Zeitschrift: Contributions to Natural History : Scientific Papers from the Natural History Museum Bern

Herausgeber: Naturhistorisches Museum Bern

Band: - (2014)

Heft: 26

Artikel: Revision of Helix Linnaeus, 1758 in its eastern Mediterranean distribution area, and reassignment of Helix godetiana Kobelt, 1878 to Maltzanella Hesse, 1917 (Gastropoda, Pulmonata, Helicidae)

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DOI: https://doi.org/10.5169/seals-787046

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Revision of *Helix* LINNAEUS, 1758 in its eastern Mediterranean distribution area, and reassignment of *Helix godetiana* KOBELT, 1878 to *Maltzanella* HESSE, 1917 (Gastropoda, Pulmonata, Helicidae)

Eike Neubert

Abstract

Contrib. Nat. Hist 26: 1–200

The species of the genus *Helix* LINNAEUS, 1758 from the eastern part of Europe and Near East are revised. Based on the investigation of thousands of shells and more than 100 preserved specimens, 29 species are recognised as valid for this area, for which more than 250 validly described names are available. The type specimens for almost all valid nominal taxa could be located and documented. The morphology of the genital organs of most of the species is described and illustrated. Geo-referenced maps are supplied to show the distribution of all species found in the investigated area. For some species, lectotypes are designated in order to stabilise nomenclature and to prevent further misidentifications. *Helix godetiana* KOBELT, 1878 is excluded from *Helix*, and included in *Maltzanella* HESSE, 1917.

Keywords: Revision, *Helix*, type designation, taxonomy, distribution.

Introduction

The genus *Helix* LINNAEUS, 1758 represents one of the oldest genera created within the Mollusca. It was used by early authors like Linnaeus and Müller (1774) for most of the landshells, despite of their completely different geographic origin. Due to progressive insights in natural history, a system was created reflecting real phylogenetic relationships, thus leading to a more restricted use of generic names. At the beginning of the last century, the concept of *Helix* was more or less concentrated in the taxa that are nowadays placed in the Helicinae with *Helix* as a "supergenus" where all known big-sized Helicidae were placed at the subgeneric level within *Helix*. *Helix* itself was characterized by (sub)generic names like *Pomatia* or *Helicogena*. The use of these names differed according to personal opinions, which, however,

was seldom discussed. Kobelt, for instance, changed the level of these names during his publications on *Helix* several times, but without any argument.

At the beginning of this century, the investigation of *Helix* culminated in Kobelt's monumental monograph in the "Systematisches Conchylien-Cabinet of Martini & Chemnitz" (1902–1906). Most of it was based on the thousands of shells still housed in the voucher collection of the Senckenberg Museum in Frankfurt/Main and is the first (and last) comprehensive work on this genus. Some years later, Kobelt's system was refined by Hesse (1915–1920), who tried to support Kobelt's view by anatomical studies. The system created by Hesse is in use until now. However, the work of Hesse contains several mistakes, and suffers in general by a lack of theoretical background because it was Hesse's wish to prove Kobelt's ideas. Nevertheless, it was a magnificent work with much detailed information, still usable today. Quite recently, Schileyko (2006) briefly reviewed *Helix* in his "Treatise" and presented a very different view on the group. This new arrangement will be discussed in a paragraph of its own.

Material and Methods

Types: The ongoing misidentifications or errors in the identification of *Helix* species can only be minimized if all validly described taxa on the species and genus level are presented and re-evaluated. For this reason, research on type specimens is pivotal. The major bulk of type specimens of *Helix* species is housed in the collection of SMF, where they have been identified by Zilch, who published his results (including the designation of type specimens) in 1952. Another source of *Helix* type specimens is the collection of Bourguignat housed in the MHNG. Where appropriate, lectotypes were designated. The names *major* and *minor* are not considered, as they are in all cases primary homonyms, because the oldest valid trinominal use of *major* and *minor* within *Helix* is *Helix nemoralis* var. *major* and var. *minor* CHARPENTIER, 1837. The name *normalis* is also not compiled in the synonymy, since authors used this name to describe what has been considered to represent the nominotypical subspecies. The synonymy lists do not pretend to be complete.

Measurements: The measurements were taken with a calliper. The diameter of the peristome is measured inside the aperture to avoid the problem where to start with the measurement at the columella. As diameter of the protoconch the diameter of the first two whorls is measured beginning from the starting point of the suture. All measurements are in mm.

Specimens examined: In this paragraph, the checked specimens are listed. In the former days, many collections were split, some of the shells given to several collectors and institutions. In many cases, these original lots have been re-united decades later when the museums bought private collections. In these cases, the lot is mentioned only once, since for this work, the zoogeographical aspect is more important than the museological one. The text on the labels is always cited in its original language and spelling. In some cases, explanations are added in parentheses [].

Anatomical studies: The original idea was to study topotypical material of all nominal taxa. This is an immense work, since there are so many names, often from locations which are not known until now or which can't be visited because for political reasons. Despite of this, almost all valid species could be anatomically studied in detail. It has to be emphasised, that the investigation focused on the reproductive organs. The preparation was done in such a way that an investigation of mantle, radula and circulatory system is still possible. It should be noted, that a comparison of Hesse's results to those presented here suffers from the almost complete lack of information on the internal anatomy of the reproductive organs in the papers of Hesse. In particular, the division of the penis and its boundary to the epiphallus is incorrectly interpreted by him (and several other authors as well). He used the insertion of the mrp at the penis as the boundary of penis and epiphallus (Hesse 1908: 189), a point of view that has been corrected by later authors, particularly since the trail-blazing anatomical studies by Schileyko (1968; 1978). In fact, the mrp inserts at the distal third or at the centre of the epiphallus, a position, which may vary to some extent and can only be detected by studying the internal anatomy. For this reason, Hesse's measurements and length-ratios of the male organs have to be used very carefully. For methodological details and nomenclature of the genital organs, the work of Neubert & Bank (2006) is followed here.

In many morphological studies on Helicidae, much attention has been given to the form and structure of the dart. This feature is not addressed here, because very often the dart is heavily damaged after opening the dart sac, and thus a comparison between species is hampered. Apart from that, I have the impression from the limited material available to me, that the structural differences in the dart's morphology on a species level does not seem to be so important. For these reasons it seems justifiable for now to set aside the systematic investigation of the dart.

The illustrations of the genital organs are not to scale but follow the best display possible; the maximum height of the situs is given in mm. Usually, the shell of the specimen dissected is also illustrated on the upper left corner of the plate.

Distribution maps: Whenever possible, all localities have been geo-referenced. On the maps only those specimens seen by the author are displayed. Thus, the maps do not reflect the total known distribution area of the species, but should be considered as an approximation. In some cases, dots may occur that are quite likely outside the suspected distribution area of a species. These records are usually based on museum specimens, where the exact origin of the specimens is unknown, and an easily identifiable larger city has been used to indicate the record; they also may be subject to a confusion caused by the collector or a mis-labelling in the museums themselves. Nonetheless, these records are added to the maps hoping that the increase of knowledge about the distribution of the species will help to clarify those doubtful records.

This study is mainly based on the enormous material stored in the Senckenberg Museum. The fact that almost 50% of the types of *Helix* spp. stem from the collection of this institution, shows the considerable impact of SMF in malacological studies. The lack of secondary material with precise localities could be compensated by material from several travels to Greece and Turkey by Hausdorf, Hemmen, Menkhorst, Nordsieck, Subai, Liebegott, the author, and others.

Private collections and several voucher collections of the following museums were studied:

BANK collection Ze'ev Bar in private coll. R.A. Bank, Hoogezand, The Netherlands
GNM Göteborg Naturhistoriska Museet
HAUS collection B. Hausdorf, Hamburg
HEMM collection J. Hemmen, Wiesbaden, now ANSP, USA
LIEB private collection A. Liebegott, Frankfurt (now in SMF)
MENK private collection H.P.M.G. Menkhorst, Krimpen of de IJssel, The Netherlands
NMBE Naturhistorisches Museum der Burgergemeinde Bern, including the private collections of P. Subai and E. Neubert
NMB Naturhistorisches Museum Basel
NMW National Museum of Wales, Cardiff
MHNG Muséum d'histoire naturelle de la Ville de Genève
MNHN Muséum national d'Histoire naturelle, Paris
MZL Musée cantonal de Zoologie, Lausanne
RÄH private collection Rähle, Tübingen, now in SMNS
SMF Senckenberg Naturmuseum Frankfurt/Main
SMNS/NORDS Staatliches Museum für Naturkunde Stuttgart, coll. H. Nordsieck
ZMB Zoologisches Museum für Naturkunde Berlin

ZSM Zoologische Staatsammlung München
ZMZ Zoologisches Museum der Universität Zürich
ZMK Zoologisch Museum Copenhagen

Other abbreviations used:

alk preserved
ast atrial stimulator
bc bursa copulatrix
D shell diameter
div diverticulum
glamuc glandulae mucosae
H shell height
MCh Kobelt, W. In: Martini & Chemnitz, VI: *Helix*
mrp musculus retractor penis
PD diameter of peristome
ped pedunculus
PH height of peristome
pp penial papilla
PrD diameter of protoconch
SD subsequent designation
W number of whorls.

Systematic account

Helix Linnaeus, 1758

1758 *Helix* Linnaeus, Systema naturae, 10. edition, 1: 768 [type species: *Helix pomatia* Linnaeus, 1758] [placed on the Official List by ICZN Opinion 94, 1926].
1778 *Cochlea* Da Costa, Historia Naturalis Testaceorum Britanniae: 67 [type species: *Helix pomatia* Linnaeus, 1758].
1820 *Glischrus* Studer, Systematisches Verzeichniss Schweizer-Conchylien 11 [type species: *Helix pomatia* Linnaeus, 1758]
1822 *Helicogena* Férussac, Tabl. syst.: 23 [27], 27 [31] [type species: *Helix pomatia* Linnaeus, 1758].
1831 *Pomatia* Leach in Turton, A manual of the land and fresh-water shells of the British Islands: 45 [nomen nudum, as the type species (*Pomatia antiquorum* Turton, 1831) is also a nomen nudum].

1837 *Pomatia* BECK, Index molluscorum praesentis aevi musei principis augustissimi Christiani Frederici 1: 43 [type species: *Helix pomatia* LINNAEUS, 1758] [Preoccupied by *Pomatia* RÖDING, 1798].

1838 *Coenatoria* HELD, Isis (Oken) 1837 (12): 910 [type species: *Helix pomatia* LINNAEUS, 1758].

1882 *Callunea* MEGERLE in Scudder, Nomenclator Zoologicus, Suppl. List 56 [not available: published in nomenclator].

1882 *Megastoma* MEGERLE in Scudder, Nomenclator Zoologicus, Suppl. List 204 [not available: published in nomenclator].

1903 *Pomatiana* FAGOT, Bulletin de la Société des Sciences Historiques et Naturelles de la Corse 22: 241 [type species: *Helix pomatia* LINNAEUS, 1758].

1909 *Pomatiella* PALLARY, Mémoires présentés a l'Institut d'Égypte 6 (1): 21, 23 [non CLESSIN, 1889 = Cochlostomatidae] [no type species selected].

1914 *Physospira* C. BOETTGER, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 46 (3): 103 [type species: *Helix vulgaris* ROSSMÄSSLER, 1839 = *Helix albescens* ROSSMÄSSLER, 1839].

1918 *Pachyphallus* HESSE, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 50 (1): 38 [type species: *Helix ligata* O.F. Müller, 1774].

1918 *Rhododerma* HESSE, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 50 (1): 38 [type species: *Helix asemnis* BOURGUIGNAT, 1860].

1936 *Cunula* PALLARY, Journal de Conchyliologie 80 (1): 47 [nomen novum pro *Pomatiella* PALLARY, 1939 (non CLESSIN, 1889)].

1939 *Tammouzia* PALLARY, Mémoires présentés a l'Institut d'Égypte 39: 22 [type species *Helix cincta* var. *anctostoma* v. MARTENS, 1874].

Description

Shells almost always globular, columella brownish-blackish or white, variable colour banding pattern from five colour spirals to fused (usually in a sub and supraperipheral band), shell smooth or with a dense granulation on the upper whorls of teleoconch; diverticulum transformed to a thick, short tube never exceeding the bursa copulatrix in length, or reduced to completely lacking, both papilla with central perforation, mrp always attaching in a central position on the epiphallus, epiphallus as long as or considerably longer than penis.

To facilitate the understanding of the argumentation, the definitions of the subgenera of *Helix* are here translated and partly discussed.

Helicogena sensu Hesse (1908: 139) includes species with "a relatively short penis, the proximal part (epiphallus sensu Hesse)] very short, less than one third of the complete length; the flagellum is considerably longer than the penis.

The diverticulum is shorter than the stem of the bursa copulatrix or completely lacking". This subgenus forms part of the genus *Helix* proper.

Physospira was created by C.R. Boettger because of the very broad protoconch of *Helix albescens*. Later, Hesse (1915–1920) justified *Physospira* anatomically as having a short and thick penis, a short flagellum, and the lack of the diverticulum. During the anatomical work it could be observed that 1) usually presence or absence of the diverticulum is a reliable character for species recognition, but 2) individuals may occur which should have a diverticulum but lack it, and vice versa. For this reason, the lack or presence of the diverticulum has to be considered very carefully in phylogenetic reconstructions. The "broad protoconch" is shared by several species (*salomonica, philibinensis*), which differ in their genital anatomy to a great extent. Thus, the name *Physospira* creates a paraphyletic group of species and has to be rejected.

Pachyphallus describes species with "a usually cylindrical, quite thick penis; the diverticulum is lacking or short, the flagellum is long, formed like a whip or short, formed like an awl". This description is inhomogeneous (short or lacking diverticulum) or uses characters, which can't be delimited (cylindrical and thick penis). It is based on the Italian species *Helix ligata*. The morphology of the genital organs in this species conform to the definition of *Helix* s. str. as used here (i. e. the diverticulum is reduced to a short tubule, and epiphallus is shorter than penis). Consequently, *Pachyphallus* is here considered a synonym of *Helix* (*Helix*).

Rhododerma is defined as a *Helix* with a "fusiform penis, the pedunculus with a regularly present diverticulum; the animal is pink or fleshy coloured, a cervical crest is missing". In fact, living animals of *H. asemnis* can be red, but the structure of the genital organs does not significantly differ from that of *Helix* proper.

Tammouzia is created for *anctostoma* because this species often has a callosity on the columella. This character state varies considerably, and can also be found as an individual variation of *H. asemnis*. Since toothed columellae occur elsewhere within the Helicini, this character state is considered plesiomorphic, and the genus *Tammouzia* is rejected.

Remark: The main feature in *Helix* is the obvious transformation of the diverticulum. In other genera of the Helicinae, this organ is a very long and simple tube exceeding the vesicle of the bursa copulatrix in length. In *Helix*, however, the diverticulum does not exceed the vesicle, and is either very short and translucent to completely lacking, or is transformed to a short, flat and broad organ. While in *H.* (*Pelasga*) all species known anatomically have the latter form of diverticulum, in *Helix* (s. str.) both forms may occur. Reduction to complete loss of the diverticulum means that its function is superfluous,

while in the other case the function may have changed. A comparative histological survey of this organ could shed some light on the problem.

***Helix* (s. str.)**

Diagnosis: shells usually with brown to blackish columella, often the complete labial callus black, shell sculpture of axial ribs or riblets; diverticulum short, epiphallus as long as or shorter than penis.

Helix (*Helix*) *pomatia* LINNAEUS, 1758 (Figs 1–23)

1758 *Helix pomatia* LINNAEUS, Systema Naturae, 10. edition: 771.

1774 *Helix pomaria* O. F. MÜLLER, Vermium terrestrium et fluviatilium II: 45 [a name for left coiled *Helix pomatia*].

1774 *Helix scalaris* O. F. MÜLLER, Vermium terrestrium et fluviatilium II: 113 [a name for scalarid forms of *Helix pomatia*].

1831 *Pomatia antiquorum* LEACH in Turton, A manual of the land and fresh-water shells of the British Islands: 45. Type locality: not given [title: "British Islands"]. Nomen nudum (in synonymy of *Helix pomatia* LINNAEUS, 1758).

1838 *Helix pomatia* var. d *fasciata* PORRO, Malacologia terrestre e fluviale della provincia Comasca: 44 [nomen nudum].

1838 *Helix pomatia* var. a *gigantea* PORRO, Malacologia terrestre e fluviale della provincia Comasca: 44 [nomen nudum].

1844 *Helicogena pomatia* var. *gesneri* HARTMANN, Erd- und Süsswasser-Gasteropoden der Schweiz: 100, Taf. 20, fig. 2 [no locality].

1844 *Helicogena pomatia* var. *rustica* HARTMANN, Erd- und Süsswasser-Gasteropoden der Schweiz: 100, Taf. 29, Fig. 2 [no locality].

1844 *Helicogena pomatia* var. *sphaeralis* HARTMANN, Erd- und Süsswasser-Gasteropoden der Schweiz: 105, Taf. 29, Fig. 2 [Rheinwald, etwas höher als Nufenen].

1844 *Helicogena inflata* HARTMANN, Erd- und Süsswasser-Gasteropoden der Schweiz: 105, Taf. 29, Fig. 2 [Fusse des Lukmanier].

1855 *Helix pomatia quinquefasciata* MOQUIN-TANDON, Histoire naturelle des mollusques terrestres et fluviatiles de France: 179 [no locality].

1855 *Helix pomatia brunnea* MOQUIN-TANDON, Histoire naturelle des mollusques terrestres et fluviatiles de France: 179 [no locality].

1855 *Helix pomatia albida* MOQUIN-TANDON, Histoire naturelle des mollusques terrestres et fluviatiles de France: 179 [no locality].

Figs 1–9. *Helix* (*Helix*) *pomatia* LINNAEUS, 1758. Fig. 1 *compacta*, syntype SMF 9573, D = 50.07, Hungary "Gestrüppe der Berglehnen"; Fig. 2 *pulskyana*, syntype SMF 9525/2a, Hungary "Inseln der Donau", D = 36.6; Fig. 3 *hajnaldiana*, syntype SMF 9658, Hungary "Budapest, im botanischen Garten", D = 34.1; Fig. 4 *solitaria*, syntype SMF 74708/2a, D = 31.1; Fig. 5 *sabulosa*, syntype SMF 9524, D = 40.5, Fig. 6 *expansilabris*, holotype SMF 9538, D = 45.5; Fig. 7 *luteola*, holotype SMF 9527, D = 34.6; Fig. 8 *pannonica*, lectotype SMF 9535, D = 40.5, Fig. 9 *lednicensis*, syntype SMF 9534/2a, D = 38.3. — All photos Neubert, original size.

1855 *Helix pomatia grandis* MOQUIN-TANDON, Histoire naturelle des mollusques terrestres et fluviatiles de France: 179 [no locality].

1855 *Helix pomatia parva* MOQUIN-TANDON, Histoire naturelle des mollusques terrestres et fluviatiles de France: 179 [no locality].

1880 *Helix pomatia* var. *compacta* HAZAY, Malakozoologische Blätter, N.F. 3: 43, Taf. II, Fig. 2 [Gestrüppe der Berglehnen].

1880 *Helix pomatia* var. *Pulskyana* HAZAY, Malakozoologische Blätter, N.F. 3: 44, Taf. I, Fig. 2 [Lebt auf den Inseln der Donau].

1880 *Helix pomatia* var. *Hajnaldiana* HAZAY, Malakozoologische Blätter, N.F. 3: 45, Taf. II, Fig. 4 [im botanischen Garten].

1880 *Helix pomatia* var. *solitaria* HAZAY, Malakozoologische Blätter, N.F. 3: 45 [Lebt in Gärten der Ebene] [non *Helix solitaria* POIRET, 1801, nec *Helix solitaria* SAY, 1818].

1880 *Helix pomatia* var. *sabulosa* HAZAY, Malakozoologische Blätter, N.F. 3: 45, Taf. II, Fig. 6 [Lebt an feuchten schattigen Orten der Ebene].

1882 *Helix promaeca* BOURGUIGNAT in Locard, Prodrome de Malacologie Française: 303 [Coire (Grisons, Suisse)].

1882 *Helix pyrgia* BOURGUIGNAT in Locard, Prodrome de Malacologie Française: 305 [Vosges, Remiremont; Troyes; Villemur].

1884 *Helix eusarcosoma* SERVAIN, Annales de Malacologie, I: 350 [nom. nov. pro *Helix pomatia* var. *solitaria* HAZAY 1880 non *Helix solitaria* POIRET, 1801, nec *Helix solitaria* SAY, 1818].

1885 *Helix pomatia* var. *radiata* ULICNY, Verhandlungen des naturforschenden Vereines in Brünn 23: 162 [Mähren: Punkwa-valley].

1885 *Helix pomatia* var. *lagarinae* ADAMI, Bullettino della Società Malacologica Italiana 11: 219 [Valle Lagarina nel Trentino (V. Adige) sale Ano ad oltre i 1300 m].

1886 *Helix* (*Helicogena*) *pomatia* L. var. *Thessalica* O. BOETTGER, Jahrbücher der deutschen Malakozoologischen Gesellschaft 13: 56 [Griechenland, Pilion, village Makrinitza close to Volo].

1888 *Helix pomatia* var. *lednicensis* BRANCSIK, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 20: 117 [Ruine Lednicz].

1888 *Helix segalaunica* SAYN, Bulletins de la Société malacologique de France 5: 142 [Peyrus].

Figs 10–19. *Helix* (*Helix*) *pomatia* LINNAEUS, 1758. Fig. 10 *claudiensis*, holotype SMF 9543, Klausenburg, D = 39.5; Fig. 11 *dobrudschae*, holotype SMF 9541, Rumania, Dobrudscha, Comana Vlasca, D = 46.2; Fig. 12 *costellata*, holotype SMF 9631, Markt in Bukarest, D = 39.7; Fig. 13 *elsae*, lectotype SMF 9529, nahe Bukarest, D = 34.9; Fig. 14 *transsylvanica*, holotype SMF 9634, Markt in Bukarest, D = 40.1; Fig. 15 *christinae*, lectotype SMF 9542, Runku über Bukarest, D = 44.5; Fig. 16 *kapellae*, holotype SMF 9544, Kapella Gebirge, D = 44.2; Fig. 17 *serbica*, holotype SMF 9540, Maidanek, D = 53.9; Fig. 18 *thessalica*, lectotype SMF 9568, Makrinitza bei Volos, D = 45.4; Fig. 19 *rhodopensis*, syntype SMF 9599/2a, Philippoppel, D = 41.0. — All photos Neubert, original size.

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1890 (*Helix*) *pomatia* var. *piceata* GREDLER, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 22: 154 [Arco].

1891 *Helix pomatia* var. *banatica* KIMAKOWICZ, Verhandlungen und Mitteilungen des siebenbürgischen Vereins für Naturwissenschaften 40: 86 [non *Helix banatica* ROSSMÄSSLER, 1838].

1892 *Helix* (*Helicogena*) *pomatia* var. *gratiosa* GREDLER, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 24: 174 [Franciscanerkloster "Alle grazie" unweit des bekannten Kurortes Arco im Sarcathale].

1906 *Helix* (*Helicogena*) *pomatia* forma *fasciata* KOBELT, Systematisches Conchylien-Cabinet VI: 243, Taf. 360, Fig. 1, 2 [Esino, Val Camonica].

1906 *Helix* (*Helicogena*) *pomatia* forma *pygmaea* KOBELT, Systematisches Conchylien-Cabinet VI: 246, Taf. 360, Fig. 8 [Wiesbaden, Steinbruch hinter der Hammermühle].

1906 *Helix* (*Helicogena*) *pomatia* var. *pannonica* KOBELT, Systematisches Conchylien-Cabinet VI: 249, Taf. 361, Fig. 8, Taf. 363, Fig. 5, 6 [Budapest].

1906 *Helix* (*Helicogena*) *pomatia* var. *luteola* KOBELT, Systematisches Conchylien-Cabinet VI: 249, Taf. 361, Fig. 11, 12 [Umgebung von Budapest].

1906 *Helix* (*Helicogena*) *pomatia* var. *kapellae* KOBELT, Systematisches Conchylien-Cabinet VI: 251, Taf. 362, Fig. 4 [Kapella Gebirge] [= 45.27 14.97, main summit Bjelolasica].

1906 *Helix* (*Helicogena*) *pomatia* var. *serbica* KOBELT, Systematisches Conchylien-Cabinet VI: 252, Taf. 363, Fig. 1, 2 [Maidanek = Madjanpek 44.42 21.94].

1906 *Helix* (*Helicogena*) *pomatia* var. *expansilabris* KOBELT, Systematisches Conchylien-Cabinet VI: 253, Taf. 363, Fig.3, 4 [Lower Hungary].

1906 *Helix* (*Helicogena*) *pomatia* var. *elsae* KOBELT, Systematisches Conchylien-Cabinet VI: 254, Taf. 363, Fig. 7, 8 [nahe Bukarest].

1906 *Helix* (*Helicogena*) *pomatia* var. *christinae* KOBELT, Systematisches Conchylien-Cabinet VI: 255, Taf. 364, Fig. 1, 2 [Runku über Bukarest].

1906 *Helix* (*Helicogena*) *pomatia* var. *dobrudschae* KOBELT, Systematisches Conchylien-Cabinet VI: 256, Taf. 364, Fig. 3, 4 [Rumania, Dobrudscha: Comana Vlasca].

1906 *Helix* (*Helicogena*) *pomatia* var. *rhodopensis* KOBELT, Systematisches Conchylien-Cabinet VI: 257, Taf. 364, Fig. 5, 6 [Slope of the Rhodope Mountains at Philippopel].

1906 *Helix* (*Helicogena*) *pomatia* var. *costellata* KOBELT, Iconographie der Land- und Süsswassermollusken 2 (13): 4, Taf. 333, Fig. 277 [Markt in Bukarest].

1906 *Helix* (*Helicogena*) *pomatia* var. *transsylvanica* KOBELT, Iconographie der Land- und Süsswassermollusken 2 (13): 5, Taf. 333, Fig. 279 [Markt in Bukarest].

1906 *Helix* (*Helicogena*) *pomatia* var. *claudiensis* KOBELT, Iconographie der Land- und Süsswassermollusken 2 (13): 5, Taf. 333, Fig. 280 [Klausenburg].

1907 *Helix* (*Helicogena*) *pomatia* var. *pedemontana* KOBELT, Iconographie der Land- und Süsswassermollusken 2 (13): 8, Taf. 335, Fig. 2085 [? Piemont].

1920 *Helix pomatia burmesteri* BLUME, Archiv für Molluskenkunde 52 (2): 90 [Südhänge des Brena (2100 m) ... Höhe von 15–1700 m ... Brena ... zirka 30 km westlich von Gjewgjelii im Wardartal].

1920 *Helix pomatia brenaensis* BLUME, Archiv für Molluskenkunde 52 (2): 91 [Südhänge des Brena (2100 m) ... Höhe von 15–1700 m ... Brena ... zirka 30 km westlich von Gjewgjelii im Wardartal].

Type specimens:

expansilabris: holotype SMF 9538 (Zilch 1952: 163): H = 44.1; D = 45.5; PH = 39.5; PD = 26; PrD = 5.4; W = 5.25. *lednicensis*: syntype SMF 9534/2a (Zilch 1952: 163): H = 38.2; D = 38.3; PH = 27.2; PD = 22.2; PrD = 5.3; W = 4.75. *pulskyana*: syntype SMF 9525/2a (Zilch 1952: 164): H = 41,9; D = 36.6; PH = 25,9; PD =20,9; PrD = 5.3; W = 5.25. *compacta*: syntype SMF 9573 (Zilch 1952: 164): H = 52.4; D = 50.07; PH = 35.3; PD = 28.3; PrD = 6.6; W = 5. *hajnaldiana*: syntype SMF 9658 (Zilch 1952: 164): H = 33; D = 34.1; PH = 21.7; PD = 18.5; PrD = 3.9; W = 4.25. *solitaria*: syntype SMF 74708/2a (Zilch 1952: 164): H = 39.2; D = 38.3; PH = 28.2; PD = 23.6; PrD = 5.2; W = 5. *sabulosa*: syntype SMF 9524 (Zilch 1952: 164): H = 34,1; D = 31.1; PH = 21,2; PD = 17,6; PrD = 4,8; W = 5.25. *pannonica*: lectotype SMF 9535 (SD Zilch 1952: 164): H = 41.4; D = 40.5; PH = 29.2; PD = 23.5; PrD = 5; W = 5. *luteola*: holotype SMF 9527 (Zilch 1952: 164): H = 35.9; D = 34.6; PH = 24.7; PD = 19.6; PrD = 4.9; W = 5. *costellata*: holotype SMF 9631 (Zilch 1952: 164): H = 43.5; D = 39.7; PH = 30; PD = 24; PrD = 5.2; W = 5. *transsylvanica*: holotype SMF 9634 (Zilch 1952: 164): H = 42.6; D = 40.1; PH = 28.5; PD = 25.9; PrD = 5; W = 5.25. *claudiensis*: holotype SMF 9543 (Zilch 1952: 164): H = 40.3; D = 39.5; PH = 27.2; PD = 21.6; PrD = 5.1; W = 5. *elsae*: lectotype SMF 9529 (SD Zilch 1952: 164): H = 34.9; D = 36.1; PH = 25.9; PD = 20.9; PrD = 4.4; W = 4.75. *christinae*: lectotype SMF 9542 (SD Zilch 1952: 164): H = 45.5; D = 44.5; PH = 32.3; PD = 28; PrD = 5.7; W = 5. *dobrudschae*: holotype SMF 9541 (Zilch 1952: 164): H = 46.1; D = 46.2; PH = 34.5; PD = 28.6; PrD = 5.6; W = 5. *rhodopensis*: syntype SMF 9599/2a (Zilch 1952: 164): H = 42.7; D = 41; PH = 40.3; PD = 25.1; PrD = 5.5; W = 4.75. *serbica*: holotype SMF 9540 (Zilch 1952: 165): H = 55; D = 53.9; PH = 38.6; PD = 32.3; PrD = 5; W = 5.25. *kapellae*: holotype SMF 9544 (Zilch 1952: 165): H = 50.4; D = 44.2; PH = 32.2; PD = 26.4; PrD = 7.1; W = 5.25. *thessalica*: lectotype SMF 9568 (SD Zilch 1952: 165): H = 44.8; D = 45.4; PH = 32.2; PD = 37.1; PrD = 6.6; W = 5.

Specimens examined:

Hungary: SMF 74648/1, Budapest 47.4975 19.0445; ditto, SMF 19975/1; ditto, SMF 74657/3; ditto, SMF 19970/5; ditto, SMF 74698/2; ditto, SMF 20245/2; ditto, SMF 20246/3; ditto, SMF 20346/2; ditto, SMF 9574/4; ditto, SMF 74708/2, ST *soli-*

taria; ditto, SMF 20340/6; ditto, SMF 74693/1; ditto, SMF 74696/3; ditto, SMF 20226/3; ditto, SMF 20291/4; ditto, SMF 74687/4; ditto, SMF 214748/2; ditto, SMF 19971/2; ditto, SMF 299256/1; ditto, SMF 74687/7, ST *pannonica*; SMF 20227/11, Budapest, Szemlöhezy; SMF 74689/3, Budapest, Margaretheninsel, 47.5260 19.0472; SMF 19835/17, Botanical Garden, Budapest, 47.4819 19.0403; ditto, SMF 74652/2; SMF 74694/4, ST *sabulosa*; SMF 19834/31, Gellert Hill, Budapest, 47.4870 19.0464, SMF 20342/1, Pest, 47.5001 19.1002; ditto, SMF 19979/1; ditto, SMF 20080/1; ditto, SMF 74658/1; ditto, SMF 20343/2; ditto, SMF 20230/1; ditto, SMF 299251/1; SMF 20334/1, Komarom, Hrutitzky, 47.7582 18.1289, Kormos; SMF 9580/1, Lower Hungaria, ex Straube, ST *expansilabris*; SMF 74703/1, 10 km N of Budapest, 47.5892 19.0626, coll. K.L. Pfeiffer; SMF 224817/1, Bankut, Bükk Mts., 48.0989 20.4886; SMF 299285/2, upper valley of the Vratna, coll. K.L. Pfeiffer; SMF 19974/1, Csobzoka, Kormos 1896; SMF 19972/1, Aluzala, Kormos; SMF 9536/1, Cerithienkalk, ex Hazay, Orig Icon 1975; SMF 19837/3, Sztrojana, ex Kormos; Tihany, Cyprian source 1 Km in dir. ferry boat, 46.9187 17.8891, 120 m alt., 5.8.1970, NMBE 522677/1; between "Paphegy" and Morgo creek, Börzsöny-Mts., 47.8856 18.9807, 250 m alt., 4.5.1971, NMBE 522666/2; Malom, Gerecse Mts., 47.582 18.4533, 205 m alt., 30.4.1971, NMBE 522654/1; Budakeszi, 47.5193 18.9427, 320 m alt., 26.4.1970, NMBE 522738/6; Tata-Tovaros, 47.6308 18.3362, 130 m alt., 3.5.1970, NMBE 522696/4; Palotaer Island, Budapest-Ujpest, 47.5764 19.0728, 26.8.1970, NMBE 522693/3; Ujszeged, Maros river, Szeged, 30.7.1967, NMBE 522712/4; Széchenyi liget (Békéscsaba), 17.11.1964, NMBE 522710/2; Budakeszi, Pest, 47.5193 18.9427, 320 m alt., 26.4.1970, NMBE 522701/6; Eger, Hotel Park, 47.9005 20.3703, 180 m alt., 12.11.1969, NMBE 522478/1; "Magas Tax", hiking path, Börzsöny Mts., 47.927 18.9277, 700 m alt., 5.10.1971, NMBE 522472/1; Mt. Kohegys, Pilis Mts., Pest, 47.6789 19.0107, 350 m alt., 8.5.1971, NMBE 522466/2; Balatonrendes, 46.8247 17.5841, 9.6.1967, NMBE 522461/4; Bubanat valley, Pilis Mts., Komarom-Esztergom, 47.8086 18.8109, 120 m alt., 15.5.1971, NMBE 522451/1; Vadorzo, Vértes Mts., Fejér, 47.4745 18.4741, 290 m alt., 3.5.1970, NMBE 522447/1; Löwenfels (= Oroszlanszikla)/ Buda Mts., 47.5426 18.9899, 340 m alt., 29.4.1971, NMBE 522444/1; Feketeko/ Pilis Mts., Komarom-Esztergom, 47.722 18.8485, 415 m alt., 30.5.1971, NMBE 522443/1; Hungaria/Ungarn, NMBE 513004/1; Szeged/Csongrad Megye, 46.25 20.17, 75 m alt., 3.1925, NMBE 22986/2.

Romania: SMF 74596/4, Broos [Orastie], 45.8497 23.2046; SMF 74582/1, Cavaelar, Constanza, 43.95 28.19, coll. Jetschin; ditto, SMF 19987/2; SMF 19968/4, Calimanesti at the Olt, 45.24 24.34, ex Mertens; SMF 19969/5, Aspahida, 46.80 23.75, Kolozs, Kormos; SMF 19983/3, Bukarest, 44.43 26.10, ex Rolle; ditto, SMF 74649/1, coll. Jetschin; ditto, SMF 19986/10, ST *elsae* ex Heynemann; ditto, SMF 20350/5, SMF 19985/11, SMF 19986/11, SMF 9585/5, ex Heynemann; SMF 19966/1, Damborita River, Bukarest; SMF 19988/2, Comana, Vlasca, 44.17 26.14, ex Grossu; SMF 214751/1, Donauinsel Adekaleh bei Orsova, 44.717 22.45, ex S. H. Jaeckel; SMF 20228/1, Hermannstadt [Sibiu], 45.79 24.15, coll. Rossmässler; ditto, SMF 78616/6, coll. Ehrmann ex Bielz; SMF 20247/1, Rotenturm Pass, 45.55 24.27, coll. O. Boettger ex Kink 1889; SMF 20345/1, Pomjaska, Krasso-Szöremy; SMF 74697/2, Berzaszka, Krasso-Szöremy [Berzasca, Caraş-Severin], 44.65 21.95, coll. C. R. Boettger; SMF 20341/1, Mehadia, shores of the Belareka, 44.905 22.365, coll. Reinhardt; SMF 74641/2, SMF 74619/3, SMF 292222/4,

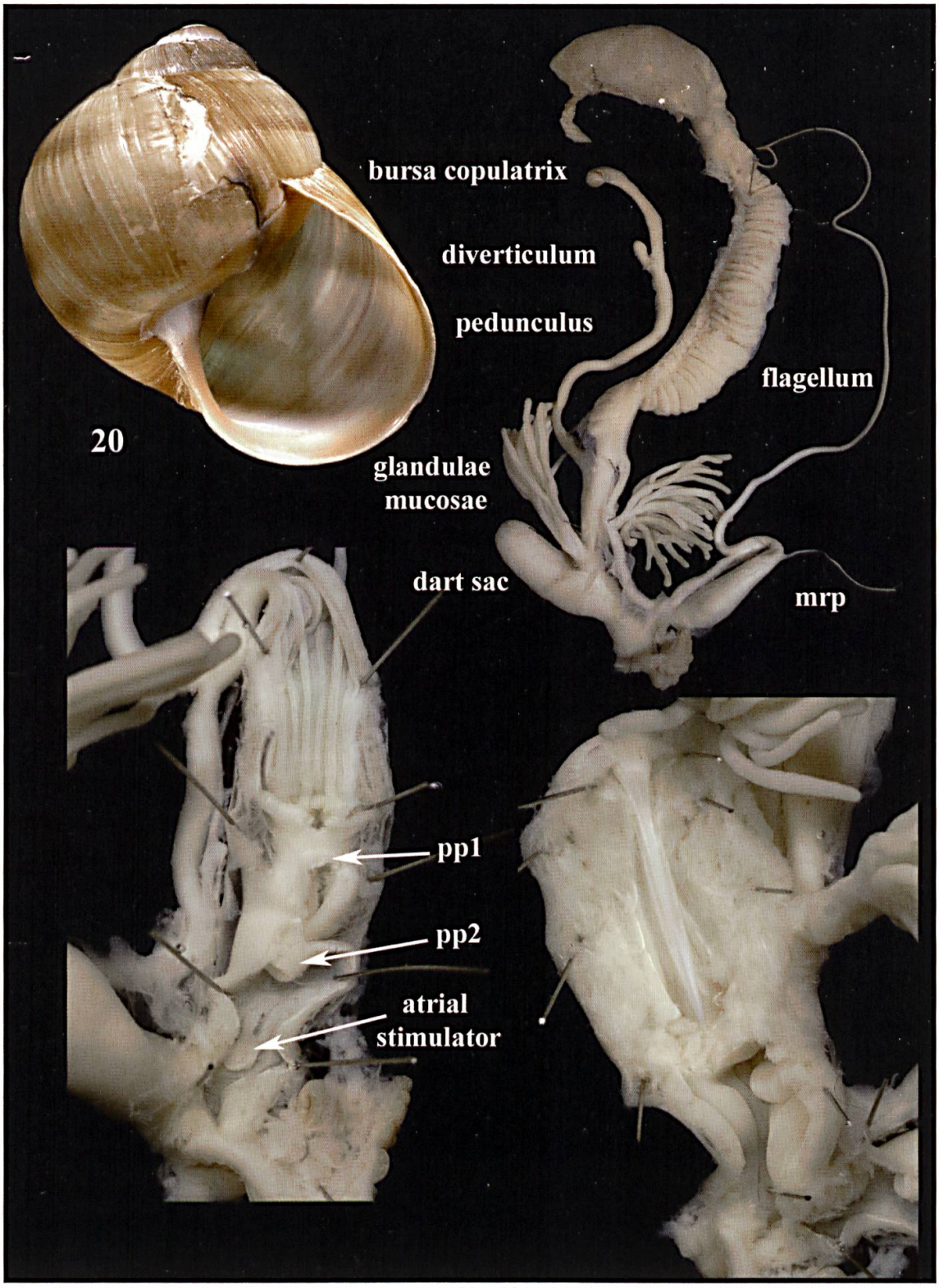


Fig. 20. *Helix* (*Helix*) *pomatia* LINNAEUS, 1758. Genital organs. Germany, Baden-Württemberg, Tuniberg close to Munzingen, Freiburg, from the vineyard slopes W of Ehrentrudis chapel. — All photos Neubert.

SMF 78617/2, SMF 74644/6, Mehadia, 44.8805 22.4066, Bath of Herkules, coll. Jetschin; ditto, SMF 74646/6, coll. C. R. Boettger; SMF 74588/1, slopes oft he Ballavaka, Mehadia, coll. Jetschin; SMF 74642/2, Bogat Valley, Persanyer hills [Persani Mts.], 45.90 25.43, coll. Jetschin; SMF 74645/2, Castle hill in Deva, 45.889 22.897, coll. Jetschin; SMF 74608/2, Deva, castle, coll. Jetschin; ditto, SMF 20224/2, coll. Reinhardt; SMF

74643/1, Schulberg close Schässburg, 46.2172 24.7905, coll. Jetschin; SMF 19962/5, Campulungu, 45.27 25.05; SMF 19961/4, SMF 78618/5, Rumku at Campulungu at Bukarest, ex C. Heynemann; SMF 9563/7, Rumku, ST *christinae*, ex C. Heynemann; SMF 19965/4, Afumati 20 km NE Bukarest, 44.53 26.25, ex C. Heynemann; SMF 19963/4, Pitest, 44.85 24.88; SMF 19967/2, Horczu, Valcea, 45.15 23.99, ex Grossu; SMF 74647/2, royal castle Sinaja, 45.360 25.543, ex C. R. Boettger; SMF 19960/12, Sinaja, 45.35 25.55, ex C. Heynemann; ditto, SMF 299198/1, coll. Bosch; SMF 19959/14, Gaesti between Bukarest and Piesti, 44.72 25.32, ex C. Heynemann; SMF 74602/1, Steierdorf [Anina], cave Pauar, 45.09 21.85, coll. Jetschin; SMF 74593/2, Klausenburg, 46.77 23.58, coll. Jetschin; SMF 74580/1, Broshtoni, Suceoara [Broșteni, Suceava], 47.24 25.70, coll. Jetschin; SMF 74581/1, Ghergani, Damboritza [Ghergani, Dâmbovița], 44.64 25.72, coll. Jetschin; SMF 20090/2, Bistritza, 47.14 24.49; SMF 74616/3, Hermannsdorf, Altenberg, coll. Jetschin; SMF 95261/1, Dobrudscha, ST *dobrudschae* ex Wohlberedt; SMF 19982/2, Vlaca, Dobrudscha, ST *dobrudschae* ex Wohlberedt; SMF 74561/1, Bates close Cheia, coll. K.L. Pfeiffer; SMF 19964/2, Anega, ex C. Heynemann; SMF 74771/2, Klausenburg, Bükk forest, coll. Jetschin; SMF 214763/1, Black Tower in Kervita, ex S.H. Jeckel; SMF 214749/1, Tuzru Magarela, coll. S. H. Jaeckel; Pietreni, Costesti creek, Capatanei Mts., Valcea, 45.1913 24.0664, 570 m alt., 2.5.2008, NMBE 522680/3; Rosie Valley, Petrila, Sureanu Mts., Hunedoara, 45.4598 23.3696, 840 m alt., 25.6.2004, NMBE 522676/1; NMBE 522392/3; Cheile Bistritei, Capatanei Mts., Valcea, 45.1907 24.04, 590 m alt., 2.5.2008, NMBE 522682/1; Bicaz Canyon, SW entrance, Hasmas Mts., Harghita, 46.8063 25.8099, 900 m alt., 3.7.2004, NMBE 522671/1; 20 km N Baile Herculane, Cerna river, Caras-Severin, 45.0323 22.5635, 345 m alt., 19.4.2007, NMBE 522665/1; Cisnadioara (= Michelsberg), Sibiu, 45.7025 24.1149, 500 m alt., 28.6.2004, NMBE 522662/1; NMBE 522399/1; Tismana Monastery, Gorj, 45.0803 22.9274, 290 m alt., 18.4.2007, NMBE 522694/5; Prapastiilor valley, quarry, Königstein Mts., Brasov, 45.5424 25.2969, 820 m alt., 1.7.2004, NMBE 522692/1; Lupsei valley, 1.1 Km W in dir. Motru Sec,Valcan Mts., Gorj, 45.0566 22.7872, 395 m alt., 22.5.2009, NMBE 522686/2; Jiu de Vest valley, Campu Mielului, Retezat Mts., Hunedoara, 45.2823 22.9714, 1110 m alt., 26.6.2004, NMBE 522683/1; Jiu de Vest, entrance Garbovul valley, Retezat Mts., Hunedoara, 45.2736 22.9588, 990 m alt., 26.6.2004, NMBE 522423/1; NMBE 522407/3; Jiu de Vest, Buta Canyon, Retezat Mts., Hunedoara, 45.3029 22.9714, 990 m alt., 26/6.2004, NMBE 522420/3; Cheii valley, Cheile Rasnovului, Postavaru Mts., 45.5473 25.5116, 750 m alt., 29.4.2008, NMBE 522410/1; Ordancusa valley, cave Poarta lui Ionel, Padis Mts., Alba, 46.4655 22.8371, 820 m alt., 6.7.2004, NMBE 522404/1; Ciunget, Rudareasa valley, Latoritei Mts., Valcea, 45.4 23.9352, 680 m alt., 1.5.2008, NMBE 522397/2; Dubova, hiking path to cave Ponicova, Mehedinti, 44.5957 22.2552, 165 m alt., 4.5.2008, NMBE 522386/1; Pietroasa, Boga valley, Apuseni Mts., Bihor, 46.6 22.67, 19.7.2012, NMBE 522417/1; Tisita Mica valley, Mt. Tisarul Mare, Vrancea Mts., 45.9409 26.5775, 630 m alt., 27.4.2008, NMBE 522429/3; Baia de Fier, cave Muierii, Gorj, 45.1923 23.754, 640 m alt., 27.6.2004, NMBE 522380/1; Sighisoara, castle hill, Mures, 46.2172 24.7905, 420 m alt., 30.6.2004, NMBE 522412/10; between Pojoga und Caprioara, Arad, 45.9925 22.3462, 230 m alt., 15.4.2007, NMBE 522394/1; ; Cheita canyon, Cheia, Prahova, 45.4731 25.9203, 1050 m alt., 28.4.2008, NMBE 522422/1; Podu Dambovitei, Cheii valley, Arges, 45.4378 25.2382, 950 m alt., 30.4.2008, NMBE 522403/1; Valea Manastrii (= canyon W Aiud)/ Trascaului

Fig. 21. *Helix* (*Helix*) *pomatia* LINNAEUS, 1758. Genital organs, NMBE 519954, Bulgaria, Iskar valley, Cerepiski Monastery, situs 51.58. — All photos Neubert.

Geb./Alba, 46.3 23.51, 17.7.2012, NMBE 522415/1; Rimetea, Mt. Piatra Secuilului, NW slope, 46.45 23.57, 18.7.2012, NMBE 522390/4; Mt. Vulcan, Bihor Mts., Hunedoara, 46.23 22.96, 19.7.2012, NMBE 522389/2; Govajdia, Govasdia, Hunedoara, 45.7259 22.8484, 350 m alt., 26.4.2008, NMBE 522428/1; Transsylvanien, NMBE 513003/1.

Ukraine: SMF 19838/4, Munikacs (= Mukatschewe), 48.441 22.7272; SMF 20349/1, Odessa, 46.48 30.72; SMF 158643/2, Dobrowlany bei Zaleszegyki am Dnjestr, 48.67 25.75, leg. Urbanski; SMF 20347, Monastery Kuresch, Charkow, 49.98 36.10, leg. Rosen; SMF 20348/2, SMF 20351/7, Karatschewka, Charkow, 49.91 36.19; SMF 19984/1, Tschetschulski Cordon am Pruth, Bessarabia; SMF 19981/2, Mlynski close Daralani, canyon Pasinskye.

Slovenia: SMF 74584/, castle of Bled, 46.3698 14.1006, coll. K.L. Pfeiffer; SMF 74722/2, Ljubljana, 46.05 14.50, coll. Jetschin; SMF 74735/, SMF 299283/1, SMF 299284/2, Sevnica, Save, 46.01 15.30, coll. K.L. Pfeiffer; SMF 299234/4, Capodistria, 45.54 13.73, coll. Kaltenbach; SMF 299184/1, Adelsberg (= Postojna), 45.77 14.21, coll. Bosch; SMF 20229/1, Goljak; SMF 299240/3, Valdes, coll. Kaltenbach; ditto, SMF 214752/1, coll. S. H. Jaeckel; Predel, 1.5 Km in dir. Bovec, crossroads to Mangart, 46.4223 13.5938, 1045 m alt., 5.9.1986, NMBE 522669/1; Gozd-Martuljek, at the Jerman creek, 46.4873 13.828, 770 m alt., 20.8.1987, NMBE 522487/2; Postojna, cave, 45.7825 14.2035, 530 m alt., 5.9.1986, NMBE 522470/4.

Croatia: SMF 20096/4, Klek, 45.260 15.145, ex Sturany; SMF 20089/3, SMF 74621/1, Klek close to Ogulin; SMF 20223/1, Varazdin, 46.3057 16.3380; SMF 20097/3, Fuzine, Modrus Fiume, 45.30 14.71, ex Kormos; SMF 227565/1, 2 km Ostarije to Brusani, 44.5188 15.1949, ex F. Seidl; SMF 74637/1, Podsused, 45.82 15.84, coll. C. R. Boettger; SMF 20088/2, Mt. Maggiore [Učka Mts.], 45.30 14.22; ditto, SMF 20103/1, coll. O. Boettger; SMF 20083/8, Mt. Obruc (Gorski Kotar) close Fiume, 45.4569 14.4678, ex Brusina; SMF 299252/1, Muggia, 45.60 13.77, coll. Kaltenbach; SMF 20094/3, Ogulin, 45.265 15.225; SMF 20086/4, Dolnja Stubica, 45.98 15.97; SMF 20092/1, Trakostane [prob. castle of Trakošćan], 46.2578 15.9450; SMF 20101/1, Gospice, 44.55 15.38; SMF 20104/1, Petrinja, 45.44 16.28; SMF 20248/1, castle ruin Pedalje, 45.1442 16.2942; SMF 299246/3, Zagreb, 45.8 16.0, coll. Kaltenbach; SMF 9571/2, Kapella Mts., ST *kapellae*, coll. Rossmässler; SMF 20093/1, Belska Doline; SMF 20091/1, Sutle; SMF 20102/1, Susede; SMF 74573/3, Billibrig di Sign, coll. Jetschin; Istria, 3.9 Km N road Veprinac to Mt. Vojak, 45.3539 14.253, 900 m alt., 2/8.2002, NMBE 522425/2; Majorija, 44.9811 14.9808, 610 m alt., 30.7.2002, NMBE 522416/2; Licko Lesce, 44.7873 15.3672, 3.8.2002, NMBE 522387/2; Senj, Zuta Lokva, 44.9667 15.055, NMBE 505533/1.

Bosnia and Hercegovina: SMF 20087/2, Treberic close Sarajevo [Mt. Trebevic], 43.8233 18.4489, coll. Kobelt ex Stussiner; SMF 20095/1, Sarajevo, 43.86 18.41, coll. Kobelt; SMF 20106/1, Jajce, 44.34 17.27, coll. Reinhardt; SMF 20099/2, Jezero close Jajce, Sarajevo, coll. Reinhardt; SMF 20100/1, Nemila, 44.33 17.91 (Unna Mts.?), coll. O. Boettger ex Reitter; SMF 74574/2, Travnik, mountains, coll. Th. Krüper; SMF 20081/17, SMF 20082/11, SMF 20085/7, SMF 20084/7, Travnik, 44.226 17.662, ex Brandis; ditto, SMF 299233/4, coll. Kaltenbach; ditto, SMF 74584/2, coll. Jetschin; SMF 74576/3, Ulaska gromila [Vlaska Gromila] close Travnik, 44.2897 17.6675, coll. Jetschin; SMF 74585/2, Vlasic close Travnik, 44.2926 17.6364, coll. Jetschin; SMF 299287/2, Vresic close Travnik, coll. K.L. Pfeiffer; Mrkonjic Grad, in dir. Banja Luka, 44.4236 17.1271, 420 m alt., 18.8.1987, NMBE 522408/1; Jajce,Piva waterfall, 44.3375 17.2701, 365 m alt., 18.8.1987, NMBE 522402/1; Jahorine Pale, Miljacka river, 43.8145 18.5768, 840 m alt., 17.8.1987, NMBE 522396/4.

Serbia: SMF 20344/1, Maidanpek, 44.42 21.95, ST *serbica*, coll. Rossmässler ex Zelebor; SMF 299213/2, Nisek, ex Rolle; Jelasnicka canyon, E of Niska Banja, 43.282 22.0622, 320 m alt., 6.7.2008, NMBE 522674/1; Despotovac, 500 m W of Mon. Manasija, 44.1009 21.4638, 235 m alt., 4.7.2008, NMBE 522405/1; Despotovac, Mon. Manasija, 44.1014 21.4694, 235 m alt., 4.7.2008, NMBE 522393/3; Zlot, Lazareva cave (= Zlotska pecina), 44.0292 21.961, 310 m alt., 10.7.2008, NMBE 522385/1; Mon. Vratna (= NW of Negotin), canyon, 44.3823 23.3389, 195 m alt., 11.7.2008, NMBE 522379/1; Ljuberada, 43.0316 22.3887, 490 m alt., 9.7.2008, NMBE 522337/1.

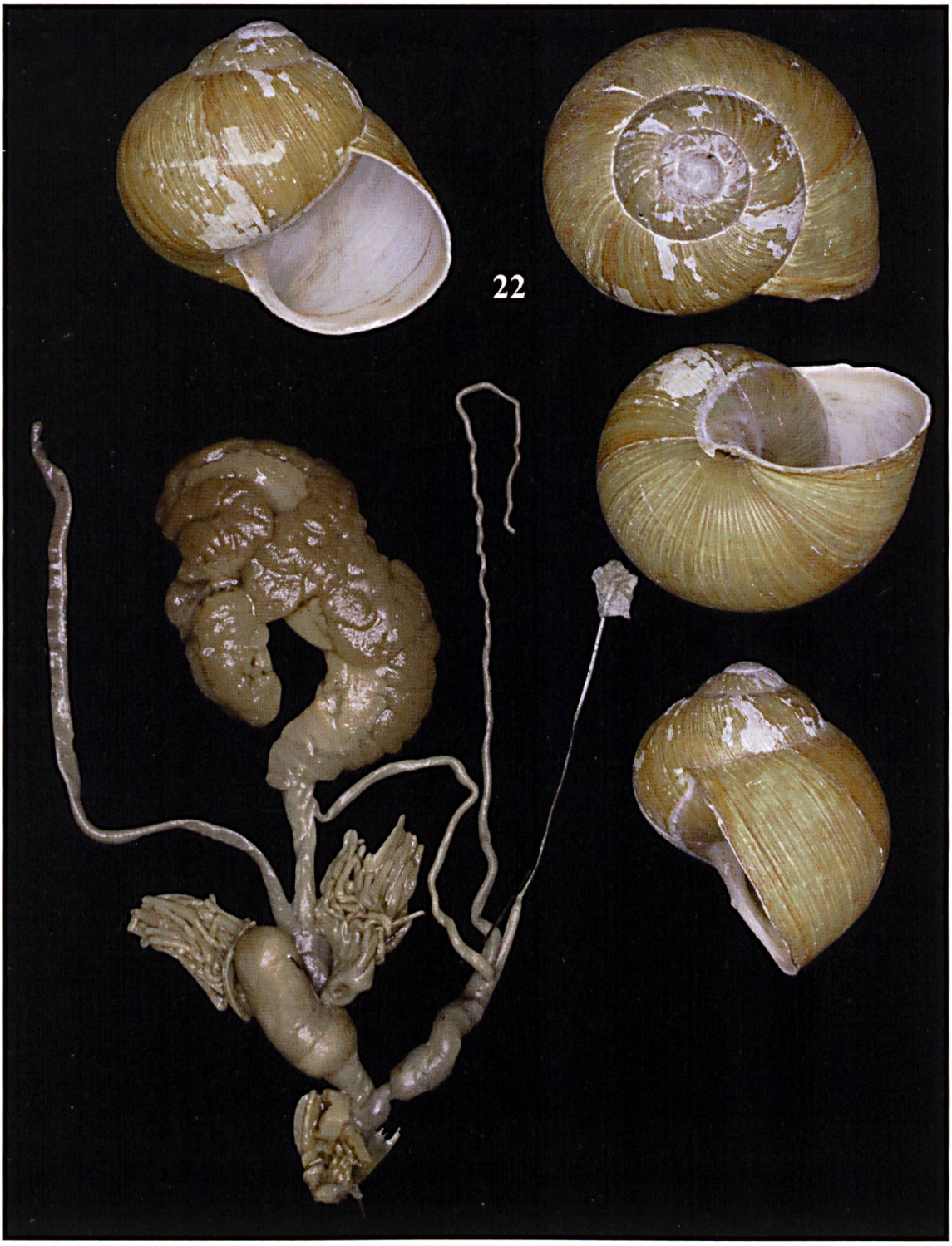


Fig. 22. *Helix* (*Helix*) *pomatia* LINNAEUS, 1758. Genital organs, NMBE 520671, Greece, Sidirónero, 12.9 Km in dir. Livaderó, situs 63.24. — All photos Neubert.

FYROM: SMF 74704/1, Ljubotin, Sara Planina [Ljuboten, Šar Planina], 42.2067 21.1194, coll. K.L. Pfeiffer.

Bulgaria: SMF 74579/3, Philippopel [Plowdiw], 42.14 24.74, coll. Jetschin; ditto, SMF 74692/6, coll. C. R. Boettger; ditto, SMF 299279/1, coll. Jetschin; ditto, SMF 20244/5, coll. Kobelt; SMF 20337/4, Rhodope Mts. close to Philippopel; SMF 78619/3,

SMF 78620/1, Sofia, 42.7 23.3, coll. Nägele; ditto, SMF 20339/2, coll. O. Boettger ex Nägele; SMF 20336/1, railway station Semen [Zemen], 42.4810 22.7475; SMF 20335/2, Kopriwstitza [Koprivštica], 42.64 24.36; SMF 299269/1, Varna, 43.2 27.9, coll. Kaltenbach; Veliko Tirnovo, 43.0705 25.6351, 155 m alt., 27.5.2007, NMBE 522664/1; Vratcata canyon W Vraca, 43.1919 23.538, 23.5.2007, NMBE 522640/1; Ledenika (= W Vraca), 43.2045 23.4936, 22.5.2007, NMBE 522639/1; Sipka, 2 Km in dir. Sipka pass, 42.7345 25.3306, 860 m alt., 28.5.2007, NMBE 522409/1; Iskar valley, parking place at Cerepiski Monastery, 5.5.2008, NMBE 519954/3; Dzhebel, 41.5 25.3, 300 m alt., 26.8.2010, NMBE 23349/2.

Greece: SMF 9567, Plakarücken des Kissavos, coll. O. Boettger ex Stussiner; SMF 20354/1, Volos, 39.37 22.94, ex Godet; SMF 9575/3, Kloster Survias, Pilion, 39.4620 22.9847, coll. O. Boettger ex Stussiner; ditto, SMF 7471/2, coll. Jetschin ex Stussiner; SMF 74711/1, Pilion, 39.4 23.04, coll. Jetschin; SMF 338128/5, Pilion, Chania, 39.3959 23.0620, 05.10.1986; Spileo, 800 m in dir. Zakas, 40.007 21.2841, 980 m alt., 24.4.2003, NMBE 522703/84; Mantoudi, Evvia, 38.7942 23.477, 20 m alt., 21.5.1997, NMBE 522400/4; Kehrokambos, 4 Km in dir. Stavroupoli, 41.1806 24.6687, 180 m alt., 7.5.1995, NMBE 522395/1; Sidirónero, 12.9 Km in dir. Livaderó, 41.274 24.2088, 600 m alt., 22.5.1997, NMBE 522265/2; 520671/2 (alk.); Melivoia, 700 m in dir. Kotili, 41.3328 24.9218, 415 m alt., 24.5.1997, NMBE 522264/1; Makriplagio, 41.2267 24.2713, 880 m alt., 22.5.1997, NMBE 522263/1.

Diagnosis: shell large, moderately thick, four to five distinct brown spiral bands, teleoconch with granulated whorls, small protoconch, aperture large, elongate, labial callus cream to brown coloured, umbilicus open; very long flagellum, epiphallus as long as penis, diverticulum reduced.

Description: a large shell, thin to moderately thick, broadly spherical, with a conical spire; basic shell colour greyish white with prominent chestnut brown spirals; usually with four to five distinct brown spiral bands, often spiral No. 1 fusing with No. 2, but spiral pattern quite variable; protoconch remarkably small in comparison to total shell size, its diameter ranging from 4.5–6 mm, smooth, white whorls; teleoconch of 3–4 regularly granulated whorls, granules arranged in spiral rows, with fine to very coarse axial riblets; last whorl only slightly descending below the periphery; aperture large, elongate to rounded, apertural rim narrow, labial callus weak, cream to brown coloured, columellar triangle small; umbilicus usually open, sometimes closed in old individuals.

Genital organs (Figs 20–22): penis club-shaped, epiphallus as long as penis; flagellum extremely long, reaching five times the length of epiphallus+penis; mrp attaching in a central position on the epiphallus; internally, both papillae of equal size, penial chamber filled with a few elongate folds, both papillae conical with a central perforation; atrial stimulator a rounded knob; female system with a very short vaginal tube, dart sac and glandulae mucosae strongly developed, the glandulae with a basic stem, multi-branched, much longer than dart sac;

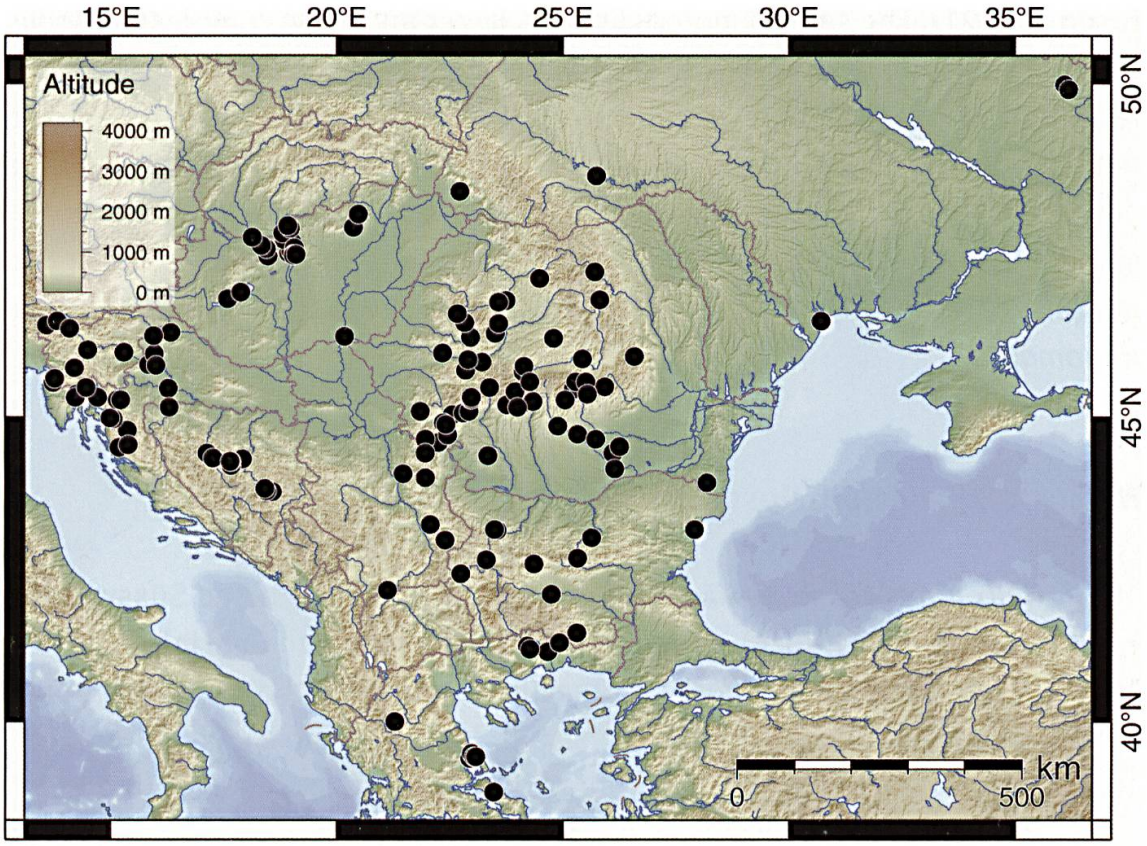


Fig. 23. *Helix* (*Helix*) *pomatia* LINNAEUS, 1758, distribution in southeast Europe.

pedunculus stem long, diverticulum reduced or even completely lacking, bursa copulatrix stem shorter than pedunculus stem, vesicle rounded and bent downwards.

Distribution (Fig. 23): This is a *Helix* species with an enormously large distribution area, inhabiting Central Europe northwards to Scandinavia and England, and expanding to large parts of Eastern Europe including the Baltic countries, Poland and larger parts of the Ukraine. It is considered to be introduced to several localities in SE Ukraine and some other places in Russia towards the vicinity of Moscow (Sysoev & Schileyko 2009). In the southern Balkans, this species surmounts the Rhodope Mts. between Bulgaria and Greece. In Greece, it has some isolated (?) occurrences in the central parts of the country, which could probably be the result of human introduction of the species as a Lenten food.

Remarks: For reasons of completeness, the synonymy list for *Helix pomatia* given here also contains taxa which are beyond the geographical focus of this work. These are not figured here.

In the Balkans, the Central European phenotype disappears and is substituted by two other shell phenotypes: the first is a small, colourful and quite thick-shelled morph, with the spiral bands being quite prominent, and usually

fused (Fig. 21). The second morph displays larger and more compressed shells with an almost oblique aperture, greenish shells with ribbed teleoconch, and a reduction to loss of the brown spirals (Fig. 22). Anatomically, both morphs do not differ in their main character sets. So far, no mixed populations could be observed, but a clear geographical pattern separating both morphs is also not visible. As a conclusion it can be speculated that for example one of these two morphs represents a cryptic species (Korábek & al. 2014) to be separated from *H. pomatia*.

Helix (*Helix*) *lutescens* Rossmässler, 1837 (Figs 24–29)

1837 *Helix lutescens* Rossmässler, Iconographie der Land- und Süsswassermollusken 1 (1) (5/6): 4, Taf. 21, Fig. 292 [Lemberg in Galicia].

1889 *H. lutescens fuscolabiata* Westerlund, Fauna der in der Paläarctischen Region lebenden Binnenconchylien. II. *Helix*: 455 [no locality].

1889 *H. lutescens fasciata* Westerlund, Fauna der in der Paläarctischen Region lebenden Binnenconchylien. II. *Helix*: 455 [no locality].

1906 *Helix lutescens serbica* Kobelt, Martini & Chemnitz, Systematisches Conchylien-Cabinet (1) 12: 264, 302, Taf. 363, Fig. 9, 10, Taf. 364, Fig. 9, 10 [Serbia; non *Helix* (*Helicogena*) *pomatia* var. *serbica* Kobelt, 1906].

Type specimens:

lutescens: neotype SMF 9850 (SD Zilch 1952: 158): H = 31.6; D = 19.2; PH = 21.2, PD = 17.7; PrD = 4.3, W = 5. *serbica*: holotype SMF 9731 (Zilch 1952: 158): H = 26.4; D = 23.95; PH = 17.1; PD = 15.9; PrD = 5.1; W = 4.75.

Specimens examined:

Poland: SMF 74682/2, Penczelice, Stopnica, 50.448 20.785, coll. C. R. Boettger; SMF 74685/2, Krakau, Twardowski rock [Zakrzówek], 50.036 19.913, coll. C. R. Boettger.

Ukraine: SMF 214891/2, Lwow, 49.8396 24.0295, coll. S. H. Jaeckel; SMF 74684/3, Sinkow, Zaleszayki [Sinkow, Salischtschyky], 48.615 25.958, coll. C. R. Boettger; SMF 214889/1, Rawa-Ruska, 50.23 23.62, coll. S. H. Jaeckel; SMF 214888/2, Tarnopol, 49.55 25.59, coll. S. H. Jaeckel; SMF 299503/4, Zalnzosyki am Dniest, coll. Kaltenbach.

Hungary: SMF Vajda-Hunyad, castle, 47.515 19.083, coll. Jetschin; SMF 280629/1, Ternanadaska [Tornanádaska], 48.5666 20.7833, coll. Schlickum; SMF 74672/6, Mumkacz [Mukatschewe?], 48.44 22.72, coll. Krüper; ditto, SMF 299495/1; Ujszeged, Maros River, Szeged, 46.2533 20.1626, 28.7.1967, NMBE 522718/1; Kraszna, 47.9428 22.3628, 110 m alt., 8.1958, NMBE 522636/2; Békéscsaba, 46.6768 21.0972, 90 m alt., 10.2.1960, NMBE 522635/3; Ketegyhaza/ Békés Megye, 46.5432 21.1864, 90 m alt., 20.5.1976, NMBE 522634/5; SMF 19119/2, Bihar, coll. O. Boettger.

Belorussia: SMF 280630/2, 52.1 23.7, Brest Litowsk, coll. Schlickum.

Figs 24–27. *Helix* (*Helix*) *lutescens* Rossmässler, 1837. Fig. 24 *lutescens*: neotype SMF 9850, "Galizien", D = 19.2; Fig. 25 *serbica*: holotype SMF 9731, "Serbien", D = 23.95; Fig. 26 NMBE 523961, Slowakia, Kechnec south of Kosice, D = 27.68; Fig. 27 SMF 75694, Romania, Siebenbürgen, Hermannstadt, coll. Kobelt ex A. Wagner [M.Ch., T. 363, fig. 9–10], D = 26.4. — All photos Neubert, original size.

Romania: SMF 86135/6, Shigisoara [Schässburg], coll. Ehrmann; ditto, SMF 299502/5, coll. Kaltenbach; ditto, SMF 299500/1, coll. Bosch; Shigisoara [Schässburg], 46.2176 24.7849, 350 m alt., 30.7.2007, NMBE 512635/1; Sighisoara, castle, 46.2172 24.7905, 420 m alt., 30.6.2004, NMBE 522344/20; ditto, SMF 74665/2, coll. Jetschin; SMF 74666/2, SMF 74668/11, Schässburg, Schulberg, coll. Jetschin; ditto, SMF 74676/4, coll. C. R. Boettger; SMF 74675/4, Schässburg, Kirchenberg; SMF 214887/2, Szamosujvar [Gherla], 47.02 23.90, coll. S. H. Jaeckel; SMF 19125/11, Deva, castle, 45.889 22.897, coll. Reinhardt; ditto, SMF 73681/2, Ruine bei Deva, coll. Jetschin; SMF 19214/2, Deva, 45.88 22.91, coll. Moellendorff; ditto, SMF 74662/6, coll. Jetschin; SMF 19004/1, Elöpatak close Kronstadt [Vâlcele], 45.855 25.68; SMF 74671/1, Kronstadt, Gesprengberg, 45.6614 25.5764, coll. Jetschin; SMF 74677/2, Hermannstadt, 45.79 24.15, coll. C. R. Boettger; ditto, SMF 299499/2, coll. Bosch; ditto, SMF 19112, coll. Rossmässler; SMF 74679/3, Einsiedlergraben close Hermannstadt, coll. Jetschin;

SMF 74667/4, Heltau close to Hermannstadt, 45.71 24.15, coll. Jetschin; ditto, SMF 74618/4, Heltau close to Hermannstadt, coll. C. R. Boettger; SMF 74680/3, Mühlstadt, Hermannstadt [Sebeș?], 45.96 23.57, coll. C. R. Boettger; SMF 74669/4, Mühlbach, Rother Berg, 45.988 23.592, coll. Jetschin; SMF 74670/2, Reps [Rupea], 46.04 25.22, coll. Jetschin; ditto SMF 299496/2, SMF 299497/2; SMF 74660/2, Klausenburg, 46.77 23.58, coll. Jetschin; SMF 19211, Kirchhof in Broos, 45.85 23.20, coll. Reinhardt; SMF 19116/2, Roter Turm Pass, 45.55 24.27, ex Rolle; SMF 74659/2, Alzen close Lechkirsch [AlțânaNocrich], 45.93 24.46, coll. Jetschin; SMF 74674/2, Apahida, 46.80 23.75, coll. Jetschin; SMF 19209/2, Fogarascher [Făgăraș] Mts., 45.6 24.73, ex Brancsik; SMF 74661/4, Galatz [Galați] close to Fogarasch, 45.43 28.04, coll. Jetschin; Torda Canyon [Tordai hasadék] close Thorenburg [Turda], 46.5636 23.6795, 550 m alt., 26.7.1977, NMBE 512560/2; ditto, SMF 214890/1, coll. S. H. Jaeckel; SMF 19123/8, Szemosujvar, Szilnok Doboka, [= Gherla], 47.0283 23.9056, coll. Kormos; SMF 155749/13, Ciorauni [Ciorani] S Adjud, 45.99 27.215, ex Grossu; canyon Cheile Turzii/ Turda/ Gilau-Muntele Mare-Mts., 46.5642 23.6817, 500 m alt., 5.7.2004, NMBE 522343/1; SMF 74673/1, Jarashti, Licherdopol, coll. Jetschin.

Slovakia: SMF 299505/2, Malco [Malcov?], 49.3 21.06, coll. Kaltenbach; Kechnec south of Košice, 48.5485 21.2663, 10.5.2014, NMBE 523961/2.

Diagnosis: shell small, thin, shell colour yellowish to cream-white, seldom with brown spirals, aperture rounded, white, columellar triangle large, umbilicus slit-like open; diverticulum reduced, large glandulae mucosae.

Description: shell small to medium size, thin, elongate spherical, with a conical spire; basic shell colour yellowish to cream-white; seldom with chestnut brown spirals, and if present, usually spiral Nos. 3, 4 and 5; protoconch small, rounded, its diameter hardly reaching 5 mm, smooth, white whorls; teleoconch of 3–4 whorls with a weak spiral pattern of beaded furrows and a few inconspicuous coarse riblets; last whorl only slightly descending below the periphery; aperture rounded, almost spherical, apertural rim narrow, labial callus weak, cream to brown coloured, columellar triangle large, expanding; umbilicus always slit-like open.

Genital organs (Fig. 28): penis club-shaped, epiphallus approximately as long as penis; flagellum long, exceeding the length of epiphallus+penis three times; mrp attaching in an apical position on the epiphallus; internally, pp1 small, pp1 larger, penial chamber short, with a few elongate folds, both papillae conical with a central perforation; atrial stimulator a rounded knob; female system with a long vaginal tube, dart sac and glandulae mucosae strongly developed, the glandulae with a thick basic stem, multi-branched, much longer than dart sac; pedunculus stem long, diverticulum missing, vesicle rounded and bent downwards.

Hesse (1919: 219–221) stressed the large glandulae mucosae with a thick stem and the relatively small dart sac, which perfectly agrees with the findings

Fig. 28. *Helix* (*Helix*) *lutescens* Rossmässler, 1837. Genital organs, NMBE 523961, Slowakia, Kechnec south of Košice, situs length 57.88. — All photos Neubert.

here; he also could not find a diverticulum. In contrast to many *Helix* species, the mrp attaches in an apical position on the epiphallus thus producing a supposedly "unbalanced subdivision" of the penis sensu Hesse (loc. cit.).

Distribution (Fig. 29): This species inhabits the eastern part of the distribution area of *H. pomatia*, a species, with which is sometimes lives in sympatric (or even syntopic?) conditions.

Remarks: This small *Helix*-species can always be separated from *H. pomatia* because of its small, thin, yellowish and non-granulated shell (Fig. 27). It can-

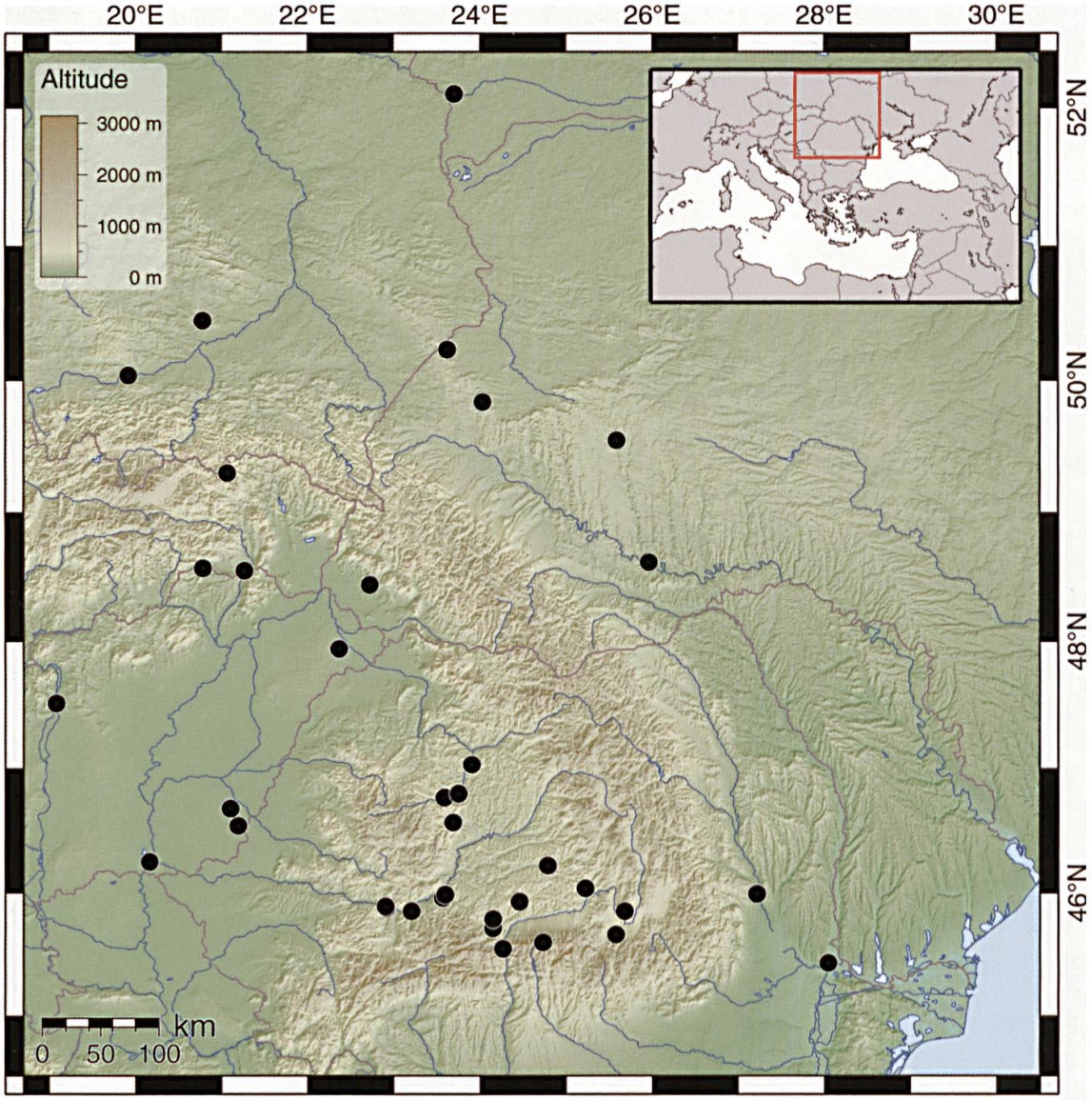


Fig. 29. *Helix* (*Helix*) *lutescens* Rossmässler, 1837. Distribution.

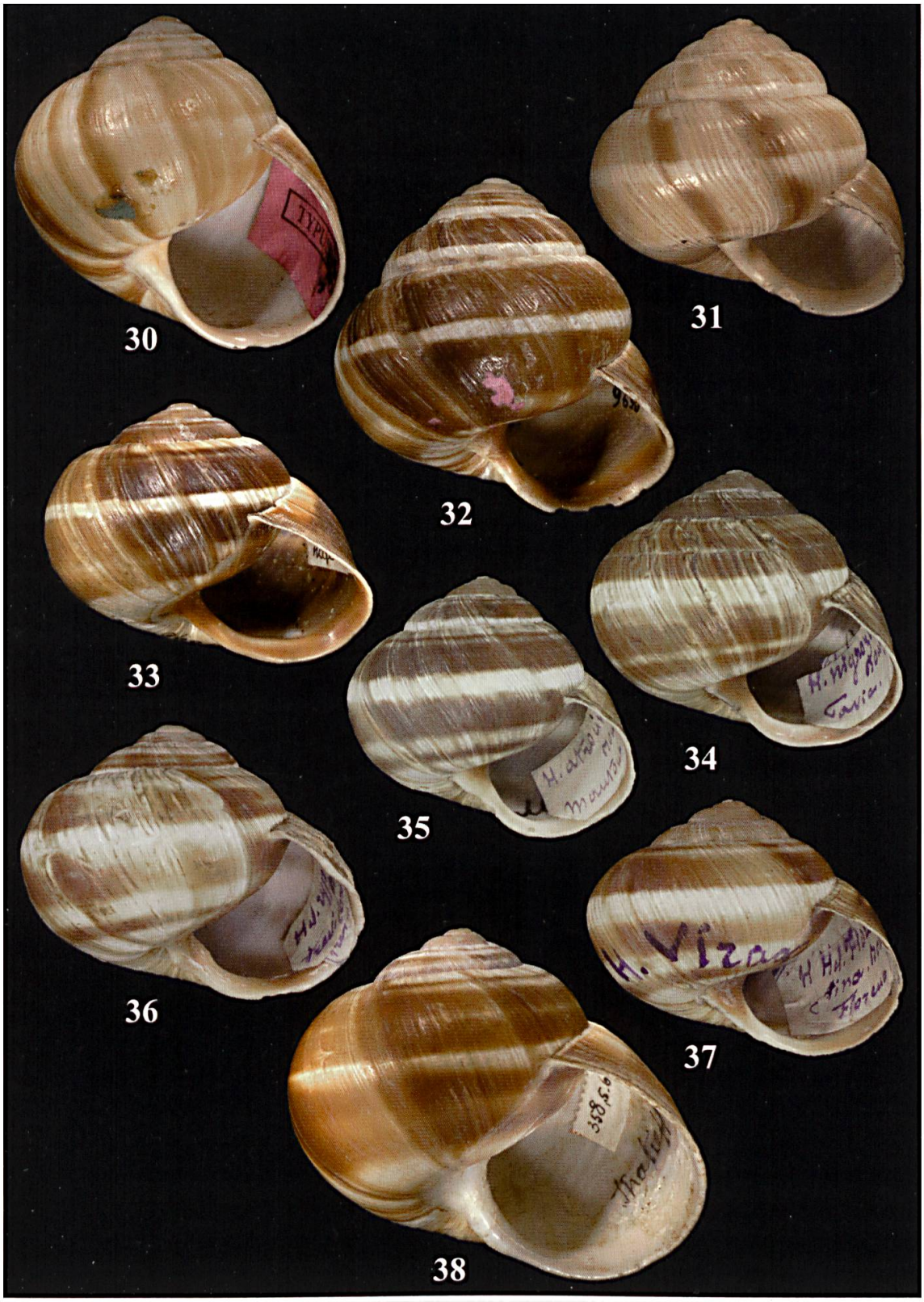
not be confused with any other species of *Helix*, and any similarities with other small white species like *H. escherichi* are only superficial. It is not clear to which other species it might be more closely related.

Helix (*Helix*) *lucorum* Linnaeus, 1758 (Figs 30–60)

1758 *Helix lucorum* Linnaeus, Systema Naturae, 10. edition: 773.

1801 *Helix castanea* Olivier, Voyage dans l'Empire Othoman: 224, Taf. 17, Fig. 1 [non *Helix castanea* O. F. Müller, 1774] [Istanbul, Gemlik (cf. Tillier & Mordan 1983)].

1822 *Helix mutata* Lamarck, Histoire naturelle des animaux sans vertèbres (6) 2: 67 [Habite en Italie et dans le Levant].



Figs 30–38. ***Helix (Helix) lucorum*** **LINNAEUS, 1758. Fig. 30** ***radiosa*****, holotype SMF 9866, "Taurien", D = 42.1; Fig. 31** ***onixiomicra*****, syntype MHNG 18131, Montagnes de Montenegro, D = 39.6; Fig. 32** ***presbensis*****, lectotype SMF 9630, Albanien am Presba-See, D = 44.7; Fig. 33** ***nigerrima*****, holotype SMF 9695, Abhang des Rhodope-Gebirges gegen Philippopel, D = 42; Fig. 34** ***nigrozonata*****, syntype MHNG 18058, environs de Pavie, de Mantoue, D = 39.9; Fig. 35** ***atrocincta*****, syntype MHNG 18124, environs de Pavie, D = 36.8; Fig. 36** ***rypara*****, syntype MHNG 18133, Trevi (Ombrie), D = 43.9; Fig. 37** ***virago*****, syntype MHNG 18137, Florence, D = 40.4; Fig. 38** ***haussknechti*****, holotype SMF 9676, Thatieff (bei Borshom), D = 53.8. — All photos Neubert, original size.**

1833 *Helix taurica* KRYNICKI, Bulletin de la Société Impériale des Naturalistes de Moscou 6: 423, pl. 10.

1838 *Helix taurica radiosa* ROSSMÄSSLER, Iconographie der Land- und Süsswassermollusken 1 (2) (1/2): 13, Taf. 33, Fig. 456 [In his synonymy ROSSMÄSSLER mentions the names *radiata* Z. (nomen nudum), the legend of Fig. 456 is *Helix radiosa*] [Taurien] [= Crimean Peninsula].

1853 *Helix socia* L. PFEIFFER, Zeitschrift für Malakozoologie 10: 146 [Circa Constantinopoli].

1860 *Helix onixiomicra* BOURGUIGNAT, Revue et Magasin de Zoologie, (2ième série) 12 (1): 72 [separatum: Aménités malacologiques II: 168, pl. 19, Fig. 1–2] [Montagnes de Montenegro].

1860 *Helix mahometana* BOURGUIGNAT, Revue et Magasin de Zoologie (2e série) 12 (1): 156 [separatum: Aménités malacologiques II: 172, Taf. 20, Fig. 5–6 [nom. nov. pro *Helix castanea* Olivier 1801 non *Helix castanea* O. F. MÜLLER, 1774].

1863 *Helix lucorum* var. *rumelica* MOUSSON, Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich 8: 282 [une partie d'Albanie, dans la Rumélie et la Thessalie].

1874 *Helix lucorum* var. *euphratica* MARTENS, Vorderasiatische Conchylien 18, Taf. 4, Fig. 22 [Nimrud Dagh (Berg des Nimrud) über Orfa].

1876 *Helix schachbulakensis* BOURGUIGNAT, Species novissimae molluscorum: 52 [Schachbulak en Arménie].

1883 *Helix* (*Helicogena*) *taurica* mut. *martensi*, O. BOETTGER, Jahrbücher der deutschen Malakozoologischen Gesellschaft 10: 172, Taf. 4, Fig. 8 [Schemacha in Schirwan].

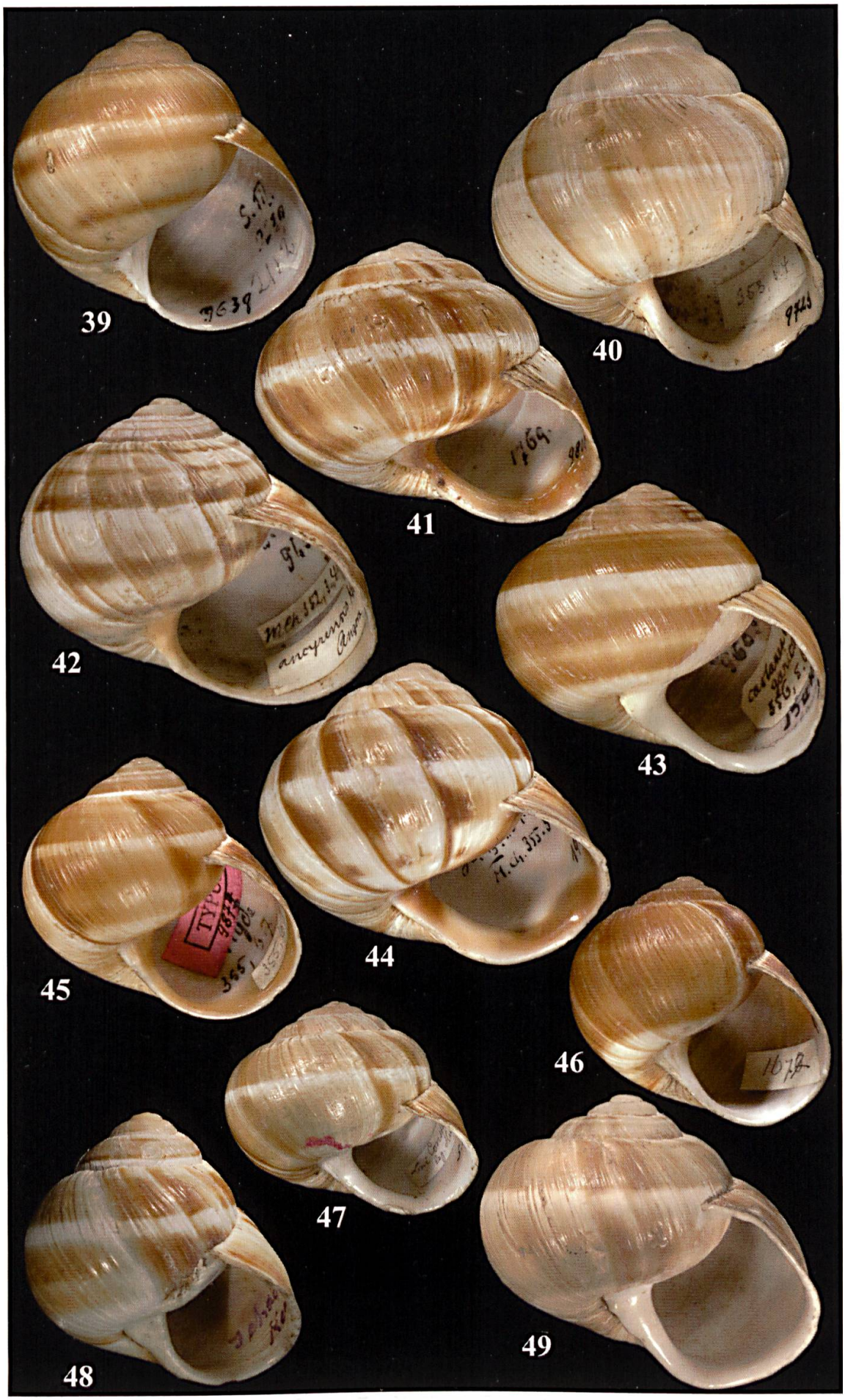
1883 *Helix atrocincta* BOURGUIGNAT, Il Naturalista Siciliano 2: 292 [environs de Mantoue, de Pavie, de Verone].

1883 *Helix nigrozonata* BOURGUIGNAT, Il Naturalista Siciliano 2: 291 [environs de Pavie, de Mantoue].

1883 *Helix rypara* BOURGUIGNAT, Il Naturalista Siciliano 2: 290: [Trevi (Ombrie), de Florence, (Toscane), de Salo, à l'orient du lac de la Garda (Vénétie).].

1883 *Helix virago* BOURGUIGNAT, Il Naturalista Siciliano 2: 265 [Florence].

Figs 39–49. *Helix* (*Helix*) *lucorum* LINNAEUS, 1758. Fig. 39 *everekensis*, holotype SMF 9639, Everek, Cilicia, D = 42.4; Fig. 40 *byzantina*, holotype SMF 9723, Markt in Konstantinopel, D = 46.7; Fig. 41 *dorylaeensis*, holotype SMF 9800, Eski-Sehir, D = 48.5; Fig. 42 *ancyrensis*, holotype SMF 9657, Angora, D = 50.1; Fig. 43 *bulgarica*, lectotype SMF 9603, Markt in Konstantinopel, D = 46.4; Fig. 44 *boettgeri*, holotype SMF 19093, Trapezunt, D = 49.4; Fig. 45 *nigdensis*, holotype SMF 9873, Niğde in Cilicia, D = 39.5; Fig. 46 *heracleensis*, holotype SMF 9797, Eregli in Cilicia, D = 36.7; Fig. 47 *hueti*, holotype SMF 9864, Um Konstantinopel, D = 35.7; Fig. 48 *schachbulakensis*, syntype MHNG 18116, Schachbulak en Arménie, D = 38.9; Fig. 49 *euphratica*, syntype ZMB, Nimrud Dagh (Berg des Nimrud) über Orfa, D = 47.8. — All photos Neubert, original size.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1889 *H. lucorum* var. *anaphora* WESTERLUND, Fauna der in der Paläarctischen Region lebenden Binnenconchylien II: 470 [Italien bei Bari in Apulien].

1903 *Helix* (*Pomatia*) *dorylaeensis* KOBELT, Iconographie der Land- und Süsswassermollusken 2 (10): 15, Taf. 276, Fig. 1769 [Eski-Sehir].

1904 *Helix radiosa* f. *angustefasciata* KOBELT, Iconographie der Land- und Süsswassermollusken 2 (10): 68, Taf. 298, Fig. 1914 [auf dem Markte in Konstantinopel].

1905 *Helix* (*Helicigona*) *rumelica magnifica* KOBELT, Systematisches Conchylien-Cabinet VI: 218, Taf. 353, Fig. 1, 2 [Bujukdere bei Konstantinopel].

1905 *Helix* (*Helicogena*) *ancyrensis haussknechti* KOBELT, Systematisches Conchylien-Cabinet VI: 237, Taf. 358, Fig. 5, 6 [Thatieff (bei Borshom)].

1905 *Helix* (*Helicogena*) *ancyrensis* KOBELT, Systematisches Conchylien-Cabinet VI: 222, Taf. 352, Fig. 3, 4 [Angora (= Ankara) in Kleinasien].

1905 *Helix* (*Helicogena*) *castanea* ? *quinquefasciata* KOBELT, Systematisches Conchylien-Cabinet VI: 220, Taf. 356, Fig. 8 [Markt in Konstantinopel].

1905 *Helix* (*Helicogena*) *castanea* var. *bulgarica* KOBELT, Systematisches Conchylien-Cabinet VI: 219, Taf. 356, Fig. 5, 7 [Markt in Konstantinopel].

1905 *Helix* (*Helicogena*) *castanea* var. *nigerrima* KOBELT, Systematisches Conchylien-Cabinet VI: 281, Taf. 372, Fig. 3, 4 [Abhang des Rhodope-Gebirges gegen Philippopel].

1905 *Helix* (*Helicogena*) *halepensis* KOBELT, Systematisches Conchylien-Cabinet VI: 235, Taf. 346, Fig. 5, Taf. 357, Fig. 1 [Um Aleppo and am Ostabhang des Giaur Dagh].

1905 *Helix* (*Helicogena*) *lucorum hueti* KOBELT, Systematisches Conchylien-Cabinet VI: 220, Taf. 348, Fig. 4–5 [Um Konstantinopel].

1905 *Helix* (*Helicogena*) *lucorum loebbeckei* KOBELT, Systematisches Conchylien-Cabinet VI: 223, Taf. 350, Fig. 3, 4 [non *Helix salisi* sensu KOBELT, Iconographie der Land- und Süsswassermollusken 2 (10): 69, Taf. 298, Fig. 1915] [Nördlicher Libanon].

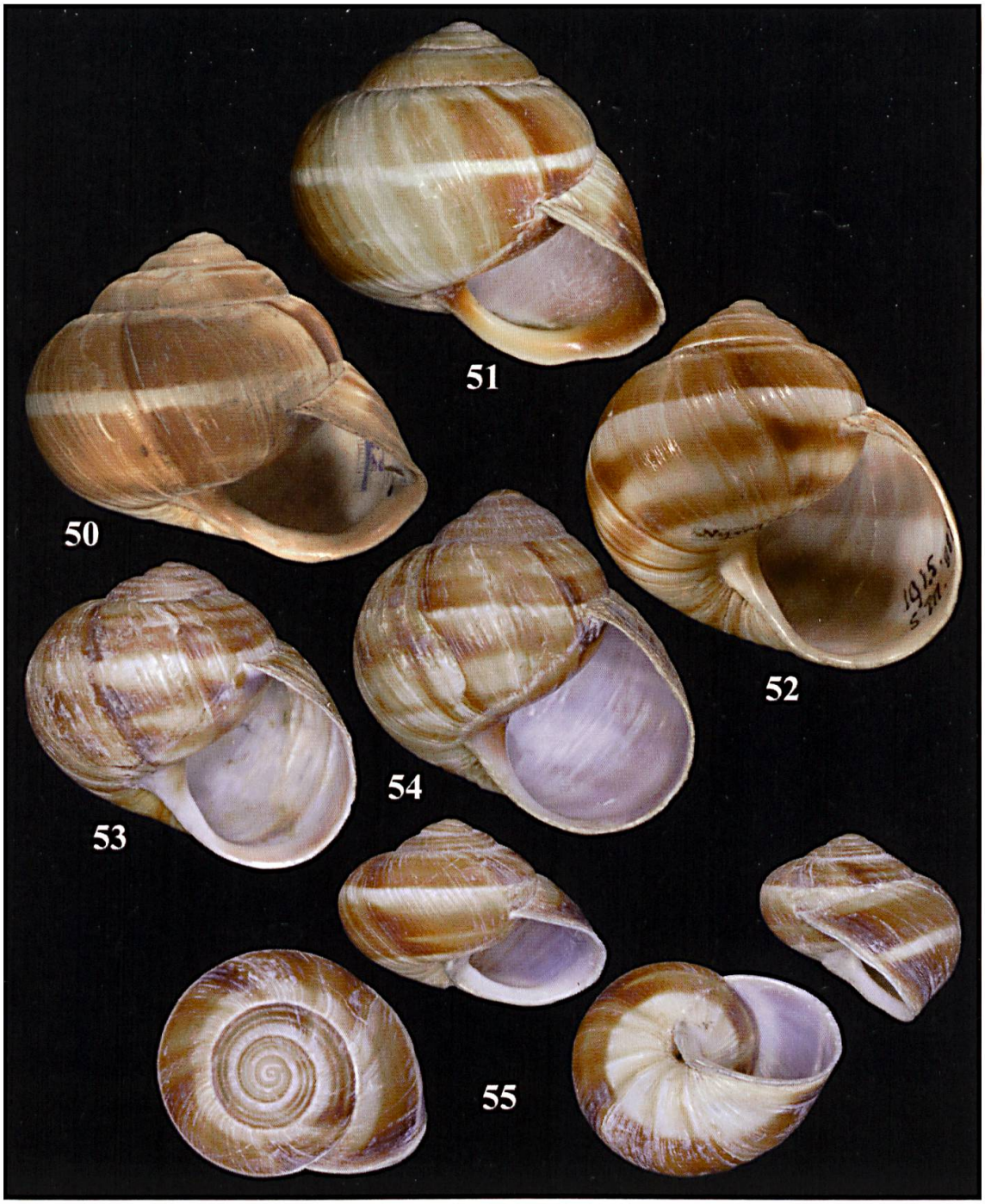
1905 *Helix* (*Helicogena*) *lucorum martensi* var. *heracleensis* KOBELT, Systematisches Conchylien-Cabinet VI: 235, Taf. 351, Fig. 7, 8 [Eregli in Cilicia].

1905 *Helix* (*Helicogena*) *lucorum martensi* var. *nigdensis* KOBELT, Systematisches Conchylien-Cabinet VI: 234, Taf. 355, Fig. 6, 7 [Niğde in Cilicia].

1905 *Helix* (*Helicogena*) *lucorum moussoni* KOBELT, Systematisches Conchylien-Cabinet VI: 230, Taf. 357, Fig. 2–7, Taf. 354, Fig. 7, 8 [Östlicher Teil der Südküste des Pontus, in Transkaukasien and dem oberen Euphratgebiet].

1905 *Helix* (*Helicogena*) *moussoni* var. *böttgeri* KOBELT, Systematisches Conchylien-Cabinet VI: 233, Taf. 355, Fig. 4, 5 [Trapezunt].

1905 *Helix* (*Helicogena*) *onixiomicra* var. *presbensis* KOBELT, Systematisches Conchylien-Cabinet VI: 215, Taf. 353, Fig. 5, 6 [Albanien am Presba-See].



Figs 50–55. *Helix* (*Helix*) *lucorum* LINNAEUS, 1758. Fig. 50 *Helix mahometana* BOURGUIGNAT, 1860, MHNG 18130, Turkey, Daoud Pacha près Constantinople, coll. Bourguignat, D = 48.05; Fig. 51 *rumelica*, probable syntype ZMZ 506269/1, Rumelien, coll. Mousson ex Friwaldsky, 1845, D = 44.99; Fig. 52 holotype *loebbeckei* SMF 9880, "nördlicher Libanon", D = 45.2; Fig. 53 SMF 320167, Iran Aserbeidschan, Kaleybar NE Täbris, D = 39.61; Fig. 54 coll. MENK, Turkey, 2.9 km S Koyluca, D = 40.8; Fig. 55 HAU 669, Turkey, old city walls of Zonguldak, D = 32.18. — All photos Neubert, original size.

1906 *Helix lucorum minima* KOBELT, Iconographie der Land- und Süsswassermollusken 2 (12): 29, Taf. 314, Fig. 1990 [Sinope].

1906 *Helix lucorum* var. *byzantina* KOBELT, Iconographie der Land- und Süsswassermollusken 2 (12): 31, Taf. 315, Fig. 1993 [Markt in Konstantinopel].

1907 *Helix* (*Helicogena*) *everekensis* KOBELT, Iconographie der Land- und Süsswassermollusken 2 (13): 19, Taf. 341, Fig. 2112 [Everek, Cilicia].

Type specimens:

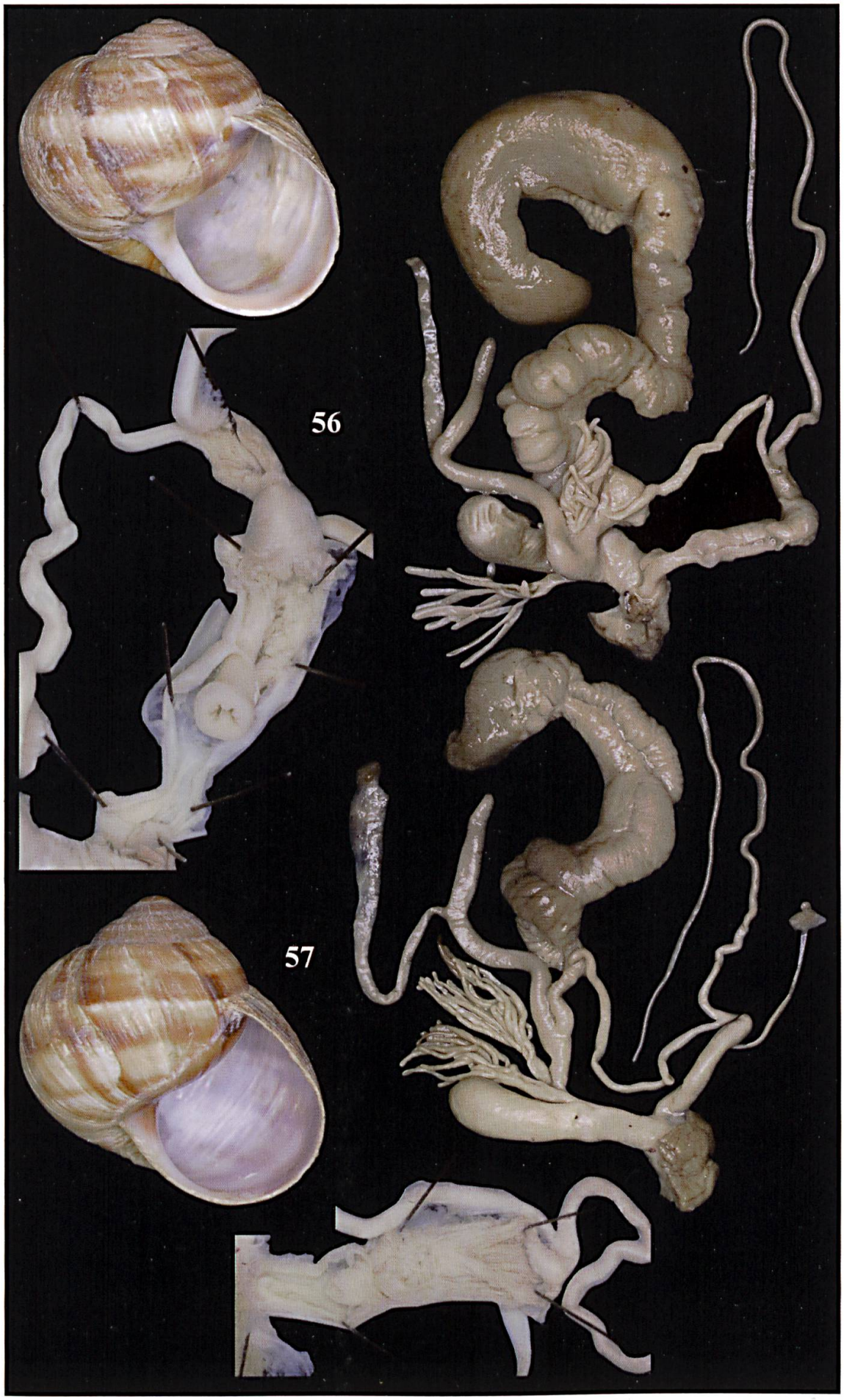
lucorum: neotype ZMUC-GAS-292 (Korábek & al. 2014), H = 39.4, D = 33.24, PH = 19.8, PD = 24.4, PrD = 4.5, W = 5.25; *taurica*: H =, D =, PH =, PD =; *radiosa*: holotype SMF 9866, H = 44.3, D = 42.1, PH = 27.1, PD = 26.2; *socia*: lost?; *onixiomicra*: syntype MHNG 18131, H = 39.6, D = 40.14, PH = 16.8, PD = 23.5, PrD = 5, W = 6.25; *mahometana* = *castanea*: 3 probable syntype(s) MNHN-IM-2000-27768 (Tillier & Mordan 1983, pl. 6 fig. 1), H = 41.5; *rumelica*: probable syntypes ZMZ 506264/2, 506269/1: H = 45.48, D = 44.99, PH = 31.02, PD = 27.58, PrD = 4.6, W = 5.5; *euphratica*: syntype ZMB, H = 41.5, D = 47.8, PH = 26.7, PD = 30.5; *schachbulakensis*: syntype MHNG 18116, H = 38.4, D = 38.9, PH = 20.2, PD = 24.5; *martensi*: lost? (Zilch 1952: 157); *virago*: syntype MHNG 18137, H = 32.8, D = 40.4, PH = 19.1, PD = 25.2; *rypara*: syntype MHNG 18133, H = 35.1, D = 43.9, PH = 22.4, PD = 25.2; *nigrozonata*: syntype MHNG 18058, H = 35.5, D = 39.9, PH = 19, PD = 23.3; *atrocincta*: syntype MHNG 18124, H = 33.5, D = 36.8, PH = 18.5, PD = 22.5; *dorylaeensis*: holotype SMF 9800, H = 39.7, D = 48.5, PH = 20.9, PD = 27.7; *angustefasciata*: holotype SMF 18 945; *presbensis*: lectotype SMF 9630, H = 46.8, D = 44.7, PH = 18.1, PD = 25.9; *quinquefasciata*: holotype SMF 9730; *hueti*: holotype SMF 9864, H = 30.4, D = 35.7, PH = 15.6, PD = 22.4; *ancyrensis*: holotype SMF 9657, H = 43.3, D = 50.1, PH = 26.8, PD = 32; *haussknechti*: holotype SMF 9676, H = 45.3, D = 53.8, PH = 29.2, PD = 32; *nigdensis*: holotype SMF 9873, H = 37.1, D = 39.5, PH = 22.6, PD = 25.6; *heracleensis*: holotype SMF 9797, H = 35.3, D = 36.7, PH = 23.5, PD = 23.7; *nigerrima*: holotype SMF 9695, H = 33.5, D = 42, PH = 19.5, PD = 25.2; *bulgarica*: lectotype SMF 9603, H = 41, D = 46.4, PH = 24.3, PD = 27.9; *magnifica*: not researched; *moussoni*: lost?; *boettgeri*: holotype SMF 19093, H = 42.7, D = 49.4, PH = 22.9, PD = 30.8; *halepensis*: probable syntype ZMZ 506255; H =, D =, PH =, PD =; *minima*: lost?; *byzantina*: holotype SMF 9723, H = 49.5, D = 46.7, PH = 21.8, PD = 28.6; *everekensis*: holotype SMF 9639, H = 42.3, D = 42.4, PH = 27.2, PD = 27.9; *loebbeckei*: holotype SMF 9880: H = 47; D = 45.2.

Note: *Helix* (*Helicogena*) *halepensis* KOBELT is based on a *Helix* specimen (under *onixiomicra*) sent to Kobelt by Mousson for publication in the Iconographie. This specimen is not in SMF, however, under ZMZ 506255, there is a single specimen (under *onixiomicra*) from "Weg nach Haleb, leg. Schläfli, 1862", which might be this specimen sent back to Mousson.

Specimens examined:

Serbia: Siceva E of Nis, 43.3421 22.0838, 370 m alt., 9.4.1971, NMBE 522329/4; Juzna Morava 12 km S Nis, 43.2012 21.8426, 17.4.1987, leg. Kinzelbach, NMBE 512896/1;

Figs 56–57. *Helix* (*Helix*) *lucorum* LINNAEUS, 1758. Genital organs. Fig. 56 SMF 320167, Iran, Kaleybar NE Täbris, situs 47.17; Fig. 57 Turkey, 2.9 km S Koyluca, situs 47.17. — All photos Neubert.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Jelasnicka canyon, E Niska Banja, 43.282 22.0622, 320 m alt., 6.7.2008, NMBE 522507/4; Rajkova Cave, Majdanpek, 44.4298 21.9341, 9.7.2008, NMBE 522514/1; Pirot, castle, 43.1591 22.5816, 370 m alt., 9.7.2008, NMBE 522511/7; Grncar, ca. 25 Km S Bela Palanka, 43.0197 22.3469, 370 m alt., 9.7.2008, NMBE 522502/1; Zagradze, railway tunnel, 44.0274 22.2255, 220 m alt., 10.7.1972, NMBE 522521/1; old railway station of Boljevac, 43.831 21.9525, 290 m alt., 10.7.2008, NMBE 522501/2 .

FYROM: Lake Ohrid, campingsite at Struga, 41.125 20.638, 19.6.1987, NMBE 512885/2; Kozjak ca. 30 km S Skopje, Brana Lake, 41.89 21.2235, 1040 m alt., 7.7.2008, NMBE 522500/1; Prespa Lake, monastery at Kurbinovo, 40.9862 21.055, 1095 m alt., 12.7.1972, NMBE 522524/6; NMBE 522520/1; Trnica, 6 Km in dir. Debar, Radika River, 41.6992 20.6477, 895 m alt., 17.7.1972, NMBE 522525/2; Ohrid Lake, outlet canal at Struga, 41.174 20.6782, 695 m alt., 13.8.1971, NMBE 522519/54.

Kosovo: Pec, 2 km in dir. Rozaje, 42.77 20.28, 28.5.2010, NMBE 23347/2 (alk.); Monastery Sveti Jovan Bigorski, 41.6211 20.6093, 29.8.1972, NMBE 522633/3.

Ukraine: Bakhchisaray, Crimean Peninsula, 44.7493 33.8546, 170 m alt., 2.6.1976, NMBE 522704/2.

Bulgaria: Iskar valley "Ritlite", 500–700 m E of Cerepiski Monastir, 43.0933 23.6247, 425 m alt., 5.5.2008, NMBE 522516/3; Kiten, 42.2389 27.7786, 7.5.2008, NMBE 522631/3; Rezovo, 41.9832 28.0303, 7.5.2008, NMBE 522515/4; Nisava valley, Razboishki Monastir, 43.0173 22.9824, 630 m alt., 21.5.2007, NMBE 522492/1; Ritlite canyon, Iskar River S shore, 43.0988 23.6183, 260 m alt., 22.5.2007, NMBE 522503/3; Gara Lakatnik, Iskar River, 43.0885 23.3845, 400 m alt., 22.5.2007, NMBE 522489/4; Baco Kiro, 6 Km SW Drjanovo, 42.9475 25.4299, 26.5.2007, NMBE 522632/4; Emen, NW Veliko Tirnovo, 43.1373 25.3569, 265 m alt., 27.5.2007, NMBE 522508/4; Veliko Tirnovo, 43.0705 25.6351, 155 m alt., 27.5.2007, NMBE 522506/4; Dunavci NW Kazanlik, 42.6617 25.2981, 428 m alt., 28.5.2007, NMBE 522517/3; Paril, Hambar Dere canyon, Slavianka Mts., 41.416 23.6648, 1040 m alt., 29.5.2007, NMBE 522518/2; Melnik SSW Goce Delcev, 41.5242 23.3955, 400 m alt., 30.5.2007, NMBE 522491/5; Karlukovo, Iskar River S shore, 43.1773 24.0728, 220 m alt., 31.5.2007, NMBE 522513/1; Kloster Aladscha NE von Varna, 43.2774 28.0163, 240 m alt., 17.7.1968 522328/1.

Greece: Vogatsiko, bridge 4 Km SE of village, 40.3983 21.4143, 680 m alt., 10.5.1995, NMBE 522505/1; confluent of Megali- and Mikra-Prespa Lakes, 40.8111 21.0706, 855 m alt., 13.7.1990, NMBE 522493/3; Mikra-Prespa Lake, 200 m W Mikrolimni, quarry, 40.7419 21.1078, 885 m alt., 13.7.1990, NMBE 522495/3; Mikrolimni, 40.7426 21.1098, 870 m alt., 10.5.1995, NMBE 522510/2; Aetia, 2.2 Km in dir. Grevena, 40.0739 21.2015, 1005 m alt., 24.4.2003, NMBE 522496/3; Griva, Gouménissa, 40.9562 22.4009, 540 m alt., 13.5.2005, NMBE 522504/1; crossroads from street Aridéa-Skidra at Néa Zoi, 40.8629 22.1183, 200 m alt., 15.5.2008, NMBE 522490/5; Alistrati, canyon 6.5 Km SE village, 41.0224 24.0067, 80 m alt., 23.5.1997, NMBE 522522/1; Litohoro, canyon N of village, 40.107 22.5029, 280 m alt., 25.5.2011, NMBE 522488/6; Maronia, Cave of Maronia, 40.89 25.556, 25.7.1990,

Figs 58–59. *Helix* (*Helix*) *lucorum* LINNAEUS, 1758. Genital organs. Fig. 58 HAU 669, Turkey, old city walls of Zonguldak, situs 39.69; Fig. 59 ditto, situs 48.16. — All photos Neubert.

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NMBE 522494/2; Avas, 13 Km N of Alexandroupoli, canyon, 40.9366 25.9129, 100 m alt., 26.7.1990, NMBE 522509/3; Didimotiho, walls of the castle, 41.351 26.4865, 60 m alt., 26.7.1990, NMBE 522497/1; road Véria-Kozani 6 Km in dir. Séli, Vérmio Mts., 40.4971 22.1253, 530 m alt., 24.9.1989; NMBE 522499/1; skiing center "Séli", Vérmio Mts., 40.5407, 22.0172, 1540 m alt., 24.9.1989, NMBE 522498/1; Agia Paraskevi, Smolikas Mts., 40.1411 20.9069, 1060 m alt., 25.9.1989, NMBE 522512/2; Strimonas at Nea Kerdilia, 40.8093 23.8269, 1983 leg. Kinzelbach, NMBE 512897/1; Florina/ Makedonia, 40.7887 21.3759, 750 m alt., 1985, NMBE 512902/5; isthmus between Large and Small Prespa Lake, 40.805 21.0714, 1986, leg. Assmuth, NMBE 512905/6; ditto, 40.743 21.11, 17.7.1990, NMBE 512888/2; Serres, 41.0885 23.5487, 22.09.1984, LIEB (4); Samothraki, Chora, 40.4744 25.5258, 10.09.1984, LIEB (4); Paläopolis and Chora, 12.09.1984, LIEB (3); Edessa, Nisi, 40.82 21.92, 9.5.2003, NMBE 19131/1.

Turkey: Çannakale, Ezine, 39.7865 26.3405, 08.06.1989, LIEB (3); Ankara, 39.93 32.86, July 1978, leg. Kazanci, NMBE 512945/1; Niğde, Sultansazligi, Ovaçiflik, 38.2186 35.0119, 28.3.19984, leg. Kasparek, NMBE 512895/3; Bursa, summit of the Uludag, 2480 m alt., 40.07 29.19, 2.8.1984, NMBE 512899/4; Bursa, Uludag, 2100 m alt, 26.7.1991, leg. Ertan, NMBE 512878/1; Bursa, Hanife Dere E Karacabey, 40.206 28.433, 6.8.1984, NMBE 512879/1; Bursa, Uluabat Gölü, Gölyazı, 40.164 28.676, 8.8.1984, NMBE 512880/3; Iznik Gölü, N Ufer, 26 km E Orhangazi, 40.487 29.6, 11.8.1984, NMBE 512881/3; Tekirdag, empty barrage 7 km N Kavak, 40.63 26.92, 18.8.1978, NMBE 512882/1; Iznik, 40.426 29.716, 6.7.1986, NMBE 512883/1; Çannakale, on the shore 5 km S Lapseki, 40.3208 26.6465, 19.4.1987 leg. Kinzelbach, NMBE 512898/1; Trabzon, Vakfikebir to Tonya, 4 km S Fevziye, 40.95 39.29, 24.7.1988, NMBE 512886/2; Kastamonu, castle at Osmancık, 40.9725 34.8022, 6.8.1989 leg. Kinzelbach, NMBE 512903/1; close to Azdavay, 41.6421 33.3050, May 2001, leg. A. Riedel; Bursa, road Bursa to Yenişehir, S Seymen, 40.212 29.393, 19.8.1989, NMBE 512887/2; Karacabey, Yeniköy in the delta area of the Hanife Dere, 40.398 28.361, 29.7.1991, NMBE 512904/1; Bursa, Uluabat Gölü, 1.5.1992, 40.1464 28.3911, leg. Tannert ex coll Groh, NMBE 512900/1 (alk.), NMBE 512900/5; Izmir, Salihli, road Sahlili to Balikesir, below the barrage of Köprübasi, 38.61 28.31, 17.4.1993, NMBE 512889/1; Bursa, Karaçabey, northern slope of Kara Dag 2 km W Kursunlu, 24.4.1993, 40.4 28.254, NMBE 512893/5; Bursa, Karaçabey, forests south of Yeniköy Plaji, 21.4.1993, 40.392 28.354, NMBE 512892/1; Bursa, Karaçabey, beach of Yeniköy Plaji, 40.398 28.361, NMBE 512891/2; Bursa, delta of the Hanife Dere (= Koçaçay) at Ballikaya 19.4.1993, 40.38, 28.44, NMBE 512890/1; Kastamonu, road Osmancık to Samsun, 30 km E Osmancık, 40.963 35.095, 27.4.1993, NMBE 512894/1; Akşehir, Madenli at Yalvaç, 1 km in direction to Yalvaç, 38.1912 31.1034, UH 32, SMNS/ NORDS; Beyşehir, Üstünler at Beyşehir, at the crossroads to Yesildag, 37.5886 31.5592, 29.5.1995, UG 76, SMNS/NORDS; Konya, 37.8621 32.4985, SMNS/NORDS (6); Bitlis, vegetation 25 km SE Tatvan, 38.4674 42.4814, 21.8.1992, NMBE 505489/1 (alk.); Behrankale, Assos, 39.4905 26.3368, 24.05.1988, LIEB (3); Ankara, Bogazkale, canyon of the Budaköyü Çay, 40.0171 34.6065, 28.07.1993, LIEB (2 juv.); Samsun, slope between Kava Samsun and Atakum, 41.3079 36.1027, 23.07.1993, LIEB (3); Trabzon, Cephanelik (Russian depot), 40.9870 39.7215, 19.07.1993, LIEB (3); Gümüşhane, Harsit Çayi bei Marmancik, 6 km SE Torul, 40.53 39.34, 13.7.1986, NMBE 512884/1; Çoruh, Borçka, 2 km in direction to Muratli, 41.3784 41.6777, 08.07.1993, LIEB (1); Izmir, Bergama, Asklepion, 39.1315 27.1851, 29.09.2001, LIEB (8); Gökçeada, Merkez in direction to Kaleköy,

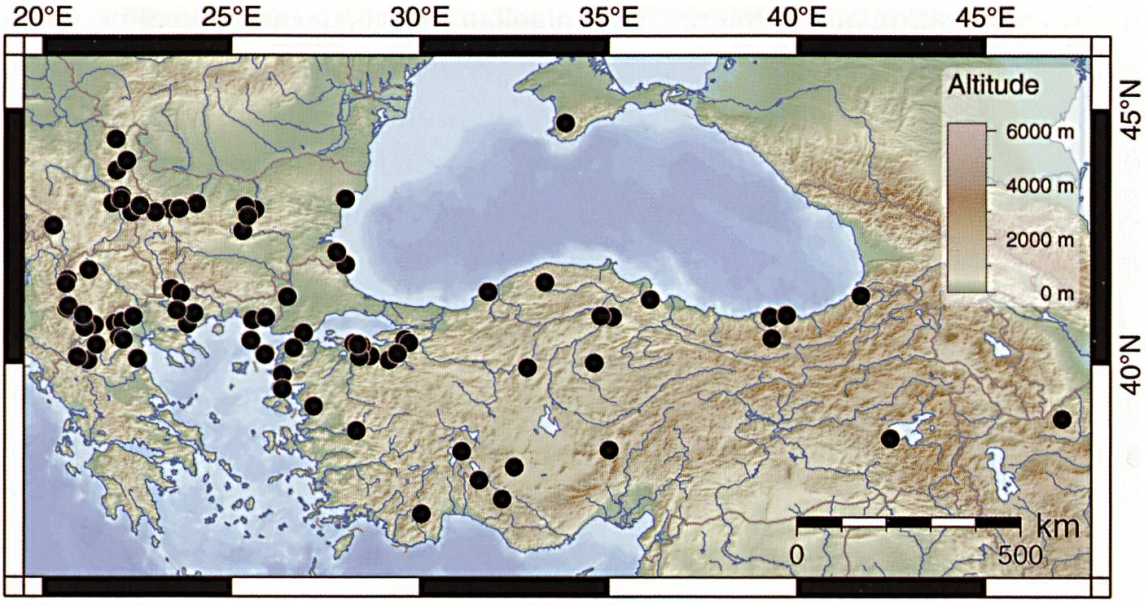


Fig. 60. ***Helix (Helix) lucorum*** **LINNAEUS, 1758, distribution in southeast Europe.**

40.2141 25.9004, 13.05.1988, LIEB (4); Gökçeada, between Merkez and the barrage, 40.1846 25.8781, 13.06.1989, LIEB (6); Dere (= Dereköy), Bozkir, Konya, 37.176 32.1666, 1260 m alt., 13.10.2001, NMBE 522523/7; Antalya, 1 Km N von Çobanisa (= ca. 12 Km NE von Elmalı), 1200 m ü. NN, 36.8743 30.0375, 10.6.1987, NMBE 522526/1; Amasra, city walls of Zonguldak, 41.4531 31.7926, leg. Hausdorf 669.

Iran: Kaleybar NW of Täbris, 38.8665 47.0368, leg. Mansoorian, SMF 320167/4.

Diagnosis: large, heavy shells, shell colour reddish to chestnut brown, peripheral zone of shell with a broad white spiral, aperture subquadrate, dark to light brown, umbilicus slightly open.

Description: shell large, heavy, depressed spherical, basic colour reddish to chestnut brown; protoconch consisting of 2.5 relatively small, smooth, white whorls; teleoconch of 3–4 whorls, body whorl large to very large, colour bands usually blurred to two broad supra- and sub-peripheral band, separated by a broad white spiral peripheral zone; shell often with broad, white axial flames; shell sculptured with densely arranged growth riblets, spiral grooves very fine to completely missing; last whorl only slightly descending below the white periphery; aperture subquadrate, labial callus present, dark to light brown, columellar triangle small; umbilicus always slightly open.

Genital organs(Figs 56–59): penis club-shaped, epiphallus reaching the same length as penis; flagellum extremely long, exceeding the length of epiphallus+penis > fivefold; mrp attaching in a central to distal position on the epiphallus; internally, pp1 short, with a central perforation, often only poorly developed, penial chamber short, filled with a few ring-like pilasters crossed by few elongate folds, pp2 usually stronger than pp1, elongate conical with a

central perforation and some ring-like lamellae on the surface; female system with a very short vaginal tube, dart sac and glandulae mucosae strongly developed, the glandulae with a basic stem, multi-branched, usually much longer than dart sac; pedunculus stem long, with a thick and short diverticulum, bursa copulatrix stem shorter than pedunculus stem, vesicle rounded and bent downwards.

Distribution (Fig. 60): *Helix lucorum* is a widespread species ranging from coastal southern France and northern Italy through Albania (Dhora & Welter-Schultes 1996), the central Balkan area, Turkey, the southern Caucasus to Iran. It is a species confined to habitats ranging from open woodlands to subarid steppe-like areas. It is quite likely that this species has been introduced to France and Italy since Roman times, where it was used as a food resource.

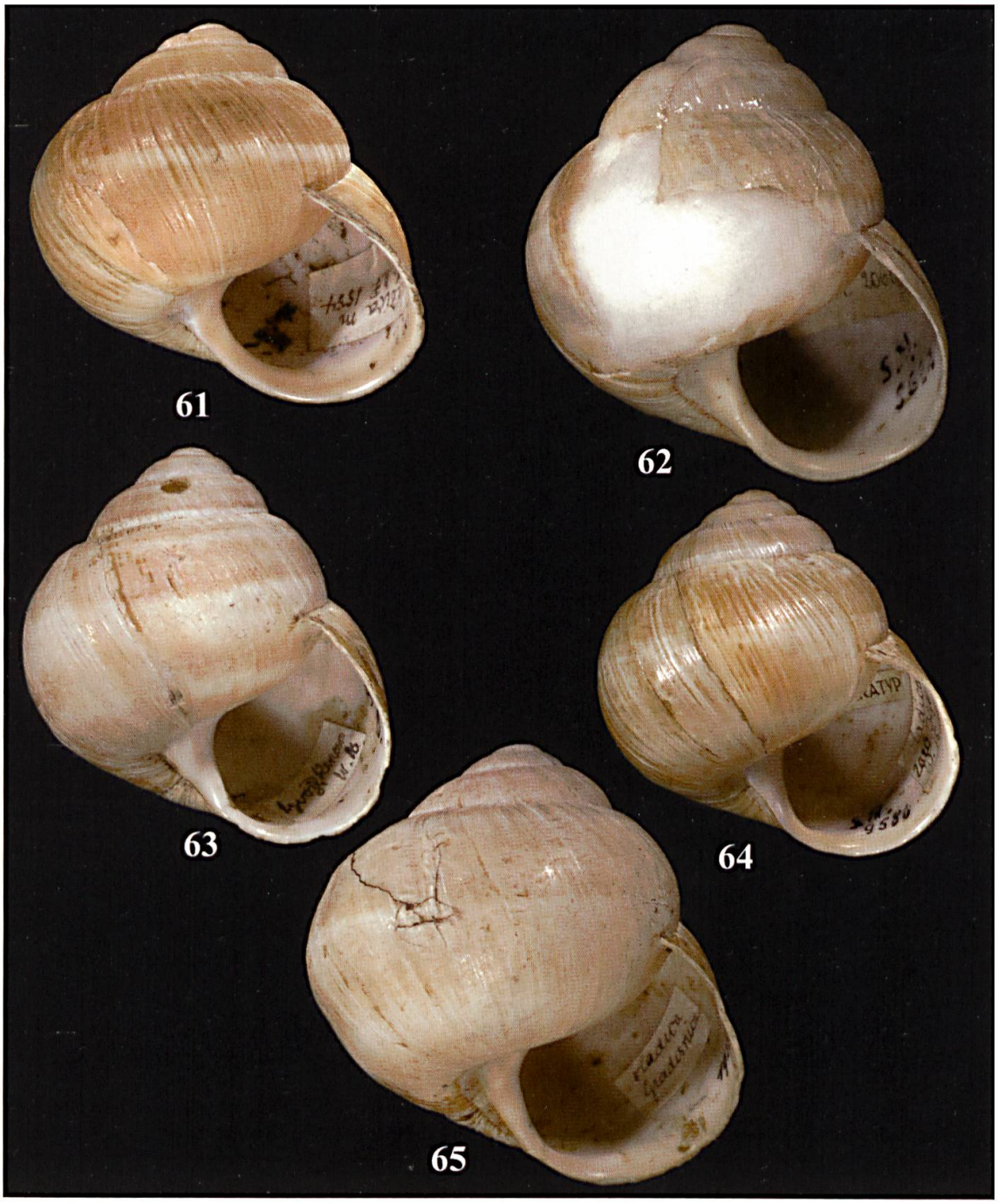
Remarks: This species is quite variable in shell shape and coloration, but usually can be easily identified by the presence of the white peripheral spiral band in combination with the heavy depressed shell and a brown apertural lip. One widespread colour form displays large white, axial flames, and has received the name "*radiosa*" or "*radiata*". However, this form can be observed in many populations together with the more common colour form, and thus cannot be separated as a taxon in its own rights. However, in north-western Turkey, a remarkable group of populations can be observed (Zonguldak). The shells of this form are smaller, more depressed to bluntly keeled, with an almost rectangular whitish aperture, more pronounced riblets, and an open umbilicus. They may probably be identical with the form described as *Helix lucorum minima* Kobelt, from Sinop. The anatomical investigation of this form did not show any major deviation from the common type, and no taxonomic decisions have been taken so far (Figs 55, 58–59). The presence of *H. lucorum* in northern Lebanon (under *salisi* = *loebbeckei* from Tripolis) could not be corroborated by modern collections.

***Helix* (*Helix*) *vladika* Kobelt, 1898** (Figs 61–67)

1890 *H. secernenda* var. *insignis* Brancsik, Trencsén Vármegyei Természettudományi Egylet 1888/ 89 évkönyve, 11–12: 71 [Bjelobrdo im Sandschak Novipazar (not identified)] [non *Helix insignis* Zieten, 1830).

1898 *Helix vladika* Kobelt, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 30: 164 [Moraca Tal, ca. 42.6157 19.3710].

1905 *Helix wohlberedti* Kobelt, Systematisches Conchylien-Cabinet VI: 239, Taf. 359, Fig. 4 [Gwozd, Krnowo, ca. 42.8931 19.1011].



Figs 61–65. *Helix* (*Helix*) *vladika* KOBELT, 1898. Fig. 61 lectotype *vladika* SMF 9607, Moraca Tal, D = 46.8; Fig. 62 *insignis*, syntype SMF 9632, Bjelobrdo (Novipazar), D = 50.1; Fig. 63 *wohlberedti*, holotype SMF 9931, Gwozd, Krnowo, D = 43.6; Fig. 64 *poljensis*, holotype SMF 9586, Polje, D = 42.8; Fig. 65 *pomatiaeformis*, neotype SMF 19220, Andrijevica, D = 52.1. — All photos Neubert, original size.

1905 *Helix wohlberedti* var. *poljensis* KOBELT, Systematisches Conchylien-Cabinet VI: 239, Taf. 359, Fig. 3, 5 [Polje, an der oberen Moraca, ca. 42.7895 19.3938].

1906 *H. vladica pomatiaeformis* KOBELT, Systematisches Conchylien-Cabinet VI: 301 (262), Taf. 359, 1, 2 [non *pomatiaeformis* WESTERLUND, 1889] [oberes Moraca Tal, Gradisnica Fluss bei Andrijevica, 42.7332 19.7926].

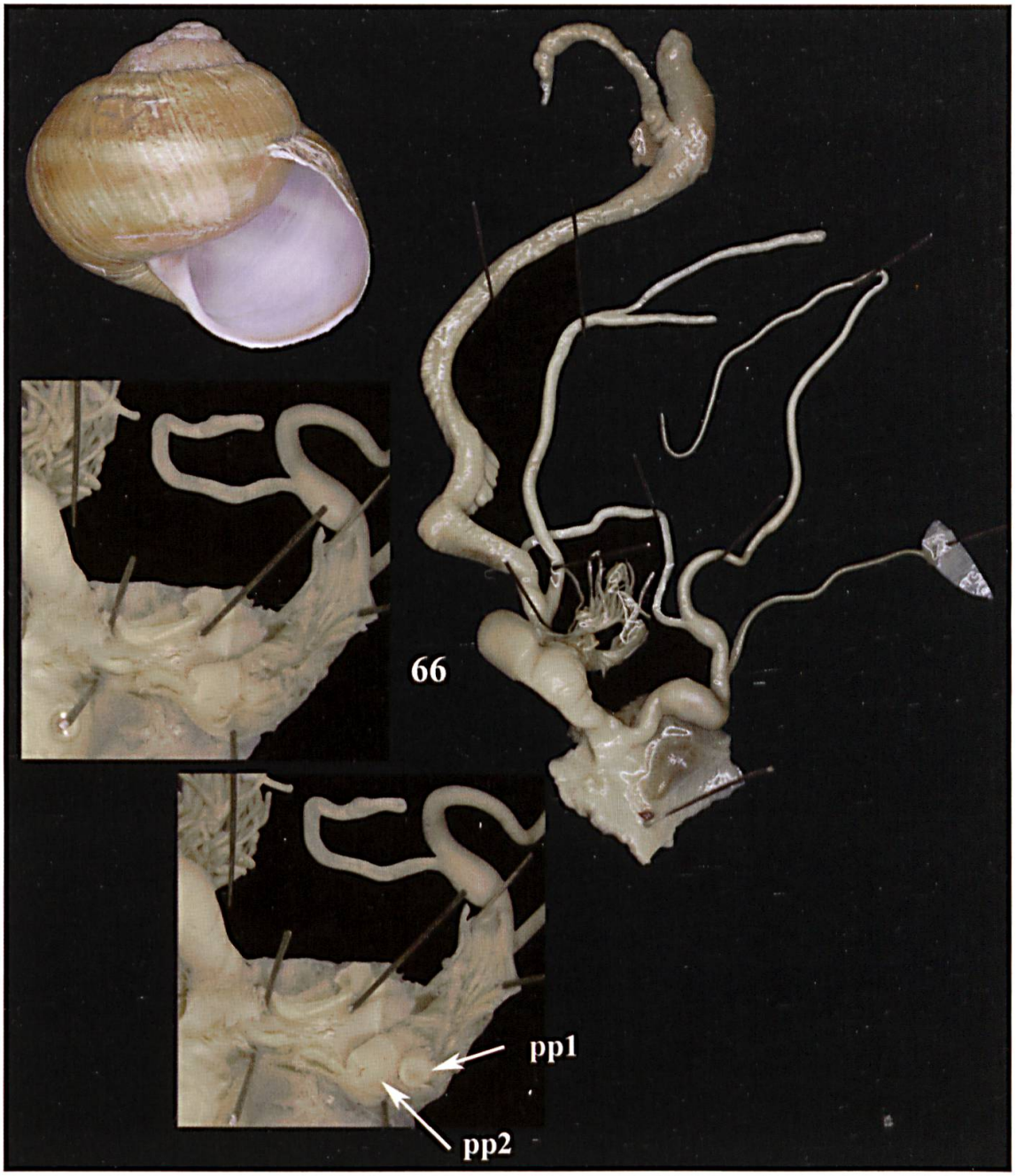


Fig. 66. *Helix* (*Helix*) *vladika* Kobelt, 1898. Genital organs, NMBE 23348, Mokro close Savnik, Situs 32.42 mm. — All photos Neubert.

Type specimens:

insignis: syntype SMF 9632 (Zilch 1952: 167): H = 55.3; D = 50.1; PH = 33.8; PD = 23.1; PrD = 5.8; W = 6. *vladika*: lectotype SMF 9607 (SD Zilch 1952: 167): H = 48.2; D = 46.8; PH = 34; PD = 23.4; PrD = 5.4; W = 5.25. *wohlberedti*: holotype SMF 9931a (, Zilch 1952: 167): H = 48.8; D = 43.6; PH = 30.1; PD = 19.6; PrD = 4.9; W = 5.75. *poljensis*: holotype SMF 9586 (Zilch 1952: 167): H = 46; D = 42.8; PH = 29.8; PD = 20.1; PrD = 5.05; W = 5.75. *pomatiaeformis*: neotype SMF 19220a (SD Zilch 1952: 167): H = 54; D = 52.1; PH = 35.1; PD = 24.7; PrD = 5.5; W = 5.75.

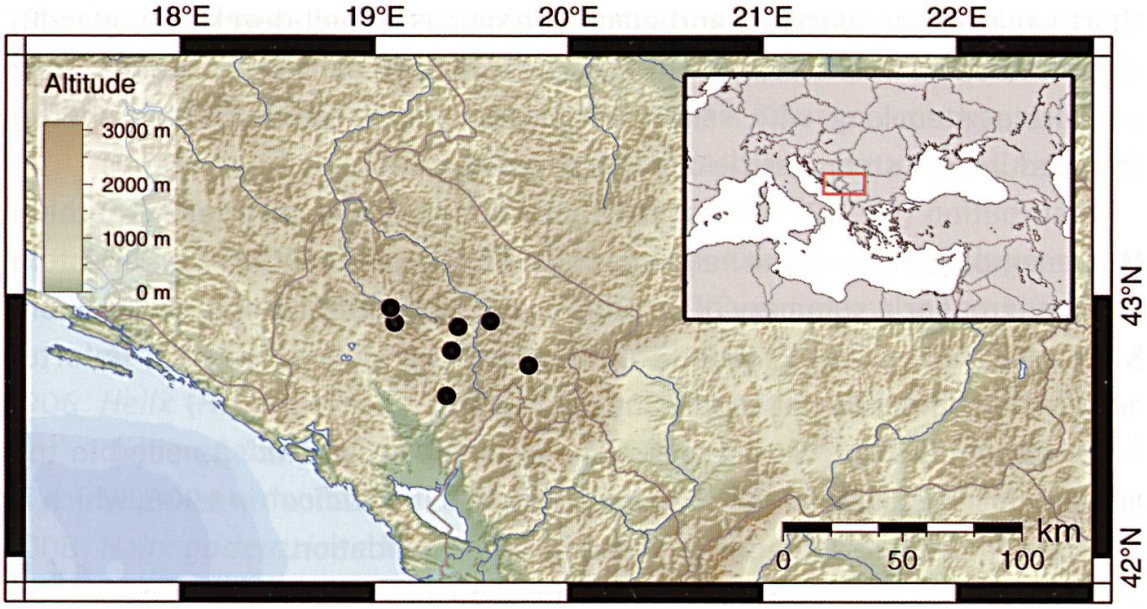


Fig. 67. *Helix* (*Helix*) *vladika* Kobelt, 1898. Distribution.

Specimens examined:

Montenegro: Moraca valley, forest at the Lake of Biogradska Gora, nature reserve 42.899 19.597, 19.09.1985, NMBE 512578/1; "Yougoslavie", 1967, leg. Clément, coll. Chevallier, MNHN (2 alk.); Gornje (= Donji) Lipovo, 42.88 19.43, leg. N. Büscher, NMBE 23352/2; Mokro close to Savnik, 42.95 19.08, leg. Büscher, NMBE 23348/3.

Diagnosis: shell large, subconical, protoconch of 2 large whorls, yellowish to chestnut brown, colour bands usually separate, aperture spherical, labial callus brown to white, umbilicus closed to slit-like open.

Description: shell large, heavy, subconical, yellowish to chestnut brown; protoconch consisting of 2 large, smooth, whitish whorls; teleoconch of 3–4 whorls, body whorl large to very large, the five brownish colour bands usually separate, sometimes spiral 2+3 fused, or spirals completely blurred to two forming a broad supra- and sub-peripheral band, separated by a broad white peripheral zone; shell sculptured with densely arranged, coarse growth riblets, spiral grooves very fine to completely missing; aperture subquadrate to spherical, labial callus present, dark brown to white, columellar triangle small; umbilicus closed to slit-like open.

Genital organs (Fig. 66): penis club-shaped with a broader proximal part, epiphallus reaching the same length as penis; flagellum long, reaching four times the length of epiphallus+penis; mrp attaching in a central position on the epiphallus; internally, pp1 short, with a central perforation, penial chamber short, pp2 larger than pp1, elongate conical with a central perforation, smooth on the surface; atrial stimulator a short upright pilaster; female system with a

short vaginal tube, dart sac and glandulae mucosae well developed, glandulae with a short basic stem, multi-branched, usually as long as the dart sac; pedunculus stem long, with a short diverticulum, bursa copulatrix stem shorter than pedunculus stem, vesicle of bursa copulatrix not seen.

Distribution (Fig. 67): This species only occurs in a small area in southern Montenegro, and also in the neighbouring parts of Kosovo, Albania and western Montenegro. For a summary of localities refer to Korábek & al. (2014). Dhora & Welter-Schultes (1996) found this species from all over Albania; unfortunately, the authors do not supply any photograph.

Remarks: The correct species name is spelled "*vladika*" as used in the original description 1898. Kobelt himself spelled it "*vladica*" in 1906, which is here considered an erroneous and thus invalid emendation.

Helix vladika can be separated from the similar *H. pomatia* by its more conical shell shape, the relatively small aperture (compared to the shell height), and the lack of prominent spiral sculpture elements. Some shells look similar to *H. lucorum*, particularly when the colour bands are fused to two broad brown spirals. However, true *H. lucorum* usually have a heavier shell with a more quadrate aperture. The genital organs are also similar to *H. pomatia* and *H. lucorum*, but the glandulae and the flagellum are clearly shorter. Moreover, the diverticulum is well developed, but often reduced to completely missing in *H. pomatia*. The concept of separation of this species from *H. lucorum* and *H. pomatia* has been corroborated by Korábek & al. (2014) by using two mitochondrial genes, the protein-coding gene for cytochrome c oxidase subunit I (COI), and 16S rRNA (16S). Although first data sets suggest the specific identity of *H. vladika* with *H. straminea* Briganti, 1825, the authors of this study still keep both species separate until more data are available to justify their synonymisation. This point of view is followed here. It has to be stressed that Korábek & al. (2014) report *H. straminea* also from Albania and Macedonia, which might then explain the records by Dhora & Welter-Schultes (1996). *H. straminea* is described from Italy and thus not covered in the present study.

Helix (Helix) buchii Dubois de Montpéreux, 1839 (Figs 68–74)

1839 *Helix buchii* Dubois de Montpéreux, Voyage autour du Caucase II: 243 [sur les bords de la Khanitskali].

1854 *Helix pomatia* var. *decussata* Mortillet, Mémoires de l'Institut national genevois 2: 7 [Près de Trébisonde].

1891 *Helix* (*Pomatia*) *buchii* var., Kobelt, Iconographie der Land- und Süsswassermollusken 2 (5): 77, Taf. 139, Fig. 883 [Karabagh].

1903 *Pomatia sieversi* KOBELT, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 35: 149 [Tschoroch in den Bergen nördlich von Baku].

1904 *Helix* (*Pomatia*) *buchii* var. *karabaghensis* KOBELT, Iconographie der Land- und Süsswassermollusken 2 (11): 191 [name for *buchii* var., Fig. 883 (1891)].

1906 *Helix* (*Helicogena*) *pomatia*? *duschekensis* KOBELT, Systematisches Conchylien-Cabinet VI: 258, Taf. 366, Fig. 6 [Duschek zwischen Tiflis und dem Kasbek; very prob. Dusheti 42.0858 44.6974].

1906 *Helix* (*Helicogena*) *buchii* var. *adsharica* KOBELT, Systematisches Conchylien-Cabinet VI: 260, Taf. 358, Fig. 1–4 (= Iconographie der Land- und Süsswassermollusken 2 (5): Taf. 139, Fig. 883) [Adsharia, Karabagh].

2008 *Helix goderdziana* MUMLADZE, TARKHNISHVILI & POKRYSZKO, Journal of Conchology 39 (5): 483 [South-Western Georgia, east of Goderdzi Pass 41.6499 42.6009].

Type specimens:

buchii: holotype MZL, H = 48.9, D = 47.8; *decussata*: not researched; *sieversi*: lectotype SMF 9806 (SD Zilch 1952), H = 52.1, D = 53.8, PH = 37.8, PD = 26.6, PrD = 5.5, W = 5.5; *karabaghensis*: lost? not present in SMF, D = 61 mm (fide Kobelt); *duschekensis*: lectotype SMF 9637 (SD Zilch 1952), H = 43.5, D = 46.5 PH = 31.1, PD = 33.3, PrD = 5, W = 5; *adsharica*: lectotype SMF 9609 (SD Zilch 1952), H = 52.1, D = 58.8, PH = 39, PD = 38.9, W = 5; *goderziana*: Holotype Zoological Research Institute (ZRI), Tbilisi, Georgia, H = 61, D = 60, PH = 40, PD = 34 (not investigated personally).

Specimens examined:

Russia: SMF 74447, Pjätigorsk, 44.0333 43.0666.

Georgia: SMF 9728, Katharinenfeld [Bolnissi], 41.4498 44.5375; SMF 9725, Tiflis, 41.7172 44.7870; SMF 18256, Elisabeth Tal close Tiflis [Assurethi], 41.5914 44.6713; SMF 18253, Marienfeld [Sartitschala], 41.7097 45.1728; SMF 18255, Radscha; SMF 74448, Kutais, 42.2502 42.7002; SMF 18252, Gelati Monastery, 42.2952 42.7685; SMF 18257, Chula; SMF 18251, road from Achalzieh to Batum, on the western side of the pass Chula; Samtavisi (= Samtawissi), 42.0063 44.409, 690 m alt., 9.6.1988, NMBE 522705/1.

Turkey, Giresun, 12 km S of Giresun, 40.8244 38.4696, 23.7.1990, MENK (11+alk.1); Giresun, at the bridge over the Melet Irmagi E of Ordu, 40.9750 37.9364, 11.7.1986, MENK/2 (alk.); Giresun, road to Şebinkarahisar 15 km S Giresun, 40.805 38.468, 150 m alt., 28.4.1993, NMBE 513038/3; Giresun, 49 km S Giresun at the road to Şebinkarahisar, 40.625 38.359, 1010 m alt., 28.4.1993, NMBE 512594/2; Giresun, road between Üniye and Ordu, 7 km E Bolaman, 41.1 37.648, 20 m alt., 5.9.1989, NMBE 513034/2; Giresun, road between Giresun and Trabzon, 6 km E Kesap, 40.94 38.579, 20 m alt., 5.9.1989, NMBE 513035/9; Giresun, coastal road 2 km W Perşembe, 41.068 37.722, 400 m alt., 28.4.1993, NMBE 513037/6+alk. 2, NMBE 505486/1; Trabzon, valley of the Harsit Dere, 7 km upstream from its mouth, 40.95 38.865, 70 m alt., 11.7.1986, NMBE 513032/1; ditto, 40.95 38.865, 70 m alt., 24.7.1988,

NMBE 512593/3; Trabzon, road Trabzon to Gümüşhane, left tributary to Maçka Dere, 1250 m alt., 7.9.1989, NMBE 513036/1; Rize, valley of the Iyidere 5 km S Ikizdere, 40.758 40.592, 750 m alt., 26.7.1988, NMBE 513033/1; Çoruh, rocks of limestone 10 km E of Hopa on a pass over the mountains, 41.4027 41.5049, 600 m alt., 21.7.1988, MENK (6); Çoruh, Cankertasan between Hopa and Borçka, 09.07.1993, LIEB (4); Ancer Yayla (ubi?), VIII.1973, RÄH (1); Tirebolu, valley of the Dogankent Çayi, 7 km upstream the delta at the road to Torul, 40.9537 38.8651, 11.7.1986, MENK (2); ditto, 24.7.1988, MENK; at the bridge over the Yomra Deresi, E of Yomra, 40.9525 39.8674, 10 m alt., NMBE 505485/2.

Diagnosis: shells usually of large size, with a brownish to greenish periostracum, teleoconch with light to heavy axial ribs and a prominent microsculpture, usually with separate spiral bands, thin white apertural lip, umbilicus closed.

Description: shell of medium to very large size, depressed spherical, reddish-, greenish- to chestnut-brown; protoconch small in relation to the complete shell, consisting of 2 large whorls with microscopic warts and wrinkles; teleoconch with a brown-yellow to -green periostracum, usually lost in many adult shells; teleoconch of 3–4 whorls; shell sculpture with irregularly arranged light to heavy axial ribs, intersected by a prominent microsculpture of minute beads, microsculpture usually prominent on the second whorl of the teleoconch, often fading out on the following whorls; banding pattern consisting of four to five spiral bands with No. 1 very small, No. 2 and 3 broadly fused, No. 4 and 5 separate; aperture broadly rounded to transversally widened with a thin white lip inside; columellar triangle small; juvenile and subadult shells slitlike umbilicated, adult shells with a closed umbilicus.

Genital organs (Fig. 73): penis cylindrical, somewhat longer than the epiphallus; flagellum reaching double the length epiphallus+penis or longer (Mumladze & al. 2008); mrp attaching in a central position on the epiphallus; internally, pp1 well developed, with a central perforation, penial chamber elongate, pp2 of the same size as pp1 with a central perforation, smooth on the surface; atrial stimulator a thick, rounded pilaster; female system with a short vaginal tube, dart sac and glandulae mucosae well developed, glandulae with a short basic stem, branching into 12–15 tubes, usually as long as the dart sac; pedunculus stem very long with a short diverticulum, bursa copulatrix stem much shorter than pedunculus stem, vesicle of bursa copulatrix elliptical.

Figs 68–72. *Helix* (*Helix*) *buchii* Dubois de Montpéreux, 1839. Fig. 68 holotype *buchii* MZL, Khanitskali, D = 47.8; Fig. 69 lectotype *adsharica* SMF 9609, Adsharia, D = 58.8; Fig. 70 lectotype *duschekensis* SMF 9637, Duschek zwischen Tiflis und dem Kasbek, D = 46.5; Fig. 71 lectotype *sieversi* SMF 9806, Tschoroch, D = 53.8; Fig. 72 NMBE 505485, Turkey, Yomra, D = 41.87. — All photos Neubert, original size.

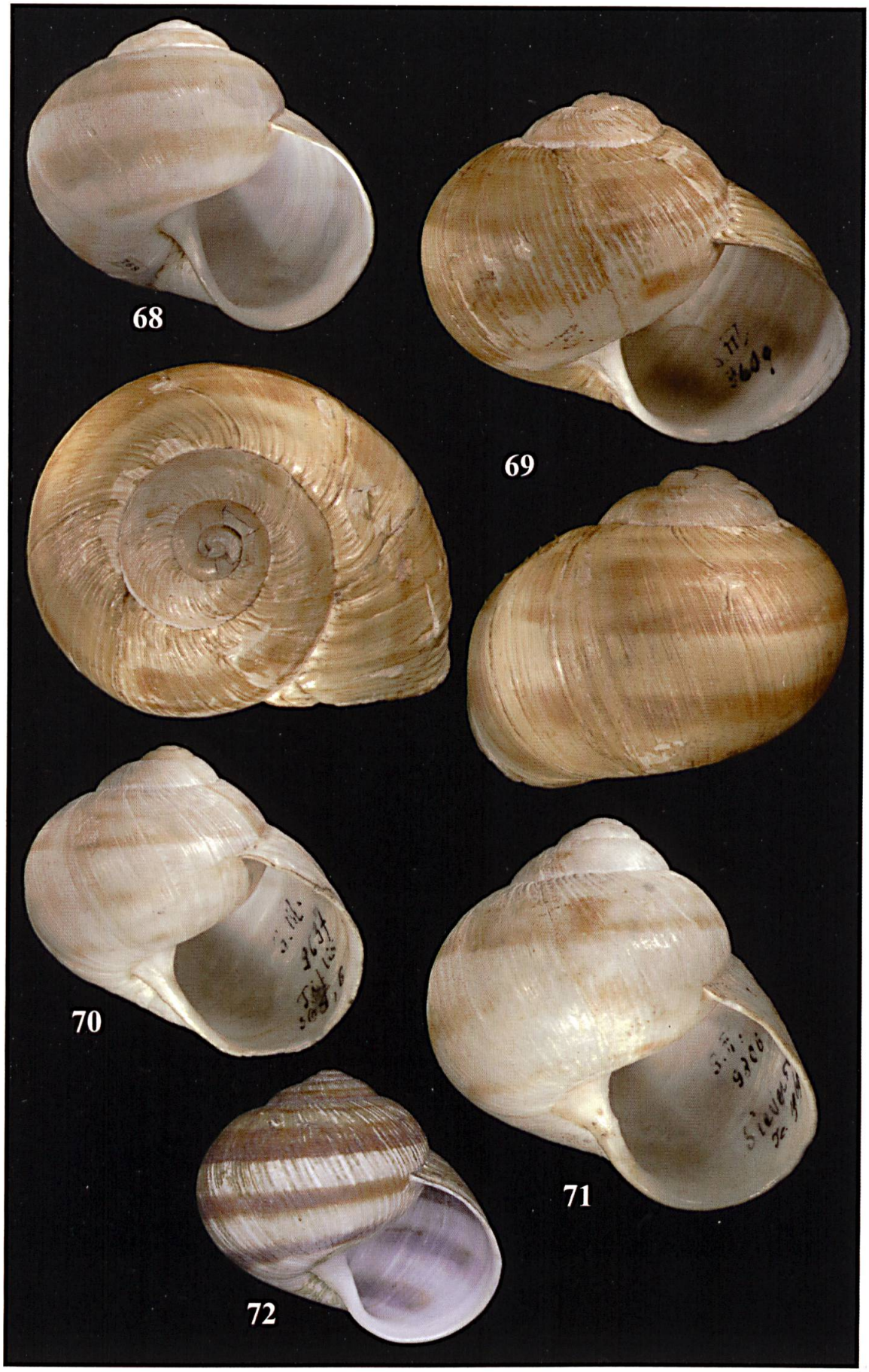

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Fig. 73. *Helix* (*Helix*) *buchii* Dubois de Montpéreux, 1839. Genital organs, NMBE 505485, Turkey, Yomra, Situs 48.79. — All photos Neubert.

Distribution (Fig. 74): *Helix buchii* seems to be restricted to the northeastern coastal part of Turkey, and to Georgia and Armenia.

Remarks: The Khanitskali may be identical with the river nowadays called Tskhenistskali, a right tributary of the Rion in Georgia. Dubois de Montpéreux reports *H. buchii* from "5 ou 6 mille pieds du niveau de la mer", this means at an altitude of 1.500 to 1.800 m which would restrict the typical area to the upper reach of this river NE of Kutais on the southern slopes of the Caucasus.

In 2008, Mumladze & al. described a new *Helix* species, *H. goderdziana*, from Adsharia, Georgia. Sysoev & Schileyko (2009) relegated this species

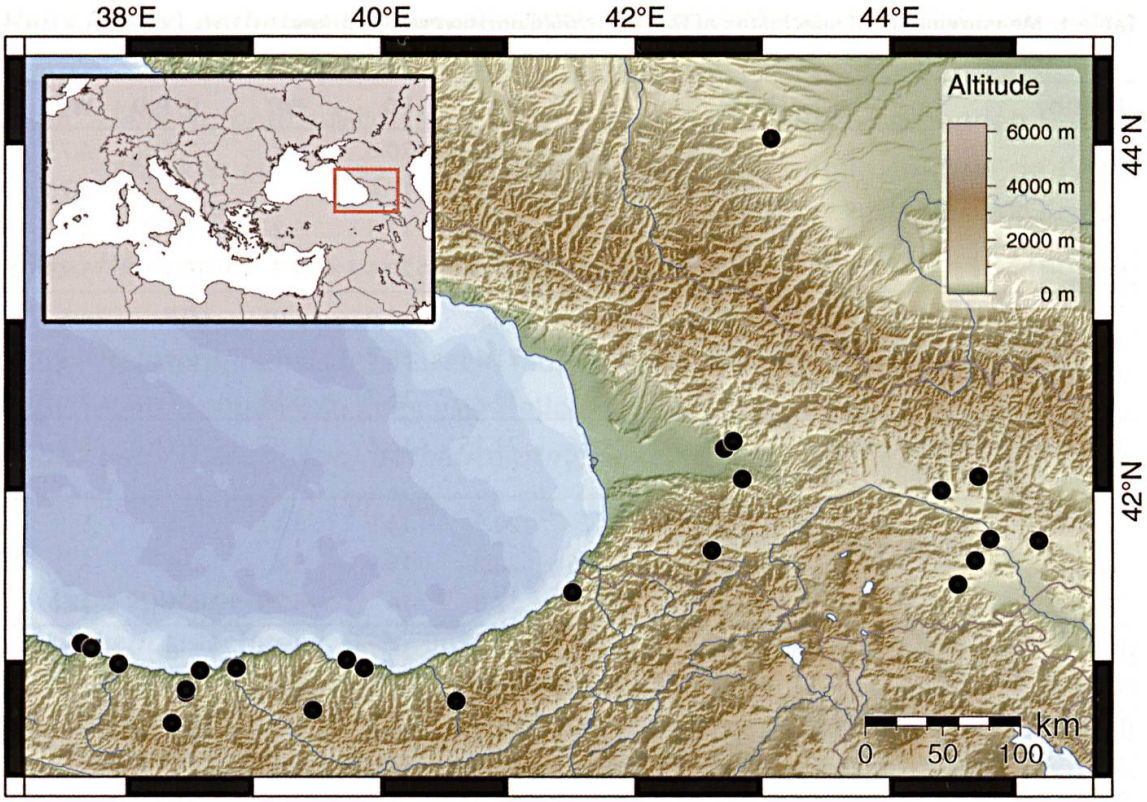


Fig. 74. ***Helix (Helix) buchii*** **Dubois de Montpéreux, 1839. Distribution.**

into the synonymy of *H. buchii*, because all traits used for the separation of *H. goderdziana* from *H. buchii* are subject to great variation, and so are not species specific at all (see also Tab. 1). Recently, Mumladze & al. (2013) revisited the problem using a combination of morphometry and molecular methods (COI and ITS-1). As a conclusion they claim that *H. goderdziana* has to be considered a separate species, which is widely overlooked, misinterpreted, and widespread in the area. In my opinion, the conclusions of the authors are incorrect for several reasons: 1) the authors apply multivariate methods, in particular principal component analysis (PCA) and multivariate analysis of variance (MANOVA), for analyzing the morphometric variation based on 28 specimens and 31 distance variables. This means that out of the total number of 31 principal components, 4 have zero variance, simply because they use merely 28 specimens. The zero variances of these components allow no meaningful interpretation and such an analysis is highly dubious (e.g., Flury & Riedwyl 1988: 198); 2) according to Tabachnick & Fidell (2007: 250), each cell in a MANOVA design should have more cases than dependent variables (DV) which means that for comparing four species, a minimum of 124 specimens is required. The authors, however, compare 28 specimens (*H. buchii* = 13, *H. goderdziana* = 7, *H. pomatia* = 4, *H. lucorum* = 4), which are unacceptably low figures yielding no reliable result; 3) in our genetic analysis of the group we

Table 1: Measurements of specimens of *Helix buchii* in northwestern Turkey.

Locality	H	D	PH	PD	PrD	D/PrD	W
12 km S of Giresun, MENK	35.4	40.7	27.6	20.6	5.6	7.3	4.75
	32.2	35.9	24.2	17.4	4.4	8.2	4.75
	30.1	35.3	23.6	17.5	5.2	6.8	4.5
	39.8	40.1	25.9	20.1	5.5	7.3	5.25
Giresun, coastal road 2 km W Perşembe, NMBE 513037	30.2	31.4	20.4	16.9	5.05	6.2	4.5
	27.1	32.7	21.1	15.3	5.1	6.4	4.5
	27.7	31.7	20.2	15.7	5.55	5.7	5
49 km S Giresun at the road to Şebinkarahisar, NMBE 512594	30.25	31.15	21.15	14.6	4.95	6.3	5
Trabzon, Harsit Dere, NMBE 513032	30.7	32.7	20.9	14.9	6.1	5.4	5
	28	34.75	20.2	15.9	5.4	6.4	5
	24	30.4	17.8	14	6.25	4.9	4.5
Trabzon, 6 km E Kesap, NMBE 513035	31.5	33.1	21.35	15.75	5.95	5.6	4.75
	25.5	31.65	19.65	15.45	5.1	6.2	4.5
	29.45	33.3	20.2	15.4	5.3	6.3	5
	28.3	22.85	20.5	15.1	5.1	4.5	5
	28.7	32.3	19.6	15.4	5.2	6.2	4.75
ø	29.93	33.13	21.52	16.25	5.36	6.23	4.80
Max	39.8	40.7	27.6	20.6	6.25	8.2	5.25
Min	24	22.85	17.8	14	4.4	4.5	4.5
StD	3.76	4.05	2.54	1.86	0.47	0.92	0.25

also used the tissues from the populations of *H. goderdziana*, but here these specimens clearly cluster within the *H. buchii* clade (Korábek & al. submitted). In case, increasing knowledge based on a much better specimen sampling should result in a separated position of *H. goderdziana*, the name *Helix* (*Helicogena*) *buchii* var. *adsharica* Kobelt, 1906, would take over precendence because of priority. Comparing the type specimen of *adsharica* presented here (Fig. 69) with the figures supplied in Mumladze & al. (2008) leaves no doubt about their conspecificity.

This is one of the largest *Helix* species, which, however, can vary enormously in size. The largest specimens reach diameters of > 60 mm, originating from humid and densely vegetated environments like the higher Pontic Mountains in east Turkey and the Lesser Caucasus (Mumladze & al. 2008; own observations). However, in the western part of the Pontic Mountains, the shell sizes decrease considerably (Table 1).

***Helix* (*Helix*) *pathetica* Mousson, 1854** (Figs 75–80)

1854 *Helix pathetica* Mousson, Mittheilungen der naturforschenden Gesellschaft in Zürich, 3: 366 ["nous ne savons de quelle contrée de l'Asie mineure"].

1855 *Helix philibensis* L. Pfeiffer, Malakozoologische Blätter, 2: 133 [nomen nudum].

1859 *Helix philibensis* L. Pfeiffer, Monographia heliceorum viventium IV: 161.

1860 *Helix pathetica* Albers, Die Heliceen, 2. Auflage: 143 [no locality given].

1904 *Helix* (*Helicogena*) *pathetica armeniaca* Kobelt, Systematisches Conchylien-Cabinet VI: 197, Taf. 347, Fig. 10, 11 [Tokat].

Type specimens:

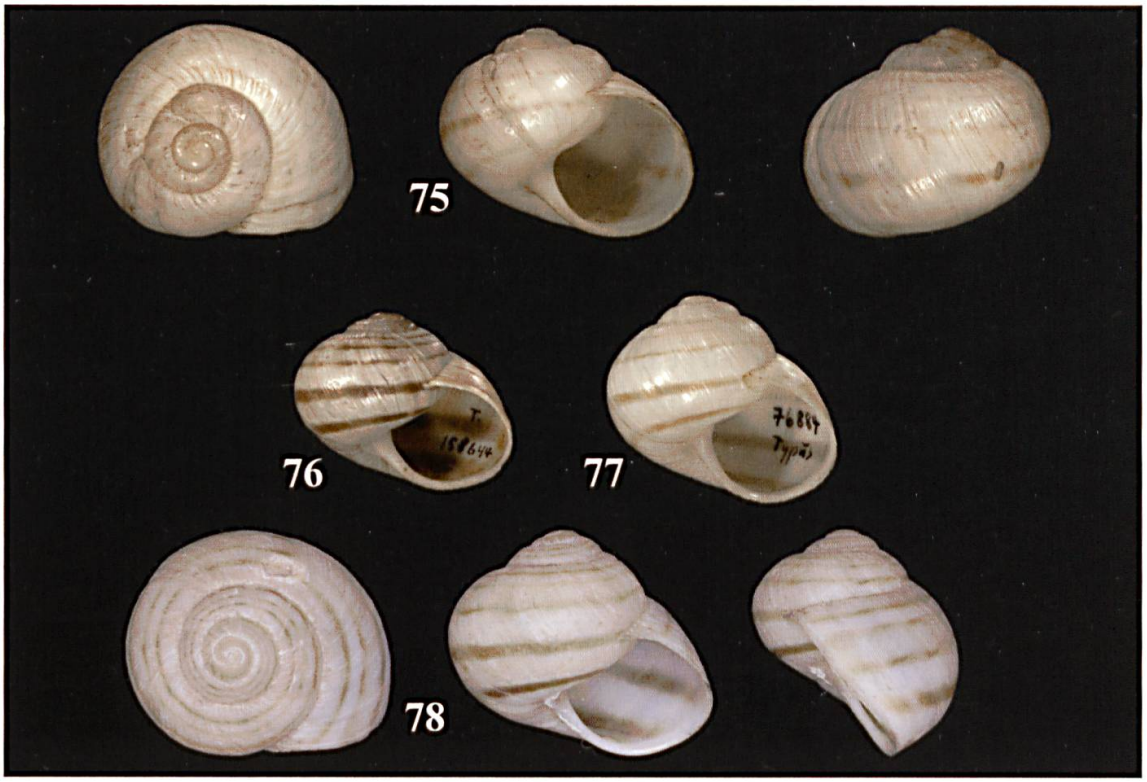
pathetica: lectotype ZMZ 506375a: H = 24.1; D = 26.4; PH = 17.8; PD = 13.8; PrD = 4.5; W = 4.75; paralectotype ZMZ 506375b: H = 22.4; D = 27; PH = 18.4; PD = 13.4; PrD = 4.8; W = 4.5 (lectotype herewith designated). *philibensis*: syntype SMF 158644, "Rumelien", coll. Dohrn ex L. Pfeiffer (ex Frivaldszky?), H = 18.4, D = 22.5; PH = 11.3; PD = 14.3. *armeniaca*: lectotype SMF 76884 (SD Zilch 1952: 160), Tokat, coll. Kobelt ex Nägele ex Chantron 1891, H = 21.4; D = 23.7, PH = 13.2, PD = 15.0; paralectotypes SMF 24318/4, SMF 76885/1.

Additional shell measurements:

Amasya (n = 12): H = 23.8; D = 26.3; PH = 17.7; PD = 13.1; PrD = 4.6; W = 5 .

Specimens examined:

Turkey: Amasya Kalesi, 40.6554 35.8264, 580 m alt., 13.7.1988, MENK; Amasya, 27 km N of Turhal, 40.5665 36.1398, 2.7.1986, BE 59, MENK; Amasya, 40.6540 35.8349, IX.1965, leg. Achtelig & Naumann, RÄH (1); ditto, 9.7.1986, NMBE 512600/17, NMBE 505492/3 (alk.); Amasya, Merzifon in dir. Çorum, 2 km N exit Çaybaşı, 40.7378 35.4428, 660 m alt., 12.7.1988, MENK; Amasya, Motel, 40.6489 35.8327 E. 430 m alt, 3.7.1986, MENK; Amasya, on the hill with the royal graves, 40.6489 35.8327, 430 m alt., 24.07.1993, LIEB (9); Ankara, rocks at bridge over Kizil Irmak at the road Kaman to Ankara, 39.5781 33.4270, 21.7.1986, MENK; Denizli, Civril 3 km in dir. Sivasli, 38.3247 29.7399, 9.6.1995, leg. Nordsieck, SMNS/NORDS; Eskişehir, 6.5 km E Badabat, 14 km NE Sivrihisar, 39.5377 31.6740, 900 m alt., 24.8.1992; Göreme, 38.65 34.86, Aug. 1989, leg. Gugel, NMBE 512605/2; ditto, 7.5.1979, leg. V. Gerber, NMBE 18473/6; Gümüşhane, rocks 0.5 km NW Gümüşhane, 40.4454 39.5038, 1250 m alt., 10.8.1992, MENK; Kastamonu, 1 km NW Bademci NW Tasköprü, 41.5501 34.0556, 8.7.1986, NMBE 512614/1; Kastamonu, along the shore of the Gök Irmak close to Haciahmetli, 14 km NW Boyabat, 41.58 34.65, 19.7.1986, NMBE 512606/1; Kastamonu, conglomerate rocks E of Igdir, 41.2191 33.1678, 550 m alt., 9.7.1988, MENK; Kastamonu, Kizil Irmak SE Duragan, 41.3401 35.1397, 9.7.1986, NMBE 512615/6; Kastamonu, road Tasköprü/Boyabat, 6 km W Sakiz, 41.6222 34.5222, 20.7.1988, NMBE 512602/1; Kay-



Figs 75–78. *Helix* (*Helix*) *pathetica* Mousson, 1854. Fig. 75 lectotype *pathetica* ZMZ 506375a, Asie mineure, D = 26.4; Fig. 76 *philibensis*: syntype SMF 158644, "Rumelien", D = 22.5; Fig. 77 lectotype *armeniaca* SMF 76884, Tokat, D = 23.7; Fig. 78 NMBE 505492, Amasya, royal graves, D = 27.3. — All photos Neubert, original size.

seri, between Kayseri and Sivas, 39.3497 36.3986, IV.1992, leg. Röttger, RÄH (2).; Nevşehir, vegetatie by rocks in Göreme, 38.6484 34.8362, 1100 m alt., 7.1986, MENK; road Gümüşhane in dir. Bayburt, 1 km W Güverçinlik, 12 km E Kale, 40.3799 38.8, 14.7.1986, NMBE 512601/1; Samsun, road Osmancık to Samsun, 30 km E Osmancık, 40.963 35.095, 27.4.1993, NMBE 512603/3; Sinop, 10 km NW Boyabat, 41.5304 34.7147 E, 320 m alt., 10.7.1988, MENK; Sivas, 5 km NE Sivas, 39.7768 37.0870, 1270 m alt., 15.7.1988, MENK; Sungurlu, 40.1609 34.377, 6.8.1989, leg. Gugel, NMBE 512604/1; Tokat Kalesi, 40.3174 36.5501, 600 m alt., 21.7.1990, MENK; Tokat, 4 km NE Zile, 40.3119 35.9418, 720 m alt., 1.8.1992, MENK; Tokat, 8 km W Tokat, 40.3329 36.4654, 600 m alt., 1.8.1992, MENK; Tokat, Köklüce 9 km SE Niksar, 40.4763 36.9811, 360 m alt., 21.7.1990, MENK; Tokat, rocks 1 km N Kervansaray, 40.4218 35.7991, 1177 m alt., 20.7.1990, MENK; Tokat, rocks 3 km ZW Turhal, 40.3499 36.1197, 540 m alt., 20.7.1990, MENK.

Diagnosis: shell medium-sized to small, whitish with up to 5 thin spiral colour bands, columellar triangle glossy white, umbilicus slit-like open; epiphallus very short, flagellum long, diverticulum broad, short.

Description: shell thin, medium-sized to small, spire raised, basic shell colour whitish-greyish, with up to 5 thin reddish to brownish or even yellowish spiral colour bands, subperipheral band(s) often broader and darker; proto-

Fig. 79. *Helix* (*Helix*) *pathetica* Mousson, 1854. NMBE 505492, Amasya, royal graves, situs: 27.48. — All photos Neubert.

conch of medium size, smooth; teleoconch of 3–4 rapidly increasing whorls, with weak axial riblets; aperture suboval, slightly oblique, labial callus weak, columellar triangle small, glossy white; umbilicus slit-like open.

Genital organs (Fig. 79): penis club-shaped, epiphallus very short, mrp inserting almost at the boundary between penis and epiphallus, penial chamber

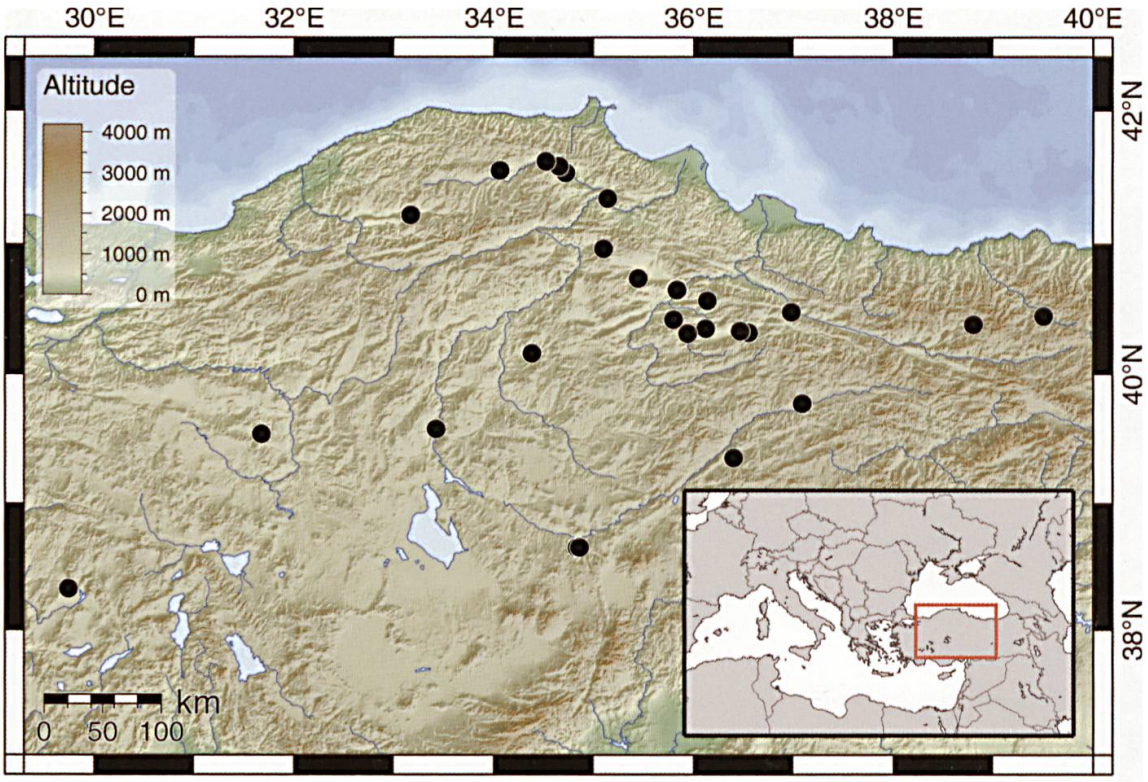


Fig. 80. *Helix* (*Helix*) *pathetica* Mousson, 1854. Distribution.

short, as long as the epiphallus, flagellum long, reaching almost three times the length of the penis+epiphallus, atrial stimulator small, a simple spatulate fold; atrium short, vagina considerably large, glandulae mucosae on very long stems, with multiple ramified gland tubes, dart sac as long as stems of glandulae mucosae, pedunculus branching off free oviduct in a basal position, diverticulum broad, short but broad, bursa copulatrix with a stalk twice the length of diverticulum.

Measurements of the reproductive organs of *Helix pathetica* (NMBE 505492): dpP = 4; ppP = 5.5; P = 9.5; Fl = 28; Epi = 2; Vag = 4.3; Ds = 10; Ped = 11.5; Div = 5; Bc = 14.

Distribution (Fig. 80): This species is endemic to Turkey. It lives restricted to the central part of the country on the Anatolian plateau.

Remarks: The shells of this species are easily confused with *H. pomacella* which is usually somewhat more spherical. Larger differences can be found in the genital organs, with the long flagellum (much shorter in *H. pomacella*), and the well developed broad diverticulum (small in *H. pomacella*).

***Helix* (Helix) *pomacella* Mousson, 1854** (Figs 81–88)

1854 *Helix pomacella* Mousson, Mittheilungen der naturforschenden Gesellschaft in Zürich 3: 365 [Les deux côtés de Bosphore].

1904 *Helix* (*Helicogena*) (*figulina* var. ?) *straubei* Kobelt, Systematisches Conchylien-Cabinet VI: 190, Taf. 344, Fig. 7, 8 [Bei Konstantinopel].

1904 *Helix* (*Helicogena*) (*figulina* var. ?) *anthesi* Kobelt, Systematisches Conchylien-Cabinet VI: 190, Taf. 344, Fig. 10, 11 [Rumeli Karsak am Bosporus].

1906 *Helix* (*Helicogena*) *figulina* var. *eumolpia* Kobelt, Iconographie der Land- und Süsswassermollusken 2 (12): 51, Taf. 326, Fig. 2046, 2047 [Philippopel].

1921 *Helix* (*Helicogena*) *figulina* var. *zonata* Germain, Mollusques terrestres et fluviatiles de Syrie I: 139, fig. 9, 10 [non *Helix mazulli* var. *zonata* Bourguignat, 1860] [Brousse (Anatolie)].

Type specimens:

pomacella: lectotype ZMZ 506387a, H = 22.3; D = 23.6; PH = 15.9; PD = 12.2; PrD = 2.9; W = 5 (lectotype herewith designated); paralectotype ZMZ 506387b: H = 20.9; D = 24; PH = 15.4; PD = 12.1; PrD = 3.3; W = 5.; *straubei*: lectotype SMF 9734 (SD Zilch 1952: 161), H = 21.3; D = 21.6; *anthesi*: lectotype SMF 9759 (SD Zilch 1952: 161), H = 22.1, D = 21.85; *eumolpia*: lectotype SMF 9843 (SD Zilch 1952: 161), H = 22.5; D = 23; *zonata*: not researched.

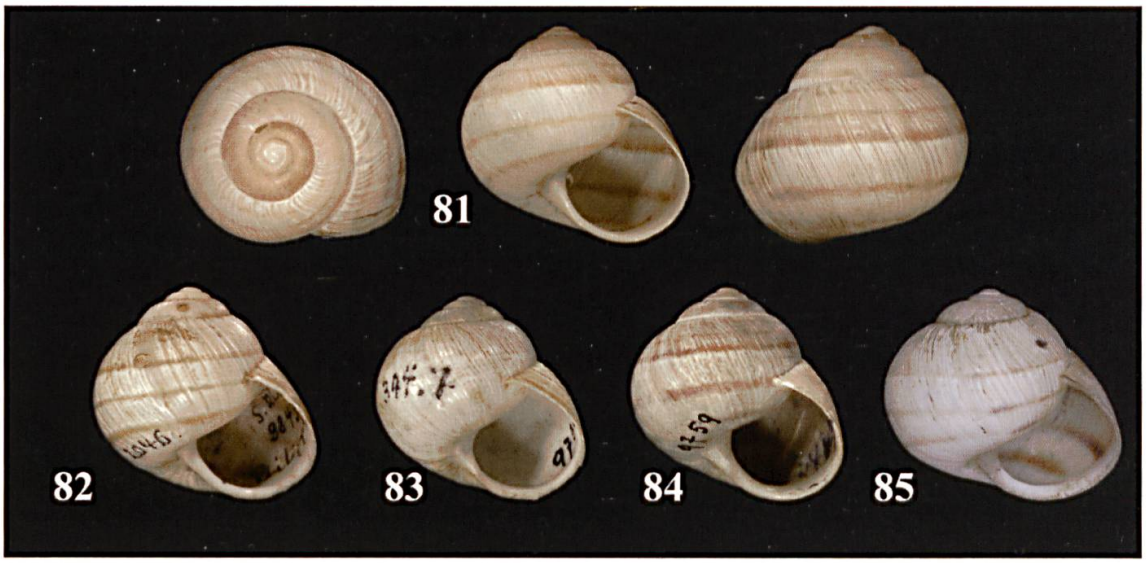
Two lots of Mousson's collection contained probable type specimens of *pomacella*, viz. ZMZ 506386 (Brussa, Thiek Koch 47) and ZMZ 506387 (Brussa, Parr. 52). The last one is herewith chosen as the lectotype lot since it contains two specimens which were distributed by Parreys himself in 1852 as cited by Mousson. The original label contains the information "Bursa" thus restricting the locus typicus to this city.

Additional measurements:

Iznik, rocks at pass 7 km S Iznik (n= 9): H = 21.7; D = 24.5; PH = 16.4; PD = 12; PrD = 4.3; W = 4.75; 5 km N Apolyont (n= 7): H = 21.6; D = 23.4; PH = 15.9; PD = 11.4; PrD = 3.36; W = 5.

Specimens examined:

Turkey: SMF 299398/4, Bosporus, 41.0339 28.9941; Çannakale, 40.1474 26.4039, 6.1970, leg. MENK; Kara Deniz close to Yesilçay, 41.1350 29.8446, 18.6.1979, leg. A.F. de Jong, MENK; Çannakale, Guzelyali 14 km SW Çannakale, 40.0323 26.2318, 30.7.1984, NMBE 512607/3; Bursa, Stadtgebiet, 40.19 29.06, 1.8.1984, NMBE 512608/1; Bursa, Pass 9 km SE Mudanya, 40.3096 28.9396, 4.8.1984, NMBE 512609/2; Bursa, Hanife Dere E Karacabey, 40.206 28.433, 6.8.1984, NMBE 512610/1; Kozan, barrage 7 km



Figs 81–85. *Helix* (*Helix*) *pomacella* Mousson, 1854. Fig. 81 lectotype *pomacella* ZMZ 506387a, Les deux cotés de Bosphore, D = 23.6; Fig. 82 lectotype *eumolpia* SMF 9843, Philippopel, D = 23.0; Fig. 83 *straubei*: lectotype SMF 9734, Konstantinopel, D = 21.6; Fig. 84 lectotype *anthesi* SMF 9759, Rumeli Karsak am Bosporus, D = 21.85; Fig.85 NMBE 505544, Bulgaria, Burgas, close to the airport; Situs: 36.8 mm, D = 24.6. — All photos Neubert, original size.

N Kavak, 40.63 26.92, 16.8.1984, NMBE 512612/1; Bursa, 6 km E Gevye to Tarakli, 40.487 30.35, 7.7.1986, NMBE 512613/1; Iznik, pass 7 km S Iznik, road to Yenişehir, 40.35 29.68, 30.8.1989, NMBE 512617/9; ditto, 26.3.1993, NMBE 512625/9, NMBE 512620/18; Çannakale, pass 10 km NW Gönen, 40.2 27.73, 29.8.1989, NMBE 512616/3; Çannakale, 20 km S Çannakale, 39.99 26.3115, 12.7.1991, leg. Ertan, NMBE 512623/1; Troja, 39.95 26.25, 30.4.1992, leg. Tannert ex coll. Groh, NMBE 512621/3; Bursa, Ufer des Uluabat Gölü bei Gölyazı, 40.167 28.682, 20.4.1993, NMBE 512619/1; Bursa, Uluabat Gölü, Macchia 5 km N Gölyazı, 40.209 28.684, 20.4.1993, NMBE 512624/9; ditto, 8.8.1994, NMBE 512611/10; Istanbul, airport, 40.9808 28.8207, 20.03.1986, leg. Rähle, RÄH (3); Çannakale, on rocks, IV.1990, leg. Röttger, RÄH (1); ZMZ 506384 Constantinopel; ditto, ZMZ 506385; Brussa, 40.1828 29.0670, ZMZ 506386; road Ballikaya to Uluabat S Harmanli, 40.27 28.431, 9.4.1993, NMBE 512618/3; Sultanköy, Tekirdag Ili, 41.02 27.99,VI.1967, NMBE 18474/1; Yeniköy, Istanbul, 41.12 29.07, VI.1967, NMBE 18472/2; Ekinlik Island, Mount Elias, Marmara Sea, 39.88 28.2, 13.7.1977, NMBE 18471/1; Kumköy (= Kilios), Istanbul, 41.25 29.04, 11.6.1967, NMBE 18470/1.

Bulgaria: Burgas, close to the airport Zara Fovo, 2008 ex coll. Dedov, 42.5707 27.5374, NMBE 505544/2 (alk.); Rezovo, 41.9832 28.0303, 7.5.2008, NMBE 523330/26; Kiten, 42.2389 27.7786, 7.5.2008, NMBE 522638/1; ditto, 14.8.1984, NMBE 522637/1.

Diagnosis: shell small sized, spherical, white, with up to 5 spiral brown bands, umbilicus closed.

Description: shell of medium to small size, spherical, basic colour white with usually 5 brownish spiral bands; protoconch of 1.5 to 2 smooth whorls, with a diameter between 2.9 and 4.8 mm; teleoconch of 3–4 whorls; shell sculp-

Figs 86–87. *Helix* (*Helix*) *pomacella* Mousson, 1854. Genital organs. Fig. 86 NMBE 505544, Burgas, close to the airport, situs 36.8 mm; Fig. 87, ditto, situs 25.29. — All photos Neubert.

ture with irregularly arranged light axial ribs, banding pattern consisting of four to five spiral bands with Nos. 1 and 2 very small, No. 3 broader, Nos. 4 to 5 narrow, usually separate; lower spirals sometimes patchy; aperture broadly rounded with a thin white lip inside; columellar triangle small; juvenile and subadult shells slitlike umbilicated, adult shells with a closed umbilicus.

Genital organs (Figs 86–87): penis slender fusiform, epiphallus of the same length as penis; flagellum short, reaching approximately the length of epiphallus+penis; mrp attaching in a central position on the epiphallus; internally, pp1 small, reduced, with a central perforation, penial chamber elongate with well developed zig-zag-formed pilasters, pp2 larger than pp1 with a central perforation, smooth on the surface; atrial stimulator a thick, rounded pilaster; female system with a long vaginal tube, dart sac and glandulae mucosae well developed, glandulae with a short basic stem, branching into 2–5 tubes, longer than the dart sac; diverticulum strong but short, branching off at the distal third of pedunculus, vesicle of bursa copulatrix rounded.

Distribution (Fig. 88): This species is known from the NW of Turkey, the European part of Turkey and the SE of Bulgaria.

Remarks: The anatomy of the genital organs of this species is only insufficiently known. Unfortunately, there were no specimens from the type locality around Istanbul available for dissection. The first to publish some data was Knipper (1939: 378, Abb. 11), who dissected specimens from Sozopol in Bulgaria. Later, Hudec & Vasatko (1973: 26, Abb. 23, pl. VII, Abb. 1) added more information from a specimen collected in Kiten at the southwestern Bulgaria coast. Both drawings show genital organs with a relatively short epiphallus, a long flagellum, and a short diverticulum. However, they differ in the branching point of the diverticulum from the pedunculus, which is in a basal position in Knipper's specimens, and much higher in the specimens from Kiten. Hudec & Vasatko (1973: 28, Abb. 26) illustrate a specimen of "*Helix philibensis*" from Florya close to Istanbul, which is also *H. pomacella* and not *H. pathetica* (the taxon *philibensis* is a junior synonym of *H. pathetica*). Here, the branching point of the diverticulum is also quite distal similar to that in the specimens from Kiten. In the adult specimen illustrated here (Fig. 86), the diverticulum is not developed, however, the pedunculus shows a thickening in the place where the diverticulum usually branches off. This is probably a teratological specimen; the second juvenile specimen from the same locality shows a well developed diverticulum in the same position as known from Hudec & Vasatko (1973).

This species differs from *H. figulina* by its more spherical, and (on average) smaller shell; the species can be easily separated by the morphology of their genital organs, with *H. figulina* belonging to *H.* (*Pelasga*) with the elongated

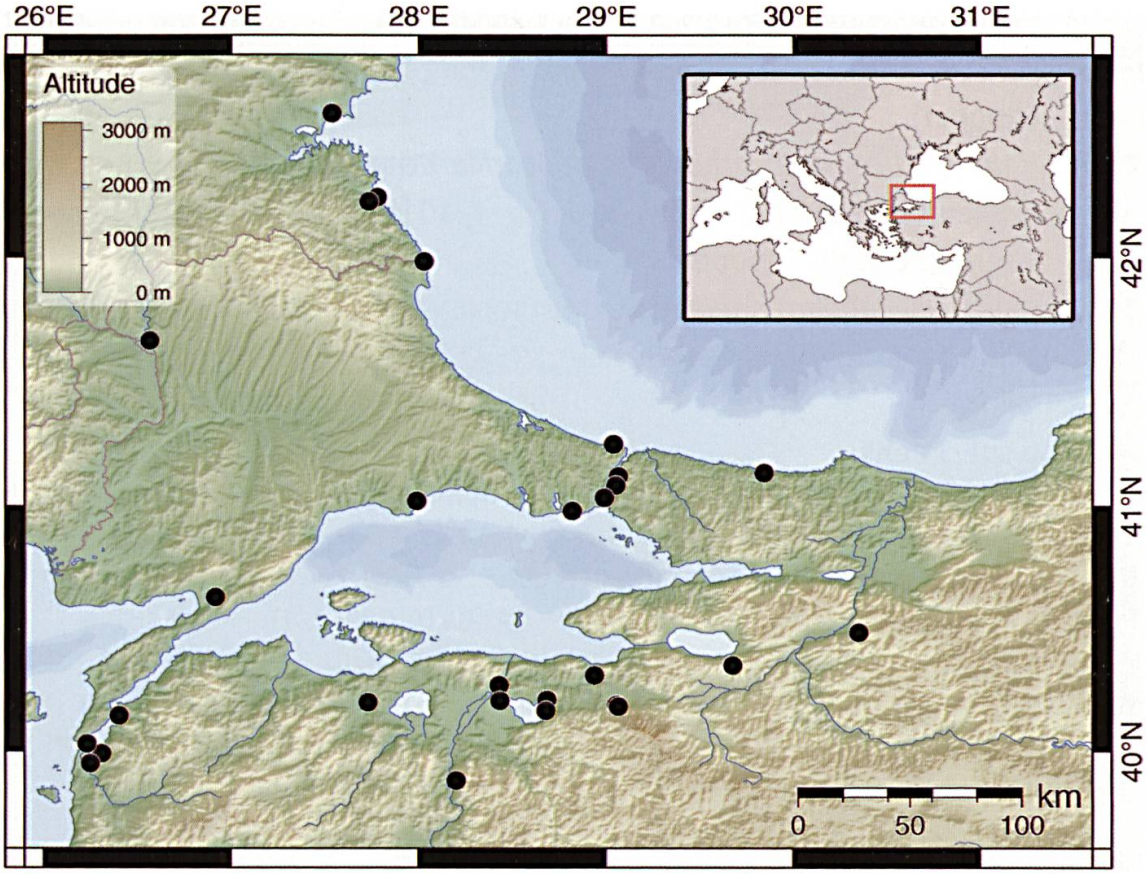


Fig. 88. *Helix* (*Helix*) *pomacella* Mousson, 1854. Distribution.

epiphallus. The shell of *H. pathetica* is slightly larger, with a more depressed spire, and has a broader aperture. Moreover, the stems of the glandulae mucosae are much longer in *H. pathetica* if compared to *H. pomacella*.

Helix (*Helix*) *philibinensis* Rossmässler, 1839 (Figs 89–96)

1839 *Helix philibinensis* Rossmässler, Iconographie der Land- und Süsswassermollusken 1 (2) (3/4): 10, Taf. 44, Fig. 581 [Macedonien].

1901 *Pomatia* (*ligata* subsp.) *oestreichi* Kobelt, Iconographie der Land- und Süsswassermollusken 2 (9): 54, Taf. 258, Fig.1674 [in der Gegend des Presba Sees in Albania].

1904 *Helix frivaldszkyi* Kobelt, Systematisches Conchylien-Cabinet VI: 146, Taf. 338, Fig. 8, 9 [Türkei, wahrscheinlich in Makedonien oder im benachbarten Teil von Rumelien].

1906 *Helix* (*Helicogena*) *despotina* Kobelt, Systematisches Conchylien-Cabinet VI: 279, Taf. 371, Fig. 9, 10 [Rhodope Gebirge (Despoto Dagh) gegen Philippopel (= Plovdiv)].

1906 *Helix* (*Helicogena*) *thracica* KOBELT, Systematisches Conchylien-Cabinet VI: 269, Taf. 368, Fig. 5, 6 [Rhodope Gebirge (Despoto Dagh) gegen Philippopel].

1906 *Helix* (*Helicogena*) *albescens bulgarica* KOBELT, Systematisches Conchylien-Cabinet VI: 275, Taf. 370, Fig. 7–10 [Rhodope Gebirge (Despoto Dagh) gegen Philippopel].

1907 *Helix* (*Helicogena*) *speideli* O. BOETTGER, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 39: 37 [Thasos].

Type specimens:

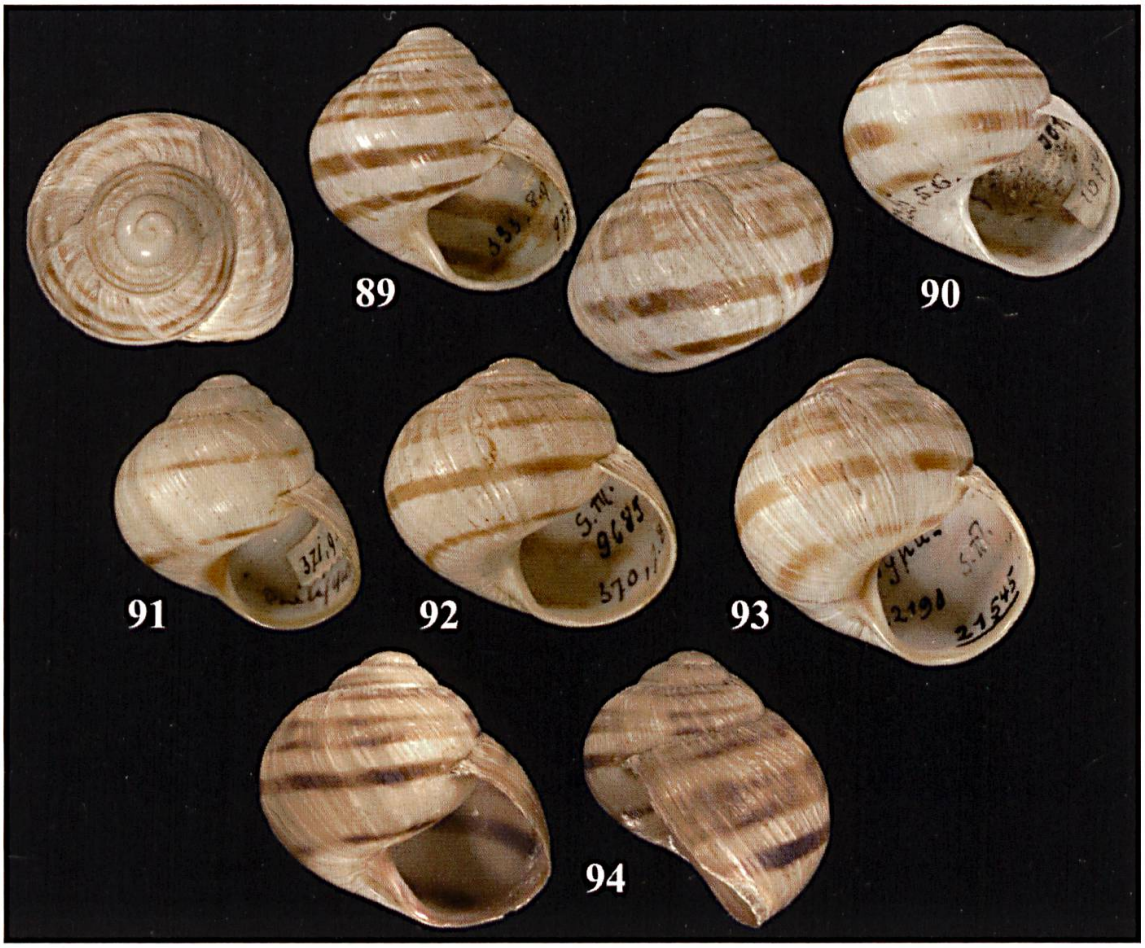
philibinensis (= *frivaldszkyi* fide Zilch 1952): holotype *frivaldszkyi* SMF 9775 (Zilch 1952: 160) H = 28.0; D = 27.4; PH = 19.7; PD = 14.4; PrD = 6.2; W = 4.5. *oestreichi*: holotype SMF 9616 (Zilch 1952: 159): H = 22.5; D = 28.6; PH = 19.5; PD = 14.9; PrD = 5; W = 4.5. *despotina*: holotype SMF 9659 (Zilch 1952: 161): H = 28.1; D = 25.4; PH = 20.3; PD = 12.6; PrD = 5.7; W = 4.5. *thracica*: H =; D =; PH =; PD =; PrD =; W =. *bulgarica*: lectotype SMF 9685 (SD Zilch 1952: 161): H = 29.1; D = 30.2; PH = 21; PD = 15; PrD = 6; W = 4.5. *speideli*: lectotype SMF 21545 (SD Zilch 1952: 161): H = 33.8; D = 31; PH = 23.1; PD = 15.9; PrD = 6.1; W = 4.75.

Specimens examined:

Bulgaria: SMF 74390/2 Sofia, 42.6907 23.3227, coll. Jetschin ex Nägele; SMF 158641, Plovdiv, hill of Bunardzik, 42.1444 24.7384, coll. Zilch ex Urbanski; SMF 158904/3, Assenova Krepot close to Assenovgrad, 41.9876 24.8756, coll. Zilch ex Urbanski; SMF 158642/2 Assenovgrad in the Rhodopes, coll. Zilch ex Urbanski; SMF 86141/6, Plovdiv, Sacháte Tepe, coll. Ehrmann ex Matschewa; Pirin Mts, on the western slope of Sveštenik Mt., Kalimantsi, Peshternik area, limestone gorge, 41.5166 23.6333, 08.06.2006, leg. I. Dedov, NMBE 519950/2 (alk.). Not checked: Plindenci, ca. 20 km N Sandanski (= 41.5502 23.2456) ((Hudec & Vasatko (1973)).

FYROM: SMF 86142/9 NE of the Dojran Lake, 41.2554 22.7114, ex Römheld 1916; ditto, SMF 86143/2; SMF 22654/1 at the Vardar, ex Römheld 1916; Demir Kapija at the Vardar, 108 m alt., 41.41 22.28, 29.7.1984, NMBE 512565/2; ditto, 3.7.1986, NMBE 512566/2; road Carina-Sveti Naum, Galicica Mts., 40.9718 20.8788, 1000 m alt., 14.7.1972, NMBE 524472/1; Belovodica in dir. Gradsko, hill slope, 41.3508 21.708, 710 m alt., 11.7.1972, NMBE 524471/3; crossroads from Demir Kapija, 3.5 Km S in dir. Gevgelija, 41.4087 22.2826, 105 m alt., 28.7.1990, NMBE 524464758.

Greece: Thessaloniki, Langadas, 40.7513 23.0683, coll. S. H. Jaeckel ex Haltenroth, SMF 214892; Serres, Akropolis, 41.0909 23.5413, 22.09.1984, LIEB (13); Xanthi, 41.1367 24.8906, 22.06.1989, LIEB (4); Makedonia, ruins of Philippi, 50 m alt., 41.0093 24.2798, 30.7.1984, NMBE 512564/1; N of the Vegoritsas Lake 1 km W of Arnissa, 800 m alt., 40.804 21.755, 1.6.1987, NMBE 5125672/1; Mikra Prespa at Mikro Limni, 860 m alt., 40.743 21.11, 17.7.1990, NMBE 512568/4; isthmus at Mikra Prespa at Mikro Limni, 860 m alt., 40.805 21.0714, 1986, NMBE 512572/10; Kastoria, rocks on the peninsula, 640 m alt., 40.505 21.279, 17.7.1990, NMBE 512569/4; Kavala, summit area of the Pangäon, 40.914 24.09, 1930 m alt., 8.9.1991, NMBE 512571/1; Stavroupoli, close



Figs 89–94. *Helix* (*Helix*) *philibinensis* Rossmässler, 1839. Fig. 89 *philibinensis* (= *frivaldszkyi*), holotype *frivaldszkyi* SMF 9775, Macedonien, D = 28.0; Fig. 90 holotype *oestreichi* SMF 9616, in der Gegend des Presba Sees in Albania, D = 28.6; Fig. 91 holotype *despotina* SMF 9659, Rhodope Gebirge gegen Philippopel, D = 25.4; Fig. 92 *bulgarica*: lectotype SMF 9685, Rhodope Gebirge gegen Philippopel, D = 30.2; Fig. 93 *speideli* lectotype SMF 21545, Thasos, D = 31.0; Fig. 94 NMBE 519950, Sveštenik Mt., Kalimantsi, D = 30.05. — All photos Neubert, original size.

to Nestos shore, 41.2031 24.7056, 120 m alt., 12.5.2008, NMBE 519953/1 (alk.); Zarkadia, 2.5km along the road, 41.0177 24.6405, 140 m alt., 22.9.1989, NMBE 519952/2 (alk.).; Evvia, Mantoudi, 38.7942 23.477, 20 m alt.,21.5.1997, NMBE 524590/7; Amarantos, Kalkberg E von Loutra, 40.1745 20.7297, 1250 m alt.,16.5.1997, NMBE 524609/1; Eleohoria, 500 m N/ Chalkidiki Peninsula, 40.3434 23.1613, 170 m alt.,5.5.1995, NMBE 524623/1; Petralona, cave, 40.3721 23.1685, 335 m alt.,29.5.1997, NMBE 524624/3; ditto, 5.5.1995, NMBE 524425/2; Gérmas, valley W of village, 40.4528 21.4149, 850 m alt.,17.5.1997, NMBE 524595/4; road Saloniki-Galatista, 9 km E Galatista, 40.465 23.364, 460 m alt.,28.8.1991, NMBE 512570/1; Monastir Panagia Mavriotissa, 40.505 21.2786, 640 m alt.,14.7.1990, NMBE 524463/10; Nymfopetra, W Volvi Lake, 40.6922 23.3085, 70 m alt.,24.9.1989, NMBE 524466/5; 4.5 Km W crossroads to Loutra Elefthero, 40.7211 24.0601, 30 m alt.,21.9.1989, NMBE 524462/50; Mikra Prespa Lake, 200 m W Mikrolimni, 40.7419 21.1078, 885 m alt.,13.7.1990, NMBE 524451/5; Mikrolimni, W, 40.7426 21.1098, 870 m alt., 10.5.1995, NMBE 524433/1; pass close Edessa, 1 km to Arnissa, Vegoritses Lake, 40.804 21.755, 800 m alt., 21.6.1987, NMBE 512567/1; Galipsos, 40.8062 23.9502, 200 m alt.,6.5.1995, NMBE

524434/2; Megali- and Mikra Prespa Lakes, confluent, 40.8111 21.0706, 855 m alt.,13.7.1990, NMBE 524456/19; Psarades, 40.8315 21.0288, 857 m alt.,10.5.1995, NMBE 524435/2; Sidirohori, 1.2 Km in dir. Folia, Simvolo Mts., 40.838 24.1375, 250 m alt.,27.5.1997, NMBE 524588/7; mountains N Podohori, 40.8473 24.0249, 450 m alt., 27.5.1997, NMBE 524602/1; Platanotopos, 1 Km in dir. Eleftheroupoli, 40.8524 24.0717, 280 m alt., 27.5.1997, NMBE 524578/3; Mousthéni, 40.8566 24.1137, 175 m alt., 6.5.1995, NMBE 524444/11; road Aridéa-Skidra, crossroads to Néa Zoi, 40.8629 22.1183, 200 m alt., 15.5.2008, NMBE 523313/17; Akrovouni, 16.5 Km, Pangéo Mts., 40.9094 24.1406, 1350 m alt., 6.5.1995, NMBE 524587/1; Pangéo summit, 9.2 Km in dir. Akrovouni, "Katafigi", 40.9109 24.1414, 1350 m alt., 27.5.1997, NMBE 524619/5, NMBE 524606/1; Akrovouni, 25.2 Km in dir. Pangéo summit, 40.9113 24.0973, 1780 m alt., 23.9.1989, NMBE 524457/9; Akrovouni, 17.8 Km in dir. Pangéo summit, 40.9147 24.1465, 1280 m alt., 23.9.1989, NMBE 524454/7; Akrovouni, 11.6 Km in dir. Pangéo summit, 40.9171 24.1906, 900 m alt., 23.9.1989, NMBE 524469/1; Akrovouni, little canyon 8 Km N Akrovouni, 40.921 24.206, 600 m alt., 6.5.1995, NMBE 524586/2; Pangéo summit, 1.3 Km in dir. Akrovouni, 40.9122 24.0936, 1850 m alt., 23.9.1989, NMBE 524460/3; Pangéo summit, below radio station, 40.9138 24.0903, 1950 m alt., 23.9.1989, NMBE 524459/1; Akrovouni, 12.3 Km in dir. Pangéo summit, 40.9222 24.1876, 950 m alt., 23.9.1989, NMBE 524470/1; Akrovouni, 7.5 Km in dir. Pangéo summit, 40.9237 24.2178, 480 m alt., 27.5.1997, NMBE 524620/3; Nikissiani, 40.9462 24.144, 355 m alt., 6.5.1997, NMBE 524617/5; Nikissiani, S of village, 40.9467 24.1439, 350 m alt., 22.9.1989, NMBE 524618/2, NMBE 524461/2; Kavala, 2.5 Km E, 40.9486 24.4438, 20 m alt., 22.9.1989, NMBE 524465/17; Griva, Gouménissa, 40.9562 22.4009, 540 m alt., 20.5.1997, NMBE 524580/3; ditto, 13.5.2005, NMBE 523314/18; ditto, 14.5.2008, NMBE 523317/1; Griva, canyon, 40.9574 22.4055, 480 m alt., 9.5.1995, NMBE 524585/2; Griva, 4.5 Km NW canyon, 40.9709 22.3769, 600 m alt., 19.4.2009, NMBE 523316/7; below Moni Ikosifinissi, 40.9652 24.1064, 575 m alt., 6.5.1995, NMBE 524455/1; Loutra Arides, Taleingang, 40.9722 21.912, 450 m alt., 19.5.1997, NMBE 524429/29; ditto, 14.5.2008, NMBE 523315/7; ditto, 26.5.2011, NMBE 523299/6; Loutraki, valley behind village, 40.9769 21.9454, 350 m alt., 19.5.1997, NMBE 524603/12; Palea Kavala, 4.2 Km in dir. Halkero, 40.9994 24.4273, 440 m alt., 26.5.1997, NMBE 524583/3; Palea Kavala, 3 Km W of village, 41.0009 24.3934, 200 m alt., 7.5.1995, NMBE 524436/1; Philippi, Krinides, above the ruin, 41.0128 24.2851, 85 m alt., 7.5.1995, NMBE 524467/2; Palea Kavala, 2.5 Km in dir. Korifés, 41.017 24.4388, 500 m alt., 7.5.1995, NMBE 524442/4; Alistrati, canyon 6.5 Km SE village, 41.0224 24.0067, 80 m alt., 23.5.1997, NMBE 524604/20; Zarkadia, 2.5 Km NNE, 41.0288 24.6417, 450 m alt., 22.9.1989, NMBE 524450/6, NMBE 524424/1; Mt. Zarkadia, 41.0293 24.6415, 470 m alt., 7.5.1995, NMBE 524439/3; Makrihori, valley 2.5 Km E in dir. Kehrokambos, 41.0466 24.6462, 180 m alt., 26.5.1997, NMBE 524615/5; Kehrokambos, 7.2 Km in dir. Makrihori, 41.1043 24.6392, 550 m alt., 26.5.1997, NMBE 524605/3; Kehrokambos, 400 m S village, 41.1514 24.6454, 390 m alt., 7.5.1995, NMBE 524430/7; Kehrokambos, 4 Km in dir. Stavroupoli, 41.1806 24.6687, 180 m alt., 7.5.1995, NMBE 524468/1; Neohori, canyon entrance, 41.0481 22.0893, 275 m alt., 9.5.1995, NMBE 524438/13; ditto, 19.5.1997, NMBE 524589/21; ditto, 27.5.2011, NMBE 523295/4; Limnia, 5 Km in dir. Zigos, 41.0589 24.3816, 730 m alt., 26.5.1997, NMBE 524613/3; mountain E Makrihori, 41.0692 24.6298, 650 m alt., 7.5.1995, NMBE

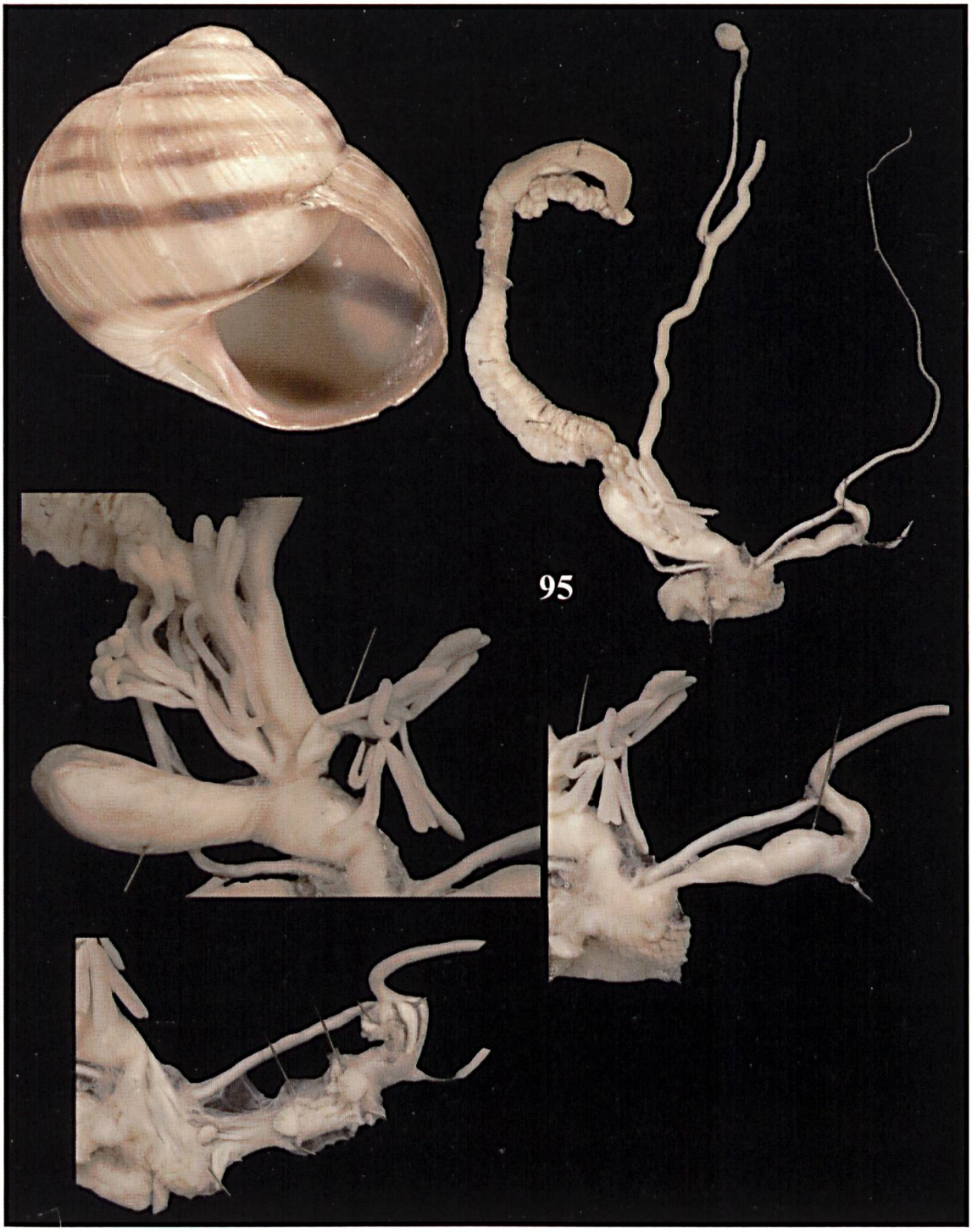


Fig. 95. *Helix* (*Helix*) *philibinensis* Rossmässler, 1839. Genital organs. NMBE 519950, Sveštenik Mt., Kalimantsi, situs 55.57 — All photos Neubert.

524431/1; Agios Kosmas 1 Km to Makrihori, 41.0783 24.6536, 380 m alt., 26.5.1997, NMBE 524611/3; Paradissos, NE village, 41.0843 24.7612, 60 m alt., 25.5.1997, NMBE 524592/3; Platamonas, 41.1001 24.5301, 720 m alt., 26.5.1997, NMBE 524610/2; Inoussa, 41.1059 23.6312, 200 m alt., 21.5.1997, NMBE 524593/5; Notia, 41.1072 22.2115, 650 m alt., 9.5.1995, NMBE 524427/7; Likostomo, 41.1078 24.4424, 740 m alt., 26.5.1997, NMBE 524614/4; Agora, 1.3 Km in dir. Peristéria, 41.1165 24.3244, 380 m alt., 23.5.1997, NMBE 524581/9; Peristéria, 1 Km W in dir. Adriani, 41.1177

24.3837, 400 m alt., 23.5.1997, NMBE 524607/1; Dipotamos, 800 m W village, 41.1196 24.5762, 690 m alt., 26.5.1997, NMBE 524445/5; Amaxades, 6.3 Km in dir. Iasmos, 41.1204 25.1406, 60 m alt., 27.7.1990, NMBE 524453/9; canyon 500 m from Kalithia to Anthohóri, 41.1249 23.9293, 215 m alt., 8.5.1995, NMBE 524446/5; Xanthi, 2 km N city, 41.1591 24.8806, 135 m alt., 27.7.1990, NMBE 524452/2; Nikiforos, bridge 1.8 Km E village, 41.1726 24.3345, 235 m alt., 23.5.1997, NMBE 524591/6; Xiropotamos, 41.1951 24.1002, 285 m alt., 8.5.1995, NMBE 524437/4; Petroussa, canyon NW village, 41.2014 24.015, 285 m alt., 13.5.2008, NMBE 523318/1; Stavroupoli, shore of Nestos River, 41.2031 24.7056, 120 m alt., 27.7.1990, NMBE 524458/16; ditto, 24.5.1997, NMBE 524440/7; ditto, 12 5.2008, NMBE 523300/10; Makriplagio, 2.6 Km SW, 41.2082 24.2519, 520 m alt., 8.5.1995, NMBE 524441/3; ditto, 22.5.1997, NMBE 524601/2; road Xanthi-Stavroupoli, 2 Km in dir. Ehinos, 41.2085 24.8612, 200 m alt., 7.5.1995, NMBE 524426/11; ditto, 24.5.1997, NMBE 524608/1; ditto, 12.5.2008, NMBE 523294/4; Prossotsani, 6 Km N village, 41.2225 23.9694, 340 m alt., 8.5.1995, NMBE 524447/10; ditto, 13.5.2008, NMBE 523297/4; 25.5.2011, NMBE 523296/3; Prossotsani, 8 Km in dir. Granitis, 41.2597 23.9737, 500 m alt., 22.5.1997, NMBE 524582/4; Makriplagio, 41.2267 24.2713, 880 m alt., 22.5.1997, NMBE 524612/3; Taxiarhis, 41.2328 24.1888, 500 m alt., 22.5.1997, NMBE 524579/7; ditto, 12.5.2008, NMBE 523298/7; Petroussa, canyon 3–3.5 Km in dir. Pirgi, 41.2332 24.0135, 510 m alt., 21.5.1997, NMBE 524596/2; Makriplagio, 3.4 Km NE village, 41.2333 24.3013, 800 m alt., 8.5.1995, NMBE 524432/1; Sidirokastro, above city, 41.2398 23.3954, 110 m alt., 20.5.1997, NMBE 524584/28; Panorama, above city, 41.2511 23.8208, 650 m alt., 21.5.1997, NMBE 524594/11; Kato Vrontou, 4.3 Km in dir. Panorama, 41.262 23.7986, 750 m alt., 21.5.1997, NMBE 524622/1; road Prossotsani-Granitis, 41.2821 23.9815, 680 m alt., 8.5.1995, NMBE 524443/2; Kato Nevrokopi, 41.3498 23.881, 650 m alt., 21.5.1997, NMBE 524600/2; Sidironero, hill slope NE village, 41.3686 24.2339, 650 m alt., 22.5.1997, NMBE 524621/1; Mikroklissoura, canyon 1 Km in dir. Potami, 41.3867 24.0698, 400 m alt., 22.5.1997, NMBE 524597/1; Ahladia, 2.9 Km in dir. Kato Nevrokopi, 41.3885 23.9748, 690 m alt., 22.5.1997, NMBE 524428/1. Thasos: Island of Thasos, coll. O. Boettger ex Speidel (paralectotypes of *speideli*), SMF 9839/2; ditto, SMF 9941/7 (paralectotypes of *speideli*); ditto, SMF 74388/3, coll. Jetschin ex C.R. Boettger (paralectotypes of *speideli*?); ditto, SMF 74389/5, coll. C.R. Boettger (paralectotypes of *speideli*?); ditto, coll. Nägele ex O. Boettger, SMF 76883/5 (paralectotypes of *speideli*); Island of Thasos 1988, coll. Hohorst ex H.G. Beckmann, SMF 311936/12; Island of Thasos, Theologos to Ypsarion, 40.6767 24.6791, 29.09.–13.10.1988, coll. Hohorst ex H.G. Beckmann, SMF 311937/6, SMF 311938/1 + SMF 311939/3; Island of Thasos, slope of the Ypsarion Mountains, 40.7254 24.6754, 26.09.1991, SMF 311940/2; Theologos, 40.6591 24.6941, 04.09.1991, coll. Hohorst ex H.G. Beckmann, SMF 311941/1; Kalivia, 15 Km in dir. Aliki, 40.5914 24.6683, 110 m alt., 21.9.1989, NMBE 524599/1, NMBE 524448/8; Aliki, S of village, olive plantation, 40.605 24.7416, 21.9.1989, NMBE 524417/12; Theologos, above cemetery, 40.6634 24.7022, 300 m alt., 21.9.1989, NMBE 524616/2; Theologos, 2.7 Km NE village, small canyon, 40.6685 24.732, 500 m alt., 21.9.1989, NMBE 524598/1; Theologos, 2.8 Km NE village, 40.6696 24.7329, 530 m alt., 25.7.1990, NMBE 524449/11.

Turkey: SMF 86144 Adrianopel (= Edirne), 41.6818 26.5622, coll. Kobelt ex Wohlberedt.

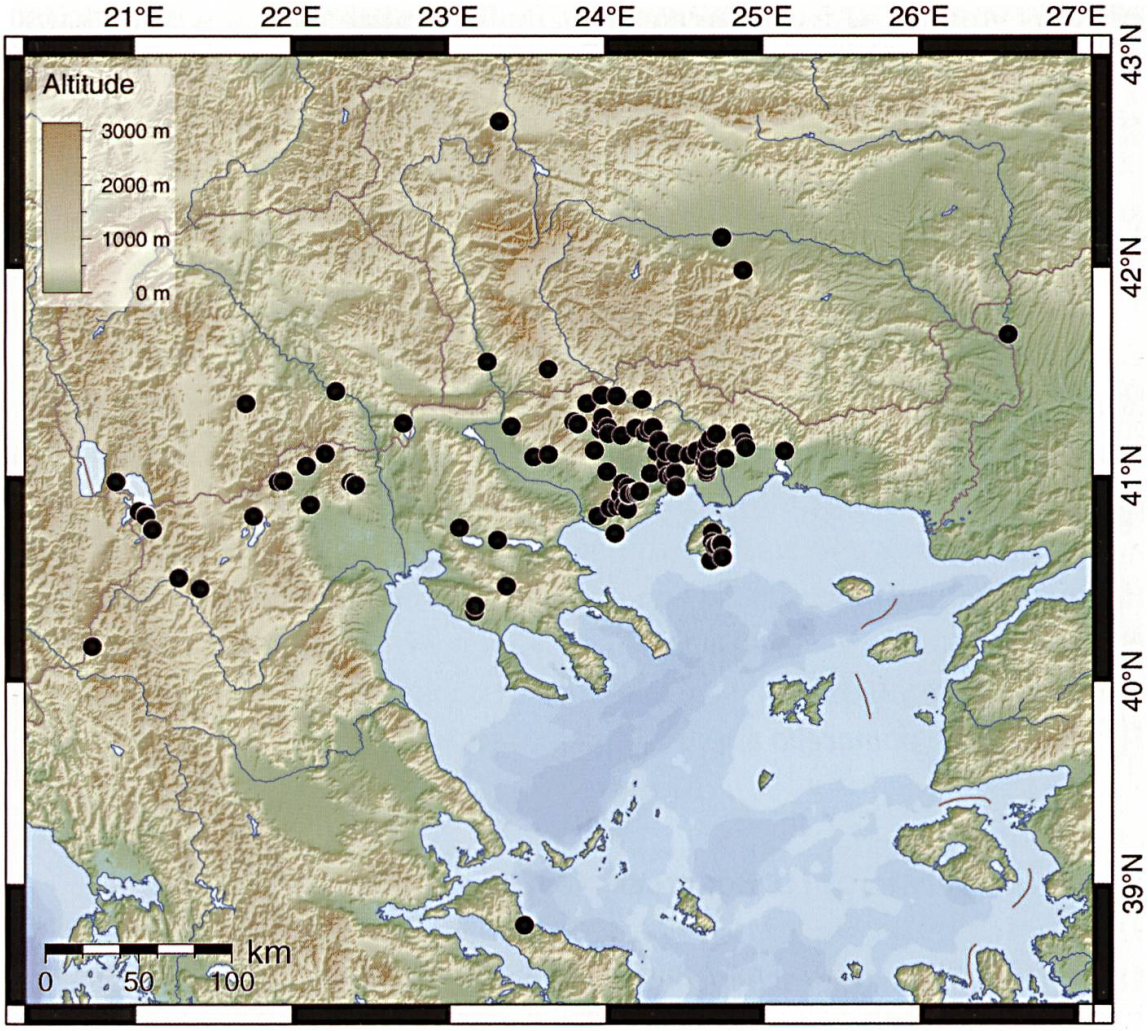


Fig. 96. *Helix* (*Helix*) *philibinensis* Rossmässler, 1839. Distribution.

Diagnosis: shell of medium size, protoconch large, five distinct brown spiral bands, labial callus cream to brown, umbilicus closed; epiphallus short, long flagellum, short diverticulum.

Description: shell of medium size, thin, elongate spherical, with the spire high conical; basic shell colour greyish white with chestnut brown spirals; protoconch large in comparison to shell, its diameter ranging from 5–6 mm, smooth, white whorls; teleoconch of 3–4 whorls; usually with five distinct brown spiral bands; sometimes spiral No. 2 fused with No. 3; last whorl only slightly descending below the periphery; aperture subquadrate to rounded, apertural rim narrow, labial callus weak, cream to brown coloured, columellar triangle small; umbilicus closed in adult shells.

Genital organs (Fig. 95): penis club-shaped, epiphallus considerably shorter than penis; flagellum extremely long, exceeding the length of epiphallus+penis fivefold; mrp attaching in a central position on the epiphallus; internally, both papillae of equal size, penial chamber long, filled with a few ring-like

pilasters crossed by few elongate folds, both papillae conical with a central perforation; atrial stimulator a rounded knob; female system with a very short vaginal tube, dart sac and glandulae mucosae strongly developed, the glandulae with a basic stem, multi-branched, longer than dart sac; pedunculus stem long, with a thick and short diverticulum, bursa copulatrix stem shorter than pedunculus stem, vesicle rounded and bent downwards.

Distribution (Fig. 96): This species is only known from a small area in the Central Balkan, from the region around the Ohrid Lake to the east as far as the Island of Thasos. Interestingly, it inhabits a wide range of habitats, from the lowlands up to mountain peaks as for example the Pangäon Mt., and summits in the Pirin Mt. in Bulgaria, which reach almost 2000 m altitude.

Remarks: *Helix philibinensis* can be discriminated from the similarly sized *H. figulina* by its brownish aperture (always white in *H. figulina*). It differs from *H. albescens* by its somewhat more elongate spire and the less ribbed shell, and anatomically by the presence of a diverticulum (missing in *H. albescens*). The shells of *H. pomacella* are considerably smaller and more globose.

***Helix* (*Helix*) *escherichi* O. Boettger, 1898** (Figs 97–99)

1898 *Helix* (*Pomatia*) *escherichi* O. Boettger, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 30: 12 [Ak-Sehir].

Type specimens:

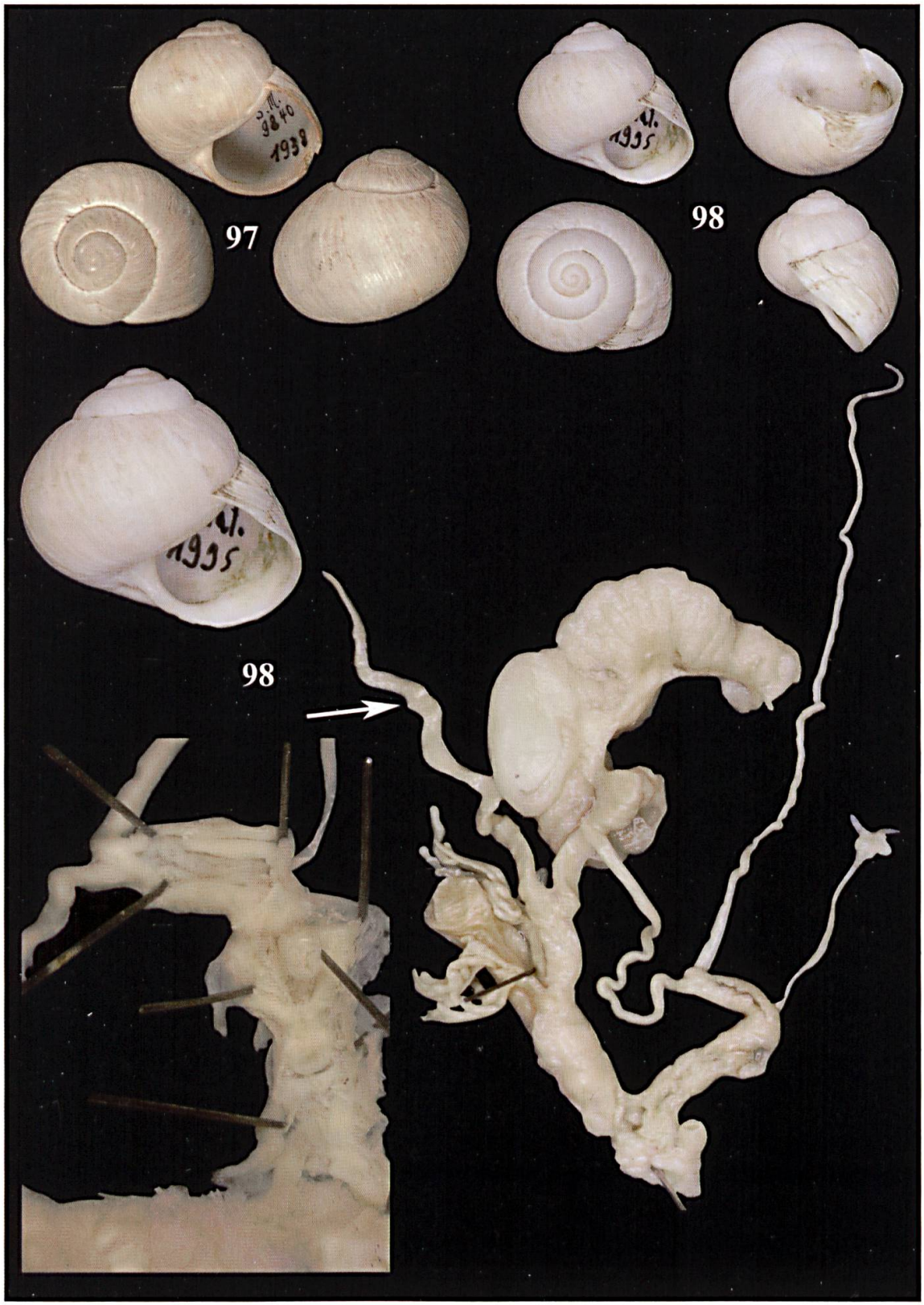
escherichi: holotype SMF 9840: H = 24.8; D = 25.6; PH = 19.5; PD = 13.6; PrD = 5.7; W = 4.25.

Specimens examined:

Turkey: NW Asia Minor, Eskişehir, 39.7753 30.5235, SMF 9841/3; Keuske-Kissik, 27 km from Eskişehir [not identified], SMF; Bolu, 15 krm E of Bolu at the crossroads to Yenicepınar, grassland with rocks, 40.7431 31.7393, UL91, 8.7.1988, MENK; Bolu, rocky slope 2 km SW of Mengen, 40.9081 32.0811, VL23, 8.7.1988, MENK; Bolu, rocks 7 km S of Eskipazar, 40.8988 32.5632, 1000 m alt., VL62 19.7.1988, MENK; Kastamonu, 0.7 km NE Seydiler, 41.6243 33.7160, 1040 m, MENK/15; Ankara, vegetation at the northern shore of the Yeniçağa Gölü, 40.7816 32.034, 8.7.1986, NMBE 512573/2, NMBE 505488/2 (alk.).

Diagnosis: shell small, very large protoconch, shells usually white without spiral bands.

Description: shell of small size, thin, spherical; basic shell colour white with a brownish to greenish periostracum; protoconch large in comparison



Figs 97–98. *Helix* (*Helix*) *escherichi* O. Boettger, 1898. Fig. 97 *escherichi*: holotype SMF 9840, Akşehir, D = 25.6; Fig. 98 NMBE 505488 Yeniçağa Gölü, situs 34.33. — All photos Neubert, original size.

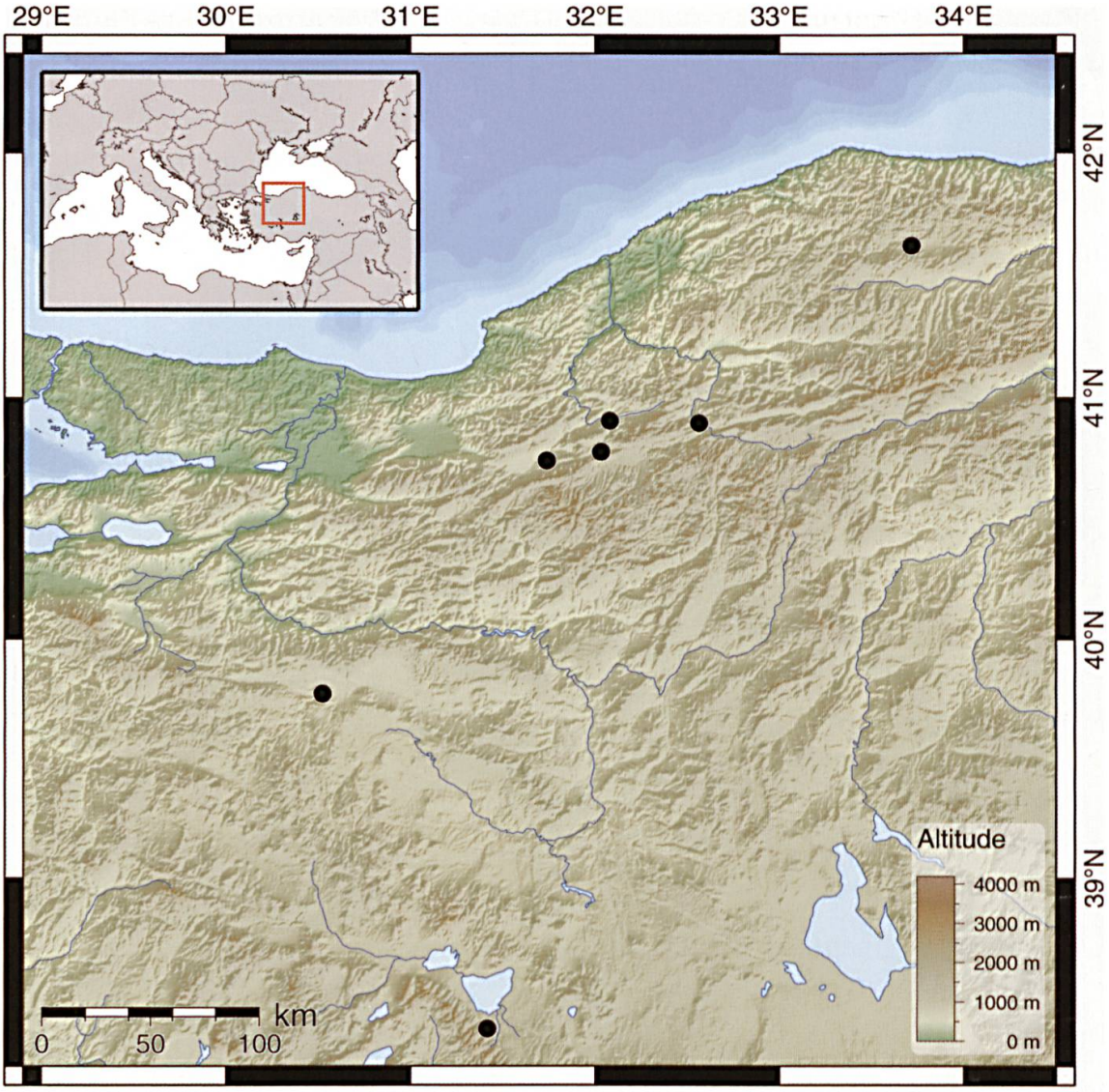


Fig. 99. *Helix* (*Helix*) *escherichi* O. Boettger, 1898. Distribution.

to shell, with a diameter up to 6 mm, smooth, white; teleoconch of 3 whorls with fine axial riblets, spiral bands usually missing; last whorl only slightly descending below the periphery; aperture rounded, labial callus weak, white to cream; columellar triangle small; umbilicus closed in adult shells.

Genital organs (Fig. 98): penis club-shaped, epiphallus shorter than penis; flagellum extremely long, exceeding the length of epiphallus+penis fourfold; mrp attaching in a subcentral distal position on the epiphallus; internally, both papillae of equal size, penial chamber long, filled with a few longitudinal pilasters, both papillae cylindrical with a central perforation; atrial stimulator a very small, rounded knob; female system with the vaginal tube somewhat shorter than the penis, dart sac and glandulae mucosae strongly developed, the glandulae with a basic stem, multi-branched, longer than dart sac; pedunculus stem long, with a thick and short diverticulum branching off in the terminal

third of the pedunculus, bursa copulatrix stem much shorter than pedunculus stem, vesicle not developed in the single specimen dissected.

Measurements of the reproductive organs of *Helix escherichi* [mm]: pp2 = 3.6; pp1 = 3.8; P = 7.4; Fl = 28.5; Epi = 4.5; Vag = 5.5; Ds = 8; Bc = 25.

Distribution (Fig. 99): So far, this species is only recorded in a small range on the western Anatolian plateau. The classical records like Akşehir and Eskişehir are not corroborated by modern records and are far from the area around Bolu, where the species is actually known. This is probably a species that has lost larger parts of its natural range.

Remarks: *Helix escherichi* is unmistakable; it is in fact the smallest *Helix*-species known. It resembles *H. pomacella* in its overall shape, but has a much larger protoconch than *H. pomacella*, and no spiral bands. The neighbouring *H. pathetica* is also larger, with a few spiral bands, a smaller protoconch, and a shorter flagellum. Unfortunately, the diverticulum got lost during preparation of the only specimen available; the branching off point is indicated by an arrow.

***Helix* (*Helix*) *albescens* Rossmässler, 1839** (Figs 100–110)

1837 *Helix obtusata* Rossmässler, Iconographie der Land- und Süsswassermollusken 1, 1 (5/6): 2, Taf. 21, Fig. 288 [non *Helix obtusata* Gmelin, 1790] [no data].

1839 *Helix vulgaris* Rossmässler, Iconographie der Land- und Süsswassermollusken 1, 2 (3/4): 10, Taf. 44, Fig. 582 [non *Helix vulgaris* Da Costa, 1778] [höchstwahrscheinlich aus der Moldau oder Walachei].

1839 *Helix albescens* Rossmässler, Iconographie der Land- und Süsswassermollusken 1, 2 (3/4): 10, Taf. 44, Fig. 585, 586 [Oberitalien, mitgetheilt von Parreyss].

1860 *Helix obtusalis* Bourguignat, Revue et Magasin de Zoologie 12: 160 [separatum: Aménités malacologiques II: 177 [nom. nov. pro *Helix obtusata* Rossmässler, 1837 non *Helix obtusata* Serres, 1823].

1877 *Helix obtusalis* var. *bicincta* Kobelt, Iconographie der Land- und Süsswassermollusken 1 (5): 116, Taf. 148, Fig. 1485 [Nowo-Rossisk am Westende des Kaukasus].

1886 *Helix* (*Helicogena*) *raddei* O. Boettger, In: Radde, G.: Fauna und Flora des südwestlichen Caspi-Gebietes III: 295, Taf. 2, Fig. 6a–c [Talysch, Lenkoran].

1889 *Helix* (*Helicogena*) *obtusata* var. *Ballionis* Retowski, Bulletin da la Société Impériale des Naturalistes de Moscou, N.S. 2 (2): 281 [Novorossiisk].

Figs 100–108. *Helix* (*Helix*) *albescens* Rossmässler, 1839. Fig. 100 neotype *vulgaris*: SMF 22367, höchstwahrscheinlich aus der Moldau oder Walachei, D = 31.1; Fig. 101 holotype *obtusata*: SMF 9613, unknown, D = 28.7; Fig. 102 holotype *albescens*: SMF 9834, "Oberitalien", D = 30.1; Fig. 103 lectotype *intermissa*: GNM 1725, Delishan, D = 32.4; Fig. 104 *roseni*: lectotype SMF 9718, Kubangebiet, D = 34.3; Fig. 105 *ballionis*: lectotype SMF 9832, Novorossiisk, D = 36.5; Fig. 106 NMBE 505484, Ivailovgrad, D = 33.4; Fig. 107 *kubanensis*: lectotype SMF 9625, Bibac, D = 34.7; Fig. 108 *tenuissima*: holotype SMF 9684, unknown, D = 27.0. — All photos Neubert, original size.

1897 *Helix intermissa* Westerlund, Annuaire du Musée Zoologique de l'Académie Impériale des Sciences de St.-Pétersbourg: 123 [Caucasus. Delishan (Gouvern. Tiflis) 7.6.1879 (A. Brandt) und Dorf Kueli (J. Ananow 1886].

1904 *Helix* (*Helicogena*) *vulgaris kubanensis* Kobelt, Systematisches Conchylien-Cabinet VI: 183, Taf. 343, Fig. 3, 4 [Bibac im Kubangebiet].

1904 *Helix* (*Helicogena*) *vulgaris roseni* Kobelt, Systematisches Conchylien-Cabinet VI: 184, Taf. 339, Fig. 8, 9 [Kubangebiet nördlich des Kaukasus].

1904 *H. vulgaris tenuissima* KOBELT, Systematisches Conchylien-Cabinet VI: 300 [only mentioned in the explanation of Taf. 342, Fig. 11, 12, not described on p. 180, as Kobelt cites himself].

Type specimens:

obtusata: holotype SMF 9613 (Zilch 1952: 141): H = 26; D = 28.7; PH = 20.2; PD = 14.7; PrD = 7.4; W = 4.25. *vulgaris*: neotype SMF 22367 (Zilch 1952: 141): H = 28.4; D = 31.1; PH = 18.5; PD = 19.2; PrD = 7.3; W = 4.5. *albescens*: holotype SMF 9834 (Zilch 1952: 141): H = 32.1; D = 30.1; PH = 22.1; PD = 15.5; PrD = 6.5; W = 4.5. *ballionis*: lectotype SMF 9832 (SD Zilch 1952: 142): H = 37.7; D = 36.5; PH = 21.1; PD = 23.5; PrD = 6.3; W = 5. *intermissa*: lectotype GNM 1725 (lectotype herewith designated): H = 33.4; D = 32.4; PH = 21.7; PD = 16; PrD = 6.9; W = 4.5. *kubanensis*: lectotype SMF 9625 (SD Zilch 1952: 142), H = 30.9, D = 34.7, PH = 17.9, PD = 21.5; *roseni*: lectotype SMF 9718 (SD Zilch 1952: 142): H = 33.8; D = 34.3; PH = 23.6; PD = 26.7; PrD = 7.3; W = 4.5. *tenuissima*: holotype SMF 9684 (Zilch 1952: 142): H = 27.6; D = 27; PH = 20.2; PD = 14.3; PrD = 6; W = 4.5.

Specimens examined:

Bulgaria: Eastern Rhodopes, Ivailovgrad town, Arda hut, 25.11.1990, 41.5276 26.1251, leg. Beshkov, ex coll. Dedov, NMBE 505484/1 (alk.).; Mitrovci, NW-town limits (= ca. 23 km W Montana), 43.4432 22.9324, 340 m alt., 23.5.2007, NMBE 522341/1; Iskar Valley "Ritlite", 500–700 m E of Cerepiski Monastir, 43.0933 23.6247, 425 m alt., 5.5.2008, NMBE 522340/1; Tabacka (= S from Ruse), 43.6133 25.983, 100 m alt., 26.5.2007, 522342/4; Arcar (= S von Vidin), 43.8126 22.9194, 33 m alt., 5.5.2008, 522339/1; Petrova Nuva, SE boundary of city, 42.0601 27.5303, 220 m alt., 8.5.2008, NMBE 522376/1.

Ukraine: Massandra close to Jalta, 44.5167 34.1833, 27.5.1976, NMBE 522617/5; Holubynka (= Golubinka), 44.5965 33.9148, 200 m alt., 6.9.1989, NME 522616/4; Chatyrdag Mt., 44.7376 34.2878, 1200 m alt., 11.8.2000, NMBE 20318/2.

Russia: Nowo-Rossisk, 44.7341 37.7717; Bibac (unclear, central Kuban area, prob. 44.983 40.476, *bicincta*, *kubanensis*, *ballionis*).

Azerbaijan: Talysch, 38.7226 48.6477 (*raddei*).

Georgia/Armenia: Delishan (prob. Dilijan in Armenia?), 40.7396 44.8679 (*intermissa*).

Diagnosis: shell of medium size, thick, usually with five separate spirals, protoconch very large, flagellum extremely short, diverticulum missing.

Description: shell of medium size, thick, spherical, with a slightly conical spire; basic shell colour greyish white to bright cream-brown with usually five separate chestnut-brown spirals, but shells with fused spirals may occur; protoconch very large in comparison to shell, smooth, white to grey; teleoconch of 4–5 whorls; last whorl only slightly descending below the periphery; aperture subquadrate, slightly oblique to rounded, apertural rim narrow, labial callus

Fig. 109. ***Helix* (*Helix*) *albescens*** **Rossmässler, 1839. Genital organs, NMBE 505484, Ivailovgrad, situs 31.52. — All photos Neubert.**

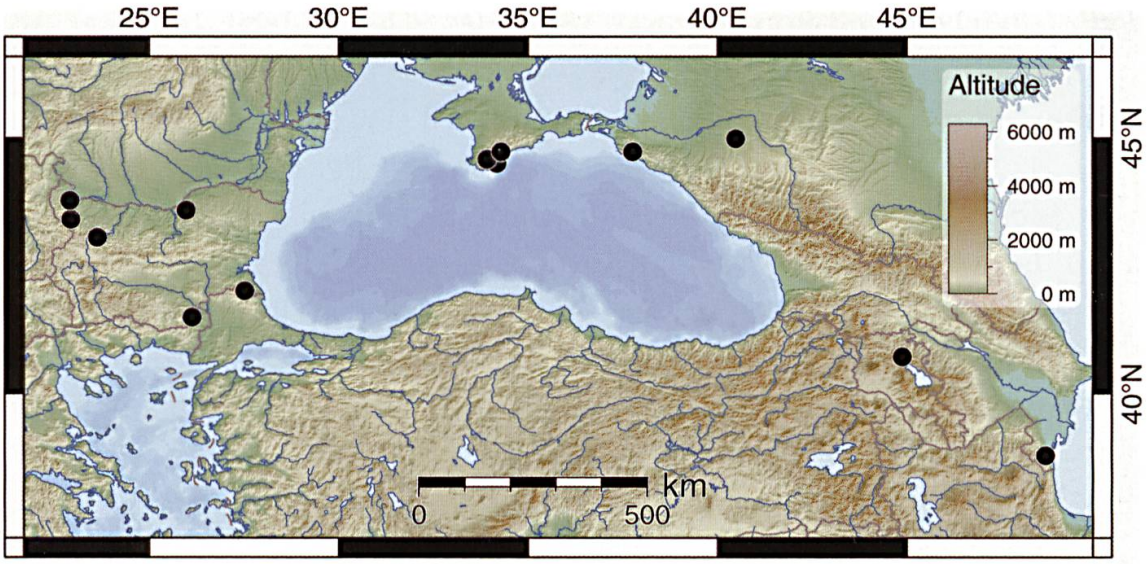


Fig. 110. *Helix* (*Helix*) *albescens* Rossmässler, 1839. Distribution.

weak, white to cream to brown coloured, columellar triangle small; umbilicus closed in adult shells.

Genital organs (Fig. 109): penis thick, club-shaped, epiphallus as long as penis; flagellum extremely short, with a thickened basal part, shorter than epiphallus+penis, mrp attaching in a central position on the epiphallus; internally, both papillae of equal size, penial chamber long, internally almost smooth, both papillae conical with a central perforation; atrial stimulator a triangular knob; female system with a very short vaginal tube, dart sac strong, glandulae mucosae thin, bifid, consisting of only a few tubes, not exceeding dart sac in length; pedunculus stem long, with a thickened basal part, diverticulum missing, vesicle rounded and bent downwards.

Distribution (Fig. 110): This species is known from Bulgaria, the northern coastal part of the Black Sea, and the Caucasian countries including the Talysch. Until now, no records are known from the Rhodope Mts. in Greece, nor from Turkey, where it can be expected at least in the European part of the country. Sysoev & Schileyko (2009) record it from the southern part of the Ukraine, the areas north of the Caucasus, and sporadically in Georgia and Armenia; no records are known so far from Ghilan, Iran. Kobelt (1906) believed *H. albescens* to slightly transform into *Lindholmia nordmanni* (Mousson, 1854)south of the great Caucasian water shed, which reflects his misapprehension of the two species which belong to two different genera (Neubert & Bank 2006: 128).

Remarks: This species is characterized by its very short flagellum and the lack of the diverticulum. It is unknown whether this character is stable in this species. Conchologically, it differs from *H. figulina* and *H. pomacella* by its very large protoconch and the generally larger shell size.

***Helix* (*Helix*) *asemnis* Bourguignat, 1860** (Figs 111–131; Table 2)

1860 *Helix solida* Albers, Die Heliceen, edition II: 142 [non *Helix solida* Born, 1778, nec *Helix* [*Helicella*] *punctulata* var. β *solida* Lowe, 1831, nec *Helix solida* L. Pfeiffer, 1851 etc.] [Kleinasien].

1860 *Helix asemnis* Bourguignat, Revue et Magasin de Zoologie (2) 12: 159, pl. 8, fig. 4, 5 [separatum: Aménités malacologiques II [1860]: 176] [nom. nov. pro *Helix solida* Albers, 1860].

1863 *Helix nilotica* Bourguignat, Mollusques nouveaux, litigeux ou peu connus: 15 (§ 7), pl. 2, fig. 10–12 [Égypte, Damiette].

1876 *Helix equitum* Bourguignat, Species novissima molluscorum: 53 [Ile de Rhodes].

1876 *Helix asemnis*, – Kobelt, Iconographie der Land- und Süsswassermollusken 1 (4): 21, Taf. 99, Figs 1032, 1033.

1889 *Helix asemnis* var. *homerica* v. Martens, Archiv für Naturgeschichte 55 (1): 195, Taf. 11, Fig. 4 [Inseln Chios, Syme].

1889 *Helix asemnis* var. *venusta* v. Martens, Archiv für Naturgeschichte 55 (1): 201, Taf. 11, Fig. 6, 7 [Küste von Caria, gegenüber Syme].

1893 *Helix* (*Pomatia*) *moabitica* Goldfuss, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 25: 86 [Wadi Medjib in Moab am Ostufer des Todten Meeres].

1895 *Helix* (*Pomatia*) *baristata* Kobelt, Iconographie der Land- und Süsswassermollusken, Suppl. 1: 46, Taf. 16, Fig. 6 [nördliches Syrien zwischen Alexandrette und Urfa].

1895 *Helix pleurorinia* Kobelt, Iconographie der Land- und Süsswassermollusken, Suppl. 1, Taf. 18, Fig. 2 [nomen nudum, only figured in 1895].

1896 *Helix* (*Pomatia*) *pericalla* Kobelt & Rolle, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 28: 35 [Giosna in Cilicien] (March 1896).

1896 *Helix* (*Pomatia*) *pericalla*, – Rolle & Kobelt, Iconographie der Land- und Süsswassermollusken, Suppl. 1: 49, Taf. 19, Fig. 3, Taf. 20, Fig. 3 [bei Giosna in Cilicia] (Sept. 1896).

Figs 111–119. *Helix* (*Helix*) *asemnis* Bourguignat, 1860. Fig. 111 syntype *solida* ZMB, Kleinasien, D = 39.5; Fig. 112 syntype *venusta* SMF 9697, Küste von Caria, gegenüber Syme, D = 36.4; Fig. 113 syntype *equitum* MHNG 17944, Ile de Rhodes, D = 34.8; Fig. 114 syntype *nilotica* MHNG 17975, Damiette, D = 38.8; Fig. 115 holotype *pompej* SMF 9716, Umgebung von Pompejopolis, D = 36.3; Fig. 116 lectotype *moabitica* SMF 9620, Wadi Medjib in Moab, D = 40.5; Fig. 117 holotype *blanckenhorni* SMF 9021, "Palästina", D = 40.8; Fig. 118 lectotype *blumi* SMF 9809, Gheuzneh in Cilicia, D = 48.2; Fig. 119 probable syntype *pericalla* SMF 9936, Giosna, D = 54.3. — Fig. 111 photo by O. Korabek, all remaining photos Neubert, original size.

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1896 *Helix* (*Pomatia*) *adanensis* KOBELT, Iconographie der Land- und Süsswassermollusken, Suppl. 1: 52, Taf. 23, Fig. 1–4 [in Cilicia, in der Umgebung von Adana].

1896 *Helix* (*Pomatia*) *nucula* var. *mersinae* KOBELT, Iconographie der Land- und Süsswassermollusken, Suppl. 1: 53, Taf. 23, Fig. 7, 8 [Umgebung von Mersina].

1896 *Helix* (*Pomatia*) *adanensis* var. *sarica* KOBELT, Iconographie der Land- und Süsswassermollusken, Suppl. 1: 53, Taf. 23, Fig. 5, 6 [Adana in Cilicia].

1896 *Helix* (*Pomatia*) *infidelium* KOBELT, Iconographie der Land- und Süsswassermollusken, Suppl. 1: 54, Taf. 24, Fig. 5, 6 [Zwischen Alexandrette und Tschengen-Köi, im Giaur Dagh].

1903 *Helix* (*Pomatia*) *adanensis* var. *incrassata* NÄGELE, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 35: 170 [Bodrun Ciliciae].

1903 *Helix* (*Pomatia*) *adanensis* var. *plicata* NÄGELE, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 35: 170 [aus dem Inneren Cilicias].

1903 *Pomatia blumi* KOBELT, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 35: 149 [Gheuzneh in Cilicia].

1904 *Helix* (*Helicogena*) *ciliciana* KOBELT, Systematisches Conchylien-Cabinet VI: 152, Taf. 334, Fig. 1–5 [von Loebbecke in den Ruinen vom Pompejopolis gesammelt].

1904 *Helix* (*Helicogena*) *pachya kossenae* KOBELT, Systematisches Conchylien-Cabinet VI: 158, Taf. 335, Fig. 5, 6 [Missat (ubi?)].

1904 *Helix* (*Helicogena*) *pachya riebecki* KOBELT, Systematisches Conchylien-Cabinet VI: 158, Taf. 335, Fig. 12 [Palästina].

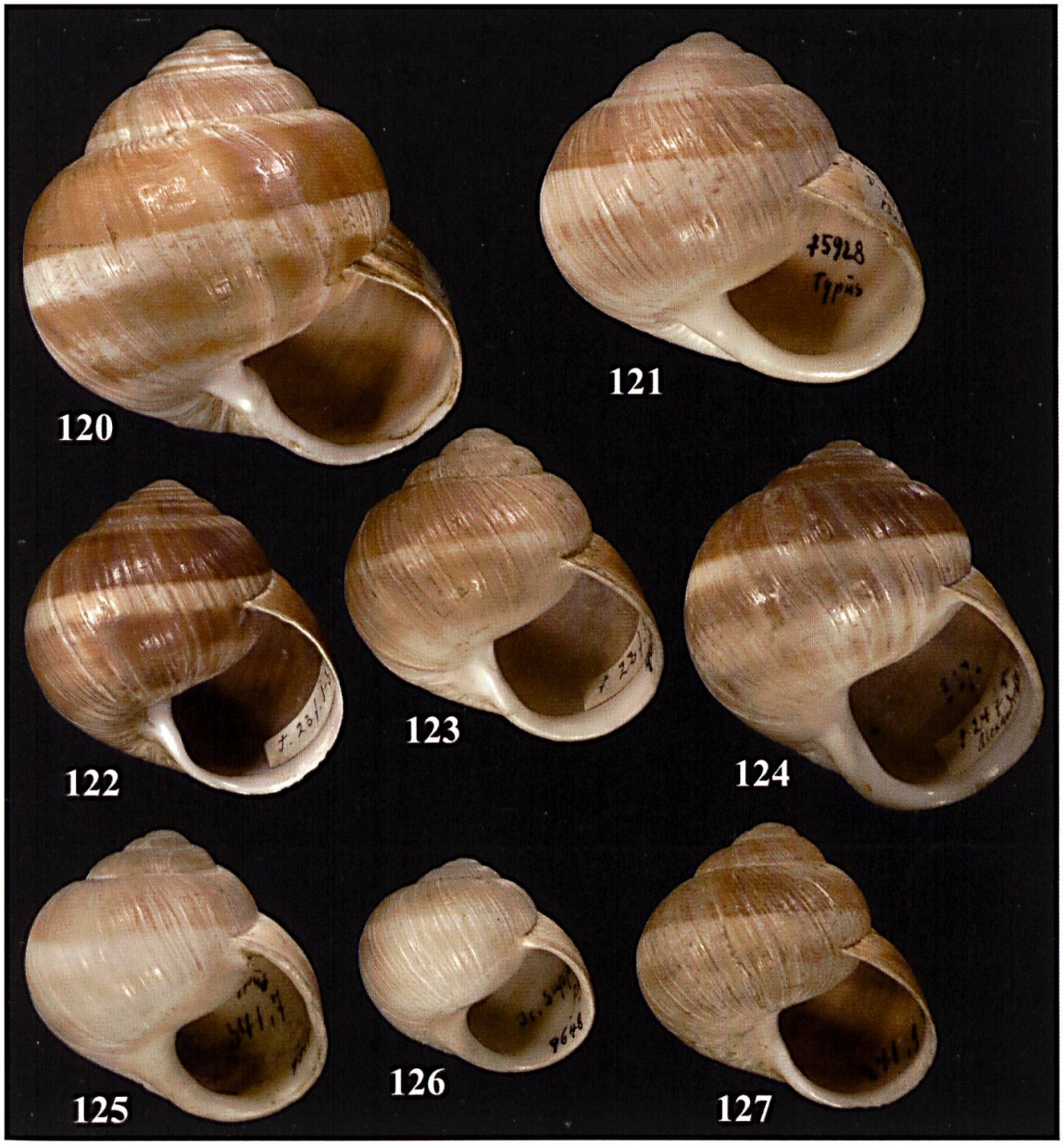
1904 *Helix* (*Helicogena*) *adanensis globulosa* KOBELT, Systematisches Conchylien-Cabinet VI: 163, Taf. 341, Fig. 7, 8 [Adane in Cilicia].

1904 *Helix* (*Helicogena*) *adanensis pyrami* KOBELT, Systematisches Conchylien-Cabinet VI: 163, Taf. 341, Fig. 9, 10 [Adane in Cilicia].

1904 *Helix* (*Helicogena*) *ciliciana pleurorinia* KOBELT, Systematisches Conchylien-Cabinet VI: 164, Taf. 336, Fig. 10 [Gebirge zwischen Alexandrette und Beilan]

1904 *Helix* (*Helicogena*) *ciliciana pompeji* KOBELT, Systematisches Conchylien-Cabinet VI: 169, Taf. 339, Fig. 4–6 [Umgebung von Pompejopolis (= Pompeiopolis in Cilicia = Soloi = western urban district of Mersin].

1904 *Helix* (*Helicogena*) *moabitica blanckenhorni* KOBELT, Systematisches Conchylien-Cabinet VI: 168, Taf. 339, Fig. 7 [no definite locality given, according to Zilch (1951: 145) "Palästina, Parreys d."].



Figs 120–127. *Helix* (*Helix*) *asemnis* Bourguignat, 1860. Fig. 120 lectotype *plicata* SMF 75930, aus dem Inneren Cilicias, D = 48.9; Fig. 121 lectotype *incrassata* SMF 75928, Bodrun Ciliciae, D = 42.8; Fig. 122 holotype *adanensis* SMF 9790, Umgebung von Adana, D = 35.4; Fig. 123 holotype *sarica* SMF 9652, Adana, D = 35.6; Fig. 124 lectotype *infidelium* SMF 9805, Zwischen Alexandrette und Tschengen-Köi, D = 39.9; Fig. 125 lectotype *globulosa* SMF 9811, Adana, D = 33.4; Fig. 126 lectotype *mersinae* SMF 9648, Umgebung von Mersina, D = 26.3; Fig. 127 holotype *pyrami* SMF 9763, Adana, D = 33.4. — All photos Neubert, original size.

Type specimens:

solida: syntype ZMB, H = 41.7; D = 39.5; PH = 23.8; PD = 22.2; PrD = 6.6; W = 5.25. *adanensis*: holotype SMF 9790 (Zilch 1952: 143), H = 36.1; D = 35.4; PH = 24.5; PD = 18; PrD = 4.8; W = 5.25. *baristata*: not researched. *blanckenhorni*: holotype SMF 9021 (Zilch 1952: 145): H = 38.8, D = 40.8, PH = 21.8, PD = 23.1. *blumi*: lectotype SMF 9809 (SD Zilch 1952: 144): H = 48.9; D = 48.2; PH = 35.2; PD = 23.8; PrD = 5.5; W = 5.25. *ciliciana* see note. *equitum*: syntype MHNG 17944, H = 37.8; D = 34.8; PH = 23.2; PD = 23.8; PrD = 5.1; W = 5. *globulosa*: lectotype SMF 9811 (SD

Zilch 1952: 143): H= 34; D = 33.4; PH = 25; PD = 15; PrD = 4.7; W = 5.25. *homerica*: not researched. *incrassata*: lectotype SMF 75928 (SD Zilch 1952: 143): H = 39.7; D = 42.8; PH = 27.8; PD = 19.4; PrD = 5.1; W = 5.5. *infidelium*: lectotype SMF 9805 (SD Zilch 1952: 144): H = 43.7; D = 39.9; PH = 31.4; PD = 20.6; PrD = 7; W = 5.5. *kossenae*: not researched. *mersinae*: lectotype SMF 9648 (SD Zilch 1952: 159): H = 24; D = 26.3; PH = 19.5; PD = 13.5; PrD = 4.4; W = 4.5. *moabitica*: lectotype SMF 9620 (SD Zilch 1952: 145): H = 39.9; D = 40.5; PH = 27.3; PD = 19; PrD = 5.1; W = 5.5. *nilotica*: syntype MHNG 17975, H = 43.9, D = 38.8, PH = 23.6; PD = 23.7. *pericalla*: probable syntype SMF 9936 (coll. Kobelt ex Rolle): H = 56.1, D = 54.3, PH = 31.8, PD = 34.6. *pleurorinia*: syntypes MHNG 17981/2, not researched. *plicata*: lectotype SMF 75930 (SD Zilch 1952: 143): H = 51.5; D = 48.9; PH = 31.3; PD = 22.8; PrD = 5.8; W = 6. *pompej*: holotype SMF 9716 (Zilch 1952: 145): H = 37.1; D = 36.3; PH = 26.8; PD = 18.3; PrD = 5.4; W = 5.25. *pyrami*: holotype SMF 9763 (Zilch 1952: 143): H = 33.5; D = 33.4; PH = 22.7; PD = 16.15; PrD = 5.4; W = 5. *riebecki*: not researched. *sarica*: holotype SMF 9652 (Zilch 1952: 143): H = 35.6; D = 35.6; PH = 25; PD = 17.1; PrD = 5.9; W = 5.25. *venusta*: syntype SMF 9697, H = 39.7; D = 36.4; PH = 23.4; PD = 23.5; PrD = 6.9; W = 5.

Note on *Helix* (*Helicogena*) *ciliciana* KOBELT, 1904: Zilch (1952: 144–145) mentioned that in Kobelt's private copy of the "Iconographie" there is a handwritten note, which says that the name "*ciliciana*" has to be attributed to his figure 1032 from Iskenderun. Because this specimen is lost, Zilch designated a neotype (SMF 22671) for this taxon from Iskenderun. However, the neotype is a specimen of *H. antiochiensis*, and not *H. asemnis* as originally intended by Kobelt. Thus, the neotype designation of Zilch has to be regarded as invalid, and the taxon *ciliciana* remains without a type specimen. Kobelt mentioned that he copied the name *ciliciana* from the collection of Bourguignat in Geneva, but so far no label and specimen with this name could be found there.

A certain chaos appears with the name *Pomatia pericalla* ROLLE & KOBELT, 1894. The authors mention "bei Giosna in Cilicia" as the type locality for this taxon, and also mention that the name is a manuscript name by Bourguignat, and that the figures were painted after the type specimens in Bourguignat's collection in Geneva. Fact is that in the collection, the name *Helix pericalla* appears with Bourguignat, 1878 as author and date, but it was never published. The two lots under this name have two different localities, none of them is Giosna (MHNG 18059/1 (Syrie, Tripoli et marché d'Alexandrie) and MHNG 18060/4 (Amrith, près Tortose), with the first meaning Tripoli in Lebanon and

Figs 128–130. *Helix* (*Helix*) *asemnis* BOURGUIGNAT, 1860. Genital organs. Fig. 128, NMBE 505539, Belbibi, Antalya, situs 45.46; Fig. 129, NMBE 525626, 6 km S Gözne, situs 62.5; Fig. 130, castle of Kozan. — All photos Neubert.

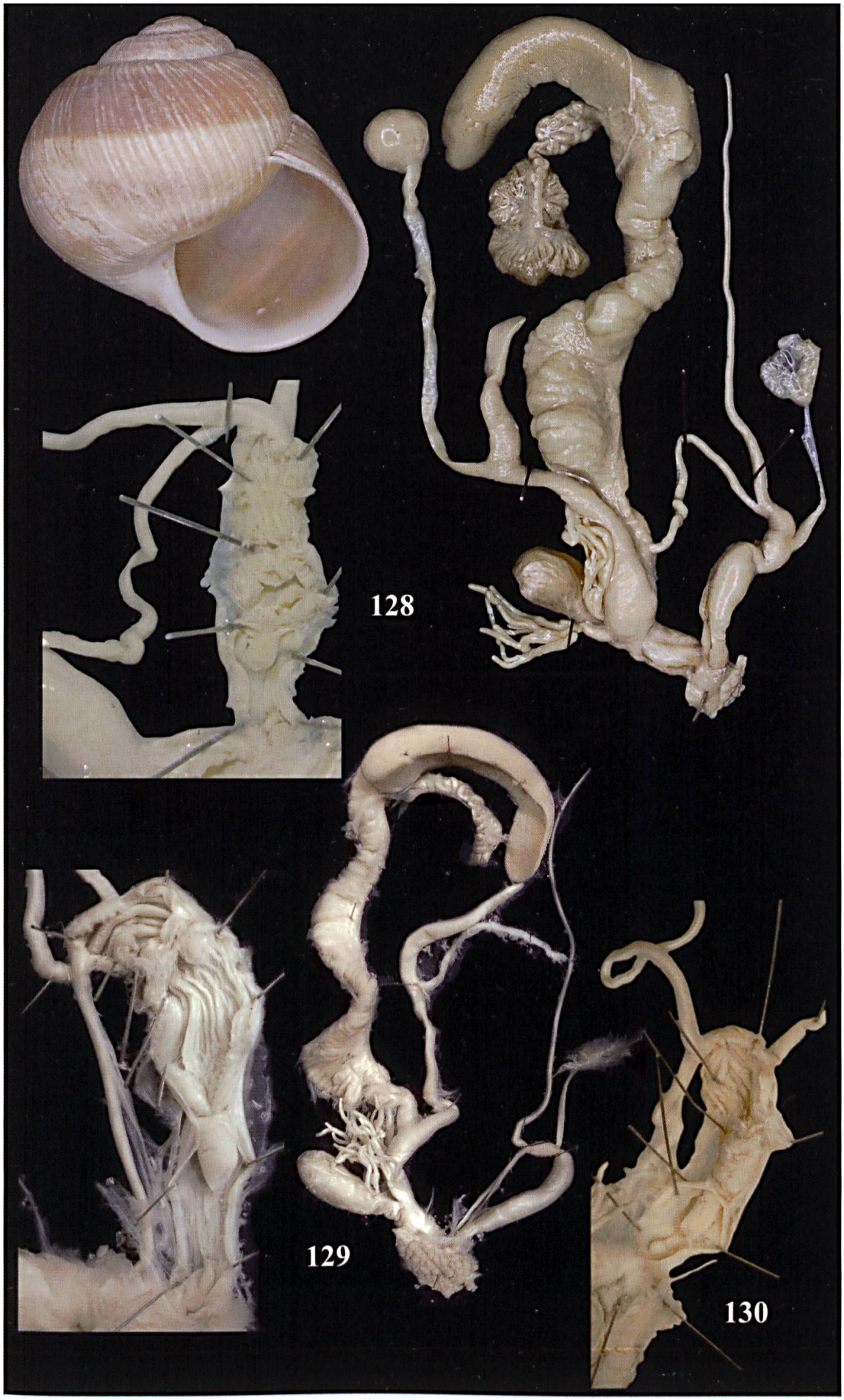

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Table 2. Measurements of selected specimens of *H. asemnis*, which had been illustrated in major works on *Helix*.

Lot	H	D	PH	PD	PrD	W
SMF 9696 = Orig. Conch.-Cab., VI: Taf. 336, Fig. 7–8, syntype *venusta*	42.1	36.7	26.8	19.5	5.2	5.25
SMF 9645 = Orig. Icon., Suppl., Taf. 24, Fig. 3 (sub *pachya*)	39.9	35.7	26.2	17.1	5.5	5.25
SMF 9644 = Orig. Icon., Suppl., Taf. 24, Fig. 4 (sub *pachya*)	41.9	39.2	28.7	19.3	5.3	5
SMF 155822 = Orig. Handbuch Fig. 2513	44.8	43.2	32.3	21.2	5.4	5
SMF 9736 = Orig. Conch.-Cab., VI: Taf. 339, Fig. 1–2 (sub *solida*)	39.9	38.2	28.8	19.4	5.6	5
SMF 9937 = Orig. Conch.-Cab., VI: Taf. 339, Fig. 3 (sub *solida*)	41.5	42.2	29.8	21.8	5.4	5
SMF 9761 = Holotype *H.* (*Helicogena*) *ciliciana pompeji*	37.1	37.5	26.6	16.9	5.4	5
SMF 9717 = Paratype *H.* (*Helicogena*) *ciliciana pompeji*	42.7	37.7	28.4	17.4	5.4	5
SMF 9810 = Paralectotype *H.* (*Helicogena*) *blumi*	47.7	46.7	34.2	23.2	5.9	5.25
SMF 9936 = Topotype *Pomatia pericalla* (Cotypus cf. Zilch, coll. SMF)	56	54.3	42.4	38.7	6.5	5.25
SMF 9791 = Orig. Icon., Suppl.: Taf. 23, Fig. 4 sub *adanensis*	38.8	34.9	27	17.8	5.5	5.25
SMF 9653 = Paratype *H.* (*Pomatia*) *adanensis* var. *sarica*	33.8	33.6	24.6	15.5	4.6	5
SMF 9765 = Paralectotype *H.* (*Helicogena*) *adanensis globulosa*	34.6	33	24	15.6	4.8	5
SMF 9764 = Paralectotype *H.* (*Helicogena*) *adanensis pyrami*	33.2	29.5	21.3	14.3	5.3	5
SMF 9651 = Paralectotype *H.* (*Pomatia*) *infidelium*	46.8	41.3	30.4	22.1	5.2	5.5
SMF 75929a = Paralectotype *H.* (*Pomatia*) *adanensis* var. *incrassata*	41.5	39.8	27.9	18.5	5.8	5.5
SMF 75929b = Paralectotype *H.* (Pomatia) *adanensis* var. *incrassata*	34.4	37.2	25.3	17.1	4.8	5.25
SMF 75931 = Paralectotype *H.* (Pomatia) *adanensis* var. *plicata*	47.2	50	31.5	23.9	5.4	5.75
SMF 22674 = Paralectotype *H.* (Pomatia) *adanensis* var. *plicata*	45.1	45.7	29.1	21.1	5.6	5.75

market in Alexandria, and the second in Amrith, a small village south of Tartus at the Syrian Mediterranean coast). In the collection of Bourguignat, the locality Giosna (and in its various notations) does not appear at all. Kobelt (1904: 156, Taf. 337, Figs 1–2) simply copies the figures from the Iconographie Supplement volume of 1896, with the note that these illustrations represent "Bourguignat's types" bought by Letourneux in Alexandria (Egypt). This latter note coincides with the collection in Geneva, however, in the same text he mentions that originally his specimens had been collected by Rolle in Giosna. Concluding, it is clear that *pericalla* has been described based on specimens collected by Rolle in Turkey, and that Kobelt was inspired by an unpublished name in Geneva. The specimens there do not have any status.

Specimens examined:

Greece: Chios: Chios, 38.4573 26.0727, SMF 22759/2 (paratypes homerica ex v. Oertzen); ditto, SMF 22760. Symi: Panormiti, 36.5476 27.8464, SMF 74319/3 [Simi]. Kasos: Kasos, 35.3906 26.9194, 17.04.1982, LIEB (4). Kastellorizo: Castelrosso, 36.1486 29.5938, SMF 299266; ditto, SMF 74320/6; Kastelorizo, 15.05.1983, LIEB (20); plateau over Aghios Ioannis, 07.06.1996 LIEB (3).

Turkey: Denizli Ili: road 330 Burdur to Denizli, 3 km W Güney, 37.51 29.51, 16.4.1993, NMBE 512919/4. Muğla Ili: Yatagan, ruins of Stratonikeia W of Yatagan, 37.3134 28.058, 07.10.1997, LIEB; Muğla, rocky slope above the old town of Muğla, 37.2229 28.3604, 30.9.1997, LIEB; Akyaka, Gökova, rocky slope N of Akyaka, 37.0648 28.3253, 06.10.1997, LIEB; Akyaka, rockgrave approx. 1 km S Akyaka, 37.0538 28.3454, 29.10.1997, LIEB; Gökova, 2 km W of Akyaka, 37.0550 28.3660, 03.10.1997, LIEB; Marmaris, road from the harbour to the Günnücek Park, 36.8489 28.2893, 04.10.1997, LIEB; Caria, coast opposite Symi, SMF 9697 ("paratype" of *venusta* ex v. Oertzen); ditto, SMF 9696; ditto, SMF 22758/2; rocks at the shore N Budrun [= Bodrum], 37.0388 27.4154, SMF 74340/6; Bodrum, Cilicia (= Bodrume, Bodume), SMF 22663; ditto, SMF 74252/3; ditto, SMF 74253/3; Bozburun Yarimadasi, Loryma, castle and adjacent area, 36.5660 28.0160, 04.06.1998, NMBE 512923/11; Peninsula of Bodrum, Ören, ruins of Keramos, 37.0374 27.9802, 05.10.1997, LIEB; Makri [= Fethiyhe], 36.6467 29.1682, SMF 22756; Fethyie, 50 km S Fethyie, Minore, ruins of Pinara, 36.4896 29.2573, 05.10.1994, LIEB (2); between Esen and Dodurga, Fethiye, 36.42 29.25, 150 m alt., 4.6.2006, NMBE 23005/21. Antalya Ili: Geris, Akseki/ Antalya, 36.9564 31.7376, 800 m alt., 16.6.1987, NMBE 522709/12; Arif, 1–2 Km S of road Finike-Elmalı, 36.509 30.0563, 600 m alt., 9.6.1987, NMBE 522708/3; Akseki, Mt. Cevizli, 37.1968 31.7635, 1100 m alt., 16.6.1987, NMBE 522707/1; Beskonak, bridge over Köprülü Canyon, 37.1919 31.187, 200 m alt., 17.6.1987, NMBE 522706/7; Antalya, 36.91 30.69, 1976, NMBE 522618/1; Alanya, Dim Valley, 5 Km from coastal road, 36.5419 32.1069, 50 m alt., 7.10.2001, NMBE 522345/5; pass between Sultaniye and Ekincik, 36.8601 28.5576, 400 m alt., 2.6.1998, NMBE 512922/1; Beldibi, 36.7349 30.5596, 9 m alt., 25.3.1986, NMBE 505539/4; Kas, 36.2 29.58, 20 m alt., 7.6.2006, NMBE 23008/1; Kalkan, Kas, 36.26 29.41, 50 m alt., 6.6.2006, NMBE 23007/3; Palamut, Kas, 36.4088 29.3644, 350 m alt., 6.6.2006, NMBE 23006/9; Cilicia, Adana, 36.9156 30.7173, SMF 22660/5; ditto, SMF 22669; ditto, SMF 22670/5; ditto, SMF 24009; ditto, SMF 74234; ditto, SMF 74235/2; ditto, SMF 74236; ditto, SMF 74237; ditto, SMF 74239; ditto, SMF 74240; ditto, SMF 74242; ditto, SMF 74243/2; ditto, SMF 74244; ditto, SMF 74247; ditto, SMF 74248; ditto, SMF 74250/2; ditto, SMF 155822; ditto, SMF 299440/2; ditto, SMF 299445/4; ditto, SMF 299446/6; ditto, SMF 299448/4; ditto, SMF 299449/5; ditto, SMF 299450/4; ditto, SMF 299451/3; ditto, SMF 299435/2; ditto, SMF 299439/3; ditto, SMF 299437/23; ditto, SMF 299441/2; SMF 74245 Adana, Caramanie; SMF 299443/2 mountains around Adana; SMF 214886 Adana (Giaur Dagh); Lycia, Adalia (= Antalya, many records with this locality in SMF), 36.9156 30.7173; Beydağları, Gedelme W Kemer, 36.6068 30.4308, ca. 900 m alt., 02.10. 1986, leg. Rähle, RÄH (1); W of the Düden waterfall, 36.8498 30.7816, 22.03.1986, leg. Rähle, RÄH (1); rocks 4 km N crossroads near Varsah 8 km N Antalya, 36.9911 30.7139, 23.12.1986, MENK (2); Antalya, 2 km N Beldibi SW Antalya, 36.7565 30.5685, 25.03.1986, leg. Rähle, RÄH (2); at the springs of Kirk Göz N of Karain, 37.0958 30.5807, 03.10.1986, leg. Rähle, RÄH (1); Castle of Alanya, 36.5327 31.9910, 27.12.1986, MENK (15); ditto, III.2003, leg. Rähle, RÄH (1); ditto, 12.1.1997, 525609/28; ditto, 7.4.1997, NMBE 525598/6; ditto, 10.5.1991, NMBE 512913/5; Alanya, castle hill, 20.05.1964, coll. Schlickum ex Schütt; Antalya, 1.5 km N of crossroads close to Güzelbağ 18 km NW Antalya, 36.7196 31.8948, 27.12.1986, MENK (3); Manavgat, E of waterfall, 36.8135 31.4553, 10.1.1997, NMBE 525605/1; Oba E of

Alanya, 36.5371 32.0499, 11.1.1997, NMBE 525599/2; 3 km SSE Demirtas SE Alanya, 36.4043 32.2143, 22.4.1997, NMBE 525602/1; Antalya 20 km N Manavgat in dir. Aydinkent, 36.834 31.506, 9.5.1991, NMBE 512926/2; Manavgat, Cevizli, 37.1939 31.7637, 24.7.1994, SMNS/NORDS; Antalya, Ihsanyie at Antalya, 36.9845 30.8547, 11.6.1995, SMNS/NORDS; Antalya, rocky slope 7 km W of Güney 25 km W of Yesilova, 1.8.1984, MENK (11); Antalya: rocks at the crossroads to the Düden waterfall NW Antalya in direction to Burdur, 22.12.1986, MENK (10); Lycia, Jenitsche Pass, SMF 299461; SMF 280624 Antalya, Fuss des Kara Dag; Antalya, Güney, 3 km in direction to Karahüyük, 10.6.1995, SMNS/NORDS. Icel Ili: Tarsus, 36.9201 34.8940, SMF 78205/2; Tarsus, Tasobasi at Tarsus, 37.0900 34.9286, 31.12.1993, SMNS/NORDS; ditto, 28.7.1994, SMNS/NORDS; Gözne, limestone cliffs opposite of castle, 36.9946 34.5551, 3770 ft alt., 09.10.2001, HEMM (3 alk., no shells); Gözne, rocks above the castle, 37.0067 34.5771, 20.4.1997, NMBE 525596/11; 6 km S Gözne N of Mersin, 36.9654 34.5717, 20.4.1997, NMBE 525626/1 (alk.); Gheuzneh (= Giosna, = Gözne), 36.9992 34.5712, SMF 9809; Mountains around Giosna, SMF 9936; ditto SMF 22752; ditto SMF 22751/4; ditto SMF 9810; ditto SMF 214785; ditto SMF 22754; ditto SMF 74294/2; ditto SMF 299459; ditto SMF 299460; ditto SMF 299462; ditto SMF 299463/2; Geuzneklis (= Giösne?), SMF 74293; Giorna, (= Giösne?), SMF 22338; Anamuryum, rocks at the ruins, 36.0253 32.8050, 28.12.1986, MENK (2); ruins of Anamuryum, 10.5.1991, NMBE 512914/2; ditto, 10.4.1997, NMBE 525604/5; ditto, 20.03.2003, leg. Rähle, RÄH (4); Mamure Kalesi at Cap Anamur, 36.0811 32.8946, 20.03.2003, leg. Rähle, RÄH (1); Icel, Silifke, Göksu Delta, April 1992, NMBE 512925/1; 5 km SW Silifke, ruins of Ayatekla, 36.3629 33.9210, 29.12.1986, MENK (10); Softa Kalesi close Boyazi ENE Anamur, 36.1042 33.0176, 9.4.1997, NMBE 525593/18; west of Boyazi ENE Anamur, 36.0906 32.93, 9.4.1997, NMBE 525592/5; 17 km from Silifke to Uzuncaburc, 36.4919 33.9208, 12.4.1997, NMBE 525603/2; Cehennem NE Silifke, 36.4541 34.1064, 13.4.1997, NMBE 525606/1; 1.5 km from Gözce to Aydıncık, 36.1298 33.1986, 11.4.1997, NMBE 525607/2; 2 km from Gözce to Aydıncık, 36.1332 33.2126, 11.4.1997, NMBE 525624/1 (alk.); approx. 2 km SW Akkum ENE Silifke, 36.4294 34.1004, 20.4.1997, NMBE 525610/1 (alk.); Balcali, Çamlitepe, 37.0628 35.3685, 23.07.1992, NMBE 512924/2; Icel, Silifke, 2 km W Tavşucu, 36.3078 33.8575, 10.5.1993, NMBE 512920/3; Icel, Silifke, Kizkalesi 23 km NE Silifke, 36.468 34.166, 24.7.1986, NMBE 512909/7; Selefke Cilicia (= Silifke), 36.3819 33.9323, SMF 9644; ditto SMF 214894; ditto SMF 74350/2; ditto SMF 299408; ditto SMF 299430/2; between Mersin and Pompejopolis, 36.7882 34.6050, SMF 22666; ditto SMF 22678; Gülek (= Camalan), 37.1989 34.8106, SMF 22673; ditto SMF 74246; ditto SMF 74251; ditto SMF 22688/2; ditto SMF 299447; ditto SMF 299453; ditto SMF 299457/2; Pompejopolis, 36.7823 34.5835, SMF 9761; ditto SMF 9683; ditto SMF 9717; ditto SMF 74363; ditto SMF 214879; ditto SMF 299456/2; ditto SMF 22692; Mersin to Silifke SMF 22761; ditto SMF 74349/2; ditto SMF 74291/2; ditto SMF 74293/2; ditto SMF 74314; ditto SMF 74351; ditto SMF 214880/2; ditto SMF 214893/2; ditto SMF 214789; ditto SMF 299452/2; Findikpinar, 36.9230 34.3691, SMF 74292; between Anamur and Silifke, 4.6 km E Aydıncık, 36.152 33.372, 11.5.1991, NMBE 512908/2; Icel, Silifke, Çennet ve Çehennem 18 km NE Silifke, 36.4524N 34.1054, 24.7.1986, NMBE 512907/1; ditto, 16.9.1989, NMBE 512912/5; Silifke, 3 km S Uzuncaburç, 36.55 33.92, 26.7.1986, NMBE 512910/2; Silifke, 6 km S Uzuncaburç, 36.53 33.945, 26.7.1986, NMBE 512911/3; Mersin, 3 km S Findikpinar, 36.906

34.382, 13.5.1991, NMBE 512916/2; 36 km N Erdemli in dir. Güzeloluk, 36.789 34.091, 12.5.1991, NMBE 512915/1; Silifke, 24 km W Silifke at the coastal road, 36.256 33.779, 10.5.1993, NMBE 512921/1; Silifke, Olba at Uzunçaburc (Aquaeduct), 36.5805 33.9246, 4.8.1994, SMNS/NORDS; Silifke, Narlikuyu, 1 km in dir. Akkum, 36.4505 34.1199, 5.8.1994, SMNS/NORDS; rock crevices in Yemiskuma 7 km to W from Erdemli, 36.4927 34.1816, 9.8.1984, MENK(11); SMF 9645 Tetemtere Cilicia; ditto, SMF 22691/2 Tenemtere (sic!); SMF 299405/2 ditto. Niğde Ili: Çamardı, Ala Dagları, Çukurbağ, Pınarbaşı, limestone rocks, 1700 m alt., 38.011 35.1472, 30.05.2007, leg. C. Huber, NMBE 24876/4; rocks 46 km SW of Niğde, 37.6238 34.5332, 1600 m alt., 18.7.1986, MENK (17). Adana Ili: Mersin, Gözne, S Kale, 36.9984 34.5726, 1060 m alt., 3.8.1994, SMNS/NORDS; Mersin, Gözne, at Kale, 3.8.1994, XF 39 SMNS/NORDS; Karaman, Taskale, 1 km in dir. Yesildere, 37.1526 33.5508, 26.7.1994, SMNS/NORDS; Pozanti, 4 km in dir. Çiftehan (Ak Köprü), 37.4677 34.8682, 26.7.1994, SMNS/NORDS; Pozanti, 70 km N Tarsus along E 5, 2300 m alt., XG 64, 8.1984, MENK (11); Pozanti, Gülek Bogazi at Tekir, 37.3785 34.8088, 27.7.1994, SMNS/NORDS; at the road Pozanti to Niğde, ca. 6 km N of Pozanti, 37.4906 34.8434,; rocks 6.5 km N of Pozanti, 700 m alt., 37.4790 34.8555, 23.12.1990, MENK (5); rocks at Yilankale 6 km SW of Ceyhan, 37.0111 35.7480, 25.12.1990, MENK (2); rocks at Tumlu Kalesi 12 km NW of Mercimek, 37.1473 35.7044, 50 m alt., 24.12.1990, MENK (4); ditto, 13.10.2001, SMF 280621/3 alk.; ditto, 15.4.1997, NMBE 525601/5, Hemm (alk.1); rocky slope W of Kozan, 37.4550 35.7784, 160 m alt., 27.7.1988 MENK (8); rocks 2.9 km N Kozan, 37.4678 35.7986, 450 m alt., 24.12.1990, MENK (28); rocks 8 km SW of Kozan, 37.3816 35.7704, 85 m alt., 27.7.1988, MENK (2); vegetation at Toprakkale, 37.0508 36.1356, 26.12.1990, MENK (7); 22 km from Tarsus to Pozanti N Tarsus, 37.0965 34.9094, 14.4.1997, NMBE 525614/7, NMBE 525628/1 (alk.); Taurus mountains close to Pozanti, 37.4013 34.8718, 18.08.1964, leg. Probst, RÄH (1); Gülek Bogazi, 37.3265 34.7911, 14.4.1997, NMBE 525600/1, NMBE 525627/1 (alk.); ditto, 22.10.2001, HEMM (2 alk.); 11 km from Gülek to Pozanti, 37.3996 34.8620, 14.4.1997, NMBE 525608/2; castle of Kozan, 37.4438 35.8104, 15.5.1991, NMBE 512918/3; ditto, 15.4.1997, NMBE 525595/3, NMBE 525594/2 (alk.); ruins of Hierapolis and Castabala, 37.11 36.11, 23.7.1986, NMBE 512927/9; road Adana to Kozan, 25 km S Imamoğlu, 37.089 35.491, 220 m alt., 14.5.1991, NMBE 512917/1; Ceyhan, Anavarza at Aysehoca, 37.2635 35.8501, 2.8.1994, SMNS/NORDS. Hatay Ili: Iskenderun, quarry above the city, 36.5741 36.2122, 16.4.1997, NMBE 525625/2 (alk.); Alexandrette (= Iskenderun), 36.5816 36.1680, SMF 22664/2; ditto, SMF 22684, ex Löbbecke; SMF 214885, mountains around Alexandrette; SMF 299458, between Alexandrette and Beilan, 36.5181 36.1628; SMF 299550/2 Antakia, cascades four hours S of Antakia (= Harbyie!), 36.1451 36.1415, coll. C. Bosch ex Rolle; Iskenderun, right of big quarry, 36.5827 36.2062, 14.10.2001, HEMM (3 alk.); Payas (= Yakacik), 5 km in dir. Hassa, 30.7.1994, 36.8351 36.3476, SMNS/NORDS; Antakya, St. Pierre Kilesi, 36.2091 36.1784, 31.7.1994, SMNS/NORDS; Harbiye in direction to Döver, slope at the road, 36.1201 36.1342, 06.04.1987, LIEB (2).

Syria, Lebanon: SMF 9736 Libanon; ditto, SMF 22672; ditto, SMF 22680; ditto, SMF 299444/4; ditto, SMF 299452; SMF 78207/3 E Lebanon; SMF Lattaquiah, 35.5259 35.7932, SMF 78208/2; SMF 2267/7 Beyrut; SMF 299455 Syrien.

Doubtful localites: SMF 74134/2 Ephesus (?) or Priene, coll. K.L. Pfeiffer ex Schickfuss.

Unidentified localites: SMF 22662/2 Hadjime, Cilicia; SMF 9646 Julet Kabas; SMF 9647 ditto; SMF 22753 Bulgar Maaden; SMF 74241/2 Tschengen-Köi.

Erroneous localities: SMF 22687 Orfa.

Unspecific localities: SMF 22665 Taurus; SMF 22668 ditto; SMF 22675 ditto; SMF 74213 "Taurus"; NMBE 18477; SMF 9937 "Cilicia"; SMF 299454/2 Caria; Lycia, SMF 22755/3; ditto, SMF 299406.

Diagnosis: shell medium sized to very large, thin to very thick, globular to slightly conical, upper three spirals fused to a large brown band, protoconch relatively small, aperture rounded, small, labial callus strong, cream coloured, columellar triangle reinforced, epiphallus shorter than penis, animal colour brick-red.

Description: shell of medium size to very large, thin to considerably thickened, globular or spire slightly conical; basic shell colour greyish white with chestnut brown spirals, usually spirals Nos. 2 and 3 fused, sometimes even fused with No. 1, the subperipheral spirals always separate; protoconch small in comparison to shell, its diameter ranging from 4.5–6 mm, smooth, white whorls; teleoconch of 3–4 whorls, smooth, with medium sized axial riblets; last whorl only slightly descending below the periphery; aperture subquadrate to rounded, rather small if compared to the overall shell size, apertural rim narrow, labial callus strong, cream coloured, columellar triangle large and reinforced, columella straight to slightly oblique; umbilicus closed in adult shells; animal colour brick-red to grey.

Genital organs (Figs 128–130): penis club-shaped, epiphallus shorter than penis or reaching the same length; flagellum long, exceeding the length of epiphallus+penis three times; mrp attaching in a proximal position on the epiphallus; internally, pp1 shorter than pp2, penial chamber long, filled with numerous elongate folds, both papillae conical with a central perforation; atrial stimulator a rounded knob, sometimes connecting to a well developed fold; female system with a very short vaginal tube, dart sac and glandulae mucosae strongly developed, the glandulae with a basic stem, multi-branched, longer than dart sac; pedunculus stem long, with a thick and elongate diverticulum, reaching or surmounting bursa copulatrix, stem of bursa copulatrix shorter than pedunculus stem, vesicle rounded and bent downwards.

Distribution (Fig. 131): This species is recorded from the eastern Aegean Islands to Lebanon and Syria. Reliable records end in Lattaquiah, Northern Syria, the records from Lebanon, Beirut, Palestine (*moabitica* etc.) could not be corroborated by recent collections. These records are probably based on misidentifications, historical mislabelling, or unintentional introductions, which did not result in stable populations (e.g. *nilotica*).

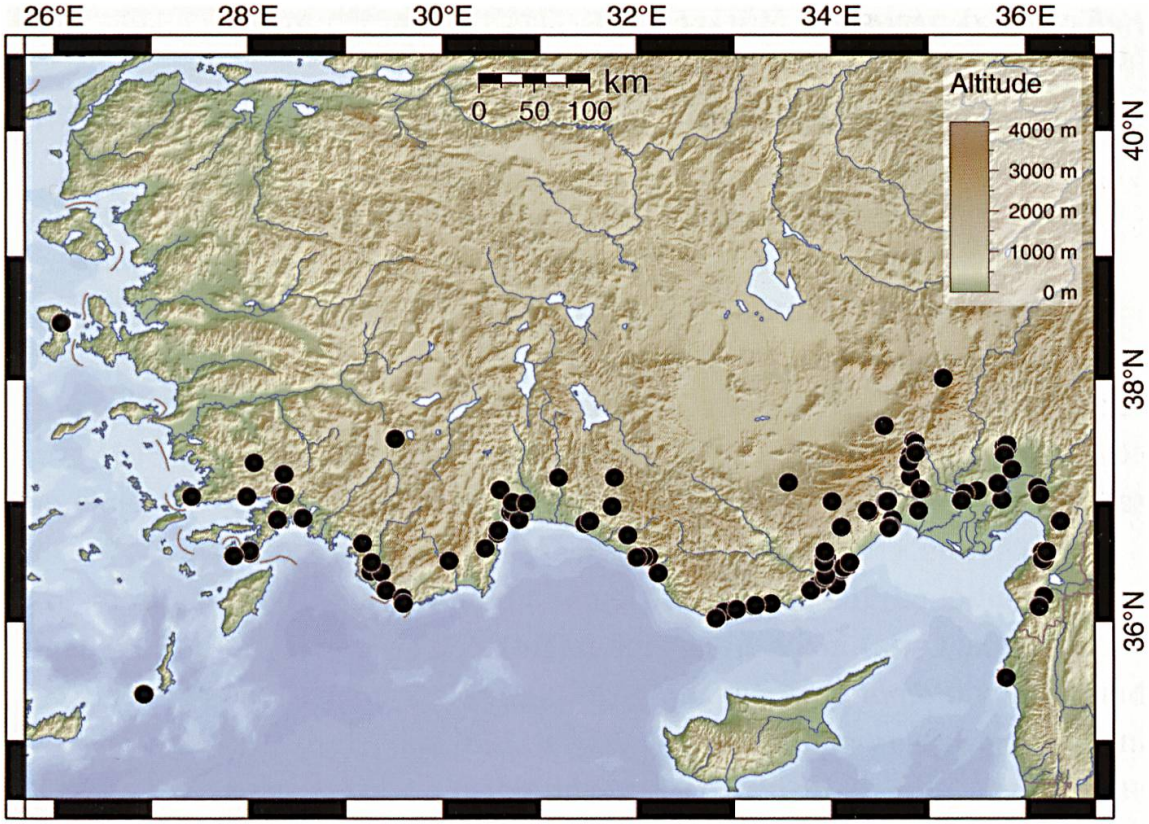


Fig. 131. *Helix* (*Helix*) *asemnis* Bourguignat, 1860. Distribution.

Remarks: *Helix asemnis* is an extremely variable species. Shells from arid and low level areas tend to be very thick, and the columella can be strongly reinforced by a callus (e.g. *adanensis*). Quite often, the larger and thinner shells originate from higher mountain regions (e.g. *blumi, pericalla*).

This species very often occurs sympatrically with *H. nucula*, both species having a white lip. *Helix asemnis* differs from this species by its usually larger size, the single brown spiral band on the upper whorl, and the smooth shell (usually with a reticulate pattern in *H. nucula*). In their genital anatomy, the two species differ by the short epiphallus in *H. asemnis*, while *H. nucula* has a very long epiphallus.

***Helix* (*Helix*) *cincta* O. F. MÜLLER, 1758** (Figs 132–147)

1774 *Helix cincta* O. F. MÜLLER, Vermium terrestrium et fluviatilium II: 58 [no type locality given].

1838 *Helix lemniscata* BRUMATI, Catalogo sistematico delle conchiglie, Monfalcone: 22 [non *Helix lemniscata* LESSON, 1831 nec *Helix lemniscata* WEBB & BERTHELOT, 1833].

1849 *Helix Pollinii* DA CAMPO, Memorie dell'Accademia d'Agricoltura, Commercio ed Arti di Verona 23:113 [not seen].

1876 *Helix giuliae* BOURGUIGNAT, Species novissimae molluscorum: 56 [Malta].

1891 *Helix* (*Pomatia*) *cincta* var. *anatolica* KOBELT, Iconographie der Land- und Süsswassermollusken 2 (5): 26, Taf.128, Fig. 767–769 [no type locality mentioned; the specimens figured in No. 767 and 768 come from "Hieronda, Caria" in SW Turkey (cf. ZILCH 1952)].

1891 *Helix* (*Pomatia*) *cincta* var. *cyprica* KOBELT, Iconographie der Land- und Süsswassermollusken 2 (5): 26, Taf. 128, Fig. 770 [Cyprus].

1893 *Helix* (*Pomatia*) *cincta* var. *trojana* KOBELT, Iconographie der Land- und Süsswassermollusken 2 (6): 55, Taf. 164, Fig 1048 [Troja].

1895 *Helix* (*Pomatia*) *stenarochila* KOBELT, Iconographie der Land- und Süsswassermollusken, Suppl. 1: 44, Taf. 16, Fig. 2, 4 [Zypern].

1895 *Helix* (*Pomatia*) *trixenostoma* KOBELT, Iconographie der Land- und Süsswassermollusken, Suppl. 1:45, Taf. 16, Fig. 5 [auf Zypern].

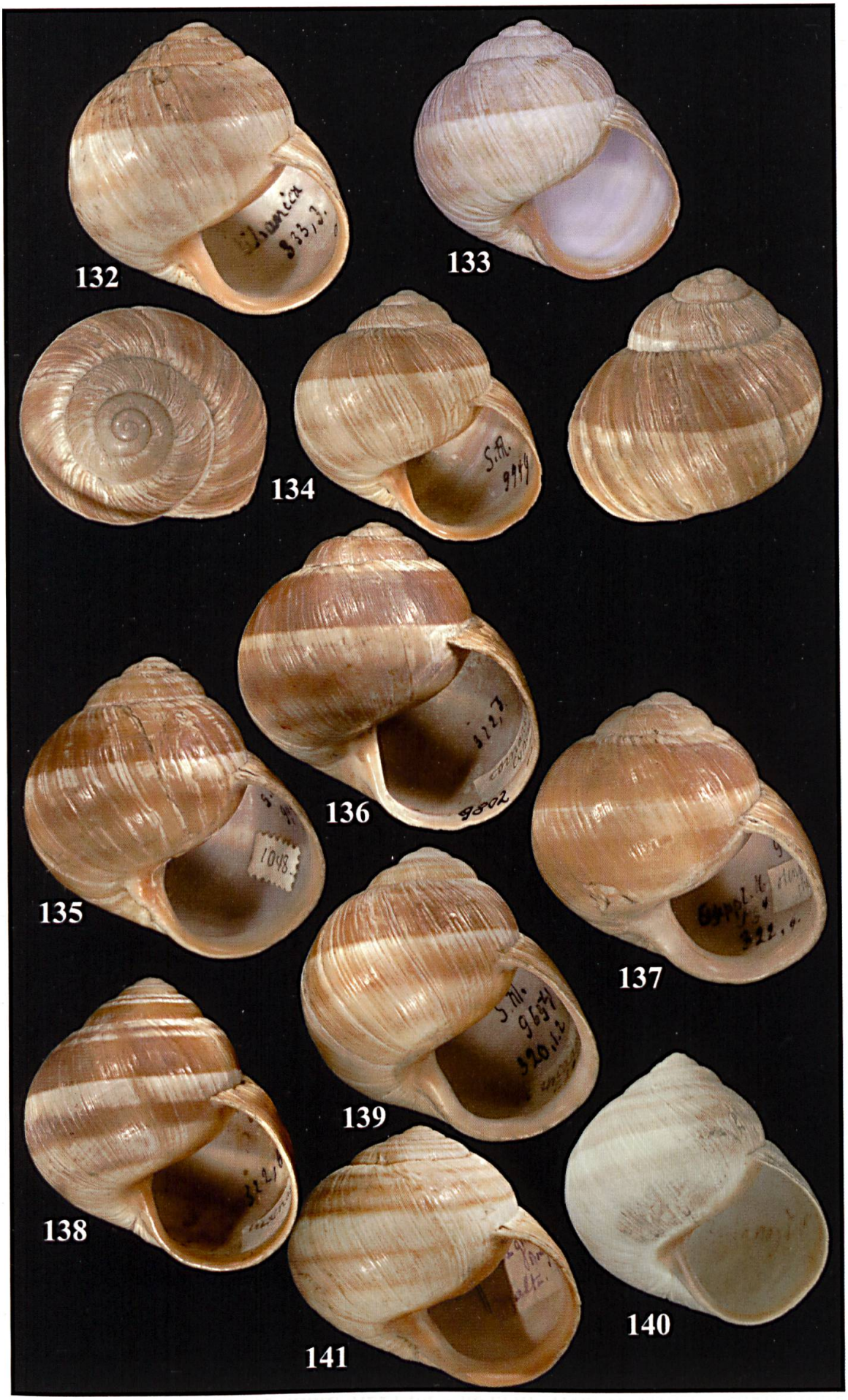
1895 *Helix* (*Pomatia*) *cornarae* KOBELT, Iconographie der Land- und Süsswassermollusken, Suppl. 1: 46, Taf. 17, Fig. 1, 2 [auf Zypern].

1895 *Helix* (*Pomatia*) *pediaea* KOBELT, Iconographie der Land- und Süsswassermollusken, Suppl. 1: 47, Taf. 17, Fig 3, 4 [auf Zypern, namentlich in der Fruchtebene des Pediaeos].

1895 *Helix* (*Pomatia*) *epidaphne* KOBELT, Iconographie der Land- und Süsswassermollusken, Suppl. 1: 52, Taf. 21, Fig. 2–5 [Antiochia (Epidaphnes in the ancient times), today Antakia].

1903 *Helix* (*Helicogena*) *cincta libanica* KOBELT, Systematisches Conchylien-Cabinet VI: 115, Taf. 333, Fig. 3–7 [Libanon].

Figs 132–141. *Helix* (*Helix*) *cincta* O. F. MÜLLER, 1758. Fig. 132 holotype *libanica* SMF 9715, "Libanon", D = 39.4; Fig. 133 NMBE 512950, Croatia, Mali Losinj, D = 37.4; Fig. 134 syntype *anatolica* SMF 9949, "Hieronda, Caria", D = 34.9; Fig. 135 lectotype *trojana* SMF 9946, Troja, D = 42.6; Fig. 136 lectotype *cornarae* SMF 9802, Zypern, D = 42.8; Fig. 137 lectotype *stenarochila* SMF 9641, Zypern, D = 41.7; Fig. 138 lectotype *trixenostoma* SMF 9794, Zypern, D = 38.6; Fig. 139 lectotype *epidaphne* SMF 9654, Antakia, D = 41.8; Fig. 140 syntype *castanostoma* MNHN, Tripoli (Lebanon), D = 36.6; Fig. 141 syntype *giuliae* MHNG 18144, Malta, D = 41.2. — All photos Neubert, original size.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1906 *Helix* (*Helicogena*) *cincta* var. *elegans* KOBELT, Systematisches Conchylien-Cabinet VI: 270, Taf. 368, Fig. 7, 8 [Crkvenica].

1921 *Helix* (*Helicogena*) *castanostoma* GERMAIN, Mollusques terrestres et fluviatiles de Syrie I: 130, Fig. 7, 8 [Tripoli de Syrie].

1921 *Helix* (*Helicogena*) *pachya* var. *incrassata* PALLARY in Germain: Mollusques terrestres et fluviatiles de Syrie I: pl. 11, fih. 13 (nomen nudum).

1928 *Helix cincta melanotica* RENSCH, Zoologischer Anzeiger 78: 2, Fig. 1 [Istrien, Rovigno, La Figarola Grande].

Type specimens:

anatolica: syntype SMF 9949: H = 36.7; D = 34.9; PH = 24.7; PD = 17.9; PrD = 4.8; W = 5.25. *giuliae*: syntype MHNG 18144: H = 36.9; D = 41.2; PH = 22.2; PD = 26.6; PrD = 4.5; W = 5.75. *stenarochila*: lectotype SMF 9641 (SD Zilch 1952: 151): H = 42.1; D = 41.7; PH = 29.8; PD = 20.2; PrD = 4.3; W = 5.5. *trixenostoma*: lectotype SMF 9794 (SD Zilch 1952: 151): H = 41.2; D = 38.6; PH = 27; PD = 18.8; PrD = 4.65; W = 5.5. *cornarae*: lectotype SMF 9802 (SD Zilch 1952: 151): H = 43.6; D = 42.8; PH = 30.3; PD = 21; PrD = 4.1; W = 5.5. *epidaphne*: lectotype SMF 9654 (SD Zilch 1952: 154): H = 42.4; D = 41.8; PH = 30.8; PD = 21.4; PrD = 5.4; W = 5. *libanica*: holotype SMF 9715 (Zilch 1952: 152): H = 43.1; D = 39.4; PH = 28.2; PD = 29; PrD = 4.3; W = 5.5. *castanostoma*: syntype(s) MNHN-IM-2000-27766, coll. Germain (ex Férussac?): H = 40.4; D = 36.6; PH = 26.9; PD = 18.5; PrD = 3.5; W = 5.5. *trojana*: lectotype SMF 9946 (SD Zilch 1952: 151), H = 44.1, D = 42.6, PH = 26.2, PD = 26.7.

Specimens examined:

Italy: Castle of Arco, Rovereto, Lombardia, 45.922 10.8853, 150 m alt., 30.4.1997, NMBE 513052/3; Desenzano del Garda/Brescia/Lombardia, 45.47 10.53, 1847, NMBE 22823/6; ditto, NMBE 22825/3; ditto NMBE 22824/4; Lake Garda, Tremosine, above Pieve to Mezzama, 45.7687 10.5737, 510 m alt., 15.5.1994, NMBE 513041/4; Milano, Lombardia, 45.5 9.5, NMBE 22827/2; Riva del Garda, Trento, 45.88 10.83, 4.1997, NMBE 505535/2; ditto, 1847, NMBE 22826/4; Verona, Veneto, 45.45 10.9937, NMBE 18485/8.

Croatia: Island Pag (= Isola di Pago), 44.45 15.0527, 7.1985, NMBE 22830/4; Mali Losinj, Istria, 44.53 14.4731, 8.1980, NMBE 512950/10; Obrovac, Velebit, 44.2 15.68, 200 m alt., NMBE 513042/5; Supetarska Draga, island Rab, 44.8121 14.7165, 20 m alt., 25.7.2002, NMBE 522628/20; Vransko Jezero N Pakostane, 43.9407 15.51925, 9.1985, NMBE 513040/2; Zadar, 44.12 15.24, NMBE 18484/2; Pag road between Novalja and Pag, 8.1978, NMBE 524289/1; Pag, SE of Dinjiska, 44.3563 15.1923, 12.6.1970, NMBE 524288/6; Paklenica National Park, Starigrad, 44.3002 15.4699, 17.6.1970, NMBE 524287/1; Rab, Supetarska Draga, 44.8121 14.7165, 20 m alt., 25.7.2002, NMBE 522628/20; Karlobag, 44.5258 15.0785, 20 m alt., 30.7.2002, NMBE 523336/2.

Greece, Dodekanes: Tilos: Tilos, 36.4230 27.3733, 25.05.1996, LIEB (6). Leros: Alinda in direction to Platamos, 37.1609 26.8257, 04.07.1997, LIEB (4). Lipsi: Lipsi, 37.2953 26.7685, 25.–30.06.1997, LIEB (36). Lesbos: Skala Eresos, Lesbos, 39.15 25.9, 17.1996, NMBE 22836/1.

Cyprus: Cape Andreas, Karpas Peninsula, 35.7 34.5823, 7.1977, NMBE 18483/2; Kato Pyrgos, 35.1817 32.6851, 10 m alt., 3.3.1990, NMBE 512592/1; Limassol, 34.68

33.03, NMBE 18488/3; ditto, NMBE 18487/3; Petra tou Romiou ca. 30 km W Limassol, 34.664 32.62724, 24.2.1990, NMBE 512591/1; on the road from Dipkarpes in direction to Yeni Erenköy, 35.5734 34.2932, 01.01.1986, LIEB (24); Larnaca, on the market, 24.10.1981, LIEB (5); on the road from Kourion in direction to Episkopi, 34.6794 32.7155, 14.10.1981, LIEB (1); Famagusta, Rizokarpaso, 35.5972 34.3792, 5.1984, BANK/6.

Turkey: Izmir: Selçuk, in rock crevices 20 km N Selçuk, 38.0933 27.4061, 28.7.1984, MENK (4); Didim, in rock crevices 1 km S of Akköy at Didim, 37.4845 27.2604, 29.7.1984, MENK (2); Izmir (= Smyrna), 38.41 27.15, 1846, NMBE 22837/3, ditto 1846 NMBE 22838/2, ditto NMBE 18489/3, ditto NMBE 18486/2; rock crevices on Kazikbeli Geçidi 20 km SE Denizli, 8.1984, 37.6308 29.2168, MENK (17); Valley of the Kücükmenderes, rocks close the road 12 km W Tire, 38.13 27.64, 11.6.1998, NMBE 512585/10; Çesme, 10 km S Mordogan, 38.4656 26.5504, 50 m alt., 15.6.1998, NMBE 512586/1; Çesme, 5 km W Abzweig Balikliova nach Çesme, 38.44 26.54, 170 m alt., 15.6.1998, NMBE 512587/1; Muğla: on the road approx. 20 km S of Denizli, 37.66 29.23, 16.4.1993, NMBE 505487/1 (alk.), ditto NMBE 512580/6; Ören, steep rocky slope 2 km before Ören close Keramos, 37.0314 27.8966, 10 m alt., 8.6.1998, NMBE 512583/4; Ören, 3 km NE Ören in direction Altikaya to Kiranköy, 37.058 27.986, 50 m alt., 8.6.1998, NMBE 512584/10; Ören, 2 km E Maziköy in direction to Ören, 37.0271 27.7564, 370 m alt., 8.6.1998, NMBE 512582/1; Milas, 37.3158 27.7797, 9.10.1997, LIEB; Denizli, 3 km E of Çubukdağı, 40 km NW Denizli, 37.9523 28.7782, 30.7.1984, MENK (30); Pamukkale, amphitheater, 37.927 29.13, 399 m alt., 30.7.1980, MENK (19), ditto 17.4.1993, NMBE 512581/2; Pamukkale, 02.10.1997, LIEB (19); Pamukkale, leg. Probst, 28.08.1964, RÄH (2); Pamukkale, Aphrodisias close to Geyre, 37.7093 28.7234, 520 m alt., 5.5.1992, NMBE 512588/1; Pamukkale, ruins of Hierapolis, 37.9206 29.1262, 330 m alt., 2.10.1997, LIEB, NMBE 503514/4, ditto 5.5.1992 NMBE 512589/17; Inlice, rock grave, 36.7482 28.9987, 07.10.1996, LIEB (6); Dalaman to Fethyie, Göcek, 36.7568 28.9445, 30.09.1996, LIEB (5); Köycegiz, rocks at the bath of Sultaniye, 36.873 28.601, 29.4.1991, NMBE 520392/1 (alk.), ditto NMBE 512579/2; Basin of Köycegiz, Ekincik, 36.83 28.559, 26.4.1991, NMBE 519951/1; Edremit, Altın Oluk (Balikesir), on the road to Sahindere, 39.5824 26.7576, 10.6.1989, LIEB (6), ditto, olive platations, 22.09.2001, LIEB (2); excavations of Karain N Antalya (holocene), 37.0777 30.5708, RÄH (3); Priene, 37.6597 27.2977, 28.4.1992 Tannert, ex coll. Groh, NMBE 512590/1; Gökova, Akyaka, rockgrave approx. 1 km S Akyaka, 37.0555 28.3264, 29.10.1997, LIEB; Gökova, mountain slope N Akyaka, 37.0646 28.3279, 6.10.1997, LIEB; ruins of Stratonikeia close Yatagan, 37.3134 28.058, 7.10.1997, LIEB; Demre, 36.2203 29.9457, 7.6.1987, NMBE 524292/7; Finike, 36.304 30.1401, 50 m alt., 8.6.1987, NMBE 524291/5; Demre, ca. 2 Km NW of sea shore, 36.2377 29.9182, 60 m alt., 6.6.1987, NMBE 524290/3; Alanya, Dim valley, 5 Km from coastal road, 36.5419 32.1069, 50 m alt., 7.10.2001, NMBE 523335/4; Antiochia, 36.2029 36.1603, coll. Kobelt ex Rolle (paralectotype *epidaphne*), SMF 9655, SMF 9942/2; ditto, coll. O. v. Moellendorff (paralectotypes *epidaphne*), SMF 9943/2; ditto, coll. C.R. Boettger (paralectotypes *epidaphne*?), SMF 74152/2; Tell am Orontes above Antakya, 20.9.1982 leg. Kinzelbach, NMBE 520414/2; Hatay (= Antakya = Antiochia)/Hatay, 36.2 36.16, 20.9.1982, NMBE 520414/7.

Syria: Ruins of Qalaat al-Mudiq (Apameia), 35.4154 36.3938, 04.04.1996, leg. Rähle, RÄH (1); Orontes, mountains of the Alawits, 05.10.1089, Röttger leg., RÄH (1); Latakieh (=Lattaquié), 35.5 35.7723, 3.2007, NMBE 517757/1.

Lebanon: Sable de Beyrouth (specimen figured by Germain 1921: pl. XI, fig. 13 ex Pallary), MNHN (1).

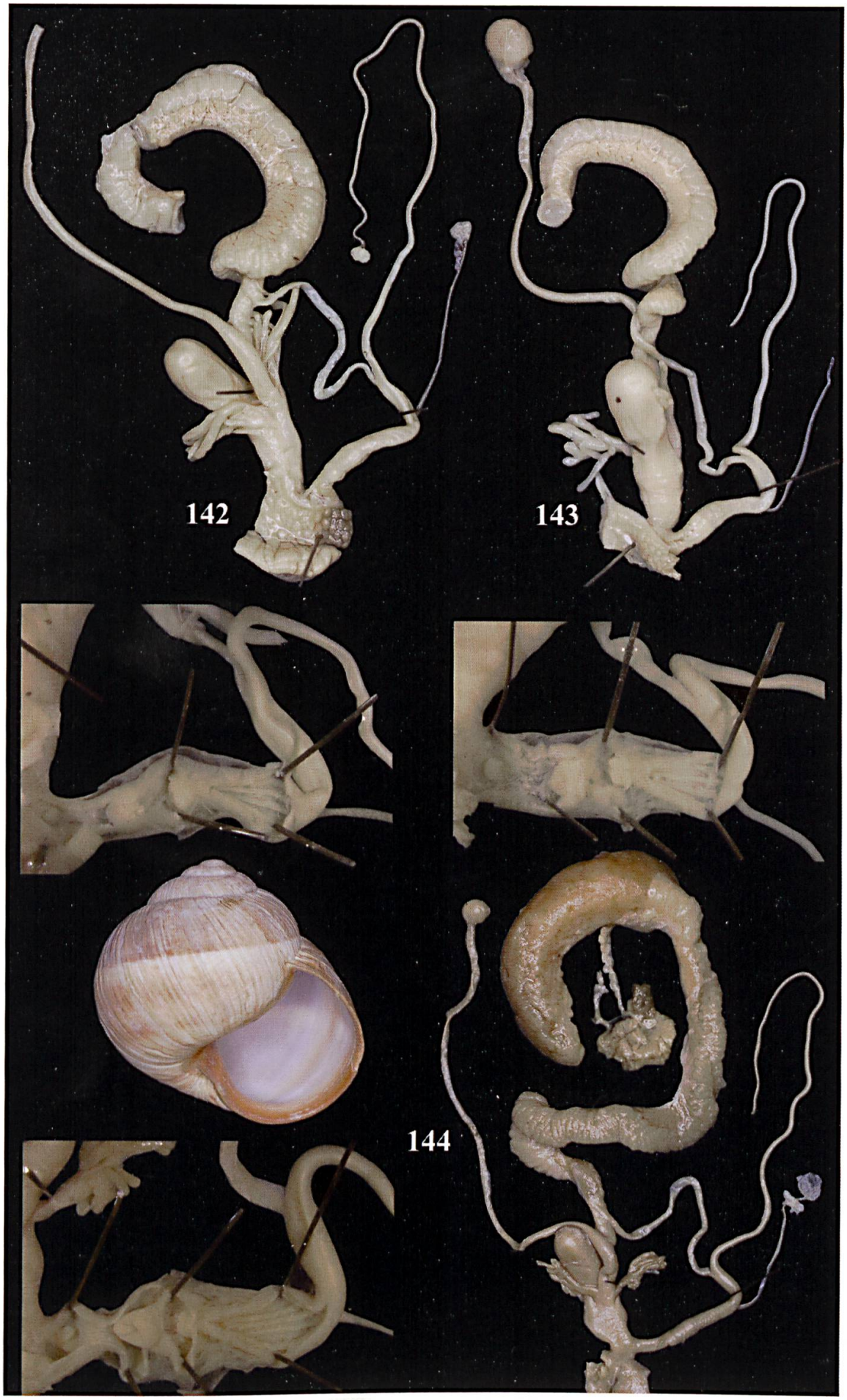
Diagnosis: shell of medium size, thick, protoconch small, spiral bands Nos. 1 to 3 usually fused, columellar side of aperture relatively straight, aperture reddish-brown coloured, umbilicus closed; flagellum extremely long, pedunculus stem long, usually without diverticulum.

Description: shell of medium size, thick, spherical, with the spire high conical; basic shell colour greyish white with chestnut brown spirals with spiral bands Nos. 1 to 3 usually fused to a large brown subsutural area, or band No. 1 a separated small brown band, periphery white to greyish, spiral bands Nos. 4 and 5 usually separate, often indistinct; protoconch small in comparison to shell, its diameter ranging from 3.5–5 mm, smooth, white whorls; teleoconch of 3–4 whorls, teleoconch surface usually smooth, seldom with some patches of granulation, often with axial riblets; last whorl only slightly descending below the periphery; aperture subquadrate to rounded, apertural rim moderately broad, labial callus weak, reddish-brown coloured, columellar triangle small; columellar side of aperture relatively straight if compared to other black-mouthed species; umbilicus closed in adult shells.

Genital organs (Figs 142–144, 145–146): penis club-shaped, epiphallus as long as penis; flagellum extremely long, exceeding the length of epiphallus+ penis at least fourfold; mrp attaching in a central position on the epiphallus; internally, both papillae of equal size, penial chamber long, filled with a few small elongate folds, both papillae conical with a central perforation; atrial stimulator a rounded knob; female system with a short vaginal tube, dart sac large, glandulae mucosae weakly developed, with a short basic stem and a few short digitiform tubules, seldom exceeding dart sac in length; pedunculus stem long, usually without diverticulum, bursa copulatrix vesicle rounded and bent downwards.

Distribution (Fig. 147): This species has two separate distribution ranges. On the one hand, it is known from Lombardy in Italy and the northern Dalmatian coast. The second distribution range covers some islands in the eastern Aegean Sea and the southwestern part of Turkey. It also lives on Cyprus, the Hatay area in Turkey where it connects to Syria and probably Lebanon. It does not live in central and southern Lebanon.

Figs 142–144. *Helix* (*Helix*) *cincta* O. F. Müller, 1758. Genital organs. Fig. 142, NMBE 505535, Italy, Riva del Garda, situs 34.81; Fig. 143, ditto, situs 38.55; Fig. 144, NMBE 512950, Croatia, Mali Losinj, situs 52.58. — All photos Neubert.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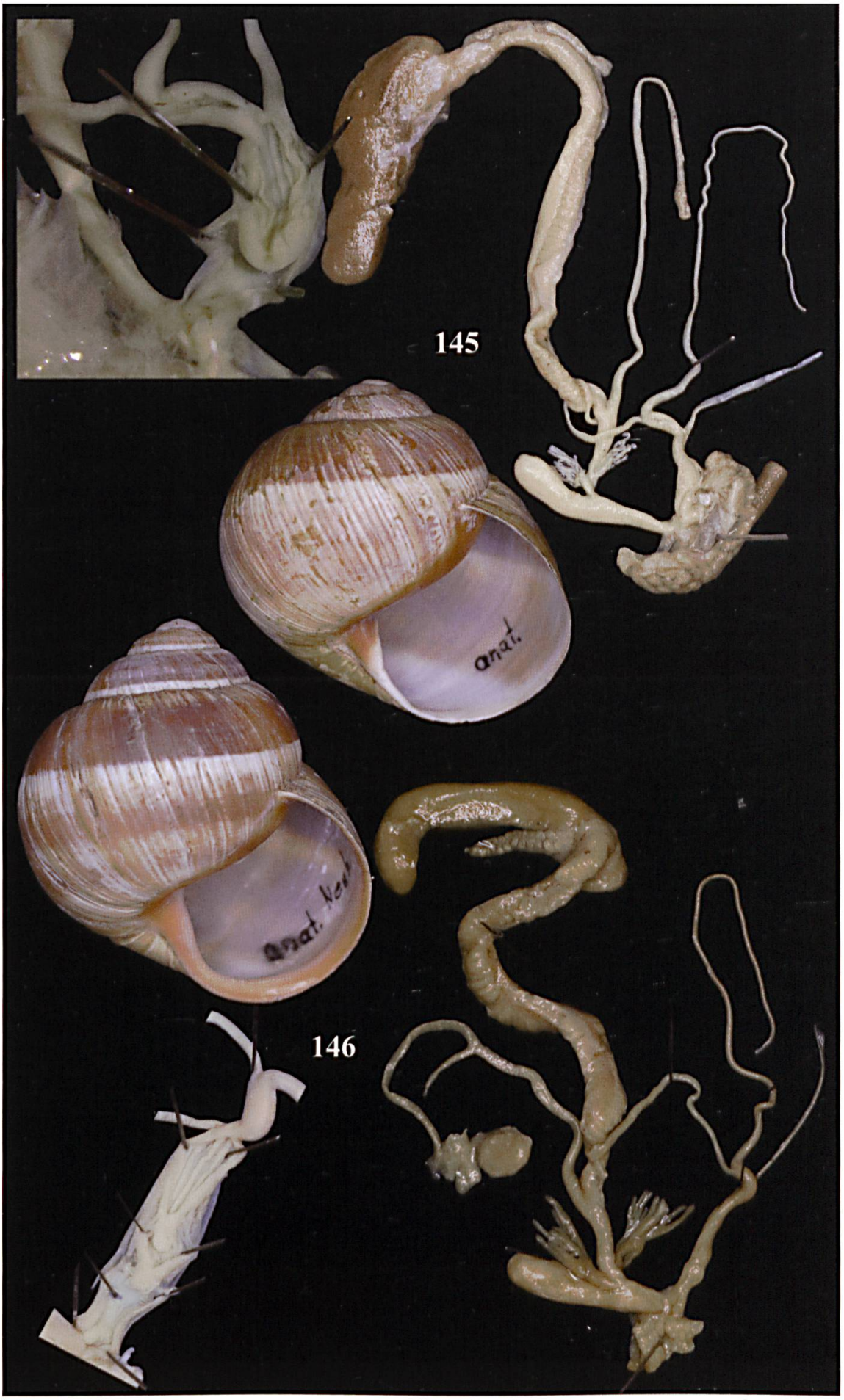
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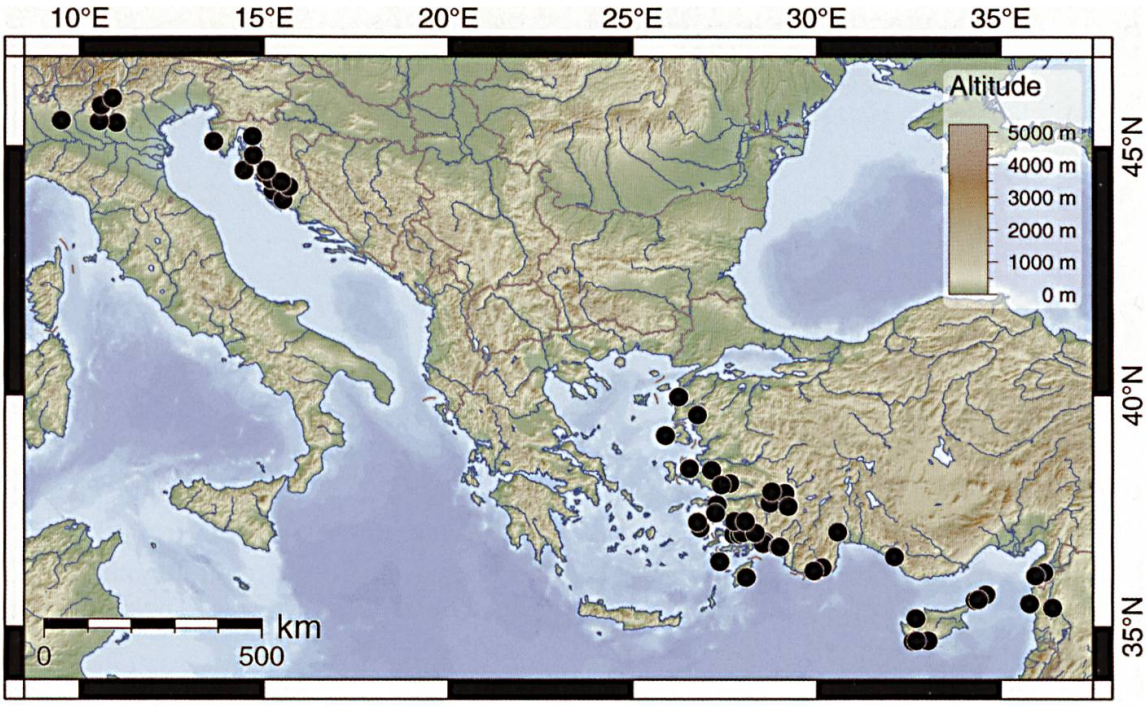


Fig. 147. *Helix* (*Helix*) *cincta* O. F. Müller, 1758. Distribution.

Remarks: According to the genetic analysis (Korábek & al. submitted), the differences between the Italian and Dalmatian and the East Mediterranean populations are low, and they cannot be separated at species level. It is very likely that this disjunct distribution area is the result of human introduction of the species to Italy rather than a fragmented larger distribution. This hypothesis is also supported by the fact that part of the gap is inhabited by the conchologically similar *H. borealis*, which, however, differs in the structure of its genital organs (Fig. 162) as well as in the genetic analysis (Psonis & al. 2014; Korábek & al. submitted). Moreover, the *H. cincta* in Italy and Dalmatia is often found in the neighbourhood of ancient Roman settlements or heavily populated places, while in the East Mediterranean it is often found in remote places under natural conditions. It has been recorded from Malta (as *giuliae*), but has never been found back there (Giusti & al. 1995). This is probably an early confusion by Bourguignat himself or his shell provider; Malta is far beyond the distribution range of *H. cincta*.

For the relationship of this species to *H. antiochiensis*, *H. valentini* and *H. anctostoma* refer to these species.

Figs 145–146. *Helix* (*Helix*) *cincta* O. F. Müller, 1758. Genital organs. Fig. 145, NMBE 520392, Turkey; Köycegiz, Bath of Sultaniye, situs 31.08; Fig. 146, NMBE 505487, Turkey, 20 rkm S Denizli, situs 49.08. — All photos Neubert.

***Helix* (*Helix*) *valentini* Kobelt, 1891** (Figs 148–150)

1891 *Helix* (*Pomatia*) *valentini* Kobelt, Iconographie der Land- und Süsswassermollusken 2 (5): 27, Taf. 128, Fig. 772 [Kalymnos].

Type specimens:

valentini: holotype SMF 9749 (Zilch 1952: 146): H = 46.7; D = 40.9; PH = 30.1; PD = 20.4; PrD = 4.7; W = 5.5.

Specimens examined:

Greece, Dodekanes: Kos: Kos, 36.8300 27.1599, coll. Kobelt ex Valentin, SMF 9808; ditto, coll. O. v. Moellendorff, SMF 22690; ditto, coll. O. Boettger ex Valentin, SMF 17940/3; ditto, coll. C.R. Boettger, SMF 74317/3. Kalymnos: Kalymnos (from the market), 36.9851 26.9926, coll. K.L. Pfeiffer, SMF 74316/6; ditto, coll. Kaltenbach ex K.L. Pfeiffer, SMF 299265/2. Pserimos: Pserimos, 36.9416 27.1442, coll. K.L. Pfeiffer, SMF 74315/2.

Turkey: Makri (= Fethiye), 36.6467 29.1682, coll. Krüper SMF 74318/4+2; Fethyie, ruins of Tlos, 36.5529 29.4210, 28.09.1994, LIEB (4), ditto, NMBE 523337/1; Fethyie, Üzümlü (= Yesilüzümlü), 36.7347 29.2295, 03.10.1994, LIEB (4).

Not checked personally: Agia Kyriaki Islet, 36.5493 26.4046; Nera Islet, 36.9140 26.9395; Telendos Islet, 37.0091 26.9105 (all from Psonis & al. 2014).

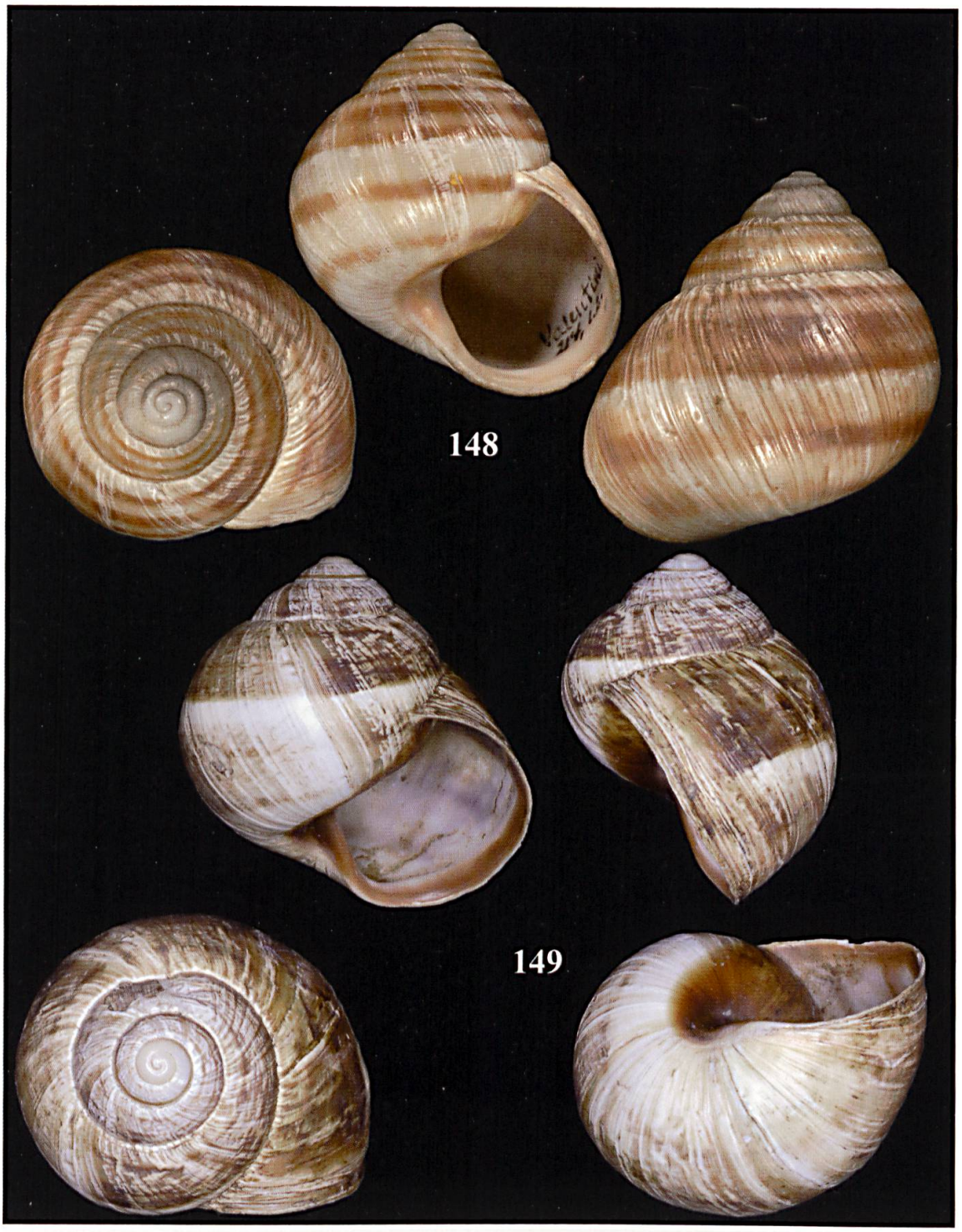
Diagnosis: shell large, thick, with a high conical spire, all five spiral bands separate, aperture subquadrate, light to dark brown coloured, umbilicus closed.

Description: shell large, thick, elongate spherical, with a high conical spire; basic shell colour greyish white with chestnut brown spirals, usually all five spiral bands separate, with a tendency of spiral No. 2 to fuse with No. 3; protoconch small in comparison to shell, its diameter about 5 mm, smooth, white whorls; teleoconch of 4 whorls sculptured by fine axial riblets; last whorl only slightly descending below the periphery; aperture subquadrate, apertural rim broad, labial callus moderately strong, cream to dark brown coloured, columellar triangle expanded; columella slightly oblique; umbilicus closed in adult shells.

Genital organs: No preserved specimens were available for an investigation of the genital organs.

Distribution (Fig. 150): This species is known from a small area in the Dodecanese islands around Kos and Kalymnos. It is not clear whether the Turkish populations are native or introduced. In the first case this could be an indication for a historically larger distribution pattern in the south-eastern Aegean, which is now restricted to two separated areas.

Remarks: The status of this taxon as a separate species may be debatable. According to Psonis & al. (2014), it clusters close to the *Helix cincta* clade.



Figs 148–149. *Helix* (*Helix*) *valentini* Kobelt, 1891. Fig. 148 holotype *valentini* SMF 9749, Kalymnos, D = 40.9; Fig. 149 NMBE 523337, Turkey, Tlos, D = 43.61. — All photos Neubert, original size.

Helix valentini differs from *H. cincta* by its larger shell with the pointed elongate spire and the almost complete separation of all spiral bands, but form and colouration of the aperture is close to *H. cincta*. This species is kept as a species in its own rights until the *H. cincta*-complex is better understood. It seems to be a species that is under pressure, because it cannot be found on the larger

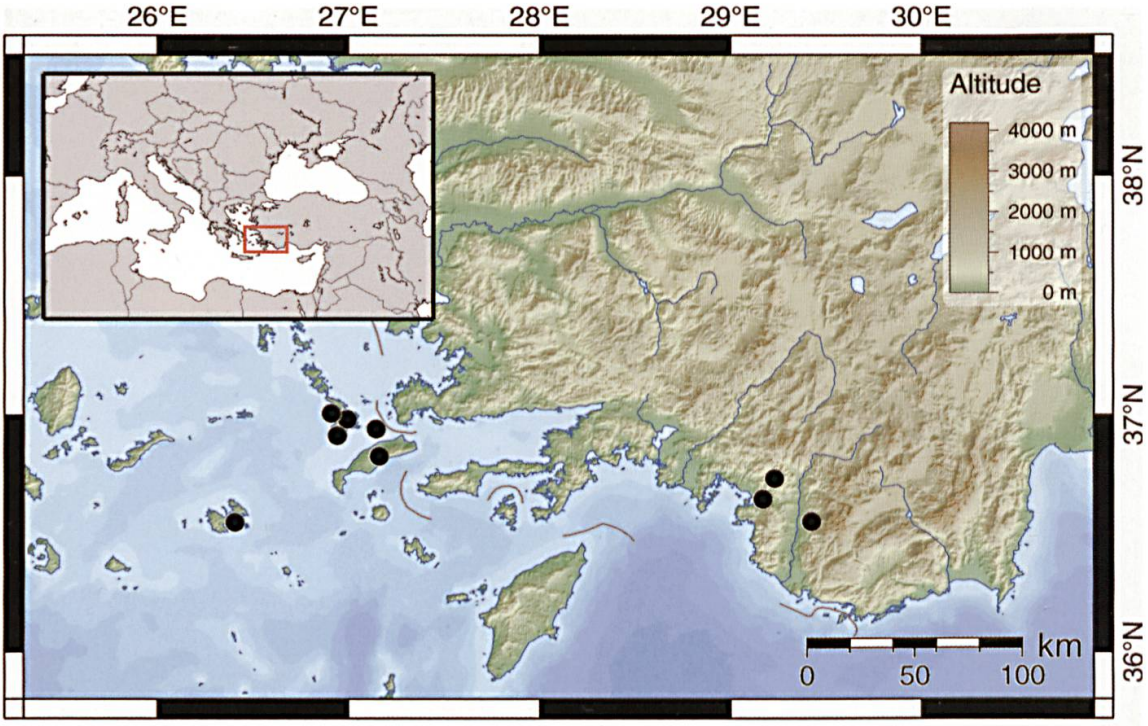


Fig. 150. *Helix* (*Helix*) *valentini* Kobelt, 1891. Distribution.

islands any more (Triantis, pers. comm. 2011). However, it might be that the smaller satellite islands with a reduced anthropogenic environmental stress may function as a reserve, where this species can survive.

Helix (*Helix*) *antiochiensis* Kobelt, 1895 (Figs 151–155)

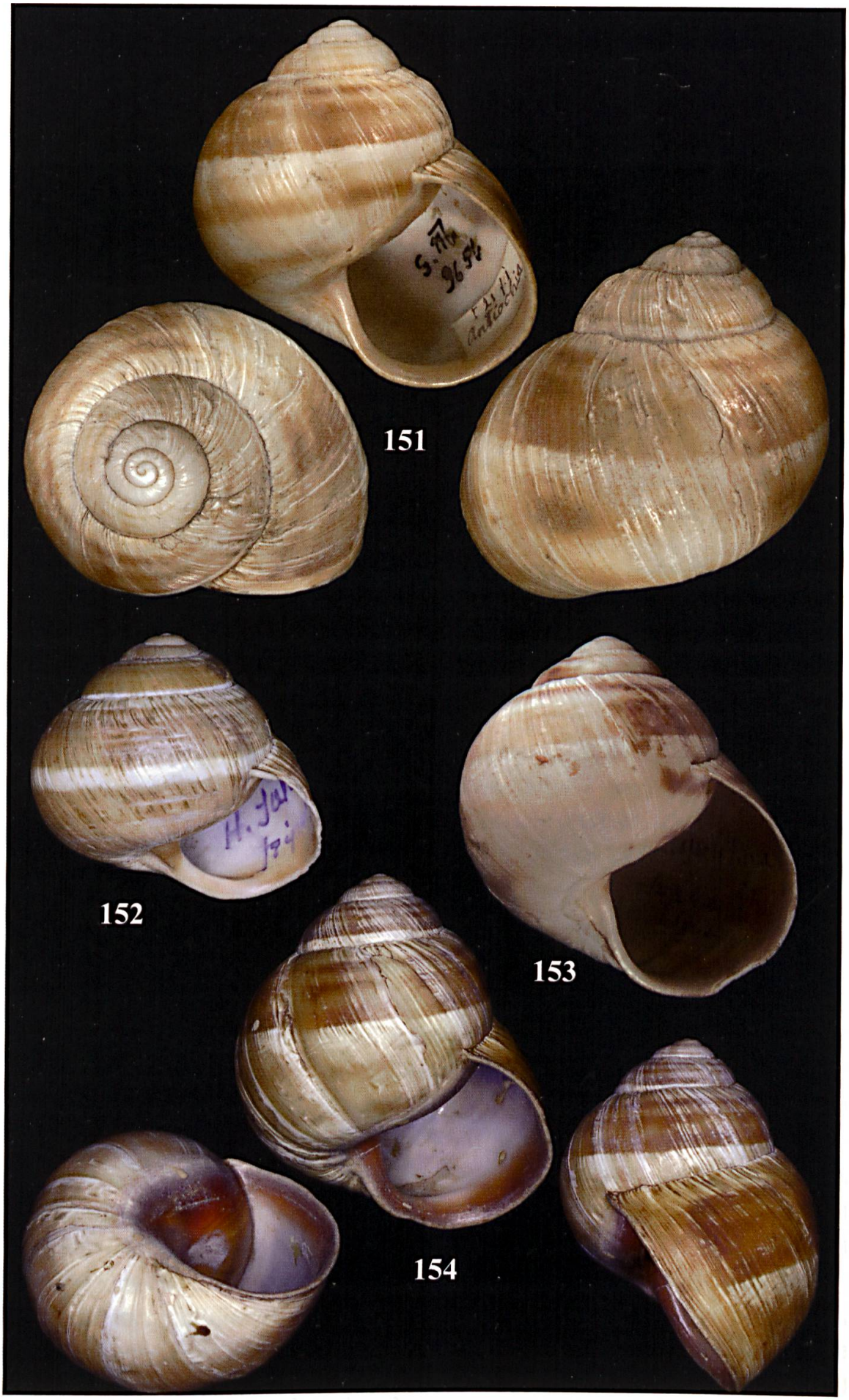
1895 *Helix* (*Pomatia*) *antiochiensis* Kobelt, Iconographie der Land- und Süsswassermollusken, Suppl. 1: 51, Taf. 21, Fig. 1, Taf. 22, Fig. 1, 2 [in der Umgebung von Antiochia (= Antakia)].

1895 *Helix salisi* Kobelt, Iconographie der Land- und Süsswassermollusken, Suppl. 1: Taf. 18, Fig. 1 [nomen nudum].

1905 *Helix* (*Helicogena*) *eduardi* Kobelt, Systematisches Conchylien-Cabinet VI: 205, Taf. 351, Fig. 1, 2 [Palästina, ... nicht allzuweit vom See Genezareth].

1905 *Helix salisi* Kobelt, Systematisches Conchylien-Cabinet VI: 225, Taf. 354, Fig. 1 [Nördliches Syrien; according to the label in MHNG: Tripoli de Syrie (= Trâblous)].

Figs 151–154. *Helix* (*Helix*) *antiochiensis* Kobelt, 1895. Fig. 151 holotype *antiochiensis*: SMF 9656, Antakia, D = 48.5; Fig. 152 holotype *salisi*, MHNG 18146, Tripolis de Syrie, D = 40.9; Fig. 153 syntype *tripolitana*: MNHN, Tripoli de Syrie, D = 47.3; Fig. 154 NMBE 520415, Qal'aat Salah ed-Din, D = 44.87. — All photos Neubert, original size.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1905 *Helix* (*Helicogena*) *berytensis* KOBELT, Systematisches Conchylien-Cabinet VI: 226, Taf. 354, Fig. 2 [Beirut].

1921 *Helix* (*Helicogena*) *tripolitana* GERMAIN, Mollusques terrestres et fluviatiles de Syrie I: 134, pl. 7, fig. 18 [Tripoli de Syrie ou il a été recueilli par le voyageur Olivier] [non *Helix* (*Helicogena*) *cavata tripolitana* KOBELT, 1904, nec WOOD, 1829].

Type specimens:

antiochiensis: holotype SMF 9656 (Zilch 1952: 149): H = 54.8; D = 48.5; PH = 37.1; PD = 24.2; PrD = 4.8; W = 5; SMF 9799 [= Iconographie der Land- und Süsswassermollusken, Suppl. 1, Taf. 22, Fig. 1–2] is a juvenile. *eduardi*: ZMB, ex coll. Paetel, not searched for. *berytensis*: ZMB, leg. Riebeck, not searched for. *tripolitana*: syntype(s) MNHN-IM-2000-27767, coll. Olivier: H = 52.7; D = 47.3; PH = 37.2; PD = 24.5; PrD = 5.2; W = 5. *salisi*: holotype MHNG 18146, H = 42.5, D = 40.9, PH = 28.9, PD = 22.5, PrD = 6.5, W = 5.5.

Specimens examined:

Turkey: SMF 9933, Antiochia, 36.2028 36.1602, coll. O. v. Moellendorff (paratypes?); ditto, SMF 74968/2, coll. Nägele; ditto, SMF 74406/2, coll. C.R. Boettger; ditto, SMF 299556, coll. Kaltenbach; Hatay, Kuruyer SE Antakya, 36.1863 36.1939, 17.4.1997, NMBE 525619/1; Antakya, St. Pierre Kilesi, 36.2091 36.1784, 3.1.1994, SMNS/NORDS; ditto, 31.7.1994; ditto, 29.12.1990, MENK (4); Samandağı, Çevlik (Titus Tüneli), 36.1204 35.9252, 1.8.1994 SMNS/NORDS; ditto 18.4.1997, NMBE 525620/3.

Syria: SMF 17639, Homs at the Orontes, coll. Nägele [doubtful].; SMF 22686 Syria, Kessab, 35.9283 35.9852, ex Mazek-Fialla; Qualaat Sahyn = Qal'aat Salah ed-Din (Castle of Saladin), 35.5958 36.0575, Nov. 1988, NMBE 520415/1.

Lebanon: Beino (cf. Thomé & Thomé 1987: 100) [not seen, doubtful].

Diagnosis: thick and large shell, high conical spire, aperture large, subquadrate, cream to deeply brown.

Description: shell of large size, thick, with a high conical spire; basic shell colour greyish white with chestnut brown spirals, with the upper three spirals slightly fusing on the body whorl; protoconch small in comparison to shell, its diameter ranging from 4.5–5.5 mm, smooth, white whorls; teleoconch of 4 whorls, smooth, with fine axial riblets alternating with a few stronger ribs; last whorl slightly descending below the periphery; aperture large, subquadrate, apertural rim broad, labial callus weak, cream to deeply brown coloured, columellar triangle small; umbilicus closed in adult shells.

Genital organs: There were no specimens for dissection available.

Distribution (Fig. 155): This taxon is one of the least known *Helix* species. So far, shells attributed to *H. antiochiensis* originate from Hatay and the connecting mountain chains in western Syria; there are no modern records for this species from Lebanon. In Beirut only *H. pachya* is known. However, it is

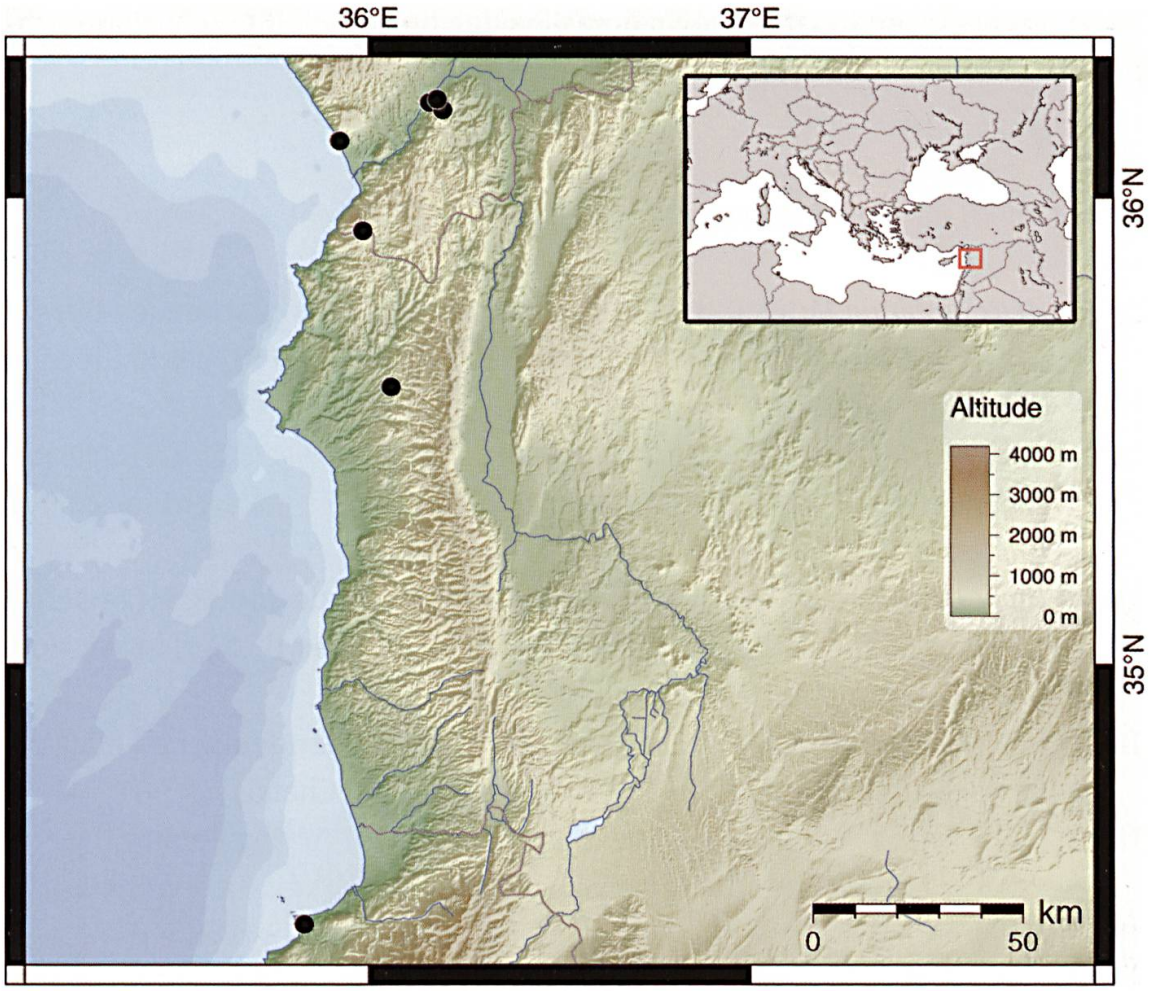


Fig. 155. *Helix* (*Helix*) *antiochiensis* Kobelt, 1895. Distribution.

possible that the species reaches the northernmost parts of the Lebanon Mts. The record from Lake Tiberias (*H. eduardi*) is surely a mislabelling, this species is not recorded from this quite well studied area.

Remarks: The status of *H. antiochiensis* as a species separate from the syntopic *H. cincta* is under debate. It differs from *H. cincta* by its much larger shells with an elongate spire. In parallel, typical *H. cincta* shells are known from the Hatay area. From a conchological point of view it is almost indistinguishable from *H. valentini*, and there is no similar form with such large shells with a high spire known in the distribution area of *H. cincta*. Synonymising *H. antiochiensis* with *H. valentini* would create a species with two disjunct distribution areas, which is not easy to explain. Korábek & al. (submitted) hypothesize that the two species *H. antiochiensis* and *H. valentini* are probably very young off-shoots from the *H.-cincta*-clade, which could explain their position in the mitochondrial trees.

Helix pachya differs from *H. antiochiensis*, which reaches similar shell sizes, by the purely white labial callus and the granulated teleoconch surface of the latter. *Helix lucorum* has a more globular shell, and usually has the upper and

lower spirals fused to large brown areas leaving only a small purely white subperipheral zone in the centre of the shell.

***Helix* (*Helix*) *borealis* Mousson, 1859** (Figs 156–163)

1859 *Helix ambigua* Mousson, Vierteljahrsschrift der naturforschenden Gesellschaft in Zürich 4: 15 [non *Helix ambigua* Linnaeus, 1758] [De la Grèce et de la Thessalie].

1859 *Helix ambigua* var. *borealis* Mousson, Vierteljahrsschrift der naturforschenden Gesellschaft in Zürich 4: 16 [Corfou, dans les broussailles des rochers de la citadelle].

1860 *Helix cyrtolena* Bourguignat, Revue et Magasin de Zoologie (2e série) 12 (1): 165 [separatum: Aménités Malacologiques II: 183] [nom. nov. pro *Helix ambigua* Mousson, 1859].

1878 *Helix* (*Pomatia*) *Thiesseana* Kobelt, Jahrbücher der deutschen Malakozoologischen Gesellschaft 5: 320 [Greece, Evvia, Chalkis].

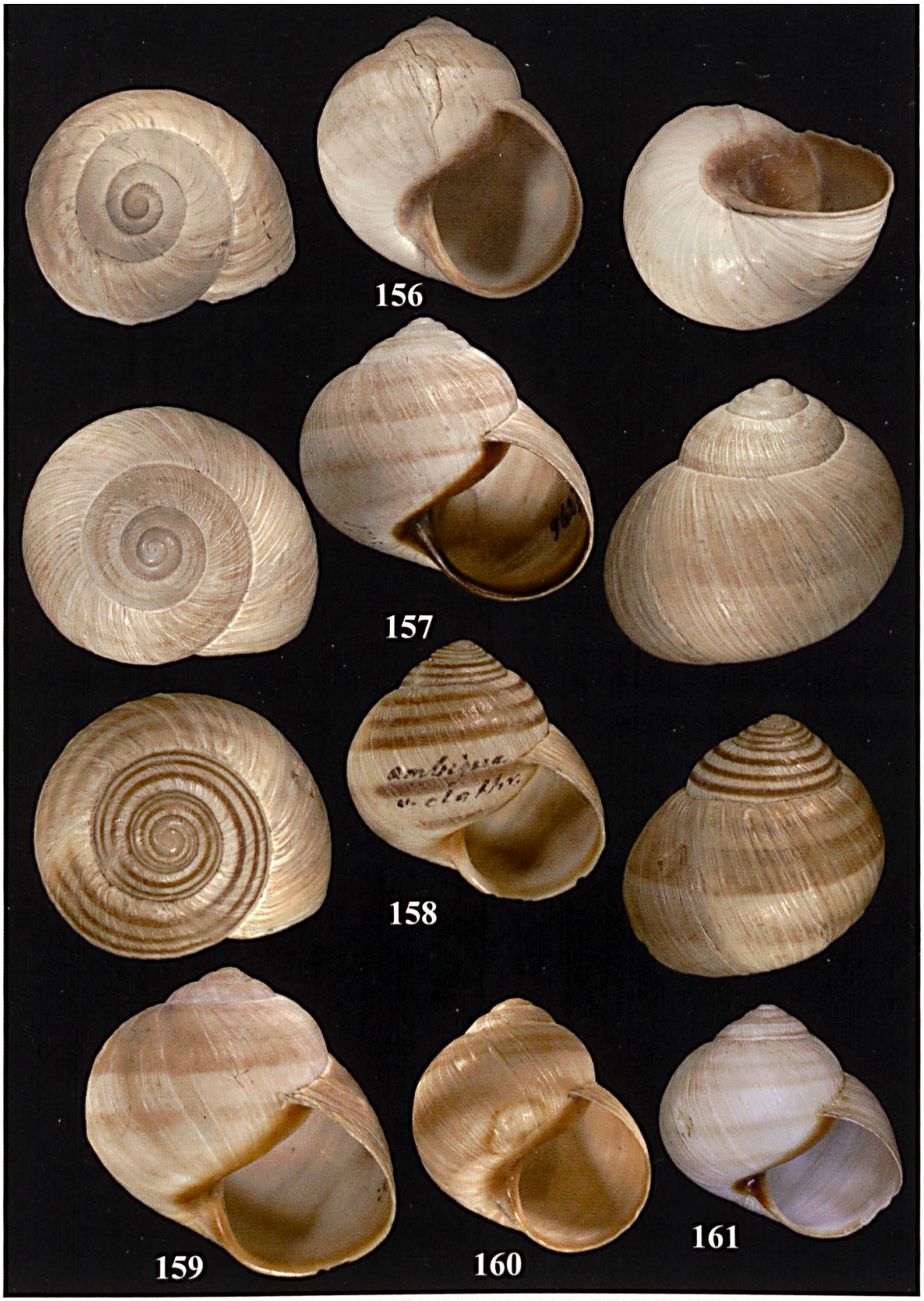
1889 *H. ambigua clathrata* Westerlund, Fauna der in der Paläarctischen Region lebenden Binnenconchylien, II. *Helix*: 459 [Kerkira und Epirus].

1892 *Helix* (*Pomatia*) *ambigua* var. *aetolica* Kobelt, Iconographie der Land- und Süsswassermollusken 2 (5): 106, Taf. 146, Fig. 936, 937 [Greece, Etoliko, Vrachori].

Type specimens:

borealis: probable syntype ZMZ 506307: H = 39.4, D = 35.65, PH = 26.6, PD = 18.9, PrD = 3.6, W = 5.25; *thiesseana*: lectotype SMF 9627 (SD Zilch 1952: 151): H = 37.9, D = 38.2, PH = 26.4, PD = 19.6, PrD = 3.9, W = 5.5; *clathrata*: lectotype GNM 1718 (lectotype herewith designated): H = 34.4, D = 33.1, PH = 24.2, PD = 16.8, PrD = 3.35, W = 5.5; *aetolica*: syntype SMF 24313a: H = 41.4, D = 39.9, PH = 31.1, PD = 20.7, PrD = 3.85, W = 5.15. *ambigua*: syntype ZMZ 548103: H = 33.2, D = 30.2, PH = 20.8, PD = 20.1.

Remarks on type specimens: *borealis*: The collection of Mousson contains six lots labelled as *Helix borealis*, but only two of them were collected by Schläfli and originate from Sagiada, a place NW of Igoumenitsa. The type specimens of *H. ambigua* var. *borealis* from the citadel of Kerkira, which were collected by Schläfli as well, are missing. A third lot contains four specimens from Argostoli on Kefallinia, which were collected by Mousson himself in 1858. The label of this lot (ZMZ 506307) reads "*H. cyrtolena* Brgt. var. *borealis* Mss., Argostoli (M. 58)" which proves that it was written after 1860, the publication date of *Helix cyrtolena* Bourguignat. Mousson does not mention Argostoli in the description of *H.*



Figs 156–161. *Helix* (*Helix*) *borealis* Mousson, 1859. Fig. 156 probable syntype *borealis*: ZMZ 506307, Argostoli, D = 35.65; Fig. 157 lectotype *thiesseana*: SMF 9627, Chalkis, D = 38.2; Fig. 158 lectotype *clathrata*: GNM 1718, Kerkira und Epirus, D = 33.1; Fig. 159 syntype *aetolica*: SMF 24313a, Vrachori, D = 39.9; Fig. 160 syntype *ambigua*: ZMZ 548103, Ionische Inseln, D = 30.2; Fig. 161 NMBE 505540, Turkey, Finike, D = 30.58. — All photos Neubert, original size.

ambigua var. *borealis*, but he had them already at his disposal, so these specimens can only be considered possible syntypes. *clathrata*: The type lot contained two specimens. The somewhat larger specimen is selected, because it shows the sculpture and bands of the upper whorls as described by Westerlund very clearly. *aetolica*: As the original specimens for figures Iconographie der Land- und Süsswassermollusken 936 and 937 are not in the SMF (Zilch 1952: 150), no lectotype was designated. A syntype specimen from SMF 24313 coll. Kobelt ex Brömme (not SMF 42313 in Zilch!) is figured.

Specimens examined:

Greece: Corfu: SMF 9848 Corfu, 39.6242 19.9216, coll. Kobelt; ditto, SMF 74133/2, coll. C.R. Boettger; SMF 214799 Corfu, Pantokrator, 39.7383 19.8723, coll. S. H. Jaeckel ex Martens ex Brenske. Lefkada: SMF 74062, Island of St. Maura (= Lefkas), coll. Krüper. ; Karia, 2 Km in dir. Lefkada, 38.7756 20.6554, 440 m alt., 5.8.1975, NMBE 524297/1; Nidri, hill slope S of village, 38.6915 20.6979, 20 m alt., 3.8.1975, NMBE 524294/1; Sivros, 38.6668 20.6433, 170 m alt., 3.8.1975, NMBE 524311/4; Sivros, Mt. Stavrotas, 38.6704 20.6373, 200 m alt., 3.8.1975, NMBE 524318/6; Kaligoni, 38.8148 20.7124, 31.7.1975, NMBE 524310/2. Kefalonia: Poros, canyon NW of village, 38.1506 20.771, 30 m alt., 6.5.2005, NMBE 522334/8; Argostoli, 1.5 Km SE of village, 38.163 20.5105, 10 m alt., 7.5.2005, NMBE 522331/1; Mt. Énos, 7.2 Km from crossroads Argostoli-Sami, 38.1539 20.6311, 1200 m alt., 7.5.2005, NMBE 522336/1. Sterea Ellada: SMF 299540 Epirus, coll. C. Bosch ex W. Schlüter; ditto, SMF 74114/4, coll. Jetschin ex Conéménos; ditto, SMF 299546, coll. C. Bosch ex Schlüter; Igoumenitsa, 39.4858 20.2818, 40 m alt., 21.7.1975, NMBE 524298/1; ditto, SMF 74112/2+1, coll. Jetschin ex Conéménos; Igoumenitsa, 5 Km E of city, 39.4882 20.3274, 370 m alt., 22.7.1975, NMBE 524296/1; SMF 74113, Epirus, Prevesa, 38.9592 20.7517, coll. Jetschin ex Conéménos; ditto, SMF 24308, coll. O. Boettger ex Conéménos; ditto, SMF 74132/3, coll. C.R. Boettger; SMF 24313/4 Vrachori (= Agrinion), 38.6244 21.4095, coll. Kobelt ex Brömme (syntypes *aetolica* Kobelt); SMF 24305 Vonitsa, Gulf of Amvrakikos, 38.9190 20.8889, coll. O. Boettger ex Conéménos; Vonitsa, 38.92 20.9089, 50 m alt., 14.4.1988, NMBE 524305/1; SMF 74070 Acarnania, Varassovo, coll. Krüper; SMF 74116/5 Acarnania, coll. Krüper; SMF 86163 Acarnania, Messolóngi, 38.3686 21.4304, coll. Nägele ex Krüper; ditto, SMF 74066/2, coll. Jetschin ex Krüper; ditto, SMF 214800, coll. S. H. Jaeckel; SMF 74069/3+1 Acarnania, Aetolico, coll. Krüper; ditto, SMF 74067, coll. Jetschin ex Krüper; SMF 24307, Aetolia, coll. O. v. Moellendorff; SMF 74122 Kalyakuda (= mountain S of Karpenission), 38.7958 21.7598, coll. Krüper; Zalongo, 500 m from crossroad in dir. Igoumenítsa, 39.1248 20.6568, 90 m alt., 6.8.1975, NMBE 524295/1; road Filiates-Igoumenitsa, cave chapel, 39.6434 20.2135, 150 m alt., 19.7.1990, NMBE 524330/1; Kartéri, 39.3953 20.3702, 170 m alt., 20.7.1990, NMBE 524326/3; ditto, 15.5.1995, NMBE 524304/1; Kotsika, 39.6592 20.2471, 300 m alt., 13.5.1995, NMBE 524307/2; Igoumenitsa, crossroads to Agia Marina, 39.4771 20.3137, 210 m alt., 25.7.1976, NMBE 524301/1; Tsara 200 m in dir. to Prevesa, rocky slope, 02.06.1985, HAUS (3); Prevesa 0.5 km in dir. to Arta, 38.9986 20.7389, 03.06.1985, HAUS (1); Domiani, 6.5 km

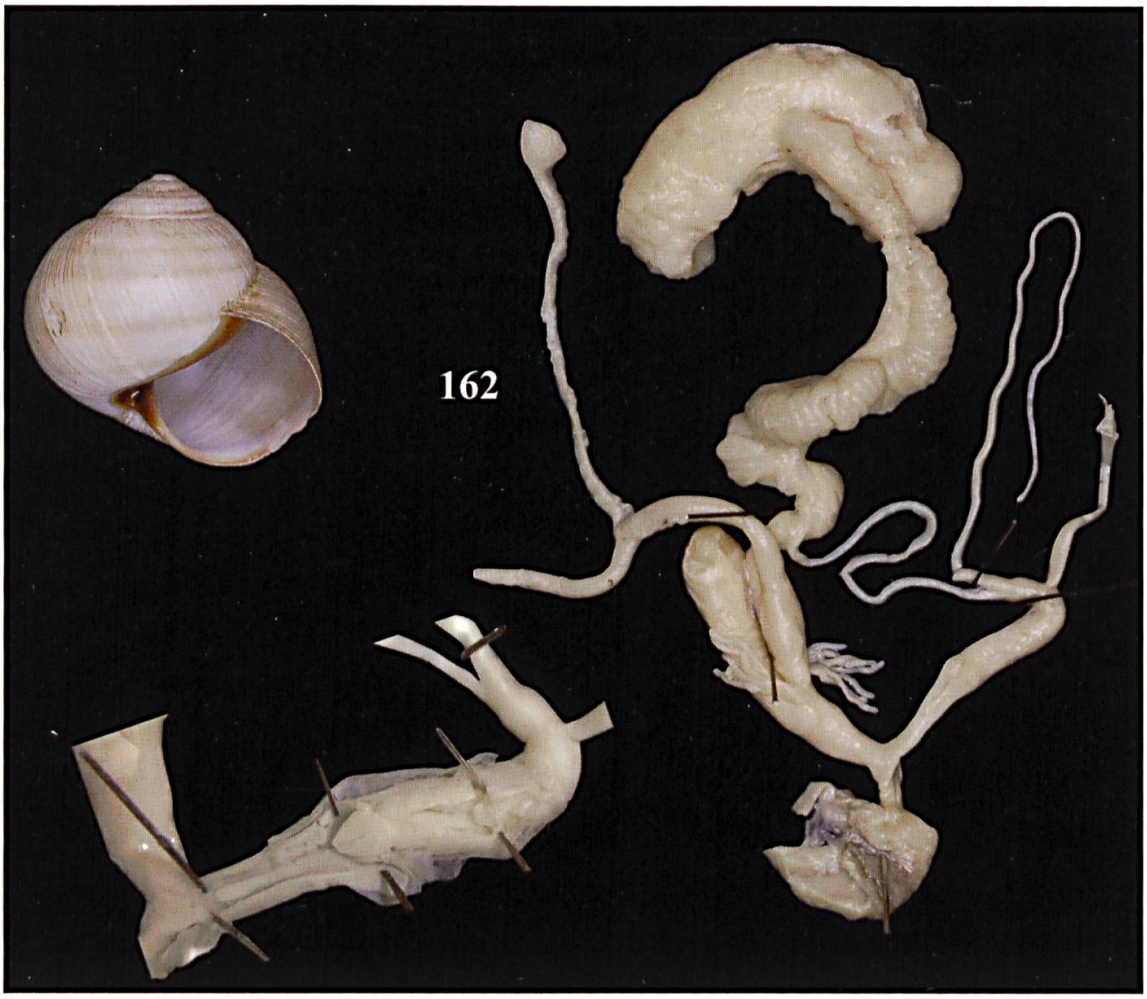


Fig. 162. *Helix* (*Helix*) *borealis* Mousson, 1859. Genital organs. NMBE 505540, Turkey, Finike, situs 38.33.

in dir. to Agia Trias, 39.0084 21.7938, 16.06.1985, HAUS (1); Kato Retsina, 38.4268 21.4313, 08.06.1985, HAUS (1); northern part of Klissoura, 25.08.1982, HAUS (1); Astakos, 38.5454 21.0902, 25 m alt., 8.5.2005, NMBE 522335/3, NMBE 522330/3; Astakos, 1 Km E of village, 38.5323 21.0998, 19.5.1991, NMBE 524317/16; Astakos, SE slope of Mt. Veloutsa, 38.537 21.0692, 185 m alt., 19.5.1991, NMBE 524328/3; Petrona, 38.9258 21.4066, 500 m alt., 20.7.1990, NMBE 524322/1; Kefalovrisso, 38.4598 21.367, 30 m alt., 30.9.1989, NMBE 524315/7; Ancient Kalydon, 2 Km from bridge over Evinos River, 38.3725 21.5332, 1.10.1989, NMBE 524314/3; Karpenissi, 7.5 Km WNW of village, 38.9245/21.7454, 1250 m alt., 9.4.1986, NMBE 524323/1; Thessaly: Loutropigi 2 km in dir. to Karditsa, 39.1521 22.0455, 18.06.1985, HAUS (1); limestone rocks above Loutropigi S of Karditsa, 39.1172 22.0415, 27.08.1982, HAUS (1); ditto, 16.06.1985, HAUS (1); Pilion, Platania on the road in dir. to Rodia, 39.1534 23.2827, 15.10.1986, LIEB (2); Dafnospilia, S of village, cave, 39.2274 21.9427, 260 m alt., 12.5.1997, NMBE 522288/2; Evvia: Evvia, 1876, NMBE 18449/3; ditto, SMF 24304, coll. Reinhardt ex Heldreich; ditto, SMF 74106, coll. K.L. Pfeiffer ex Staudinger; ditto, SMF 299543, coll. C. Bosch ex Rolle ex Schlüter; ditto, SMF 74110/5, coll. Krüper; SMF 74109 N Evvia, coll. Jetschin ex Krüper; ditto, SMF 299544, coll. O. Boettger ex Thiesse; SMF 9628, Chalkis, 38.4645 23.605, coll. Kobelt ex Thiesse ex Godet (para-

lectotype *thiesseana* Kobelt); ditto, SMF 9826/3, coll. O. v. Moellendorff ex Thiesse; ditto, SMF 24309/3, coll. O. Boettger ex Thiesse; ditto, SMF 74111/2, coll. C.R. Boettger; ditto, 21.5.1983, NMBE 503512/6; quarry 2 km E Ellinika, 38.9957 23.3488, 18. 06. 1994, NMBE 512598/1; Ellinika, 1.7 Km in dir. Vassilika, 38.9979 23.3488, 35 m alt., 30.4.1991, NMBE 524320/2; Kourbatsion (= Artemision), 39.02 23.23, 58 m alt., 1884, NMBE 18451/26/3, NMBE 18455/4, NMBE 18454/3, NMBE 18453/2, NMBE 18452/3; Koulouros, 38.86 23.24, 1876, NMBE 18450/3. Northern Sporades: SMF 74122 Giura [Alonissos], 39.3953 24.1736, coll. Krüper; ditto, 25.05.1979, LIEB (2); SMF 74063/2 Skopelos, coll. Krüper; Skopelos, on the road to Stathmos, 39.0968 23.7219, 1.11.1981, LIEB (1); Piperi, 39.3496 24.3252, 11.06.1981, LIEB (2). Peloponnessos: SMF 24306 Morea (= Peloponnesos), coll. O. Boettger ex E. Brenske; SMF 74107 Achaia in Morea, coll. Jetschin ex Conéménos; SMF 74064/2 Patras, 38.2466 21.7345, coll. Jetschin ex Conéménos; ditto, 74108/2, coll. Jetschin ex Conéménos; ditto, 74065/2, coll. Jetschin ex Schneider; ditto, SMF 24310 Patras, coll. O. Boettger ex Conéménos; ditto, SMF 74068, coll. Krüper; Kaiafas NW of Zaharo, thermal springs, 37.5193 21.6022, 7.4.1986, NMBE 524308/2; SMF 74120, Olympia, 37.6447 21.6254, coll. Krüper; ditto, SMF 299545/3, coll. C. Bosch ex Schlüter; ditto, SMF 74119/2, coll. K.L. Pfeiffer; SMF 24311, Santameri, 37.9877 21.5724, coll. O. Boettger ex Conéménos; SMF 74118/2, Sparta, 37.0744 22.4302, coll. K.L. Pfeiffer; ditto, SMF 74115/5, coll. Krüper; SMF 74123 Taygetos, coll. Krüper; Githio in dir. Sparti, hill slope, 36.7594 22.5562, 30 m alt., 18.2.1981, NMBE 524316/7; Skala, 13 Km in dir. Githio, 36.7959 22.5957, 50 m alt., 14.7.1979, NMBE 524303/1; Githio, 10 Km in dir. Areopoli, canyon, 36.7299 22.5055, 40 m alt., 18.2.1981, NMBE 524302/1; 4 Km N crossroads to Molai, 36.8456 22.8448, 250 m alt., 14.7.1979, NMBE 524293/1; SMF 24312/2 Pylos (Navarino), 36.91 21.7, coll. Kobelt; ditto, NMBE 18458/4; Eleohori (= Janitsa), 37.0408 22.1817, 545 m alt., 10.5.1991, NMBE 524329/1; Paleokastro S of Petrohori, 36.9582 21.6568, 120 m alt., 18.4.1988, NMBE 524325/2; Gargaliani, 1 Km in dir. Kiparissia, 37.0667 21.6199, 200 m alt., 10.7.1979, NMBE 524321/2; castle of Kiparissias, 37.2506 21.6783, 100 m alt., 29.06.1987, NMBE 512670/1; ditto, 10.7.1979, NMBE 524309/2; mountain SW Hrisokellaria, 36.7864 21.8801, 400 m alt., 11.5.1991, NMBE 524306/1; Pigi, 15 Km in dir. Kalamata, 36.8592 22.2564, 25 m alt., 13.7.1979, NMBE 524300/1; Skala 6.5 km in dir. Githion, rocky slope, 36.8053 22.6183, 01.10.1986, HAUS (1); crossroads W of Gerakion 5 km in dir. Kosmas, 37.0248 22.7078, 05.10.1986, HAUS (1); Kalivia 0.5 km in dir. to Skutarion, 37.3134 22.1389, 04.10.1986, HAUS (1); Mistras, 37.0745 22.3666, 05.07.1987, NMBE 512671/1; plateau above Gerolimenas, 36.486 22.387, 100 m alt., 7.7.1987, NMBE 512672/1; Rizes 1 km to Agios Petros at the crossroads to Astros, 37.4405 22.4880, 06.10.1986, HAUS (3); Vouno, Takka Lake, 37.4265 22.413, 680 m alt., 20.4.1988, NMBE 524327/7; crossroads to Agriakona, 37.3217 22.2701, 705 m alt., 8.5.1991, NMBE 524312/1; Klitoria, 2 Km S in dir. Tripoli, 37.8808 22.1355, 500 m alt., 9.7.1979, NMBE 524324/1; Kerpini, crossroads Kalavrita-Diakofto to Rogi, 38.0534 22.1384, 700 m alt., 13.5.1991, NMBE 524319/2; Agionori, 2 Km in dir. Limnes, 37.7439 22.8739, 700 m alt., 4.4.1986, NMBE 524313/1. Kythira: SMF 74117/3, Keramoto, 36.1998 22.9731, coll. Krüper; ditto, SMF 86162, coll. Nägele ex Krüper ex Leonis 1902; ditto, SMF 86161/2, coll. Nägele ex Krüper.

Turkey: Antalya: ruines of Lymira 7 km N Finike, 36.3620 30.1515, 15.7.1990, MENK (12+alk.1); Sahilkent E of Finike, 36.3024 30.1502, 13.1.1997, NMBE 525615/8, Hemm

(alk. 3); Finike, 36.304 30.1401, 13.1.1997, NMBE 505540/3; valley above Olympos, ca. 60 km SSW Antalya, 01.10.1986, leg. Rähle, RÄH (1).

Uncertain localities: SMF 299547/6 Greece, coll. Krüper; SMF 299541/2 Greece, coll. Krüper; SMF 299542/2, Greece, coll. Jetschin; SMF 24303 Egypt, coll. Gysser.

Diagnosis: shell of medium size, thin, protoconch small, aperture very large, dark brown, palatal area with expanded dark brown coloration, umbilicus closed.

Description: shell of medium size to large, thin, elongate spherical, spire high conical; basic shell colour greyish white with brown spirals, sometimes with five distinct brown spiral bands or spiral No. 2 fused with No. 3; protoconch considerably small in comparison to shell, its diameter ranging from 3–4 mm, smooth, white whorls; teleoconch of 3–4 whorls sculptured by fine axial riblets; last whorl only slightly descending below the periphery; aperture suboval to rounded, very large if compared to the total shell height; apertural rim narrow, labial callus weak, dark brown coloured, palatal area usually with an expanded dark brown coloration; columellar triangle small; umbilicus closed in adult shells.

Genital organs (Fig. 162): penis elongate club-shaped, epiphallus as long as penis; flagellum long, exceeding the length of epiphallus+penis at least twice; mrp attaching in a central position on the epiphallus; internally, both pp1 smaller than pp2, penial chamber long, filled with a few strong elongate folds, both papillae conical with a central perforation; atrial stimulator an elongate pilaster terminating in a rounded knob; female system with a short vaginal tube, dart sac large, glandulae mucosae weakly developed, with a short basic stem and a few short digitiform tubules, much shorter than dart sac; pedunculus stem broad, diverticulum short and thick, branching off in the proximal third of the pedunculus, remaining bursa copulatrix stem long, bursa copulatrix vesicle rounded and bent downwards.

Distribution (Fig. 163): This species lives in the coastal areas of western Central Greece, the Ionian Island, the western and southern Peloponnesus, and the eastern part of Crete (Psonis & al. 2014). The specimens from the Northern Sporades need to be carefully compared to *H. pelagonesica*, they probably belong to this species instead to *H. borealis*. The specimens from the northern and central part of the island Evvoia were once separated by Kobelt under the name *thiesseana* because of minor difference in the shell colour. In fact, the specimens from Evvoia are less strongly banded to completely white. The author was able to observe a living specimen on a steep limestone slope at the northern Dirfis Mountain in Evvoia where the species lives on the open rock faces. Here, the white colour perfectly helped to mask the animal. Dhora & Welter-Schultes (1996) list some records from Albania (obviously literature

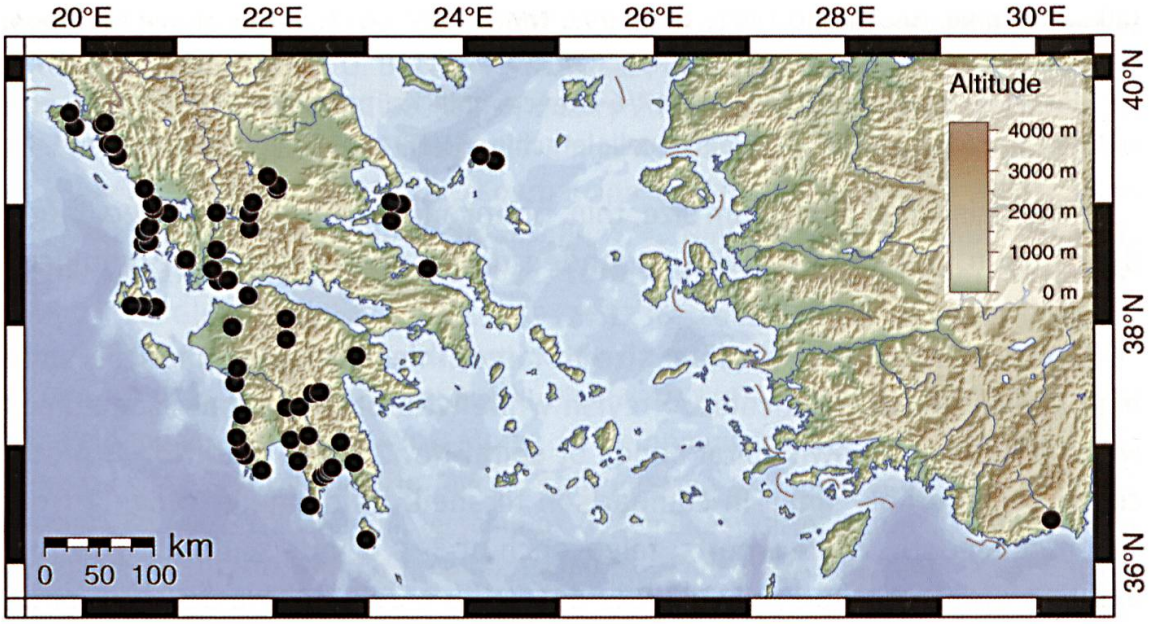


Fig. 163. *Helix* (*Helix*) *borealis* Mousson, 1859. Distribution.

records) under *H. cincta,* repeating misidentifications of former authors but note that these require confirmation.

Remarks: The separation of the dark-mouthed *Helix* specimens from Central Greece from *H. cincta* is under debate (Psonis & al. 2014). Comparing the shell characters, *H. borealis* has a somewhat thinner and larger shell, and a larger aperture than *H. cincta*. This also holds true if compared to *H. melanostoma*, which is smaller and even more spherical. Psonis & al. (2014) showed that there is a cluster of species originating from central Greece and western Crete, and which the authors identify as "*H. cincta*". Another cluster originates from the East Aegean and Cyprus, which is named "*H. cincta anatolica*". Both groups are widely separate genetically, supporting their status as independent species. This western "*H. cincta*" group is what is here considered to be *H. borealis*, while the "*H. cincta anatolica*" group represents the true *H. cincta*. Unfortunately, no specimens from the Greek mainland or the type locality Corfu were available for dissection, so the morphology of the genital organs of the typical population is unknown.

In a very small area in southwestern Turkey, there is a black-mouthed *Helix* species known, which is here attributed to *H. borealis*, because its shell is thinner and more globular than that of *H. cincta*, and is usually almost white. Conchologically, it very much resembles *H. thiesseana* from Chalkis (Evvoia), which is here considered a synonym of *H. borealis*. Interestingly, it only occurs in or close to ancient Greek settlements, so it seems highly probable that it is introduced there by human activities.

***Helix* (*Helix*) *fathallae* NÄGELE, 1901** (Figs 164–171)

1901 *Helix* (*Pomatia*) *fathallae* NÄGELE, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 33: 20 [La Trappe bei Akbès].

1903 *Helix* (*Helicogena*) *pseudopomatia* KOBELT, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 35: 150 [non *Helix pseudopomatia* WESTERLUND, 1889 = *Helix ligata*] [Cheikli Syriae].

1909 *Helix* (*Helicogena*) *mississiensis* KOBELT, Iconographie der Land- und Süsswassermollusken 2 (15): 9, Taf. 395, Fig. 2268, 2269 [Missis in Cilicia].

1939 *Pomatia babelis* PALLARY, Mémoires présentés a l'Institut d'Égypte, 39: 20, pl. 1, fig. 5, 6 [Alexandrette, Vagin de la Vierge].

1939 *Pomatia melanostomella* PALLARY, Mémoires présentés a l'Institut d'Égypte, 39: 20, pl. 1, fig. 1, 2 [Alexandrette, Vagin de la Vierge].

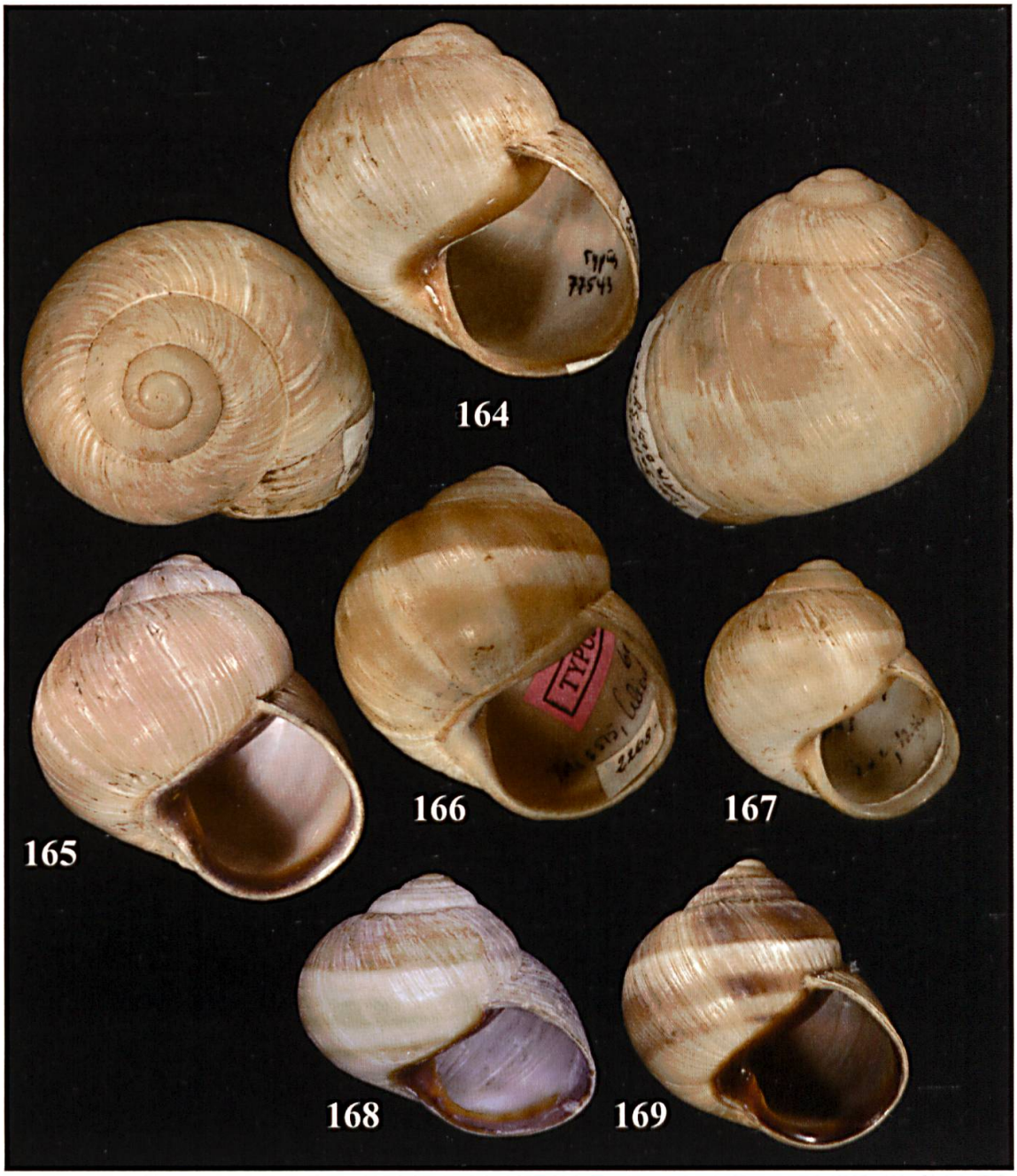
1952 *Helix cheikliensis* ZILCH, Archiv für Molluskenkunde 81 (4/6): 142 [nom. nov. pro *Helix* (*Helicogena*) *pseudopomatia* KOBELT, 1904 non *Helix pseudopomatia* WESTERLUND, 1889].

Type specimens:

fathallae: lectotype SMF 77543 (SD Zilch 1952: 154): H = 41.6; D = 40.9; PH = 30.5; PD = 21.1; PrD = 4.8; W = 5. *mississiensis*: lectotype SMF 6968 (SD Zilch 1952: 138): H = 41.9; D = 39.8; PH = 29.8; PD = 20.5; PrD = 5.2; W = 5. *pseudopomatia* = *cheikliensis*: lectotype SMF 9711 (SD Zilch 1952: 142): H = 31.2; D = 29.9; PH = 21.2; PD = 14.5; PrD = 5.4; W = 5; *babelis*: not located. *melanostomella*: not located.

Specimens examined:

Turkey: SMF 9813 La Trappe at Akbès, 36.8562 36.5190, coll. Kobelt ex Nägele; SMF 9827/4 Cheikli, coll. O. Boettger; ditto, SMF 24314; ditto, SMF 74071, coll. Krüper; ditto, SMF 9712, coll. Kobelt ex Nägele (paralectotype *cheikliensis*); SMF 74139/2 Taurus, coll. K.L. Pfeiffer; SMF 77545, SMF 77546/3 Akbès, coll. Nägele ex Tembé; ditto, SMF 77544, coll. Nägele ex Rabat; ditto, SMF 74072/2 Akbès, coll. Jetschin ex Nägele; ditto, SMF 24315/2 Akbès, coll. O. Boettger; ditto, SMF 24314/6, coll. Kobelt ex Tembé; SMF 86170, Amanus, Edilli [Idili Köyü], 36.9837 36.5612, coll. Nägele ex Tembé; SMF 9638 Missis [Mopsuestia], 36.9580 35.6195, coll. Kobelt ex Nägele (paralectotyp *mississiensis*); ditto, SMF 17637/2, coll. O. Boettger ex Nägele (paralectotyp *mississiensis*?); ditto, SMF 299539/2, 2.6.1898, coll. Nägele ex Bayadjian; Tumlu Kalesi, 37.1473 35.7044, 15.4.1997, SMF 311932/5, NMBE 505541/5 (alk.), NMBE 525616/20; ditto, rocks at Tumlu Kalesi 12 km NW of Mercimek, 24.12.1990, MENK (8); rocks at Yilankale 6 km SW of Ceyhan, 37.0111 35.7480, 25.12.1990, MENK (12); ditto, 13.10.2001, leg. Hemmen (2 alk.); Ulucinar, 36.4138 35.8951, 30.03.1987, LIEB (8); rocky canyon in Sariseki 11 km NE of Iskenderun, 36.6725 36.2260, 27.12.1990, MENK (6); ditto, 05.01.1994, SMNS/NORDS; rocks 3.5 km S of Güvenc (= Aktepe), 36.6725 36.4652, 230 m alt., 31.12.1990, MENK (17); Iskenderun, quarry above the city, 36.5741 36.2122, 16.4.1997, NMBE 525617/6, NMBE 525618/2 (alk.), one specimen in SMF 311429); Iskenderun,



Figs 164–169. *Helix* (*Helix*) *fathallae* Nägele, 1901. Fig. 164 lectotype *fathallae*: SMF 77543, La Trappe, D = 40.9; Fig. 165 SMF 311429, Iskenderun, quarry, D = 38.8; Fig. 166 *mississiensis*: lectotype SMF 6968, Missis, D = 39.8; Fig. 167 lectotype *pseudopomatia* = *cheikliensis*: SMF 9711, Cheikli, D = 29.9; Fig. 168 NMBE 505541, Tumlu Kalesi, D = 34.79; Fig. 169 SMF 311932, ditto, D = 34.79. — All photos Neubert, original size.

right off big quarry, 36.5827 36.2062, 14.10.2001, HEMM (3 alk.); Iskenderun, close to the canyon above the city, 36.5689 36.2071, 02.01.1994, SMNS/NORDS; ditto, 29.07.1994 SMNS/NORDS; rocks 20 km E of Sakcagözü, 37.1781 37.1262 E, 1080 m alt., 2.1.1991, MENK (4); rock in the center of Aydınoğlu, 12 km WSW Islahiye, 36.9343 36.5710 E, 560 m alt., 31.12.1990, MENK (17); Çevlik, west of entrance to Titus Tüneli, 36.1210 35.9226, 19.10.2001, leg. Hemmen (alk.).

Greece: SMF 74153 Rhodos, Mt. Profitis Elias, 36.2771 27.9439, 700 m alt., April 1934, coll. K.L. Pfeiffer; Rhodos, Lindos, 36.0918 28.0856, coll. Saurin, MNHN (1).

Fig. 170. *Helix* (*Helix*) *fathallae* NÄGELE, 19011. Genital organs. NMBE 505541, Turkey, Tumlu Kalesi, situs 34.79.

Diagnosis: shell medium to large, thick, shell colour bluish brownish to cream, teleoconch smooth with few fine axial riblets, and a few fine subsutural spiral furrows, aperture subquadrate, deep brown to even bluish, columella straight;

Description: shell of medium to large size, thick, spherical, spire conical; basic shell colour bluish brownish to cream white with brown spirals, spirals No. 1–3 tend to fuse, subperipheral spirals usually separate; protoconch small in comparison to shell, its diameter ranging from 4.5–5.5 mm, smooth, white whorls; teleoconch of 3–4 whorls, smooth, but with irregularly arranged fine axial riblets, and a few fine incised subsutural spiral furrows; last whorl slightly descending below the periphery; aperture large, subquadrate to rounded,

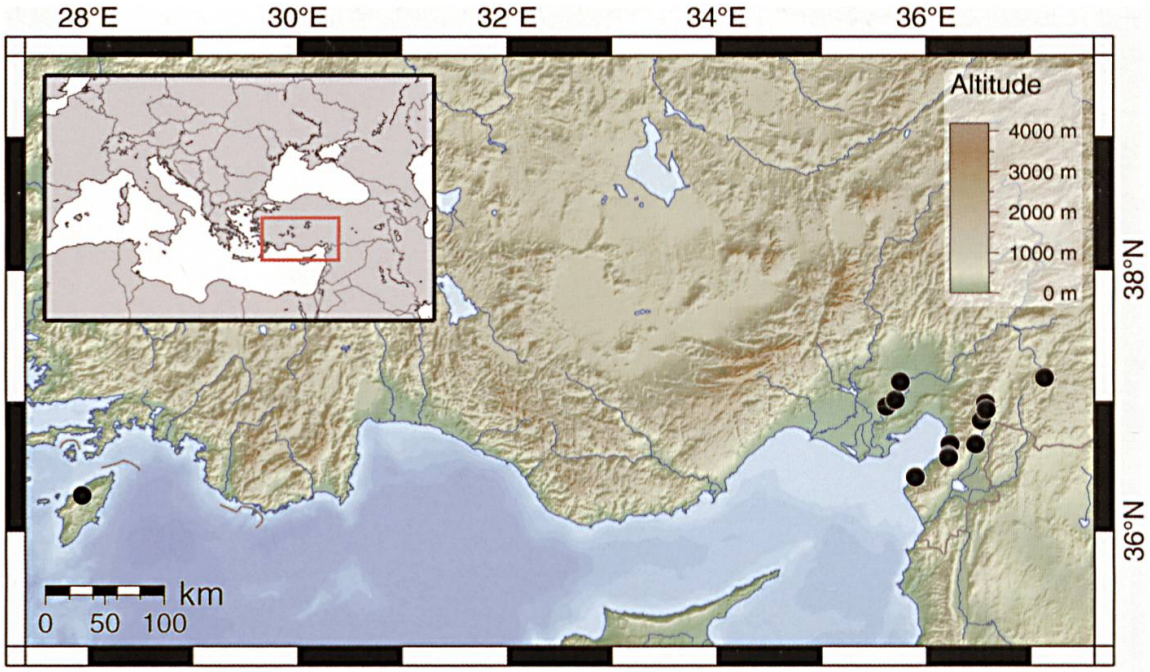


Fig. 171. *Helix* (*Helix*) *fathallae* NÄGELE, 1901. Distribution.

apertural rim narrow, labial callus moderately strong, deep brown to sometimes even bluish coloured, columella straight, columellar triangle small; umbilicus closed in adult shells.

Genital organs (Fig. 170): penis club-shaped, epiphallus as long as penis; flagellum long, exceeding the length of epiphallus+penis three times; mrp attaching in a central position on the epiphallus; internally, both papillae of equal size, penial chamber short, filled with a few ring-like pilasters, both papillae conical with a central perforation; atrial stimulator an isolated rounded knob; female system with a short vaginal tube, dart sac and glandulae mucosae well developed, the glandulae with a basic stem, branching into a few tubules, shorter than dart sac; pedunculus stem long, with a thick and short diverticulum branching off in a central position, bursa copulatrix as long as pedunculus stem, vesicle rounded and bent downwards.

Distribution (Fig. 171): This species is only known from a restricted area in the Hatay and Adana province in southern Turkey, it is so far not recorded from Syria. The presence of this species on Rhodes is corroborated by molecular analysis (Korábek & al. submitted), but it remains unclear whether this population represents the remains of a formerly wider distribution area, or whether it was introduced here by human activities.

Remarks: Specimens from Iskenderun are more elongate, showing a small callosity on the upper columella (*babelis*), while specimens from Misis usually have the lower bands fused (*mississiensis*). At Yilankale, Tumlu Kalesi and Iskenderun quarry, this species lives sympatrically with *Helix asemnis*.

This species very much resembles *H. cincta* from the Central Anatolian plateau, and shell morphological differences are few. The main distinguishing features concern the riblets, which on average are finer than in *H. cincta*; the more bluish and generally darker colour of the aperture, which is more brown to reddish in *H. cinta*; and the presence of bright and uncoloured whitish shells, which so far have not been observed in *H. cincta*. However, the main difference can be found in the morphology of the genital organs: *H. fathallae* has a well developed diverticulum, which is missing or only rudimentarily present in *H. cincta*.

***Helix* (*Helix*) *anctostoma* MARTENS, 1874** (Figs 172–175)

1874 *Helix cincta* var. *anctostoma* v. MARTENS, Vorderasiatische Conchylien 19, Taf. 4, Fig. 21 [Castle hill of Orfa].

1892 *Helix* (*Pomatia*) *beilanica* WESTERLUND, Verhandlungen der k. k. zoologisch-botanischen Gesellschaft 42: 34 [Syria, at Beilan close to Alexandrette].

1895 *Helix* (*Pomatia*) *achidea* KOBELT, Iconographie der Land- und Süsswassermollusken, Suppl. 1: 48, Taf. 18, Fig. 5 [Tarablus in Syria].

1895 *Helix* (*Pomatia*) *bituminis* KOBELT, Iconographie der Land- und Süsswassermollusken, Suppl. 1: 49, Taf. 19, Fig. 4, 5 [Tschengen-Köi in Cilicia].

1895 *Helix* (*Pomatia*) *issica* KOBELT, Iconographie der Land- und Süsswassermollusken, Suppl. 1: 50, Taf. 20, Fig. 1, 2 [Alexandrette (Alexandria ad Issicum].

1895 "*Helix iskuraxa*", – Kobelt, Iconographie der Land- und Süsswassermollusken, Suppl. 1: 50, 51, Taf. 18, Fig. 4 [Alexandrette] [nomen nudum].

1939 *Pomatia* (*Tammouzia*) *anctostoma* var. *edentula* PALLARY, Mémoires présentés a l'Institut d'Égypte 39: 22 (= Iconographie der Land- und Süsswassermollusken, Suppl. 1: 50, Taf. 20, Fig. 4, 5 sub *Helix* (*Pomatia*) *beilanica* [in den Bergen drei Stunden von Tschengen-Köi in Cilicia]).

1939 *Pomatia* (*Tammouzia*) *anctostoma* var. *alta* PALLARY, Mémoires présentés a l'Institut d'Égypte 39: 22 [Beilan, = Belen, Bilan, Beylan].

1939 *Pomatia* (*Tammouzia*) *anctostoma* var. *ampulla* PALLARY, Mémoires présentés a l'Institut d'Égypte 39: 22 [Beilan].

Type specimens:

anctostoma: lectotype ZMB 22426a, H = 37.4; D = 35.9; PH = 23.5; PD = 16.3; PrD = 4.3; W = 6.25 (lectotype, herewith designated), paralectotype ZMB 22426b. *issica*: holotype SMF 9812 (Zilch 1952: 149): H = 35.2; D = 35.2; PH = 25.2; PD = 17.2; PrD = 4.3; W = 5.75. *bituminis*: lectotype SMF 9672 (SD Zilch 1952: 149): H = 29.2; D = 29.7; PH = 19.4; PD = 13.4; PrD = 4.1; W = 5.75. *achidaea*: holotype MHNG

Figs 172–174. *Helix* (*Helix*) *anctostoma* Martens, 1874. Fig. 172 lectotype *anctostoma*: ZMB 22426a, "Orfa", D = 35.9; Fig. 173 *issica*: holotype SMF 9812, Alexandrette, D = 35.2; Fig. 174 *bituminis*: lectotype SMF 9672, Tschengen-Köi in Cilicia, D = 29.7. — All photos Neubert, original size.

18065, not researched. *beilanica*, *edentula*, *alta*, *ampulla*: not researched. "*iskuraxa*": MHNG 18069/3.

Remarks on type specimens: *anctostoma*: The type lot consists of two specimens as described by Martens which match the dimensions given by him more or less (1874: 19). The height of 30 mm given by him for specimen nr. 2 surely is a misprint. One of the specimens contained a small label in Martens' handwriting which reads "21". This obviously relates to the fig. 21 on table 4. In the authors opinion, this specimen does not represent figure 21, because the upper rim of its peristome was damaged and afterwards repaired by the animal, leading to an abnormally formed aperture. In contrast, the figured specimen is complete. For this reason, the second specimen is here selected as lectotype.

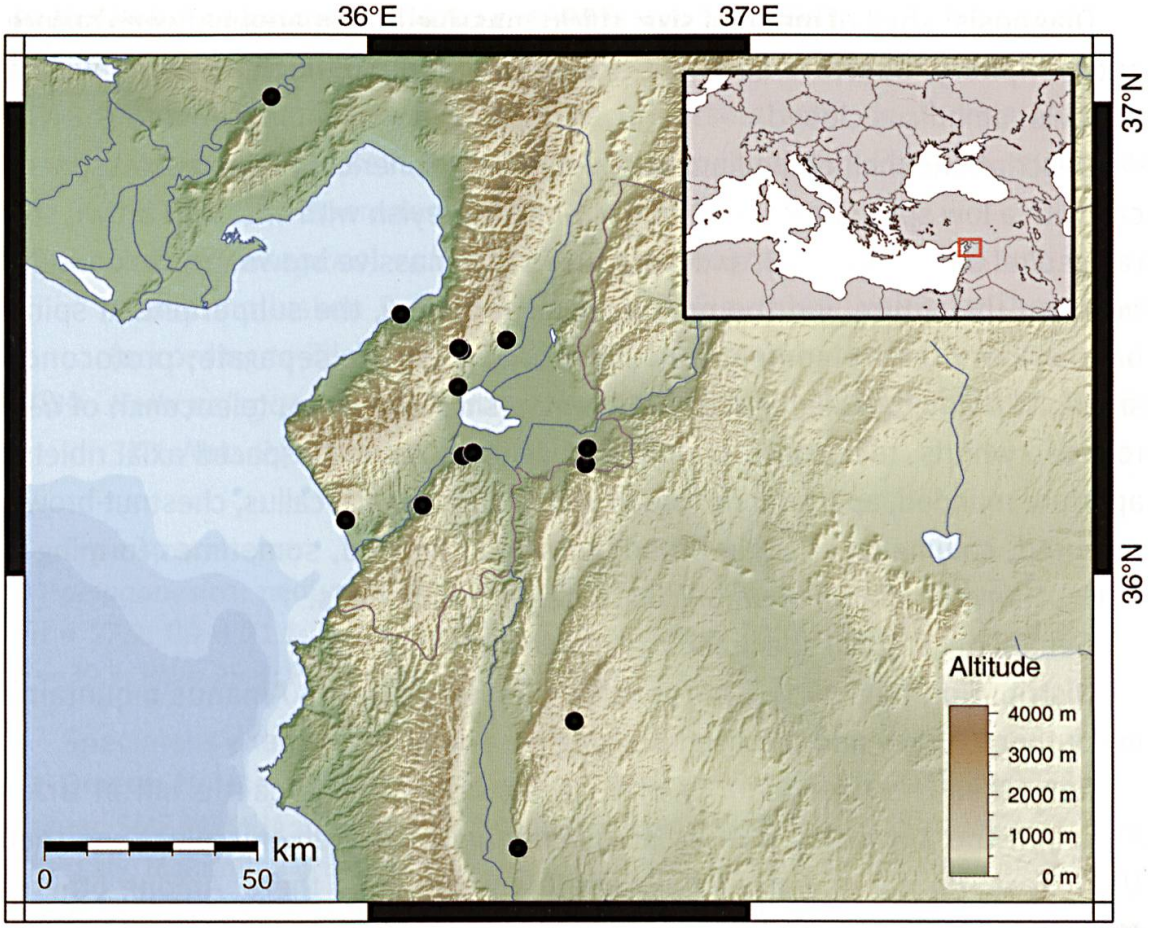


Fig. 175. *Helix* (*Helix*) *anctostoma* MARTENS, 1874. Distribution.

Specimens examined:

Turkey: SMF 74053 Hatay, Beilan, 36.4751 36.247, coll. K.L. Pfeiffer ex Rolle; SMF 74054 Hatay, Beilan, coll. C.R. Boettger; Hatay, rocks at Topboğazı, 750 m alt., 12 km SE Iskenderun, 36.4808 36.2375, 28.12.1990, MENK (7); Hatay, rocks 8 km NE of Ulucinar, 28.12.1990, MENK (9); Hatay: rocks 7 km N of Serinyol at the crossroads of Maraşboğazı, 36.3999 36.2362, 31.12.1990, MENK (16); Hatay, castle of Bektasli (= Sultankale) 8 km SW of Güvenc, 36.4751 36.247, 31.12.1990, MENK (10); Hatay: rocks in Yenişehir 4 km S Reyhanli, 36.2341 36.5707, 30.12.1990, MENK (1) + 1 alk.; Hatay, rocks at the shore 11.5 km S Iskenderun, 36.552 36.0866, 28.12.1990, MENK (8); Hatay: Antakya, Reyhanli, 36.2684 36.5751, 04.04.1987, LIEB (6); Hatay: Antakya, Harbiye, 36.1465 36.1417, 07.04.1987, LIEB (7); Hatay: Antakya, Kirikhane, 36.4991 36.3617, 03.04.1987, LIEB (5); Hatay: Antakya, Belen, 30.03.1987, LIEB (5); Hatay: Iskenderun, 29.03.1987, LIEB (1); Ceyhan, Yilankale, 37.0111 35.7479, 23.7.1994, YG 40, SMNS/NORDS; Hatay, vegetatie Magaracik ruins 4 km NW Samandağı, 36.1159 35.9424, 29.12.1990, YF 60, MENK; Orontes 9 km NE Antakya, 36.2591 36.2735, 90 m alt., 10.8.1988, leg. R. Kinzelbach, NMBE 520417/1; Orontes, 8 km E Antakya, 36.2516 36.2482, 90 m. alt., 17.8.1989 leg. Kinzelbach, NMBE 520418/3.

Syria: Apameia 15 km N Suqaylibiyah, 35.4154 36.3938, 240 m. alt., Nov. 1988, leg. Pauscher, NMBE 520416/1; Al Barah W von Maarat Ann Nu'mah, 660 m alt., 35.6873 36.5399, Nov. 1988, leg. Pauscher, NMBE 520419/1.

Diagnosis: shell of medium size, thick, massive brown area between suture and periphery, aperture chestnut-brown rounded, columella twisted with a denticle, umbilicus closed.

Description: shell of medium size, very thick, spherical to depressed spherical, with a low spire; basic shell colour whitish-greyish with chestnut brown spirals; spiral bands Nos. 1, 2, and 3 are fused to a massive brown area expanding between the suture and the purely white periphery, the subperipheral spiral bands Nos. 4 and 5 sometimes fusing or indistinctly separate; protoconch small, its diameter ranging from 4–4.5 mm, smooth, white; teleoconch of 4–5 rounded whorls; teleoconch sculpture of distinct, narrowly spaced axial riblets; aperture rounded, apertural rim broad with a strong labial callus, chestnut-brown coloured, columellar triangle broad, columella twisted, sometimes forming a thick columellar denticle; umbilicus closed in adult shells.

Genital organs: No specimens available for dissection.

Distribution (Fig. 175): This species is endemic to the Amanus mountains in southern Turkey and the neighbouring area in Syria.

Remarks: The type locality of H. *anctostoma* is the castle hill in Urfa. Although the author as well as many colleagues visited this place, neither *H. anctostoma* nor any other *Helix* species were found there. Among others, Martens also records *Sphincterochila fimbriata* (Bourguignat, 1853) from Urfa, which is also not living there. Presumably, there occurred a confusion of labels or localities by Haussknecht himself. In the introduction, Martens cites the itinerary of Haussknecht who started his botanical research in Iskenderun and performed several excursions to the Amanus Mountains and later went to Halep via Beilan. This is the typical area where H. *anctostoma* is abundant.

This characteristic species lives partly in sympatry with *H. cincta*. In some cases, shells of both species are hard to discriminate, and it seems that *H. anctostoma* is a close relative to *H. cincta*. The two species can always be separated by the formation of the columella, which is straight in *H. cincta*, and twisted to denticulate in *H. anctostoma*. Moreover, shells of *H. anctostoma* tend to be very compact and more densely coiled than those of *H. cincta*. In the area, the black-mouthed *H. fathallae* can be found, which usually has a larger and more conical shell, with an almost black-violet aperture and distinct spiral bands No. 4 and 5.

***Helix* (*Helix*) *pelagonesica* (ROLLE, 1898)** (Figs 176–180)

1898 *Pomatia pelagonesica* ROLLE, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 30: 91 [Pelagonisi = Kirà Panagià, Islands of the Northern Sporades].

1906 *Helix* (*Helicogena*) *volensis* KOBELT, Iconographie der Land- und Süsswassermollusken 2 (12): 49, Taf. 325, Fig. 2041 [Volos in Thessalien (according to Zilch (1952: 160): Canyon of Makrinitsa in the Pilion].

1939 *Helix pelagonesica vardarica* KNIPPER, Archiv für Naturgeschichte, N.F. 8: 373, Abb. 9 [surrounding of Hudova].

Type specimens:

pelagonesica: neotype SMF 9771 (design. Zilch 1952: 160): H = 36.7; D = 41.6; PH = 27.9; PD = 21.1; PrD = 6.4; W = 5.25. *volensis*: holotype SMF 9804: H = 39.3; D = 39.3; PH = 25.3; PD = 19.5; PrD = 5.7; W = 5.75.

Specimens examined:

Greece: Northern Sporades, Pelagonisi (= Kirà Panagià), 39.3316 24.0778, coll. Krüper, SMF 74155/4; ditto, coll. Jetschin ex Krüper SMF 74154/2; ditto, 1978, LIEB (1); Thessaly, Makrinitsa (Pilion), 39.4016 22.9852, coll. Jetschin ex Stussiner, SMF 74156; Thessaly, Pilion, canyon of Makrinitsa, 39.4024 23.0011, coll. O. Boettger ex Stussiner, SMF 17647; Oros Olimbos, coll. Krüper, SMF 74131; Oros Olimbos, Pieriá, Ag. Kori at Vrondu, 40.1935 22.4327, 17.10.1986, HAUS (4); Chalkidiki, road from Thessaloniki to the Chalkidiki, 9 km E Galatitsa, 460 m alt., 40.465 23.364, 8.8.1991, NMBE 5125702/1; Chalkidiki, 3 km W Pirgadikia, 40.326 23.7, 22.9.1989, NMBE 524841/1; Makedonia, Sithonia, Porto Koufos, rocks at the quarry south of village, 39.9576 23.9263, leg. Subai, NMBE 520670/3 (preserved).

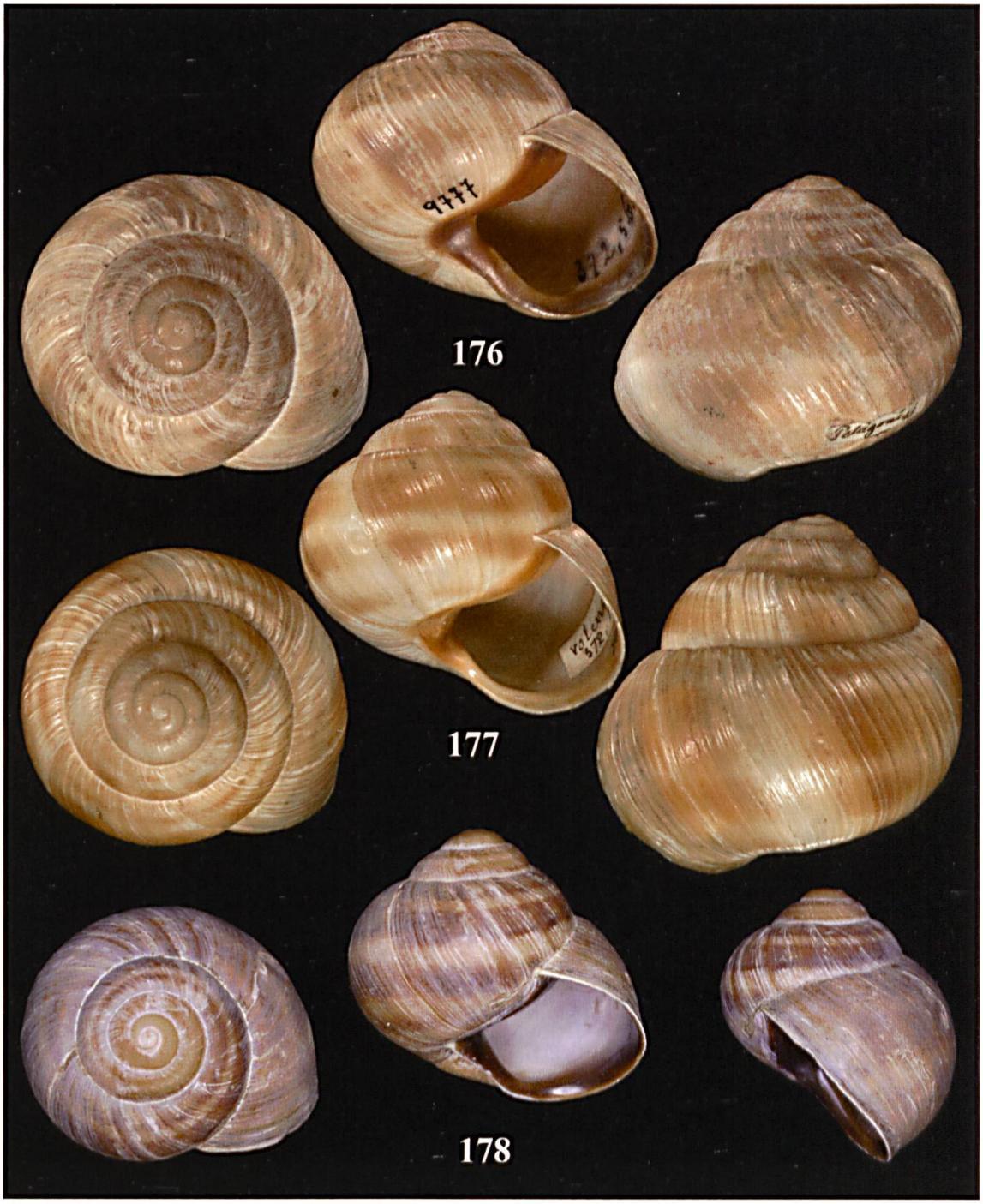
FYROM: SMF 60086 Hudova [= Udovo], 41.3436 22.4425, ex Mus. Berlin ex Doflein (paralectotype of *vardarica* KNIPPER).

Uncertain: SMF 17764 "Makedonien", coll. Rossmässler ex Frivaldsky. This specimen was identified by Knipper as his *vardarica*.

Not checked: Athos, Monastery Russikon [=Monastery of St. Panteleimon], 40.2377 24.2014, leg. Schultz-Korth, ZMB; Athos, surrounding of Haryes [= Karyes], 40.2576 24.2465, leg. Schultz-Korth, ZMB (Knipper 1939).

Diagnosis: shell thick, compact, spire slightly depressed, aperture obliquely oval, depressed, labial callus relatively strong, almost black, columella oblique, umbilicus closed.

Description: shell of medium size, thick, spherical, spire slightly depressed to elongate; basic shell colour white with reddish brown spirals; usually spiral No. 2 fused with No. 3, all other spiral bands separate; protoconch medium sized to large in comparison to shell, its diameter ranging from 5–6.5 mm, smooth, white whorls; teleoconch of 4 whorls, sculpture consists of fine axial



Figs 176–178. *Helix* (*Helix*) *pelagonesica* (Rolle, 1898). Fig. 176 neotype *pelagonesica* Rolle, 1898, SMF 9771, Pelagonisi, D = 41.6; Fig. 177 holotype *volensis* SMF 9804, "Volos", D = 39.3; Fig. 178 NMBE 520670, Porto Koufos, D = 35.71. — All photos Neubert/Bochud, original size.

riblets; last whorl slightly descending below the periphery; aperture obliquely oval, depressed, apertural rim broad, labial callus relatively strong, dark reddish brown to almost black coloured, columella oblique, columellar triangle small; umbilicus closed in adult shells.

Genital organs (Fig. 179): penis club-shaped, epiphallus as long as penis; flagellum long, exceeding the length of epiphallus+penis three times; mrp

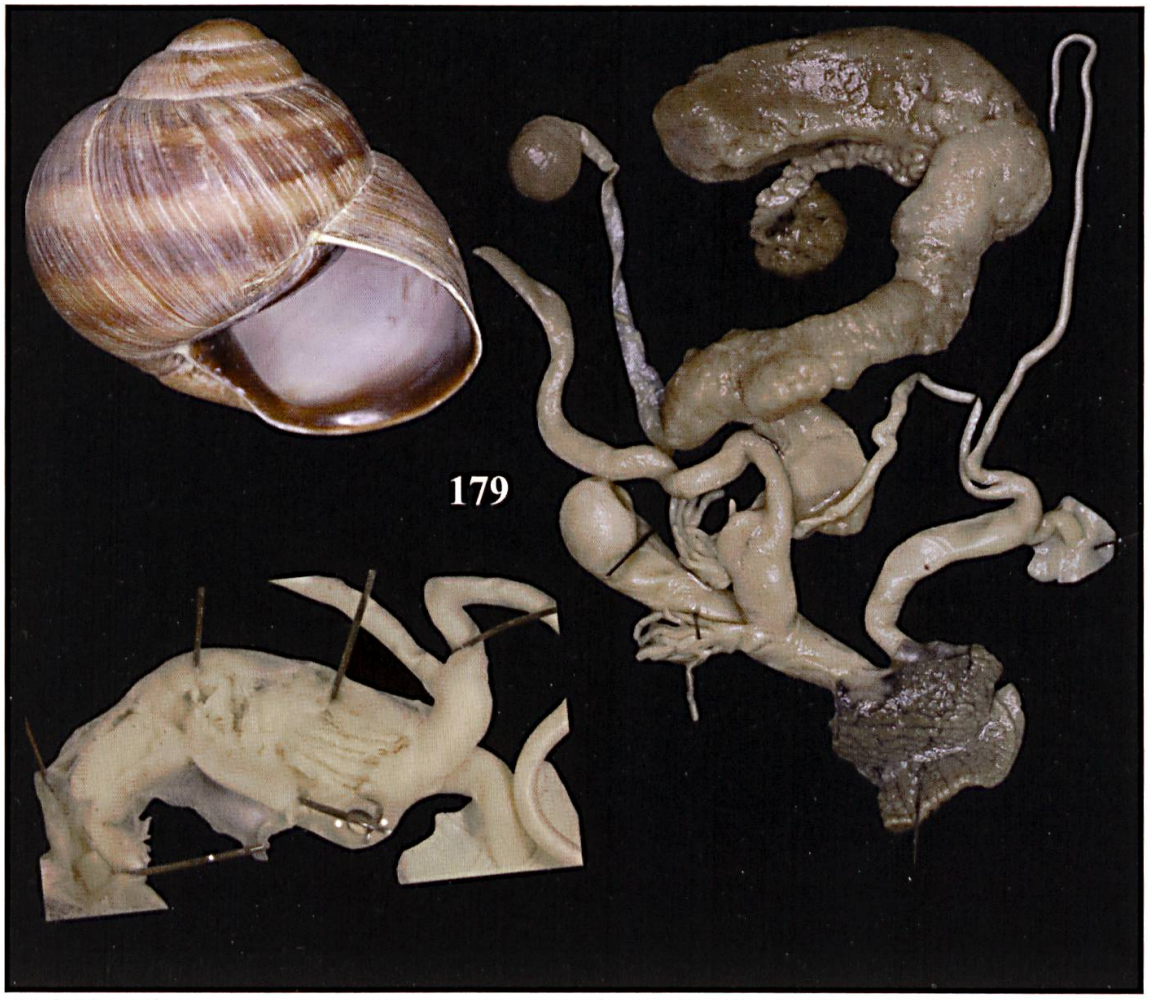


Fig. 179. *Helix* (*Helix*) *pelagonesica* (Rolle, 1898). Genital organs. NMBE 520670, Porto Koufos, situs 44.23.

attaching in a central position on the epiphallus; pp1 much smaller than pp2, penial chamber short, filled with a few ring-like pilasters, both papillae conical with a central perforation; atrial stimulator a rounded knob; female system with a short vaginal tube, dart sac long, glandulae mucosae with a very short basic stem, multi-branched, much shorter than dart sac; pedunculus stem short, with a thick and long diverticulum, bursa copulatrix stem longer than pedunculus stem, vesicle rounded and bent downwards.

Distribution (Fig. 180): *Helix pelagonesica* is known from a limited area in the larger catchment area of the Vardar River, and is also found on the Pilion as well as on the Northern Sporades.

Remarks: The knowledge on this species is very limited. Although distributed over a larger area, there are only a few populations known, all of them seemingly quite isolated. It differs from *H. borealis* by its larger and heavier shell and its larger protoconch; it also has a darker and polished black lip, sometimes with a small columellar thickening. The columella is oblique and

Fig. 180. *Helix* (*Helix*) *pelagonesica* (Rolle, 1898). Distribution.

not perpendicular as in *H. borealis*. In *H. philibinensis*, the lip is usually white with a brownish hue in the upper columellar edge; this species is also smaller and less compact if compared to *H. pelagonesica*, with a relatively thin shell and the coloured spiral bands usually fully separated.

***Helix* (*Helix*) *melanostoma* Draparnaud, 1801** (Figs 181–189)

1801 *Helix melanostoma* Draparnaud, Tableau de Mollusques de la France: 77 [France, Marseille].

1839 *Helix melanostoma* var. *candida* Rossmässler, Iconographie der Land- und Süsswassermollusken 1 (2) (3/4): 9, Taf. 44, Fig. 579 [ohne Vaterland].

1839 *Helix melanostoma* var. *vittata* Rossmässler, Iconographie der Land- und Süsswassermollusken 1 (2) (3/4): 9, Taf. 44, Fig. 577, 578 [ohne Vaterland] [non *Helix vittata* O. F. Müller, 1774].

1876 *Helix melanonixia* Bourguignat, Species novissimae molluscorum: 57 [Algérie, Mascara].

1882 *Helix pachypleura* Bourguignat in Locard, Prodrome de Malacologie Française: Catalogue général des Mollusques vivants de France: 305 [Environs de Grasse].

1883 *Helix uthicensis* Pechaud, Excursions malacologiques dans le nord de l'Afrique de La Calle à Alger, d'Alger à Tanger: 35 [Ruins de Uthica].

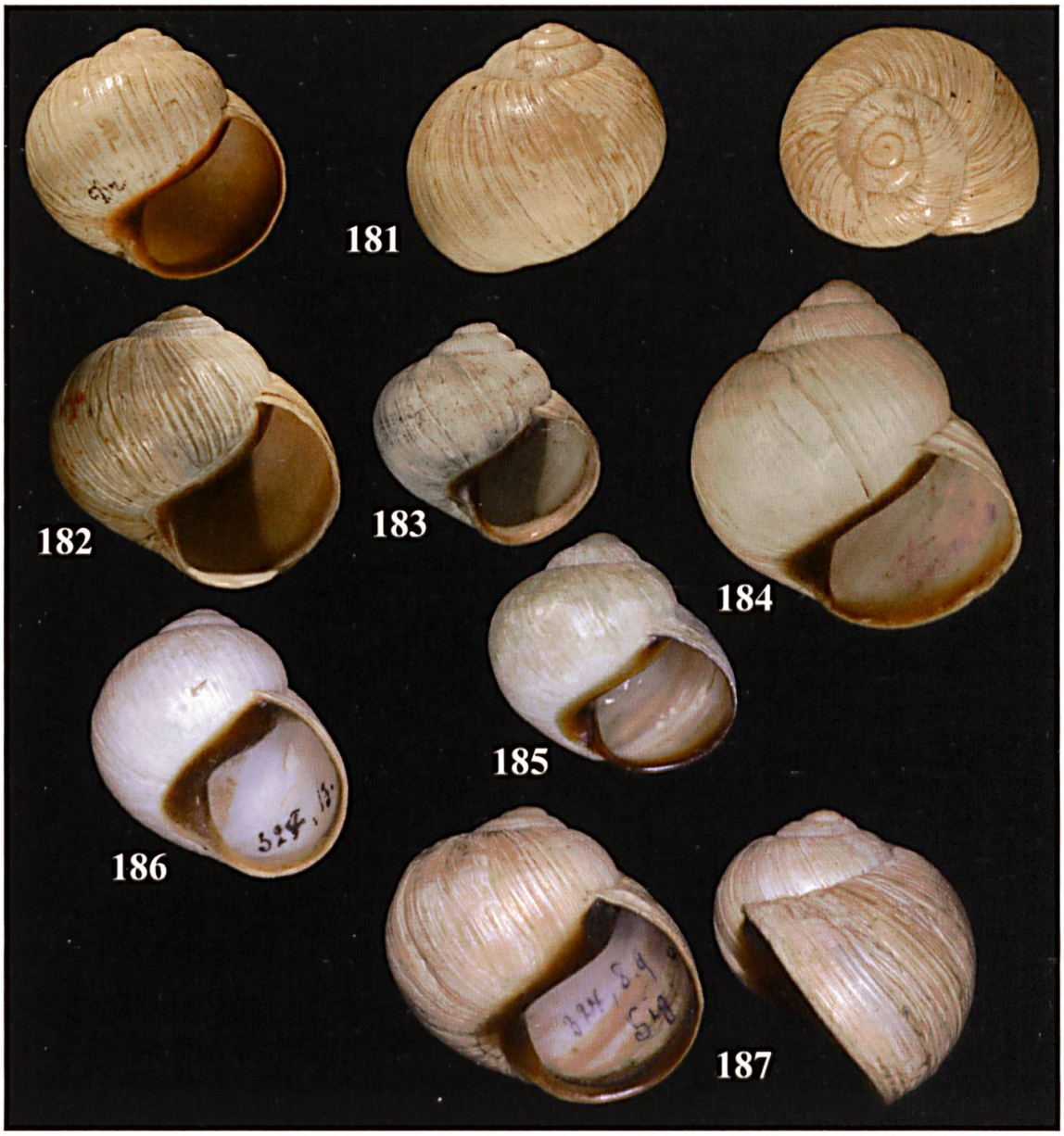
1939 *Pomatia* (*Cunula*) *melanostoma* var. *doliolum* Pallary, Journal de Conchyliologie, 80: 47 [Tunis].

Type specimens:

melanostoma: syntype NHMW 14812; H = 28.01; D = 28.98; PH= 18.2; PD = 19.0; PrD = 4.7; W = 4.5. *vittata*: not searched. *melanonixia*: syntype MHNG 18156, D = 32.2. *pachypleura*: syntype MHNG 18177, D = 25.2. *uthicensis*: syntype MHNG 18185, D = 36.24. *doliolum*: not searched.

Specimens examined:

Tunisia: Kasserine, Cillum, 35.1671 8.7989, 19.4.1997, NMBE 512629/16; ditto, NMBE 503513/7, NMBE 520822/2; ditto, SMF 338069/2; Kasserine, Sbeitla (=Sufe Tula), 35.23 9.13, 1961, NMBE 18447/7; ditto, SMF 280599/12, coll. Schlickum; ditto, SMF 338063/20; Gabes, 33.88 10.12, NMBE 517333/1; Thuburbo Maius, el-Fahs, antique ruins, 36.4017 9.9033, 1.1.1995, NMBE 512633/14; El-Djem, 15 km on the road to north, 35.4186 10.6287, 3.1.1995, NMBE 512632/1; Hammamet, 20 km S Hammamet, 36.3254 10.4817, 2.3.1993, NMBE 512631/1; Sebkhet Mecheguia, Kairouan, 34.9444 10.0457, 2.3.1993, NMBE 512630/1; Takrouna, 36.1502 10.3271, 25.8.2008, NMBE 504093/2; SMF 9691/1, valley of the Medjerdu close Tunis, Orig. MCH 324, fig. 7; SMF 9703/3, Uthica, 37.0565 10.0622, Orig. MCH 325, fig. 1–6; SMF 172518/1, 10 km E Bizerte, 37.2248 9.9583, coll. Kaltenbach; SMF 176520/3, 14 km S Sfax, 34.65 10.66, coll. Kaltenbach; SMF 172519/1, 66 km S Sfax, 34.42 10.18, coll. Kaltenbach; SMF 172521/5, Kriba el Mediouni [Quşaybat al Madyūnī], Monastir area, 35.69 10.84, coll. Kaltenbach; SMF 172517/1, 67 km S Tunis, 36.34 10.49, coll. Kaltenbach; SMF 24351/2, Carthago, 36.86 10.33, coll. O. Boettger; ditto, SMF 74077/3, coll. K.L. Pfeiffer; ditto, SMF 74086/1, coll. Jetschin; ditto, SMF 86131/2, coll. Ehr-



Figs 181–187. *Helix* (*Helix*) *melanostoma* Draparnaud, 1801. Fig. 181 syntype *melanostoma* NHMW 14812, Marseille, D = 28.98; Fig. 182 *melanonixia* syntype MHNG 18156, Mascara, D = 32.2; Fig. 183 syntype *pachypleura* MHNG 18177, Grasse, D = 25.2; Fig. 184 syntype *uthicensis* MHNG 18185, Uthica, D = 36.24; Fig. 185 SMF 311885, Tunesia, Sbeitla, D = 27.41; Fig. 186 SMF 9693, Algeria, El Guerrah, M.-CH. Taf. 324 fig 13, D = 28.4; Fig. 187 SMF 9690, Algeria, Saint Denis au Sig, M.-CH. Taf. 324 fig 8–9, D = 35.4. — Fig. 181 by courtesy of A. Eschner, NHMW, all other photos Neubert, original size.

mann; ditto, SMF 74078/2, coll. Jetschin; SMF 338060/6, Carthago, ruins of the Therme of Antonius, 36.8543 10.3351, 21.04.1998, LIEB; SMF 172514/3, 54.5 km S Tunis in dir. Susa, 36.47 10.57, coll. Kaltenbach (tissue sample Korábek); SMF 172525/7, 82 km S Tunis, Sidi Kalifa, 36.25 10.425, coll. Kaltenbach; SMF 161224/3, "Djebel" El Kef, 37.0469 9.5469, coll. Brandt; SMF 172522/4, 9 km N Kairoun in direction Enfidaville, 35.76 10.12, coll. Kaltenbach; SMF 172524/8, Enfidaville, 16 km W dir. Kairouan, 36.01 10.32, coll. Kaltenbach (tissue sample Korábek); SMF 74265/1, Kairouan, 35.67 10.09, coll. K.L. Pfeiffer; Tunis, Ariana, 36.8 10.18, NMBE 22854/3; SMF 24348/2, Tunis, 36.7826

Fig. 188. *Helix* (*Helix*) *melanostoma* Draparnaud, 1801. Genital organs. SMF 311885, Tunesia, Sbeitla, situs 46.31.

10.1875, Orig. Icon. 1036; ditto, SMF 9612/1, around Tunis, Orig. MCH 324, fig. 5–6; ditto, SMF 172576/1, around Tunis, coll. Kaltenbach; ditto, SMF 9714/1, Tunis, Orig. MCH 324, fig. 10; ditto, SMF 24341/1, coll. O. Boettger; ditto, SMF 24342/1, coll. Henrich; ditto, SMF 24336/2, coll. Moellendorff; ditto, SMF 24357/2, ex Pallary; ditto, SMF 74098/1, coll. C. R. Boettger; ditto, SMF 74074/2, coll. K.L. Pfeiffer; ditto, SMF 74075/2, Tunis, Fort, coll. K.L. Pfeiffer; ditto, SMF 74076/2, Tunis, Belvedere, coll. K.L. Pfeiffer; ditto, SMF 74097/2, SMF 74085/2, Tunis, coll. Jetschin; ditto, SMF 74094/3, coll. C. R. Boettger; ditto, SMF 24349/5, coll. O. Boettger; ditto, SMF 24360/9, coll. Kobelt; ditto, SMF 338061/8, Tunis, Belvedere Park, 19.04.1998; SMF 74092/3, Beja, 36.73 9.18, coll. C. R. Boettger; ditto, SMF 9703/3, SMF 24359/8, coll. Kobelt; SMF 74082/3, La Goulette, 36.817 10.305, coll. Jetschin; ditto, SMF 74093, coll. C. R. Boettger; SMF 299491/2, Hammamet, 36.40 10.62; ditto, SMF 214883/2, coll. S. H. Jaeckel; ditto, SMF 280600/5, coll. Kaltenbach (tissue sample Korábek); SMF 280598/7, Tozeur, 33.92 8.13, coll. Schlickum; SMF 338062/7, Bizerta, 37.27 9.87, 16.04.1998, LIEB; SMF 338068/9, Haidra at Thala, 35.565 8.445, 05.04.1998, LIEB; SMF 338066/14, Dugga close to Teboursouk, 36.423 9.219, 07.04.1998, LIEB; ; SMF 338064/10, Bulla Regia close to Jendouba, 36.56 8.76, 09.04.1998, LIEB; ditto, SMF 338067/14; SMF 338065/1, Mahdia, Cap Afrique, 35.505 11.075, LIEB; SMF 338059/2, Djerba, Mederine, LIEB; SMF 24354/1, El

Kantara, coll. O. Boettger; SMF 24340/1, Djebel Batteria close Monastir, coll. O. Boettger; SMF 161233/3, 10 km south Susa, coll. Brandt; SMF 172515/2, 10 km south Susa, coll. Kaltenbach; SMF 172523/19, Sebka Kalbia, on the road to Kairouan, coll. Kaltenbach (tissue sample Korábek); SMF 172526/9, 8 km W Libyian border, coll. Kaltenbach.

Algeria: SMF 9689/1, valley of the Bu Merzug, Constantine, Orig. MCH 324, fig. 11–12; SMF 74080/1, Constantine, 36.37 6.62, coll. Jetschin; ditto, NMBE 22851/1; ditto, NMBE 22850/2; SMF 9693/1, El Guerrah, 36.14 6.61, Orig. MCH 324, fig. 13; SMF 24355/1, Lambessa, 35.49 6.255; ditto, SMF 74079/2, coll. Jetschin; ditto, SMF 74091/2, coll. C. R. Boettger; ditto, 214882/1, coll. S. H. Jaeckel; ditto, SMF 9688, Orig. MCH 324, fig. 14; SMF 86127/1, Oran, 35.69 -0.63 coll. Nägele; ditto, SMF 172513/1, coll. Kaltenbach; ditto, SMF 74087/2, coll. Jetschin; SMF 74090/2, Algier, city, 36.76 3.05, coll. C. R. Boettger; ditto, SMF 24352, ex Terver; ditto, NMBE 22852/6; SMF 86126/4, south of Boghari, 35.84 2.77, coll. Nägele ex Ancey; Mostaganem, 35.93 0.09, NMBE 22849/4;

Problematic with deep spirals and granules: SMF 9690/1 (sub *melanostoma*): Algeria, Saint Denis du Sig, 35.53 -0.19, Orig. MCH 324, fig. 8–9, coll. Kobelt; 24327/1, Constantine, coll. Rossmässler; 24356/3, Saint Denis du Sig, coll. Kobelt.

Diagnosis: shell of medium size, greyish to brilliant white, spherical, teleoconch sculptured by coarse ribs, labial callus and palatal area deep brown to chocolate coloured, umbilicus closed; penis and epiphallus of same length, flagellum moderately long, glandulae mucosae much shorter than dart sac, pedunculus with a thick and short diverticulum.

Description: shell of medium size, spherical, spire depressed to moderately raised, conical; basic shell colour greyish to brilliant white, seldom with chestnut brown spirals, sometimes the upper three spirals fused to form a single broad and darker subsutural area, sometimes all five spirals visible; protoconch medium sized in comparison to shell, its diameter ranging from 4–5.5 mm, smooth, white whorls; teleoconch of 3–4 whorls, sculptured by coarse ribs, no granulation present, but sometimes with faint subsutural spiral incisions on the body whorl; last whorl slightly descending below the periphery; aperture rounded, apertural rim broad, labial callus moderately strong, deep brown to chocolate coloured, dark colour expanding to the complete palatal area; columellar triangle small; umbilicus closed or seldom slit-like open in adult shells.

Genital organs (Fig. 188): penis club-shaped, epiphallus of same length as penis; flagellum long, exceeding the length of epiphallus+penis three times; mrp attaching in a central position on the epiphallus; internally, pp1 considerably smaller than pp2, penial chamber long, filled with a few elongate folds, both papillae conical with a central perforation; atrial stimulator an elongated raised lamella with a small terminal knob; female system with a long vaginal tube, dart sac strongly developed, glandulae mucosae with a basic stem branching into a few tubules, much shorter than dart sac; pedunculus stem long, with a thick and short diverticulum branching off the pedunculus in

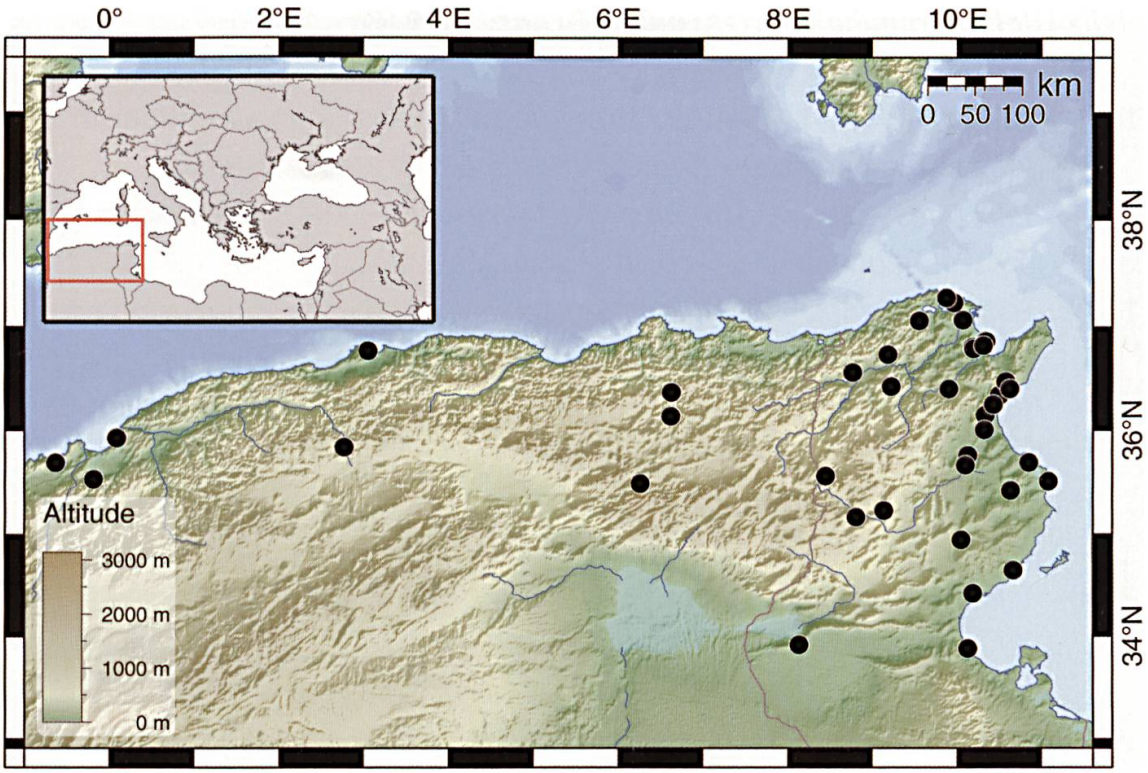


Fig. 189. *Helix* (*Helix*) *melanostoma* DRAPARNAUD, 1801. Distribution.

its lower third, bursa copulatrix stem longer than pedunculus stem, vesicle rounded and bent downwards.

Distribution (Fig. 189): This species is known from the complete Mediterranean coast of France, Malta, and from Tunisia to Oran in Algeria, at the border to Morocco.

Remarks: The conchological distinction between *H. melanostoma* and *H. pronuba* is sometimes difficult. Usually, the shells of *H. melanostoma* are smooth besides a pattern of quite strong and coarse ribs; *H. pronuba* shows a delicate pattern of granules and much finer riblets on the teleoconch. Particularly in southern Tunisia including Djerba, shells are recorded which could be either *H. pronuba* or *H. melanostoma*, and it is very likely that in this area, the two species occur in sympatric conditions.

Another remarkable population is recorded from a few localities in Algeria (St-Denis-du-Sig; Mostaganem; Constantine) (Kobelt 1904: 124, Taf. 324, Figs 8–9). Here, the shells are ornamented with deep subsutural spiral incisions on the body whorl, which is in clear contrast to the usually smooth shells in *H. melanostoma*. These shell characters are here considered as local variations, a geographical pattern of this trait is not observed at the moment. Still, the difference of these shells to *H. pronuba* consist in the teleoconch granulation of the latter.

***Helix* (*Helix*) *pronuba* WESTERLUND & BLANC, 1879** (Figs 190–197)

1859 *Helix nucula*, – L. Pfeiffer, Monographia heliceorum viventium 4: 160 [Alexandria] [non *Helix figulina* var. *nucula* MOUSSON, 1854].

1879 *Helix thiesseana* var. *pronuba* WESTERLUND & BLANC, Aperçu sur la faune malacologique de la Grèce: 80 [Crete, Messarà].

1879 *Helix thiesseana* var. ? *nupta* WESTERLUND & BLANC, Aperçu sur la faune malacologique de la Grèce: 82 [Crete, Messarà].

1904 *Helix* (*Helicogena*) ? *rueppelli* KOBELT, Systematisches Conchylien-Cabinet VI: 122, Taf. 325, Fig. 13, 14 [Egypten].

1905 *Helix* (*Helicogena*) *grothei* KOBELT, Systematisches Conchylien-Cabinet VI: 201, Taf. 349, Fig. 7, 8 [Regentschaft Tripolis, Libyen].

1950 *Helix nucula* forma *incultarum*, – Kaltenbach, Archiv für Molluskenkunde 79 (1/3): 62, Taf. 10, Fig. 9 [Cyrenaika, Plateau s. der östl. Kaserne von Derna].

1950 *Helix nucula* forma *semidesertorum*, – Kaltenbach, Archiv für Molluskenkunde 79 (1/3): 62, Taf. 10, Fig 10–11 [Cyrenaika, Dünen beim südlichen Salzsee von el-Coefia, etwa 11 km n. Bengasi].

Type specimens:

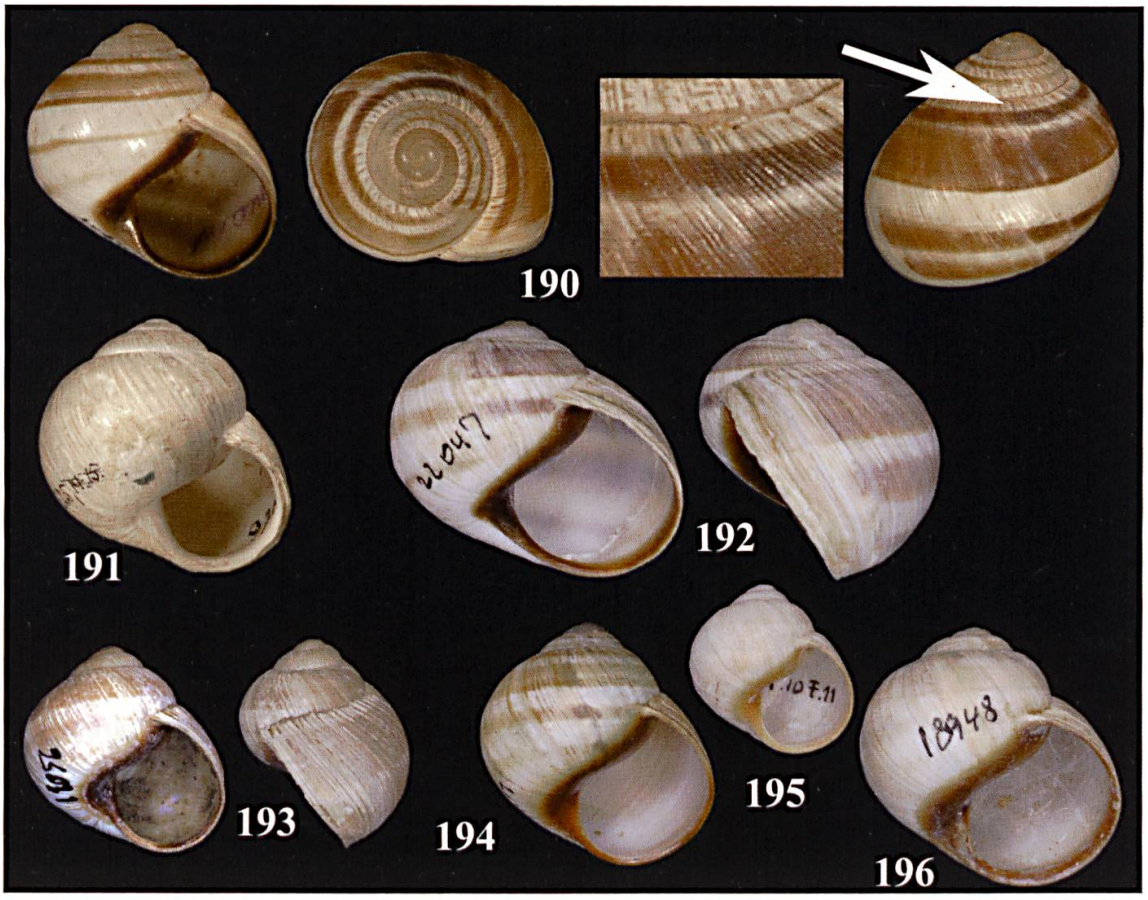
nucula: no original specimens were found in major European museums. *pronuba*: syntype GNM 1723, H = 26.3; D = 25.5; PH = 19.8; PD = 12.7; PrD = 4.3; W = 4.75. *nupta*: no specimens found in GNM. *rueppelli*: holotype SMF 9702, D = 26.7. *grothei*: holotype SMF 9836, not measured.

Note: In contrast to the commonly accepted use throughout the last 150 years, Pfeiffer did not describe a new species in 1859 but simply tried to redefine *H. nucula* Mousson using the specimen(s?) he had received from Parreyss. The quotation of Mousson in the synonymy of this species shows that he was aware of the true authorship of this name. Unfortunately, this was in fact the dark-mouthed North African *Helix*, and not the true white-mouthed *H. nucula* from Turkey. For this reason, the next available name has to be used, i.e. *pronuba* WESTERLUND & BLANC, 1879.

Specimens examined:

Greece, Crete: Arkasa, Karpathos, 35.4782 27.1196, 9.7.1982, NMBE522643/1; Lendas, Gortys, Kreta, 34.9308 24.9243, 29.12.1984, NMBE503511/9, SMF/20; Palaiochora, Kreta, 35.2268 23.6811, 27.12.1980, NMBE 503510/3; Hagios Deka, Gortys, Kreta, 35.06 24.95, 2.5.1994, NMBE 18457/1. Dodekanissos: Chalki Island, 21.5.1983, SMF/8, NMBE 528722/3.

Egypt (if not mentioned otherwise, all samples from coll. Kaltenbach): Alexandria (Al Iskandariyah), 31.2 29.92, NMBE 22856/3; ditto, 1854, NMBE 22853/2; ditto,



Figs 190–196. *Helix* (*Helix*) *pronuba* WESTERLUND & BLANC, 1879. Fig. 190 *pronuba*: syntype GNM 1723, Messarà, D = 25.5; Fig. 191 *rueppelli*: holotype SMF 9702, Egypten, D = 26.7; Fig. 192 SMF 172512, Egypt, 11 km W road Alexandria to Kairo, D = 30.1; Fig. 193 SMF 172492, Egypt, Alexandria, garden of the Borromaeum, D = 20.7; Fig. 194 SMF 214791, Libya, El Kish close to Barka, D = 24.1; Fig. 195 *semidesertorum*, smallest specimen from W Agheila, D = 16.7; Fig. 196 SMF 172900, Libya, Tripolitania, Wadi Goam close Houm Genit, D = 26.7. — All photos Neubert, original size.

SMF 24427/1, coll. Rossmässler; ditto, SMF 24439/1, ex Knobbe; ditto, SMF 74104, coll. C. R. Boettger; Djebel Bakhevia, Upper Nil, NMBE18493/8; Port Said/Bur Said, 31.27 32.3, 2.1913, NMBE18479/1; SMF 172486/3, El Alamein, 30.8199 28.9504; SMF 172476/2, 83 km W Alexandria, 30.816 29.1599; SMF 172447/1, 32 km E Sidi Barani, 31.5312 26.2473; SMF 172478/1, 9.4 km W Sidi Hamid, 30.6206 30.8095; SMF 172479/2, 108 km W Marniet (?); SMF 172480/1, 10 Alexandria in dir. Kairo, 31.1739 30.0766; SMF 172481/1, 102 km W Marsa Marniet; SMF 172482, Alexandria, S of 1. dam over the Mariut Lake, 31.1712 29.9058; SMF 172483/1, 85 km E Sollum [Sidi Barami], 31.6012 25.9387; SMF 172484/1, Bakis (= Bakisch, Bakus?) W Alexandria, 31.2379 29.9671; SMF 172485/2, valley 183.7 kmW Alexandria, 31.0670 28.1787; SMF 172487/1, Mariut Lake 3 km from Alexandria in dir. Kairo, 31.1655 29.9242; SMF 172492/8, Alexandria, garden of the Borromaeum; SMF 172493/4, 10 km E Sollum, 31.5140 25.2022; SMF 172494/7, km 344 E Sollum, 31.0283 28.4991; SMF 172488/2, between the 2 branches oft he Mariut Lake, 31.1439 29.8656; SMF 172489/1, Marsa Matruh, harbour, 31.3615 27.2456; SMF 172490/1, 20 km from Sidi Barami to Marsa Matruh, 31.5522 26.1262; SMF 172491, few kilometers E Sid Abd el Bachwan; SMF 172495/7, Alexandria, hill SW of 1. dam over the Mariut Lake;

ditto, 172496/5, ; SMF 172497, Alexandria, hills W of Mariut Lake; ditto, 172498/4; SMF 172499/10, Abu Mena SW Alexandria, 30.841 29.663; SMF 172502/2, 14 km E Beleig [Balig Hasaf?] (= 8 km W crossroads Alexandria–Kairo), 31.0802 30.3187; SMF 172503/2, 3.5 km W Matruh, 31.3539 27.1876; SMF 172500/13, 43 km from Alexandria to Kairo, 31.0735 30.3447; SMF 172508/1, 3 km E Debba; SMF 172509/8, road Alexandria to Sollum, somewhat W Behig, 30.9458 29.5106; SMF 172510/12, Abu Mena, 40 km SW Alexandria, 30.841 29.663; SMF 172504/2, 107 km W Marsa Matruh, 31.5333 26.2367; SMF 172505/1, 56 km W Alexandria, 30.9099 29.4355; SMF 172506/1, 10 km E Marsa Matruh, 31.3416 27.3408; SMF 172507/2, Behig, 30.9322 29.6066; SMF 172511/17, quarry N Behig, 30.9501 29.5801; SMF 172512/29, 11 km W road Alexandria to Kairo, 31.1647 30.085, coll. Kaltenbach; SMF 24438/2, Ramleh close to Alexandria, 31.228 29.9762; ditto, SMF 24434/4, ex Loebbecke; ditto, SMF 74099/2, coll. Jetschin; ditto, SMF 74105/3, coll. C. R. Boettger; SMF 9686/2, unknown, Orig. MCH 325, fig. 10, 11 (reduced granulation); SMF 24225/2, Kairo, Palais of the Khediva; SMF 1411/2, Heliopolis, 30.0917 31.3224, ex Rolle; SMF 24436/3, El Mecks close Alexandria, 31.1445 29.8367, coll. O. Boettger; SMF 24444/21, Mariut Alexandria, 31.1712 29.9058, ex Schweinfurth.

Libya (if not mentioned else, all from coll. Brandt or Kaltenbach). Cyrenaica: SMF 158511/24, Cyrene, Roman bath, 32.8234 21.8528; SMF 86132, Derna, 32.7667 22.6334, ex Stürmer; ditto, 16.12.1956, NMBE 18499/3; SMF 158526/7, Tokra pass; SMF 158573/12, Tokra, castle, 32.5341 20.5666; SMF 158525/8, 6 km S Agedabia [Adschabiya], 30.7087 20.2742, ditto SMF 1558538/7; SMF 37027/1, Tobruk, 32.0772 23.9608, ex Wohlberedt; SMF 280587/5, Cyrenaika, Apollonia, 32.8997 21.9666; SMF 158519/6, Wadi Garhar, 12 km S Derna (Gahham?), 32.6644 22.5829; SMF 158515/17, steppe below Benina pass; SMF 158507/20, Cami close to El Kish, Bengasi; SMF 158523/7, Wadi Bu Msaper [Wadi Bu Musafir?], close Derna, 32.7351 22.5899; SMF 158518/5, Wadi Bu Msefer S Derna = [Wadi Bu Musafir?]; SMF 158506/19, Driana [Daryanah], E of lighthouse, 32.345 20.3031; SMF 158520/9, Wadi El Gattara [Wadi al Qattarah], 32.0543 20.0331; SMF 158524/12, Zuetina [Az Zuwaytinah], 30.9522 20.1203; SMF 161222/5, Wadi Scalium close to El Labiat; SMF 158522/11, Derna, 6 km S Fort Marabuta, 32.7043 22.6108; SMF 158514/5, Rues Mlella; SMF 158532/6, Wadi Sakal w Tobruk, 32.0762 23.9611; SMF 161450/5, Marsa Breza [Marsa Brega (al-Buraiqa)], 30.4092 19.5708; SMF 158529/5, Wadi Fil; SMF 158521/7, 13 km S Magrun [Al Maqrun], 31.3342 20.1991; SMF 158531, Hosc es Zuama SE Bengasi [Hawsh, Ḫawsh Shatwān?], 31.9659 20.1622; SMF 158540/4, El Kisch [Dar el Kish], 32.0936 20.07, ditto, 8.10.1956, NMBE 18494/3; SMF 158517/4, Ain Mara, 32.7511 22.3855; Wadi Mradem [Wadi el Maradim], Fiorita, 32.8713 22.3067, 12.4.1959, NMBE 18498/4; Wadi el Maalegh, Martuba [Wādī al Mu'allaq], 32.3795 23.0886, 4.12.1955, NMBE 18497/4; ditto, NMBE 18496/4; Haua Zeiana, Benghasi [Ayn Zayyānah?], 32.2134 20.161, 3.3.1956, NMBE 18495/5. Sirte: SMF 172840/80, 9 km E Sirte city, 31.2082 16.7062; SMF 172835/6, 21 km S Mesrata along the coast, 32.216 15.3151; SMF 1172836/9, 99 km W Agedabia from Sirte, 30.2847 19.4083; SMF 172837/12, 7 km W Agedabia from Sirte, 30.6911 20.1807; SMF 172838/14, 18 km E Sirte city, 31.1925 16.7802; SMF 172839/11, E Buerat [Bwayrat al Ḫasūn], 84 km W Sirte, 31.3989 15.7216; SMF 172834/12, 32 km E Buerat, 31.2719 16.0292; SMF 172833/12, 3 km E crossroads (from coastal road?) to Nafilia [An-Nufalija], 30.8446 17.9132; SMF 172819/1, 58.5

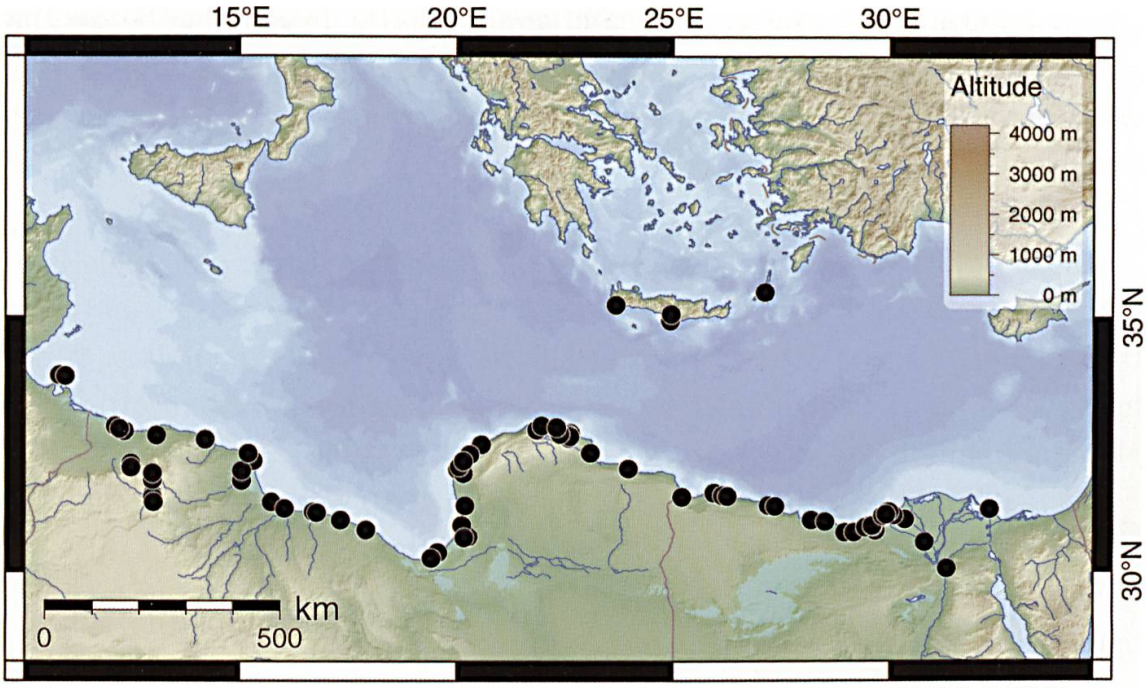


Fig. 197. *Helix* (*Helix*) *pronuba* Westerlund & Blanc, 1879. Distribution.

km W crossroads to Nafilia, 31.0396 17.3222. Tripolitanien: SMF 172900/77, Wadi Goam bei Houm Genit (?); SMF 172898/25, Sidi ben Aden [Suani Beni Aden], 25 km S Tripolis, 32.7172 13.077; SMF 172899/51, 16 km S Tauorga [Tawurgha] close Misrata, 31.8301 15.0407; SMF 172897/30, 11 km N Mirda (Mizda?), 31.5484 12.9919; SMF 172896/16, between Bir Gneim and Jeffren, Garian Mts. [Bi'r al Ghanam and Jafran], 32.1668 12.4918; SMF 172895/18, 7 km E Zneria [Zuwara], 103 km W Tripolis, 32.8933 12.1426; SMF 172876/4, 116 km W Buerat, 32.0185 15.0415; SMF 172877/2, 4 km W Jeffren, 32.0803 12.5042; SMF 172880/1, 29 km E Zuevia, 32.7941 12.3445; SMF 1722889/1, 6 km N Mirda, 31.5035 12.9903; SMF 172879/2, 5 km S Mirda, 31.4076 13.0029; SMF 172882, 100 km E Tripolis, 32.6305 14.2075; SMF 172883/1, 9 km E Misurata, 32.3673 15.1932; SMF 172887/1, 45 km N Mirda, 31.8489 12.9840; SMF 172889/4, 93 km W Tripolis, 32.8476 12.2337; SMF 172894/12, 59 km N Mirda in dir. Garian, 31.9733 12.9841 .

Tunisia: Djerba Island, 33.88 10.85, ex Pallary, NMBE 22855/2; Djerba, Plage Sidi Maharez, 33.8595 10.9834, 20.08.1993, NMBE 512634/1.

Diagnosis: shell small to very small, spherical, white or with up to 5 spirals, teleoconch with fine and densely spaced riblets and a prominent granulation, aperture deep chocolate brown.

Description: shell of small to very small size, thin, spherical, spire conical; basic shell colour greyish white with chestnut brown spirals, often the upper spirals fused to a single brown band, completely white shells abundant; protoconch large in comparison to shell, its diameter ranging from 4–5 mm, smooth, white whorls; teleoconch of 3–4 whorls, sculptured by fine and densely spaced riblets, crossed by deeply incised spiral furrows producing

a prominent pattern of granules; last whorl slightly descending below the periphery; aperture rounded, apertural rim narrow and weak, labial callus weak, deep chocolate brown, columellar triangle small; umbilicus closed in adult shells.

Genital organs: There were no specimens available for dissection.

Distribution (Fig. 197): This species is known from Crete and some East Aegean islands (own records; Psonis & al. 2014, under *H. nucula*), and from the northern African coast from the Nile delta westwards to Tunisia. In the material paragraph only a selection of localities for *H. pronuba* is recorded, for more information on Libyan records see Kaltenbach (1950).

Remarks: The taxa named by Kaltenbach in 1950 were described as ecological forms (*incultarum*, *semidesertorum*) and thus have no status. At least the forma *semidesertorum* is illustrated to show the variability of this interesting *Helix* species living along the border of the Sahara.

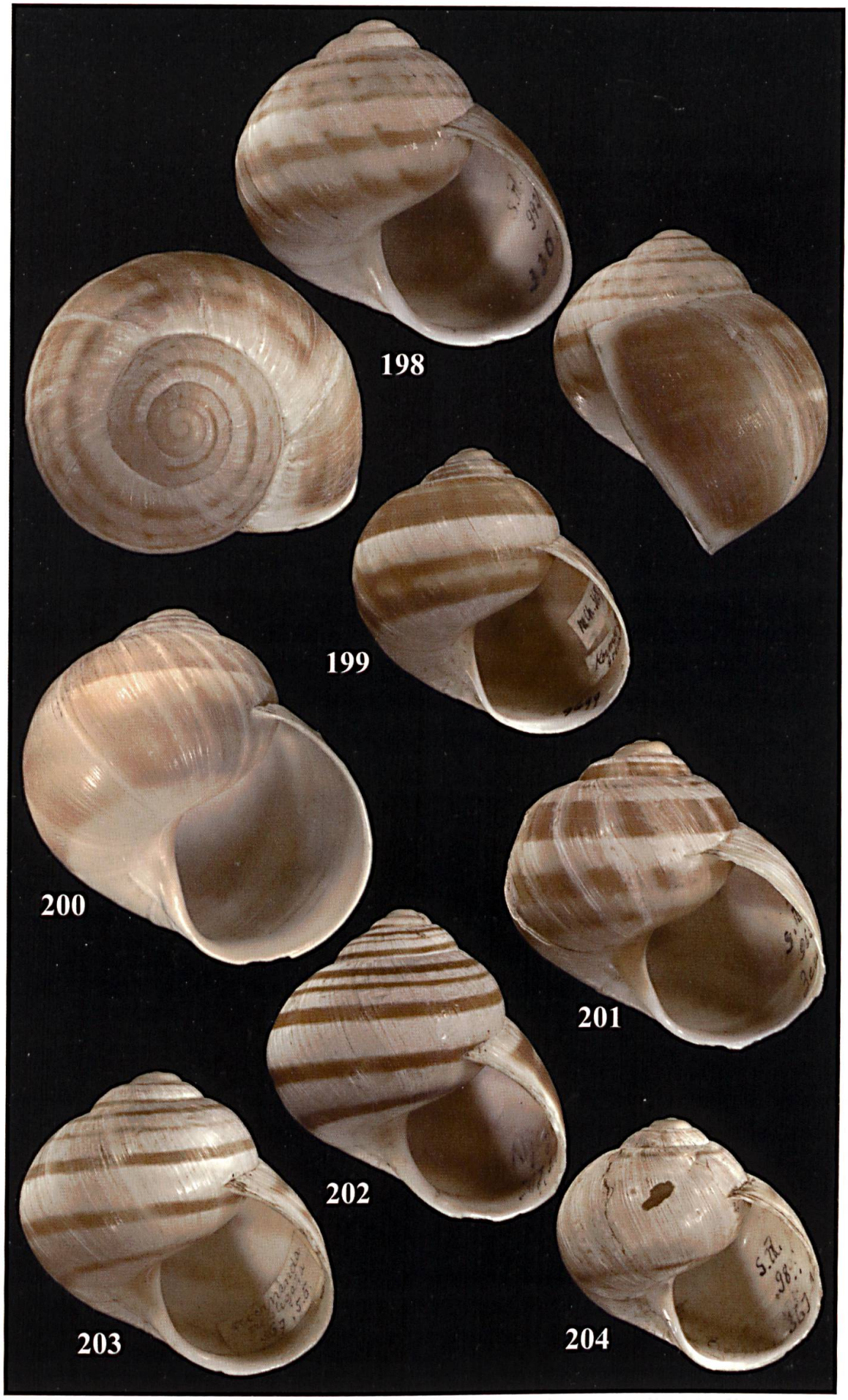
There is an interesting shift of character sets from east to west. In Egypt, the typical form (*Helix nucula* L. Pfeiffer auct.) occurs, with spirally arranged granulation, and clear brown spiral bands; this pattern continues westwards into the Cyrenaica. However, in the Syrte area, the granulation becomes almost obsolete, although still present in some specimens. Here, shells tend to be very small, almost smooth and whitish to cream without spiral bands; in western Libya, shells tend to become larger again, and also the granulation becomes stronger again, while the ribs remain small. For differentiation to *H. melanostoma* refer to this species.

Helix (*Helix*) *secernenda* Rossmässler, 1847 (Figs 198–209)

1847 *Helix secernenda* Rossmässler, Zeitschrift für Malakozoologie 4: 163–164 [Dalmatien, designation of neotype (= Martini & Chemnitz, Systematisches Conchylien-Cabinet 1 (12), Taf. 330, Fig. 1, 2) by Zilch 1952 (165)].

1901 *Helix secernenda* var. *montenegrina* Wohlberedt, Abhandlungen der naturforschenden Gesellschaft Görlitz 23: 197 [Montenegro, Virpazar].

Figs 198–204. *Helix* (*Helix*) *secernenda* Rossmässler, 1847. Fig. 198 *secernenda*: neotype SMF 9923, Risano, D = 47.4; Fig. 199 *dimidiata*: syntype SMF 9699, Grizane, D = 39.3; Fig. 200 *montenegrina*: syntype ZMB, Virpazar, D = 49.3; Fig. 201 *kormosi*: syntype SMF 9633, Senj, D = 45.7; Fig. 202 *njegusensis*: syntype SMF 9737, Karstabhang zwischen Njegus und Cettinje, D = 42.55; Fig. 203 *subligata*: syntype SMF 9747, Karstabhang zwischen Njegus und Cettinje, D = 44.05; Fig. 204 *subalbescens*: syntype SMF 9899, Crkvenica in der Nähe von Fiume, D = 37.1. — All photos Neubert, original size.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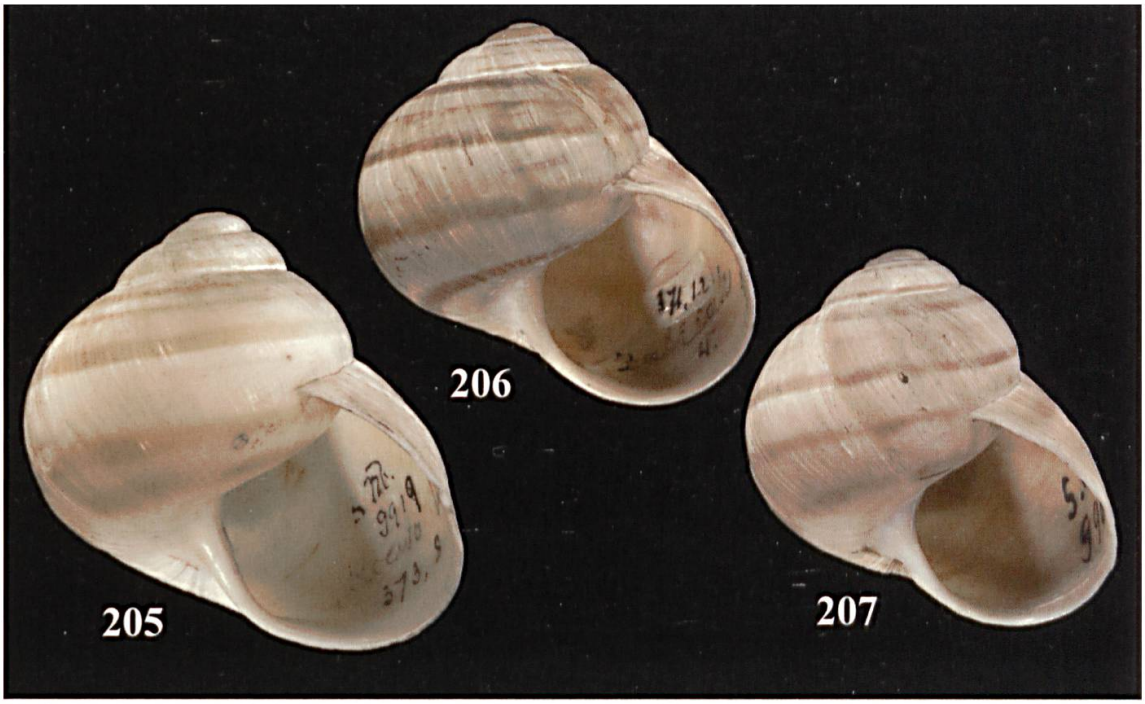


Figs 205–207. *Helix* (*Helix*) *secernenda* Rossmässler, 1847. Fig. 205 *inflata*: possible paratype SMF 9919, Albania, Bogë, D = 45.3; Fig. 206 *subobtusata*: syntype SMF 9782, Zabljak, D = 40.5; Fig. 207 *albanica*: possible paratype SMF 9904, Albania, Bogë, D = 38.2. — All photos Neubert, original size.

1906 *Helix* (*Helicogena*) *secernenda kormosi* Kobelt, Systematisches Conchylien-Cabinet VI: 265, Taf. 367, Fig. 1, 2 [Zengg; = Croatia, Senj, Segna, Segno].

1906 *Helix* (*Helicogena*) *secernenda njegusensis* Kobelt, Systematisches Conchylien-Cabinet VI: 266, Taf. 367, Fig. 3, 4 [Karstabhang zwischen Njegus und Cettinje].

1906 *Helix* (*Helicogena*) *secernenda subligata* Kobelt, Systematisches Conchylien-Cabinet VI: 266, Taf. 367, Fig. 5, 6, Taf. 368, Fig. 3, 4 [Karstabhang zwischen Njegus und Cettinje].

1906 *Helix* (*Helicogena*) *secernenda subalbescens* Kobelt, Systematisches Conchylien-Cabinet VI: 267, Taf. 367, Fig. 7, 8 [bei Crkvenica in der Nähe von Fiume; = Croatia, Crikvenica, Cirquenizza, Crkvenica close to Rijeka].

1906 *Helix* (*Helicogena*) *secernenda dimidiata* Kobelt, Systematisches Conchylien-Cabinet VI: 268, Taf. 368, Fig. 1, 2 [Grizane; = Croatia, Grižane].

1906 *Helix* (*Helicogena*) *secernenda subobtusata* Kobelt, Systematisches Conchylien-Cabinet VI: 277, Taf. 371, Fig. 1, 2 [Zabljak].

1909 *Helix secernenda* (var. *inflata, albanica*) Wohlberedt, Wissenschaftliche Mitteilungen aus Bosnien und der Herzegowina 11: 654 [Albanien, Tal des Pronisat "Boga" fide Zilch; = Albania, Bogë, Kisha e Boges, Kisha e Bogës, Boga, Precaj].

Type specimens:

secernenda: neotype SMF 9923, H = 47.65 mm, D = 47.0; *montenegrina*: syntype ZMB, H = 50.5, D = 49.3; *dimidiata*: syntype SMF 9699, H = 41.9 mm, D = 39.3; *kormosi*: syntype SMF 9633, H = 43.25 mm, D = 45.7; *njegusensis*: syntype SMF 9737, H = 45.5 mm, D = 42.55; *subalbescens*: syntype SMF 9899, H = 36.6 mm, D = 37.1; *subligata*: syntype SMF 9747, H = 43.2 mm, D = 44.05; *subobtusata*: syntype SMF 9782, H = 40.2 mm, D = 40.5; *inflata*: possible paratype SMF 9919, H = 46.4 mm, D = 45.3; *albanica*: possible paratype SMF 9904, H = 40.8 mm, D = 38.2.

Specimens examined:

Croatia: Korcula, Pupnat, 4.3 km in dir. Pupnatska Luka, 42.9319 17.0017, 170 m alt., 8.8.1987, NMBE 523252/1; Knin, SE border of village, 44.0326 16.1913, 30 m alt., 8.1986, NMBE 523258/5; Vrlika, castle, 43.9137 16.3954, 550 m alt., 30 m alt., 8.1986, NMBE 524224/6; Dubravica, 1 km in dir. Metkovic, 43.0281 17.651, 3.8.1972, NMBE 524222/1; Metkovic, 500 m in dir. Glusci, 3.8.1972, NMBE 524221/1; Paklenica National Park, Starigrad, 44.3002 15.4699, 5.8.1972, NMBE 524218/5; Veliki Alan pass, Podgorje Mountains, 44.7091 14.9625, 1100 m alt., 29.7.2002, NMBE 523269/1; Karlobag, E border of village, 44.5258 15.0785, 20 m alt., 30.7.2002, NMBE 523263/2; Road to Stirovaca, Podgorje Mountains, 44.7045 14.9211, 250 m alt., 29.7.2002, NMBE 523259/7; Komolac, close to the source of the Ombla, 42.6751 18.1392, 25.9.2006, NMBE 523254/1; Trstenik, pass above village, 42.9399 17.3769, 385 m alt., 13.4.2009, NMBE 523243/6; Pelješac, Orebic, small footpath to N, 42.9937 17.2054, 200 m alt., 13.4.2009, NMBE 523242/7; Zadar, Nationalpark Paklenica, 44.3415 15.4514, 600 m alt., 8.1978, NMBE 512901/2; Senj, SW slope of Mt. Nehaj, 44.9883 14.8983, 10 m alt., 18.9.2006, NMBE 512674/2; Budva in dir. Cetinje, on the pass close to Martinovici, 42.307 18.93, 880 m alt., 18.6.1987, NMBE 512576/2; hill slope above Trstenik, 42,9287 17.3962, 200 m alt., 10.8.1987, NMBE 523231/1; Pelješac, Mt. Sveti Ilija N of Orebic, 42.9905 17.1596, 210 m alt., 9.8.1987, NMBE 523241/7; Pelješac, village border of Trpanj, 43.0017 17.2765, 50 m alt, 10.8.1987, NMBE 524223/2; Pelješac, Mt. Carovic, Zagorje Mts., 42.8597 17.541, 370 m alt., 6.8.1987, NMBE 523245/3; Pelješac, hill slope at the W border of Sparagovii (= Ponikve), 42.8616 17.6048, 450 m alt., 6.8.1987, NMBE 523268/1; Pelješac, canyon at the Bay of Prapratna, 42.8205 17.6704, 6.8.1987, NMBE 523260/3.

Montenegro: Orlina (= SE Niksic), Vrtac Lake, S lake shore, 42.7493 18.8783, 625 m alt., 12.8.1987, NMBE 523230/3; Dobrota, bay of Kotor, source of the Ljuta, Orahovac, 42.4862 18.7671, 5 m alt., 22.7.1972, NMBE 524219/1; 10 km E Duravci, Mt. Kronistar, S slope, 42.1099 19.2318, 350 m alt., 21.9.2005, NMBE 522357/1; 10 km E Duravci, Mt. Kronistar, S slope, 42.1099 19.2318, 480 m alt., 16.4.2009, NMBE 523264/3; 10 km E Duravci, Mt. Kronistar, S slope, 42.1099 19.2318, 500 m alt., 16.9.2006, NMBE 523250/2, NMBE 523229/4; 10 km E Duravci, Mt. Kronistar, W slope, 42.1109 19.2321, 500 m alt., 26.9.2006, NMBE 523248/2; Kurioci, NW part of the Skutari Lake, 42.3132 19.1885, 23.9.2006, NMBE 523257/9; Herceg Novi, Mokrine, 42.5143 18.4873, 575 m alt., 14.4.2009, NMBE 523249/5; 4 km S Arbnes, Rumija Mts., 42.0583 19.3535, 350 m alt., 21.9.2005, NMBE 522349/1; ditto, 16.4.2009, NMBE 523247/2, NMBE 523237/1 (check); Rijeka Crnojevica, Obodska Cave, 42.352 19.0053, 110 m alt., 23.9.2006, NMBE 523246/1; Krute, canyon 200 m in dir. Ulcinj,

Fig. 208. ***Helix (Helix) secernenda*** **Rossmässler, 1847. Genital organs. NMBE 23350, Lovcen National Park, situs 46.05.**

42.0018 19.2635, 120 m alt., 18.4.2009, NMBE 523244/4; 1 km S, Gluhi Do, on a hill, 42.227 19.0654, 50 m alt., 17.4.2009, NMBE 523236/1; Tudemili, 17 km in dir. Virpazar, Rumija Mts., 42.1829 19.1091, 480 m alt., 25.9.2005, NMBE 522364/5; ditto, 15.4.2009, NMBE 523234/1; Tudemili, 1 km in dir. Virpazar, Rumija Mts., 42.1373 19.1398, 395 m alt., 25.9.2005, NMBE 522371/6; Tudemili, 1 km in dir. Virpazar, Rumija Mts., 42.1323 19.1434, 300 m alt., 25.9.2005, NMBE 522374/7; Tudemili, E village border, Rumija Mts., 42.1323 19.1434, 300 m alt., 25.9.2005, NMBE 522372/3; 2 km E Ostros, 42.0989 19.3046, 130 m alt., 15.9.1985, NMBE 512575/1; 4 km S of Tuzi (= SE of Podgorica), 42.3124 19.3187, 10 m alt., 22.9.2005, NMBE 512906/6; road crossing Petrovac–Virpazar, Pastrovici Mts., 42.2171 19.0219, 600 m alt., 25.9.2005, NMBE 522370/1; Buljarica, SW village border, 42.1998 18.9607, 50 m alt., 25.9.2005, NMBE 522375/10; Duravci, 4 km E in dir. Ostros, S of the Skutari Lake, 42.1479 19.2191, 300 m alt., 21.9.2005, NMBE 522359/1; 4.2 km NW of Mokrine in

dir. Trebinje, 42.5322 18.4671, 770 m alt., 13.10.2004, NMBE 522356/2; 8 km von Kameno in dir. Crkvice, 42.488 18.5813, 1010 m alt., 13.10.2004, NMBE 522373/2; 8.5 km von Kameno in dir. Crkvice, 42.4891 18.5834, 1050 m alt., 13.10.2004, NMBE 522350/3; Kameno, above village, 42.4899 18.5364, 13.10.2004, NMBE 522369/1; Mokrine, NW border, 42.5143 18.4873, 520 m alt., 13.10.2004, NMBE 522354/8; ditto, 19.9.2005, NMBE 522352/6; S crossroads Sutorina–Njivice–Igalo, 42.457 18.4919, 17.9.2006, NMBE 523232/3; Kolasin, 42.82 19.52, 950 m alt., 29.5.2010, NMBE 23353/1; Komarno, Jabukov Do Cave, 42.2736 19.0703, 23.9.2005, NMBE 522366/1; Kotor, 42.4248 18.7719, 24.7.1972, NMBE 524220/2; Kotor, at the southern city walls, 42.4224 18.7715, 15 m alt., 12.10.2004, NMBE 522362/1; Kotor Bay between Risan and Perast, above Monastery Banja, 42.5028 18.6948, 50 m alt., 20.9.2005, NMBE 522368/2; Kotor Bay, Lipci, 42.498 18.6543, 50 m alt., 20.9.2005, NMBE 522365/1; Kotor–Skaljari, hill slope, 42.413 18.7615, 150 m alt., 20.9.2005, NMBE 522348/3; Kotor–Skaljari, SW border, hill slope, 42.4116 18.7623, 200 m alt., 24.9.2005, NMBE 522355/2; Mali Kaliman, 42.0387 19.2673, 350 m alt., 21.9.2005, NMBE 522360&1; Medun NE of Podgorica, 42.4777 19.3677, 450 m alt., 22.9.2005, NMBE 522353/2; Njegusi/Lovcen National Park, 42.4 18.81, 1650 m alt., 2010, NMBE 23351/1, NMBE 23350/1 (alk.); Orahovac, NW village border, 42.4901 18.7532, 20 m alt., 9.2005, NMBE 522367/1; Petrovac, Rijeka–Rezevici, 42.2281 18.9132, 170 m alt., 18.9.2005, NMBE 522351/2; Petrovac, valley N of Perazica Do, 42.2133 18.9294, 100 m alt., 18.9.2005, NMBE 522361/2; Stari Bar, canyon in the NE, 42.0974 19.1381, 200 m alt., 21.9.2005, NMBE 522347/6; Korita, canyon at Mt. Ma e Sokolit, 42.4873 19.5492, 1370 m alt., 22.9.2005, NMBE 522347/6; 4 km S Tuzi, SE of Podgorica, 42.3539 19.3416, 60 m alt., 22.9.2005, NMBE 522363/24; Virpazar, W of road to Podgorica, 42.2515 19.0887, 20 m alt., 22.9.2005, NMBE 522358/2.

Bosnia and Hercegovina: close to Mostar, 11.4.1966, leg. W. Fauer coll. Subai.

Albania: Qafa e Pejes, N of Okol, 42.4416 19.7738, 1700 m alt., 6.7.2003, NMBE 512574/1.

Diagnosis: shell large, thin, elongate spherical, all five spirals separate, aperture cream with columellar triangle brownish; epiphallus as long as penis, glandulae mucosae longer than dart sac, short diverticulum, bursa copulatrix stem short.

Description: shell of medium to large size, thin, elongate spherical, with a high conical spire; basic shell colour greyish white with chestnut brown spirals, usually all five spirals separate, sometimes, spiral No. 2 fused with No. 3; protoconch small in comparison to shell, its diameter ranging from 5–6 mm, smooth, white whorls; teleoconch of 3–4 smooth whorls with fine axial growth riblets; last whorl only slightly descending below the periphery; aperture large, subquadrate to rounded, apertural rim narrow, labial callus weak, cream coloured, usually columellar triangle brownish coloured; columellar triangle small; umbilicus closed in adult shells.

Genital organs (Fig. 208): penis club-shaped, epiphallus as long as penis; flagellum long, exceeding the length of epiphallus+penis three times; mrp

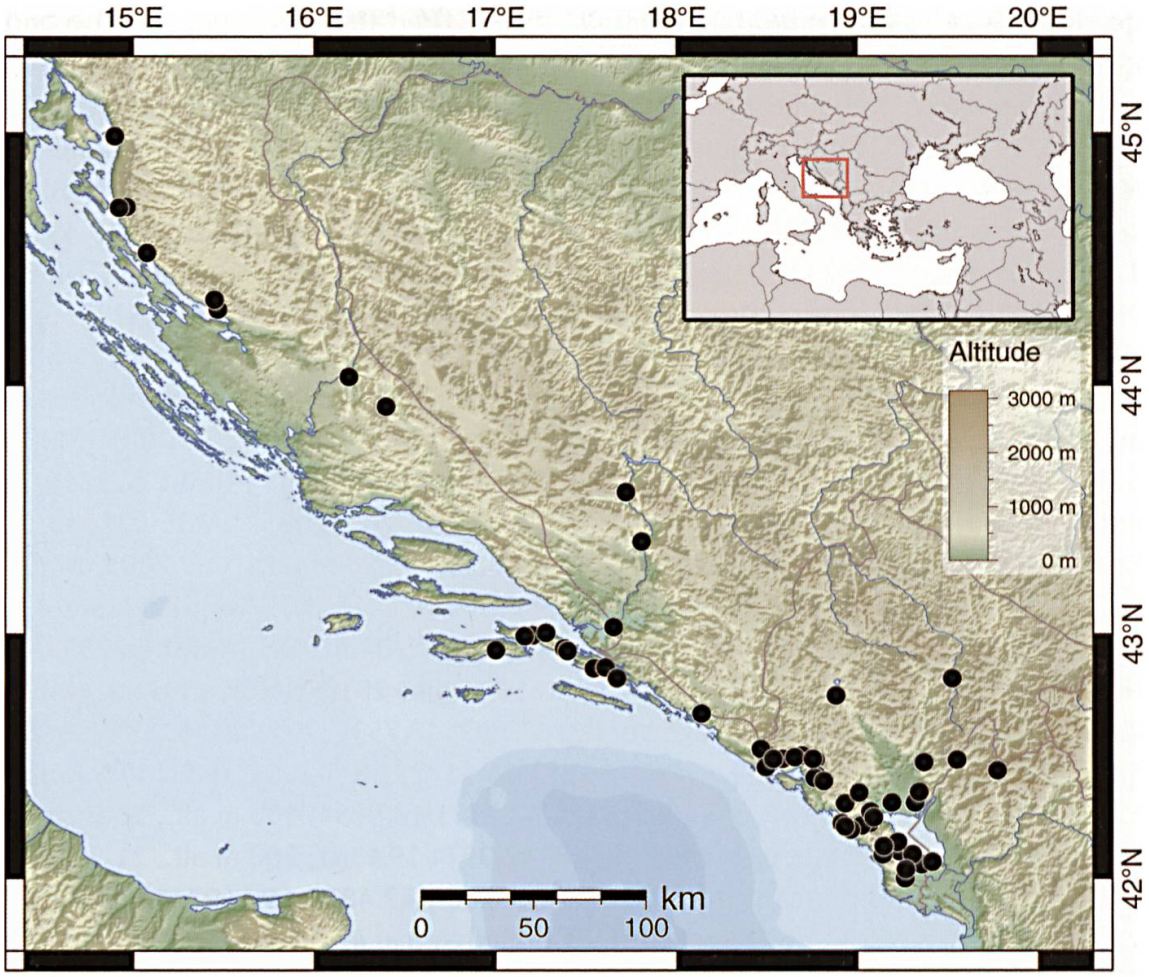


Fig. 209. *Helix* (*Helix*) *secernenda* Rossmässler, 1847. Distribution.

attaching in a central position on the epiphallus; internally, both papillae of equal size, penial chamber short, with a few elongate folds, both papillae conical with a central perforation; atrial stimulator a rounded knob; female system with a very short vaginal tube, dart sac and glandulae mucosae strongly developed, the glandulae with a basic stem, multi-branched, longer than dart sac; pedunculus stem long, with a thick and short diverticulum, bursa copulatrix stem shorter than pedunculus stem, vesicle rounded and bent downwards.

Distribution (Fig. 209): This species is distributed on the northern half of the Balkan Peninsula, mainly in the area of the former Yugoslavia and Albania. Dhora & Welter-Schultes (1996) do not discriminate between *H. secernenda* and *H. schlaeflii*, however, the figures supplied by them (1996: 197, plate 16) show that only Fig. 218–219 from "region Shkoder, 1 km E Zogaj" can be attributed to *H. secernenda*. This place is close to the border to Montenegro. All other figures (Figs 216, 217 and 220, 221) represent *H. schlaeflii*, as can be seen from the smaller and more rounded aperture and the finely striated shell surface. All these figures are records from southern Albania near the bor-

der with Greece. Currently it is not clear, where the boundary between the two taxa can be found, a re-investigation of the specimens that are illustrated in the distribution map of Dhora & Welter-Schultes (1996: 169) could clarify this question.

Remarks: For differences to *H. schlaeflii* refer to this species.

***Helix* (*Helix*) *dormitoris* Kobelt, 1898** (Figs 210–219)

1898 *Pomatia dormitoris* Kobelt, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 30: 163 [Montenegro: Durmitor].

1898 *Helix kolaschinensis* Kobelt, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 30: 164 [Montenegro: Kolašin].

1906 *Helix* (*Helicogena*) *kolasinensis* ? var. *bosnica* Kobelt, Systematisches Conchylien-Cabinet VI: 263, Taf. 362, Fig. 9, 10 [Bosnia and Herzegovina: Bjelasnica bei Serajewo].

1906 *Helix* (*Helicogena*) *stolacensis* Kobelt, Systematisches Conchylien-Cabinet VI: 284, Taf. 374, Fig. 1–4 [Berg Stolac an der serbisch-bosnischen Grenze; = ? 43° 47' 35N 19° 24' 22E, 1011 m alt.?].

1906 *Helix* (*Helicogena*) *pivensis* Kobelt, Systematisches Conchylien-Cabinet VI: 285, Taf. 374, Fig. 5–6 [Montenegro: Durmitor gegen das Pivathal].

1906 *Helix* (*Helicogena*) *pivensis lubnicensis* Kobelt, Systematisches Conchylien-Cabinet VI: 286, Taf. 374, Fig. 7, 8 [Bosnia and Herzegovina: Ljubicna].

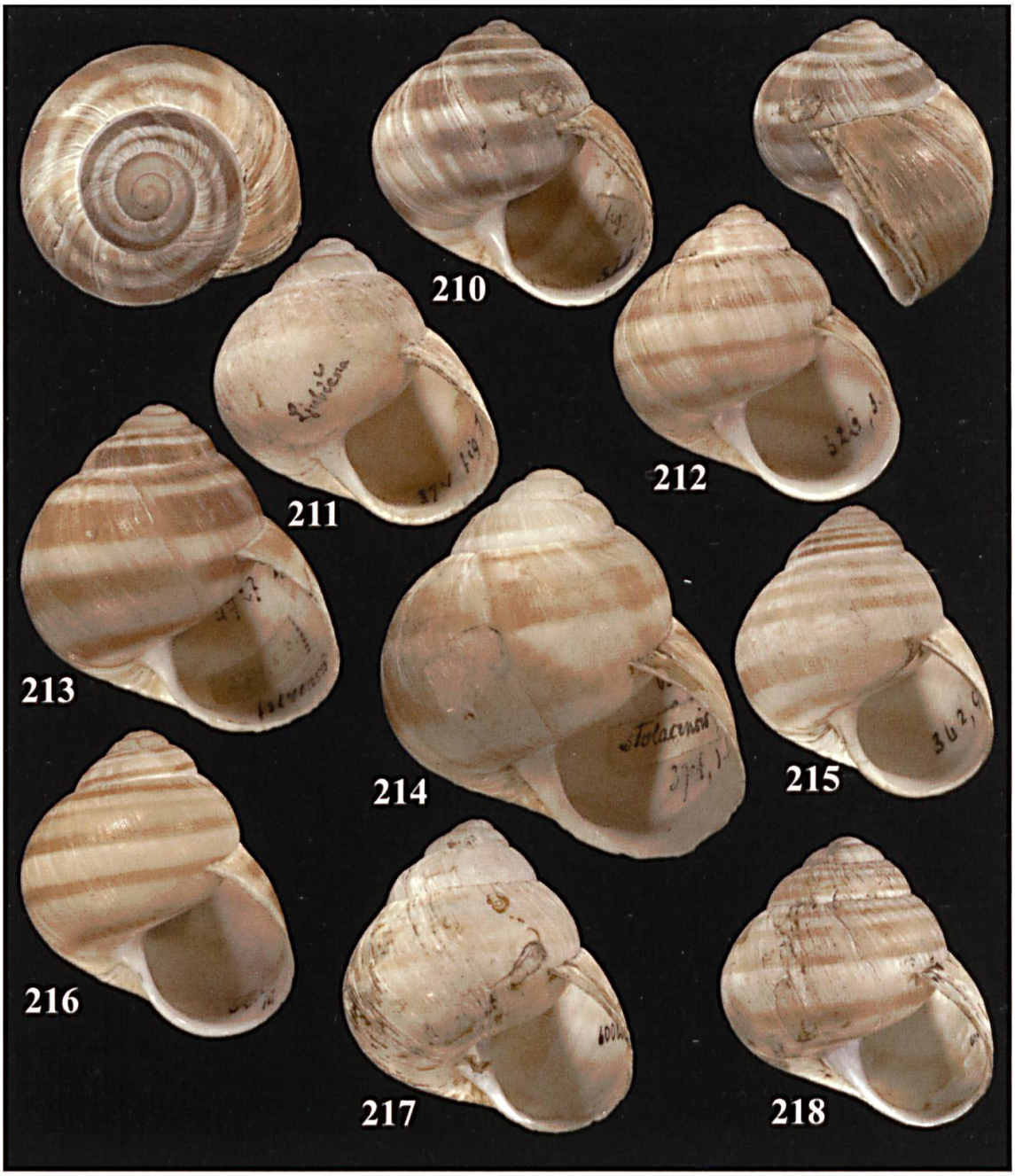
1906 *Helix* (*Helicogena*) *sturanyi* Kobelt, Iconographie der Land- und Süsswassermollusken 2 (12): 42, Taf. 321, Fig. 2027 [Bosnia and Herzegovina: Gacko].

1939 *Helix dormitoris*, Rasse *arnautorum* Knipper, Archiv für Naturgeschichte, N.F. 8: 351 [Aleksandrova vis (= Turcin) in der Šarplanina].

1939 *Helix dormitoris*, Rasse *hajlensis* Knipper, Archiv für Naturgeschichte, N.F. 8: 349 [Hajila Berg unweit Péc, Gipfelregion, 2000–2400 m; Serbia, Kosovo].

Type specimens:

dormitoris: lectotype SMF 9755 (SD Zilch, 1952: 152), H = 34.1, D = 32.75. *kolaschinensis*: lectotype SMF 9721 (SD Zilch, 1952: 153, err. under SMF 7921), H = 34.55, D = 33.0. *bosnica*: lectotype SMF 9757 (SD Zilch, 1952: 153), H = 34.7, D = 30.0. *stolacensis*: holotype SMF 9732, H = 47.2, D = 42.55. *pivensis*: holotype SMF 9727, H = 40.1, D = 37.05. *lubnicensis*: lectotype SMF 9788 (SD Zilch, 1952: 153), H = 34.8, D = 33.2. *sturanyi*: holotype SMF 9772, H = 35.8, D = 31.9. *arnautorum*: paratype SMF 60084, H = 33.3, D = 31.65. *hajlensis*: paratype SMF 60085, H = 37.4, D = 33.7.



Figs 210–218. *Helix* (*Helix*) *dormitoris* Kobelt, 1898. Fig. 210 lectotype *dormitoris* SMF 9755, Durmitor, D = 32.75; Fig. 211 lectotype *lubnicensis* SMF 9788, Ljubicna, D = 33.2; Fig. 212 lectotype *kolaschinensis* SMF 9721, Kolašin, D = 33.0; Fig. 213 holotype *pivensis* SMF 9727, Durmitor gegen das Pivathal, D = 37.05; Fig. 214 holotype *stolacensis* SMF 9732, Berg Stolac, D = 42.55; Fig. 215 lectotype *bosnica* SMF 9757, Bjelasnica bei Serajewo, D = 30.0; Fig. 216 holotype *sturanyi* SMF 9772, Gacko, D = 31.09; Fig. 217 paratype *hajlensis* SMF 60085, Hajila Berg unweit Péc, D = 33.7; Fig. 218 paratype *arnautorum* SMF 60084, Aleksandrova vis, D = 31.65. — All photos Neubert, original size.

Specimens examined:

Montenegro: Crno-Jezero, 1–2 Km from Zabljak, Durmitor, 43.1475 19.0876, 1440 m alt., 15.8.1987, NMBE 523963/8; Budecevica, bridge over the Tara, 43.1502 19.2953, 690 m alt., 13.8.1987, NMBE 523962/189; Zabljak, Durmitor, 43.16 19.12, 27.5.2010, NMBE 23346/3.

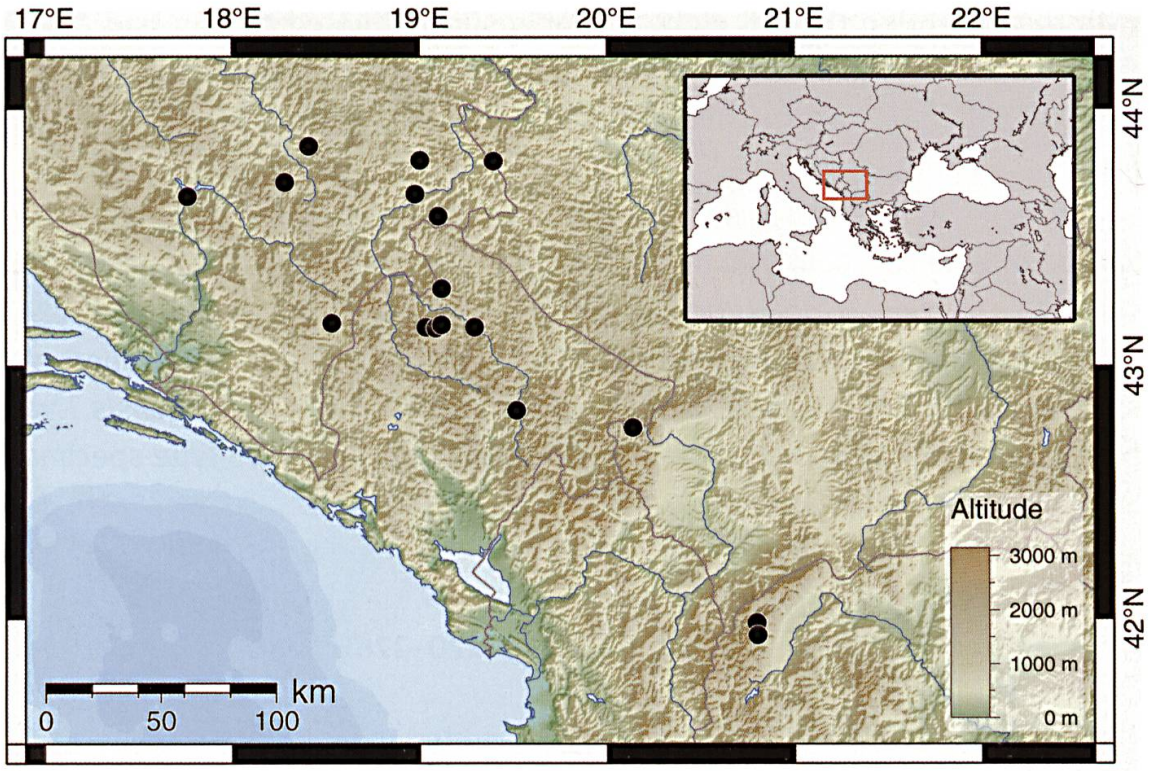


Fig. 219. *Helix* (*Helix*) *dormitoris* Kobelt, 1898. Distribution.

Other records:

Rudoka planina at the village Rudoka, 41.9344 20.8016; Neretva Valley close Jablanica (Hercegovina), 43.6602 17.7652; Rogatica, Bosnia, 43.7992 19.0048; Sarajevo, 43.8557 18.4088; village Pepice close Pec (not identified) (all Knipper 1939). — Cajnica, Bosnia, 43.5828 19.1012; Gorazda, Bosnia, 43.6691 18.9764; Boan-Tuschina, Montenegro (not identified) (all Hesse 1920: 221).

Diagnosis: shell medium sized, high conical spire, usually spiral No. 2 fused with No. 3, aperture cream to white.

Description: shell small to medium sized, thin, elongate spherical, high conical spire; basic shell colour greyish white with chestnut brown spirals, usually spiral No. 2 fused with No. 3 or all five spirals separate; protoconch large in comparison to shell, its diameter ranging from 5–6.5 mm, smooth, white whorls; teleoconch of 3–4 whorls, smooth, with fine axial riblets and a few subsutural spiral incisions; last whorl only slightly descending towards the periphery; aperture rounded, apertural rim narrow, labial callus weak, cream to white coloured, columellar triangle small; umbilicus closed in adult shells.

Genital organs: There were no specimens available for dissection. Hesse (1920: 221, Taf. 658, Fig. 8, 9. Taf. 659, Fig. 1.) under *H. kolaschinensis* noted that the morphology of the genital organs is similar to those of *H. pomatia*,

with the exception that all eight specimens investigated by him had a well developed diverticulum, which is small or even missing in *H. pomatia*.

Distribution (Fig. 219): This species is a small range endemic to the Dinaric Alps in the Central Balkans.

Remarks: The status of this taxon as a separate species is not fully established, and the conchological differences to *H. secernenda* are few. In comparison to this species, *H. dormitoris* has smaller shells, with a more elevated spire, a relatively smaller and more rounded aperture, and an always white aperture. Knipper (1939: 349) records specimens of *H.* (*Helicogena*) *kolasinensis* ? var. *bosnica* from Sarajevo with a reddish columella, however, the type specimen SMF 9757 has a white aperture.

***Helix* (*Helix*) *schlaeflii* Mousson, 1859** (Figs 220–226)

1859 *Helix schläflii* Mousson, Vierteljahrsschrift der naturforschenden Gesellschaft in Zürich 4: 266 [Iannina, Sziza ex Schläfli 1858].

1879 *Helix schläfli* var. *praestans* Westerlund & Blanc, Aperçu sur la faune malacologique de la Grèce : 83 [Corfu, Pantocrator 1000 m].

1906 *Helix* (*Helicogena*) *pomatia* var. *krüperi* Kobelt, Systematisches Conchylien-Cabinet VI: 258, Taf. 365, Fig. 1, 2 [Agnanta (upper reach of the Arachthos, Pindos, not too far from the sanctuary of Dodona) = Agnanda].

1970 *Helix secernenda edlaueri* Urbanski, Bulletin de la Societé des Amis des Sciences et des Lettres de Poznan, Série D 11: 76 [Albanien, Burghof in Kruje].

Type specimens:

schlaeflii: 2 syntypes ZMZ 506230, illustrated syntype: H = 42.75; D = 40.55; PH = 29.1; PD = 21.7; PrD = 6.1; *praestans*: syntype GMN 1754: H = 50.5; D = 48; PH = 34.8; PD = 25.3; PrD = 6.7; W = 5.25. *krüperi*: holotype SMF 9584 (Zilch 1952): H = 43.3; D = 46.4; PH = 31.2; PD = 24.7; PrD = 5.7; W = 5. *edlaueri*: not seen.

Specimens examined:

FYROM: Jablanitsa Mts., up to village Gorna Belitsa, alpine meadow, 41.2312 20.5241, July 2006, leg. I. Dedov, NMBE 520399/3; Galicica Mts., Magaro Peak, 40.9351 20.8204, leg. I. Dedov, NMBE 520400/2.

Greece: SMF 9675 Corfu, Pantokrator, coll. Kobelt; SMF 1818190/2 Corfu; ditto, SMF 18192, coll. O. Boettger ex Reitter; ditto, SMF 18191/2, coll. Kobelt ex Wohlberedt, SMF 18189/5, coll. O. v. Moellendorff; ditto, SMF 86146, coll. Nägele; ditto, SMF 74400, coll. Krüper; ditto, SMF 74401, coll. Krüper; ditto, SMF 74399, coll. Jetschin ex Linnaea; ditto, SMF 74398/2, coll. Jetschin ex Conéménos; ditto, SMF 74402/2, coll. C.R. Boettger; ditto, SMF 74397/2 Corfu (?), coll. K.L. Pfeiffer; Kerkyra, 39.62 19.92,

Figs 220–224. *Helix* (*Helix*) *schlaeflii* Mousson, 1859. Fig. 220 syntype *schlaeflii* ZMZ 506230/a, Iannina, Sziza, D = 39.8; Fig. 221 syntype *praestans* GMN 1754, Corfu, Pantocrator, D = 48.0; Fig. 222 holotype *krüperi* SMF 9584, Agnanta, Pindos, D = 46.4; Fig. 223 NMBE 520399, Jablanitsa Mts., D = 40.24; Fig. 224 NMBE 524743, Porto Koufos, D = 42.05. — All photos Neubert, original size.

NMBE 18480/2; Kerkyra, slope of Mt. Pantokrator, 39.7249 19.8776, 20.7.1975, NMBE 524235/1; Kerkyra, above Petalia, 39.7468 19.8425, 7.8.1995, NMBE 523281/1; Kerkyra, summit of Pantokrátor, radiostation, 39.7471 19.8723, 5.8.1995, NMBE 523273/3; Kerkyra, Mt. Loutses, 39.7722 19.8928, 2.8.1995, NMBE 523275/1; SMF 9674 Epirus, coll. Kobelt; ditto, SMF 18185; ditto, SMF 18186; ditto,SMF 74396/2, SMF 74392/4, coll. Jetschin ex Conéménos; ditto,SMF 74392/2+2, coll. Krüper; ditto, SMF 299519, coll. Kaltenbach ex Linnaea; SMF 18188 Kamarina, 39.1356 20.6722, coll. O. Boettger ex Conéménos; SMF 18187 Goumenitsa [= Igoumenitsa], 39.5061 20.2655, coll. O. Boettger ex Conéménos; ditto, SMF 74391/2, coll. Jetschin ex Conéménos; SMF 74394/2, Arta, 39.1592 20.9868, coll. K.L. Pfeiffer ex Wohlberedt; ditto, SMF 74394/4, coll. C.R. Boettger; SMF 74653/2, Agnanda, coll. Krüper (types of *krüperi*?); SMF 20222/2, Tschumerka [= old name for the mountain chain E of Agnanda, Oros Athamanon], coll. O. v. Moellendorff; ditto, SMF 74710, Tschumerka, coll. Krüper; Amphithea close to Ioannina 200 m in direction to Longades, 31.05.1985, HAUS (3); Amphithea close to Ioannina 3.5 km in direction to Longades, 31.05.1985, HAUS (2); Perama close to Ioannina 3.5 km in direction to Metsovon, 39.6872 20.8739, 22.08.1982, HAUS (2); Perama 3 km in direction to Metsovon, rocky canyon, 30.05.1985, HAUS (1); Ioannina in direction to Driskos, rocks at the crossroads to Kastritsa, 39.6342 20.9930, 31.05.1985, HAUS (1); Ioannina, rocks at the crossroads to Kastritsa SE shore of the Ioannina Lake, 39.599 20.919, 20.07.1990, NMBE 524740/2; Ioannina, Baltuma, 6.7 km in direction to Ioannina, 30.05.1985, HAUS (3); rocks in Mikro Peristeri, 39.7395 21.0888, 30.05.1985, HAUS (3); Lakmos Oros, rock walls above church in Megalo Peristeri, 39.7234 21.0622, 30.05.1985, HAUS (1); Vrosina 1 km in direction to Igoumenitsa, 39.6505 20.5079, 23.08.1982, HAUS (2); Vrosina 10 km in direction to Igoumenitsa, 39.5981 20.4940, 01.06.1985, HAUS (1); Igoumenitsa 6 km in direction to Plataria, rocky canyon close to the lake, 24.08.1982, HAUS (1); Margariti 7 km in direction to Igoumenitsa, 24.08.1982, HAUS (1); Mt. Zalongon N of Prevesa, 39.1481 20.6837, 24.08.1982, HAUS (1); Prevesa, rocks above Dropos, 39.1530 20.7280, 03.06.1985, HAUS (1); Metsovon, 10.5 km in direction to Milea, 39.8247 21.1841, 29.05.1985, HAUS (2); Votonosion 7.5 km in direction to Metsovon, 29.05.1985, HAUS (2); Sitsa 3.8 km in direction to Lithinon, 01.06.1985, HAUS (1); Thesprotias, Paramithia 2 km in direction to Ag. Kiriaki, 39.4795 20.5199, 01.06.1985, HAUS (1); E of Amalthea 1.5 km in direction to Seatozi, 23.08.1982, HAUS (1); Karditsa, rocks W of Morfovounion, 39.3556 21.7372, 18.06.1985, HAUS (1); Karditsa, rocks at Musaki 1.5 km in direction to Krioneri, 19.06.1985, HAUS (1); Krionéri, SW slope of Mt. Varassova, 38.3477 21.5973, 1.10.1989, NMBE 524210/2; Lefkada, Frini in dir. Tsoukalades, 38.8236 20.68, 5.8.1975, NMBE 524236/2; Loutropigi, 39.1173 22.0424, 18.5.1995, NMBE 523267/2; Louros valley, Agios Georgios, 39.2723 20.8446, 28.9.1989, NMBE 524248/2; Gliki, road to Koukoulii, 39.3322 20.603, 15.5.1995, NMBE 523285/1; Morfovouni, 39.3567 21.7464, 23.4.2003, NMBE 523270/11; road Ioanina–Arta, crossroads to Klissoura, 39.3607 20.888, 14.5.2011, NMBE 523253/1; Kartéri, 1 Km N village, 39.3929 20.3718, 14.5.1997, NMBE 523286/1; ditto, 21.4.2009, NMBE 523256/12; Kartéri, 1 Km E village, road Margariti–Igoumenitsa, 39.3953 20.3702, 20.7.1990, NMBE 524253/10; ditto, 15.5.1995, NMBE 523279/1; Louros valley, N exit of canyon, 39.3991 20.838, 20.7.1990, NMBE 524238/1; ditto, 28.9.1989, NMBE 524232/2; ditto, 14.5.2011, NMBE 523240/3; Theodoriana, 6.3 Km S Ort, Athamanon Geb., 39.4021 21.2068, 15.5.2008, NMBE

523255/1, NMBE 523233/1; crossroads to Porti, 1.6 Km S Mouzaki, 39.4113 21.663, 23.4.2003, NMBE 524746/1; Platanoussa, 39.43 21.0117, 16.5.2008, NMBE 523239/2; source of Louros River, 39.4327 20.8413, 28.9.1989, NMBE 524244/1; Plataria, hills W of the bay, 39.4408 20.271, 18.5.2008, NMBE 523262/2; Plataria, above Camping «Kalami Beach», 39.474 20.2493, 9.5.2011, NMBE 523261/3; Frossini39.4496 20.5951, 15.5.1995, NMBE 523276/2; Kataraktis, above the waterfalls, 39.4627 21.1126, 13.5.1997, NMBE 523274/4; Igoumenitsa, pass 35 km E Igoumenitsa, 39.491 20.478, 11.9.1991, NMBE 524739/2; Parapotamos, 2 Km in dir. Ioanina , 39.5297 20.3426, 23.7.1975, NMBE 524228/4; Ano Vereniki, 39.5534 20.5487, 13.5.1995, NMBE 523277/2; Dovla, canyon of small creek, 39.5679 20.5481, 13.5.1995, NMBE 523280/2; Vrossina, 16 Km in dir. Igoumenitsa, 39.5777 20.4766, 14.4.1988, NMBE 524237/1; Vrossina, 13 Km in dir. Igoumenitsa, 39.5944 20.4918, 11.5.2011, NMBE 523235/1; Ioannina, rocks at the crossroads to Kastritsa, 39.599 20.919, 20.7.1990, NMBE 524740/2; Dafni, 39.6356 20.3898, 10.5.2011, NMBE 523238/1; Kastritsa, 39.6393 20.9145, 24.7.1975, NMBE 524234/10; road Filiates–Igoumenitsa, cave chapel, 39.6434 20.2135, 19.7.1990, NMBE 524259/2; ditto, 15.5.1997, NMBE 523272/5; Rizo, crossroads Filiates–Keramitsa 39.6435 20.4164, 19.7.1990, NMBE 524200/2; Tsamantas, SE of village, waterfall, 39.669 20.3214, 17.7.1990, NMBE 524246/3, ditto, 11.5.2011, NMBE 523265/1; Mazia, 39.6705 20.9485, 11.4.1988, NMBE 524252/2; Amfithea, 2 Km E village, 39.6802 20.8871, 24.7.1975, NMBE 524233/6; Amfithea, 39.686 20.8727, 14.5.2011, NMBE 523266/2; Ioannina, cave of Perama, 39.695 20.846, 20.7.1990, NMBE 512577/1; Pérama, 39.6986 20.8482, 28.9.1989, NMBE 524209/24; ditto, 12.5.1995, NMBE 523284/1; mountain slope E Méga Peristéri, Lakmos Mts., 39.7099 21.0941, 21.7.1990, NMBE 524203/5; road Kalambaka – Ioanina, 39.7326 21.0589, 28.7.1975, NMBE 524229/1; ditto, 29.7.1976, NMBE 524226/1; crossroads from road Ioanina–Konitsa, 39.7345 20.7737, 29.7.1975, NMBE 524201/3; Lia, 5.9 Km in dir Lista, 39.7355 20.4581, 17.7.1990, NMBE 523289/1; Monastir Pateron (= W of Zitsa), 39.7642 20.6167, 22.5.1991, NMBE 524250/1; Monastir Pateron, in the valley 1 Km NE, 39.7729 20.6146, 13.5.1997, NMBE 523278/3; Dikorifo, Mitsikéli Mts., 200 m S, 39.7828 20.8041, 23.5.1991, NMBE 524245/1; Kepéssovo, 7.2 Km S of village, old bridge, 39.862 20.7749, 23.5.1991, NMBE 524242/1; Kipi, 200 m W, old bridge, 39.8647 20.7897, 12.5.1995, NMBE 523287/1; Kalpaki, ca. 50 m S of Velas Monastery, 39.8705 20.6253, 13.4.1988, NMBE 524241/2; ditto, 16.7.1990, NMBE 523290/1; road Kalpaki–Monodéndri, 39.8753 20.6951, 30.7.1975, NMBE 524227/1; Monodendri, 5 km above village towrds Farangiou Vikou, 39.89 20.738, 19.7.1990, NMBE 524744/1; Vikos canyon, hiking path to Aristi and Papigo, 39.879 20.7365, 11.4.1988, NMBE 524257/3; Vikos canyon, ca. 200 m from monastery Ag. Paraskevi, 39.888 20.7539, 27.9.1989, NMBE 524258/2; Vikos canyon, N exit at Klidonia, 39.9677 20.6634, 30.7.1975, NMBE 524225/1; road Kerassovo – Lavdani, 39.8799 20.4671, 17.7.1990, NMBE 524255/3; Skamnéli, in dir. Tsepélovo, 39.9089 20.825, 22.5.1991, NMBE 524205/6; Skamnéli, 1 Km E village, 39.9131 20.8738, 23.5.1991, NMBE 524249/3; Papigo, 3h Fussweg E Katafigi, Timfi-Gebirge, 39.9773 20.7644, 24.5.1991, NMBE 524208/9; Porto Koufos, easternmost mountain, Sithonia, Chalkidiki, 39.942 23.944, 2.9.1991, NMBE 524743/7; Toroni, Chalkidiki, 39.98 23.9, 29.8.1991, NMBE 524742/6; 17 km S Sarti, Sithonia, Chalkidiki, 39.993 23.959, 8.9.1991, NMBE 524745/2; crossroads from road Konitsa–Molivdoskepastis, 40.0038 20.5617, 16.5.1997, NMBE 523288/1; Konitsa, 600 m

Fig. 225. *Helix* (*Helix*) *schlaeflii* Mousson, 1859. Genital organs. NMBE 520399, Jablanitsa Mts., situs 52.76.

from old bridge, 40.0331 20.748, 26.9.1989, NMBE 524239/1; Pades, ca. 28 Km E Konitsa, 40.0408 20.9054, 16.7.1990, NMBE 524202/5; Kakolakos, Mt. Dousko, 40.0411 20.4757, 12.5.1995, NMBE 523271/9; road Konitsa – Molivdoskepastis to Pogonisko, 40.0438 20.5617, 16.7.1990, NMBE 524247/3; ditto, 26.9.1989, NMBE 524240/2; Konitsa, Topolca creek, tributary to the Aoos, 40.0706 20.7608, 26.9.1989, NMBE 524207/13; Aetia, 2.2 Km E in dir. Grevena, 40.0739 21.2015, 24.4.2003, NMBE 523251/3; crossroads from road Konitsa–Neapoli, 40.0836 20.7422, 12.4.1988, NMBE 524256/6; Sarantaporos canyon between Exohi and Agia Varvara, 40.1101 20.7203, 11.5.1995, NMBE 523283/1; Sarantaporos canyon, 40.1114 20.7218, 16.7.1990, NMBE 524260/3; Sarantaporos River, 3 Km N Drossopigi, 40.2281 20.9133, 15.7.1990, NMBE 524243/1; Agia Paraskevi, 40.1438 20.8965, 25.9.1989, NMBE 524230/2; Loutra N of Amarantos, 40.1676 20.7321, 25.9.1989, NMBE 524206/6; Loutra, summit of mountain, 40.1735 20.731, 12.4.1988, NMBE 524254/3; Loutra, W slope of mountain, 40.1745 20.7297, 12.4.1988, NMBE 524251/1; Kastania, Kozani, 40.1741 22.0232, 4.8.1991, NMBE 524741/2; mountain between Epano Aréna and Kato Aréna, E slope, 40.2948 20.9381, 11.5.1995, NMBE 523282/1; Epano Aréna, E slope of mountain, Grammos Mts., 40.3447 20.8845, 15.7.1990, NMBE 524204/2; Pérama, 24.7.1975, NMBE 524231/6; Epirus, NMBE 18490/1; Epirus, NMBE 18481/2.

Diagnosis: shell large, large protoconch broadly submammillate, upper spiral bands often fused, aperture brown, umbilicus closed.

Description: shell large to very large, shell form subspherical broad to conical; basic shell colour whitish grey, with the bright spiral band No. 2 and No. 3 almost always fused, sometimes even fused with No. 1, median area of last whorl usually with a sharply pronounced white zone, band No. 4 and No. 5 narrow and always free; protoconch submammillate, usually with a shallow suture and consisting of 2.5 whorls, its diameter ranging from 6–7 mm; teleoconch of 3–4 whorls; covered by fine but rugose and somewhat irregularly arranged riblets or strongly pronounced growth lines; grey axial streaks frequently occur giving a cloudy appearance to the shell; aperture obliquely subquadrate, peristome wide, its rim only weakly calloused; columella and columellar triangle brown, the peristomial rim usually light brown; parietal area usually with a reduced brown colour marking; umbilicus closed in adult shells.

Genital organs (Fig. 225): penis elongate club-shaped, epiphallus considerably longer than penis; flagellum long, three times longer than epiphallus+penis; mrp attaching in a proximal position on the epiphallus; internally, both papillae of equal size, penial chamber very short, smooth inside, both papillae conical with a central perforation; atrial stimulator a triangular knob; female system with a short vaginal tube, dart sac and glandulae mucosae strongly developed, the glandulae with a thick basic stem, multi-branched with a few glandular tubules, longer than dart sac; pedunculus stem short, with a thick and short diverticulum, bursa copulatrix longer than pedunculus stem, vesicle rounded and bent downwards.

Distribution (Fig. 226): This species inhabits the Epirus and the southwestern Rhodope Mts.; it has been reported by Dhora & Welter-Schultes (1996: Figs 216 ("7 km SE of Ballsh"), 217 (Gjirokaster, castle) and 220–221 ("12 km SE Korce)) at least from southern Albania, it probably can be found in Central Albania as well (see also the remark section under *H. secernenda*). These three localities are included in the map here.

Remarks: There is no type designated for *praestans*, because the single specimen does not match the dimensions as given by Westerlund & Blanc in the original description. The authors say (1879: 83) "la hauteur et le diamétre de la coquille, sont égaux et mesurent 53 mm ... l'ouverture est de 39 mm de hauteur sur 30 mm de diamétre". These numbers differ considerably from what could be taken from the specimen GMZ 1754. The description of the banding patterns is (more or less) close, but the figured specimen differs in shape of the aperture, coloration of the columella and parietal area and the fact that the lower two bands are missing. Thus, the status of the specimen

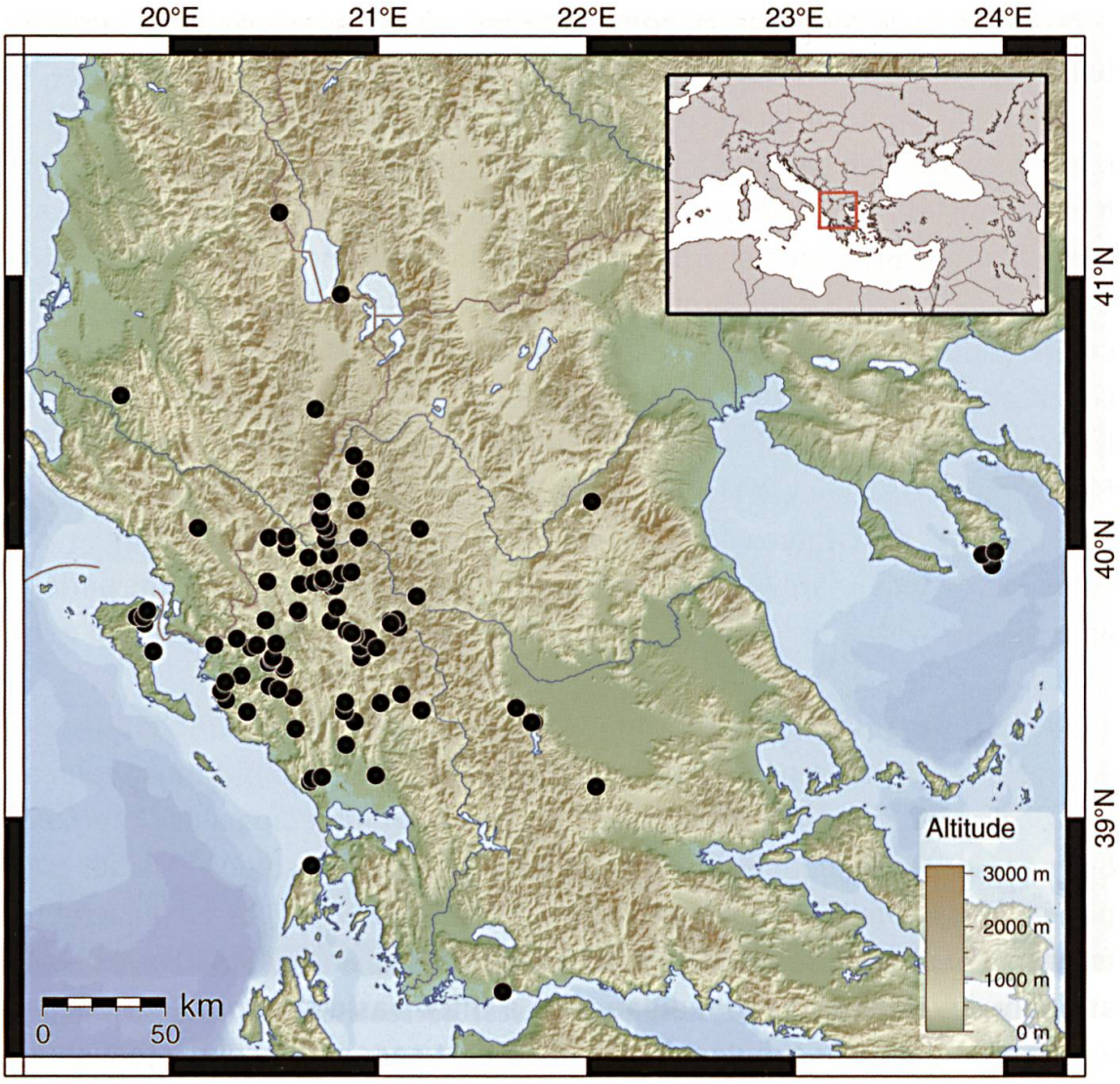


Fig. 226. *Helix* (*Helix*) *schlaeflii* Mousson, 1859. Distribution.

GMN 1754 is somewhat vague, but it is accepted as a syntype as it obviously forms part of the original lot. The allocation of *H. secernenda edlaueri* to *H. schlaeflii* is more problematic. The type locality of *edlaueri* is situated in the presumed overlap area between the two species, but still, the correct distribution pattern of these *Helix* species in Albania is not satisfyingly clarified. Urbanski (1970) describes the shell to have rough riblets on its surface, which usually does not occur in *H. secernenda*, but sometimes can be seen in *H. schlaeflii*. Probably this is a hybrid population between the two species, but currently there is only a single preserved topotype specimen available for molecular research, which is not enough to resolve this problem (Korábek, pers. comm.).

The separation of *Helix* (*Helix*) *schlaeflii* as a species distinct from *H. secernenda* is based on the following character states: The shells of *H.*

secernenda have the spiral bands Nos. 1, 2, and 3 usually separate (usually fused in *H. schlaeflii*), the shell surface of *H. secernenda* is usually smoother than that of *H. schlaeflii*, which has fine axial riblets, the epiphallus in *H. secernenda* is shorter than in *H. schlaeflii*, and the glandulae mucosae are much more developed in *H. secernenda* than in *H. schlaeflii*.

Helix (*Pelasga*) Hesse, 1908

1908 *Pelasga* Hesse, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 40 (3): 139 [type species: *Helix* (*Helicogena*) *pelasgica* Kobelt, 1904 = *Helix figulina* Rossmässler, 1839].

1917 *Pseudofigulina* Hesse, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 49 (3): 123 [nomen novum pro *Pelasga* Hesse, 1908 (non *Pelasgis* Ragonot, 1890); superfluous emendation].

1918 *Naegelea* Hesse, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 50 (1): 38 [type species: *Helix* (*Pomatia*) *Salomonica* Nägele, 1899].

Diagnosis: shells with a white columella and labial callus, shell sculpture smooth or with a fine to strong reticulate pattern; diverticulum long, epiphallus twice as long (or even longer) than penis, flagellum relatively short.

Hesse (1908: 139) defined *Pelasga* to comprise species with "a relatively long penis, the proximal part (epiphallus sensu Hesse) is longer than one third of the complete length; the flagellum is shorter than the penis. The diverticulum is as long as or longer than the stem of the bursa copulatrix". This definition suffers from the insufficient separation of penis and epiphallus, but he already recognised a long "penis" as one of the main character sets.

Remark: *Naegelea* is defined like *Pelasga*, only the dart complex is missing. It has to be stressed that the phenomenon of a complete loss of dart sac and glandulae mucosae is also known in the south Arabian helicoid species *Levantina* (*Laevihelix*) *asagittata* Neubert, 1998. The morphological features of the penis of *H. salomonica* clearly conicide with other species of *Pelasga*, which makes *Naegelea* a synonym of the former.

This subgenus of *Helix* can be easily separated by the morphology of its genital organs. Members of *Helix* (*Pelasga*) inhabit a continuous part of the south-eastern *Helix* distribution range from Greece to Iran in the east, and to Israel and Jordan in the south.

***Helix* (*Pelasga*) *figulina* Rossmässler, 1839** (Figs 227–233)

1839 *Helix figulina* Rossmässler, Iconographie der Land- und Süsswassermollusken (1), 2 (3/4): 9, Taf. 44, Fig. 580 [Griechenland].

1904 *Helix* (*Helicogena*) *pomacella* var. *attalus* Kobelt, Iconographie der Land- und Süsswassermollusken 2 (10): 70, Taf. 299, Fig. 1917 [Pergamon].

1904 *Helix* (*Helicogena*) *pelasgica* Kobelt, Systematisches Conchylien-Cabinet VI: 192, Taf. 345, Fig. 6–11 [Phthiotis, Hypati].

Type specimens:

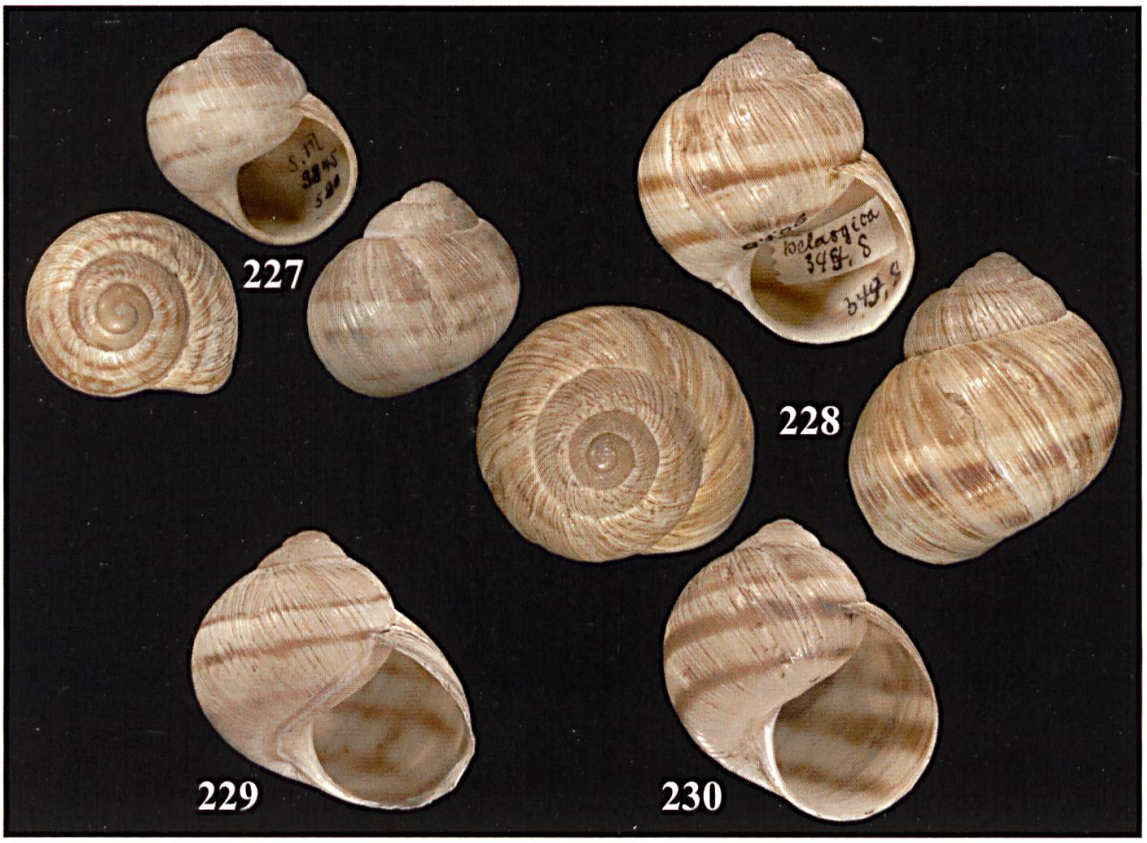
figulina: holotype SMF 9845: H = 22.6, D = 22.1, PH = 17.2, PD = 11.6, PrD = 3.5, W = 4.75. *pelasgica*: lectotype SMF 9706 (SD Zilch 1952: 138): H = 32.6, D = 28.4, PH = 22.7, PD = 16, PrD = 3.4, W = 5.5; paralectotype *pelasgica* SMF 9708: H = 30.1, D = 31.2, PH = 23.5, PD = 16.8, PrD = 3.3, W = 5.25. *attalus*: lectotype SMF 9846: H = 21.2, D = 20.7, PH = 15.7, PD = 10.8, PrD = 3.8, W = 4.75.

Specimens examined:

Bulgaria: SMF 18529, Tripolitza (not identified, probably Tripolitza on the Peloponnese?).

FYROM: SMF 74203/3, between Skopje and Zelenikovo, 41.9022 21.5456, coll. K.L. Pfeiffer ex Knipper*; Skopje, 10 Km E Skopje, 41.9872 21.6565, 293 m alt., 11.7.1972, NMBE 524571/2; SMF 74201/2 Skopje 4 km N of the city, 42.0482 21.4206, coll. K.L. Pfeiffer ex Knipper*; SMF 311935/13 at the Vardar, ex Römheld 1916*.

Greece: SMF 24475 unknown (probably Greece, probable typoid specimen of *figulina*?), coll. Rossmässler; SMF 299394/7+2, Greece, coll. Krüper. Makedonia: Kozani, Kila close Kozani, 40.3306 21.7886, 21.06.1985, HAUS (1 alk.); Limni Pikrolimni, Mikrokambos, 40.85 22.82, 50 m alt., 10.5.2003, NMBE 19277/2; Kozani, Servia 6.5 km in dir. Kozani, 40.2398 21.9661, 21.06.1985, HAUS (1); Kozani, dry rocky slope 2 km S of Kozani, 40.2720 21.7628, 28.05.1985, HAUS (1); Kozani, 4.3 Km in dir. Florina, 1.3 Km N Kéla, 40.3552 21.797, 720 m alt., 24.9.1989, NMBE 524565/1; Kozani, 2 Km S Xirolimni, 40.2744 21.6465, 700 m alt., 14.5.2005, NMBE 523305/4; Xirolimni, 4.2 Km in dir. Kozani/ Makedonia, 40.3164 21.7457, 700 m alt., 25.9.1989, NMBE 524569/2; Asprovalta, 40.7204 23.7057, 30.7.1984, NMBE 512667/1; Chalkidiki, ruins of Olynthos, 40.296 23.354, 50 m alt., 24.7.1990, NMBE 512652/2; Chalkidiki, Petralona at Eleohori, 40.344 23.162, 180 m alt., 28.8.1991, NMBE 512653/3; Chalkidiki, cave of Petralona, 40.374 23.165, 310 m alt., 23.7.1990, NMBE 512651/1; Chalkidiki, Sithonia, Porto Koufos, 39.962 23.933, 20, 8.9.1991, NMBE 512666/7; Chalkidiki: 5 km NW Krini, 40.401 23.111, 180 m alt., 28.8.1991, NMBE 512654/1; Chalkidiki, Eleohoria, 40.3434 23.1613, 170 m alt., 5.5.1995, NMBE 524564/2; Asvestohori, 40.6466 23.0236, 400 m alt., 8.5.1997, NMBE 524568/2. Thessaly: SMF 74190/4 Thessaly, coll. Krüper; ditto, SMF 299393, coll. Kaltenbach; Castle of Nea Panteleimon S Katerini, 39.989 22.603, 200 m alt., 11.9.1991, NMBE 512655/5; SMF 280623/20, Oros Olimbos, Platamon, 39.9905 22.6244, coll. Schlickum ex Schütt; SMF 280626/2 Canyon of Tyrnavos between Larissa and Elassona, 39.8091 22.2703, coll. Schlickum ex Schütt; SMF 280625/2 Levadia, Lofistion between Levadia and Thiva, at the Kopais Lake, coll. Schlic-



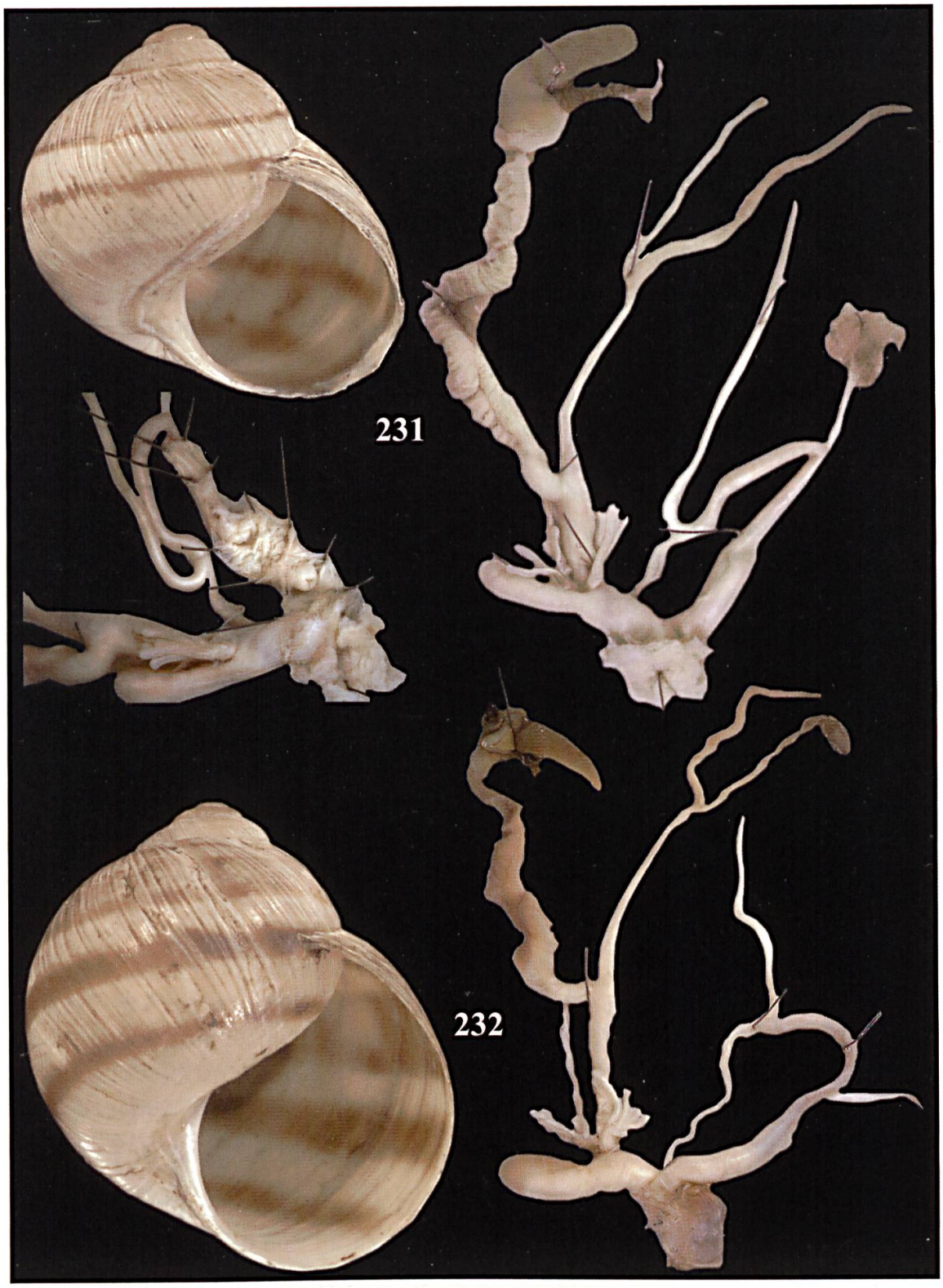
Figs 227–230. *Helix* (*Pelasga*) *figulina* Rossmässler, 1839. Fig. 227 holotype *figulina*: SMF 9845, Griechenland, D = 22.1; Fig. 228 lectotype *pelasgica*: SMF 9706, Hypati in der Phthiotis, D = 31.2; Fig. 229 NMBE 512669, Mistros, D = 29.2; Fig. 230 ditto, D = 28.4. — All photos Neubert, original size.

kum ex Schütt; SMF 18552, Volos, 39.3621 22.9421, coll. O. Boettger ex Stussiner; ditto, SMF 18547, coll. Kobelt ex Heldreich; ditto, SMF 74211/3, coll. C.R. Boettger; ditto, SMF 78213/, coll. Nägele; ditto, SMF 74172/9, coll. Jetschin ex Stussiner; Volos, Platania on the Pilion, 39.1429 23.2750, 15.10.1986, LIEB (2); Volos, Mt. Pelio, 39.4384 23.0475, 1610 m alt., 1845, NMBE 22789/2; Volos, Chorefto on the Pilion, 39.4519 23.1200, 08.10.1986, LIEB (3); Volos, Makrinitsa on the Pilion, 39.4017 22.9877, 30.08.1986, LIEB (14); Pilion, rocks 4 km W Xania above Volos, 39.38 23.03, 990 m alt., 15.6.1994, NMBE 512656/2; Néa Ionia (= Volos), W of harbour, 39.3492 22.9768, 30.4.1991, NMBE 524513/3; Kalambaka, Moni Megalo Meteoron, 39.7266 21.6257, 20.08.1982, HAUS (3); Trikala in direction to Larissa, rocks at crossroads Petrolon, 39.5650 21.9703, 17.06.1985, HAUS (3); Ampelia 1.5 km in direction to Kalambaka, 39.7082 21.5269, 20.06.1985, HAUS (1); Theopetra, 39.6737 21.6843 21.08.1982, HAUS (2); ditto, rocks close to the church, 21.08.1982, HAUS (6); Theopetra, Kuvelci, 6 Km SSE von Kalambaka, 39.6798 21.681, 260 m alt., 26.7.1975, NMBE 524525/6; Vlochos 1 km in direction to Palasmas 39.4956 22.0924, 17.06.1985, HAUS (2); ditto, 28.08.1982, HAUS (7); Vlochos 3.8 km in direction to Farkadon, aride rocky slope, 39.5487 22.0926, 17.06.1985, HAUS (3); Farkadon, 39.5933 22.0674, 17.06.1985, HAUS (5); SMF 74183/3 Lamia, coll. Krüper; Kastri, castle, 39.6246 22.6905, 135 m alt., 12.5.2005, NMBE 523333/140; Astolofos, Larissa, 39.692 22.7273, 230 m alt., 12.5.2005, NMBE 523331/22; Larissa, 1 Km N of Potamia, 39.6686 22.7877, 135 m alt., 12.5.2005, NMBE 523312/1. Sterea Ellada: SMF

9707, SMF 18548/2, Hypati [Ipati], 38.8716 22.2413, (paralectotypes of *pelasgica*), coll. Kobelt ex Thiesse; Ipati, waterfall, 38.871 22.244, 380 m alt., 16.5.1991, NMBE 524549/1; road 1.5 Km NE Larissa, 38.9673 22.3874, 615 m alt., 10.4.1986, NMBE 524560/5; Dio Vouna, 3 Km in dir. Gorgopotamos, 38.8172 22.3933, 360 m alt., 28.4.2003, NMBE 523329/2; Néo Monastiri, 6.5 Km in dir. Lamia, 39.1816 22.2883, 140 m alt., 10.4.1988, NMBE 524558/1; Amfiklia, SE of village, chapel at canyon entrance, 38.6306 22.5963, 500 m alt., 10.4.1986, NMBE 524548/1; SMF 74168 Parnass, Grotto of Korykos, coll. K.L. Pfeiffer; Phthiotis, Pelasgia 1 km in direction to Glifa, 38.9453 22.8506, 17.10.1986, HAUS (2); Phthiotis, Pelasija 7.5 km in direction to Glifa, 38.9412 22.9142, 17.10.1986, HAUS (1); Mornou dam, 9 Km in dir. Lévka, 38.5342 22.1634, 550 m alt., 13.4.1986, NMBE 524519/2; Agios Spirido, E of Glifada, 38.3679 22.1169, 30 m alt., 1.10.1989, NMBE 524553/8; Agios Spirido, E of village, 38.3681 22.1299, 60 m alt., 20.4.2003, NMBE 523326/3; Nafpaktos 28 km in direction to Galaxidi, 38.3637 22.1293, 25.08.1982, HAUS (3); Eratini, hill slope N of village, 38.3978 22.1931, 500 m alt., 14.4.1986, NMBE 524520/1; Lidoriki, 4 Km N crossroads to Eratini, 38.4384 22.2387, 550 m alt., 13.4.1986, NMBE 524522/2; Glifada, hill slope W of village, 38.3883 22.0711, 15.4.1988, NMBE 524510/3; crossroads Lidoriki–Eratini–Amfissa, 38.4052 22.255, 640 m alt., 1.10.1989, NMBE 524537/1; Itea, 10 Km in dir. Galaxidi, 38.413 22.395, 15 m alt., 20.4.2003, NMBE 523301/6; ditto, 25.08.1982, HAUS (2); Itea, 6 Km in dir. Galaxidi, 38.4326 22.397, 20.4.2003, NMBE 523306/5; Gravia, 2.5 Km in dir. Amfissa, 38.6607 22.4253, 540 m alt., 12.4.1986, NMBE 524550/1; Mariolada, S of village, 38.6517 22.4655, 400 m alt., 29.4.2003, NMBE 523308/4; SMF 74188/3, Delphi, 38.483 22.5, coll. Krüper; ditto, SMF 74167/3, coll. K.L. Pfeiffer; ditto, SMF 214869/4, coll. S. H. Jaeckel & Plate; ditto, SMF 311942/4, temple of Apollon, 23.10.1982, coll. Hohorst; ditto, 630 m alt., 16.5.1991, NMBE 524526/7; Antikira, 6.3 Km in dir. Desfina, 38.3889 22.5915, 500 m alt., 20.4.2003, NMBE 523324/3; Camping Apollon W Delphi, 38.4824 22.4757, 480 m alt., 20.6.2003, NMBE 524420/1; canyon at the Castalian well, Delphi, 38.4831 22.5055, 590 m alt., 21.6.2003, NMBE 512642/2; SMF 311943/4, monastery of Ossias Lukas, 38.3954 22.7467, 24.10.1982, coll. Hohorst; Itea, 38.428 22.456, 20 m alt., 22.6.1987, NMBE 512645/3; 5 km E Desfina, 38.4 22.58, 520 m alt., 24.6.1987, NMBE 512646/2; road Eratini to Amfissa, 38.4 22.27, 650 m alt., 25.6.1987, NMBE 512648/1; castle of Amfissa, 38.531 22.373, 230 m alt., 25.6.1987, NMBE 512647/1; SMF 311947/1, Eratini, 38.3606 22.2286, 23.10.1982, coll. Hohorst; Lidorikion 15.5 km in direction to Nafpaktos, 38.5185 22.1525, 11.06.1985, HAUS (2); Nafpaktos, castle, 38.3969 21.8241, 100 m alt., 12.6.2003, NMBE 524421/3; Kalesméno, Tavropos River, 38.9418 21.6832, 300 m alt., 17.5.1995, NMBE 524566/1; Paralia Sarandi, 4.3 Km in dir. Prodromos, 38.2578 22.8826, 225 m alt., 15.4.1986, NMBE 524570/81; crossroads Distomo–Delfi–Livadia, 38.4627 22.7161, 310 m alt., 14.4.1986, NMBE 524547/1; Kiriaki, 6 Km in dir. Distomo, 38.3625 22.7208, 100 m alt., 14.4.1986, NMBE 524532/1; Paralia Sarandi, 3 Km in dir. Prodromos, 38.2572 22.8756, 220 m alt., 15.4.1986, NMBE 524530/1; Korini [Domvrena], SE of Thisbi, 38.2513 22.9886, 170 m alt., 15.4.1986, NMBE 524541/3; mountain E Kalamaki, 38.2005 23.1261, 25 m alt., 1.5.2003, NMBE 523325/1; SMF 74194 Agoriani, 38.8851 22.1150; road cross Akréfnio, 5.5 Km SE crossroads at Kastro, 38.45 23.2092, 120 m alt., 11.5.1997, NMBE 524562/2; Skoponéri, 38.5032 23.3549, 10 m alt., 11.5.1997, NMBE 524567/2; 2 Km E Aliartos, 38.4282 23.5309, 270 m alt., 9.4.1988, NMBE 524531/2; Tithoréa, canyon and cave, 38.5702

22.6602, 850 m alt., 11.4.1986, NMBE 524551/4; Krionéri, 38.3452 21.5969, 8.4.1986, NMBE 524512/4; ditto, steep rocks, 08.06.1985, HAUS (1); Mt. Varassova, SW slope, Krionéri, 38.3477 21.5973, 50 m alt., 1.10.1989, NMBE 524498/5. Attica: SMF 74187/12, SMF 74198 Attica, coll. Krüper; ditto, SMF 78210/2, coll. Ehrmann ex Schlüter; ditto, NMBE 22788/3; SMF 74175/4 Attica, Daphni, 38.0129 23.6358; SMF 18531 ruderal field E of Athens, coll. O. Reinhardt; SMF 74171/2 Ambelaki at Salamis, 37.9510 23.5280, coll. K.L. Pfeiffer; SMF 280622/8 Megara, 37.9952 23.3426, coll. Schlickum ex Schütt; Mégara, Kloster Agios Ierothéou/ Atiki, 38.093 23.2677, 300 m alt., 7.7.1979, NMBE 524499/1; Mégara, W of city, 37.9962 23.324, 65 m alt., 7.7.1979, NMBE 524511/3; SMF 74165 Attica, Sunion, 37.6591 24.0147 coll. K.L. Pfeiffer; Aigosthena (= Porto Germeno), 38.1483 23.2321, 45 m alt., 16.5.1991, NMBE 524502/3; SMF 24476/4 Athens, 37.9839 23.7293 ex Raymond; SMF 18534/3 Athens, Hymettos, 37.9583 23.8196, coll. O. Boettger ex P. Hesse; SMF 18528/2, Athens, Lykabettos, 37.9826 23.7436, coll. Kobelt ex Anthes; ditto, SMF 74169/2, coll. K.L. Pfeiffer; ditto, SMF 74199, K.L. Pfeiffer ex Kaltenbach; ditto, SMF 299392/3, SMF 299555, coll. Kaltenbach; ditto, 250 m alt., 19.7.1979, NMBE 524523/6; ditto, 22.4.1988, NMBE 524503/2; Varkiza, Camping "Varkiza-Beach", 37.8226 23.817, 30 m alt., 20.7.1979, NMBE 524500/2; Vari, 3 Km in dir. Koropi, 37.8415 23.8215, 50 m alt., 20.7.1979, NMBE 524504/2; Keratéa, 1.5 Km in dir. Markopoulon, 37.8542 23.9345, 100 m alt., 20.7.1979, NMBE 524509/2; Lavrio, 4 Km in dir. Markopoulo, 37.7523 24.026, 125 m alt., 5.5.1991, NMBE 524501/1; SMF 311948/2, Athens, Philopoppos hill, 25.10.1982, coll. Hohorst; Mandra 2 km in direction to Thiva, 38.0851 23.4841, 16.10.1986, HAUS (1); rocks at a quarry in Kasa 2.5 km in direction to Erithres, 22.09.1986, HAUS (1); Kifissia, 38.08 23.82, 260 m alt., 3.1864, NMBE 18463/4; ditto, 1864, NMBE 18469/3; Vouliagmeni, 37.8216 23.7754 07.01.1985, LIEB (1).; SMF 18550/2 Isthmus of Korinth, 37.9257 23.0017, coll. O. Reinhardt. Peloponnese: SMF 74205 Peloponnese, coll. Krüper; SMF 78211 Korinth, 37.9375 22.9306, coll. Ehrmann ex Schlüter; Zemeno 5.5 km in direction to Kaliami, canyon, 14.10.1986, HAUS (1); Zemeno close to Xylokastron, rocks at the school, 38.0299 22.6059, 14.10.1986, HAUS (2); SMF 74186/3, Xylokastron, 38.0772 22.6326, coll. Krüper; Xilokastro between Pellini and Dendro, 38.0392 22.5393, 500 m alt., 11.7.1996, NMBE 512659/4; Kefalari 1 km in direction to Xylokastron, 37.9303 22.5316, 15.10.1986, HAUS (1); Stimfalia Limni, 37.87 22.47, 27.4.1996, NMBE 13584/3; Kaliani, 6 Km in dir. Kiato, Killini Mts., 37.9236 22.5262, 710 m alt., 8.7.1979, NMBE 524538/1; Kaliani, 10 Km in dir. Kiato, 37.9473 22.5663, 780 m alt., 8.7.1979, NMBE 524544/8; Kefalari, mountain 2 Km E village, 37.9151 22.5319, 730 m alt., 5.5.2005, NMBE 523332/55; Agios Vassilios, 8.5 Km in dir. Argos, 37.7779 22.7339, 290 m alt., 18.7.1979, NMBE 524528/1; Akrokorinthos, old castle, 37.89 22.869, 400 m alt., 18.7.1979, NMBE 524543/7; Akrokorinthos, 37.8906 22.8708, 520 m alt., 12.7.1996, NMBE 512660/4; Arhea Korinthos, 37.9059 22.8792, 80 m alt., 8.1973, NMBE 524536/1; Heraiou Lake, Heraion, 38.0349 22.8708, 60 m alt., 18.7.1979, NMBE 524539/1; lighthouse Akron Ireo, Heraion, Korinthia, 38.0285 22.8499, 460 m alt., 12.7.1996 NMBE 512661/2; above Loutraki, 37.9801 22.9858, 90 m alt., 19.2.1981, NMBE 524542/1; Sikion close to Kiato, theatre, 38.0079 22.7444, 14.10.1986, HAUS (1); Nemea 1 km in direction to Kaliani, 37.8431 22.6392, 16.10.1986, HAUS (2); rocks SE of Nemea, 37.8110 22.6886, 16.10.1986, HAUS (1); Killini Mountains, Mesi Sinika Trikalon, 15.10.1986, HAUS (1); Neméa, 1 Km S/ Korinthia, 37.8024 22.667, 370 m alt., 7.5.1991, NMBE 524527/1; Agios Vasilios, 37.7907 22.7974, 12.4.2003, NMBE 523303/1; ditto,

6.5.2005, NMBE 523322/2; SMF 74173/2, Kyllene [Killini], 37.9346 21.1449 coll. Jetschin; SMF 18549, Dimitsana, 37.5955 22.0395, coll. O. Reinhardt; SMF 74170, road Argos to Tripolis, on the pass, 37.5326 22.5818, coll. K.L. Pfeiffer; SMF 214868, Levidhi, 37.6820 22.2956, coll. S. H. Jaeckel; SMF 214895/2, Tripolitza [Tripolis], 37.5101 22.3726, coll. S. H. Jaeckel ex Martens; Paralio Astros, castle, 37.4183 22.7663, 50 m alt., 16.7.1979, NMBE 524557/1; ditto, 17.7.1996, NMBE 512665/1; Astros, 7 Km in dir. Argos, 37.4663 22.7421, 75 m alt., 16.7.1979, NMBE 524529/3; 3 Km S Astros, hill slope, 37.3841 22.7437, 20 m alt., 13.4.2003, NMBE 523323/4; Astros 3 km in dir. Leonidion, 37.3789 22.7455, 24.09.1986, HAUS (1); Vitina, 5 Km SW of village, 37.6515 22.1685, 985 m alt., 17.4.1988, NMBE 524555/2; Levidi, 4.7 Km in dir. Kandila, 37.7214 22.3276, 720 m alt., 7.5.1991, NMBE 524518/1; Perthori, 3.7 Km in dir. Moni Epano Hrépas, 37.5417 22.3347, 1000 m alt., 8.5.1991, NMBE 524534/2; Manthiréa, 4 Km in dir. Sparti, 37.3813 22.4034, 860 m alt., 5.8.1976, NMBE 524540/1; Leonidion, Wof village, 37.1684 22.8427, 145 m alt., 19.2.1981, NMBE 524554/10; ditto, 16.7.1979, NMBE 524545/11; Steno 0.5 km in direction to Tripolis, 37.4953 22.4554, 07.10.1986, HAUS (4); Rizes 1 km in direction to Ag. Petros, under stones at the crossroads to Astros, 37.4405 22.4880, 06.10.1986, HAUS (1); Stavrodromio, 1 Km in dir. Arhea Olympia, 37.6989 21.9392, 630 m alt., 2.8.1976, NMBE 524516/1; Tropea, 6 Km N in dir. Dafni, 37.7594 21.9578, 550 m alt., 17.4.2003, NMBE 523309/3; Dimitsana, 4 Km N of village, 37.6254 22.0606, 990 m alt., 16.4.2003, NMBE 523320/2; Kalonéri, 3.5 Km in dir. Arhea Olympia, 37.6719 22.0617, 1100 m alt., 16.4.2003, NMBE 523327/1; Ipsous (= Stemnitza), 37.5515 22.0706, 1080 m alt., 16.4.2003, NMBE 523321/2; Pirgaki, 38.1648 22.0822, 700 m alt., 19.4.2003, NMBE 523302/4; Klitoria, 2 Km S in dir. Tripoli, 37.8808 22.1355, 500 m alt., 9.7.1979, NMBE 524521/1; Agios Vassilios, 2.7 Km in dir. Tripotama, 37.8629 21.9235, 600 m alt., 17.4.2003, NMBE 523307/3; Petsaki, canyon 1 Km N of village, 38.1009 22.0331, 905 m alt., 19.4.2003, NMBE 523319/1; Ptéri, 3 Km S, 38.1418 22.071, 1150 m alt., 15.4.1988, NMBE 524514/1. Argolis: SMF 18544 Argolis, Nauplion [Nafplio], 37.5673 22.8015, coll. O. Reinhardt; ditto, 25.3.1987, NMBE 512673/2; Nafplion, northern boundary, 08.10.1986, HAUS (2); Nafplion, Palamidi, 37.5618 22.8042, 180 m alt., 12.7.1985, NMBE 524419/4; Nafplio, below castle, 37.5634 22.8013, 50 m alt., 18.7.1979, NMBE 524552/21; SMF 78212/6, castle of Mykene, 37.73 22.76, 250 m alt., coll. Ehrmann ex Schlüter; ditto, SMF 299391/4, coll. C. Bosch ex Schlüter; ditto, SMF 311946/2, 26.10.1982, coll. Hohorst; ditto, NMBE 512658/1, NMBE 18467/2; Mykene, valley below castle, 37.7221 22.7538, 150 m alt., 20.4.1988, NMBE 524563/27; SMF 74166/3, Epidavros, 37.5958 23.0768, coll. K.L. Pfeiffer; ditto, SMF 311945/1, theatre of Epidavros, 27.10.1982, coll. Hohorst; Lygourio 3 km in direction to Nea Epidavros, 37.6319 23.0536, 13.10.1986, HAUS (1); Didima, rocks righ of the doline, 37.4728 23.1648, 540 m alt., 13.7.1996, NMBE 512662/1; Didima, 37.4639 23.1725, 10.10.1986, HAUS (2); Argos, rocks above the church, 37.6351 22.7288, 23.09.1986, HAUS (1); Argos, castle Larissa, 37.6383 22.7154, 250 m alt., 16.7.1996, NMBE 512664/5; ditto, 18.7.1979, NMBE 524559/5; rocky slopes N of Argos, 22.09.1986, HAUS (1); Agrilitsa W of Argos, 37.6246 22.5964, 23.10.1986, HAUS (1); Argos, Aspis hill, 23.09.1986, HAUS (1); bay 5 km W Iria, 37.512 22.9817, 16.7.1996, NMBE 512663/1; Agiorgitika, 12.5 Km in dir. Argos, 37.5385 22.5741, 800 m alt., 5.4.1986, NMBE 524561/3; Ahladokambos, 7 Km in dir. Argos, 37.5168 22.6154, 650 m alt., 20.4.1988, NMBE 524533/1; Kenchreai, 37.8841 22.9859, 17 m alt., 18.7.1979, NMBE 524625/22; Vavari, 37.537 22.9211, 25 m



Figs 231–232. *Helix* (*Pelasga*) *figulina* Rossmässler, 1839. Genital organs. Fig. 231 NMBE 512669, Mistros, situs 43.1; Fig. 232, ditto, situs 45.7.

alt., 21.5.2011, NMBE 523328/1, NMBE 523310/7; Kandia, 37.5288 22.9554, 17 m alt., 21.5.2011, NMBE 523311/3; Kranidi 1.5 km in direction to Ermioni, 37.3742 23.1762, 11.10.1986, HAUS (1); eastern boundary of Vivarion, 10.10.1986, HAUS (1); quarry opposite to Kilada, 37.4133 23.1253, 11.10.1986, HAUS (1); Ermioni 1.2 km in direction to Kranidi, 37.3846 23.2329, 11.10.1986, HAUS (3); slope at the road Ag. Triada in direc-

tion to Arachneo, 37.6508 22.9144, 08.10.1986, HAUS (2); Amarianos 2 km in direction to Arachneo, 37.6470 22.9033, 08.10.1986, HAUS (1); SMF 311944/1, road Nafplio to Tripolis at the crossroads to Achladokambos, 37.5250 22.5901, 25.06.1985, coll. Hohorst; plateau above Gerolimenas, 36.486 22.387, 100 m alt., 7.7.1987, NMBE 512649/4; castle of Monemvasia, 36.687 23.052, 100 m alt., 10.7.1987, NMBE 512650/10; ditto, 30.09.1986, HAUS (3).; Monemvassia, 2 Km in dir. Nomia, 36.671 23.0306, 17.2.1981, NMBE 524506/1; Geroliménas, 36.4842 22.3993, 25 m alt., 13.7.1979, NMBE 524508/1; Skala, 3 Km in dir. Sparti, 36.8594 22.6058, 100 m alt., 14.7.1979, NMBE 524505/2; crossroads Geraki–Sparti, Skála–Kosmás, 37.0607 22.7071, 800 m alt., 18.2.1981, NMBE 524524/15; Dermatianika, Mt. Kabos, 36.5451 23.0533, 70 m alt., 17.2.1981, NMBE 524507/1.

Greek Islands: Agios Eustratios: Agios Eustratios, 39.5368 24.9897, 21.05.1986, LIEB (1). Donousa: Donousa, 37.1005 25.7951, 02.05.1984, LIEB (9). Skopelos: SMF 74203/1, SMF 74179, Skopelos, 39.1251 23.6799, coll. Krüper. Skiathos: Megalos Aselinos, 39.1720 23.4226, 01.06.1979, LIEB (45). Skyros: Molos, 38.9147 24.5655, 01.10.1982, LIEB (4). Evvia: SMF 74197 Evvia, coll. Krüper; ditto, SMF 18536/3, ex Godet; ditto, SMF 74174/2, coll. Jetschin ex Schneider; ditto, SMF 74204, coll. Krüper; Halkida (= Chalkis), 38.47 23.62, 1884, NMBE 18466/2; 2 km S Pilio, 2 km in dir. Vlahia, 38.7579 23.6185, 170 m alt., 18.6.1994, NMBE 512657/1; Southern slope of Ochi Mts., 5 km E of Bouros, 37.9512 24.5005, 35 m alt., 31.09.2000, NMBE 512643/1; Mt. Olimbos, NE slope, small canyon E of Mistros, 38.5183 23.8591, 320–600 m alt., 04.10.2000, NMBE 512669/2 (alk.), NMBE 512644/7; Mantoudi, 38.7942 23.477, 20 m alt., 1.5.1991, NMBE 524515/3; Néa Artaki, 1–2 km N of village, 38.5404 23.6344, 9.4.1988, NMBE 524556/1; Alivéri, 38.4022 24.0138, 350 m alt., 16.4.1986, NMBE 524517/3; Vrissi, Mavrovouni Mts. cave niches, 38.5549 24.0268, 450 m alt., 16.4.1986, NMBE 524546/1. Samothraki: Chora, 40.4715 25.4751, 10 m alt., 11.5.2008, NMBE 523304/7. Keos: Otzias, 1 Km E, 37.6774 24.3625, 180 m alt., 6.5.1991, NMBE 524535/1. Naxos: SMF 74185/3 Naxos, 37.0755 25.5207, coll. Krüper; ditto, SMF 18545; ditto, Naxos, 04.09.1984, LIEB (6). Syros: SMF 74189/4 Syros, 37.4234 24.9160, coll. Krüper. Ägina: Ägina, 37.7408 23.5014, 03.06.1083, LIEB (1). Poros: SMF 74180/5 Poros, 37.5088 23.4586; ditto, SMF 74184/7, coll. Krüper. Paros: Paros, eastern coast at Piso Livadia, 37.036 25.2598, Sept. 1986, NMBE 512668/3, ex Kleinhenz; ditto, 3.1994, NMBE 505542/3. Limnos: Poliochni, 39.9093 25.1994, 31.05.1986, LIEB (1). Thira: Thira, 36.3931 25.4615, 19.05.1991, LIEB (11). Milos: Milos, 36.6914 24.3935, 15.06.1991, LIEB (1).

Turkey: SMF 74212/3, Adrianopel [Edirne], 41.6818 26.5622, coll. C.R. Boettger; ditto, SMF 78209/19, coll. Nägele ex Braun; Balikesir Ili: Gulf of Edremit, Altın Oluk, olive plantation, 39.5823 26.7393, 22.09.2001, LIEB (2); Altın Oluk, limestone rocks at the Şahin Dere, 39.5844 26.7565, 22.09.2001, LIEB (3). Izmir Ili: Pergamon, 39.1321 27.1843, 30.4.1992, leg. Tannert, ex coll. Groh, NMBE 512622/4; Bergama, Asklepion, 29.09.2001, LIEB (30).

Unknown localities: SMF 74182 Seidikeri.

Unspecific localities: SMF 18546 Greece, coll. O. Reinhardt

(*) Specimens from these localities show reticulate pattern on the shell surface and are similar to *H. nucula*.

Diagnosis: shell small, thin, spherical, protoconch small, teleoconch smooth with coarse axial riblets, aperture always white; flagellum as long as epiphallus+penis, long diverticulum exceeding bursa copulatrix in length.

Description: shell of small size, thin, spherical, spire elevated conical; basic shell colour greyish white with chestnut brown spirals, usually spiral No. 2 fused with No. 3 or diffuse, often with all five spirals separate; protoconch small, its diameter ranging from 3–4 mm, smooth, white whorls; teleoconch of 3–4 smooth whorls, sculptured by coarse but densely arranged axial riblets; last whorl slightly descending towards the periphery; aperture rounded, apertural rim narrow, labial callus weak, always white, columellar triangle small; umbilicus closed in adult shells.

Genital organs (Figs 231–232): penis club-shaped, epiphallus considerably longer than penis; flagellum as long as epiphallus+penis; mrp attaching in a subterminal position on the epiphallus; internally, pp1 smaller than pp2, penial chamber long, filled with numerous minute ring-like folds, both papillae conical with a central perforation; atrial stimulator a rounded knob; female system with a very short vaginal tube, dart sac strongly developed, glandulae mucosae with a thick and short basic stem and a few short tubules, glandulae mucosae shorter than dart sac; pedunculus stem long, with a long diverticulum branching off in the upper third of pedunculus and exceeding bursa copulatrix in length, bursa copulatrix stem shorter than pedunculus stem, vesicle rounded and bent downwards.

Distribution (Fig. 233): This species is widespread in Greece, and also reaches the northern slopes of the Rhodope Mountains in Bulgaria; however, its northern distribution boundaries are not known because of probable confusions with species living syntopic like *H. philibinensis* and *H. pomacella*. Hudec & Vasatko (1973: 30, Abb. 28) illustrate the genital organs of a specimen collected in the valley of the Marica river close to Biser at Harmanli (41.8619 25.9797), which match the major characteristics of specimens from Greece. The elongate epiphallus is clearly visible, with a relatively short flagellum, and the very long and well developed diverticulum. It is also recorded from the west Mediterranean Turkish coast in the area from Bergama southwards (Korábek et al., submitted).

Remarks: This species can best be differentiated from its next relative *H. nucula* by the absence of any granulation on its teleoconch. After study of hundreds of shells from Greece, only a few exceptions could be found, where some fine subsutural furrows were present. On the other hand, many shells of *H. nucula* from Turkey need very close examination for the granulation, which is sometimes only visible under high magnification. In most shells of *H. nucula*, the granulation pattern is restricted to a small subsutural area on

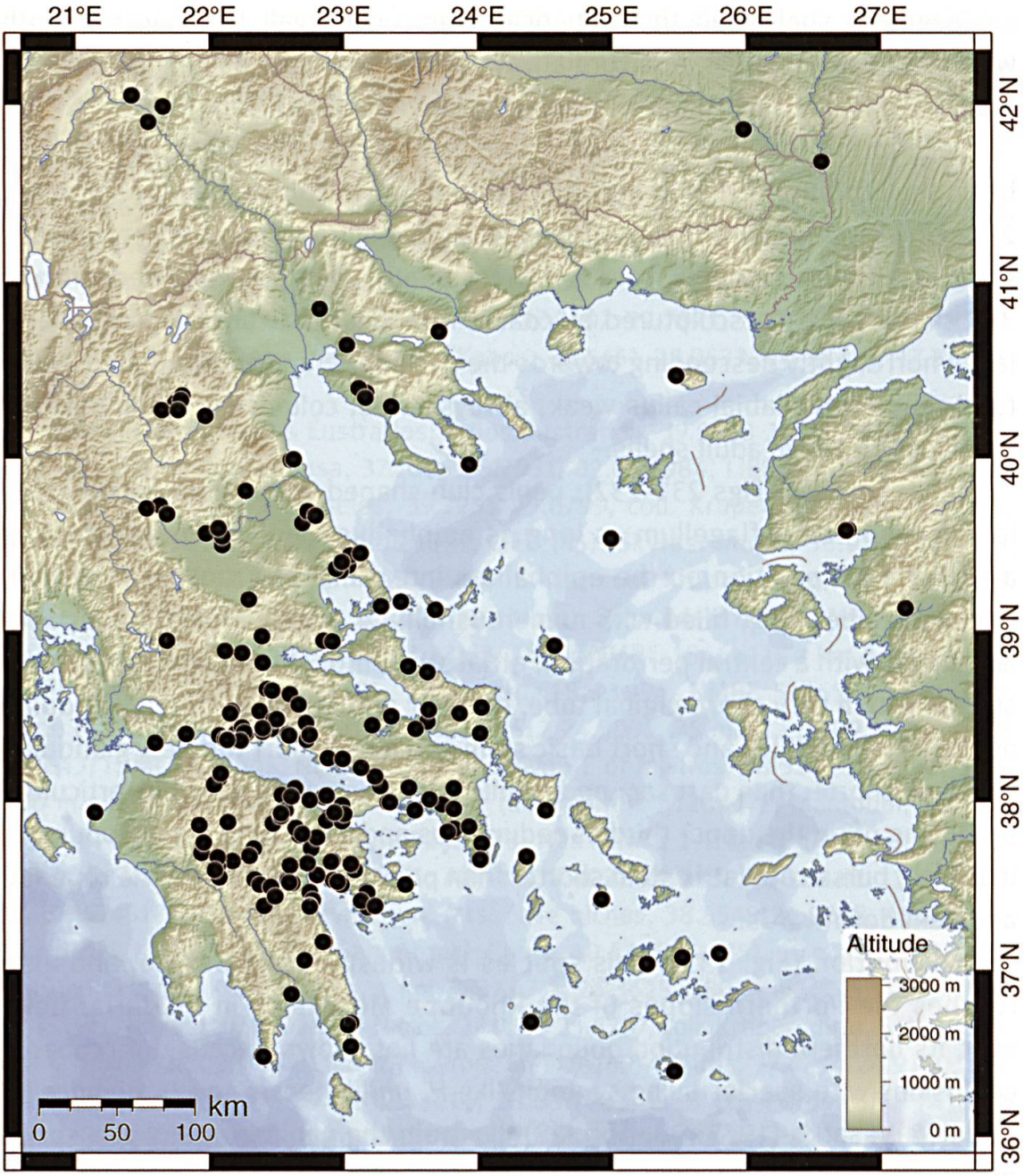


Fig. 233. *Helix* (*Pelasga*) *figulina* Rossmässler, 1839. Distribution.

the upper whorls, but sometimes it can cover large parts of the teleoconch. The character states of the genital organs are very similar in both species; the stems of the glandulae mucosa and the vaginal tube seem to be somewhat longer in *H. nucula* than in *H. figulina*, and probably the branching point of the diverticulum is different in both species. However, it is not clear whether these slight differences are good character states to be used for species discrimination, or if they simply reflect individual variation.

In shell characters, *H. figulina* differs from both, *H. philibinensis* and *H. pomacella* by its very small protoconch. *Helix philibinensis* has a somewhat

larger shell, usually a cream to brown aperture, and all colour spiral bands well separated. Shells of *H. pomacella* are considerably smaller, and much more globular. Problems in identification may arise in southern Bulgaria, while in Central Greece this species is unmistakable.

SMF 18540/3 Cerigotto, coll. O. Boettger ex Krüper; SMF 74181/3 Cerigotto, coll. Krüper: The specimens of this lot are determined as *figulina*, but the shells are heavy, broader and have a protoconch > 5 mm. The shells are subfossil/fossil, their identity is not clear yet. SMF 74185/3 from Naxos: These specimens are very small and globose and resemble *pomacella*.

***Helix* (*Pelasga*) *nucula* Mousson, 1854** (Figs 234–241)

1854 *Helix figulina* var. *nucula* Mousson, Mittheilungen der naturforschenden Gesellschaft in Zürich 3 (8): 372 [Smyrna (Bellardi); = Izmir] [non *Helix nucula* L. Pfeiffer, 1859].

1895 *Helix* (*Pomatia*) *xeraethia* Kobelt, Iconographie der Land- und Süsswassermollusken, Suppl. 1: 44, Taf. 16, Fig. 3 [Zypern].

1895 *Helix* (*Pomatia*) *chassyana* Kobelt, Iconographie der Land- und Süsswassermollusken, Suppl. 1: 47, Taf. 17, Fig. 6, Taf. 19, fig. 1, 2 [Cyprus, in the vicinity of Larnaka].

1904 *Helix* (*Helicogena*) *pelasgica rhodensis* Kobelt, Systematisches Conchylien-Cabinet VI: 193, Taf. 346, Fig. 4–7 [Rhodos].

1906 *Helix* (*Helicogena*) *pelasgica* (var.?) *cosensis* Kobelt, Iconographie der Land- und Süsswassermollusken 2 (12): 53, Taf. 327, Fig. 2050 [Island of Cos].

Type specimens:

nucula: lectotype ZMZ 506381a: H = 22.1; D = 22.6; PH = 17.7; PD = 12.5; PrD = 3.4; W = 4.75 (lectotype herewith designated), paralectotypes ZMZ 506381/b, ZMZ 506394; *xeraethia*: syntype MHNG 17987, H = 30.53; D = 27.4; PH = 21.11; PD = 17.33; PrD = 3.9; W = 5; *chassyana*: lectotype SMF 9671 (SD Zich 1952: 137): H = 32.8; D = 31.9; PH = 25.8; PD = 16.6; PrD = 4; W = 5; *rhodensis*: lectotype SMF 9768 (SD Zilch 1952: 138): H = 27.1; D = 26.8; PH = 20.6; PD = 13.8; PrD = 4.6; W = 4.75; *cosensis*: lectotype SMF 18537 (SD Zilch 1952: 138): H = 28; D = 27.9; PH = 20.7; PD = 14.5; PrD = 3.9; W = 5.

Specimens examined:

Greek Islands, Rhodos and Dodekanes (all SMF lots sub *cosensis* and *rhodensis*): **Chios**: SMF 74200 Chios, 38.4636 26.0714, coll. K.L. Pfeiffer. **Kos**: Asklepion, 36.8754 27.257, 08.10.1980, LIEB (6); Aspri Petra close to Kefalos, 36.7416 26.9672,

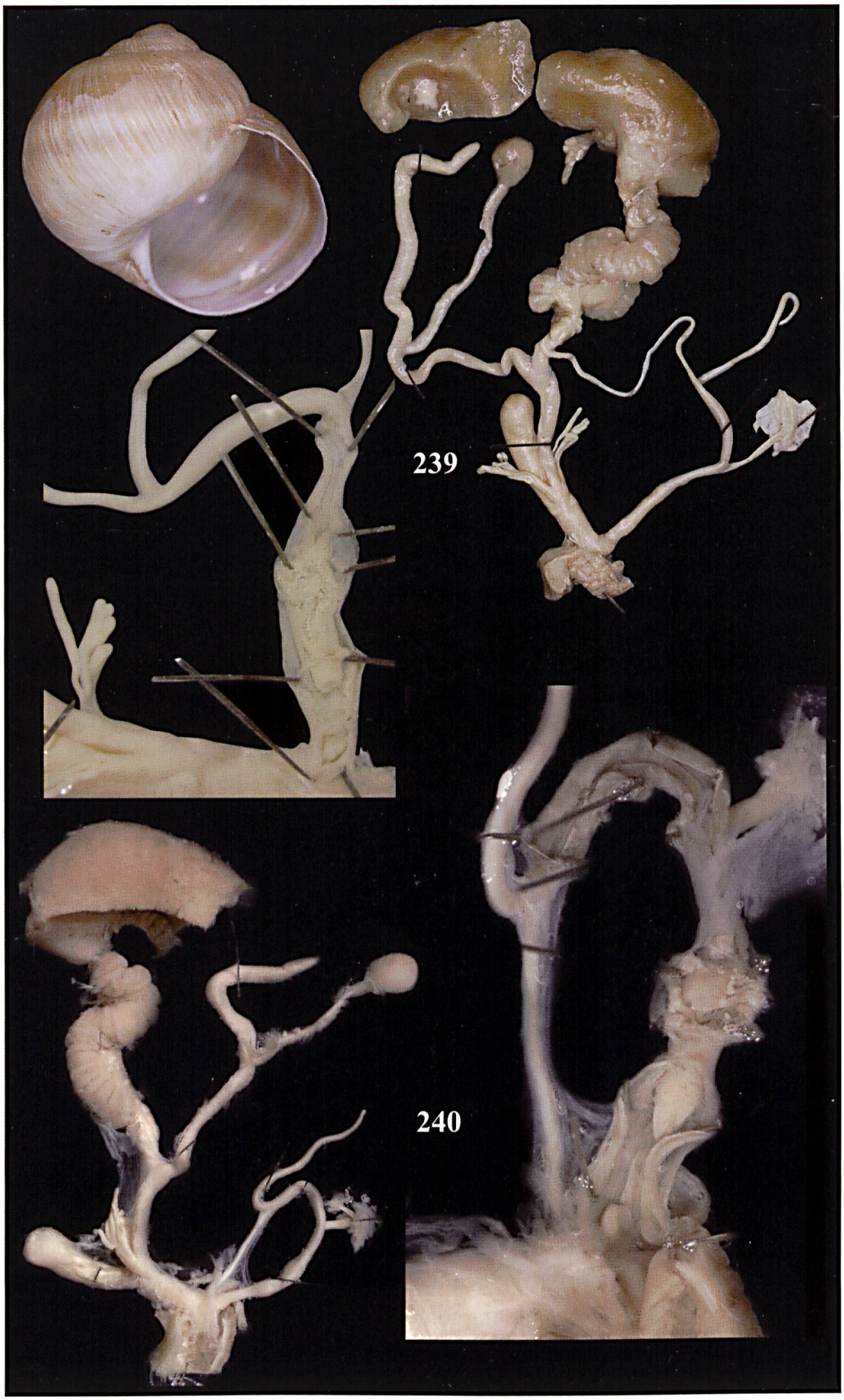
06.06.1983, LIEB (3). **Rhodos**: SMF 74221 Mte. Attaviros, 36.1965 27.8243, 660 m, coll. K.L. Pfeiffer, SMF 74215 Rhodos city, 36.4349 28.2264, coll. K.L. Pfeiffer, ditto, SMF 21487/3, old cemetery at the citywalls, coll. K.L. Pfeiffer; SMF 299396/4 road Rhodos to Coschino, 36.3969 28.2, coll. K.L. Pfeiffer; SMF 74217 mountain at Therme de Callitea, 36.3273 28.1484, coll. K.L. Pfeiffer; SMF 74220 Mt. Profitis, summit, 36.2722 27.9331, 798 m alt., coll. K.L. Pfeiffer; SMF 74219 Rhodos, ruin of the Castello, coll. K.L. Pfeiffer; SMF 74218 Mt. Smith, Rhodos, coll. K.L. Pfeiffer; SMF 74216/3 at Porte Romano, coll. K.L. Pfeiffer; Kamiros Skala, 36.2714 27.8263, 18.05.1983, LIEB (4); Rhodos, on fields around the city, 10.05.1983, LIEB (4); Paradisi, 36.3991 28.08409, 04.04.1982, LIEB (13); Lindos, 36.0915 28.0863, coll. Saurin MNHN (1). **Karpathos** (= Scarpanto): SMF 74336/2 Pigadia to Menethe, 35.493 27.1957, coll. K.L. Pfeiffer; SMF 74335/12, plaine at Lasto, 35.5756 27.1411, 700 m, coll. K.L. Pfeiffer; SMF 74224/6 harbour of Pigadia, 35.5097 27.2168, coll. K.L. Pfeiffer; SMF 74226/2 Mte. Profeto Elia at Menetho, 35.4871 27.1683, coll. K.L. Pfeiffer; SMF 74225/2, road Panagia Mte. Colla, 250 m, coll. K.L. Pfeiffer; SE part of the Island, 6 km N of the airport at the road to Pigadia, 35.4647 27.1657, 1.5.1997, NMBE 512539/4; SE part of the Island, coastal limestone rocks 5 km N of the airport, 35.4577 27.1566, 1.5.1997, NMBE 512538/20; Pigadia, 15.04.1982, LIEB (7). **Nimos**: SMF 74339/2, Island Nimos 36.6525 27.8468, coll. K.L. Pfeiffer. **Symi**: SMF 74338/4 road Panormiti to Symi, 36.5876 27.8353, coll. K.L. Pfeiffer; Symi (no exact locality given), 12.10.1984, LIEB (1). **Armathia**: SMF 74223 Armathia close Kasos, 35.4363 26.8691, coll. K.L. Pfeiffer. **Kasos**: SMF 74222/3 canyon close Ofri, 35.4121 26.9419, coll. K.L. Pfeiffer; Kasos (no exact locality given) 17.04.1982, LIEB (8). **Tilos** (= Piscopi): SMF 74337 road from harbour to Mikro Horio, 36.4241 27.3799, coll. K.L. Pfeiffer; Tilos (no exact locality), 15.05.1983, LIEB (10); Tilos (no exact locality), 25.05.1983, LIEB (22); Livadia in direction to Gera, 36.4056 27.4176, 12.06.1996, LIEB (16); ditto 17.06.1996, LIEB (4); Agios Panteleimon in direction to Agios Andreas, 36.3810 27.3946, 18.06.1996, LIEB (3); Megalo Chorio, 36.45473 27.3453, 15.06.1996, LIEB (9); Eristos plaine and Livadia, 36.4147 27.3841, 14.06.1996, LIEB (5). **Pserimos**: SMF 74341 at the harbour, 36.9327 27.1309, coll. K.L. Pfeiffer. **Astipalaea**: surroundings of Livadia, 36.5465 26.3408, 19.06.1997, LIEB (4). **Ano Kufonisi:** Ano Kufonisi, 36.9348 25.6028, 27.04.1984, LIEB (2 subfossil?). **Kastelorizo**: Kastelorizo, 36.1482 29.5896, 09.10.1996, LIEB (10). **Chalki**: Chalki, 36.2234 27.6114, 02.06.1996, LIEB (1); .

Turkey: SMF 74192/3, Smyrna [Izmir], coll. Krüper; ditto, SMF 18532; ditto, SMF 74210/2, coll. C.R. Boettger; SMF 74191/7 Smyrna, Burnabat [Izmir, Bornova], 38.4627 27.2446, coll. Krüper; ditto, SMF 78203/5, coll. Nägele ex Krüper; Manisa close Izmir, 38.6190 27.4288, IV.1990, leg. Röttger, RÄH (2); Izmir: Menderes delta, Dilek Yarimadasi, rocks at the road from Doganbey to Karina 2 km W of Doganbey, 37.625 27.14, 9.6.1998, NMBE 512547/2. **Muğla Ili**: SMF 74206 Makri [Fethyie], 36.6438 29.163, coll. Krüper; SMF 74177/2 ditto, coll. Jetschin ex Krüper; SMF 74340/6, rocks on the shore N of Bodrum, 37.0255 27.4179, coll. K.L. Pfeiffer; Marmaris, 36.853 28.263, 10 m alt., 28.4.1991, NMBE 512596/1; Didim, 1 km S of Akköy close at Didim, 37.4825 27.2598, 29.7.1984, MENK (2); Didim [Didyma], 37.3848 27.3562, 27.4.1992, NMBE 512559/1; Muğla, 7 km SW Milas, 37.2606 27.7376, 11.7.1990, MENK/1; Resadiye Yarimadasi, ruins of Knidos, 36.6885 27.3742, 20 m alt., 5.6.1998, NMBE 512544/6; Resadiye Yarimadasi, 15

Figs 234–238. *Helix* (*Pelasga*) *nucula* Mousson, 1854. Fig. 234 lectotype *nucula*: ZMZ 506381a, Izmir, D = 22.6; Fig. 235 lectotype *chassyana*: SMF 9671, Larnaka, D = 31.9; Fig. 236 lectotype *cosensis*: SMF 18537, Cos, D = 27.9; Fig. 237 lectotype *rhodensis*: SMF 9768, Rhodos, D = 26.8; Fig. 238 syntype *xeraethia*: MHNG 17987, Zypern, D = 27.4. — All photos Neubert, original size.

km W Resadiye (= Datça), 36.707 27.55, 420 m alt., 5.6.1998, NMBE 512545/1; Bozburun Yarimadasi, Loryma, castle and adjacent area, 36.566 28.016, 4.6.1998, NMBE 512543/3; ruins of Kaunos, 36.824 28.624, 04.10.1996, LIEB (1); ruins of Kaunos, 21.6.1987, NMBE 512551/1; ditto, 2.6.1998, NMBE 512540/1; Bayirköy in dir. Altin Yunus, 36.715 28.179, 200 m alt., 3.6.1998, NMBE 512542/1; Köycegiz, Köycegiz Gölü, bath of Sultaniye, 36.873 28.601, 30 m alt., 2.6.1998, NMBE 512541/1; Kidirak S Fethiye, 36.5233 29.136, 28.5.1988, NMBE 512554/1; Dalyan, 36.835 28.6416, 28.3.1986, NMBE 512553/1; Göcek, on the road Dalaman to Fethyie, 36.7546 28.9560, 30.09.1996, LIEB (4); Inlice, on the road Dalaman to Fethyie, 36.7479 29.0047, 07.10.1996, LIEB (1); Fethyie, castle hill, 36.6185 29.1130, 01.10.1996, LIEB (10); Fethiye, castle, 36.62 29.12, 50 m alt., 5.6.2006, NMBE 23018/3; Fethyie, at the rock graves, 36.6183 29.1123, 27.09.1994, LIEB (3); Fethyie, beach at the hotel Botanik, 26.09.1994, LIEB (5); Kayaköy, 36.5791 29.0881, 09.10.1996, LIEB (4); 50 km S Fethyie, Minore, ruins of Pinara, 36.4891 29.2583, 05.10.1994, LIEB (2); Tlos, ruins, 36.5529 29.421, 440 m alt., 5.6.2006, NMBE 23019/3; ditto, 28.09.1994, LIEB (11); Patara, ruins, 36.26027 29.31416, 03.10.1996, LIEB (8); ditto, 14.7.1990, Menk; Patara, above hotel Gelemis, 36.2761 29.3228, 06.10.1996, LIEB (5); Fethyie, Üzümlü (= Yesilüzümlü), 36.7347 29.2295, 30.10.1995, LIEB (7); Fethyie, Ölüdeniz, 36.5800 29.1448, 07.10.1994, LIEB (7); Ören, 2 km E Maziköy in dir. Ören, 37.0271 27.7564, 370 m alt., 8.6.1998, NMBE 512546/2; Xanthos, ruins of Letoon 4 km SW of Xanthos, 36.3314 29.2892, 13.7.1990, MENK (27). Xanthos, ruins, 36.3567 29.3185, 2.1.1987, MENK (14). **Antalya Ili**: SMF 18523 Adalia [Antalya], 36.9156 30.7173, coll. O. Boettger ex Conéménos; ditto, SMF 74176/2, coll. Jetschin ex Conéménos; ditto, SMF 74208/2, coll. C.R. Boettger; ditto, SMF 24441/2, coll. O. v. Moellendorff; ditto, SMF 24442/2, coll. Kobelt ex Rolle; SMF 280624/11, Antalya, Karadag W of Antalya, coll. Schlickum ex Schütt; W of the Düden waterfall, 36.8498 30.7816, 02.10.1986, leg. Rähle, RÄH (6); Komluca, 8 Km NE in dir. Antalya, 36.3677 30.3403, 100 m alt., 8.6.1987, NMBE 522715/3; Myra, 36.2593 29.9849, 10.09.1989, leg. Rähle, RÄH (1), ditto, rocky slope behind the theatre, 12.5.1993, NMBE 512597/1; ditto, roman theater in Myra, QA61, 1.1.1987, MENK (20); ditto, graves, 6.6.1987, NMBE 522716/19; Perge, rock crevices in the ruins, 36.9531 30.8506, UF09, 1.8.1984, MENK (78); ditto, 23.12.1986, UF09, MENK (10); ditto, NMBE 512552/9; ditto, 9.9.1988, NMBE 512548/10; ditto, 22.11.2002, NMBE 503515/4; ditto, 23.03.2986, leg. Rähle, RÄH (2); ditto, 12.1.1997, NMBE 525612/4; Aspendos, 36.94 31.17, 28.7.1986, NMBE 512595/1; ditto, theater, UF39, 1.8.1984, MENK (8); Kizilot, 36.7 31.57, 7.6.1987, NMBE 18475/4; Kas near Cerler, 36.28 29.78, 470 m alt., 7.6.2006, NMBE 23021/2; Kas, Simena, 36.19 29.87, 30 m alt., 7.6.2006, NMBE 23020/4; Demre, 500 m from the beach, 36.2501 29.9994, 7.6.1987, NMBE 522714/12; Island of Kekova, 36.1835 29.8818, 23.04.1986, leg. Engelhardt, RÄH (2); Kinik, ruins, 36.3566 29.3183, 30.09.1994, LIEB (9); Kinik, rocky rivershore, 36.3558 29.3162, 14.7.1990, MENK (29); Sahilkent E of Finike, 36.3024 30.1502, 13.1.1997, NMBE 525613/4, HEMM (2 alk.); Finike, 36.304 30.1401,

Figs 239–240. *Helix* (*Pelasga*) *nucula* Mousson, 1854. Genital organs. Fig. 239 NMBE 505543, Turkey, Finike, situs 42.43; Fig. 240, rock graves between Finike and Saklikent, situs 45.5.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50 m alt., 13.1.1997, NMBE 505543/2; Lymira, ruins of 7 km N Finike, 36.3620 30.1515, 15.7.1990, MENK (9+alk.1); Kemer, Canyon of Kesme, 36.5996 30.4777, 24.4.1997, NMBE 525611/10; Kemer, 36.6020 30.5623, 9.6.1987, NMBE 8601/2; rocks 3 km S Kemer, 36.6285 29.3678, 13.7.1990, MENK (1). rocks 2 km E of Kale, 36.2424 30.0255, 14.7.1990, MENK (9); Aksu 3 km S Perge, 36.9467 30.8363, 1.8.1984, MENK (14); Sillyon, 36.9894 30.9876, 11.9.1988, NMBE 512549/10; rocks 10 km N of Yeniköy 50 km N of Antalya, 37.1128 30.5822, 3.1.1987, MENK (8); rocks 6 km NE of Antalya, 36.9185 30.7855, 22.12.1986, MENK (10); rocks 4.6 km NE of Manavgat, 36.7935 31.5088, MENK (4); rocks at the crossroads to the Düden waterfall NW Antalya in direction to Burdur, 22.12.1986, MENK (10); Denizkent, 21 km W Manavgat, 36.8338 31.2071, 25.4.1987, NMBE 512550/2; road Manavgat–Seydişehir to Akseki, 37.031 31.7549, 960 m alt., 10.10.2001, NMBE 523964/36; Roman bridge 2 km S of Selge, 60 km NE Antalya, IV.1987, leg. Albrecht, RÄH (1);

Cyprus: SMF 22302, Cyprus, coll. Kobelt ex Rolle; SMF 22306, ditto, coll. O. v. Moellendorff ex Rolle; SMF 74232/7 Cyprus, Larnaka, 34.9329 33.6103, coll. Krüper ex Rolle; ditto, SMF 22301, coll. Kobelt ex Nägele; ditto, SMF 22304, coll. O. Boettger ex Nägele; ditto, SMF 74233, coll. C.R. Boettger; ditto, SMF 74231/2, coll. Jetschin ex Krüper; ditto,SMF 78214/5, coll. Nägele ex Bajadyan; SMF 18533 Cyprus, Mt. Armenian NE of Nicosia, 3065 feet, coll. O. Boettger ex Nägele; SMF 299390/4, Ormidia, 34.9925 33.7802, coll. C. Bosch ex Rolle; SMF 17954, Amathus, 34.7092 33.1203, ex Mavromoustakis; SMF 17955/3, Limassol, 34.6951 33.0247, ex Mavromoustakis; on the shore of the barrage lake at Skouli, 34.977 32.4645, march 1993, NMBE 512555/4; northern coast at Akamas, 35.0797 32.3086, may 1990, NMBE 512558/1; Lachi, 35.0402 32.3858, may 1990, NMBE 512557/1; Limassol, Pissouri beach, 34.6497 32.7234, 17.3.1993, NMBE 512556/3; Dikarpas, 35.5986 34.3803, 01.01.1986, LIEB (5); St. Hilarion, 35.3127 33.2798, 25.12.1985, LIEB (2); Paphos, 34.7720 32.4297, 18.10.1981, LIEB (7); Larnaca, 34.92 33.63, 4.1935, NMBE 18476/5; Pissouri, 34.6683 32.7011, 17.10.1981, LIEB (5); Pentadaktylos in dir. Esentepe, 35.2987 33.5463, 28.12.1986, LIEB (5); .

Erroneous localities: SMF 18524/2, eastern Balkan Peninsula, coll. Rossmässler ex Stentz; SMF 78205 Tarsus, coll. Nägele ex P. Hesse.

Diagnosis: shell small to moderately sized, thin, spherical, protoconch small, teleoconch with coarse axial riblets and surface granulation, aperture always white; flagellum as long as epiphallus+penis, long diverticulum surmounting bursa copulatrix in length.

Description: shell of small to medium size, thin, spherical, spire elevated conical; basic shell colour greyish white with chestnut brown spirals, usually spiral No. 2 fused with No. 3 or diffuse, often also No.4 and No.5 fused, seldom spirals separate; protoconch small, its diameter ranging between 3–4 mm, smooth, white whorls; teleoconch of 3–4 whorls, sculptured by coarse but densely arranged axial riblets combined with a more or less well visible pattern of fine granulation, granulation restricted to the supraperipheral parts of the shell, seldom missing; last whorl slightly descending towards the

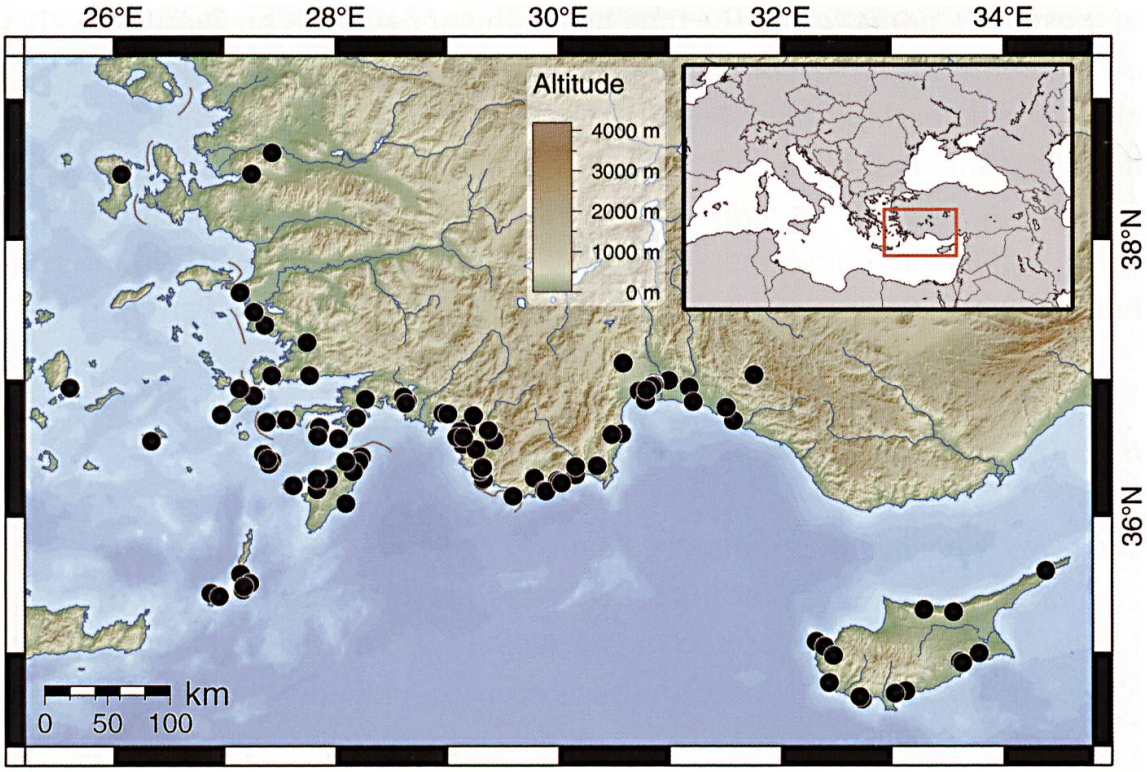


Fig. 241. *Helix* (*Pelasga*) *nucula* Mousson, 1854. Distribution.

periphery; aperture rounded, apertural rim narrow, labial callus weak, always white, columellar triangle small; umbilicus closed in adult shells.

Genital organs (Figs 239–240): penis club-shaped, epiphallus longer than penis; flagellum as long as epiphallus+penis; mrp attaching in a subterminal position on the epiphallus; internally, pp1 smaller than pp2, penial chamber long, filled with a few elongate folds, both papillae conical with a central perforation; atrial stimulator a prominent rounded knob; female system with a short vaginal tube, dart sac strongly developed, glandulae mucosae with a moderately long basic stem and a few short tubules, glandulae mucosae shorter than dart sac; pedunculus stem long, with a long diverticulum branching off in the centre of pedunculus and reaching bursa copulatrix in length, bursa copulatrix stem as long as pedunculus stem, vesicle rounded and bent downwards.

Distribution (Fig. 241): This is a widespread species inhabiting the Southeastern Aegean Islands and living along the Mediterranean Turkish coast from Izmir to an area east of Manavgat, and the island of Cyprus.

Remarks: For a differential diagnosis with *H. figulina* refer to this species. *Helix nucula* is partly the "Turkish *Helix figulina*" as used by many authors in the past. It differs from the Lebanese and Syrian *H. pachya* mainly in size as this species, inhabiting the moist Lebanon Mountains builds shells comparable

to those of *H. pomatia*. For the time being, the populations on Cyprus are also considered to belong to *H. nucula*, because the shells do not reach the enormous size as in *H. pachya*. Both species have a white aperture, and can have heavily granulated teleoconch whorls. Germain (1936: 124 sub *texta*) mentions the name *Helix tremithensis* BOURGUIGNAT from Cyprus, which obviously is a manuscript name, there are no specimens under this name in the coll. Bourguignat in Geneva (probably in coll. Bourguignat in MNHN, Paris?).

Helix (*Pelasga*) *pachya* BOURGUIGNAT, 1860 (Figs 242–250)

1860 *Helix pachya* BOURGUIGNAT, Revue et Magasin de Zoologie (2) 12: 162, pl. 5, fig. 6–9 [separatum: Aménités malacologiques II [1860]: 180] ["commune dans les contrées arides de la Syrie notamment dans les environs du lac de Tibériade" according to Aménités Malacologiques II: 180, pl. 21, fig. 6–9].

1860 *Helix pachya* var. B. *Elongata* BOURGUIGNAT, Revue et Magasin de Zoologie (2) 12: 163, Aménités Malacologiques II: 180, 181], pl. 21, fig. 8 [environs de Tibériade].

1861 "*Helix texta*" Mousson, Vierteljahrsschrift der naturforschenden Gesellschaft in Zürich 6: 32 [Tiberias (Roth)].

1876 *Helix luynesiana* BOURGUIGNAT, Species novissima molluscorum: 54 [Montagnes du Nahr-el-Kelb].

1889 *Helix dehiscens* WESTERLUND, Fauna der in der Paläarctischen Region lebenden Binnenconchylien II: 454 [Bunias im oberen Jordangebiet].

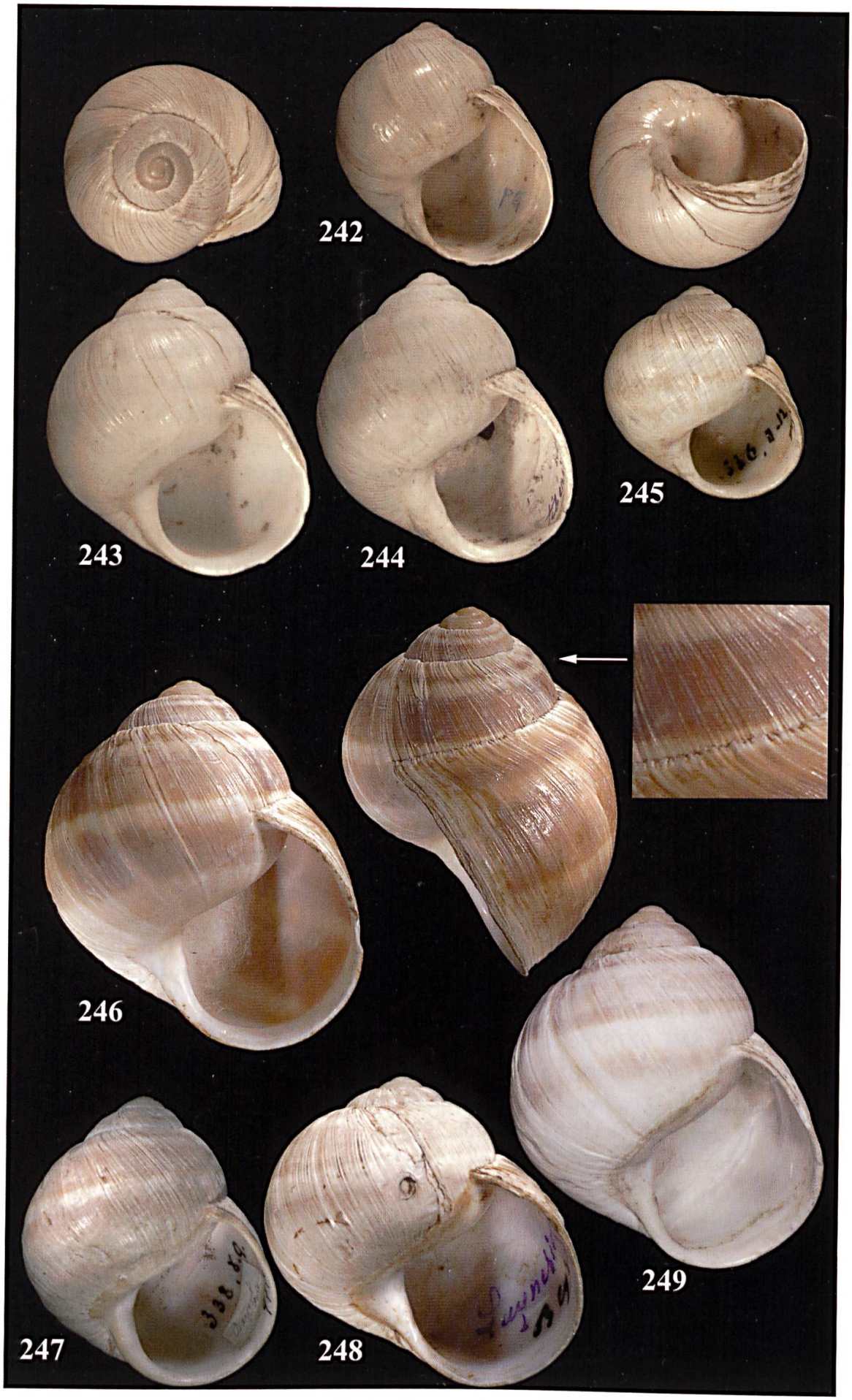
1895 *Helix* (*Pomatia*) *racopsis* KOBELT, Iconographie der Land- und Süsswassermollusken, Suppl. 1: 48, Taf. 18, Fig. 3 [in den Bergen um Beirut].

1903 *Helix* (*Pomatia*) *xerekia* NÄGELE, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 35: 170 [Saida, in monte Libano Syriae].

1904 *Helix* (*Helicogena*) *pachya subtexta* KOBELT, Systematisches Conchylien-Cabinet VI: 159, Taf. 336, Fig. 11, 12 [In Syria].

1904 *Helix edraea* Bourguignat in coll., – Kobelt, Systematisches Conchylien-Cabinet VI: 170 171 [as Kobelt points out, this taxon was already

Figs 242–249. *Helix* (*Pelasga*) *pachya* BOURGUIGNAT, 1860. Fig. 242 *pachya*: lectotype MHNG 17947a, lac de Tibériade, D = 30.8; Fig. 243 paralectotype *pachya* MHNG 17947b, D = 37.1; Fig. 244 *elongata*: syntype MHNG 17954, Tibériade, D = 36.25; Fig. 245 *subtexta*: holotype SMF 9678, "Syria", D = 30.1; Fig. 246 *texta*: original specimen ZMZ 506327, Tiberias, D = 44.95; Fig. 247 *phoeniciaca*: lectotype SMF 9778, Beirut, D = 36.1; Fig. 248 *luynesiana*: syntype MHNG 18020, Montagnes du Nahr-el-Kelb, D = 45.3; Fig. 249 BANK 800, Israel, Banyas, D = 44.27. — All photos Neubert, original size.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figured in Iconographie der Land- und Süsswassermollusken 1 (4) Taf. 99, Fig. 1030][Bunias][nomen nudum].

1904 *Helix texta phoeniciaca* KOBELT, Systematisches Conchylien-Cabinet VI: 171, Taf. 338, Fig. 4–11 [Beirut].

1939 *Pomatia* (*Pseudofigulina*) *karamiana* PALLARY, Mémoires présentés a l'Institut d'Égypte 39: 19, pl. I, fig. 3, 4 [Jounieh].

Type specimens:

pachya: lectotype MHNG 17947a: H = 34.8; D = 30.8; PH = 26.35; PD = 21.0; PrD = 3.8; W = 5 (lectotype herewith designated); paralectotypes MHNG 17947b/4; *elongata*: syntype MHNG 17954: H = 42.5; D = 36.25; PH = 30.0; PD = 29.6; PrD = 5; W = 5.25. *texta*: original specimens ZMZ 506327/2: H = 52.4; D = 44.95. *luynesiana*: syntype MHNG 18020: H = 45.8; D = 45.3; PH = 33.7; PD = 24.45; PrD = 2.0; W = 5.25; *racopsis* syntype MHNG 17957: H =; D =; PH =; PD =; PrD =; W =; *xerekia*: lectotype SMF 75504 (SD Zilch 1952: 140): H = 43.7; D = 37.7; PH = 30.6; PD = 18.2; PrD = 5.05; W = 5; *subtexta*: holotype SMF 9678: H = 30.1; D = 28.3; PH = 22.5; PD = 14.4; PrD = 3.8; W = 5; *phoeniciaca*: lectotype SMF 9778 (SD Zilch 1952: 139): H = 41.8; D = 36.1; PH = 29.2; PD = 18; PrD = 4.1; W = 5.25; *karamiana*: unknown.

Note on typoid specimens: "*Helix edraea* Bourguignat in coll". is mentioned by Kobelt (1904) in the synonymy of *H. texta*. The collection of Bourguignat contains two lots of "*Helix edraa* Bourguignat [sic!]", viz. MHNG 17973 and MHNG 17974, but both originate from Batroun in Lebanon, and not from Bunias (= Banias).

Specimens examined:

Turkey: between Tekebaşı and Meydan 7 km S of Samandağı, 36.0401 35.9865, 18.4.1997, NMBE 525622/2; ditto, 1.8.1994, SMNS/NORDS; approx. 1 km from Harbiye to Yayladağı, 36.1280 36.1485, 18.4.1997, NMBE 525623/1 (alk.).

Syria: Tartus: ruins of Amrit 10 km S of Tartus, 34.8327 35.9126, Oct. 1990, MENK (8); SMF 78208 Lattaquiah, 35.5259 35.7932, coll. Nägele ex Pallary 1910; SMF 214877, Syria, coll. S. H. Jaeckel.

Lebanon: SMF 9778 Beirut, 33.8886 35.4954, coll. Rossmässler ex Frivaldszky (paralectotype *phoeniciaca*); SMF 74128, Lebanon, ditto, coll. Jetschin ex Krüper; SMF 22334, ditto, coll. O. v. Moellendorff; SMF 74347, ditto, coll. K.L. Pfeiffer ex Staudinger; SMF 22336, ditto, ex Löbbecke; SMF 299410, ditto, coll. C. Bosch ex Schlüter; SMF 74359/2 Lebanon, ditto, coll. Krüper ex P. Hesse; SMF 22345, ditto; SMF 74361/4, ditto, coll. C.R. Boettger; SMF 22349, ditto, coll. O. Boettger ex Nägele; SMF 22340, ditto, coll. O. Reinhardt; SMF 22351, ditto, ex Löbbecke; SMF 74362/8, ditto, coll. Krüper ex P. Hesse; SMF 22342, ditto; SMF 22343/2 Beirut, in the gardens, coll. O. Boettger ex Schumacher; SMF 299404, Lebanon, coll. C. Bosch ex Schlüter; SMF 74348/4 Lebanon, coll. Krüper; SMF 22341, ditto, coll. O. v. Moellendorff ex Nägele; SMF 78222/3, ditto, coll. Nägele; SMF 17951, ditto, coll. Kobelt ex Nägele; SMF 18543 E Lebanon, coll. O. v. Moellendorff; SMF 78207/3 eastern Lebanon, coll. Nägele ex Torrend; SMF

78223/2 Lebanon, Hamana, 33.8254 35.7342, 1000 m alt., coll. Nägele ex M. des Archanges; SMF 22333, ditto, 1000 m alt.; SMF 22337, ditto, 1000 m alt., coll. Nägele; SMF 22681, ditto, coll. Kobelt ex Nägele; SMF 74358, ditto, coll. Jetschin ex Paar; SMF 75505 "Syria", Saida (= Sidon), 33.5627, coll. Nägele paralectotype *xerekia*); SMF 75506/7, ditto, (paralectotypes *xerekia*) coll. Nägele; SMF 9698/2 Saida, coll. Kobelt ex Nägele (paralectotypes *xerekia*); SMF 74366/3, ditto, coll. Jetschin ex Nägele (paralectotypes *xerekia*); SMF 299407/2, ditto, coll. Krüper ex P. Hesse; SMF 74364, ditto, coll. Krüper ex Nägele; SMF 74365, ditto, coll. Jetschin ex Wohlberedt; SMF 9780, ditto, coll. Kobelt; SMF 9831, "Lebanon", Banias, 33.2486 35.6944, upper each of the Jordan, coll. Kobelt ex Löbbecke; SMF 9713 Lebanon, Ghazir, 34.0185 35.6628, coll. Kobelt; SMF 78221/2, ditto, coll. Nägele ex Tembé; SMF 78220/3, ditto, coll. Nägele ex Tembé; rocks in Sribbin (= Srobbine?) 5 km N of the Israelian border, 33.1539 35.3581, 1.10.1979, MENK (26); Qaroun Lake, 33.551 35.682, 870 m alt., 21.8.2008, NMBE 524410/4; Kfarhoune, 33.4866 35.5921, 930 m alt., 21.8.2008, NMBE 524409/3; Jezzine, Mazrad el Mathané, 33.576, 35.519, 450 m alt., 21.8.2008, NMBE 524408/1; Jezzine, W of village, steep slope, 33.546 35.575, 940 m alt., 21.8.2008, NMBE 524407/6; Nahr Ibrahim, Chouene, trail Chouene - Chouwan Lake, 34.081 35.785, 450 m alt., 20.8.2008, NMBE 524406/3; Qanater al Zbeideh, Nahr Beirut, 33.85 35.556, 80 m alt., 19.8.2008, NMBE 524405/3; Nahr Abu Ali close to Seraad, 34.382 35.93, 630 m alt., 19.8.2008, NMBE 524404/2; Tourza, 34.281 35.89, 870 m alt., 19.8.2008, NMBE 524403/2; Jazire, Nahr al Qasimiyah (part of the Litani), 33.32 35.288, 15 m alt., 18.8.2008, NMBE 524402/14; Nahr al Damour, 33.704 35.452, 20 m alt., 18.8.2008, NMBE 524401/2; Nahr Kfar Matta at Jisr el Kadi, 33.721 35.558, 260 m alt., 17.8.2008, NMBE 524400/2; Falougha above Soha water plant, 33.835 35.756, 1610 m alt., 17.8.2008, NMBE 524399/2; Ain al Jdeidi, 33.809 35.63, 918 m alt., 17.8.2008, NMBE 524398/2; Nahr el Kalb, Jeita Grotto, cave entrance, 33.944 35.641, 90 m alt., 16.8.2008, NMBE 524397/1; Nahr el Kelb, road to Jeita Grotto, limestone slope, 33.947 35.637, 115 m alt., 16.8.2008, NMBE 524396/5; Tartus, 34.8896 35.8851, 2.5.2007, NMBE 517768/1; Jezzine, Mazrad el Mathané, 33.576 35.519, 450 m alt., 21.8.2008, NMBE 509480/1; Aaramoun, 34.0153 35.6973, 760 m alt., 27.10.2011, NMBE 506384/1; Kfour, 34.0348 35.6952, 817 m alt., 27.10.2011, NMBE 506383/1; Adma, 34.0166 35.6489, 85 m alt., 27.10.2011, NMBE 506382/4; above Delbta, 34.0122 35.6975, 852 m alt., 27.10.2011, NMBE 506369/1; Jabal Moussa above Mchati, 34.0571 35.7692, 1505 m alt., 30.10.2011, NMBE 506318/15; below Barouk Cedar Forest, 33.7042 35.6997, 1310 m alt., 29.10.2011, NMBE 506317/6; Wadi Abadieh, 33.8434 35.6344, 310 m alt., 28.10.2011, NMBE 506316/12; Ajhbe, 34.0087 35.7108, 1164 m alt., 27.10.2011, NMBE 505494/2.

Israel: along Dan–Banyas road, 33.2506 35.6729, 12.4.1976, BANK/2; Banyas, 33.2474 35.6918, 15.2.1971, BANK/3; Hermon, Nahal Sion, 1–3 km N Banyas, 33.2371 35.6626, 20.2.1976, BANK/4; Hermon, Banyas, 33.474 35.6918, 12.4.1976, BANK/1; Hermon, road to Djebbel Rus (Har Dov), path to Ibrahim el-Halil, 1200 m alt., W-slope, 33.3039 35.7126, 25.9.1971, BANK/3; Hermon, Ein Kunia, N-slope, 31.1.1976, BANK/3; Hermon, Migdal Rir, Mashhad Attair, 15.2.1971, BANK/6.

Unspecific localities: SMF 22335 Syria, Blanc ex coll. Martens; Palestine, coll. Shuttleworth ex Boissier 1847, NMBE 524414/1.

Diagnosis: shell large, protoconch relatively small, spiral bands No. 2 and No. 3, and No. 4 and No. 5 fused, strong surface granulation, fine axial riblets, aperture large, white.

Description: shell large sized, thick, elongate spherical, with a high conical spire, basic shell colour greyish white with bluish brown spiral bands, usually the subsutural spiral No. 1 separate, spiral No. 2 fused with No. 3, and spirals No. 4 and No. 5 fused, each forming large brownish areas on the teleoconch, protoconch small in comparison to shell, its diameter ranging from 4.5–6 mm, smooth, white whorls, teleoconch of 3–4 whorls, usually with a strong surface granulation and fine axial riblets, last whorl slightly descending below the periphery, aperture large, elongate, apertural rim narrow, labial callus weak, always white coloured, columellar triangle large, umbilicus closed in adult shells.

Genital organs: There were no preserved specimens available for dissection.

Distribution (Fig. 250): This species inhabits the coastal mountain chains from the Hatay area in Turkey, northern Syria, and the Lebanon to northern Israel. Still, the Syrian coastal mountains are rather unexplored, and records for *H. pachya* from there are scarce. The type locality "environs du lac de Tibériade" [Lake Genezareth] is south of the hitherto known range of the species, but this might be due to a broad interpretation of geography.

Remarks: Forcart (January 1978, on label in coll. Bourguignat) considered as "holotype" the specimen, which he identified to represent the specimen figured by Bourguignat (1860: pl. 21, fig. 6) and which has the caption "6. *Helix pachya*, (type)". This has to be interpreted as meaning "typical form", because Bourguignat then illustrated with his figs 7–9 so-called "var.", meaning varieties of *H. pachya*. Thus, he has several specimens at hand, and the note "type" is not an original designation of a holotype in our present sense. Thus, the original specimen illustrated in Fig. 6 is here designated as lectotype. The lot MHNG 17954 contains the specimen figured by Bourguignat (1860: pl. 21, fig. 8) as a variation of *H. pachya*, the brown spirals and the size of the shell match the original description. The three other specimens of this lot rather look like *H. engaddensis* than *H. pachya*. It has to be noted that the lectotype specimen of *H. pachya* is quite untypical, because the cancellate sculpture is almost missing. For this reason, a paralectotype is illustrated showing the characteristic sculpture pattern.

Heller (2009: 335–336) records three species from Israel, viz. *H. engaddensis*, *H. texta*, and a third unknown species from Mt. Hermon. The first species *H. engaddensis*, is said to be widespread in Israel southwards to the end of the Dead Sea, while *H. texta* and the unknown species are restricted to Mt. Hermon. The basic difference in shell characters between the two species *H. engaddensis* and *H. texta* is the strong reticulate sculpture on the teleoconch

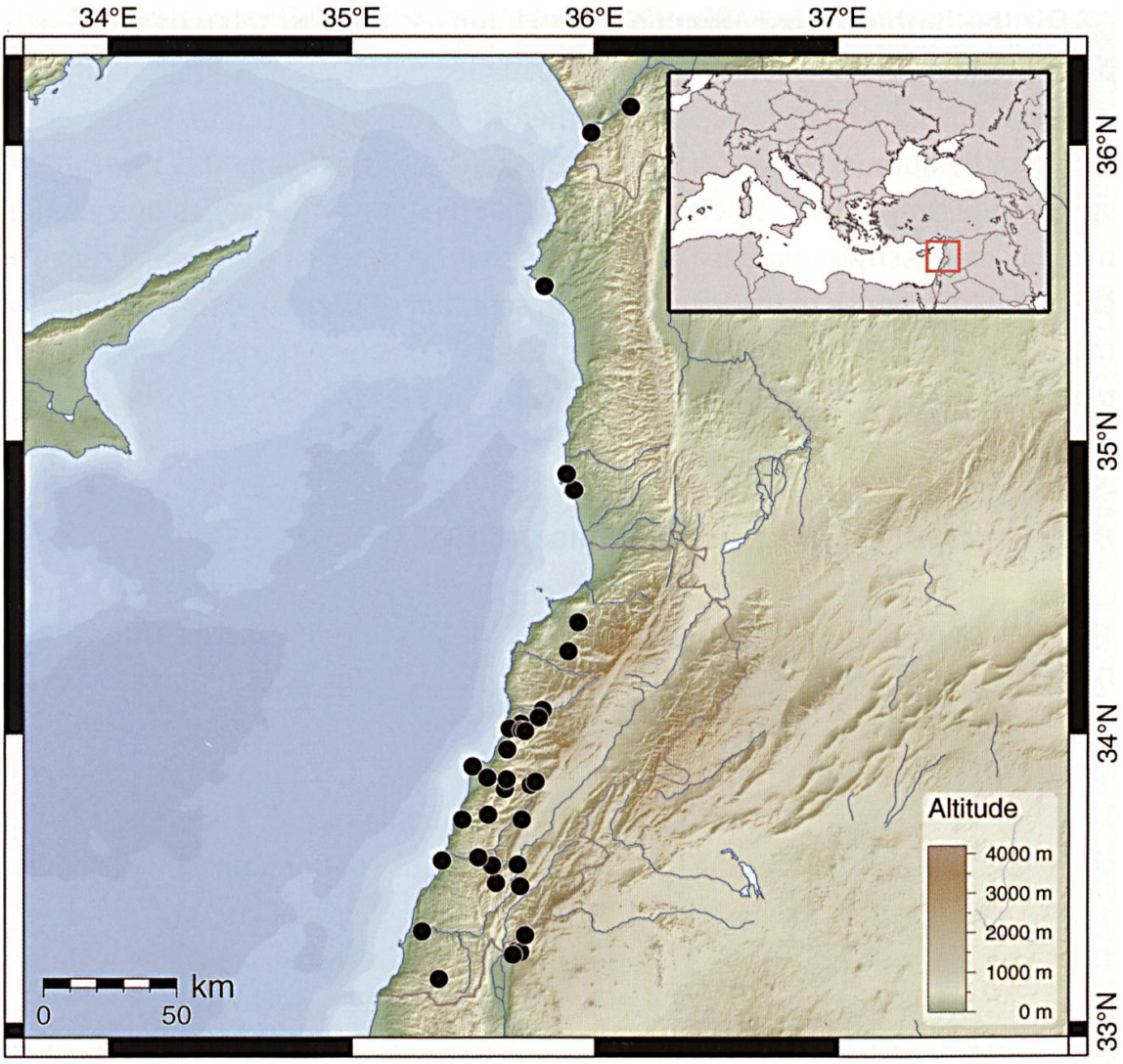


Fig. 250. *Helix* (*Pelasga*) *pachya* Bourguignat, 1860. Distribution.

of the latter species, which might explain the shell pattern in *H.* (*Pelasga*) sp. (Heller (2009: lower figure on page 336). As main species-specific difference, Heller stresses the size of the protoconch. For *H. engaddensis*, he notes a diameter of 3.5 mm, for *H. texta* 4.0 mm, and for *H.* (*Pelasga*) sp. the value is 4.8 mm. However, protoconch sizes vary 1) individually, 2) according to the measuring method applied, and 3) whether the start of adult growth is well discernible. Due to the differing larval development between terrestrial and marine snails, the change in protoconch sculpture is by far not that drastic as can be seen in many marine gastropods. In the author's experience, a difference of 1.3 mm in protoconch diameter in large *Helix* species should not be over-emphasised. Own measurements (based on specimens from Lebanon) range from 4.5–6 mm. Concluding, a re-consideration of Israelian specimens with a focus on the shell sculpture is required to clarify the southern distribution limit of *H. pachya*. So far, it has not been recorded from Jordan.

For the problem of separation from *H. nucula* refer to this species. *Helix pachya* can easily be identified by the usually well developed granulation on its teleoconch, its large shell size and the often conical spire. It often has been recorded by authors under "*H. texta* Mousson", but this name has never been validly published. Mousson clearly states that the name *pachya* has precedence over his manuscript name *texta*, and adds that he supplies his original diagnosis for *texta* because of the insufficient description of *H. pachya* by Bourguignat (Mousson 1861: 32). In fact, Mousson's "*texta*" specimen is much more characteristic of *H. pachya* than the type itself (compare Fig. 242 with 246).

Helix (Pelasga) engaddensis Bourguignat, 1852 (Figs 251–259)

1852 *Helix engaddensis* Bourguignat, Testacea novissima quae Cl. de Saulcy in itinere per Orientem annis 1850 et 1851 collegit: 11 [Palaestinam, in locis aridis circa mare Mortuum, habitat].

1853 *Helix figulina* var. B *albidula* Bourguignat, Catalogue raisonné des Mollusques terrestres et fluviatiles recueillis par M. F. de Saulcy: 15, pl. 1, fig. 44, 45 [Habite les montagnes qui environnent la mer Morte, notamment à Mar-Saba].

1854 *Helix cavata* Mousson, Mittheilungen der Naturforschenden Gesellschaft in Zürich, 3 (101): 367 [Environs de Jérusalem].

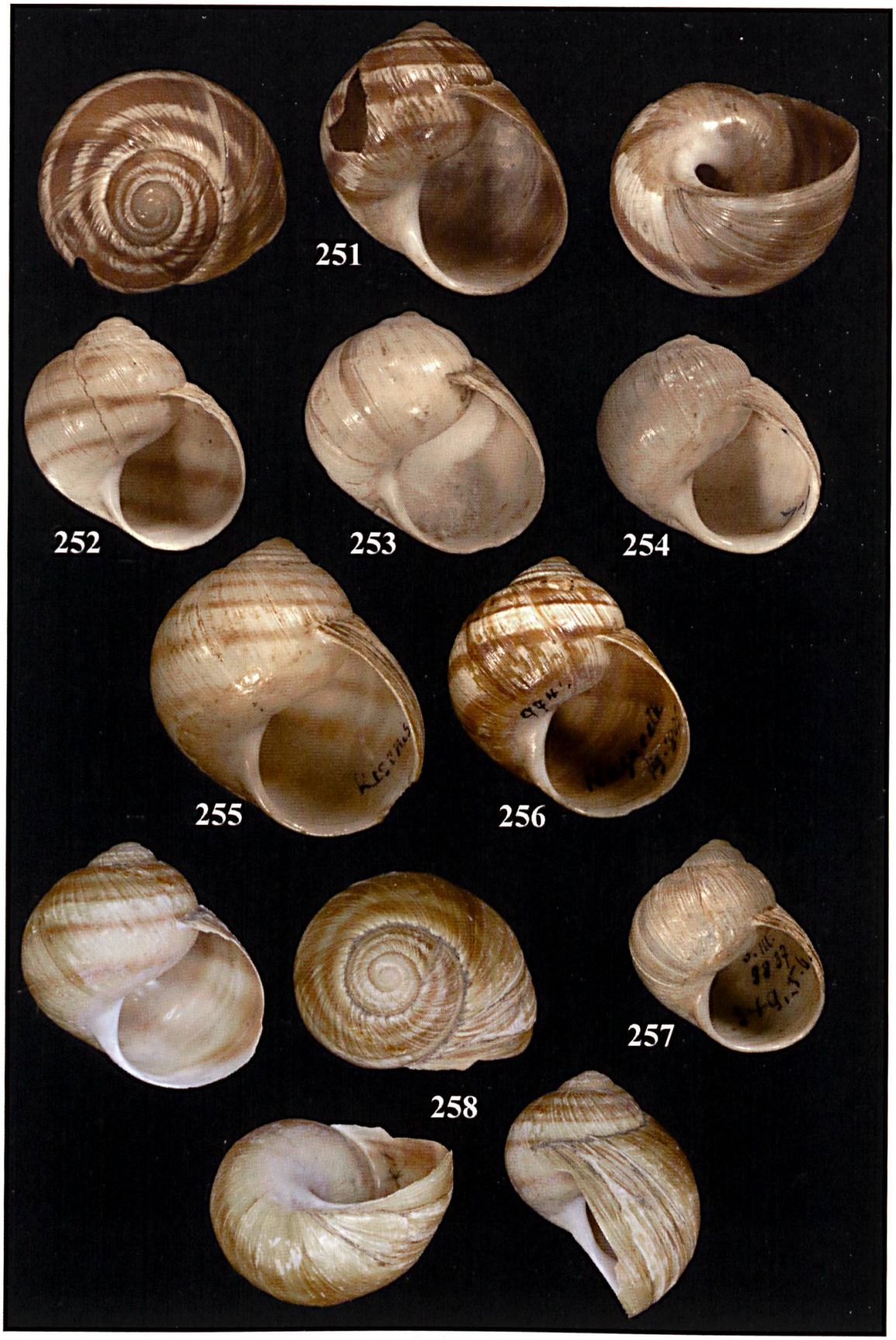
1855 *Helix prasinata* Roth, Malakozoologische Blätter 2: 31, Tab. 1, Fig. 1, 2 [Apud Tiberiadem].

1860 *Helix engaddensis* var. *concolor* Bourguignat, Aménités Malacologiques II: 204, pl. 24, fig. 8 [Environs de Nazareth].

1860 *Helix pycnia* Bourguignat, Revue et Magasin de Zoologie, (2) 12: 164 [separatum: Aménités Malacologiques, II: 182, pl. 2, fig. 7–9 [Syrie, aux environs de Nazareth].

1904 *Helix (Helicogena) cavata tripolitana* Kobelt, Systematisches Conchylien-Cabinet VI: 200, T. 349, Fig. 5, 6 [non Wood 1829] [Tripolitanien].

Figs 251–258. *Helix (Pelasga) engaddensis* Bourguignat, 1852. Fig. 251 *engaddensis*: syntype MHNG 17942, circa mare Mortuum, D = 33.1; Fig. 252 *cavata*: syntype ZMZ 506406, Jérusalem, D = 29.05; Fig. 253 *concolor*: syntype MHNG 17943, Nazareth, D = 33.0; Fig. 254 *pycnia*: syntype MHNG 17956, Nazareth, D = 30.05; Fig. 255 *kisonis*: lectotype SMF 9317, Kison-Ebene bei Haifa, D = 36.6; Fig. 256 *galilaea*: lectotype SMF 9745, Nazareth, D = 32.3; Fig. 257 *tripolitana*: holotype SMF 9837, "Tripolitanien", D = 26.1; Fig. 258 BANK 2567, Israel, Oranim college near Tiv'on, D = 32.62. — All photos Neubert, original size.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1905 *Helix* (*Helicogena*) *kisonis* KOBELT, Systematisches Conchylien-Cabinet VI: 202, Taf. 350, Fig. 5–8 [Kison-Ebene (Esdrelon oder Jezreel) bei Haifa].

1905 *Helix* (*Helicogena*) *engaddensis* var. *galilaea* KOBELT, Iconographie der Land- und Süsswassermollusken 2 (12): 25, Taf. 313, Fig. 1985, 1986 [Um Nazareth].

Type specimens:

engaddensis: syntype MHNG 17942: H = 35.2, D = 33.1, PH = 28.2, PD = 18.7, PrD = 4.3, W = 5. *albidula*: no type specimens identifiable in coll. Bourguignat. *cavata*: syntypes ZMZ 506406/3 (ex Parreyss 1852), illustrated syntype: H = 31.15, D = 29.05, PH = 22.4, PD = 15.65, PrD = 3.95, W = 5.25. *prasinata*: not searched, most probably in ZSM; *concolor*: syntype MHNG 17943: H = 33.0, D = 32.1, PH = 26.9, PD = 20.5, PrD = 4.2, W = 5. *pycnia*: syntype MHNG 17956: H = 31.05, D = 30.05, PH = 24.5, PD = 17.3, PrD = 4.2, W = 4.5. *tripolitana*: holotype SMF 9837: H = 29.2, D = 26.1, *kisonis*: lectotype SMF 9317 (SD Zilch 1952: 138): H = 38.5, D = 36.6. *galilaea*: lectotype SMF 9745 (SD Zilch 1952: 137): H = 36.7, D = 32.3.

Specimens examined:

Syria: Daraa (= Dera'a) at the Syrian/Jordanian border, 32.6252 36.1061, NMBE 525977/1.

Israel: Samaria, at excavations, 2.11.1976, MENK (2); SMF 18541 Palästina, Scharon; Jaffa, 32.03 34.75, NMBE 517329/1; King Husein Bridge (=Allenby Bridge) to Shouna, 31.8747 35.5407, 3.10.1990, leg. Steffek, NMBE 508260/1; Jericho, limestone cliffs, 31.857 35.4066, 9.10.1990, leg. Steffek, NMBE 508282/1; Nahf, upper Galiläa, limestone rock, 32.9347 35.3165, 9.10.1990, leg. Steffek, NMBE 508232/3; Mont Beatitudes, limestone slope, 32.8822 35.5552, 8.10.1990, leg. Steffek, NMBE 508294/2; W. Galilee, Beth Ha'emeq, 32.9707 35.1448, 15.11.1975, BANK/4; W. Galilee, Bustan Hagalil, 32.9486 35.0807, 4.12.1974, BANK/4; W. Galilee, Judeida, 32.9287 35.1506, 31.12.1975, BANK/2; W. Galilee, Kabri S-slope, dolomite, 33.0184 35.1471, 18.9.1971, BANK/4; Oranim college near Tiv'on, 32.7113 35.1099, 26.12.1968, BANK/2; 2 km SW Mefalsim, 31.49944 34.5425, 15.2.1972, BANK/2; Samaria, Salfit, 32.0777 35.1741, 4.10.1975, BANK/3; Judea, between Dahariyah & Tel Shoqet (S. Hebron Mountains), 31.3712 34.9488, 14.3.1971, BANK/3; Hermon, Migdal Shames (=Majdal Shams), E.slope, 33.268 35.7733, 3.4.1976, BANK/5; L. Galilee, Yodphat junction nr. Segev, 32.8427 35.2618, 6.3.1973, BANK/3; Acre-Safed Road, Kfar Yassif junction, E. slope, 32.9118 35.1545, 12.1.1974, BANK/1; Hermon, descent to Wadi Ar'ar, 32.2881 35.7518, 1500–1400 m alt., 18.6.1973, BANK/2; Hermon, Senir along Dan–Banyas road, 33.2401 35.6769, 12.4.1976, BANK/4; Hermon, 0.5 km S. Hill 1720 (alt. 1650 m), 33.2869 35.7697, 8.6.1976, BANK/9; Golan, Mevo Hama N-slope, 32.7408 35.6561, BANK/3; Netzer Sireni, 31.9228 34.8212, 19.7.1971, BANK/2.

Jordan: Al Shuneh, xeroterm limestone rocks, valley of Jordan River, 31.9120 35.6443, 12.3.2000, leg. Steffek, NMBE 508316/4; Ajlun Nature Reserve, 32.3835 35.7636, 22.05.2007, leg. Z. Amr, JUST, NHMW 104097/2; Ajlun, 32.3251 35.7272, 1000

m alt., Feb 93, leg. Waitzbauer, NHMW 106892/1; ditto, Ajlun, near Castle, 24.05.2007, leg. Z. Amr, NHMW 104085/1, JUST; Anas Alfaldi, 05.05.2007, leg. Z. Amr, NHMW 106778/1; Aqraba, 32.7265 35.8055, 13.03.2004, leg. Z. Amr, NHMW 104092/1, NHMW 104032/1; ditto, Aqraba, 18.3.2004, JUST; Birkat Al Arayes, 9.7.2007, leg. M. Amr, 104098/2; Dana, 30.6789 35.6122, Oct 1993, leg. Waitzbauer, NHMW 90048/1; Dibbin National Park, 32.2500 35.8333, 19.3.1990, leg. Z. Amr, JUST; Jawa, 31.85 35.9333, 7.2.2008, leg. Z. Amr, JUST; Jerash, 32.2777 35.8907, 18.3.1990, leg. Z. Amr, JUST; King Talal Dam, 32.1898 35.7980, 04.08.2000, L. Rifai, JUST, NHMW 104089/1; ditto, 28.04.2007, leg. A. Falih, NHMW 104088/2, NHMW 104087/1; Kufr Khall, 32.3581 35.8839, 19.04.2003, leg. A. Mahaseneh, NHMW 104094/3, NHMW 104034/3, ditto, 2.1.2000, 19.4.2005, JUST; Malka, 32.6736 35.7511, 32.6764 35.7531, 400 m alt., June 2007, leg. Z. Amr, NMBE 517745/6; Mt. Nebo, 31.7668 35.7250, 21.3.1990, leg. Z. Amr, JUST; Pella [Tabaqat Fahl], pasture, 32.4497 35.6156, Feb 94, leg. Waitzbauer (juvenile specimens), NHMW 90927/1; ditto, 9.4.1996, leg. Z. Amr, JUST; Schaubak [asch-Schawbak], 30.5313 35.5608, 20.8.2007, leg. Z. Amr, NMBE 517746/10; Salt, 32.0397 35.7264, 840 m alt., December 2007, leg. Z. Amr, NMBE 517748/6; Tafila, 30.8352 35.6106, 26.9.1990, leg. Steffek, NMBE 508263/1; ditto, 9.10.1990, leg. Steffek, NMBE 508198/4; Um Al Qutain [Um el Quttein], 32.3158 36.6315, 17.05.2007, leg. Z. Amr, NHMW 104093/3, NHMW 104099/2, JUST; Umm Qays, 32.6563 35.6779, 07.04.2007, leg. A. Falih, NHMW 104083/3, JUST; Wadi Al Arab Dam, 32.5265 35.6203, 27.04.2007, leg. Z. Amr, NHMW 104084/4; ditto, 24.6.2007, JUST; Wadi Al Mujib, 31.4561 35.5883, 17.5.2007, leg. E. Eid, NHMW 104090/3, NHMW 104091/2, NHMW 104095/2, JUST; Wadi el Hasa, 30.9900 35.5935, 380–540 m alt., 22.03.2000, leg. Waitzbauer, NHMW 106902/2; Wadi Mousa, Jabal Karara, 30.3199 35.4794, 7.3.2000, leg. Steffek, NMBE 508212/3; Wadi Sartaba, Pella, 32.4492 35.6096, 11.3.2000, leg. Steffek, NMBE 508255/1; Wadi Zarqa Ma'in 1 (WZM-1), 31.6214 35.7168, 730 m alt., May–June 2011, leg. Pokines, NMBE 508939/1, 508938/1, 508937/1, 508936/1, 508935/1, 508934/1, 508933/1, 508932/1, 508710/1; Zobya, 32.4333 35.7667, 13.05.2004, leg. Z. Amr, NHMW 104036/2, NHMW 104086/2, NHMW 104096/2, JUST; ditto, 4.8.2000, leg. Z. Amr, JUST; ditto, 900 m alt., leg. Z. Amr, 5.1.2007, NMBE 517749/1.

Diagnosis: shell medium sized, aperture very large, columellar triangle elongate, aperture glossy white.

Description: shell medium sized, elongate globose, thin, basic shell colour whitish-greyish, usually with four distinct brown spiral bands, and spiral No. 2 fused with No. 3, protoconch of medium size in comparison to shell, its diameter ranging from 4–5.5 mm, smooth, white whorls, teleoconch of 3–4 rapidly increasing whorls, smooth (i.e. no granulation on shell), with relatively strong axial riblets, aperture very large, elongate oval to almost rounded, labial callus weak, columellar triangle elongate, glossy white, umbilicus closed.

Genital organs: There were no preserved specimens available for dissection. Hesse (1919: 135–137) described the genital organs of *H. engaddensis* (under *kisonis*). He stated that in his specimen the flagellum was shorter than penis+epiphallus, and the diverticulum was thick and long, which is quite

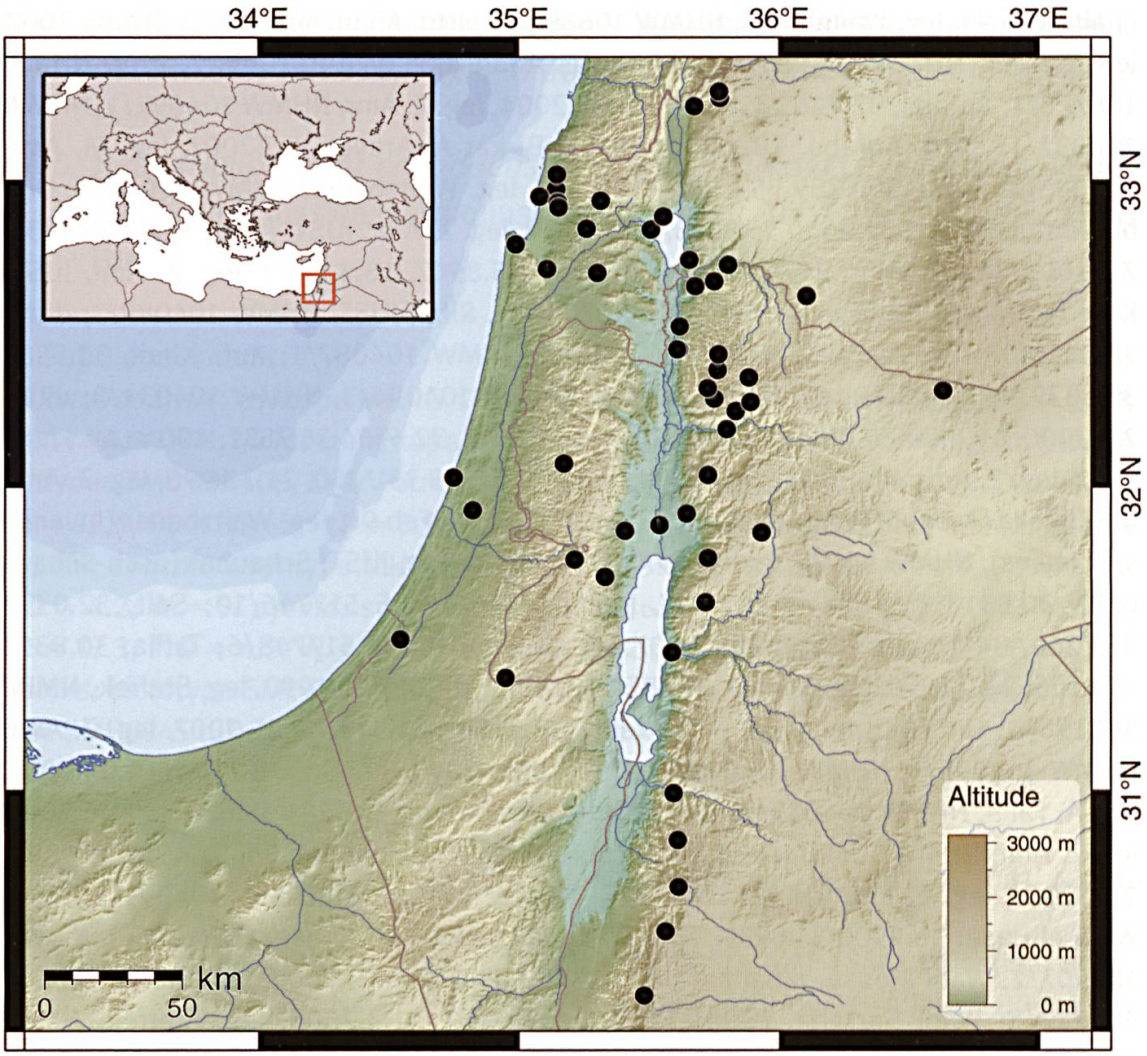


Fig. 259. *Helix* (*Pelasga*) *engaddensis* Bourguignat, 1852. Distribution.

characteristic for the subgenus *Pelasga*. Moreover he noted that the specimen had quite a long vagina, and poorly developed glandulae mucosae with a short stem.

Distribution (Fig. 259): This species is known from Israel, and also from southern Syria and the Mediterranean part of Jordan.

Remarks: *Helix* (*Helicogena*) *cavata tripolitana* Kobelt, 1904, remains a doubtful record for *H. engaddensis*. The specimen is heavily eroded, and thus almost impossible to correctly assign to a species. The white aperture, shell size and shape make it quite probable that this is a *H. engaddensis* introduced to western Libya through human activity as speculated by Kobelt. Until today, there is no additional record of this species known from Libya. Germain (1936: 124 sub *prasinata*) mentions a "*Helix jordanica* Bourguignat", which seems to be another manuscript name of Bourguignat, a publication or validation of this name could not be found so far (three lots under this name present in MHNG).

***Helix* (*Pelasga*) *salomonica* NÄGELE, 1899** (Figs 260–263)

1899 *Helix* (*Pomatia*) *Salomonica* NÄGELE, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 31: 28 [Urmia Persiae, coll. Nägele ex Pater Salomon 1898].

1962 *Helix* (*Naegelea*) *salomonica*, – Biggs, Journal of Conchology 25 (2): 65, figs 1, 2.

Type specimens:
salomonica: lectotype SMF 75507 (SD Zilch 1952: 140): H = 27.1 mm, D = 26.0 mm.

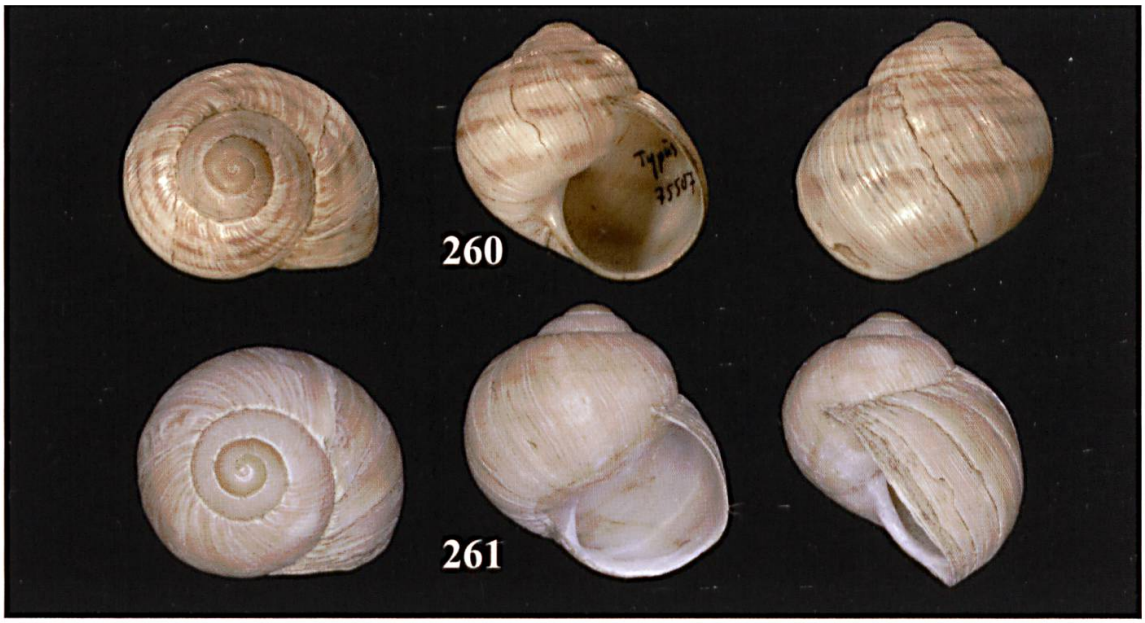
Specimens examined:
Turkey: Vil. Siirt, canyon of a tributary to the Botan Çayi, along the road 6.5 km SW Siirt, 37.8833 41.8833, 760 m alt., 03.08.1988, NMBE 512626/44; Hakkari, Castle, 37.5820 43.7338, 15.5.2011, leg. H. Menkhorst, NMBE 505493/4 (preserved); Arsameia, 37.9427 38.6569, 3.6.1987, NMBE 18492/1.

Iran: W-**Azerbaijan**, Mohabad, Sardasht Orimieh, [= Azarbayian-e Gharbi, Mahabad], 36.7630 45.7222, 12.10.1996, leg. A. Mansoorian, NMW/7; Qaleh Paswah (Pasaveh) [= Azarbayian-e Sharqi, Pasveh, 36.7952 45.3258, 1515 m alt.], 08.11.1961 (?), leg. Flannery (Biggs 1962); Bakhtaran, Bisotun (= Beihistun), 34.3896 47.4349, NMBE 512627/; Kermanshah, Tang-i-Knisht [Tang-e Kenesht], 34.3298 47.1316, 09.04.1961, leg. Reed (Biggs 1962); Qasr-e Shirin, 34.5108 45.5764, April 1995, leg. Borzoo & Noori, NMW/6; Luristan, Kaharé, close to Pol-e Dokhtar (ca. 33.1503 47.7167), 600 m alt., November 1991, leg. Pauscher, NMBE 512628/5; Sarab Karazan, Ilam, 33.7431 46.4867, 4.2011, NMBE 32729/37; Sarableh, Ilam, 33.78 46.62, April 2011, NMBE 32735/18 (preserved); ditto, NMBE 32728/3; Vahdat Dam N of Sanandadsch, 35.4197 46.9952, April 2011, NMBE 32732/1.

Iraq (all after Biggs 1959): 4 miles west of Erbil, 36.2098 43.9330; 5 km from Zara Touka [Swaratyka], 37.0095 43.2262; 9 km east of Dohuk, 36.8631 43.0867; 800 m. inside the Rowanduz Gorge from the east end, 36.6113 44.5225; Koi Sanjaq, 36.0833 44.6333; south and north of Kirkuk, 35.4363 44.3842; Jujar village; Nimrod [Namrud], 36.0939 43.3193; Maltai.

Diagnosis: shell small, spherical (quite similar to *Helix figulina*), protoconch large, columella white, straight to somewhat oblique.

Description: shell small, spherical, of greyish-brownish basic colour, protoconch consisting of 2.5 large, broad, smooth whorls, always uniformly darker brown than the teleoconch whorls, teleoconch of 3 whorls, body whorl very large, colour bands blurred, usually the upper two spirals fused, followed by a grey peripheral zone, the remaining three bands indistinct, shell sculptured with densely arranged riblets, spiral grooves missing completely, last whorl only slightly descending, aperture rounded to subquadrate, columellar triangle small, labial callus only weakly developed, umbilicus closed.



Figs 260–261. *Helix* (*Pelasga*) *salomonica* NÄGELE, 1899. Fig. 260 *salomonica*: lectotype SMF 75507, Urmia, D = 26.0; Fig. 261 NMBE 32735, Iran, Sarableh, D = 27.17. — All photos Neubert, original size.

Genital organs (Fig. 262): penis club-shaped, short, epiphallus reaching at least twice the length of penis, covered with a dark-greyish pigmentation, flagellum relatively short, not exceeding the length of epiphallus+penis, mrp attaching in a central position of the epiphallus connecting to the lung wall, internally, pp1 quite short cylindrical with a central perforation, penial chamber short, filled by strongly folded pilasters, pp2 elongate conical with a central perforation and some ring-like lamellae on the apex, female system simple, with a long vaginal tube, dart sac and glandulae mucosae lacking, pedunculus long, with a thick and short diverticulum, bursa copulatrix longer than diverticulum, vesicle rounded (not shown).

These findings exactly match the drawing of the genital organs of specimens from Iran (Biggs 1962).

Distribution (Fig. 263): The distribution range of *H. salomonica* covers SE Turkey, NE Iraq to the Central Zagros Mountains in Iran. It can be expected to also live in the mountains in northern Iraq. Thus, it represents the easternmost species of the genus *Helix*. The map also contains records for this species from Iraq not personally checked by the author. However, as there is no other *Helix* species living in the area, and Biggs knew the species quite well, his records are considered reliable.

Remarks: This species is easy to recognise because of its small shell combined with a dark and very large protoconch. This clearly separates it from *H. kazouiniana*, the neighbouring species in the west of its range, which has

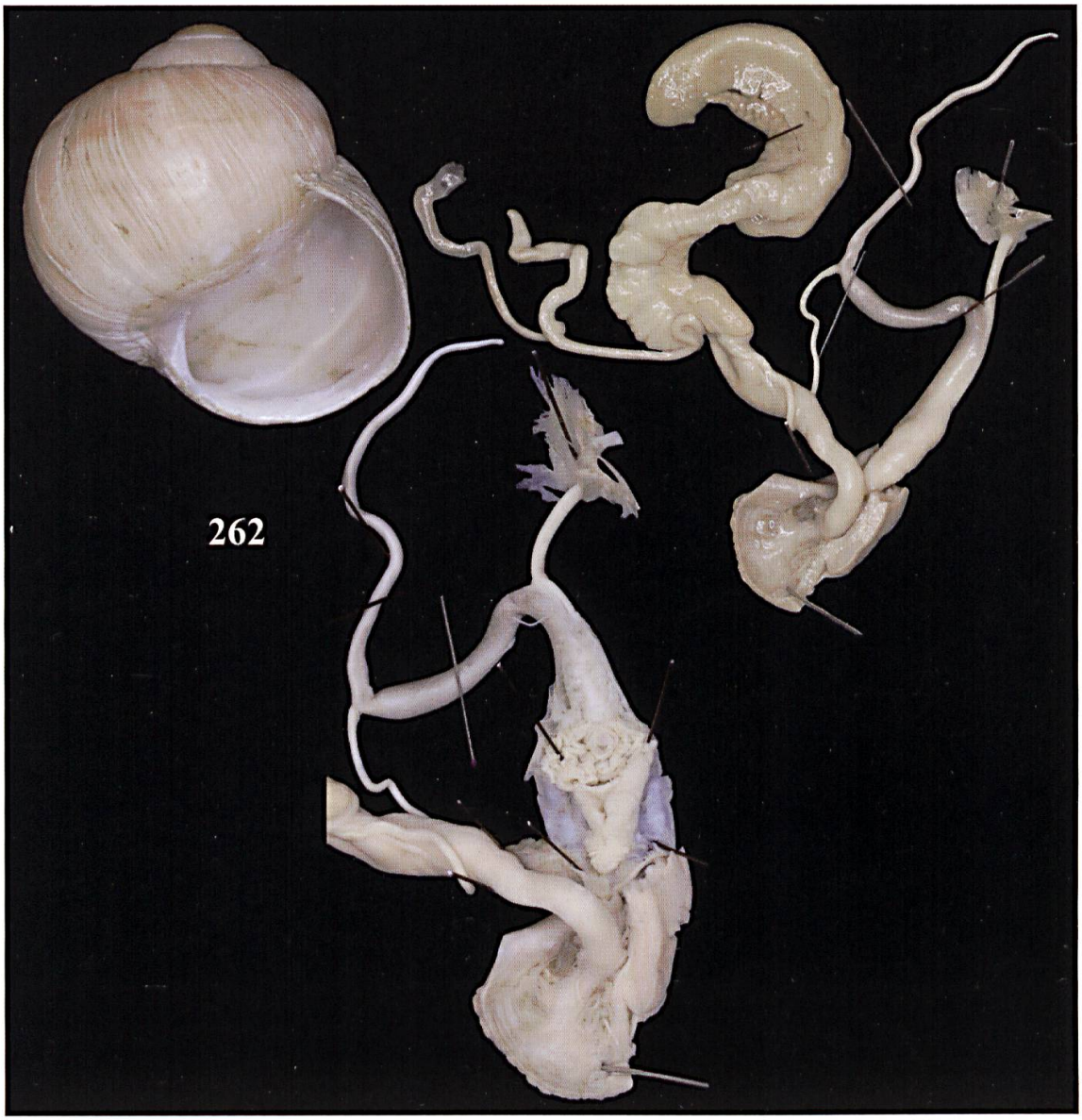


Fig. 262. *Helix* (*Pelasga*) *salomonica* NÄGELE, 1899. Genitalia. Fig. 262 NMBE 32735, Iran, Sarableh, situs 38.3. — All photos Neubert, original size.

a small protoconch. Anatomically, the complete loss of its dart sac and glandulae mucosae is characteristic for this species and a unique feature in *Helix*. However, the epiphallus, which is much longer than the penis, clearly assigns this species to the subgenus *Pelasga*.

This *Helix* species lives under a continental climate regime, which is characterized by high temperature amplitudes ranging from -40°C to +40°C, with much snow in winter and long dry periods in summer. According to some of the collectors, the species lives in "mountainous and sunshine zones among bushes".

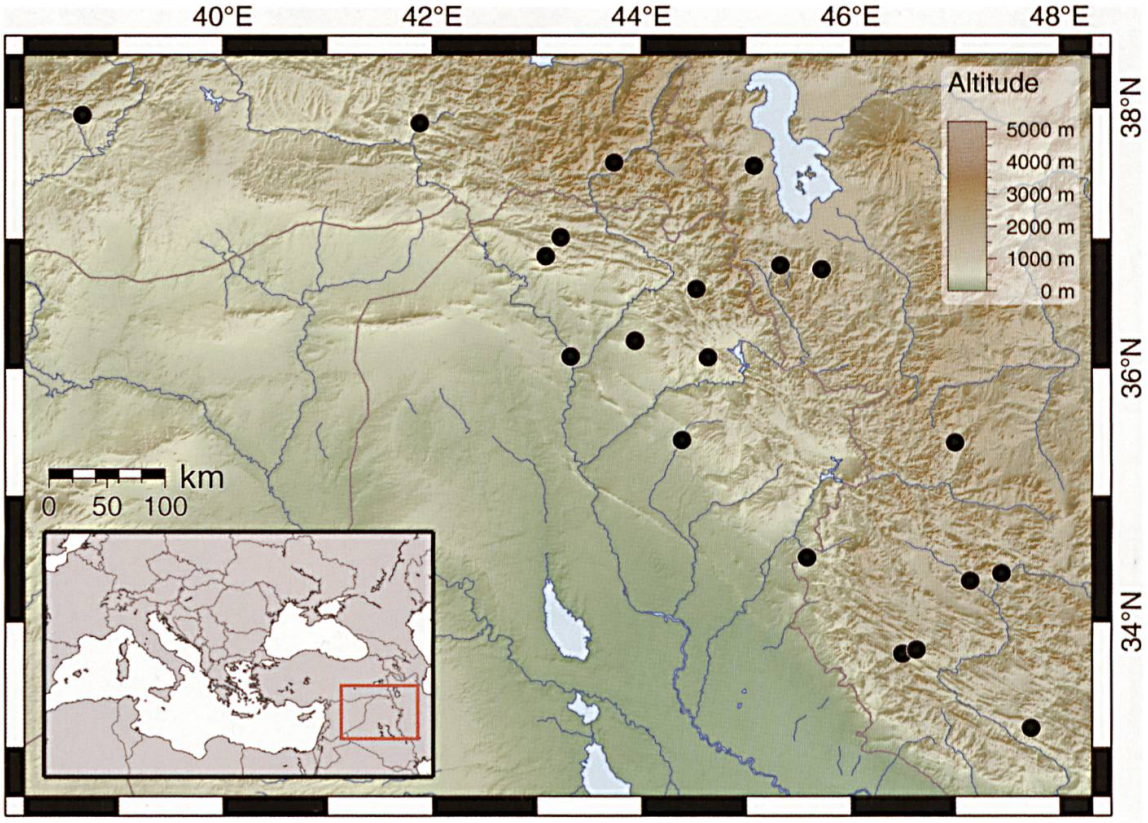


Fig. 263. *Helix* (*Pelasga*) *salomonica* NÄGELE, 1899. Distribution.

Helix (*Pelasga?*) *kazouiniana* (PALLARY, 1939) (Figs 264–267)

1939 *Pomatia* (*Naegelea*) *kazouiniana* PALLARY, Mémoires présentés a l'Institut d'Égypte 39: 17, pl. 1, fig. 16, 20 [Alexandrette].

1939 *Pomatia* (*Pseudofigulina*) *Daphnensis* PALLARY, Mémoires présentés a l'Institut d'Égypte 39: 18, pl. I, fig. 12–15 [Antioche, après la cascade de Daphné sur la route de Souéïdié].

Type specimens:

kazouiniana, daphnensis: The whereabouts of Pallary's type specimens of species described in his eastmediterranean publications are not clarified yet.

Specimens examined:

Turkey: SMF 78206/2 Taurus, coll. Nägele ex Rolle; SMF 22316, "Antiochia" ex Heyden; SMF 299400 Adana, 37.0 35.3213 (several additional lots with this location); ditto, SMF 78204/7, coll. Nägele ex Chartron; ditto, SMF 299400/7, coll. Nägele ex Tembé; ditto, SMF 74193/2, coll. Krüper ex Nägele; ditto, SMF 18538, coll. O. Boettger ex Nägele; ditto, SMF 74209/3, Adana, coll. C.R. Boettger; Adana, surrounding of the barrage, 37.0343 35.3463, 22.04.1987, LIEB (3); ruins of Hierapolis and Castabal,

Figs 264–266. *Helix* (*Pelasga*?) *kazouiniana* (PALLARY, 1939). Fig. 264 SMF 311933, Seyhan, rocks 2.3 km N Kozan, D = 24.5; Fig. 265 NMBE 512563, ruins of Hierapolis, D = 26.69; Fig. 266 ditto, D = 25.52. — All photos Neubert, original size.

37.11 36.11, 23.7.1986, NMBE 512563/12; ruins of Karatepe (Aslantas), 37.18 37.14, 23.7.1986, NMBE 512562/3; Kahramanmaras, 37.5858 36.9371, 18.04.1987, LIEB (1); Mersin, Alata, 36.6063 34.3116, 18.5.1992, NMBE 524418/7; road Gaziantep/Bahçe 17 km E Sakçagöz, 37.17 37.11, 23.7.1986, NMBE 512561/1; Seyhan, rocks 2.3 km N Kozan, 37.4678 35.7986, 400 m alt., 24.12.1990, MENK (28, SMF 311933/5); vegetation at Toprakkale, 37.0508 36.1356, 26.12.1990, MENK (10); W border of Kozan, 37.4647 35.8671, 516 m, 27.7.1988, MENK (9); deposition Kozan Baraji 8 km N. Kozan, 37.5068 35.8409, 290 m, 27.7.1988, MENK (44); rocks at Yilankale 6 km SW Ceyhan, 37.0111 35.7480, 25.12.1990, MENK (14); rocks at the Petrus cave 2 km N of Antakya, 36.2128 36.1763, 106 m alt., 29.12.1990, MENK (1); Petrus church, 01.04.1987, LIEB (3); 11.5 km NW Dörtyol, 36.9176 36.1230, 28.12.1990, MENK (19); Hatay, Iskenderun, close to the shore, 36.5889 36.1487, 29.03.1987, LIEB (4); rocky slope 2 km SE of Belen, 36.4978 36.1889, 27.12.1990, MENK (23); Hatay, surrounding of Belen, 36.5224 36.1606, 31.03.1987, LIEB (12); rocks 2 km SW Kirikhan, 36.4714 36.3426, 31.12.1990, MENK (20); castle of Bektasli 8 km SW Güvenç, 36.6544 36.4072, 420 m alt., 31.12.1990, MENK (30); Ulucinar, 36.4138 35.8951, 30.03.1987, LIEB (1); Harbiye in direction to Döver, slope at the road, 36.1239 36.1398, 06.04.1987, LIEB (2); Yayladağı, 35.9019 36.0644, 08.04.1987, LIEB (2); between Tekebaşı and Meydan 7 km S of Samandağı, 36.0401 35.9865, 18.10.2001, HEMM (2 alk.).

Syria: SMF 311934, Lattaquiah, 35.5259 35.7932, coll. Nägele ex Pallary 1910 (ex SMF 78208).

erroneous (?): SMF 18551/2 Dorak (Pers. Kurdistan), coll. Kobelt ex Bollinger.

Diagnosis: shell small, thin, globular, protoconch small, teleoconch smooth with coarse axial riblets, aperture always white.

Description: shell of small size, thin, globular, spire conical, basic shell colour greyish white with chestnut brown spirals, usually spiral No. 2 fused with No. 3 or diffuse, often with all five spirals separate, protoconch small, its diameter ranging from 3–4 mm, smooth, white whorls, teleoconch of 3–4 smooth whorls, sculptured by coarse but densely arranged axial riblets, last whorl slightly descending towards the periphery, aperture rounded to depressed rounded, apertural rim narrow, labial callus weak, always white, columellar triangle small, umbilicus closed in adult shells.

Genital organs: There were no preserved specimens available for dissection.

Measurements (NMBE 512563/12): H = 26.4 ± 3.1; D = 25.12 ± 2.04; PH = 16.3 ± 1.61; PD = 15.44 ±1.2; PrD = 3.24 ± 0.24; W = 4.

Distribution (Fig. 267): This species lives restricted to a small area in south-western Turkey comprised of the Adana, Gaziantep and Hatay region, and is also found in the neighbouring areas in northern Syria. The record "Dorak, persisch Kurdistan" seems to be an error, there are no modern records of this species from Iraq or Iran. However, there is a little village in the Taurus in Turkey north of Mersin called Dorak, which eventually might be the correct locality.

Remarks: The status of this species is not well established, and its affiliation to *Pelasga* is only provisional. It shows no major conchological differences to *H. figulina* from Greece besides having a somewhat more globular and smaller shell. In contrast to the *H. nucula-pachya* complex, there are no traces of any granulation on the teleoconch surface of *H. kazouiniana*. In addition, there are molecularly evidenced records of *H. figulina* from Hatay (Korábek & al. submitted) making the situation more complex. It is not clear whether the specimens of this single record have been introduced from Greece, or whether they are genetically consistent with specimens from the whole region. Concluding, one scenario could be the presence of two independent species, viz. *H. figulina* (with occasional introductions to the area) and *H. kazouiniana*, or presence of a single species, *H. figulina*, which then is established in two completely isolated areas in Greece and south-central Turkey. It is quite difficult to prove the latter hypothesis with zoogeographical arguments. For this reason, *H. kazouiniana* is for the time being considered to represent a separate species.

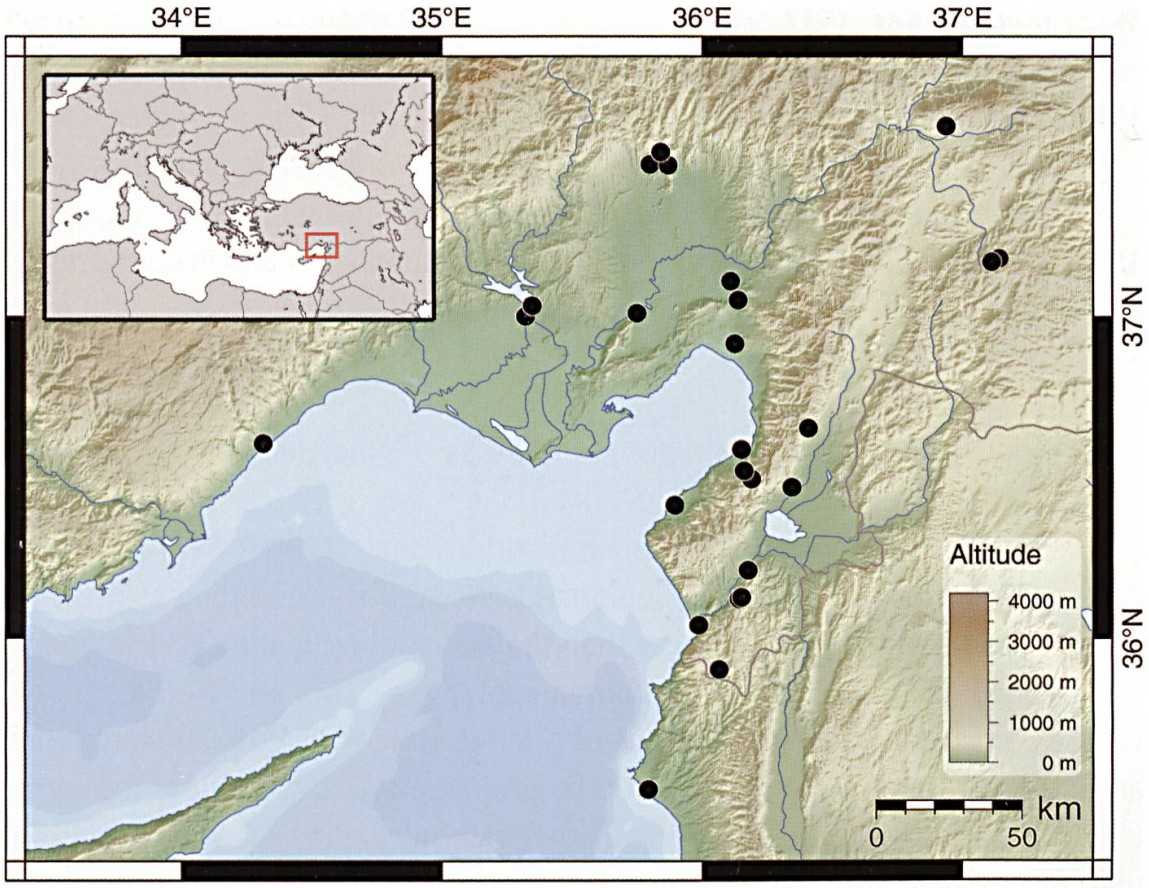


Fig. 267. *Helix* (*Pelasga*?) *kazouiniana* (PALLARY, 1939). Distribution.

Note on *Helix godetiana* KOBELT, 1878

Since its description, this enigmatic species from the Central Aegean has been assigned to the genus *Helix*. A reassessment of the shell characters showed that this species has an extraordinarily large and dome-shaped protoconch, which is not seen in any species of *Helix* as defined here in this revision, but typical for *Maltzanella* HESSE, 1917. The other two species currently affiliated with *Maltzanella*, *Maltzanella maltzani* (KOBELT, 1883) and *Maltzanella dickhauti* (KOBELT, 1903) are small-range endemics living in the western part of Turkey (Schütt 1976).

Quite recently, Psonis & al. (2014) showed in their analysis of dark-mouthed *Helix* species from Greece that this species branches off in a basal position opposite to all *Helix* species. In their recent molecular analysis of the genus *Helix* and related genera, Korábek & al. (submitted) found the genus *Maltzanella* to be close but clearly separated from *Helix*. For these reasons, *Helix godetiana* KOBELT, 1878 is excluded from *Helix*, and affiliated to *Maltzanella*.

Maltzanella Hesse, 1917

1908 *Maltzania* Hesse, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 40 (3): 140 [type species: *Helix maltzani* Kobelt, 1883] [preoccupied by *Maltzania* O. Boettger, 1881 [Reptilia].

1917 *Maltzanella* Hesse, Nachrichtsblatt der deutschen Malakozoologischen Gesellschaft 49 (3): 122 [nomen novum pro *Maltzania* Hesse, 1908 (non *Maltzania* O. Boettger, 1881)].

Type species: *Helix maltzani* Kobelt, 1883 by original designation.

Diagnosis: *Maltzanella* was characterized by Hesse (1908: 140) as having "a long penis, the [proximal part (epiphallus sensu Hesse)] as long as the [distal] one or longer; flagellum longer than the penis; diverticulum very long and thick, longer than the stem of the bursa copulatrix". The improved diagnosis can be amended as follows: A genus of the Helicinae with globular shells with an enlarged protoconch [eggs with a large diameter], diverticulum tubiform, longer or shorter than the bursa copulatrix, glandulae mucosae with numerous digitiform tubes, basal part of the flagellum sometimes convoluted.

Maltzanella godetiana (Kobelt, 1878) comb. nov. (Figs 268–273)

1878 *Helix* (*Pomatia*) *godetiana* Kobelt, Jahrbücher der Deutschen Malakozoologischen Gesellschaft 5: 319 [Amorgos, coll. Kobelt ex Godet].

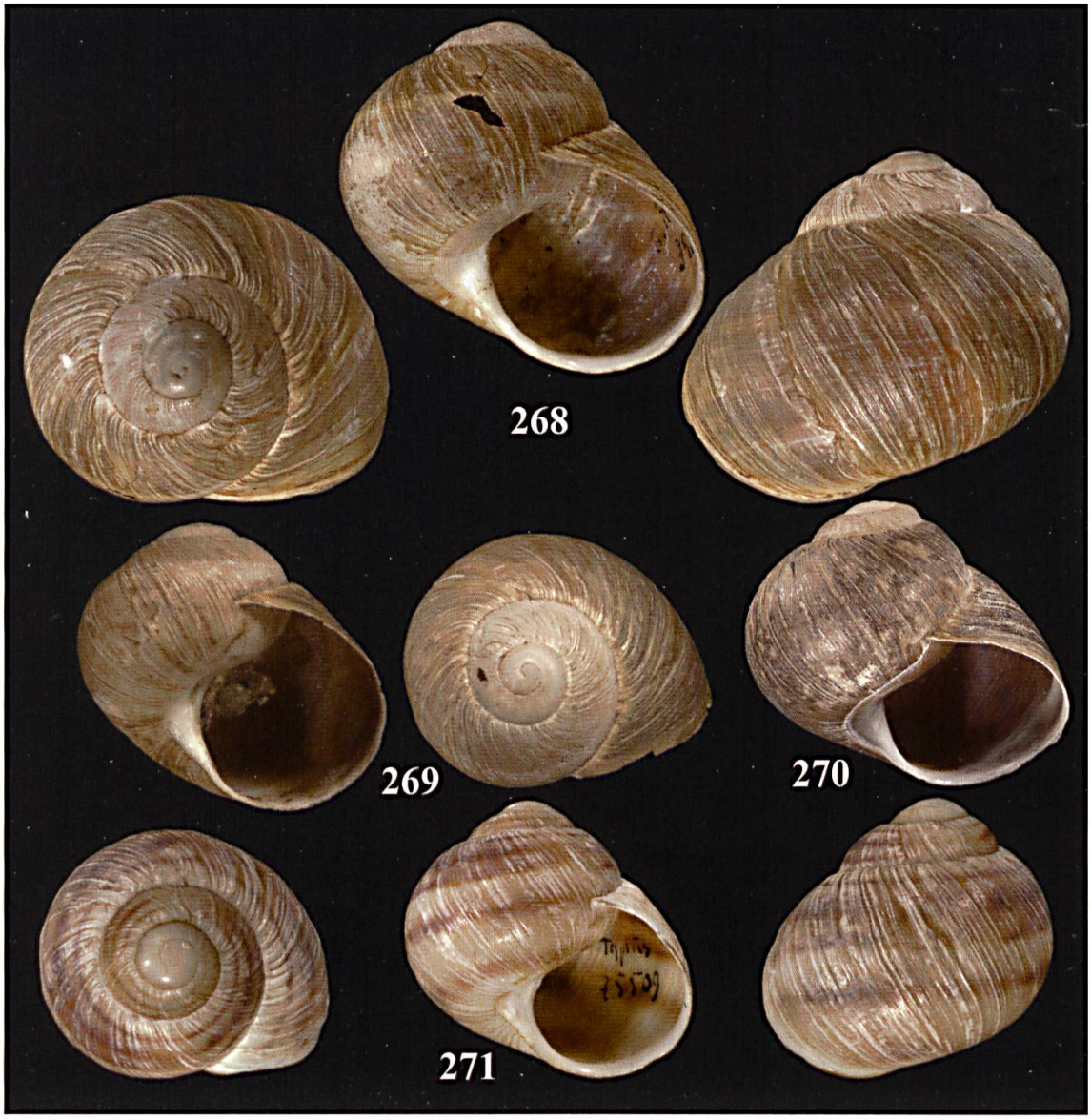
1884 *Helix dacoronae* Letourneux, Bulletins de la Société malacologique de France, 1: 287 [Santorin "vit sous les rochers entre le couvent Saint-Élie et la colline de Messa Vouno"].

Type material:

godetiana: lectotype SMF 9954 (SD Zilch 1952: 154): H = 39.4; D = 39.5; PH = 29; PD = 21.7; PrD = 8; W = 4.25. *dacoronae*: syntype MHNG 17941: H = 31.2; D = 33.2; PH = 22.7; PD = 23.1; PrD = 9.5; W = 4.

Specimens examined:

Greek Islands: **Kasos**: on the way to Agios Georgios, 35.4197 26.9096, 17.04.1982, LIEB (2 subfossil?). **Tilos**: Western Tilos, from Agios Panteleimonas in direction to Agios Anton, 36.3927 27.3954, 18.06.1996, LIEB (7 subfossil?). **Folegandros**: Folegandros, 36.6172 24.9162, 12.06.1991, LIEB (2 subfossil?). **Amorgos**: Island of Amorgos, 36.8401 25.8876, coll. Leutwein ex A. Wild ex J. Thiesse, NMBE 18478/2. **Naxos**: S of Agiassos, 36.9549 25.4391, 12.12.1979, leg. M. Mylonas, NHMC 50/0982.



Figs 268–271. Species of *Maltzanella*. Figs 268–270. *Maltzanella godetiana* (Kobelt, 1878). Fig. 268 *godetiana*: lectotype SMF 9954, Amorgos, D = 39.5; Fig. 269 *dacoronae*: syntype MHNG 17941, Santorin, D = 33.2; Fig. 270 NHMC 50/0982, Naxos, Agiassos, D = 35.2. Fig. 271 *Maltzanella dickhauti*, lectotype SMF 75509, "Jerusalem", D = 31.4. — All photos Neubert, original size.

Not checked personally (all after Psonis & al. 2014): Astypalea, 36.5393 26.3130; Kounoupoi Islet, 36.538242 26.4677; Pontikousa Islet, 36.5549 26.2286.

Diagnosis: shell large, thin, dark bluish brown with axial yellowish streaks and ribs, protoconch large, dome-shaped, aperture very large, aperture cream coloured, umbilicus closed.

Description: shell of large size, thin, spherical, with a moderately high conical spire; basic shell colour dark bluish brown, usually all five spirals fused, with a bright yellowish spiral in the centre of the last whorl; protoconch large, dome-shaped, its diameter almost reaches 10 mm, smooth, bright corneous to bluish whorls; teleoconch of 3–4 smooth whorls with a dense pattern of relatively

Fig. 272. ***Maltzanella godetiana*** **(Kobelt, 1878). Genitalia. NHMC 50/0982, Naxos, Agiassos, situs 55.58.**

fine axial granulated ribs and fine axial yellowish streaks; last whorl descending below the periphery; aperture very large, rounded, palatal shell wall inside aperture dark brown to bluish, apertural rim narrow, labial callus weak, cream coloured, columellar triangle white, relatively small; umbilicus closed in adult shells.

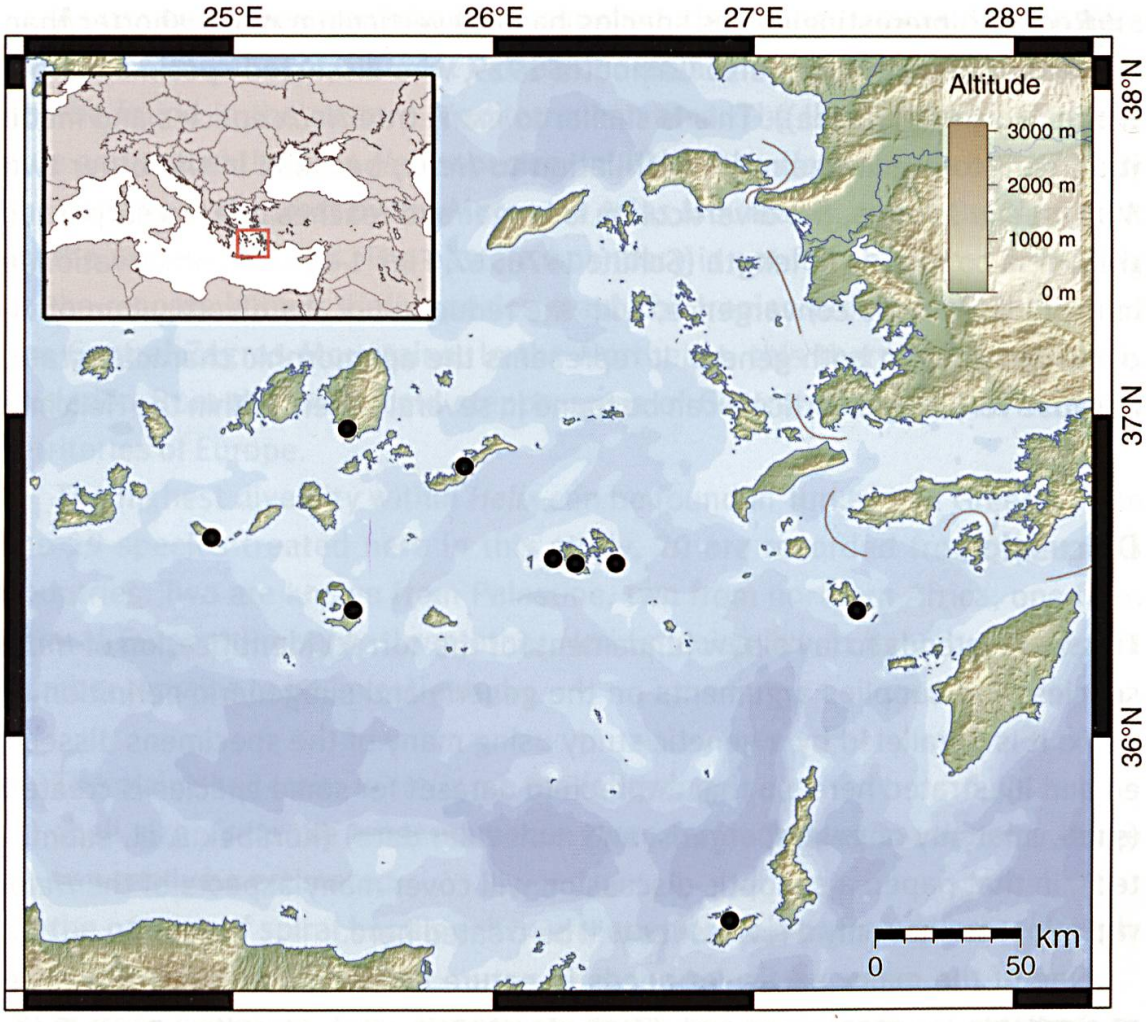


Fig. 273. *Maltzanella godetiana* (Kobelt, 1878). Distribution.

Genital organs (Fig. 272): penis club-shaped, epiphallus somewhat longer than penis; flagellum short, approximately of the same length as epiphallus+ penis; mrp attaching in a central position on the epiphallus; internally, pp1 smaller than pp2, penial chamber short, with perpendicularly arranged folds, both papillae conical with a central perforation; atrial stimulator a massive rounded knob; female system with a very short vaginal tube, dart sac and glandulae mucosae strongly developed, the glandulae with a short basic stem, multi-branched, only slightly longer than dart sac; pedunculus stem long, with a thick and moderately long diverticulum not exceeding the bursa copulatrix and branching off in the proximal third of pedunculus, bursa copulatrix stem longer than pedunculus stem, vesicle rounded and bent downwards.

Distribution (Fig. 273): This species is endemic to several islands in the Central southern Aegean Sea. It differs from *M. dickhauti* (Kobelt, 1903) (Fig. 271) by the uniformly dark shell colour which is caused by the almost complete fusion of the spiral bands. In *M. dickhauti*, these are usually narrow and separate, and the cream basic colour of the shell can be seen easily.

Remark: Interestingly, this species has a diverticulum much shorter than the bursa copulatrix (see also Gambetta 1929, who dissected specimens from Stampalia (= Astypalea)). This is similar to many true *Helix* species and made it difficult to argue against its affiliation to *Helix*, because in the other two *Maltzanella* species, the diverticulum is longer and reaches or even surpasses the bursa copulatrix in length (Schütt 1976: 67, Figs 1–3). This observation is interpreted here as convergence, with the reduction of the diverticulum obviously occurring in both genera. It represents the apomorphic character state, because very long diverticula can be found in several genera within the Helicini.

Discussion

This work intends to lay a new fundament for the correct identification of *Helix* species, and supplies arguments on the generic and subgeneric definition of *Helix*. It is paralleled by a genetic study using many of the specimens dissected and illustrated here, so that a threefold dataset for some species is created (shell, anatomy of genital organs, and molecular data) (Korábek & al. submitted). In that paper, a synoptic discussion will cover many aspects of the *Helix* radiation, so that only a few issues will be treated here.

One of the major particular needs in nature conservation is the presence of a reliable taxonomic concept. Students of molluscs face quite a unique situation for a zoologist: usually, only the shell of a species is at hand and the animal itself is missing, reducing the researcher's view to a diminished set of characters and character states. So one of the aims of this paper is to make shells of *Helix* identifiable without using a lab, but corroborated by all types of information.

So the question remains: what defines a *Helix* species? Looking at the long history of *Helix* research, an enormous taxonomical chaos becomes visible, which prevented proper research on the group. On the one hand, this was caused by the simple plesiomorphic shells with similar characters states within the genus, and on the other hand, by the over-estimation of minor differences in shell habitus, sculpture, coloration and other character states. This gave rise to a plethora of names within *Helix*. In particular the students of the "Nouvelle école" (namely J.R. Bourguignat and his supporters) and the famous German malacologist W. Kobelt created most of the more than 250 names available for *Helix* taxa. Today, many more specimens are available for study, and together with the anatomy of the genital organs of many of the species (completely omitted by the classical authors), a new hypothesis on the alphataxonomic composition of the genus can be presented.

As can been seen from the maps supplied, the genus *Helix* as defined here is a typical member of the west Palaearctic malacofauna. The highest diversity can be found in the eastern Mediterranean area. The Iberian Peninsula lacks true and autochthonous *Helix* species. In Africa, the *Helix*-area is bordered by the Sahara, in the west by the Moroccan Atlas Mountains, and in the Near East by the Arabian deserts. The eastern boundary is not fully clear but according to the records known, *Helix* species reach the Iranian province of Ghilan and the Central Zagros Mountains. In the Northeast, this thermophilic genus is excluded from the wintercold steppe areas of Central Asia and the northern territories of Europe.

The highest diversity within *Helix* can be found in Turkey and Greece. From the 29 species treated here in this study, 20 are recorded from these two countries. Two are known from Palestine, two from northern Africa, one from central Europe. Probably three other *Helix* species live in Italy, but the exact number remains to be investigated.

The main shell traits in *Helix* are the following:

1) shell size: from the measurements given for each species, the size range can easily be estimated
2) the pattern of spiral banding: in many species, this pattern is astonishingly stable
3) surface sculpture: very important; shells can be smooth, granulated, or show a pattern of incised spiral lines
4) colouration of the aperture: this is also a considerably stable character state, particularly in species like *H. figulina*, *H. pachya*, and others. Several species show deeply chocolate brown apertures, in others it is only the columellar triangle that has a brownish hue.
5) umbilicus: in most species, the umbilicus is closed, however, in *H. pomatia*, the umbilicus is usually slitlike open.

Some character states in the genital organs are probably species specific (for an overview refer to Tab. 3):

1) diverticulum: in a few species, the diverticulum seems to be absent in general, in others it may occasionally occur as a small tubule. A histological comparison of diverticula seems to be promising, since in some species, it is formed as a broadened and flat tube (*H. pelagonesica*), and more rounded and slim in others.
2) glandulae mucosae: these may be reduced in number of tubules and the mode of branching; moreover, the length of the stem seems to be stable in

Species	Diverticulum	Penial stimulator	pp1	Penial chamber	pp2	Epiphallus	Flagellum	Attachment mrp
albescens	missing	small	long	short	short	as long as penis	≤ p+ep	central epiphallus
asemnis	long, thick, terminal branching	large	long	median sized	short	shorter than penis	> 3x p+ep	central epiphallus
borealis (Fig. 162)	short, thick, basal branching	long	long	long	short	shorter than penis	> 3x p+ep	central epiphallus
buchii	long, thick, terminal branching	medium	long	long	long	shorter than penis	> 2x p+ep	central epiphallus
cincta	missing (with exceptions)	large	median sized	short	long	as long as penis	> 4x p+ep	central epiphallus
escherichi	short, thick, terminal branching	small	long	long	long	as long as penis	> 3x p+ep	distal epiphallus
fathallae	short, thick, central branching	large	short	short	short	as long as penis	> 4x p+ep	central epiphallus
lucorum	short, thick, terminal branching	medium	long	short	long	as long as penis	> 4x p+ep	central epiphallus
lutescens	missing	small	long	short	short	as long as penis	> 2x p+ep	proximal epiphallus
melanostoma	short, thick, central branching	short	long	long	short	as long as penis	3x p+ep	central epiphallus
pathetica	short, thick, central branching	small	short	long	short	shorter than penis	≤ 2x p+ep	central epiphallus
pelagonesica	long, thick, central branching	large	long	long	short	as long as penis	> 2x p+ep	central epiphallus
philibinensis	short, thick, terminal branching	large	long	long	long	shorter than penis	> 4x p+ep	central epiphallus
pomacella	short, thick, terminal branching	medium	long	long	short	shorter than penis	= p+ep	central epiphallus
pomatia	missing (with exceptions)	large	short	short	short	as long as penis	> 4x p+ep	central epiphallus
schlaeflii	short, thick, central branching	small	long	long	short	shorter than penis	> 2x p+ep	central epiphallus
secernenda	short, thick, terminal branching	large	long	long	short	as long as penis	> 2x p+ep	central epiphallus
vladika	short, thick, terminal branching	small	long	short	short	as long as penis	> 3x p+ep	central epiphallus
figulina	long, thick, terminal branching	small	long	long	long	> 2x p	= p+ep	central epiphallus
nucula	long, thick, central branching	large	long	long	long	> 2x p	= p+ep	central epiphallus
salomonica	long, thick, central branching	small	long	long	short	> 2x p	= p+ep	central epiphallus

Table 3. Characters states of diverticulum and male genitalia in *Helix* species.

a species as well as the general length of the glandulae in comparison to the length of the dart sac.

3) atrial stimulator: from the experience it can be said that the relative form and strength of this organ seems to rather depend on the individual development stage of the specimen than being species specific.
4) Penial papillae and penial chamber: as a rule, pp1 is a strong papilla, while pp2 is short and sometimes only represented by a little perforation in the internal epiphallial wall; the length of the penial chamber seems not to be relevant, because a certain amount of individual variation could be observed.
4) epiphallus: as discussed earlier, the relative length of the epiphallus in comparison to the penis is used here to define the subgenus *Pelasga*; in *Helix* s. str., its relative length seems to be relatively stable at species level.
5) flagellum: the relative length of the flagellum in comparison to the combination of penis+epiphallus seems to be quite significant for species recognition, particularly if this trait is used in combination with diverticulum length, and the formation of glandulae mucosae.
6) mrp: in general, the attachment site of the mrp is the central part of the epiphallus, with only very little variation.

Some conchologically similar species have usually been mixed up with *Helix* but anatomical details as well as molecular data proved their separate position. This concerns for example the genus *Cornu* Born, 1778, *Erctella* Monterosato, 1894, but also other genera like *Lindholmia* Hesse, 1919, and *Maltzanella* (Colomba & al. 2011; Neubert & Bank 2006; Neubert herein). For more information on this subject also refer to Korábek et al (submitted).

Schileyko (2006) included the nominal genera *Maltzanella*, *Pachyphallus*, *Codringtonia* Kobelt, 1898, *Isaurica* Kobelt, 1902, and *Naegelea* under his *Helix* sensu lato. Three of these names, *Pachyphallus*, *Maltzanella* and *Naegelea* have been treated here already. The remaining two genera differ from *Helix* as defined here in several respects: 1) the shells of all species belonging to these genera are more or less flat and not spherical as in *Helix*, 2) the diverticula are as long or even longer than the bursa copulatrix (Subai 2005; Schileyko 2006: Figs 2319 and 2320). In addition, *Codringtonia* differs by the massive stems of the glandulae mucosae, which usually exceed the dart sac in length, a character state never encountered in *Helix*. This is contrasted by *Isaurica*, where the glandulae mucosae are clearly reduced (Subai 1994) (much more than in any species of *Helix*), showing its relationship to the other east Mediterranean helicoid groups like *Levantina* Kobelt, 1871, and *Assyriella* Hesse, 1908.

Acknowledgements

This work could only be conducted with the support, help, discussion and encouragement of many friends, colleagues, and curators of collections. Over the years, they all contributed in various ways to make this enterprise a success. All persons here mentioned are listed in alphabetical order: R.A. Bank, Hoogezand; H. Baur, Bern; E. Bochud, Bern; R. Bonifer, Schweighof; P. Bouchet, Paris; G. Falkner, Munich; Y. Finet, Geneve; E. Gittenberger, Leiden; M. Glaubrecht, Berlin; M. Gosteli, Bern (†); A. Haugerud, Geneve; B. Hausdorf, Hamburg; J. Hemmen, Wiesbaden (†); V. Héros, Paris; R. Janssen, Frankfurt; O. Korábek, Prague; A. Liebegott, Frankfurt; J. Mariaux; Genève; H.P.M.G. Menkhorst, Krimpen/Ijssel; M. Mylonas, Iraklió; T. v. Proschwitz, Göteborg; T. Schiøtte, Copenhagen; P. Subai, Aachen; K. Vardinoyannis, Iraklió.

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