

**The genus *Alzoniella* Giusti & Bodon, 1984, in France.
West European Hydrobiidae, 9¹ (Gastropoda, Prosobranchia)**

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In France the genus *Alzoniella* Giusti & Bodon, 1984, is represented with two subgenera, viz. its nominate subgenus and *Navarriella* subgen. nov. The nominate subgenus comprises six species, three of which are described as new, viz. *A. (A.) haicabia* spec. nov., *A. (A.) junqua* spec. nov. and *A. (A.) provincialis* spec. nov., next to *A. (A.) navarrensis* Boeters, 1999, *A. (A.) perrisii* (Dupuy, 1851) and *A. (A.) pyrenaica* (Boeters, 1983). The new subgenus is proposed for *A. (Navarriella) elliptica* (Paladilhe, 1874) only. *A. (A.) perrisii* (Dupuy, 1851) [*Hydrobia*], the first species of this genus that became known from France, is redefined and described here with two subspecies, viz. *A. (A.) p. perrisii* and *A. (A.) p. irubensis* subsp. nov.

Key words: Gastropoda, Prosobranchia, Hydrobiidae, *Alzoniella* (*Alzoniella*) and *Alzoniella* (*Navarriella*), France.

INTRODUCTION

Giusti & Bodon (1984: 169) described *Alzoniella* for three eyeless, subterranean, hydrobiid species from Italy, that might have evolved from small populations that locally survived the Quaternary glaciations. It turned out that *Alzoniella* is also represented in France, where mountain regions are inhabited that have partially been subject to glaciations, viz. the Pyrenees and the Mediterranean Alps. In these regions too, populations of ancestral *Alzoniella* might have survived locally by invading subterranean waters. This development apparently went less far than in for example *Bythiospeum* Bourguignat, 1882, and *Moitessieria* Bourguignat, 1863. Species of these two genera, which are eyeless stygobionts, occur not only in karstic waters, but also in the interstitium and in subterranean waters bordering river valleys such as that of the Rhône river (Boeters & Müller 1992). *Alzoniella* species can be found sympatrically with for example *Moitessieria* species, but the former are more restricted in their ranges. This is exemplified by for example *A. (A.) pyrenaica* (Boeters, 1983) in its sympatric occurrence with *Moitessieria lescherae* Boeters, 1981.

All known representatives of *Moitessieria*, *Bythiospeum* and *Palaospeum* Boeters, 1999, are stygobionts that probably evolved from crenophilous ancestors. In *Alzoniella*, this hypothesized way from crenobiont to stygobiont has not been followed by all species. This implies that, if a reversal is not taken into account, the species ancestral to the genus was not yet a stygobiont.

In contrast to the eyeless, stygobiont *Alzoniella* species of the karstic Pyrenees and Mediterranean Alps, the crenophilous *Alzoniella* (*A. perrisii*) (Dupuy, 1851) is more widely distributed and inhabits springs in the drainage area of the Adour in front of the

¹ For no. 8 in this series see Archiv für Molluskenkunde 122: 149-153, 1993.

Pyrenees. This area has not been subject to glaciation to the same extent as the mountainous regions.

An examination of 33 localities with freshwater prosobranchs in the French departments of Pyrénées-Atlantiques and Landes (table 1) shows that the genus *Bythinella* Moquin-Tandon, 1856, is represented in at least 10 and *Alzoniella* (*Navarriella*) *elliptica* (Paladilhe, 1874) in 16 of these springs, whereas *Alzoniella* s. s. can be reported from only 9 localities, 4 of which inhabited by *A. (A.) perrisii* (Dupuy, 1851).

- XN 09 (1) Na (BOE 359); (2) Na (BOE 360)
 XN 19 (3) Na (BOE 348); (4) Na (BOE 349; LUCAS 1960: 125); (5) Na (BOE 350)
 XN 37 (6) Al, By, Na (BOE 362 = 1441); (7) Al, By, Na (BOE 363 = 1442); (8) By, Na (BOE 1444)
 XN 47 (9) By (BOE 352); (10) By, Na (BOE 353); (11) Na (BOE 1443)
 XN 48 (12) By, Na (BOE 351)
 XN 66 (13) Mo (Bertrand, 1995: 28); (14) Pa (Bernasconi, 1999: 386)
 XN 68 (15) Mo (Bertrand, 1995: 28)
 XN 77 (16) Mo (BOE 752); (17) Al (BOE 754); (18) Mo, Ne (Bertrand, 1997: 209, 212); (19) Pa (Bernasconi, 1999: 386)
 XN 96 (20) Mo (Bertrand, 1997: 212)
 XP 00 (21) Na (BOE 356); (22) Al, By (BOE 357); (23) Na (BOE 365)
 XP 10 (24) Na (BOE 355); (25) By, Na (BOE 358)
 XP 11 (26) Al (BOE 364); (27) Al (Colln G. Falkner)
 XP 21 (28) Al (BOE 193)
 XP 50 (29) Mo (Bertrand, 1997: 212)
 YN 18 (30) By, Pa (BOE 1445); (31) Al, Mo, Pa (BOE 1446)
 YN 37 (32) Mo (Bertrand, 1995: 28)
 YP 06 (33) Al, By (BOE 1440; Dupuy, 1851: 563 partim)

Table 1. Moitesseriidae and Hydrobiidae at 33 localities in the French departments of Landes and Pyrénées-Orientales. The left column shows UTM codes; the right column lists locality numbers (between brackets), the genera represented at the localities (abbreviated), and a reference to either a sample in the Colln Boeters (BOE) or a record in the literature. Abbreviations: Al = *Alzoniella* s. str., By = *Bythinella*, Na = *A. (Navarriella)*, Ne = *Neohoratia*, Pa = *Palaospeum*. Al: 6, 7, 17, 22, 26, 28, 31, 33. By: 6, 7, 8, 9, 10, 12, 22, 25, 30, 33. Na: 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 21, 23, 24, 25. Ne: 18. Mo: 13, 15, 16, 18, 20, 29, 31, 32. Pa: 19, 30, 31.

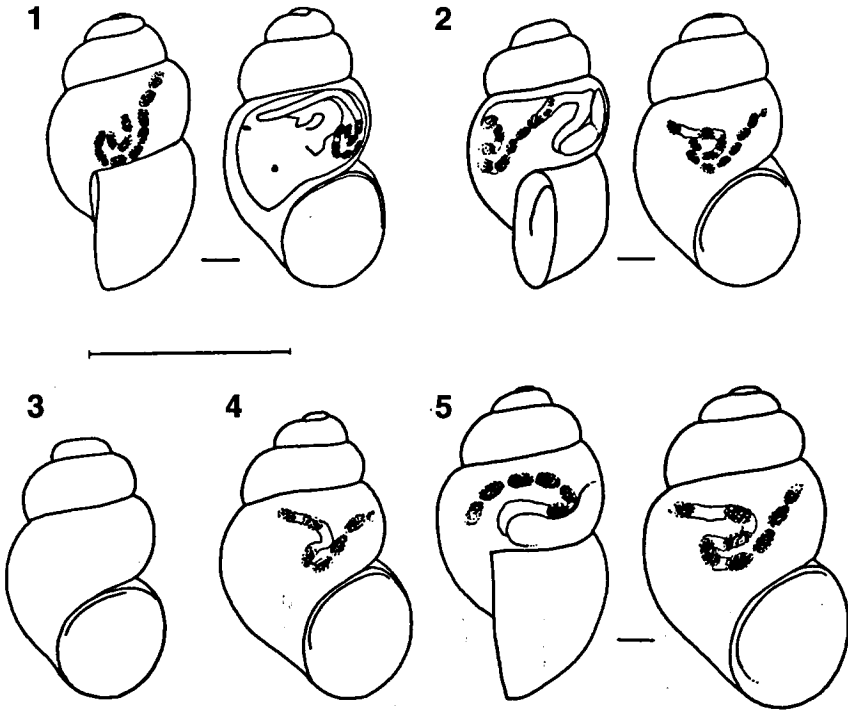
SYSTEMATIC PART

In France *Alzoniella* Giusti & Bodon, 1984, is represented by two subgenera, viz. *Alzoniella* s. s. with six species and *Alzoniella* (*Navarriella*) subgen. nov. with only a single species. These two subgenera can be distinguished as follows.

— On leaving the stomach the intestine forms 2 Z-shaped loops; the pedunculi of both receptacula of the female sex tract are very short or lacking; *Alzoniella* (*Alzoniella*) Giusti & Bodon, 1984.

— On leaving the stomach the intestine forms first a Z-shaped loop followed by a U-shaped bend; the pedunculi of both receptacula of the female sex tract are comparatively long; *Alzoniella* (*Navarriella*) subgen. nov.

Unless stated otherwise, the specimens listed below with the new (sub)species have to be considered paratypes.



Figs. 1-5. *Alzoniella* (*Alzoniella*) spec. 1-2, *A. (A.) p. perrisii* (Dupuy, 1851), France, Landes, Mont-de-Marsan (BOE 1440) (1 = 18 and 32; 2 = 25); 3, *A. (A.) perrisii irubensis* subsp. nov., France, Pyrénées-Atlantiques, St. Pierre-d'Irube, Cantegril (BOE 193); 4-5, *A. (A.) junqua* spec. nov., France, Pyrénées-Atlantiques, Rébénacq, below Mas Hiqueres and Mas Junqua (BOE 1446) (4 = 20). Scale bar $\frac{1}{2}$ mm. If characters of the same individual are shown, that is indicated by a cross-reference.

Genus *Alzoniella* Giusti & Bodon, 1984

Subgenus *Alzoniella* (*Alzoniella*)

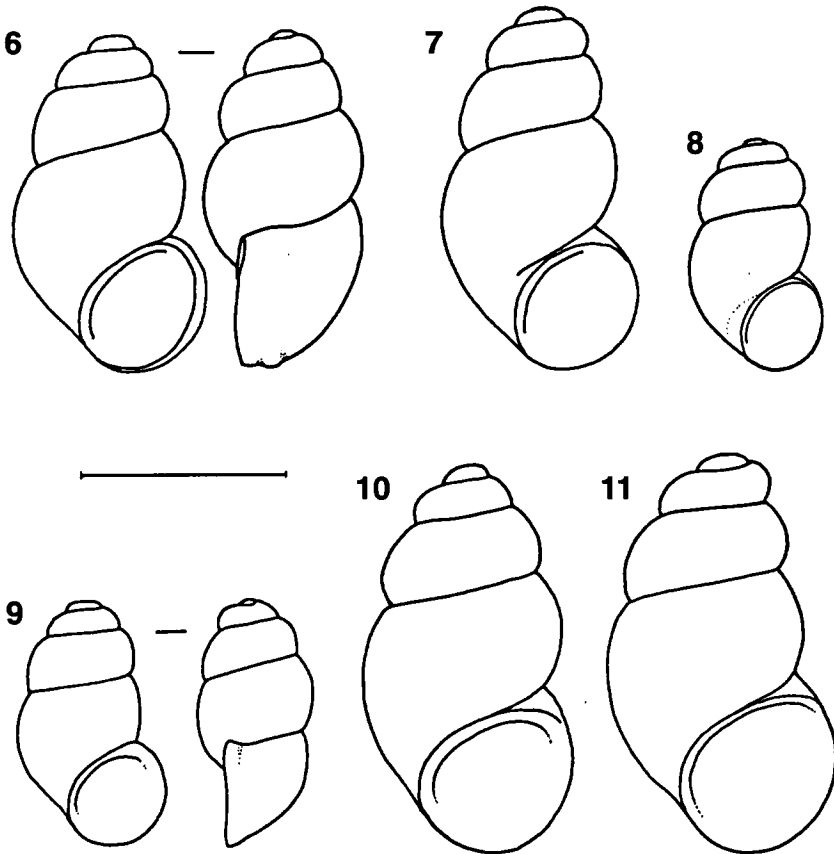
Type species (by original designation): *Alzoniella fnalina* Giusti & Bodon, 1984

Additional species in France: *A. (A.) haicabia* spec. nov., *A. (A.) junqua* spec. nov., *A. (A.) navarrensis* Boeters, 1999, *A. (A.) pyrenaica* (Boeters, 1983), *A. (A.) perrisii* (Dupuy, 1851) and *A. (A.) provincialis* spec. nov.

***Alzoniella* (*Alzoniella*) *haicabia* spec. nov.** (figs 6, 13, 22, 28)

Material. — France, Pyrénées-Atlantiques, between St.-Jean-de-Luz and Hendaye, spring about 200 m from the sea at the farm Haicabia, N. of Route Nationale 10c [UTM XP00]; Boeters leg., 18.ix.1970 (NNM 75231/ holotype, shell, 75232/2 shells; BOE 357/1 shell and 24 animals).

Shell. — Shell elongated ovoid; with 3.50-3.75 whorls, separated by a prominent



Figs. 6-11. *Alzoniella* spec. 6, *A. (A.) haicabia* spec. nov., France, Pyrénées-Atlantiques, between St. Jean-de-Luz and Hendaye at Mas Haicabia (BOE 357); 7, *A. (A.) pyrenaica* (Boeters, 1983), France, Pyrénées-Atlantiques, Tardets, Grotte de Suhare (BOE 754); 8, *A. (A.) navarrensis* Boeters, 1999, France, Pyrénées-Atlantiques, Arnéguy, 1.3 km behind church towards St. Jean-Pied-de-Port (BOE 1442); 9, *A. (A.) provincialis* spec. nov., France, Alpes-Maritimes, NE. of Vence, captured spring at road from Gattières to Carros (BOE 257); 10-11, *A. (Navariella) elliptica* (Paladilhe, 1874), France, Pyrénées-Atlantiques, Arnéguy (BOE 1442) (10 = 31; 11 = 24). Scale bar 1 mm. If characters of the same individual are shown, that is indicated by a cross-reference.

suture. Last whorl forming about 70 % of the shell height. Aperture ovoid, slightly slanted. Inside and outside the palatal border is somewhat thickened and, as a consequence, the basal outline of the aperture forms a slight step towards its edge (lateral view). The border of the aperture touches the last whorl over a short distance and, more basally, slightly widens, forming a funnel-like umbilical slit. Height 1.5-1.7 mm, width 0.86-0.95 ($n = 2$). Operculum with a yellowish nucleus.

Soft body. — The eyes are pigmented black, whereas head and foot are pigmentless. The gill has seven leaflets (one male investigated). The intestine first forms a Z-like bend,

which is followed by a second such bend towards the anus; the last turn of the first bend fully touches the stomach wall.

Male copulatory organ. Seen from above, the organ looks like a bifurcated fork. Its base carries a wart-like protrusion. The vas deferens crosses the penis laterally, opposite the appendix.

Female sex tract. The bursa copulatrix resembles a rounded sac. Two receptacula are present.

Differentiating features. — The shell of *A. (A.) haicabia* spec. nov. differs from that of *A. (A.) perrisii irubensis* subspec. nov., the geographically closest representative of the same subgenus, by a more elongated shape and the step-like broadening of its aperture. The bursa is about twice as large as in *A. (A.) perrisii*.

Habitat. — Known from only a single spring, where it occurs sympatrically with *Bythinella* spec. and *Potamopyrgus antipodarum* (Gray, 1843).

Distribution. — This species lives like *Alzoniella (A.) perrisii irubensis* subspec. nov. and *A. (A.) navarrensis* Boeters, 1999, within the range of *A. (Navarriella) elliptica* (Paladilhe, 1874). Maybe it can also be found in neighbouring Spain.

Derivatio nominis. — The name of this species is derived from the farm Haicabia.

***Alzoniella (Alzoniella) junqua* spec. nov. (figs 4-5, 20-21, 27)**

Material. — France, Pyrénées-Atlantiques. Spring below farms Hiqueres and Junqua, 1.350 km WSW. of the center of Rébénacq [UTM YN18]; Boeters leg., 3/4.vi.1998 (NNM 75233/holotype, shell, 75234/2 shells; BOE 1446/26 animals). Rébénacq, spring 150 m E. of Mairie [UTM YN18]; Boeters leg., 20.ix.2000 (BOE 1487/6 shells).

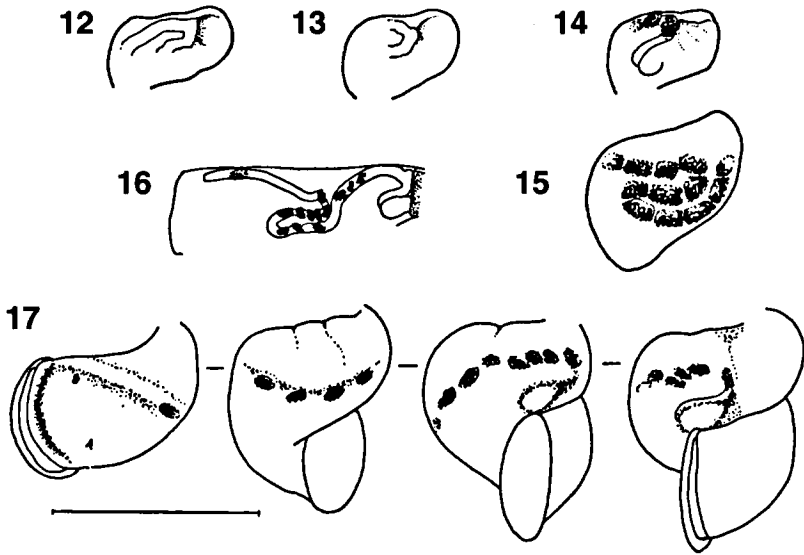
Shell. — Shell ovoid; with 4.0 whorls, separated by a deepened suture. Last whorl forming about 75 % of the shell height. Aperture ovoid, slightly slanted. Apertural border sharp and only very slightly broadened at the base. The columellar border makes only point-contact with the shell; below this point it forms a broad funnel-like umbilical slit with the shell wall. A thickening of the area of the umbilicus inside the shell is missing. Height 1.4-1.6 mm, width 0.82-1.0 mm (n = 5). Operculum very light yellowish, nucleus more intensively coloured.

Soft body. — Eyes and gill leaflets (1 male) could not be detected. Head and buccal mass without black pigmentation. The intestine first forms a Z-shaped bend, which is followed by a second such bend towards the anus. In the other *A. (Alzoniella)* species the first bend shows a slight protrusion which entrappes the first faecal pellet and leans against the wall of the stomach. In *A. (A.) junqua* the protrusion is missing and the first faecal pellet is formed already in the first leg of the initial bend, where it leans against the intersection of the style sac and the stomach.

Male copulatory organ. The penis carries three extensions (when seen from above such that the tip points away from the observer), one to the right of its base, the second to the left close to the tip, and the third to the right at the tip. The vas deferens crosses the right side of the penis, cutting across its tip where the penis is broadened by the third extension.

Female sex tract. The bursa copulatrix is formed like a sac. Two receptacula are present.

Differentiating features. — The shell of *A. (A.) junqua* is more globular than that of *A. (A.) p. perrisii* and *A. (A.) p. irubensis*. As compared to *A. (A.) haicabia*, the shell of *A.*



Figs. 12-17. Anatomical details of the intestine, seen through the body whorl, in *Alzoniella* species. 12, *A. (A.) perrisii irubensis* subsp. nov., France, Pyrénées-Atlantiques, St. Pierre-d'Irube, Cantegril (BOE 193); 13, *A. (A.) haicabia* spec. nov., France, Pyrénées-Atlantiques, between St. Jean-de-Luz and Hendaye at Mas Haicabia (BOE 357); 14-15, *A. (A.) pyrenaica* (Boeters, 1983), course of the intestine behind the stomach (1st specimen) and in front of the anus (2nd specimen), France, Pyrénées-Atlantiques, Tardets, Grotte de Suhare (BOE 754); 16, *A. (A.) navarrensis* Boeters, 1999, last body whorl stretched, France, Pyrénées-Atlantiques, Arnéguy, 0.3 km behind church towards St. Jean-Pied-de-Port (BOE 362); 17, *A. (Navarriella) elliptica* (Paladilhe, 1874), France, Pyrénées-Atlantiques, Arnéguy (BOE 1442). Scale bar 1 mm.

(A.) junqua is more globular and its aperture is not thickened by a ridge. In contrast to both *A. (A.) p. perrisii* and *A. (A.) p. irubensis*, no eyes or gill leaflets could be found in *A. (A.) junqua*.

Habitat. — In a springs, occasionally sympatric with *Palaospeum bessonii* (Bernasconi, 1999) and *Bythinella* spec.

Distribution. — Only known from the surroundings of Rébénacq, Vallée du Néz, Pyrénées-Atlantiques, France.

Derivatio nominis. — The name is derived from the farm Junqua.

Alzoniella (Alzoniella) navarrensis Boeters, 1999 (figs 8, 16, 30)

Belgrandiella cf. *perrisii* (Dupuy, 1851); Boeters, 1983: 20, 22, figs 26, 34. Not *Hydrobia perrisii* Dupuy, 1851. *Alzoniella navarrensis* Boeters, 1999: 77.

Material. — France, Basses-Pyrénées. Arnéguy, well (iron pipe) about 300 m NE. of the church and to the right of the road leading to St. Jean-Pied-de-Port [UTM XN37]; Boeters leg., 21.ix.1970 (NNM 59144/ holotype, shell; BOE 362/2 females). Arnéguy, well (iron pipe) about 1.3 km NE. of the church and to the

right of the road leading to St. Jean-Pied-de-Port [UTM XN37]; Boeters leg., 29.v.1998 (BOE 1442/1 female).

Shell. — Shell ovate-cylindrical, with 3.5 whorls, separated by a rather shallow suture. Whorls smooth or only very faintly striped. Last whorl forming more than half the total height of the shell. Aperture ovoid, slightly slanted. Apertural edge sharp, neither thickened nor widened. The aperture touches the last whorl over a short distance. More basally there is an umbilical slit. In the area of the umbilicus the shell wall is thickened inside; this thickening can easily be seen through the transparent shell wall. Height 1.2 mm, width 0.64 mm (holotype). Operculum transparent, brownish, nucleus also brownish to pale orange.

Soft body. — Eyes could not be detected. The animal is pigmentless. Upon dissection of the mantle cavity of a female, only a single gill leaflet was found. The intestine first forms a Z-shaped bend, which is followed by a second pronounced Z-shaped bend. The last turn of the first bend touches the stomach wall fully.

Male copulatory organ. Unknown.

Female sex tract. The bursa is globular, with two receptacula (Boeters, 1983: 20, fig. 26).

Differentiating features. — The neighbouring *A. (A.) pyrenaica* differs in the height of its shell, which is nearly twice that of *A. (A.) navarrensis*. The former species also differs in the shape of the bursa, which is not roundish but kidney-shaped, leading into the pedunculus at its distal end.

Habitat. — Known from only two neighbouring wells, where it occurs sympatrically with *Alzoniella (Navarriella) elliptica* (Paladilhe, 1874) and *Bythinella* spec. The small number of specimens found there and their lack of pigmentation point to a subterranean habitat.

Distribution. — France, Pyrénées-Atlantiques, Arnéguy.

Alzoniella (Alzoniella) pyrenaica (Boeters, 1983) (figs 7, 14-15, 23, 29)

Belgrandiella pyrenaica Boeters, 1983: 18, figs 6, 14, 27, 36.

Material. — France, Pyrénées-Atlantiques, Tardets-Sorholus, Grotte de Suhare [UTM XN77]; Lescher-Moutoué don. (SMF 256208/holotype, shell; BOE 754/paratypes, 1 shell and 9 animals).

Shell. — Shell elongated ovoid; with 4.00-4.25 whorls, separated by a fairly pronounced suture which is gradually engraved towards the aperture. The last whorl forms 65-70 % of the shell height. The aperture does neither ascend nor descend on the last whorl. Apertural edge sharp, only slightly broadened at its base. The columellar border of the aperture does not touch the shell wall but forms a long narrow slit with it. Height 1.75-1.95 mm, width 0.96-1.00 mm ($n = 3$). Operculum faint yellowish.

Soft body. — Eyes could not be detected. The animal is without any pigmentation.

The gill is formed by 7-9 leaflets ($n = 2$). The intestine has two Z-shaped bends behind the stomach (Boeters, 1983: 19, figs 6, 14).

Male copulatory organ. The penis has a lateral appendix and a basal protrusion (Boeters 1983: 19, fig. 14). It is open to question whether this protrusion is a wart-like structure as in, for example, *A. (A.) perrisii*, or a vas deferens that is thickened at its insertion into the penis, as suggested by Boeters (1983: 18).

Female sex tract. The bursa is more or less elongated kidney-shaped; the two receptacula are like small sacs (Boeters, 1983: 20, fig. 27).

Differentiating features. — In its shape, the shell resembles that of representatives of *Avenionia* Nicolas, 1881. The species differs from all other representatives of *Alzoniella* in the form of the bursa.

Habitat. — Known from subterranean waters, where it occurs sympatrically with *Moitessieria lescherae* Boeters, 1981.

Distribution. — Only known from the type locality.

Alzoniella (Alzoniella) perrisii (Dupuy, 1851)

In this species, characterized conchologically, two forms can be distinguished on the basis of anatomical details, viz. different gills and a different course of the intestine. These forms, which live more than 85 km apart, are provisionally considered subspecies.

Alzoniella (Alzoniella) perrisii perrisii (Dupuy, 1851) (figs 1-2, 18, 25, 32-35)

Hydrobia perrisii Dupuy, 1851: 563, pl. 28 fig. 3.

Microna saxatilis perrisii (Dupuy, 1851); Boeters, 1970: 130, pl. 8 fig. 24.

Material. — France, Landes. Mont-de-Marsan (Colln Paladilhe, ex Dupuy, cf. Boeters, 1970: 130, lectotype designation); spring in left border of Midouze, about 150 m W. of the former railway bridge [UTM YP06]; Boeters leg., 27.v.1998. (BOE 1440/2 shells and 21 animals).

Shell. — Shell ovoid to slightly elongated ovoid; with 3.25-3.75 whorls, separated by a fairly pronounced suture. Last whorl forming about 70-75 % of the shell height. Aperture ovoid, slightly slanted. The final part of the last whorl ascends very slightly on the shell wall (lateral view). Apertural border sharp, not broadened or slightly broadened at its base; columellar border touching the shell wall over a short distance or fused with it, forming an umbilical funnel-like slit. In the umbilical region the shell wall is thickened, which can easily be seen through the transparent shell wall. Height 1.4-1.6 mm, width 0.78-0.85 mm (n = 4). Operculum corneous, nucleus yellowish.

Soft body. — The eyes are pigmented black, but the head, foot and buccal mass up to the area of the style sac, do not carry any pigment. The gill has 10 leaflets (one male investigated). The intestine has a Z-shaped bend, followed by a second such bend in the direction of the anus. The last turn of the first bend fully touches the stomach wall.

Male copulatory organ. This organ resembles a bifurcated fork; it carries a protrusion at its base.

Female sex tract. There is a sac-like bursa copulatrix. Two receptacula are present.

Differentiating features. — The surface of the gill leaflets (investigated in two males and two females) is less than half that in *Alzoniella (A.) irubensis*. *A. (A.) p. perrisii* differs from *A. (A.) haicabia*, the other representative of *Alzoniella* s.s. which does not live in subterranean waters, in that the aperture is not thickened by a ridge and that in females the volume of the bursa is only half that observed in *A. (A.) haicabia*.

Habitat. — Dupuy (1851) did not give any data on the habitat. The snail was rediscovered in a spring bordering the river Midouze, the bed of which has cut its way into the gravel plain south of Mont-de-Marsan. At that site it lives sympatrically with *Bythinella* spec.

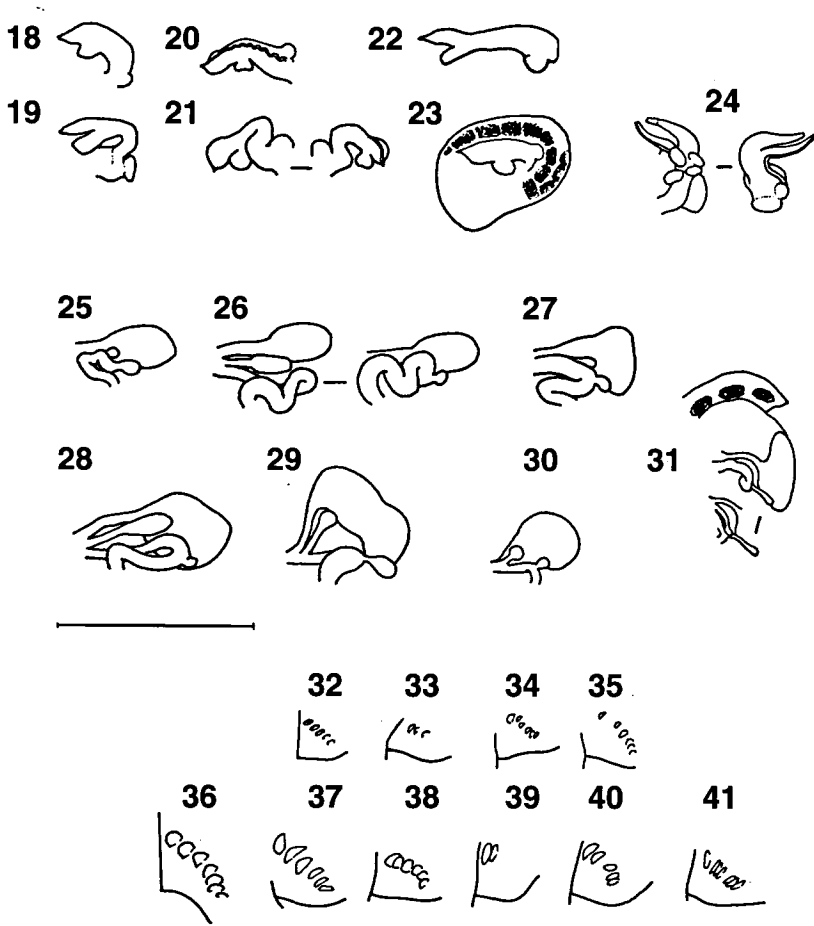
Distribution. — Known merely from France, Landes, Mont-de-Marsan.

***Alzoniella (Alzoniella) perrisii irubensis* subsp. nov.**

(figs 3, 12, 19, 26, 36-41)

Paludina saxatilis (Reynies, 1844); Folin & Berillon, 1877: 453 [Separatum: 32]. Not *Paludina saxatilis* Reynies, 1844.

Belgrandiella cf. *perrisii* (Dupuy, 1851); Boeters, 1983: 19, figs 4-5, 13, 25, 35.



Figs. 18-41. Anatomical details of the male copulatory organs, female sex tract, and gills, in *Alzoniella* spec., indicating only the gill leaflets immediately behind the mantle edge. 18, *A. (A.) p. perrisii* Dupuy, 1851, France, Landes, Mont-de-Marsan (BOE 1440) (18 = 1 and 32); 19, *A. (A.) perrisii irubensis* subspec. nov., Pyrénées-Atlantiques, St. Pierre-d'Irube, Cantegril (BOE 193); 20-21, *A. (A.) junqua* spec. nov., France, Pyrénées-Atlantiques, Rébénacq, below Mas Hiqueres and Mas Junqua (BOE 1446) (20 = 4); 22, *A. (A.) haicabia* spec. nov., France, Pyrénées-Atlantiques, between St. Jean-de-Luz and Hendaye at Mas Haicabia (BOE 357); 23, *A. (A.) pyrenaica* Boeters, 1983, France, Pyrénées-Atlantiques, Tardets, Grotte-de-Suhare (BOE 754); 24, *A. (Navarriella) elliptica* (Paladilhe, 1874), France, Pyrénées-Atlantiques, Arnéguy (BOE 1442) (24 = 11); 25, *A. (A.) p. perrisii* (Dupuy, 1851), France, Landes, Mont-de-Marsan (BOE 1440) (25 = 2); 26, *A. (A.) perrisii irubensis* subspec. nov., France, Pyrénées-Atlantiques, St. Pierre-d'Irube, Cantegril (BOE 193); 27, *A. (A.) junqua* spec. nov., France, Pyrénées-Atlantiques, Rébénacq, below Mas Hiqueres and Mas Junqua (BOE 1446); 28, *A. (A.) haicabia* spec. nov., France, Pyrénées-Atlantiques, between St. Jean-de-Luz and Hendaye at Mas Haicabia (BOE 357); 29, *A. (A.) pyrenaica* (Boeters, 1983), France, Pyrénées-Atlantiques, Tardets, Grotte de Suhare (BOE 754); 30, *A. (A.) navarrensis* Boeters, 1999, France, Pyrénées-Atlantiques, Arnéguy, 0.3 km behind church towards St. Jean-Pied-de-Port (BOE 362); 31, *Alzoniella (Navarriella) elliptica* (Paladilhe, 1874), France, Pyrénées-Atlantiques, Arnéguy (BOE 1442) (31 = 10); 32-35, *Alzoniella (A.) p. perrisii* (Dupuy, 1851) (32-33, males; 34-35, females), France, Landes, Mont-de-Marsan (BOE 1440) (32 = 1 and 18); 36-41, *Alzoniella (A.) perrisii irubensis* subspec. nov. (36-37 and 39-40, males; 38 and 41, females); 36-38, France, Pyrénées-Atlantiques, St. Pierre-d'Irube, Cantegril (BOE 193); 39-41, France, Pyrénées-Atlantiques, between Biarritz and Bidart, Lac de la Negresse (Colln G. Falkner). Scale bar: 1 mm for figs 18-24, 31-41; 0.5 mm for figs 25-30. If characters of the same individual are shown, that is indicated by a cross-reference.

Material. — France, Pyrénées-Atlantiques. St. Pierre-d'Irube, spring in Cantegril [UTM XP21] (possibly destroyed during construction of the main road; a detailed description of the locality was already published by Folin & Berillon, 1877); Boeters leg., 28.ix.1968 (NNM 75235/holotype, shell; 75236/2 shells; BOE 193/12 shells and 17 animals). Spring horizon in southern border of Lac de la Negresse, between Biarritz and Bidart [UTM XP11]; G. Falkner leg. (Colln G. Falkner/3 shells and c. 200 animals). About 3 km E. of the coast at Bidart, river Ouhabia or Herigoin, upstream of the mill, S. of farm Bassillour (depth of the river about 1 m and breadth about 2 m) [UTM XP11]; Boeters leg., 22.ix.1970 (BOE 364/2 shells, maybe not recent).

Shell. — Height 1.3-1.7 mm, width 0.78-0.98 mm ($n = 11$). Operculum yellowish with a reddish-yellow nucleus.

Soft body and differentiating features. — The gill has 12 leaflets (one male investigated). The surface of the gills (investigated in four males and two females) is twice as large as in the nominate subspecies; the last loop of the first Z-bend of the intestine touches the stomach wall and does not form a wedge-like gap with it.

Habitat. — *Alzoniella* (*A.*) *perrisi irubensis* subsp. nov. inhabits springs, at the type locality together with *Theodoxus* spec. and (according to Folin & Berillon, 1877) *Mercuria lanceolata* (Paladilhe, 1869).

Distribution. — France, Pyrénées-Atlantiques, surroundings of Bayonne.

Derivatio nominis. — The name is derived from the village St. Pierre-d'Irube.

***Alzoniella* (*Alzoniella*) *provincialis* spec. nov. (fig. 9)**

Material. — France, Alpes-Maritimes, Gattières NE. of Vence, well at the route towards Carros [UTM LP54]; Boeters leg., 22.ix.69 (NNM 75237/holotype; 75238/1 shell; BOE 257/4 shells).

Shell. — Shell slightly elongated ovoid; with 3.75 whorls, rapidly increasing in width and separated by a rather shallow suture. Aperture roundish, slightly slanted; its border gradually broadened and shortly ascending along the last whorl (lateral view). Apertural edge sharp; columellar border touching the shell wall over a long distance or even fused with it and reducing the umbilicus to at most a shallow umbilical slit. Height 1.20-1.35 mm, width 0.70-0.80 mm, apertural height 0.50-0.55 mm, apertural width 0.45-0.50 mm ($n = 5$). Operculum unknown.

Soft body. — Unknown.

Differentiating features. — Geographically neighbouring is *A.* (*A.*) *finalina* Giusti & Bodon, 1984, described from NW. Italy. The shell of this species is, however, more conical (Giusti & Bodon, 1984: pl. 6 figs 1-8) instead of elongated ovoid.

Habitat. — It is to be assumed that the snail lives in subterranean waters, since only empty shells were found in a well, amongst living *Graziana* (?) *trinitatis* (Caziot, 1910).

Distribution. — Only known from the type locality.

Derivatio nominis. — The name is derived from the French region Provence.

Subgenus *Navarriella* subgen. nov.

Type species: *Paludinella elliptica* Paladilhe, 1874. No further species included.

Boeters (1970) classified *Paludinella elliptica* Paladilhe, 1874, with *Microna* Clessin, 1890. Later on (Boeters, 1974) the species was considered to belong in *Litthabitella* Boeters, 1970, and later again (Boeters, 1988) it was classified in *Belgrandiella* A. J. Wagner, 1928.

Based on an improved knowledge of *Lithabitella* (see Bole, 1970; Schütt, 1980; Radoman, 1993) and *Belgrandiella* (see Haase, 1993, 1994, 1996) none of these assignments seems to be correct and *Navarriella* subgen. nov. is described here for the species.

Differentiation. — On leaving the stomach, the intestine of *Alzoniella* (*Navarriella*) *elliptica* forms a Z-shaped loop first, followed by a U-shaped bend. In species of *Alzoniella* s. s., the intestine forms two Z-shaped loops, as may be concluded from data in the literature (Giusti & Bodon, 1984: 164, fig. 3G, I [*A. (A.) feneriensis*]; 161, fig. 2H [*A. (A.) finalina*]; 167, fig. 4L, Q-R [*A. (A.) sigestra*]; Bodon, 1988: 57, fig. 1B [*A. (A.) hartwigschuetzi*]; Boeters, 1998: 54, fig. 13 [*A. (A.) slovenica*]) and this publication for the French species of *Alzoniella* s. s.

In *Alzoniella* (*Navarriella*) *elliptica* the pedunculi of both receptacula are not only long, but also in the same range of length. The proportion of each pedunculus to its receptaculum resembles that of a forearm to its first. In representatives of *Alzoniella* s. s. the pedunculi of both receptacula are very short or even lacking, so that their receptacula plus pedunculi are roundish. This becomes evident from the literature (Giusti & Bodon, 1984: 164, fig. 3G [*A. (A.) feneriensis*]; 161, fig. 2G [*A. (A.) finalina*]; 167, fig. 4L [*A. (A.) sigestra*]; Bodon, 1988: 57, fig. 1L-N [*A. (A.) hartwigschuetzi*]; Boeters, 1998: 54, fig. 15 [*A. (A.) slovenica*]) and this publication for the French species of *Alzoniella* s. s.

Alzoniella (*Navarriella*) *elliptica* (Paladilhe, 1874) (figs 10-11, 17, 24, 31)

Paludinella elliptica Paladilhe, 1874: 33, pl. 3 figs 11-12.

Microna elliptica (Paladilhe, 1874); Boeters, 1970: 132, pl. 9 fig. 34.

Lithabitella elliptica (Paladilhe, 1874); Boeters, 1974: 90.

Belgrandiella elliptica (Paladilhe, 1874); Boeters, 1988: 227, pl. 3 fig. 45.

Material. — France, Pyrénées-Atlantiques. Ascain [UTM XP10] (Colln Paladilhe, Montpellier/7 syntypes, shells; Colln Bourguignat, Genève/1 syntype, shell; Senckenberg Museum, Frankfurt am Main 141895/4 syntypes, shells); Arnéguy, brook about 200 m north of Chubialdea [UTM XN47] (BOE 1443); Boeters leg., 29.v.1998. See additionally Boeters (1974) for localities BOE 348, 349, 350, 351, 353, 355, 356, 358, 359, 360, 362 and 365, and Boeters (1999a) for BOE 362, 363.

Spain, Navarra, Valcarlos, spring (trough) [UTM XN37] (BOE 1444); Boeters leg., 30.v.1998.

Shell. — Shell ovoid; with 3.5-4.0 whorls, separated by a moderately pronounced suture. Last whorl forming about 75 % of the total shell height. Aperture ovoid, slightly slanted; not or hardly ascending on the penultimate whorl (lateral view). Apertural border slightly thickened; columellar border touching the shell wall over a long distance, forming a slight umbilical slit. The umbilical region is thickened, which can easily be seen through the transparent shell wall. Height 1.7-2.1 mm, width 1.1-1.3 mm ($n = 4$, BOE 355). Operculum chestnut-brown (Paladilhe, 1874: 33).

Soft body. — Eyes, mantle, head and foot strongly pigmented blackish. Gill with 11-13 leaflets ($n = 3$). After leaving the stomach, the intestine forms a Z-shaped loop, followed by a U-shaped bend.

Male copulatory organ. The penis has an appendix. This appendix and the base of the penis are provided with wart-like structures. A large transverse gland at the penial base seems to be always present, whereas other wart-like structures can be absent or fused.

Female sex tract. Bursa copulatrix, with its pedunculus, kidney-shaped. The two

receptacula, entering the oviductus quite separate from each other, have comparatively long pedunculi. The anus and the distal end of the pallial oviductus are not positioned at the same level; the distal end of the oviductus is about three times further from the mantle edge than the anus.

Habitat. — Springs, occasionally sympatric with *Bythinella* spec. and *Alzoniella* (*A.*) *navarrensis*.

Distribution. — France, Pyrénées-Atlantiques and adjacent Spain.

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