ZOOLOGISCHE MEDEDELINGEN

UITGEGEVEN DOOR HET

RIJKSMUSEUM VAN NATUURLIJKE HISTORIE TE LEIDEN
(MINISTERIE VAN WELZIJN, VOLKSGEZONDHEID EN CULTUUR)

Deel 59 no. 17 31 december 1985 ISSN 0024-0672

A PYRENEAN *MONACHA* SPECIES, *MONACHA (METATHEBA) ATACIS* SPEC. NOV. (MOLLUSCA: GASTROPODA: PULMONATA)

by

E. GITTENBERGER

and

A. J. DE WINTER

Gittenberger, E., & A. J. de Winter: A Pyrenean *Monacha* species, *Monacha* (*Metatheba*) *atacis* spec. nov. (Mollusca: Gastropoda: Pulmonata).

Zool. Med. Leiden 59 (17), 31-xii-1985: 197-207, figs. 1-11. – ISSN 0024-0672.

Key words: Mollusca; Pulmonata; *Monacha*; *Metatheba*; taxonomy; subgenera.

Monacha (*Metatheba*) *atacis* spec. nov. is described from the French NE Pyrenees. The status of *Metatheba*, hitherto known from Caucasia and Asia Minor only, as well as that of other *Monacha* "subgenera" is discussed.

E. Gittenberger, Rijksmuseum van Natuurlijke Historie, Postbus 9517, 2300 RA Leiden, The Netherlands.

A. J. de Winter, Dorpsstraat 139, 6871 AG Renkum.

INTRODUCTION

The occurrence of a *Monacha* (*Metatheba*) species in the French part of the eastern Pyrenees was discovered by the late Dutch malacologist Mr. D. Aten as early as 1958. This may be concluded from his correspondence with contemporary malacologists like the late Dr. C. O. van Regteren Altena, former curator of the molluscan department of the Rijksmuseum van Natuurlijke Historie at Leiden (where Aten's collection is kept now). Aten could not find a reliable name for his problematic species, especially not among the many nominal taxa introduced for French Helicidae in the nineteenth century and, therefore, his results remained unpublished.

The present paper was not composed until the second author rediscovered the strange *Monacha* of the western Pyrenees and contacted the first author, who knew about it from the correspondence mentioned above.

To indicate collections the following abbreviations are used: LMP, Laboratoire de Biologie Marine et Malacologie, Paris; MK, H. P. M. G. Menkhorst, Krimpen a.d. IJssel; NH, W. H. Neuteboom, Heemskerk; RMNH, Rijksmuseum van Natuurlijke Historie, Leiden; SMF, Senckenberg Museum, Frankfurt am Main; WR, A. J. de Winter, Renkum.

We would like to thank Mr. W. H. Neuteboom, who allowed us to study the material in his collection. Mr. G. Donkersloot (Leiden) and Dr. A. Solem (Chicago) indirectly contributed to the present paper by discussions with the first author concerning taxonomic characters of the mantle collar and the pallial region, respectively, which is acknowledged here.

SPECIES GROUPS IN *MONACHA*

The genus *Monacha* Fitzinger, 1833, was subdivided into six subgenera by Zilch (1960: 673-675). A seventh subgenus was added by Pintér (1977), who summarized the characters of the genitalia on which six of the seven subgenera are based, viz. absence versus presence of (1) a penial retractor muscle, (2) mucous glands, and (3) an appendix of the vagina. Various combinations of these three simple series of anatomical character states have been found and all these combinations have been named as subgenera. This resulted in the present, phenetic, subgeneric arrangement of the *Monacha* species. It is worth investigating whether a convincing phylogenetic classification of species groups in *Monacha* may be determined as well.

In an overwhelming majority of the Helicidae there are (1) a penial retractor and (2) mucous glands. Therefore, in both cases, absence of these structures should be considered the apomorphic character state. The absence or presence of (3) an appendix cannot be interpreted equally convincingly, because appendices inserting close to the genital atrium have evolved in various groups of pulmonates independently. A bipartite appendix as in several *Monacha* species, proximally inflated and distally more slender and tapering, is not found in the Helicellinae sensu auct., which are usually considered most closely related to *Monacha* (e.g. Zilch, 1960: 673). Other types of appendices are known to exist in certain groups of the Helicellinae sensu auct., however, and one of these types might be homologous to the *Monacha* appendix. On the other hand we cannot exclude the possibility that the species ancestral to *Monacha* did not possess an appendix at all, i.e. that

this structure characterizes only a sub-group in *Monacha*, being analogous, not homologous to one of the other helicid appendices.

Based on an autapomorphous "absence of a penial retractor", the "subgenera" *Monacha* s.str., *Cyrnotheba* Germain, 1929, and *Szentgalya* Pintér, 1977, together, should be considered a monophyletic group. After an autapomorphous "absence of mucous glands", however, *Ashfordia* Taylor, 1917, *Szentgalya* and *Cyrnotheba* would constitute a monophyletic group. Considering "presence of an appendix" the autapomorphic character state, *Monacha* s. str., *Paratheba* Hesse, 1914, and *Cyrnotheba*, together, are a monophyletic entity, whereas "absence of an appendix" considered autapomorphic, would indicate the combination *Metatheba* Hesse, 1914, *Ashfordia* and *Szentgalya* as a monophyletic group. Apparently an unequivocal phylogenetic classification of sub-groups in *Monacha* cannot easily be derived from the limited number of available characters. We can only conclude that convergent or parallel evolution has to be accepted in *Monacha*.

In addition it should be mentioned that Schileyko (1978: 289) introduced still another "subgenus" of *Monacha*, viz. *Boemica*, for both *M. (B.) subcarthusiana* (Lindholm, 1913) and the fossil *M. (B.) praeorientalis* Steklov, 1966. According to Schileyko (1978: 290, fig. 379) the former species is characterized by genitalia with a penial retractor, a rudimentary vaginal appendix and a single, unbranched mucous gland. This implies that *Boemica* is most similar to *Paratheba*, in which the vaginal appendix is not rudimentary, however, and more complicated mucous glands are present. We are not convinced that *M. (B.) praeorientalis* can be classified with *Boemica* without serious doubt on shell characters only. Our knowledge concerning *Boemica* favours the view that a subdivision of *Monacha* can be hardly more than premature at present. (The species figured as "*Metatheba (Metatheba) subcarthusiana*" by Hudec (1973: 246, fig. 7) is different from *subcarthusiana* sensu Schileyko, 1978, and it remains uncertain which interpretation is correct).

Metatheba, which is considered a separate genus by some authors (e.g. Hesse, 1931, and Hudec, 1973), cannot be characterized as yet by any autapomorphic character and, consequently, it is quite uncertain whether it should be considered a monophyletic entity. Its distribution, Caucasia and Asia Minor in the east and the NE. Pyrenees in the west, suggests that a paraphyletic group might be involved. A monophyletic origin cannot be excluded for this reason, however, because a roughly similar, disjunct, autochthonous range is known for e.g. *Orculella bulgarica* (Hesse, 1915) (see Gittenberger, 1983: 333). In the present paper *Metatheba* is used as usual to indicate a species group in *Monacha*, characterized by the presence of both

mucous glands and a penial retractor muscle, and the absence of a vaginal appendix.

THE PYRENEAN *MONACHA* (*METATHEBA*) SPECIES

Monacha (Metatheba) atacis spec. nov.
(figs. 1-11)

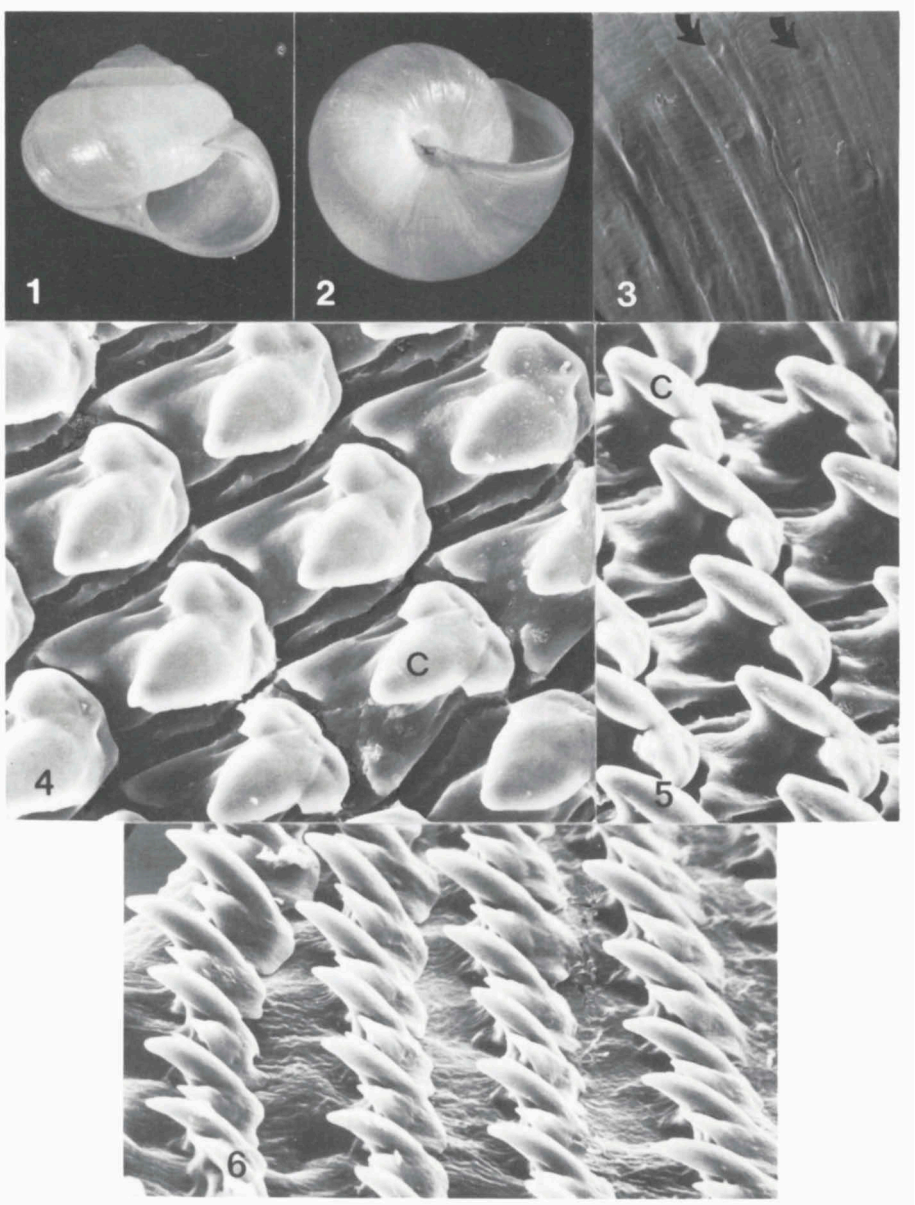
Material (an asterisk indicates that there are no specimens with soft parts in the sample). Holotype. – Department of Aude, Quillan, near the "Château", UTM DH34 (RMNH 55688). Paratypes. – Department of Aude: Type locality (RMNH 55689/4; *55715/8); between Joucou and Marsa, UTM DH24 (RMNH 55702/6); Gorges de Rebenty, road to Belfort, UTM DH24 (RMNH 55698/3); Gorges de l'Aude, 10 km SW. of Axat, UTM DH33 (RMNH 55712/4); Axat, road to St. Martin-Lys, UTM DH33 (RMNH 55697/3); Gorges de St. Georges, 10 km SSE. of Quillan, UTM DH33 (RMNH 55687/5, *55692/2, *55713/12); Quillan, Châlet Cachar, UTM DH34 (*55690/3); Belvianes-et-Cavirac, UTM DH34 (RMNH 55691/4); St. Martin-Lys, UTM DH34 (*NH/2; RMNH 55695/6; SMF 256728/1); Quillan, road to Belvianes, UTM DH34 (LMP/2; RMNH 55703/10); Quillan, road to Col du Portel, UTM DH34 (*NH/3); between Axat and crossing roads D117 and D118, UTM DH34 (WR/4); between Quillan and Ginoles, UTM DH34 (RMNH 55694/4;* WR/7); along the river Aude near the crossing of roads D117 and D118, UTM DH34 (RMNH 55717/1); Quillan, camping municipal (WR/6); Marsa, UTM DH34 (RMNH 55696/4); between Cournanel and Alet-les-Bains, UTM DH36 (NH/4; RMNH 55700/3, *55701/1, *55714/1); Coustaussa, along the river Sals, UTM DH45 (RMNH *55711/2); Carcassonne, along the river Aude, UTM DH48 (RMNH 55693/1); St. Paul-de-Fenouillet, road to the Gorges de Galamus, UTM DH54 (NH/7; RMNH 55699/8, 55709/12). Department of Ariège: Quié, road to Tarascon, UTM CH84 (NH/3; RMNH 55704/11; SMF 256729/1); Ussat-les-Bains, UTM CH84 (NH/2; RMNH 55705/4, *55716/10); Tarascon-sur-Ariège, near the railway station, UTM CH84 (NH/1; RMNH 55707/10); Foix, left bank of the river Ariège, UTM CH85 (RMNH 55706/3, 55708/2). Department of Pyrénées-Orientales: 5 km W. of Estagel, UTM DH73 (*MK/29; RMNH *55710/2); 1 km W. of Estagel, UTM DH73 (*WR/2).

Diagnosis. – A *Monacha* with a more or less globular, rimate, pale shell, with hair-pits all over. Genitalia with a penial retractor and glandulae mucosae, without a vaginal appendix; flagellum (much) longer than the epiphallus.

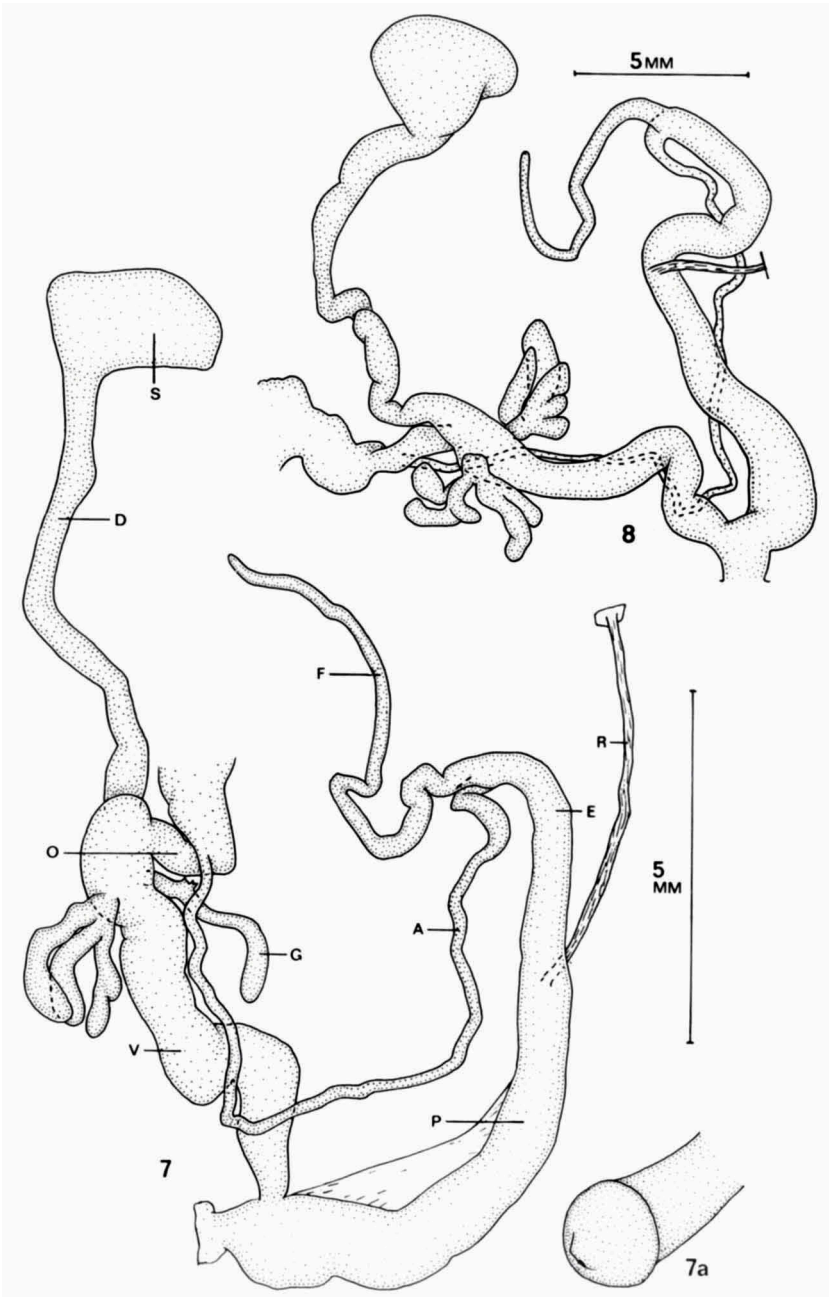
Shell (figs. 1-3). – Shell greyish to creamy-white, opaque or somewhat translucent, globular, with 5 1/4-6 rather inflated whorls and a more or less depressed spire. Shell sculptured with fine, irregular growth-ridges and very fine, indented spiral striae; in addition there are conspicuous hair-pits on all the whorls (fig. 3). Aperture circular to slightly elliptical, with a thickened, white, internal rib; apertural lip reflected only near the minute umbilicus, which is partly obscured.

Breadth 7.5-15.2 mm; height 6.6-10.8 mm.

Shells of *M.* (*Metatheba*) *atacis* can be distinguished from those of both the



Figs. 1-6. *Monacha* (*Metatheba*) *atacis* spec. nov. 1, 2, holotype, actual breadth 12.8 mm; France, department of Aude, Quillan, near the castle; D. Aten leg., 16.viii.1957 (RMNH 55688). 3, sculpture of the last quarter of the fourth whorl (two hair-pits indicated by arrows), × 65; France, department of Aude, Quillan, near Châlet Cachar; D. Aten leg., 25.viii.1958 (RMNH 55690). 4-6, SEM-photographs of the central (4, 5) and marginal (6) part of the radula; C = central tooth. Photographs by G. J. van Zonneveld, Leiden (1, 2) and J. H. W. Krom, RMNH (3-6).



Figs. 7, 8. *Monacha* (*Metatheba*) *atacis* spec. nov., genitalia. 7, type locality (RMNH gen. slide no. 932a); 8, France, department of Ariège, Ussat-les-Bains, left bank of the Ariège (RMNH gen. slide no. 933). Both D. Aten leg., 25.viii.1958 and 1.ix. 1959, respectively. 7a, penial papilla,

allopatric *M.* (*Monacha*) *cantiana* (Montagu, 1803) [= *cemenelea* Risso, 1826 (see Chatfield, 1977)], which is usually (much) larger, and the nearly equally sized, partly sympatric *M.* (*Monacha*) *cartusiana* (Müller, 1774), by its hair-pits all over the shell. Apart from the typical micro-sculpture and the dimensions, *M.* (*Metatheba*) *atacis* is conchologically more or less intermediate between these species. In *M.* (*Monacha*) *cantiana* the umbilicus is (slightly) wider than in *M.* (*Metatheba*) *atacis*, whereas in *M.* (*Monacha*) *cartusiana* it may be narrower. Usually *M.* (*Monacha*) *cartusiana* is more depressed than *M.* (*Metatheba*) *atacis*, and has a more clearly elliptical aperture.

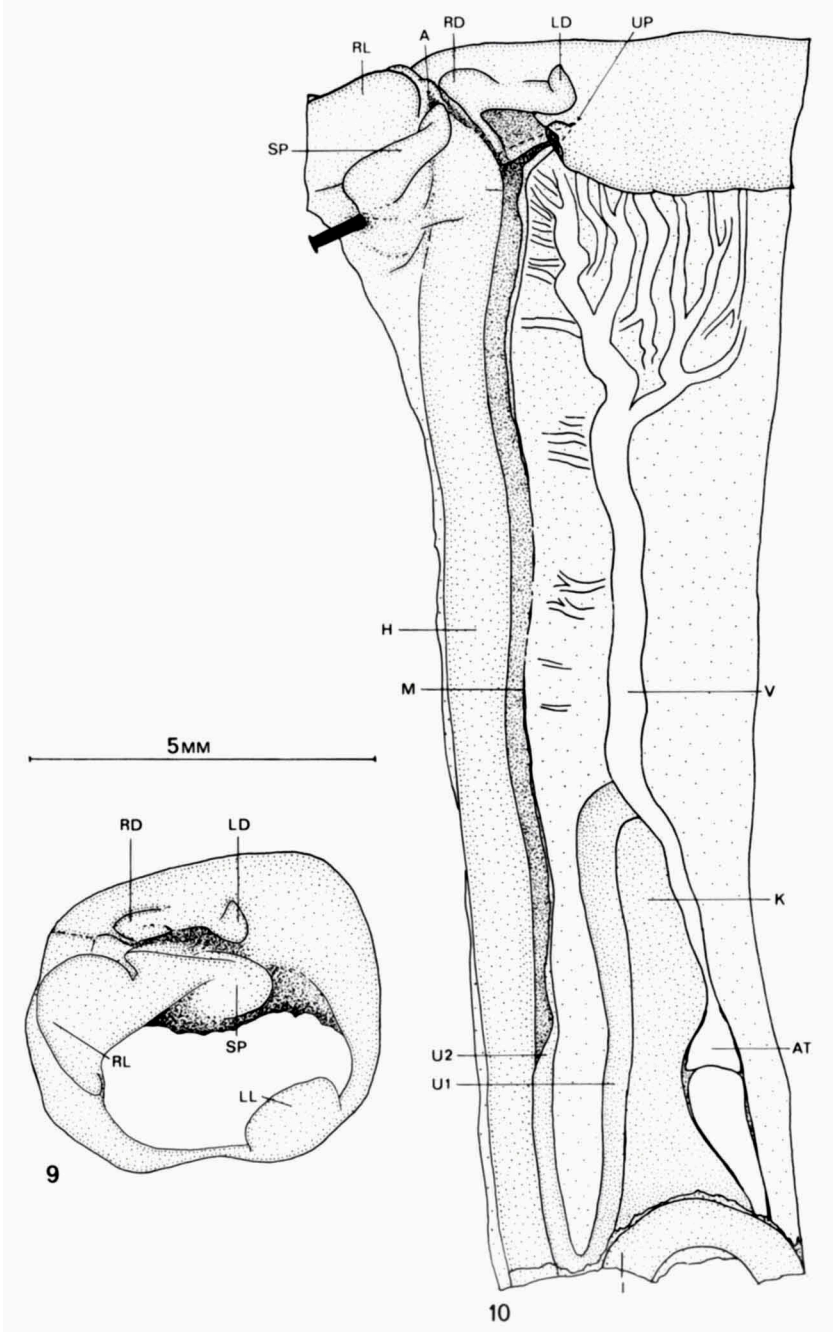
The eastern *Metatheba* species are still poorly known (Hudec, 1973: 244). Specimens of *M.* (*Metatheba*) *samsunensis* are less fragile than shells of *M.* (*Metatheba*) *atacis*; they are larger and more like *M.* (*Monacha*) *cantiana* in general shape. The micro-sculpture of *M.* (*Metatheba*) *samsunensis* is quite similar to that of *M.* (*Metatheba*) *atacis*, which might be considered an argument in favour of a monophyletic origin of *Metatheba*. It is quite uncertain, however, whether the presence of hair-pits all over the shell should be considered an apomorphic or a plesiomorphic character state.

Genitalia (figs. 7, 8). – Nine full-grown specimens from various localities have been dissected. The flagellum, the epiphallus and the penis are quite variable in length. The slender flagellum is 1.2 to 1.8 times as long as the epiphallus, which measures 0.3 to 1.0 of the penial length. Inside the proximal half of the penis there is a cylindrical penial papilla (fig. 7a) with a broadened, low conical, anterior part. The penial retractor insertion indicates the distal end of the penis. There is a plate-like structure of muscular fibres and connective tissue connecting one side of the penis (and the proximal part of the epiphallus) with the genital atrium. The vagina is about as long as the penis; close to its distal end there are two mucous glands, which are split up terminally into two to five branches. The spermathecal duct is (clearly) longer than the vagina and about as broad as the very short free oviduct; the large spermatheca is more or less irregularly elliptical.

The genitalia of *M.* (*Metatheba*) *samsunensis* have been figured by Hesse (1931: pl. 6 fig. 55), Hudec & Ležava (1969: 126, fig. 22), Hudec (1973: 244, fig. 6), and Schileyko (1978: 288, figs. 377, 378). If these various figures really apply to a single species, we have to accept that this species, viz. *M.* (*Metatheba*) *samsunensis*, is very variable in length of the spermathecal duct, length of the penis, and size and branching of the glandulae mucosae. It appears that

---

France, department of Aude, Axat; A. J. de Winter leg., 26. vii.1980 (RMNH alc. 9150). Abbreviations: A, vas deferens; D, spermathecal duct; E, epiphallus; F, flagellum; G, mucous gland; O, oviduct; P, penis; R, penial retractor muscle; S, spermatheca; V, vagina. (E. G. del.).



Figs. 9, 10. *Monacha* (*Metatheba*) *atacis* spec. nov. Mantle collar and pallial region, respectively;

M. (*Metatheba*) *atacis* is characterized anatomically most clearly by the comparatively long flagellum, which may be much longer than the epiphallus (fig. 7).

Mantle collar (fig. 9). – The mantle collar has a small, very thin, left, lateral lobe, which is widely separated from the other lobes, being situated opposite the pneumostome. The upper and the lower border of this lobe are at right angles with the mantle collar; the inner margin is slightly curved convexly. The right, lateral, mantle lobe is larger and thicker than the left one; it is ear-shaped, with a regularly rounded dorsal part and a small ventral "ear-lobe". The left, dorsal, mantle lobe is very small but easily discernible because of its thick, rather acute, free tip. The right, dorsal, mantle lobe is about as large as the left one, but lacks the conspicuous tip. The subpneumostomal mantle lobe is about as large as the right, lateral one, but quite different in shape; its left part is regularly rounded, whereas its right part is more acuminate.

Pallial region (fig. 10). – The pallial region extends for about 1/2 whorl apically. The lung roof has an irregular pattern of blackish pigment spots, which is extremely variable. The heart is about half as long as the kidney, which is somewhat shorter than half the length of the lung roof. The primary ureter is broad but inconspicuous if empty; it is situated on the kidney. The secondary ureter opens opposite the atrium of the heart and continues anteriorly as a groove bordered by the hindgut at one side and a low erect margin at the other side. If the mantle collar encircling the pneumostome is cut and the subpneumostomal lobe is turned back (as in fig. 10), a bifurcation of the anterior, open, secondary ureter becomes visible; there is a narrow groove running along the anus, and a broader groove, bordered by two margins, running to a ureteric pore situated close to the left, dorsal, mantle lobe.

Radula (figs. 4-6). – Two specimens have been studied. Next to the tricuspid central tooth there are 29 teeth, nearly all of which are bicuspid. Only in the most marginal teeth the tip of the side-cusp may be split. Figs. 4-6 illustrate some features of the central and the more marginal teeth.

Ecology. – *M.* (*Metatheba*) *atacis* inhabits the calcareous mountains of the eastern French Pyrenees, both in man-made and in natural habitats. The second author found the species among short vegetation, in meadows, in

---

after several specimens from the type locality. In the schematic fig. 10 the secondary ureter especially is indicated with much more contrast than actually can be seen in the specimens studied. Abbreviations: A, anus; AT, atrium of the heart; H, hindgut; I, intestine; K, kidney; LD, left dorsal mantle lobe; LL, left lateral mantle lobe; M, margin along the open part of the secondary ureter; RD, right dorsal mantle lobe; RL, right lateral mantle lobe; SP, subpneumostomal mantle lobe; U1, primary ureter; U2, secondary ureter; UP, ureteric pore; V, principal pulmonary vein. (E. G. del.)

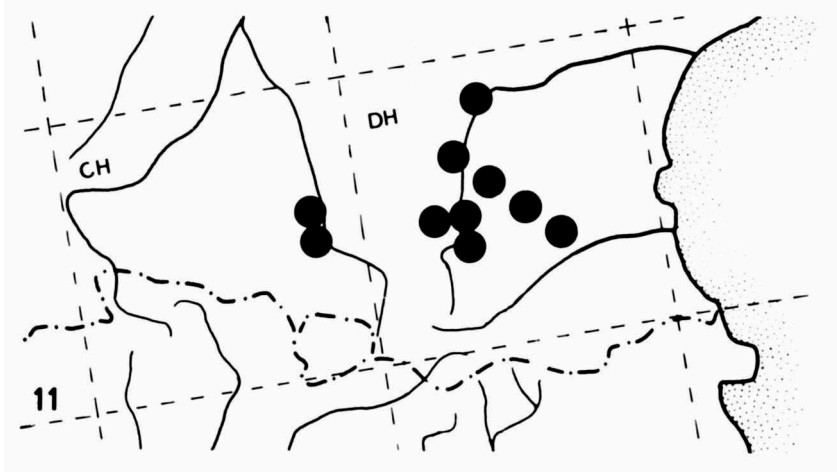


Fig. 11. UTM 50 km grid map, illustrating the distribution known for *Monacha* (*Metatheba*) *atacis* spec. nov.

limestone ridges, along rivers and roads. The species has not been observed high in the mountains. It has been found in mixed populations with *M.* (*Monacha*) *cartusiana*.

Distribution (fig. 11). – *M.* (*Metatheba*) *atacis* is known from three departments in the French northeastern Pyrenees. The species is most common in the department of Aude. A few localities are known in the departments of Ariège and Pyrénées-Orientales.

Note. – Guided by Germain's (1928) monograph concerning "Les Helicidae de la faune Française", we have looked in vain for a name for the present species among the numerous nominal helicid taxa introduced mainly during the second half of the 19th century by the "Nouvelle école". We only considered nominal taxa described from the French northeastern Pyrenees, i.e. from the range of the species under discussion. The (surroundings of the) Pyrenees have been sampled well enough with regard to the comparatively large helicid species to make this procedure acceptable.

Derivatio nominis. – The epithet *atacis* is derived from the antique (Roman) name for the river Aude, viz. Atax. Along the river Aude *M.* (*Metatheba*) *atacis* appears to be most common.

REFERENCES

Chatfield, J. E., 1977. Preliminary studies on the distribution of the land snail genus Monacha in western Europe. – Malacologia 16: 81-85.

Germain, L., 1928. Les Helicidae de la faune Française. – Arch. Mus. Hist. nat. Lyon 13: 1-484.
Gittenberger, E., 1983. Beiträge zur Kenntnis der Pupillacea. IX. Nochmals über Orculidae. – Proc. kon. Ned. Akad. Wetensch. (C) 86: 325-342.
Hesse, P., 1931. Zur Anatomie und Systematik palaearktischer Stylommatophoren. – Zoologica 31 (81): 1-118.
Hudec, V., 1973. Helicidae (Gastropoda, Pulmonata) gesammelt von der niederländischen biologischen Expedition in die Türkei in 1959. II. – Zool. Med. Leiden 46: 231-259.
Hudec, V., & G. I. Ležava, 1969. Bemerkungen zur Erforschung der Landmollusken der grusinischen sozialistischen Sowjetrepublik (II). – Sborník nár. Muzea Praze 25 B: 93-155.
Pintér, L., 1977. Studien an Monacha (Gastropoda: Helicidae), I. Über die subgenerische Zugehörigkeit von Monacha gregaria (Rossmässler). – Arch. Moll. 108: 53-55.
Schileyko, A. A., 1978. Nazemnye molluski nadsemejstva. Helicoidea. – Fauna S.S.S.R. (n.s.) 117 (Molluski 3, 6): 1-384. [In Russian].
Zilch, A., 1960. Gastropoda, 2. Euthyneura (part.). – Handb. Paläozool. 6 (2, 4): 601-834.