

Xeropicta derbentina (Krynicky, 1836) (Gastropoda, Hygromiidae) in Italy and along the Croatian coast, with notes on its systematics and nomenclature

Willy DE MATTIA

Via dei Templari 15, I 34147 Muggia, Italy; willy@renice.it

Xeropicta derbentina (Krynicky, 1836) is recorded for the first time from Italy. An anatomical and conchological description is given and its distribution along the north-eastern Adriatic shores is reported. *Xerophila homoleuca* Brusina, 1870, *Helix liburnica* Stossich, 1880, and *Helix vukotinovici* Hirc, 1881, are junior synonyms of *Helix derbentina* Krynicky, 1836. Notes on ecology and conservation are given.

Key words: Gastropoda, Pulmonata, Hygromiidae, *Xeropicta*, anatomy, taxonomy, nomenclature, distribution, Italy, Croatia.

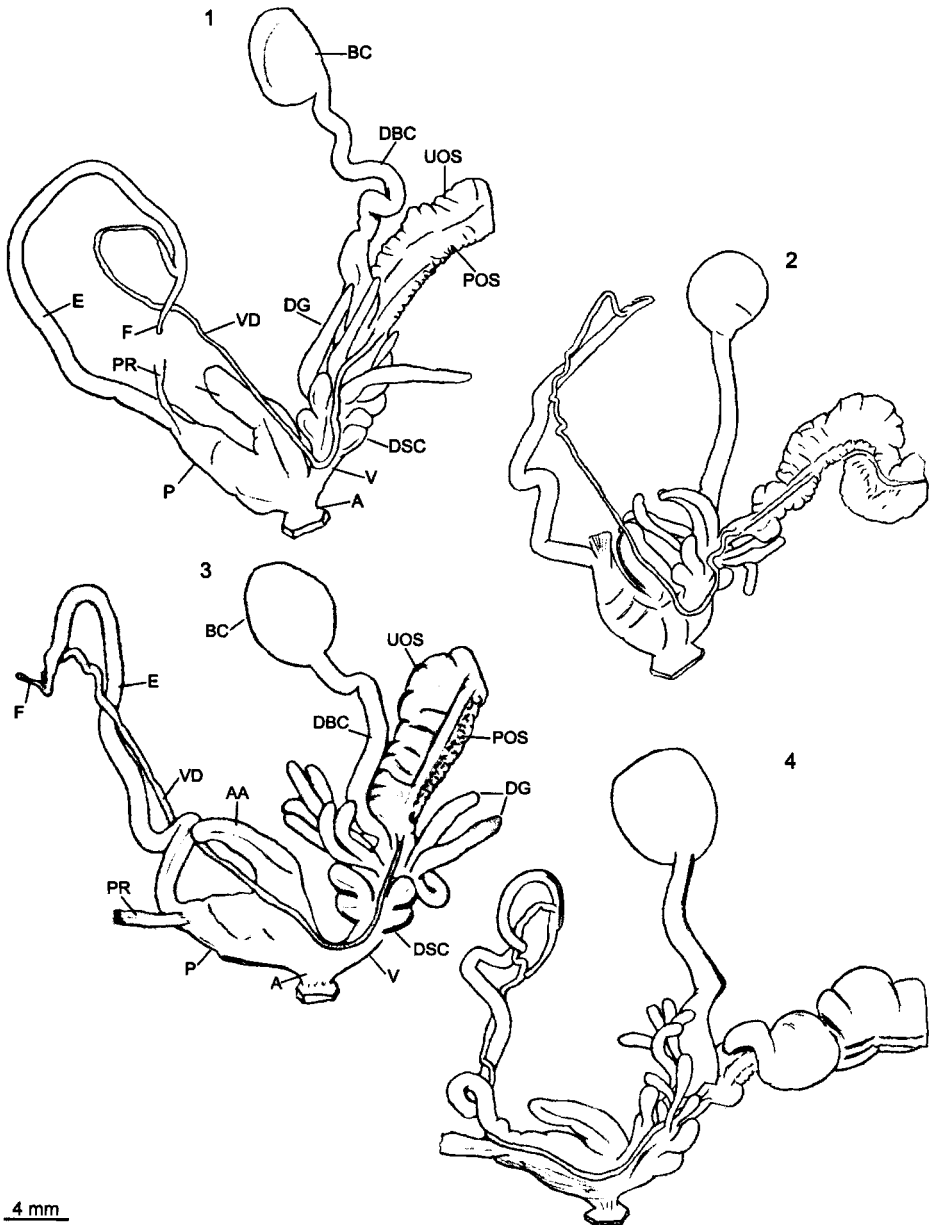
INTRODUCTION

During a faunistic survey near the mouth of the Isonzo river, in the territory of Val Cavanata (Gorizia, north-eastern Italy), many shells and living specimens of a xerophilous hygromiid were collected. The shells are entirely white, depressed and with a wide umbilicus, recalling *Cerनुella* (*Xerocinta*) *neglecta* (Draparnaud, 1801) and *Xerolenta obvia* (Menke, 1828). Anatomical and conchological studies revealed that this snail belongs to *Xeropicta derbentina* (Krynicky, 1836), a species described from Derbent (Turkey). In western Europe, Altena (1960: 23) reported this species as *X. derbentina homoleuca* (Brusina, 1870) from France (Bouches-du-Rhône, Gard, Vaucluse, Haute Provence) and Croatia (Pag and Krk and the coastal region between Rijeka and Karlobag). From the literature this species is also known from southern and central-eastern Balkan Peninsula, Asia Minor, Crimea and Caucasus (table 1). The over-all distribution of *X. derbentina* can not be clearly defined yet, because of the lack of anatomical data, for example as regards Egypt and the Cyrenaica (Schütt, 2001: 447). *Xeropicta* is a genus of xerophilous hygromiids distributed around the eastern Mediterranean and the Black Sea, in Asia Minor, the Ukraine, the Caucasus, the Middle East and Persia.

Probably *X. derbentina* has already been cited for Italy by Stossich (1899: 11) as *Xerophila arenosa* Ziegler "In luoghi sterili a Monfalcone" ("Along sterile fields near Monfalcone").

Albania?	Polinski, 1924
Caucasus	Schütt, 2001; Grossu, 1983
Crimea	Schütt, 2001; Grossu, 1983
Croatia	Sandri & Kutschig, 1846; Brusina, 1885a; Brusina, 1885b; Stossich, 1880; Hirc, 1881; Stossich, 1895; Cherbonnier, 1953; Jaekel et al., 1957; Altena, 1960; Maassen, 2005
France	Cherbonnier, 1953; Falkner et al., 2001; Falkner et al., 2002, Altena, 1960
Italy?	Stossich, 1899
Libya?	Grossu, 1983
Montenegro	Wohlberedt, 1909
Romania	Grossu, 1983
Turkey	Grossu, 1983; Schütt, 2001
Ukraine	Schütt, 2001

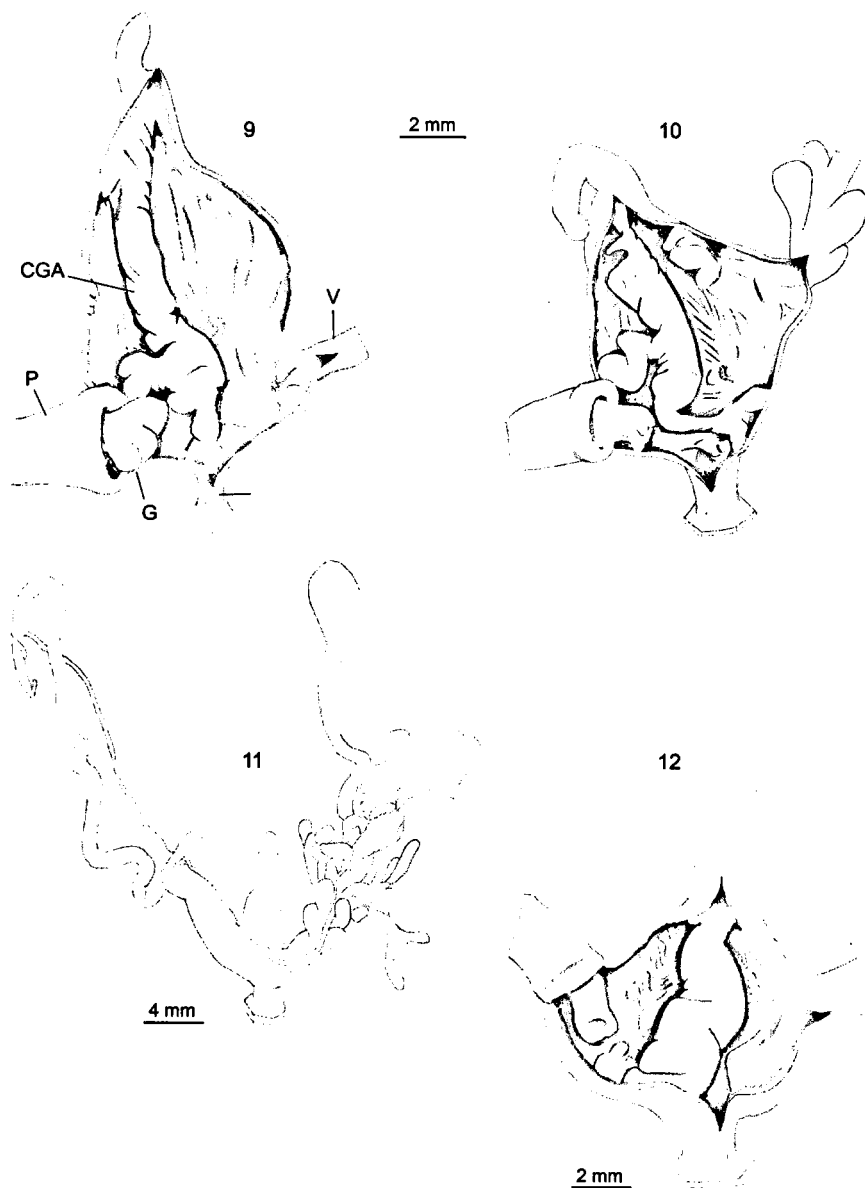
Table 1. Distribution of *Xeropicta derbentina* (Krynicky, 1836), according to the literature.



Figs 1-4. *Xeropicta derbentina* (Krynicky, 1836). 1, Val Cavanata near Bocca di Primero, Grado, Gorizia province, Italy, genitalia (ovotestis excluded); 2, Kraljevica, Primorsko-Goranska Zupanija, Croatia, genitalia (ovotestis excluded); 3, Baška, Island of Krk, Primorsko-Goranska Zupanija, Croatia, genitalia (ovotestis excluded); 4, Bakarac, Primorsko-Goranska Zupanija, Croatia, genitalia (ovotestis excluded).



Figs 5-8. *Xeropicta derbentina* (Krynicky, 1836). 5, Senj, Licko-Senjska Zupanija, Croatia, genitalia (ovotestis excluded); 6, Bay of Valbiska, Island of Krk, Primorsko-Goranska Zupanija, Croatia, genitalia (ovotestis excluded); 7-8. inner walls of atrium and atrial appendage; 7, Val Cavanata near Bocca di Primero, Grado, Gorizia province, Italy; 8, Kraljevica, Primorsko-Goranska Zupanija, Croatia.



Figs 9-12. *Xeropicta derbentina* (Krynicky, 1836). 9-10, inner walls of atrium and atrial appendage; 9, Baška, Island of Krk, Primorsko-Goranska Zupanija, Croatia; 10, Bakarac, Primorsko-Goranska Zupanija, Croatia; 11-12, Samsun, Turkey, B. Hausdorf leg.; 11, whole genitalia (ovotestis excluded); 12, inner walls of atrium and atrial appendage.

Maybe this site coincides with the one reported at present. Stossich's collection got lost.

To investigate the distribution of *X. derbentina* along the shores of the north-eastern Adriatic, field work was started in 1999. In this paper a detailed anatomical description is given, summarizing old and new data about its distribution and nomenclature.

MATERIAL AND METHODS

The snails were killed in water and then fixed in 75 % ethanol. For each population at least eight specimens were dissected. Empty shells were measured (15 specimens for each population). The material is deposited in the author's private collection and in the Natural History Museum of Trieste (MCSNTS) (Italy). All specimens have been collected by the author if not otherwise stated. Anatomical nomenclature follows Giusti et al., 1995.

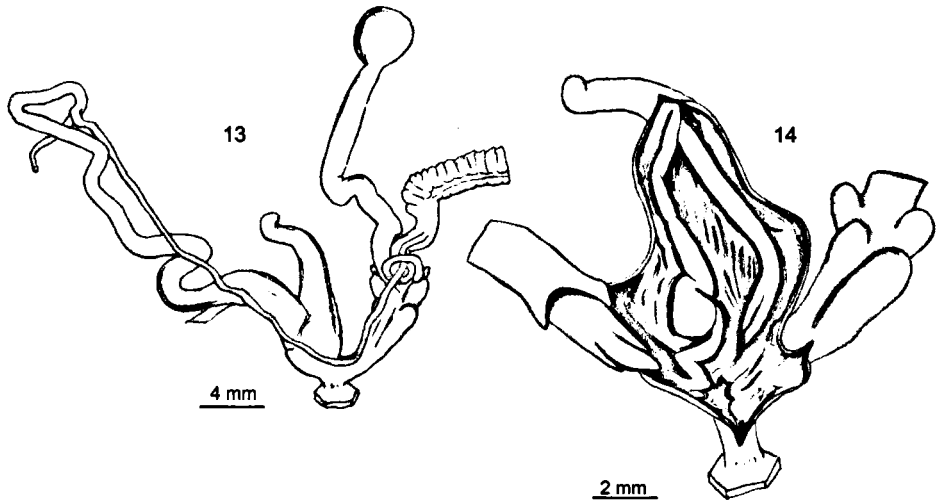
The following abbreviations are used: A, atrium; AG, albumen gland; BC, bursa copulatrix; CGA, crest-like structure of the genital atrium; dsp, dissected specimen[s]; DBC, duct of bursa copulatrix; DG, digitiform glands; DP, distal penis; DSC, dart-sac complex; DSO, dart-sac openings; F, flagellum; G, glans or penial papilla; P, penis; PA, penial appendage; POS, prostatic ovispermiduct; PP, proximal penis; PR, penial retractor muscle; UOS, uterine ovispermiduct; V, vagina; VD, vas deferens.

Xeropicta derbentina (Krynicky, 1836)

Material examined (unless stated otherwise, from between sea level and 25 m alt.). — Italy: Friuli – Venezia Giulia, Grado, Val Cavanata near Bocca di Primero, 45°41'N 13°27'E, 15.vii.1999, 8 dsp. Croatia: Licko-Senjska Zupanija: Island of Pag, Pag, 44°25'N 15°03'E, around 1880, De Vidovich leg. (MCSNTS Wt 1603); Lukovo, 45°51'N 14°53'E, date and collector unknown (MCSNTS Wt 1604); Senj, Senjska Draga, 44°59'N 14°56'E, 12.x.1999, 7 dsp. Primorsko-Goranska Zupanija: Island of Krk, Baška near the cemetery of Sv. Ivan, 138 m alt., 45°58'N 14°45'E, 18.xii.2004, 6 dsp; Island of Krk, Bay of Valbiska, 45°01'N 14°29'E, 15.viii.1999, 6 dsp; Novi Vinodolski, field near the harbour, 45°08'N 14°48'E, 12.x.1999, 6 dsp; Kraljevica, 45°16'N 14°34'E, around 1880, Stossich leg. (MCSNTS Wt 1606), topotypes of *Helix liburnica* Stossich, 1880 (labelled by Stossich); Kraljevica harbour, 45°16'N 14°34'E, 18.xii.2004, 8 dsp (topotypes of *Helix liburnica* Stossich, 1880, and *Helix vukotinovi* Hirc, 1881); Bakar, Bakarac, 45°16'N 14°34'E, 19.x.1999, 5 dsp; Rijeka, 45°20'N 14°25'E, around 1890, De Vidovich leg. (MCSNTS Wt 1605). Istarska Zupanija: Labin, Most Raša, Raškopolje, 45°03'N 14°02'E, 14.viii.2003.

Shell (figs 20-27). — Protoconch dark violet-brown to dark red. Teleoconch uniformly white to light yellowish-white, without any bands or dots; the external surface somehow waxy with well-defined, irregularly spaced growth lines. Spire conical, almost flat to slightly raised, with 4 $\frac{3}{4}$ -5 $\frac{3}{4}$ regularly growing, convex whorls, separated by deep sutures. Last whorl relatively large, more or less descending near the aperture. Umbilicus wide, measuring about $\frac{1}{4}$ of the maximum shell diameter. Aperture rounded to moderately elliptical; peristome interrupted, never reflected, seldom with a thin whitish thickening on the palatal inner margin. Dimensions: height 7.20 \pm 0.85 mm, diameter 12.01 \pm 1.11 mm (mean \pm standard deviation; n = 90) (see also table 2).

Diagnostic characters of genitalia (figs 1-14). — Proximal part of vagina with 8-11 digitiform (sometime branched) glands, disposed all around at irregular intervals. The dart-sac complex, entering distal vagina at opposite sides (2 + 2 dart-sac complex), consisting of two proximal, club-like, larger, dart-bearing, and two distal, club-like, smaller, dartless stylophores. Cavities of each of the 4 stylophores end with almost independently opening into vagina.



Figs 13-14. *Xeropicta derbentina* (Krynicky, 1836), Villeneuve les Avignon, dept. Gard, France, E. Vial leg.; 13, genitalia (ovotestis excluded); 14, inner walls of atrium and atrial appendage.

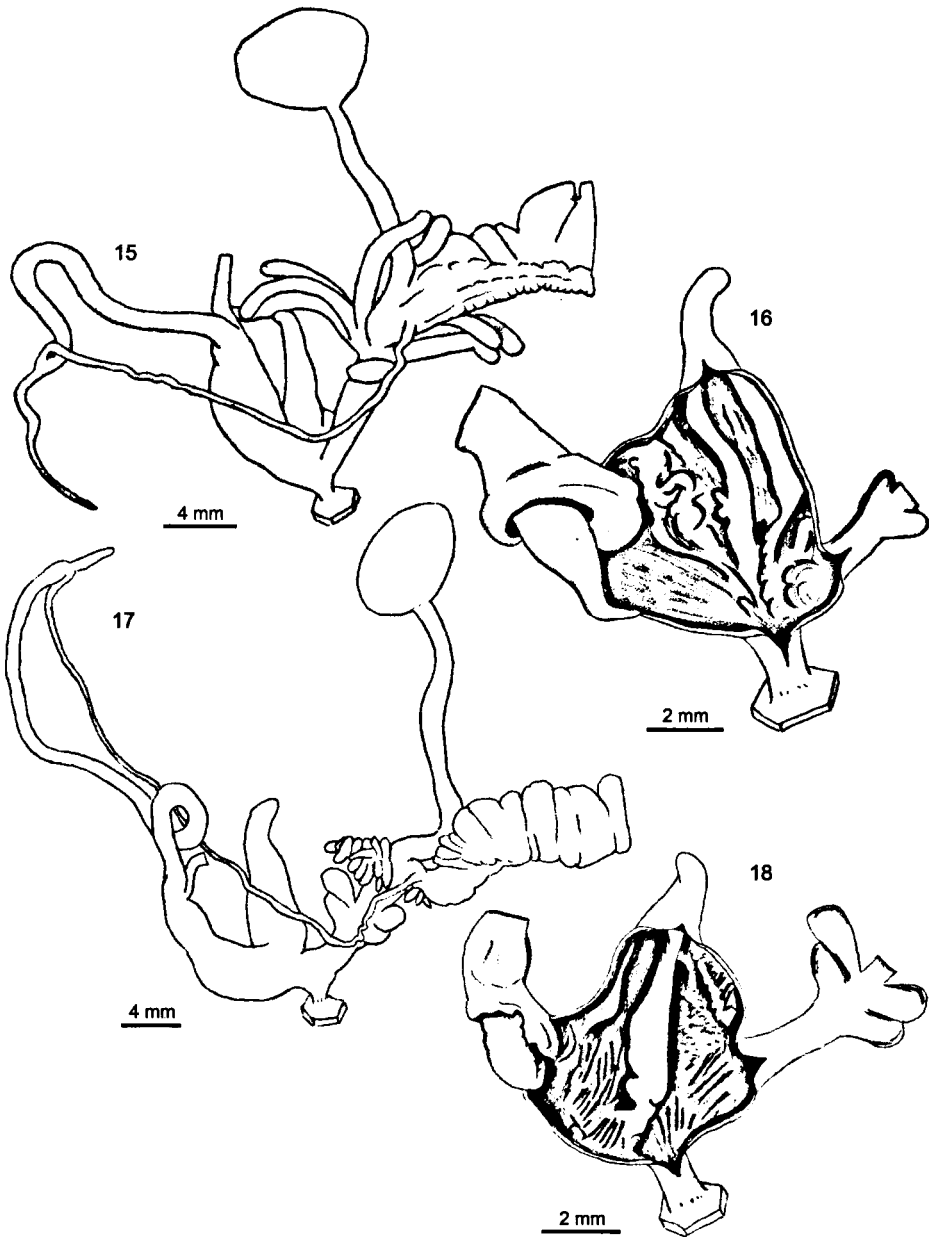
	shell diameter (mm)	mean with s.d.	shell height (mm)	mean with s.d.
Cavanata	9.5 - 12.5	10.8 ± 0.8	6.0 - 7.7	6.8 ± 0.6
Arsa	9.9 - 11.3	11.2 ± 1.0	5.5 - 8.5	6.5 ± 0.8
Bucarizza	10.4 - 14.7	12.4 ± 1.3	5.9 - 9.5	7.6 ± 1.1
Kraljevica	9.8 - 15.8	12.3 ± 1.6	5.3 - 10.9	7.7 ± 1.2
Valbiska	11.1 - 15.9	12.7 ± 1.2	5.9 - 9.4	7.1 ± 0.9
Baška	11.7 - 14.5	12.7 ± 0.8	6.6 - 8.4	7.5 ± 0.5

Table 2. Shell dimensions of *Xeropicta derbentina* (Krynicky, 1836) from Italy and Croatia. n = 15 for each locality; mean with standard deviation (= s.d.).

Penial flagellum short (2.2-2.9 mm) and slender. Epiphallus (14.3-19.1 mm) 7-9 times longer than the flagellum. Penis approximately as long as epiphallus (5.7-6.9 mm), without penial sheath. Distal penis segment with conical, smooth, penial papilla with subapical or apical opening; its tip variable, i.e. bi-, tri- or (more rarely) quadri-lobated.

Genital atrium with a large, markedly conical, penial appendage, which is usually as long as the penis (5.4-7.2 mm). Inner walls of atrium and appendage densely ribbed with parallel pleats and lobes. A large crest-like structure develops from the tip of the atrial appendage, reaching, gradually increasing in height, the atrial aperture (figs 7-10). This structure usually shows a very developed lobe in the middle of the atrium, possibly an "organ of contact" during copula. A second smaller, lobated crest-like structure can be found in the atrial appendage, parallel to the main one, situated on its right.

Remarks. — Altena (1960: 23) found no anatomical differences among specimens from France, Croatia and Turkey. He proposed to classify the specimens from France and Croatia as a subspecies, *X. derbentina homoleuca* (Brusina, 1870), distinguishing them from the nominate subspecies *X. derbentina derbentina* (fig. 27) only by the absence of a colour



Figs 15-18. *Xeropicta* spp. 15-16, *Xeropicta krynickii* (Krynicky, 1833), Livadia near Thebe, Viotia, Greece, Hemmen leg.; 15, genitalia (ovotestis excluded); 16, inner walls of atrium and atrial appendage. 17-18, *Xeropicta vestalis* (L. Pfeiffer, 1841), Kerkhof near Baka (Azerbaijan), H. J. Hopman leg; 17, genitalia (ovotestis excluded); 18, inner walls of atrium and atrial appendage.

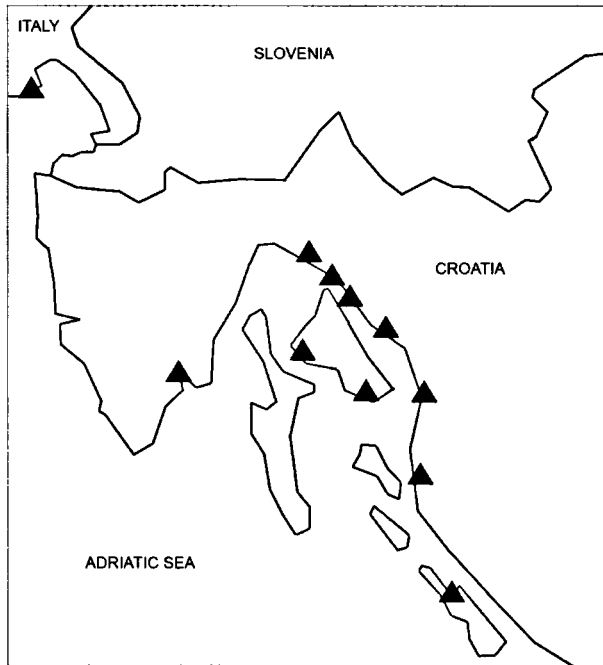


Fig 19. Distribution of *Xeropicta derbentina* (Krynicky, 1836) in Italy and Croatia.

pattern on the shell. Noteworthy is the fact that some shells from the Val Cavanata (Grado, Italy) (fig. 21) clearly show a colour pattern, resembling that of the nominate subspecies.

During the present study many specimens from France ($n = 5$; figs 13-14), Italy ($n = 15$; figs 1, 7), Croatia ($n = 70$; figs 2-6, 8-10) and Turkey ($n = 6$; figs 11-12) have been dissected. No taxonomical significant differences among these population were found. All specimens were characterized by a short flagellum (see Hesse, 1934: 28), a long epiphallus and a similar organization of the crest-like structure (CGA) and pleats of the genital atrium and penial appendage (PA).

The colour pattern is not a significant taxonomic feature (cf. Giusti & Manganelli, 1992), and therefore the subspecific dichotomy proposed by Altena cannot be accepted. The epithet *homoleuca* Brusina, 1870, is a junior synonym of *derbentina* Krynicky, 1836.

In the MCSNTS six topotypes of *Helix liburnica* Stossich, 1880, collected by Stossich himself, were found (figs 24-25). Stossich's material is identical, both conchologically and anatomically (figs 2, 8), to all Croatian populations of *X. derbentina*. Therefore *Helix liburnica* is a junior synonym of *Xeropicta derbentina*.

The status of *Helix vukotinovici* Hirc, 1881 (Hirc, 1881: 524) has already been clarified by Brusina (1885a: 7; 1885b: 21). Hirc described *H. vukotinovici* well knowing that Stossich, a few months earlier, described the same taxon from the same locality.

Helicella gyroides L. Pfeiffer, 1870, is probably another synonym of *X. derbentina*, but so far, more data are needed to clarify the status of this nominal taxon, which could also refer to a white form of *Xerolenta obvia* (Menke, 1828).

X. derbentina belongs to the group of "short penial flagellum" (Altena, 1960; Hesse, 1934), such as *X. vestalis* (L. Pfeiffer, 1841) (figs 17-18). These species have quite similar

anatomical features while diagnostic differences in shell-shape are present. Shells of *X. vestalis* (fig. 28) are more globose, with a higher spire, less deep sutures and a narrower umbilicus. Other species of the genus, such as *X. krynickii* (Krynicky, 1833), even if very similar in shell features (fig. 29), belong to the "long penial flagellum" group (figs 15-16) and are anatomically distinguishable from *X. derbentina*.

Distribution. — The finding of *X. derbentina* in the Val Cavanata (Grado, Gorizia, Italy) represents the first record for the Italian malacofauna, while the record from Most Raša (Raškopolje, Croatia) is the first one for the Istrian peninsula. Along the north-eastern Adriatic shores, *X. derbentina* has a scattered distribution, reaching its northernmost point at the Val Cavanata. After a gap, it is found along the shores of the mainland and some islands (Krk and Pago) of the Gulf of Kvarner (Croatia). Altena (1960: 24) cited the species also from "Kapela" and "Obrovac", but it was impossible to confirm the presence of the species for the Kapela Massif, whereas the second locality, Obrovac, could also not be confirmed after field research. For the distribution of *X. derbentina* in Italy and Croatia see fig. 19.

Xeropicta derbentina probably is not autochthonous along the north-eastern Adriatic shores, although Altena (1960: 24) considered the Croatian populations the westernmost part of its natural range. Considering that the nearest populations have been recorded (doubtfully) for Albania (Polinski, 1924) and its (supposed) lack all along the Dalmatian shores, it is unlikely that the Croatian specimens are autochthonous. The species might have been spread during the 15th and 16th century by the Venetians. Trading routes between north-eastern Adriatic harbours and Asia Minor in those days were frequently used.

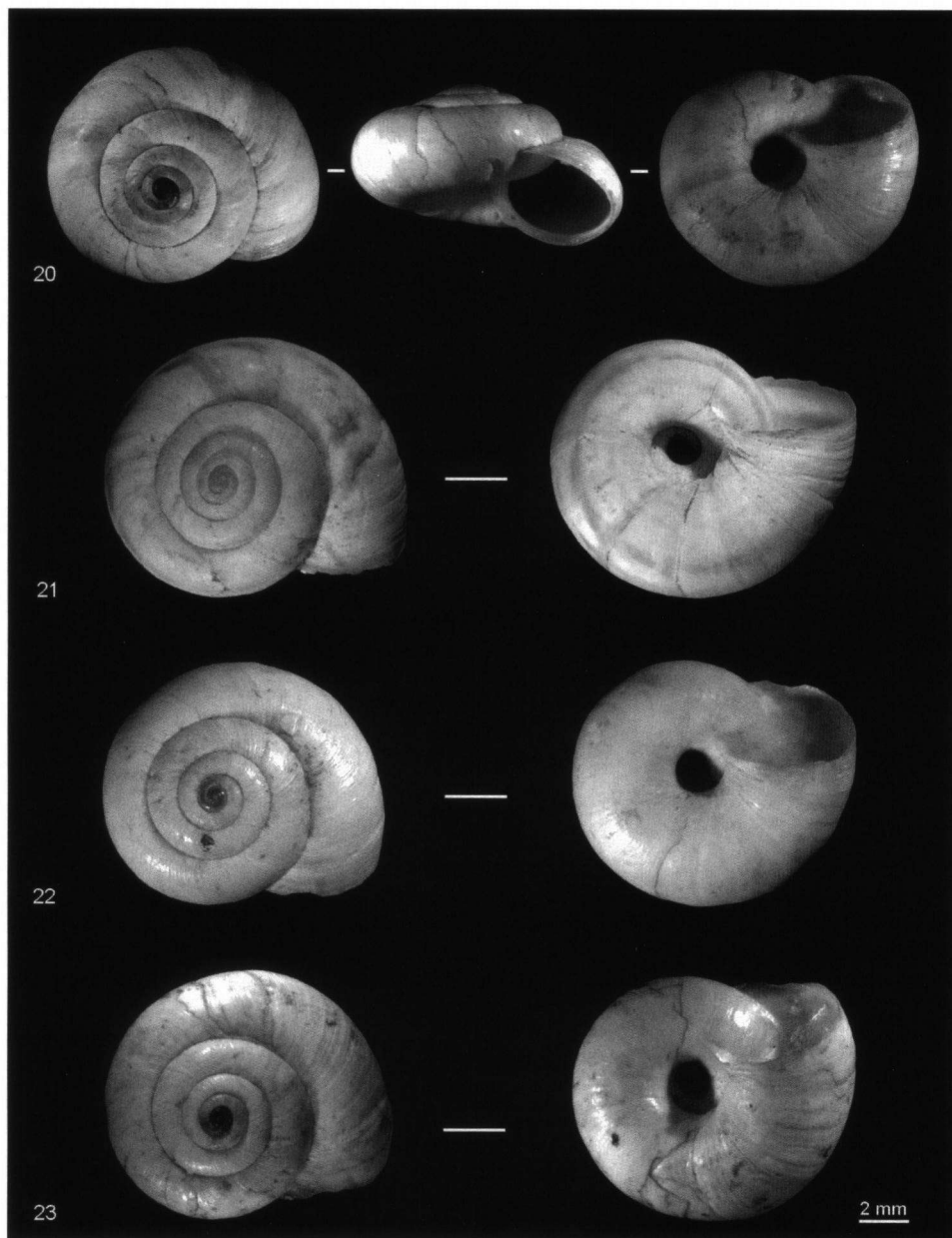
The real distribution of *X. derbentina* in Croatia is still to be defined by anatomical research, since its shell-features (such as a uniformly white colour and a deep, wide umbilicus) can be referred to other common and widespread species, such as white forms of *Xerolenta obvia*.

Habitat and ecology. — In the Val Cavanata, *X. derbentina* has colonized a very small area, where it occurs on grass and branches of halophile plants on sandy dunes, 1 m alt., less than 10 m from the sandy shore. In the Valbiska Bay (Krk, Croatia) a very large population was found aestivating on grass, 1 m from the rocky shore, at 0.5 m alt. The population of Senjska Draga is the most distant from the sea (2.5 km), while the population 3 km beyond from the old town Krk (Maassen, 2005: 80) is the highest (300 m alt.). The species seems to be indifferent regarding the nature of the soil. The snails are usually found on grass stems and bush branches of a xerophile and halophile vegetation in open fields. All the localities, except for the Val Cavanata, are heavily disturbed by human influence. The populations are always very dense, counting not less than 60 living specimens per square meter. During winter time the number of living specimens drastically decreases, probably due to the death of full-grown (at the end of their life cycle) snails and the wintering of the remaining animals, hidden in the sand or in the soil.

Status and conservation. — The species occurs in dense populations, showing a high adaptation to man-made modifications. In Croatia, even if only few localities are seriously endangered (Valbiska Bay, Kraljevica and Novi Vindolsk), the species seems to be not threatened. In spite of its very limited distribution in the Val Cavanata, which would be a clear risk factor, the species is not under immediate threat since the biotope is relatively inaccessible and is now included in the Natura 2000 project (IT3330006).

ACKNOWLEDGEMENTS

I am grateful to Jessica Macor (Muggia, Italy) and Massimo Prodan (Trieste, Italy) for help during field collecting. Thanks are due to the curators of the Natural History Museum



Figs 20-23. Shells of *Xeropicta derbentina* (Krynicky, 1836). 20-21, Val Cavanata near Bocca di Primero, Grado, Gorizia province, Italy; 22, Most Raša, Raškopolje, Istarska Zupanija, Croatia; 23, Bakarac, Primorsko-Goranska Zupanija, Croatia.



Figs 24-29. Shells of *Xeropicta* spp. 24, original label of topotypes of *Helix liburnica* Stossich, 1880, MCSNTS Wt 1606; 25, topotypes of *Helix liburnica* Stossich, 1880. 26-27, *Xeropicta derbentina* (Krynicky, 1836); 26, Villeneuve les Avignon, dept. Gard, France, E. Vial leg.; 27, Simferopol, Crimea, Ukraine, E. Korol leg. 28, *Xeropicta vestalis* (L. Pfeiffer, 1841), Klatzik str., Ramat Aviv, Israel, H. Mienis leg.; 29, *Xeropicta krynickii* (Krynicky, 1833), 2 km N of Lohria, Timbaki, Crete, Greece.

of Trieste (Italy) for the permission to study the material. For providing alcohol-preserved material and critical comments I'm deeply indebted to B. Hausdorf (Hamburg, Germany), W. J. M. Maassen (Leiden, The Netherlands), H. Mienis (Tel Aviv, Israel), E. Korol (Kiev, Ukraine), A. Bertrand (Boussenac, France) and U. Bar-Zeev (Ramat-Gan, Israel).

REFERENCES

- ALTENA, C. O. van REGTEREN, 1960. On the occurrence of a species of *Xeropicta* in France. — *Basteria* 24: 21-26.
- BRUSINA, S., 1885a. Sull'*Helix homoleuca* del littorale croato. — *Bollettino della Società Malacologica Italiana* 11: 5-10.
- BRUSINA, S., 1885b. Sopra tre elici della Croazia. Note d'aggiunta all'articolo sull'*Helix homoleuca*. — *Bollettino della Società Malacologica Italiana* 11: 16-26.
- CHERBONNIER, G., 1953. Sur la présence, en France, de *Helicella (Helicopsis) arenosa* (Ziegler) (Gastéropode). — *Bulletin du Muséum National d'Histoire Naturelle*, Paris 25: 495-500.
- GROSSU, A. V., 1983. *Gastropoda Romaniae*. 4. Ordo Stylommatophora. Suprafam. Arionacea, Zonitacea, Ariophantacea si Helicacea: 1-563. Editura Litera, Bucuresti.
- FALKNER, G., P. OBRDLÍK, E. CASTELLA & M.C.D. SPEIGHT, 2001. Shelled Gastropoda of Western Europe: 1-267. Friedrich-Held-Gesellschaft, München.
- FALKNER, G., T.E.J. RIPKEN & M. FALKNER, 2002. Mollusques continentaux de France. Liste de référence annotée et Bibliographie: 1-350. Publication Scientifique du Muséum National d'Histoire Naturelle, Paris.
- GIUSTI, F., & G. MANGANELLI, 1992. The problem of the species in malacology after clear evidence of the limits of morphological systematics. — *Proceeding of the Ninth International Malacological Congress*: 153-172.
- GIUSTI, F., G. MANGANELLI & P. J. SCHEMBRI, 1995. The non-marine molluscs of the Maltese Islands — *Museo Regionale di Scienze Naturali*, Torino, Monografia 15: 1-607.
- HESSE, P., 1934. Zur Anatomie und Systematik palaearktischer Stylommatophoren. Zweiter Teil. — *Zoologica* 33 (85): 1-59.
- HIRC, D., 1881. Die Mollusken-Fauna des liburnischen Karstes. — *Verhandlungen der kaiserlich-königlichen zoologisch-botanischen Gesellschaft in Wien* 30: 519-530.
- JAECKEL, S.G., W. KLEMM & W. MEISE, 1957. Die Land- und Süßwassermollusken der nördlichen Balkanhalbinsel. — *Abhandlungen und Berichte des Staatlichen Museums für Tierkunde Dresden* 23: 141-205.
- MAASSEN, W. J. M., 2005. Malakologische aantekeningen uit het voormalige Joegoslavië: vondsten van niet-marine mollusken van het eiland Krk. — *De Kreukel* 41 (7): 77-82.
- POLINSKI, W., 1924. Contributions à l'étude systématique et zoogéographique des mollusques de l'Albanie et de régions limitrophes. — *Annales Musei Polonici Historiae Naturalis* 3 (3/4): 127-150.
- SANDRI, G. B., & C. KUTSCHIG, 1846. *Conchigliologia*. — *La Dalmazia*. Giornale letterario economico, inteso agli interessi della provincia, Zara 2 (41): 434-436.
- SCHÜTT, H., 2001. Die Türkische Landschnecken. — *Acta Biologica Benrodis*, Supplementband 4: 1-548.
- STOSSICH, A., 1880. Il Carso Liburnico. — *Bollettino della Società Adriatica di Scienze Naturali* 5: 333-351.
- STOSSICH, A., 1895. I molluschi del Velebit. — *Bollettino della Società Adriatica di Scienze Naturali* 16: 131-140.
- STOSSICH, A., 1899. Contribuzione alla fauna malacologica terrestre e fluviale del territorio di Trieste e in parte delle località contermini. — *Bollettino della Società Adriatica di Scienze Naturali* 19: 17-51.
- WOHLBEREDT, O., 1909. Zur Fauna Montenegros und Nordalbaniens (Mollusken, Käfer, Isopoden, Chilopoden, Diplopoden). — *Wissenschaftliche Mitteilungen aus Bosnien und der Herzegowina* 11: 586-711.