On *Trochoidea geyeri* (Soós, 1926) and some conchologically similar taxa (Mollusca: Gastropoda Pulmonata: Hygromiidae)

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To provide background information for a proposal to the International Commission on Zoological Nomenclature to suppress five subjective senior synonyms of *Trochoidea geyeri*, the synonymies of this and some other hygromiid species are given. The nominal taxa that are dealt with concern species that are conchologically more or less similar. These species were studied to minimize the risk that even more unused senior synonyms of *T. geyeri* would be discovered, which would require an additional ruling of the Commission. Distributional data and short conchological diagnoses are added to increase the usefulness of the present paper.

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Introduction

Trochoidea geyeri (Soós, 1926) has frequently been confused with conchologically similar species. Its name, however, is well known. It remained unchallenged since the original description. Therefore, it was rather surprising to discover six senior synonyms, all but one of which available names that remained unused after their introduction. In line with ICZN Article 23 (b), this case is referred to the Commission for a ruling, to conserve the usage of the seventh name (case no. 2870: Gittenberger, in press).

In the first part of the present paper, the nominal taxa are listed that apply to *T. geyeri* according to the present author. In all cases topotypes of these taxa could be studied from the collection of J. R. Bourguignat, kept in the Muséum d'Histoire Naturelle, Geneva. These topotypes might even be syntypes, donated to J. R. Bourguignat, the 'bête noir of French conchology' (Dance, 1986: 163), by his disciples of the so-called "Nouvelle École". Unfortunately, this cannot be proved because the labels indicate only specific names and localities. Additional material from other classical collections was studied as well (see the list of abbreviations below).

While looking for *T. geyeri* in various collections, samples of many more, poorly known nominal taxa met the authors eyes. These taxa belong to species that are conchologically more or less similar to *T. geyeri*. In the second part of the present paper they are dealt with, to make the results of this side-line research available as well. Instead of dealing with each nominal taxon at length, which would lead beyond the scope of the present paper, the various names are clustered into synonymy lists of the species to which they are supposed to belong according to the original descriptions and the topotypes or syntypes mentioned before. When one or more syntypes were available, a lectotype has frequently been selected to stabilize the use of the synonym in question.

The following nominal taxa (epithets) are dealt with:

For collections the following abbreviations are used: MHNG = colln. J. R. Bourguignat, in Muséum d'Histoire Naturelle (Geneva); MNHN = colln. A. Locard, in Muséum National d'Histoire Naturelle (Paris); NMG = colln. C. A. Westerlund in Naturhistoriska Museet (Göteborg); NMW = Naturhistorisches Museum (Wien); RMNH = Nationaal Natuurhistorisch Museum (Leiden); SMF = Forschungs-Institut Senckenberg (Frankfurt am Main).

I. In favour of *Trochoidea geyeri*, the last name of the septet

The following list of references to *T. geyeri* is not intended to be a complete one. Only citations relevant to the nomenclature or to distributional data are included, as well as references to useful illustrations. In general, "fig[s]." refers to illustrations of shells, but the nos. followed by [g] apply to genitalia.

Trochoidea geyeri (Soós, 1926) (figs. 1-6)

Helix arceuthophila Mabille, 1881: 122 ("Fontainebleau", Seine et Marne, France); topotype, MHNG (fig. 4). Nomen oblitum.

Helix ycaunica Mabille, 1881: 122 ("Mailly le Château", Yonne, France); topotype, MHNG (fig. 3). Nomen oblitum.

Helix vicianica Bourguignat, in Locard, 1882: 106, 331 (between "Thiers" and "Vichy", Allier, France); 2 syntypes, MHNG. Nomen oblitum.

Helix deana Berthier, 1884: 354 ("Die", Drôme, France); topotype, MHNG. Nomen oblitum.

Helix pleurestha Berthier, 1884: 355 ("Die", Drôme, France); 2 topotypes, MHNG. Nomen oblitum.

Helix (*Xerophila*) *striata*; Geyer, 1896: 30 [part.], pl. 2 fig. 21a-b; 1909: 44 [part.], pl. 3 fig. 21a-b. Not *Helix striata* Müller, 1774.

Xerophila striata f. *minor* Geyer, 1917: 65, pl. 2 figs. 58-60 ("am Jusi bei Kohlberg", Baden-Württemberg, Germany). Not *Xerophila pyramidata* var. *minor* Monterosato, 1892; not *Xerophila mexensis* var. *minor* Pallary, 1909.

Xerophila geyeri Soós, 1926: 98, pl. 5 figs. 1, 2, 3 [g] ("Gotternscher Herzberg" near Bothenheiligen, 11 km ESE of Mühlhausen, Erfurt, Germany).

Helicella (*Candidula*) *geyeri*; Germain, 1930: 278.

Helicella (*Xeroplexa*) *geyeri*; Mermod, 1930: 188, fig. 54 [g]. Hesse, 1934: 17, pl. 3 fig. 24 a [g], b [g], c [mandibula]. Kerney, 1963: 237, pl. 12 figs. d-f. Evans, 1972: 182.

Helicella (*Helicopsis*) *geyeri*; Geyer, 1927: 76, pl. 4 fig. 21a, b.

Helicella geyeri; Favre, 1927: 201, pl. 14 fig. 1. Ehrmann, 1933: pl. 5 fig. 61. Hubendick, 1947: 75, fig. Adam, 1960: 296, fig. 113.

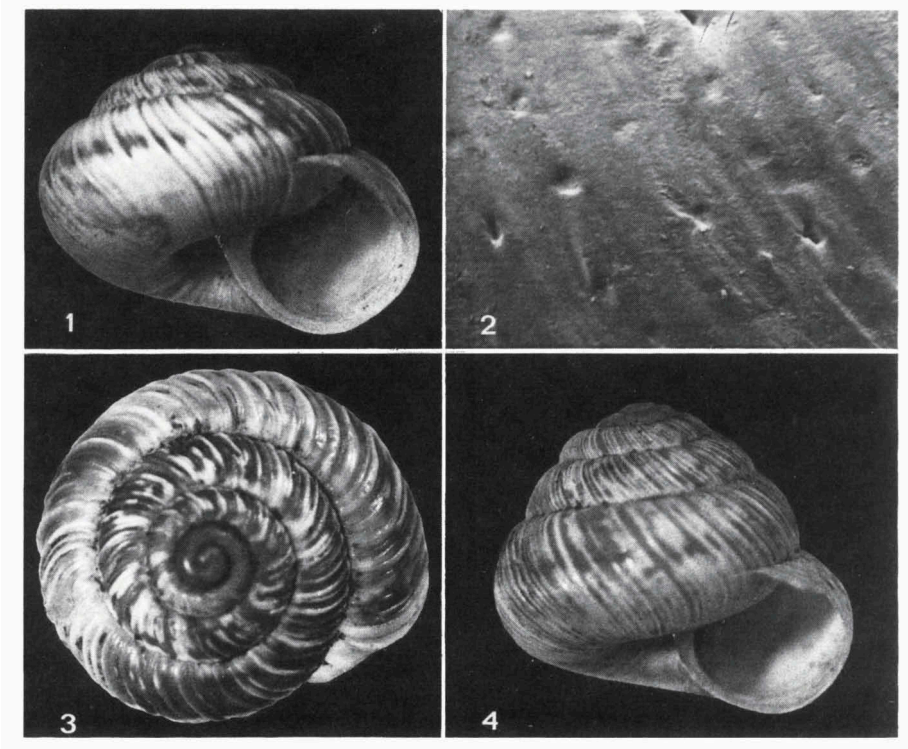
Trochoidea (*Xerotricha*, *Xeroclausa*) *geyeri*; Jaeckel, 1962: 175.

Trochoidea (*Xeroclausa*) *geyeri*; Zeissler, 1962: 25. Clauss, 1963. Zeissler & Klausnitzer, 1965: 177. Altimira, 1970: 49, fig. 2 [g]. Altimira & Barcells, 1972: 51. Klemm, 1974: 370. Schlickum, Puisségur & Clair, 1978: 13, pl. 3 fig. 38. Kerney & Cameron, 1979: 46, 182, 183 with fig. A [g], 250 with fig. 221 [distribution], pl. 15 fig. 5a-c. Magnin, 1989.

Trochoidea (*Xerocrassa*) *geyeri*; Aparicio, 1981: 214.

Trochoidea geyeri; Kuhna & Schnell, 1965: 1965. Jünger & Matzke, 1965. Coles et al., 1983: 259. Holyoak & Seddon, 1985: 69. Aparicio, 1986: 5. Falkner, 1990: 216, 217, fig. 2 (live animal).

Shell.— The shell is often rather fragile, globular to slightly depressed, with $4^{1}/_{2}$-5 evenly rounded whorls, which show a very irregular, more or less coarse radial sculpture. Hair-pits are discernible especially on the initial post-nuclear whorls (fig. 2). The



Figs. 1-4. *Trochoidea geyeri* (Soós, 1926). 1, France, Moselle, Metz (MHNG, "*Helix costulata*"), actual width 6.8 mm; 2, Belgium, Namur, Frasnes, microsculpture with hair-scars after $^{31}/_{4}$ whorls, × 145 (RMNH); 3, France, Yonne, Mailly le Château (MHNG, "*Helix ycaunica*"), actual width 7.0 mm; 4, France, Seine et Marne, Fontainebleau (MHNG, "*Helix arceuthophila*"), actual width 6.7 mm.

umbilicus is rounded, its width is $^1/_6$-$^1/_9$ of that of the shell; it is not quickly narrowing inside. The aperture is rounded; an internal rib is weakly developed to (most often) lacking completely. The shell is greyish white, usually with one or more comparatively narrow, dull brownish, rather vaguely delimitated spiral bands, which are frequently interrupted by the radial riblets.

Height 3.4-6.0 mm; width 5.1-8.0 mm (based on 342 specimens: Zeissler & Klausnitzer, 1965: 180, 181).

T. geyeri has frequently been confused with *Helicopsis striata* (Müller, 1774), or strongly sculptured forms of *Candidula unifasciata* (Poiret, 1801). On an average it differs from both by the more globular body whorl and general shape, a more fragile shell without a prominent apertural rib, with a more cylindrical umbilicus, a less regular radial sculpture and a more dusty colouring. According to Kerney & Cameron (1979: 182), *T. geyeri* can be distinguished from *H. striata* by the width of its protoconch, being 1.0 mm in the former versus 1.5 mm in the latter species. For further information, see the notes on conchological characters of various species in the second part of this paper.

Genitalia.— Whenever the identification of *T. geyeri* can be verified anatomically, that opportunity should be used. The genitalia (fig. 6) have the *Trochoidea* structure, characterized by only two rudimentary "dart-sacs" on the vagina. The flagellum is about as long as the epiphallus. Because there is no appendage inserting on the genital atrium, the species could be classified with the subgenus *Xerocrassa* Monterosato, 1892. The current interpretation of this subgenus is quite unsatisfactory, however. It makes *Xerocrassa* by far the most speciose and a conchologically very heterogeneous taxon within the Hygromiidae, with several more or less clearly delimitated species groups. As long as this situation persists, the present author prefers not to classify *T. geyeri* on a subgeneric level.

Recent and fossil distribution.— *Trochoidea geyeri* is a wide-spread inland species with a distribution that is unique in *Trochoidea* Brown, 1827. The many congeneric species are concentrated around the Mediterranean. It is known from the Swedish island of Gotland in the north-east, to the Spanish province of Soria in the south-west. Most records are from central Europe.

The earliest records are from the Pliocene, viz. the British Red Crag and a deposit in France (see below). During periods of the Pleistocene the species was more widely distributed than it is at present and inhabited SE England, where it occurs in certain interglacials (Bramertonian, Cromerian) and also in many deposits of Late-Glacial age (= closing phase of the last glacial period). Generally, it became extinct very early in the Postglacial period, as forests spread. It is also found at Gwithian in Cornwall, in a deposit of Late Postglacial date, where it is most common in a layer within coastal sand-dunes dated by radiocarbon to 3070 ± 103 b.p., which is a date within the Bronze Age. [These data concerning the British fossil occurrences were most kindly provided by Dr M. P. Kerney (in litt., 7.xii.1992) and Dr R. C. Preece (in litt., 7.xii.1992)].

According to Schlickum et al. (1978: 1, 13) the species was found in a deposit dating from the end of the Pliocene in the French department of Côte d'Or and from Burgundian Early Pleistocene deposits. Magnin (1989) summarized the data concerning the Pleistocene occurrences and concluded that the disjunct actual range of the species follows a wider and more continuous range during colder Pleistocene periods.

The following records concerning Recent occurrences of *T. geyeri* are either veri-

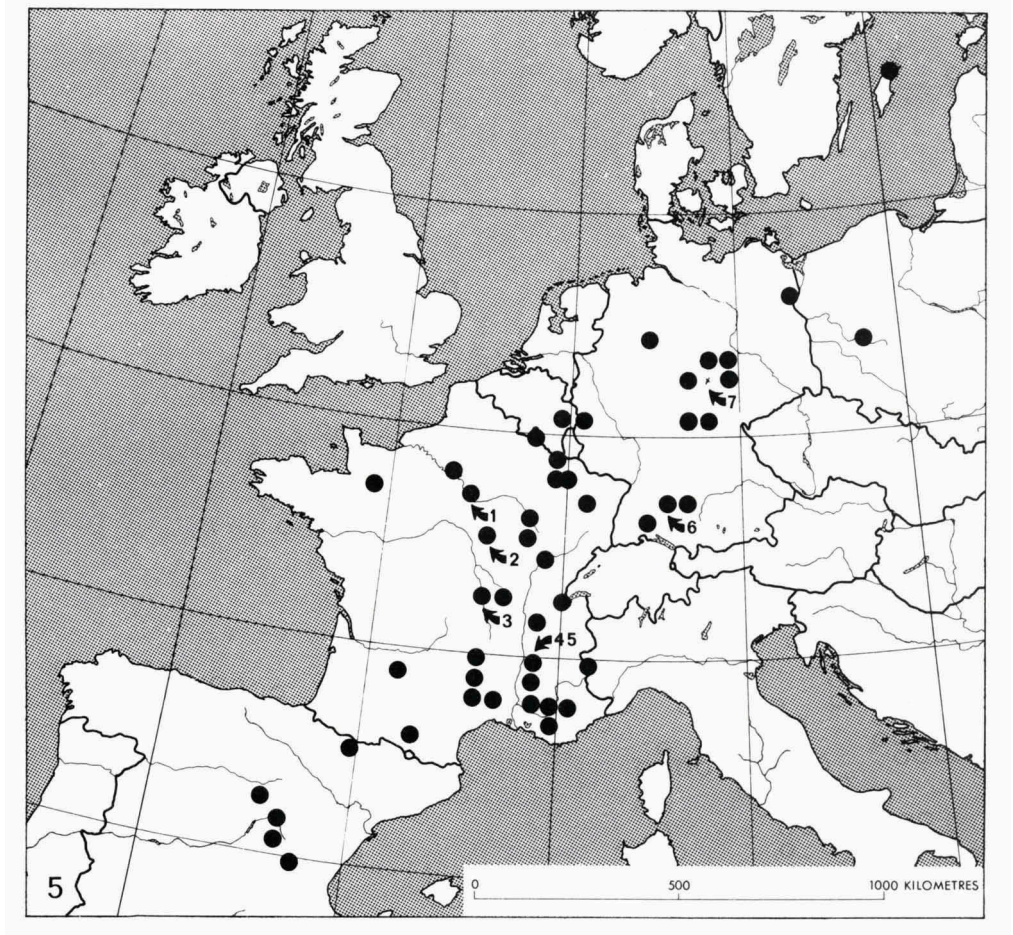


Fig. 5. Records of *Trochoidea geyeri*, with numbered arrows indicating the type localities of *H. arceuthophila* [1], *H. ycaunica* [2], *H. viciniana* [3], *H. deana* and *H. pleurestha* [4, 5], *X. striata minor* [6], and *X. geyeri* [7].

fied by the present author (when a collection is indicated), or based on those data in the literature that are considered reliable, because the authors concerned were well aware of the difficulties in distinguishing *T. geyeri* from conchologically similar species. These records are indicated on a distribution map (fig. 5), with numbered arrows pointing to the type localities of the various nominal taxa involved.

Austria.— The species has been reported from various localities in Austria (Klemm, 1974: 370). These data are not considered reliable, however. According to P. L. Reischütz (in litt., 10.xi.1992), the occurrence of *T. geyeri* in Austria has never been confirmed.

Belgium.— Namur: between Couvin and Chimay, 3 km WSW of Couvin, FR04 (RMNH); between Couvin and Dailly, FR04 (RMNH); quarry at Frasnes, 3 km NNE of Couvin, FR04; Nismes, FR14 (Adam, 1960: 297); Rocheford, FR55 (Jaeckel, 1962: 175). - Luxembourg: Virton, FQ89 (Adam, 1960: 297).

France.— Ain: Fort de l'Écluse, 2 km SSW of Collonges, GM31 (Favre, 1927: 201); Gex, KS73 (Favre, 1927: 201). - Allier: between Vichy and Thiers, EM30 (MHNG, *Helix vicianica*); St. Germain des Fossés, EM31 (MNHN, *Helix vicianica*). - Ariège: Arabaux, NE of Foix, CH86 (Coles et al., 1983: 259). - Aveyron: Causse du Larzac, at 735 and 745 alt., and down to 400 m near Millau, EJ17 (Magnin, 1989:

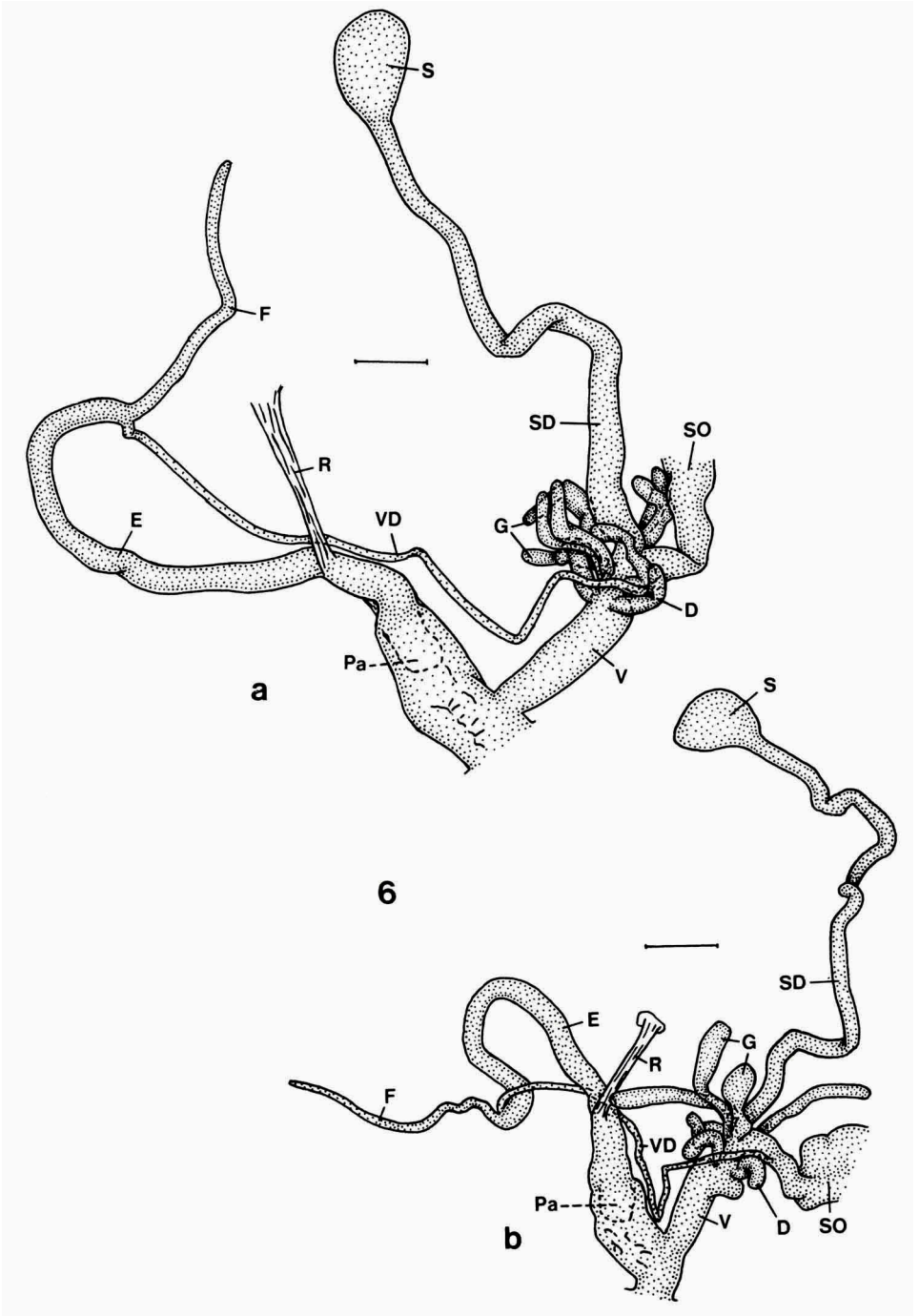


Fig. 6. *Trochoidea geyeri*, genitalia. a, Spain, Huesca, near the parking at the Monte Oroel, S. of Jaca, 100-1200 m alt. (RMNH, slide 534a); b, Germany, Baden-Württemberg, 1 km W. of Giengen, 10 km SE. of Heidenheim (RMNH, slide 556a). Abbreviations: D = "dart-sac"; E = epiphallus; F = flagellum; G = glandulae mucosae; O = oviduct; Pa = penial papilla inside the penis proximalis; R = penial retractor muscle; S = spermatheca; SD = spermathecal duct; SO = spermoviduct; V = vagina; VD = vas deferens. Scale bars, 1 mm.

782). - Basses Alpes: Montagne de Lure, GJ28 (Magnin, 1989: 781); Moustiers Sainte Marie, 950-1000 m alt., KP75 (Magnin, 1989: 782). - Bouches du Rhône: Grand Luberon (mtn.), 1000-1125 m alt. (southern slope) and 870-1125 m alt. (northern slope), FJ95 (Magnin, 1989: 781); NE side of the Montagne Sainte Victoire, 850-1011 m alt., GJ12 (Magnin, 1989: 780). - Côte d'Or: Buncey, 15 km S of Châtillon sur Seine, FN18 (MNHN, *Helix pleurestha*); Châtillon sur Seine, FP10 (MNHN, *Helix pleurestha*); Dijon, FN54 (MNHN, *Helix striata*). - Dordogne: 3 km S of Mazeyrolles, CK44 (Holyoak & Seddon, 1985: 69). - Drôme: Buis les Baronnies, southern slope of the Montagne de la Nible, 800 m alt., FK80 (RMNH); La Chaudière, 18.5 km SW of Die, FK75 (MHNG, *Helix bakonyca*); Die, FK85 (MHNG, *Helix deana* and *Helix pleurestha*; MNHN, *Helix deana*); Montagne d'Albion, GJ09 (Magnin, 1989: 780). - Gard: 1 km N of Anduze, EJ77 (Holyoak & Seddon, 1985: 69). - Hautes Alpes: Briançon, LQ17 (RMNH). - Isère: La Verpillière, FL75 (MNHN, *Helix pleurestha*). - Haute Savoie: Lossy, 5 km E of Annemasse, KS91 (Favre, 1927: 201); Machilly, KS92 (Favre, 1927: 202); S of Monnetier, Mont Salève, KS81 (Favre, 1927: 201). - Lozère: St. Symphorien, EK46 (MNHN, *Helix pleurestha*); Florac, EK40 (MNHN, *Helix vicianica*). - Mayenne: Mayenne, XU75 (MNHN, *Helix costulata*). - Meurthe et Moselle: Lunéville, LU18 (MNHN, *Helix costulata*). - Meuse: 10 km S of Verdun, FQ73 (RMNH). - Moselle: Metz, KV94 (MHNG and MNHN, both *Helix costulata* and *Helix pleurestha*). - Paris: Bois de Boulogne, DQ41 (MHNG, *Helix paladilhi*). - Saône et Loire: Paray le Monial, EM84 (MNHN, *Helix vicianica*). - Seine et Marne: Fontainebleau, DP76 (MHNG, *Helix arceutophila*). - Var: Joug de l'Aigle (mtn.), Sainte Baume, 1050-1118 m alt., GJ20 (Magnin, 1989: 780). - Vaucluse: Mont Ventoux, up to nearly 2000 m alt., FJ89 (Magnin, 1989: 781). - Yonne: Mailly le Château, EN47 (MHNG, *Helix ycaunica*).

Germany.— Baden-Württemberg: Bad Boll, NU48 (Jaeckel, 1962: 175); Dachswald, SE of Stuttgart, NV00 (Jaeckel, 1962: 175); 1 km W of Giengen, 10 km SE of Heidenheim, NU98 (RMNH); Kohlberg near Metzingen, 5 km NW of Urach, NU27 (Geyer, 1917: legends of pl. 2; Jaeckel, 1962: 175); Kornbühl, 7 km SE of Mössingen, 800-885 m alt., NU05 (RMNH); Nordsteter Höhe near Villingen, MU62 (Jaeckel, 1962: 175). - Bayern: Hammelburg, NA55 (Jaeckel, 1962: 175); Oberlauter near Coburg, PA46 (Zeissler, 1962: 25). - Erfurt: Gotternscher Herzberg near Bothenheiligen, 11 km ENE of Mühlhausen, PB17 [type locality] (RMNH; Zeissler & Klausnitzer, 1965); Finneweg near Bad Sulza, PB86 (Zeissler & Klausnitzer, 1965: 182). - Frankfurt Oder: Niederfinow, 10 km E of Eberswalde, VU15 (RMNH). - Gera: between Jena and Zwätzen, PB84 (RMNH). - Halle: Gleinaer Berge near Laucha-Dorndorf (Zeissler & Klausnitzer, 1965: 181); between Halle und Eisleben along the Süssen See, PC80 (Jünger & Matzke, 1965: 95); Park Münchenberg [not "Möncheberg": see Clauss, 1963: 38] between Stecklenberg and Suderode, NE Harz, PC43 (Clauss, 1963). Niedersachsen: quarry E of Langelsheim, 7 km WNW of Goslar, MC95 (RMNH). - Nordrhein-Westfalen: 2 km NW of Ahrhütte (= 7 km SE of Blankenheim), LA38 (RMNH). - Rheinland-Pfalz: Bausenberg near Niederzissen, LA79 (Kuhna & Schnell, 1965: 92; Schnell & Schnell, 1968).

Spain.— Cuenca: Priego, WK5382 (Aparicio, 1986: 5); Laguna del Marquesado, XK1449 (Aparicio, 1986: 5). - Guadalajara: Cuevas Minadas, WL8118 (Aparicio, 1981: 214). - Huesca: near the parking at the Monte Oroel, S of Jaca, 1100-1200 m alt., YN01 (RMNH). - Soria: between Torralba and Ambrona, 4 km W of Medinaceli, WL45 (RMNH); Laguna de la Cima, ca. 6 km W of Medinaceli, WL45 (RMNH).

Sweden.— Gotland: Fårö, N of Gotland (Hubendick, 1947); northern part of Gotland (Jaeckel, 1962: 175).

Switzerland.— Genève: SW of Chaux-Vive near Chancy, along the Rhône, GM31 (Favre, 1927: 201; H. Turner, in litt., 13.xi.1992). Mermod (1930: 190), after Favre (1927: 201), listed several localities in his monograph of Swiss gastropods, which are in fact situated in France; other records cited by this author are based on old data from the literature that cannot be considered reliable. Forcart (1934) denied the occurrence of *T. geyeri* in Graubünden.

II. Poorly known nominal taxa in the Hygromiidae, described from within or close to the range of *T. geyeri* and conchologically similar to that species

Candidula Kobelt, 1871

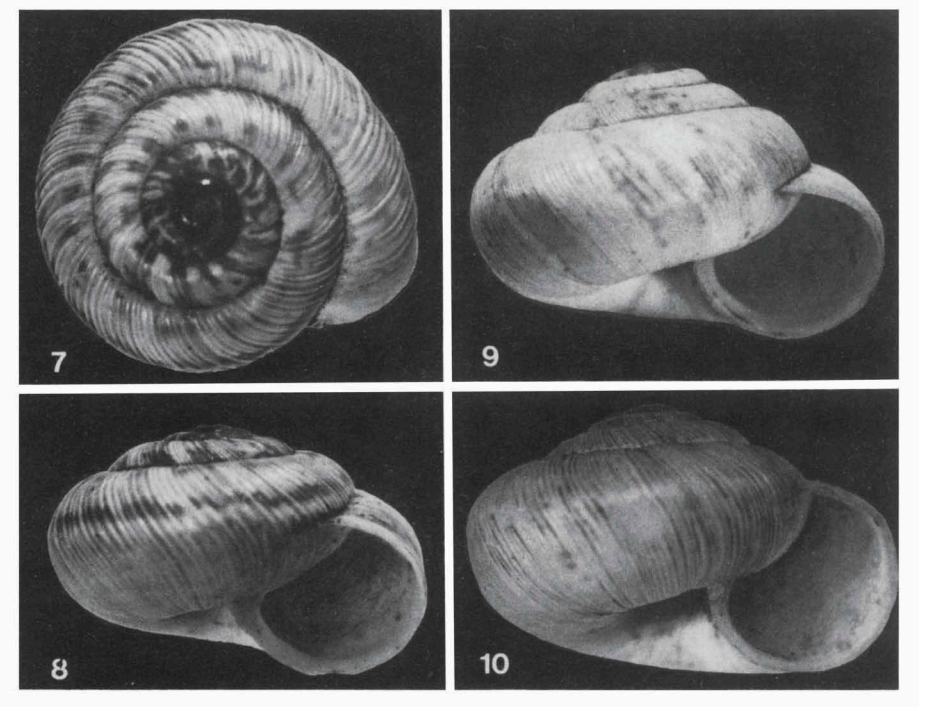
The western European *Candidula* species *C. gigaxii* (Pfeiffer, 1848), *C. intersecta*

(Poiret, 1801) and *C. unifasciata* (Poiret, 1801) can be considered relatively well known now, although *C. unifasciata* still offers some problems because of its variability. In the 19th century these *Candidula* species were confused frequently among each other and with other species like *T. geyeri*.

Candidula gigaxii (Pfeiffer, 1848)
(figs. 7-10)

Helix gigaxii Pfeiffer, 1848: 167 ("Arles Galliae", "Highbycombe Bueks Britanniae" [= High Wycombe, Bucks = Buckinghamshire]). *Helix danieli* Bourguignat, 1860: 101, pl. 1 figs. 9-11 ("Brest", Finistère, France); lectotype (design. nov.), MHNG (fig. 9).
Helix ramburi Mabille, 1867: 28 ("Arcueil", Val de Marne, France); lectotype (design. nov.) [exceptionally Mabille is indicated on the original label], MHNG (fig. 10).
Helix valcourtiana Bourguignat, in Servain, 1880: 80 ("Hyères", Var, France); 3 syntypes, MHNG.
Helix acentromphala Bourguignat, in Servain, 1880: 81 ("Ollioules", Var, France); syntype, MHNG.
Helix phlomiphila Mabille, 1881: 124 ("Carcassonne", Aude, France); topotype, MHNG (figs. 5, 6).
Helicella (*Candidula*) *ramburi*; Germain, 1930: 276.
Helicella (*Candidula*) *danieli*; Germain, 1930: 277.

Conchological characters.— *C. gigaxii* is most easily recognizable by its sculpture of very regular, narrowly spaced riblets and the umbilicus, which is more than proportionally broadened by the final quarter of the body whorl and, therefore, clearly



Figs. 7-10. *Candidula gigaxii* (Pfeiffer, 1850). 7, 8, France, Aude, Carcassonne (MHNG, "*Helix phlomiphila*"), actual width 7.0 mm; 9, France, Finistère, Brest (MHNG, syntype of *Helix danieli*), actual width 9.9 mm; 10, France, Seine/Val de Marne, Arcueil S Paris (MHNG, lectotype of *Helix ramburi*), actual width 8.2 mm.

more oval than roundish. The umbilical width is $^1/_5$-$^1/_6$ of that of the shell. In well-preserved specimens there is a microsculpture of moderately prominent spiral striae. Hair-pits are lacking. Shell height 4-8 mm; width 6-15 mm.

C. intersecta has coarser and less regularly arranged radial riblets and a more roundish umbilicus. *C. unifasciata rugosiuscula* comes closest to *C. gigaxii*, differing mainly by slightly coarser riblets, a comparatively narrower body whorl, a more prominent apertural rib, and smaller dimensions. *T. geyeri* differs clearly from *C. gigaxii* by its much more irregular and coarser sculpture, the more roundish umbilicus and aperture, and a microsculpture with hair-pits.

Nomenclature.— Germain (1930: 276, 277) dealt with "*Helicella* (*Candidula*) *ramburi*" (with five junior synonyms) and "*Helicella* (*Candidula*) *danieli*" as two separate species, next to *T. geyeri* in the same subgenus. This view cannot be supported. Both nominal taxa were based on white shells of *Candidula gigaxii* and thus belong into the synonymy of that species, whereas four of the five so-called junior synonyms of *H. ramburi* have to be assigned to other species, among which *T. geyeri*. Only *H. phlomiphila* is synonymized correctly [as "*philomiphila*"]. Germain (1930: 275) synonymized *Helix valcourtiana* and *H. acentromphala* correctly.

Candidula intersecta (Poiret, 1801)
(fig. 22)

Helix intersecta Poiret, 1801: 80, 81 ("Département de l'Aisne et aux environs de Paris", France).
Helix paladilhi Bourguignat, 1866: 180, pl. 30 figs. 1-5 ("Garrigues de Foncaude près de Montpellier", Hérault, France; lectotype (design. nov.), MHNG (fig. 22).
Helix carcusiaca Mabille, 1881: 123 ("Carcassonne", Aude, France); 3 topotypes, MHNG.
Helix deferiana Bourguignat, in Locard, 1882: 107, 332 ("Estaing, dans l'Aveyron", "Montredon, près de Marseille", France); syntype from locus typicus (restr. nov.) Montredon, MHNG.

Conchological characters.— *C. intersecta* differs from *T. geyeri* in the finer ribbing of the shell and a microsculpture with relatively prominent spiral striae and no hair-pits. In *T. geyeri* the body whorl is more regularly inflated.

Nomenclature.— Germain (1930: 278) listed *H. paladilh*[*e*]*i* with *Candidula* [*unifasciata*] *rugosiuscula*. That view is neither clearly supported by the original description nor by the two syntypes from "Montpellier" in Bourguignats collection, one of which is here selected as lectotype. Two more samples in the Bourguignat collection, that cannot be considered syntypic because of their provenance, belong to other species, one of which is *T. geyeri* (from the Bois de Boulogne near Paris).

The three specimens in MHNG labelled "*Helix carcusiaca*" can be characterized as *C. intersecta* with an exceptionally prominent apertural rib. Germain (1930: 276) considered *H. carcusiaca* a synonym of *H. ramburi* (= *Candidula gigaxii*).

Candidula unifasciata (Poiret, 1801)

C. unifasciata varies considerably in shell sculpture, but not so within populations; these are relatively uniform in this character. There is a geographic component in the variability, but very similar forms may occur in subranges that are situated widely apart. This reminds of parallel evolution. Most commonly populations are

composed of shells that are finely ribbed or provided with prominent growth lines only. A microsculpture with spiral striae is not clearly discernible in *C. unifasciata*, and hair-pits are lacking completely. Regularly and densely spaced, more prominent riblets are known best from populations from Hungary (as *C. soosiana* Wagner, 1933) and SE France (as *C. rugosiuscula* Michaud, 1856). Shells with coarse, more irregular ribs, in combination with a distinctly angled, relatively high periphery, are only known from SE France (first described as *Helix acosmia* Bourguignat, 1882). From Hyères, the type locality of *C. unifasciata acosmia*, specimens that cannot be distinguished from *C. unifasciata rugosiuscula* are also known; only arbitrary the distinction between two forms can be made here (see figs. 14, 18 & 19). Maybe *C. u. unifasciata*, *C. u. rugosiuscula* and *C. u. acosmia*, dealt with as three subspecies below, represent three more or less subjectively delimitated forms in a cline, fully developed in SE France and, without the most extremely sculptured forms, also elsewhere in Europe by parallel evolution.

Shells of *T. geyeri* differ from those of all forms of *C. unifasciata* in microsculpture, whereas they are usually not provided with a (prominent) apertural rib, which is frequently developed in the latter group. With its coarse, irregular sculpture, *C. unifasciata acosmia* is very similar to *T. geyeri*, but differs by the much more depressed general shape, with an angular periphery. For the moment being, synonymy lists and some illustrations of characteristic forms are given. It should be emphasized that the interpretation of *C. unifasciata acosmia* is based on conchological and biogeographical data only. Therefore, and because only a very limited material has been studied, the present notes cannot be viewed as a revision of *C. unifasciata*. They aim at a better understanding of *T. geyeri* in the first place.

Candidula unifasciata acosmia (Bourguignat, 1882)
(figs. 14-17, 20, 21)

Helix acosmia Bourguignat, in Locard, 1882: 112, 336 ("Hyères", Var, France); lectotype (design. nov.), MHNG (figs. 14-16).
Helix callestha Bérenguier, 1884: 285 ("bois de Valaury près de Trans", Var, France); topotype, MHNG (fig. 21).
Helix idiophya Florence, 1886: 228 ("le Luc", Var, France); topotype, MHNG (fig. 20).

Material.— France. Bouches du Rhône: 8 km ESE of Aubagne, 200 m alt., GH19 (RMNH); Marseille, FH99 (RMNH). Hérault: S of Montpellier, EJ72 (RMNH). Var: Hyères, KN67 (MHNG); le Luc, KP80 (MHNG); bois de Valaury near Trans, KP91 (MHNG); Plan d'Aups (Massif de la Sainte Baume), 690 m alt., GJ20 (RMNH).

Conchological characters.— With an angular periphery and (very) coarse, irregular ribs. Umbilical width $^1/_{5.5}$-$^1/_{6.3}$ of the total shell width.

Candidula unifasciata rugosiuscula (Michaud, 1831)
(figs. 11-13, 18, 19)

Helix rugosiuscula Michaud, 1831: 14, pl. 15 figs. 11-14 ("les environs d'Aix" [en Provence], Bouches du Rhône, France).

Material.— France. Ariège: Mayeux [not located] (MHNG, "*Helix aurigerana*"); Auzat, 14 km SW of Tarascon sur Ariège, CH73 (RMNH); Grotte de Niaux, 3 km SSW of Tarascon sur Ariège, CH84; between Tarascon sur Ariège and Ussat, 4 km SSE of Tarascon, CH84 (RMNH); between Foix and St. Martin, 6 km NW of Foix, CH86 (RMNH). Aude: Limoux, DH36 (MHNG, "*Helix acmella*", "*Helix microphana*"). Bouches du Rhône: Aix, FJ92 (MHNG). Haute Garonne: Odars, CJ82 (MHNG, "*Helix aurigerana*").

Conchological characters.— Periphery regularly rounded. Whorls with coarse, regularly and narrowly spaced ribs. Umbilical width $^1/_5$-$^1/_7$ of the total shell width.

Xerotricha Monterosato, 1892

Only rarely *Xerotricha apicina* and *X. conspurcata* have been confused with *T. geyeri*. *X. vatonniana* from Spain and N Africa is about equally similar, but apparently too rare to have caused confusion. The three species have whitish shells with a dull light corneous brown colour pattern and without an apertural lip, which makes them resemble *T. geyeri*. They can be distinguished, however, by different general shapes, (far) less prominently developed ribs, and much more conspicuous hair-pits. Synonymy lists and short notes on some additional diagnostic conchological characters of these three species are given below.

Xerotricha apicina (Lamarck, 1822)

Helix apicina Lamarck, 1822: 93 ("Brives": in the department of Corrèze, France [after Michaud, 1831: 34]). Michaud, 1831: 33, pl. 15 figs. 9, 10.

Helix hypaeana Bourguignat, in Locard, 1882: 106, 331 ("Château d'If près de Marseille", Bouches du Rhône, France); syntype, MHNG.

Helix (*Xerophila*) *horridula* Westerlund, 1892: 386 ("Sevilla", Spain); lectotype (design. nov.), NMG 1196 (5.6 × 3.4 mm). Not sensu Ortiz de Zárate y López (1950: 53), which concerns *X. conspurcata* (Draparnaud, 1801).

Helicella apicina; Kerney & Cameron, 1979: 160, 182, pl. 15 fig. 4.

Conchological characters.— This species differs from *T. geyeri* by the characters mentioned before, and additionally by the relatively large body whorl and the much more depressed shell. Fresh specimens are provided with long hairs.

Nomenclature.— Germain (1930: 276) listed *Helix "hypaena"* (= *hypaeana*) with *H. ramburi* (= *Candidula gigaxii*).

Xerotricha conspurcata (Draparnaud, 1801)

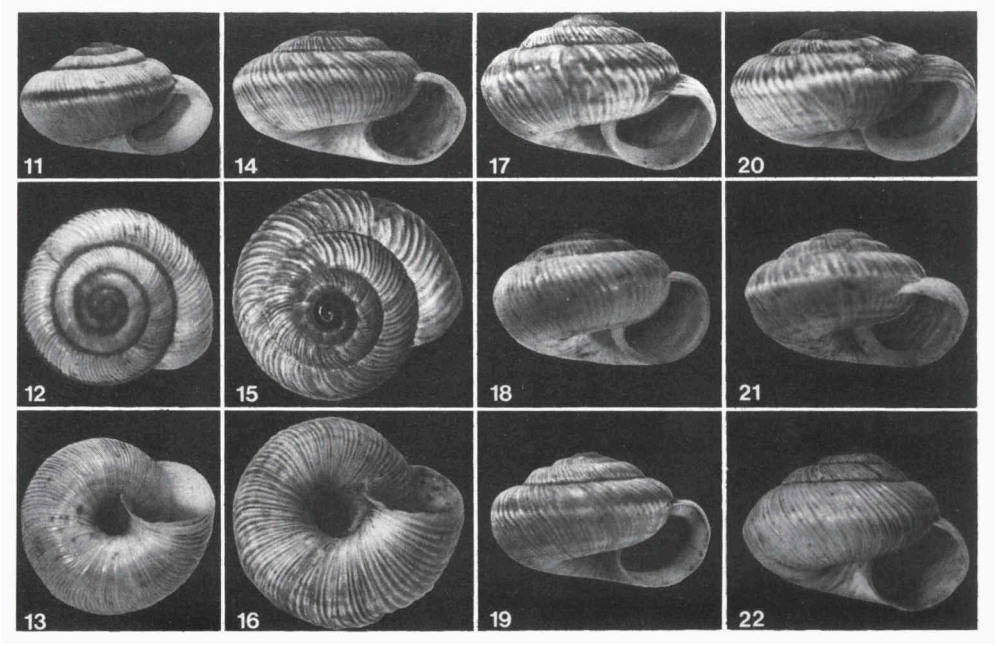
Helix conspurcata Draparnaud, 1801: 93 ("F. M." [= France méridionale]); 36 syntypes, NMW 1820.xxvi.127

Helix moricola Paladilhe, 1875: 1, pl. 21 figs. 1-6 ("Aniane", Hérault, France); many topotypes, MHNG.

Helix (*Xerophila*) *euaxes* Westerlund, 1893: 32 ("Gibraltar"); lectotype (design. nov.), NMG W1197 (4.8 × 2.7 mm).

Helicella (*Xerotricha*) *horridula*; Ortiz de Zárate y López, 1950: 53; not Westerlund, 1892 (= *H. apicina* Lamarck, 1822).

Helicella conspurcata; Kerney & Cameron, 1979: 182, pl. 15 fig. 8.



Figs. 11-22. Figs. 11-13, 18, 19. *Candidula unifasciuta rugosiuscula* (Michaud). 11-13, France, Bouches du Rhône, Aix en Provence (MHNG, topotype), actual width 5.8 mm; 18, 19, France, Var, Hyères (MHNG, "*Helix rugosiuscula*"), actual widths 5.7 mm and 5.5 mm, respectively. Figs. 14-16, 17, 20, 21. *Candidula unifasciata acosmia* (Bourguignat). 14-16, France, Var, Hyères (MHNG, lectotype), actual width 5.6 mm; 17, idem (MHNG, "*Helix rugosiuscula*"), actual width 6.0 mm; 20, France, Var, Le Luc (MHNG, topotype of *Helix idiophya*), actual width 6.4 mm; 21, France, Var, Bois de Valaury (MHNG, topotype of *Helix callestha*), actual width 6.9 mm. Fig. 22. *Candidula intersecta* (Poiret), France, Var, Montpellier (MHNG, lectotype of *Helix paladilhi*), actual width 7.2 mm.

Conchological notes.— *Xerotricha conspurcata* can be easily distinguished from *T. geyeri* by the characters mentioned before, and additionally by its clearly more depressed general shape. Fresh shells have long hairs.

Xerotricha vatonniana (Bourguignat, 1867) (figs. 23-27)

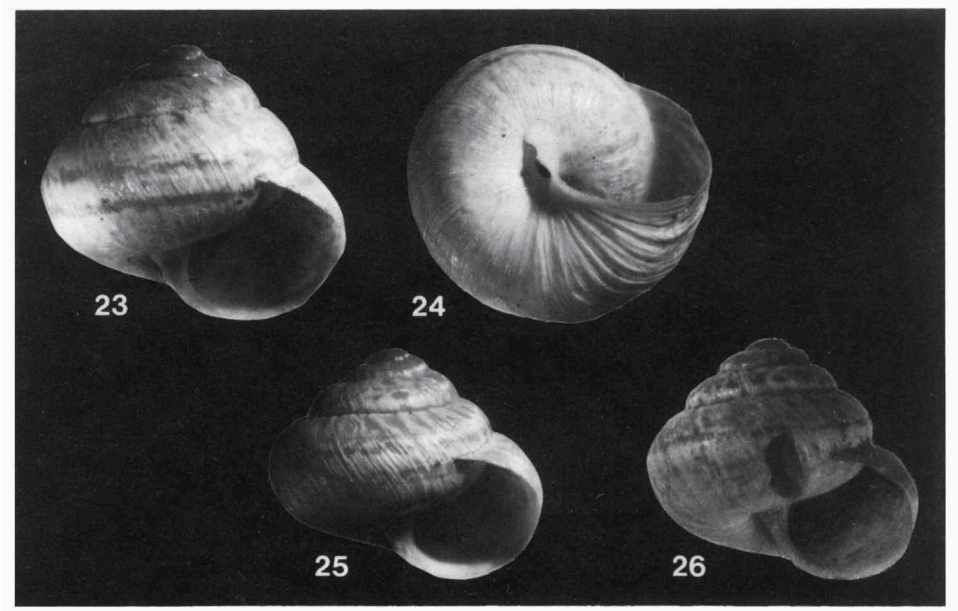
Helix vatonniana Bourguignat, 1867: 254, pl. 37 figs. 13-16 ("sur les hauts plateaux du Sersou, entre Boghar [= Boghari = Ksar El Boukhari] et Tiharet [= Tiaret = Tagdempt]; dans les déblais de vieux tumulus qui se trouvent sur la rive droite du Nahr-Ouassel", Algeria); lectotype (design. nov.), MHNG (6.6 × 7.2 mm).

Helix gibilmanica Servain, 1880: 77 ("Séville, dans les alluvions du Guadalquivir", Spain); topotype, MHNG (fig. 25).

Helix (*Candidula*) *florentiae* Kobelt, 1882: 68 ("Tanger"); lectotype (design. nov.), SMF 10404 (6.0 × 7.0 mm).

Helix (*Xerophila*) *pumila* Westerlund, 1892: 386 ("Sevilla", Spain); lectotype (design. nov.), NMG (figs. 23, 24).

Helicopsis (*Helicopsis*) *altenai* Gasull, 1974: 73 ("Palma del Condado", Huelva, Spain); syntype, RMNH 56775 (fig. 26).



Figs. 23-26. *Xerotricha vatonniana* (Bourguignat). 23, 24, Spain, Sevilla (NMG, lectotype of *Helix pumila*), actual width 6.8 mm; 25, Spain, Sevilla (MHNG, topotype of *Helix gibilmanica*), actual width 5.6 mm; 26, Spain, Huelva, Palma del Condado (NNM, syntype of *Helicopsis* (*Helicopsis*) *altenai*), actual width 6.5 mm.

Conchological characters.— This rare species differs from *T. geyeri* by the characters mentioned before, and additionally by the even more strongly inflated body whorl and the extremely narrow umbilicus, measuring less than $^1/_{10}$ of the total shell width. Some specimens have a prominent apertural rib. Hairs c. 0.1 mm long. Height 4.6-6.8 mm; width 5.6-7.3 mm.

Distribution.— Pallary (1897: 559) reported this species from four localities in N Africa, in addition to the type locality: Tanger (TE46), and Saïda (BU46), Mascara (BV32) and Lourmel (XE65) in Algeria. The UTM codes of the various type localities are: Sersou, c. DV22; Sevilla, TG34; La Palma del Condado, QB13. In the NNM there are two samples from Algeria: Ksar El Boukhari (EV08); 30 km W of Berrouaghia along the road W22 (A. J. de Winter leg.), 375 m alt. (DA60). Thus the species is known from N Africa, from Algeria to Morocco, and from S Spain (fig. 27).

Trochoidea Brown, 1827

See the notes on the subdivision of *Trochoidea* in the first part of this paper, under *Trochoidea geyeri*, genitalia.

Trochoidea penchinati (Bourguignat, 1868)

Helix penchinati Bourguignat, 1868: 305, pl. 42 figs. 7-11 ("Barcelone", Barcelona, Spain); lectotype

(design. nov.), MHNG (3.3 x 6.2 mm).
Helix saldubensis Servain, 1880: 85 ("alluvions de l'Ebre à Saragosse", Spain); topotype, MHNG.
Helix zaragozensis Servain, 1880 ("alluvions de l'Ebre à Saragosse", Spain); topotype, MHNG.
Helix monistrolensis Fagot, 1884: 182 ("à l'ouest de la station de Monistrol, au pied du Montserrat", Barcelona, Spain); syntype: Bofill & Haas, 1920: pl. 2 figs. 27-32.
Helix miraculensis Marcet, 1906: 135 ("Sanctuarii Btae. Mariae de Miraculo", Barcelona, Spain); syntype: Bofill & Haas, 1920: pl. 2 figs. 33-38.
Helicella (*Xeroplexa*) *monistrolensis*; Ortiz de Zárate y López, 1946: 345, fig. 4 [g].
Helicella (*Helicopsis*) *rugosiuscula monistrolensis*; Haas, 1929: 218, fig. 50.
Helix (*Candidula*) *rugosiuscula monistrolensis*; Bofill & Haas, 1920: 468, pl. 2 figs. 27-38.
Trochoidea (*Xerocrassa*) *penchinati*; Coles, Holyoak & Preece, 1983: 259.

Conchological characters.— *T. penchinati* differs clearly from *T. geyeri* by the more depressed shell. Because this species has been confused with *C. unifasciata rugosiuscula*, it is mentioned here.

Notes.— This species is known from the extreme SE of France and from N Spain.

Helicella Férussac, 1821

Among the Hygromiidae of the eastern Pyrenees several poorly known species occur, at least one of which belonging to *Helicella* (or *Xerotricha*) and slightly similar to *T. geyeri* in some conchological characters. Within the scope of the present paper, provisional results concerning this species and several nominal taxa that have been associated with it, are reported upon. Most probably none of these nominal taxa applies to *T. geyeri*.

Helicella barcinensis (Bourguignat, 1868)

Ortiz de Zárate y López (1946) demonstrated that there are two species hidden

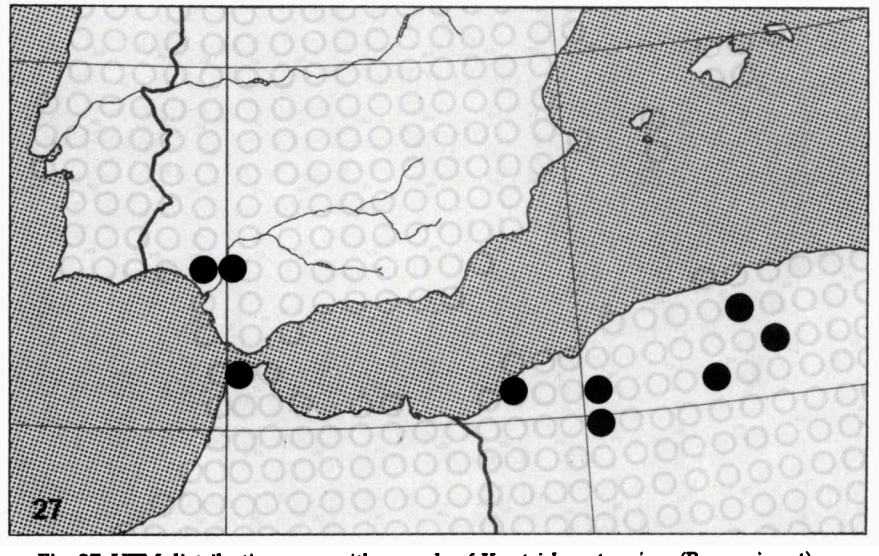
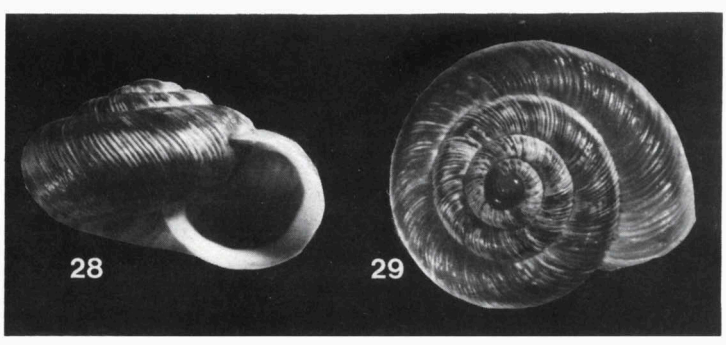


Fig. 27. UTM distribution map with records of *Xerotricha vatonniana* (Bourguignat).



Figs. 28, 29. *Helicella barcinensis* (Bourguignat), lectotype (MHNG); near Barcelona, actual width 9.6 mm.

under the single name *Helicella barcinensis* (Bourguignat, 1868). Although these species are not even congeneric, which is evident from the structure of the genitalia, they are very much alike in shell shape and sculpture. Ortiz de Zárate y López assumed that Soós (1926) correctly used the epithet *barcinonensis* (= *barcinensis*) for the species of the couple belonging to what is called *Trochoidea* in the recent literature and, therefore, introduced the epithet *parabarcinensis* for the second species, which is classified with *Helicella* Férussac, 1821. In fact, there were no grounds for this assumption because Soós, while publishing on *barcinonensis* from Guardiola, Barcelona, was not aware of the existence of a pair of (conchologically) sibling species in NE Spain. It would have been a matter of sheer luck if he had chosen correctly; it turned out now that he did not.

The syntypes of *Helix barcinensis* (in MHNG) belong to a species of *Helicella* or *Xerotricha*. For conchological reasons only, the former generic name is used here. In one of the shells the essential parts of the genitalia were still present and could be studied after softening with sodiumphosphate (because of this poor conservation, it remains uncertain whether not a *Xerotricha* species is involved). Consequently, *Helicella parabarcinensis* has to be considered a junior synonym of *H. barcinensis*.

It is still unclear what name(s) apply to the *Trochoidea* species in the area. This adds to the problems in diagnosing and classifying the various forms.

Within the scope of the present paper it is most relevant that none of the nominal taxa has to be considered a senior synonym of *Trochoidea geyeri*. The shells differ by being more regularly and less coarsely ribbed than specimens of *T. geyeri* and they frequently have a prominent apertural rib. To facilitate future research, the names in this complex of at least two species are listed below.

Helix barcinensis Bourguignat, 1864: 355 ("*Helix caperata* de Rossmässler"). Nomen nudum; the note accompanying the name cannot be considered an Indication in the sense of ICZN Art. 12(b)(3), because it remains unclear whether Bourguignat referred to Rossmässlers earliest interpretation (1837: 28), with *Helix caperata* as a synonym of *Helix striata*, or to his second, quite different view (1854: 24, 25, pl. 67 figs. 830-832), with *Helix caperata* as a widely distributed separate species (encompassing several species according to modern views).

Helix barcinensis Bourguignat, 1868: 303, pl. 42 figs. 12-16 ("Barcelone", Spain); lectotype (design. nov.), MHNG, according to the label from "Pedralbas près Sarria près Barcelone", (figs. 28, 29).

Helix barcinonensis Chia, 1886: 28. Replacement name for *Helix barcinensis* Bourguignat, 1868

Helix pallaresica Fagot, 1886: 4 ("A partir desde la Pobla, la especie es bastante comun en el valle del

Noguera Pallaresa", Lerida, Spain).
Helix salvanae Fagot, 1886: 5 ("Espinelvas", Gerona, Spain). Chia, 1916: 22 ("= *H. barcinensis*, Bgt.").
Helix chiae Fagot, 1886: 6 ("S Daniel" near "Gerona", Chia, 1886: 29. Chia, 1916: 21 ("= *H. barcinensis*, BGT. var.").
Helix moreri Fagot, 1886: 6 (without locality; after Fagot [1891: 22] "Environs de Gérone", Gerona, Spain). Chia, 1886: 30. Chia, 1916: 22 ("= *H. barcinensis*, Bgt.").
Helix mascarenasi Fagot, 1888: 36 [12] ("Seo de Urgel", "676 m", Lerida, Spain).
Helix segetum Fagot, 1888: 36 [12] ("Campo" [inundated area: Embalse de Campo], Huesca, Spain).
Helix culmi Fagot, 1888: 36 [12] ("Campo" [inundated area: Embalse de Campo], Huesca, Spain).
Helix urgelensis Fagot, 1889: 280 [7]. Nomen nudum.
Helix ribasica Fagot, 1891: 22 [1892: 79]. Nomen nudum.
Helix marceti Fagot, 1906: 133 [1] ("in Monteserrato ad S Michaëlem", Barcelona, Spain).
Xerophila (*Helicopsis*) *bruchiana* Serradell, 1909: 140. Nomen nudum (cf. Bofill et al., 1921: 904).
Helicella (*Xerotricha*) *parabarcinensis* Ortiz de Zárate y López, 1946: 351, figs. 7, 8 [g] ("En la ladera que desde la estación del ferrocarril del Norte de Monistrol de Montserrat, baja hasta el Llobregat", Barcelona, Spain).

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