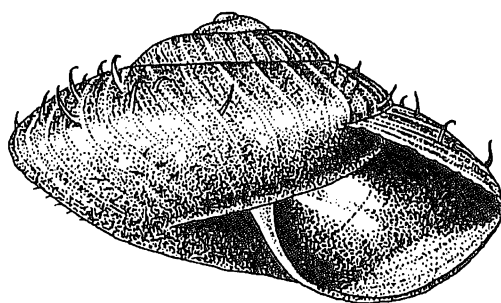


A. A. Schileyko

TREATISE ON RECENT TERRESTRIAL
PULMONATE MOLLUSCS

Part 10

Ariophantidae, Ostracolethidae, Ryssotidae,
Milacidae, Dyakiidae, Staffordiidae,
Gastrodontidae, Zonitidae, Daudebardiidae,
Parmacellidae



Ruthenica, Supplement 2
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Editors of the volume: A. V. Sysoev, D. L. Ivanov,
Zoological museum of Moscow State University
Camera-ready copy: Yu. I. Kantor,
A.N.Severtzov Institute of Problems of Evolution, Russian Ac. Sci.
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**Sophinini Blanford et
Godwin-Austen, 1908**

Blanford & Godwin-Austen, 1908: 283 (Zonitidae subf.).

Flagellum present, sometimes secondarily reduced to full disappearance. Epiphallic caecum missing. Penis with verge. Sarcobelum mostly present.

DISTRIBUTION. Hindustan Peninsula, Ceylon, Nicobar and Andaman Islands, Myanmar (= Burma), S China, Thailand, N Vietnam, Hongkong, Hainan Island, Philippines, Sulawesi.

***Rhysotopsis* Ancey, 1887
Fig. 1711**

Ancey, 1887: 64.

— *Haughtonia* Godwin-Austen, 1899: 120 (nom. praecoc., non Kinahan, 1859; *Bensonia* subg.; t.-sp. *Helix conferta* L. Pfeiffer, 1856; monotypy).

— *Rhysotopsis* Thiele, 1931: 630 (nom. err. pro *Rhysotopsis* Ancey, 1887).

TYPE SPECIES — *Helix haughtoni* Benson, 1863 (= *Helix conferta* L. Pfeiffer, 1856); OD. Shell depressed-conic, moderately solid,

shining, of 4.5-5 slightly convex whorls. Last whorl scarcely angulated, a little descending in front. Color of thick periostracum yellowish-brown. Embryonic whorls smooth, later whorls with weak, irregular radial wrinkles and wavy, incised spiral lines. Aperture subquadrangular, well oblique; peristome obtuse, slightly thickened inside, columellar margin reflexed, with smoothed callus between columellar margin and shell wall. Umbilicus narrow, constricted by callus. Height 19-23, diam. 30-35 mm (21.2 × 31.2 mm).

Sole not divided. Caudal foss large, caudal horn absent.

Right shell-lobe rudimentary, left lobe missing.

Vas deferens entering epiphallus subapically, leaving small, subglobular flagellum. Epiphallus bent on itself. Penis swollen, bulky, its lower part surrounded by sheath. Penial retractor attached to sharp curvature of epiphallus. Free oviduct moderately long, vagina much shorter. Sarcobelum very long, convoluted, with its own apical retractor. Spermathecal stalk slender, rather short; reservoir pear-shape, bedded in lower part of spermoviduct.

DISTRIBUTION. Andaman Islands. 1 sp.

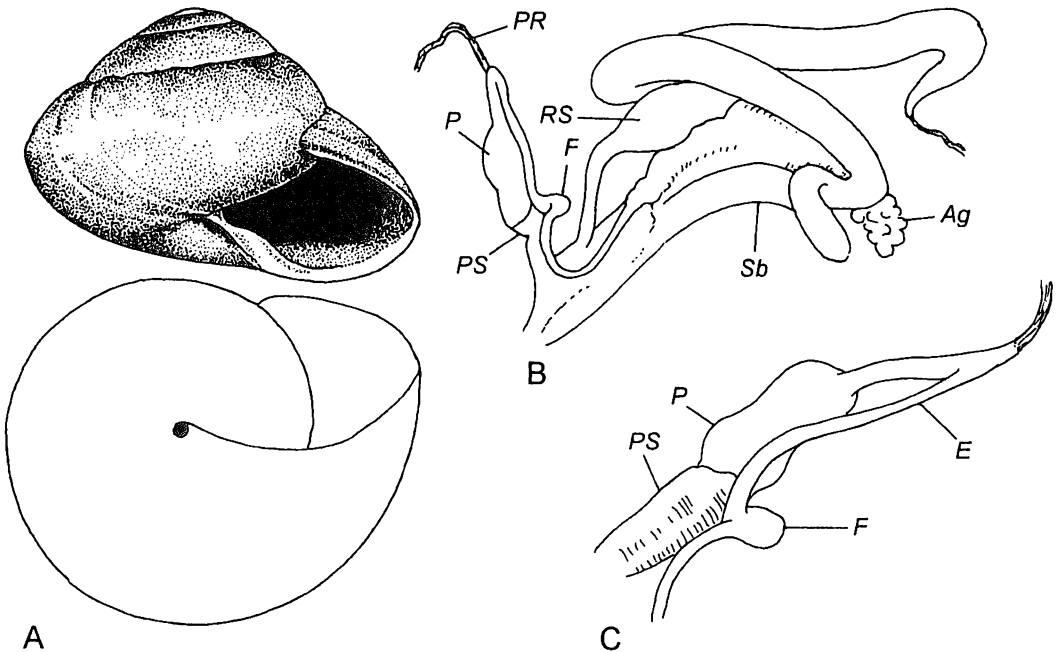


Fig. 1711 *Rhysotopsis confertus* (L. Pfeiffer, 1856).

A — shell: Andaman Islands. Paris. B — reproductive tract. C — penis from other side. After Godwin-Austen, 1899.

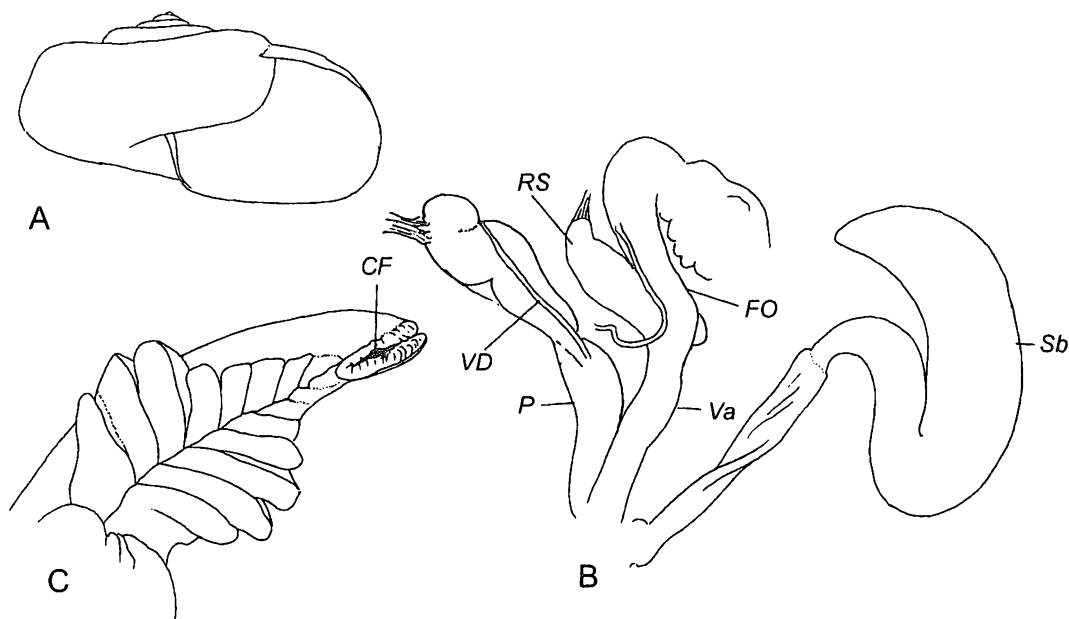


Fig. 1712. *Rotungia williamsoni* Godwin-Austen, 1918.

A — shell. B — reproductive tract. C — dorsal view of extremity of cephalopodium. After Godwin-Austen, 1918a. CF — caudal fossa.

Rotungia Godwin-Austen, 1918

Fig. 1712

Godwin-Austen, 1918: 590.

TYPE SPECIES — *Rotungia williamsoni* Godwin-Austen, 1918; OD.

Shell depressed, flatly subglobose, very thin, membranaceous, shining, of 5 convex, somewhat shouldered whorls. Last whorl ample, subangulated above periphery, much flattened above and sinuately rounded below angle. Color ochraceous-brown with a golden sheen when animal fills the shell. Postembryonic whorls with indistinct radial striation. Aperture large, broadly lunate, only slightly oblique, with thin margins; columellar margin straight, almost vertical. Umbilicus absent. Height 3.5, diam. 12.25 mm.

Posterior end of cephalopodium on dorsal side much flattened, leaf-like, a central longitudinal groove with lobes on right and left. Caudal fossa large, slit-like.

Vas deferens enters epiphallus laterally. Flagellum short, conic. Penis lacking caecum, somewhat sinuous. Penial retractor at-

tached at base of flagellum. Free oviduct moderately long, vagina a little longer. Sarcobelum large, without terminal retractor. Spermatheca short, nearly sedentary, with apical ligament.

DISTRIBUTION. Abor Hills (Assam, India). 1 sp.

Teraia Solem, 1966

Fig. 1713

Solem, 1966: 39.

TYPE SPECIES — *Teraia thailandica* Solem, 1966; OD.

Shell depressed-conoid, rather thin, glossy, of 4.5-5 convex whorls. Last whorl evenly rounded at periphery. Color yellowish-white. Embryonic whorls smooth or with very fine radial riblets. Rest whorls with weak to strong radial sculpture above and nearly smooth below. Aperture rounded, moderately oblique, with slight lip callus. Umbilicus wide. Height 3.5-5.5, diam. 6.2-10.4 mm (5.4 × 10.4 mm).

Sole tripartite. Caudal fossa cup-shaped, caudal horn very reduced, not overhanging.

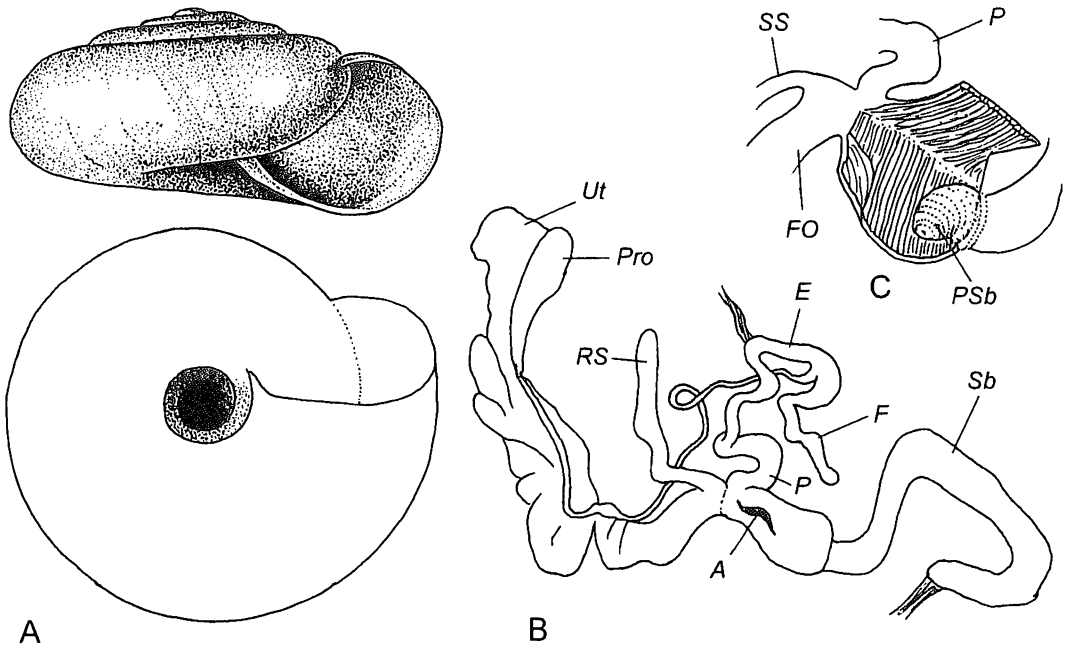


Fig. 1713. *Teraia thailandica* Solem, 1966.

A — shell: Doi Sutep, North Thailand at 1300 meters elevation. Paratype. Chicago No. 135276.
 B — reproductive tract. C — interior of preputial part of sarcobelum. After Solem, 1966.

Vas deferens long, slender, joining epiphallus laterally. Epiphallus long, with well developed, finger-like, sinuate flagellum (lime-sac), entering penis through a long verge with slightly corrugated sides and a blunt tip. Penis rather short, its basal part surrounded by a muscular sheath. Epiphallic or penial caecum absent. Penial retractor attached to upper section of epiphallus. Free oviduct short, thick-walled, choked inside with glandular tissue. Atrial and vaginal areas not differentiated, so vagina as such absent. Sarcobelum long, tubular, with terminal retractor, glandular layer covers muscular; preputial chamber of sarcobelum contains large papilla. Spermatheca finger-shaped, with stalk reaching far up spermo-viduct.

DISTRIBUTION. N Thailand, N Vietnam, Hongkong, Hainan Island. 4 spp.

Sophina Benson, 1859

Fig. 1714

Benson, 1859: 473 (*Helix* sect.).

— *Siphona* Habe, 1943: 96 (evidently, nom. err. pro *Sophina* Benson, 1859).

TYPE SPECIES — *Helix calias* Benson, 1859; SD Blanford & Godwin-Austen, 1908.

Shell flattened to depressed-globose, thin, glossy, of 4-5 slightly convex whorls. Last whorl not descending in front, evenly rounded at periphery. Color whitish (? glass-like when fresh). Embryonic whorls with exceptionally fine spiral striae, sculpture of later whorls nearly so. Aperture large, ovate, moderately oblique, with simple margins; columellar margin distorted to form sharp angle or keel, encircling (very) narrow umbilicus. Height 7-12, diam. 9-17 mm (7.2 × 10.8 mm).

Sole tripartite. Caudal foss and caudal horn well developed.

Vas deferens entering bulbous expansion of penis (flagellum) close below attachment of strong penial retractor. Penis long, sinuate. Free oviduct rather short, vagina practically absent. Sarcobelum short, thick, internally with well-developed pointed papilla which lacking spine. Spermathecal stalk stout, moderately long, reservoir subglobular.

DISTRIBUTION. India, Burma (= Myanmar). 6 spp. & subspp.

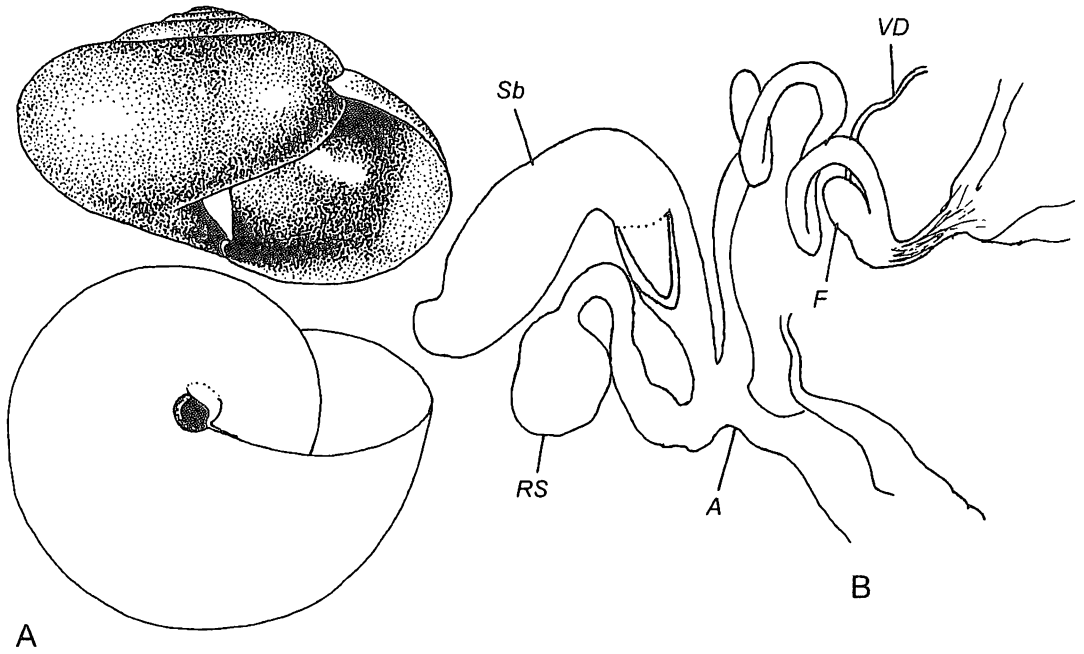


Fig. 1714. A — *Sophina calias* (Benson, 1859). Shell: Moulmein, Burma. Paris.
 B — ! *Sophina schistostelis* (Benson, 1859). Reproductive tract. After Blanford & Godwin-Austen, 1908.

Cryptaustenia Cockerell, 1898
 Fig. 1715

Cockerell, 1898: 10.

TYPE SPECIES — *Vitrina planospira* Benson, 1859; OD.

Shell vitrinoid, thin, fragile, shining, subtransparent, of 3-4.5 flattened whorls. Last whorl rounded at periphery. Color pale-greenish or yellowish. Embryonic whorls with exceptionally fine, regular spiral striation. Rest whorls lacking regular sculpture. Aperture ample, ovate, slightly oblique; upper part of palatal margin more or less arched forward. Umbilicus closed. Height 3.8-8.0, diam. 9.5-17.0 mm (7.6 × 12.8 mm).

Vas deferens long, slender, entering penis subapically at sharp angle. Penis rather long, cylindrical. Penial retractor attached to penis at short distance from base of vas deferens. Sarcobelum large, with apical retractor. Free oviduct much longer than vagina. Spermathecal stalk short, reservoir comparatively small.

DISTRIBUTION. India, Bhutan, Burma (= Myanmar), Thailand. About 20 spp.

Rasama Laidlaw, 1932
 Fig. 1716

Laidlaw, 1932b: 259 (nom. nov. pro *Sarama* Godwin-Austen, 1908).

— *Sarama* Godwin-Austen in Blanford & Godwin-Austen, 1908 (nom. praeocc., non Moore, 1887; t.-sp. *Macrochlamys kala* Godwin-Austen, 1883; OD).

— *Saramina* Wenz, 1947: 36 (nom. nov. pro *Sarama* Godwin-Austen, 1908).

TYPE SPECIES — *Macrochlamys kala* Godwin-Austen, 1883; OD.

Shell depressedly conic, thin, translucent, shining, of about 5 weakly convex whorls. Last whorl not descending, with rounded periphery. Color pale greenish-comes. Embryonic whorls smooth, polished, later whorls with fine, much smoothed radial wrinklets and dense microscopic spiral striation. Aperture broadly lunate, subvertical, with thin margins. Umbilicus minute. Height 4.0-4.5, diam. 7.0-8.5 mm (4.2 × 7.3 mm).

Vas deferens entering epiphallus laterally leaving a very short conic flagellum. Flagellum and upper section of epiphallus internally with numerous narrow cavities that

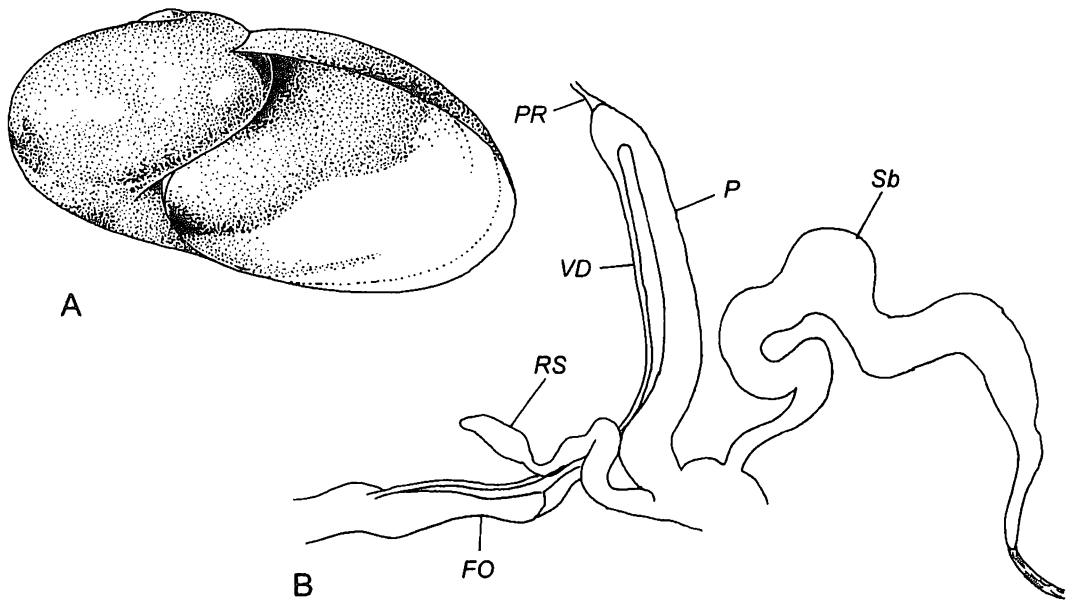


Fig. 1715. *Cryptaustenia planospira* (Benson, 1859).
 A — shell: no data. Paris. B — reproductive tract. After Blanford & Godwin-Austen, 1908.

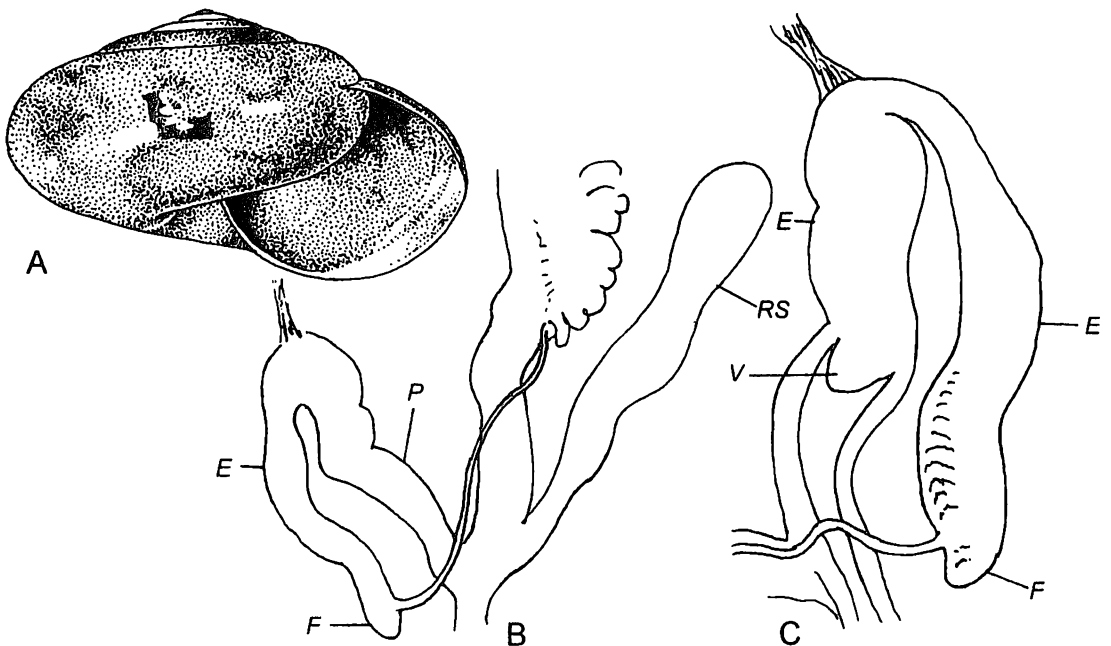


Fig. 1716. *Rasama kala* (Godwin-Austen, 1883).
 A — shell: Damsang Peak, W Bhutan. Syntype. London No. 1995074. B — reproductive tract. C — interior of penis. After Blanford & Godwin-Austen, 1908.

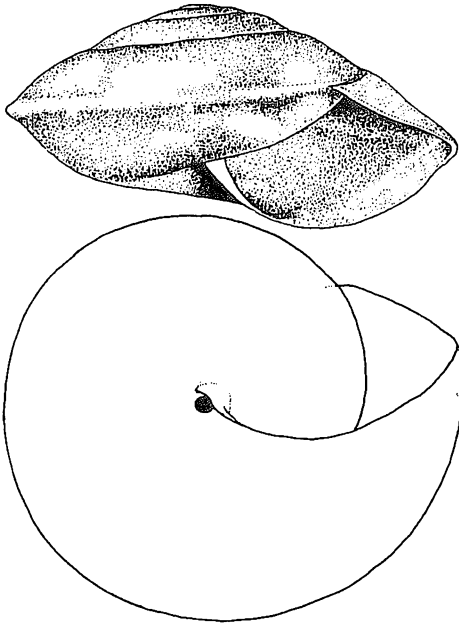


Fig. 1717 *Nesaecia massoni* (L. Pfeiffer, 1859).
Andaman Islands. Zürich No. 501119.

correspond to spines of spermatophore. Penis internally with short globular verge. Penial caecum absent. Penial retractor attached to penis/epiphallus junction. Sarcobelum absent. Free oviduct somewhat expanded, moderately long; vagina almost absent. Spermatheca rather long, stout, clavate. Spermatophore with short, simple and bicuspid spines scattered throughout its ampulla and tail.

DISTRIBUTION. Hindustan Peninsula. 1 sp.

Nesaecia Gude, 1911
Fig. 1717

Gude, 1911 270 (nom. nov. pro *Rotularia* Mörch, 1872).

— *Rotularia* Mörch, 1872: 308 [nom. praeocc., non DeFrance, 1827 (Foraminifera); *Nanina* subg.; t.-sp. *Helix massoni* L. Pfeiffer, 1859; SD Gude, 1911].

TYPE SPECIES — *Helix massoni* L. Pfeiffer, 1859; OD.

Shell lentiform, fragile, shining, semi-transparent, of about 5 flattened whorls. Last whorl with a sharp peripheral angle or keel. Color (light) corneous. Embryonic whorls delicately radially wrinkled. Later whorls with beautiful granulation because

of crossing of obliquely-spiral shallow lines with fine radial wrinklets; basal surface looking polished, just with local, exceptionally fine traces of spiral striae. Aperture irregularly rhomboid, quite oblique. Umbilicus minute. Height 3-8, diam. 6-18 mm (7.4 × 15.0 mm).

DISTRIBUTION. Nicobar and Andaman Islands. 3-4 spp.

Holkeion Godwin-Austen, 1908
Fig. 1718

Godwin-Austen in Blanford & Godwin-Austen, 1908: 239.

TYPE SPECIES — *Caracolla anceps* Gould, 1844; OD.

Shell depressed-conic, thin, translucent, shining, of 6 strongly flattened whorls. Last whorl with a sharp peripheral angle. Color yellowish or shell colorless. Embryonic whorls smooth, polished. Postnuclear sculpture of thin, irregular radial striae. Aperture broadly lunate, only slightly oblique, with thin, simple margins; upper part of columellar margin dilated. Umbilicus dot-like, partly covered. Height 7-8, diam. 12-13 mm (7.7 × 12.8 mm).

Vas deferens free, thin, entering epiphallus terminally. Flagellum rather long. Proximal part of epiphallus fusiform, distal part sub-cylindrical. Shape of penis roughly repeats shape of epiphallus. Penial retractor inserted on slender section of epiphallus. Caecum missing. Free oviduct rather long, locally expanded (? perivaginal gland); vagina somewhat shorter. Spermathecal stalk comparatively long, reservoir embedded in middle of spermoviduct. Sarcobelum large, its preputial section containing pointed papilla.

DISTRIBUTION. Burma (= Myanmar), N Thailand. 2 spp.

Sivella Blanford, 1863
Fig. 1719

Blanford, 1863: 86 (*Helix* subg.). Gude, 1914: 3 (*Trochomorpha* subg.).

TYPE SPECIES — *Helix castra* Benson, 1852; SD Gude, 1914.

Shell conic, thin, translucent, glossy, of 5-6 flattened whorls. Last whorl with sharp peripheral angle, not descending. Color light-corneous to brownish. Embryonic whorls smooth, later with dense microscopic spiral striation. Aperture angled, with

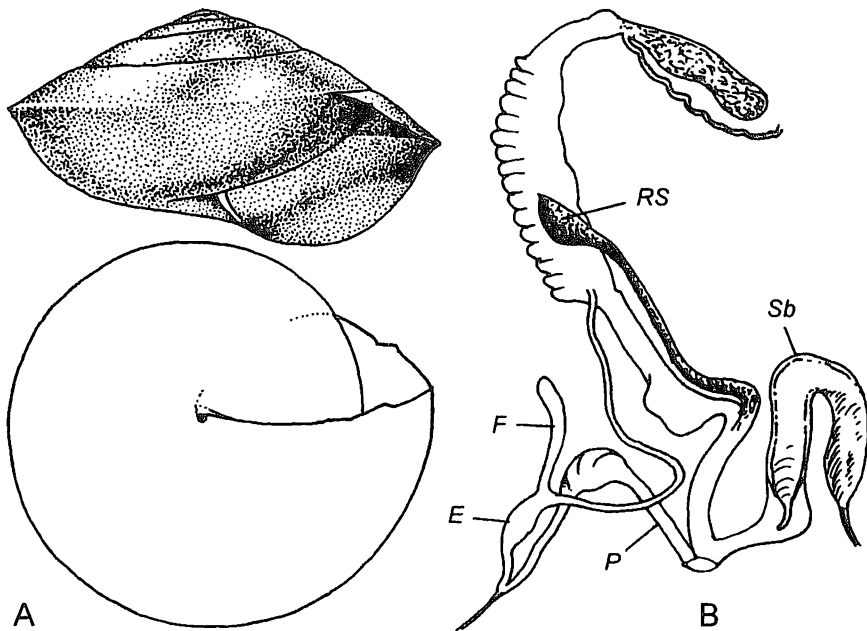


Fig. 1718. *Holkeion anceps* (Gould, 1844).

A — shell: Viaggio, Burma. SPb. B — reproductive tract. After Blanford & Godwin-Austen, 1908.

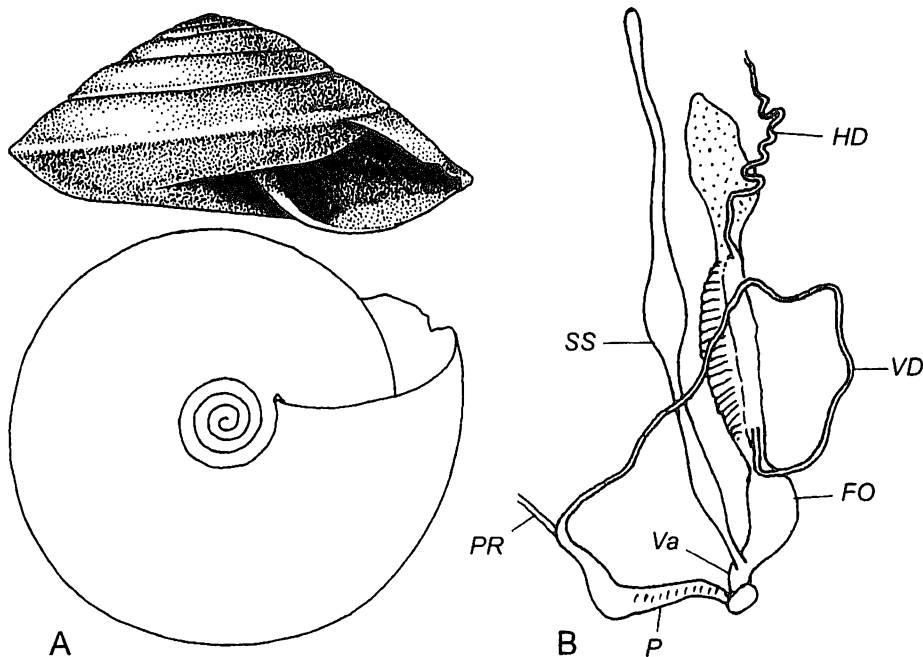


Fig. 1719. *Sivella castra* (Benson, 1852).

A — shell: Khasi Hills, Bengal. Phil. No. 1337 B — reproductive tract. After Stoliczka, 1873.

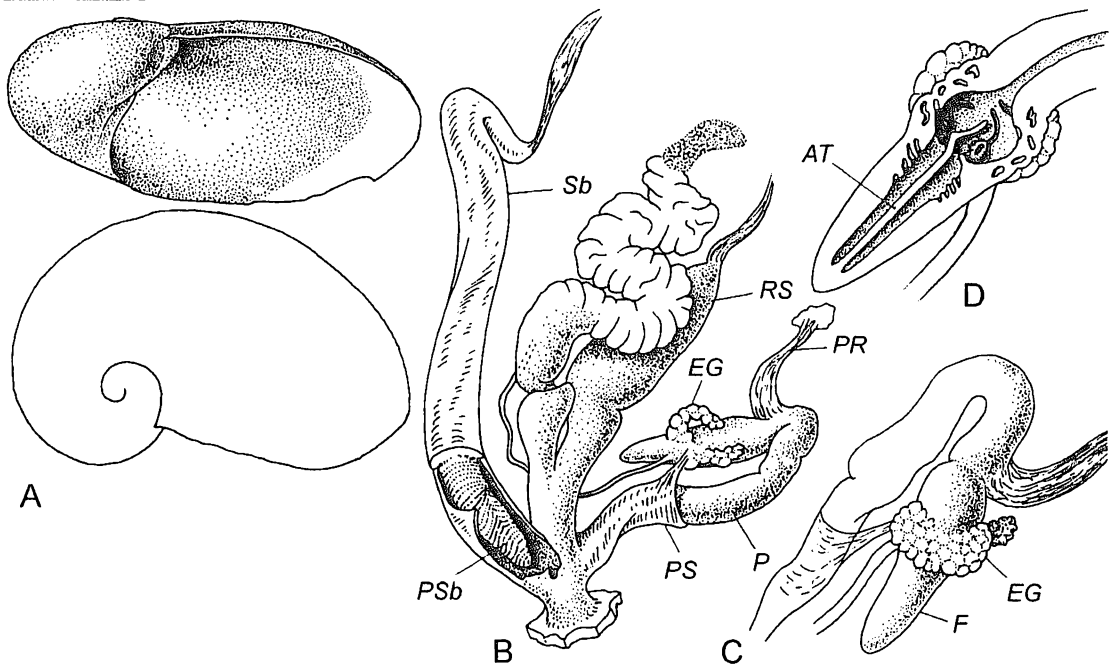


Fig. 1720. *Austenia gigas* (Benson, 1836).

A — shell: "Type" Cardiff. B, C, D — Pasholte Bungalow, India. B — reproductive tract. C — proximal section of penis/epiphallus complex from other side. D — interior of the same. Phil. No. A-14305. AT — axial thread. EG — epiphallic gland.

thin, simple margins. Umbilicus moderately narrow, perspective. Height 3.25-8.00, diam. 8-15 mm (5.3 × 11.2 mm).

Godwin-Austen (1918b) noted some discrepancies between anatomical data obtained by himself and description given by Stoliczka (1873). Seemingly, they dealt with different species, but, since I do not know which species is a real *Sivella castra*, I am bringing descriptions by both authors.

Stoliczka: Vas deferens long, slender, entering penis apically. Flagellum absent, epiphallus apparently absent as well. Penis not long. Penial retractor inserting at entrance of vas deferens. Free oviduct noticeably swollen. Vagina very short. Spermathecal stalk long, with swelling in midway; reservoir as such not expressed.

Godwin-Austen: Vas deferens entering long epiphallus laterally, leaving rather long flagellum. Penial retractor attached to penis/epiphallus junction. Free oviduct rather short, not swollen. Vagina long. Spermathecal stalk rather short, reservoir subglobular.

DISTRIBUTION. Hindustan Peninsula, Ceylon, Nicobar Islands, Burma (= Myan-

mar), SE Asia including S China; ? Philippines. About 10 spp.

Austenia Nevill, 1878 Fig. 1720

Nevill, 1878: 16 (*Helicarion* subg.).

— *Cryptibycus* Cockerell, 1898: 10 (*Ibycus* sect.; t.-sp. *Ibycus magnificus* Nevill et Godwin-Austen, 1877; OD).

TYPE SPECIES — *Vitrina gigas* Benson, 1836; OD.

Shell vitrinoid, thin, fragile, glossy, transparent, of 1.25-2 very rapidly increasing whorls. Last whorl rounded at periphery. Color yellowish or yellow-greenish. Sculpture of microscopic spiral striation that stronger at suture. Aperture ovate, very large, with very thin, membranaceous margins. Umbilicus closed. Height 4-18, diam. 10-40 mm (16.0 × 30.0 mm).

Cephalopodium with a large, vertical caudal foss.

Vas deferens thin, entering epiphallus laterally through a simple pore, leaving a short conic flagellum. Internally flagellum

with well developed axial thread, its walls contain numerous narrow cavities in which spines of spermatophore formed. Base of flagellum a little swollen, surrounded by semicircular alveolar gland; both ends of gland free-hanging. Penis moderately long, subcylindrical, internally with sharp longitudinal folds; its lower half coated by a thin sheath; upper edge of sheath connected with flagellum-epiphallus junction by a band, attaching to space between ends of epiphallic gland. Penial retractor attached to upper half of epiphallus. Sarcobelum long, slender, with apical retractor and long papilla lacking thorn; muscular layer covers glandular. Free oviduct moderately long, vagina shorter. Spermatheca with quite short shaft and capacious reservoir provided with apical ligament.

DISTRIBUTION. Hindustan Peninsula, SE Asia. 10-12 spp.

REMARK. Blanford & Godwin-Austen (1908) did not mention the presence of either epiphallic gland or axial thread in *Austenia gigas*; Solem (1966: 91, fig. 22) did not discover epiphallic gland in *Austenia doisutepensis* Solem, 1966.

Ibycus Heynemann, 1863

Fig. 1721

Heynemann, 1863: 142.

—? *Leptodontarion* P Sarasin et F. Sarasin, 1899: 124 (*Helicarion* subg.; t.-sp. not designated).

TYPE SPECIES — *Ibycus fissidens* Heynemann, 1863; monotypy.

Semislugs. Shell very thin, leathery, translucent, polished, of about 2.5-4 whorls. Color amber. Embryonic whorls smooth. Later whorls with very delicate radial lines. Aperture large, lunate, very oblique. Umbilicus absent. Height up to 5, diam. up to 12 mm.

Sole tripartite. Caudal foss with well developed horn.

Radula with a central tooth which is much broader at base than at shovel-like top rising up like a spoon. Lateral teeth have 2 cusps, each projecting forward and connected with a plate behind, and passing gradually into smaller but similar marginal teeth.

Vas deferens enters penis apically. Flagellum and epiphallus absent. Spermatheca almost sessile. Sarcobelum relatively very

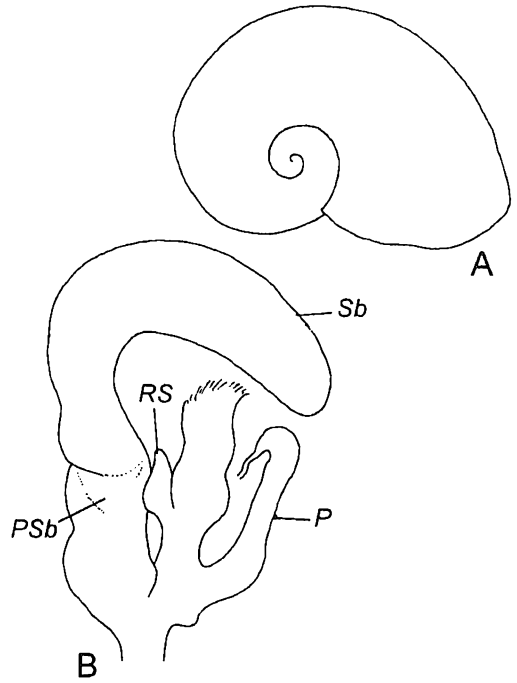


Fig. 1721 ! *Ibycus minutus* (Godwin-Austen, 1876).

A — shell. B — reproductive tract. After Godwin-Austen, 1883.

large, without its own retractor, internally with a short, conic papilla lacking spine.

DISTRIBUTION. India, Sikkim (E Bhutan); Sulawesi Island. 6-8 spp.

Pseudaustenia Cockerell, 1891

Fig. 1722

Cockerell, 1891: 225 (*Ibycus* subg.).

TYPE SPECIES — *Africarion atra* Godwin-Austen, 1888; OD.

Semislugs. Shell ear-shaped, not covered by mantle, flat above, very thin, shining, of about 1.5 whorls. Color straw or green. Embryonic and later whorls lacking regular sculpture. Aperture ample. Umbilicus absent. Height up to 2.5, diam. up to 13 mm.

Sole tripartite. Caudal foss small, caudal horn short.

Vas deferens entering epiphallus terminally. Flagellum absent. Epiphallus greatly enlarged, walls of swollen part thickened, contain many slit-like cryptae where spines of spermatophore form. Penis rather long, internally with well developed verge. Basal half of penis surrounded by sheath. Penial

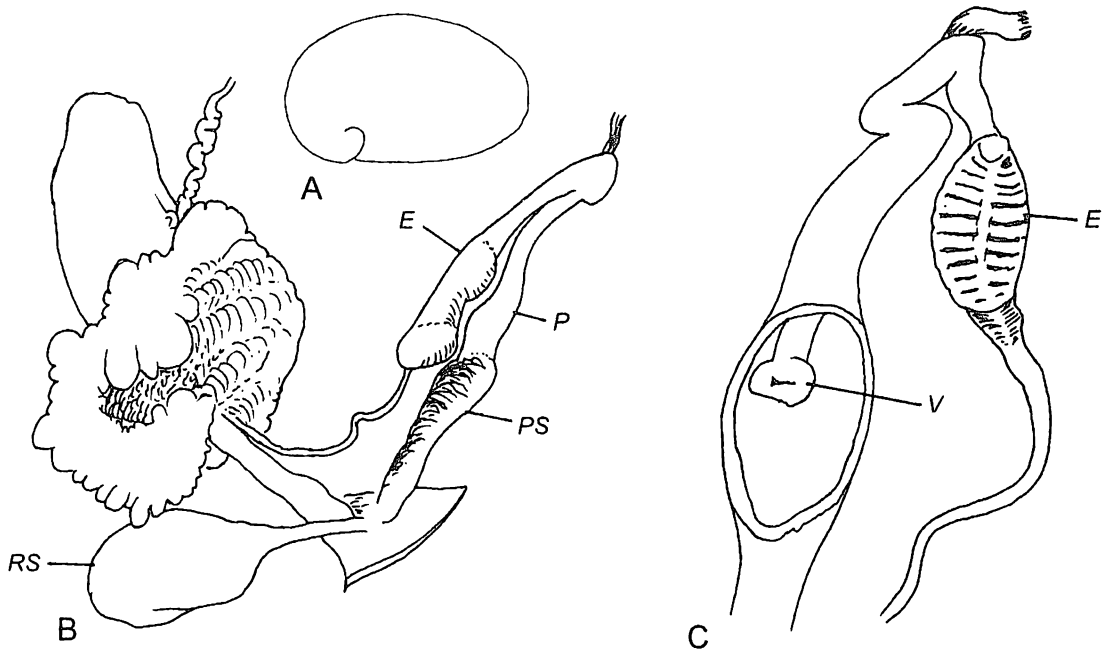


Fig. 1722. *Pseudostenia atra* (Godwin-Austen, 1888).

A — shell. B — reproductive tract. C — interior of penis and epiphallus. After Blanford & Godwin-Austen, 1908.

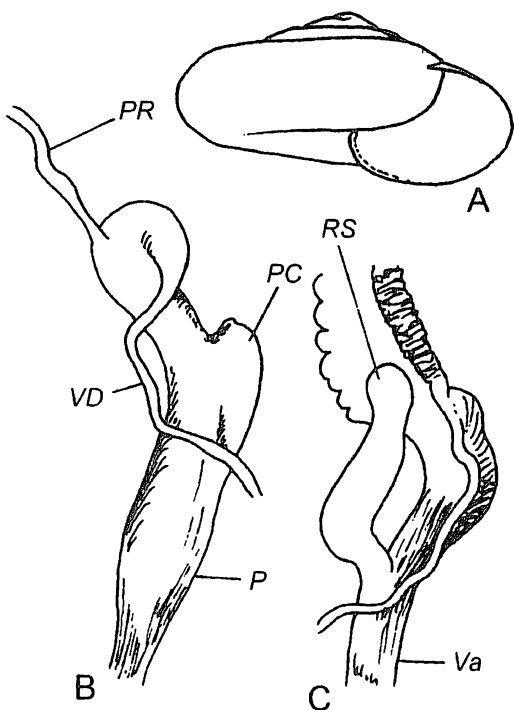


Fig. 1723. *Eurychlamys platychlamys* (Blanford, 1880).

A — shell. B — penis. C — distal section of female division. After Blanford & Godwin-Austen, 1908.

retractor inserted on border between epiphallus and penis. Free oviduct moderately long, vagina absent. Spermathecal stalk short, slender; reservoir capacious.

DISTRIBUTION. Hindustan Peninsula. At least 5 spp. & subspp.

? *Eurychlamys* Godwin-Austen, 1899
Fig. 1723

Godwin-Austen, 1899: 90.

TYPE SPECIES — *Macrochlamys* ? *platychlamys* Blanford, 1880; OD.

Shell much depressed, thin, semitransparent, shining, of 3.25-5 strongly flattened whorls. Last whorl rounded at periphery. Color reddish- or fulvous-corneous. Embryonic whorls smooth. Later whorls without regular sculpture. Aperture widely semilunate, slightly oblique, with simple margins. Umbilicus minutely open. Height 5.5-6.5, diam. 10-17 mm.

Sole tripartite. Cephalopodium with caudal foss and overhanging caudal horn.

Vas deferens thin, entering very short epiphallus apically. Epiphallic caecum missing, but a small enlargement may be present at penis/epiphallus junction. Penial retrac-

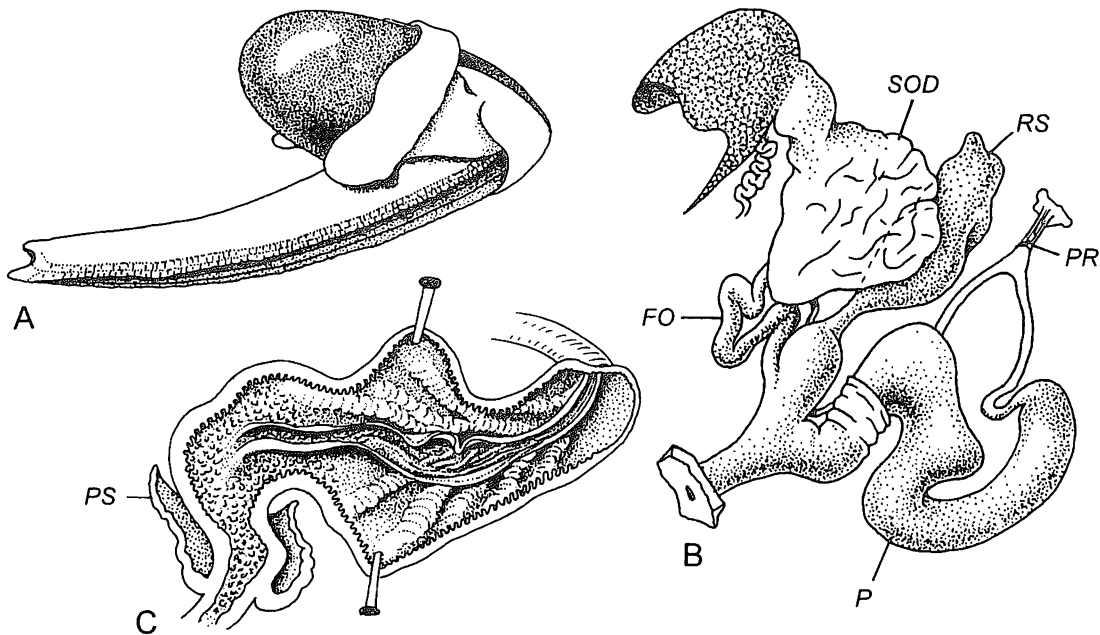


Fig. 1724. *Satiella dekhanensis* (Godwin-Austen, 1898). Travancore [SE India]. A — preserved specimen. B — reproductive tract. C — interior of penis. London.

tor attached to epiphallus. Free oviduct rather long, stout. Vagina short. Spermatheca rather short, with poorly defined reservoir. Sarcobelum wanting.

DISTRIBUTION. S India, Ceylon. 2 spp.

REMARK. Because of absence of all additional organs of genitalia it is hard to determine the correct taxonomic position of *Eurychlamsys*. In all probability, it is a secondarily simplified member of Ariophantinae.

Satiellini Schileyko, trib. nov.

Type genus — *Satiella* Godwin-Austen, 1908.

Flagellum missing. Epiphallic caecum very short. Penis with a minute, sphincter-like verge; inner surface of penis has complex and conspicuous structure. Sarcobelum absent.

DISTRIBUTION. S India, Ceylon, Andaman Islands.

Satiella Godwin-Austen, 1908

Fig. 1724

Godwin-Austen in Blanford & Godwin-Austen, 1908: 221.

TYPE SPECIES — *Durgella dekhanensis* Godwin-Austen, 1898; OD.

Shell vitrinoid to slightly lenticular, very thin and somewhat membranaceous, of 3.5-5 much flattened whorls. Last whorl evenly rounded at periphery. Color reddish-corneous. Embryonic whorls with distinct, regular, spiral striation, rest whorls without regular sculpture. Umbilicus absent. Height 4-8, diam. 10.5-18.5 mm (8.0 × 14.0 mm).

Sole tripartite. Caudal foss with not long overhanging horn.

Vas deferens expanding gradually into slender epiphallus which enters long penis apically. Epiphallus entering penis through a sphincter-like verge and provided with a short, rounded caecum, on which penial retractor inserted. Basal part of penis surrounded by sheath. Internally penis with 2 thin, high, lamellar parallel pilasters; besides, there are several wide, corrugated folds directed at sharp angle to lamellar pilasters; above all, inner surface, especially in basal section, bears numerous minute tubercles. Free oviduct long, convoluted; vagina almost absent. Sarcobelum missing. Basal portion of spermathecal stalk more or less swollen, reservoir club-shaped, pear-shaped

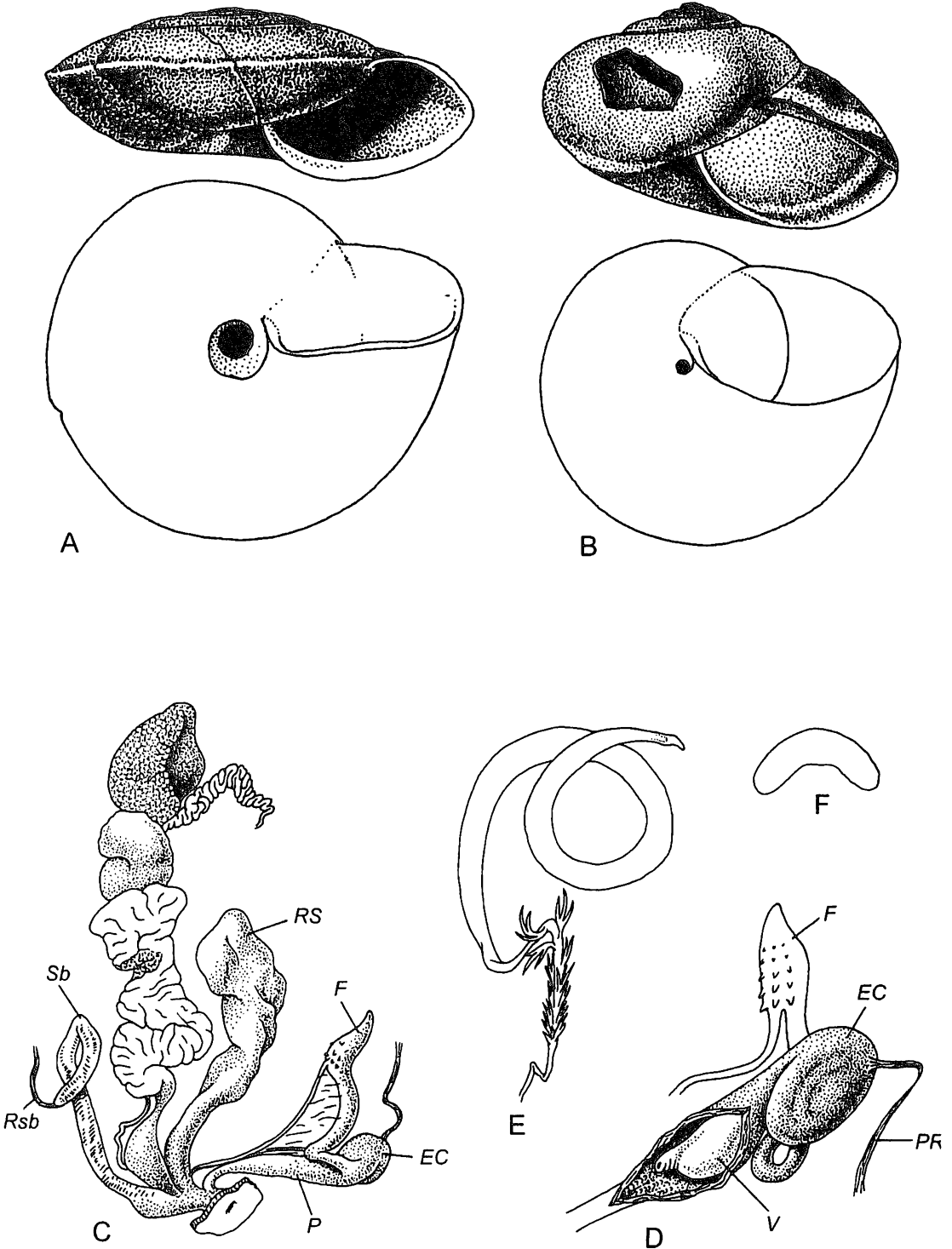


Fig. 1725. A — *Oxytesta oxytes* (Benson, 1836). Shell: Khasi Hills, E India. Leiden.
 B, C, D, E, F — ! *Oxytesta orobia* (Benson, 1848). Environs of Katmandu, Nepal, June 10-20, 1986. B — shell. C — reproductive tract. D — interior of penis. E — spermatophore.
 F — jaw. Moscow No. Lc-25377 (gift of C. Frank).

or subcylindrical, not attending albumen gland.

DISTRIBUTION. S India, Ceylon, Andaman Islands. 7 spp.

Macrochlamymini Godwin-Austen, 1888

Godwin-Austen, 1888: 253 (Zonitidae subf. as Macrochlamyinae).

— Tanychlamydinae Baker, 1928: 6 (as synonym of "Macrochlamyinae")

Flagellum present. Epiphallic caecum spirally coiled. Penis with verge. Sarcobelum present.

DISTRIBUTION. Central Asia, China, Hindustan, Indochina and Malaya Peninsula; Taiwan, Andaman and Nicobar Islands, Philippines, Indonesia, New Guinea.

Oxytesta Zilch, 1956 Fig. 1725

Zilch, 1956: 85 (nom. nov. pro *Oxytes* L. Pfeiffer, 1855).

— *Oxytes* L. Pfeiffer, 1855: 138 (nom. praeocc. non Giebel, 1848; *Helix* subg.; t.-sp. *Helix oxytes* Benson, 1836; tautonymy).

TYPE SPECIES — *Helix oxytes* Benson, 1836; tautonymy.

Shell lens-shaped to depressed-orbicular, rather thin, of about 6 flattened whorls. Last whorl not descending, rounded or with (rather) sharp peripheral keel. Color corneous to chestnut; if keel present, it sometimes margined by darker, narrow bands. Embryonic whorls smooth, later with beautiful fine granulation. Aperture ovate, angled in lenticular shells, with reflexed basal (and columellar) margins. Umbilicus rather narrow to dot-like. Height 10-21, diam. 25-50 mm (*oxytes*: 21.0 × 49.8 mm; *orobia*: 22.4 × 34.2 mm).

Caudal foss large, caudal horn practically absent.

Jaw with very weak median projection.

Hermaphroditic duct very long, strongly convoluted. Vas deferens thin, entering epiphallus laterally. Flagellum conic, rather short, with acuminate tubercles corresponding to spines of spermatophore. Epiphallus with spirally coiled caecum to which penial retractor attached. Basal section of penis

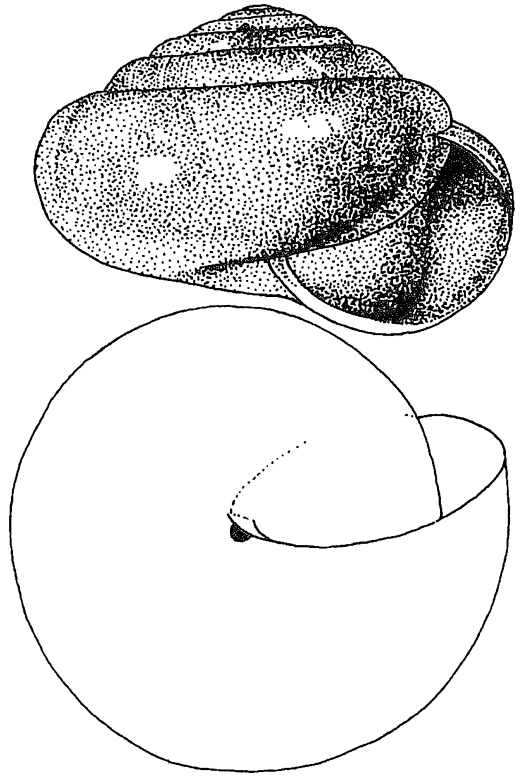


Fig. 1726. *Tadunia oakesi* Godwin-Austen, 1918. Abor Hills, Assam [India]. Syntype. London No. 1995075.

narrowed, upper section somewhat enlarged and contains a verge. Verge thick-walled, sac-like, internally with a narrow canal shifted toward one side. Sarcobelum long, with apical retractor. Free oviduct rather long, more or less expanded; vagina absent. Spermatheca without distinct division into stalk and reservoir, not attending albumen gland. Spermatophore consisting of a hard tip, long, thin-walled ampulla and slender tail, bearing 2- or 3-cuspid spines.

DISTRIBUTION. Hindustan Peninsula and Indochina. 8 spp.

Tadunia Godwin-Austen, 1918 Fig. 1726

Godwin-Austen, 1918a: 588.

TYPE SPECIES — *Tadunia oakesi* Godwin-Austen, 1918; monotypy.

Shell globosely flatly conic, thin, translucent, shining, of 7 convex whorls. Spire dome-shaped. Last whorl straight, evenly

rounded at periphery. Color yellowish to pale-amber-brown. Embryonic whorls glabrous, subsequent whorls with more or less smoothed radial wrinkles and much finer spiral striation. Aperture semilunate, only slightly oblique, with simple margins. Umbilicus tiny. Height 5.5-6.5, diam. 8.0-9.5 mm (6.2 × 9.3 mm).

Sole tripartite. Caudal foss and horn normally developed.

Penial caecum absent. Sarcobelum absent. Spermatheca very long. Spermatophore with many bifid spines on tail.

DISTRIBUTION. Assam (Abor Hills and Naga Hills, Hindustan Peninsula). 1 or 2 spp.

REMARK. Formally, Godwin-Austen (1918a) did not designate the type species of *Tadunia*. He included "*Tadunia oakesi*, n. sp." and "*Tadunia ? muspratti*, n. sp." in this genus; the former was illustrated, the latter was not figured. As the latter species came under question mark, the type species must be regarded as designated by monotypy (ICZN Art. 67.2.5).

Macrochlamys Benson, 1832

Benson, 1832: 76.

— *Tanychlamys* Benson, 1834: 89 (nom. nud.).

— *Orobia* Albers, 1860: 57 (t.-sp. "*Nanina*" *vitri-
noides* Deshayes, 1832; OD).

TYPE SPECIES — *Macrochlamys indicus* Benson, 1832 (nom. nud.; = *Helix petrosa* Hutton, 1834); monotypy.

Shell depressed-conic to lenticular, thin, usually much translucent, mostly shining, of 4-7 (moderately) convex whorls. Last whorl rounded to angulated. Color (pale) corneous to rich chestnut, sometimes with light radial strikes. Embryonic whorls smooth or with delicate spiral striation. Postembryonic sculpture of variously developed but never strong radial or spiral striation. Aperture lunate, generally with simple margins (rarely with internal lip), slightly to quite oblique. Umbilicus minutely open or closed.

Sole tripartite. Caudal foss overhung by a well-developed caudal horn.

Talon small, exposed or hidden. Flagellum shortly ovate to finger-shaped, internally with axial thread and narrow slit-like cryptae in walls where spines of spermatophore form. Epiphallus with spirally coiled caecum to which penial retractor attached.

Penis short, surrounded by thin sheath, internally with verge of various structure. Free oviduct moderately long. Vagina very short or almost absent. Sarcobelum well developed, with glandular outer layer; under this layer there is a muscular layer consisting of longitudinal fibers; innermost, also muscular layer consists of circular fibers. Preputial section of sarcobelum containing a fleshy papilla formed by invagination of sarcobelum proper into lumen of prepuce; papilla lacking spine. Sarcobelum provided with apical retractor arising from columellar muscle. Spermathecal stalk short to moderately long, reservoir thin-walled, capacious. Spermatophore consisting of thin-walled ampula having apical thorn, and a long tail bearing numerous, sometimes branched spines.

DISTRIBUTION. Central, S and SE Asia.

Macrochlamys (*Bensonies*)

Baker, 1938)

Fig. 1727

Baker, 1938: 33 (nom. nov. pro *Bensonia* L. Pfeiffer, 1855).

— *Bensonia* L. Pfeiffer, 1855: 119 (nom. praeocc. non Gray, 1847; t.-sp. *Nanina monticola* Hutton, 1838; SD Nevill, 1878).

TYPE SPECIES — *Nanina monticola* Hutton, 1838; SD Nevill, 1878.

Shell depressed, subdiscoidal, moderately thin, shining, of 5-6 rather convex whorls. Last whorl with rounded or somewhat angulate periphery. Color corneous to light-gray, frequently with brown supraproperipheral band. Embryonic whorls glabrous or microgranulated. Postapical sculpture of rather regular, smoothed, delicate radial wrinklelets and fine, uneven spiral striae, which often disappear on body whorl; combination of these sculpture elements gives appearance of fine network or granulation. Aperture lunate to ovate, more or less oblique, with simple margins. Umbilicus narrow. Height 6-21, diam. 10-35 mm (21.0 × 34.8 mm).

Talon exposed, drop-like. Vas deferens quite long, joining epiphallus laterally. Flagellum finger-like, rather long. Epiphallus cylindrical. Penis and distal section of epiphallus coated by sheath. Internally proximal chamber of penis with verge of irregular shape, pore of verge occupies lateral position not far from tip. Inner surface of

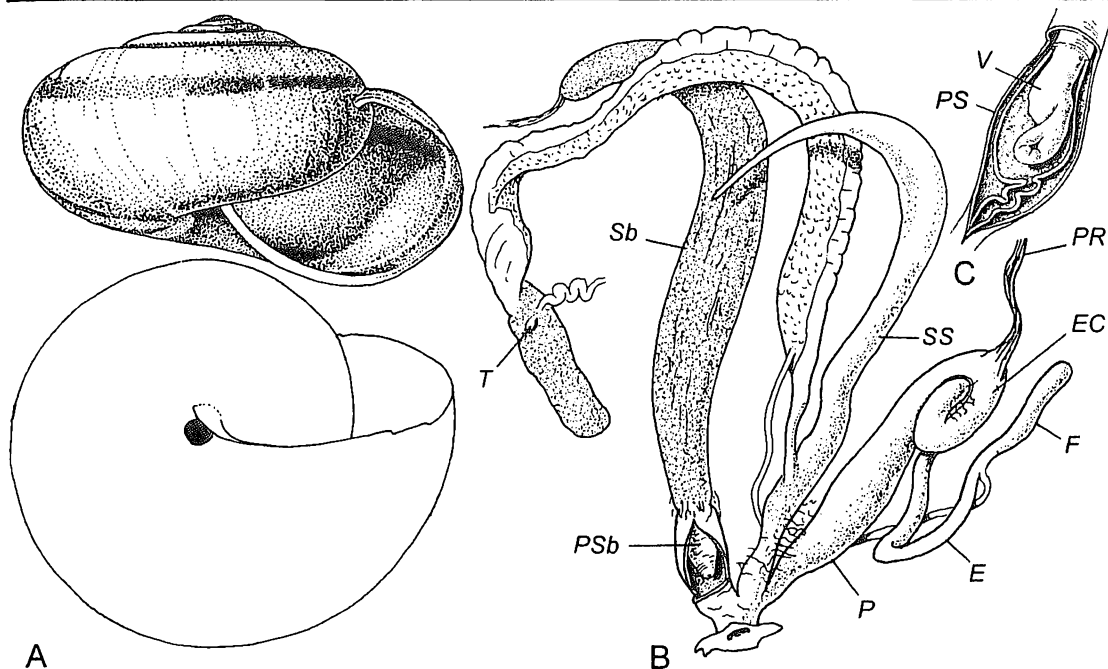


Fig. 1727 A — *Macrochlamys (Bensonies) monticola* (Hutton, 1838). Shell: India. Paris.
 B, C — ! *Macrochlamys (Bensonies) nepalensis* (Blanford, 1904). Garden of Ministry of Education, Thamel district, Katmandu, Nepal, April 24, 1995. Topotype. B — reproductive tract. C — interior of penis. Moscow No. Lc-23637

this chamber covered by smoothed, sinuous folds. Distal chamber of penis much narrowed, a little convoluted. Free oviduct slender, moderately long; vagina more stout, subequal in length. Spermatheca without visible division into stalk and reservoir, pointed above, not reaching albumen gland. Sarcobelum large, with small prepuce which contains a conic papilla.

DISTRIBUTION. Himalayas from Afghanistan to Sikkim. About 10 spp.

Macrochlamys (Macrochlamys s. str.)

Fig. 1728

Shell mostly strongly depressed, very thin, (silky) glossy, of 5-7 (moderately) convex whorls. Last whorl (rather) slowly increasing, rounded to angled at periphery. Color yellowish to chestnut or reddish. Spiral striae usually well developed, radial sculpture weak, irregular. Aperture generally widely lunate, moderately oblique. Umbilicus minutely open, rarely closed. Height 4-16, diam. 7-27 mm (8.2 × 14.3 mm).

Anatomically differs from *Bensonies* mainly by well defined, ovoid reservoir of

spermatheca; spermathecal stalk short to moderately long.

DISTRIBUTION. Central, S and SE Asia. At least 120 spp., subsp. & forms.

Macrochlamys (Parvatella)

Blanford et Godwin-Austen, 1908)

Fig. 1729

Blanford & Godwin-Austen, 1908: 145 (pro gen.).

TYPE SPECIES — *Vitrina flemingi* L. Pfeiffer, 1856; OD.

Shell somewhat vitrinoid, fragile, of no more than 5 slightly convex whorls; last whorl rapidly increasing, rounded peripherally. Color corneous to greenish-olive. Embryonic whorls smooth, later whorls with very fine spiral striation, including basal surface. Aperture large, broadly lunate, very oblique, upper part of palatal margin somewhat protruding. Umbilicus tiny or closed. Height 16-23, diam. 26-31 mm (17.8 × 29.2 mm).

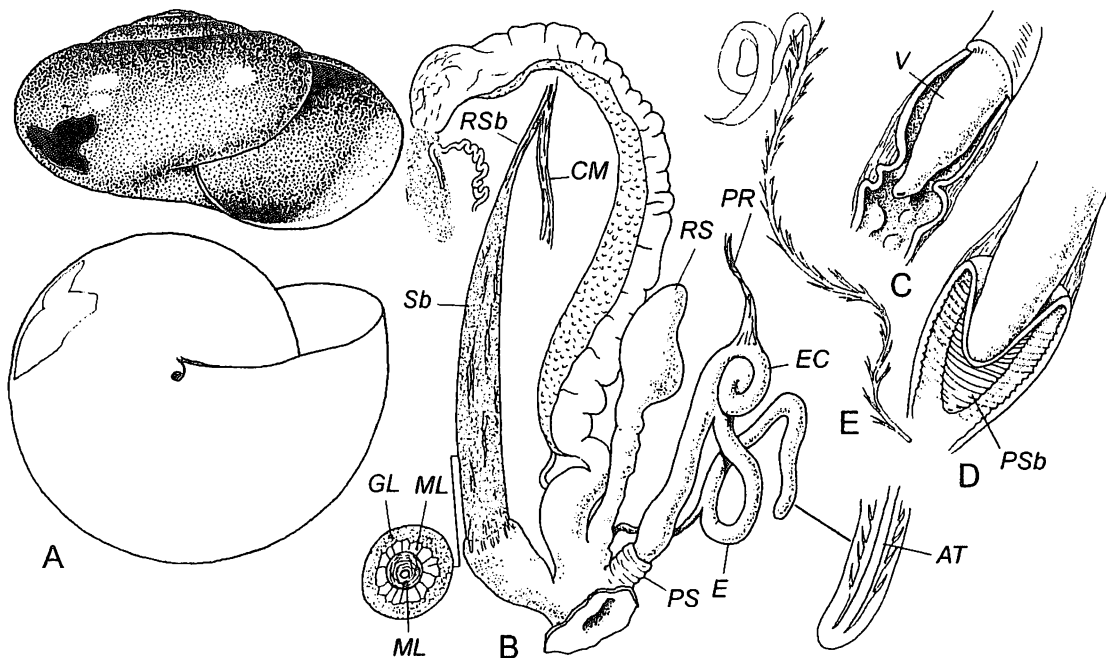


Fig. 1728. A — ! *Macrochlamys (Macrochlamys) vitrinoides* (Deshayes, 1832). Shell: no data. Holotype. Paris. B, C, D, E — *Macrochlamys (Macrochlamys) petrosa* (Hutton, 1834). Elville, Nossy-Be Island at NW coast of Madagascar, April 15, 1983. B — reproductive tract, cross-section of sarcobelum and longitudinal section of flagellum. C — interior of penis. D — interior of sarcobelum prepuce. E — spermatophore. Moscow No. Lc-13854. AT — axial thread. CM — columellar muscle.

Anatomy not differs substantially from that of *Macrochlamys* s. str.

DISTRIBUTION. Central Asia, China, Hindustan and Indochina Peninsulæ. 7-9 spp.

REMARK. Judging from the original diagnosis of *Parvatella*, it differs conchologically from *Macrochlamys* by more rapidly increasing whorls, closed umbilicus and by the presence of a thick olivaceous periostracum. However, among numerous species of *Macrochlamys* listed and described by Blandford & Godwin-Austen (1908: 77-145) one can find species with mentioned characters. Anatomically *Parvatella* differs from *Macrochlamys*, according to these authors, by elongate tongue-shaped shell-lobes, broader than in *Macrochlamys*, and pointed caudal horn above the caudal foss. Taking into consideration the variety of *Macrochlamys*, I have some doubt (in the given case) about taxonomic value of these characters. That is why I think that a thorough revision of *Macrochlamys* will show that *Parvatella* is a synonym of *Macrochlamys*.

Macrochlamys (Euaustenia)

Cockerell, 1898)

Fig. 1730

Cockerell, 1898: 10 (*Austenia* sect.).

TYPE SPECIES — *Vitrina scutella* Benson, 1859 (= *Helix monticola* L. Pfeiffer, 1848); OD.

Shell somewhat vitrinoid, thin, fragile, very shining, translucent, of about 3 slightly convex whorls. Last whorl inflated, widely rounded at periphery. Color of well-developed periostracum yellowish or olivaceous. Embryonic whorls with very thin, close-set spiral striae. Postapical sculpture of smoothed, irregular radial wrinkles (at first glance surface looking glabrous and polished). Aperture ample, ovate, well oblique. Umbilicus tiny or closed. Height 9.5-11.0, diam. 15-20 mm (10.6 × 17.9 mm).

Talon hidden. Penis rather thin, coated by a sheath, internally with a small verge having lateral slit-like orifice. Free oviduct rather long, expanded. Vagina very short.

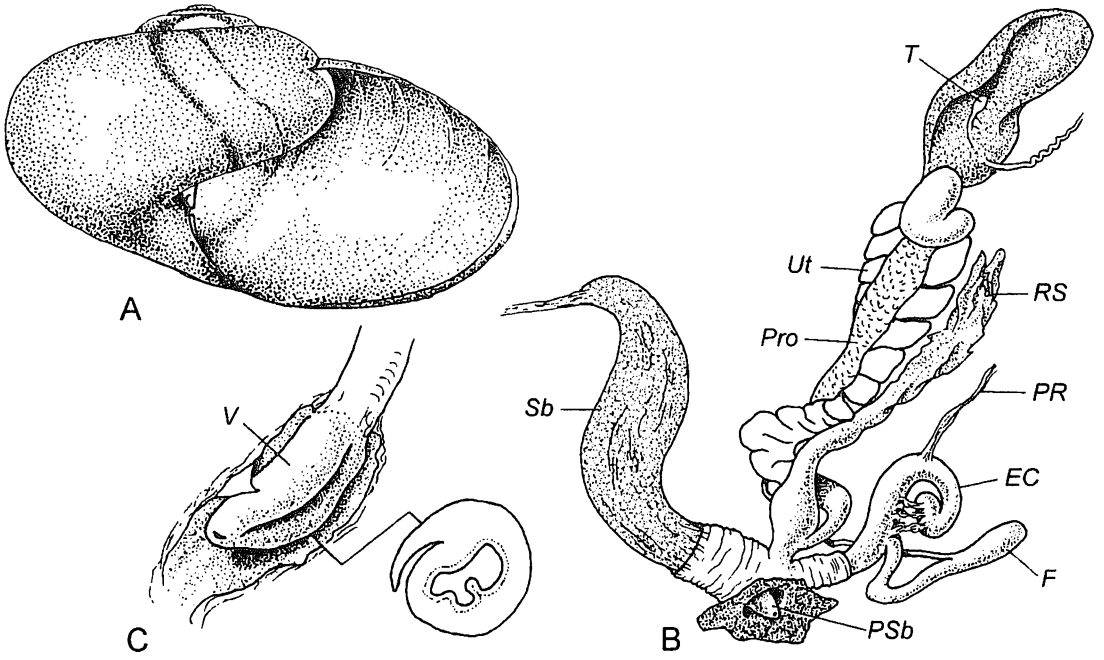


Fig. 1729. A — *Macrochlamys (Parvatella) flemingi* (L. Pfeiffer, 1856). Shell: Pegu, Burma. Paris.
 B, C — ! *Macrochlamys (Parvatella) turanica* Martens, 1874. Near Kyz-Kye village, 30 km from Bystrovka, Kyrgyzstan, July 26, 1987 B — reproductive tract. C — interior of penis and cross-section through verge. Moscow No. Lc-13858.

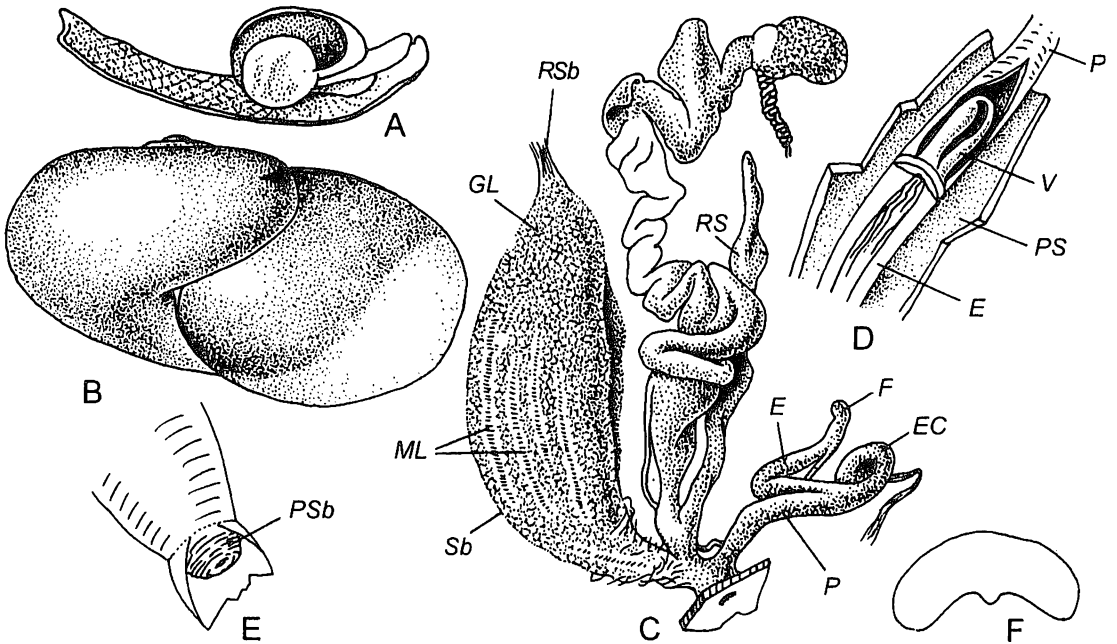


Fig. 1730. *Macrochlamys (Euaustenia) scutella* (Benson, 1859).
 Nepal, environs of Katmandu, June 10-12, 1986. A — external view of animal. B — shell.
 C — reproductive tract. D — interior of penis. E — interior of sarcobelum. F — jaw.
 Moscow No. Lc-25321 (gift of C. Frank).

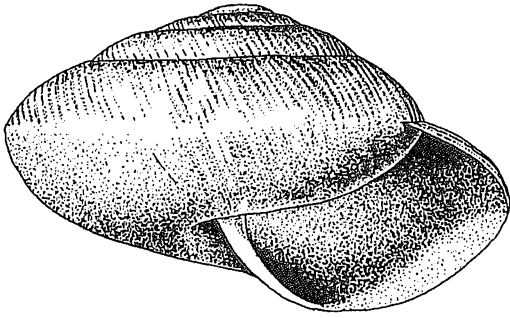


Fig. 1731 *Macrochlamys (Rhadella) kashmirensis* (Nevill, 1878).
Sonamarg, Kashmir. Phil. No. 63535.

Sarcobelum very large, glandular layer covers muscular, but latter visible locally as longitudinal stripes. Prepuce of sarcobelum contains a short, sphincter-like papilla. Spermatheca without distinct division into stalk and reservoir, not reaching albumen gland.

DISTRIBUTION. W Himalayas to Sikkim, westward to Kuram Valley, India. 5 spp.

Macrochlamys (Rhadella)

Godwin-Austen, 1914)

Fig. 1731

Godwin-Austen, 1914: 322.

TYPE SPECIES — *Nanina (Rotula) kashmirensis* Nevill, 1878; OD.

Shell considerably depressed to lenticular, thin, silky glossy, of about 5 a little convex whorls. Last whorl more or less angulated. Embryonic whorls smooth. Postapical whorls plicately, radially striate or closely ribbed above, less so below. Aperture comparatively narrow, semilunate, a little oblique, with simple, fragile margins; columellar margin dilated above. Umbilicus narrow, subcylindrical, semi-

covered. Height 3.75-3.80, diam. 6.5-7.5 mm (3.8 × 6.6 mm).

Animal with small right and left shell-lobes. Reproductive tract like those of *Macrochlamys* s. str.; coiled epiphallic caecum large.

DISTRIBUTION. N India (Kashmir). 1 sp.

Himalodiscus Kuznetsov, 1996

Fig. 1732

Kuznetsov, 1996: 163. Schileyko & Kuznetsov, 1998: 85.

TYPE SPECIES — *Himalodiscus aculeatus* Kuznetsov, 1996; OD.

Shell obesely lenticular, thin, fragile, semitransparent, of 4.25-5.25 angulated, gradually increasing whorls. Color (dark) corneous-brown. Embryonic sculpture of crowded radial riblets; very fine interrupted spiral striae also may be present. Postapical whorls with fine radial lines and rather coarse, more or less regular radial riblets; besides, there is a delicate spiral striation around umbilicus and on its slopes. Fresh shells covered with dense periostracum, forming radial lamellae on riblets and attenuated sharp spines or ciliae at periphery. Aperture generally rounded-ovate, moderately to well oblique, with fragile, simple margins. Umbilicus narrowly to moderately open, perspective. Height 2.7-3.7, diam. 4.8-6.1 mm (3.7 × 6.0 mm).

Vas deferens not adherent, entering flagellum/epiphallus junction at sharp angle. Flagellum rather long, tapering, with semicircular superficial folds. Epiphallus slightly shorter, furnished with 2 caeca: loosely coiled and additional short, clavate, located at base of coiled caecum. Penis rather long, of irregular shape, with very thin, semitransparent walls, without visible inner structure (perhaps, a short verge present in adult animals). Sarcobelum very large, with apical retractor, its body covered with glandular layer; preputial section of sarcobelum very thin-walled, containing large, fleshy, conic papilla. Free oviduct and vagina moderately long, subequal in length. Spermathecal stalk long, reservoir attending albumen gland.

DISTRIBUTION. Nepal. 2 spp.

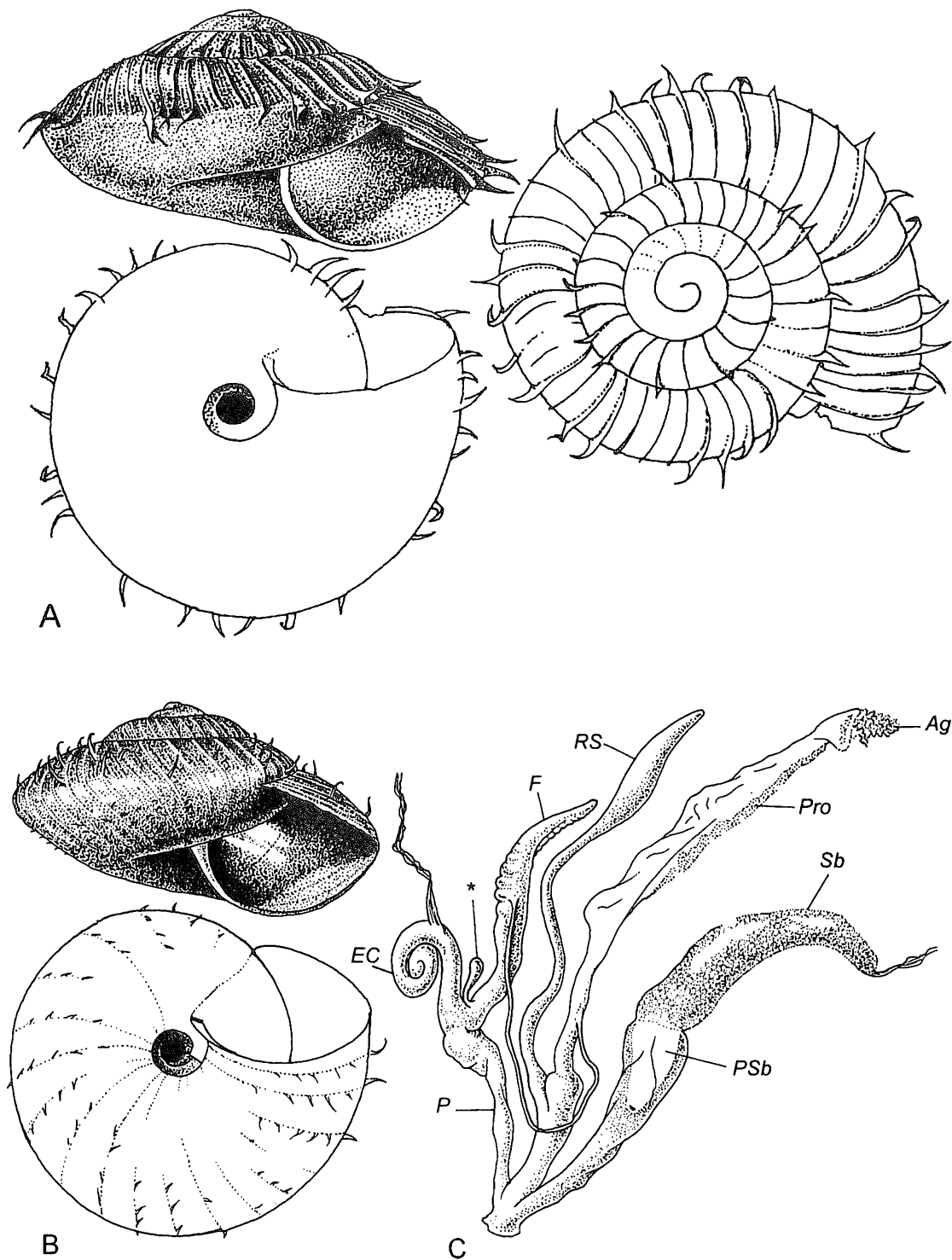


Fig. 1732. A — *Himalodiscus aculeatus* Kuznetsov, 1996. Shell: 3.75 km SE of Godawari village, NE slope of Phulchoki mountain, Katmandu valley, Nepal. Holotype. Moscow No. Lc-22840.
 B, C — ! *Himalodiscus echinatus* Schileyko et Kuznetsov, 1998. Right side of Lete-Khola Valley (right tributary of Kali-Gandaki River), Dhaulagiri zone, Annapurna National Park, W Nepal. B — shell of holotype. C — reproductive tract (subadult specimen). Paratype. Moscow No. Lc-23258 *Asterisk* — additional caecum.

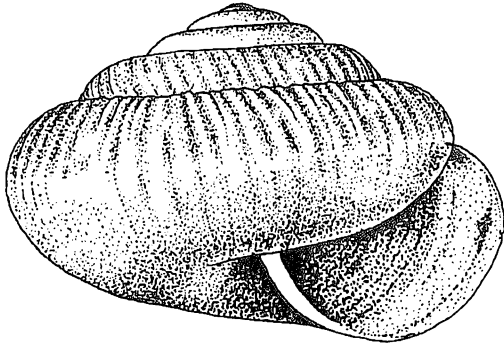


Fig. 1733. *Rahula (Sinaenigma) chengweiensis* Pilsbry, 1934.
Chengwai, Szechwan, W China. Holotype.
Phil. No. 159701a.

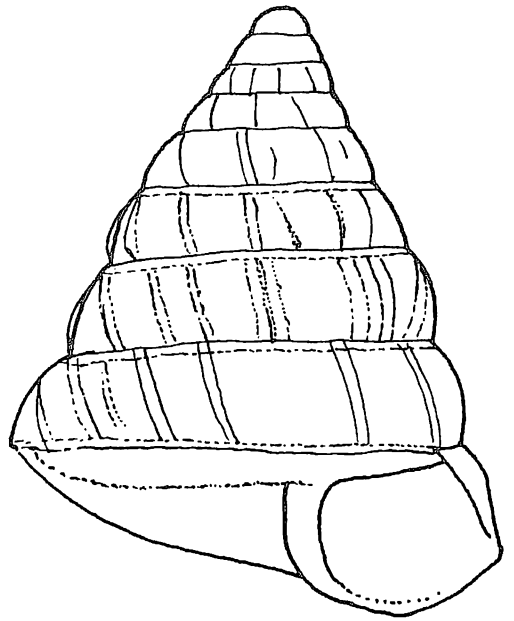


Fig. 1734. B — *Rahula (Rahula) macropleuris* (Benson, 1859).
After Zilch, 1959.

Rahula Godwin-Austen, 1907

Godwin-Austen, 1907: 216.

TYPE SPECIES — *Helix macropleuris* Benson, 1859; OD.

Shell elongately pyramidal to conically trochiform, of 4.5-8 (rather) convex, rounded or carinate whorls. Apex pointed or rounded. Basal side more or less flattened. Color whitish to corneous. Embryonic whorls (nearly) smooth. Later whorls with close or distant radial ribs. Aperture irregularly ovate, with thin margins; columellar margin usually widely reflexed. Umbilicus narrow.

DISTRIBUTION. India, Indochina Peninsula, W China.

Rahula (Sinaenigma) Pilsbry, 1934

Fig. 1733

Pilsbry, 1934: 20, 21.

TYPE SPECIES — *Rahula chengweiensis* Pilsbry, 1934; OD.

Shell conically trochiform, thin, somewhat shining, of 4.5 rather convex whorls. Last whorl rounded at periphery. Color corneous. Embryonic whorls at first (0.5

whorl) nearly smooth, next whorl with delicate, close, curved, regular, retractive, radial striae. Postnuclear whorls with well-spaced, slender riblets and some fine radial striae between riblets on last half whorl; riblets continue on base, becoming weaker as they approach umbilicus. Aperture lunate, only slightly oblique, becoming expanded on columellar margin and a little dilated above. Umbilicus not surrounded by a ridgelet. Height 2.0-2.3, diam. 3.2-3.3 mm (2.10 × 3.25 mm).

DISTRIBUTION. W China, Szechwan (= Sichuan) Prov. 1 sp.

Rahula (Rahula) s. str.)

Fig. 1734

Shell elongately pyramidal to conically trochiform, of 6-8 moderately convex whorls. Last whorl with variously developed filiform keel. Color whitish to corneous. Embryonic whorls smooth. Later whorls with distant, irregular radial ribs. Aperture roughly quadrangular, quite oblique, columellar margin expanded. Umbilicus deep, not wide, surrounded by a ridgelet. Height 3.0-5.8, diam. 2-5 mm.

DISTRIBUTION. India. About 10 sp.

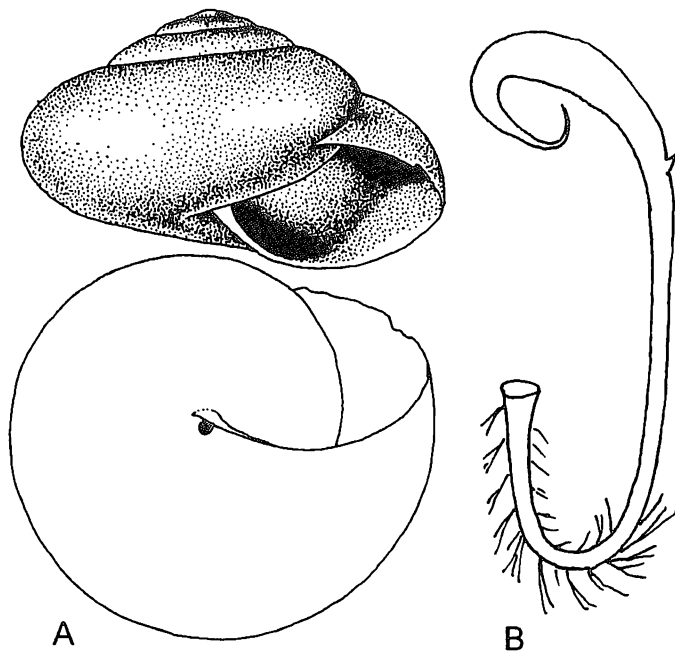


Fig. 1735. *Sakiella honesta* (Gould, 1846).

A — shell: Pegu, Burma [Myanmar]. Phil. No. 5571 B — spermatophore. After Blanford & Godwin-Austen, 1908.

Sakiella Godwin-Austen, 1908

Fig. 1735

Godwin-Austen in Blanford & Godwin-Austen, 1908: 237

TYPE SPECIES — *Helix honesta* Gould, 1846; OD.

Shell depressedly conic, thin, fragile, shining, of about 5 rather convex whorls. Last whorl slightly, gradually descending in front. Color yellowish to light-corneous. Embryonic whorls smooth, polished, rest whorls with spiral striation, that expressed better on basal surface. Aperture broadly lunate, well oblique, with simple margins. Umbilicus minute, more or less covered by reflection of columellar margin. Height 6-7, diam. 10.0-11.5 mm (7.0 × 10.6 mm).

Caudal foss and caudal horn present.

Spermatophore as in *Macrochlamys*.

DISTRIBUTION. Myanmar (Tenasserim and Pegu). 2-3 spp.

Baiaplecta Laidlaw, 1956

Fig. 1736

Laidlaw, 1956: 83 (nom. nov. pro *Pangania* Laidlaw, 1932).

— *Pangania* Laidlaw, 1932a: 81, 83 [nom. praeocc., non Poppius, 1914 (Insecta, Hemiptera); t.-sp. *Helicarion lowi* Morgan, 1885; monotypy].

TYPE SPECIES — *Helicarion lowi* Morgan, 1885; monotypy.

Shell vitrinoid, thin, translucent, of 3.5 whorls. Last whorl not descending, evenly rounded at periphery. Color olive-greenish. Embryonic whorls smooth, subsequent whorls with well spaced incised radial grooves, on body whorl there is extremely fine, crowded, spiral striation; basal surface smooth and shining. Aperture ovate, oblique, upper part of palatal part protruding. Umbilicus, a narrow slit. Height up to 21, diam. up to 35 mm (20.0 × 35.0 mm).

Sole undivided.

Vas deferens rather long, thin, entering epiphallus laterally. Flagellum elongate-ovoid. Epiphallus with a coiled caecum, supplied with a retractor. Penis internally with sharp axial folds in distal part and peculiar, spoon-like vergic stimulator in proximal part. Free oviduct and vagina of about equal length, rather stout. Sarcobelum long, somewhat twisted, its prepuce folded, contains a fleshy papilla with very narrow lu-

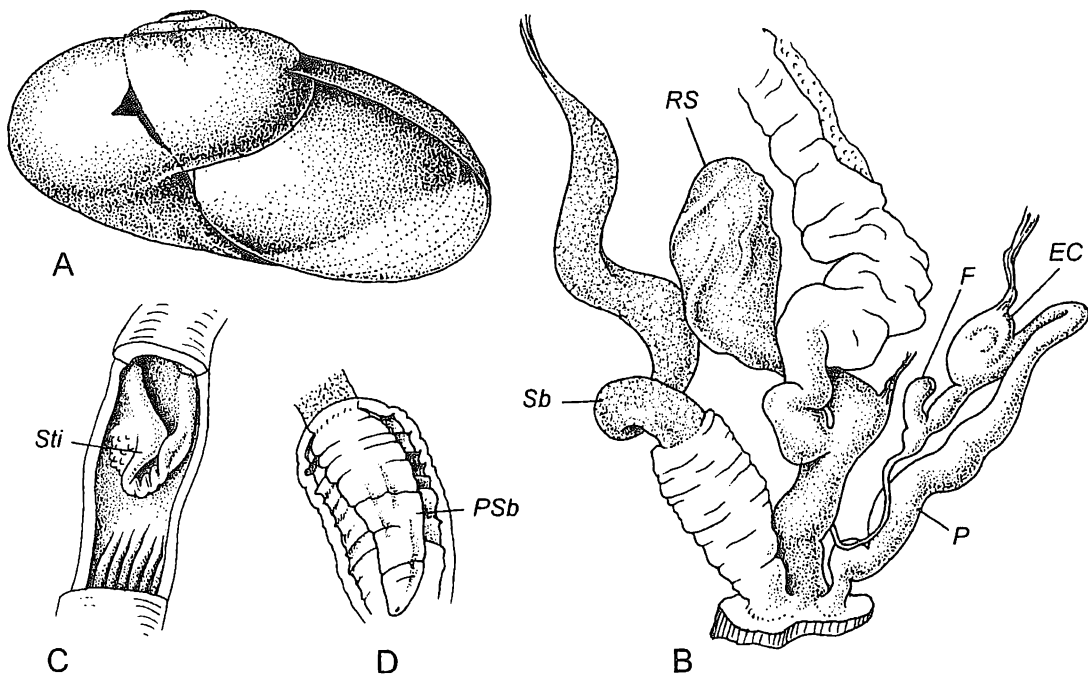


Fig. 1736. *Baiaplecta lowi* (Morgan, 1885).

A — shell: Perak. Probable syntype. Paris. B, C, D — Gu Benom, Malaya, March 20, 1967 B — reproductive tract. C — interior of penis. D — interior of sarcobelum. London No. 1995065.

men. Spermathecal stalk short, stout, reservoir voluminous, embedded in lower part of spermoviduct.

DISTRIBUTION. Malaya Peninsula. 1 sp.

Syama Godwin-Austen, 1908

Fig. 1737

Godwin-Austen in Blanford & Godwin-Austen, 1908: 152 (*Euaustenia* subg.).

TYPE SPECIES — *Macrochlamys prona* Nevill, 1878; OD.

Shell depressed, low conic, thin, translucent, shining, of 5-8 moderately convex whorls. Last whorl not descending, rounded peripherally. Color light-corneous. Embryonic whorls smooth, next 3 whorls nearly so, with very fine spiral striae, visible predominantly at suture; body whorl with distinct dense spiral striation, especially on base. Aperture ovate, slightly oblique, with simple sharp margins. Umbilicus (very) narrow. Height 4.5-11.5, diam. 10-23 mm (11.1 × 22.5 mm).

Male organs similar to those of *Macrochlamys*, but sarcobelum absent.

DISTRIBUTION. Hindustan Peninsula. 7 spp. & subsp.

? *Microcystina* Mörch, 1872

Fig. 1738

Mörch, 1872: 311 (*Nanina* subg.).

— ? *Chronoceryx* Iredale, 1941: 67 (t.-sp. *Sitala* ? *sublimis* Hedley, 1897; OD).

— ? *Taiwanosiphona* Habe, 1943: 93 (t.-sp. *Lamprocystis spadix* Schmacker et Boettger, 1891; OD).

Habe, 1945: 28 [as syn. of *Chalepotaxis* Ancey, 1889 (*Bradybaenidae*)].

TYPE SPECIES — *Nanina* (*Microcystina*) *rinkii* Mörch, 1872; monotypy.

Shell more or less depressed to subglobular, thin, shining, translucent to subtransparent, of 4-5.5 flattened to nearly flat whorls. Color white to corneous or olivaceous. Embryonic whorls microscopically spirally striated. Rest whorls generally smooth, without regular sculpture. Aperture lunate, moderately oblique, with simple margins. Umbilicus very narrow to covered.

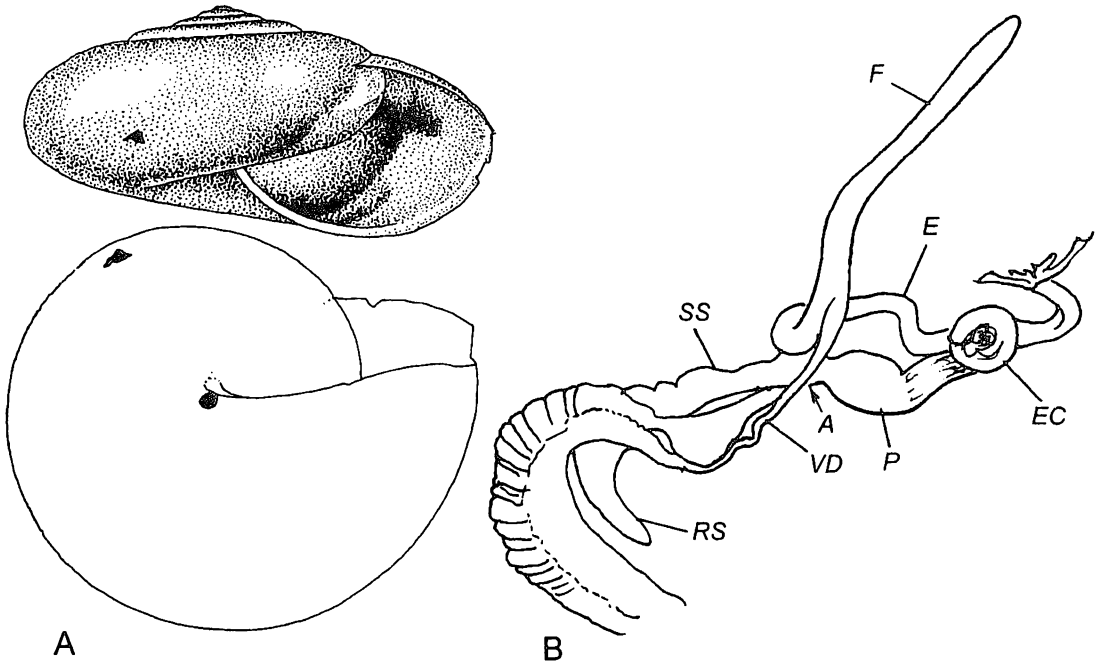


Fig. 1737. A — *Syama prona* (Nevill, 1878). "Chakrata — Deoban, W Himalayas" [India, Uttar Pradesh State]. Senck. No. 153503.
 B — ! *Syama annandalei* Godwin-Austen, 1908. Reproductive tract. After Blanford & Godwin-Austen, 1908.

Height 1.7-6.5, diam. 2.5-8.0 mm (3.4×5.6 mm).

Male part without appendages or flagellum may be present. Vagina with or without a small sarcobelum.

DISTRIBUTION. Hindustan Peninsula, SE Asia including S China and Taiwan, Andaman and Nicobar Islands, Philippines, Indonesia, New Guinea. About 60 spp.

REMARK. In spite of the fact that the genus *Microcystina* includes many species, their anatomy is poorly studied. Until a thorough revision is made, I follow Blanford & Godwin-Austen (1908) in referring this genus to Macrochlamydini.

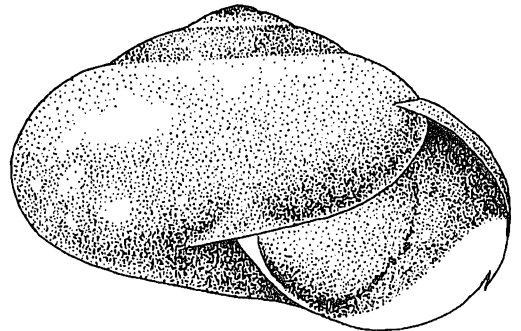


Fig. 1738. A — ! *Microcystina tersa* (Issel, 1874). Bolaäng Mongondow, N arm of Sulawesi, Indonesia. Moscow No. Lc-25403 (gift of J.J. Vermeulen).

PARMARIONINAE

Blanford et Godwin-Austen, 1908

Blanford & Godwin-Austen, 1908: 180.

Shell much reduced; semislugs or slugs.

Sole tripartite. Caudal foss present, caudal horn present or missing.

Flagellum present or absent. Penis with-

Parmarion P Fischer, 1856
Fig. 1740

Fischer P 1856: 357.

— *Rigasia* Gray in H. Adams & A. Adams, 1858: 640 (t.-sp. *Limax problematicus* Férussac, 1823; designated here).

Hoffmann, 1940: 3.

TYPE SPECIES — *Limax problematicus* Férussac, 1823 (? = *Parmarion pupillaris* Humbert, 1863); SD Humbert, 1863.

Shell much reduced, partially covered by mantle.

Vas deferens thin, enters flagellum/penis junction through a simple pore. Flagellum comparatively large, conic, internally with a well developed axial thread and high circular folds which higher on convex side. Penis not long, subcylindrical, its upper section internally with transversely-oblique folds; lower section lined with tubercles of irregular shape. Penial retractor attached to proximal section of penis. Sarcobelum large, with apical retractor, internally with calcareous thorn having central canal and sitting on a short papilla. Outer surface of sarcobelum covered by glandular layer, inner wall muscular. Free oviduct and vagina not long, of nearly equal length. Spermathecal stalk very short, reservoir thin-walled, rather large.

DISTRIBUTION. S China to Java. 3-5 spp.

Apoparmarion Collinge, 1902
Fig. 1741

Collinge, 1902b: 73.

TYPE SPECIES — *Apoparmarion partridgii* Collinge, 1902; monotypy.

Semislug. Shell thin, membranaceous, with distinct apex, of 2 whorls. Basal wall partly resorbed. Color amber. Mantle coarsely granulated, rising upon shell on all sides, on right side posteriorly a large wing-like lobe covers shell apex. Diam. of shell 9.5 mm; length of preserved animal 25 mm.

Sole tripartite. Caudal foss not extending to sole. Caudal horn rather weak.

Penis long, tubular, with a sharply differentiated beak-like flagellum. Latter marked by a series of crescent shaped constrictions, while just below point where vas deferens joins penis, there is a peculiar little outgrowth. Internally cavity of penis differs considerably from external form. Commencing as a narrow tube, lumen widens

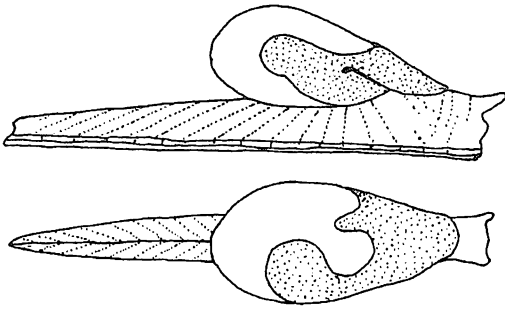


Fig. 1739. *Cryptosemelus gracilis* Collinge, 1902.
After Collinge, 1902b.

out verge. Sarcobelum well developed, contains papilla supplied with calcareous thorn (dart).

DISTRIBUTION. Philippines, S China and Cambodia to Indonesia.

Parmarionini
Blanford et Godwin-Austen, 1908

Flagellum present. Spermatheca with a short stalk or sessile.

DISTRIBUTION. S China and Cambodia to Indonesia.

Cryptosemelus Collinge, 1902
Fig. 1739

Collinge, 1902b: 76.

TYPE SPECIES — *Cryptosemelus gracilis* Collinge, 1902; monotypy.

Semislug. Shell comparatively well developed, thin, membranaceous, of 3.5 whorls. Color yellow. Mantle rises upon shell anteriorly and laterally, on right side it produced into a wing-like extension covering shell apex, while on left side anterolaterally there is a smaller lappet. Length of preserved animal 19.5 mm.

Caudal foss very small. Caudal horn absent.

DISTRIBUTION. Malay Peninsula (Bukit Besar, State of Nawng Chik). 1 sp.

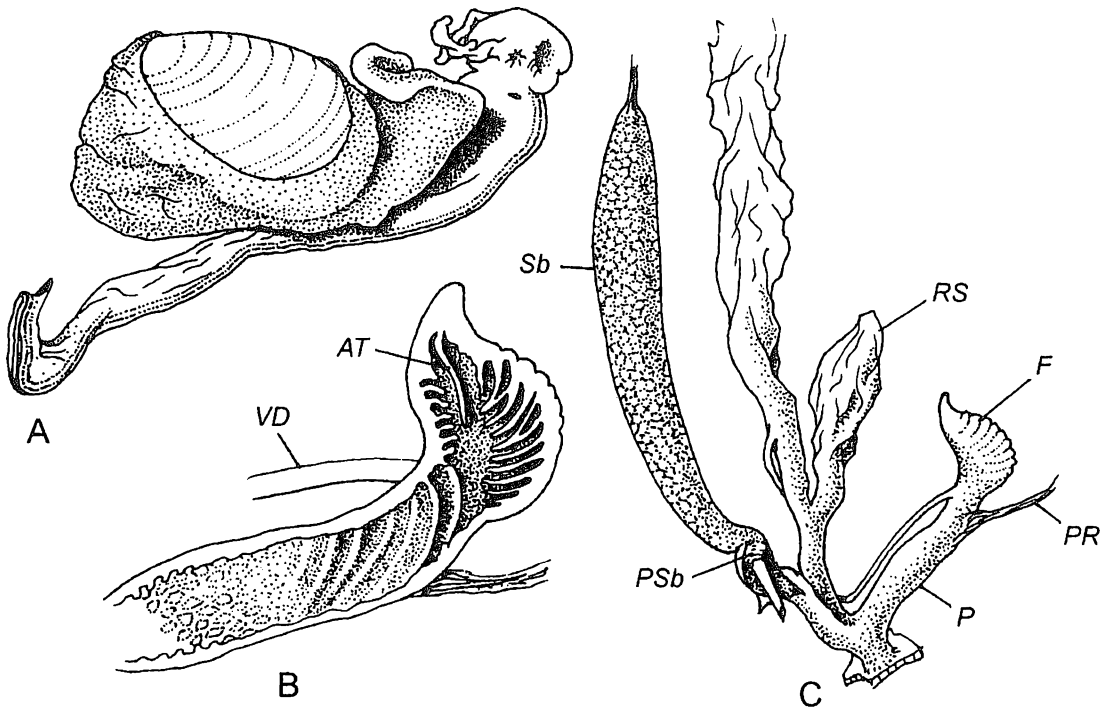


Fig. 1740. *Parmarion pupillaris* Humbert, 1863. Java.
 A — external view of preserved animal. B — interior of flagellum and penis. C — reproductive tract. London. AT — axial thread.

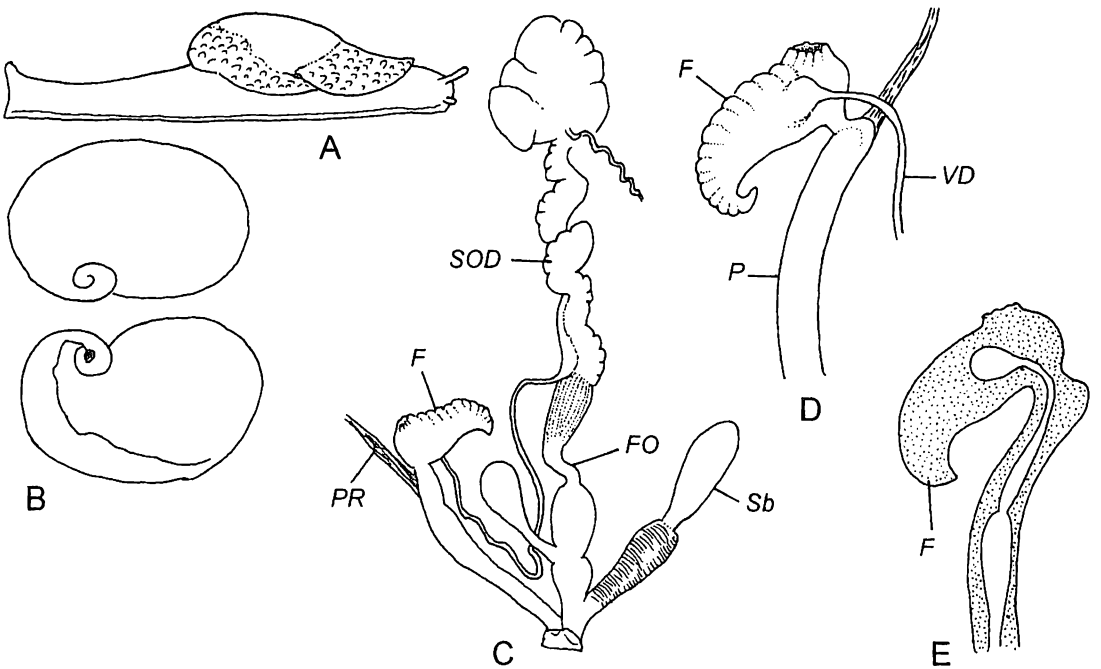


Fig. 1741. *Apoparmarion partridgii* Collinge, 1902.
 A — external view of animal. B — shell. C — reproductive tract. D — epiphallus and flagellum enlarged. E — interior of epiphallus and flagellum (diagrammatic). After Collinge, 1902b.

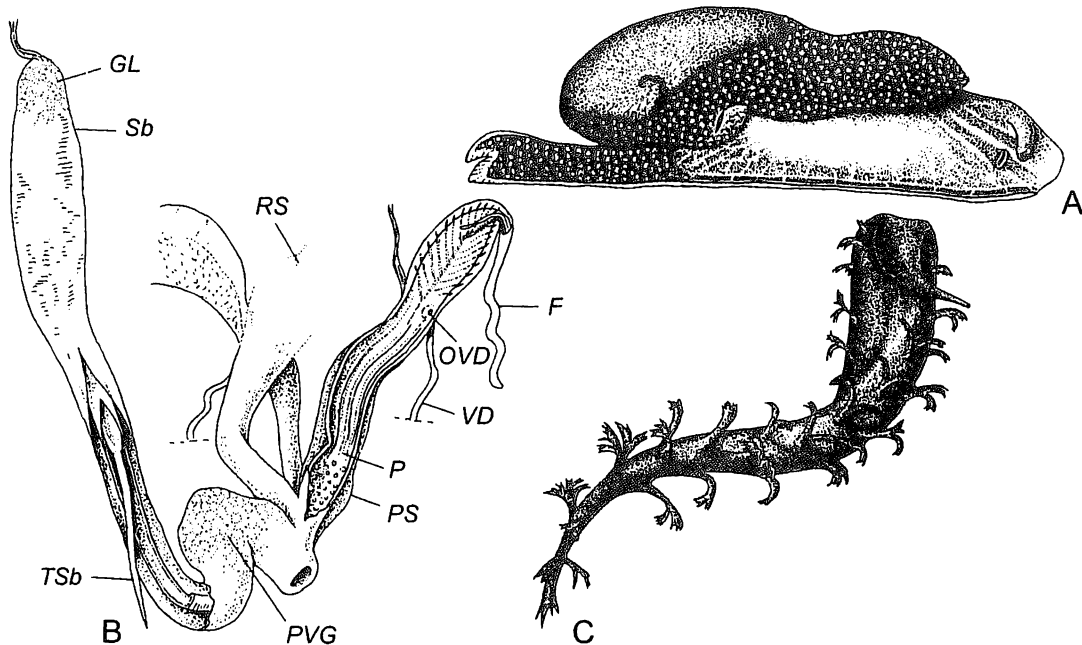


Fig. 1742. *Cambodiparmarion doroshenkoi* Kuznetsov et Kuzminykh, 1999. SW end of Kompong Som (= Sihanoukville), Kompot prov., Cambodia, September 1, 1998. A — external view of paratype. B — reproductive tract (holotype). C — spermatophore. Moscow No. Lc-23790. A and C — after Kuznetsov & Kuzminykh, 1999. *TSb* — thorn of sarcobelum papilla.

until about middle of penis, then narrowing somewhat abruptly, and passing through neck as a very fine tube it expands in lower portion of flagellum into a globular sac, which connected on its ventral side with vas deferens. Remaining portion of flagellum solid. Penial retractor inserted on proximal end of penis. Sarcobelum with comparatively long prepuce which contains a fleshy papilla surface of which minutely studded with fleshy tubercles. Retractor of sarcobelum absent. Free oviduct consisting of 3 sections: proximal section wide, thin-walled, then narrow tube follows, and distal section thick-walled, swollen. Vagina short, stout. Spermathecal stalk short, reservoir not reaching spermoviduct.

DISTRIBUTION. Malay Peninsula (Perak). 1 sp.

Cambodiparmarion

Kuznetsov et Kuzminykh, 1999

Fig. 1742

Kuznetsov & Kuzminykh, 1999: 113.

TYPE SPECIES — *Cambodiparmarion doroshenkoi* Kuznetsov et Kuzminykh, 1999; OD.

Semislugs. Shell ear-shaped, very thin, of about 1.5 whorls. Upper spire calcareous over periphery, basal part membranaceous. Color amber. Embryonic sculpture of delicate radial wrinklets. Postapical surface with irregular radial wrinkles and faintly visible, widely spaced, locally interrupted spiral striae. Columellar margin strongly arcuate. Height 3.0-4.5, diam. 6.9-8.9 mm (3.5 × 8.1 mm).

Cephalopodium sharply keeled above behind shell, terminating in large caudal foss with greatly overhanging horn.

Vas deferens thin, entering flagellum/epiphallus junction. Flagellum consisting of 2 parts: proximal part narrow and long, containing axial thread; distal part enlarged, with numerous transversal folds. Epiphallus cylindrical, as long as penis, internally with longitudinal folds. Penis, a thin-walled, simple tube, its lower portion internally with minute crowded tubercles, upper portion nearly smooth. Penis, atrium and basal part of sarcobelum surrounded by a sheath. Penial retractor weak, attached to boundary between flagellum and epiphallus. Free oviduct long, vagina as such almost absent. Sarcobelum large, roughly fusiform,

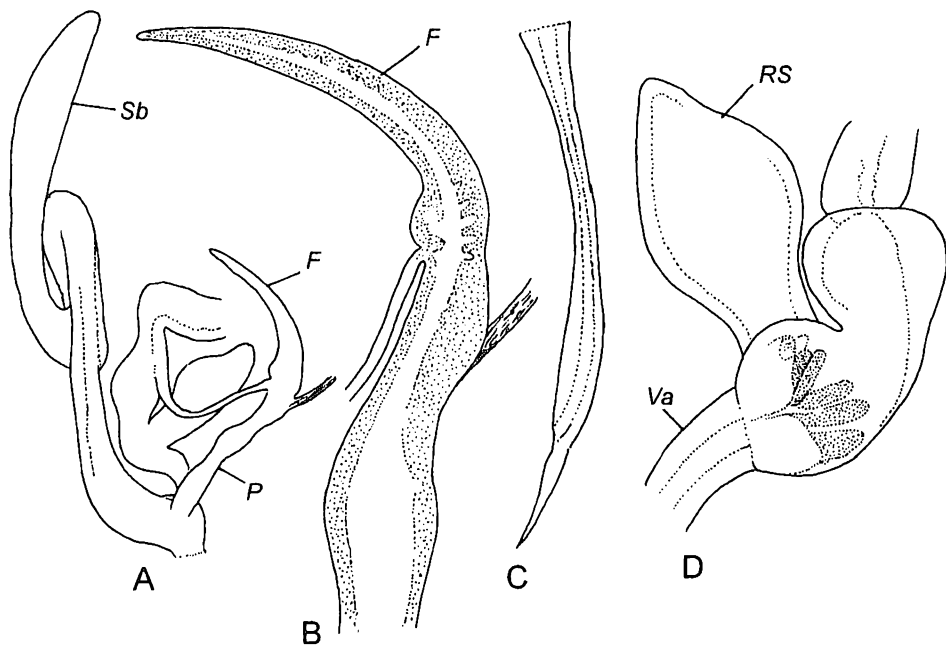


Fig. 1743. *Damayantia dilecta* Issel, 1874.

A — reproductive tract. B — interior of epiphallus and flagellum. C — thorn of sarcobelum. D — interior of free oviduct. After Hoffmann, 1940.

with apical retractor, long prepuce containing a calcareous thorn (dart). Wall of distal section of prepuce glandular (? perivaginal gland). Spermathecal stalk thick, not long, reservoir adhering to middle part of spermoviduct. Spermatophore consists of thin-walled ampula covered with 3 rows of dichotomically branched spines.

DISTRIBUTION. Cambodia. 1 sp.

Damayantia Issel, 1874

Fig. 1743

Issel, 1874: 389. Hoffmann, 1940: 107

TYPE SPECIES — *Damayantia dilecta* Issel, 1874; monotypy.

Slugs. Shell thin, almost entirely membranaceous, of about 2 whorls. Visceral hump situated anteriorly. Back of cephalopodium sharply keeled. Mantle, which completely covers shell, exhibits a well-defined right and left lobes, right one overlapping left lobe posteriorly. Length of preserved animal up to 28 mm.

Sole not divisible into median and lateral planes. Obliquely placed, ovate caudal foss present.

Vas deferens thin, entering epiphallus laterally. Flagellum rather long, conic, internally with cryptae corresponding to spines of spermatophore. Epiphallus short, indistinctly separated from penis. Penis moderately long. Penial retractor attached to penis/epiphallus junction. Free oviduct very short, internally with a peculiar valve; vagina somewhat longer. Spermatheca almost sedentary. Sarcobelum large, with papilla armed with calcareous thorn pierced by a narrow canal; opening of canal occupies lateral position.

DISTRIBUTION. Kalimantan (= Borneo). 6 spp.

Damayantiella Hoffmann, 1940

Fig. 1744

Hoffmann, 1940: 116, 127

TYPE SPECIES — *Damayantia rugosa* Collinge, 1903; OD.

Shell ear-shaped, completely covered by mantle.

Vas deferens rather short, enters epiphallus apically. Flagellum missing. Epiphallus short. Penis surrounded by

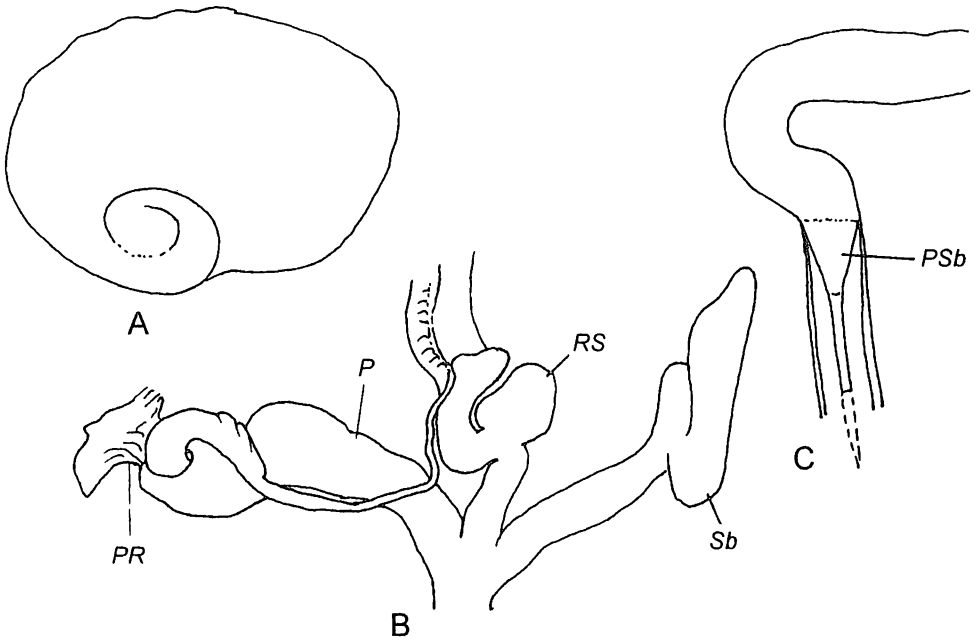


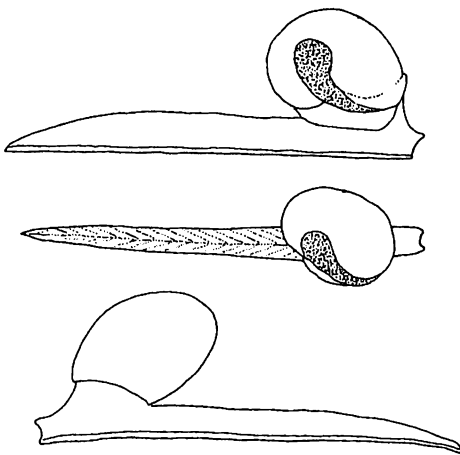
Fig. 1744. ! *Damayantiella smithi* (Collinge et Godwin-Austen, 1898).
 A — shell. B — reproductive tract. C — interior of sarcobelum prepuce. After Godwin-Austen, 1898 (1898-1899).

sheath. Penial retractor inserted on penis/epiphallus junction. Free oviduct and vagina subequal, medium in length. Sarcobelum large, sinuous, without apical retractor. Prepuce of sarcobelum contains calcareous thorn sitting on a short, conic papilla. Spermatheca sessile.

DISTRIBUTION. Kalimantan (= Borneo), Malaya Peninsula. 2 spp.

Paraparmarion Collinge, 1902

Fig. 1745



Collinge, 1902b: 75.

TYPE SPECIES — *Paraparmarion elongatus* Collinge, 1902; monotypy.

Semislugs. Shell comparatively well developed, thin, membranaceous, of 3 whorls. Visceral hump shifted forward. Mantle degenerate, rising upon shell on right side only, as a dark brown, wing-like lobe, covering shell apex. Length of preserved animal 12 mm.

Sole tripartite, median plane narrow, lateral ones broader. Caudal foss small, not extending to sole; caudal horn missing.

DISTRIBUTION. Malay Peninsula (Perak). 1 sp.

Fig. 1745. *Paraparmarion elongatus* Collinge, 1902.
 After Collinge, 1902b.

Microparmarionini
Schileyko, trib. nov.

Type genus — *Microparmarion* Simroth, 1893.

Flagellum absent. Spermatheca (almost) sessile.

DISTRIBUTION. Philippines, Malay Peninsula, Indonesia.

***Wiegmannia* Collinge, 1901**
Fig. 1746

Collinge, 1901a: 299, 300. Hoffmann, 1940: 87

TYPE SPECIES — *Parmarion* ? *dubius* Wiegmann, 1898; OD.

Slugs. Visceral hump large, lies upon a depression of dorsum. Back of cephalopodium with a keel. Mantle shows faint traces of a keel, and has a thin shell border more or less covering margins of shell. Length of preserved animal up to 50 mm.

Tail truncate, with large, slit-like pore.

Vas deferens passes into epiphallus apically. Epiphallus furnished with a short, conic caecum in distal part. Penis rather long, more or less twisted. Penial retractor attached to boundary between penis and epiphallus. Free oviduct moderately long, of about same length as vagina. Spermatheca sedentary. Sarcobelum very large, with apical retractor, internally with a short calcareous spine.

DISTRIBUTION. Kalimantan (= Borneo). 6 spp.

***Microparmarion* Simroth, 1893**
Fig. 1747

Simroth, 1893: 222.

— *Collingea* Simroth, 1898: 168 (t.-sp. *Microparmarion strubelli* Simroth, 1893; monotypy).

Hoffmann, 1940: 42.

TYPE SPECIES — *Microparmarion austeni* Simroth, 1893; SD Simroth, 1898.

Slugs. Shell reduced to a small plate. Visceral hump situated on middle of cephalopodium.

Vas deferens entering epiphallus terminally. Epiphallus with a short caecum in distal part. Walls of caecum contain branched cryptae in which spines of spermatophore forming (i.e. this organ is flagellum morphologically but caecum topographically). Penis looped, surrounded by a thin sheath. Internally penis with numerous small tubercles. Penial retrac-

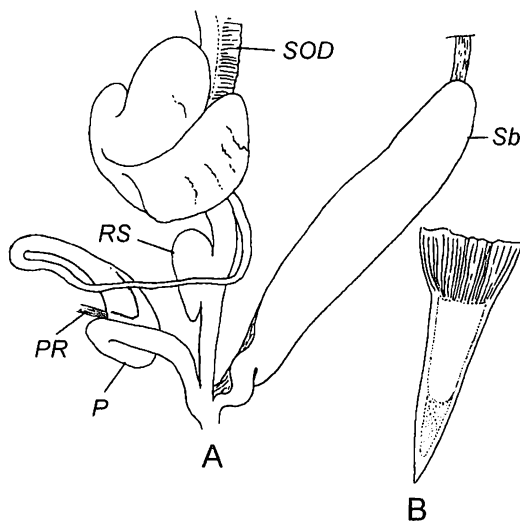


Fig. 1746. *Wiegmannia dubia* (Wiegmann, 1898). A — reproductive tract. B — spine in sarcobelum. After Hoffmann, 1940.

tor inserting on proximal part of penis just below caecum. Sarcobelum long, slender, clavate, with a short muscular papilla capped with calcareous thorn pierced by a narrow canal which opens laterally by narrow slit. Retractor of sarcobelum missing. Spermatheca nearly sedentary, with exceptionally short stalk. All parts of distal genitalia strongly pigmented with black.

DISTRIBUTION. Malaya Peninsula, Sumatra, Java, Lombok, Kalimantan. 18 spp.

***Parmunculus* Collinge, 1899**
Fig. 1748

Collinge in Moellendorff, 1899b: 57 Hoffmann, 1940: 122.

TYPE SPECIES — *Tennentia philippinensis* Semper, 1870; OD.

Semislugs. Shell thin, plate-like, of about 3 whorls. Periostracum dark-amber or corneous, overlapping edges of shell.

Vas deferens short, entering penis apically. Flagellum and epiphallus absent. Penis simple, not long. Free oviduct short, vagina a little longer, somewhat swollen. Sarcobelum long, elongate-clavate, with apical retractor, internally with calcareous spine having corrugated ribs. Spermatheca sessile.

DISTRIBUTION. Philippines (Mindanao Island). 1 sp.

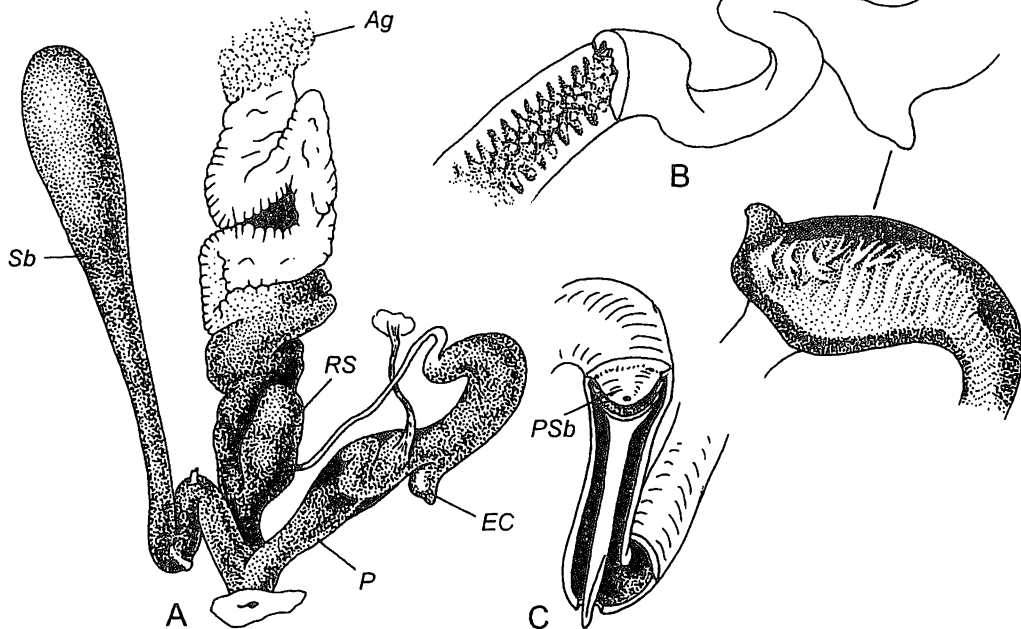


Fig. 1747 ! *Microparmarion strubelli* Simroth, 1893.
 A — reproductive tract. B — interior of penis and caecum. C — interior of sarcobelum.
 Buitenzorg, Java. Moscow No. Lc-25395 (Vienna No. 22.973).

Philippinella Moellendorff, 1899

Fig. 1749

Moellendorff, 1899b: 54 (nom. nov. pro *Tennentia* Moellendorff, 1899, non Humbert, 1862).

— *Tennentia* Moellendorff, 1899a: 21 (for *Tennentia philippinensis* Semper, 1870, *T. carinata* Moellendorff, 1894 and *T. quadrasi* Moellendorff, 1894).

Hoffmann, 1940: 118.

TYPE SPECIES — *Tennentia quadrasi* Moellendorff, 1894; SD Zilch, 1959.

Slugs. Periostracum dark-amber or corneous, overlapping edges of shell.

Vas deferens rather long, entering very short epiphallus terminally. Epiphallus inserts on penis laterally near its middle, leaving large caecum. Penis very short. Penial retractor attached to caecum apically. Free oviduct rather long, with a large ovoid expansion (vaginal appendix). Vagina absent as very short spermathecal stalk enters atrium. Atrium very large, subglobular. Sarcobelum well developed, with apical retractor. Upper portion of sarcobelum solid, externally covered by a loose sheath composed mainly of plain muscle fibers. Distal portion of sarcobelum folded upon itself, contains a small, simple, calcareous thorn,

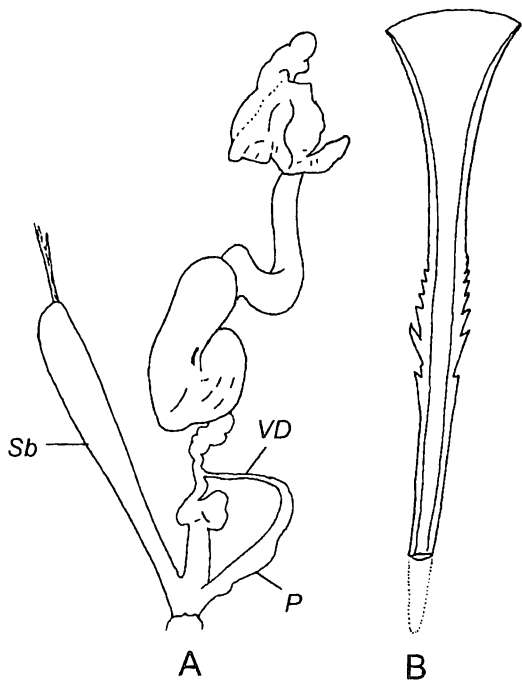


Fig. 1748. *Parmunculus philippinensis* (Semper, 1870).
 A — reproductive tract. B — thorn in sarcobelum. After Semper, 1870.

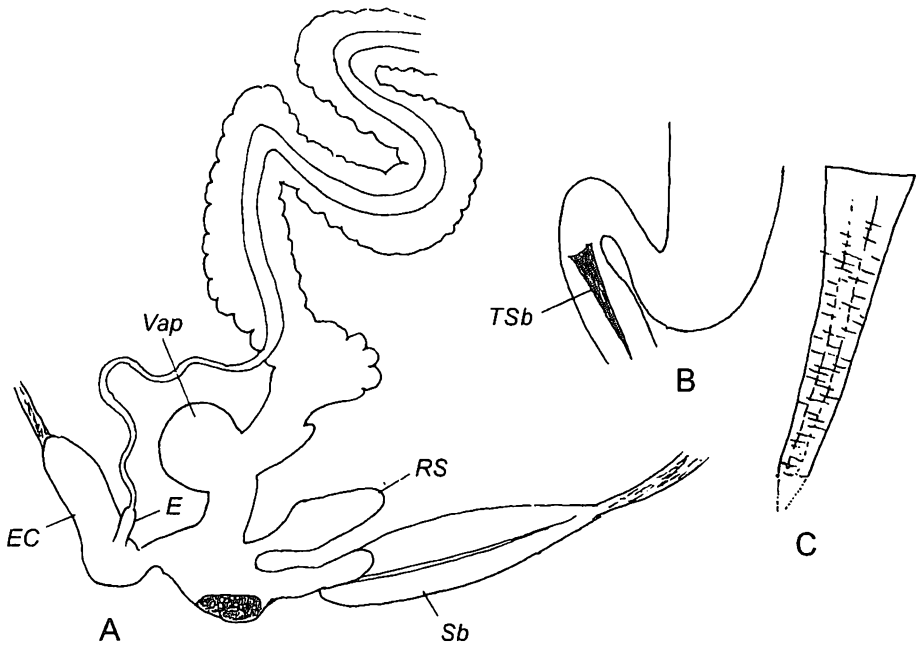


Fig. 1749. ! *Philippinella moellendorffi* Collinge, 1899.

A — reproductive tract. B — lower portion of sarcobelum. C — thorn of sarcobelum. After Collinge in Moellendorff, 1899b. *TSb* — thorn of sarcobelum.

broadening at its base and pointed at apex. Spermatheca sessile, voluminous.

DISTRIBUTION. Philippines (Busuanga, Sibuyan and Mindoro Islands). 3 spp.

Isselentia Collinge, 1901

Fig. 1750

Collinge, 1901a: 305. Hoffmann, 1940: 100.

TYPE SPECIES — *Isselentia plicata* Collinge, 1901 (= *Microparmarion litteratus* Schepman, 1896); SD Zilch, 1959.

Slugs. Shell thin, membranaceous, amber-colored. Mantle anteriorly forms 2 wing-like lobes lying on each side of visceral hump. Back of cephalopodium posteriorly keeled. Length of preserved animal up to 26 mm.

Sole tripartite. Caudal foss small.

Vas deferens enters epiphallus terminally. Flagellum absent. Epiphallus internally with thin cryptae corresponding to spines of spermatophore. Penis of considerable length, its basal portion somewhat swollen, with or without caecum. Free oviduct very short, vagina markedly longer. Spermatheca sessile. Sarcobelum with calcareous thorn having lateral orifice.

DISTRIBUTION. Kalimantan (= Borneo). 3 spp.

? *Cerataconta* Cockerell, 1930

Fig. 1751

Cockerell, 1930: 19 (*Girasia* subg.).

TYPE SPECIES — *Parmarion intermedium* Collinge, 1897; OD.

Semislugs. Shell plate-like, thin, fragile, transparent. Surface lacking regular sculpture. Diam. 8.5-18.5 mm. Length of preserved animal up to 45 mm.

Caudal foss strongly developed.

"The dart gland [sarcobelum — A.Sch.] is an elongated cylindrical structure, with a downwardly curved process at the end, and at the base suddenly reflexed before it joins the long slender pedicel or sac, the whole structure suggesting a large anther on its filament. The dart is pale brown (dark brown when dry), corneous, not at all calcareous, narrow and parallel sided but flattened, pointed apically, very obtusely rounded at base." (Cockerell, 1930: 18-19).

DISTRIBUTION. Thailand, Lombok Island. 2 spp.

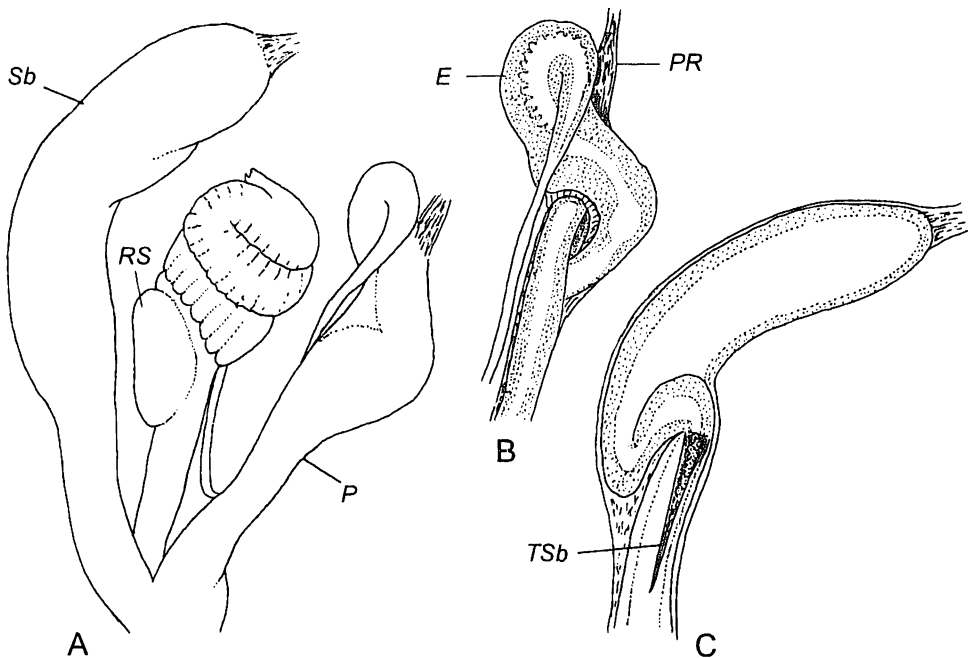


Fig. 1750. *Isselentia litterata* (Schepman, 1896).

A — reproductive tract. B — interior of epiphallus. C — interior of sarcobelum. After Hoffmann, 1940. *TSb* — thorn of sarcobelum.

OSTRACOLETHIDAE Simroth, 1901

Simroth, 1901: 64.

— Myotestidae Collinge, 1902a: 11.

Slugs. Shell plate-like. Visceral hump large, elevated.

Jaw of polyplacognathous type, with broad, slightly protruding ribs.

Ovotestis of 1 clump of small acini. Hermaphroditic duct convoluted. Talon hidden or exposed, ovate. Flagellum missing or vestigial. Epiphallus with 0, 1 or 2 short, uncoiled caeca. Penis internally with a small, conic verge. Penial retractor attached to epiphallus below or above caeca. Sarcobelum absent.

DISTRIBUTION. N Vietnam, N India.

Ostracolethe Simroth, 1901

Fig. 1752

Simroth, 1901: 64.

TYPE SPECIES — *Ostracolethe fruhstorfferi* Simroth, 1901; monotypy.

Slugs. Shell plate-like. Visceral hump situated on middle of animal back.

Collinge (1902a) gives a translation of

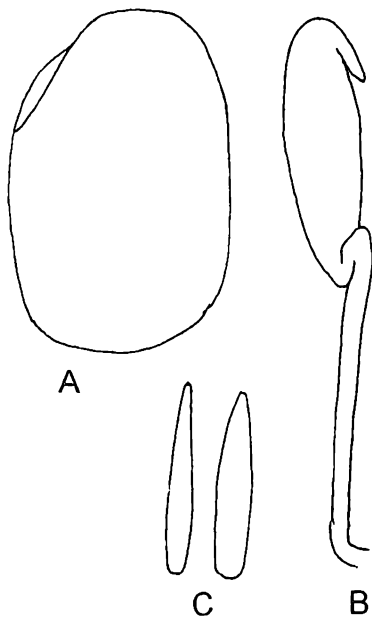


Fig. 1751. A — *Cerataonta intermedia* (Collinge, 1897).

B, C — ! *Cerataonta siamensis* (Cockerell, 1891). A — sarcobelum. B — spine in sarcobelum. After Cockerell, 1930.

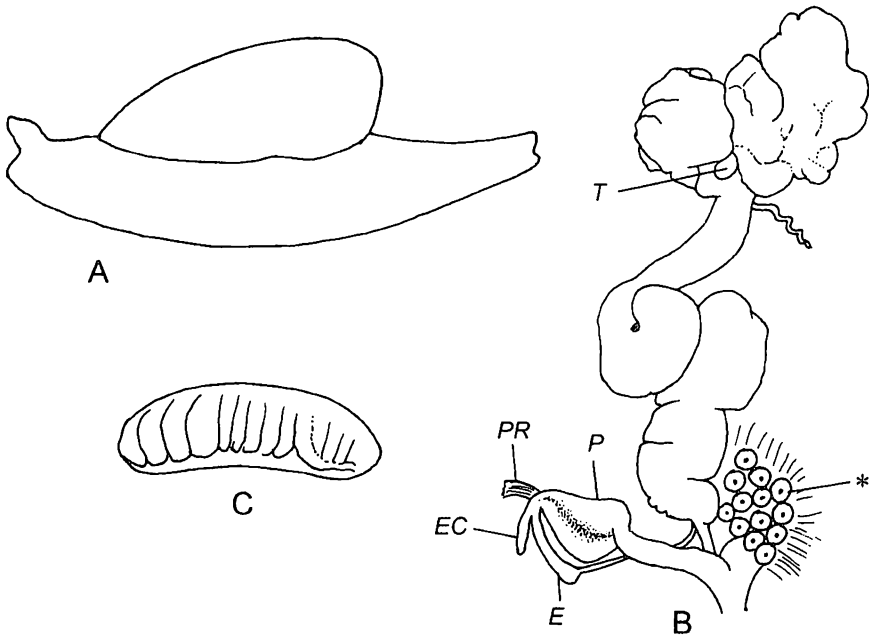


Fig. 1752. *Ostracolethe fruhstorfferi* Simroth, 1901

A — external view of animal. B — reproductive tract. C — jaw. After Simroth, 1904.
 Asterisk — plate-shaped disks.

Simroth's description as follows: "Vas deferens has, before it passes into penis, 3 short, thick flagella; penis resembles that of *Parmarion* group, such as *Microparmarion*, its retractor originates neither on the left, nor by the diaphragm, but further forward, quite close to inner root of right ommatophore. Vas deferens, after running separately for a time near oviduct, enters and is blended with it. This portion, which is attached by muscles to right-wall of body, is I regret not clearly defined in this specimen, although it has been carefully dissected. From point of origin there proceed 2 cords, of which one is normal seminal duct, which can be traced as far as near end of penis, the other turns to thick muscle underneath and penetrates to distal extremity of penis. This muscle seems to contain a fine canal, which may serve for internal impregnation, as the case with many other robber pulmonates, but in a somewhat different fashion. The most remarkable peculiarity lies in fact that, near point of origin, in adhering muscle, there are a number of plate-shaped discs which can best be likened to buttons, which concave on one side. They are arranged on one base. Each disc has a narrow central,

cloven lumen, and arises out of cruciform muscle fibers, of which radiating bundles are enclosed. It is this penis muscle which I wished to bring into connection with attraction and dart-glands of the *Vitrinae*, which species together with others of Atlantic members of this genus, discharge upon themselves from penis, and must necessarily be more or less permeated by seminal fluid. Although it is quite certain that luminae of discs must be connected by a canal, I have as yet unfortunately failed to distinguish any such canal in muscular tissue"

DISTRIBUTION. N Vietnam. 1 sp.

REMARKS. 1). Solem (1966: 66) synonymized *Ostracolethe* with *Myotesta* Collinge. Moreover, he was convinced that *Myotesta fruhstorfferi* Collinge, 1901 and *Ostracolethe fruhstorfferi* Simroth, 1901 "are almost certainly based on the same species" However Solem did not discuss the nature of those enigmatic button-shaped discs on lower portion of female duct. Until proper restudy of *Ostracolethe fruhstorfferi* is made, I prefer to retain this genus as such.

2). In the original description, Simroth (1901) used the spelling of species name as *fruhstorfferi* after the name Fruhstorffer, who

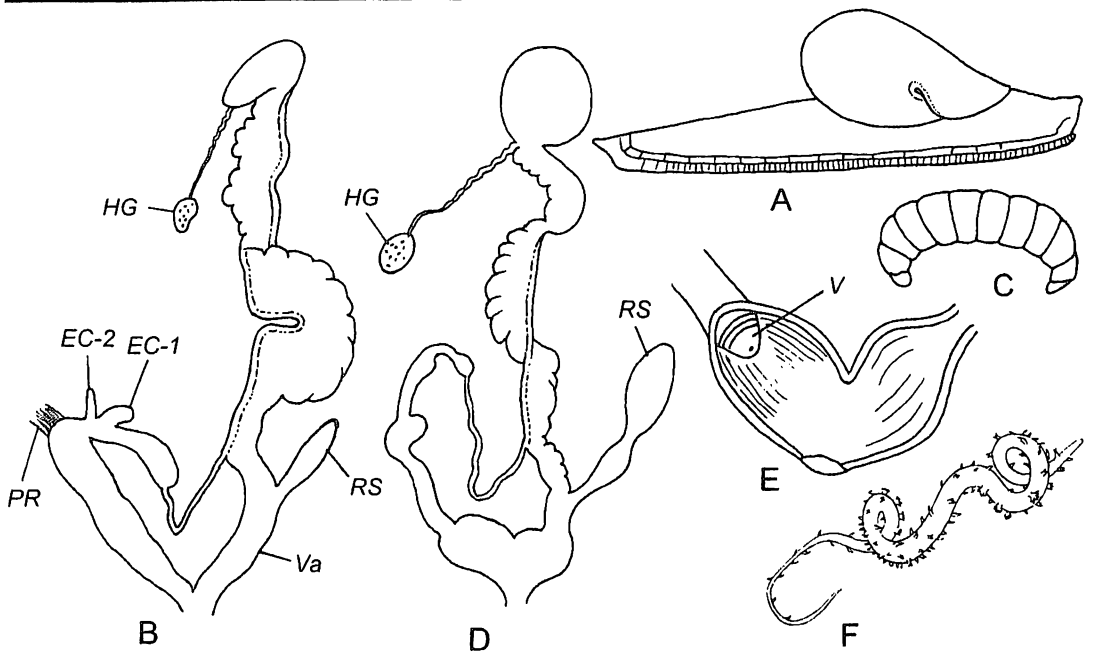


Fig. 1753. A, B, C — *Myotesta fruhstorferi* Collinge, 1901. A — lateral view of animal. B — reproductive tract. C — jaw.
D, E, F — ! *Myotesta punctata* Collinge, 1901. D — reproductive tract. E — interior of penis, atrium and vagina. F — spermatophore. After Collinge, 1902a.

sent the material to Simroth. The same spelling Simroth used in his later article (1902: 356) although the name of the collector he spelled as Fruhstorfer. In the paper of 1904 (Simroth, 1904), he wrote the species name as *fruhstorferi*.

Myotesta Collinge, 1901
Fig. 1753

Collinge, 1901b: 118.

TYPE SPECIES — *Myotesta fruhstorferi* Collinge, 1901; SD Zilch, 1959.

Slugs. Shell completely hidden, flat, somewhat ovoid, non-spiral. Mantle conspicuously elevated into voluminous visceral hump. Foot posteriorly with sharp keel. Respiratory orifice located in front of middle of right margin of mantle. Length of preserved animal up to 39 mm.

M. fruhstorferi: Hermaphroditic duct short, slightly convoluted. Vas deferens comparatively short, entering epiphallus apically. Epiphallus not long, with 1 or 2 caeca; one (smaller) is a simple outgrowth, the other slightly larger, thicker and more muscular. Beyond caeca epiphallus expands

into a club-shaped body and contains a few, irregular shaped, calcareous particles. Penis longer, thick-walled, sometimes swollen basally. Penial retractor arises from right body wall, attached to proximal part of penis. Free oviduct short. Vagina thick-walled, slightly bent, twisted. Spermathecal stalk short to very short.

M. punctata: Hermaphroditic duct and vas deferens longer than in *M. fruhstorferi*. Epiphallus without caeca. Penis distally consists of a wide, sac-like sheath, in which there is a short verge protruding into atrium; proximalward penis narrowed and just before joining epiphallus widens out into a bulbous head. Penial retractor not found. There is a wide atrium into which short vagina opens on the left. Spermatheca much larger than in *M. fruhstorferi*, which lay due to fact that here it was fully distended by its contents, and contained a well-developed spermatophore. Spermatophore consists of a spirally wound tube with numerous, short, variously shaped spines studded over its surface; some of spines simple while others much more complicated.

DISTRIBUTION. N Vietnam. 2 spp.

REMARK. As one can conclude from the

above descriptions, the reproductive tracts of *M. fruhstorferi* and *M. punctata* differ considerably. So, it is quite possible that the mentioned species belong to different (sub)genera. However, I refrain from erecting of a new taxon since I have not seen the material.

***Minyongia* Godwin-Austen, 1916**
Fig. 1754

Godwin-Austen, 1916: 556 [*Minyongai* (sic!) — err. typogr.].

TYPE SPECIES — *Minyongia kemp* Godwin-Austen, 1916; OD.

Slugs. Shell rudimentary, ovate, situated at anterior border of mantle above respiratory orifice. Diam. major 2.8, diam. minor 1.75 mm.

Foot long, narrow, tripartite. Caudal foss minute, with short overhanging horn.

Spermoviduct short. Vas deferens extremely short. Epiphallus long, convoluted. Penis bulbous, short; penial retractor attached to it apically. Sarcobelum wanting. Spermatheca very short, nearly sessile, pear-shaped.

DISTRIBUTION. Assam (India). 1 sp.

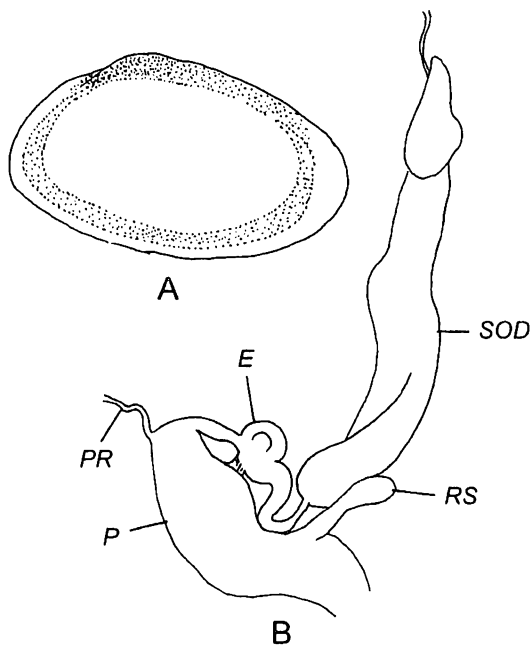


Fig. 1754. *Minyongia kemp* Godwin-Austen, 1916.

A — shell. B — reproductive tract. After Godwin-Austen, 1916.

RYSSOTIDAE Schileyko, fam. nov.

TYPE GENUS — *Ryssota* Albers, 1850.

Shell generally helicoid, somewhat flattened to subglobose, large to very large, moderately thin to quite solid; peripheral keel, when present, not sharp. Embryonic whorls smooth, microgranulated, radially wrinkled or spirally striated. Aperture without barriers except for lip in some species. Umbilicus generally closed or nearly so.

Sole undivided. Caudal foss and horn present or missing.

Flagellum totally absent. Epiphallus variously developed. Flagellum or caecum missing. Penis internally with tubercular relief; verge absent or missing. Penis sheath surrounds penis and (sometimes) distal part of epiphallus. Penial retractor attached to epiphallus. Female division lacking additional organs.

DISTRIBUTION. China, Malaysia, Philippine and Caroline Islands, Indonesia (Kalimantan).

REMARK. Ryssotidae differ from all the rest Helicarionoidea mainly by unusually large shell, undivided sole, and absence of

additional organs of reproductive tract. The family probably is a distant relative of Trochomorphidae.

RYSSOTINAE Schileyko, subfam. nov.

Penis lacking verge.

DISTRIBUTION. China, Malaysia, Philippine and Caroline Islands, Indonesia (Kalimantan).

***Ryssota* Albers, 1850**
Fig. 1755

Albers, 1850: 45, 61.

— *Rhyssota* L. Pfeiffer, 1855: 121 (nom. err. pro *Ryssota* Albers, 1850).

— *Rhyssota* Martens in Albers, 1860: 54 (nom. err. pro *Ryssota* Albers, 1850).

Baker, 1941: 262.

TYPE SPECIES — *Helix ovum* Valenciennes, 1827; SD Martens in Albers, 1860.

Shell depressedly conoid, quite solid, of about 5 moderately convex, slightly shouldered whorls. Last whorl only slightly an-

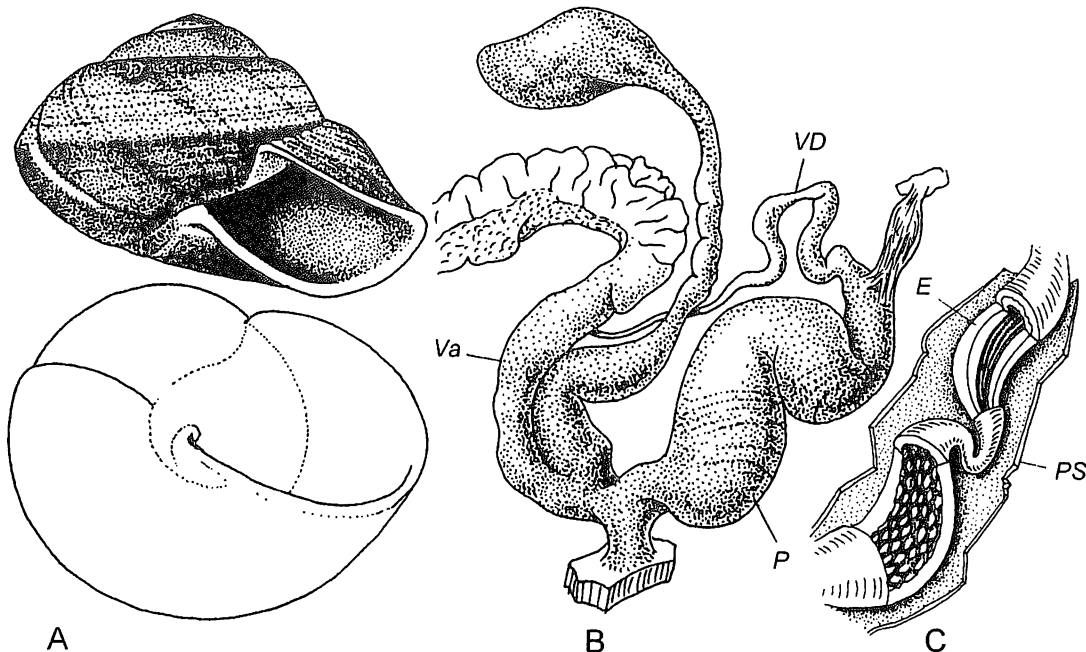


Fig. 1755. *Ryssota otaheitana ovum* (Valenciennes, 1827).

A — shell: Laguna de Bay, Laguna Prov., Luzon Island, Philippines. Moscow No. Lc-12089.

B, C — Magdivang, Sibuyan Island, Philippines, May 27, 1989. B — reproductive tract.

C — interior of penis. Chicago No. 201977

gled at periphery, straight or scarcely descending in front. Color ochraceous-yellow or light corneous; below peripheral angle usually darker. Embryonic whorls vaguely microgranulated, later whorls with smoothed irregular radial wrinkles and spiral engraved sculpture: at first spiral lines distinct and broadly spaced, toward aperture they become thinner and denser. Aperture irregularly ovate, well oblique, with thickened, slightly reflexed margins. Umbilicus closed. Height 23-90, diam. 40-120 mm (54.2 × 76.8 mm).

Caudal foss large, with overhanging horn.

Vas deferens rather short, entering epiphallus apically without definite boundary. Epiphallus large, swollen at anterior end, with very heavy wall, internally with longitudinal folds; marked off from penis by a strong constriction. Penis somewhat swollen, internally with rather regular relief of rhomboid tubercles. Penial sheath heavy, muscular, attached at both ends, embraces upper portion of penis and lower part of epiphallus. Penial retractor inserting around epiphallus and on penis sheath. Free oviduct quite long, without evident perivaginal

gland. Vagina exceptionally short. Spermathecal shaft rather long, somewhat expanded basally; reservoir voluminous. Spermatophore with attenuated apical end, smooth ampula and a tail which markedly flattened and armed along edge with 1 row of large recurved hooks, that are quite simple near ampula but develop thin triangular wings farther back.

DISTRIBUTION. Philippines. About 15 spp. & subsp.

Pararyssota Bartsch, 1938 Fig. 1756

Bartsch, 1938: 102 (*Ryssota* subg.).

TYPE SPECIES — *Helix maxima* L. Pfeiffer, 1853; OD.

Shell depressedly conic, very solid and ponderous, of 6-6.5 more or less convex whorls. Last whorl not descending, bluntly angled. Coloration consists of brownish or fulvous background and many darker and lighter bands. Embryonic whorls with indistinct granulation and fine irregular radial wrinkles. Postapical sculpture of weak irregular wrinkles and very fine spiral striae.

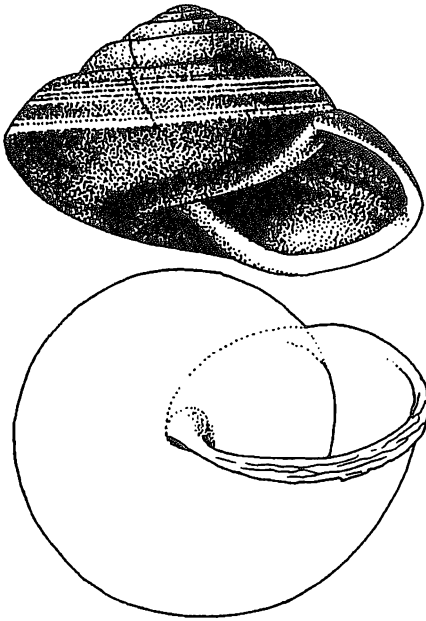


Fig. 1756. *Pararyssota maxima* (L. Pfeiffer, 1853).
Upper part of Aghusan River valley, Mindanao Island, Philippines. Moscow No. Lc-12079.

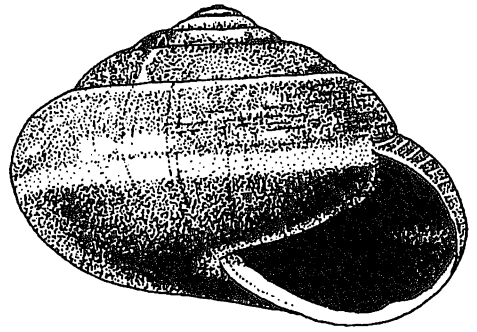


Fig. 1757 *Atrichoconcha luteofasciata* (Lea, 1841).
Camarines, Luzon [Philippines]. Paris.

Aperture ovate, quite oblique, margins thickened, not reflexed. Umbilicus closed or slit-like. Height 45-60, diam. 65-96 mm (54.6 × 79.4 mm).

DISTRIBUTION. Philippines. 3 spp. with many forms.

Atrichoconcha Bartsch, 1942
Fig. 1757

Bartsch, 1942: 28, 38 (*Hemitrichia* subg.).

TYPE SPECIES — *Helix luteofasciata* Lea, 1841; OD.

Shell low-conic, moderately solid to comparatively thin, somewhat shining, of about 6 rather convex whorls. Last whorl not descending, evenly rounded at periphery. Color chestnut, often with ivory peripheral band; sometimes there is another (diffuse) band occupying subsutural position; umbilicus may be encircled by a light zone. Embryonic whorls smooth, sculpture of upper surface down to peripheral band of rather coarse radial wrinkles and quite regular, well spaced spiral lines; below — microscopic spiral striation. Aperture broadly lunate, slightly oblique, with sim-

ple, sharp margins. Umbilicus very narrow. Height 14-26, diam. 23.0-36.5 mm (20.4 × 29.0 mm).

DISTRIBUTION. Philippines. 20 spp. & subsp.

Exrhysota Baker, 1941
Fig. 1758

Baker, 1941: 321 (? *Bertia* subg.).

TYPE SPECIES — *Helix brookei* Adams et Reeve, 1848; OD.

Shell sinistral, depressed-conic, solid, glossy, of 4.5-5 slightly convex whorls. Last whorl with distinct peripheral angle. Color chestnut-brown, peripheral angle paler. Embryonic whorls smooth. Early postapical whorls finely granulated, then (locally) delicately spirally striated; last whorl nearly smooth. Aperture rhombic, well oblique, with more or less thickened, not reflexed margins. Umbilicus closed or nearly so. Height 45-50, diam. 70-80 mm (48.2 × 75.0 mm).

Talon not visible. Vas deferens moderately long, enters penis apically through a simple pore. Penis subcylindrical, coated by

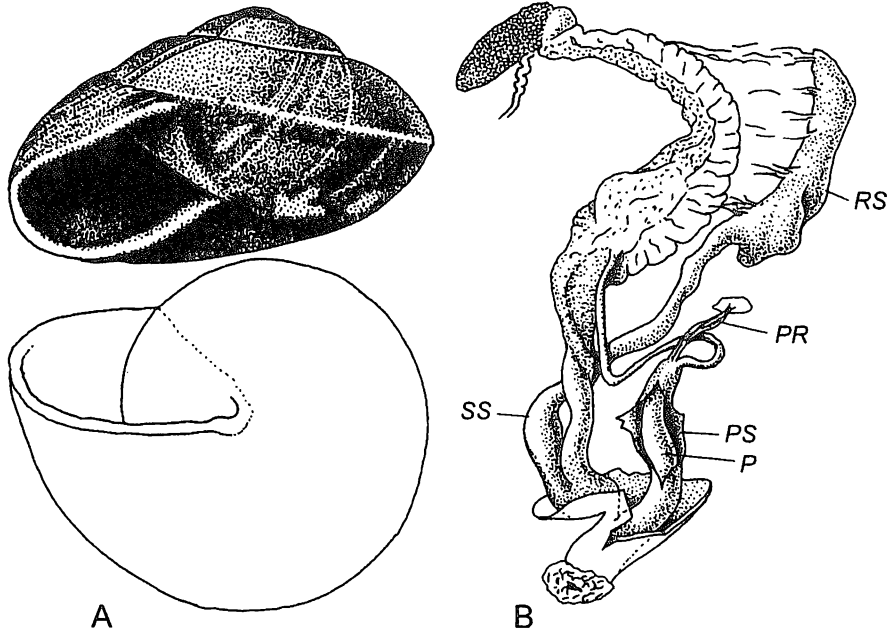


Fig. 1758. *Exrhysota brookei* (Adams et Reeve, 1848).

A — shell: Rivier Mandai, Borneo. B — reproductive tract. Long Rapun, Sarawak, Malaysia, February 22, 1987 Leiden.

a thin sheath, internally with sinuous pilasters broken into series of tubercles by transverse grooves. Free oviduct long, internally with high, lamellar, axial plicae. Vagina very short. Spermathecal stalk long, reservoir voluminous, almost attending albumen gland.

DISTRIBUTION. Malaysia, Kalimantan (= Borneo). 1 sp.

Hemitrichiella Zilch, 1956

Fig. 1759

Zilch, 1956: 85 (nom. nov. pro *Hemitrichia* Moellendorff, 1888).

— *Hemitrichia* Moellendorff, 1888: 81 (nom. praecoc., non Rostafinski, 1873; *Nanina* subg.; t.-sp. *Helix xanthotricha* L. Pfeiffer, 1842; OD).

TYPE SPECIES — *Helix xanthotricha* L. Pfeiffer, 1842; OD.

Shell depressedly semiglobose, thin, fragile, of 5-6 slightly convex whorls. Last whorl not descending, evenly rounded at periphery. Color yellowish to light-brown, unicolor or with narrow supraperipheral darker band. Embryonic whorls smooth, polished.

Postnuclear sculpture represented by distinct regular granulation arising due to crossing of radial and spiral lines. Each granule bears short, curved, golden hair which easily lost and in fully mature shells often remain mainly near suture. This sculpture located only on upper surface above periphery; below periphery surface shining, with very fine spiral striae. Aperture broadly lunate, peristome insertions widely remote, margins simple or slightly reflexed. Umbilicus rim-like or closed by reflection of columellar margin. Height 12-16, diam. 20-33 mm (12.7 × 22.0 mm).

Vas deferens thin, entering epiphallus apically through simple pore. Epiphallus short, not distinctly demarcated from penis both externally and internally. Internally epiphallus with high, slender papillae; in penis these papillae transformed into rhomboid tubercles. Penis sheath surrounds most of penis. Penial retractor arising on diaphragm, inserting on upper edge of sheath. Free oviduct rather long, stout. Vagina absent. Greatly swollen basally spermathecal stalk enters atrium between free oviduct

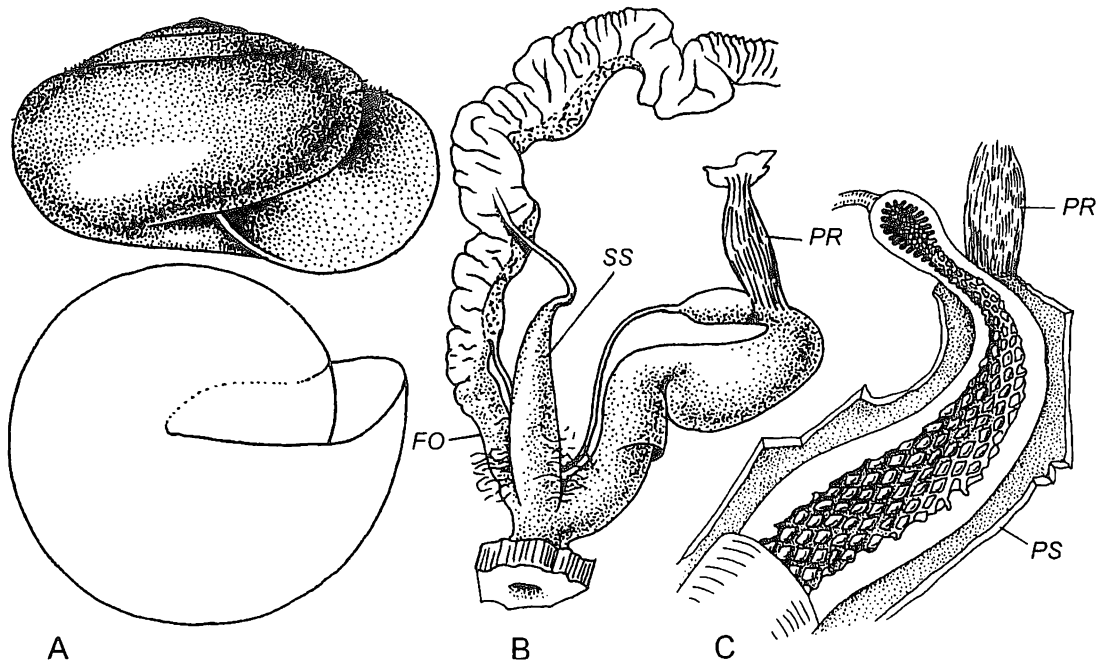


Fig. 1759. A — ! *Hemitrichiella velutinella* (Bartsch, 1942). Shell: Luzon Island, Philippines. Moscow No. Lc-12046.

B, C — ! *Hemitrichiella boettgeri* (Moellendorff, 1888). Environs of Magdiwang, Sibuyan Island, Philippines, May 19, 1989. B — reproductive tract. C — interior of penis. Chicago No. 201971.

and penis; upper portion of stalk slender, reservoir not located.

DISTRIBUTION. Philippines. 33 spp. & subspp.

Lepidotrichia Bartsch, 1942

Fig. 1760

Bartsch, 1942: 28, 38 (*Hemitrichia* subg.).

TYPE SPECIES — *Hemitrichia purpurascens* Moellendorff, 1890; OD.

Shell depressedly semiglobose, thin, of 4-4.5 moderately convex whorls; spire flattened, dome-shaped. Last whorl not descending, with 2 smoothed, blunt angles: above and below somewhat compressed periphery. Color reddish, chestnut or brownish-corneous. Embryonic whorls smooth. On upper surface (above upper angle) there are short, golden hairs arranged in spiral rows; each hair sits on its own tubercle; periphery (between angles) smooth, shining; surface below lower angle smooth, polished, with microscopical spiral

striae. Umbilicus absent. Height 12.5-14.0, diam. 21-25 mm (12.8 × 21.0 mm).

DISTRIBUTION. Philippines. 1 or 2 spp.

Trichobensonia Moellendorff, 1902

Fig. 1761

Moellendorff, 1902: 223 (*Bensonia* subg.).

— *Trochobensonia* Moellendorff, 1902: 267 [in Register (nom. err. pro *Trichobensonia*)].

TYPE SPECIES — *Plectotropis luzonica* Moellendorff, 1894; OD.

Shell lenticular, thin, translucent, of about 5 flattened whorls. Last whorl not descending, with sharp peripheral angle or keel. Color yellowish. Embryonic whorl with distinct spiral threads; later whorls with crowded, irregular, radial wrinkles having thin periostracal fringes; angle on last 3 whorls decorated with long cilia-like hairs. Aperture ovately angled, slightly oblique, with simple, sharp margins. Umbilicus narrowly open but quite perspective. Height 7.4-8.0, diam. 15-18 mm (7.4 × 15.0 mm).

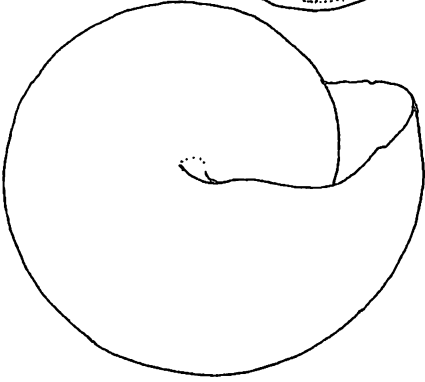
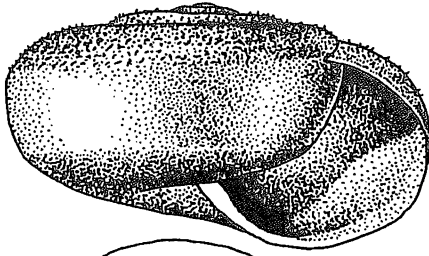


Fig. 1760. *Lepidotrichia purpurascens* (Moellendorff, 1890).
Manuquid, Sarsogon, Luzon. Chicago No. 125742 [as *L. brachytrichia* (Moellendorff, 1890)].

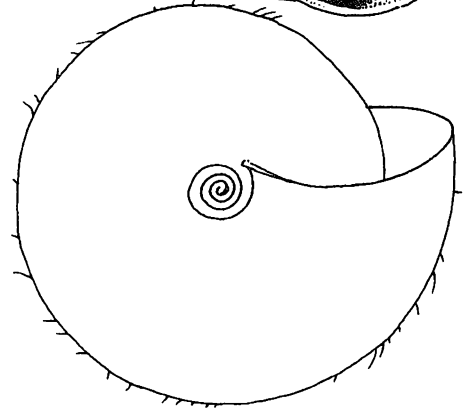
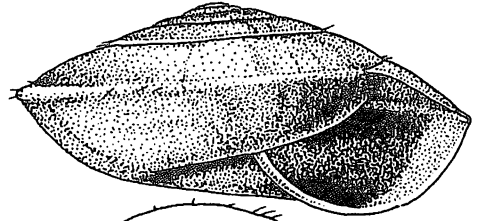


Fig. 1761. *Trichobensonia luzonica* (Moellendorff, 1894).
Mt. Angilog, Luzon Island. Lectotype. Senck. No. 157881.

DISTRIBUTION. Luzon Island (Philippines). 5-6 spp.

Glyptobensonia Moellendorff, 1894

Fig. 1762

Moellendorff in Quadras & Moellendorff, 1894: 93 (*Bensonia* subg.).

TYPE SPECIES — *Bensonia* (*Glyptobensonia*) *exasperata* Moellendorff, 1894; SD Zilch, 1959.

Shell depressedly conic, thin, translucent, of 5-7 quite convex whorls, last whorl slightly descending in front, with cord-like peripheral keel. Color light-corneous to straw. Apical sculpture of a few coarse spiral threads, postembryonic whorls with crowded, fine but sharp radial riblets crossed by well spaced spiral cords; peripheral cord (keel) is largest. Aperture widely lunate, moderately oblique, with simple margins. Umbilicus narrowly open but perspective. Height 3-13, diam. 7.5-25.0 mm (12.7 × 22.8 mm).

DISTRIBUTION. Philippines. 2 spp.

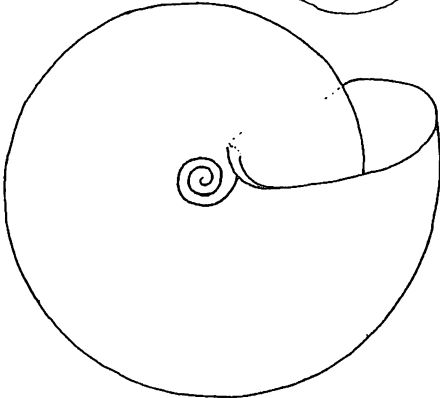
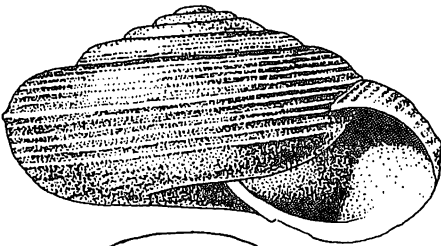


Fig. 1762. *Glyptobensonia exasperata* (Moellendorff, 1894).
Mt. Angilog, Luzon Island. Lectotype. Senck. No. 157879.

Hemiglypta Moellendorff, 1893

Fig. 1763

Moellendorff, 1893: 1.

TYPE SPECIES — *Helix blainvilleana* Lea, 1841; OD.

Shell depressedly conic, moderately solid, dull, with rounded apex and conic outlines of spire, of 6 whorls. Upper whorls only slightly convex, penultimate strongly convex, last whorl more or less shouldered, not descending, angled at periphery. Color yellowish-corneous, periphery lighter, below it rather narrow brown band may be present. Embryonic whorls finely radially wrinkled, upper surface of postnuclear whorls covered with clear granulate sculpture due to crossing of radial and spiral deeply engraved lines. Basal surface (below peripheral angle) smooth, glossy, sometimes with microscopic spiral striae. Aperture broadly lunate, with slightly thickened margins. Columellar margin reflexed. Umbilicus minutely open, semicovered. Height 19.5-26.0, diam. 33-38 mm (25.8 × 38.0 mm).

DISTRIBUTION. Philippines, China. At least 10 spp.

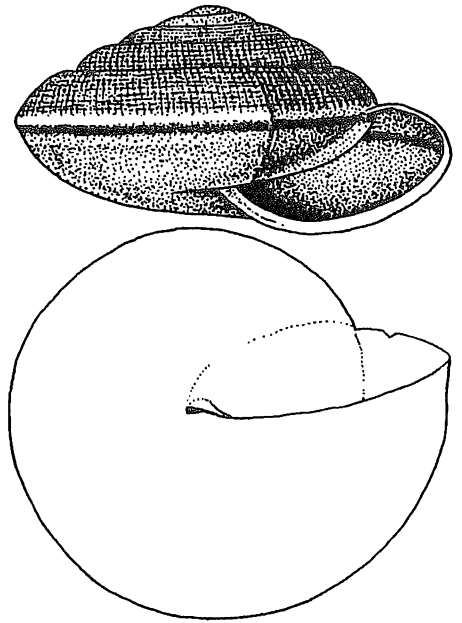


Fig. 1763. *Hemiglypta blainvilleana* (Lea, 1841).
Lubang Island, Philippines. SPb.

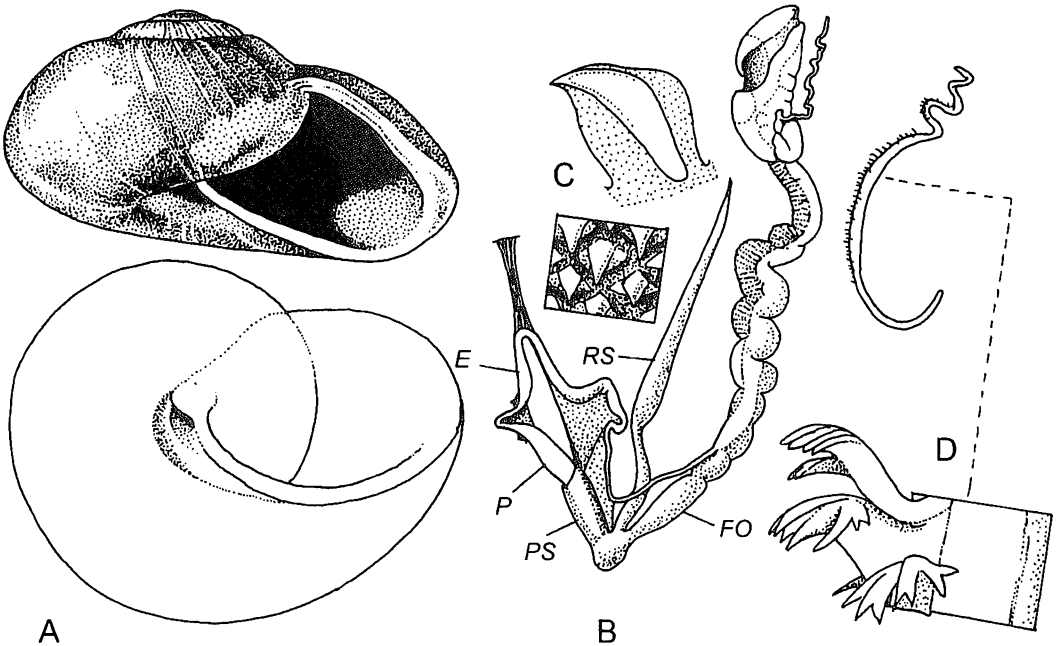


Fig. 1764. *Trukrhysa pachystoma* (Hombron et Jacquinot, 1841).

A — shell: Tru Ku, Toi Islet, Truk, Caroline Is. Phil. No. 178339. B — reproductive tract.
C — papilla in penis enlarged. D — spermatophore and its fragment. After Baker, 1941.

Trukrhysa Baker, 1941
Fig. 1764

Baker, 1941 259 (*Ryssota* sect.).

TYPE SPECIES — *Helix pachystoma* Hombron et Jacquinot, 1841; OD.

Shell depressed, low conic to turbinate, solid, of 5-5.5 slightly convex whorls. Last whorl enlarged, scarcely and gradually descending toward aperture, with widely rounded angle at periphery. Color yellow or ochraceous, with irregular diffuse brownish radial streaks; sometimes there is chestnut supra-peripheral band. Embryonic whorls smooth, postnuclear whorls with 2 sorts of spiral striation: deeper, well spaced, distinct engraved lines, and shallower, dense, very delicate striae. On basal surface sculpture weaker. Aperture ovate, strongly oblique, with thickened, slightly reflexed margins. Umbilicus narrow, encircled by rounded callus. Height 19.6-35.7, diam. 34.7-55.0 mm (26.7 × 45.0 mm).

Talon short, weakly bipartite; carrefour small. Vas deferens enlarging rather abruptly into epiphallus. Epiphallus long fusiform, attenuate at both ends, with very glandular walls, which marked off from penis only by gradual constriction. Penial sheath covering about 0.4 of penis, very thick basally but becoming thin at apical end and connecting broadly with epiphallus. Penis fusiform, with apical end attenuate and sharply recurved inside heavy muscular investment; internally lined by closely packed papillae, each of which has roughly diamond-shaped end and contains corneous thorn with its tip projecting and pointing anteriorly. Penial retractor arising from diaphragm and inserting between basal and middle thirds of epiphallus, but continued by fibers to penis sheath. Free oviduct with thin-walled glandular zone more brownish and sharply demarcated apically. Vagina very short (almost absent). Spermathecal stalk short, with swollen base, reservoir long, spindle-shaped. Spermatophore with numerous branched spines.

DISTRIBUTION. Carolines (Truk Island). 3 spp.

LAMARCKIELLINAE
Schileyko, subfam. nov.

TYPE GENUS — *Lamarckiella* Moellendorff, 1898.

Penis contains a large verge of complex structure.

DISTRIBUTION. Philippines, Kalimantan (= Borneo).

Lamarckiella Moellendorff, 1898
Fig. 1765

Moellendorff, 1898: 66 (*Rhysota* sect.).

TYPE SPECIES — *Helix lamarckiana* Lea, 1841; OD.

Shell more or less lentiform, rather thin to solid, of about 5 flattened to moderately convex whorls. Last whorl not descending, with distinct angle at periphery. Color light-corneous to dark-brown, often with small light speckles and brown to chestnut diffuse band below peripheral angle. Embryonic whorls with 3 types of sculpture: delicate malleation, fine radial grooves, and thin spiral threads. Later whorls with coarse sculpture of irregular radial wrinkles and thinner crowded spiral lines; last whorl sometimes with elements of malleation. Aperture ovate, very oblique, margins thickened, non-reflexed. Umbilicus closed or slit-like. Height 13-36, diam. 26-67 mm (35.2 × 64.0 mm).

Vas deferens rather short, gradually passes into thick-walled epiphallus that forms S-shaped loop within penis sheath which surrounds epiphallus only. Internally epiphallus with strong axial folds. Penis expanded, containing a large verge that has 2 types of sculpture: one side of verge occupied by regular longitudinal folds, the other side with ovate, smoothed tubercles. Inner surface of penis with a few branched axial plicae. Penial retractor attached to middle portion of epiphallus; another (additional) retractor inserted at base of vas deferens. Free oviduct rather short, stout; vagina almost absent. Spermathecal stalk moderately thin, tapering. Reservoir not attending albumen gland.

DISTRIBUTION. Philippines, Kalimantan (= Borneo). 12-14 spp. & forms.

MILACIDAE Ellis, 1926

Ellis, 1926: 252 (Opinions & decl. rendered by the ICZN, vol. 10, part 20, 1955: 484).

Wiktor, 1987: 183.

Shell plate-like, more or less ovate in outline, symmetrical (nucleus lies on longi-

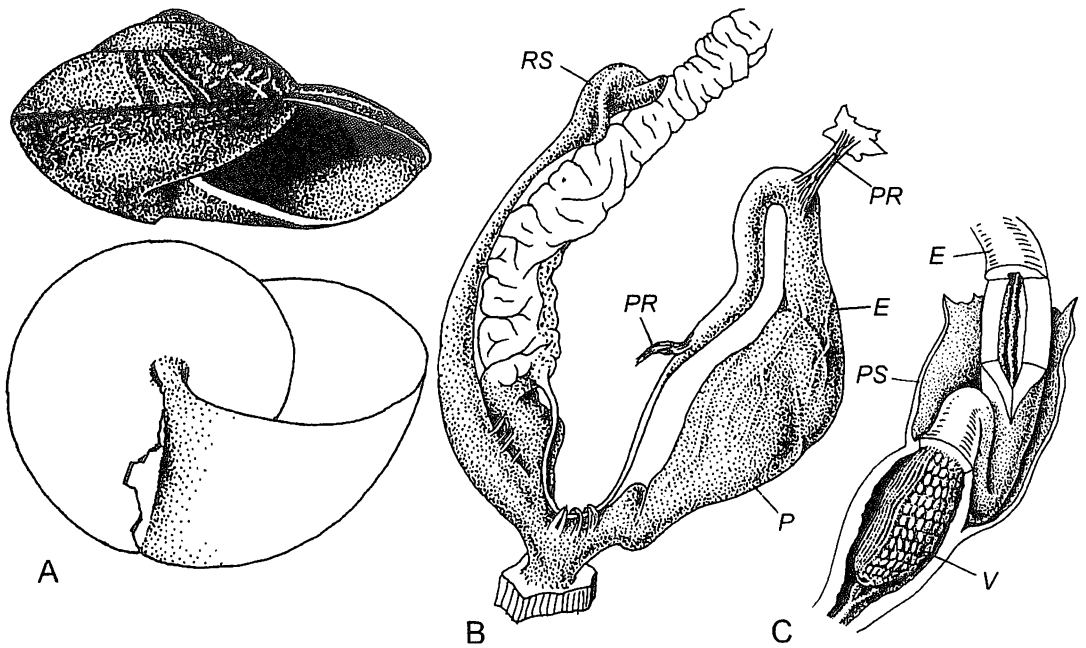


Fig. 1765. *Lamarckiella lamarckiana sibuyanensis* Bartsch, 1939.
Mt. Guitin-guitin, Sibuyan Island, Philippines, May 8, 1989. A — shell. B — reproductive tract. C — interior of penis. Chicago No. 201967

tudinal axis of shell, at some distance from its posterior margin). Boundary between nucleus and spathula scarcely expressed.

Slugs of medium or big size, with a well developed keel and rather small mantle (no more than 1/3 of body length) situated on anterior part of body. Surface of mantle with delicate granulation, without concentric lines; horseshoe-like groove usually present. Cephalic shield comparatively small.

Genital orifice situated at midway between pneumostome and base of right ommatophore.

Sole tripartite, rather broad, with transversal V-shaped grooves.

Digestive system of two-looped type, usually much twisted. Right lobe of hepatopancreas forms summit of visceral sac. Columellar muscle attached at posterior margin of mantle complex.

Heart lies in left anterior quarter of mantle complex; its axis inclined to the right at 45°. Aorta very long. Lung venation lies in front of kidney.

Right ocular retractor free from penioviducal angle.

Ovotestis compact. Hermaphroditic duct strongly convoluted in distal section. Vas deferens enters well developed epiphallus

more or less apically. Inner surface of epiphallus with complex cryptae in which spines of spermatophore form. Penis of various shape, lacking external appendages, internally with a verge. Vagina contains a crown of strong triangle folds which sometimes form a vaginal papilla; this papilla may be protruded to atrium. There are conspicuous atrial gland(s). Atrium internally with folds and wrinkles (*Tandonia*) or stimulator (*Milax*). Spermathecal duct short. Spermatophore complex, with branched spines.

DISTRIBUTION. Predominantly SW Palearctic, especially Balkan Peninsula. A few species in British Islands, W and Central Europe.

Milax Gray, 1855

Gray, 1855 (May): 174.

Amalia Moquin-Tandon, 1855 (Sept.): 19 (t.-sp. *Limax gagates* Draparnaud, 1801; SD Wiktor, 1981).

Lallemantia Mabilie, 1868: 143 [t.-sp. *Limax polyptyelus* Bourguignat, 1859 (= *Limax gagates* Draparnaud, 1801); monotypy].

—? *Palizzolia* Bourguignat, 1877: 15 (t.-sp. *Palizzolia Monterosati* Bourguignat, 1877; monotypy).

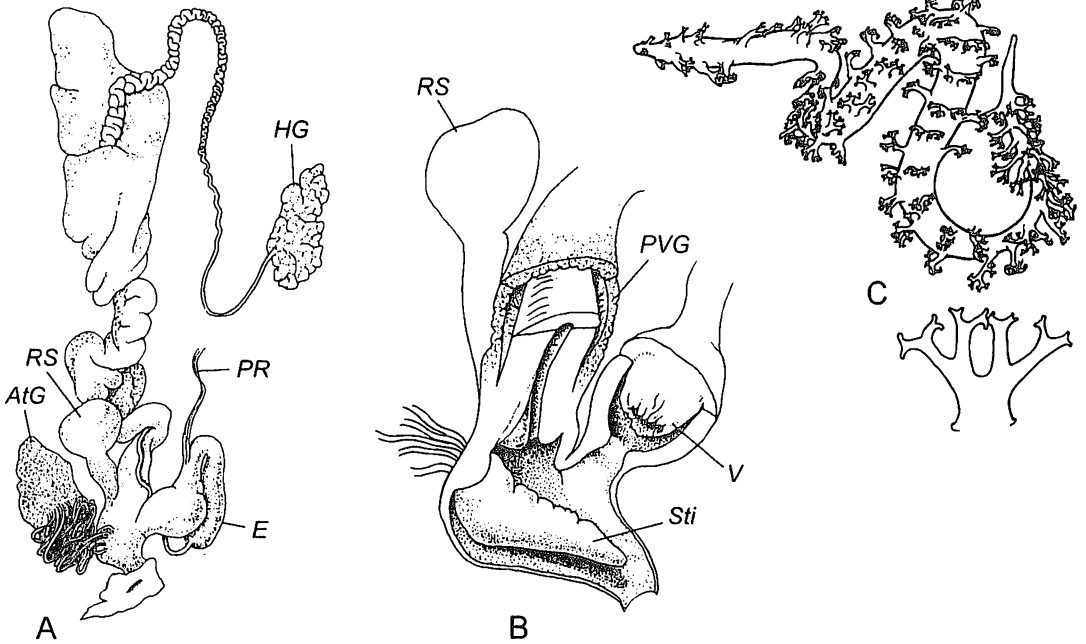


Fig. 1766. *Milax (Milax) gagates* (Draparnaud, 1801). Khroumirie near Algeria-Tunisia border. 1907 A — reproductive tract. B — interior of distal section of genitalia. Moscow No. Lc-25439 (Paris). C — spermatophore and separate enlarged spine. After Wiktor, 1987

— ? *Sansania* Bourguignat, 1881: 11 (t.-sp. *Limax Larteti* Dupuy, 1870; monotypy).

— *Pirinea* Lessona et Pollonera, 1882: 57 (t.-sp. "*Amalia gagates* Draparnaud, 1801"; OD).

Wiktor, 1981: 149; 1987: 184.

TYPE SPECIES — *Limax gagates* Draparnaud, 1801; SD Hesse, 1926.

Body comparatively stocky, gradually narrowed backwards; keel occupies all length of back. Body length up to 70 mm when crawling.

Heart auricle covered by kidney from above and below.

Atrium inflated, containing a conic or tongue-like, straight or spirally coiled stimulator [exception: in *Milax (Micromilax) verrucosus* Wiktor, 1969 stimulator absent]; inner surface of atrium without regular relief. Single atrial gland enters atrium at base of stimulator by 1 to 12 ducts.

DISTRIBUTION. British Islands, Mediterranean countries, S Caucasus.

Milax (Milax s. str.)

Fig. 1766

Epiphallus rather long. Penis swollen, subglobular, thick-walled, internally with a

large, wide verge which has broad inner canal. Free oviduct with muscular walls, surrounded by a sheath which looks like glandular (? perivaginal gland). Atrial appendix variously developed, lacking its own retractor. Atrial gland compact, entering atrium by several (up to 12) not long, thin ducts.

DISTRIBUTION. British Islands, Mediterranean countries, Caucasus. 5-6 spp.

Milax (Micromilax Hesse, 1926)

Fig. 1767

Hesse, 1926: 33 (nom. nov. pro *Cypria* Simroth, 1910).

— *Cypria* Simroth, 1910: 158 [nom. praeocc., non Zenker, 1854 (Ostracoda)]; t.-sp. *Amalia cypria* Simroth, 1906; monotypy].

TYPE SPECIES — *Cypria cyprius* Simroth, 1910; monotypy.

Epiphallus short. Penis not long, internally with small, swollen verge. Free oviduct lacking glandular area. Atrial appendix subglobular, with its own retractor. Atrial gland folded, entering atrium by a single, enormously long duct. Atrium internally with a

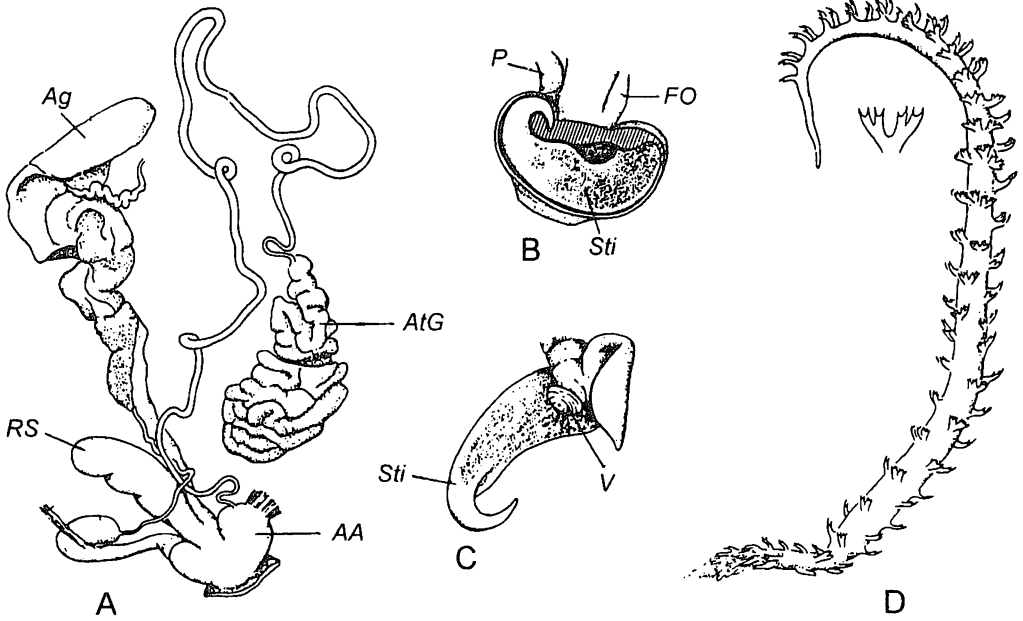


Fig. 1767 *Milax (Micromilax) cyprius* Simroth, 1910.

A — reproductive tract. B — interior of atrium. C — atrial stimulator and penial verge everted. D — spermatophore and separate spine from middle part of spermatophore. After Rähle, 1991

large, conic, sometimes spirally coiled stimulator.

DISTRIBUTION. Cyprus, Palestine. 2 spp.

Tandonia Lessona et Pollonera, 1882
Fig. 1768

Lessona & Pollonera, 1882: 54.

- *Subamalia* Pollonera, 1887: 5 (t.-sp. *Amalia robici* Simroth, 1885: 339; SD Hesse, 1926).
- *Macrothylacus* H. Wagner, 1930: 45 [*Milax* subg.; t.-sp. *Milax (Macrothylacus) jablanacensis* H. Wagner, 1930; OD].
- *Promilax* H. Wagner, 1930: 50 [*Milax (Milax)* sect.; t.-sp. "*Milax baldensis* (Simroth, 1910)"; SD Wiktor, 1981].

Wiktor, 1987: 220.

TYPE SPECIES — *Limax marginatus* Draparnaud, 1801 (non Müller, 1774) = *Limax rusticus* Millet, 1843; SD Hesse, 1926.

Body comparatively slender; keel occupies all length of back or restricted by its posterior part.

Heart auricle not covered by kidney.

Atrium not inflated, lacking stimulator, internally with variously developed folds. Atrial glands (2 or more in number) composed by rather small acini or tubules, more

or less shifted to vagina. These glands either surround vagina circumferentially and enter vagina near its boundary with atrium, or form 1-2 tangles or clusters, entering vagina by few short ducts.

DISTRIBUTION. S Alps, Balkan Peninsula, W and Central Europe, Crimea, Asia Minor, N Africa. About 36 spp.

DYAKIOIDEA

Gude et Woodward, 1921

Gude & Woodward, 1921: 185 (pro fam.). Laidlaw, 1931: 190 (Zonitidae subf.).

Shell helicoid or zonitoid, depressed to low turbinat, dextral, rarely sinistral, thin to solid, with toothless aperture.

Sole uniform. Caudal foss present; caudal horn present or missing.

Jaw oxygnathous.

Flagellum present or absent. Epiphallus present. Penis simple, sometimes rudimentary, internally with pilaster or tubercles. Penial gland absent. Penial caecum devel-

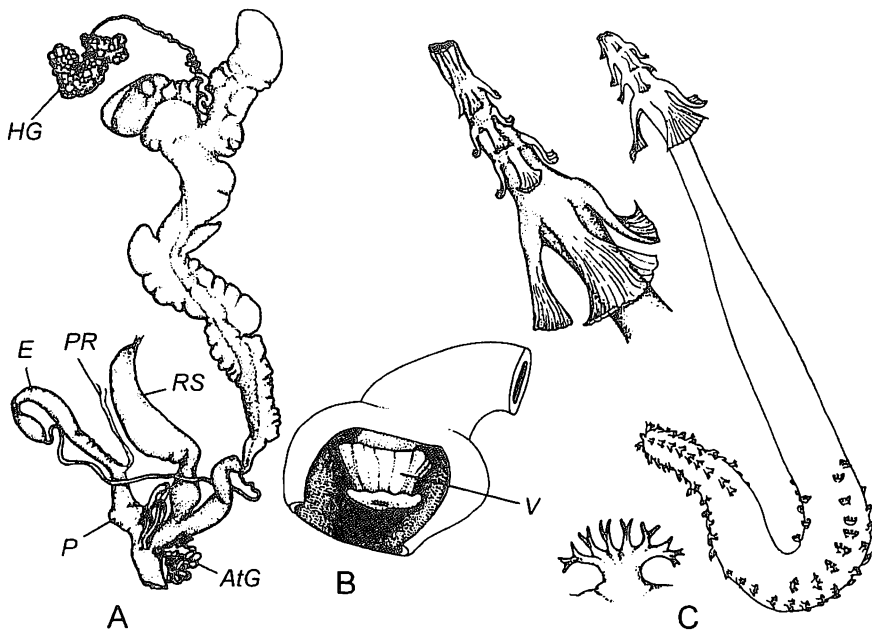


Fig. 1768. A, B — *Tandonia rustica* (Millet, 1843). A — reproductive tract. After Wiktor, 1989. B — interior of penis. After Likharev & Wiktor, 1980. C — ! *Tandonia sowerbyi* (Férussac, 1823). Spermatophore. After Wiktor, 1987

oped or missing. Penis sheath present or absent. Sarcobelum vaginal, with apical glands, internally with conchyolinous or calcareous dart (thorn). Vagina simple, without appendages or internal papilla. Perivaginal gland not present. Atrium lacks appendages. Spermatophores missing.

Herbivorous.

DISTRIBUTION. SE Asia, Japan, Philippines, Indonesia, Molukkas.

DYAKIIDAE

Gude et Woodward, 1921

Mantle without shell lobes.

Jaw with a more or less developed median projection.

Sarcobelum with a mucus gland consisting of several lobes, entering sarcobelum by 2 or more ducts; sometimes ducts fused immediately before inserting. In Pseudoplectinae sarcobelum reduced, lacks gland.

DISTRIBUTION. SE Asia, Japan, Philippines, Indonesia, Molukkas; 1 sp. introduced to Fiji.

DYAKIINAE

Gude et Woodward, 1921

Jaw with well developed median projection.

Sarcobelum well developed, with mucus glands.

DISTRIBUTION. SE Asia, Japan, Philippines, Indonesia, Molukkas.

Vitrinulini Schileyko, trib. nov.

TYPE GENUS — *Vitrinula* Gray, 1857

Penis with flagellum and small caecum.

DISTRIBUTION. Japan, Philippines, Indonesia (Sulawesi).

Vitrinula Gray, 1857

Fig. 1769

Gray in Carpenter, 1857 (1855-1857): 237 (nom. nov. pro *Vitrinella* J. Gray, 1855).

— *Vitrinella* J. Gray, 1855: 52, 65 [nom. praeocc., non C. Adams, 1850 (Trochidae); for *Helix flammulata* Quoy et Gaimard, 1832 and *Helix viridis* Quoy et Gaimard, 1832].

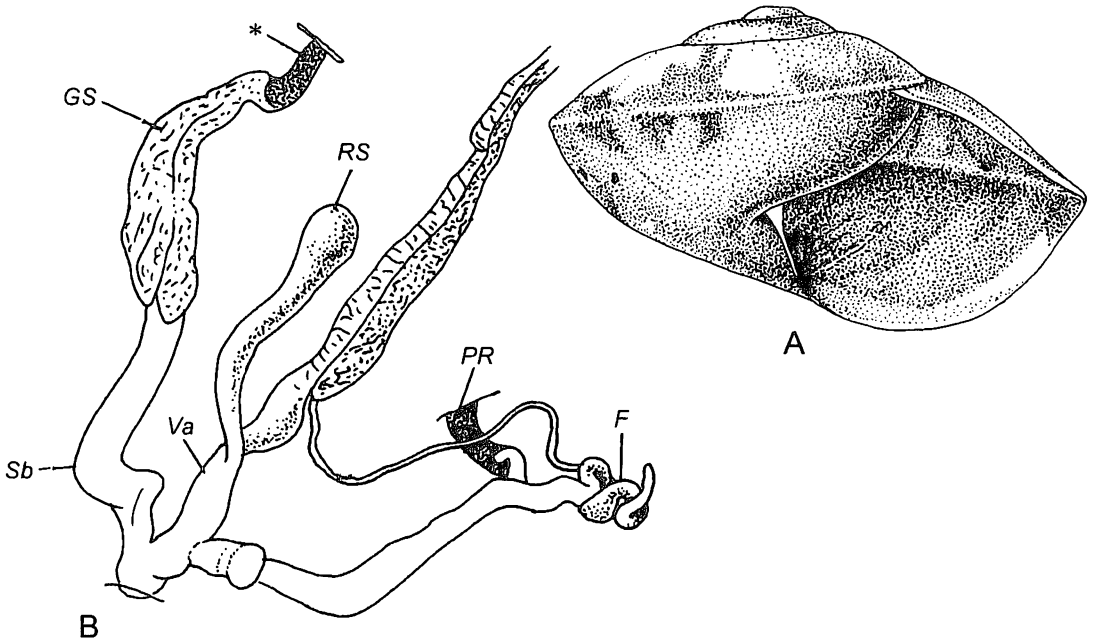


Fig. 1769. *Vitrinula viridis* (Quoy et Gaimard, 1832).
 A — shell: Manado, Celebes [= Sulawesi]. Syntype. Paris. B — reproductive tract. After Wiegmann, 1898. *Asterisk* — retractor of gland of sarcobellum.

- *Otesia* H. Adams et A. Adams, 1858: 642 (nom. nov. pro *Vitrinella* Gray, 1855).
- *Medyla* Martens in Albers, 1860: 47 (*Nanina* subg.; t.-sp. "*Nanina viridis* Quoy, 1832"; OD).
- *Pareuplecta* Moellendorff, 1890: 202 [*Euplecta* "Gruppe"; t.-sp. *Euplecta* (*Pareuplecta*) *marginata* Moellendorff, 1890; monotypy].

TYPE SPECIES — *Vitrina viridis* Quoy et Gaimard, 1832; SD Zilch, 1959.

Shell dextral, vitrinoid or obesely lenticular, rather solid to thin and fragile, semi-transparent, of 4.3-6 slightly convex whorls. Last whorl with variously developed peripheral angle or keel. Color light-corneous or greenish-yellow. Embryonic whorls smooth, polished, rest surface finely irregularly radially wrinkled; last whorl with fine spiral striation and elements of malleate sculpture. Aperture wide, with thin margins; columellar margin shortly reflexed. Umbilicus dot-like, semicovered or closed. Height 5-14, diam. 11-26 mm (12.2 × 19.8 mm).

Mantle lobe covering greater part of shell.

Vas deferens entering epiphallus laterally. Flagellum well developed, twisted. Epiphallus long, with a small caecum, to

which penial retractor attached. Penis very short. Sarcobellum with apical gland which provided with its own retractor; number of gland ducts unknown. Free oviduct and vagina subequal in length, not long. Spermathecal stalk rather short, reservoir poorly defined, not attending albumen gland.

DISTRIBUTION. Japan, Philippines, Sulawesi Island. At least 20 spp.

Dyakiini Gude et Woodward, 1921

Penis without flagellum or caecum.

DISTRIBUTION. SE Asia, Japan, Philippines, Indonesia, Molukkas.

Asperitas Gude, 1911

Fig. 1770

Gude, 1911: 273.

TYPE SPECIES — *Xestina rugosissima* Moellendorff, 1903; OD.

Shell dextral, subglobose to trochiform, moderately thin, a little translucent, glossy, of 5-6 rather convex whorls. Last whorl rounded to more or less angled at periphery.

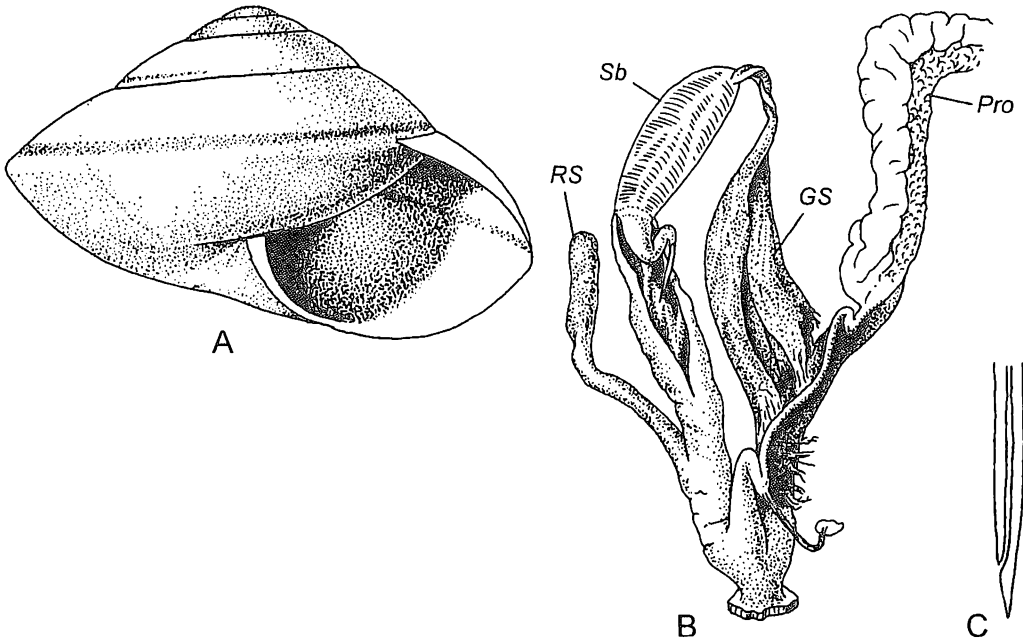


Fig. 1770. A — *Asperitas rugosissima* (Moellendorff, 1903). Shell: "Ins. Roma, Philippinen" Vienna.
 B, C — ! *Asperitas trochus* (Müller, 1774). Komodo Island, Indonesia, September 17, 1984.
 B — reproductive tract. C — thorn of sarcobelum, enlarged. Leiden.

Color variable: white, yellowish, pinkish, brown or greenish, often with darker peripheral band; another band may be present below suture. Embryonic whorls usually with variously developed, minute, accurate, radial riblets; later whorls with weak, smoothed, radial wrinkles and distinct spiral striation that is dense in the beginning, then gradually becoming coarser; body whorl sometimes also with light malleation. On basal surface, besides spiral striation, oblique striae may be present. Aperture ovate, well oblique, with thin or slightly thickened margins. Umbilicus very narrow, semicovered, often with mucus film. Height 13.5-30.5, diam. 21-62 mm (13.7 × 21.3 mm).

All sections of male division reduced in length. Vas deferens entering epiphallus apically. Penis conic, internally without distinct relief. Verge absent. Penial retractor attached to vas deferens/epiphallus junction. Sarcobelum strong, with muscular body and a long prepuce. Mucus glands alveolar, 3-4 in number, their upper parts integrated into tissue of vagina walls which pigmented with chocolate-brown. Each gland has its own duct entering summit of sarcobelum side-by-side. Prepuce of sar-

cobelum contains a long papilla with calcareous thorn at tip. Thorn with a narrow canal which opens laterally at short distance from its end (as in needle of a syringe). Spermatheca without distinct division into shaft and reservoir, entering prepuce of sarcobelum.

DISTRIBUTION. Philippines, Malay Archipelago, Indonesia. 15-16 spp.

Rhinocochlis Thiele, 1931

Fig. 1771

Thiele, 1931 633.

TYPE SPECIES — *Helix nasuta* Metcalfe, 1852; monotypy.

Shell sinistral, lens-shaped, thin, fragile, semitransparent, shining, of 5-6 almost flat whorls; last whorl with a sharp peripheral angle. Spire conic, apex narrowly rounded. Color whitish to corneous. Embryonic whorls finely granulate, subsequent whorls with fine irregular radial wrinkles and delicate, crowded, spiral striation. Aperture rhomboid, well oblique, with thin margins. Umbilicus, a minute perforation. Height 10-14, diam. 24-36 mm (11.2 × 30.0 mm).

Vas deferens inserted on epiphallus ter-

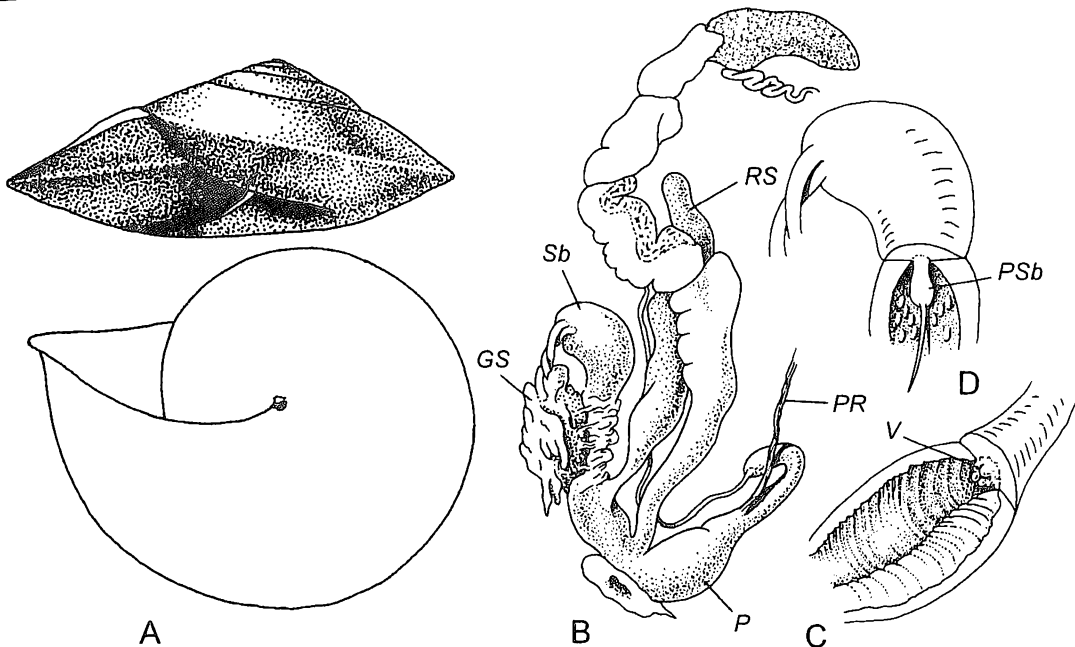


Fig. 1771. *Rhinocochlis nasuta* (Metcalf, 1852).

A — shell: "G. Klam (Borneo)" Leiden. B, C, D — Mt. Kinabalu (Kinabalu Nat. Park), Sabah, N Borneo, January 1981 B — reproductive tract. C — interior of penis. D — interior of sarcobelum. Paris.

minally. Epiphallus clavate, thick-walled, with a narrow lumen, entering penis through very short verge that has tubercular surface. Penis rather short, bulky, internally with numerous weak circular folds and a strong, rounded, longitudinal pilaster. Penial retractor attached to epiphallus at short distance above penis. Sarcobelum consists of shortly ovate, muscular body and a long prepuce; latter contains a short papilla armed with a long, solid, calcareous thorn. Inner walls of prepuce covered with elongated tubercles. Gland of sarcobelum amorphous, bound to prepuce by numerous fibers and entering summit of sarcobelum by 2 twisted ducts. Spermatheca voluminous, without distinct subdivision into shaft and reservoir, inserted on lower part of sarcobelum prepuce.

DISTRIBUTION. Kalimantan (= Borneo). 1 sp.

Sasakina B. Rensch, 1930

Fig. 1772

Rensch B., 1930b: 182 (nom. nov. pro *Sasakia* B. Rensch, 1930).

— *Sasakia* B. Rensch, 1930a: 74 [nom. praeocc.

non Moore, 1896 (Lepidoptera); t.-sp. *Trochonanina oxyconus* Martens, 1896; OD].

TYPE SPECIES — *Trochonanina oxyconus* Martens, 1896; OD.

Shell dextral, conic-trochiform, moderately thin, of about 7 nearly flat whorls. Last whorls with sharp peripheral angle. Color generally corneous, with darker band above peripheral angle; band may be broken into row of spots. Embryonic whorls smooth, polished. Postnuclear sculpture of very fine, irregular radial wrinkles and microscopical radial striae; base shining, distinctly spirally striated. Aperture subquad-rangular, quite oblique. Umbilicus (nearly) absent. Height 10-15, diam. 12.0-17.5 mm (15.0 × 17.2 mm).

Vas deferens entering rather slender epiphallus terminally. Penis more or less cylindrical. Penial retractor attached to upper part of epiphallus. Sarcobelum large; three-lobed gland entering sarcobelum via single, slender duct. Spermathecal shaft attached to atrium; there is no definite boundary between shaft and reservoir.

DISTRIBUTION. Indonesia (Lombok, Sumbawa, Sumba, Bali and Flores Islands). 4 spp.

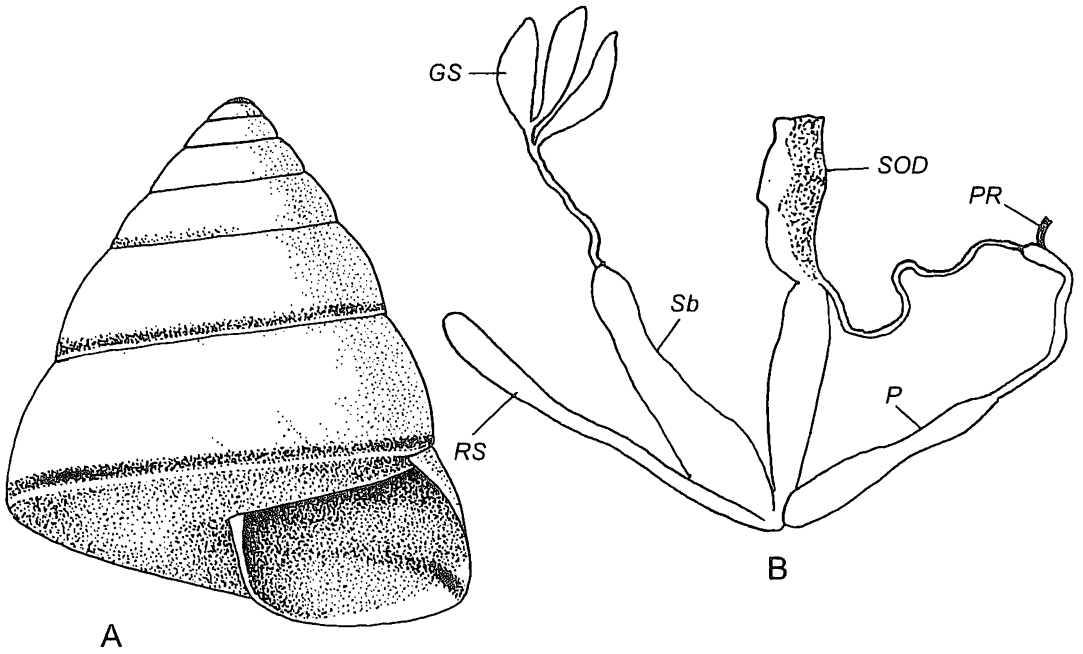


Fig. 1772. A — ! *Sasakina plesseni* (Rensch, 1938). Shell: Pura Mundi, Nusa Penido, Bali. Coll. of A.G. Kuznetsov.
 B — *Sasakina oxyconus* (Martens, 1896). Reproductive tract. After B. Rensch, 1930b.

Elaphroconcha Gude, 1911
 Fig. 1773

Gude, 1911 273.

TYPE SPECIES — *Ariophanta internota* E. Smith, 1898 (= *Nanina fruhstorferi* Martens, 1896); OD.

Shell dextral, depressed-orbicular, thin, fragile, translucent, dull above, shining below, of 3.75-6.5 moderately convex whorls; last whorl rounded or with indistinct peripheral angle. Color corneous or amber, uniform or with 1-3 dark bands. Embryonic whorls smooth. Upper surface of postapical whorls with fine radial striation or microscopical granulation; basal surface polished, delicately spirally striated. Aperture ovate, moderately oblique, with thin, sharp margins. Umbilicus dot-like. Height 12-22, diam. 25-43 mm (15.7 × 26.6 mm).

Vas deferens entering very short epiphallus apically. Penis more or less cylindrical, not long. Penial retractor attachment marks epiphallus/vas deferens junction. Sarcobelum long, with rather small body and long prepuce. Glands of sarcobelum rela-

tively small, 3-4 in number, each of them with its own duct; ducts fused before entering apex of sarcobelum. Upper portion of sarcobelum prepuce contains hollow calcareous thorn with lateral orifice, inner surface of lower portion bears series of tubercles. Spermatheca attached to prepuce shortly above atrium; spermathecal shaft comparatively long, reservoir well defined, with stretched out tip.

DISTRIBUTION. Indonesia (Java, Bali, Lombok, Flores, Sulawesi). About 10 spp:

Kalamantania Laidlaw, 1931
 Fig. 1774

Laidlaw, 1931: 193.

TYPE SPECIES — *Helicarion* ? *whiteheadi* Godwin-Austen, 1891; OD.

Shell depressed-subglobose, thin, fragile, of about 3.5 slightly convex whorls; last whorl not descending, with extremely weak peripheral angle. Color corneous. Embryonic whorls smooth, subsequent whorls with vague, irregular, radial wrinkles and spiral engraved lines, which are much

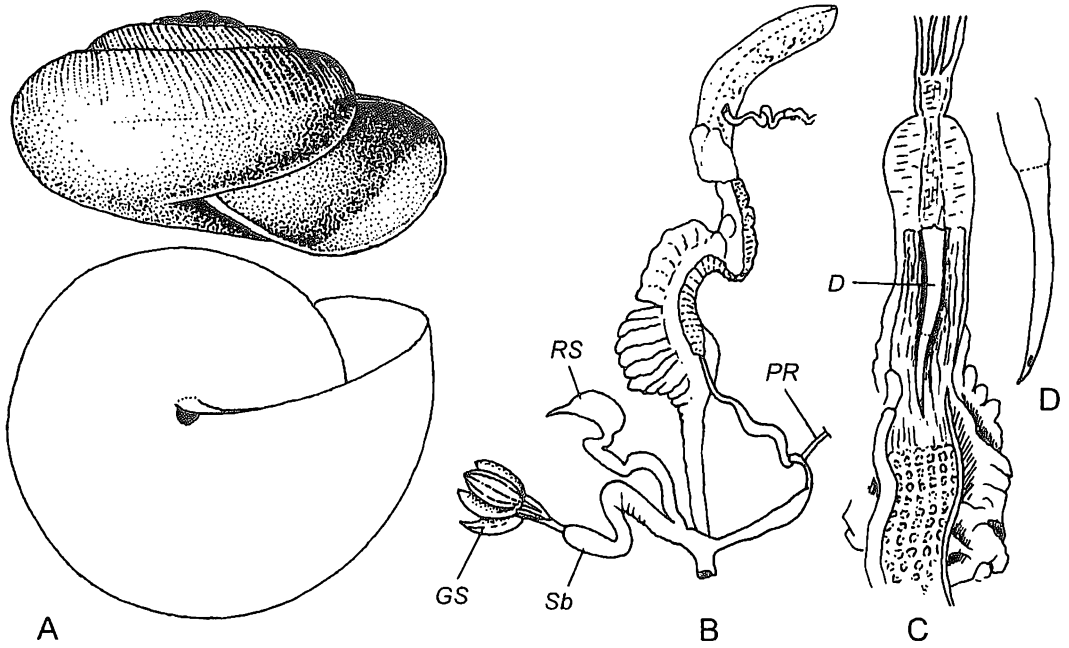


Fig. 1773. A — !*Elaphroconcha semisculpta* (Martens, 1873). Shell: S of Lake Mooat, E of Kotamobagu, Solaöng Mongondow, N arm Sulawesi. Moscow No. Lc-19567 (gift of J.J. Vermeulen). B, C, D — !*Elaphroconcha nemorensis* (Müller, 1774). B — reproductive tract. C — interior of sarcobelum, D — thorn (dart) in sarcobelum. After Wiegmann, 1893.

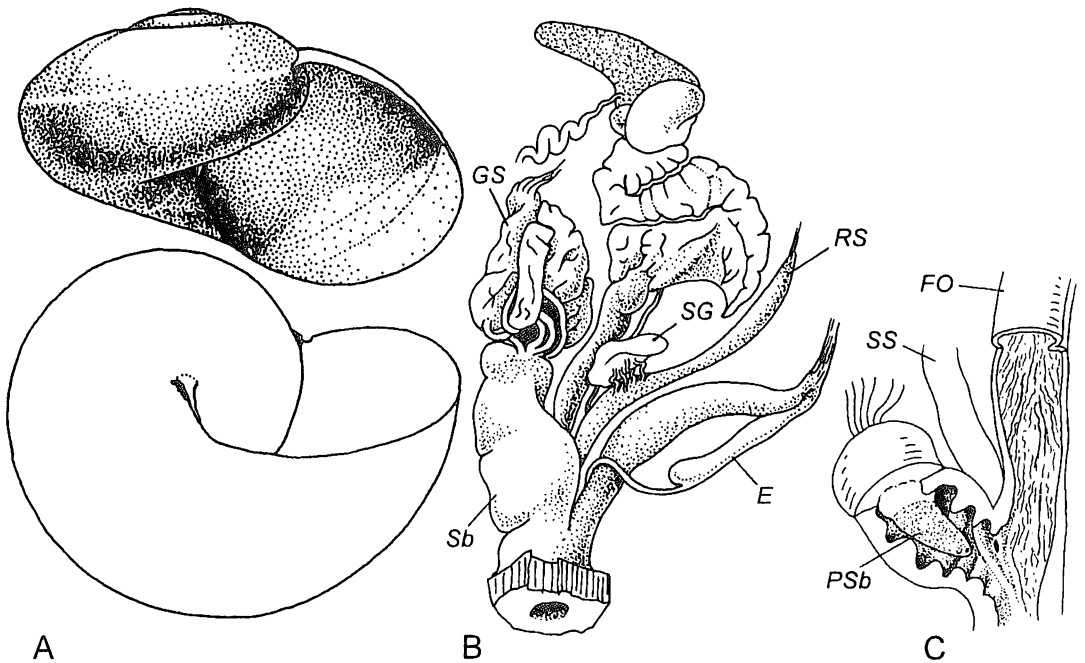


Fig. 1774. *Kalamantania whiteheadi* (Godwin-Austen, 1891).

A — shell: Sabah, about 12 km N of Keningau, Lian Cave. Moscow No. Lc-19579 (gift of J.J. Vermeulen). B, C — Kalimantan, Mesilau, Mamut Trail Path, Kinabalu S, August 12, 1967 B — reproductive tract. C — interior of distal section of genitalia. London No. 1995068.

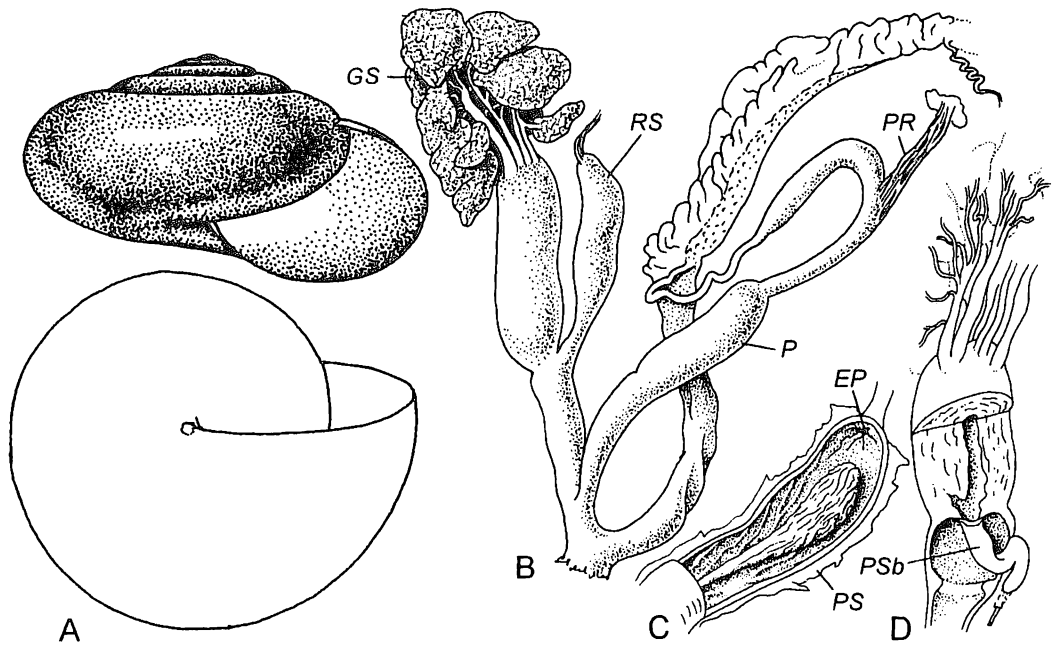


Fig. 1775. A — *Everettia jucunda* (L. Pfeiffer, 1863). Shell: Seria, Brunei. Moscow No. Lc-19607 (Leiden). B, C, D — ! *Everettia corrugata* Laidlaw, 1937 Kinabalu (Kinabalu Nat. Park), Sabah, N Borneo [= Kalimantan], January 1981. B — reproductive tract. C — interior of penis. D — interior of sarcobelum. Paris.

weaker on basal surface. Aperture ample, well oblique, with simple, sharp margins; upper margin a little elevated; margin insertions widely remote. Umbilicus dot-like, semicovered. Height 18-21, diam. 30-35 mm (19.2 × 31.1 mm).

Vas deferens entering epiphallus subapically, leaving very short, rounded, rudimentary flagellum. There is sharp bend at penis/epiphallus junction; penial retractor attached to this bend. Internally penis with longitudinal folds. Sarcobelum rather short, bulky, inner surface of its prepuce with a few strong circular folds; papilla of sarcobelum minutely papillose, without thorn. Gland of sarcobelum consists of few lobes, each of them entering sarcobelum apically. Retractor of sarcobelum present, attached to summit of gland. Free oviduct long, internally with numerous, very thin but rather high lamellar folds. Spermatheca entering boundary between sarcobelum and free oviduct, without distinct reservoir, with terminal ligament. Additional white compact gland entering lower half of spermatheca by several short ducts.

DISTRIBUTION. Kalimantan (= Borneo). 1 sp.

Everettia Godwin-Austen, 1891

Fig. 1775

Godwin-Austen, 1891: 33 (*Dyakia* subg.).

TYPE SPECIES — *Helix jucunda* L. Pfeiffer, 1863; OD.

Shell zonitoid, depressed-conic, thin, much translucent, brilliant, of 5-7 moderately convex whorls; last whorl straight, evenly rounded at periphery. Color pale-yellow to light-corneous. Embryonic whorls smooth, postnuclear sculpture of delicate spiral striation. Aperture widely lunate, a little oblique, with simple, straight margins. Umbilicus dot-like. Height 7-13, diam. 12-23 mm (10.6 × 18.5 mm).

Vas deferens short, entering epiphallus apically without sharp boundary. Epiphallus rather long, curved. Penis somewhat clavate, surrounded with very thin transparent sheath, internally with numerous, fine, irregular folds and a strong wrinkled pilaster; verge missing. Sarcobelum consisting of

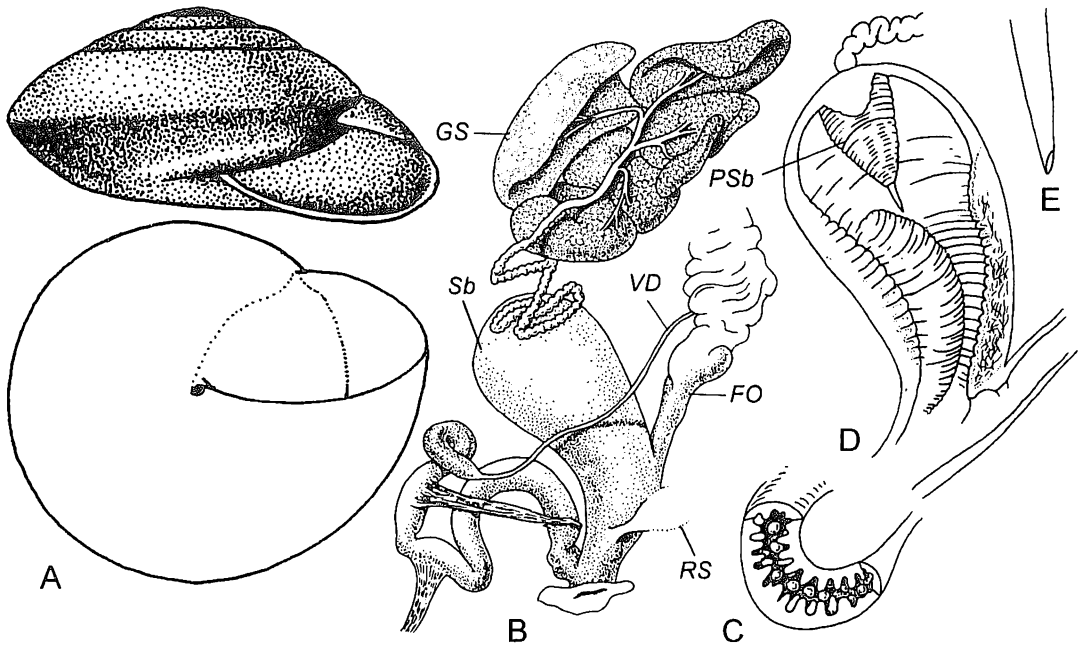


Fig. 1776. *Quantula striata* (Gray, 1834).

A — shell: S Vietnam. Moscow No. Lc-25528. B, C, D, E — Suva, Viti-Levu, Fiji, June 5, 1980. B — reproductive tract. C — interior of epiphallus. D — interior of sarcobelum. E — thorn of sarcobelum. Moscow.

elongate-ovate body and long, cylindrical prepuce; former contains long papilla bearing hollow calcareous thorn, whose base surrounded by thin, delicate, semitransparent collar. Structure of glands of sarcobelum as in *Kalamantania*. Elongated sac-like spermatheca has a thin apical ligament and inserts on very upper part of prepuce of sarcobelum.

DISTRIBUTION. Kalimantan (= Borneo), Labuan Island. 15-16 spp.

Quantula Baker, 1941

Fig. 1776

Baker, 1941: 268 (*Dyakia* subg.).

TYPE SPECIES — *Nanina striata* Gray, 1834; OD.

Shell depressed, solid, moderately translucent, somewhat glossy, of 5-6 slightly convex whorls; last whorl with angled periphery. Spire dome-shaped, apex slightly protruding. Color corneous above, basal side whitish around umbilicus. Embryonic whorls smooth. Later whorls with very weak radial wrinkles above and fine spiral striae;

basal surface microscopically granulate. Aperture ovate, well oblique, with slightly thickened margins. Umbilicus dot-like. Height 12-16, diam. 24-32 mm (13.4 × 27.2 mm).

Vas deferens entering epiphallus terminally. Penis + epiphallus rather long, without external boundary between these organs. Upper portion of epiphallus internally with large papillae, inner surface of penis covered with numerous, fine, longitudinal folds. Verge missing. Penial retractor attached to lower part of epiphallus; there is an additional muscular band connecting mid section of epiphallus with lower section of penis. Sarcobelum large, ovate, with reduced body; strictly speaking, the organ consists of prepuce, containing muscular papilla with calcareous hollow thorn. Within distal part of sarcobelum there is a strong longitudinal pilaster. Gland of sarcobelum composed of several lobes, whose ducts enter single long common duct. Spermatheca entering lower part of sarcobelum, its shaft very short, reservoir ovate.

DISTRIBUTION. Vietnam, Malaya Penin-

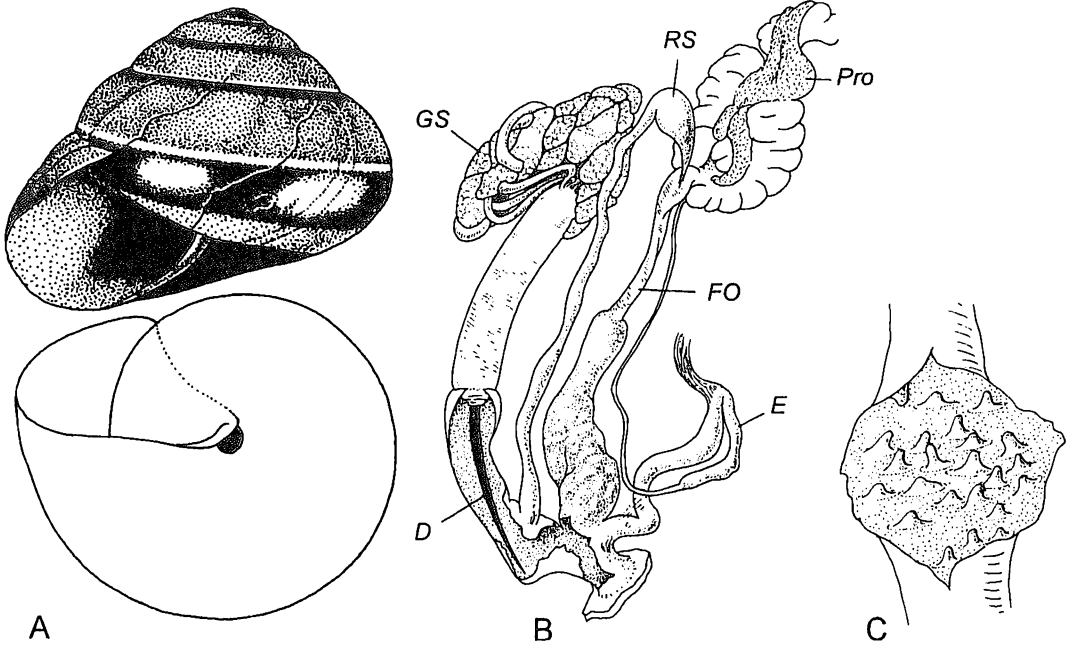


Fig. 1777 *Bertia cambojiensis* (Reeve, 1860).

A — shell: Cambodia. Leiden. B, C — Cambodia. B — reproductive tract. C — interior of lower section of free oviduct. Paris. D — thorn (dart) in sarcobelum.

sula; introduced to Fiji and Line Archipelago. 1 variable sp.

Bertia Ancey, 1887

Fig. 1777

Ancey, 1887: 53.

TYPE SPECIES — *Helix cambojiensis* Reeve, 1860; OD.

Shell sinistral, semiglobose, rather thin to (moderately) solid, shining, of 5-6 slightly convex whorls; last whorl not deflected, rounded or indistinctly angulated at periphery. Color fulvous above, with subsutural narrow dark band; below yellowish, with wide black subperipheral band which bordered at upper edge by narrow light band; umbilicus surrounded by black zone. Embryonic whorls smooth, subsequent whorls with fine, radial wrinkles broken into series of short folds; body whorl nearly smooth. Aperture ovate, well oblique, with simple margins. Umbilicus narrow. Height 55-58, diam. 72-80 mm (56.3 × 73.2 mm).

Caudal foss present, caudal horn missing. Vas deferens long, thin, entering epiphallus terminally. There is a sharp

bending at epiphallus/penis junction, to which penial retractor attached. Epiphallus moderately long. Penis cylindrical, longer than epiphallus, internally with thin folds and strong longitudinal pilaster. Body of sarcobelum thick-walled, heavily muscularized; prepuce, on the contrary, very thin-walled. Sarcobelum body ending in very short papilla which bears exceptionally long (15.6 mm in dissected specimen) solid, black, conchyolinous thorn. Gland of sarcobelum composed of many tightly packed lobes; each lobe has its own duct entering sarcobelum apically. Free oviduct consists of upper muscular and lower thin-walled sections; latter internally with large, numerous papillae visible without dissection of the organ. Spermathecal stalk long, inserting on prepuce of sarcobelum, reservoir not large, not attending albumen gland, with pointed tip and weak apical ligament.

DISTRIBUTION. Cambodia. 1 sp.

Dyakia Godwin-Austen, 1891

Fig. 1778

Godwin-Austen, 1891: 29.

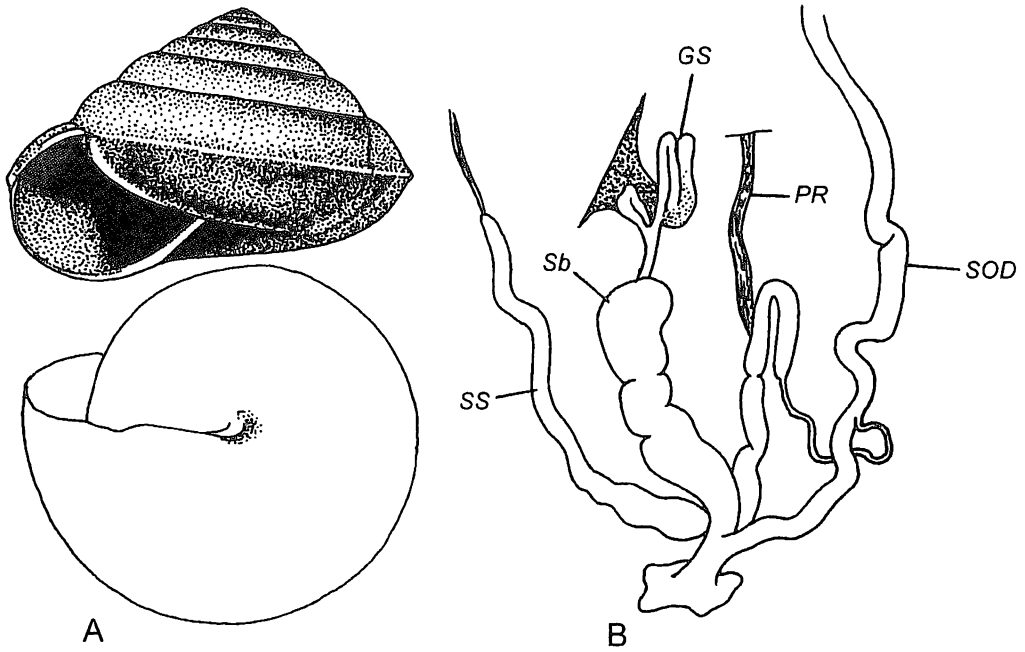


Fig. 1778. *Dyakia hugonis* (L. Pfeiffer, 1863).

A — shell: Borneo. Leiden. B — reproductive tract. After Wiegmann, 1898.

— ? *Semperia* Godwin-Austen, 1898 (1898-1899): 82 (nom. praeocc., non Crosse, 1867; *Ariophanta* subg.; t.-sp. *Helix retrorsa* Gould, 1844; SD Baker, 1941).

TYPE SPECIES — *Helix hugonis* L. Pfeiffer, 1863; OD.

Shell sinistral, turbanate, quite solid to rather thin, of 6.5-8 moderately convex to flattened whorls. Last whorl sharply angulate or keeled, not descending in front. Spire conic, apex narrowly rounded. Color olivaceous above peripheral keel, basal surface light-brown to chestnut. Embryonic whorls smooth, postnuclear whorls with delicate reticulate sculpture of thin radial and spiral striae. Aperture widely lunate, slightly oblique, with simple margins; columellar margin shortly reflexed and (almost) completely covers umbilical perforation. Height 10-25, diam. 18-45 mm (24.1 × 34.9 mm).

The description below is based on investigation by Wiegmann (1898: 411, Taf. XXVI, Fig. 20) of single not fully mature specimen. Vas deferens entering epiphallus apically. There is a circular narrowing at penis/epiphallus junction. Penial retractor attached to distal portion of epiphallus. Sar-

cobelum large, with apical twisted gland. Spermatheca without visible differentiation into shaft and reservoir, entering base of sarcobelum. There is a weak ligament attached to spermatheca apically.

DISTRIBUTION. From Tenasserim (S Myanmar) through Malaya to Kalimantan. About 20 spp.

PSEUDOPLECTINAE Thiele, 1934

Thiele, 1934: 1007

Jaw with a small median projection. Sarcobelum vestigial, lacks mucus gland. DISTRIBUTION. Malay Peninsula.

Pseudoplecta Laidlaw, 1932 Fig. 1779

Laidlaw, 1932a: 91, 92.

TYPE SPECIES — *Rotula bijuga* Stoliczka, 1873; OD.

Shell obesely lenticular, thin, fragile, semitransparent, of 5.5-6 slightly convex whorls. Last whorl with somewhat rounded

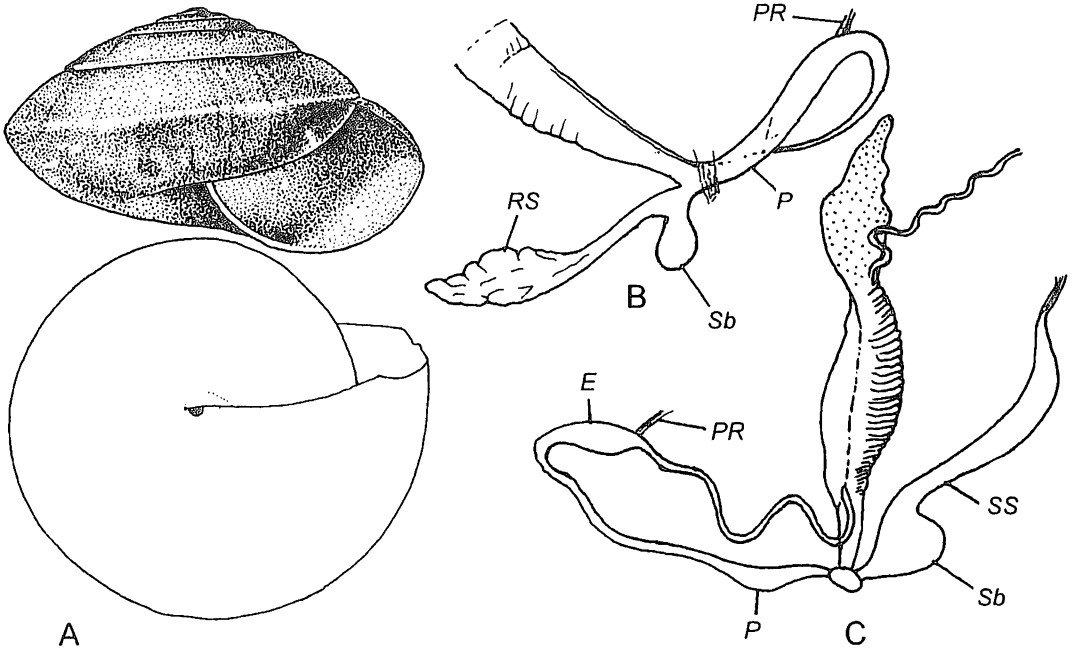


Fig. 1779. *Pseudoplecta bijuga* (Stoliczka, 1873).
 A — shell: Perak, Malay Peninsula. Zürich No. 501201. B, C — reproductive tract. B — after Laidlaw, 1932a. C — after Stoliczka, 1873.

peripheral keel. Color light-corneous. Embryonic whorls delicately radially wrinkled. Rest whorls with distinct, regular radial wrinkles broken up into series of elongate tubercles owing to presence of shallow, well spaced spiral grooves; basal surface polished, shining, lacking regular sculpture. Aperture widely lunate, only slightly oblique, with thin margins. Umbilicus tiny. Height 8.0-10.5, diam. 14.5-18.8 mm (10.2 × 17.4 mm).

Caudal foss present, caudal horn inconspicuous.

Talon hidden. Vas deferens entering epiphallus apically. Proximal section of epiphallus may be swollen. Penis rather short, cylindrical or subfusiform. Penial retractor attached to epiphallus. Free oviduct moderately long. Vagina as such absent. Sarcobelum (sub)globular, located on base of spermathecal stalk. Latter rather short, reservoir capacious, with or without apical ligament.

DISTRIBUTION. Malay Peninsula. 1 sp.

? *Pliotropis* Moellendorff, 1899
 Fig. 1780

Moellendorff, 1899b: 91 (*Otesia* subg.).

TYPE SPECIES — *Helix biangulata* L. Pfeiffer, 1845; OD.

Shell low conic or obesely lentiform, thin, moderately translucent, of about 6 shouldered whorls. Last whorl not descending, with sharp peripheral keel and 1-2 cord-like angles above periphery. Color light-corneous, base lighter. Embryonic whorls smooth, later whorls with very vague, smoothed, radial wrinkles (nearly smooth). Aperture semilunate, rather narrow, subvertical, with sharp, simple margins; columellar margin a little reflexed. Peristome insertions widely remoted. Umbilicus minute, semicovered. Height 4.0-7.5, diam. 8-15 mm (7.5 × 15.0 mm).

DISTRIBUTION. Philippines. About 10 spp. & subsp.

REMARK. The genera *Pliotropis* and *Inozonites* are included in Dyakiidae tentatively, until anatomy of their representatives is known.

? *Inozonites* Pfeffer, 1883
 Fig. 1781

Pfeffer, 1883: 22.

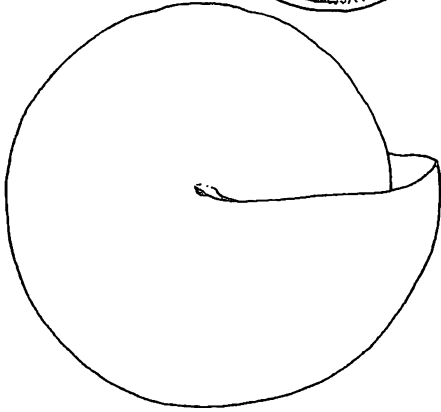
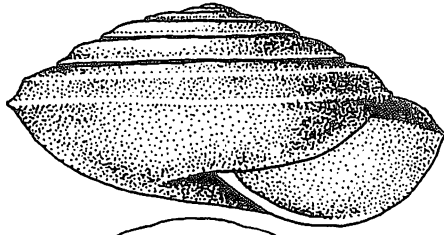


Fig. 1780. *Pliotropis biangulata* (L. Pfeiffer, 1845).
Camarinas, Luzon, Philippines. SPb.

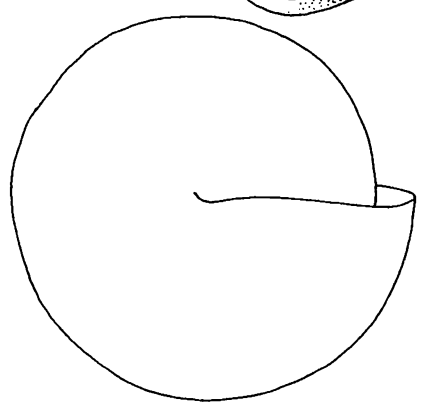
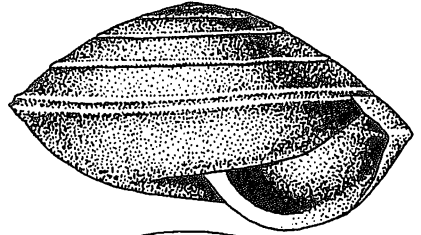


Fig. 1781. ! *Inozonites cebuensis* (Moellendorff, 1887).
Cebu Island, Philippines. Leiden.

TYPE SPECIES — *Helix filocinctus* L. Pfeiffer, 1845; monotypy.

Shell obesely lenticular, thin, translucent, glossy, of 5.5-6.5 almost flat whorls. Last whorl straight, with 1-2 peripheral keels. Color pale-corneous to brown. Embryonic whorls smooth. Later whorls with very fine, irregular radial striae. Aperture rather narrow, lunate, almost vertical; columellar margins more or less thickened, expanded. Umbilicus closed. Height 3.0-5.8, diam. 6.5-11.0 mm (5.4 × 10.3 mm).

DISTRIBUTION. Philippines, Java, Bali. At least 10 spp.

STAFFORDIIDAE Thiele, 1931

Thiele, 1931: 632 (Ariophantidae subf.).

Mantle with shell lobes.

Jaw without median projection.

Sarcobelum with a gland mass on top of a long, twisted tube.

DISTRIBUTION. NE India.

Staffordia Godwin-Austen, 1907 Fig. 1782

Godwin-Austen, 1907: 184.

TYPE SPECIES — *Staffordia daflaensis* Godwin-Austen, 1907; OD.

Shell *Macrochlamys*-like, depressed, thin to rather solid, more or less translucent, of 5-6 slightly convex whorls; last whorl straight, evenly rounded at periphery. Color olivaceous or olive-green, often with ochre tint. Embryonic whorls smooth, remaining with more or less regular, radial broad-ridged ribbing. Aperture broadly ovate, moderately oblique, with acute margins, sinuous above and slightly so below, columellar margin much reflexed, very oblique and descending. Umbilicus rather narrow. Height 7.2-9.4, diam. 15.2-23.5 mm.

Caudal foss or caudal horn absent.

Vas deferens entering epiphallus terminally. Distal male section sharply bent at epiphallus/penis junction. Penis cylindrical, markedly longer than epiphallus. Penial retractor attaching to penis/epiphallus junction. Sarcobelum short, thin-walled, consists of prepuce containing a blunt, conchy-

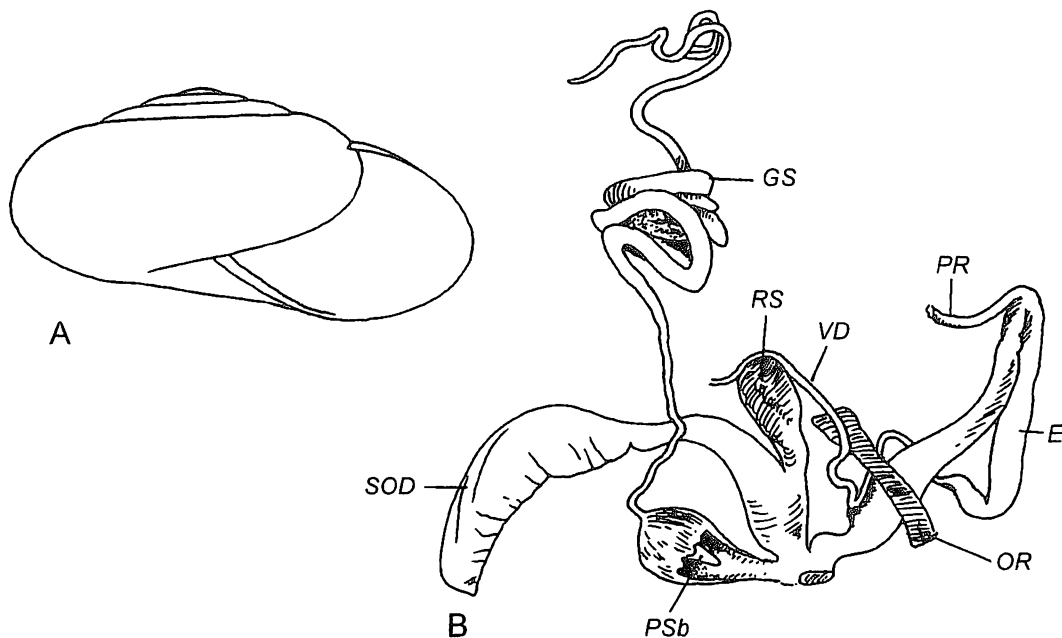


Fig. 1782. *Staffordia daflaensis* Godwin-Austen, 1907
 A — shell. B — reproductive tract. After Godwin-Austen, 1907 Gland of sarcobelum not shown.

olinous, conic, solid papilla. Structure of gland of sarcobelum not known, its duct very long. Spermatheca with short shaft and voluminous reservoir.

DISTRIBUTION. SE Himalaya (Dafla Hills). 3-4 spp.

Atrial appendix absent. Spermathecal stalk usually with 1 or 2 additional ducts. Spermatophores missing.

Omnivorous.

DISTRIBUTION. Palearctic, Madeira and Canary Islands, continental N and Central America; Guadalupe Island, Bermuda.

GASTRODONTOIDEA Tryon, 1866

Tryon, 1866: 242.

Shell generally zonitoid.

Sole tripartite. Caudal foss small; caudal horn absent.

Jaw oxygnathous.

Flagellum missing. Epiphallus small.

Penis simple, sometimes rudimentary, internally mostly with calcareous stimulator. Penial gland (coronary gland) single or paired, located in upper part of penis. Penial caecum absent. Penis sheath present but sometimes poorly developed. Sarcobelum penial, internally with a long calcareous dart (thorn). Vagina simple, without appendages. Perivaginal gland present.

GASTRODONTIDAE Tryon, 1866

— Janulinae Wenz, 1923: 300 (Zonitidae subf.).

— Poecilozonitinae Pilsbry, 1924: 1.

Schileyko, 1972: 145; Riedel, 1980: 13.

Shell generally zonitoid, smooth or radially ribbed. Aperture simple or with basal teeth or entering basal lamella.

Sole uniform or divided into 2 lateral fields by median longitudinal furrow (Gastrodontinae) or tripartite (Nastiinae). Caudal foss absent.

Penis internally with a calcareous plate (sometimes absent); supplied with a long accessory organ (sarcobelum) containing calcareous dart (in some species of *Striatura* dart absent). Spermathecal stalk long, slen-

der, mostly with 1 or 2 bridges which connect stalk with free oviduct and penis sheath. Vagina very short or absent.

DISTRIBUTION. As in superfamily.

GASTRODONTINAE Tryon, 1866

Left mantle lobe with accessory lappets. Sole bipartite, with median longitudinal groove.

Right ommatophoran retractor free from peni-oviducal angle.

Spermathecal stalk has additional connection with penis or penis sheath.

DISTRIBUTION. As in the superfamily.

Poecilozonites O. Boettger, 1884

Boettger O. 1884: 139 (*Zonites* sect.).

— *Bermudia* Ancy, 1887: 53 (pro gen. or *Helix* subg.; t.-sp. *Helix bermudensis* L. Pfeiffer, 1845; OD).

— *Juno* Mazzyck, 1888: 211 (t.-sp. *Helix bermudensis* L. Pfeiffer, 1845; OD).

Riedel, 1980: 22.

TYPE SPECIES — *Helix bermudensis* L. Pfeiffer, 1845; SD Pilsbry, 1888.

Shell depressed-conic to lenticular, moderately solid, of 7-8 flattened to moderately convex whorls. Last whorl rounded to sharply angulated. Coloration comprises variously developed dark band, radial streaks or marble pattern. Aperture ovate, quite oblique, with simple margins; long, entering basal lamella may be present. Umbilicus rather narrow and profound to broad and shallow.

Vas deferens comparatively long, convoluted, entering twisted epiphallus subapically. Penis very short, surrounded by a sheath. Sarcobelum long, lacking coronal gland. Penial retractor inserted on sarcobelum apically. Free oviduct long, thin. Vagina almost absent. Spermathecal stalk long, slender, its basal part connected with penis sheath by a short bridge.

DISTRIBUTION. Bermuda Islands.

Poecilozonites (*Discozonites*

Pilsbry, 1924)

Fig. 1783

Pilsbry, 1924: 2, 4.

TYPE SPECIES — *Poecilozonites* (*Discozonites*) *blandi* Pilsbry, 1924; OD.

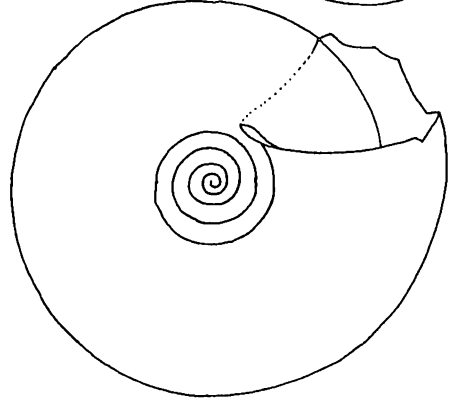
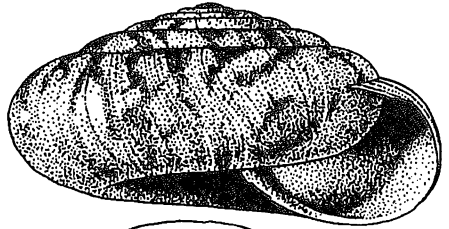


Fig. 1783. *Poecilozonites* (*Discozonites*) *blandi* Pilsbry, 1924.

Church Cave, Paynters Vale, near Tuckers Town, Bermuda. Paratype. Moscow No. Lc-25416 (Phil. No. 94960).

Shell depressed. Last whorl rounded peripherally, without an internal lamella. Color corneous, marbled with brown. Umbilicus broad, shallow. Height 3.0-6.0, diam. 9.3-13.6 mm (4.5 × 9.2 mm).

DISTRIBUTION. Bermuda Islands. 7 spp. & subsp.

Poecilozonites (*Poecilozonites* s. str.)

Fig. 1784

Shell more or less distinctly lenticular. Last whorl carinated or angulated, without entering lamella. Color (pale) corneous, with 2 dark bands — above and below peripheral keel. Umbilicus subcylindrical, profound. Height up to 11, diam. up to 20 mm (10.0 × 19.4 mm).

Reproductive tract as in genus.

DISTRIBUTION. Bermuda Islands. 2 or 3 Recent spp.

Poecilozonites (*Gastrelasmus*

Pilsbry, 1924)

Fig. 1785

Pilsbry, 1924: 2.

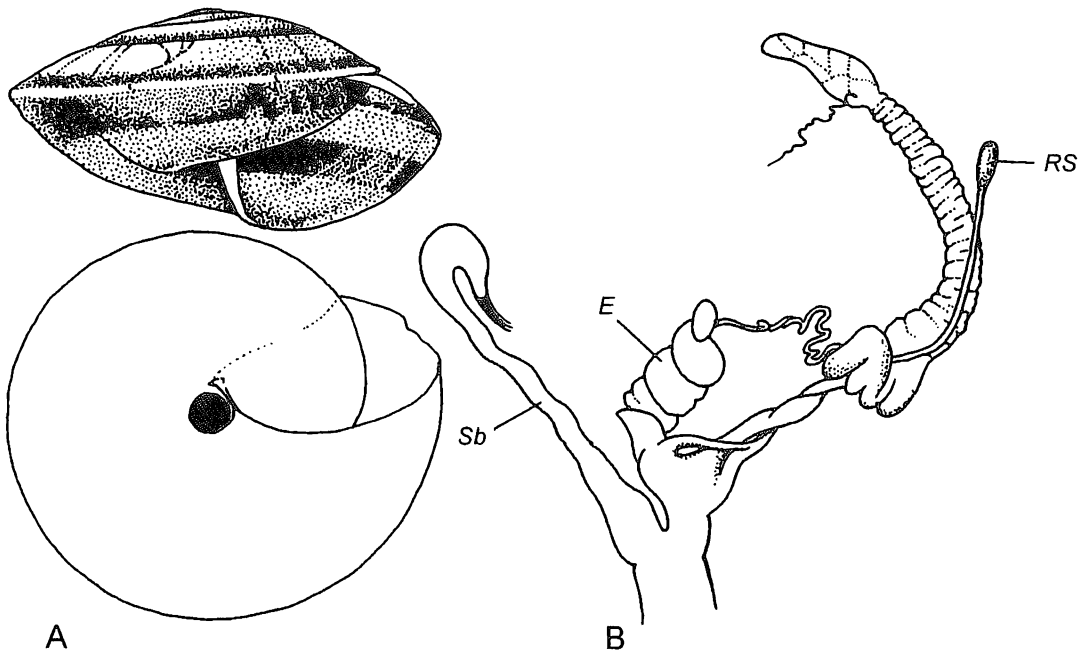


Fig. 1784. *Poecilozonites (Poecilozonites) bermudensis* (L. Pfeiffer, 1845).

A — shell: Flatts near Frascati Hotel, Bermuda. Moscow No. Lc-25419. B — reproductive tract. After Pilsbry, 1889.

TYPE SPECIES — *Helix circumfirmata* Redfield, 1853; OD.

Shell depressed. Last whorl rounded or with very weak peripheral angle, with a long, thin, entering palatal lamella. Color corneous, with peripheral darker band broken into a series of radial streaks. Umbilicus subcylindrical, profound. Height 4.5-5.8, diam. 10.3 mm (5.7 × 9.3 mm).

DISTRIBUTION. Bermuda Islands. 4 spp. & subspp.

Janulus Lowe, 1852

Fig. 1786

Lowe, 1852: 115 (*Helix* group). Pilsbry, 1947: 94.

TYPE SPECIES — *Helix (Janulus) calathus* Lowe, 1852 (= *Helix stephanophora* Deshayes, 1851); monotypy.

Shell depressed-conic, moderately solid, of 7-8 quite convex, somewhat shouldered whorls. Last whorl slightly angulated at periphery. Color (pale) corneous. Embryonic whorls with fine spiral striae. Later whorls with large, rounded ribs above and fine spiral striation on basal surface. Aperture narrowly semilunate, only slightly oblique; basal margin with a white lip on which 2-4

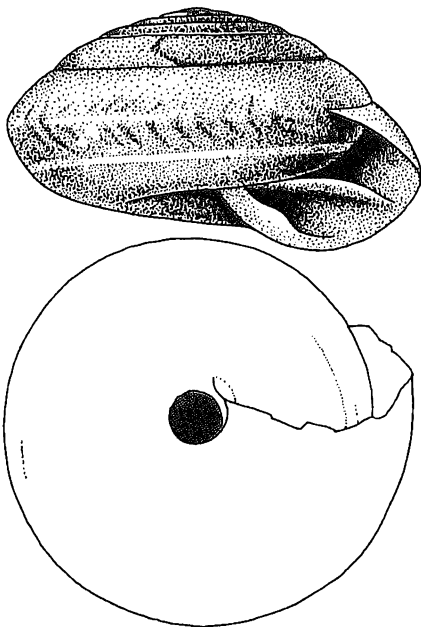


Fig. 1785. *Poecilozonites (Gastrelasmus) circumfirmatus* (Redfield, 1853).

Bermuda. Moscow No. Lc-25425 (Phil. No. 48590).

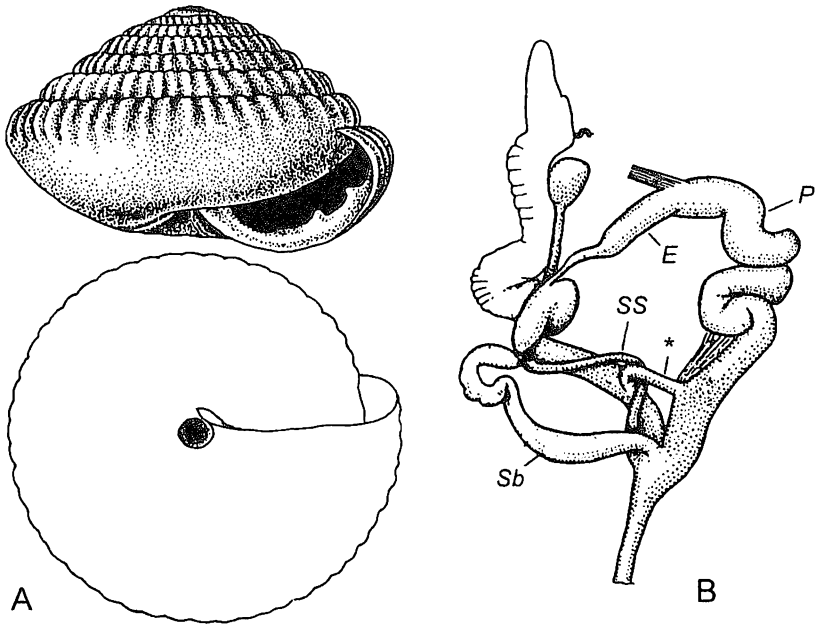


Fig. 1786. A — *Janulus stephanophorus* (Deshayes, 1851). Shell: Madeira. Phil. No. 97228 (syntype of *Helix calatus* Lowe, 1852).
 B — ! *Janulus bifrons* (Lowe, 1833). Reproductive tract. After Pilsbry, 1947. Asterisk — connection between free oviduct and penis sheath.

tubercular or lamellar teeth stand. Umbilicus deep, narrow. Height 2.5-9.5, diam. 4-12 mm (5.3 × 8.2 mm).

Vas deferens very short. Epiphallus short, thick. Penis long, rather stout, somewhat convoluted, its distal part surrounded by sheath. Penial retractor attached to penis near its boundary with epiphallus. Sarcobelum seats on base of penis, arcuate; its top connected with shaft of spermatheca by a short connective-tissued bridge. Thorn not found [Pilsbry (1947: 96) suggested that it "probably dissolved by the preservative"]. Coronal gland missing. Free oviduct long, connected with penis sheath by a short bridge. Vagina absent. Spermathecal stalk long, slender, reservoir ovoid, attending base of albumen gland. Atrium long.

DISTRIBUTION. Madeira and Canary Islands. 3-4 recent spp.

Gastrodonta Albers, 1850

Fig. 1787

Albers, 1850: 88 (*Helix* subg.). Riedel, 1980: 14.

TYPE SPECIES — *Helix interna* Say, 1822; SD Albers, 1857

Shell depressed-conic, moderately solid,

glossy below, of 7.5-9 rather convex whorls. Last whorl rounded at periphery. Color (pale) cinnamon-brown. Embryonic whorls smoothish. Later whorls above with distinct, regular, retractive curved ribs separated by spaces of about twice their width; base with faint, fine radial striae only. Aperture narrowly semilunate, slightly to moderately oblique; basal margin with a strong, white lip on which 2 teeth stand; inner tooth tubercular, outer tooth either tubercular or compressed laterally. Umbilicus minute. Height 4.5-5.4, diam. 6.0-8.5 mm (5.3 × 8.2 mm).

Vas deferens long, slender, entering short, slender epiphallus apically. Epiphallus joining penis laterally, leaving ovoid caecum. Penis short, stout, internally with triangular, calcareous plate (stimulator); inner surface of penis with several axial folds and a small tubercular boss. Sarcobelum long, with a pair of long, clavate coronal glands; internally with very long, spear-like dart (thorn). Free oviduct slender, connected with penis by a thin bridge. Spermathecal stalk long, slender; reservoir small, ovoid, not attending albumen gland.

DISTRIBUTION. East of N America (Indi-

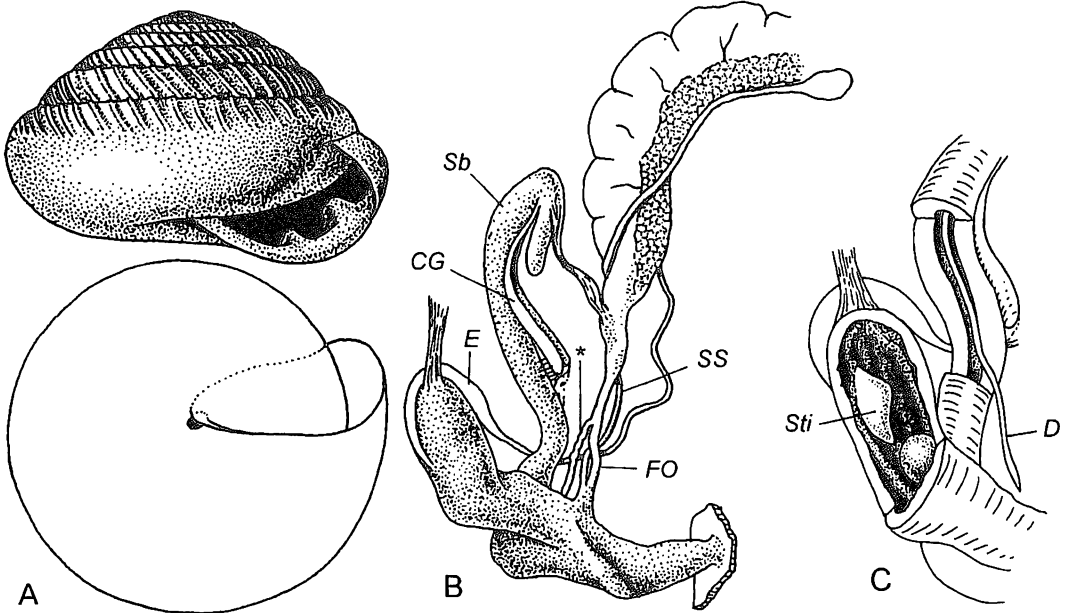


Fig. 1787 *Gastrodonta interna* (Say, 1822).

A — shell: Ohio, U.S.A. SPb. B, C — Facing ravine, Cleburne Co., Alabama, April 14, 1983. B — reproductive tract. C — interior of penis and of sarcobelum. Moscow No. Lc-20447 (Chicago No. 213376). D — thorn in sarcobellum. Asterisk — bridge between free oviduct and penis.

ana, Ohio to Mississippi, Alabama, Georgia, North Carolina, West Virginia). 2 spp.

Zonitoides Lehmann, 1862

Lehmann, 1862: 111. Riedel, 1980: 16.

TYPE SPECIES — *Helix nitida* Müller, 1774; monotypy (Opinion ICZN 335, 1955).

Shell depressed, thin, shining, translucent, of 4-8.5 whorls. Last whorl more or less rounded or markedly angled at periphery. Color uniformly white or yellowish to reddish-brown, sometimes greenish or olivaceous; rarely with pale, diffuse peripheral band. Embryonic whorls smooth. Later whorls with fine radial striation and frequently with variously developed spiral striation. Aperture ovate to rounded, moderately oblique, with simple or a little thickened margins. Umbilicus minute to very broad.

Ovotestis composed of 5-8 clusters of drop-like acini. Hermaphroditic duct not convoluted. Talon small, exposed, ovoid. Vas deferens not long, passes gradually into variously developed epiphallus. Conic

penial caecum may be present. Penial sarcobelum large, with coronal gland. Spermathecal duct connected by thin bridge with penis sheath and, sometimes, with vagina which usually very short (nearly absent).

DISTRIBUTION. Holarctic; in America southward to Panama.

Zonitoides (*Elliottius* Pilsbry, 1946)

Fig. 1788

Pilsbry, 1946: 471 (*Ventridens* sect.).

TYPE SPECIES — *Helix elliotti* Redfield, 1856; monotypy.

Shell depressed, thin, of 5.5-6 moderately convex whorls. Last whorl slightly but distinctly descending in front, evenly rounded at periphery. Color yellowish. Postembryonic whorls distinctly radially striated above; this sculpture nearly effaced at basal surface. Aperture irregularly quadrangular, margins thickened within to form a light lip. Umbilicus moderately broad, funnel-shaped. Height 4.0-4.9, diam. 7.5-8.4 mm (4.1 × 7.8 mm).

Vas deferens relatively short. Epiphallus

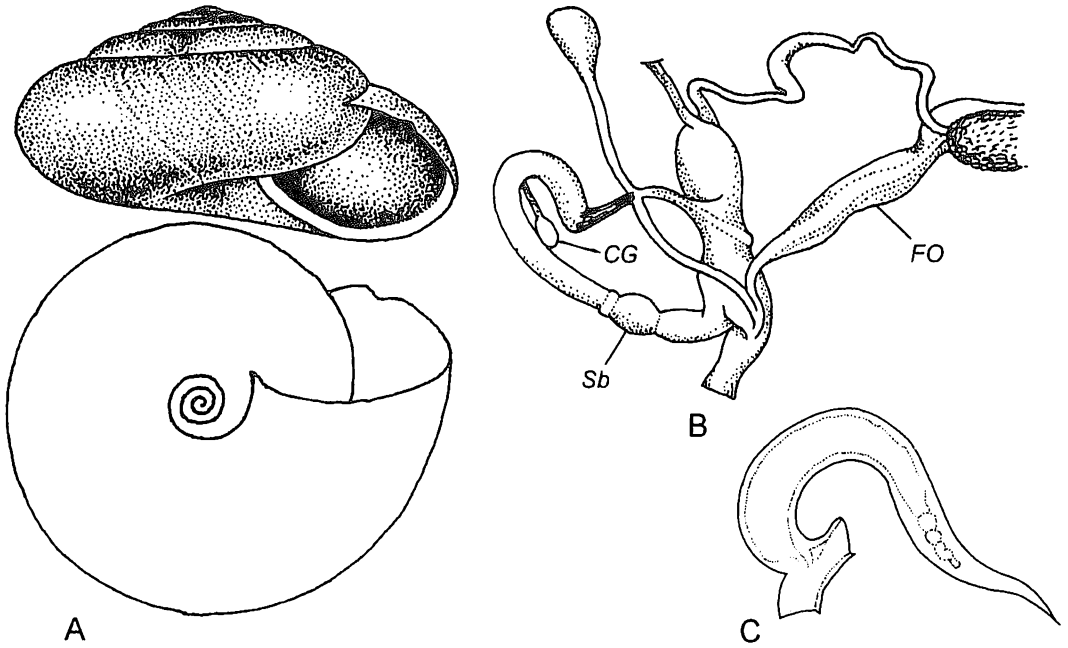


Fig. 1788. *Zonitoides (Elliottius) elliotti* (Redfield, 1856).

A — shell: Mts of Georgia N.C. Phil. No. 76988. B — reproductive tract. C — spermatophore. After Baker, 1929b. CG — coronal gland.

long and quite slender, slightly swollen in apical half. Penial verge quite short, conic, with orifice on one side about halfway to apex, armed with heavy, complicated collar. Wall of vergic sac with heavy internal pilasters; orifice of coronal gland opposite to apex of verge. Sarcobelum relatively slender, swollen to form a distinct annulus just above thin-walled basal 1/4 of its length; dart papilla almost 1/3 as long as sac. Coronal gland elongate and simple. Thorn (dart) gently curved throughout most of its length but quite sharply bent just before its expansion into a short, lanceolate blade. Free oviduct long, acuminate basally. Spermatophore fusiform, smooth, often with expanded base.

DISTRIBUTION. N America (U.S.A: West Virginia, North Carolina, Georgia). 1 sp.

Zonitoides (Ventricallus) Pilsbry, 1946

Fig. 1789

Pilsbry, 1946: 458 (*Ventridens* sect.).

TYPE SPECIES — *Helix ligera* Say, 1821; OD.

Shell depressed to dome-shaped or sub-

globose, rather thin, glossy, of 5-7.5 slightly convex whorls. Last whorl rounded or with smoothed to rather sharp peripheral angle. Color yellowish with corneous, green or olive tint; sometimes there is a light, diffuse peripheral band. Postapical sculpture weak, of fine radial wrinkles and variously developed spiral striae, mainly on base. Aperture ovate, sometimes a little rostrate. At early stages of postembryogenesis entering basal lamella may be present. Umbilicus minutely open. Height 4.8-13.2, diam. 7.5-18.5 mm (9.2 × 13.2 mm).

Vas deferens short, entering epiphallus apically. Epiphallus short, more or less conic. Penis rather small, internally with comparatively large verge which may be bifurcated at tip. Penis sheath surrounds basal part of penis. Penial retractor attached to penis at base of epiphallus. Sarcobelum long, with a well developed pair of coronal glands widely separated from one another. Sarcobelum contains a long papilla bent on itself and supplied with a short apical thorn. Free oviduct and vagina long, subequal in length. Lower part of long spermathecal stalk sends off 2 bridges: one to lower part

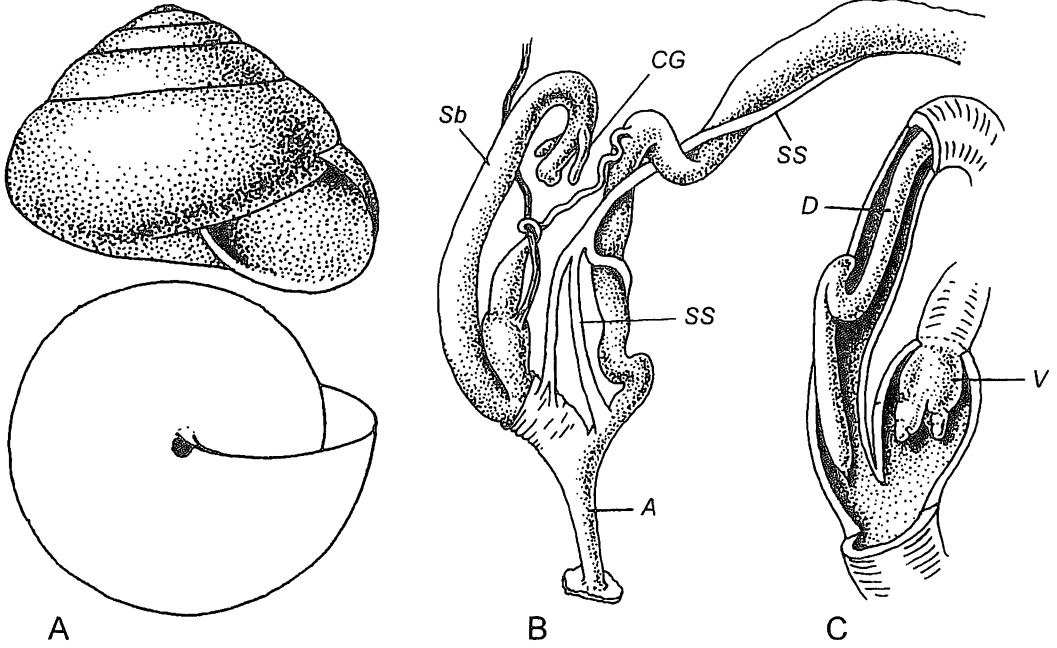


Fig. 1789. *Zonitoides (Ventricallus) ligerus* (Say, 1821).
 New York, Tompkins Co., Carolina Center, September 18, 1982. A — shell. B — reproductive tract. C — interior of penis. Leiden. CG — coronal gland.

of vagina, another — to penis sheath. Atrium very long.

DISTRIBUTION. N America. 9 spp.

Zonitoides (Ventridentis) suppressus
 Bland, 1869)

Fig. 1790

Binney & Bland, 1869: 292 (*Zonites* subg.).

TYPE SPECIES — *Helix suppressa* Say, 1829; SD Nevill, 1878.

Shell depressed to dome-shaped, thin, polished, shining, of 6-8.5 slightly convex whorls. Last whorl evenly rounded or angled. Color generally corneous — darker or paler, sometimes yellowish-olive. Postapical whorls finely to moderately radially striated; elements of spiral striation may be present; on base sculpture, as a rule, weaker. Aperture ovate to nearly lunate, moderately oblique. In juvenile shells there is baso-columellar lamella and baso-palatal tubercle (sometimes a few additional upper palatal plicae may be present as well); one or both may disappear in adult stage. Umbilicus profound, moderately narrow to rather

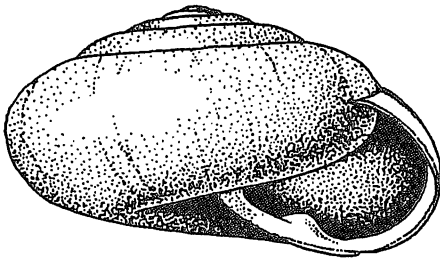


Fig. 1790. *Zonitoides (Ventridentis) suppressus*
 (Say, 1829).
 Philadelphia. SPb.

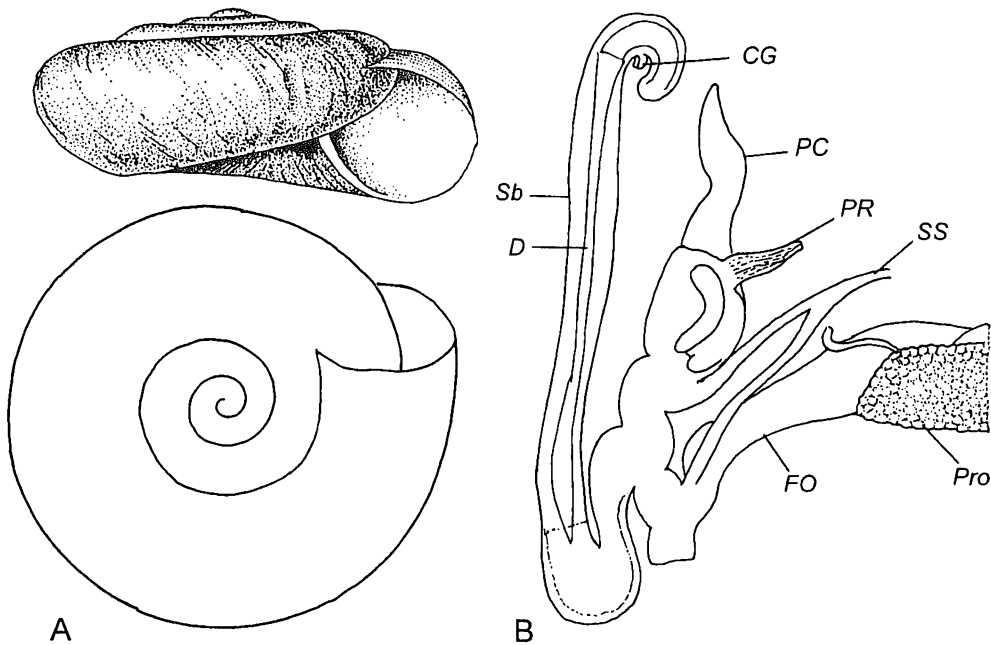


Fig. 1791. *Zonitoides (Pseudohyalus) lateumbilicatus* (Pilsbry, 1895).

A — shell: Sherwood, Tennessee. Vienna No. R 71311. B — reproductive tract. After Baker, 1929b. CG — coronal gland. D — dart (thorn) in sarcobelum.

broad. Height 3.5-5.0, diam. 5.5-9.5 mm (3.8 × 6.0 mm).

DISTRIBUTION. N America. 12 spp.

Zonitoides (Pseudohyalus)

Baker, 1929)

Fig. 1791

Baker, 1929b: 256 [*Zonitoides (Zonitellus)*; sect.].

TYPE SPECIES — *Gastrodonta (Pseudohyalina) lateumbilicata* Pilsbry, 1895; OD.

Shell strongly depressed, opaque, lusterless, of 4.3-5 whorls. Last whorl rounded. Color white, pale-corneous or light-green. Upper surface of postembryonic whorls with sharp radial rib-striation and exceptionally fine, dense spiral striae. Aperture subcircular, moderately oblique, with simple margins. Umbilicus broad, quite perspective. Height 1.5-3.6, diam. 4.3-5.8 mm (1.6 × 4.4 mm).

Penis with a conic caecum. Penial verge armed, arising from one side of vergic sac. Sarcobelum very long, slender; thickening around apex of dart inconspicuous; dart papilla short. Coronal gland small, bifurcate.

Dart (thorn) long, slender, almost straight. Preputial sac of sarcobelum very short. Free oviduct quite long, cylindrical.

DISTRIBUTION. N America. 3 spp.

Zonitoides (Zonitoides s. str.)

Fig. 1792

— *Zonitellus* Baker, 1928: 33, 37 (*Zonitoides* subg. or sect.; t.-sp. *Helix arboreus* Say, 1816; OD).

— *Alienitor* Iredale, 1937: 6 [t.-sp. *Helix lyndhurstensis* Cox, 1868 (= *Helix arboreus* Say, 1816); OD]. Bishop, 1978: 8.

Schileyko, 1972: 145. Riedel, 1980: 17

Shell depressed conic, thin, translucent, shining, of 4-5 moderately convex whorls. Last whorl rounded or scarcely angulated at periphery. Color yellowish-corneous to reddish. Later whorls with more or less developed radial lines and, sometimes, spiral striae. Aperture rounded, with simple margins, moderately oblique. Umbilicus not wide, perspective. Height 2.4-4.0, diam. 5-7 mm (3.0 × 5.6 mm).

Talon exposed, with small globular head. Vas deferens entering very short epiphallus.

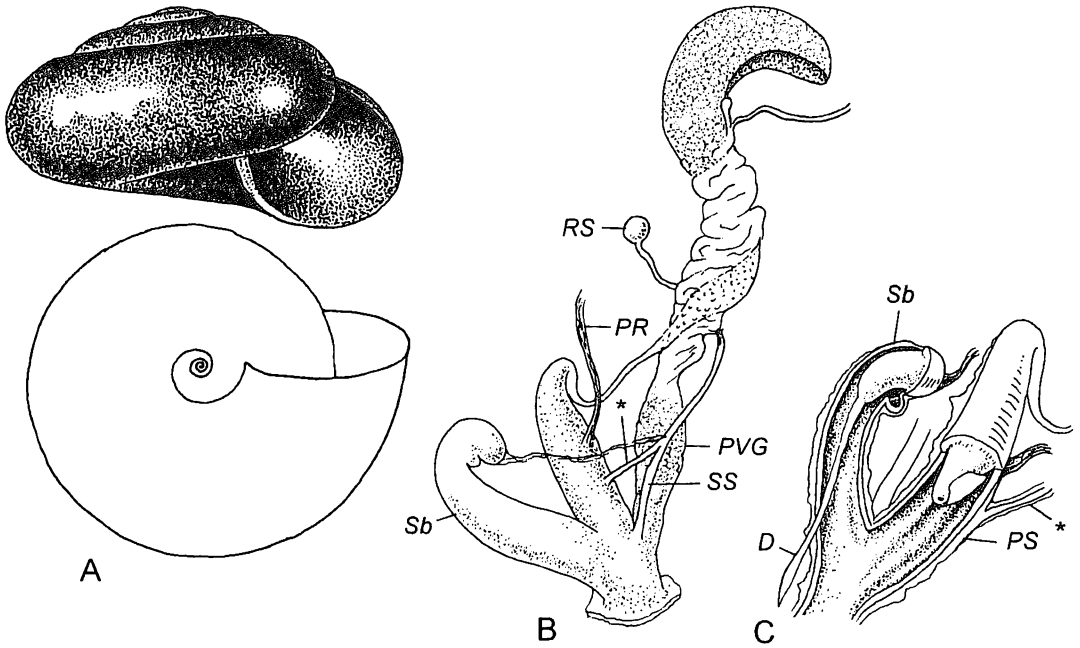


Fig. 1792. *Zonitoides (Zonitoides) nitidus* (Müller, 1774).

Valley of Serebrianka River near Pushkino, Moscow district, June 9, 1966. A — shell. B — reproductive tract. C — interior of penis and sarcobelum. Moscow No. Lc-25441. Asterisk — penial arm of spermathecal duct. D — dart in sarcobelum.

Caecum absent. Penis subcylindrical, internally with conic verge which covered by a curved calcareous plate. Inner surface of penis with smoothed axial folds. Sarcobelum with a small coronal gland, internally with fleshy papilla on which long thorn (dart) situated. Penis and sarcobelum surrounded by very thin, transparent sheath. Free oviduct long, coated with perivaginal gland. Spermathecal stalk thin, entering between penis and free oviduct. Additional duct connects stalk with penis sheath; another (additional) duct may connect stalk with distal part of free oviduct. Reservoir nearly attending albumen gland.

DISTRIBUTION. Holarctic; southward down to Panama. Introduced into Australia. 7 spp.

Striatura Morse, 1864

Fig. 1793

Morse, 1864: 17 Riedel, 1980: 24.

TYPE SPECIES — *Helix milium* Morse, 1859; SD Baker, 1928.

Shell depressed-conic, thin, shining, of 3-3.5 moderately convex whorls. Last whorl

evenly rounded. Color yellowish-corneous or gray. Embryonic whorls with distinct spiral lirae which begin at some distance below apex. Later whorls with oblique radial riblets decussated by fine spiral striae. Aperture subcircular, well oblique, with simple margins; peristome insertions approached. Umbilicus wide, shallow, quite perspective. Height 0.7-0.9, diam. 1.45-1.55 mm (0.78 × 1.51 mm).

Ovotestis ellipsoid, weakly lobed. Hermaphroditic duct swollen in base into short knot and enlarged again at confluence with stalk of talon. Talon clavate, deeply embedded in albumen gland. Vas deferens quite short. Epiphallus small, entering penis laterally through sphincter-like verge. Penis with apical sarcobelum containing short papilla topped by a small, conic dart. Internally penis with a few smoothed, axial folds. Penis sheath very thin, transparent, surrounds penis, sarcobelum and basal part of epiphallus. Free oviduct relatively large, coated by perivaginal gland. Spermathecal stalk long, with branches to base of penis and to vagina. Atrium long.

DISTRIBUTION. N America (NE states of the U.S.A. and SE Canada). 1 sp.

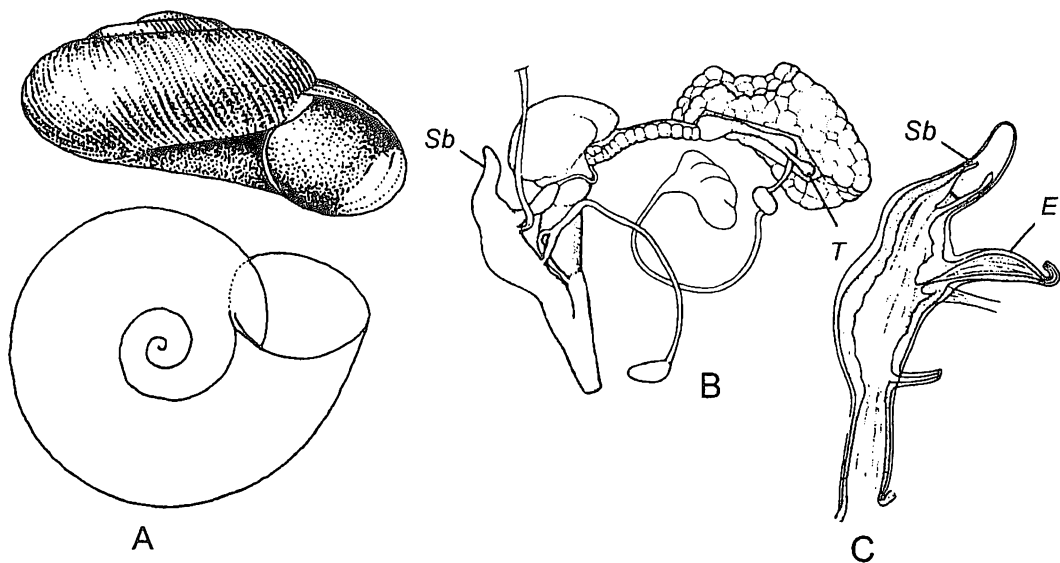


Fig. 1793. *Striatura milium* (Morse, 1859).

A — shell: Gorham, Maine. Syntype. Phil. No. 12188. B — reproductive tract. C — interior of penis. After Baker, 1928.

Pseudohyalina Morse, 1864

Fig. 1794

Morse, 1864: 15.

TYPE SPECIES — *Helix exigua* Stimpson, 1850; SD Kobelt, 1879.

Shell much flattened, fragile, of 3-3.5 rather convex whorls. Last whorl rounded. Color yellow or (pale) greenish-yellow. Embryonic whorls with spiral threadlets which begin at the very apex. Postapical sculpture of thin, well spaced periostracal riblets and spiral threadlets in intervals. Aperture sub-circular, well oblique, peristome insertions approached. Umbilicus very broad, shallow. Height 1.2-1.3, diam. 2.2-2.5 mm (1.28 × 2.29 mm).

Ovotestis roughly lanceolate, weakly lobate. Hermaphroditic duct long, swollen in distal half. Talon long-stalked, with swollen, recurved tip. Vas deferens very short. Epiphallus large, acuminate apically, thick-walled, internally with coarse, axial plicae. Penis short, sac-like, lacks sarcobelum, internally with low, rounded verge, crowned by a cirlet of small, apparently conchyolinous spines; a second, larger cirlet of spines

located more distally; there is a heavy, transverse, glandular thickening which extends from entrance of epiphallus to that of spermathecal stalk. Very thin penis sheath surrounds penis and lower part of epiphallus. Penial retractor attached to penis at base of epiphallus. Free oviduct long, covered by well developed perivaginal gland. Spermathecal stalk long, bifurcate, its penial arm short to very short. Atrium long.

DISTRIBUTION. SE Canada, U.S.A., Mexico, Guadalupe Island, Bermuda, Hawaiian Islands (? introduced). 4-5 spp.

REMARK. Riedel (1980) follows Baker (1928) and Pilsbry (1946) in consideration of *Pseudohyalina* and *Striaturops* as subgenera of *Striatura*. However these three taxa (which are certainly related to each other) differ, as it could be seen from the descriptions, by quite evident characters.

Striaturops Baker, 1928

Fig. 1795

Baker, 1928: 33.

TYPE SPECIES — *Striatura ferrea* Morse, 1864; OD.

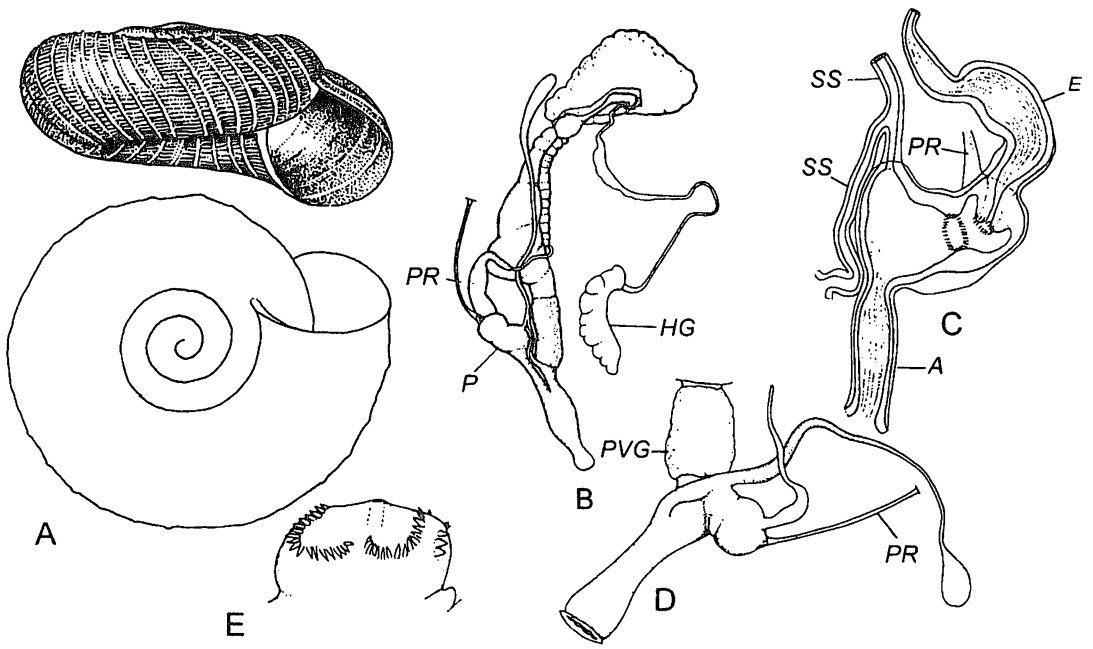


Fig. 1794. *Pseudohyalina exigua* (Stimpson, 1850). A — shell: Woodland, Aroostook Co. Me [USA]. Phil. No. 79783. B — reproductive tract. C — interior of penis. D — ! *Pseudohyalina meridionalis* (Pilsbry et Ferriss, 1906). Distal part of genitalia. E — ! *Pseudohyalina pugetensis* (Dall, 1895). Everted penis. After Baker, 1928.

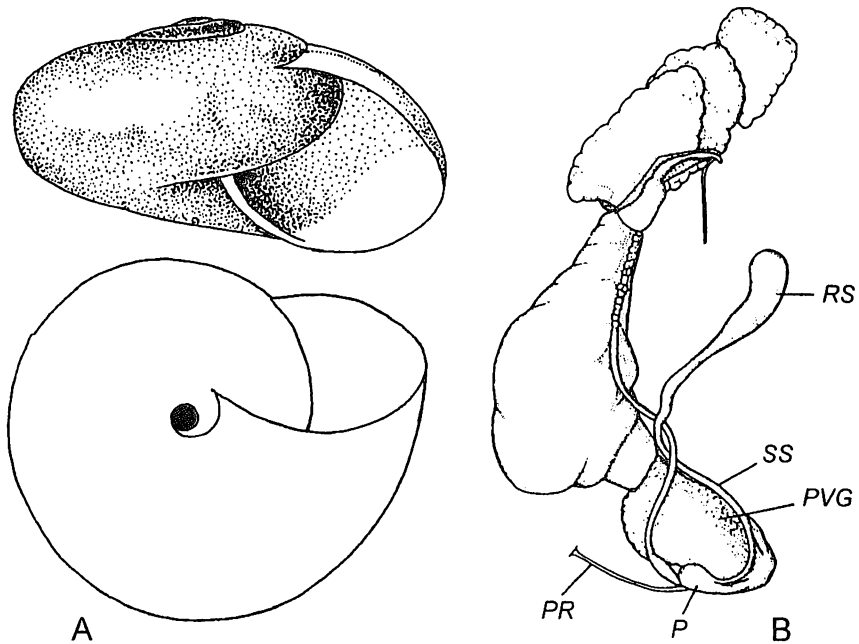


Fig. 1795. *Striaturops ferrea* (Morse, 1864). A — shell: Geneva, Achtabula Co., Ohio, U.S.A. Vienna No. R 71.293/3. B — reproductive tract. After Baker, 1928.

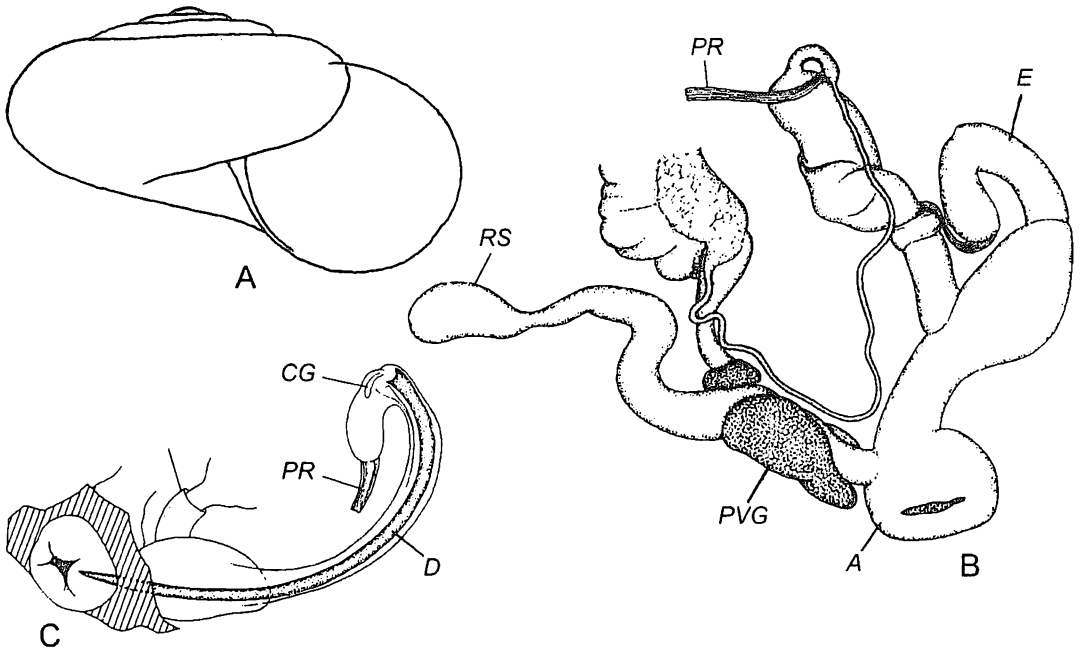


Fig. 1796. *Nastia viridula* Riedel, 1989.

A — shell. B — reproductive tract. C — interior of sarcobelum. After Riedel, 1989. CG — coronal gland. D — dart (thorn) in sarcobelum.

Shell depressed-orbicular, very thin, fragile, semitransparent, shining, of about 3 much flattened whorls. Last whorl somewhat swollen, rounded. Color yellowish or greenish. Embryonic sculpture of very fine spiral threads which begin some distance below apex. Postapical whorls with extremely fine, crowded spiral striation and also fine radial lines. Aperture ovate, comparatively large, well oblique; peristome insertions not approached. Umbilicus funnel-shaped, narrow. Height 1.4-1.7, diam. 2.5-3.2 mm (1.5 × 2.7 mm).

Ovotestis irregular in shape, of 2 weakly-lobed ellipsoid masses. Hermaphroditic duct slender. Talon large, elongate, with short head. Vas deferens long, entering small epiphallus which is simply a slight, poorly defined enlargement. Penis almost vestigial, internally without verge or special relief. Sarcobelum absent. Free oviduct large, stout, with well developed perivaginal gland. Spermathecal shaft bifurcated; its vaginal branch short, penial branch curved across free oviduct to enter proximal part of penis. Atrium very short.

DISTRIBUTION. NE U.S.A. and SE Canada. 1 sp.

NASTIINAE Riedel, 1989

Riedel, 1989: 366.

Left mantle lobe lacking accessory lap-pets.

Sole tripartite.

Right ommatophoran retractor passes through peni-oviducal angle.

Spermathecal stalk simple, without additional connection with penis or penis sheath.

DISTRIBUTION. NE Turkey.

Nastia Riedel, 1989

Fig. 1796

Riedel, 1989: 365.

TYPE SPECIES — *Nastia viridula* Riedel, 1989; monotypy.

Shell much depressed, thin, translucent, very shining, of 4.75-5 moderately convex whorls. Last whorl rounded at periphery. Color pale greenish-yellow. Postembryonic whorls with very fine radial striation and microscopical, close-set, spiral lines. Aperture rather large, subcircular, moderately oblique. Umbilicus rather narrow, funnel-shaped, perspective. Diam. 12-14 mm (holotype: height 5.9, diam. 12.0 mm).

Vas deferens long, entering short epiphallus apically. Penis rather long, internally axially plicate. Sarcobelum supplied with paired, minute coronal gland, contains a long, slender, calcareous dart. Basal section of penis surrounded by a thin sheath. Penial retractor attached to epiphallus at base of vas deferens; besides, there is additional muscular band connecting apex of sarcobelum with penis at upper margin of penis sheath. Free oviduct and vagina of about equal length, moderately short. Perivaginal gland well developed, surrounds distal part of free oviduct and vagina. Spermathecal stalk rather long, somewhat enlarged basally.

DISTRIBUTION. East part of Pontic Mountains (NE Turkey). 1 sp.

ZONITOIDEA Mörch, 1864

Mörch, 1864: 5 (pro fam.).

Shell zonitoid to reduced (auriform), but never hidden; when reduced, spiral coiling reduced-like.

Sole tripartite or uniform. Caudal foss present or absent, caudal horn absent.

Jaw oxygnathous or plated, sometimes absent.

Flagellum missing. Epiphallus present. Penis short to long, internally with stimulators, tubercles or calcareous hooks; sometimes rudimentary. Penial gland absent. Penial caecum present or absent. Penis sheath present or missing. Sarcobelum wanting (exception: in *Troglaeopis* there is a sarcobelum-like structure). Vagina simple or with internal papilla (ovipositor). Perivaginal gland present. Atrial appendix absent. Spermatophores, when present, without spines.

Omnivorous or carnivorous.

DISTRIBUTION. Holarctic, N Africa and Central America; Hawaii; Norfolk Island.

ZONITIDAE Mörch, 1864

Mörch, 1864: 5.

— Hyaliniinae Strebel et Pfeffer, 1880: 17

Riedel, 1980: 10.

Shell low-conic to flat, mostly thin, translucent, smooth, generally weakly sculptured, colorless to chestnut, rarely with darker peripheral bands. Aperture simple or (in a few cases) with teeth. Umbilicus, a minute perforation to wide, sometimes closed.

Cephalopodium usually with more or less developed slit-like caudal foss, without caudal horn. Sole undivided (Pristilomatinae) or tripartite (rest groups). Mantle as a whole without shell-lappets (a few exceptions in *Oxychilus*), left neck-lappet mostly with smaller lower accessory lappet.

Jaw aulacognathous, very rarely (*Pristiloma* and *Ogaridiscus*) polyplacognathous.

Reproductive apparatus often with various, sometimes complex inner structure. Vagina usually surrounded by perivaginal gland. Penis mostly with short caecum, internally of various structure.

DISTRIBUTION. Holarctic, N Africa and Central America; Hawaii; Norfolk Island.

PRISTILOMATINAE Cockerell, 1891

Cockerell, 1891 216 (as Pristilominae).

— Ariophantinae Baker, 1928: 23 (non Godwin-Austen, 1888).

— Vitreinae Thiele, 1931: 587

Shell mostly glass-like, minute to small (diam. 1-6, very rarely up to 8 mm), colorless to corneous.

Left neck-lappet of mantle usually somewhat subdivided, that is with smaller lower accessory lobe.

Sole smooth, uniform.

Orifice of genital atrium located close to base of lower tentacle (exception: *Paravitrea*).

Jaw of polyplacognathous type.

Vas deferens very short to moderate in length. Penial caecum present or absent; when present, penial retractor attached to it apically. Penis internally with axial folds or with peculiar stimulator(s); verge present or absent. Penis sheath absent or thin, usually transparent. Perivaginal gland present. Spermatheca variously developed, may be absent.

DISTRIBUTION. Pacific coast of N America from Alaska to California, eastwards to Montana and Idaho; Mexico; Afghanistan; south of Russian Far East, Japan, Korea, Taiwan, Hawaii; ? Norfolk Island.

Pristilomatini Cockerell, 1891

Penis internally with axial folds. Spermatheca normally developed.

DISTRIBUTION. As in subfamily.

Pristiloma Ancey, 1887

Ancey, 1887: 54 (nom. nov. pro *Pristina* Ancey, 1886 et *Anceyia* Pilsbry, 1886).

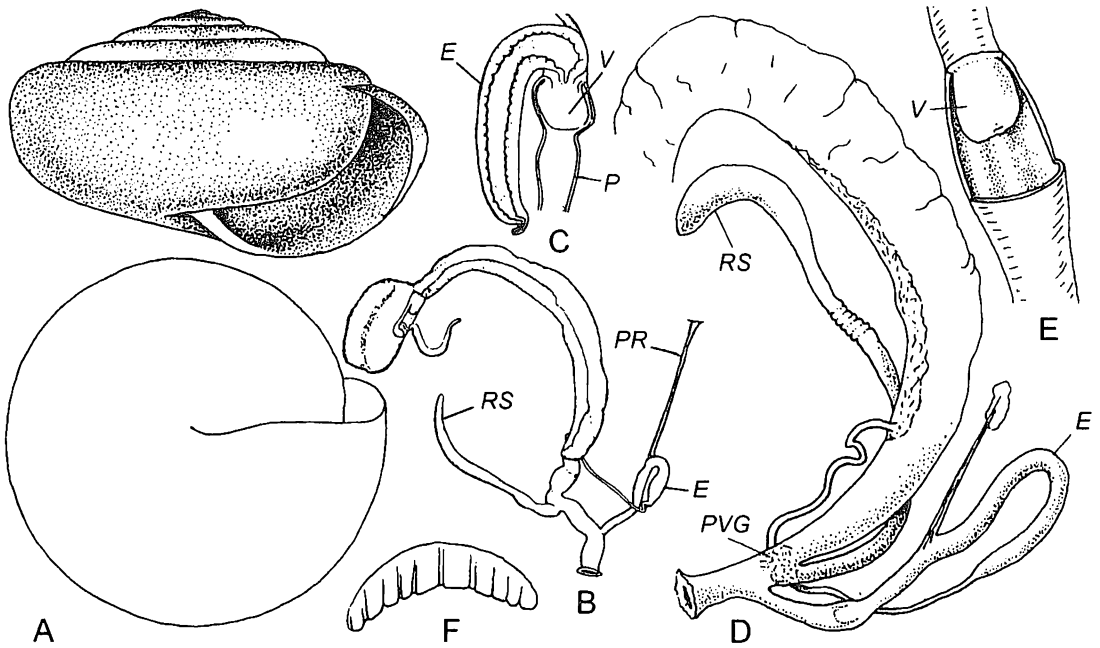


Fig. 1797 A, B, C — *Pristiloma (Pristinopsis) idahoense* Pilsbry, 1902. A — shell: Stevens Ranch, Weiser Canyon, Adams Co., Idaho. Holotype. Phil. No. 82353a. B — reproductive tract. C — interior of epiphallus and penis. After Baker, 1931.
D, E, F — ! *Pristiloma (Pristinopsis) japonicum* Pilsbry et Hirase, 1903. Dubovoye settlement, Kunashir Island, Kuril Islands, September 3, 1971. D — reproductive tract. E — interior of penis. F — jaw. SPb.

— *Pristina* Ancey, 1886: 20 [*Hyalina* subg.; nom. praeocc., non Ehrenberg, 1831 (Vermes); t.-sp. not designated, taxon established for *Zonites stearnsi* Bland, 1875 and *Zonites lansingi* Bland, 1875].

— *Anceyia* Pilsbry, 1886: 26 (nom. nov. pro *Pristina* Ancey; nom. praeocc., non Mabilie, 1886).

Riedel, 1980: 29.

TYPE SPECIES — *Zonites stearnsi* Bland, 1875; SD Baker, 1930a.

Shell small to minute, depressed to almost flat, polished, of 4.5-6 moderately to slightly convex whorls. Last whorl rounded to scarcely angulated. Periostracum corneous or hyaline. Embryonic whorls smooth. Postembryonic whorls with weak, irregular radial wrinkles (exception: species of *Pristiloma* s. str. have distinct radial grooves on upper surface) crossed by very fine, closely spaced, spiral striae. Aperture broadly or narrowly lunate, lacks internal armature (except in *Pristinoides*). Umbilicus narrow or absent.

Jaw polyplacognathous, consisting of separate or partially fused plates.

Epiphallus enters penis apically or laterally, mostly through verge. Penis with or without terminal flagellum. Penial retractor attached to penis apically or to epiphallus. Perivaginal gland surrounds free oviduct. Atrium usually long.

DISTRIBUTION. Pacific coast of N America from Alaska to California, eastwards to Montana and Idaho. 1 species in NE Asia.

Pristiloma (Pristinopsis) Baker, 1931 Fig. 1797

Baker, 1931 86.

— *Pristinopsis* Pilsbry, 1946: 395 (err. typogr. pro *Pristinopsis*).

TYPE SPECIES — *Pristiloma idahoense* Pilsbry, 1902; OD.

Shell subglobose-depressed, glossy, of 5.5-6 moderately convex whorls. Last whorl rounded or obsolete angulate above midline. Color uniformly yellowish-corneous, tawny-brown or pinkish-buff. Postapical sculpture of very slight radial wrinklets near suture and (sometimes) weak spiral lines.

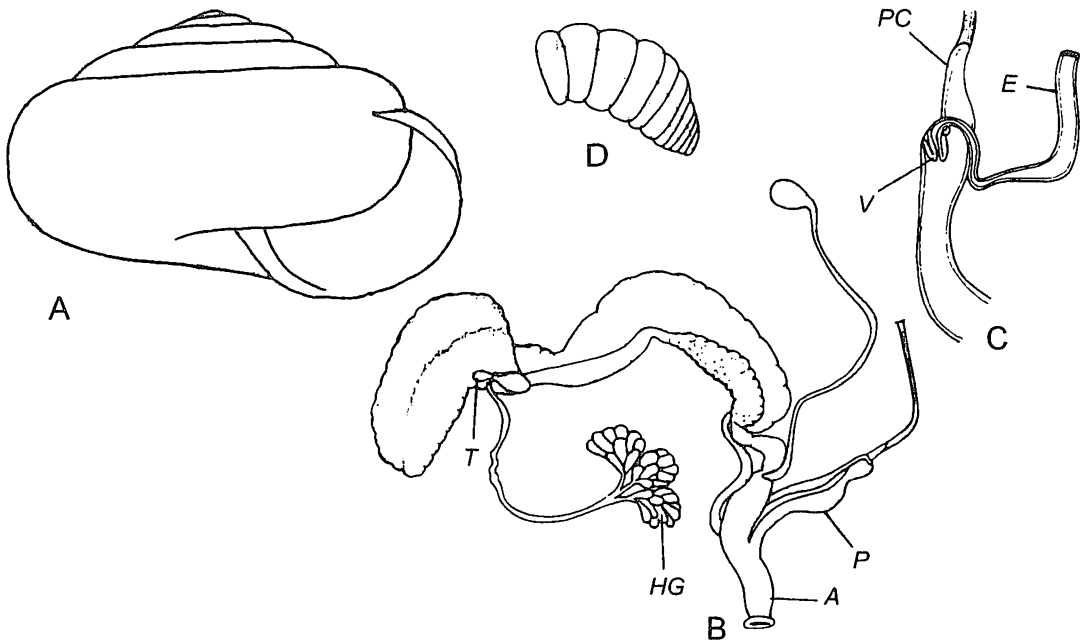


Fig. 1798. *Pristiloma (Priscovitrea) chersinella* (Dall, 1886).
 A — shell. B — reproductive tract. C — interior of penis. D — half of jaw. After Baker, 1931

Aperture narrowly lunate, simple, subvertical. Umbilicus absent. Height 1.3-2.1, diam. 3.0-3.4 mm (1.6 × 3.2 mm).

Hermaphroditic gland of 3 clusters of acini. Talon stout, recurved. Vas deferens rather short, entering shorter epiphallus terminally. Penis elongate, internally with subglobular verge. Lower section of penis thin-walled, with weak axial folds. Penial retractor inserting near base of epiphallus. Free oviduct quite short, with a weak perivaginal gland. Vagina of about same length. Spermathecal stalk sometimes with enlargement which contains some glandular tissue; reservoir poorly differentiated.

DISTRIBUTION. E Asia (N Japan, Sakhalin and Kurile Islands, S Kamchatka); NE America (Alaska, Oregon, Washington, Idaho). 4 spp. & subspp.

Pristiloma (Priscovitrea) Baker, 1931
 Fig. 1798

Baker, 1931: 86 (pro gen.).

TYPE SPECIES — *Helix chersinella* Dall, 1886; OD.

Shell depressed-globular, shining, of 4.5-

5 moderately convex whorls. Last whorl evenly rounded at periphery. Color yellowish. Postnuclear sculpture of weak, irregular radial lines. Aperture lunate, comparatively broad, a little oblique. Umbilicus very narrow, slit-like. Height 1.0-2.3, diam. 2.0-3.6 mm.

Hermaphroditic gland of 3 clusters of clavate acini. Talon drop-like. Vas deferens thin-walled, markedly enlarged throughout most of its length, enters penis subterminally through tiny conic verge. There is a rather short, conic flagellum. Penis internally with 2-3 axial folds. Penial retractor attached to flagellum apically. Free oviduct short, perivaginal gland surrounds its distal half. Vagina long, swollen. Spermathecal stalk long, slender, reservoir small, well expressed.

DISTRIBUTION. Western territories of N America (Washington, Oregon, ? Idaho, Montana, California). 1 or 2 spp.

Pristiloma (Pristinoides) Baker, 1931
 Fig. 1799

Baker, 1931: 86 (pro subg.); 89 (pro subg. of sect. of *Pristiloma* s. str.).

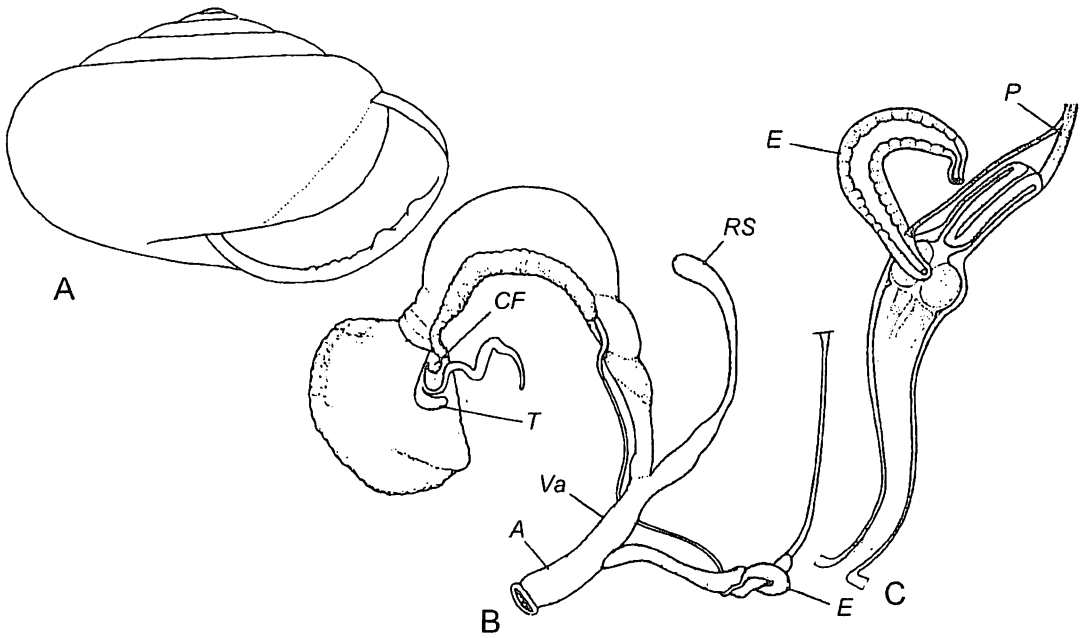


Fig. 1799. *Pristiloma (Pristinoides) lansingi* (Bland, 1875).
 A — shell. B — reproductive tract. C — interior of penis. After Baker, 1931.

TYPE SPECIES — *Zonites lansingi* Bland, 1875; OD.

Shell orbicular-depressed, shining, of about 5.5 rather convex whorls. Last whorl obsoletely angular above mid-line. Base convex, a little impressed around umbilical depression. Color dark-corneous. Postapical whorls with rather close, unequally spaced radial wrinkles, strongest near suture, very much reduced on nearly smooth base. Aperture narrowly lunate, slightly oblique; basal and palatal margins with callous lip bearing minute tubercles. Umbilicus absent. Height up to 1.3, diam. up to 3.0 mm (1.28 × 3.00 mm).

Hermaphroditic gland of 2 clusters of acini. Vas deferens developing short, stout epiphallus which enters laterally between apical and middle thirds of elongate penis. Internally penis with verge which followed by a pair of short, rounded tubercles on each side of verge; basal 2/3 of penis occupied by 2 heavy pilasters. Penial retractor inserting apically but with slender branch to base of epiphallus. Free oviduct elongate, with poorly developed perivaginal gland; vagina somewhat shorter. Spermathecal

stalk enlarged basally, reservoir slightly differentiated.

DISTRIBUTION. Western regions of N America (British Columbia, Washington, Oregon, California). 1 sp.

Pristiloma (Pristiloma s. str.)
 Fig. 1800

Shell depressedly globose, with convex base, glossy, subtransparent, of 6.3-7 slightly convex whorls. Color corneous, base paler. Embryonic whorls smooth. Postapical whorls with rather close, deeply impressed radial grooves which fade out on periphery, leaving base marked with rather close, low radial wrinkles; besides, on base there is microscopical, indistinct spiral striation. Aperture rather narrowly crescentic, subvertical, with thin margins becoming thickened within near columellar margin. Umbilicus absent. Height 1.7-2.7, diam. 2.5-3.8 mm.

Ovotestis composed of 6-7 clumps of elongate, sometimes bifid acini. Penis without flagellum, epiphallus enters terminally. Penial retractor inserted onto middle portion of epiphallus. Oviduct very short. Vagina nearly absent. Perivaginal gland lo-

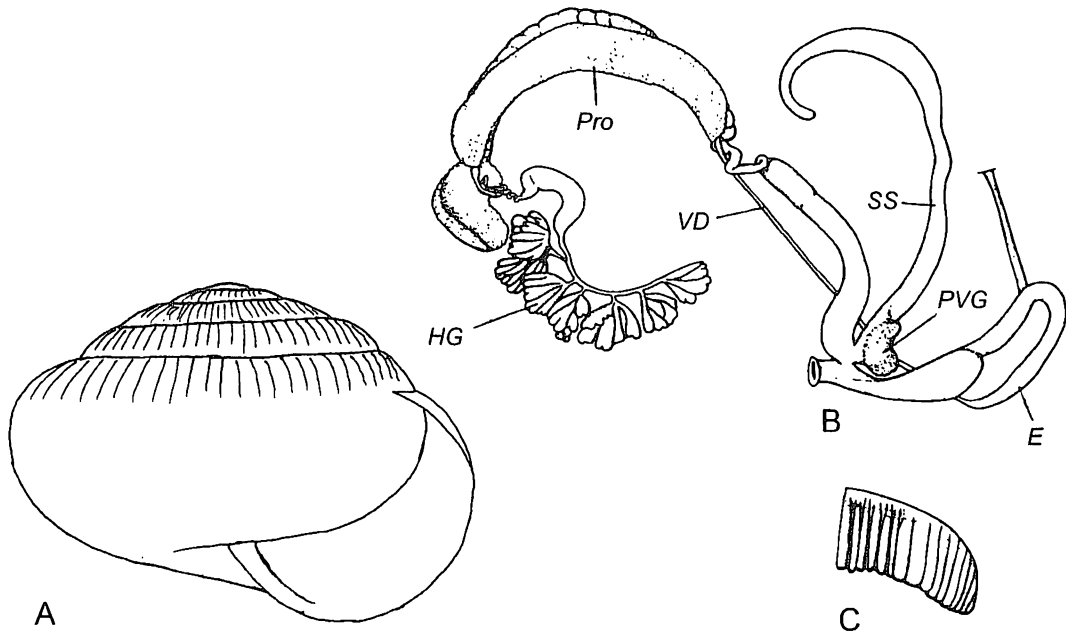


Fig. 1800. *Pristiloma (Pristiloma) stearnsi* (Bland, 1875).

A — shell. After Pilsbry, 1946. B — reproductive tract. C — interior of penis. After Baker, 1931

cated on base of spermathecal stalk. No visible boundary between stalk and reservoir of spermatheca.

DISTRIBUTION. W Canada (British Columbia), N and NW U.S.A. (Alaska, Washington, Oregon). 2 spp.

Pristiloma (Priscovitreaops)

Baker, 1931)

Fig. 1801

Baker, 1931 86 (pro subg.); 88 (pro sect. of subg. *Priscovitrea* of *Pristiloma*).

TYPE SPECIES — *Pristiloma nicholsoni* Baker, 1930; OD.

Shell much depressed to almost flat, hyaline, shining, of 3.5-4.5 wide whorls. Last whorl evenly rounded. Color corneous or shell nearly colorless when fresh. Postapical surface mostly with delicate radial lines. Aperture ovate, comparatively broad, slightly oblique. Umbilicus narrow to closed. Height 1.0-2.5, diam. 2.0-4.8 mm (1.08 × 2.02 mm).

Ovotestis of 4 clusters of acini. Talon

lanceolate. Vas deferens enlarged distally to form a short epiphallus. Flagellum absent. Penis internally with minute verge and large, glandular pilaster. Penial retractor inserting on apex of penis. Free oviduct moderate in length, almost covered by perivaginal gland. Vagina short. Spermathecal stalk rather long, demarcation between it and reservoir quite visible.

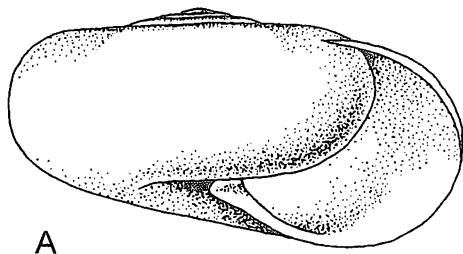
DISTRIBUTION. Western regions of N America (British Columbia, Washington, Oregon, California). 6 spp.

Paravitrea Pilsbry, 1898

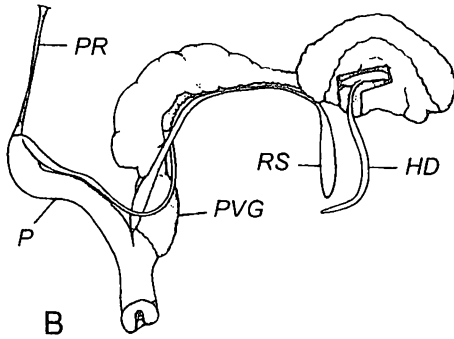
Pilsbry, 1898: 130 (*Vitrea* sect.). Riedel, 1980: 46.

TYPE SPECIES — *Helix capsella* Gould, 1851; SD Baker, 1928.

Shell flattened, thin, polished, glass-like, of 5-7 whorls. Last whorl rounded at periphery. Color corneous to hyaline. Embryonic whorls smooth. Postapical sculpture delicate, usually of major and minor series of radial wrinklets, which less prominent on



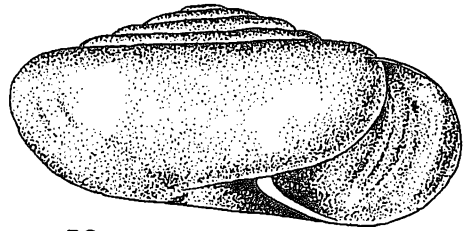
A



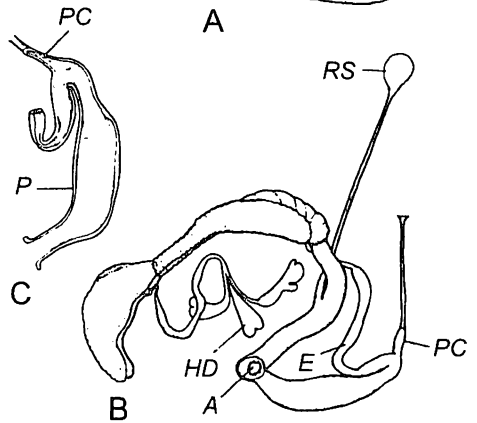
B

Fig. 1801 *Pristiloma (Priscovitreops) nicholsoni* Baker, 1930.

A — shell: 2 miles south of Lagunitas, Marin Co., California. Lectotype. Phil. No. 149978a. B — reproductive tract. After Baker, 1931.



A



B

Fig. 1802. *Paravitrea (Pectovitrea) variabilis* (Baker, 1929).

A — shell: Cumberland Escarpment about 2 miles northwest of Pikeville, Bledsoe Co., Tennessee. Holotype. Phil. No. 147190a. B — reproductive tract. C — interior of penis and epiphallus. After Baker, 1931

basal surface; spiral lines may be present. Aperture with simple margins. Within shell there are baso-palatal radial rows or pairs of teeth or radial barriers, usually recurring at intervals, and developed chiefly at postembryonic stage, usually reduced or wanting in adults or absent at all stages of growth. Parietal or columellar lamellae missing, internal armature commonly reduced at adult stage. Umbilicus narrow to dot-like. Jaw with about 5 vestigial, rib-like thickenings which form medium point on cutting edge.

Right ommatophoran retractor free from peni-oviduct angle.

Hermaphroditic duct quite long, straight or weakly convoluted. Vas deferens short. Epiphallus well developed. Penis large, with or without caecum. Penial retractor attached to penis or caecum (when present). Free oviduct rather long. Vagina moderately short to rather long. Perivaginal gland wanting. Spermathecal stalk rather long; reservoir globular or elongated, (nearly) reaching albumen gland.

Right ommatophoran retractor free from peni-oviduct angle.

DISTRIBUTION. Eastern regions of the U.S.A. and SE Canada.

Paravitrea (Pectovitrea) Baker, 1931 Fig. 1802

Baker, 1931: 97, 98 (pro gen.).

TYPE SPECIES — *Paravitrea variabilis* Baker, 1929; OD.

Shell depressed-conic, glass-like, shining, of 5.5-6.5 convex whorls. Last whorl with blunt, rounded angle above mid-line. Suture margined. Color very pale-yellowish to corneous. Embryonic whorls with delicate, regular radial wrinklets. Postnuclear whorls with same but less regular, denser wrinkles and microscopic spiral lines in intervals and over wrinkles. On base radial wrinkles markedly weaker. Aperture semilunate, a little oblique. Internal armature present at most stages of growth. Umbilicus rather narrow, subcylindrical. Height 1.45-1.81, diam. 2.90-3.57 mm (1.60 × 3.20 mm).

Ovotestis of 3, weakly lobed, clavate clumps. Talon vermiform, over 3 times

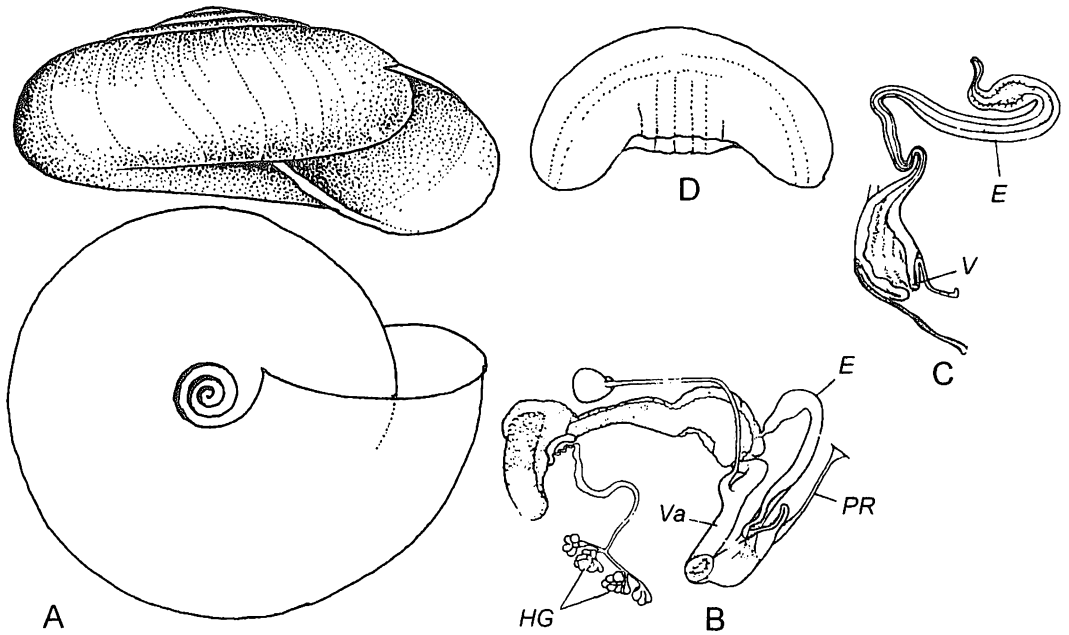


Fig. 1803. *Paravitrea (Petrovitrea) petrophila* (Bland, 1883).

A — shell: Knoxville, Knox Co., Tennessee. Vienna. B — reproductive tract. C — interior of epiphallus and penis. D — jaw. After Baker, 1931.

shorter than carrefour. Epiphallus long-clavate, continuous with penial apex, without distinct verge. Penis with a small caecum, internally with weakly anastomosing, convoluted axial folds which may break into rows of papillae near apex. Penial retractor attached to caecum apically. Free oviduct rather long but shorter than vagina. Atrium very short. Spermathecal shaft long, more or less swollen basally; reservoir lanceolate or globular.

DISTRIBUTION. U.S.A.: Tennessee and North Carolina. 2 or 3 spp.

Paravitrea (Petrovitrea)
Baker, 1931)
Fig. 1803

Baker, 1931: 97, 99.

TYPE SPECIES — *Zonites petrophila* Bland, 1883; OD.

Shell depressed, thin, glass-like, shining, transparent, of 4.5-6 moderately convex whorls. Last whorl rounded at periphery. Colorless. Embryonic whorls smooth. Postapical sculpture consisting of widely spaced, engraved radial lines that better vis-

ible near suture. Aperture ovate, subvertical, apparently without internal armature at any stage. Umbilicus not wide but perspective. Height 2.2-3.0, diam. 4.4-6.0 mm (2.3 × 4.4 mm).

Hermaphroditic gland of 4 clusters of ovoid acini. Talon much longer than carrefour. Vas deferens extremely short. Epiphallus clavate, swollen near apex. Penis short, fusiform, stout; its apical 2/3 containing a plicate chamber which extends into large verge that almost half fills short, quite thin, simple-walled penis proper. Penial retractor attached to side of penis near apex of mentioned chamber. Free oviduct rather long, vagina of about same length. Spermathecal stalk rather long, a little enlarged basally; reservoir globular.

DISTRIBUTION. U.S.A.: Oklahoma, Arkansas, Tennessee, Kentucky, Alabama, Virginia. 3 spp. (anatomy of 2 of them unknown).

Paravitrea (Paravitreops Baker, 1928)
Fig. 1804

Baker, 1928: 24, 29 (*Paravitrea* sect.).

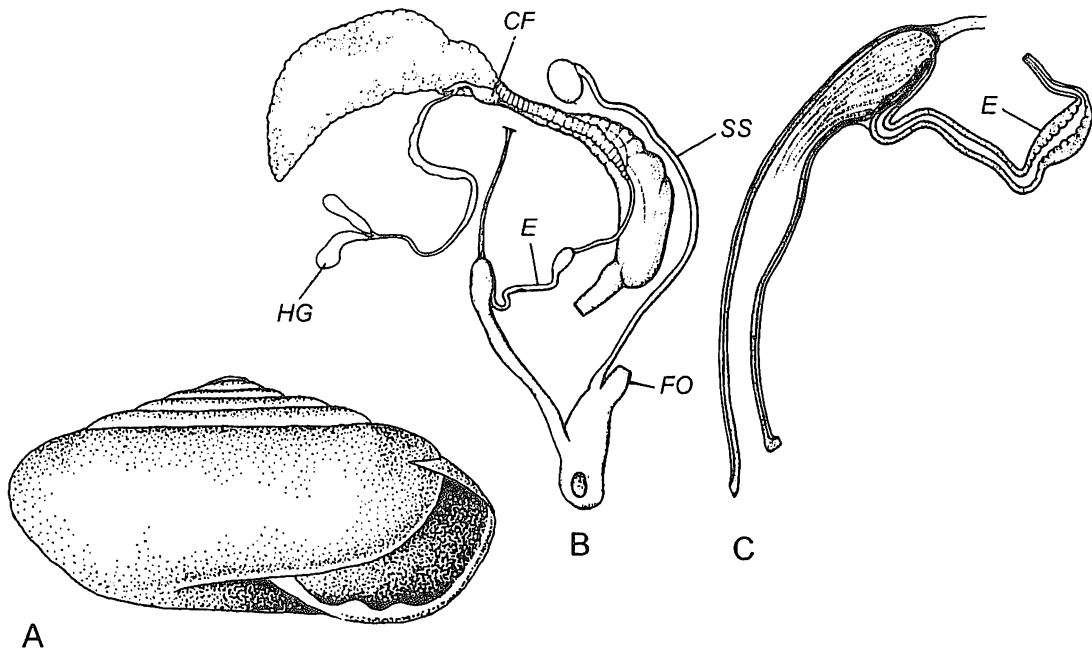


Fig. 1804. *Paravitrea (Paravitreops) multidentata* (Binney, 1840).

A — shell: Ithaca, New York. Vienna No. K 31903. B — reproductive tract. C — interior of epiphallus and penis. After Baker, 1928.

— *Parmavitrea* Baker, 1931 97 (pro subg.); 98 [pro sect. of *Paravitrea* s. str.; t.-sp. *Paravitrea (Parmavitrea) pontis* Baker, 1931; OD].

TYPE SPECIES — *Helix multidentata* Binney, 1840; OD.

Shell depressed, shining, semitransparent, of 6-7 slightly convex whorls. Color yellowish or shell colorless. Embryonic whorls smooth. Postapical sculpture of smoothed, fine radial wrinklets; on base there is delicate but distinct spiral striation. Aperture semioval, only slightly oblique, with 2-6 baso-palatal folds which may fuse to form radial lamella; in adults apertural armature lacking. Umbilicus narrowly open. Height 1.8-2.8, diam. 2.4-4.8 mm (2.7 × 4.7 mm).

Ovotestis of 2-4 clavate, weakly lobate clusters. Hermaphroditic duct nearly straight. Talon small, fusiform, shorter than carrefour. Vas deferens moderately short, entering apical enlargement of epiphallus terminally. Walls of this enlargement thick, probably glandular. Epiphallus joins penis subapically through a simple pore. Penis rather long, slender, somewhat swollen at upper end; internally swollen chamber axially plicated. Penis sheath extremely thin, coating all length of penis. Free oviduct me-

dium in length. Vagina stout, quite short. Spermathecal stalk scarcely swollen basally; reservoir ovoid, lies on side of albumen gland.

DISTRIBUTION. SE Canada, U.S.A. (Ney York, Tennessee, North Carolina, Virginia, Missouri, Arkansas, Oklahoma, Mississippi, Alabama, Florida). 6 spp. and few forms.

Paravitrea (Paravitrea s. str.)
Fig. 1805

— ? *Taxodontia* Pilsbry, 1898: 132 (*Gastrodonta* subg.; t.-sp. *Helix significans* Bland, 1866; monotypy).

— Hubricht, 1978: 37

Shell flattened to dome-shaped, thin, glass-like, of 5.5-8 whorls. Last whorl rounded at periphery. Colorless. Postapical sculpture of well spaced, radial grooves or wrinklets. Aperture widely lunate, slightly to moderately oblique; last whorl in juvenile shells internally with sets of tubercles which in adults may be absent. Umbilicus profound, minute to moderately wide. Height 1.6-4.3, diam. 3.0-7.8 mm (1.9 × 3.8 mm).

Ovotestis of 6-8 clusters of acini. Talon

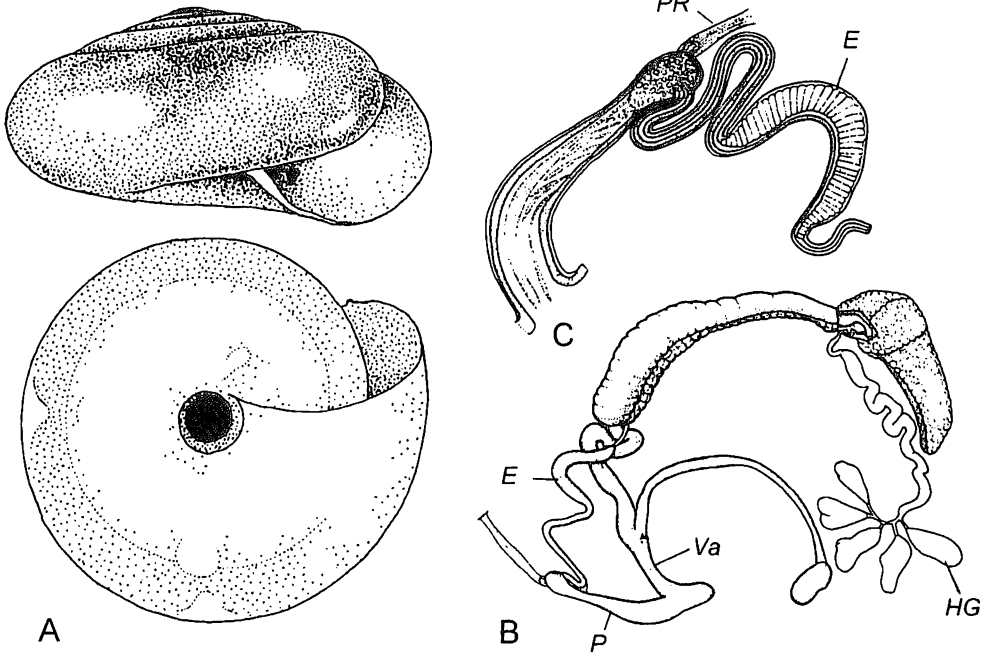


Fig. 1805. A — ! *Paravitrea (Paravitrea) capsella lacteodens* (Pilsbry, 1903). Shell: Near Wetumpka, Alabama. Vienna No. R 71.593/2.
 B, C — *Paravitrea (Paravitrea) capsella capsella* (Gould, 1851). B — reproductive tract.
 C — interior of penis and epiphallus. After Baker, 1928.

ellipsoid, shorter than carrefour. Vas deferens extremely short. Epiphallus rather long, cylindrical, opening through longitudinal slit at base of side of teat-shaped verge, nearly 1/3 as long as penis. Caecum reduced in size or missing. Penis stout but with short, basal, stalk-like constriction; apical third demarcated to form vergic sac by a heavy sphincteric fold and internally complicated by diamond-shaped papillae; axial pilaster may be present. Penial retractor inserted on penial apex above entrance of epiphallus or below it. Free oviduct and vagina medium to long, subequal in length. Spermathecal stalk gradually swollen toward base; reservoir ovoid to subglobular, reaching albumen gland.

DISTRIBUTION. U.S.A. (Tennessee, Alabama, West Virginia, North Carolina, Kentucky, Oklahoma, Mississippi, Illinois, Georgia). 19 spp. & subsp. (anatomy of 13 of them unknown).

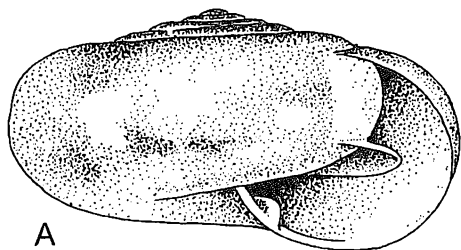
Pilsbryna Baker, 1929
 Fig. 1806

Baker, 1929a: 91 (pro genus). Riedel, 1980: 51.

TYPE SPECIES — *Pilsbryna aurea* Baker, 1929; OD.

Shell much depressed, thin, shining, semitransparent, of 4-5.5 slightly convex whorls. Last whorl evenly rounded. Color pale-yellowish. Embryonic whorls smooth, polished. Later whorls with fine, irregular radial wrinkles and microscopic spiral lines in intervals. Aperture semilunate, slightly oblique, with parietal and columellar lamellae continuously elongate with new growth and simultaneously absorbed at their inner ends. Umbilicus moderately wide. Height 0.67-1.85, diam. 1.6-3.64 mm (1.16-1.80 mm).

Ovotestis of 5 clumps of acini. Talon small, exposed. Vas deferens very short. Epiphallus long, enlarged. Penis with apical half swollen and internally armed by rows of thorn-shaped papillae; verge low, inconspicuous. Penial retractor inserting laterally a short distance below markedly recurved penial apex. Free oviduct with slight outgrowth on one side; vagina shorter. Spermathecal shaft a little swollen basally; reservoir rather small, (nearly) attending albumen gland.



A

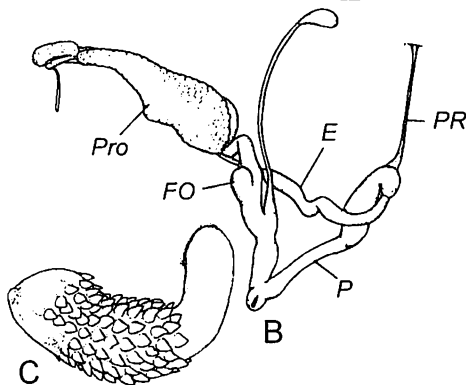
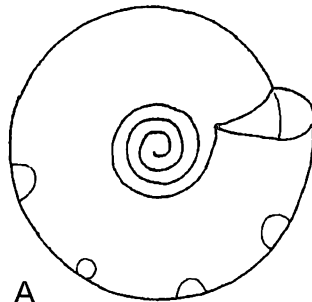
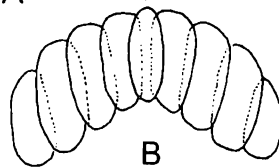


Fig. 1806. *Pilsbryna aurea* Baker, 1929.
A — shell: Limestone Cave, near Unicoi, Unicoi Co., Tennessee. Holotype. Phil. No. 147189a. B — reproductive tract. C — everted penis. After Baker, 1929a.



A



B

Fig. 1807 *Clappiella aldrichiana* (Clapp, 1907).
A — shell. After Clapp, 1907 B — jaw. After Baker, 1930a.

DISTRIBUTION. East of U.S.A. (S Appalachian and Ozark Plateau). 3 spp.

? *Clappiella* Baker, 1929
Fig. 1807

Baker, 1929a: 90 (*Gastrodonta* subg.).

TYPE SPECIES — *Vitrea* (*Paravitrea*) *aldrichiana* Clapp, 1907; OD.

Shell depressed to nearly flat, thin, sub-transparent, shining, of about 5 convex whorls. Last whorl broadly rounded. Color greenish or greenish-white. Embryonic whorls smooth. Later whorls with weak radial lines and spiral lines or threadlets. Aperture crescentic, with thin lip, slightly oblique to subvertical. Last half of body whorl with a series of several successive vertically lengthened palatal teeth, alternating with smaller teeth in a columellar series. Umbilicus wide, shallow, quite perspective. Height 1.0-1.6, diam. 2.0-3.5 mm.

Jaw consisting of 9 plates, which firmly soldered together and which slightly overlap each other from center out.

DISTRIBUTION. East of U.S.A. (Alabama, Tennessee, South Carolina). 2 spp.

REMARK. Hubricht (1964) has transferred *Clappiella* to *Helicodiscidae*. In all probability he is right but I postpone the definite decision until the anatomy of *Clappiella aldrichiana* is known.

Pycnogyra Strebel et Pfeffer, 1880
Fig. 1808

Strebel & Pfeffer, 1880: 20. Riedel, 1980: 27

TYPE SPECIES — *Helix berendti* L. Pfeiffer, 1861; monotypy.

Shell depressedly conic, thin, of 6.5-8 tightly coiled, quite convex whorls. Last whorl with rounded, smoothed peripheral angle. Color light-corneous to whitish. Embryonic whorls smooth. Postapical whorls with fine, regular, radial riblets and microscopical, crowded, spiral striae in interstices. Aperture narrow, semilunate, somewhat oblique. Umbilicus wide, shallow. Height 2.0-2.5, diam. 3.5-4.5 mm (2.0 × 3.7 mm).

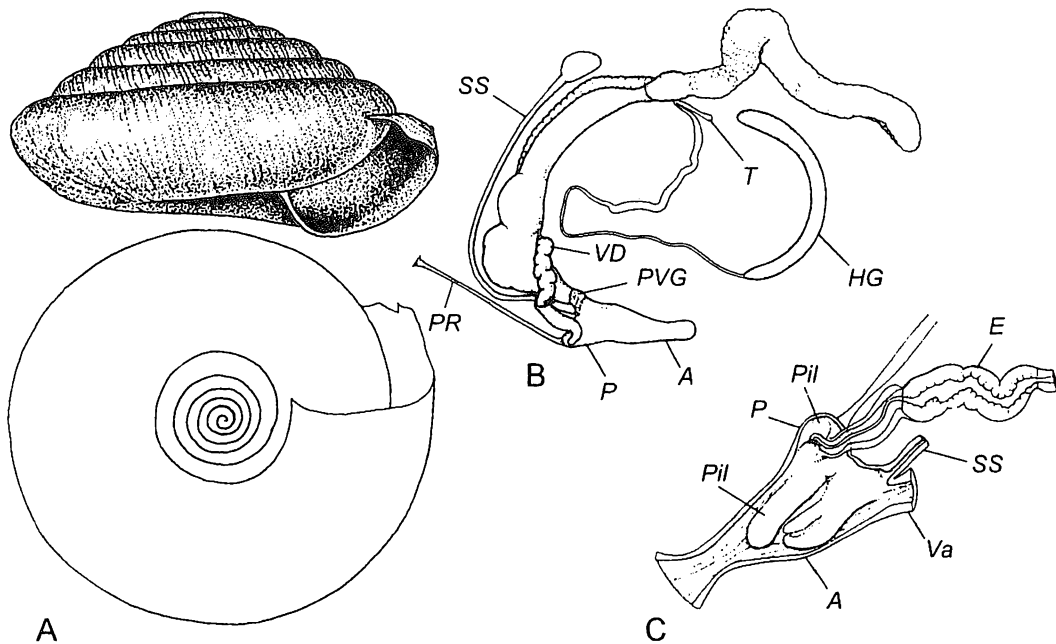


Fig. 1808. *Pyncogyra berendti* (L. Pfeiffer, 1861).

A — shell: Jalapa, Mexico. Zürich No. 503380. B — reproductive tract. C — interior of penis. After Baker, 1928.

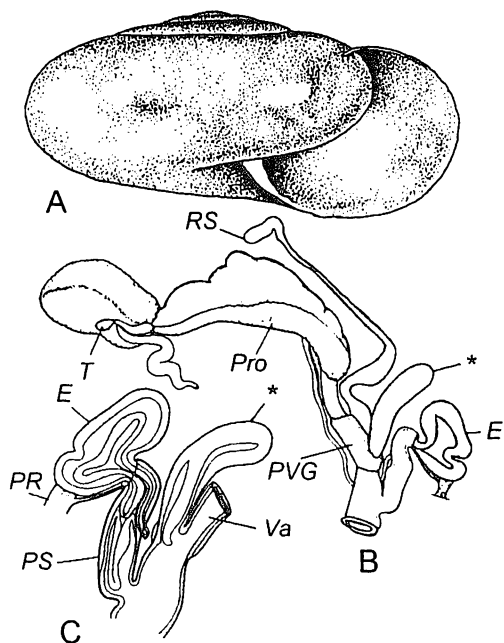


Fig. 1809. *Ogaridiscus subrupicola* (Dall, 1877).

A — shell: Near Clinton's Cave, Lake Point, Tooele Co., Utah. Phil. No 158711 B — reproductive tract. C — interior of distal section of genitalia. After Baker, 1931 *Asterisk* — additional organ on spermathecal stalk.

Right ommatophoral retractor passes through peni-oviducal angle.

Ovotestis long, sausage-shaped; hermaphroditic duct very long, not convoluted, swollen in basal 2/3. Talon exposed, long-clavate. Vas deferens short, stout, convoluted. Proximal part of epiphallus thick-walled, with glandular walls. Penis short, internally with pocket-shaped pilaster, bordered ventrally by heavy atrial folds. Penial retractor inserted on penis apex. Free oviduct short. Vagina very short, with a collar of perivaginal gland. Atrium elongate, its apical end swollen by large double pilaster with shortly free ends, which begins in angle between vagina and penis; remainder of cavity with longitudinally plicate inner surface. Spermathecal stalk subcylindrical, small reservoir (nearly) reaching base of albumen gland.

DISTRIBUTION. E Mexico. 1 sp.

REMARK. Hausdorf (1998: 56-57) synonymized the genus *Pyncogyra* with *Pseudohyalina* (Gastrodontiidae). However comparison of Fig. 1794 (*Pseudohyalina*) with Fig. 1808 (*Pyncogyra*) shows significant differences in anatomy of these taxa.

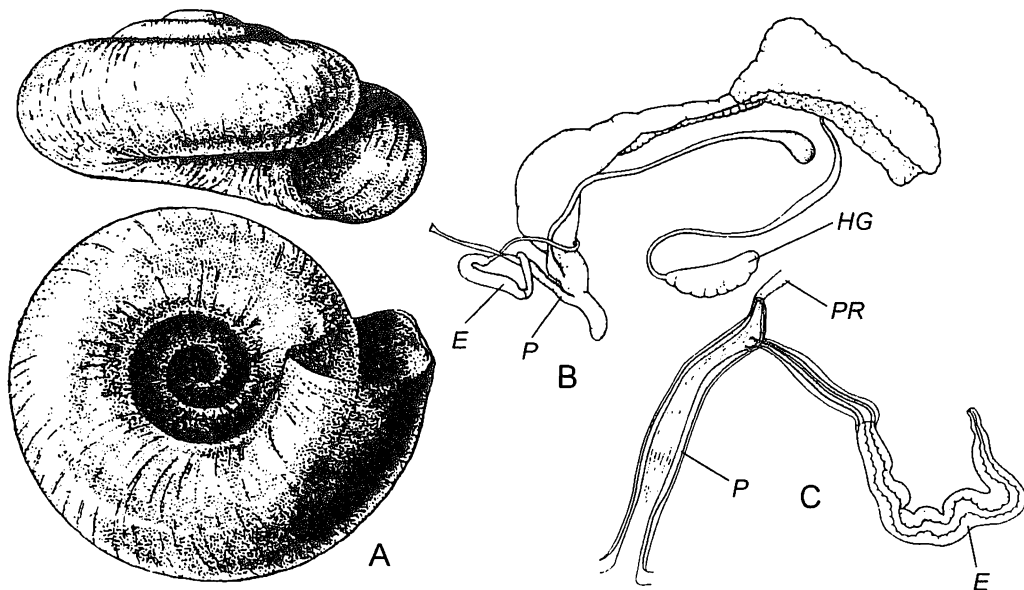


Fig. 1810. *Hawaiiia minuscula* (Binney, 1840).

A — shell: Naumova Island, Peter The Great Bay [Japan Sea], Russian Far East. Moscow No. Lc-7820. B — reproductive tract. C — interior of epiphallus and penis. After Baker, 1928.

Ogaridiscus

Chamberlin et Jones, 1929

Fig. 1809

Chamberlin & Jones, 1929: 96. Baker, 1931: 88.
Riedel, 1980: 33.

TYPE SPECIES — *Hyalina subrupicola* Dall in Packard, 1877; monotypy.

Shell as in subg. *Priscovitreoops* (*Pris-tiloma*) (see Fig. 1801), but with dot-like umbilicus. Whorls count 3.75-4.5. Height 1.6-2.2, diam. 3.0-5.5 mm (1.6 × 3.1 mm).

Jaw consists of separate or partially fused plates.

Talon exposed, ovate. Vas deferens rather long, slender, entering not long epiphallus terminally. Flagellum absent. Epiphallus comparatively stout. Penis fusiform, small, internally with a long verge. Penis sheath surrounds penis and distal part of vas deferens. Penial retractor inserting on proximal section of epiphallus. Free oviduct quite long, vagina markedly shorter. Perivaginal gland surrounds distal part of free oviduct and proximal part of vagina. At base of spermathecal stalk there

is a peculiar additional organ with muscular walls, containing a long papilla protruding in lumen of vagina. Spermathecal stalk quite long, somewhat expanded basally; reservoir small.

DISTRIBUTION. U.S.A. (Utah, Idaho, Oregon). 1 sp. (+ 1 subsp.?).

Hawaiiia Gude, 1911

Fig. 1810

Gude, 1911 272.

— ? *Macgillivrayella* Preston, 1913: 532 [nom. praecoc. non Ashmead, 1899; t.-sp. *Macgillivrayella crystallina* Preston, 1913; monotypy].

— ? *Johannesconcha* Preston, 1913: 533 (t.-sp. *Helix multivolta* Preston, 1913; OD).

— *Pseudovitrea* H. Baker, 1928: 25 (t.-sp. *Helix minuscula* Binney, 1840; OD).

Riedel, 1980: 28. B. Smith, 1992: 320.

TYPE SPECIES — *Helix kawaiensis* "L. Pfeiffer" Reeve, 1854 (= *Helix minuscula* Binney, 1840); monotypy.

Shell depressed, turritate, slender, thin, shining, vitreous, of 3.3-5 rather rapidly in-

creasing whorls. Last whorl scarcely ascending in front, with fine growth lines. Color white (shell colorless when fresh). Regular sculpture absent. Aperture lunate, oblique. Umbilicus narrow, well-like. Height 0.25-0.50, diam. 1.75-3.00 mm (0.9 × 2.4 mm).

Ovotestis compact, of 1 cluster of tightly packed acini. Hermaphroditic duct not convoluted. Talon long-stalked, buried, along with ellipsoid carrefour, in albumen gland. Vas deferens moderately short, entering epiphallus apically. Epiphallus fusiform, its apical part with thick, apparently glandular wall and large, plicate lumen; basal section slenderer, with heavy muscular wall and narrower lumen. Penis slender, small, with very short caecum, internally with strong axial folds; verge represented by a heavy pilaster which runs from apex of penis to just below epiphallic pore. Penis sheath very thin, intimate. Penial retractor inserted on apex of caecum. Free oviduct short, surrounded by perivaginal gland. Vagina very short. Spermathecal stalk a little swollen at base; reservoir embedded near base of albumen gland.

DISTRIBUTION. South of Russian Far East, Japan, Korea, Taiwan, N America, Hawaii, Norfolk Island; Afghanistan. 2 (+3 from Norfolk?) spp. and several subspp.

REMARK. I have not seen species of *Johannesocoacha*, and the type species of this genus has never been illustrated; but, judging by original description, this genus is somewhat similar to New Zealand *Phenacharopa*, differing mainly by sculptureless, transparent shell and white color. On the other hand, *Johannesocoacha multivolvra* somewhat recalls New Zealand *Laoma* (Punctidae) in having a high, smooth, shining shell, although it lacks apertural barriers.

Vitreini Thiele, 1931

Thiele, 1931 (1929-1935): 587 (pro subfam.).

Penis internally with peculiar stimulator(s). Spermatheca reduced to absent.

DISTRIBUTION. W Palearctic including N Africa; 1 sp. in Korean Peninsula.

Gyralina Andreae, 1902.

Andreae, 1902: 8 (*Hyalinia* subg.). Riedel, 1980: 43.

TYPE SPECIES — *Helix circumlineata* L. Pfeiffer, 1846; OD.

Shell strongly flattened, thin, glass-like, somewhat glossy, of 4.25-5.5 convex whorls. Last whorl rounded at periphery. Colorless. Embryonic whorls smooth. Postapical whorls with weak, more or less crowded radial striae, spiral sculpture variously developed; base almost smooth. Aperture rounded to semilunate, (almost) vertical. Umbilicus wide to very wide.

Left mantle lobe with a small accessory lappet below. Shell lobes absent.

Right ommatophoran retractor passes through peni-oviducal angle.

Vas deferens thin, long. Flagellum or caecum absent. Epiphallus thin, short to rather long. Penis long, slender, internally with numerous, small hooks or blade-like scales. Penis sheath comparatively thick, surrounding all penis, free at upper margin. Penial retractor attached laterally to vas deferens/epiphallus junction. Free oviduct rather short. Vagina very long. Perivaginal gland weak or not evident. Spermathecal stalk short to middle in length; reservoir small.

DISTRIBUTION. S Yugoslavia, N Albania, Corfu Island. Subterranean animals.

Gyralina (*Spelaeopatula*

A. Wagner, 1922)

Fig. 1811

Wagner A., 1922: 112 (pro gen.). Riedel, 1980: 44.

TYPE SPECIES — *Zonitoides candidus* A. Wagner in Wohlberedt, 1909; monotypy.

Shell flattened, thin, glass-like, of 4.5-5 moderately convex whorls. Suture deep. Last whorl rounded or slightly angulated at periphery. Color whitish to slightly yellowish. Later whorls with weak, more or less crowded radial striae, spiral sculpture very weak or absent. Aperture rounded to semilunate, its basal margin a little protruded. Umbilicus broad, rather deep, quite perspective. Height 2.1-3.2, diam. 4.2-7.1 mm.

DISTRIBUTION. S Herzegovina, S Dalmatia, N Albania, Macedonia. 5 spp.

Gyralina (*Gyralina* s. str.)

Fig. 1812

Shell much flattened, thin, glass-like, shining, translucent, of 4.5-5.5 (slightly) convex whorls; last whorl rounded or scarcely angulate at periphery. Practically

colorless. Upper surface of postapical whorls with distinct spiral cordlets, base practically smooth. Aperture semilunate, columellar margin somewhat reflexed; upper part of palatal margin detached from penultimate whorl for more or less long (up to about 1/4 of whorl) distance leaving a narrow slit. Umbilicus moderately broad, shallow, quite perspective. Height 2.0-2.4, diam. 5-7 mm (2.2 × 5.5 mm).

Hermaphroditic duct practically not convoluted. Talon not located. Vas deferens very long, thin, piercing upper margin of penis sheath, entering epiphallus apically without distinct boundary. Epiphallus rather long, narrow. Penis long, slender, internally with numerous, small, pointed hooks or scales. Penis sheath free above, surrounds penis and very distal part of epiphallus. Penial retractor attached to epiphallus at its junction with vas deferens. Free oviduct short. Vagina unusually long, its upper part coated by perivaginal gland. Spermathecal stalk short, reservoir lanceolate, not attending middle of spermoviduct.

DISTRIBUTION. S Dalmatia, W Montenegro, W and S Macedonia, Corfu Island. 12 spp.

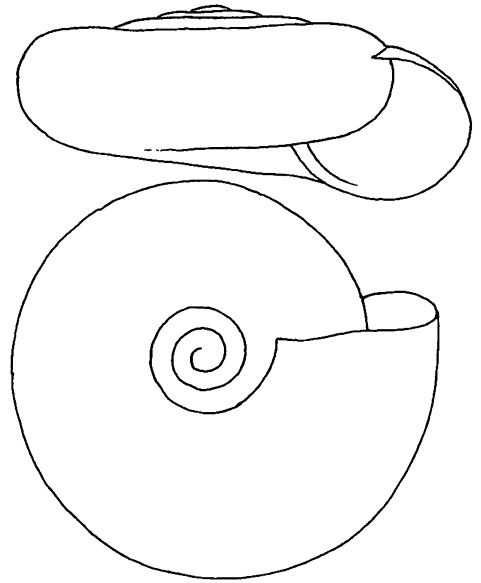


Fig. 1811 *Gyalina (Spelaeopatula) candida* (A. Wagner, 1909). After Riedel, 1980.

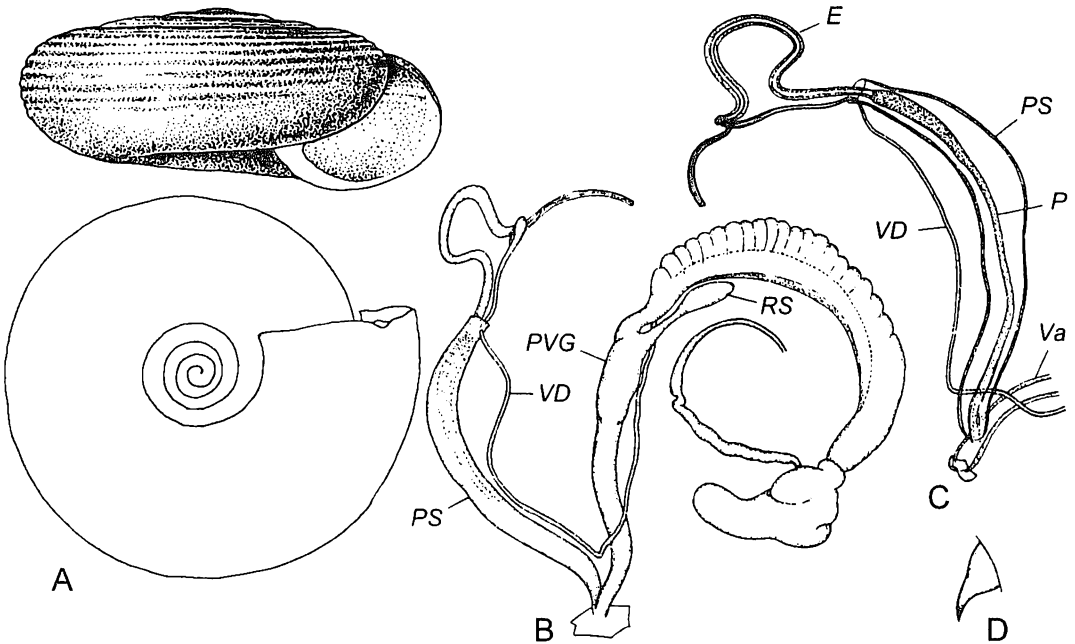


Fig. 1812. A — *Gyalina (Gyalina) circumlineata* (L. Pfeiffer, 1846). Dalmatia. Paris. B, C, D — ! *Gyalina (Gyalina) sattmanni* Riedel, 1990. B — reproductive tract. C — interior of penis. D — hook in penis, enlarged. After Riedel, 1990.

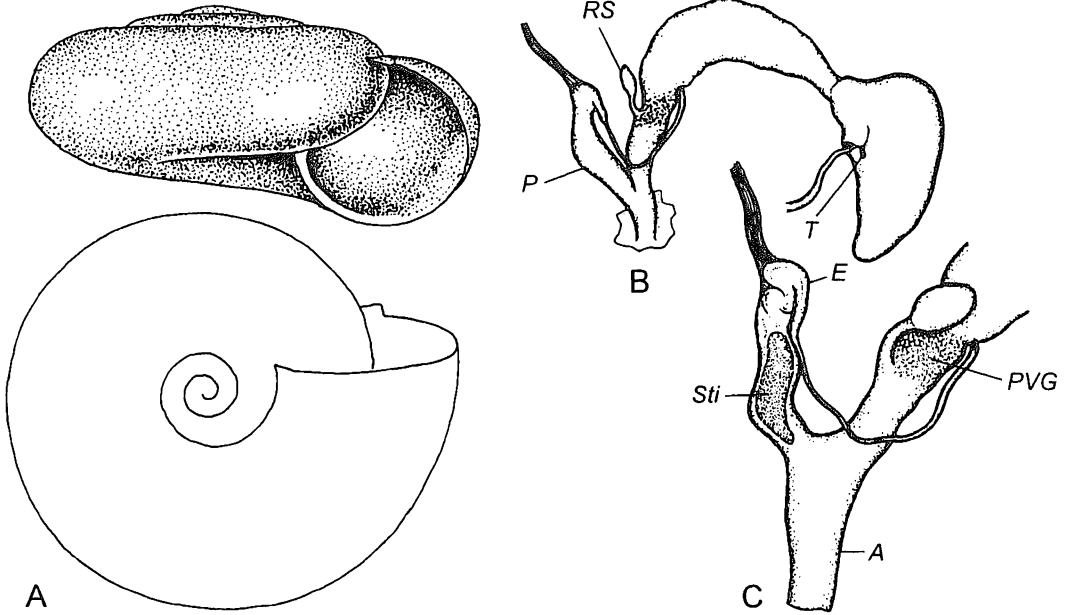


Fig. 1813. *Coreovitrea mroczkowskii* Riedel, 1967

A — shell: "N.-Korea, Prov. Chongdzin-si, Musu-ri, distr. Purjong, ad flux Susong-ehon" Paratype. SPb No. 106-1967 B — reproductive tract. C — distal parts of genitalia, enlarged. After Riedel, 1967

Coreovitrea Riedel, 1967
Fig. 1813

Riedel, 1967: 361.

TYPE SPECIES — *Coreovitrea mroczkowskii* Riedel, 1967; OD.

Shell as of *Vitrea*, depressed, glass-like when fresh, transparent, shining, of 4-4.5 slightly convex whorls. Last whorl rounded or scarcely compressed peripherally. Colorless. Embryonic whorls smooth. Postapical sculpture of microscopical, irregular, radial wrinkles. Aperture subcircular, a little oblique. Umbilicus wide, shallow, quite perspective. Height 1.2-1.6, diam. 2.8-3.5 mm (1.2 × 2.8 mm).

Left neck-lappet of mantle subdivided.

Hermaphroditic duct not convoluted. Talon minute, exposed. Vas deferens rather short, passes into epiphallus without sharp boundary. Epiphallus short, somewhat enlarged, enters penis apically. Penis rather short, stout, lacking caecum, slightly narrowed in basal part, internally with a large stimulator. Penial retractor attached to epiphallus laterally. Free oviduct short, surrounded by perivaginal gland; vagina no-

ticeably longer. Spermatheca rudimentary, its stalk and reservoir subequal in length.

DISTRIBUTION. NE of Korean Peninsula. 1 sp.

Troglovitrea Negrea et Riedel, 1968
Fig. 1814

Negrea & Riedel, 1968: 209.

TYPE SPECIES — *Troglovitrea argintarui* Negrea et Riedel, 1968; OD.

Shell depressed to almost flat, thin, glossy, subtransparent, of about 4.5 slightly convex whorls. Last whorl evenly rounded. Color whitish or yellowish. Embryonic whorls smooth. Postapical whorls with rather crowded radial striae. Aperture ovate, a little oblique, with simple margins; columellar margin very short, oblique, thickened. Umbilicus slit-like or closed. Height 1.8, diam. 4-5 mm.

Hermaphroditic duct convoluted. Talon exposed, drop-like. Vas deferens moderately long, entering very short epiphallus terminally. Penis stout, with a blunt terminal caecum, internally with a high axial pilaster. Penis sheath absent. Penial retractor

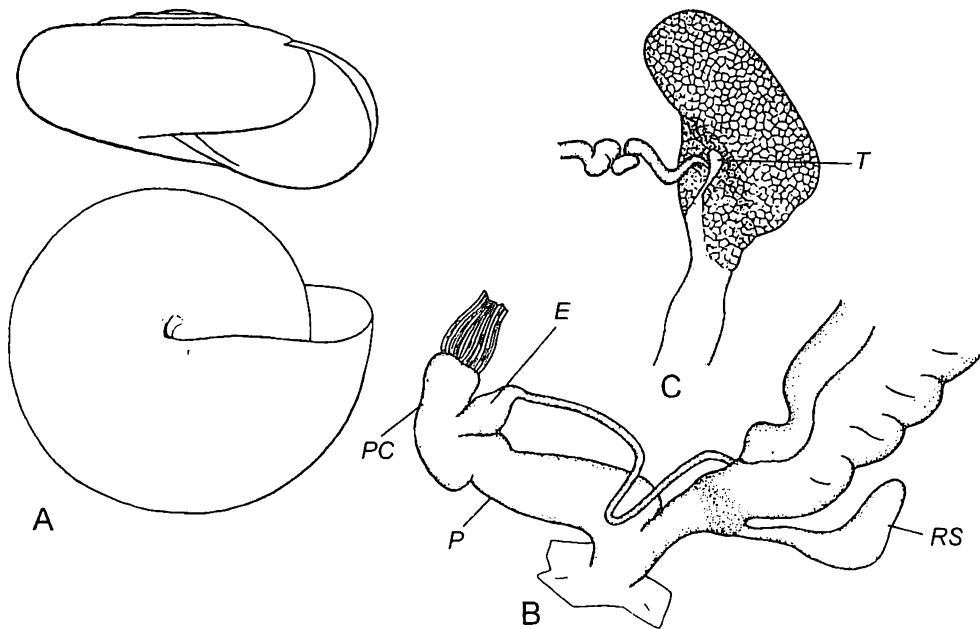


Fig. 1814. *Troglovitrea argintarui* Negrea et Riedel, 1968.
 A — shell. B — reproductive tract. C — albumen gland, hermaphroditic gland and talon.
 After Negrea & Riedel, 1968.

attached to caecum apically. Free oviduct and vagina subequal in length, perivaginal gland surrounds distal part of free oviduct and adjacent section of vagina. Spermathecal stalk short; reservoir embedded in distalmost part of spermoviduct.

DISTRIBUTION. Romania (Mehedinti Mts.). 1 sp.

Lindbergia Riedel, 1959
 Fig. 1815

Riedel, 1959: 110.

TYPE SPECIES — *Lindbergia spiliaenymphus* Riedel, 1959; OD.

Shell as in *Vitrea*, much depressed, thin, glass-like, shining, of 4-6 flattened to rather convex whorls. Last whorl rounded at periphery. Colorless. Embryonic and later whorls lacking regular sculpture. Aperture ovate, slightly oblique, its basal margin angulated. Umbilicus moderately wide, perspective [in *L. orbicularis* (Riedel, 1962), rather narrow]. Height 1.4-2.9, diam. 3.0-5.3 mm.

Vas deferens rather short, passing gradually into thick epiphallus. Penis inter-

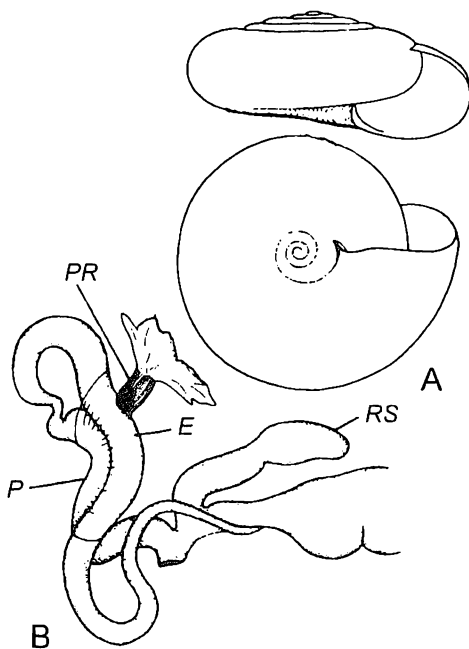


Fig. 1815. *Lindbergia spiliaenymphus* Riedel, 1959.
 A — shell. B — reproductive tract. After Riedel, 1959.

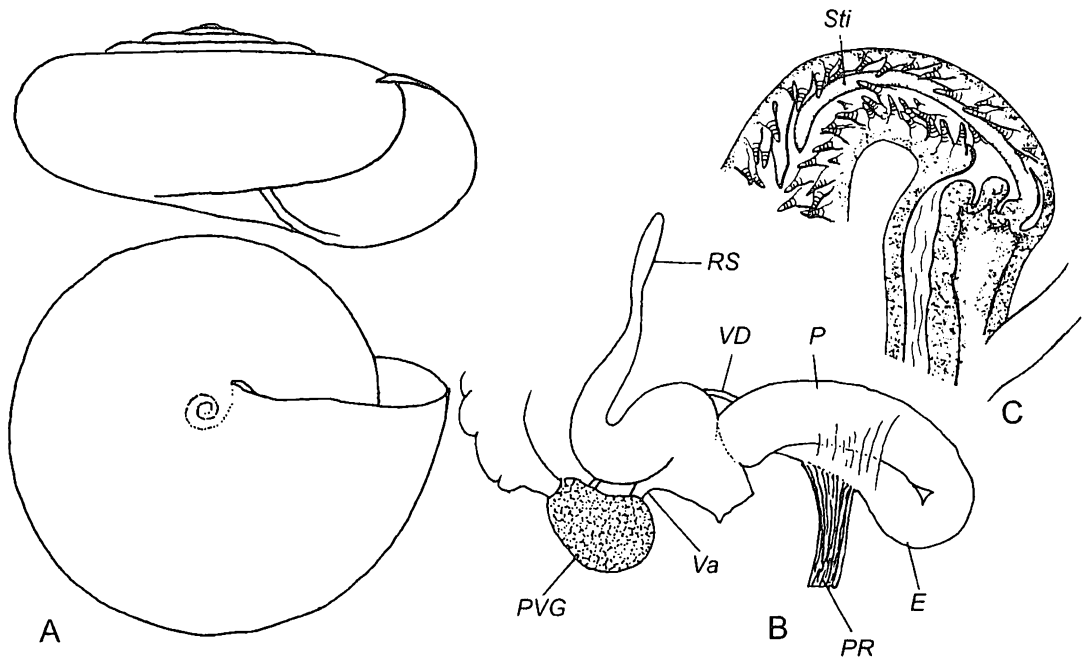


Fig. 1816. *Spinophallus uminskii* (Riedel, 1960).

A — shell. B — reproductive tract. C — interior of penis. After Riedel, 1960.

nally without papillae or hooks. Penis sheath embraces penis and epiphallus. Penial retractor attached to epiphallus. Free oviduct rather long. Vagina very short. Perivaginal gland surrounds vagina and atrium. Spermathecal stalk more or less swollen basally, reservoir embedded in distal part of spermoviduct.

DISTRIBUTION. Eastern part of Balkan Peninsula and Crete Island; ? W Turkey (Anatolia). 6-9 spp.

Spinophallus Riedel, 1962

Fig. 1816

Riedel, 1962a: 226 (nom. nov. pro *Echinophallus* Riedel, 1960).

— *Echinophallus* Riedel, 1960: 334 [nom. praeocc., non Schumacher, 1914 (Cestodes); t.-sp. *Lindbergia* (*Echinophallus*) *uminskii* Riedel, 1960; OD].

TYPE SPECIES — *Lindbergia* (*Echinophallus*) *uminskii* Riedel, 1960; OD.

Shell flattened, thin, glass-like, transparent, of about 5 moderately convex whorls. Last whorl rounded at periphery. Colorless when fresh. Embryonic whorls smooth. Upper surface of postapical whorls

with very distinct, crowded spiral lines; radial striation weak. Aperture narrowly lunate, subvertical, basal margin somewhat protruded. Umbilicus narrow, deep. Height 1.5-1.6, diam. 3.3 mm.

Vas deferens moderately long. Epiphallus passes into penis without distinct superficial boundary. Penis large, longer than epiphallus, internally with numerous, rather large, conic, segmented papillae; besides, there is a very long, thorn-like stimulator arising on upper wall of penis at epiphallic pore. Penis sheath not evident. Penial retractor attached to epiphallus which connected with penis by fan-like "bridge" Free oviduct rather thin, moderately long, surrounded by perivaginal gland. Vagina very short. Spermathecal stalk greatly swollen basally; reservoir small, lanceolate.

DISTRIBUTION. Bulgaria (Stara Planina). 1 sp.

Vitrea Fitzinger, 1833

Fitzinger, 1833: 99.

— *Diaphanella* Clessin, 1880: 206 [*Hyalina* (*Vitrea*) "Gruppe"; t.-sp. *Glischrus* (*Helix*) *diaphana* Studer, 1820; OD].

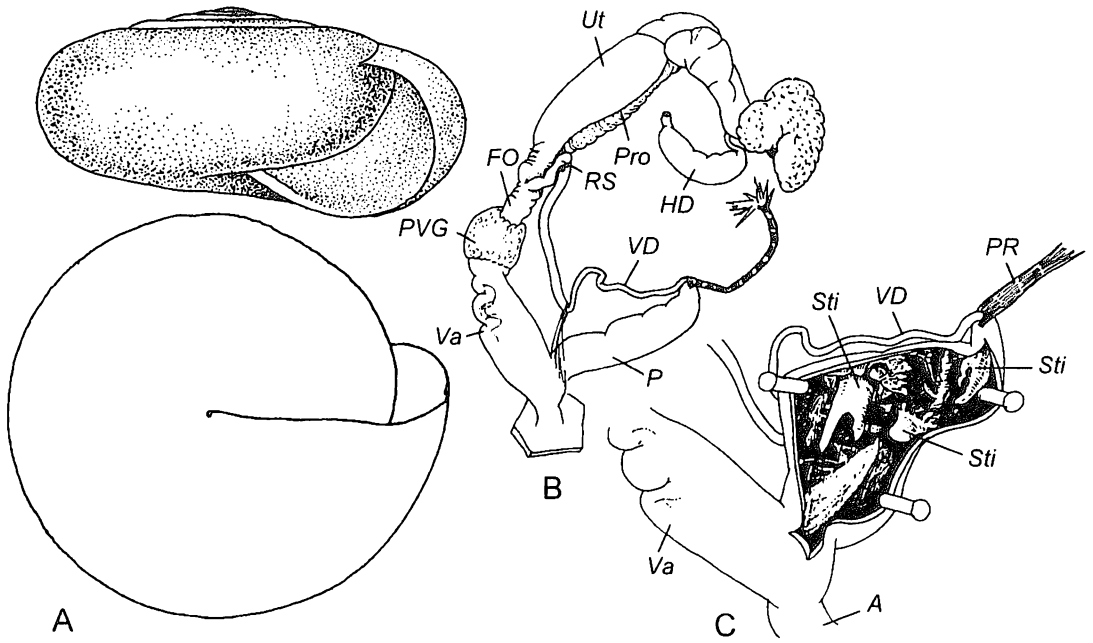


Fig. 1817 *Vitrea (Subrimatus) subrimata* (Reinhardt, 1871).

A — shell: "Krimberg bei Laibach" [Ljubljana, Slovenia]. SPb. B — reproductive tract. C — interior of penis. After Giusti et al., 1995.

— *Anomphala* Westerlund, 1886: 29 [*Hyalina (Vitrea)* "Gruppe"; nom. praeocc., non Jonas, 1846 (Naticidae); t.-sp. *Glischrus (Helix) diaphana* Studer, 1820; SD Westerlund, 1902].

— *Anomphalus* A. Wagner, 1907: 101 (nom. nov. pro *Anomphala* Westerlund, 1886).

Riedel, 1980: 34.

TYPE SPECIES — *Glischrus (Helix) diaphana* Studer, 1820; monotypy (cf. Forcart, 1965: 95).

Shell depressed to nearly flat, small (diam. up to 5.3 mm), glass-like, shining, of 3.5-7 whorls. Last whorl rounded to keeled at periphery. Colorless or slightly greenish. Sculpture very weak. Aperture semioval, without teeth. Umbilicus moderately wide to dot-like, rarely closed.

Hermaphroditic duct convoluted (at least in distal part). Vas deferens entering penis apically through a simple pore. Epiphallus missing. Penis internally with 1 to several large stimulatory papillae; verge absent. Penis sheath missing. Penial retractor attached to penis at entrance of vas deferens. Perivaginal gland developed. Spermatheca rudimentary or absent.

DISTRIBUTION. W Palearctic.

REMARK. Altogether the genus *Vitrea* in-

cludes about 50 spp. and subspp., the anatomy of about 30 of them is unknown. At the same time, the main differences between subgenera are based primarily on the inner structure of penis. Therefore for each subgenus I indicate the number of only those species whose place in the given subgenus is supported by anatomical investigations.

Vitrea (Subrimatus) A. Wagner, 1907 Fig. 1817

Wagner A., 1907: 106 (*Crystallus* "Formenkreis"). Riedel, 1980: 41

TYPE SPECIES — *Hyalina subrimata* Reinhardt, 1871; tautonymy.

Shell nearly flat, transparent, of 5 flattened whorls. Embryonic whorls smooth, surface of later whorls highly polished, with gentle radial wrinkles becoming obsolete below periphery; base with extremely fine spiral lines. Umbilicus closed. Height 1.3-1.7, diam. 3.0-3.3 mm (1.4 × 3.1 mm).

Penis contains 2-3 stimulators of very complex structure. Spermatheca rudimentary.

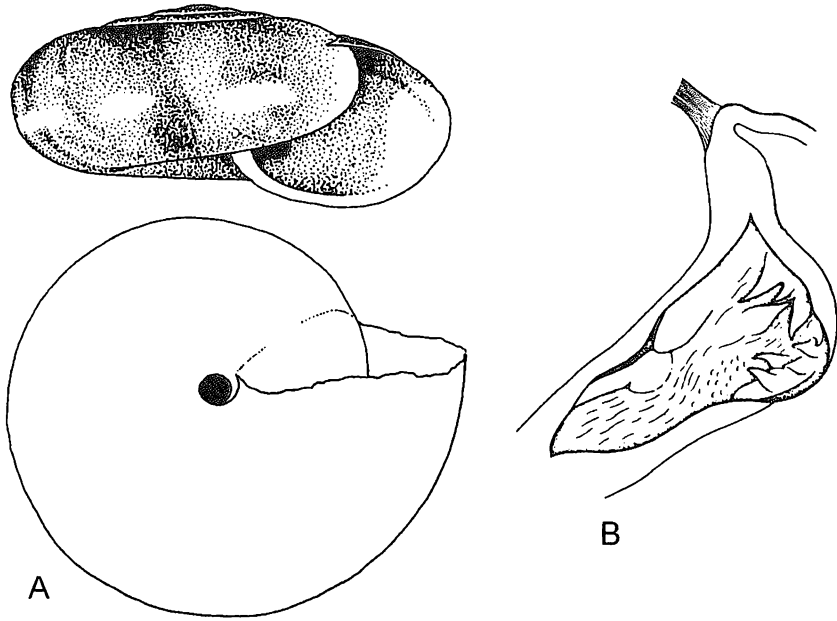


Fig. 1818. *Vitrea (Pinterella) spelaea* (A. Wagner, 1914).

A — shell: "Kroatien, Crnulja Höhle a. Popovo polje" Paratype. Vienna No. K 17.544.
 B — interior of penis. After Riedel, 1980.

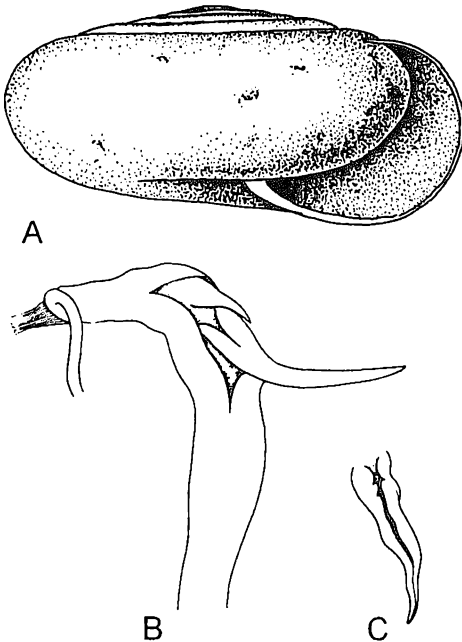


Fig. 1819. *Vitrea (Vitrea) diaphana* (Studer, 1820).

A — shell: Nevitsky Zamok near Uzhgorod, E Carpathians. Moscow No. Lc-7864. B — interior of penis. C — stimulator of another specimen. After Riedel, 1980.

DISTRIBUTION. Mountains of Central, SW and SE Europe, N Africa. 2 spp.

Vitrea (Pinterella) Riedel, 1980

Fig. 1818

Riedel, 1980: 40.

TYPE SPECIES — *Crystallus spelaeus* A. Wagner, 1914; OD.

Shell much flattened, transparent, of 4-4.5 moderately convex whorls. Last whorl evenly rounded at periphery. Colorless. Embryonic whorls smooth, later whorls nearly so. Aperture semioval, subvertical. Umbilicus narrow, subcylindrical. Height up to 2.3, diam. up to 5.1 mm (2.1 × 4.5 mm).

Penis internally with several large thorn-like stimulatory papillae.

DISTRIBUTION. Croatia. 1 sp.

Vitrea (Vitrea) s. str.

Fig. 1819

Shell much flattened to nearly flat, thin, of 5-7 slightly convex, slowly increasing whorls. Last whorl rounded at periphery. Colorless. Embryonic whorls smooth.

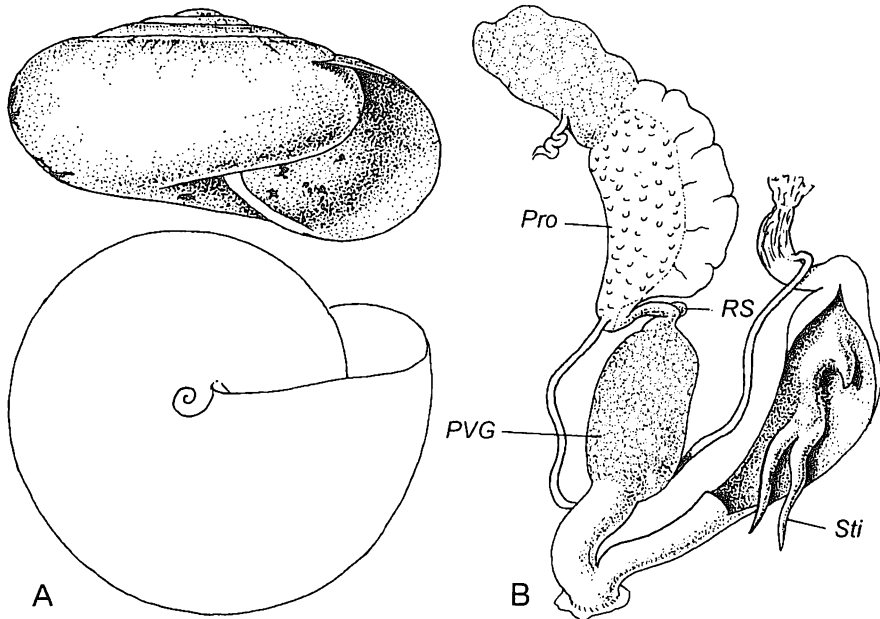


Fig. 1820. *Vitrea (Crystallus) crystallina* (Müller, 1774).

A — shell: "Göllersdorfal L. Ennstbrunn, Niederösterreich" Vienna No. K 57697 B — reproductive tract. Vorobyovy Gory, Moscow [Russia], April 6, 1975. Moscow No. Lc-19865.

Postapical sculpture of variously developed but never strong, irregular radial lines. Aperture narrowly semilunate, subvertical. Umbilicus tiny or absent. Height 1.5-2.0, diam. 3.8-4.5 mm (1.8 × 4.2 mm).

Penis elongated, internally with 1-2 long, pointed, simple stimulators; larger stimulator with longitudinal groove.

DISTRIBUTION. W Palearctic. At least 8 spp. & sub spp.

Vitrea (Crystallus) Lowe, 1854)

Fig. 1820

Lowe, 1854: 178 (*Helix* "Gruppe").

— *Crystallinus* A. Wagner, 1907: 101 (t.-sp. *Helix crystallina* Müller, 1774; tautonymy).

Riedel, 1980: 40.

TYPE SPECIES — *Helix crystallina* Müller, 1774; monotypy.

Shell flattened, thin, of 4.5-5 slightly convex whorls. Last whorl rounded at periphery. Colorless or slightly greenish. Embryonic whorls smooth. Postapical whorls very finely radially striated (especially near suture). Aperture semilunate, subvertical, margins sometimes a little thickened. Um-

bilicus minutely open. Height 1.6-2.0, diam. 3.2-4.0 mm (1.7 × 3.6 mm).

Penis with bifurcated stimulator located on smoothed, axial fold. Arms of stimulator long, vermiform, tapering. In proximal end of mentioned fold an additional, short, conic stimulator may be present. Spermatheca rudimentary or absent.

DISTRIBUTION. Europe. 2 spp.

? *Monadea* Westerlund, 1902

Fig. 1821

Westerlund, 1902: 87 (*Vitrea* subg.).

TYPE SPECIES — *Zonites lawleyianus* Bourguignat, 1863; OD.

Shell subglobose, thin, a little shining, of 3.3 slightly convex whorls. Last whorl with scarcely expressed rounded peripheral angle. Spire dome-shaped. Color light-grey (probably glass-like and colorless when fresh). Embryonic whorls smooth, comparatively large. Postapical sculpture of microscopical, rather dense radial striation. Aperture subquadrangular, a little oblique, with rounded palatal and baso-columellar angles; columellar and basal margins mark-

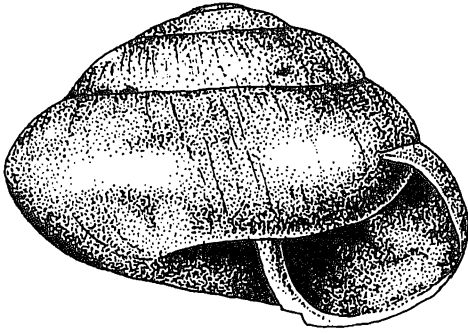


Fig. 1821 *Monadea lawleyiana* (Bourguignat, 1863).
"Alluv. de l'Arno Florence" [Italy]. Holotype. Geneva, Bourguignat collection.

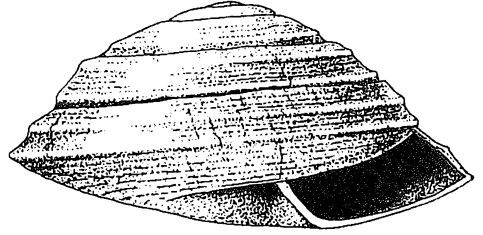


Fig. 1822. *Gollumia filocincta* (Hesse, 1915).
Adana, Cilicia, from flotsam of Sarus, Turkey. Holotype. Phil. No. 210622.

edly reflexed. Umbilicus moderately wide, perspective. Height 0.72, diam. 0.93 mm.

DISTRIBUTION. Italy. 1 sp. (? subfossil).

REMARK. Riedel (1980: 39) thinks that *Monadea* "ist keine Zonitide und gehört wahrscheinlich zu Endodontidae-Punctidae" I have inspected the holotype of *Zonites lawleyianus* and came to the conclusion that this species may belong to the Pristilomatidae in having smooth embryonic whorls, though it differs from European representatives by the shell shape.

? *Gollumia* Riedel, 1988
Fig. 1822

Riedel, 1988c: 193. Hausdorf, 1993: 79.

TYPE SPECIES — *Gollumia pageti* Riedel, 1988 (? = *Trochula filocincta* Hesse, 1915); OD.

Shell lentiform, comparatively thick-walled, of 5.25 rather convex whorls. Last whorl with cord-like keel. Shell of holotype lost its initial color but seemingly it was colorless and glass-like. Embryonic whorls with distinct spiral cordlets. Later whorls with 2 major cords and fine cordlets plus irregular radial wrinkles above; basal surface with about 10 coarse cords and a few

weaker cordlets. Aperture subquadrangular, angulated at baso-columellar part, a little oblique. Umbilicus wide, shallow. Height 1.40-1.88, diam. 3.36-3.50 mm (1.88 × 3.36 mm).

DISTRIBUTION. Asia Minor [S Anatolia (Cilicia, Turkey)]; 1 or 2 spp. Riedel (1998b) points out that there is one more undescribed species from Cyprus Island.

REMARK. Hausdorf (1993) synonymized *Gollumia pageti* Riedel, 1988 with *Trochula filocincta* Hesse, 1915. However Riedel's description and drawing differ from the holotype of *Trochula filocincta* in details of sculpture and width of umbilicus, therefore *pageti* and *filocincta* are perhaps different species. Systematic position of this peculiar genus can be established only after anatomical investigation.

GODWINIINAE Cooke, 1921

Cooke, 1921 263.

Shell sometimes glass-like, small to medium (diam. 2-40 mm), colorless to reddish.

Left neck-lappet of mantle entire.

Sole tripartite.

Orifice of genital atrium shifted backward.

Jaw of odontognathous type or oxygnathous.

Vas deferens short to long. Penial caecum present or absent; when present, penial retractor attached to it apically or laterally, sometimes to base of caecum. Penis internally with axial and (sometimes) circular folds; verge absent. Penis sheath absent or exceptionally thin, intimate, transparent. Perivaginal gland mostly missing. Spermatheca normally developed.

DISTRIBUTION. Holarctic, Hawaiian Islands.

Godwinia Sykes, 1900

Sykes, 1900: 277

TYPE SPECIES — *Vitrina caperata* Gould, 1847; OD.

Shell vitrinoid, thin, fragile, of 3 whorls. Color uniformly greenish. Embryonic whorl smooth. Postapical sculpture of dense radial striation and short grooves of somewhat spiral orientation. Aperture large, ovoid, well oblique. Umbilicus narrow.

Vas deferens short. Epiphallus short, swollen, entering penis laterally. Penis with a large, ovoid, glandular caecum. Penial retractor attached to caecum apically; another arm of retractor, inserting on epiphallus, may be present. Free oviduct rather long, vagina shorter. Spermathecal stalk moderately long, reservoir lies on middle of spermoviduct.

DISTRIBUTION. Hawaiian Islands (Kauai and Oahu). 1 or 2 spp.

Godwinia (Omphalops)

Baker, 1941)

Fig. 1823

Baker, 1941: 332.

TYPE SPECIES — *Helix newcombi* Reeve, 1854; OD.

Embryonic whorls of shell with only traces of radial rugae. Later whorls with more regular radial wrinkles. Body whorl almost evenly rounded. Height 6-8, diam. 8-11 mm.

Vas deferens enters epiphallus subterminally. Epiphallus equal in size to penial caecum. Penial retractor bifurcate, one arm attached to epiphallus, the other — to penial caecum.

DISTRIBUTION. Hawaii [Kauai (and Oahu?)]. 1 sp.

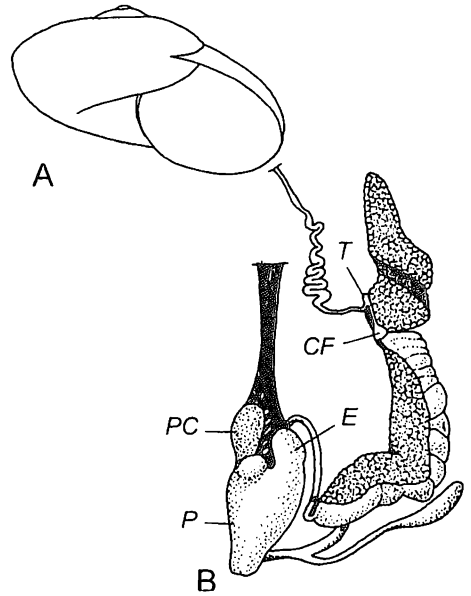


Fig. 1823. *Godwinia (Omphalops) newcombi* (Reeve, 1854).

A — shell. B — reproductive tract. After Baker, 1941.

Godwinia (Godwinia s. str.)

Fig. 1824

Embryonic whorls with coarse radial rugae. Later whorls with rather irregular radial wrinkles. Body whorl bluntly angulate. Height 5.5-7.0, diam. 8.4-12.3 mm (6.8 × 11.8 mm).

Vas deferens enters epiphallus nearly apically. Epiphallus smaller than penial caecum. Penial retractor not bifurcate, attached to penial caecum.

DISTRIBUTION. Hawaii (Kauai). 2 spp.

Omphix Pilsbry, 1911

Pilsbry, 1911 479 (*Mesomphix* subg.).

TYPE SPECIES — *Helix inornata* Say, 1821; OD.

Shell depressed to almost flat, thin, fragile, shining, of 4.5-6 slightly convex whorls. Last whorl evenly rounded. Color blue-black to yellow or olivaceous, often with darker radial streaks followed by paler streaks. Embryonic whorls smooth or finely striated. Postnuclear sculpture of inconspicuous, irregular, radial lines and microscopical spiral striae; base smooth, polished. Aperture rounded-lunate, with whit-

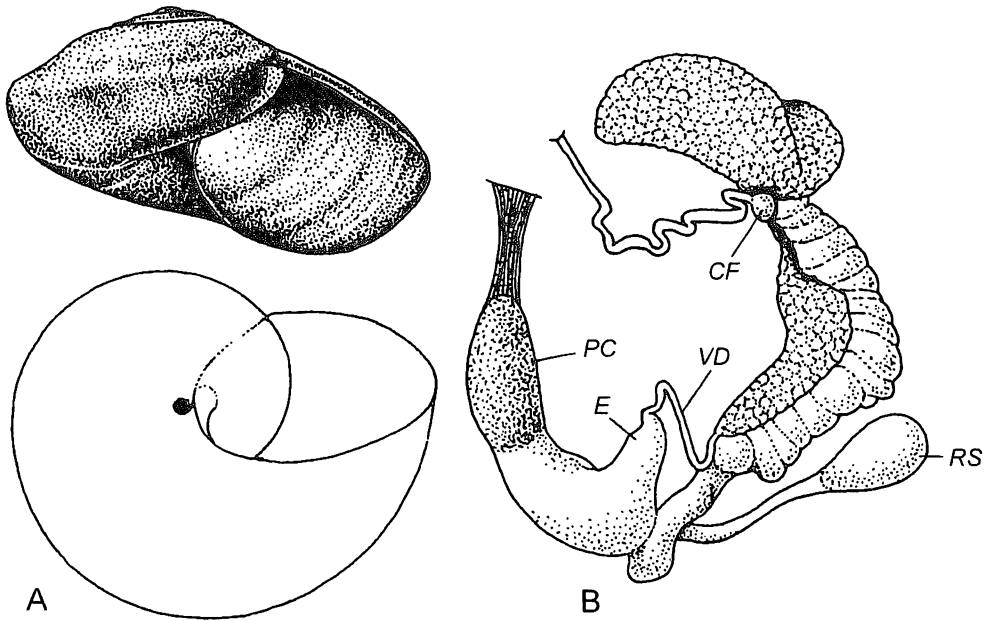


Fig. 1824. *Godwinia (Godwinia) caperata* (Gould, 1847).

A — shell: Halemanu, Kauai. Phil. No. 178323. B — reproductive tract. After Baker, 1941

ish parietal callus, slightly oblique. Umbilicus narrow to dot-like.

Vas deferens not long, entering epiphallus without sharp boundary. Epiphallus long, entering penis through a simple pore not far from that of caecum. Penis club-shaped, with a slender caecum, internally cavity of penis has transverse, irregular folds near proximal end, below which wall is thinner, with very low, irregular reticulation. Penial retractor attached to penis at base of caecum. Free oviduct long. Vagina very short. Spermathecal stalk moderately long; reservoir ovate, embedded in lower half of spermoviduct.

DISTRIBUTION. N America.

Omphix (Omphix s. str.)

Fig. 1825

Embryonic and later whorls without regular sculpture, smooth. Umbilicus narrow. Height 8-11, diam. 13-21 mm (8.6 × 15.8 mm).

Epiphallus entering penis near insertion of penial retractor.

DISTRIBUTION. N America, from SE Canada to Tennessee and North Carolina. 2 or 3 spp.

Omphix (Micromphix Pilsbry, 1911)

Fig. 1826

Pilsbry, 1911 479.

TYPE SPECIES — *Helix sub-plana* Binney, 1842; OD.

Embryonic whorls (at least last one) and later whorls finely radially striate. Umbilicus dot-like. Height 9-11, diam. 18-23 mm (9.0 × 20.0 mm).

Epiphallus entering penis well anterior to insertion of penial retractor.

DISTRIBUTION. Appalachians (N America). 3 spp. & subspp.

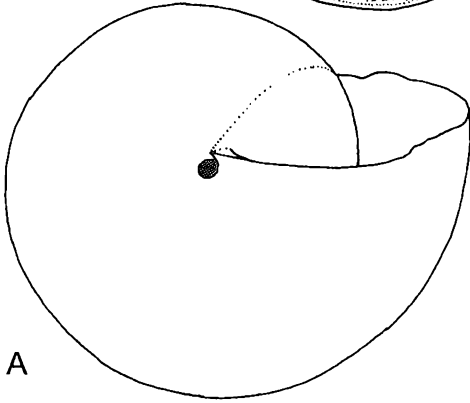
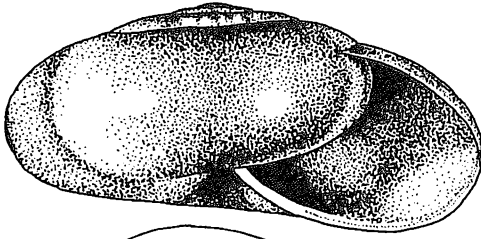
Vitrinizonites Binney, 1879

Fig. 1827

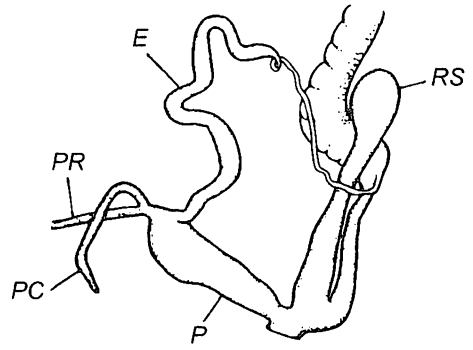
Binney, 1879: 333. Pilsbry, 1946: 344. Riedel, 1980: 77

TYPE SPECIES — *Vitrina latissima* Lewis, 1875; monotypy.

Shell vitrinoid, very thin, shining, of 2.5 whorls. Last whorl enlarges rapidly and dilated transversely. Color rich chestnut. Both embryonic and later whorls with regular, spiral, extremely fine punctation on upper side and delicate fine spiral striation on basal surface. Aperture ample, ovate,



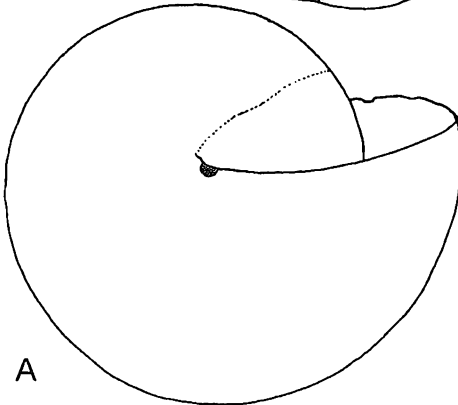
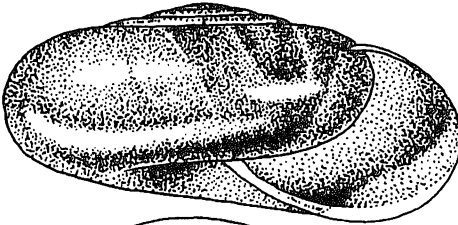
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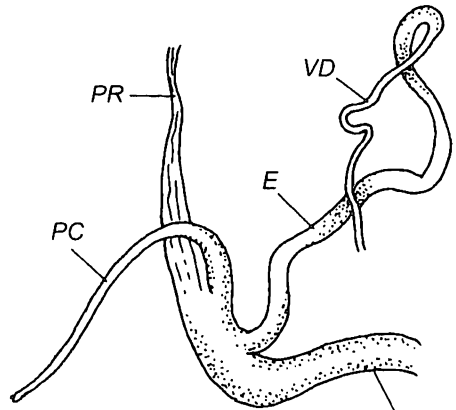
B

Fig. 1825. *Omphix (Omphix) inornatus* (Say, 1821).

A — shell: "Eastern States" Bern, coll. Shuttleworth/833. B — reproductive tract. After Pilsbry, 1946.



A



B

Fig. 1826. *Omphix (Micromphix) subplanus* (Binney, 1842).

A — shell: Indian Gap Road, Mt. Le Conte, Sevier Co., Tennessee. Moscow. No. Lc-25420 (Phil. No. 160051). B — distal part of male division of reproductive tract. After Pilsbry, 1911

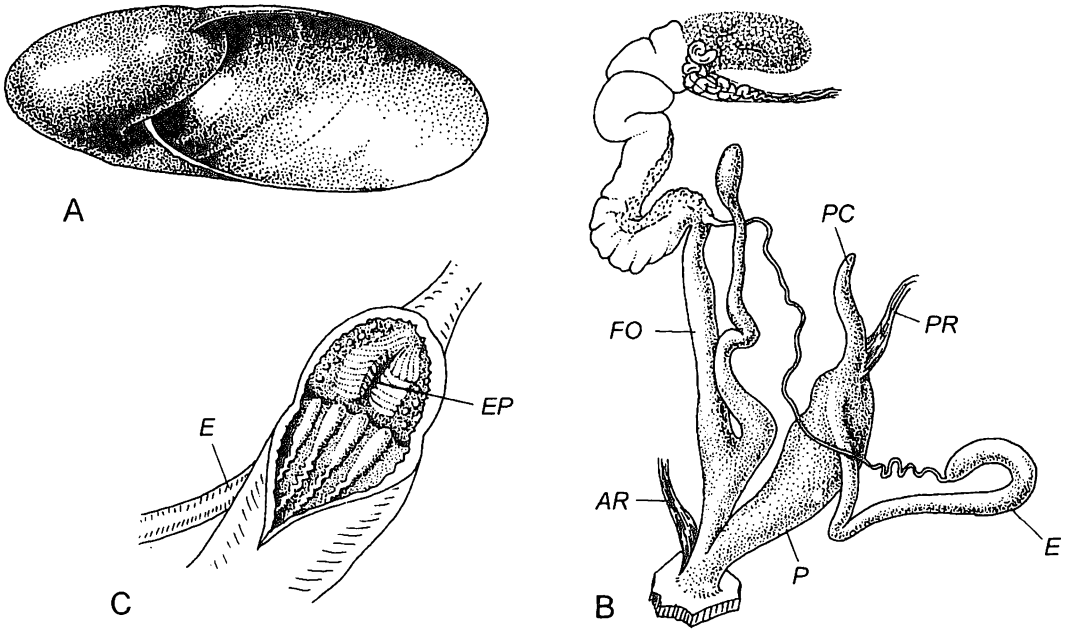


Fig. 1827 *Vitrinizonites latissimus* (Lewis, 1875).

Appalachian Trail at Clingmans Dome tower trail (Great Smokie Mts Nat. Park), Sevier Co., Tennessee, August 27, 1974. A — shell. B — reproductive tract. C — interior of penis. Chicago No. 171203.

quite oblique. Umbilicus closed. Height 6.0-9.2, diam. 17.0-19.5 mm (7.0 × 16.5 mm).

Sole tripartite. Caudal foss rather large, caudal horn absent.

Talon hidden. Vas deferens long, thin, entering epiphallus abruptly. Epiphallus subcylindrical, long, joining penis at sharp angle. Penial caecum conic. Penis swollen, roughly fusiform or clavate, internally with 2 chambers: upper chamber short, with slit-like epiphallic pore flanked with a pair of transversally grooved "lips"; rest surface of this chamber with small tubercles. Apical chamber separated from distal by a narrow circular furrow; distal chamber with several axial folds which have appearance of rounded pilasters above; distally they become thinner and corrugated. Free oviduct long, vagina markedly shorter. Spermathecal stalk a little expanded basally; reservoir not attending albumen gland.

DISTRIBUTION. N America: Appalachian region (Tennessee, Alabama, North Carolina, Virginia). 1 sp.

Mesomphix Rafinesque, 1819

Rafinesque, 1819: 425. Riedel, 1980: 69.

TYPE SPECIES — *Helix laevigata* "Rafinesque" Férussac, 1832; SD Herrmannsen, 1847 (non Linnaeus, 1767 = *Mesomphix vulgatus* Baker, 1933).

Shell medium-sized to large, subglobular to almost flat, opaque, of 4.5-5 whorls; last whorl ample, rounded or bluntly angled at periphery. Color mostly yellow, greenish or brown. Sculpture fine. Aperture lunate, with simple margins. Umbilicus never wide.

Sole tripartite. Caudal foss present.

Mantle with small right and left bodylobes.

Epiphallus usually well demarcated from vas deferens, entering penis submedially to subapically. Penial retractor attached to penis terminally or penis with a continuation beyond attachment of retractor. Spermathecal stalk not long. Atrial pore situated below visceral sac.

DISTRIBUTION. W part of N America, from Canada to Guatemala.

Mesomphix (*Mesomphix* s. str.)

Fig. 1828

Shell subglobose, thin but rather opa-

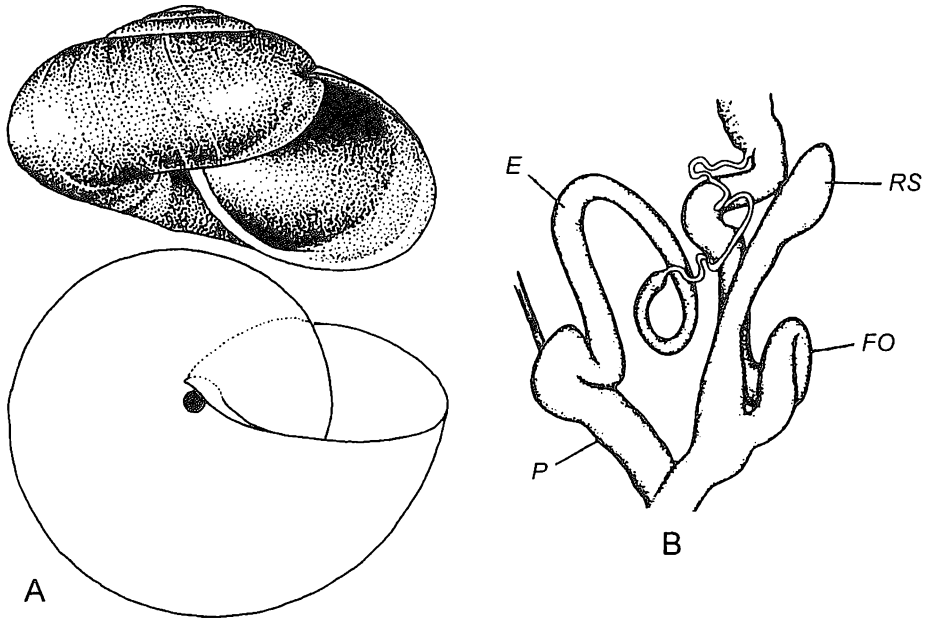


Fig. 1828. *Mesomphix (Mesomphix) vulgatus* Baker, 1933.

A — shell: Hills around Gurley, Madison Co., Alabama. Phil. No. 150331 B — reproductive tract. After Pilsbry, 1911

que, of 5 slightly convex whorls. Last whorl rounded. Color greenish. Embryonic sculpture of fine radial wrinkles; postapical whorls with very fine, crowded spiral lines, and dense, much more coarse radial wrinkles. Aperture widely ovate, slightly oblique. Umbilicus cylindrical, narrowly open. Height 9.7-13.2, diam. 18.7-28.0 mm (16.5 × 27.0 mm).

Vas deferens long, thin. Epiphallus also long, entering penis at sharp angle. Penis rather short, club-shaped, with apical extension on which a minute, lateral outgrowth may be present. Penial retractor attached to apical extension. Free oviduct long. Vagina very short. Spermathecal stalk stout, reservoir reaching distal half of spermoviduct.

DISTRIBUTION. Appalachians. 6 nominal spp.

Mesomphix (Omphalina)

Rafinesque, 1831)

Fig. 1829

Rafinesque, 1831: 3 (pro gen.).

TYPE SPECIES — *Omphalina cuprea* Rafinesque, 1831; monotypy.

Shell moderately depressed to subglobo-

se, thin, transparent, shining, of 4-5 whorls. Color dark-yellow. Embryonic whorls smooth, subsequent whorls slightly radially wrinkled; elements of spiral striation exceptionally weak, visible mainly in places, where periostracum detached. Aperture rounded, moderately oblique. Height 12.4-20.5, diam. 21.0-35.5 mm (14.5 × 23.5 mm).

Vas deferens rather short, convoluted, entering long epiphallus apically. Epiphallus forms a sharp angle at its boundary with penis. Penis short. Penial retractor inserting on penis/epiphallus junction. Free oviduct and vagina moderately long, subequal in length. Perivaginal gland surrounds lower half of vagina and atrium. Spermathecal stalk rather long, ovate reservoir embedded in middle part of spermoviduct.

DISTRIBUTION. N and Central America from Ontario to Mexico (? and Guatemala). 10 spp. & subspp.

Mesomphix (Moreletia)

Gray, 1830

Gray, 1855: 148 (*Zonites* "group").

— ? *Edusa* Martens in Albers, 1860: 72 [nom.

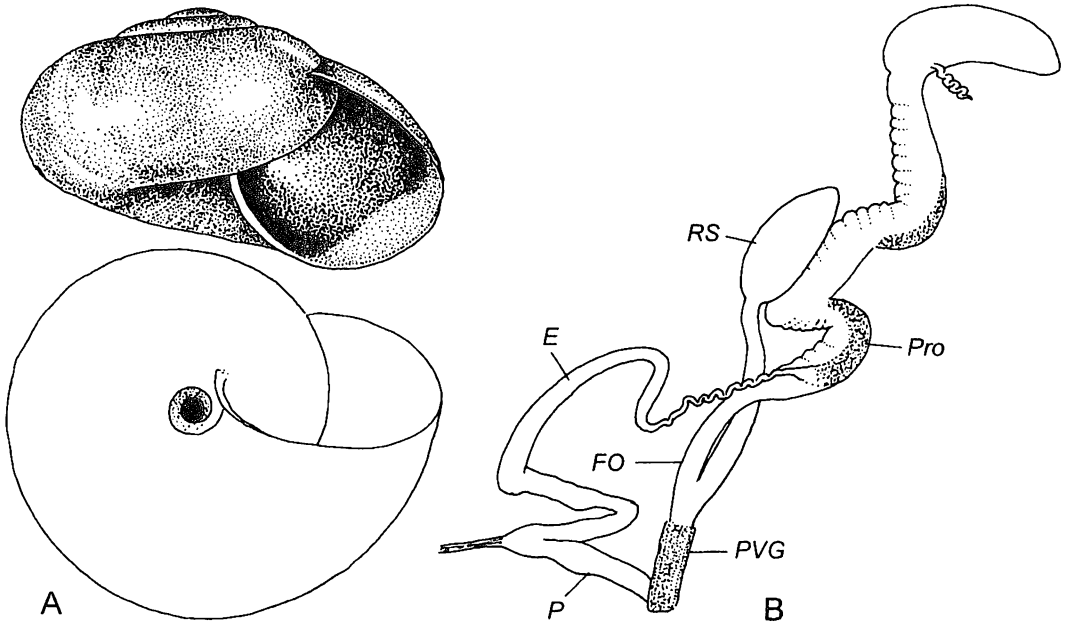


Fig. 1829. *Mesomphix (Omphalina) cuprea* (Rafinesque, 1831).

A — shell: Vinton Co., Ohio. Vienna No. K 28883. B — reproductive tract. After Pilsbry, 1946.

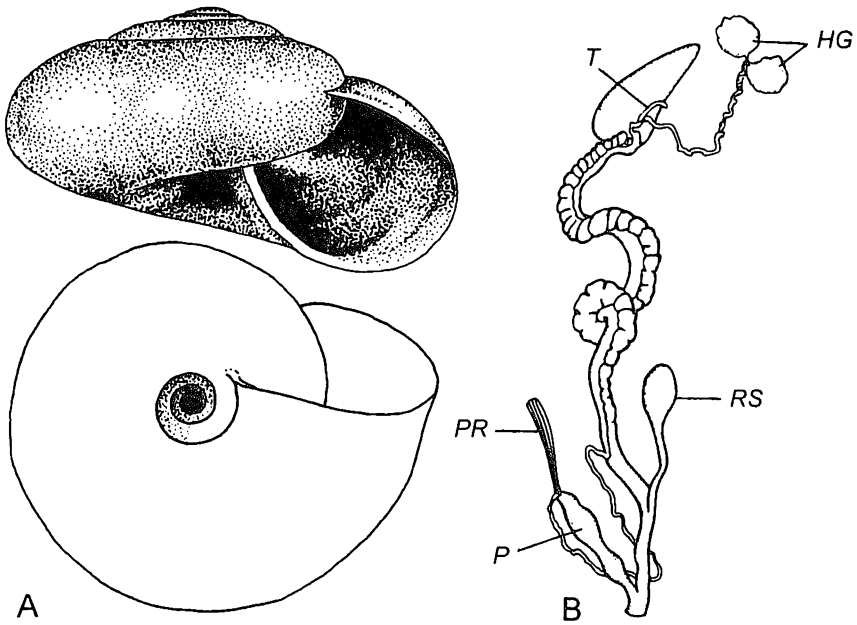


Fig. 1830. *Mesomphix (Moreletia) curyomphala* (L. Pfeiffer, 1845).

A — shell: Guatemala. Vienna No. G 1571 B — reproductive tract. After Fischer & Crosse, 1878.

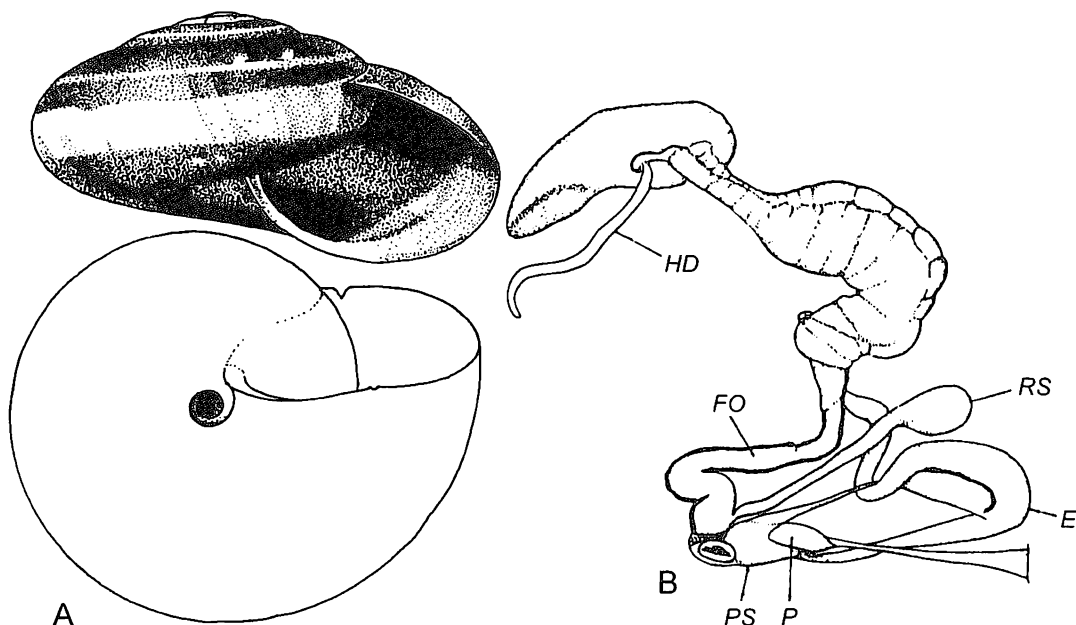


Fig. 1831 *Mesomphix (Zonyalina) bilineatus* (L. Pfeiffer, 1845).
 A — shell: Mexico. Paris. B — reproductive tract. After Baker, 1930b.

praeocc., non Dejean, 1835 (Coleoptera), nec Gistel, 1848 (Tunicata); *Hyalina* subg., t.-sp. *Helix zonites* L. Pfeiffer, 1845; OD].

Riedel, 1980: 74 (as syn. of *Omphalina Rafinesque*, 1831).

TYPE SPECIES — *Helix euryomphala* L. Pfeiffer, 1845; monotypy.

Shell depressed-subglobose, rather solid, slightly translucent, of 4.5 moderately convex whorls. Last whorl rounded at periphery. Color yellowish-corneous, sometimes with darker radial streaks. Embryonic whorls smooth. Postapical whorls with dense, silky radial rib-striation above, basal surface with much weaker radial striation and with widely spaced, shallow spiral lines. Aperture subcircular, moderately oblique. Umbilicus not wide but perspective. Height 20-23, diam. 35-40 mm (20.5 × 35.4 mm).

Ovotestis of 2 subglobular clusters of small acini. Hermaphroditic duct more or less convoluted. Talon exposed, thin, rod-like. Vas deferens long, entering penis terminally. Epiphallus seemingly absent. Penis rather short, with narrowing in middle. Free oviduct and vagina subequal in length, moderately long. Perivaginal gland not evident. Spermathecal stalk rather

short, evenly thin; reservoir ovate, embedded in lower half of spermoviduct.

DISTRIBUTION. Guatemala. 1 sp.

Mesomphix (Zonyalina)
 Martens, 1865)
 Fig. 1831

Martens, 1865: 16 (*Hyalina* subg.).

TYPE SPECIES — *Helix bilineata* L. Pfeiffer, 1845; monotypy.

Shell depressed, thin, translucent, shining, of about 4.5 whorls. Most characteristic color pattern is: wide chestnut to brown band below suture, then very narrow light band comes; after that a broad light peripheral one; on basal surface again broad dark band, and umbilicus encircled by a light wide zone. Sometimes darker elements may be reduced to various degree. Embryonic whorls smooth, later whorls with gentle, irregular radial wrinkles. Umbilicus moderately narrow. Height 7-11, diam. 15-23 mm (9.8 × 18.0 mm).

Vas deferens very short. Epiphallus long, entering short penis laterally, leaving short, conic caecum. Penis rather small, ovoid. Penial retractor attached to caecum

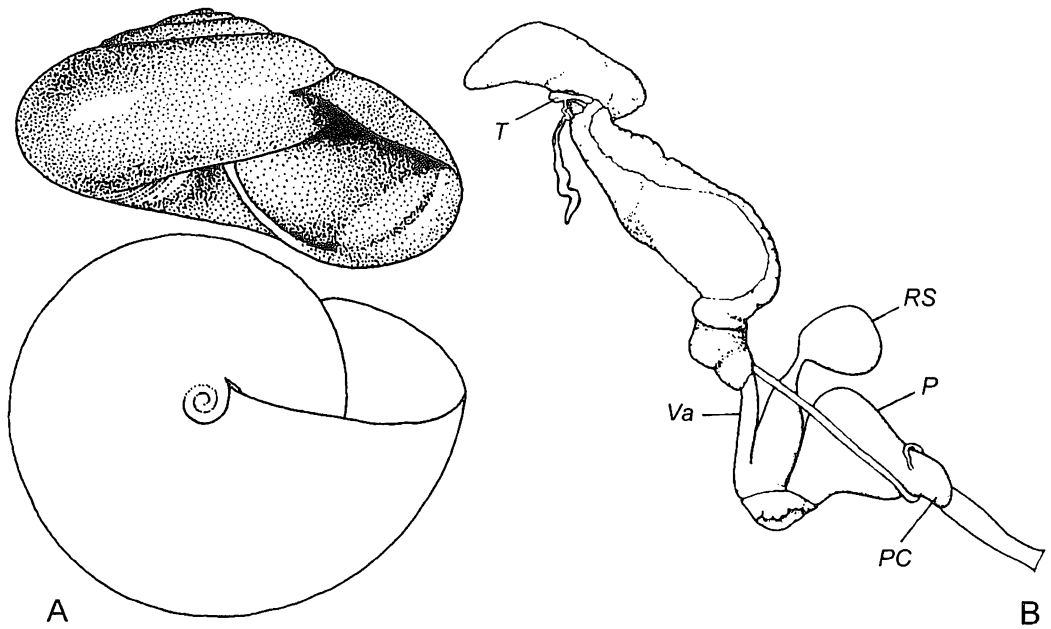


Fig. 1832. *Mesomphix (Omphalinella) veracruzensis* (L. Pfeiffer, 1856).

A — shell: Las Tortolas, Cordoba, Estadio Vera Cruz, Mexico. Phil. No. 256581 B — reproductive tract. After Baker, 1930b.

apically. There is a muscular band connecting penis with lower half of epiphallus. Free oviduct very long. Vagina extremely short. Spermathecal stalk almost cylindrical, reservoir reaching lower half of spermo-viduct.

DISTRIBUTION. E and S Mexico. 3 nominal spp.

Mesomphix (Omphalinella)

Baker, 1930)

Fig. 1832

Baker, 1930b: 25.

TYPE SPECIES — *Helix veracruzensis* L. Pfeiffer, 1856; OD.

Shell depressed-conic, thin, semitransparent, shining, of 4.5-5 slightly convex whorls; last whorl scarcely descending in front. Color yellow to light-greenish. Embryonic whorls smooth. Later whorls with fine radial wrinkles; no spiral sculpture. Aperture ovate, well oblique, upper part of palatal margin may be indented. Umbilicus narrowly open. Height 5.4-8.0, diam. 9.9-13.5 mm (7.5 × 13.1 mm).

Hermaphroditic duct moderately convoluted. Talon exposed, tubercular. Vas def-

erens rather short, entering penis laterally through slit-like pore leaving short, stout caecum. Epiphallus absent. Penis short, bulky, swollen, internally with U-shaped pilaster, many small folds and minutely papillate area at one of arms of pilaster. Penial retractor attached to caecum apically. Free oviduct rather long, its proximal half surrounded by perivaginal gland. Vagina extremely short. Spermathecal stalk not long, greatly swollen basally, subglobular reservoir separated from stalk by narrow neck, embedded in lower part of spermo-viduct.

DISTRIBUTION. Mexico and Guatemala. 4-5 spp. & subssp.

Mesomphix (Patulopsis)

Strebel et Pfeffer, 1880)

Fig. 1833

Strebel & Pfeffer, 1880: 16 (pro gen.). Baker, 1930b: 26.

TYPE SPECIES — *Patulopsis carinatus* Strebel et Pfeffer, 1880; monotypy.

Shell depressed-conic or obesely lenti-form, thin, fragile, translucent, of about 4.5 slightly convex whorls. Last whorl

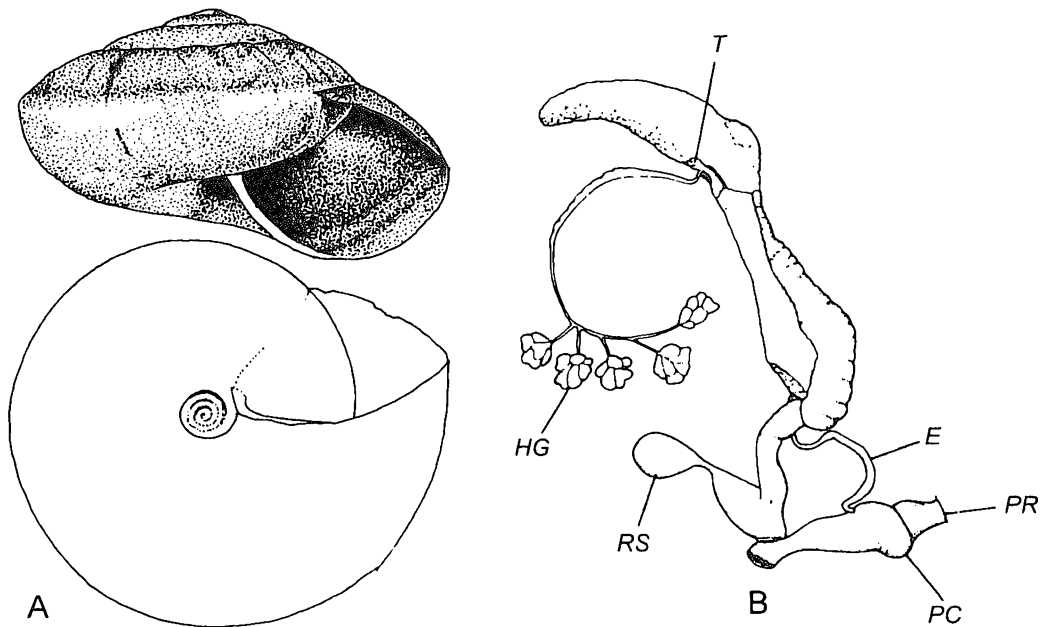


Fig. 1833. *Mesomphix (Patulopsis) carinatus* (Strebel et Pfeffer, 1880).

A — shell: "Mexiko, Jalapa, Vera Cruz" Zürich No. 502188. B — reproductive tract. After Baker, 1930b.

slightly, bluntly angulated at periphery. Color corneous-brown. Embryonic whorls smooth. Postnuclear whorls sharply rib-striated above, on base sculpture much weaker. Aperture broadly ovate, quite oblique. Umbilicus rather narrow but perspective. Height 4.5, diam. 8-9 mm (4.5 × 8.2 mm).

Ovotestis of 4-6 clusters of acini of irregular shape. Hermaphroditic duct not convoluted. Talon exposed, composed of a few minute lobes. Vas deferens very short. Epiphallus not long, slender, entering penis laterally. Penis short, with swollen, subglobular caecum. Penial retractor attached to penial caecum apically. Free oviduct rather long, vagina almost absent. Perivaginal gland poorly developed. Spermathecal stalk short, swollen, demarcated from ovate reservoir by sharp narrowing.

DISTRIBUTION. E Mexico. 1 sp.

Glyphyalinia Martens, 1892

Martens, 1892: 117 (*Hyalinia* subg.).

— *Glyphyalina* Pilsbry, 1898: 130 (nom. err. pro *Glyphyalinia*).

— *Glyphialinia* Haas, 1929: 16 (nom. err. pro *Glyphyalinia*).

Riedel, 1980: 79.

TYPE SPECIES — *Helix indentata* Say, 1823; SD Baker, 1928.

Shell much depressed to almost flat, thin, somewhat translucent to subtransparent, shining, of 4.25-7 slightly convex whorls. Color (pale) corneous or honey-yellow to buff. Embryonic whorls smooth. Most visible elements of postnuclear sculpture — narrowly to widely spaced radial grooves which often weaker on base; spiral striation mostly present. Aperture broadly semilunar, slightly to moderately oblique. Umbilicus moderately broad.

Jaw crescentic, cutting edge almost straight, with a few shallow notches, which continued by impressed lines.

Talon exposed. Vas deferens short. Epiphallus well developed, with glandular walls. Penis internally with circular folds, lacking verge. Penial retractor attached to proximal part of penis or to boundary between penis and epiphallus. Free oviduct longer than vagina; latter may be absent. Perivaginal gland developed. Spermathecal stalk short to rather long.

DISTRIBUTION. East part of N and Central America from SE Canada to Guatemala, westward to Utah and Arizona.

Glyphyalinia (*Glyphyalus*)
Baker, 1928)
Fig. 1834

Baker, 1928: 19.

— *Glyphyaloides* Baker, 1930c: 196 (*Retinella* sect.; t.-sp. *Vitrea dalliana roemeri* Pilsbry et Ferriss, 1906; OD).

Riedel, 1980: 80.

TYPE SPECIES — *Glyphyalinia burringtoni* Pilsbry, 1928; OD.

Major radial grooves widely and irregularly spaced. Height 1.1-2.9, diam. 2.0-6.5 mm (1.8 × 3.9 mm).

Epiphallus greatly swollen apically, rather short. Epiphallic pore almost apical. Penis lacking caecum. Vagina present. Spermathecal stalk rather long.

DISTRIBUTION. East part of N America. 11 spp.

Glyphyalinia (*Glyphyalops*)
Baker, 1928)
Fig. 1835

Baker, 1928: 19.

TYPE SPECIES — *Vitrea rhoadsi* Pilsbry, 1899; OD.

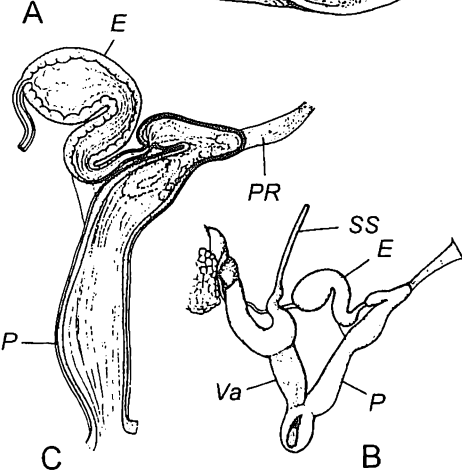
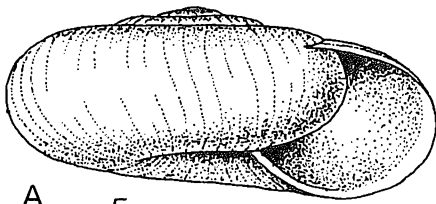


Fig. 1834. *Glyphyalinia* (*Glyphyalus*) *burringtoni* Pilsbry, 1928.

A — shell: Natural Bridge, Rockbridge Co., Virginia. "Type" Phil. No. 144764. B — reproductive tract. C — interior of epiphallus and penis. After Baker, 1928.

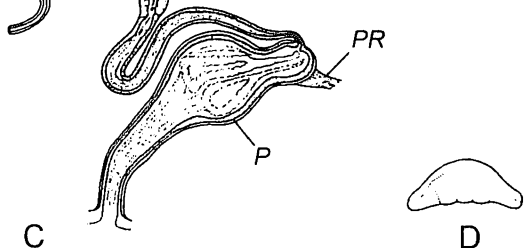
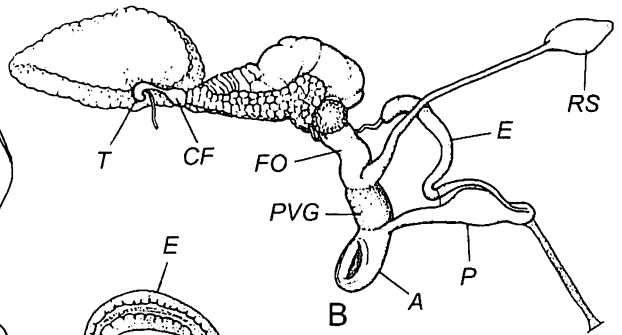
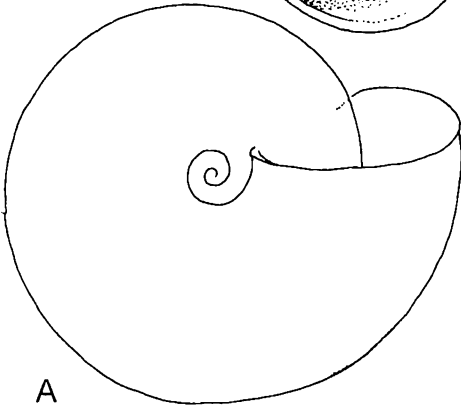
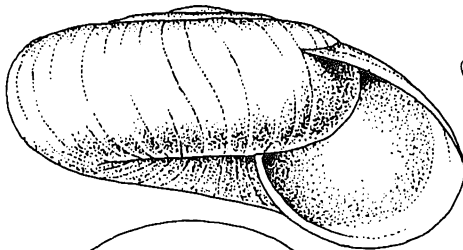


Fig. 1835. *Glyphyalinia* (*Glyphyalops*) *rhoadsi* (Pilsbry, 1899).

A — shell: White Pond, N.J. [USA]. Lectotype. Phil. No. 68213a. B — reproductive tract. C — interior of epiphallus and penis. D — jaw. After Baker, 1928.

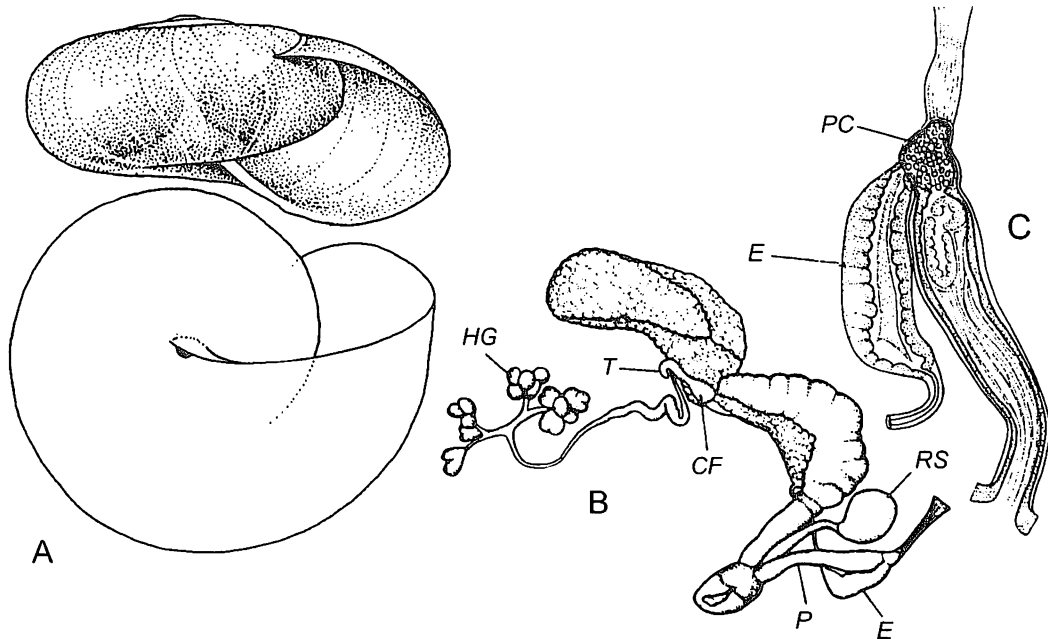


Fig. 1836. *Glyphyalinia (Glyphyalinia) indentata* (Say, 1823).

A — shell: New Jersey. "Type" Phil. No. 11954. B — reproductive tract. C — interior of epiphallus and penis. After Baker, 1928.

Major radial striae strong on basal side and much more prominent than minor ones on upper surface. Height 2.45-2.50, diam. 4.7-5.3 mm (2.5 × 5.1 mm).

Epiphallus only slightly swollen apically, comparatively long. Epiphallic pore almost apical. Penis lacking caecum. Vagina present. Spermathecal stalk rather long.

DISTRIBUTION. SE Canada (Ontario) and NE United States. 3 spp. & subspp.

Glyphyalinia (Glyphyalinia s. str.)

Fig. 1836

— *Glyphognomon* Baker, 1930c: 196 [*Retinella (Glyphyalinia)* sect.; t.-sp. *Helix sculptilis* Bland, 1858; OD].

Riedel, 1980: 82.

Major radial striae widely spaced, equally strong above and on basal surface. Height 2.8-5.5, diam. 4.7-12.5 mm (2.9 × 4.7 mm).

Epiphallus rather short, subfusiform. Penis with small, internally papillate caecum. Vagina (nearly) absent. Spermathecal duct short.

DISTRIBUTION. East part of N and Cen-

tral America from SE Canada to Guatemala, westward to Utah and Arizona. 13 spp.

Nesovitrea Cooke, 1921

Fig. 1837

Cooke, 1921: 271. Riedel, 1980: 84.

TYPE SPECIES — *Helix pauxillus* Gould, 1852; OD.

Shell flattened, thin, shining, translucent to semitransparent, of 3.5-4.5 slightly convex whorls. Last whorl rounded at periphery. Color (pale) corneous, slightly greenish or shell colorless. Embryonic whorls smooth. Postapical whorls radially costulately striated above, almost smooth on base. Aperture ovate, moderately oblique, with simple margins. Umbilicus rather wide, perspective. Height 1.3-2.8, diam. 2.4-8.0 mm (2.1 × 4.5 mm).

Hermaphroditic duct convoluted. Talon, a simple widening of distal part of duct. Vas deferens thin, sinuous, enters penis laterally leaving a short caecum. Epiphallus missing. Penis not long, subcylindrical, internally without regular structures. Penial retractor attached to caecum

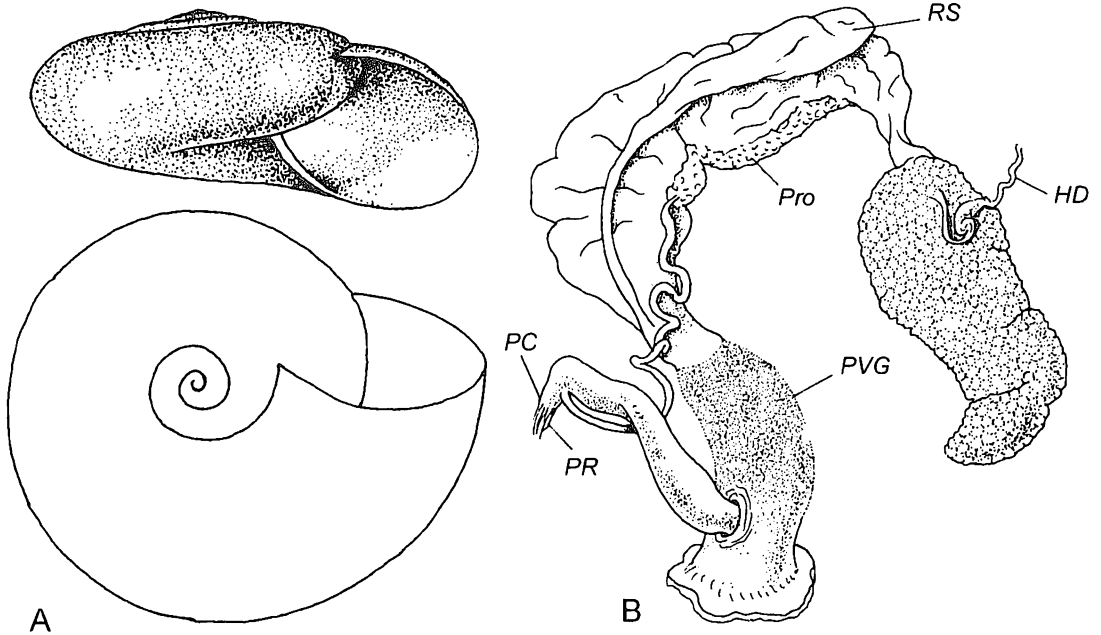


Fig. 1837 *Nesovitrea pauxilla* (Gould, 1852).
Maunahooma, West Maui, Hawaiian Islands. A — shell. B — reproductive tract. Phil. No. A 9400F

apically. Free oviduct enlarged, superficially fused with distal portion of uterus. Vagina greatly swollen, long, surrounded by well developed perivaginal gland composed of very small alveoli. Spermathecal stalk slender, rather long; reservoir ovate, embedded in upper half of spermoviduct.

DISTRIBUTION. Hawaiian Islands. 3 spp.

Aegopinella Lindholm, 1927

Fig. 1838

Lindholm, 1927: 324 (*Aegopina* sect.; nom. nov. pro *Polita* Kobelt, 1904, non Held, 1837).

— *Polita* Clessin, 1882: 158 (nom. praeocc., non Held, 1837; *Hyalina* sect. t.-sp. *Helix pura* Alder, 1830; OD).

— *Polita* Kobelt, 1904: 130 (nom. praeocc., non Held, 1837; *Hyalina* subg.; t.-sp. *Helix pura* Alder, 1830; OD).

Riedel, 1980: 63.

TYPE SPECIES — *Helix pura* Alder, 1830; OD.

Shell flattened, thin, glass-like, of 3.75-5 flattened, not shining, rapidly increasing whorls. Last whorl rounded at periphery. Colorless or pale corneous-yellowish. Em-

brionic whorls smooth. Later whorls with microscopical reticulate sculpture. Aperture ovate, moderately to well oblique. Umbilicus broad, shallow, perspective. Height 2-6, diam. 4-15 mm (2.4 × 4.4 mm).

Mantle without shell lobes, left neck lobe divided.

Vas deferens not long, entering short to long epiphallus through small papilla (at least in some species). Penis of various shape, internally without regular relief. Penial retractor attached to epiphallus. Free oviduct rather to quite long. Vagina more or less enlarged, surrounded by well developed perivaginal gland. Spermathecal stalk (rather) short; reservoir lies on lower half of spermoviduct or on free oviduct.

DISTRIBUTION. Most part of Europe, Caucasus; eastward approximately to the Volga River. 9 spp. & subspp.

Retinella P Fischer, 1877

Fischer P in Shuttleworth, 1877: 5 (*Zonites* subg.).

— *Mesomphix* Albers, 1857: 91 (non Rafinesque, 1819; *Hyalina* "Gruppe"; t.-sp. *Helix olivetorum* Gmelin, 1791; OD).

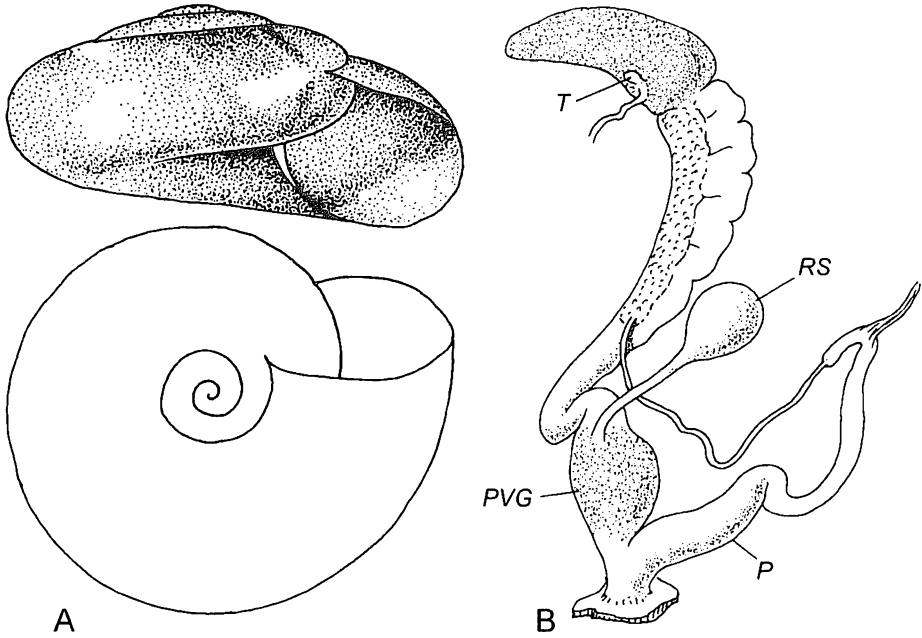


Fig. 1838. *Aegopinella pura* (Alder, 1830).
Stepanavan, Armenia. A — shell. B — reproductive tract. Institute of Zoology, Yerevan.

— *Aegopina* Kobelt, 1878 (1878-1879): 15 (*Hyalina* "Gruppe"; t.-sp. *Helix olivetorum* Gmelin, 1791; SD Kobelt, 1879).

— *Aegopsina* "Bourguignat" Westerlund, 1886: 67, 73 (nom. nov. pro *Aegopina*).

Riedel, 1980: 65.

TYPE SPECIES — *Helix olivetorum* Gmelin, 1791; ICZN Opinion 335, 1955.

Shell flattened to depressed-subglobular, comparatively thick-walled, weakly translucent, composed of 5-6 relatively convex whorls, divided by deep suture. Embryonic whorls smooth or with spiral threads. Later whorls with rather weak sculpture or with strong spiral cords and fine spiral striae in interstices. Aperture more or less circular. Umbilicus moderate to wide.

Vas deferens enters epiphallus apically, without inner papilla. Penis with or without short caecum to which penial retractor attached apically. Internally penis with short, sometimes sphincter-like verge and axial pilasters. Penis sheath present or missing. Perivaginal gland, if present, located in the very upper part of free oviduct. Spermathecal stalk (very) long. Sper-

matophore long fusiform, smooth, closed at both ends.

DISTRIBUTION. Italy, incl. Sicily and S Alps; Pyrenees; NW Morocco; Canary Islands.

Retinella (*Retinella* s. str.)

Fig. 1839

Shell depressed-conic, thin, polished or mat. Embryonic whorls smooth, later whorls sometimes with coarse radial striation and fine spiral lines. Umbilicus shallow, perspective. Height 6-16, diam. 10-32 mm (14.0 × 26.0 mm).

Epiphallus entering penis through a large slit-like pore surrounded by circular thickening (a sort of sphincter). Flagellum distinct. Penis internally with a few variously developed, wrinkled pilasters that begin below epiphallic pore. Penis sheath absent. Free oviduct quite long, its upper part with perivaginal gland. Vagina practically absent. Spermathecal stalk very long, reservoir lies on albumen gland.

DISTRIBUTION. Apennines with Sicily; NW Morocco. 4 spp. & subspp.

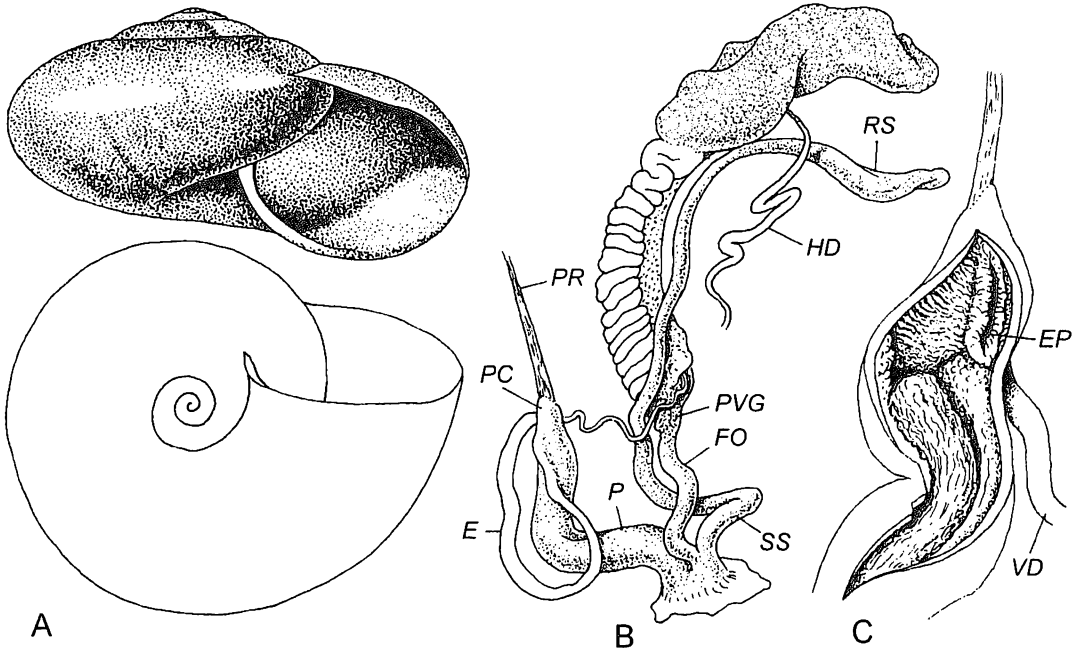


Fig. 1839. A — *Retinella (Retinella) olivetorum* (Gmelin, 1791). Shell: Toscana, Italy. SPb. B, C — ! *Retinella (Retinella) hiulca* (Albers, 1850). Caslano Mt. near Lugano, Switzerland, May 10, 2000. B — reproductive tract. C — interior of penis. Moscow No. Lc-25437

Retinella (Retinelloides) Riedel, 1977
Fig. 1840

Riedel, 1977: 504, 508.

TYPE SPECIES — *Helix incerta* Draparnaud, 1805; OD.

Shell depressed-subglobular, thin, shining. Embryonic whorls smooth. Sculpture of postembryonic whorls represented by very smoothed, weak and irregular radial wrinkles. Umbilicus rather narrow, funnel-shaped. Height 8-13, diam. 17-23 mm (11.4 × 17.3 mm).

Epiphallus entering penis through a minute, conic verge. Flagellum absent. Penis sheath surrounds most part of penis. Free oviduct moderately long, vagina of about same length. Perivaginal gland not evident. Spermathecal stalk subcylindrical, moderately long, reservoir pyriform. Spermatophore fusiform, with smooth surface.

DISTRIBUTION. Pyrenees. 1 sp.

Retinella (Lyrodiscus) Pilsbry, 1893
Fig. 1841

Pilsbry, 1893 (1893-1895): 48 (nom. nov. pro *Lyra* Mousson, 1872).

— *Lyra* Mousson, 1872:26 [nom. praeocc., non Sowerby, 1816 (Brachiopoda); *Patula* "group", t.-sp. *Helix circumscissa* Shuttleworth, 1852; SD Pilsbry, 1893 (1893-1895)].

TYPE SPECIES — *Helix circumscissa* Shuttleworth, 1852; OD.

Shell depressed, more or less opaque. Sculpture of embryonic and later whorls of strong spiral cords and fine spiral striae in interstices. Umbilicus wide, shallow. Height 2-4, diam. 5-9 mm (4.1 × 8.5 mm).

Flagellum short. Penis sheath absent. Free oviduct rather short, vagina very short. Perivaginal gland not evident. Spermathecal stalk a little expanded basally, moderately long, reservoir ovoid.

DISTRIBUTION. Canary Islands. 1 sp.; perhaps there are 2 more spp. whose anatomy is still unknown.

***Perpolita* Baker, 1928**
Fig. 1842

Baker, 1928: 15 (*Retinella* sect.).

TYPE SPECIES — *Helix hammonis* sensu Baker, 1928 (non Ström, 1765 = *Helix electrina* Gould, 1841); OD.

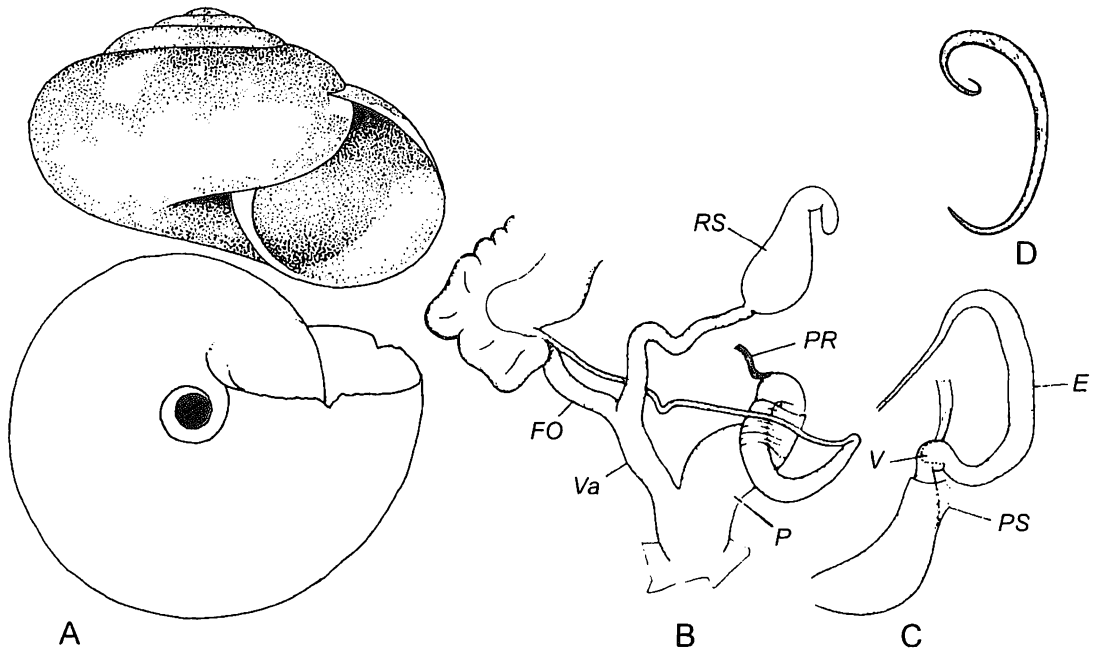


Fig. 1840. *Retinella (Retinelloides) incerta* (Draparnaud, 1805).

A — shell: Navarra, Spain. Private coll. of A.G. Kuznetsov. B — reproductive tract. C — penis. D — spermatophore. After Riedel, 1977

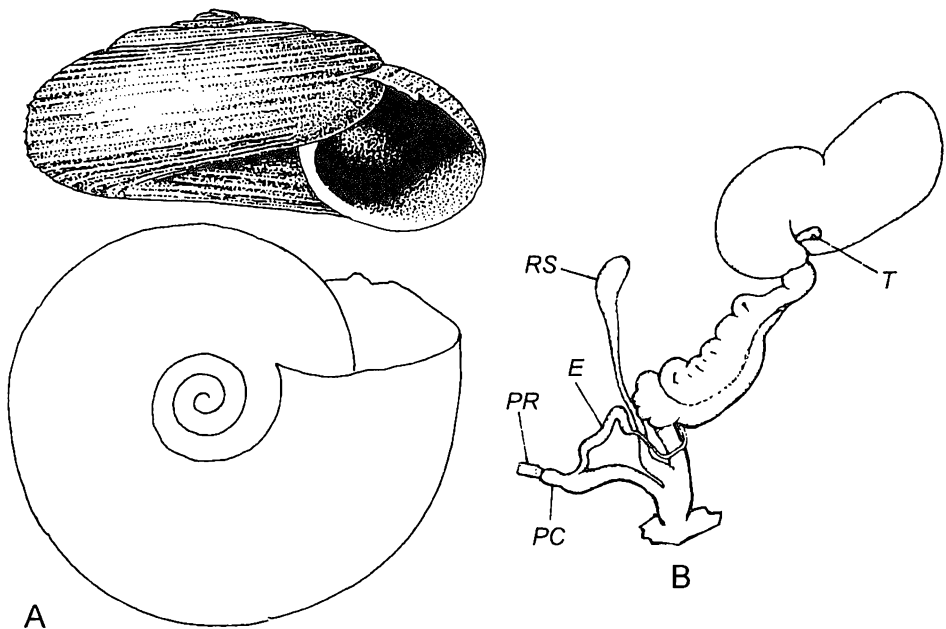


Fig. 1841 *Retinella (Lyrodiscus) circumsessa* (Shuttleworth, 1852).

A — shell. Tenerife Island [Canary Islands]. Vienna No. 2753. B — reproductive tract. After Riedel, 1980.

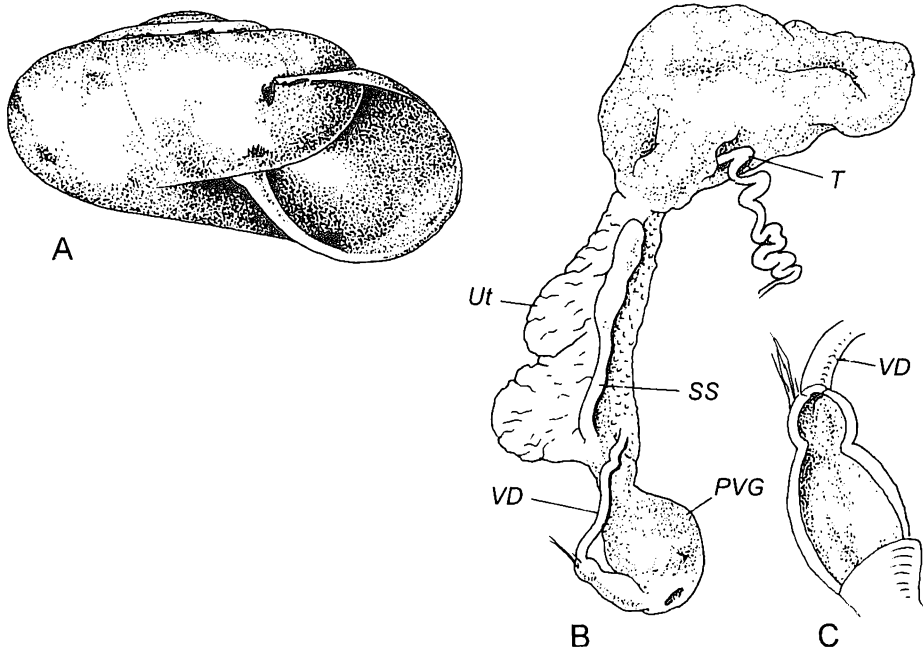


Fig. 1842. A — *Perpolita electrina* (Gould, 1841). Shell: Pilgrim Springs, near Nom village, Seward Peninsula, Alaska. Moscow No. Lc-23989.
 B, C — ! *Perpolita petronella* (L. Pfeiffer, 1853). Valley at Krestovsky Cape, E shore of Baikal Lake, September 18, 1981 B — reproductive tract. C — interior of penis. Moscow No. Lc-19836.

Shell depressed, thin, much translucent to semitransparent, shining, of 4-5 moderately convex whorls. Color pale-corneous, greenish or shell colorless. Embryonic whorls smooth. Later whorls with well spaced radial grooves; microscopical spiral striation weak or wanting. Aperture ovate, moderately oblique. Umbilicus rather narrow, funnel-shaped. Height 1.3-2.5, diam. 2.4-5.2 mm (2.4 × 4.6 mm).

Ovotestis of 3-4 groups of ovoid acini. Hermaphroditic duct convoluted in distal part. Talon exposed, straight or recurved; carrefour ovoid. Vas deferens (very) short, joining epiphallus apically or subapically through a simple pore. Epiphallus short, poorly differentiated. Penis lacking caecum, (relatively) small, thick-walled, internally with irregular, sometimes smoothed, axial folds which may be interrupted about 1/3 length from apex by a series of elliptic, sucker-shaped thickenings. Penis sheath very thin, transparent, surrounds penis and epiphallus. Penial retractor inserted at apex of epiphallus. Free oviduct extremely short; vagina rather long, more or less swollen, surrounded by variously developed peri-

vaginal gland. Spermathecal stalk short, elongated reservoir nearly attending albumen gland.

DISTRIBUTION. Holarctic. 8 spp. & subspp.

ZONITINAE Mörch, 1864

Mörch, 1864: 5.

— Neozonitinae Strebel et Pfeffer, 1880: 19 (nom. inval., because the name *Neozonites* does not exist).

Riedel, 1980: 26.

Shell mostly more or less opaque, medium to large (diam. 6.5-57.0), corneous to chestnut.

Left neck-lappet of mantle usually somewhat subdivided, that is with smaller lower accessory lobe.

Sole tripartite.

Orifice of genital atrium shifted backward.

Jaw oxygnathous.

Vas deferens long. Penial caecum

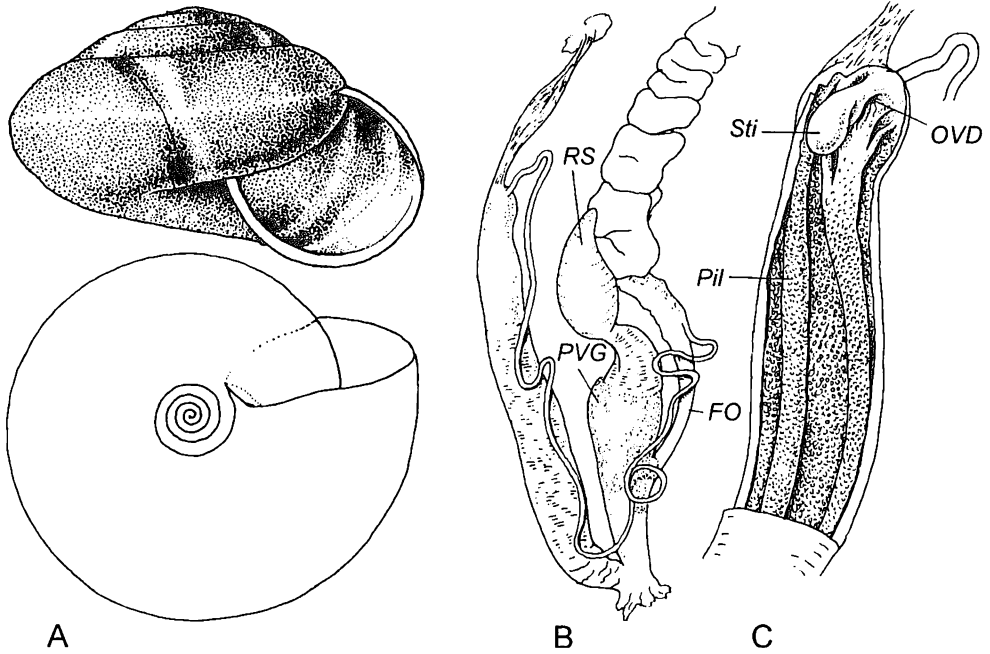


Fig. 1843. *Aegopsis verticillus* (Lamarck, 1822).

A — shell: "Krain, Laibach" [Slovenia, Ljubljana]. SPb. B, C — 13th district, Gemeindeberg, damp forest, Vienna, Austria, September 30, 1996. B — reproductive tract. C — interior of penis. Moscow No. Lc-25430.

present or absent; when present, penial retractor attached to it apically. Penis internally with tubercles which in adult animals often capped with calcareous hooks; verge absent. Penis sheath strong. Perivaginal gland present. Spermatheca normally developed.

DISTRIBUTION. Neartic (down to Central America) with Hawaii Islands and W Palearctic (1 species is Pan-Palearctic).

Aegopsis Fitzinger, 1833
Fig. 1843

Fitzinger, 1833: 99. Riedel, 1980: 61

TYPE SPECIES — *Helix verticillus* Lamarck, 1822; monotypy.

Shell depressedly subglobose, thin, matt above and glossy below, of about 6 slightly convex whorls. Color yellowish-corneous, with radial streaks, each of them consists of brown portion (nearer to aperture) and light yellow (farther from aperture). Embryonic whorls with delicate spiral threads, postnuclear whorls finely granulate because of crossing of radial wrinkles and spiral grooves;

basal surface polished. Aperture subcircular, moderately oblique. Umbilicus moderately narrow, open, cylindrical. Height 5-22, diam. 12-35 mm (19.3 × 31.0 mm).

Talon hidden. Vas deferens long, looped or somewhat convoluted, entering penis subapically through a small pore which covered up by a minute, spoon-like stimulator. Epiphallus absent. Penis long, subcylindrical, internally with 2 axial pilasters; inner surface covered by numerous, minute papillae. Penis sheath attached at both ends, its length 1/2-2/3 of penis length. Penial retractor inserting on penis terminally, at entrance of vas deferens. Free oviduct slender, rather long; vagina somewhat shorter. Perivaginal gland surrounds base of spermathecal stalk and adjacent area of vagina. Spermathecal stalk short, greatly swollen, strongly muscular; reservoir ovate, very thin-walled; in specimen dissected by me reservoir with many circular lines; filled by a brown mass, without traces of spermatophore.

DISTRIBUTION. Western part of Balkan Peninsula, E Alps, Apennine Peninsula, Peloponnes. 6-10 spp.

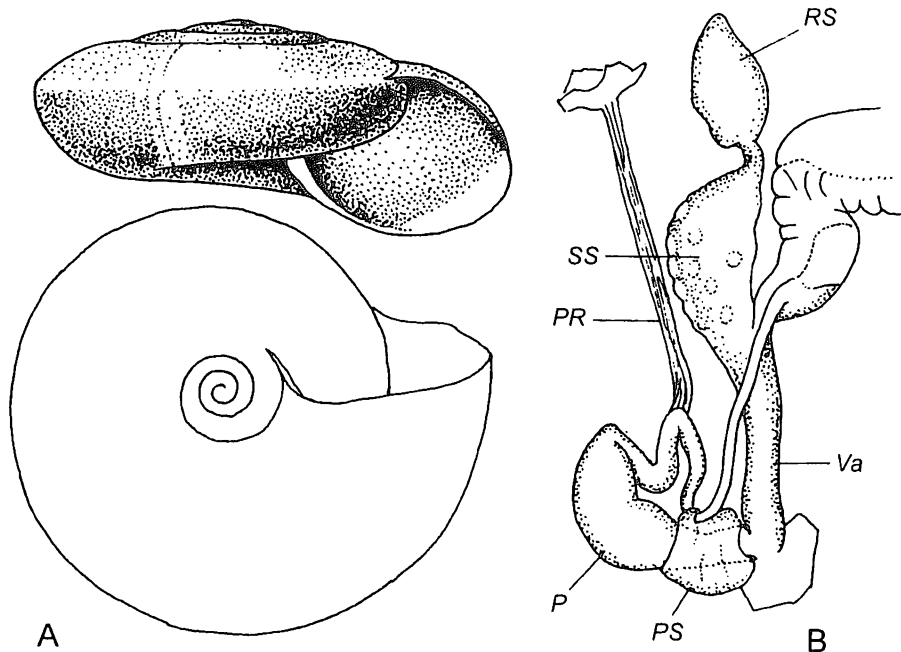


Fig. 1844. *Paraegopsis albanicus* (Rossmäessler, 1836).

A — shell: Albania. Moscow No. Lc-7833. B — reproductive tract. After Riedel, 1980.

Paraegopsis Hesse, 1910

Fig. 1844

Hesse, 1910: 168 (*Zonites* subg.). Riedel, 1980: 58.

TYPE SPECIES — *Helix albanica* Rossmäessler, 1836; OD.

Shell depressed, moderately thin, dull, of 4-5 flattened whorls. Last whorl with blunt peripheral angle. Color corneous, with paler radial streaks; base lighter. Embryonic whorls microgranulated. Postapical sculpture of irregular, rather coarse radial wrinkles and distinct, crowded spiral striae. Aperture ovate, slightly oblique. Umbilicus wide, perspective. Height 8-21, diam. 17-43 mm (15.4 × 32.2 mm).

Vas deferens comparatively short, passing into epiphallus without noticeable boundary. Epiphallus not long, joins penis at sharp angle. Penis bulky, internally with numerous papillae, its lower part surrounded by sheath. Penial retractor attached to middle part of epiphallus. Free oviduct very short, vagina long. Spermathecal shaft greatly swollen, perhaps, because of presence perivaginal gland. Reservoir ovate.

DISTRIBUTION. Western parts of Balkan Peninsula. 4 spp. & 1 subsp.

Balcanodiscus

Riedel et Urbanski, 1964

Fig. 1845

Riedel & Urbanski, 1964: 74 (*Paraegopsis* subg.).

TYPE SPECIES — *Helix frivaldskyana* Rossmäessler, 1842; OD.

Shell much depressed, thin, translucent, shining, of about 6 tightly coiled convex whorls. Last whorl with a peripheral angle or thread-like keel. Color corneous, usually with paler radial streaks. Embryonic whorls smooth, rest surface with sharp radial wrinkles and very fine dense spiral striation; granulation absent. Aperture ovate, slightly oblique. Umbilicus shallow, very wide. Height 3.7-4.2, diam. 7-11 mm (3.9 × 9.0 mm).

Right ocular retractor passes through peni-oviducal angle.

Vas deferens enters long, slender epiphallus terminally through minute papilla. Caecum exceptionally short or absent. Penis long to very long, cylindrical, without distinct boundary with epiphallus.

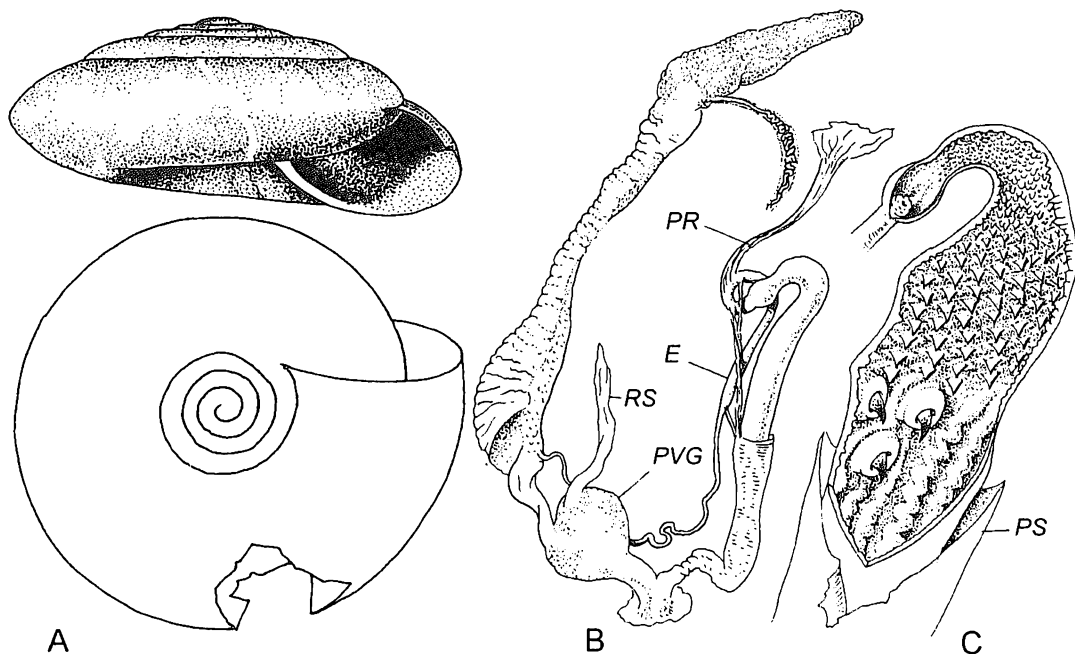


Fig. 1845. *Balcanodiscus frivaldskyanus* (Rossmassler, 1842).

A — shell: "Bulgarien: Ostrovica bei Kârdzali, Höhle Tilkiini." Vienna. B, C — "Höhle gegenüber Stbr. 4 km N Diobymstichon" [Greece]. B — reproductive tract. C — interior of penis. Moscow No. Lc-25435.

Internally distal portion of penis bears longitudinal folds, middle and proximal parts lined with conspicuous small hook-shaped chequer-wise papillae; nearer to epiphallus these papillae become bigger and sclerotized. Upper edge of penial sheath connected with vas deferens by a short ligament. Besides penial retractor attaching to end of epiphallus, there is an additional muscular bundle which connects lower and upper parts of epiphallus. Free oviduct moderately long. Vagina short, perivaginal gland well developed. Spermatheca small, its stalk very short (practically absent).

DISTRIBUTION. Bulgaria, NE Greece and Samothráki Island. 4 spp.

Thasiogenes Riedel, 1988

Fig. 1846

Riedel, 1988b: 94 (*Balcanodiscus* subg.).

TYPE SPECIES — *Balcanodiscus frivaldskyanus carinatus* Reischütz, 1983; OD.

Shell lens-shaped, rather thin, of about 4.5 flattened whorls. Last whorl with sharp peripheral angle. Color (light)-corneous, with weak, diffuse whitish streaks. Embry-

onic whorls smooth. Later whorls with delicate radial and spiral striae. Aperture rather narrow, rostrate, slightly oblique. Umbilicus very broad, shallow. Height 3.8-4.1, diam. 6.5-11.0 mm (4.1 × 11.0 mm).

Vas deferens thin, long, entering long epiphallus apically. Epiphallus forms a short, conic caecum (flagellum, after Riedel) at its junction with penis. Penis long, subcylindrical, its basal part surrounded by sheath. Penial retractor attached to epiphallus; another muscular band connects summit of caecum with distal part of epiphallus. Free oviduct long, stout. Vagina of about same length, perivaginal gland surrounds its middle portion. Spermathecal stalk not long, reservoir reaching distal part of spermoviduct.

DISTRIBUTION. Greece (western part of continental Thrakia and Thasos Island). 2 spp.

Turcozonites Riedel, 1987

Fig. 1847

Riedel, 1987: 12 (? *Zonites* subg.).

TYPE SPECIES — *Zonites wandae* Riedel, 1982; OD.

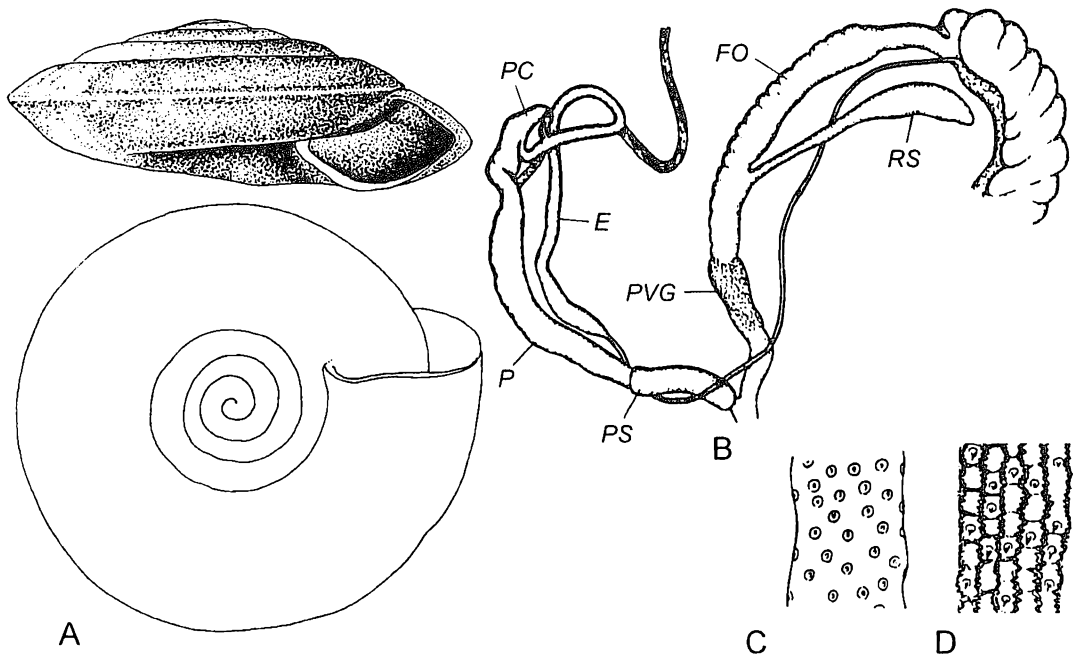


Fig. 1846. *Thasiogenes carinatus* Reischütz, 1983.

A — shell: "Insel Thasos, oberhalb von Theologos (im Süden des Ipsarion-Gebirges)" Holotype. Vienna No. 82.874. B — reproductive tract. C, D — details of inner surface of penis. After Riedel, 1998b.

Shell depressed, rather thin, of 5 whorls. Last whorl with peripheral keel. Color yellowish to whitish, keel lighter. Embryonic whorls with minute smoothed tubercles, rest whorls with distinct reticulate (tuberculate) sculpture because of crossing of very irregular radial lines and well spaced spiral ones; basal surface nearly smooth. Aperture only slightly oblique. Diam. 24-57 mm (7.6 × 17.4 mm).

Vas deferens long, slender, entering epiphallus apically, with abrupt boundary. Epiphallus cylindrical, rather long, joining penis excentrically, leaving short, rounded caecum. Penis long, internally with numerous, short, conic spines. Penis sheath surrounds basal section of penis, its upper margin connected by fibers with proximal part of epiphallus. Penial retractor attached to penis/epiphallus junction opposite to caecum. Free oviduct quite long. Vagina rather long, coated by well developed perivaginal gland supplied on penial side with many retractors. Spermathecal stalk short, thin; reservoir voluminous, with apical ligament. Spermatophore lacking tail, with apical process; its basal end bears denticulate fringe.

DISTRIBUTION. S and SW Asia Minor. 5-7 spp.

Zonites Montfort, 1810

Fig. 1848

Montfort, 1810: 282.

- *Tragonma* Held, 1837: 916 (t.-sp. *Helix algira* Linnaeus, 1758; SD Riedel, 1980).
- *Helicodes* Dumas, 1847: 113 [nom. praeocc., non Boisduval, 1844 (Lepidoptera); emend. Herrmannsen, 1852 pro "*Helicodes*"; t.-sp. *Helix algira* Linnaeus, 1758; monotypy].
- *Verticillus* Moquin-Tandon, 1848: 375 (*Zonites* sect.; t.-sp. *Helix algira*; OD).
- ? *Aegophthalmus* Hesse, 1910: 168 [*Zonites* subg.; t.-sp. *Zonites verticillus* var. *graeca* Kobelt, 1876 (= *Zonites graecus* Kobelt, non *Zonites albanicus* var. *graeca* Kobelt, 1876 = *Zonites kobelti* O. Boettger, 1898 — fide Riedel, 1978b, 1980); OD].

Riedel, 1978b: 322; 1980: 53; 1998a: 25.

TYPE SPECIES — *Helix algira* Linnaeus, 1758; OD.

Shell depressed, solid, of 5-7 flattened whorls. Last whorl angled or keeled. Color corneous, yellowish or reddish, usually with alternating darker and lighter radial streaks. Embryonic whorls with radial wrinkles crossed by spiral lines; this sculpture re-

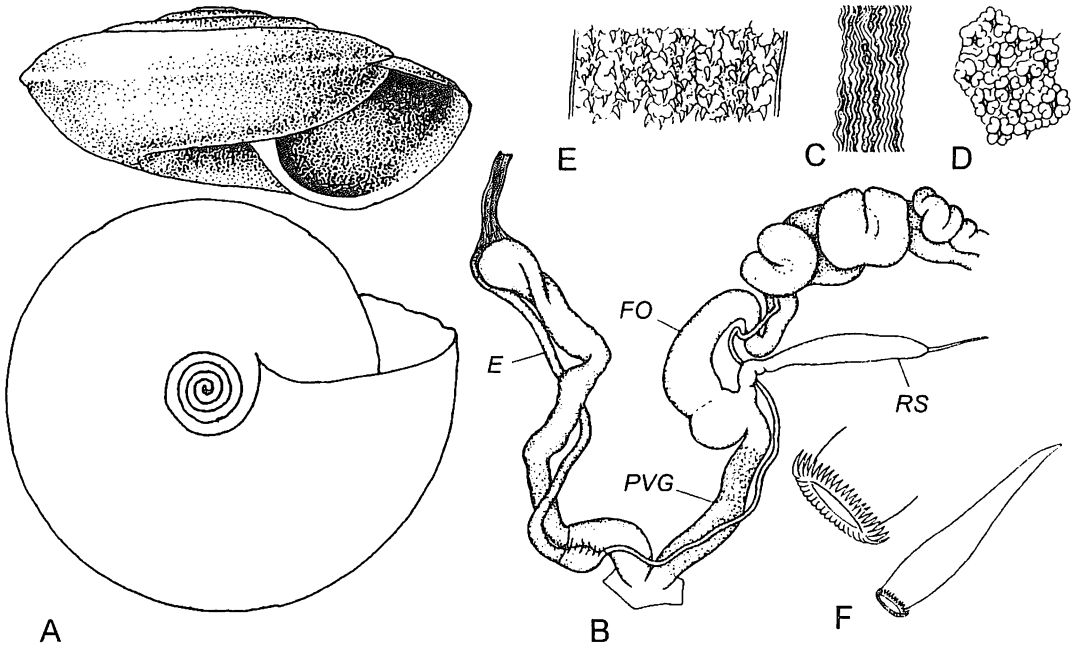


Fig. 1847 A, B — *Turcozonites wandae* (Riedel, 1982). A — shell: Kovada Golu, Turkey. Vienna No. 81465 (immature specimen). B — reproductive tract.
 C, D, E — ! *Turcozonites corax* (L. Pfeiffer, 1857). Interior of penis. F — ! *Turcozonites megistus* (Rolle, 1894). After Riedel, 1987 Spermatophore. After Riedel, 1998a.

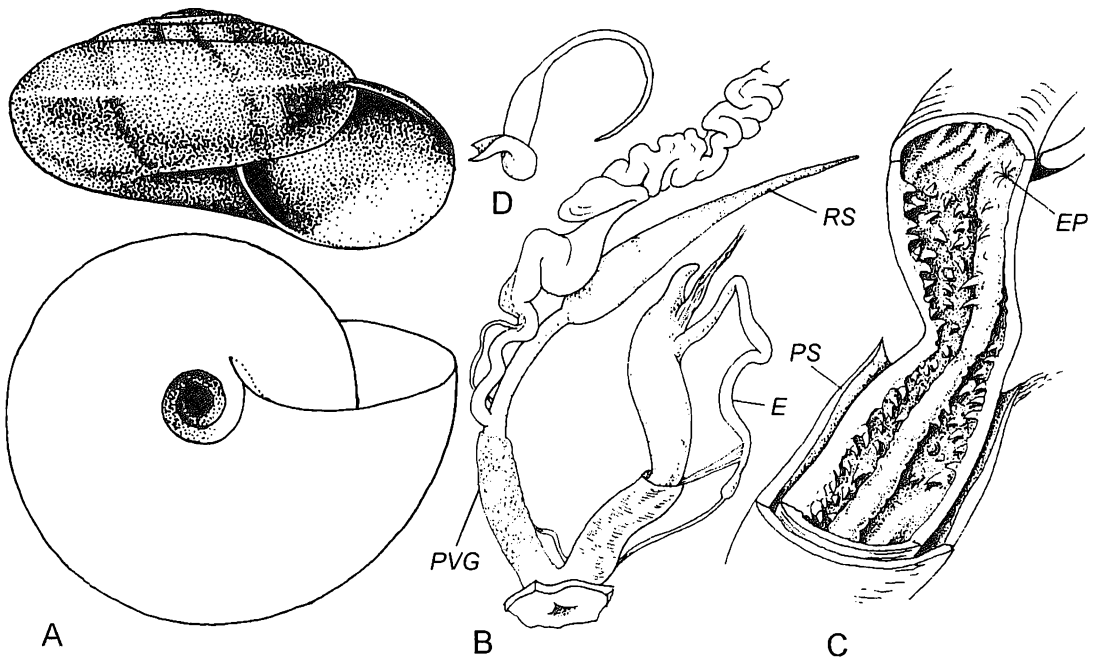


Fig. 1848. A, B, C — *Zonites algerus* (Linnaeus, 1758). A — shell: Montpellier, France. Moscow No. Lc-23099. B, C — Salines de Frontignan, Hérault, France, April 21, 1979. B — reproductive tract. C — interior of penis. Geneva No. 979/671
 D — ! *Zonites anaphiensis* Riedel et Mylonas, 1981. Spermatophore. After Riedel & Mylonas, 1981.

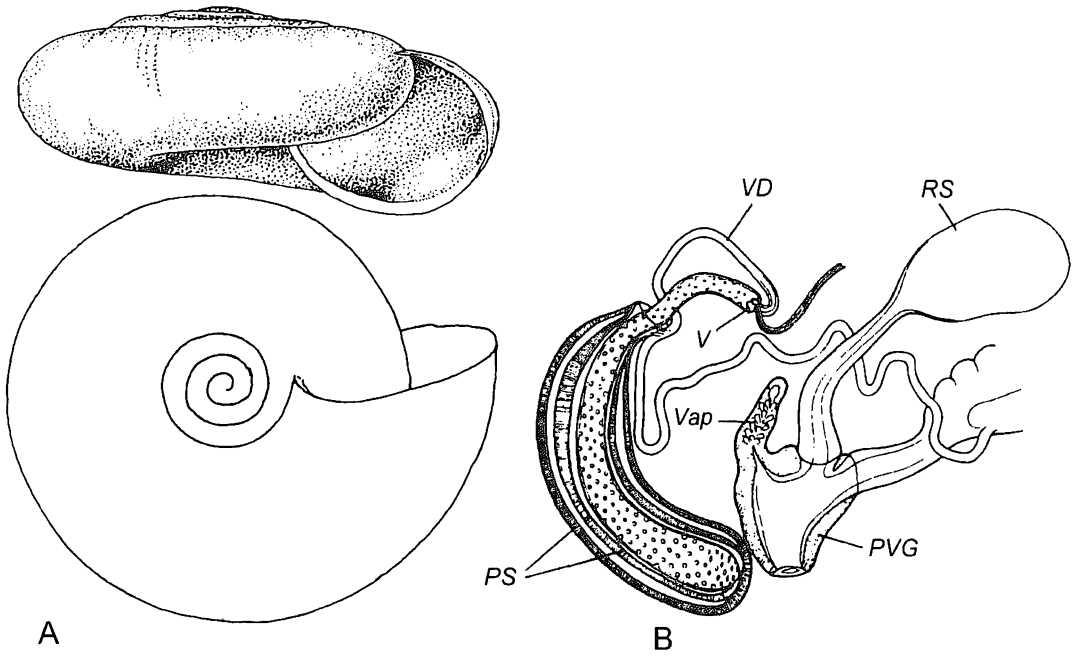


Fig. 1849. *Meledella weneri* Sturany, 1908.

A — shell: "Dalmatie, Grotte Movrica pećina ad Babino polje, Ins. Mljet" Paris. B — reproductive tract. After Riedel, 1980.

tained on later whorls. Aperture ovate to widely semilunate, slightly to moderately oblique. Umbilicus not wide, perspective. Height 10-25, diam. 25-57 mm (22.7 × 40.4 mm).

Right ommatophoral retractor passes through peni-oviducal angle.

Sole tripartite.

Vas deferens thin, joining moderately long epiphallus apically, sometimes through a small swelling. Epiphallus enters penis laterally through a simple pore, leaving conic penial caecum. Internally epiphallus with many high, narrow, corrugated folds broken in places into small, dense papillae. Penis rather long, stout, thick-walled, internally with 1-2 axial pilasters and many large papillae; in not fully mature specimens papillae soft, in fully mature animals most papillae topped with very strong calcareous spines directed toward atrium. Penis sheath thick, surrounds distal half of penis; upper edge of sheath free, connected with proximal part of epiphallus by muscular fibers. Penial retractor attached to penis at base of caecum. Free oviduct and vagina moderately long, of about equal length. Vagina coated by well developed perivaginal gland. Spermathecal stalk not long, reservoir carrot-shaped, with attenuated apical part. Spermatophore smooth,

consisting of thread-like, pointed upper section and somewhat enlarged lower part which opens by wide slit in basal end.

DISTRIBUTION. S Greece, islands of E Mediterranean (except for Crete and Cyprus), Asia Minor; 1 species in Italy and S France. 36 or 37 spp. & subspp.

Meledella Sturany, 1908
Fig. 1849

Sturany, 1908: 38. Riedel, 1980: 60.

TYPE SPECIES — *Meledella weneri* Sturany, 1908; monotypy.

Shell nearly flat, thin, fragile, translucent, of 5.25-5.75 tightly coiled whorls. Color whitish (glass-like when fresh). Embryonic whorls with well spaced spiral lines. Postapical sculpture of similar spiral striation and fine, regular rib-striation; on basal surface spiral sculpture absent, radial becomes obsolete. Aperture ovate, only slightly oblique. Umbilicus widely open. Height 5-6, diam. 12-16 mm (5.5 × 13.1 mm).

Vas deferens long, entering penis apically through a minute verge. Epiphallus missing. Penis large, surrounded by double sheath, internally with distinct, small, numerous tubercles. Free oviduct moderately

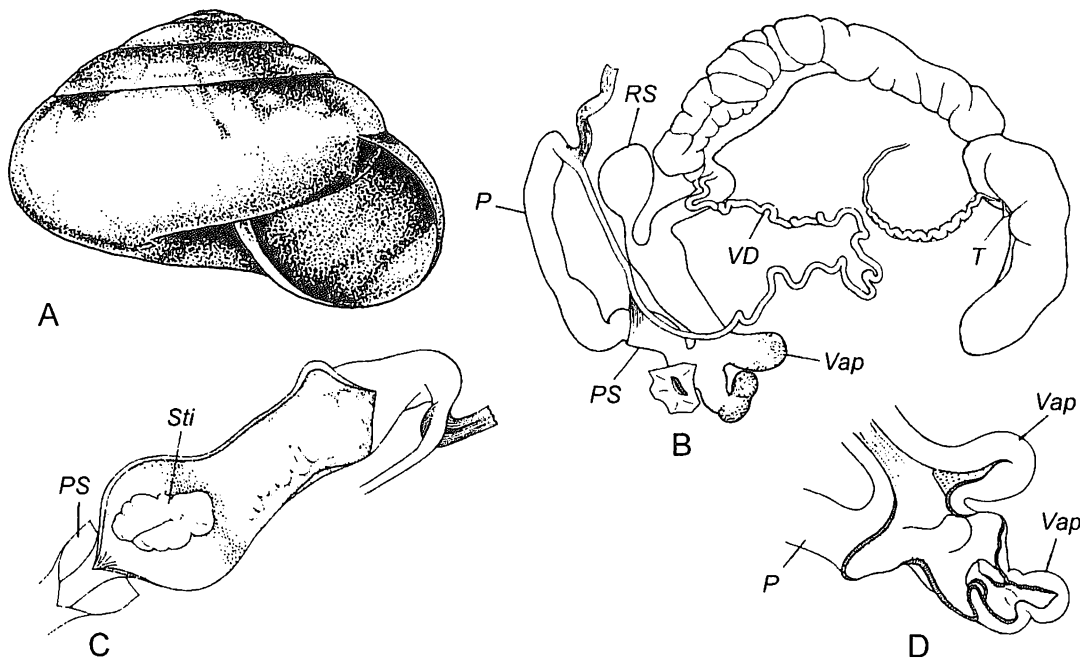


Fig. 1850. *Allaegopsis skanderbegianus* (Poliski, 1924).

A — shell: "Römerbrücke bei Tirana" Vienna No. E 32638. B — reproductive tract. C — interior of penis. D — interior of vagina and vaginal appendages. After Riedel, 1979.

long. Vagina short, greatly swollen, with lateral glandular appendix which lacks lumen. Perivaginal gland coats vagina and base of free oviduct. Spermathecal stalk moderately long, reservoir capacious, ovoid. Atrium as such absent, male and female pores open independently.

DISTRIBUTION. Croatia (Mljet Island). 1 sp.

Allaegopsis Riedel, 1979

Fig. 1850

Riedel, 1979: 468, 469 (*Aegopsis* subg.); 1998a: 31.

TYPE SPECIES — *Aegopsis skanderbegianus* Poliski, 1924; OD.

Shell subglobular to lenticular, moderately solid, of 5.5-6.5 slightly convex whorls. Last whorl rounded or with variously developed peripheral angle or keel. Color pale-corneous to brown. Embryonic whorls smooth. Later whorls with delicate, crowded radial wrinklets and variously developed spiral lines; basal part with similar but weaker sculpture. Aperture subcircular to ovate, only slightly oblique. Umbilicus not wide, deep. Height 10.4-18.0, diam. 18-35 mm (17.3 × 26.5 mm).

Retractor of right ommatophore passes through peni-oviducal angle.

Hermaphroditic duct convoluted. Talon

small, clavate. Vas deferens very long, convoluted, entering penis apically. Epiphallus wanting. Penis rather long, internally with pad-like stimulator in distal part and tightly convoluted axial pilaster in proximal part. Penis sheath surrounds basal section of penis. Penial retractor attached to vas deferens/penis junction. Free oviduct moderately long, stout, subcylindrical. Vagina long, stout, with 1-14 glandular appendages (seemingly, derivatives of perivaginal gland). Internally some of these appendages with a high fold. Spermathecal stalk very short, reservoir voluminous, subglobular.

DISTRIBUTION. SW Balkan Peninsula from Albania and Macedonia to NW Peloponnes, ? Corfu (= Kérkira) Island, Levkas Island (Greece). 7-8 spp. & sub spp.

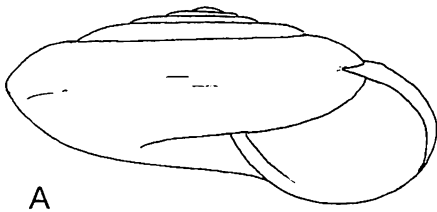
Doraegopsis Riedel, 1982

Fig. 1851

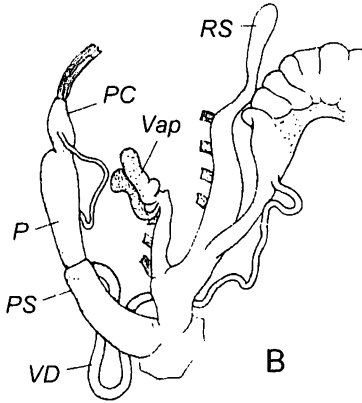
Riedel, 1982: 20.

TYPE SPECIES — *Aegopsis* (*Allaegopsis*?) *bocoticus* Riedel, 1980; OD.

Shell lentiform, thin, somewhat translucent, of 5-6 rather convex whorls. Last whorl with distinct peripheral angle or keel. Color light-brown, base paler. Embryonic whorls smooth or with very fine spiral



A



B

Fig. 1851 *Doraegopsis boeoticus* (Riedel, 1980).
A — shell. B — reproductive tract. After
Riedel, 1982.

striae. Postnuclear sculpture of not coarse, irregular, radial wrinkles crossed by delicate spiral lines. Aperture broadly ovate, slightly oblique. Umbilicus rather wide. Height 9.2, diam. 16-20 mm.

Right ommatophoran retractor free from peni-oviducal angle.

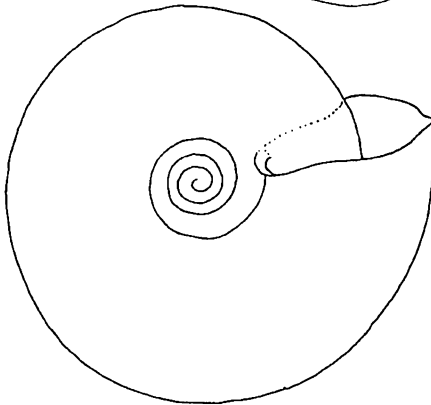
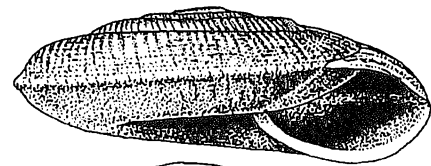
Vas deferens long, more or less enlarged in middle part, entering base of a short penial caecum. Penis long, cylindrical, its distal half surrounded by sheath. Inner surface of penis variously decorated, predominantly with axial folds; pointed papillae may be present as well. Free oviduct somewhat longer and thinner than vagina. Perivaginal gland as such absent; perhaps, it transformed into 2-10 long, flattened alveolar processes sitting on common duct (vaginal appendix). Spermathecal stalk rather long, enlarged; reservoir embedded in distal half of spermoviduct.

DISTRIBUTION. Central and S Greece. 4 spp.

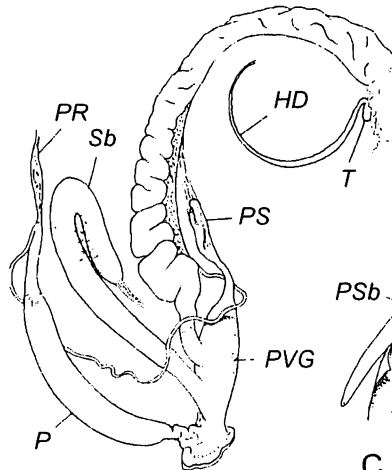
Troglægopsis Riedel et Radja, 1983
Fig. 1852

Riedel & Radja, 1983: 159. Riedel, 1998a: 34.

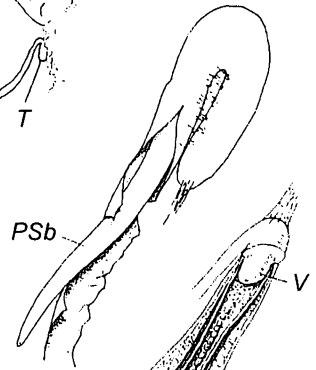
TYPE SPECIES — *Aegopsis mosorensis* Kusčer, 1933 [? = *Zonites (Aegopsis) obenbergeri* Frankenberger, 1917)]; OD.



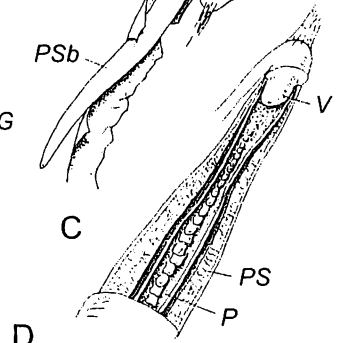
A



B



C



D

Fig. 1852. *Troglægopsis mosorensis* (Kusčer, 1933).

A — shell: "Vranjaca" [Cave Spilja Vranjača near Kotlenica NE of Split, Dalmatia]. Syntype. Vienna. B, C, D — "Dalmatia, Mosor Mts.: Kotlenica near Split, Spilja Vranjača, May 11, 1999" B — reproductive tract. C — interior of sarcobelum prepuce. D — interior of penis. Moscow No. Lc-25424 (gift of A. Riedel).

Shell depressed, lentiform, moderately thin, dull, of 5.25-5.5 rather convex whorls. Color yellowish to corneous. Embryonic whorls with distinct spiral cords; later whorls with same cords, which gradually become weaker toward aperture. Radial sculpture of crowded wrinkles; base and slopes of umbilicus with clear granulation. Aperture ovate, scarcely oblique; columellar and basal margins somewhat reflexed. Umbilicus broad, shallow. Height 6.0-6.2, diam. 16.0-16.5 mm (6.2 × 16.4 mm).

Hermaphroditic duct not convoluted. Talon exposed, drop-like. Vas deferens long, entering penis apically through a small verge. Epiphallus absent. Penis long, cylindrical, internally with minute, chequer-wise tubercles and a row of large, tongue- or scale-like papillae. Penis sheath thick, double. Free oviduct not long. Vagina swollen, surrounded by perivaginal gland that has no clear boundaries. There is a long, slender organ (a sort of sarcoelium) having long, thin-walled prepuce containing vermiform papilla. Spermathecal stalk short, greatly swollen basally; reservoir not large, supplied with apical ligament.

DISTRIBUTION. Croatia (Dalmatia). Lives in caves. 1 sp.

OXYCHILINAE Hesse, 1927

Hesse in Geyer, 1927: 47 Riedel, 1980: 86.

Shell thin, rarely glass-like, small to large (diam. 2.7-31.0 mm), colorless to reddish.

Left neck-lappet of mantle entire.

Sole tripartite.

Orifice of genital atrium shifted backward.

Jaw oxygnathous.

Vas deferens long. Penial caecum present (only exception - *Drouetia*); penial retractor attached to it apically. Penis internally with axial folds (which often broken into series of tubercles), hooks or stimulators of variously shape; verge absent. Penis sheath present. Perivaginal gland generally well developed. Spermatheca never reduced.

DISTRIBUTION. W Palearctic; one genus in SW Arabian Peninsula.

Eopolita Pollonera, 1916

Fig. 1853

Pollonera, 1916: 2 (*Hyalinia* subg.).

— *Birulana* Lindholm, 1922: 306 [t.-sp. *Hyalinia* (*Polita*) *siraphora* Westerlund, 1897; monotypy; = *Hyalinia* (*Polita*) *derbentina* O. Boettger, 1886].

Riedel, 1980: 113.

TYPE SPECIES — *Zonites aequatus* Mousson, 1854 [= *Eopolita protensa protensa* (Férussac, 1832)]; monotypy.

Shell depressed, thin, translucent, of about 4.5 rapidly increasing whorls. Last whorl evenly rounded. Color light-corneous. Apex smooth, first postembryonic whorl with vague radial wrinkles, next whorls with spiral cords over wrinkles; surface of last whorl with microsculpture arising because of crossing of spiral and radial elements. Aperture large, well oblique. Umbilicus moderately broad, quite perspective. Height 5.5-9.5, diam. 12-23 mm (8.4-18.2 mm).

Vas deferens long, entering epiphallus apically. Epiphallus fusiform, separated from penis by distinct narrowing, internally with many transversal partitions piercing by a narrow central canal. Penis long, cylindrical, internally with longitudinal, anastomosing folds. Penis sheath surrounds distal half of penis. Penial retractor inserting on epiphallus. Free oviduct long; vagina long as well, its upper part coated by perivaginal gland. Spermathecal shaft short, reservoir embedded in lower part of spermoviduct.

DISTRIBUTION. From N Africa (Cyrenaika), Crete and Attika to W Iran and E Caucasus. 5 spp. & subspp.

Discoxychilus Riedel, 1966

Fig. 1854

Riedel, 1966: 227

TYPE SPECIES — *Patula ruderata* var. *gorchtschana* Mousson, 1873, sensu Lindholm, 1922 (= *Discoxychilus lindholmi* Riedel, 1966); OD.

Shell similar to that of *Discus*, strongly depressed, rather thin, slightly translucent (especially its base), of 5-5.5 convex whorls. Last whorl with blunt, rounded angle. Color corneous-brown or yellowish, paler on base. Embryonic whorls smooth. Postapical sculpture of radial riblets that becoming weaker on base and dense, microscopic spiral striae. Aperture narrowly ovate, variously oblique. Umbilicus wide,

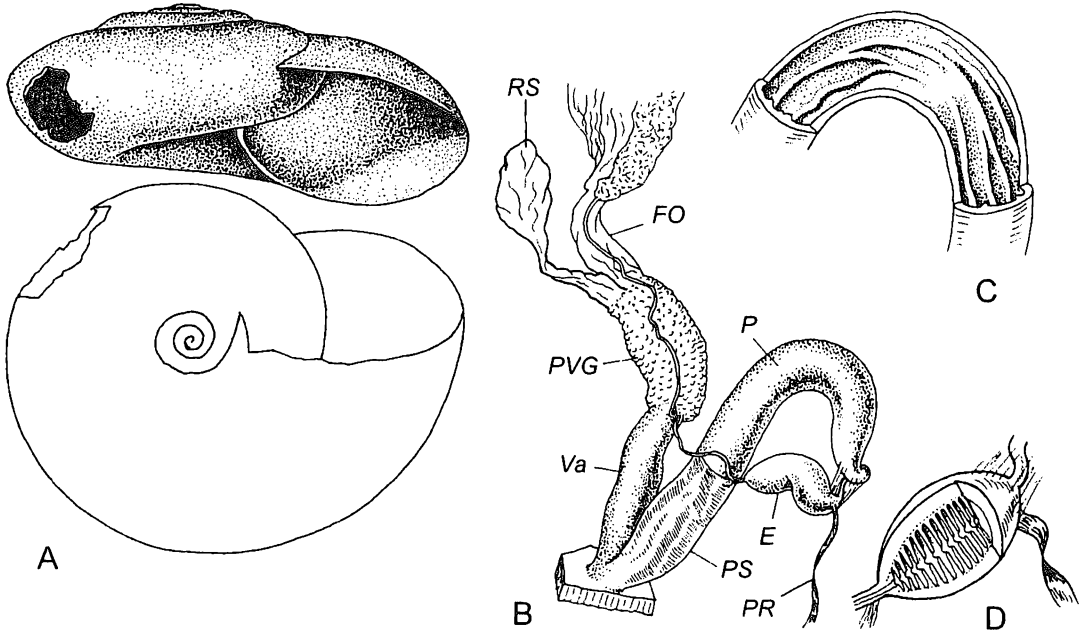


Fig. 1853. A — *Eopolita protensa* (Férussac, 1832). No data. Lectotype. Paris.
 B, C, D — ! *Eopolita derbentina* (O. Boettger, 1886). NW of Noemberian, Armenia, April 19, 1952. B — reproductive tract. C — interior of penis. D — interior of epiphallus. SPb.

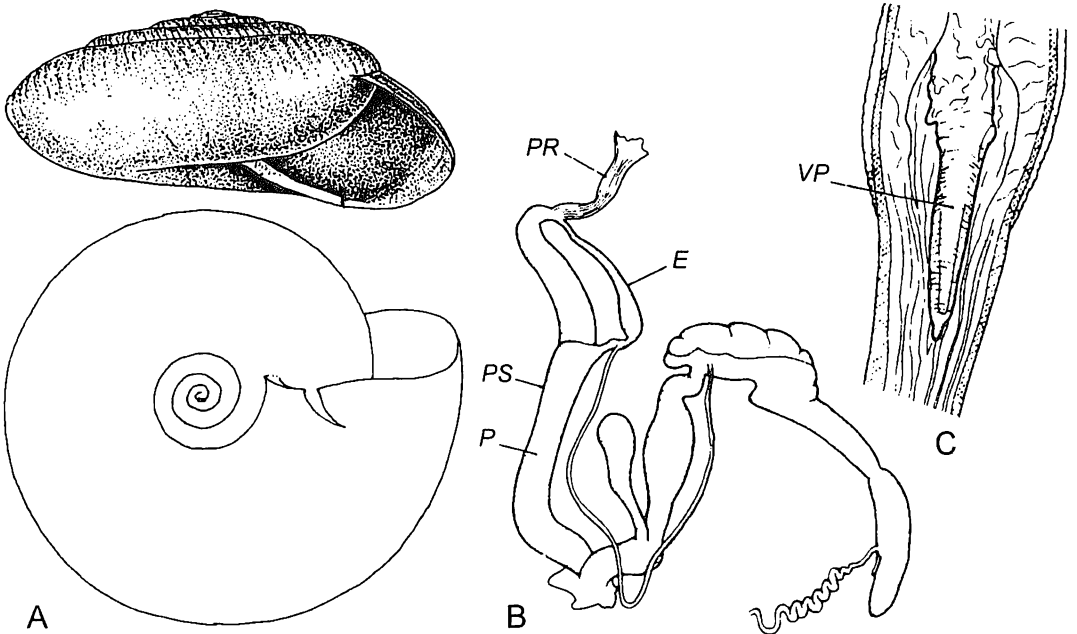


Fig. 1854. *Discoxychilus lindholmi* Riedel, 1966.
 A — shell: Chirnaly River valley, Adzharia. SPb. B — reproductive tract. C — interior of free oviduct. After Riedel, 1966.

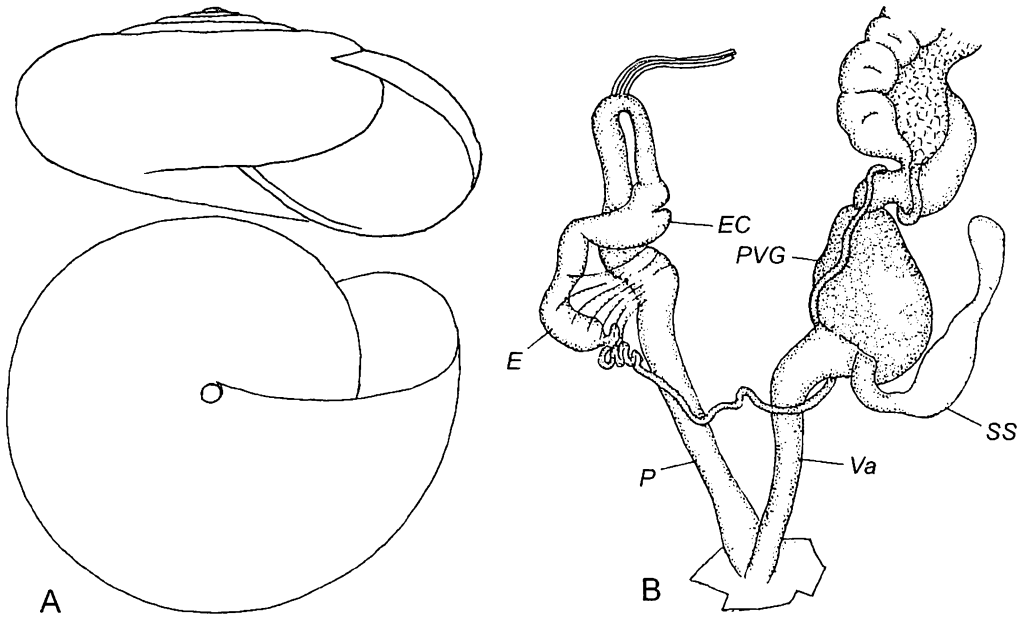


Fig. 1855. *Iranoxychilus herzi* (O. Boettger, 1889).

A — shell. After Riedel, 1981. B — reproductive tract. After Riedel, 1998b.

perspective. Height 2.2-2.6, diam. 7.5-8.7 mm (2.4 × 7.9 mm).

Mantle without lobes.

Hermaphroditic duct convoluted. Talon exposed, small, rod-like. Vas deferens long, thin, entering epiphallus apically. Epiphallus not long, clavate. Penis long, cylindrical, its basal 2/3 coated by sheath; upper edge of sheath connected with vas deferens/epiphallus junction by a short, muscular band. Internally distal part of penis, covered by sheath, locally with oblique, irregular folds; proximal part with squamulose, subquadrangular papillae. Free oviduct swollen, contains a long, pointed papilla provided with central canal. Vagina about 3 times shorter than free oviduct. Perivaginal gland poorly developed. Spermathecal stalk rather short; reservoir indistinctly demarcated, not reaching spermoviduct.

DISTRIBUTION. Adzharia, coastal territories. 1 sp.

Iranoxychilus Riedel, 1998

Fig. 1855

Riedel, 1998b: 103 (*Oxychilus* subg.).

TYPE SPECIES — *Hyalinia (Polita) herzi* O. Boettger, 1889; OD.

Shell much depressed, rather thin, shi-

ning, of 5.3-5.5 flattened whorls. Last whorl evenly rounded at periphery. Color corneous. Embryonic and later whorls lacking regular sculpture. Aperture broadly ovate, only slightly oblique, with fragile margins. Umbilicus very narrow. Diam. 15-19 mm.

Vas deferens long, narrow, convoluted distally, entering epiphallus abruptly. Epiphallus moderately long, with a short, conic caecum in distal part. Penis long, subcylindrical, without caecum, internally lined with numerous papillae. Sheath surrounds lower half of penis and connected with proximal part of epiphallus by fibers. Penial retractor attached to proximal part of penis. Free oviduct rather long, expanded, coated by well developed perivaginal gland. Vagina long, subcylindrical. Spermathecal stalk short, reservoir variable in shape.

DISTRIBUTION. N Iran. 1 sp.

Conulopolita O. Boettger, 1879

Fig. 1856

Boettger O., 1879: 97 (*Hyalinia* sect.).

TYPE SPECIES — *Hyalinia (Conulopolita) raddei* O. Boettger, 1879; monotypy.

Shell low turbinata to nearly flat, thin, shining, of 4.5-7 moderately convex

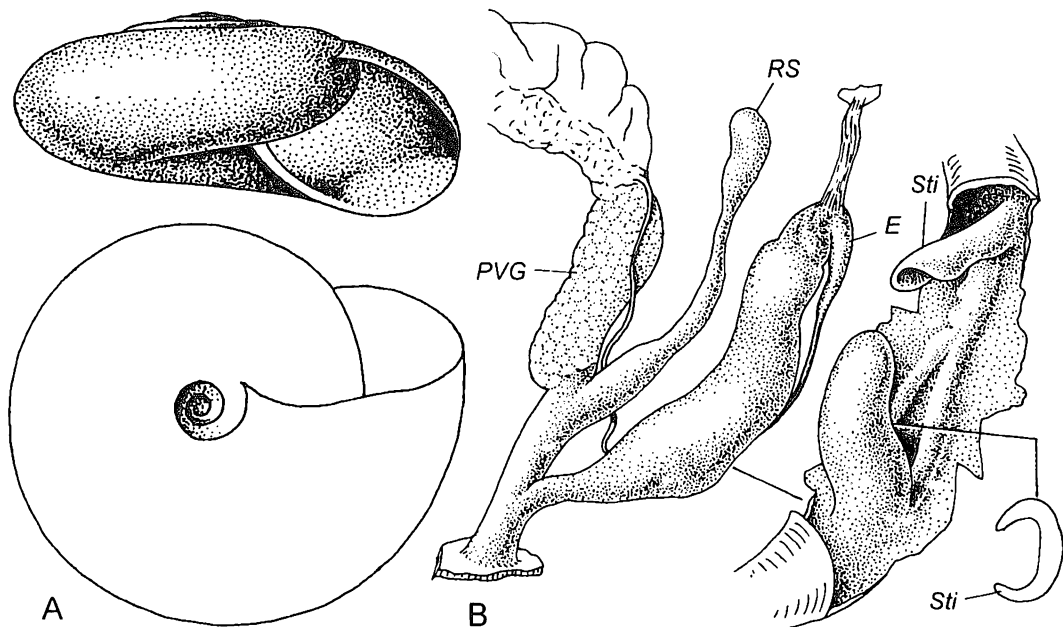


Fig. 1856. ! *Conulopolita sieversi* (O. Boettger, 1879).

Ikhrek, Daghestan, E Caucasus, July 14, 1967 A — shell. B — reproductive tract and interior of penis. Moscow No. Lc-19826.

whorls. Last whorl rounded at periphery. Color pale-corneous, base whitish. Embryonic and later whorls without regular sculpture; spiral elements missing. Aperture ovate, somewhat nautiloid, moderately oblique. Umbilicus very narrow to wide, sometimes absent. Height 3.0-7.1, diam. 7-13 mm (3.4 × 7.2 mm).

Mantle without lobes or with 1 small right shell-lobe.

Vas deferens rather long, thin, entering very short epiphallus apically. Penis large, bulky, internally with 1 or 2 spoon-like or vermiform stimulators; if there are 2 stimulators, they not equal in size. Penis sheath indistinct. Penial retractor marks boundary between penis and epiphallus. Free oviduct long, covered by perivaginal gland; vagina shorter. Spermathecal stalk more or less swollen at base, reservoir lies on lower half of spermoviduct.

DISTRIBUTION. Caucasus. 4 spp.

Allogenes Gude, 1911

Fig. 1857

Gude, 1911 272.

TYPE SPECIES — *Vitrea prodigiosa* Ancey, 1899; OD.

Shell ammonitoid, flat, thin, with sunken apex, of 5-5.5 involute, rather convex whorls. Last whorl with narrowly rounded peripheral angle. Color (pale) corneous. Embryonic whorls smooth, later whorls nearly so. Aperture narrowly semilunate, nautiloid, almost vertical. Umbilicus rather wide, subcylindrical, scarcely perspective. Height 4-6, diam. 10-19 mm (5.0 × 14.8 mm).

Vas deferens rather long, entering epiphallus terminally. Epiphallus not long, indistinctly demarcated from penis. Penis subcylindrical, internally with very small, squamulate papillae; its lower half or 1/3 surrounded by sheath. Penial retractor attached to epiphallus. Free oviduct rather long, its lower part coated by well developed perivaginal gland. Vagina swollen. Spermathecal stalk short, expanded basally; reservoir poorly defined, lies on lower part of spermoviduct.

DISTRIBUTION. N Algeria (Kabylia, southward to Djurdjura Mts.). 4 spp.

Cellariopsis A. Wagner, 1914

Fig. 1858

Wagner A., 1914: 3 (*Schistophallus* subg.). Riedel, 1980: 94.

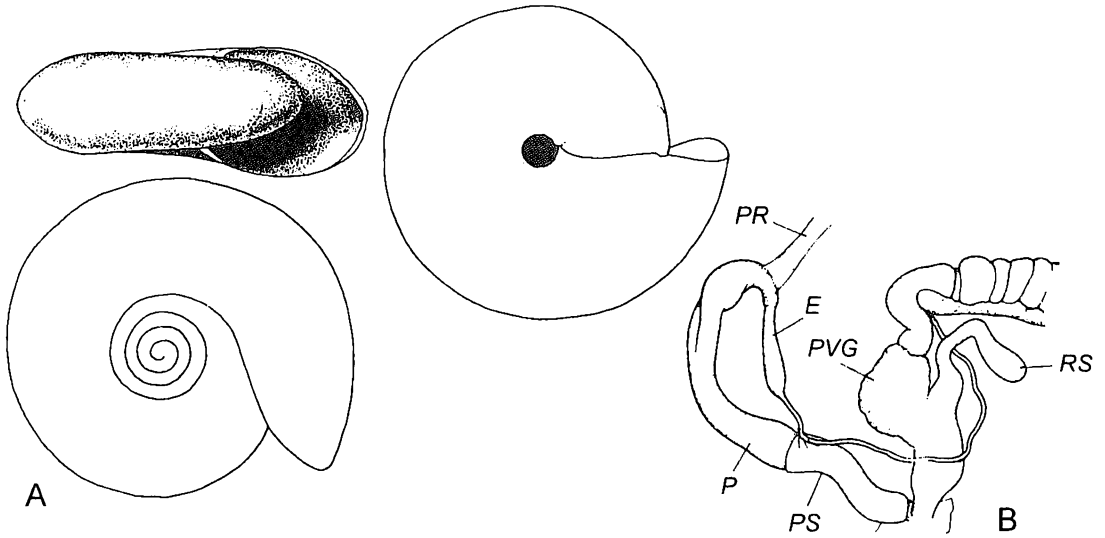


Fig. 1857 A — *Allogenes prodigiosus* (Ancey, 1899). Shell: Djurdjura Central [Algeria]. Holotype. Paris.
 B — ! *Allogenes cepedei* (Dautzenberg, 1907). Reproductive tract. After Riedel, 1975.

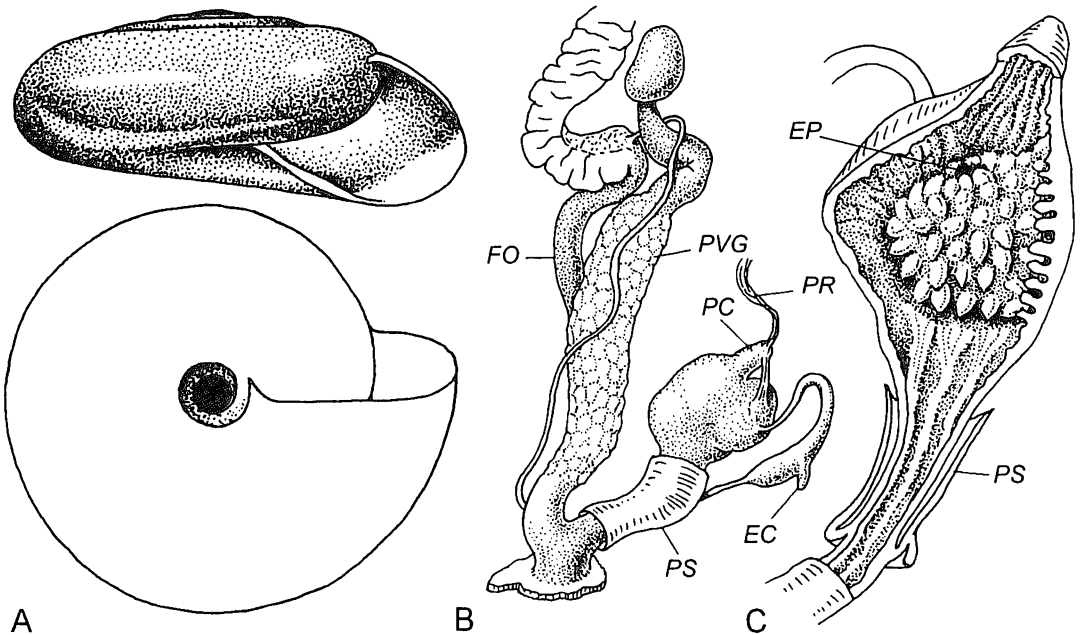


Fig. 1858. *Cellariopsis orientalis* (Clessin, 1887).
 Poroshkovo, Perechirsky district, W Ukraine, June 10, 1982. A — shell. B — reproductive tract. C — interior of penis. Moscow No. Lc-19832.

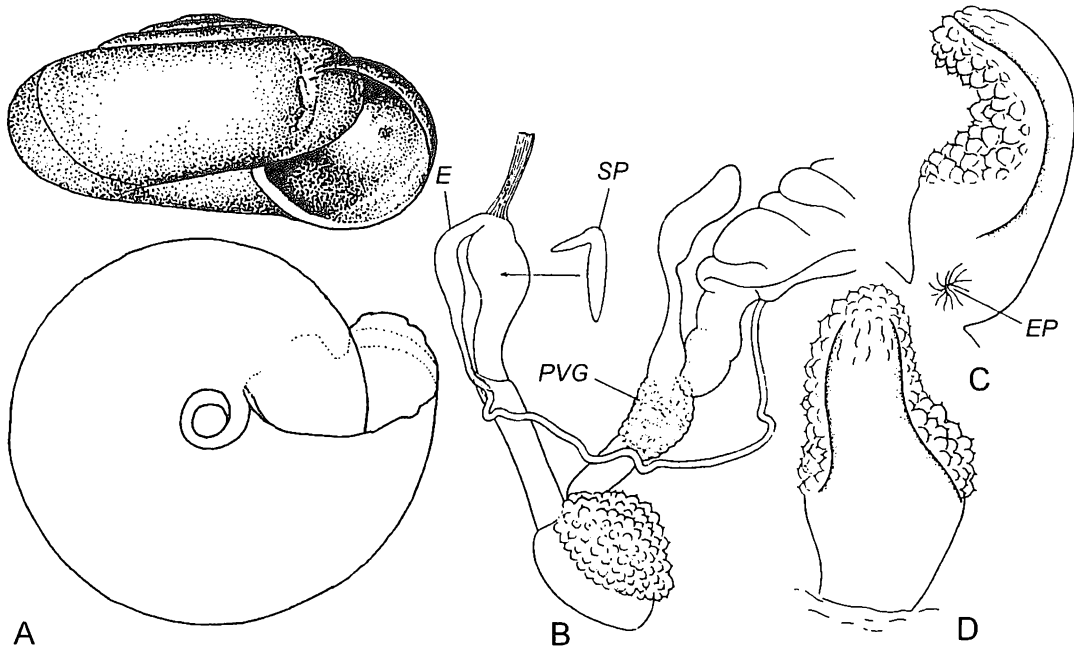


Fig. 1859. *Pseudopolita eurabdota* (Bourguignat, 1867).

A — shell: Algeria. Inst. royal des Sci. naturelles de Belgique, Bruxelles. Dautzenberg collection, column No. 951 B — reproductive tract with everted penis and spermatophore. C, D — everted penis in two positions. After Riedel, 1975.

TYPE SPECIES — *Schistophallus* (*Cellariopsis*) *deubeli* A. Wagner, 1914 [= *Hyalina* (*Euhyalina*) *cellaria* var. *orientalis* Clessin, 1887]; monotypy.

Shell much depressed, thin, very shining, much translucent, of about 5 much flattened whorls. Last whorl rounded at periphery. Color pale-yellowish, on base whitish. Embryonic and later whorls lacking regular sculpture. Aperture ovate, moderately oblique, with simple margins; columellar margin scarcely reflexed. Umbilicus moderately narrow, subcylindrical. Height 4.5-4.7, diam. 9-11 mm (4.6 × 10.8 mm).

Vas deferens thin, long, enters epiphallus apically. Epiphallus clavate, narrowing toward penis, supplied with a short, conic caecum. Penis consists of narrow distal and greatly swollen proximal parts. Narrow part surrounded by sheath which is free at upper end, internally with a few axial folds; swollen part has another caecum, internally with a large subglobular stimulator bearing many large papillae; epiphallic pore located above base of stimulator. Penial retractor attached to penial caecum apically; additional muscular band connects caecum

with proximal part of penis. Free oviduct quite long, vagina somewhat shorter. Perivaginal gland surrounds upper part of vagina and lower half of spermathecal stalk. Latter moderately long, stout; reservoir ovate, nearly reaching middle of spermooviduct. Spermatophore smooth, consisting of elongate part and 2 processes.

DISTRIBUTION. Carpathians, ? Serbia. 1 sp.

Pseudopolita Germain, 1908

Fig. 1859

Germain, 1908: 147 (*Hyalinia* subg.). Riedel, 1975: 2 (*Otychilus* subg.).

TYPE SPECIES — *Zonites eurabdotos* Bourguignat, 1867; OD.

Shell much depressed, thin, mat, of 4.5-5.5 quite convex whorls. Suture deep, groove-like. Last whorl rounded at periphery. Color yellowish-corneous to pale. Embryonic whorls microtubercular. Postapical whorls with distinct tubercles which arise because of crossing of radial wrinkles and spiral lines above periphery; below periphery surface almost smooth and shining. Aperture widely semilunate, moderately oblique. Umbilicus not wide but perspec-

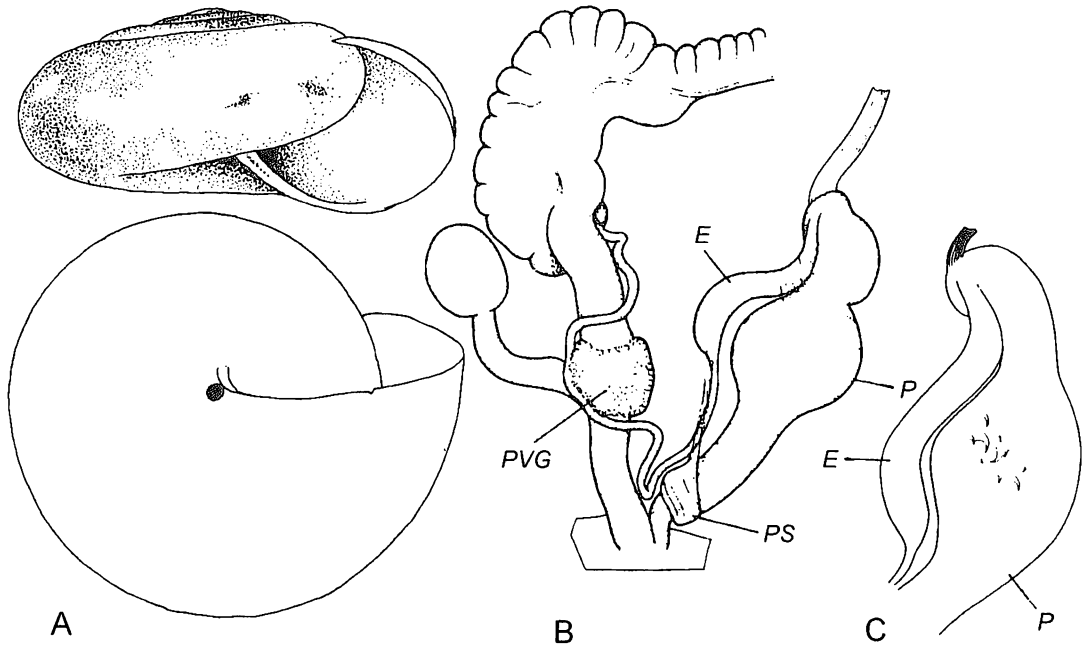


Fig. 1860. *Riedeliconcha depressa* (Sterki, 1880).

A — shell: "Weidlingbachgenist unterh. Agnesbrücke Hochwasser" Vienna No. E 52.350.
 B — reproductive tract. C — interior of penis. After Riedel, 1969.

tive. Height 3.0-4.5, diam. 6-9 mm (3.9×7.9 mm).

Vas deferens quite long, narrow, entering short, fusiform epiphallus apically. Caecum absent. Penis long, thin, swollen basally, internally with numerous, rather large, pointed papillae on one side; opposite side smooth. Penis sheath coats lower 1/3-1/2 of penis. Penial retractor attached to penis/epiphallus junction. Free oviduct rather long, vagina of about same length. Perivaginal gland surrounds lower part of free oviduct and upper part of vagina. Spermathecal stalk not long, enlarged basally; reservoir lanceolate, not reaching middle of spermooviduct. Spermatophore with smooth surface, somewhat reminds boomerang in shape, with one arm shorter than the other.

DISTRIBUTION. N Africa: Haut Atlas Mts. 2 spp.

Riedeliconcha Schileyko, nom. nov.

Fig. 1860

Riedelius Hudec, 1961: 110 (*Oxychilus* subg.);
 Riedel, 1980: 111 (*Oxychilus* subg.); 1997:
 755 (*Oxychilus* subg.). [See Remark].

TYPE SPECIES — *Hyalina depressa* Sterki, 1880.

Shell much depressed, very thin, polished, shining, subtransparent, of 4.25-5.5 slightly convex whorls. Color pale-yellow to light-corneous. Embryonic whorls smooth. Postnuclear whorls nearly so, without spiral sculpture. Aperture ovate, slightly oblique. Umbilicus minute. Height 2.3-8.0, diam. 5-17 mm (2.3×5.0 mm).

Vas deferens long, entering epiphallus apically. Epiphallus joins penis (sub)terminally, connected with penis by a thin membrane or muscular band; sometimes with lateral caecum. Penis of various shape, more or less swollen; a short terminal or lateral caecum may be present; internally penis with 1 to several curved, sometimes quite long, hook(s) and complex folds. Penis sheath very thin. Penial retractor attached to terminal caecum or to epiphallus. Free oviduct and vagina subequal in length. Perivaginal gland well developed. Spermathecal stalk not long; reservoir lies on distal part of spermooviduct. Atrium as such absent, female and male pores open independently on bottom of shallow depression.

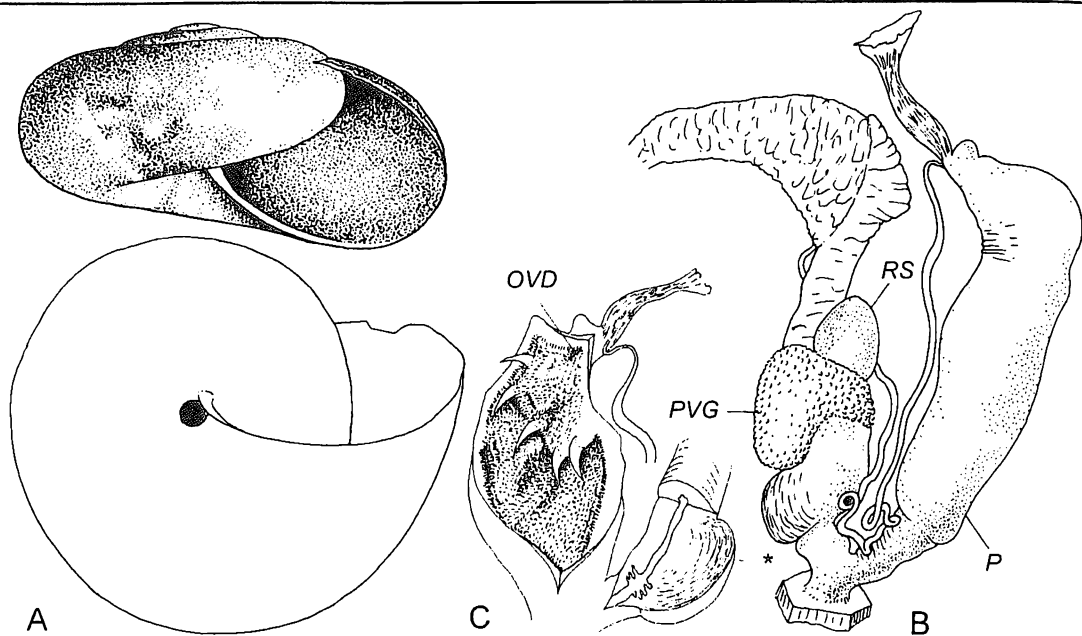


Fig. 1861 *Vitrinoxychilus (Gagroxychilus) subsuturalis* (O. Boettger, 1888).

A — shell: "Plaine de Kurdschia, Cauc. Occidental" Paratype. Paris. B, C — Khaishi village, Inguri (= Enguri) River valley, W Caucasus, April 10, 1971. B — reproductive tract. C — interior of penis and of vagina. Moscow No. Lc-19866. Asterisk — lateral thickening of vagina.

DISTRIBUTION. Central Europe and Balkan countries. 7 spp.

REMARK. The subgenus *Riedelius* has been established for *Oxychilus inopinatus* (Uličný, 1887) and *O. depressus* (Sterki, 1880) with the former as the type species. Riedel (1990: 528-529) pointed out that Hudec (1961) has unfortunately chosen "untypische" *inopinatus*; Giusti et al. (1985) have shown that "true" *inopinatus* actually belongs to the subgenus *Mediterranea* Clessin, 1880. That is why Riedel (1990: 529) suggested to establish *Oxychilus depressus* (Sterki, 1880) as the type species of *Riedelius* and "Dieser Vorschlag muss aber noch durch die International Commission on Zoological Nomenclature beraten und eventuell akzeptiert werden" However since there is no decision of ICZN at the moment, I am introducing the new name for *Riedelius* Hudec, 1961.

Vitrinoxychilus Riedel, 1963.

Riedel, 1963: 281

TYPE SPECIES — *Hyalinia (Polita) suturalis* O. Boettger, 1881; OD.

Shell flattened, low conic, thin, semi-

transparent, shining, of 4-4.75 slightly convex whorls. Last whorl evenly rounded. Color light- or dark-corneous. Embryonic and later whorls lack regular sculpture except for very fine spiral striation on postapical whorls. Aperture widely ovate, well oblique. Umbilicus narrowly open.

Vas deferens long, entering epiphallus or penis apically. Epiphallus short or missing. Penis large, bulky, internally with well developed hooks and numerous minute tubercles; verge absent. Penis sheath absent. Penial retractor attached at entrance of vas deferens. Free oviduct very short. Vagina long, sometimes with lateral, muscular thickening. Perivaginal gland surrounds upper part of vagina and base of spermathecal shaft. Latter very short, reservoir lies on lower part of spermoviduct.

DISTRIBUTION. Caucasus and NE Turkey.

Vitrinoxychilus (Gagroxychilus) Claus, 1991)

Fig. 1861

Claus, 1991 174.

TYPE SPECIES — *Hyalinia (Polita) subsuturalis* O. Boettger, 1888; OD.

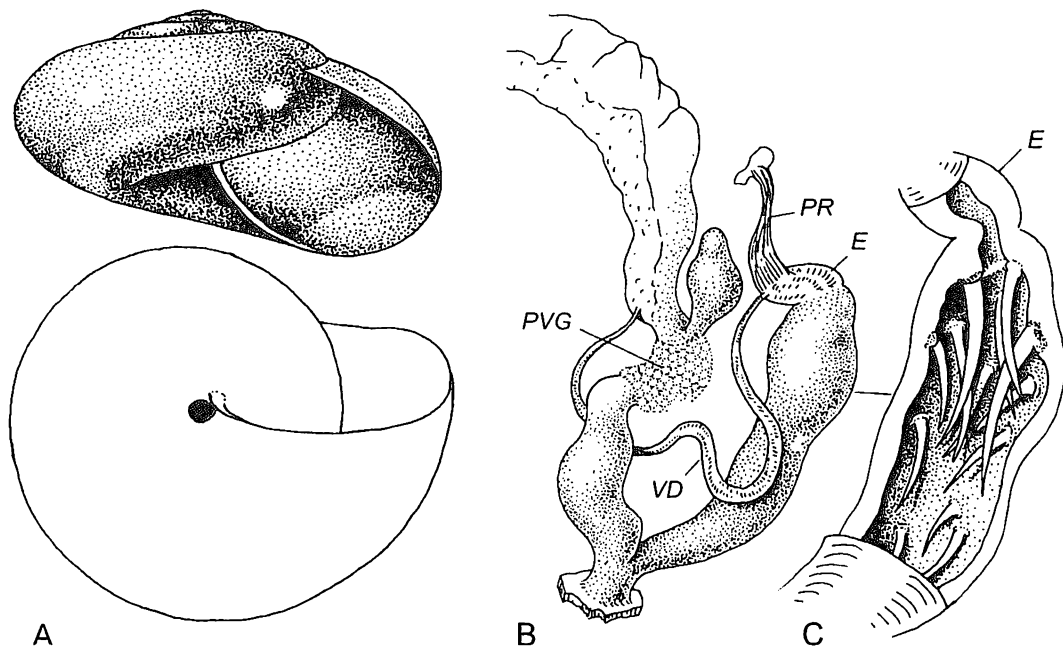


Fig. 1862. *Vitrinoxychilus (Vitrinoxychilus) suturalis* (O. Boettger, 1881). Zeraboseli, Kintrish Natural Reserve, Adzharia, October 13, 1981. A — shell. B — reproductive tract and interior of penis. Moscow No. Lc-19837

Shell of 4-4.5 whorls. Height 2.8-3.0, diam. 6.3-6.5 mm (3.0 × 6.4 mm).

Epiphallus absent. Hooks in penis rather short, standing on margin of nearly transverse, wide fold. Vagina with lateral thickening.

DISTRIBUTION. W part of Great Caucasus. 1 sp.

Vitrinoxychilus (Vitrinoxychilus s. str.)
Fig. 1862

Shell of 4.5-4.75 whorls. Height 3.5-4.0, diam. 7.0-7.5 mm (3.5 × 6.1 mm).

Epiphallus short. Hooks in penis long, scattered throughout inner surface of penis. Vagina without lateral thickening.

DISTRIBUTION. NE Turkey, N Armenia, Georgia, S Abkhasia. 1 sp.

Gastranodon O. Boettger, 1889
Fig. 1863

Boettger O., 1889: 940 (*Hyalinia* sect.). Riedel & Pieper, 1980: 185.

TYPE SPECIES — *Hyalinia (Gastranodon) siaretana* O. Boettger, 1889; monotypy.

Shell depressed, rather thin, of 6.5-8

tightly coiled, very convex whorls. Last whorl distinctly angulated at periphery. Color light-brown. Embryonic whorls smooth. Remaining whorls finely but distinctly radially ribbed above; basal surface smooth. Aperture narrowly semilunate, nearly vertical. Umbilicus minutely open. Height up to 3.5, diam. up to 6.8 mm.

Mantle lacks shell lobes, left neck lobe not divided.

Right ommatophoran retractor passes through peni-oviducal angle.

Vas deferens rather long, entering penis laterally. Penis very long, somewhat clavate, with apical caecum. Penis sheath not evident. Internally proximal expanded part of penis and caecum with distinct network of tightly sitting, small wrinkles, papillae and grooves; distal narrowed part of penis with fine axial folds. Penial retractor attached to caecum terminally. Free oviduct rather short, vagina about 2 times longer. Perivaginal gland surrounds free oviduct and basal section of spermathecal stalk. Latter expanded basally, rather long, reservoir not differentiated (juvenile character?).

DISTRIBUTION. N Iran (Chorassan and Mazandaran prov.). 1 sp.

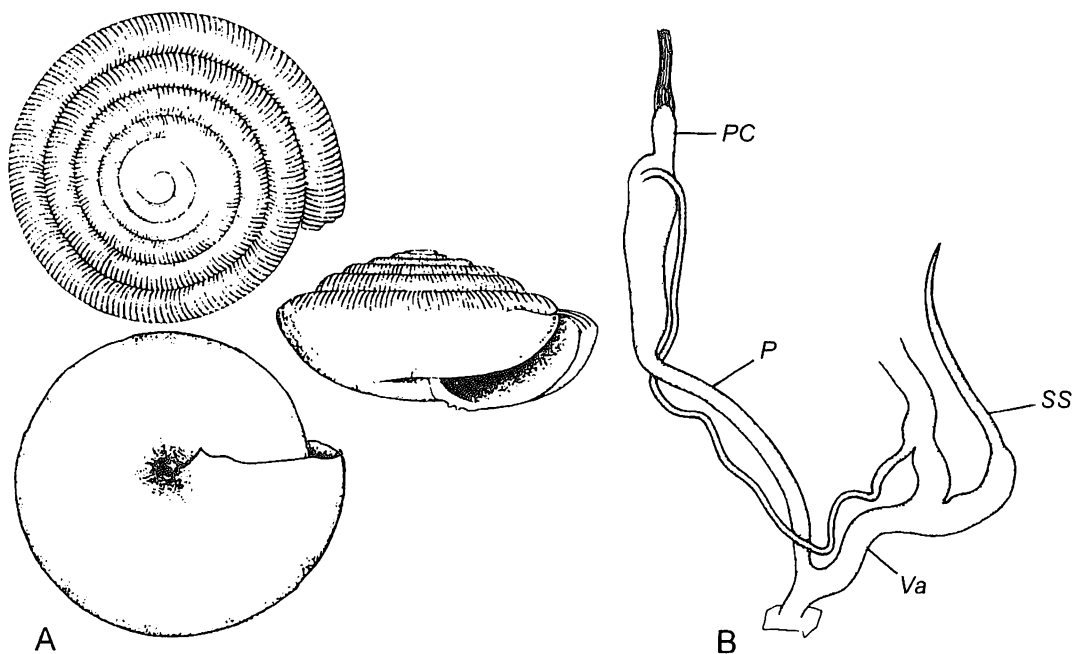


Fig. 1863. *Gastronodon siaretana* (O. Boettger, 1889).

A — shell. B — reproductive tract (not fully developed). After Riedel & Pieper, 1980.

Araboxychilus Riedel, 1977

Fig. 1864

Riedel, 1977: 509; 1998a: 43.

TYPE SPECIES — *Trochomorpha sabaea* Martens, 1889; OD.

Shell lenticular, thin, of 6-6.5 slightly convex whorls. Last whorl with well developed peripheral angle. Spire elevated, with somewhat pointed apex. Color corneous. Embryonic whorls almost smooth. Postapical sculpture consisting of rough radial wrinkles crossed by widely spaced spiral lines. Aperture ovate, angulated, slightly oblique. Umbilicus not wide but perspective. Height 10-13, diam. 14-20 mm (estimated: 10 × 14 mm).

Mantle lacking shell lobes.

Vas deferens moderately long, enters epiphallus apically. Epiphallus moderately long, joins penis laterally leaving quite long caecum. Penis nearly cylindrical, internally with longitudinal folds and a conspicuous valve composed by 2 lobes. Penis sheath surrounds distal half of penis, upper edge of sheath connected with entrance of vas deferens by fine fibers. Free oviduct rather long, vagina approximately of same length,

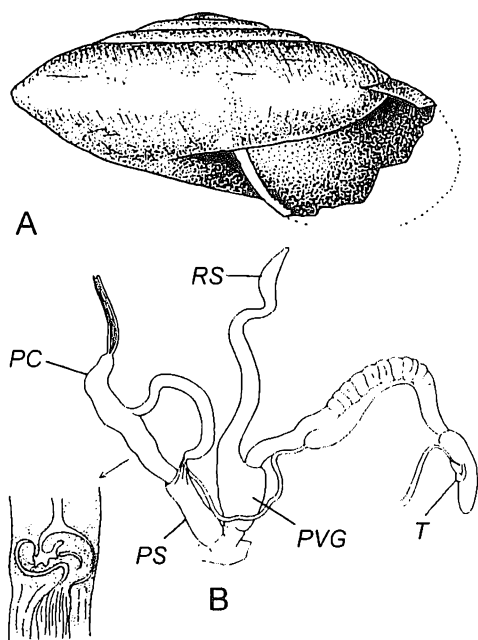


Fig. 1864. *Araboxychilus sabaeus* (Martens, 1889).

A — shell: "Yemen bei Ibb. Basel No. 11'178-a (broken shell). B — reproductive tract and interior of penis. After Riedel, 1998a.

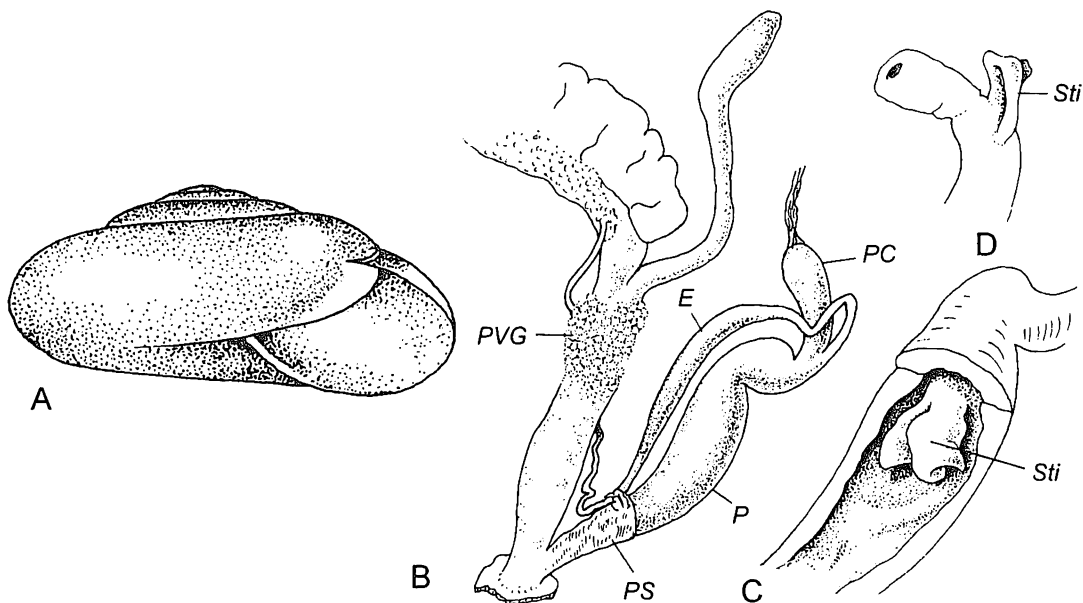


Fig. 1865. *Morlina glabra* (Rossmuessler, 1836).

A — shell: "France, Mastre (Ardeche)" Paris. B, C, D — Ivano-Frankovsk, W Ukraine, October 15, 1964. B — reproductive tract. C — interior of penis. D — everted penis of another specimen. SPb. No. 8.

surrounded by perivaginal gland which extends to base of long spermathecal stalk.

DISTRIBUTION. Mountains of SW parts of Arabian peninsula. 1 sp.

Morlina A. Wagner, 1914

Fig. 1865

Wagner A. in Sturany et Wagner, 1914: 27 (*Hyalinia* subg.).

— *Gemma* Hazay, 1884: 333 [nom. praeocc., non Deshayes, 1853 (*Bivalvia*); *Hyalina* subg., t.-sp. *Helix glabra* Rossmuessler, 1836; monotypy].

Riedel, 1980: 107 (*Oxychilus* subg.).

TYPE SPECIES — *Helix glabra* Rossmuessler, 1836; SD Lindholm, 1927

Shell somewhat depressed, low-conic, thin, highly shining, of 5-6 moderately convex whorls. Last whorl evenly rounded at periphery. Color corneous to brown, base lighter. Embryonic whorls polished, later whorls nearly smooth, just with fine, smoothed, radial wrinkles. Aperture ovate, moderately oblique. Umbilicus narrowly open. Height 5.5-7.0, diam. 9-18 mm (6.0 × 14.8 mm).

Vas deferens rather short. Epiphallus

thin, long, enters penis laterally, leaving well developed caecum. Penis moderately long, stout, internally with a large, high pilaster which passes into lamellar, bifurcate stimulator. Penis sheath surrounds basal part of penis only. Penial retractor attached to penial caecum apically. Free oviduct (very) short, vagina markedly longer, swollen, its proximal portion coated by perivaginal gland. Spermathecal stalk moderately long, reservoir poorly demarcated.

DISTRIBUTION. S Europe from Catalonia to NW Asia Minor (absent in islands of Aegean Sea); northward to Mid-Europe mountains. 2 spp.; 1 of them with 5 subspp.

Oxychilus Fitzinger, 1833

Fitzinger, 1833: 100.

— *Polita* Held, 1837: 916 (t.-sp. *Helix cellaria* Müller, 1774; SD Herrmannsen, 1847).

— *Hyalinia* "Agassiz" Charpentier, 1837: 13 (*Helix* subg., t.-sp. *Helix cellaria* Müller, 1774; SD Westerlund, 1902).

— *Helicella* J. Gray, 1847: 173 (nom. praeocc., non Férussac, 1821 (*Hygromiidae*); t.-sp. *Helix cellaria* Müller, 1774; OD).

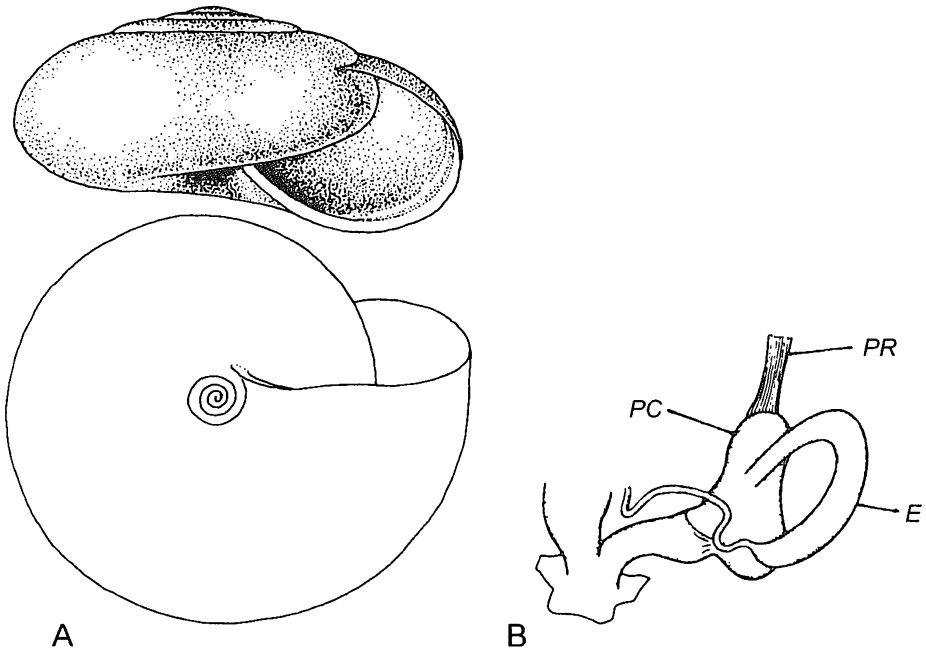


Fig. 1866. *Oxychilus (Radiolus) volutellus* (L. Pfeiffer, 1856).

A — shell: Azores. Zürich No. 502389. B — distal part of male section of reproductive tract. After Riedel, 1964.

- *Hyalina* Albers, 1850: 66 (*Helix* subg.; t.-sp. *Helix cellaria* Müller, 1774; SD Martens in Albers, 1860).
- *Lucilla* Lowe, 1854: 177 (*Helix* subg.; t.-sp. *Helix cellaria* Müller, 1774; OD).
- *Aplostoma* Moquin-Tandon, 1855: 72 (*Zonites* sect., t.-sp. *Helix cellaria* Müller, 1774; SD Lindholm, 1927).
- *Euhyalina* Albers, 1857: 91 (*Hyalina* subg., t.-sp. *Helix cellaria* Müller, 1774; OD).
- *Euhyalina* Taylor, 1907: 18 (nom. err. pro *Euhyalina* Albers, 1857).

Riedel, 1980: 86.

TYPE SPECIES — *Helix cellaria* Müller, 1774; SD Herrmannsen, 1847 (Opinion ICZN 431, 1956).

Shell nearly flat to subglobular, sometimes lens-shaped, mostly thin and shining, of 4.5-7 whorls. Color pale-yellowish (nearly colorless) to rich-chestnut or reddish. Sculpture various but generally not strong; spiral striation mostly present. Aperture simple or (rarely) with baso-columellar teeth). Umbilicus dot-like to rather broad, rarely absent.

Mantle as a rule without shell lobes.

Epiphallus enters penis laterally. Structure of penis variable, mostly with axial

folds which may be broken into series of tubercles. Penial caecum present (rarely reduced), penial retractor attached to it terminally. Penis sheath present, its upper edge connected with vas deferens or epiphallus by variously developed fibers. Perivaginal gland present. Spermathecal stalk mostly moderately long, (rather) thick.

DISTRIBUTION. W Palearctic. Some species introduced to many countries.

Oxychilus (Radiolus) Wollaston, 1878 Fig. 1866

Wollaston, 1878: 17 (*Hyalina* subg.). Riedel, 1980: 96; 1998: 40.

TYPE SPECIES — *Helix volutella* L. Pfeiffer, 1856; SD Riedel, 1964.

Shell depressed, thin, translucent, glossy, of 4.5-5 weakly convex whorls. Last whorl rounded at periphery. Color yellowish or corneous. Embryonic and later whorls practically lacking regular sculpture. Aperture ovate, only slightly oblique. Umbilicus narrow, subcylindrical. Height 3.5-5.0, diam. 6.5-10.0 mm (4.7 × 9.6 mm).

Vas deferens enters epiphallus apically. Epiphallus subfusiform, joining penis later-

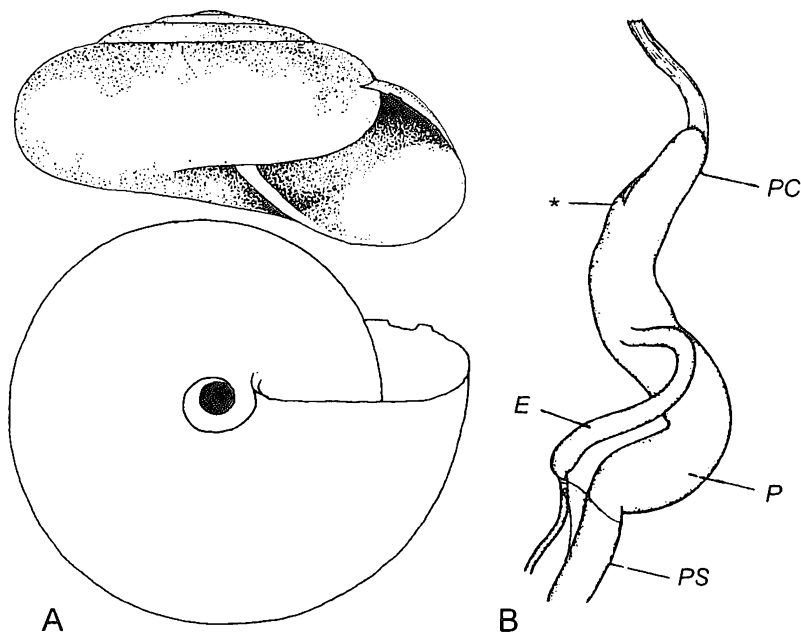


Fig. 1867 *Oxychilus (Hirania) renaniana* (Pallary, 1939).

A — shell: Nahr-Borada River valley, Damask, Syria. Private coll. of A.G. Kuznetsov. B — penis. After Riedel, 1962b. *Asterisk* — lateral process on penial caecum.

ally. Penis short, bulky, with subglobular caecum. Penis sheath surrounds basal section of penis and connected with distal part of vas deferens by a thin bridge. Perivaginal gland rather strongly pigmented.

DISTRIBUTION. Azores. 5 spp.

Oxychilus (Hirania) Pallary, 1939

Fig. 1867

Pallary, 1939: 5 (*Hyalina* subg.). Riedel, 1980: 93.

TYPE SPECIES — *Hyalina (Hirania) renaniana* Pallary, 1939; OD.

Shell strongly to moderately depressed, with conic or dome-shaped spire, thin, somewhat opaque, shining, of 5.5-6 slightly shouldered whorls separated by deep suture. Last whorl straight or a little descending in front. Base somewhat flattened. Color yellowish to corneous, basal surface lighter. Embryonic whorls polished, postnuclear surface covered with delicate irregular radial wrinkles and extremely fine also irregular spiral lines. Aperture ovate, wider than high, with slightly thickened and slightly reflexed columellar and basal

margins. Height 3.5-12.0, diam. 8-23 mm (5.5 × 10.9 mm).

Reproductive tract similar to that of *Longiphallus* (see Fig. 1875), differing mainly by presence of a small lateral process on penial caecum; a fine additional retractor connects apex of process with base of penial retractor. Penis internally with axial folds which in caecum transformed into irregularly scattered papillae.

DISTRIBUTION. Coastal regions of E Mediterranean, southern parts of Balkan countries. 7 spp.

Oxychilus (Mediterranea)

Clessin, 1880)

Fig. 1868

Clessin, 1880: 207 (*Hyalina Vitrea* "Gruppe"). Riedel, 1998a: 45.

TYPE SPECIES — *Helix hydatina* Rossmäessler, 1838; OD.

Shell depressed-conic, thin, *Vitrea*-like, shining, of 4-5.5 moderately convex whorls. Last whorl evenly rounded. Color whitish to yellowish. Embryonic whorls smooth. Later whorls nearly so or with microscopical reticulate striation. Aperture

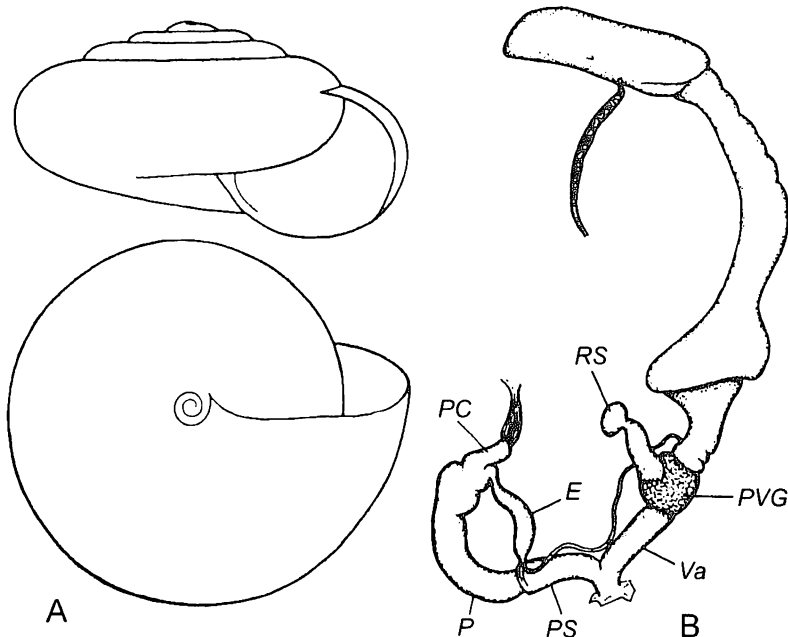


Fig. 1868. *Oxychilus (Mediterranea) hydatinus* (Rossmassler, 1838).
A — shell. B — reproductive tract. After Riedel, 1968.

widely semilunate, slightly oblique. Umbilicus absent or minutely open. Height 1.8-5.0, diam. 3.5-8.5 mm.

Vas deferens long, entering short epiphallus. Penis subcylindrical, with well developed caecum, internally with few to many papillae topped with sharp thorns. Free oviduct short, vagina markedly longer. Perivaginal gland variously developed. Spermathecal stalk short, more or less swollen basally, reservoir lies on distal part of spermoviduct.

DISTRIBUTION. Mediterranean countries including Canary Islands and Crimea; Central and E Europe (Carpathians, Hungary, Poland). 7-10 spp.

Oxychilus (Hyalocornea)
Monterosato, 1892)
Fig. 1869

Monterosato, 1892: 7 (*Hyalinia* group).

— *Oxychilops* C. Boettger, 1930: 580 (*Oxychilus* subg.; t.-sp. *Helix testae* Philippi sensu auct. monotypy; = *Helix canini* Benoit, 1843 — fide Riedel, 1980).

TYPE SPECIES — *Hyalinia philippi* sensu Monterosato, 1892 = *Helix canini* Benoit, 1843; SD Riedel, 1973b.

Shell depressed, dome-shaped, relatively solid, of 5-7.3 moderately to strongly convex, very narrow, tightly coiled whorls. Last whorl rounded at periphery. Color yellowish or corneous. Embryonic whorls smooth, remaining whorls with weak, irregular radial wrinklets and exceptionally fine, microscopical traces of spiral striation. Aperture semioval, moderately oblique. Umbilicus rather narrow, subcylindrical. Height. 4-8, diam. 8-15 mm (6.5 × 12.0 mm).

Reproductive tract very similar to that of *Oxychilus* s. str. (see Fig. 1881), differing mainly in structure of spermatheca: in *O. (Hyalocornea)* reservoir almost not differentiated from stalk.

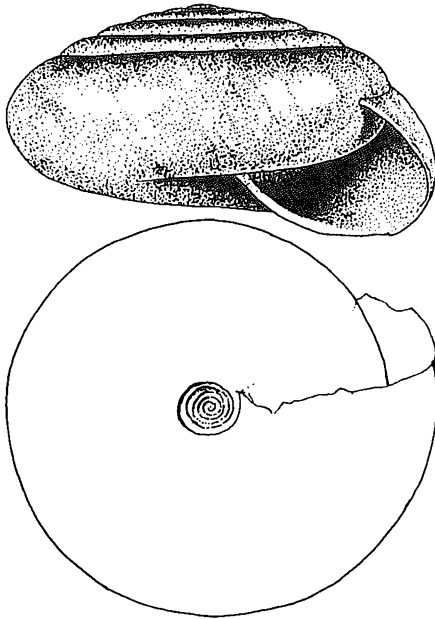
DISTRIBUTION. NW Sicily with adjacent islets; ? N Africa. 4 or 5 spp.

Oxychilus (Drouetia Gude, 1911)
Fig. 1870

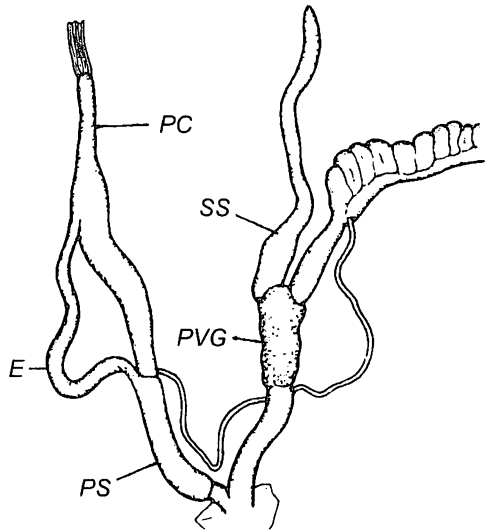
Gude, 1911 272 (pro gen.).

TYPE SPECIES — *Helix atlantica* Morelet et Drouet, 1857; monotypy.

Shell depressedly conic, thin, shining, translucent, of about 5 whorls. Last whorl evenly rounded. Color pale-brown or cor-



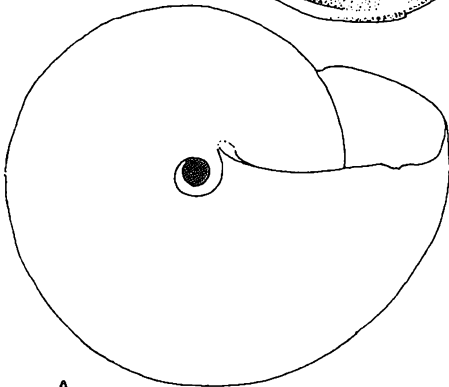
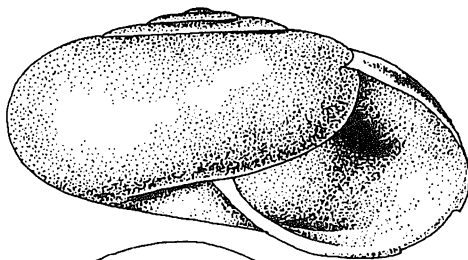
A



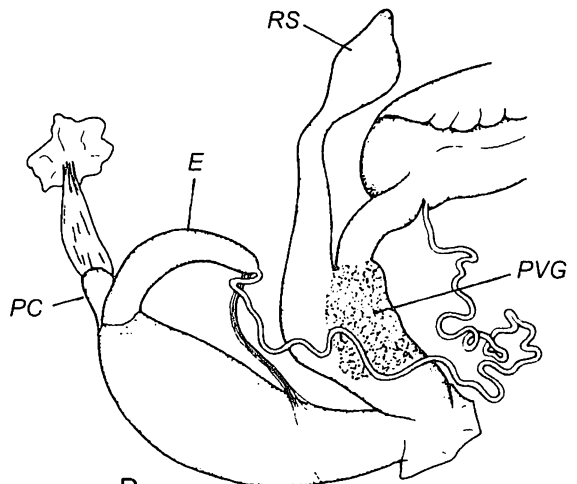
B

Fig. 1869. *Oxychilus (Hyalocornea) canini* (Benoit, 1843).

A — shell: Sicily. Zürich No. 502550. B — reproductive tract. After Riedel, 1973b.



A



B

Fig. 1870. A — *Oxychilus (Drouetia) atlanticâu* (Morelet et Drouet, 1857). Shell: San Miguel, Azores. Cardiff.

B — ! *Oxychilus (Drouetia) brincki* Riedel, 1964. Reproductive tract. After Riedel, 1964.

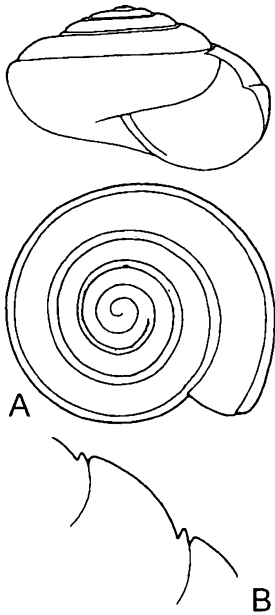


Fig. 1871. *Oxychilus (Atlantoxychilus) spectabilis* (Morelet, 1860).
A — shell. B — whorl in profile to show a keel. After Riedel, 1964.

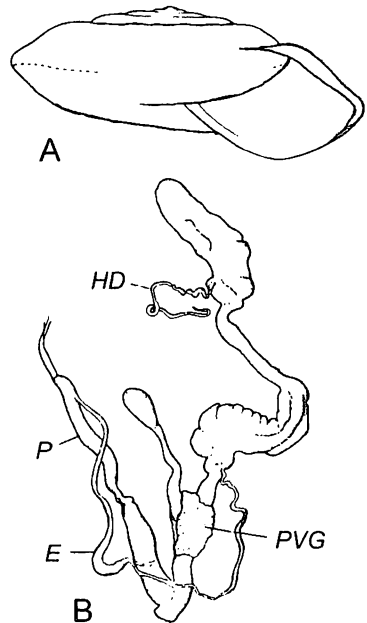


Fig. 1872. *Oxychilus (Alzonula) oglasicolus* Giusti, 1968.
A — shell. After Giusti, 1968. B — reproductive tract. After Riedel, 1980.

neous-greenish. Embryonic whorls smooth, later whorls weakly sculptured with delicate irregular radial wrinkles. Aperture relatively large, slightly oblique. Umbilicus narrow or closed. Height 4.8-5.0, diam. 8.5-9 mm (4.9 × 8.8 mm).

Vas deferens very long, entering rather short epiphallus. Penis more or less swollen, with short caecum, internally with axial folds. Penial retractor unusually short and dense. Free oviduct moderately long, vagina enlarged. Perivaginal gland partly surrounds distalmost part of free oviduct and most of vagina. Spermathecal stalk stout, expanded basally; reservoir lies on lower half of spermoviduct.

DISTRIBUTION. Azores. 3 spp.

Oxychilus (Atlantoxychilus)
Riedel, 1964)
Fig. 1871

Riedel, 1964: 36.

TYPE SPECIES — *Helix atlantica* var. *spectabilis* Morelet, 1860; OD.

Shell depressed-subglobular, thin, shining, of 4.75-5 convex, shouldered whorls. Last whorl with keel which turned upward

and margined above by rather deep groove. Color corneous. Embryonic and later whorls lacking regular sculpture. Aperture subcircular, its palatal margin with a small angle and depression corresponding to keel and groove. Umbilicus absent. Height up to 4.3, diam. up to 5.5 mm.

Epiphallic caecum short. Penis internally with small, column-shaped papillae arranged in axial rows.

DISTRIBUTION. Azores: Santa Maria Island. 1 sp.

Oxychilus (Alzonula) Giusti, 1968)
Fig. 1872

Giusti, 1968: 219.

TYPE SPECIES — *Oxychilus (Alzonula) oglasicola* Giusti, 1968; OD.

Shell depressed, lenticular, opaque, of 5.5-6 flattened whorls. Last whorl with sharp peripheral angle. Color generally chestnut. Embryonic whorls smooth. Postapical sculpture of rather coarse, irregular, radial wrinkles. Aperture ovate-rhomboid, rostrate, well oblique. Umbilicus open, moderately wide. Height 7-8, diam. 18.0-19.5 mm.

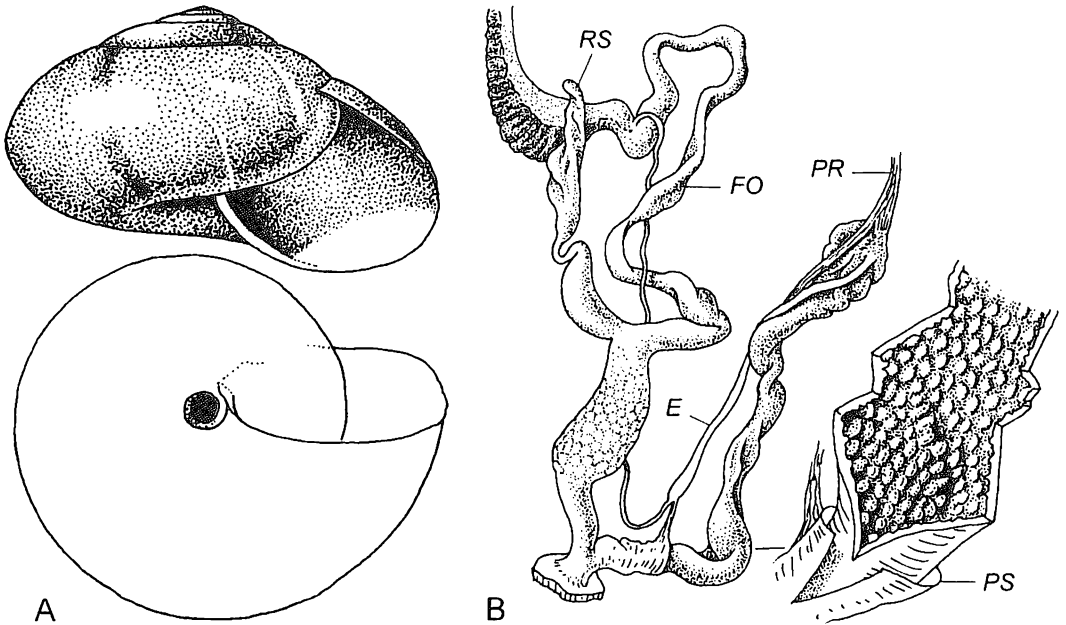


Fig. 1873. *Oxychilus (Forcartiella) difficilis* (O. Boettger, 1888).

Khosta, W Caucasus, August 28, 1983. A — shell. B — reproductive tract and interior of penis. Moscow No. Lc-25418.

Hermaphroditic duct slightly convoluted in distal part. Talon hidden. Vas deferens moderately long, enters long, slender epiphallus apically. Penis with short caecum, consists of 2 subcylindrical parts separated by a narrowing. Free oviduct and vagina subequal in length. Perivaginal gland surrounds distal part of free oviduct, base of spermathecal shaft and proximal part of vagina. Spermathecal stalk moderately long, ovate reservoir attending middle section of spermoviduct.

DISTRIBUTION. Italy: Toscanian Archipelago, Montecristo and Scoglio la Scola Islands. 1 sp.

Oxychilus (Forcartiella) Riedel, 1966
Fig. 1873

Riedel, 1966: 174.

TYPE SPECIES — *Hyalinia (Retinella) difficilis* O. Boettger, 1888; OD.

Shell depressed-conic, fragile, glossy, of 5.5-6.5 moderately convex whorls; last whorl evenly rounded. Color yellowish to light-corneous, sometimes with darker streaks. Embryonic whorls smooth, later whorls with vague, smoothed radial

wrinklets. Aperture ovate, moderately oblique. Umbilicus narrowly open. Height 13-21, diam. 19-35 mm (20.8 × 34.1 mm).

Vas deferens long, thin, entering epiphallus terminally. Epiphallus also long and slender, joining penis laterally. Penis very long, narrow, internally with distinct tubercular pattern. Penis sheath short, surrounds basal part of penis only and connected by bridge with epiphallus at entrance of vas deferens. Penial retractor splitted, one arm attached to upper part of penis, the other — to distal half of epiphallus. Free oviduct enormously long, narrow. Vagina moderately long, expanded, coated by distinct perivaginal gland. Spermathecal stalk markedly swollen basally, reservoir (together with stalk) shorter than free oviduct.

DISTRIBUTION. Westernmost part of Great Caucasus, Adzharia and NE Turkey. 2 spp.

Oxychilus (Schistophallus
A. Wagner, 1914)
Fig. 1874

Wagner A. 1914: 3 (pro gen.).

— *Stenorhachiodon* Lindholm, 1927: 323 (*Schisto-*

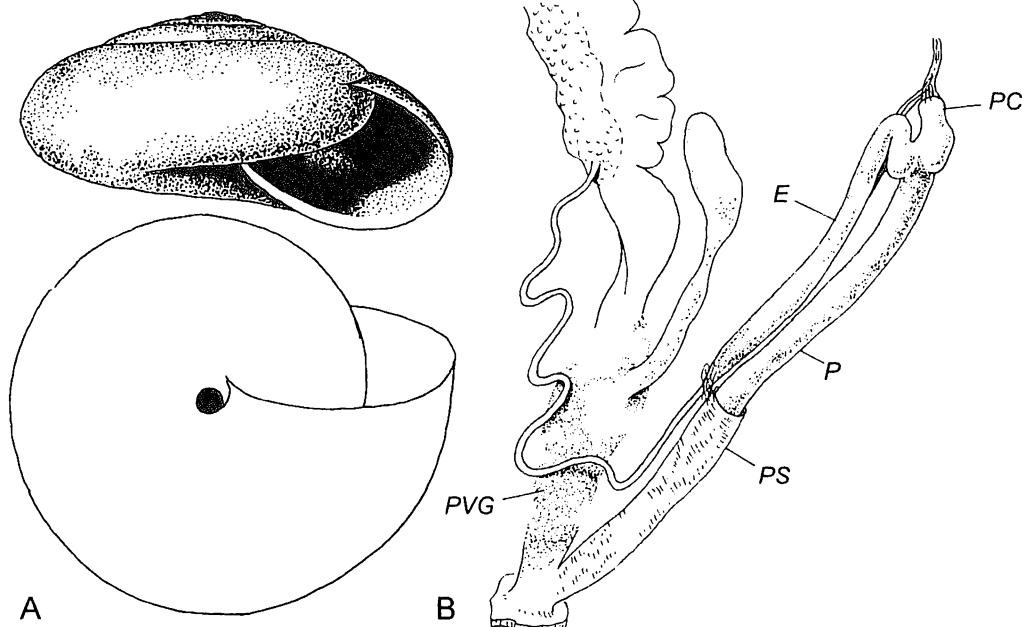


Fig. 1874. A — *Oxychilus (Schistophallus) moussoni* (Kobelt, 1878). On sched.: "Constantinopel", on shell: "Dalmatien" Vienna.

B — ! *Oxychilus (Schistophallus) elegans* (O. Boettger, 1881). Right bank of Lenkoran-chai River, ca. 15 km from Lenkoran, SE Transcaucasia, June 8, 1964. Reproductive tract. Moscow No. Lc-19958.

phallus subg., t.-sp. *Retinella kobelti* Lindholm, 1910; OD).

TYPE SPECIES — *Hyalina (Retinella) oscari* Kimakowicz, 1883 (= *Hyalina moussoni* Kobelt, 1878); OD.

Shell as in *O. (Forcartiella)*, differs by narrower and less perspective umbilicus. Whorls number 5-6.25. Height 7-14, diam. 14-31 mm (7.2 × 15.3 mm).

Vas deferens very long, often convoluted, entering long epiphallus (sub)apically. Penis large, with enlarged upper part and finger-shaped subterminal or lateral caecum. Inner surface of penis lined with numerous papillae which in distal part become larger. Penial retractor splitted distally: one arm attached to penis/epiphallus junction, the other — to caecum apically. Free oviduct long, vagina shorter. Perivaginal gland well developed. Spermathecal shaft rather short, more or less swollen basally; reservoir reaching middle section of spermoviduct.

DISTRIBUTION. From S Italy (?) through S Balkan countries, Crete and islands of Aegean Sea, W and N Asia Minor, Crimea and Caucasus to N Iran; 1 sp. in Carpathians. 17 spp. & subsp.

Oxychilus (Longiphallus) Riedel, 1958 Fig. 1875

Riedel, 1958: 384.

— *Pseudoretinella* Forcart, 1957: 105 (nom. nud. fide Riedel, 1980).

— *Eopolita* Forcart, 1957: 126 (part.; non Polonera, 1916).

TYPE SPECIES — *Helix filicum* Krynicki, 1836; OD.

Shell depressed-subglobose, moderately solid, slightly translucent, mostly a little glossy, of 5-7 moderately convex whorls. Last whorl rounded. Color yellowish-, reddish-, or greenish-corneous, base paler. Embryonic whorls smooth. Later whorls with irregular, sometimes rather rough, radial wrinkles and spiral lines. Aperture widely ovate, moderately oblique. Umbilicus not wide, subcylindrical. Height 5-22, diam. 9-27 mm (10.7 × 18.3 mm).

Vas deferens long, thin, sometimes convoluted in proximal part. Epiphallus fusi-form. Penis subcylindrical, internally with axial rows of distinct, irregular tubercles; similar sculpture in caecum. Penial caecum long. Sheath surrounds lower half of penis.

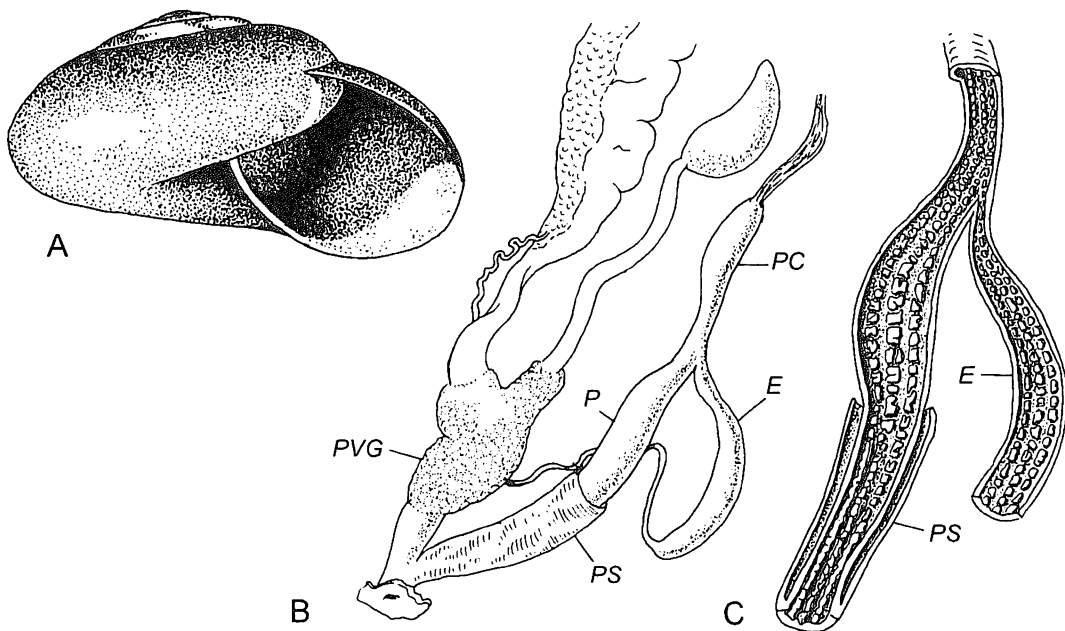


Fig. 1875. *Oxychilus (Longiphallus) filicum* (Krynicky, 1836).

Right bank of Lenkoran-chai River, Talysh, SE Transcaucasia, June 8, 1964. A — shell. B — reproductive tract. C — interior of penis. Moscow No. Lc-19932.

Free oviduct quite long, vagina of about same length. Perivaginal gland surrounds distal part of free oviduct, proximal part of vagina and (mostly) base of spermathecal stalk. Latter comparatively long, reservoir ovate or pointed apically.

DISTRIBUTION. SE Europe, W and N parts of Asia Minor, W Caucasus, Elburs and Talysh Mts. 10 spp. & subspp.

Oxychilus (Helicophana)

Westerlund, 1886)

Fig. 1876

Westerlund, 1886: 67 (*Mesomphix* "Gruppe").

— *Cretozonites* Kobelt, 1904: 83 (*Hyalina* subg.; t.-sp. *Helix (Levantina) aegopinoides* Maltzan, 1883; monotypy).

Riedel, 1980: 92.

TYPE SPECIES — *Helix (Levantina) aegopinoides* Maltzan, 1883, SD Kobelt, 1904.

Shell depressed to nearly semiglobose, solid, opaque, dull, of 5-5.5 flattened whorls. Periphery of young shells with a thread-like keel, in adults periphery weakly angled to rounded. Color yellowish-corne-

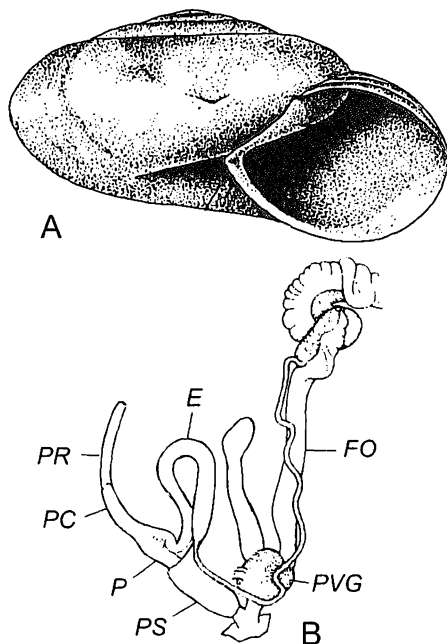


Fig. 1876. *Oxychilus (Helicophana) aegopinoides* (Maltzan, 1883).

A — shell: Hills S of Kato Zakros, Nomos Lassithi, Island of Crete, Greece. Moscow No. Lc-25429. B — reproductive tract. After Riedel, 1998.

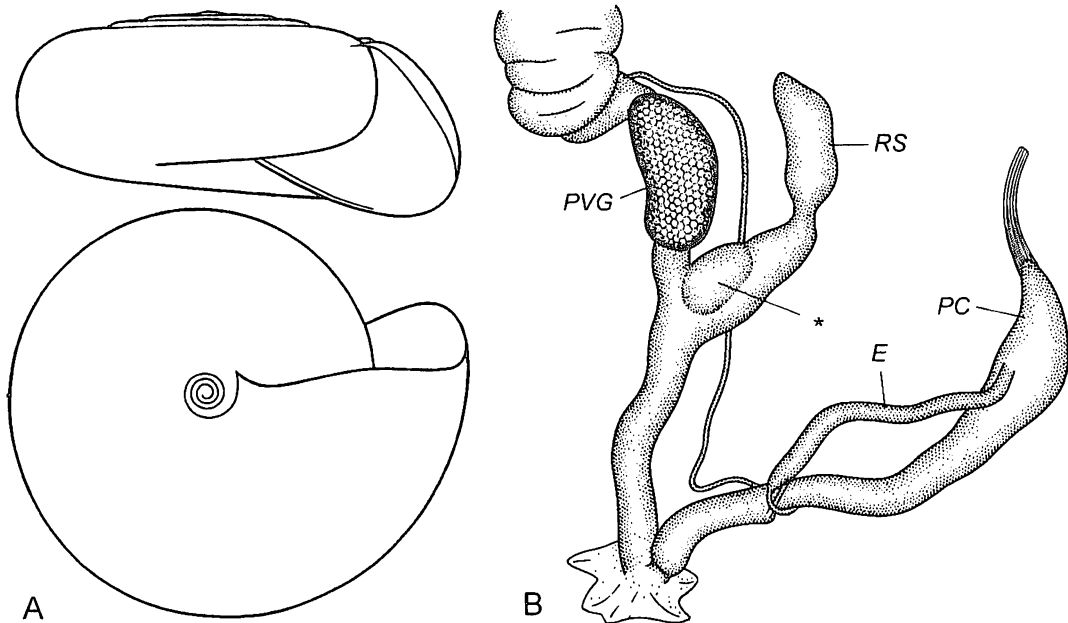


Fig. 1877 *Oxychilus (Retowskiella) crenimargo* (Retowski, 1889).

A — shell. B — reproductive tract. After Riedel, 1966. Asterisk — appendix on base of spermathecal stalk.

ous, sometimes with very weak, pale, diffuse, peripheral band. Embryonic whorls smooth. Postapical sculpture of irregular but rather dense radial wrinkles. Aperture ovate, with thickened margins; peristome insertions approached and connected by a heavy callus. Umbilicus subcylindrical, moderately wide. Height 9-15, diam. 20-24 mm (13.2 × 24.0 mm).

Vas deferens long. Epiphallus looped, joining penis laterally. Penis rather short, with well developed caecum. Penis sheath surrounds lower 2/3 of penis. Free oviduct unusually long. Vagina rather short. Perivaginal gland well developed, coating distalmost part of free oviduct, proximal part of vagina and base of stout spermathecal stalk; reservoir ovoid, not attending spermoviduct.

DISTRIBUTION. Crete Island. 1 sp.

Oxychilus (Retowskiella) crenimargo Riedel, 1966

Fig. 1877

Riedel, 1966: 202.

— *Pontoxychilus* Riedel, 1970a: 32 [t.-sp. *Oxychilus (Conulopolita) impressus* Riedel, 1966; OD].

Riedel, 1989: 400.

TYPE SPECIES — *Hyalinia (Polita) crenimargo* Retowski, 1889; OD.

Shell much flattened to flat, thin, translucent, shining, of 6-6.5 moderately convex whorls separated by deep suture. Color yellowish-corneous, somewhat lighter on base. Embryonic and later whorls lacking regular sculpture. Aperture often more or less triangular, with simple margins, only slightly oblique. Upper section of palatal margin somewhat protruded. Umbilicus rather narrow to closed. Height 3.5-8.0, diam. 7-19 mm.

Vas deferens moderately long. Epiphallus slender. Penis somewhat thicker, internally with complex relief consisting of stimulatory pilasters, some of which transversely plicate. Penis sheath coats basal part of penis. Free oviduct moderately long, surrounded by perivaginal gland; vagina of same length or longer. Various developed appendix on base of spermathecal stalk may be present. Spermathecal stalk rather short; reservoir lies on lower part of spermoviduct.

DISTRIBUTION. Adzharia and NE Turkey. 3 spp.

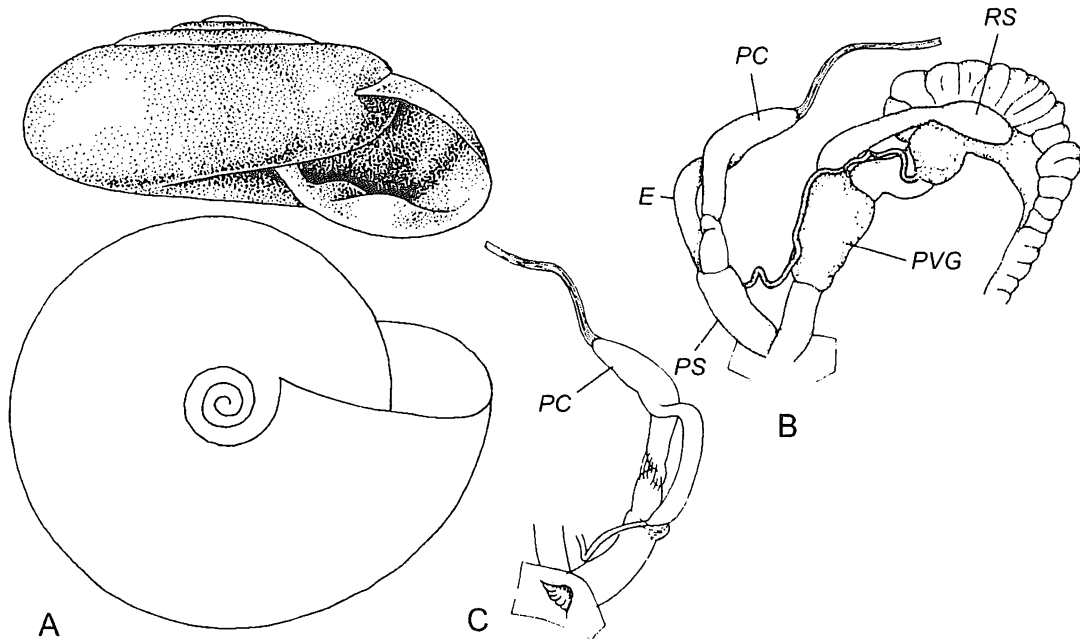


Fig. 1878. *Oxychilus (Calloretinella) mavromoustakisi* (Haas, 1934).
 A — shell: Paramali, Cyprus. Vienna No. 71573/1 B — reproductive tract. C — penis.
 After Riedel, 1991.

Oxychilus (Calloretinella) Haas, 1934
 Fig. 1878

Haas, 1934: 16 (*Retinella* subg.). Riedel, 1980: 90.

TYPE SPECIES — *Retinella (Calloretinella) mavromoustakisi* Haas, 1934; OD.

Shell depressed, relatively solid, slightly translucent, of 5 whorls. Color yellow. Embryonic whorls smooth. Later whorls with weak, irregular, radial lines and wrinklets. Aperture moderately oblique. Basal margin with well developed basal callosity, another one may be present at short distance behind the first. Umbilicus rather broad, quite perspective. Height 4.4-4.7, diam. 10-11 mm (4.6 × 11.0 mm).

Vas deferens rather long, somewhat convoluted. Epiphallus swollen. Penis consisting of 2 parts demarcated by narrowing, furnished by well developed caecum. Penis sheath surrounds distal 2/3 of lower chamber of penis. Free oviduct and vagina subequal in length, expanded. Perivaginal gland surrounds distal part of free oviduct, proximal part of vagina and base of somewhat expanded spermathecal stalk. Reservoir ovoid, lies on distal half of spermoviduct.

DISTRIBUTION. Cyprus Island. 1 sp.

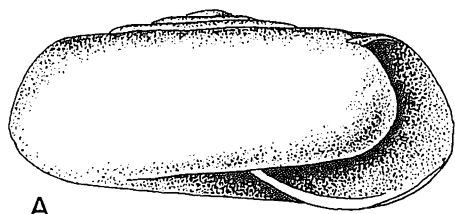
Oxychilus (Hyalofusca) Monterosato, 1892
 Fig. 1879

Monterosato, 1892: 7, footnote (*Hyalinia* group).
 Riedel, 1980: 102.

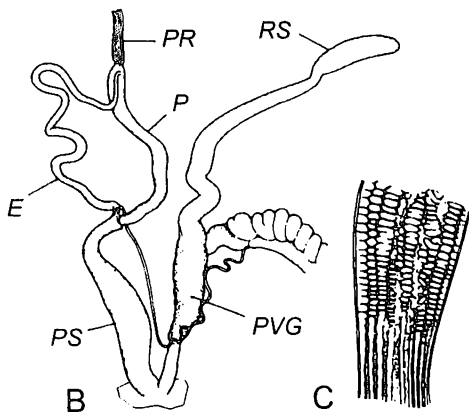
TYPE SPECIES — *Helix denatale* "Benoit" L. Pfeiffer, 1856; monotypy.

Shell (nearly) flat, thin, of 6-6.75 quite convex whorls. Last whorl slightly subangulated below midline. Spire a little elevated, apex rounded. Color corneous. Embryonic whorls smooth, later whorls with weak, irregular, radial striae. Aperture very narrow, semilunate, subvertical, with simple margins; columellar margin very shortly reflexed. Umbilicus subcylindrical, profound, not broad. Height 4.5-5.8, diam. 12-17 mm (4.7 × 12.1 mm).

Vas deferens very thin, entering also long, slender epiphallus apically. Epiphallus narrowing distally, joining penis laterally, leaving extremely short caecum. Penis consists of slender proximal and fusiform distal sections, internally with irregular radial pilasters partly broken into series of prismatic tubercles. Penis sheath surrounds distal section of penis, its upper edge con-



A



B



C

Fig. 1879. *Oxychilus (Hyalofusca) denatale* (L. Pfeiffer, 1856).

A — shell: Sicily. Geneva. B — reproductive tract. C — interior of penis. After Riedel, 1973b.

connected with vas deferens/epiphallus junction. Penial retractor attached to rudimentary caecum apically. Free oviduct short. Vagina long, surrounded by well developed perivaginal gland. Spermathecal stalk rather long.

DISTRIBUTION. Marettimo Islet near NW Sicily. 1 sp.

Oxychilus (Ortizius) Forcart, 1957)

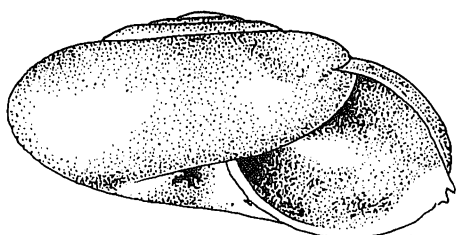
Fig. 1880

Forcart, 1957: 125.

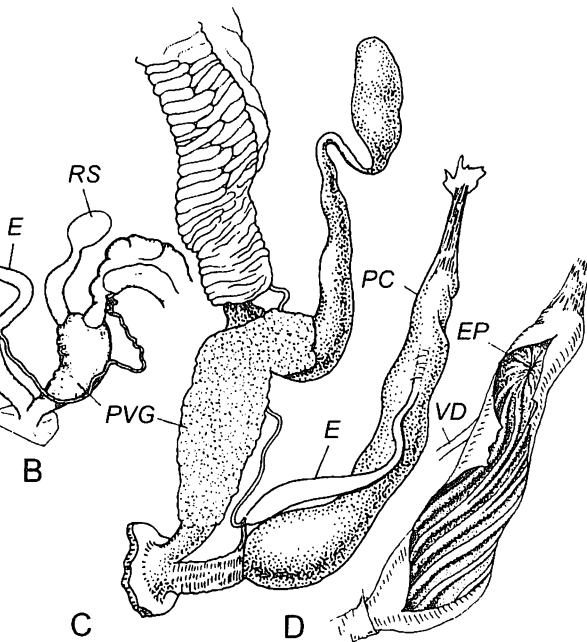
TYPE SPECIES — *Hyalina (Polita) helvetica* Blum, 1881; OD.

Shell generally depressed, thin, translucent, shining or dull, of 4-6 slightly to moderately convex whorls. Color (light) corneous. Embryonic whorls smooth. Postapical sculpture ranged from extremely weak and irregular to distinctly reticulate. Aperture (broadly) lunate, moderately oblique. Umbilicus narrow to rather broad. Height 1.5-9.5, diam. 2.7-20.0 mm (4.6 × 9.0 mm).

Vas deferens moderately long, entering epiphallus apically. Epiphallus elongate-clavate. Penis subcylindrical, often narrowed in middle part, with a short to quite



A



B

C

Fig. 1880. A, B — *Oxychilus (Ortizius) helveticus* (Blum, 1881). A — shell: Hägendorf, Switzerland. Vienna No. K 38548. B — reproductive tract. After Riedel, 1970b.

C, D — ! *Oxychilus (Ortizius) caspius* (O. Boettger, 1880). Lenkoran District, Biliaras [SE Transcaucasia], June 3, 1974. C — reproductive tract. D — interior of penis. SPb.

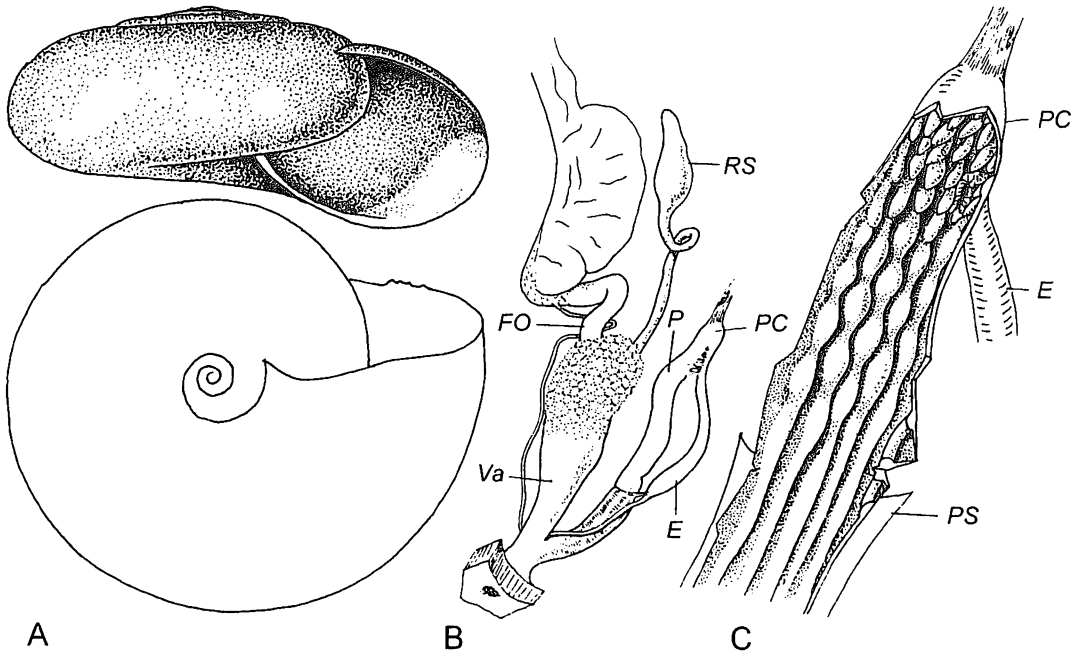


Fig. 1881. *Oxychilus (Oxychilus) cellarius* (Müller, 1774).
 A — shell: Como, Italy. Zürich No. 502331 B, C — “Polska: Srebrna Góra ad Zabrowice Slaskie, 3.VI.1958” B — reproductive tract. C — interior of penis. SPb.

long, blunt caecum; internally with smooth, even, longitudinal folds which not broken into papillae or tubercles. Penis sheath coats lower 1/3 of penis. Perivaginal gland well developed, surrounds free oviduct, base of spermathecal stalk and upper part of vagina. Spermathecal stalk moderately long, sometimes swollen basally; reservoir variously expressed.

DISTRIBUTION. Europe, Asia Minor, Caucasus, N Iran. 21-25 spp. & subspp.

Oxychilus (Oxychilus) s. str.

Fig. 1881

- *Hydatina* Westerlund, 1886: 29, 37 [nom. praeocc., non Ehrenberg, 1828 (Rotatoria); *Hyalina Vitrea* sect., t.-sp. *Helix hydatina* Rossmäessler, 1838; tautonymy].
- *Hydatinus* A. Wagner, 1907: 108 (nom. nov. pro *Hydatina* Westerlund, 1886).
- *Diaphanella* Hesse, 1916: 124 (nom. praeocc., non Clessin, 1880; nom. nov. pro *Hydatina* Westerlund non Ehrenberg, 1828).
- *Geodiaphana* Thiele, 1917: 23 (nom. nov. pro *Hydatina* Westerlund, 1886 et *Diaphanella* Hesse, 1916).

— *Hyalofulgida* Monterosato, 1892: 7 (*Hyalinia* group, t.-sp. *Helix villae* Mortillet in Strobel, 1853, non Deshayes, 1850 = *Helix mortilleti* “Stabile” L. Pfeiffer, 1859; SD Riedel, 1973b).

— *Retinella* Westerlund, 1902: 86 (non Fischer in Shuttleworth, 1877; t.-sp. *Helix fuscosa* Rossmäessler, 1838; OD).

— *Retinella* Lindholm, 1927: 323 (non Fischer in Shuttleworth, 1877; t.-sp. *Helix fuscosa* Rossmäessler, 1838; OD).

— *Lindholmella* C. Boettger, 1930: 580 (nom. nov. pro *Retinella* Lindholm, 1927).

Riedel, 1980: 97

Shell depressed to almost flat, thin, more or less glossy, of 5-6 slightly to moderately convex whorls. Last whorl evenly rounded to slightly angulated. Color yellowish to reddish. Embryonic whorls smooth. Postapical whorls nearly smooth to rather coarsely radially striated; spiral striation, as a rule, distinct. Aperture widely lunate, subvertical. Umbilicus moderately wide. Height 3-7, diam. 6-21 mm (6.6 × 14.1 mm).

Conchological differences from *O. (Ortizius)* not reliable.

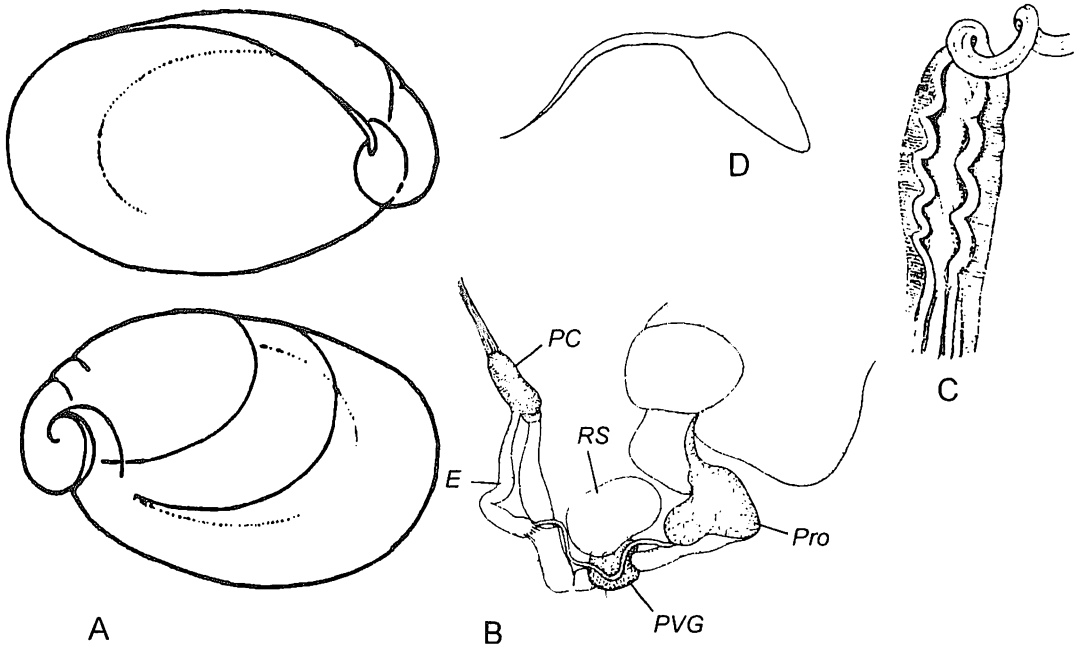


Fig. 1882. *Lotharia cretica* (Forcart, 1950).
 A — shell. B — reproductive tract. After Riedel, 1988a. C — interior of caecum (?epiphallus).
 After Simroth, 1891. D — spermatophore. After Riedel, 1973a.

Anatomically differs from *O.* (*Ortizius*) by inner structure of penis: longitudinal folds (at least in proximal section) broken into series of papillae or tubercles.

DISTRIBUTION. Europe, Crimea, Asia Minor, Azores, Canary Islands, N Africa. 15-16 spp.

DAUDEBARDIIDAE Kobelt, 1906.

Kobelt, 1906 (1905-1906): 178 (Zonitidae subf.).

Semislugs; shell ear-shaped, thin, smooth or finely spirally striate, consisting of 1-3 whorls. Demarcation between nucleus (embryonic part of shell) and spatula (postembryonic part) weakly expressed. Maximal body length of crawling animal up to 50 mm. Visceral sac and shell strongly shifted backward.

Sole tripartite. Orifice of genital atrium moved away from base of right ommatophore. On back there are 4 deep longitu-

dinal grooves: a pair of straight medial and a pair of oblique lateral.

Throat strongly developed, its retractors separated from ommatophoran retractors and attached to columella or (more often) to left body wall.

Jaw rudimentary, transparent, slightly curved.

Albumen gland capacious, of irregular shape. Penis coated with sheath which attached only by its lower edge. Inner structure of penis very diverse. Vagina with perivaginal gland. Spermatheca voluminous, with very short stalk, sometimes nearly sedentary.

Carnivorous animals, feed mainly on earthworms and mollusks; cases of cannibalism known.

DISTRIBUTION. W Palearctic; eastward to Crimea, W Caucasus and Iraq.

REMARK. Stefani in Stefani & Pantanelli (1879: 12) has established the section *Pseudolibania* (of the genus *Daudebardia*) with type species *Daudebardia tarentina* Stefani, 1879 from S Italy. Zilch (1985) has shown that *Daudebardia tarentina* is a synonym of *Susania testudinaria* Cantraine,

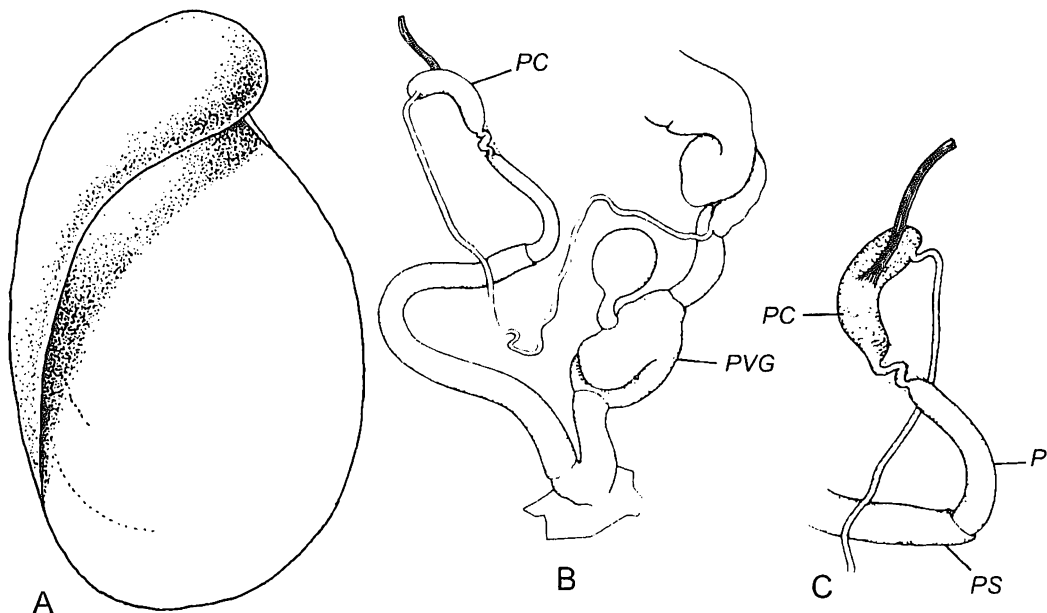


Fig. 1883. *Cibania transsilvanica* (Bielz, 1859).

A — shell: "Lotrion-Tal, Siebenbürgen" [Romania]. Vienna No. 75378. B — reproductive tract. C — penis from other side. After Riedel, 1978a.

1835, and *Pseudolibania* is a synonym of *Susania* Gray, 1857 (Pleurobranchidae).

Lotharia Schileyko, 1986
Fig. 1882

Schileyko, 1986: 117 Riedel, 1998a: 61 (*Carpathica* subg.).

TYPE SPECIES — *Pseudolibania* (*Carpathica*) *cretica* Forcart, 1950; OD.

Nucleus consists of 1.5 whorls. Aperture without plates. Umbilicus closed.

Pharyngeal retractors arising on left body wall.

Vas deferens moderately long, thin. Epiphallus well developed, entering penis laterally. Internally epiphallus smooth-walled. Penial caecum with glandular walls. Penis without verge. Penial retractor attached apically to caecum. Spermatheca nearly sessile, practically without stalk. Spermatophore consisting of pointedly-ovate body and slender tail thread.

DISTRIBUTION. Crete, Kos, Cyprus, ? Rhodos Islands; NW Asia Minor. 2 spp.

Cibania A. Wagner, 1914
Fig. 1883

Wagner A., in Sturany & Wagner, 1914: 104.

— *Cibinia* A. Wagner, 1915: 444 (nom. nov. pro *Cibania*; t.-sp. *Daudebardia transsilvanica* Bielz, 1859; monotypy).

— *Deceballia* Grossu, 1969: 85 (t.-sp. *Deceballia nana* Grossu, 1969; OD).

TYPE SPECIES — *Daudebardia transsilvanica* Bielz, 1859; monotypy.

Nucleus (no more than 1 whorl) ovate, smooth. Aperture simple. Umbilicus absent.

Pharyngeal retractors insert to left body wall.

Vas deferens long, enters upper portion of penis subapically. Penis consists of three portions: lower very long, cylindrical, passes into short tubular coiled portion; upper with glandular walls (? derivative of caecum and epiphallus). Penial sheath unusually long, attached near atrium. Penial retractor inserts approximately to middle of upper portion of penis by a single band. Inner structure of penis unknown. Base of spermathecal stalk not enlarged.

DISTRIBUTION. SW Carpathians. 2 spp.

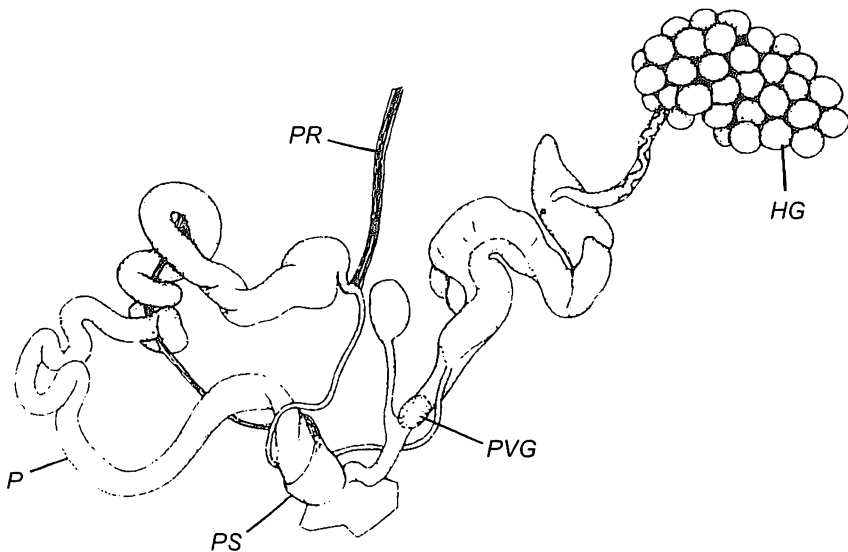


Fig. 1884. ! *Libania wiktori* (Riedel, 1967).
Reproductive tract. After Riedel, 1998a.

Libania Bourguignat, 1870
Fig. 1884

Bourguignat in Penchinat, 1870: 164 (nom. nov. pro *Moussonia* Bourguignat, 1866).

— *Moussonia* Bourguignat, 1866: 211 [nom. praeocc., non Semper, 1865 (Cyclophoridae); t.-sp. *Testacella sauleyi* Bourguignat, 1866; SD Forcart, 1950].

TYPE SPECIES — *Testacella sauleyi* Bourguignat, 1852; SD Forcart, 1950.

Nucleus (of 1-1.5 whorls) ovate. Aperture without a plate. Umbilicus closed.

Pharyngeal retractors attached usually to body wall [2 exceptions: in *L. riedeli* (Forcart, 1971) they still insert to columella, in *L. parvula* (Grossu, 1969) to both left and right body walls].

Vas deferens long, enters penis apically through a sharp curvature. Penial retractor attached to curvature by a single branch. Penis not divided into sections, internally with more or less developed longitudinal folds; in *L. parvula* there are papillae as well. Penial sheath (very) short, attached near atrium. Base of spermathecal stalk not or only slightly enlarged.

DISTRIBUTION. S Carpathians, E Rho-

dope Mts., Lebanon, Israel and S Asia Minor to NE Iraq. 7 spp.

Daudebardia Hartmann, 1821
Fig. 1885

Hartmann, 1821 41.

— *Isselia* Bourguignat, 1877: 64 [nom. praeocc., non Schmeltz, 1874 (Rissoidea); t.-sp. *Helicarion sardous* Issel, 1873; monotypy].

— *Arthuria* Servain, 1891 181 [nom. praeocc., non Dall, 1881 (Planaxidae); nom. nov. pro *Isselia* Bourguignat, 1877].

— *Dudichia* H. Wagner, 1941 655 (t.-sp. *Daudebardia cavicola* Soós, 1927; monotypy).

— *Rufina* Clessin, 1878: 98 (t.-sp. *Helix rufa* Draparnaud, 1805; SD Forcart, 1950).

— *Eudaudebardia* Westerlund, 1886: 4 (*Daudebardia* subg., t.-sp. *Helix rufa* Draparnaud, 1805; SD Forcart, 1950).

TYPE SPECIES — *Helix rufa* Draparnaud, 1805; monotypy.

Nucleus rounded, with 2-2.5 slowly increasing whorls. Embryonic sculpture of extremely fine spiral striation. Aperture toothless. Umbilicus open or nearly so.

Pharyngeal retractors attached to columella.

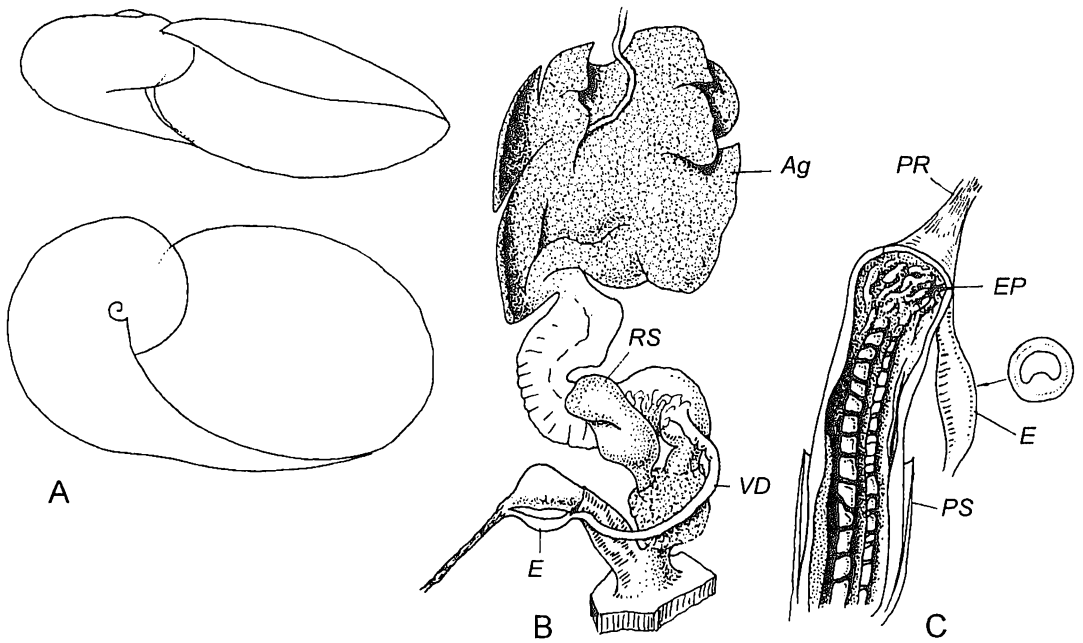


Fig. 1885. *Daudebardia rufa* (Draparnaud, 1805).

Zolotye Mosty near Sofia [Bulgaria], June 3, 1967 A — shell. B — reproductive tract. C — interior of penis. After Schileyko, 1986.

Vas deferens short, entering penis subterminally, at sharp angle, near penis it forms spindle-shaped enlargement. Penis not subdivided into separate parts, internally with longitudinal folds, which sometimes broken into series of tubercles. Verge wanting. Penis sheath attached near atrium. Penial retractor inserted on penis apically, as a single arm. Base of spermathecal duct not enlarged.

DISTRIBUTION. SE and Central Europe, W Caucasus. 4 spp. and several subsp.

Bilania Schileyko, 1986

Fig. 1886

Schileyko, 1986: 101 Riedel, 1998a: 61 (*Carpathica* subg.).

TYPE SPECIES — *Daudebardia boettgeri* Clessin, 1883; OD.

Nucleus (of about 1.5 whorls) ovate, practically smooth. Aperture toothless, but with a thickening on columellar margin, half-covering umbilicus.

Pharyngeal retractors attached to left body wall.

Vas deferens sharply bent before entering penis; distal part of this duct somewhat

convoluted. Penis in general spindle-shaped, internally with longitudinal folds which become more regular in upper part; as folds approaching pore of vas deferens, incisions appear and become more and more sharp; as a result these folds transformed into series of large papillae. Penis sheath attached near atrium. Penial retractor inserted terminally on highly muscled tissue, within which vas deferens enters penis; besides main branch of retractor there are 1-2 additional ones, descending along penis. Base of spermathecal duct not enlarged.

DISTRIBUTION. Mountain Crimea and environs of Novorossiysk (W Caucasus). 1 sp.

Sieversia Kobelt, 1880

Fig. 1887

Kobelt, 1880: 28 (*Daudebardia* subg.). Riedel, 1998a: 59 (*Daudebardia* subg.).

TYPE SPECIES — *Daudebardia heydeni* O. Boettger, 1879; monotypy.

Nucleus (about 2 whorls) ovate, with extremely fine spiral striation. Aperture toothless, columellar margin not thickened.

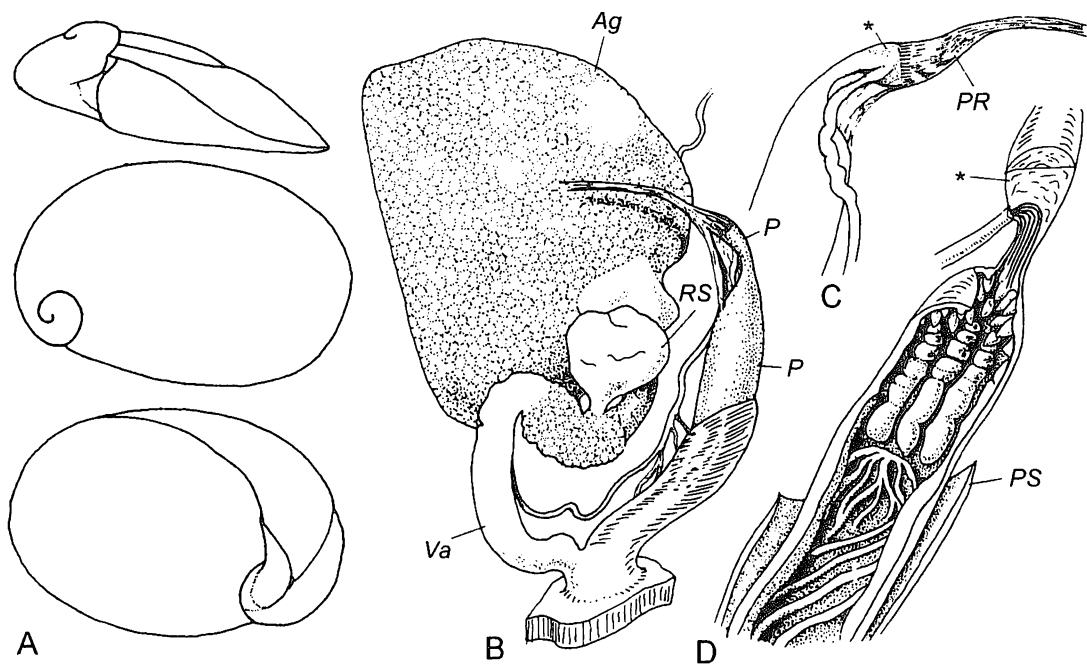


Fig. 1886. *Bilania boettgeri* (Clessin, 1883).
 Yalta, Crimea, February 23, 1956. A — shell. B — reproductive tract. C — proximal part of penis from other side. D — interior of penis. After Schileyko, 1986. *Asterisk* — muscular tissue.

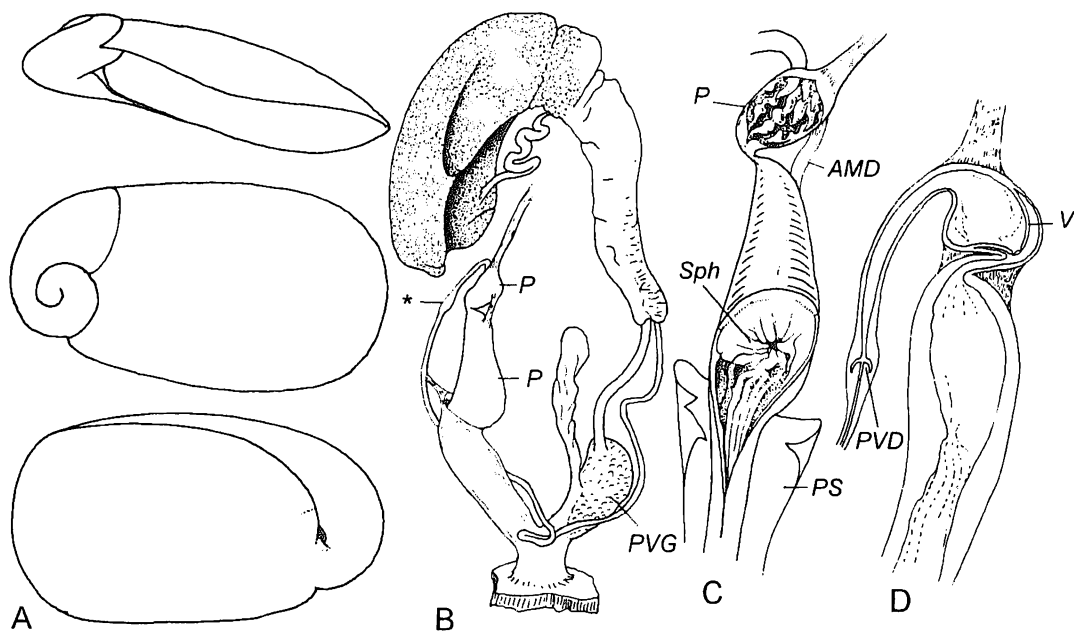


Fig. 1887. *Sieversia heydeni* (O. Boettger, 1879).
 Botanical Garden, Batumi, SW Transcaucasus, April 7, 1971 A — shell. B — reproductive tract. C — interior of penis. D — same of another specimen (semidiagrammatic). After Schileyko, 1986. *Asterisk* — enlargement of vas deferens.

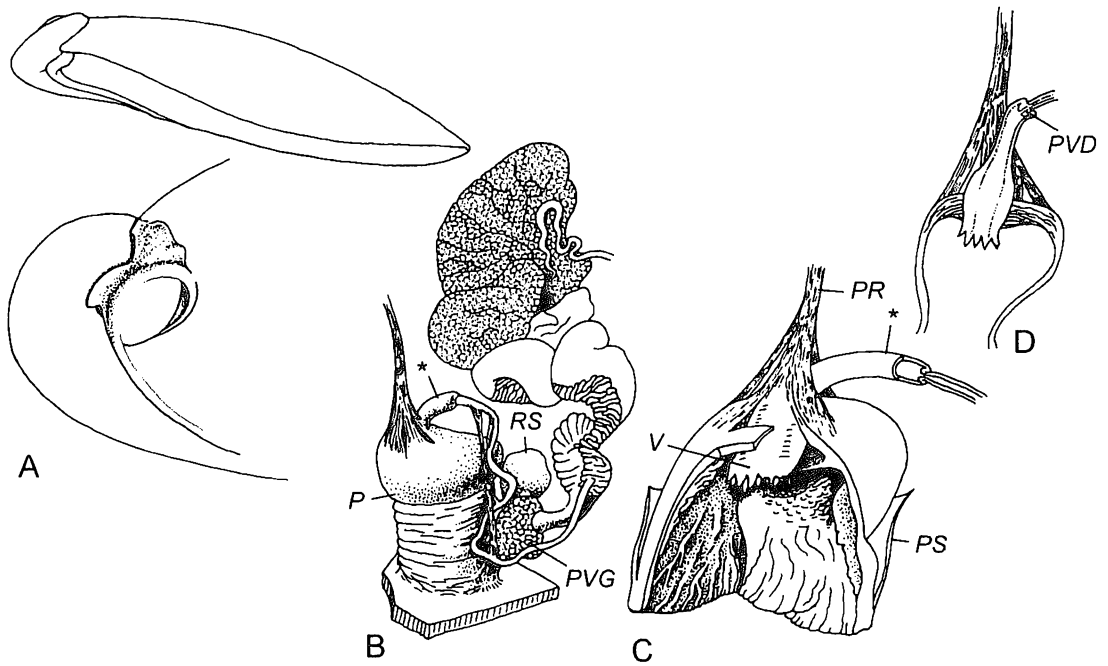


Fig. 1888. *Inguria wagneri* (Rosen, 1911).

Gagry, W Caucasus, April 8, 1911 A — shell. B — reproductive tract. C — interior of penis. D — sagittal section through penis, diagrammatic. After Schileyko, 1986. Asterisk — enlarged part of vas deferens.

Umbilicus no more than half covered by reflection of columellar margin.

Pharyngeal retractors inserting on columella.

Vas deferens long, with minute enlargement in distal part which contains a tiny papilla. Penis in general cylindrical, consisting of 2 parts. Internally longer lower part with longitudinal folds; approximately at middle of this part folds form a sort of sphincter. Upper part contains capacious thin-walled verge with thin axial folds within; these folds sometimes turned into series of papillae. Penial sheath attached near atrium. Penial retractor attached subapically. Base of spermathecal stalk not enlarged.

DISTRIBUTION. Coastal parts of Black Sea from Maikop and Sochi to environs of Istanbul. 2 spp.

Inguria Schileyko, 1986

Fig. 1888

Schileyko, 1986: 108. Riedel, 1998a: 59 (syn. of *Sieversia*).

TYPE SPECIES — *Daudebardia wagneri* Rosen, 1911; OD.

Nucleus (of about 2 whorls) ovate, sculptured with very fine spiral striation. Basal margin of aperture continuing to parietal wall, turning into a high crest-like spiral plate. Umbilicus nearly closed with a tongue-like process of mentioned plate.

Pharyngeal retractors attached to columella.

Vas deferens moderately long, within its slightly enlarged distal part there is a minute papilla. Penis sac-like, not divided into portions, its inner surface bears numerous folds of various size. Apical wall of penis much thickened, highly muscled and tightly embracing end of vas deferens, whose pore surrounded by large papillae. Penial sheath attached near atrium. Penial retractor attached apically by several bands. Base of spermathecal stalk not enlarged.

DISTRIBUTION. Western parts of the Greater Caucasus from Maikop southward to Taleri River valley; one finding in the west of Minor Caucasus. 1 sp.

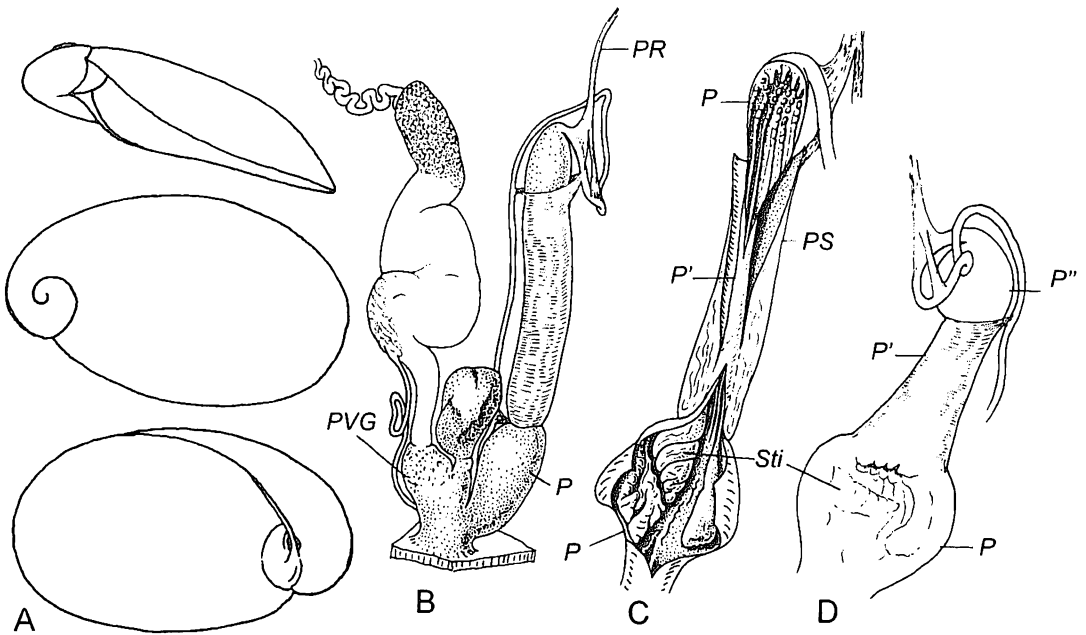


Fig. 1889. *Szuchumiella jetschini* (A. Wagner, 1895).

A-C: Besla River, Sukhumi, W Caucasus, August 25, 1905. A — shell. B — reproductive tract. C — interior of penis. D — Tkvarcheli, Georgia, September 12, 1957 Penis. After Schileyko, 1986. *P'* and *P''* — divisions of penis.

Szuchumiella H. Wagner, 1945

Fig. 1889

Wagner H., 1945: 53 (*Daudebardia* subg.).

— *Suhumiella* Wagner H., 1952: 95, 96 (nom. err. pro *Szuchumiella*).

— *Suchumiella* Wagner H., 1952: 145 (nom. nov. pro *Szuchumiella*).

Riedel, 1998a: 59 (*Daudebardia* subg.).

TYPE SPECIES — *Daudebardia (Libania) jetschini* A. Wagner, 1895; SD Forcart, 1950.

Nucleus ovate, with slowly increasing whorls (not less than 2 in number). Embryonic sculpture practically absent. Aperture without plate. Umbilicus slit-like.

Pharyngeal retractors attached to columella.

Vas deferens long, evenly slender, lacking papilla. Penis consists of 3 sections. On inner surface of rounded lower division several thick folds situated; of these there is a single one, incised with deep cross furrows. Next division long, slender, coated by penial sheath; it separated from lower one by a sphincter. Upper division en-

larged, contains longitudinal folds, separated into a series of tubercles; near pore of vas deferens these tubercles turn into papillae. Penial sheath attached at some distance from atrium and embraces middle third of penis. Penial retractor attached to vas deferens near place of its entering penis by 1-2 bands. Base of spermathecal stalk somewhat enlarged.

DISTRIBUTION. Coastal parts of Black Sea shore of Caucasus. 1 sp.

Illyrica A. Wagner, 1895

Fig. 1890

Wagner A., 1895: 621 (*Daudebardia* sect.).

Riedel, 1998a: 61 (*Carpatica* subg.).

TYPE SPECIES — *Daudebardia (Illyrica) stussineri* A. Wagner, 1895: monotypy.

Nucleus (of about 1 whorl) ovate, smooth. Aperture toothless. Umbilicus closed or just narrow slit remains.

Pharyngeal retractors attached to left body wall.

Vas deferens enters penis apically, embracing penial retractor; this duct has neither enlargement nor papilla. Penis consists

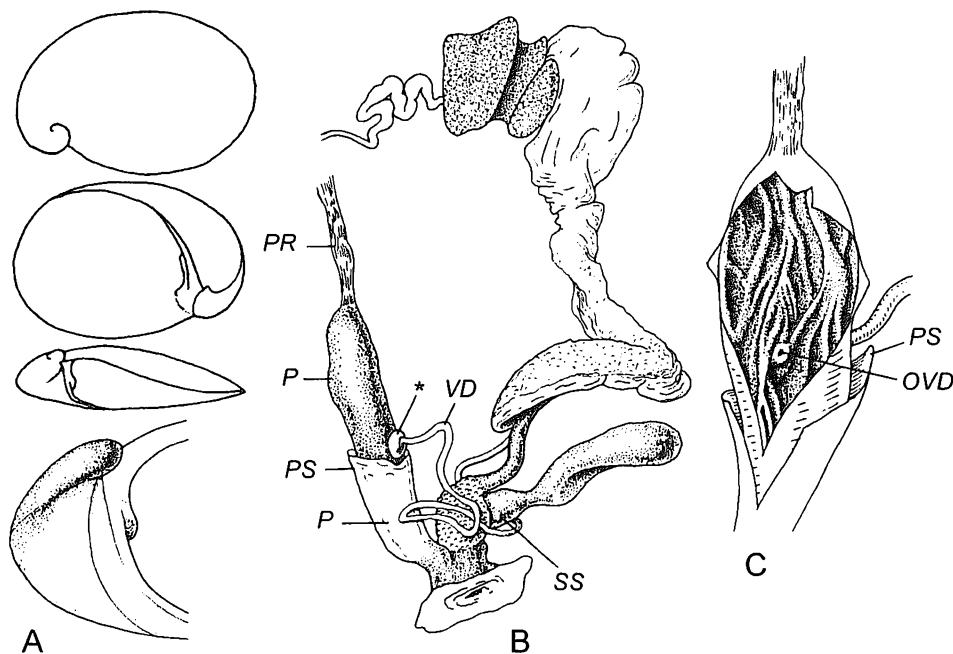


Fig. 1890. *Illyrica stussineri* (A. Wagner, 1895).

A — shell. After Riedel, 1967b. B — reproductive tract. C — interior of penis. After Schileyko, 1986. *Asterisk* — muscular tissue.

of 2 sections. Lower section slender, long, thick-walled, with very narrow lumen. Upper section enlarged, thin-walled, internally with 1 or 2 stimulators. Penis sheath attached near atrium. Penial retractor attached terminally by a single band. Base of spermathecal stalk markedly enlarged.

DISTRIBUTION. Balkan countries and adjacent territories. 3 spp.

Carpathica A. Wagner, 1895

Fig. 1891

Wagner A. 1895: 621 (*Daudebardia* sect.).

— *Banatoconcha* H. Wagner, 1941: 652 [*Daudebardia* subg., t.-sp. *Daudebardia* (*Banatoconcha*) *soosi* H. Wagner, 1941; SD Forcart, 1950; = *Daudebardia langi* L. Pfeiffer, 1846].

TYPE SPECIES — *Daudebardia* (*Carpathica*) *kimakowiczi* A. Wagner, 1895 (= *Daudebardia calophana* Westerlund, 1881); SD Forcart, 1950.

Nucleus consists of 1-1.5 rapidly increasing whorls; embryonic sculpture practically absent. Columellar margin of aperture occupied by a vertical thickening. Umbilicus closed.

Pharyngeal retractors inserting onto left body wall.

Vas deferens long, enters middle portion of penis, before entering it much narrowed and lacking an internal papilla. Place of vas deferens entrance surrounded by a lateral thickening. Penis internally bears a complex relief of branched, anastomosing folds. Penial sheath attached near atrium. Penial retractor inserts terminally by a single band to blind end of penis. Base of spermathecal stalk, as a rule, enlarged.

DISTRIBUTION. Mountain regions of SE Europe; NW Asia Minor, Crete Island. 5 or 6 spp.

PARMACELLIDAE P. Fischer, 1856

Fischer P. 1856: 390.

— Cryptellidae J. Gray, 1855: 347 (as Cryptellidae; nom. oblit.).

Large slugs with fleshy body; back with keel. Between keel and mantle there is a

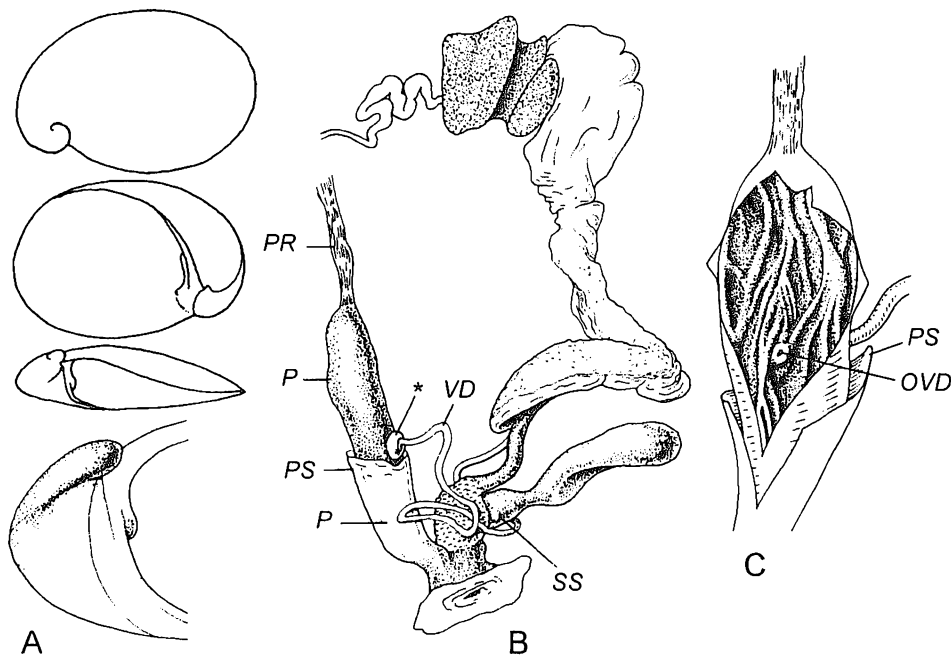


Fig. 1891 *Carpathica calophana* (Westerlund, 1881).

Kvassi village, Rakhov distr. Ukraine, September 14, 1959. A — shell. B — reproductive tract. C — interior of penis. SPb. Asterisk — lateral thickening on penis.

slit, through which a part of nucleus visible. Mantle occupies about a half of body length, with distinct horseshoe-shaped groove. Length of cephalic shield equal or more than total length of mantle. Pneumostome shifted backwards.

Shell consists of coiled embryonic part (nucleus) and plate-like postembryonic part (SPATHULA).

Caudal foss or horn absent.

Gut of two-looped type.

Ovotestis compact. Prostate of 2 parts: rounded proximal and band-like distal. Flagellum absent. Epiphallus not long, fusiform. Penis consists of 2 chambers: proximal one internally with numerous, small papillae and sometimes with verge; inner surface of distal chamber with axial folds. Vagina surrounded by perivaginal gland and supplied with glandular appendage(s) of various shape. Spermatophore consists of long, smooth ampulla and thread-like tail; tail ends in peculiar "anchor" in form of circle provided with many minute spines.

DISTRIBUTION. SW Europe (Portugal, S Spain), N Africa (from Alexandria to Mo-

rocco); Canary Islands; E Caucasus, Kopet-Dag, N Iran, Central Asia, Afghanistan.

REMARK. On the conservation of the name Parmacellidae — see Schileyko, 2003 (in press).

Cryptella Webb et Berthelot, 1833 Fig. 1892

Webb & Berthelot, 1833: 310.

— *Phosphorax* Webb et Berthelot, 1833: 308 (t. sp. *Phosphorax noctilucus* Webb et Berthelot, 1833; monotypy).

TYPE SPECIES — *Cryptella canariensis* Webb et Berthelot, 1833; OD.

Body comparatively slender. Mantle broad, extending over nearly a half of body length; through a slit at its posterior end shell nucleus is visible.

Penis sheath surrounds distal section of penis. Vagina very short, without perivaginal gland. Atrium with appendix that internally covered with papillae similar to those of upper portion of penis. Spermathecal duct without additional organ, swollen basally and at its middle; reservoir reaching base of albumen gland.

DISTRIBUTION. Canary Islands. 7 spp., 2 of them probably extinct.

REMARK. Hutterer and Groh (1991), as well as Groh et al. (1993), indicate that the members of this genus have no atrial appendix. However, a specimen of the type species I dissected is a syntype, collected by Webb and Berthelot, and it has a quite distinct appendix.

Parmacella Cuvier, 1804
Fig. 1893

Cuvier, 1804: 442 (as *Parmacelle*).

— *Parmacellus* Férussac, 1819: 79 (nom. err. pro *Parmacella* Cuvier, 1804).

— *Drusia* Gray, 1855: 57 (t.-sp. not designated).

— *Clathropodium* Westerlund, 1897: 117 (t.-sp. *Clathropodium vitrinaeforme* Westerlund, 1897; monotypy).

— *Euparmacella* Simroth, 1912: 43 (pro subg.; t.-sp. not designated).

TYPE SPECIES — *Parmacella olivieri* Cuvier, 1804; monotypy.

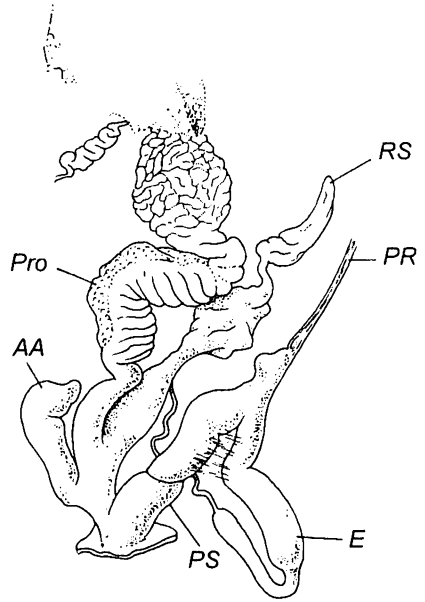


Fig. 1892. *Cryptella canariensis* Webb et Berthelot, 1833. Canary Islands. Reproductive tract. Syntype. Paris.

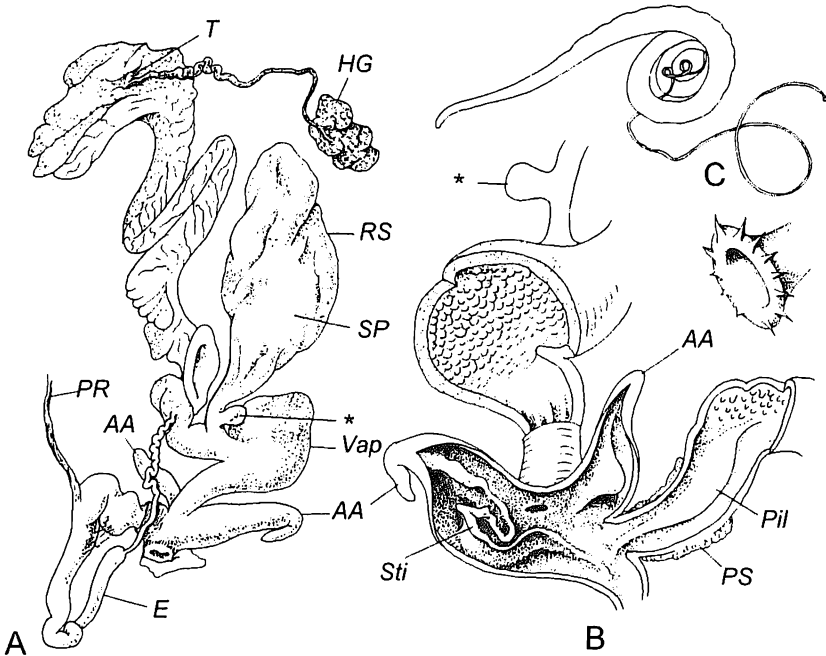


Fig. 1893. ! *Parmacella iberica* Eichwald, 1841 Kara-Yalchy Gorge, Kara-Kala, Kopet-dag Range. A — reproductive tract. B — interior of distal parts of genitalia. C — spermatophore and its tail end enlarged. Moscow No. Lc-21881. Asterisk — additional organ on spermathecal stalk.

Body bulky. Mantle broad, extending over nearly a half of body length;

Penis sheath absent. Vagina very large, of complex shape; mostly bean-shaped, with thick muscular and glandular walls and a large, glandular vaginal appendix. Atrium with 2 or (rarely) 1 appendages: larger, with 2 leaf-like stimulators, and smaller. Spermathecal stalk very short, muscular, its base with a small additional globular organ having very narrow lumen; "anchor" of spermatophore located in it. Reservoir not reaching albumen gland.

DISTRIBUTION. N Africa, Portugal, S Spain, S France, E Transcaucasia, N Iran, W Kopetdag. 6 spp.

Candaharia Godwin-Austen, 1888.

Godwin-Austen, 1888: 217

Proparmacella Simroth, 1912: 43 (*Parmacella* subg.; t.-sp. not designated).

Kandaharia Godwin-Austen, 1914: 314 (nom. err. pro *Candaharia* Godwin-Austen, 1888).

Likharev & Wiktor, 1980: 342.

TYPE SPECIES — *Parmacella rutellum* Hut-
ton, 1849; monotypy.

Body bulky. Mantle broad, extending over nearly a half of body length.

Penis sheath surrounds distal section of penis. Vagina cylindrical, somewhat swollen, surrounded by perivaginal gland supplied with band-like organ having very nar-

row lumen; vaginal gland absent. Atrium lacking appendages. Spermathecal stalk longer than in *Parmacella*, without additional organ. Reservoir not reaching albumen gland.

DISTRIBUTION. Central Asia, Afghanistan, NE Iran.

Candaharia (*Candaharia* s. str.)

Fig. 1894

Epiphallus entering penis (sub)apically. Penis with verge. Penial retractor attached to penis/epiphallus junction or to upper section of penis.

DISTRIBUTION. Mountain systems of Central Asia and Afghanistan. 2 spp.

Candaharia (*Levanderia*

Likharev et Wiktor, 1980)

Fig. 1895

Likharev & Wiktor, 1980: 348.

TYPE SPECIES — *Parmacella levanderi* Simroth, 1901; OD.

Epiphallus, gradually narrowing, enters penis laterally. Penis without verge, sometimes with caecum. Penial retractor inserted on apex of upper end of penis.

DISTRIBUTION. Mountain systems of Central Asia, N Afghanistan, NE Iran (? introduced). 2 spp.

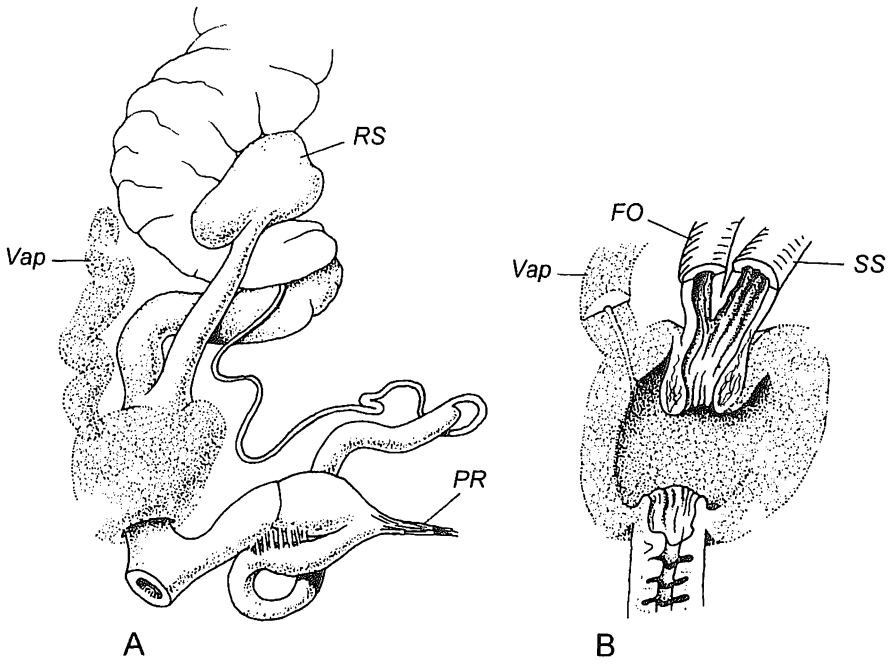


Fig. 1894. *Candaharia (Candaharia) rutellum* (Hutton, 1849).
 Karabalty Gorge, Kyrgyz Range, Kyrgyzzia, May 31, 1937 A — reproductive tract. B — interior of vagina. Moscow No. Lc-5005.

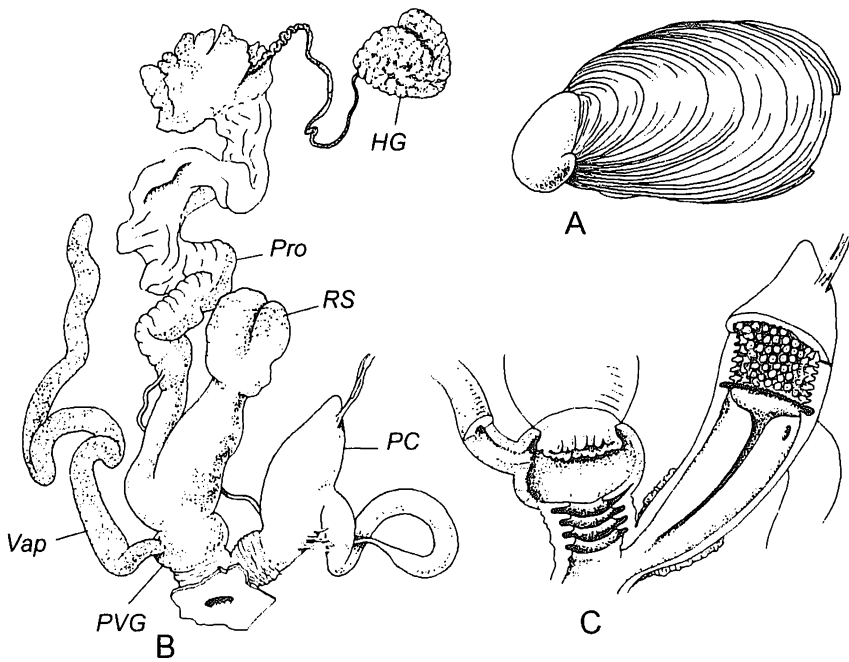


Fig. 1895. *Candaharia (Levanderia) levanderi* (Simroth, 1901).
 Bul-bul Gorge, Turkestan Range, Tien-Shan, April 7, 1990. A — shell. B — reproductive tract. C — interior of penis and vagina. Moscow No. Lc-20509.

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