital system: penis without any protrusion, very slender, its base measuring 1/10 of its length.

Habitat and distribution (map 1). – Interstitial waters; collected at temperatures of 9.9, 10.2 and 19.7°C. Drainage area of the Rio Guadalquivir in the provinces of Jaén and Sevilla.

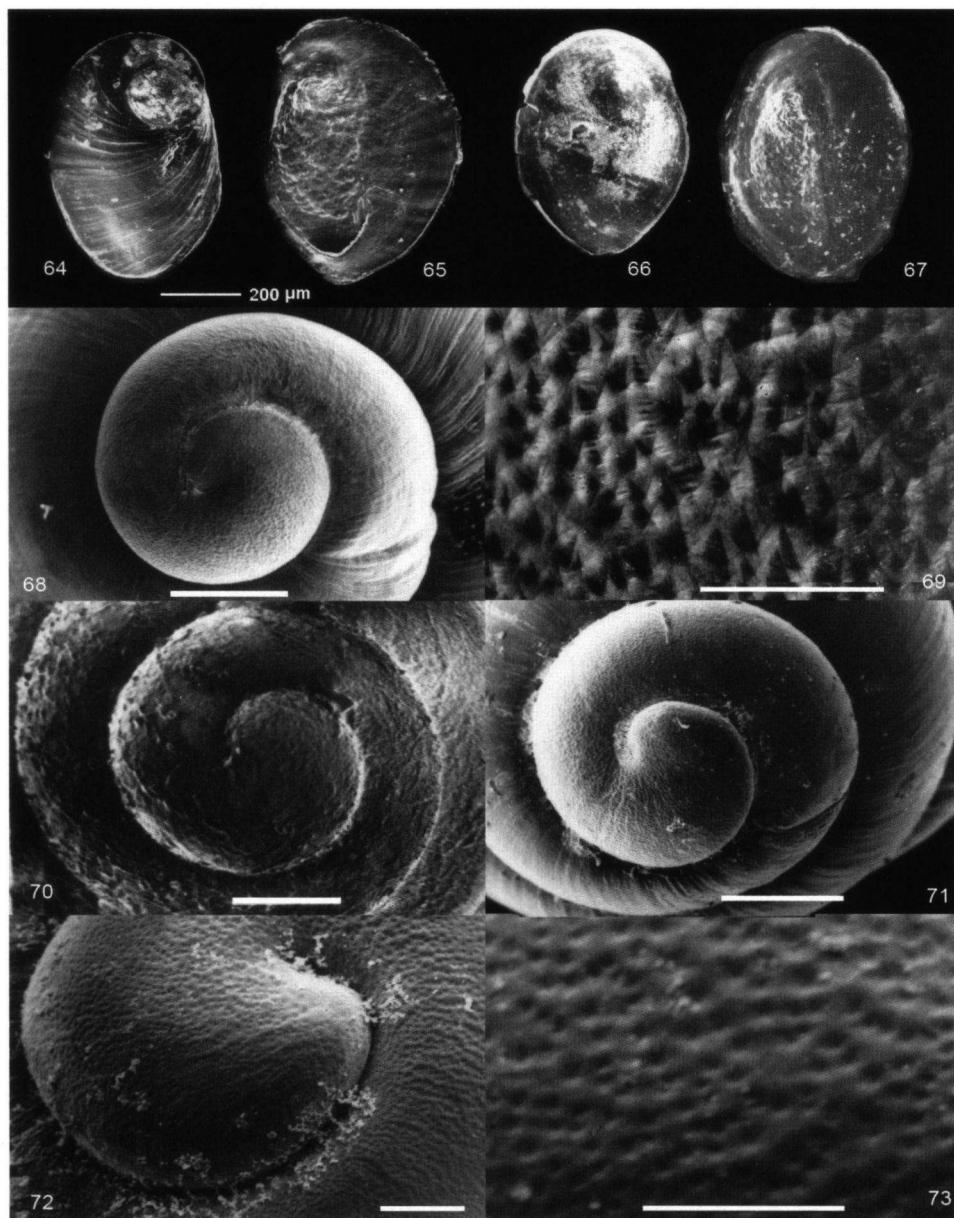
DISCUSSION

Biogeography. – *Alzoniella* species are known from Slovakia, Austria, northern Italy (Giusti & Bodon, 1984), southern France (Boeters, 1999, 2000) and the northern Iberian Peninsula with the Balearic Islands. Until recently the Iberian representatives of this genus have been regarded as belonging to *Belgrandiella*. Now it should be said, that the genus *Belgrandiella* is not known from the Iberian Peninsula, despite the fact that its species seem to be widespread, in Austria (Reischütz, 1983; Bodon, 1988; Haase, 1994, 1996; Boeters, 1998), France (Boeters, 1983: 18), Germany (Boeters, 1995), the Lebanon (Schütt & Sesen, 1993), Turkey (Schütt & Sesen, 1993), Slovenia (Slapnik, 1997), Greece (Schütt & Velitzelos, 1991), former Yugoslavia (Angelov, 1972; Bole, 1979; Radoman, 1975), and northern Italy (Pezzoli & Giusti, 1980). However, taking into account that the species of the Iberian Peninsula have been regarded as belonging to *Belgrandiella* for a long time, and meanwhile are attributed to *Alzoniella* and *Guadiella*, the question arises whether the present understanding of *Belgrandiella* is correct.

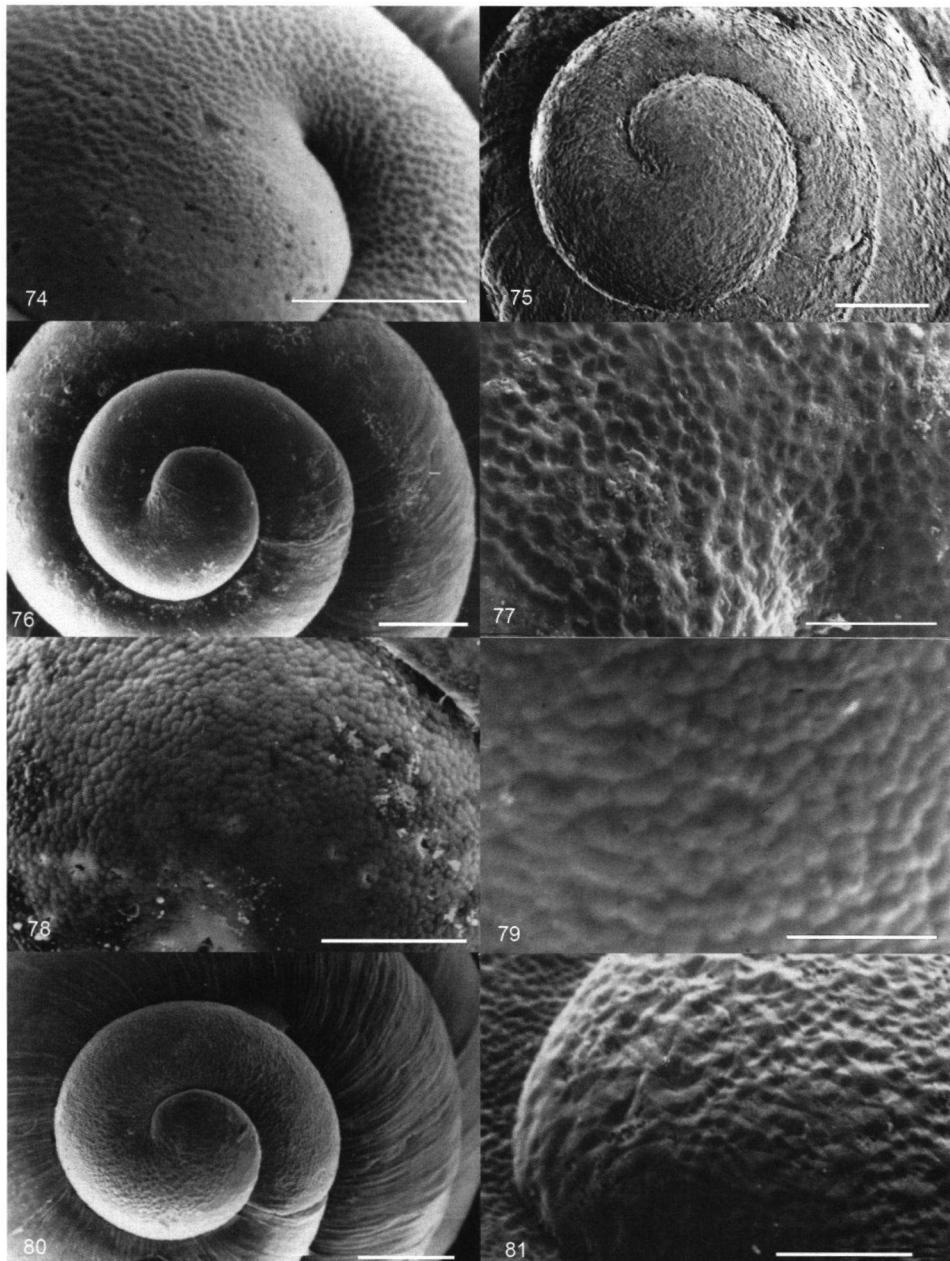
Morphology. – There is a remarkable difference in shell size between the species. *Alzoniella* (*A.*) *asturica* is the smallest one, with a shell length of about 1 mm. On the other hand, *A.* (*A.*) *lucensis* and *A.* (*A.*) *ovetensis*, as well as *A.* (*Navarriella*) *pellitica* have shell lengths of over 2 mm. Almost all the species have ovoid-elongated shells, but in *A.* (*A.*) *asturica* and *A.* (*A.*) *cantabrica* shell shape is mostly ovoid, as in *A.* (*Navarriella*) *pellitica*, whereas in *A.* (*A.*) *lucensis* and *A.* (*A.*) *montana* the shells are most clearly elongated.

The protoconch microsculpture is very similar for all *Alzoniella* species. The protoconch is paucispiral and has about one whorl. In the nominate subgenus the protoconch has a markedly pitted-like microsculpture with aligned pits that are very similar in most species. In *A.* (*A.*) *edmundi* there is a microsculpture consisting of circular and shallower pits, and in *A.* (*A.*) *rolani* the protoconch is provided with granules instead of pits. *Alzoniella* (*Navarriella*) *pellitica* has angular and less rounded pits.

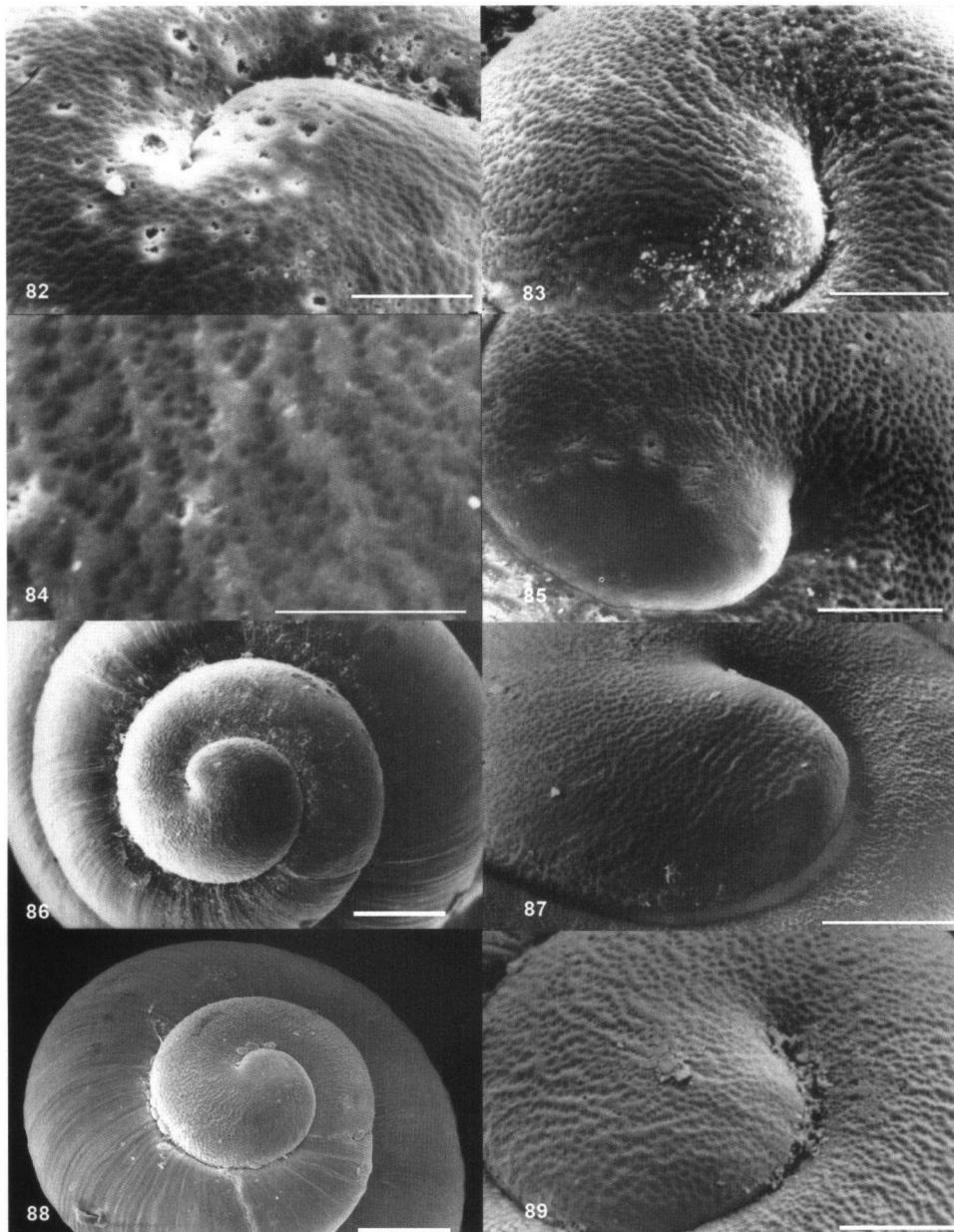
The radula is very similar to the radulae in other genera of the Hydrobiidae, includ-



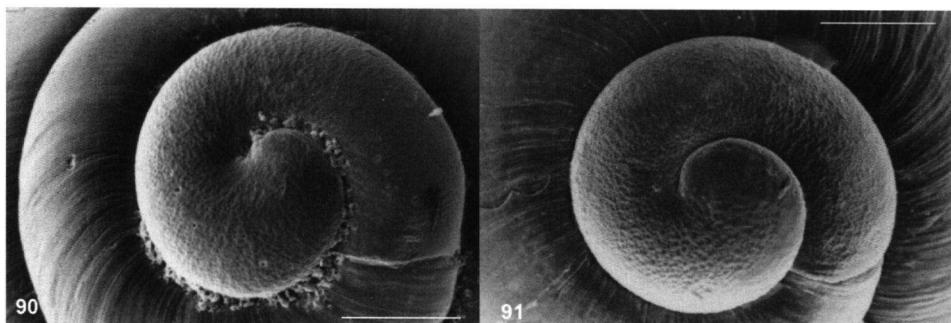
Figs 64-65. Opercula of *Alzoniella (Navarriella) pellitica* spec. nov., Alava, Arriola, near Mondragón (WN36); 66-67. Opercula of *Alzoniella (A.) mariana* spec. nov., Asturias, Salas, Villazón, Fuente Caliente (type locality) (QJ21); 68-73. Protoconchs and microsculpture of several *Alzoniella* species. 68-69. Protoconch and protoconch microsculpture of *Alzoniella (Navarriella) pellitica* spec. nov., Álava, Arriola (WN36); 70. Protoconch of *Alzoniella (A.) pyrenaica* (Boeters, 1983), holotype (SMF 253578), France, Pyrénées-Atlantiques, Tardets (XN77); 71. Protoconch microsculpture of *Alzoniella (A.) iberopyrenaica* spec. nov., Vizcaya, Ereño, Arieta neighbourhood (WP30). 72-73. Protoconch and microsculpture of *Alzoniella (A.) cantabrica* (Boeters, 1983), Valladolid, Aguilarejo (UM26). Scale bar for figs 64-67: 200 µm; figs 68, 70, 71: 100 µm; fig. 72: 50 µm and figs 69, 73: 20 µm.



Figs 74-81. Protoconchs and microsculpture of *Alzoniella* and *Guadiella* species. 74, *A. (A.) cantabrica* (Boeters, 1983), Cantabria, Las Fraguas (VN18). 75, *G. andalucensis* (Boeters, 1983) (SMF 256210/holotype), Jaén, Úbeda (VG89). 76-77, *A. (A.) edmundi* (Boeters, 1984), Majorca, Andraitx to Valldemossa highway (DD59). 78-79, *A. (A.) rolani* (Boeters, 1986); 78, Pontevedra, Gondomar (NG25); 79, Portugal, Beira Baixa (NE25). 80-81, *A. (A.) asturica* (Boeters & Rolán, 1988), Asturias, Grado (QJ30). Scale bars: figs 75, 76, 80, 100 µm; figs 74, 78, 50 µm; figs 77, 79, 81, 20 µm.



Figs 82-89. Shell protoconchs and microsculpture of *Alzoniella* (A.) species. 82. *Alzoniella* (A.) *galaica* (Boeters & Rolán, 1988), Lugo, Road from Monforte to Ourense (PH00). 83-84. *Alzoniella* (A.) *lucensis* (Rolán, 1993). 83. León, Salas de la Ribera (PH80). 84. Lugo, O Courel (PJ40). 85. *Alzoniella* (A.) *ovetensis* (Rolán, 1993), Asturias, Grado (QJ30). 86-87. *Alzoniella* (A.) *montana* (Rolán, 1993), Vizcaya, from Mungia to Bermeo (WP10). 87. Cantabria, Las Fraguas (VN18). 88-89. *Alzoniella* (A.) *marianae* spec. nov.; 88, Asturias, Salas, Villazón, Fuente Caliente (type locality) (QJ21). 89. Asturias, Salas (QJ21). Scale bar for figs 86, 88: 100 µm; figs 82, 83, 85, 87, 89: 50 µm and figs 84: 10 µm.

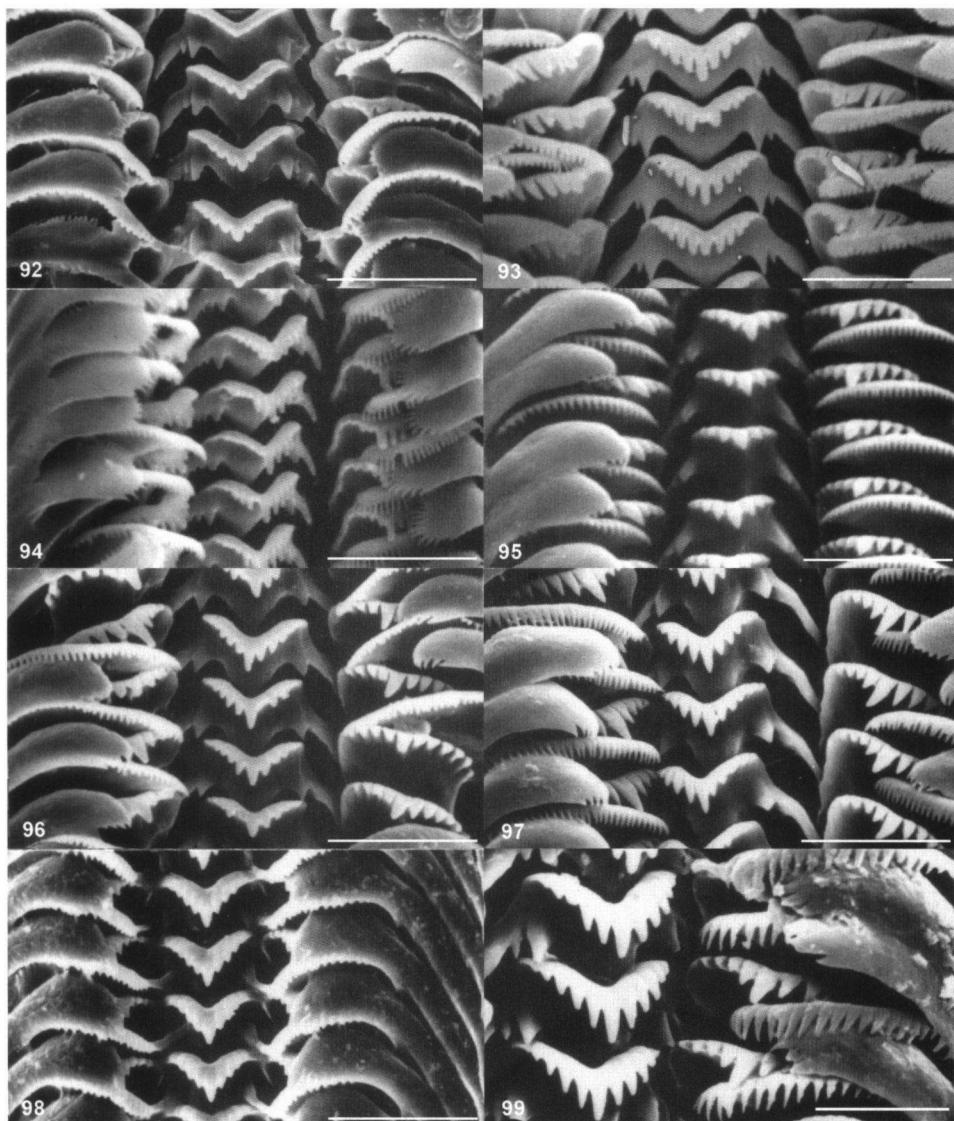


Figs 90-91. Shell protoconch and microsculpture of *Alzoniella* (A.) spec. 1; Lugo, Puente Castro (QH19). Scale bar: 100 μ m.

ing *Belgrandiella*. In the latter, the number of basal cusps of the central teeth can vary. The same counts for *Alzoniella*, where there can be one or two basal cusps at each side of the central teeth (Giusti & Bodon, 1984), or even three in some populations of *A. (A.) cantabrica*. Most of the species have two basal cusps at each side, a large one with a small one behind it. Only *A. (A.) rolani* has a single large basal cusp (figs 96-97). The second cusp in *A. (A.) galaica* (fig. 100), *A. (A.) ovetensis* and *A. (A.)* spec. 1 is slightly developed. Exceptionally, minute third basal cusps have been observed in two populations of *A. (A.) cantabrica* and *A. (A.) lucensis*.

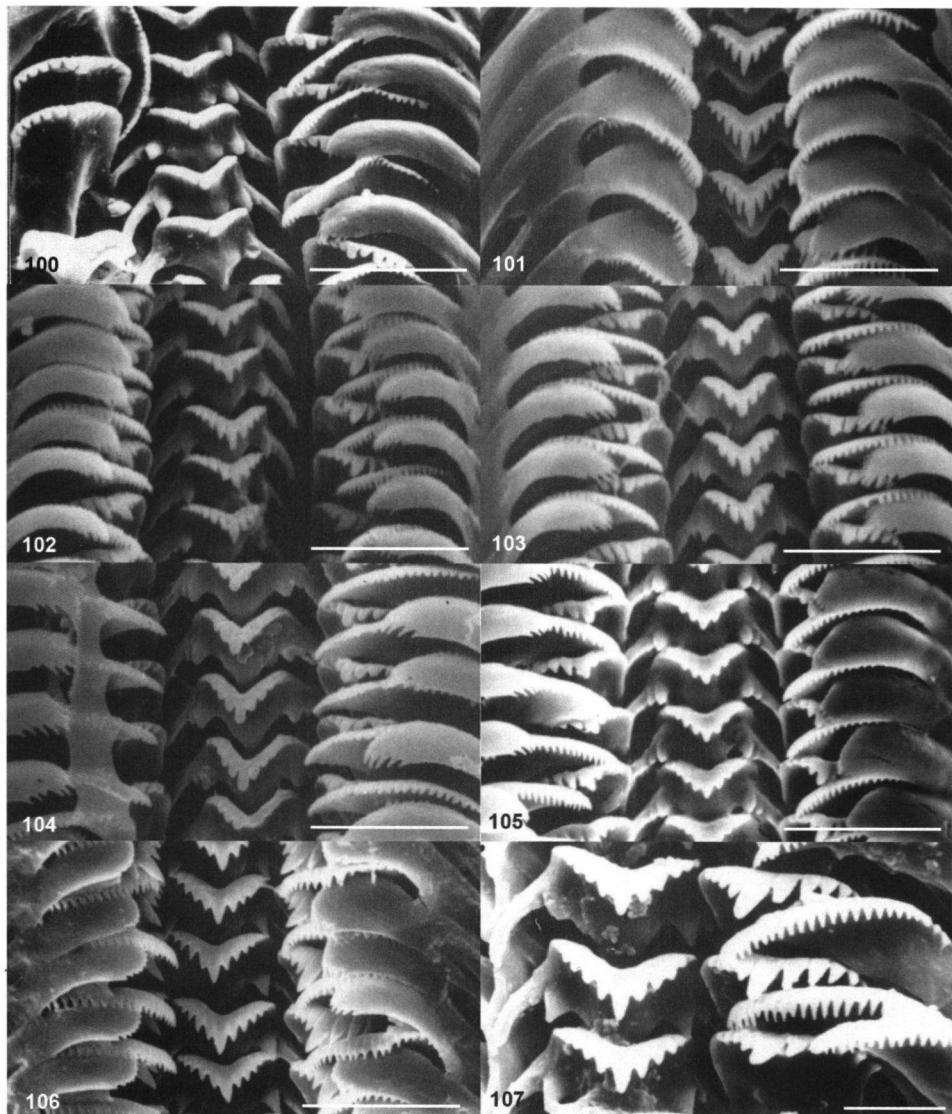
In *Alzoniella*, the ctenidium is described as having 5 to 11 lamellae (Giusti & Bodon, 1984) or only a single one (Boeters, 1999). In most of the Iberian species, there are 8 to 11 lamellae, except for *A. (A.) asturica* and *A. (A.) edmundi*, which have 3-5. The rectum in the pallial cavity (fig. 14) can have different shapes. It can follow a slight curve as in *A. (A.) rolani*, an open U-shaped loop as in *A. (A.) lucensis*, *A. (A.) cantabrica* and *A. (A.)* spec. 1, or an U-shaped loop inclined towards the anterior part of the body as in the remaining species. In *A. (Navarriella) pellitica* the rectum is slightly curved. The curvature is not entirely independent of the state of contraction of the animal however (compare figs 9G and 14D).

The size of the bursa has at least a certain intersubgeneric variability. In *Alzoniella* (A.) *galaica* there is a large bursa copulatrix, which is very small in *A. (Navarriella) elliptica*. The bursal duct is generally inserted in an anteroventral position. This duct is short in several species, such as *A. (A.) iberopyrenaica*, *A. (A.) edmundi* and *A. (A.) mariana*, long in *A. (A.) galaica* and *A. (A.) lucensis*, and medium-sized in the other species. As regards the genus *Belgrandiella*, Boeters (1983: 20, fig. 24) described for *Belgrandiella saxatilis* a well developed SR1 and a reduced SRF2 and suggested a tendency in the genus to loose the SR2 (Boeters, 1988: 225). The relevance in the number of seminal receptacles is reflected by Radoman's policy (1983), who created a new subfamily, Belgrandiellinae, to include those species with a unique seminal receptacle, and transferred all species with two seminal receptacles to the subfamily Orientalininae. In the Iberian species of *Alzoniella*, two seminal receptacles are always present: a proximal one (SR1) which is located close to the bursal duct, and a distal one (SR2) located above the renal oviduct. The SR2 of *A. (A.) cantabrica*, *A. (A.) rolani*, *A. (A.) lucensis* and *A. (A.) mariana* is very small. On the other hand, the SR2 is elongated in *A. (A.) edmundi*, *A. (A.) galaica* and *A. (A.) montana* and very big in *A. (Alzonella) ovetensis*. The size and position of SR1 is very similar in all species, except for *A. (A.) iberopyrenaica*, in which both seminal receptacles share a common origin in the renal oviduct. Among the hydrobiid species vicinal receptacles are not unknown (see *Mercuria*;

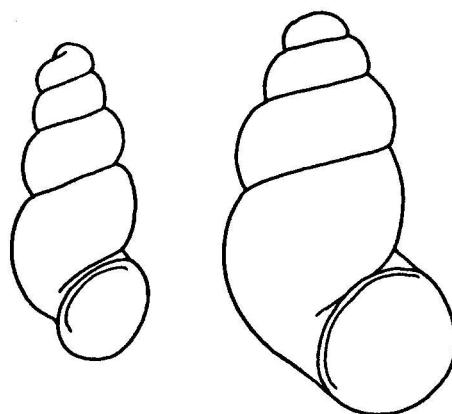


Figs 92-99. Radulae of *Alzoniella* species. 92. *Alzoniella (Navarriella) pellitica* spec. nov., Alava, Arriola (WN36). 93-94. *Alzoniella (A.) cantabrica* (Boeters, 1983); 93. Valladolid, Aguilarejo (UM26). 94. Cantabria, La Marrana, Cobrices (UP90). 95. *Alzoniella (A.) edmundi* (Boeters, 1984), highway from Andraitx to Valldemossa (DD59). 96-97. *Alzoniella (A.) rolani* (Boeters, 1986); 96. Lugo, Peares (PH00). 97. Pontevedra, Rasas, Gondomar (NG25). 98-99. *Alzoniella (A.) asturica* (Boeters & Rolán, 1988), Asturias, Grado (QJ30).

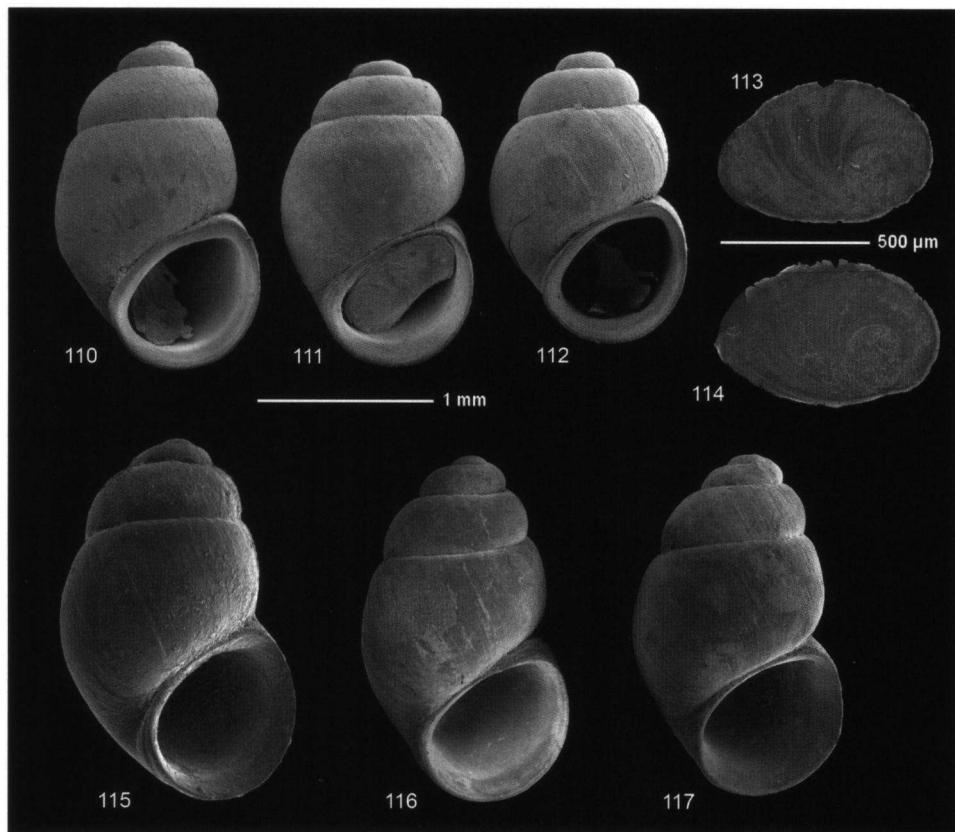
Scale bar for figs 92-98: 10 µm and fig. 99: 5 µm.



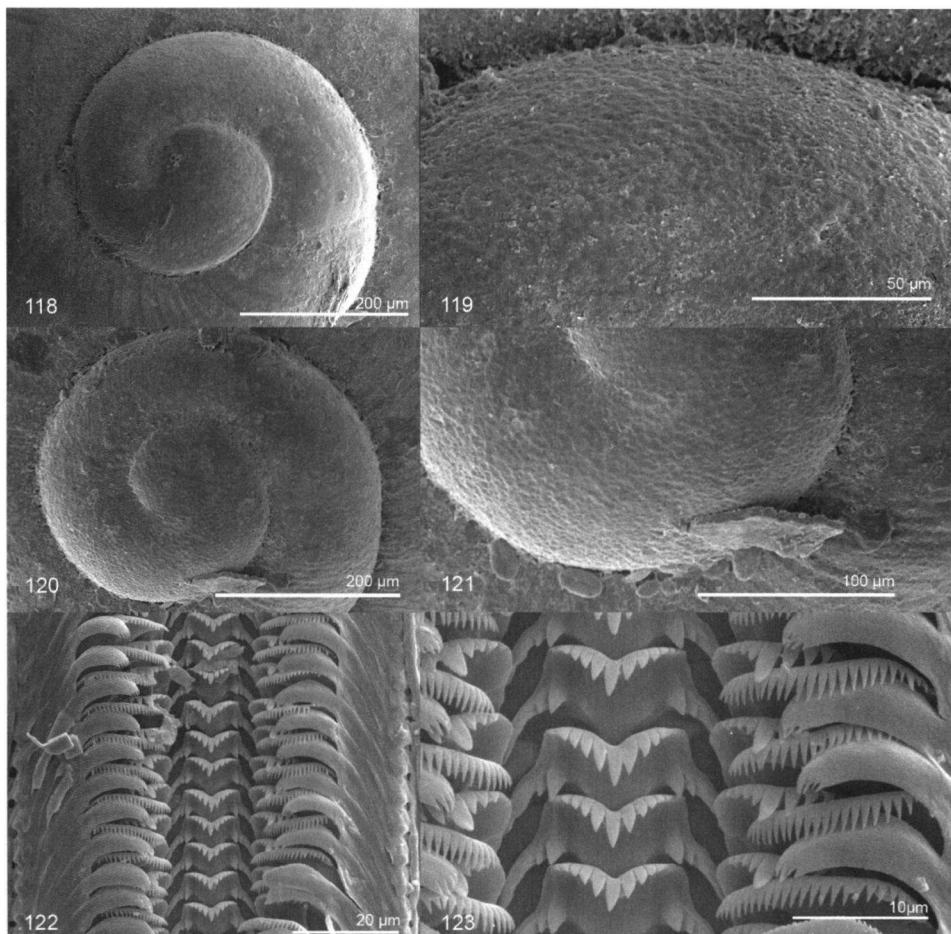
Figs 100-107. Radulae of *Alzoniella* species. 100, *A. (A.) galaica* (Boeters & Rolán, 1988), Lugo, Peares (PH00). 101-102, *A. (A.) lucensis* (Rolán, 1993); 101, León, Salas de La Ribera (PH80); 102, Lugo, Seoane (PH52). 103, *A. (A.) ovetensis* (Rolán, 1993), Asturias, from Grado to Baselgas (QJ30). 104, *A. (A.) montana* (Rolán, 1993), Cantabria, Unquera (UP70). 105, *A. (A.) mariana* spec. nov., Asturias, Salas, Villazón, Fuente Caliente (type locality) (QJ21). 106-107, *A. (A.)* spec. 1, Lugo, Puente Castro (QH119). Scale bars: figs 100-106, 10 µm; fig. 107, 5 µm.



Figs 108-109. *Alzoniella* shells. 108. (?) *Alzoniella (A.) murita* Boeters, 2003, Burgos, Berberane, Murita, Cueva de Murita 1. 109. *Alzoniella (A.) onatensis* Boeters, 2003, Guipuzcoa, Onate, 0.25 km S of Berezano, captured spring.



Figs 110-117. Shells and opercula. 110-114. *Alzoniella (Navarriella) elliptica* (Paladilhe, 1874), France, Pyrénées-Atlantiques, Sare, Grottes-de-Sare (XN37). 110-112. Shells. 113-114. Opercula. 115-117. *Alzoniella (Navarriella) pellitica* spec. nov., Guipuzcoa, Villafranca de Oria (WN76).



Figs 118-123. *Alzoniella (Navarriella)* species. 118-121, protoconch and its microsculpture. 118, 119, *A. (N.) elliptica* (Paladilhe, 1874), France, Pyrénées-Atlantiques, Sare, Grottes-de-Sare (XN37); 120, *A. (N.) pellitica* spec. nov., Guipuzcoa, Villafranca de Oria (WN76). 122-123, radulae of *A. (N.) elliptica* (Paladilhe, 1874), France, Pyrénées-Atlantiques, Sare, Grottes-de-Sare (XN37).

Boeters, 1976: 95).

In the original description of the genus *Alzoniella* (Giusti & Bodon, 1984) a penis is mentioned with one or two glandular penial lobes, one on the concave side of the penis and the other (when present) near its base. For the closely related genus *Belgrandiella*, some authors suggest a high interspecific variability in penial shape (Pezzoli & Giusti, 1980; Haase, 1994), while others define a general shape for it (Radoman, 1975). In *Alzoniella* there is great variability between species from the Iberian Peninsula. All the penises are lobed, but size and position of the penial lobe can vary, being small in *A. (A.) asturica*, *A. (A.) gallica*, *A. (A.) lucensis*, *A. (A.) montana*, *A. (A.) mariana* and *A. (A.)* spec. 1, medium-sized in *A. (A.) iberopyrenaica*, *A. (A.) cantabrica*, *A. (A.) edmundi*, *A. (A.) rolani* and *A. (A.) ovetensis* and very large in *A. (Navarriella) elliptica*. As regards penial pigmentation,

in some species such as *A. (A.) lucensis* and *A. (A.) marianae* it is always present, while others such as *A. (A.) cantabrica* and *A. (A.) rolani* only occasionally present a black pigmented penis. Others have pink pigmentation and a wider penis (*A. (A.) ovetensis*), white iridescent spots (*A. (A.) edmundi*) or an unpigmented penis [*A. (A.) asturica*, *A. (A.) galaica*, *A. (A.) montana* and *A. (A.) spec. 1*]. The penis tip may be roundish or tapered. Some penial features (e.g. the pink colour in *A. (A.) ovetensis*) can only be studied in live specimens.

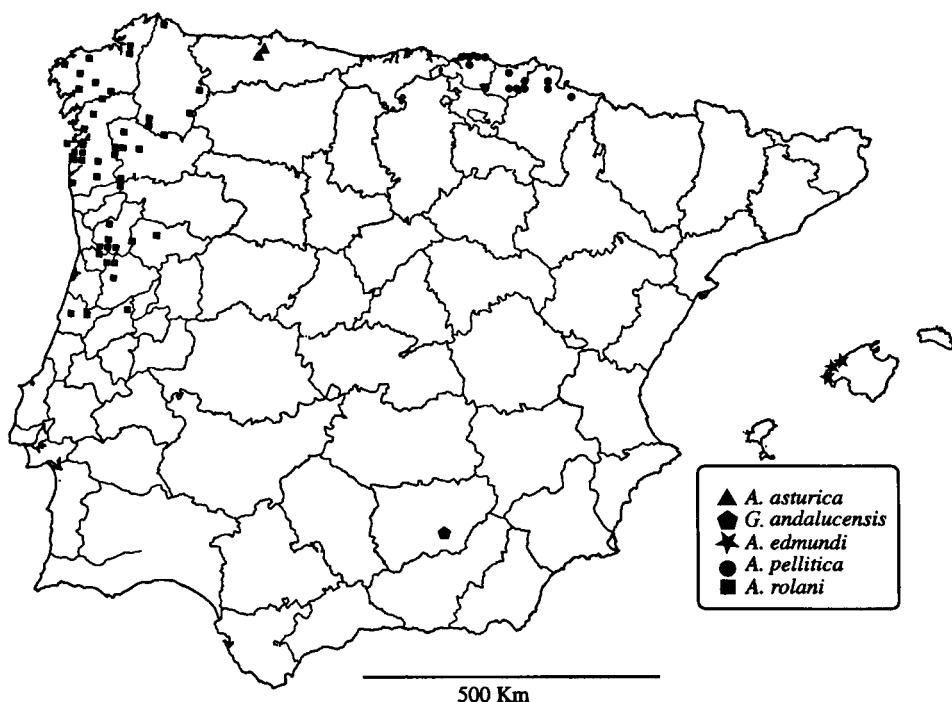
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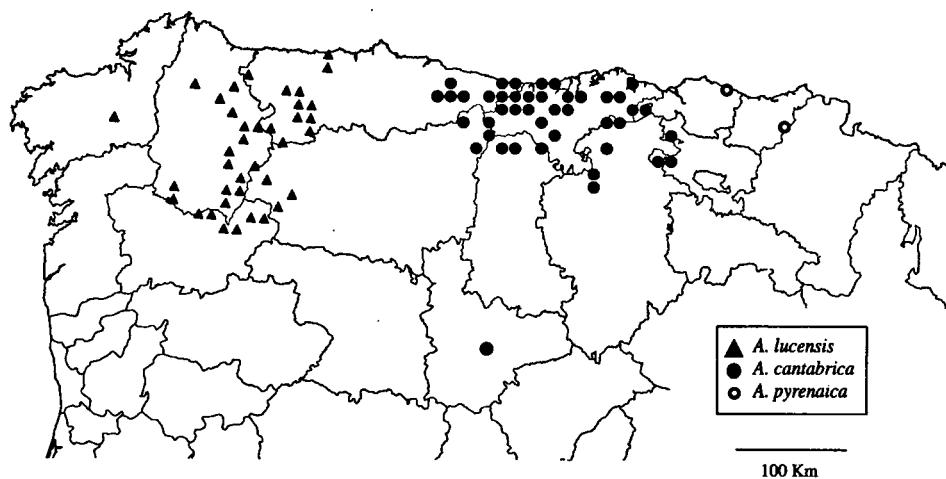
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Map 1. Distributions of Iberian *Alzoniella* and *Guadiella* species.



Map 2. Distributions of Northwestern Iberian *Alzoniella* species.

Map 3. Distributions of Northwestern Iberian *Alzoniella* species.Table 1. Anatomical measurements (in mm) of *Alzoniella elliptica*.

	Mean	S.D.	C.V.	Max.	Min.
Bc L (n=2)	0.05	0.01	0.16	0.05	0.04
Bc W (n=2)	0.05	0.00	0.07	0.05	0.04
Po L (n=3)	1.27	0.20	0.16	1.50	1.10
Po W (n=3)	0.38	0.02	0.07	0.41	0.35
Bc L / Po L (n=2)	0.03	0.00	0.11	0.04	0.03
RS1 L (n=3)	0.19	0.04	0.21	0.21	0.14
P L (n=2)	0.62	0.01	0.01	0.62	0.61
Head L (n=2)	0.64	0.09	0.14	0.70	0.57
P L / Head L (n=2)	0.98	0.13	0.13	1.06	0.89

Table 2. Anatomical measurements (in mm) of *Alzoniella pyrenaica*.

	Mean	S.D.	C.V.	Max.	Min.
Bc L (n=1)	0.23				
Bc W (n=1)	0.17				
Po L (n=1)	0.80				
Po W (n=1)	0.18				
Bc L / Po L (n=1)	0.29				
RS1 L (n=1)	0.12				
P L (n=4)	0.73	0.13	0.18	0.90	0.60
Head L (n=4)	0.48	0.02	0.04	0.50	0.046
P L / Head L (n=4)	1.53	0.32	0.21	1.98	1.21

Table 3. Anatomical measurements (in mm) of *Alzoniella cantabrica*.

	Mean	S.D.	C.V.	Max.	Min.
Bc L (n=2)	0.47	0.11	0.25	0.55	0.39
Bc W (n=2)	0.26	0.03	0.11	0.29	0.25
Po L (n=2)	1.11	0.04	0.03	1.14	1.08
Po W (n=2)	0.34	0.10	0.30	0.42	0.27
Bc L / Po L (n=2)	0.43	0.11	0.25	0.51	0.35
RS1 L (n=2)	0.14	0.02	0.20	0.16	0.12
RS2 L (n=1)		0.05			
P L (n=4)	0.81	0.11	0.14	0.91	0.66
Head L (n=2)	0.74	0.14	0.19	0.84	0.64
P L / Head L (n=2)	1.17	0.12	0.10	1.25	1.08

Table 4. Anatomical measurements (in mm) of *Alzoniella edmundi*.

	Mean	S.D.	C.V.	Max.	Min.
Bc L (n=2)	0.20	0.01	0.05	0.20	0.19
Bc W (n=2)	0.05	0.02	0.35	0.07	0.04
Po L (n=2)	0.42	0.02	0.05	0.43	0.41
Po W (n=2)	0.24	0.04	0.17	0.28	0.22
Bc L / Po L (n=2)	0.46	0.04	0.10	0.50	0.43
RS1 L (n=2)	0.05	0.01	0.28	0.07	0.04
RS2 L (n=1)		0.07			
P L (n=2)	0.60	0.03	0.04	0.62	0.58
Head L (n=2)	0.54	0.01	0.03	0.55	0.53
P L / Head L (n=2)	1.11	0.08	0.07	1.16	1.05

Table 5. Anatomical measurements (in mm) of *Alzoniella rolani*.

	Mean	S.D.	C.V.	Max.	Min.
Bc L (n=3)	0.25	0.04	0.18	0.30	0.22
Bc W (n=3)	0.10	0.02	0.24	0.13	0.09
Po L (n=4)	0.66	0.19	0.30	0.80	0.38
Po W (n=4)	0.21	0.04	0.20	0.26	0.16
Bc L / Po L (n=3)	0.43	0.16	0.37	0.62	0.30
RS1 L (n=2)	0.16	0.06	0.38	0.20	0.12
RS2 L (n=1)	0.04				
P L (n=4)	0.55	0.05	0.09	0.58	0.46
Head L (n=3)	0.66	0.16	0.25	0.84	0.54
P L / Head L (n=3)	0.82	0.17	0.21	1.01	0.67

Table 6. Anatomical measurements (in mm) of *Alzoniella asturica*.

	Mean	S.D.	C.V.	Max.	Min.
Bc L (n=2)	0.22	0.01	0.04	0.23	0.22
Bc W (n=2)	0.13	0.02	0.15	0.14	0.12
Po L (n=2)	0.49	0.02	0.04	0.51	0.48
Po W (n=2)	0.15	0.04	0.25	0.19	0.13
Bc L / Po L (n=2)	0.45	0.00	0.00	0.46	0.45
RS1 L (n=2)	0.07	0.01	0.12	0.09	0.07
RS2 L (n=2)	0.02	0.00	0.00	0.30	0.30
P L (n=2)	0.46	0.02	0.04	0.48	0.45
Head L (n=2)	0.40	0.04	0.10	0.43	0.38
P L / Head L (n=2)	1.14	0.06	0.05	1.19	1.10

Table 7. Anatomical measurements (in mm) of *Alzoniella galactica*.

	Mean	S.D.	C.V.	Max.	Min.
Bc L (n=2)	0.50	0.21	0.42	0.65	0.35
Bc W (n=2)	0.17	0.02	0.22	0.21	0.15
Po L (n=2)	0.78	0.12	0.15	0.87	0.70
Po W (n=2)	0.26	0.06	0.24	0.31	0.22
Bc L / Po L (n=2)	0.62	0.17	0.28	0.75	0.50
RS1 L (n=2)	0.17	0.08	0.48	0.24	0.12
RS2 L (n=2)	0.12	0.05	0.40	0.17	0.09
P L (n=2)	0.58	0.23	0.39	0.74	0.42
Head L (n=2)	0.52	0.09	0.18	0.58	0.45
P L / Head L (n=2)	1.10	0.24	0.22	1.27	0.93

Table 8. Anatomical measurements (in mm) of *Alzoniella lucensis*.

	Mean	S.D.	C.V.	Max.	Min.
Bc L (n=9)	0.37	0.05	0.14	0.45	0.30
Bc W (n=9)	0.23	0.06	0.25	0.34	0.12
Po L (n=8)	0.93	0.28	0.30	1.57	0.74
Po W (n=8)	0.29	0.05	0.19	0.39	0.23
Bc L / Po L (n=8)	0.36	0.12	0.35	0.51	0.12
RS1 L (n=9)	0.13	0.03	0.24	0.18	0.09
RS2 L (n=6)	0.06	0.03	0.44	0.11	0.03
P L (n=6)	0.66	0.14	0.21	0.85	0.49
Head L (n=5)	0.55	0.07	0.14	0.64	0.44
P L / Head L (n=5)	1.28	0.28	0.22	1.64	1.00

Table 9. Anatomical measurements (in mm) of *Alzoniella ovetensis*.

	Mean	S.D.	C.V.	Max.	Min.
Bc L (n=3)	0.21	0.02	0.10	0.23	0.19
Bc W (n=3)	0.17	0.04	0.23	0.21	0.14
Po L (n=3)	0.69	0.10	0.15	0.79	0.58
Po W (n=3)	0.25	0.03	0.12	0.27	0.21
Bc L / Po L (n=3)	0.30	0.09	0.30	0.40	0.24
RS1 L (n=3)	0.15	0.03	0.17	0.18	0.13
RS2 L (n=3)	0.11	0.07	0.62	0.17	0.04
P L (n=3)	0.86	0.07	0.08	0.93	0.79
Head L (n=2)	0.67	0.01	0.01	0.68	0.67
P L / Head L (n=2)	1.34	0.03	0.02	1.36	1.32

Table 10. Anatomical measurements (in mm) of *Alzoniella montana*.

	Mean	S.D.	C.V.	Max.	Min.
Bc L (n=3)	0.28	0.09	0.34	0.39	0.22
Bc W (n=3)	0.17	0.05	0.30	0.22	0.12
Po L (n=3)	0.72	0.35	0.43	1.08	0.51
Po W (n=3)	0.20	0.11	0.58	0.33	0.10
Bc L / Po L (n=3)	0.40	0.03	0.08	0.43	0.36
RS1 L (n=3)	0.08	0.06	0.72	0.16	0.04
RS2 L (n=3)	0.05	0.02	0.40	0.09	0.03
P L (n=3)	0.79	0.38	0.48	1.23	0.56
Head L (n=2)	0.45	0.08	0.02	0.46	0.45
P L / Head L (n=2)	1.27	0.01	0.01	1.28	1.26

Table 11. Anatomical measurements (in mm) of *Alzoniella mariana*.

	Mean	S.D.	C.V.	Max.	Min.
Bc L (n=4)	0.29	0.08	0.27	0.37	0.20
Bc W (n=4)	0.17	0.03	0.15	0.19	0.15
Po L (n=4)	0.68	0.21	0.31	0.82	0.37
Po W (n=4)	0.24	0.04	0.16	0.28	0.19
Bc L / Po L (n=4)	0.44	0.08	0.18	0.54	0.35
RS1 L (n=4)	0.13	0.05	0.26	0.19	0.09
RS2 L (n=3)	0.05	0.01	0.26	0.05	0.03
P L (n=3)	0.64	0.03	0.08	0.70	0.61
Head L (n=3)	0.51	0.08	0.15	0.58	0.42
P L / Head L (n=3)	1.27	0.18	0.14	1.47	1.14

Table 12. Anatomical measurements (in mm) of *Alzoniella sp.1*.

	Mean	S.D.	C.V.	Max.	Min.
Bc L (n=3)	0.33	0.08	0.25	0.42	0.26
Bc W (n=3)	0.25	0.03	0.13	0.28	0.21
Po L (n=4)	0.78	0.10	0.12	0.90	0.69
Po W (n=4)	0.27	0.02	0.07	0.30	0.25
Bc L / Po L (n=3)	0.43	0.15	0.34	0.58	0.28
RS1 L (n=4)	0.12	0.03	0.27	0.15	0.07
RS2 L (n=4)	0.12	0.01	0.12	0.14	0.11
P L (n=3)	0.71	0.08	0.11	0.80	0.64
Head L (n=3)	0.58	0.06	0.10	0.64	0.52
P L / Head L (n=3)	1.22	0.11	0.09	1.32	1.10