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A. A. SCHILEYKO

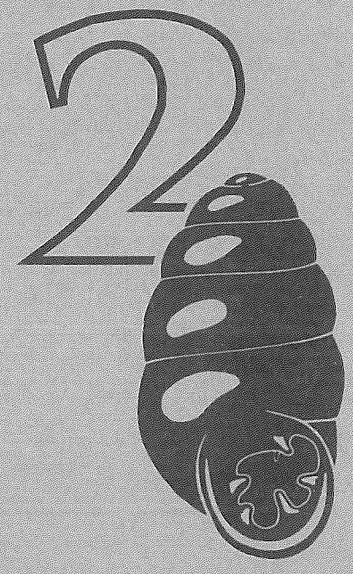
TREATISE

ON

RECENT TERRESTRIAL PULMONATE MOLLUSCS

RUTHENICA

SUPPLEMENT 2



A. A. Schileyko

TREATISE ON RECENT TERRESTRIAL PULMONATE MOLLUSCS

Part 2

Gastrocoptidae, Hypselostomatidae, Vertiginidae, Truncatellinidae, Pachnodidae, Enidae, Sagdidae

Ruthenica, Supplement 2
Moscow ✦ 1998

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VERTIGINOIDEA Pilsbry, 1918

Pilsbry, 1918 (1916-1918): 68 (pro fam.).

Shell minute to tiny, ovate to cylindrical, smooth or radially sculptured. Embryonic whorls smooth or finely granular, rarely radially ribbed. Aperture toothed or (rarely) toothless; if columellar and parietal lamellae present, they developed at subadult age. Margins of aperture simple or reflexed, thin or somewhat thickened. Lip, with a few exceptions, absent. Umbilicus usually minutely open.

Head lacking lower pair of tentacles, except in Gastrocoptidae.

Prostate of a few acini at base of albumen gland. Penis with epiphallus, often abruptly separated by distinct circular narrowing. Internally penis with smoothed longitudinal folds. Penial appendix primarily present but retained only in Nesopupinae (Vertiginidae). Penial retractor uniramous, attached to vas deferens/epiphallus junction. Spermathecal stalk without diverticle.

DISTRIBUTION. Circumglobally.

GASTROCOPTIDAE Pilsbry, 1918

Pilsbry, 1918 (1916-1918): x (Pupillidae subf.).

Shell ovate, cylindrical or ovate-conic, mostly glass-like and colorless, and transparent when fresh. Whorls convex. Apex not prominent. Embryonic whorls smooth, later whorls weakly sculptured. Aperture rounded, often free or nearly so, mostly heavily armed. Angular and parietal lamellae more or less completely united into one biramous, bifid, lobed or sinuous lamella or these two lamellae connected by callus; anterior face of parietal lamella often looking forked at standard position of shell. Columellar lamella present. Palatal plica or plicae mostly present. Aperture margins well expanded. Umbilicus, a minute slit or perforation; rarely wide.

Head with 4 tentacles.

Penis not long. Epiphallus well developed. Penial appendix absent. Penial retractor uniramous, attached near upper end of penis. Vagina very short. Spermathecal stalk rather long.

DISTRIBUTION. Cape Verde Islands, Caucasus, S Ural, Siberia, Central and E Asia, Sri Lanka, Philippines; America; Bermudas; a number of islands of tropical and temperate zones of the Pacific and Indian oceans; Australia.

REMARK. Current systematics of this taxon is based only upon features connected with structure of the aperture. However, species in different parts of the huge area of the family often show similar patterns of aperture armament and their variation. So, "It thus seems that they are convergences and the use of subgeneric units would imply affinities that may not exist" (Solem, 1988: 480). At the same time, judging by the very limited anatomical data, we should not expect that anatomy is a good tool for taxonomic decisions in this family.

Pumilicopta Solem, 1988
Fig. 141

Solem, 1988: 497.

TYPE SPECIES — *Pumilicopta kessneri* Solem, 1988; OD.

Shell minute, conic-ovate, of 4.25 to nearly 5 very strongly rounded, convex whorls. Surface covered with weak radial wrinkles or microscopical malleation. Aperture rounded, places of its attachment drawn together. Angular and parietal lamellae well separated, partly or completely fused. Columellar lamella extends far back into aperture with varying posterior descension; subcolumellar plate from simple angled crescent to deeply recessed, vertical blade. Basal tooth from nodular to partly to completely transverse ridge. Palatal wall with folds more deeply recessed from top to bottom, structure and position variable, with or without accessory palatal nodes just inside lip. Height 1.5-2.2, diam. 1.09-1.22 mm.

DISTRIBUTION. Northern parts of Australia including Queensland; Indonesia (Sumba and Timor Islands). 4 spp.

Correction to Part 1.

Page 122, left column. After "Wenz, 1919: 78" [*Pleurodiscus*] should be inserted: Type species — *Helix balmei* Potiez et Michaud, 1838; OD.

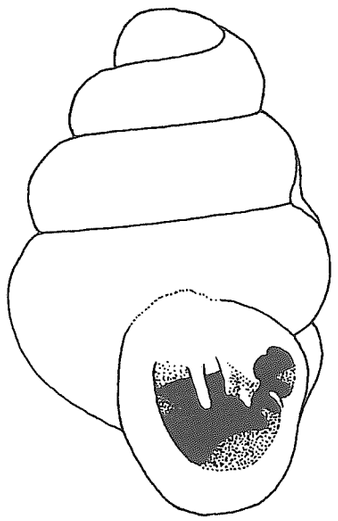


Fig. 141. ***Pumilicopta kessneri*** Solem, 1988. Holotype.
After Solem, 1988 (drawing made from photo).

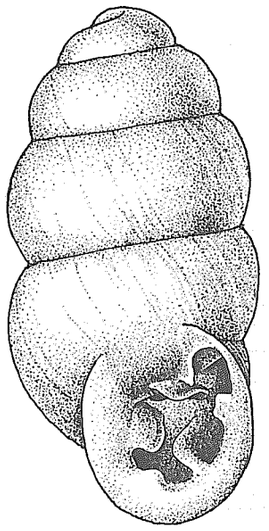


Fig. 142. ***Gastrocopta (Australbinula) hedleyi*** Pilsbry, 1916).
Narrabi, New South Wales. Syntype. **Phil.** No. 63279.

Gastrocopta Wollaston, 1878

Wollaston, 1878: 515 (*Pupa* subg.).

TYPE SPECIES — *Pupa acarus* Benson, 1856; SD Pilsbry, 1916.

Shell conic to subcylindrical, of 4.5-6 somewhat flattened to quite convex whorls. Sculpture weak, shell looks smooth. Places of peristome incertion approached to various degree, sometimes aperture nearly free. Angular and parietal lamellae separated or partially fused. Columellar lamella variously developed. Palatal plicae and marginal nodes on palatal callus (lip) often present.

DISTRIBUTION. As of subfamily.

Gastrocopta (*Australbinula* Pilsbry, 1916) Fig. 142

Pilsbry, 1916 (1916-1918): 11, 166 (pro sect.).

— *Gyrodaria* Iredale, 1940: 234 (pro gen.; t.-sp. *Australbinula strangeana* Iredale, 1937 = *Pupa strangei* L.Pfeiffer, 1853; OD).

— ?*Papualbinula* Iredale, 1941: 63 (t.-sp. *Gastrocopta macdonnelli macrodon* Pilsbry, 1916; OD).

TYPE SPECIES — *Gastrocopta rossiteri* Pilsbry, 1916 [non Brazier, 1875 (= *Gastrocopta hedleyi* Pilsbry, 1916)]; OD.

Shell dextral or (rarely) sinistral, ovate-conic to subcylindrical. Aperture rounded, interrupted on parietal wall, with reflexed margins. Angular and parietal lamellae diverging in front, parietal initially subhorizontal, then curving towards columella within. Columellar lamella steeply directed upward. Palatal folds (2-3 in number) present, but no palatal callus. Height 2.1-3.2, diam. 1.0-1.4 mm (2.1 × 1.0 mm).

DISTRIBUTION. Australia and New Guinea. 11-12 spp.

REMARK. It seems that Solem (1988: 480) was right in saying "Use of the subgeneric names *Sinalbinula* Pilsbry, 1916 and *Australbinula* Pilsbry, 1916 has not been accepted, since their supposed differences are bridged by the taxa reviewed here [northern part of Australia — A.Sch.]."

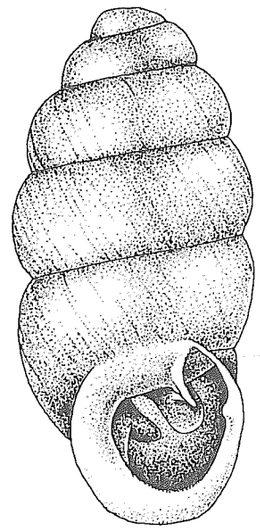


Fig. 143. ! ***Gastrocopta (Immersidens) cochisensis*** (Pilsbry et Ferriss, 1910).
Tanner Canyon, Huachucas, Arizona. Holotype. **Phil.** No. 97442.

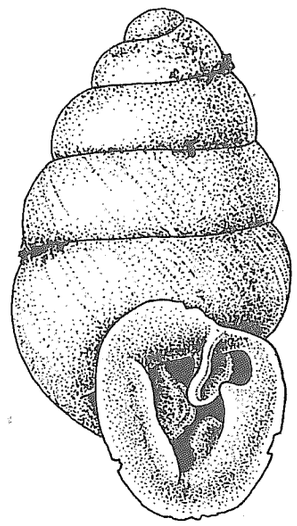


Fig. 144. ***Gastrocopta (Albinula) contracta*** (Say, 1822).
Near Garden Lake Station, W of Clementon, New Jersey. **Moscow** No. Lc-23283 (**Phil.**)

Gastrocopta (*Immersidens* Pilsbry et Vanatta, 1900) Fig. 143

Pilsbry & Vanatta, 1900: 606.

TYPE SPECIES — *Bifidaria ashmuni* Sterki, 1898; SD Pilsbry, 1916.

Shell cylindrical, thin, of 5-6 moderately convex to convex whorls. Color pale brown to whitish. Peristome thin, expanded. Angular lamella united with parietal at inner end of former, the two diverging forward, and together shaped like reversed "Y". Columellar lamella strongly developed. Basal fold, when present, longitudinal or transverse to plane of aperture. Palatal thickening sometimes present. Height 1.6-2.6, diam. 0.7-1.2 mm (2.5 × 1.1 mm).

DISTRIBUTION. Central plateau and mountains of North America, from the Grand Canyon, southward to southern Brazil and western Argentina. 11-13 spp. & subspp.

Gastrocopta (*Albinula* Sterki, 1892) Fig. 144

Sterki, 1892: 4.

— *Leucochilus* O.Boettger, 1880: 64 (non *Leucochila* Martens in Albers, 1860; *Pupa* sect.; t.-sp. *Pupa armifera* Say, 1821; OD).

TYPE SPECIES — *Pupa contracta* Say, 1822; OD.

Shell elongated-ovate or ovate-conic, of 5-7.5 rather convex whorls. Colorless and glass-like when alive, dead shell often whitish. Aperture free or nearly so, margins thin and expanded. Angular lamella well developed, concrescent to varying degree with parietal. Inner end of parietal lamella often curving towards periphery. Columellar lamella horizontal in front and curves towards base within (except in *G. armifera*). Palatal folds stand upon white palatal callus; supra-

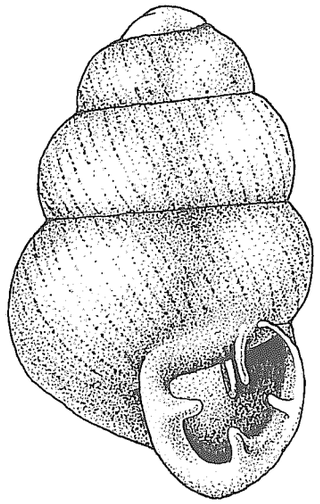


Fig. 145. ***Gastrocopta (Geminidens) geminidens*** (Pilsbry, 1916).
Cariaquita, Venezuela. Holotype. **Phil.** No. 105200.

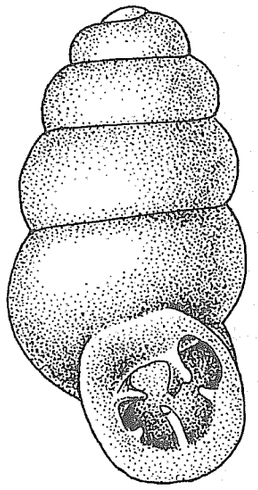


Fig. 146. ***Gastrocopta (Gastrocopta) acarus*** (Benson, 1856).
Fogo Islet [Cape Verde archipelago]. **Phil.** No. 97279.

palatal fold usually developed. Height 1.5-5.2, diam. 0.8-2.5 mm (2.2 × 1.1 mm).

DISTRIBUTION. North America except the Pacific slope. 11 spp. & subspp.

Gastrocopta (*Geminidens* Pilsbry, 1930) Fig. 145

Pilsbry, 1930: 351.

TYPE SPECIES — *Bothriopupa geminidens* Pilsbry, 1916; OD.

Shell ovate-conic, thin, of about 5 quite convex whorls. Postnuclear whorls slightly irregularly radially wrinkled, with microscopic granulation. Aperture ovate, peristome insertions not or only slightly approached. Angular and parietal lamellae thin, high, former stands before parietal nearly on the same line. Columellar lamella horizontal. Basal plica tooth-like, palatal short, not immersed. Height 1.5, diam. 0.8 mm.

DISTRIBUTION. Venezuela. 1 sp.

Gastrocopta (*Gastrocopta* s.str.) Fig. 146

— *Bifidaria* Sterki in Pilsbry, 1891: 315 (t.-sp. *Pupa servilis* Gould, 1843; SD Dall, 1904).

— *Eubifidaria* Sterki, 1893: 101 [t.-sp. "*Pupa hordeacea* Gabb" sensu Sterki (= *Bifidaria procera cristata* Pilsbry et Vanatta, 1900); OD].

Shell cylindrical or oblong-conic, of 5-6 moderately to quite convex whorls. Aperture nearly free, with reflexed margins. Angular and parietal lamellae united into sinuous or bifid plate. Columellar lamella short, horizontal. Basal fold, when present, on base of aperture, not subcolumellar in position. Palatal folds not standing upon callous ridge, upper sometimes wanting. Height 1.4-3.0, diam. 0.5-1.4 mm (1.75 × 0.75 mm).

DISTRIBUTION. Tropical and warm temperate portions of America and Africa, Cape Verde and Mascarene Islands; Ceylon; Philippines; introduced in the Hawaii. 25-30 spp. & subspp.

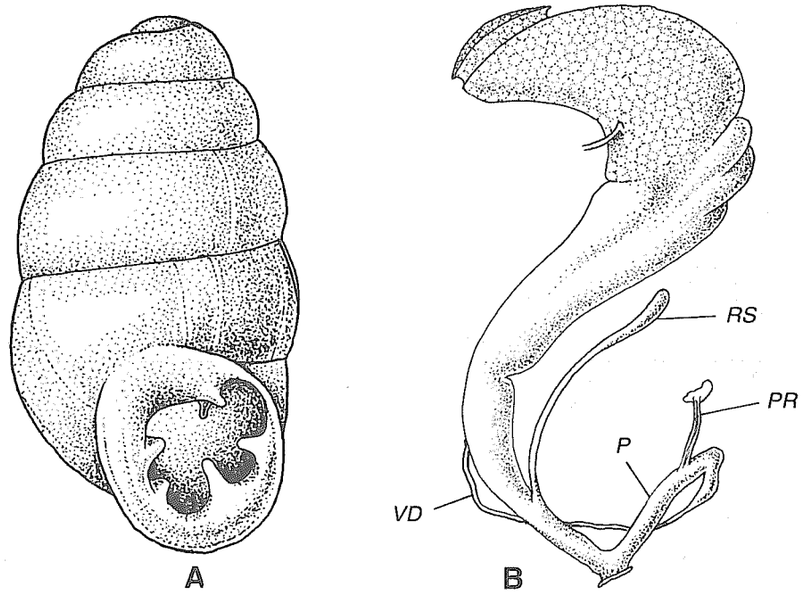


Fig. 147. ! ***Gastrocopta (Sinalbinula) theeli*** (Westerlund, 1877).
Ussuri Natural Reserve, Peishula village, July 4, 1971. A — shell; B — reproductive tract. **Moscow** No. Lc-23300.

Gastrocopta (*Sinalbinula* Pilsbry, 1916) Fig. 147

Pilsbry, 1916 (1916-1918): 11.

TYPE SPECIES — *Pupa armigerella* Reinhardt, 1877; OD.

Shell mostly elongated-ovate, of about 5 not strongly convex or flattened whorls. Aperture rounded, nearly free, with widely reflexed margins. Parietal lamella straight inside or curving towards columella, its anterior end usually free, but sometimes angular and parietal plates fuse into single sinuous lamella. Columellar lamella horizontal or its inner end curved downwards. Baso-columellar tubercle often present. Palatal teeth on lip 1-3 in number. Height 1.5-2.5, diam. 0.7-1.2 mm (2.1×1.0 mm).

Talon minute, as curvature of hermaphroditic duct. Prostate of a few poorly discernible acini. Vas deferens intering epiphallus terminally. Penis/epiphallus junction marked by penial uniramous retractor insertion. Free oviduct and vagina of about equal length. Spermathecal stalk thin, without diverticle, reservoir small.

DISTRIBUTION. S and E Asia, Siberia, Caucasus, Polynesia, Micronesia, Hawaii, Australia. Over 30 spp.

Gastrocopta (*Staurotrema* Pilsbry, 1948) Fig. 148

Pilsbry, 1948: 893.

TYPE SPECIES — *Gastrocopta quadridens* Pilsbry, 1916; OD.

Shell subcylindrical, slowly tapering upward, translucent white, of 6 convex whorls. Aperture ovate, interrupted, without crest behind peristome, with 4 teeth in form cross: strong, nearly simple angulo-parietal; smaller columellar lamella; upper and lower palatal plicae. Height 2.7-3.1, diam. 1.3 mm (2.8×1.3 mm).

DISTRIBUTION. North America (New Mexico, Arizona, Utah). 1 sp.

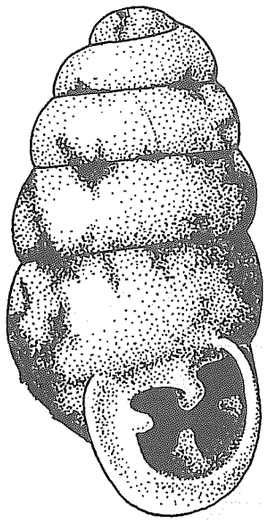


Fig. 148. ***Gastrocopta (Staurotrema) quadridens*** Pilsbry, 1916.
Capitan Mts., Lincoln Co., New Mexico (type locality). **Chicago** No. 57645.

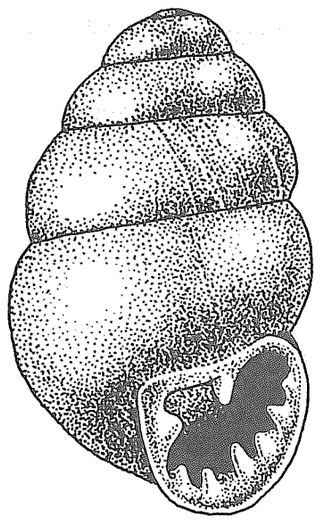


Fig. 149. ***Gastrocopta (Vertigopsis) pentodon*** (Say, 1821).
Des Moines, Iowa. **Phil.** No. 168745.

Gastrocopta (*Vertigopsis* Sterki, 1893)
Fig. 149

Sterki, 1893: 101.

TYPE SPECIES — *Pupa curvidens* Gould, 1841 (= *Vertigo pentodon* Say, 1821); OD.

Shell ovate to ovate-cylindrical, of about 5 convex whorls. Aperture rounded-triangular, with moderately reflexed margins. Angular lamella very small or absent, parietal one weak to strong, simple. Columellar lamella subhorizontal. Basal and palatal margins with 3-8 tuberculiform teeth located on more or less developed lip lying at some distance from aperture edge. Height 1.2-4.5 mm, diam. 0.8-1.2 mm (1.8×1.1 mm).

DISTRIBUTION. North and Central America. 6-7 spp. & subspp.

Gastrocopta (*Privatula* Sterki, 1893)
Fig. 150

Sterki, 1893: 101.

TYPE SPECIES — *Odostomia corticaria* Say, 1816; monotypy.

Shell ovate-cylindrical or subcylindrical, of 5.5 convex whorls. Aperture ovate, peristome insertions only slightly approached. Angular lamella small, tuberculiform, stands before parietal lamella on the same line. Parietal lamella much reduced, weak and short; sometimes both these lamellae united into single bilobed plate. Basal and palatal margins toothless. Height 2.5, diam. 1.0 mm.

DISTRIBUTION. East of N America. 1 sp.

Cavipupa Pilsbry, 1934
Fig. 151

Pilsbry, 1934 (1927-1935): 120 (*Gastrocopta* subgen).

TYPE SPECIES — *Gastrocopta (Cavipupa) euryomphala* Pilsbry, 1934; OD.

Shell ovate-conic, tapering upward, thin, of 4.5 strongly convex whorls. Last whorl flattened at periphery in last half and marked with short groove over position of lower palatal plica. Color whitish when empty. Embryonic whorls with microscopic granulation, later whorls with fine, somewhat irregular radial striae. Aperture subcircular, free or nearly so. Parietal lamella straight, rather strong; angular lamella united with parietal. Columellar lamella turning down a little at its inner end. Basal

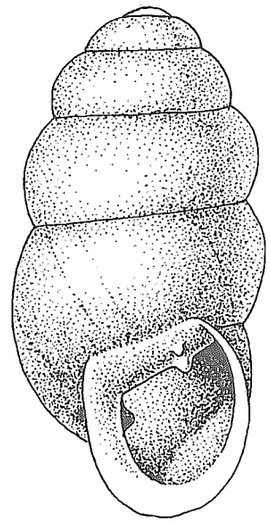


Fig. 150. ***Gastrocopta (Privatula) corticaria*** (Say, 1816).
Manayunk, Philadelphia. Neotype. **Phil.** No. 64524a.

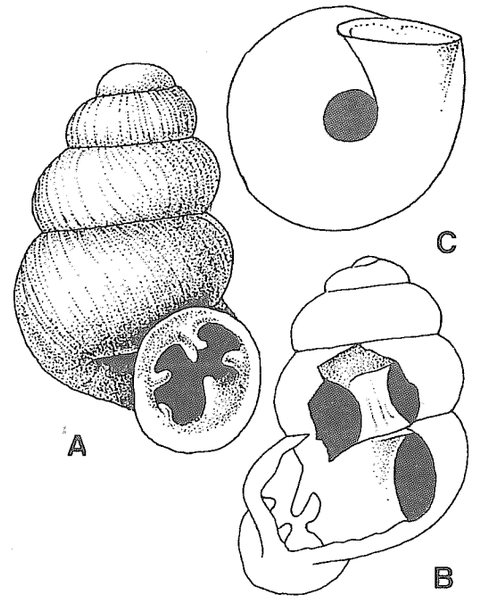


Fig. 151. ***Cavipupa euryomphala*** Pilsbry, 1934. A — Bintuan, Busuanga, Philippines. Holotype. **Phil.** No. 160431. B, C — After Pilsbry, 1934 (1927-1935).

plica tuberculate, lower palatal rather strong, upper palatal tuberculiform. Umbilicus comparatively broad, cylindrical. Height 2.1-2.2, diam. 1.3 mm (2.2×1.3 mm).

DISTRIBUTION. Philippines. 1 sp.

Chaenaxis Pilsbry et Ferriss, 1906
Fig. 152

Pilsbry & Ferriss, 1906: 145 (*Bifidaria* subg.).

TYPE SPECIES — *Bifidaria tuba* Pilsbry et Ferriss, 1906; OD.

Shell cylindrical or slightly tapering, of 5.5-6.5 rather convex whorls. Color whitish to pale brown. Aperture shortly ovate, adnate, its margins broadly reflexed and expanded. Angular and parietal lamellae entirely concrescent into single lobed lamella. Columellar lamella well developed, horizontal; deeply entering supracolumellar plate sometimes present. Basal tuberculiform tooth at some distance from peristome. 2-3 palatal folds short. Umbilicus unusually wide, cylindrical, leading to large hollow

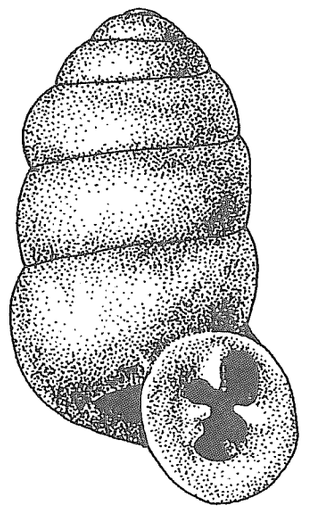


Fig. 152. ***Chaenaxis tuba*** (Pilsbry et Ferriss, 1906). Drift of San Pedro River, Cochise Co., Arizona. Holotype. **Phil.** No. 87062a.

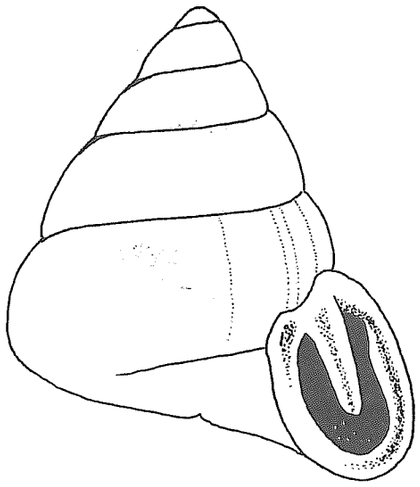


Fig. 153. ***Gibbulina infundibuliformis*** (Orbigny, 1835).
After Orbigny, 1835 (1834-1847).

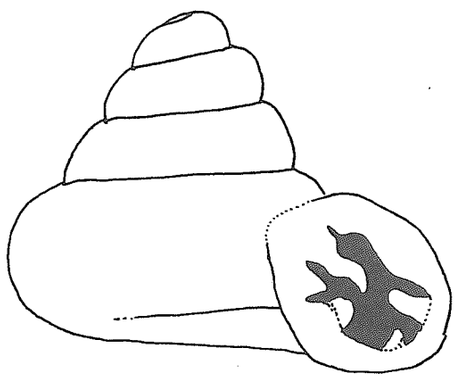


Fig. 154. ***Ulpia venusta*** Hylton Scott, 1955.
After Hylton Scott, 1955.

axis. Height 3.0-4.2, diam. 1.5-2.0 mm (3.3 × 1.6 mm).

DISTRIBUTION. Arizona and northern Mexico (Sonora). 2 spp., one with two subspp.

Gibbulina Beck, 1837
Fig. 153

Beck, 1837 (1837-1838): 81 (*Pupa* subg.).

— *Infundibularia* L.Pfeiffer, 1876: 213 (t.-sp. *Helix infundibuliformis* Orbigny, 1835 (1834-1847); monotypy).

TYPE SPECIES — *Helix infundibuliformis* Orbigny, 1835; SD Gray, 1847.

Shell subpyramidal, thin, of about 6 flattened whorls. Last whorl slightly ascending in front. Sculpture weak and irregular. Aperture free, ovate, with shortly reflexed margins. Aperture with only one tooth — very strong parietal lamella. Umbilicus broad, quite perspective. Height 2.5, diam. 2.3 mm.

DISTRIBUTION. Bolivia. 1 sp.

Ulpia Hylton Scott, 1955
Fig. 154

Hylton Scott, 1955: 67.

TYPE SPECIES — *Ulpia venusta* Hylton Scott, 1955; OD.

Shell turbinate, thin, of about 5 convex whorls. Last whorl slightly ascending towards aperture. Sculpture weak. Aperture nearly free, with broadly reflexed margins and 5 teeth: high, oblique parietal lamella; tuberculiform columellar lamella; rounded baso-columellar tubercle; small basal tooth; strong palatal plica. Umbilicus rather broad. Height 1.5-1.9, diam. 1.5-2.1 mm.

DISTRIBUTION. Argentina. 1 sp.

HYPSELOSTOMATIDAE Zilch, 1959

Zilch, 1959: 162 (Chondrinidae subf.).

— Aulacospirinae Zilch, 1959: 164 (Chondrinidae subf.).

Shell turrite to nearly lenticular or microhelicoid. Whorls convex to flattened. Apex prominent. Aperture rounded, mostly free or nearly so, sometimes detached. Maximal set of apertural armature consists of 5 teeth

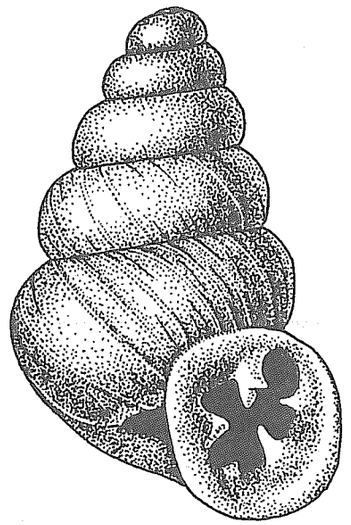


Fig. 155. ! ***Boysidia (Boysidia) hunanensis*** (Gredler, 1881).
Hunan, China. **Phil.** No 78393.

(parietal, columellar, basal, and two palatal); however, they tend to reduce down to complete disappearance. Numerous additional marginal knobs sometimes present. Umbilicus open, narrow to broad.

DISTRIBUTION. Indochina, Indonesia, Australia, Philippines.

REMARK. Zilch (1959) has erected two subfamilies within Chondrinidae sensu Zilch: Hypselostomatinae and Aulacospirinae. However, a comparison of diagnoses of these subfamilies shows that used characters are either overlapping, or incomparable, i.e. there are no diagnostic characters.

Boysidia Ancey, 1881

Ancey, 1881a: 373.

— *Gredleriella* Moellendorff, 1884a: 179, 180 [*Pupa* sect.; t.-sp. "*Pupa hunana*" Gredler, 1881 (nom. err. pro *Pupa hunanensis* Gredler, 1881); monotypy].

TYPE SPECIES — *Pupa dorsata* Ancey, 1881; SD Gude, 1914.

Shell conic, thin, fragile, of 4-6.5 convex whorls. Color yellowish-brown to chestnut. Embryonic whorls smooth, later with delicate granulation or spiral fimbriation. Aperture with 3-4 teeth. Umbilicus open, narrow to relatively broad.

DISTRIBUTION. China, Borneo.

Boysidia (*Boysidia* s.str.)
Fig. 155

Shell oblong-conic, of 5-6.5 convex whorls. Color yellowish-brown to chestnut. Postapical whorls more or less radially striate and often finely granulate. Aperture subcircular, only slightly oblique, free or nearly so, with widely reflexed thin margins. Parietal and angular lamellae fused, forming bilobed lamella (as in many Gastrocoptidae). Columellar lamella 1, basal margin smooth or with 1 tubercle, palatal plicae 2, short, pointed. Umbilicus narrowly open. Height 1.7-4.0, diam. 0.8-2.4 mm (3.5×2.2 mm).

DISTRIBUTION. China. 7-8 spp. & subspp.

Boysidia (*Paraboysidia* Pilsbry, 1917)
Fig. 156

Pilsbry, 1917 (1916-1918): 174.

TYPE SPECIES — *Boysidia paviei* Bavay et Dautzenberg, 1912; OD.

Shell turbinate-conic, thin, of about 5 very convex whorls. Color corneous. Embryonic whorls polished, glabrous, subsequent with very fine crowded spiral threadlets and delicate radial wrinklets. Aperture roughly rounded-triangular, nearly free, with thin reflexed margins. Angular and parietal lamellae distinct, moderately high, subvertical, parallel to each other; subparietal somewhat deviating towards palatal wall; small angular tubercle sometimes present. Columellar lamella directed slightly upward. Baso-columellar tooth rather short, lamellar. Palatal wall with 3 long entering plicae; besides, there is a marginal pointed tooth at upper part of palatal side. Umbilicus relatively broad. Height 1.8-5.0, diam. 1.0-4.0 mm (3.6 × 2.5 mm).

DISTRIBUTION. From Hindustan Peninsula eastward to China and Java. 6-8 spp.

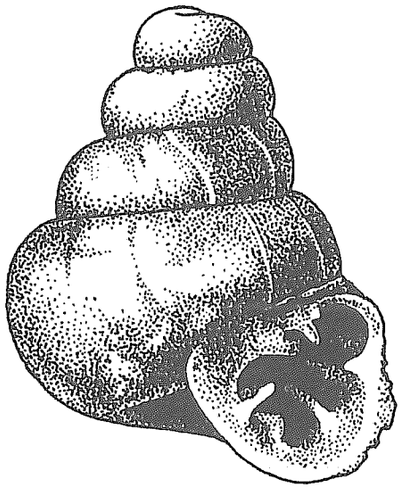


Fig. 156. ***Paraboysidia paviei*** (Bavay et Dautzenberg, 1912).
Pac-Kha, N Vietnam. **Phil.** No. 105095.

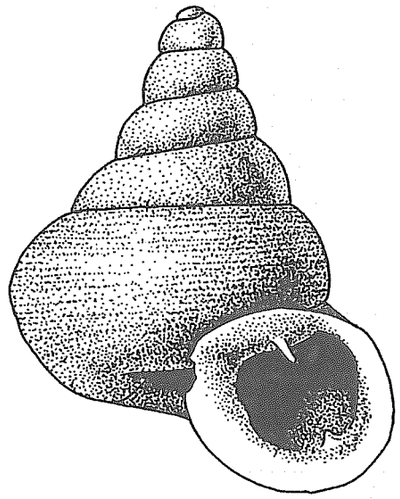


Fig. 158. ***Anauchen gereti*** (Bavay et Dautzenberg, 1903).
N Vietnam ["Tonkin"]. Syntype. **SPb.**

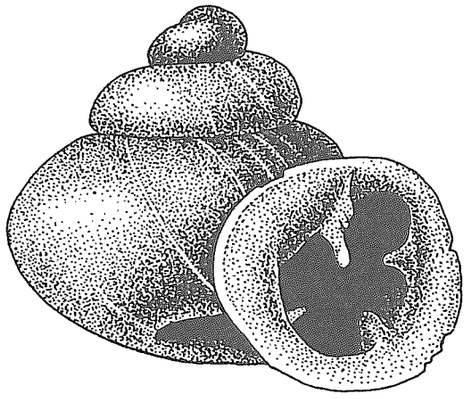


Fig. 157. ***Boysidia (Dasypupa) salpinx*** Thompson et Dance, 1983.
Fourth Div., ca. 4.0 mi. SW Miri, Niah area, E foot Gunong Subis, Sarawak, Borneo. Paratype. **Moscow** No. Lc-23280 (**Gain.** No. UF 35946).

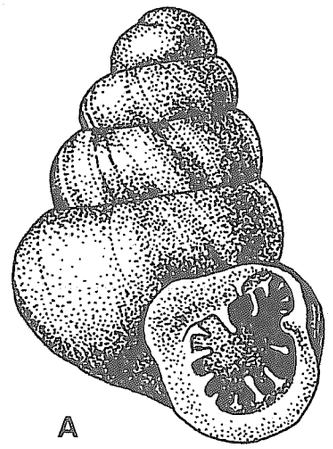
Boysidia (*Dasypupa* Thompson et Dance, 1983)
Fig. 157

Thompson & Dance, 1983: 105.

TYPE SPECIES — *Boysidia (Dasypupa) salpinx* Thompson et Dance, 1983; OD.

Shell shortly turbinate, of 4-5 convex whorls. Last whorl more or less angular in profile. Spire depressed-conic to elongate-conic. Color dark-corneous. Sculpture of postembryonic whorls represented by minute spiral periostracal fimbriations, but spiral striation absent. Occasional raised spiral threads may be present due to fusion of short segments of granular sculpture. Aperture nearly circular or subquadrate, adnate to or separated from body whorl. Margins expanded and widely reflexed. There are 4 teeth. Angular and parietal lamellae concrescent into short bilobed ridge. Columellar plate tubercular (not blade-like), deeply recessed. Basal and palatal plicae short. Umbilicus relatively wide, round. Height 1.70-3.45, diam. 2.10-2.85 mm (1.90×2.43 mm).

DISTRIBUTION. Borneo. 7 spp.



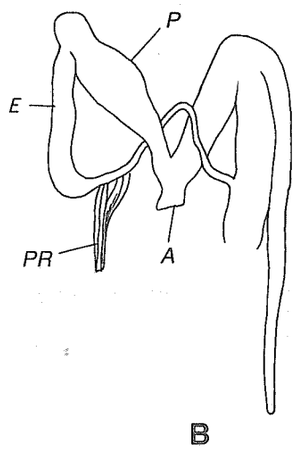


Fig. 159. ***Bensonella plicidens*** (Benson, 1849).
A — shell: Mt. Mitake, Japan. **Moscow** No. Lc-19574 (**Leiden**). B — reproductive tract. After Habe, 1956b.

Anauchen Pilsbry, 1917
Fig. 158

Pilsbry, 1917 (1916-1918): 188.

TYPE SPECIES — *Boysidia gereti* Bavay et Dautzenberg, 1903; OD.

Shell high-conic, thin, dull, of 5-6 convex whorls. Last whorl straight, with very weak angle in profile. Slopes of spire concave. Color uniformly corneous to greyish. Embryonic whorls smooth, postapical with weak irregular radial wrinklets and spaced, spiral, periostracal, wavy threads. Aperture free or nearly so, rounded, oblique, its margins thin, broadly reflexed, shortly adnate above. Angular lamella absent. Parietal lamella short, low. Columellar lamella small to hardly visible, horizontal. Baso-palatal side with 0-3 folds. Umbilicus open, funnel-shaped, perspective, encircled by rounded ridge. Height 2.8-3.5, diam. 2.3-2.8 mm (3.0 × 2.5 mm).

DISTRIBUTION. N Vietnam and S China. 4-5 spp.

Bensonella Pilsbry et Vanatta, 1900
Fig. 159

Pilsbry & Vanatta, 1900: 591, footnote (*Bifidaria* sect.).

TYPE SPECIES — *Pupa plicidens* Benson, 1849; OD.

Shell shortly conic, thin, dull, of 4.5-5 convex whorls; last whorl rounded at periphery, gradually ascending towards aperture. Color uniformly corneous. Embryonic whorls glossy, other whorls covered by widely spaced, fine, periostracal threads and very fine radial striation. Aperture subvertical, practically adnate, its margins slightly reflexed. Apertural armament complex, all teeth lamellar, thin, deeply situated. Supraparietal lamella continuing angular one; parietal strongest in all parietal group; subparietal rather small; boundary of parietal and columellar margins sometimes with tiny tubercle. Columellar lamella horizontal, of same size as subparietal. Baso-columellar tooth very small; next to it there is a small basal, far larger basal tooth, directed by its

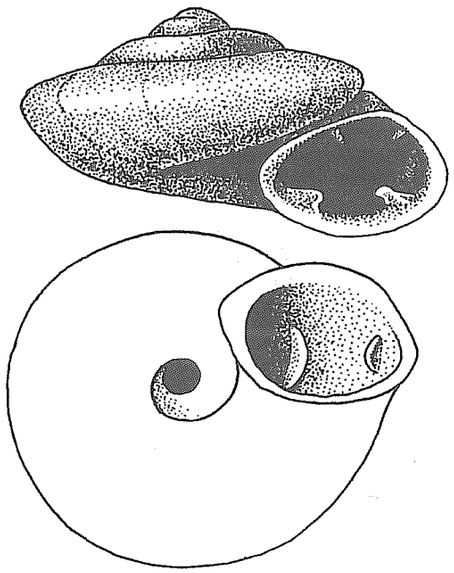


Fig. 160. ***Aulacospira scalatella*** Moellendorff, 1890.
Manila, Philippines. **SPb.**

ridge to parietal lamella. Palatal margin with incision and few plicae of about similar size. Umbilicus dot-like, cylindrical, open. Height 2.1-2.5, diam. 1.7-2.0 mm (2.2×1.8 mm).

Vas deferens rather short, entering epiphallus terminally. Penis/epiphallus junction with small swelling (caecum?). Penis shortly fusiform. Penial retractor attached to very distal portion of vas deferens just above its contact with epiphallus. Penial appendix absent. Free oviduct and vagina about equal in length. Spermatheca sleeve-like, without reservoir.

DISTRIBUTION. Hindustan peninsula, SE Asia including China; Japan. 2 sp.

REMARK. Chen et al. (1995) described two new species from Shaanxi Province (China): *Boysidia dilamellaris* and *B. fengxianensis*. While the former species really belongs to the genus *Boysidia*, the latter evidently should be transferred to the genus *Bensonella*, differing from *B. plicidens* mainly by lesser number of marginal teeth in the aperture.

Aulacospira Moellendorff, 1890
Fig. 160

Moellendorff, 1890: 224 (pro subg. or gen.).

— *Micropetasus* Moellendorff, 1890: 224 (*Aulacospira* sect.; t.-sp. *Aulacospira scalatella* Moellendorff, 1890; SD Pilsbry, 1895).

TYPE SPECIES — *Aulacospira scalatella* Moellendorff, 1890; SD Pilsbry, 1895.

Shell depressed, low-conic, thin, fragile, of 4 scalariform whorls. Apex prominent, spire with slightly concave outline. Color uniformly greyish-corneous (shell often daubed with particles of mud). Embryonic whorls vaguely granular, postapical with broadly spaced radial lines and exceptionally fine spiral periostracal threadlets. Aperture much oblique, free, with 4 lamellate teeth — one on each side. Umbilicus rather wide, funnel-shaped, somewhat excentrical. Height 1.3-4.0, diam. 2.5-6.5 mm (1.3×2.5 mm).

DISTRIBUTION. Philippines. 6-7 spp.

Pseudostreptaxis Moellendorff, 1890
Fig. 161

Moellendorff, 1890: 225 (*Aulacospira* sect.).

TYPE SPECIES — *Helix azpeitiae* Hidalgo, 1890; monotypy.

Shell microhelicoid, thin, of 4.5-5 whorls; initial whorls keeled, irregularly coiled; body whorl with very smoothed peripheral angle. Color corneous. Embryonic whorls smooth, later whorls coarsely and irregularly radially wrinkled. Aperture somewhat oblique, ovate, with reflexed margins; columellar margin strongly dilated. Teeth lamellate, 4-6 in number. Parietal lamella oblique, columellar horizontal; palatal margin with 2-4 tuberculiform teeth. Umbilicus relatively wide, perspective. Height 1.7-2.0, diam. 2.0-3.0 mm (2.0×3.0 mm).

DISTRIBUTION. Philippines. 1 sp.

Gyliotrachela Tomlin, 1930
Fig. 162

Tomlin, 1930 (1929-1931): 24 (nom. nov. pro *Gyliauchen* Pilsbry, 1917).

— *Gyliauchen* Pilsbry, 1917 (1916-1918): 174, 210 [nom. praeocc., non Nicoll, 1915 (Trematoda); t.-sp. *Hypselostoma hungerfordiana* Moellendorff, 1891; OD].

— *Gyliotrachea* Pilsbry, 1931 (1927-1931): 73 (nom. err. pro *Gyliotrachela* Tomlin, 1930).

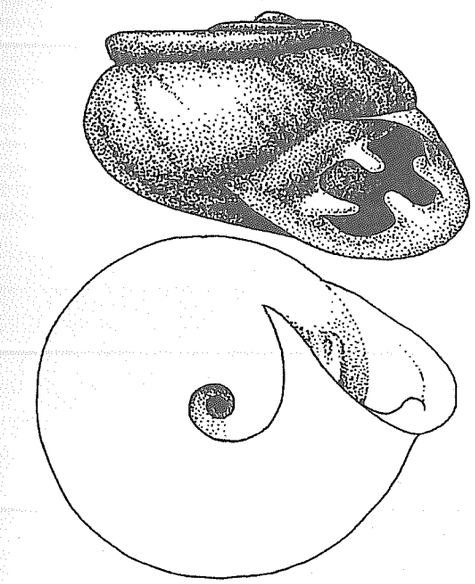


Fig. 161. ***Pseudostreptaxis azpeitiae*** (Hidalgo, 1890).
Busuanga Island, Philippines. **Leiden.**

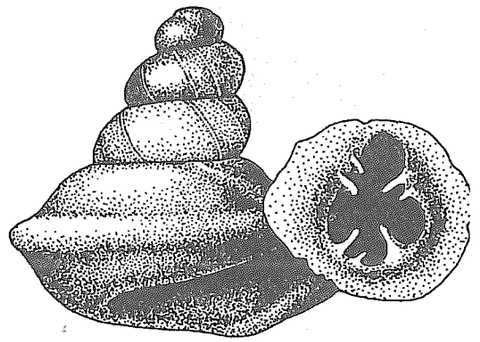


Fig. 162. ***Gyliotrachela hungerfordiana*** (Moellendorff, 1891).
Malakka. **Moscow** No. Lc-19585 (**Leiden**).

TYPE SPECIES — *Hypselostoma hungerfordiana* Moellendorff, 1891; OD.

Shell broadly conic, fragile, thin, of 4-5 convex whorls; body whorl straightened, with two rounded keels — one on periphery, other on basal surface; distal part of last whorl produced or ascending. Embryonic whorls decorated with very delicate radial riblets. Postapical whorls finely granulate; last whorl locally with very fine spiral periostracal threads. Aperture subcircular, with broadly expanded thin margins. Apertural armament represented by thin longitudinal lamellate teeth: short angular lamella, higher parietal close to angular; columellar plate small. 2-3 baso-columellar teeth, middle of them highest; baso-palatal margin with 1-2 teeth, upper much stronger; 1-2 palatal folds. Umbilicus funnel-shaped. Height 2.0-4.5, diam. 3.0-5.5 mm (2.0×3.0 mm).

DISTRIBUTION. SE Asia including Indonesia, W and N Australia. Over 20 spp.

Hypselostoma Benson, 1856
Fig. 163

Benson, 1856b: 342 (nom. nov. pro *Tanystoma* Benson, 1856a).

— *Tanystoma* Benson, 1856a: 130 [nom. praeocc., non Latreille, 1829 (Diptera); t.-sp. *Tanystoma tuberiferum* Benson, 1856; monotypy].

TYPE SPECIES — *Tanystoma tuberiferum* Benson, 1856; monotypy.

Shell trochiform-conic (excluding body whorl), moderately thin, dull, slightly translucent. Whorls 4.25-4.5, strongly convex, body whorl nearly straight to intensively ascending toward aperture, periphery of last whorl with rounded keel. Color uniformly brown. Embryonic whorls smooth, rest surface with irregular radial wrinkles; basal surface with very fine periostracal threads. Aperture free, directed upward, furnished with

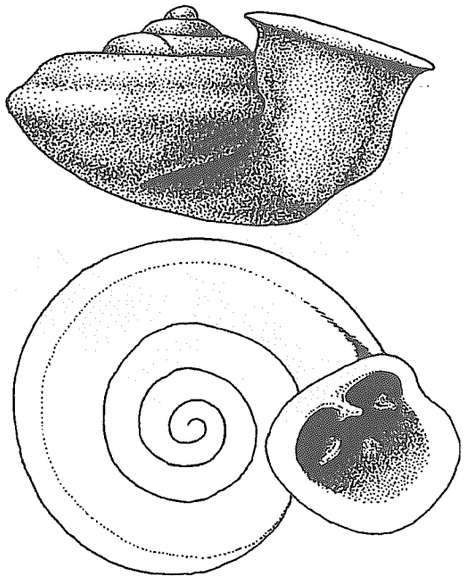


Fig. 163. ! ***Hypselostoma roebeleni*** (Moellendorff, 1890).
Kalamianes Island, Philippines. **SPb.**

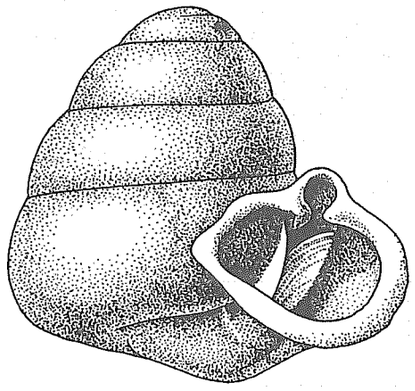


Fig. 164. ***Campolaemus perexilis*** (E.Smith, 1892).
St. Helena. **Paris.**

4 teeth. Ridge of parietal lamella deviated rightward, then (at its posterior end) leftward, resulting in lamella looking bilobed at apertural view (as in many Gastrocoptidae). Lamella on columellar side high, crest-like, with thickened ridge. Basal fold tuberculiform or as a short crest; palatal fold thin, high, short. Umbilicus open, rather wide, encircled by rounded ridge. Height 2-5, diam. 2-5 mm (3.4×4.5 mm).

DISTRIBUTION. SE Asia, Liukiu islands, Philippines. 12-14 spp. & subspp.

Campolaemus Pilsbry, 1892
Fig. 164

Pilsbry, 1892: 96.

TYPE SPECIES — *Tomigerus* (?) *perexilis* E.Smith, 1892; OD.

Shell dextral or sinistral, thin, obtusely conic, of about 4.5-5.5 rather convex whorls. Last whorl distorted, well ascending. Color uniformly corneous or brown. Sculpture of both apical and postapical whorls weak. Margins of aperture well expanded. Aperture slanting upward, with distinct sinulus bounded by long, emerging angular lamella and upper palatal fold. Parietal and columellar lamellae and lower palatal plica very deeply immersed. Height 1.5-1.7, diam. 1.6-1.8 mm (1.7×1.8 mm).

DISTRIBUTION. St. Helena Island. 1 sp.

Boysia L.Pfeiffer, 1849
Fig. 165

Pfeiffer L., 1849: 103, 105.

— *Hypostoma* Albers, 1850: 130 [nom. praeocc., non Rudolphi, 1809 (Pisces); t.-sp. "*Hypostoma Boysii* Benson"; monotypy].

— *Hypotrema* Martens in Albers, 1860: 304 (nom. emend. pro *Hypostoma* Albers, 1850).

— *Hypoma* L.Pfeiffer, 1879 (1878-1881): 343 (nom. err. pro *Hypostoma* Albers, 1850).

— *Hypostrema* L.Pfeiffer, 1879(1878-1881): 343 (nom. err. pro *Hypotrema* Martens in Albers, 1860).

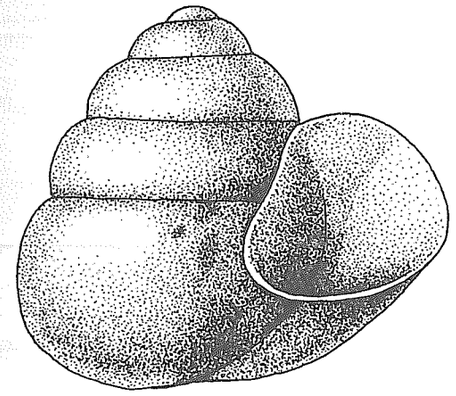


Fig. 165. ***Boysia boysii*** (L.Pfeiffer, 1846).
"Nerbudda-Tal, Indien". **Senck.** No. 51 683.

TYPE SPECIES — *Tomogeres boysii* L.Pfeiffer, 1846; monotypy.

Shell dextral, thin, shining, looking as "toothless *Campolaemus*". Whorls convex, about 5 in number. Color brown. Embryonic whorls smooth, rest nearly so. Aperture roundly triangular, well oblique, somewhat turned upward, with slightly reflexed margins. Umbilicus narrowly open. Height 3.2, diam. 3.5 mm.

DISTRIBUTION. Hindustan Peninsula. 1 sp.

VERTIGINIDAE Pilsbry, 1918

Pilsbry, 1918 (1916-1918): 68.

Shell ovate or ovate-cylindrical, mostly dark-colored, never glass-like, nearly smooth to ribbed. Whorls convex to flattened. Apex not prominent. Aperture toothed to simple; if angular and parietal lamella present, they not united. Columellar lamella often present. Palatal wall with or without plicae or tubercles.

Head with two tentacles.

Penis comparatively long. Epiphallus variously developed. Penial appendix present or wanting; so, penial retractor uni- or biramous. Vagina long. Spermathecal stalk rather long.

DISTRIBUTION. Throughout all the continents except Antarctica.

REMARK. Two largest subfamilies of Vertiginidae, Nesopupinae and Vertigininae, differ from one another in the only character — the presence (Nesopupinae) or absence (Vertigininae) of penial appendix. It is quite possible, however, that reduction of the appendix might take place more than once, hence, Vertigininae may be not monophyletic. At the same time, Vertigininae are more compact conchologically than Nesopupinae. On the other hand, the anatomy of only a few Nesopupinae is known. Therefore, the present classification of Vertiginidae should be considered as only tentative.

NESOPUPINAE Steenberg, 1925

Steenberg, 1925: 201.

— Cylindrovertillidae Iredale, 1940: 234.

Penial appendix present, penial retractor biramous.

DISTRIBUTION. Tropical and subtropical regions.

Afripupa Pilsbry et Cooke, 1920
Fig. 166

Pilsbry & Cooke in Pilsbry, 1920: 357 (*Nesopupa* sect.).

TYPE SPECIES — *Pupa griqualandica* Melvill et Ponsonby, 1893; OD.

Shell ovate, thin, of 4-4.5 convex whorls. Color corneous. Embryonic whorls smooth, subsequent closely rib-striated, without periostracal edges. Aperture irregularly rounded, with narrowly reflexed margins. Palatal margin with shallow depression. Angular lamella thin, well developed; parietal of about same size. Parieto-columellar angle occupied by small deeply located tubercle.

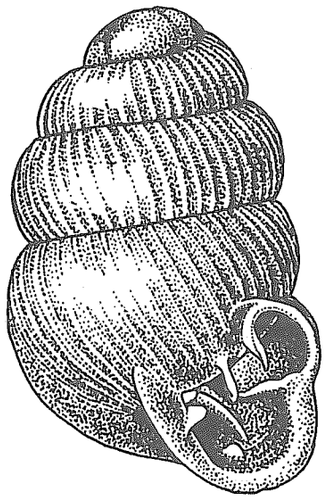


Fig. 166. *Afripupa griqualandica* (Melvill et Ponsonby, 1893).
Bushmans R. Falls, S Africa. **Moscow** No. Lc-23282 (**Phil.** No. 145476).

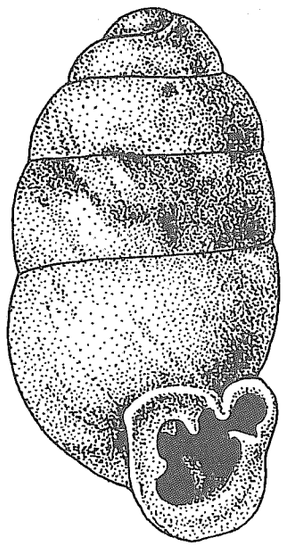


Fig. 167. *Helenopupa turtoni* (E.Smith, 1892).
St. Helena. Syntype. **Phil.** No. 99404.

Columellar lamella variously developed, not turned down at its inner end. Basal wall with small tubercle at some distance from apertural edge. Entering plica situated somewhat above this tubercle. Another palatal plica reaching aperture edge. Umbilicus tiny. Height 1.4-2.0, diam. 0.8-1.1 mm (1.5 × 0.9 mm).

DISTRIBUTION. South Africa. 6 spp. & subspp.

Helenopupa Pilsbry, 1920
Fig. 167

Pilsbry, 1920: 363 (pro sect.).

TYPE SPECIES — *Pupa turtoni* E.Smith, 1892; OD.

Shell ovate-subcylindrical, thin, of 5 slightly convex whorls. Color corneous. Sculpture very weak. Aperture relatively small, irregularly rounded, with moderately reflexed margins. Angular lamella and upper palatal plica define distinct sinulus. Parietal callus well developed. Parietal lamella rather short. Parieto-columellar angle occupied by small additional tubercle. Columellar lamella curved slightly upward at its inner end. Inner palatal plica basal in position. Umbilicus dot-like. Height 2.2-2.5, diam. 1.1-1.3 mm (2.4×1.2 mm).

DISTRIBUTION. St. Helena Island. 1 sp.

Nesopupilla Pilsbry et Cooke, 1920
Fig. 168

Pilsbry & Cooke in Pilsbry, 1920: 278 (pro sect.).

TYPE SPECIES — *Nesopupa waianaensis* Pilsbry et Cooke 1920; OD.

Shell ovate, moderately thin, of 4.5 convex whorls. Color corneous. Embryonic whorls smooth; axial ribbing on subsequent whorls begins as dense rib-striation, then ribs become more distant, on body whorl ribs well spaced; ribs have periostracal edges. Aperture neck with two nearly parallel longitudinal depressions, separated by rounded crest. Aperture subcircular, with a little reflexed margins and well developed parietal callus. Angular lamella thin, parietal markedly thicker; columellar lamella subhorizontal. Basal wall with small tubercle at some distance from edge. Palatal plica with uneven ridge, entering less than 0.5 whorls.

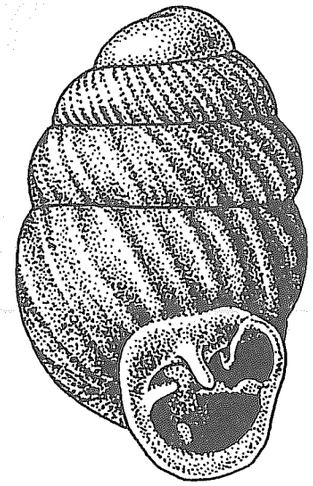


Fig. 168. *Nesopupilla waianaensis* Pilsbry et Cooke, 1920.
Pukaloa, Oahu. Syntype. **Phil.** No. 47560.

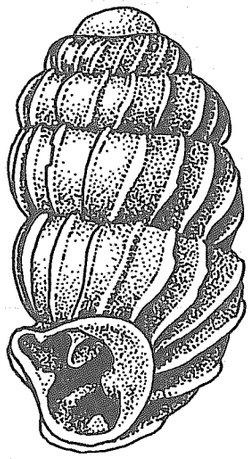


Fig. 169. ! *Lyropupa (Lyropupa) hawaiiensis* Ancey, 1904.
Palihoukapapa, Hawaii Island. **Spb.**

Umbilicus comparatively wide. Height 1.4-1.8, diam. 0.8-1.0 mm (1.7×0.8 mm).

DISTRIBUTION. Hawaii. 8-10 spp. & subspp.

Lyropupa Pilsbry, 1900

Pilsbry, 1900: 432 (*Nesopupa* subg.).

TYPE SPECIES — *Pupa lyrata* Gould, 1843; OD.

Shell dextral or sinistral, ovate to ovate-cylindrical, of 5-6 convex whorls. Color pale brown. Postembryonic sculpture of strong, widely spaced radial ribs. Aperture more or less ovate, with thin reflexed margins. There are two palatal plicae, upper very long, emerging to lip, defining distinct sinulus. Columella hollow, umbilicus relatively rather broad.

DISTRIBUTION. Hawaii.

Lyropupa (*Lyropupa* s.str.)
Fig. 169

Shell sinistral. Palatal plicae 2, upper very long, situated deep without approaching lip, bordering sinulus. Columella hollow, rather large. Height 1.8-3.0 mm, diam. 0.7-1.2 mm (2.1×0.9 mm).

DISTRIBUTION. Hawaii. About 30 spp., subspp. & forms.

Lyropupa (*Lyropupilla* Pilsbry et Cooke, 1920)
Fig. 170

Pilsbry & Cooke in Pilsbry, 1920: 247 (*Lyropupa* sect.).

TYPE SPECIES — *Lyropupa (Lyropupilla) spaldingi* Pilsbry et Cooke, 1920; OD.

Shell sinistral, ovate to ovate-cylindrical, moderately thin. Whorls 4-5, convex, last whorl straight, in profile (at right side) with weak depression. Color corneous, ribs

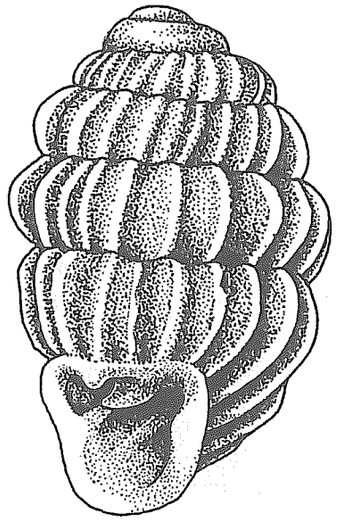


Fig. 170. ***Lyropupa (Lyropupilla) spaldingi*** Pilsbry et Cooke, 1920.
Puu Kaua, Oahu. Paratype. **Phil.** No. 119470.

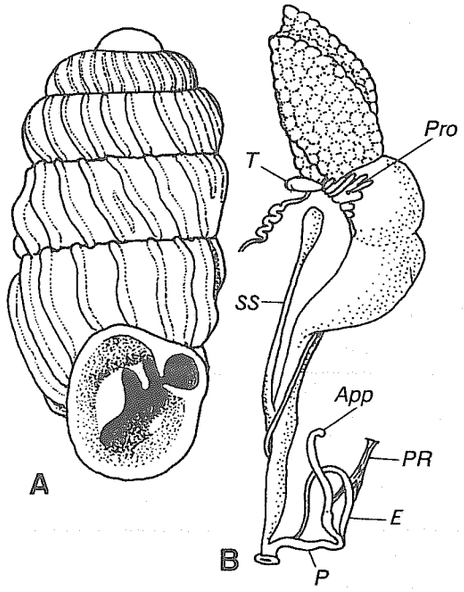


Fig. 171. ***Lyropupa (Mirapupa) perlonga*** (Pease, 1871).
A — shell. After Pilsbry, 1920. B — reproductive tract. After Pilsbry, 1935 (1927-1935).

lighter. Embryonic whorls glossy, rest surface covered with spaced thin calcified ribs; interspaces smooth. Aperture entire, somewhat detached, its angular region drawn off to left; angular tubercle rather small. Parietal lamella high, crest-like, entering. Columellar lamella rather strong, tubercular. Two palatal plicae, upper approaching lip, lower located much deeper. Basal tooth variously developed, shifted to columella. Umbilicus dot-like. Height 2.2-2.8, diam. 1.3-1.7 mm (2.8×1.6 mm).

DISTRIBUTION. Hawaii. 5-7 spp.

Lyropupa (*Mirapupa* Pilsbry et Cooke, 1920)
Fig. 171

Pilsbry & Cooke in Pilsbry, 1920: 255 (*Lyropupa* sect.).

TYPE SPECIES — *Vertigo perlonga* Pease, 1871; OD.

Shell dextral, (sub)cylindrical. Postembryonic whorls ribbed and finely spirally striated (when unworn). Aperture irregularly circular, free or nearly so; margins reflexed. Sinulus quite distinct. Angular lamella high and rather long. Parietal lamella stands rather deep. Columellar lamella large, subvertical. Lower palatal plica small, tubercular; upper much higher, lamellate. Height 1.8-2.8 mm, diam. 0.8-1.4 mm.

Vas deferens entering epiphallus apically, without visible demarcation. Penis thin. Penial appendix superficially consisting of only two sections. Penial retractor arising on diaphragm, penial arm inserting on middle of epiphallus, appendical arm — on lower part of upper section of appendix. Free oviduct and vagina rather long. Spermathecal stalk thin, reservoir elongated, small.

DISTRIBUTION. Hawaii. About 15 spp. & subspp.

Indopupa Pilsbry et Cooke, 1920
Fig. 172

Pilsbry & Cooke in Pilsbry, 1920: 339 (pro sect.).

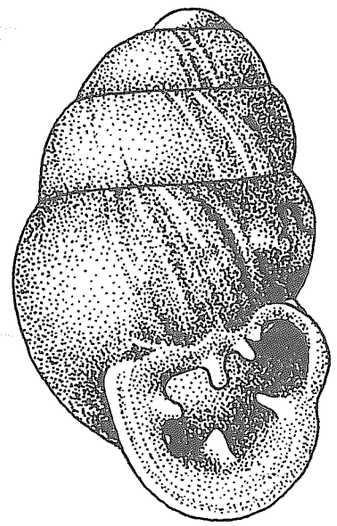


Fig. 172. ***Indopupa filosa*** (Theobald et Stoliczka, 1872).
[?Arakan, Burma]. Syntype. **Phil.** No. 131392.

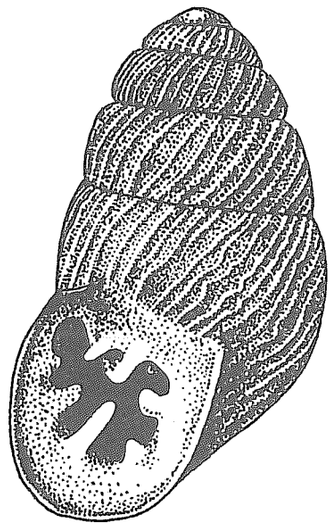


Fig. 173. ***Nesopuparia norfolkensis*** (Sykes, 1900).
Norfolk Island. **Phil.** No. 140005.

TYPE SPECIES — *Pupa filosa* Theobald et Stoliczka, 1872; OD.

Shell dextral, ovate, of 4-4.5 rather convex whorls. Color light-corneous, sometimes with darker streaks. Postembryonic whorls finely, irregularly but densely radially striated; sometimes somewhat pitted. Aperture widely ovate, margins well reflexed and expanded; palatal margin with shallow depression. Angular lamella connected with apertural margin; additional angular tubercle often present. Parietal lamella in middle of parietal margin. Columellar lamella horizontal or slightly ascending at inner end; minute, deeply lying subcolumellar lamella sometimes present. Height 1.5-2.2, diam. 0.8-1.1 mm (2.0 × 1.0 mm).

DISTRIBUTION. Hindustan Peninsula, Sri Lanka, S-E Asia, Borneo, Philippines. 4-6 sp.

Nesopuparia Pilsbry, 1926
Fig. 173

Pilsbry, 1926 (1922-1926): 227 (pro sect.).

TYPE SPECIES — *Vertigo norfolkensis* Sykes, 1900; OD.

Shell sinistral, ovate-conic, thin, not glossy, of about 5 flattened whorls. Color dark-brown. Embryonic whorls vaguely microgranular (nearly smooth), later with thin, uneven, lamellate, partially periostracal ribs. Aperture ovate, with well reflexed and expanded margins. Palatal wall with 3 lamellae: angular, parietal and small, deeply lying infraparietal. Columellar lamella horizontal, with thickened ridge. Baso-columellar angle occupied by small pointed tubercle. Palatal margin with 3 non-entering plicae diminishing in size upward. Umbilicus, a long crack. Height 3.9-4.0, diam. 2.2-2.3 mm (4.0 × 2.3 mm).

DISTRIBUTION. Norfolk Island. 1 sp.

Nesopupa Pilsbry, 1900

Pilsbry, 1900: 432.

— *Ptychochilus* O.Boettger, 1881: 47 (*Pupa*

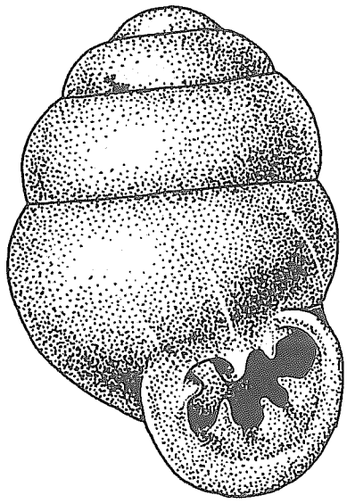


Fig. 174. ***Nesopupa (Nesopupa) tantilla*** (Gould, 1847).
Niau Atoll, Tuamotu Islands. **Phil.** No. 156354.

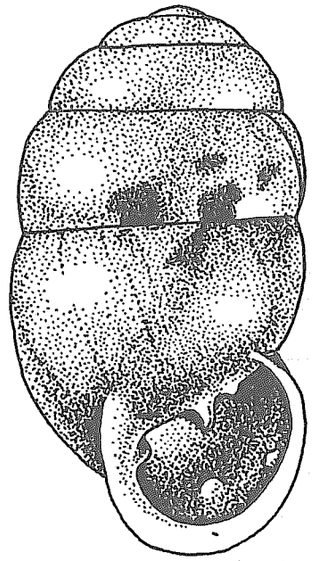


Fig. 175. ***Nesopupa (Insulipupa) minutalis*** (Morelet, 1881).
Ins. Mayotta, Comores. **Phil.** No. 22918.

"Gruppe", t.-sp. *Pupa tantilla* Gould, 1847; OD; non Jordon, 1837).

— *Westralcopta* Iredale, 1939: 8 (t.-sp. *Pupa mooreana* E.Smith, 1894; OD).

TYPE SPECIES — *Pupa (Vertigo) tantilla* Gould, 1847; OD.

Shell dextral or sinistral, small, ovate to ovate-conic, surface of postapical whorls opaque and dull, pitted, radially striate or ribbed. Aperture with angular, parietal and columellar lamellae and usually with palatal plicae. Aperture margins expanded.

DISTRIBUTION. Many islands of Oceania, Hawaii, N Australia, S Asia, S Africa, Mauritius Island, St. Helena Island.

Nesopupa (*Nesopupa* s.str.)
Fig. 174

Shell ovate, thin, of 4-5 rather convex whorls. Color corneous. Embryonic whorls smooth, later with very fine radially-oblique wrinklets (looks smooth). Aperture rounded, slightly to moderately oblique, with widely expanded margins. Normally there are 6 tubercle-like teeth: angular, parietal, columellar, well-developed basal and two palatal. Umbilicus tiny. Height 1.4-4.0, diam. 1.0-1.7 mm (1.8 × 1.2 mm).

DISTRIBUTION. Many islands of Pacific Ocean in tropical zone; Mauritius. Over 20 spp.

Nesopupa (*Insulipupa*
Pilsbry et Cooke, 1920)
Fig. 175

Pilsbry & Cooke in Pilsbry, 1920: 342 (pro sect.).

— ?*Pagodella* H.Adams, 1867: 304 [nom. praeocc., non Swainson, 1840; *Pupa* subg.; t.-sp. *Pupa (Pagodella) ventricosa* H.Adams, 1867; OD].

TYPE SPECIES — *Pupa minutalis* Morelet, 1881; OD.

Shell ovate, rather thin, of 5 slightly convex whorls. Color corneous. Postembryonic sculpture of very fine silky radial striation. Aperture rounded, with moderately reflexed margins. Angular lamella small, tuberculiform. Parietal lamella entering. Columellar lamella straight or slightly turned up at its inner end. Baso-palatal wall with small tubercle within; another tubercle on palatal side. Umbilicus tiny. Height 1.5-2.7, diam. 0.90-1.90 mm (2.05×1.86 mm).

DISTRIBUTION. Central and South Africa, islands of western part of the Indian Ocean (Comores etc.), Hindustan Peninsula, Borneo, Philippines. About 10 spp.

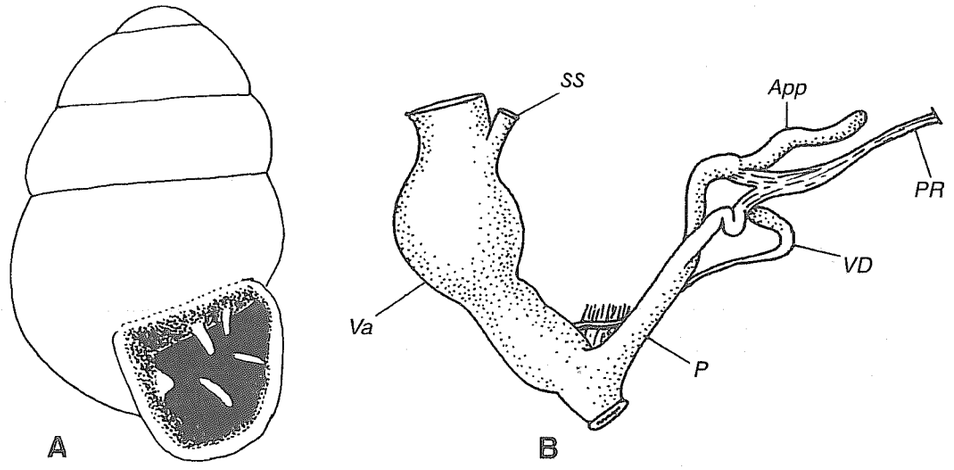


Fig. 176. ***Nesopupa (Cocopupa) cocosensis*** (Dall, 1900).
A — shell. After Pilsbry, 1920. B — reproductive tract. After Pilsbry, 1935 (1927-1935).

Nesopupa (*Cocopupa*
Pilsbry et Cooke, 1920)
Fig. 176

Pilsbry & Cooke in Pilsbry, 1920: 322 (pro sect.).

TYPE SPECIES — *Vertigo cocosensis* Dall, 1900; monotypy.

Shell ovate, very finely pitted, slightly striated. Last whorl not distinctly furrowed back of lip. All teeth lamellar: angular plate low, parietal somewhat higher; inner end of columellar lamella not turned downwards; 2 short palatal plicae. Depressions on neck vague. Height 2.2, diam. 1.3 mm.

Vas deferens entering short epiphallus apically. Penial appendix with two distinguishable sections: cylindrical basal, resulted from fusion of A-1, A-2, and A-3, and slightly tapering terminal (A-4 + A-5). Penial retractor splitted low; one arm attached to upper portion of basal section of appendix, other — to penis/epiphallus junction. Upper portion of vagina considerably swollen.

DISTRIBUTION. Cocos Island. 1 sp.

Nesopupa (*Nesodagys*
Cooke et Pilsbry, 1920)
Fig. 177

Cooke & Pilsbry in Pilsbry, 1920: 299 (pro sect.).

TYPE SPECIES — *Nesopupa wesleyana* Ancey, 1904; SD Zilch, 1959.

Shell dextral, ovoid-subcylindrical, very thin, of 4-4.5 very convex whorls. Color corneous. Embryonic whorls smooth, postnuclear whorls with delicate, irregularly

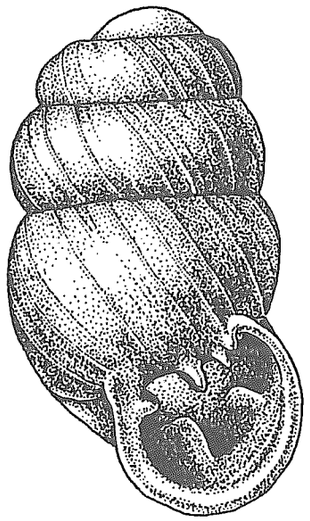


Fig. 177. *Nesopupa (Nesodagys) wesleyana* Ancey, 1904.
Hilo Woods, Hawaii. Paratype. **Phil.** No. 44737.

spaced, periostracal riblets. Aperture subcircular, slightly oblique, with well reflexed margins. Angular lamella attending lip; parietal lamellae 2, lower stronger than upper. Columellar lamella subhorizontal. Palatal plicae 2, short, lamellate. Umbilicus minutely open. Height 1.4-2.3, diam. 0.8-1.2 mm (2.0 × 1.1 mm).

DISTRIBUTION. Hawaii. 2 spp. with few subspp. & forms.

Nesopupa (*Limbatipupa* Cooke et Pilsbry, 1920)
Fig. 178

Cooke & Pilsbry in Pilsbry, 1920: 306 (pro sect.).

TYPE SPECIES — *Pupa newcombi* L.Pfeiffer, 1852; OD.

Shell ovate, thin, translucent, of about 4 very convex whorls; last scarcely descending in front. Color brown, chestnut, or greenish-brown. Embryonic whorls smooth, later with delicate periostracal riblets which sometimes slightly prolonged into sharp points, and very fine radial striation between riblets. 5 primary lamellae and plicae present in majority of species, angular lamella shortly lamellate, nodular, or absent. Umbilicus dot-like. Height 1.5-2.2, diam. 0.9-1.4 (1.7 × 1.0 mm).

Talon as such not expressed, represented by curvature of vas deferens at place of its contact with carrefour. Latter lies on surface of albumen gland. Vas deferens passing into epiphallus without visible demarcation. Penis thin and short. Penial appendix, a narrow cylindrical tube, without division into sections. Penial retractor forked very low, appendical arm attached below middle of appendix. Spermathecal stalk long, slightly enlarged basally, reservoir small.

DISTRIBUTION. Hawaii. About 10 spp. & subspp.

Nesopupa (*Infranesopupa* Cooke et Pilsbry, 1920)
Fig. 179

Cooke & Pilsbry in Pilsbry, 1920: 289 (pro sect.).

TYPE SPECIES — *Nesopupa limatula* Cooke et Pilsbry, 1920; OD.

Shell dextral or (in one species) sinistral, ovate, thin, translucent. Color corneous. Postembryonic whorls silky radially striated. Aperture rounded, with thin, only slightly reflexed margins. Angular lamella short, not attending peristome, parallel to parietal. Columellar lamella oblique, not descending, slightly sigmoid in view from below. Upper palatal fold much shorter than lower, none of them with corresponding sulcus outside last whorl. Neck thickening weak. Height 1.4-2.1, diam. 0.8-1.4 mm (1.8 × 1.3 mm).

DISTRIBUTION. Hawaii. 7-10 sp. & subsp.

Costigo O.Boettger, 1891
Fig. 180

Boettger O., 1891: 270 (*Vertigo* sect.).

TYPE SPECIES — *Vertigo (Costigo) saparuana* O.Boettger, 1891; OD.

Shell ovate, thin, translucent, scarcely glossy, of about 5 convex whorls. Color corneous to light-brown. Embryonic whorls smooth, subsequent densely striated or costulate with fine, widely spaced periostracal riblets. Aperture subvertical, without neck

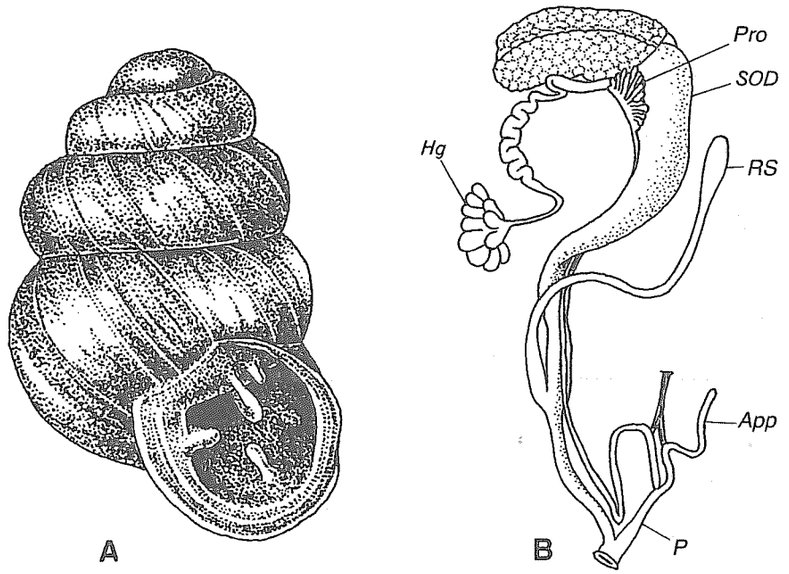


Fig. 178. *Nesopupa (Limbatipupa) newcombi* (L.Pfeiffer, 1852). A — shell: Mapaleho Valley, Molokai Island. **Vienna** No. E 15056. B — reproductive tract. After Pilsbry, 1935 (1927-1935).

annular thickening, but margins somewhat thickened. Angular tubercle absent, parietal lamella tooth-like. Columellar tooth always present. Palatal teeth 0 to 2. Umbilicus dot-like. Height 1.7-2.5, diam. 1.10-1.25 mm (2.0 × 1.1 mm).

DISTRIBUTION. Moluccas, Java, Philippines. 4-5 sp.

Cylindrovertilla O.Boettger, 1880

Boettger O., 1880: 62 (*Pupa* "Gruppe").

TYPE SPECIES — *Pupa fabreana* Crosse, 1894; OD Pilsbry, 1920.

Shell sinistral, ovate to elongated, of about 5 convex whorls. Color light-brown or corneous. Embryonic whorls smooth, postembryonic silky radially striated. Aperture rounded, its margins enlarged, thickened inside. Parietal wall with entering lamella, that either occupies nearly middle of wall, or shifted towards angular position. Columellar lamella short, deeply lying. Palatal plicae 1 or 2. Umbilicus tiny.

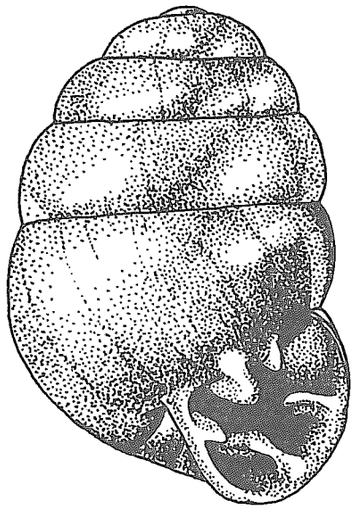


Fig. 179. *Nesopupa (Infranesopupa) limatula* Cooke et Pilsbry, 1920.
Haleakala Crater, Ainaho, E Maui. Paratype. **Phil.** No. 44692.

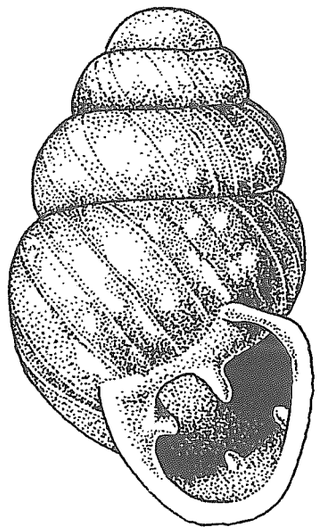


Fig. 180. ***Costigo saparuana*** (O. Boettger, 1891). Sirisori, Saparua Island, Moluccas. Paralectotype. **Senck.** No. 4746b.

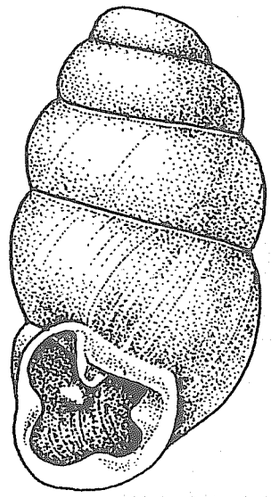


Fig. 181. ***Cylindrovertilla (Cylindrovertilla) fabreana*** (Crosse, 1894).
Noumea, New Caledonia. **Chicago** No. 168398.

DISTRIBUTION. New Caledonia, Australia.

Cylindrovertilla (*Cylindrovertilla* s.str.)
Fig. 181

Palatal plica one in number. Height 1.5-2.0, diam. 0.7-1.0 mm (1.7 × 0.9 mm).

DISTRIBUTION. New Caledonia, Queensland. 4-5 spp.

Cylindrovertilla (*Wallivertilla* Iredale, 1937)
Fig. 182

Iredale, 1937b: 303.

TYPE SPECIES — *Pupa kingi* Cox, 1868; OD.

Palatal plicae 2 in number. Height 1.8-2.1, diam. 0.9-1.0 mm (2.1 × 1.0 mm).

DISTRIBUTION. New South Wales. 1 sp.

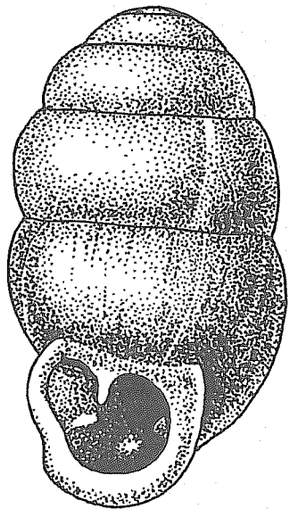


Fig. 182. ***Cylindrovertilla (Wallivertilla) kingi*** (Cox, 1868).
Vaucluse Point, Port Jackson, New South Wales. **Phil.** No. 115529.

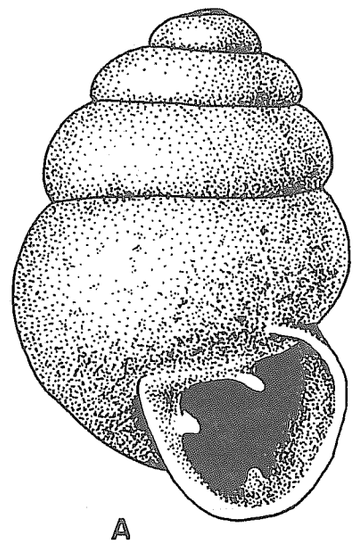


Fig. 183. A — ***Bothriopupa variolosa*** (Gould, 1848).
Shell: SE point of Big Pine Key, Florida. **Phil.** No. 104026. B — ! ***Bothriopupa tenuidens*** (C.Adams, 1845). Reproductive tract. After Baker in Pilsbry, 1948.

Bothriopupa Pilsbry, 1898
Fig. 183

Pilsbry, 1898a: 119.

TYPE SPECIES — *Pupa variolosa* Gould, 1848; OD.

Shell ovate-conic, of about 4.5 convex whorls. Embryonic whorls virtually smooth, surface of postapical whorls minutely and closely pitted, or granulose by confluence of pits, weakly or not striated. Aperture broadly truncated above, lip insertions remote. Basal and palatal margins slightly, columellar broadly expanded. Parietal lamella curved, in median position on parietal wall. Columellar lamella short, horizontal. Basal tooth tuberculiform. Palatal wall with or without short plica. Umbilicus dot-like. Height 1.5-2.0, diam. 1.0-1.5 mm (1.8 × 1.3 mm).

Vas deferens entering epiphallus terminally. Epiphallus slightly longer than penis; both ducts narrow. Penial appendix sleeve-like, without visible separation into divisions. Penial retractor biramous, appendical arm attached slightly above middle of appendix, penial arm — to upper end of penis. Vagina long.

Ovoviviparous.

DISTRIBUTION. N South America, Florida, West Indies. 6 spp.

Pronesopupa Iredale, 1913

Iredale, 1913: 384.

TYPE SPECIES — *Pronesopupa senex* Iredale, 1913; monotypy.

Shell dextral, ovate, thin, translucent, of 4-5.5 rather convex whorls. Initial 1.5 whorls smooth or finely granulose and spirally striated; subsequent whorls covered with sharp, spaced, lamellate wrinkles; interspaces radially striated. Aperture relatively large, toothless, interrupted, more or less circular. Margins reflexed; columellar margin enlarged, basal and palatal reflexed and expanded. Umbilicus minute.

DISTRIBUTION. Hawaii, Kermadec Islands, Marquesas Islands.

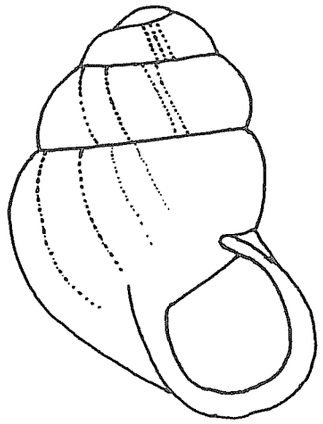


Fig. 184. ***Pronesopupa (Pronesopupa) senex*** Iredale, 1913.
After Iredale, 1913.

Pronesopupa (*Pronesopupa* s. str.)
Fig. 184

Whorls moderately convex. Embryonic whorls smooth. Columellar margin of aperture markedly oblique. Height 1.4-2.0, diam. 0.8-1.25 mm.

DISTRIBUTION. Hawaii, Kermadec Islands, Marquesas. 10-12 sp. & subspp.

Pronesopupa (*Edentulopupa* Pilsbry et Cooke, 1920)
Fig. 185

Pilsbry & Cooke, 1920 (1920-1921): 11 (pro sect.).

TYPE SPECIES — *Pupa admodesta* Mighels, 1845; OD.

Whorls very convex. Embryonic whorls granulose, minutely spirally striated. Rest surface sculptured with rather crowded riblets, each bearing faint narrow periostracal edge. Columellar margin of aperture vertical. Height 1.3 mm, diam. 1.0 mm.

Vas deferens entering long epiphallus apically. Latter entering penis by simple pore. Basal section of appendix (A-1 + A-2) well developed, with tiny papilla inside. A-3 wanting. A-4 and A-5 short. Penial arm of penial retractor attached to epiphallus markedly above penis, appendical arm — to A-4 at short distance above basal part of appendix.

DISTRIBUTION. Hawaii. 1 sp.

Pronesopupa (*Sericipupa* Pilsbry et Cooke, 1920)
Fig. 186

Pilsbry & Cooke, 1920 (1920-1921): 13 (pro sect.).

TYPE SPECIES — *Pronesopupa frondicola* Pilsbry et Cooke, 1920; OD.

Shell dextral, narrowly ovate, fragile, translucent, of 5-6 convex whorls. Color corneous. Embryonic whorls convex, very finely granulose, granules finer than in species of any other subgenus. Postapical whorls covered with crowded radial riblets; costae with faint narrow periostracal edges. Aperture relatively small, in general toothless, only rarely with light tubercle or lamella deeply on columella. Columellar margin subvertical. Umbilicus tiny. Height 1.8-2.7, diam. 1.0-1.3 mm (2.2 x 1.2 mm).

DISTRIBUTION. Hawaii. 2-3 sp.

Somniopupa Iredale, 1937
Fig. 187

Iredale, 1937a: 305. B. Smith, 1992: 296.

TYPE SPECIES — *Pupa* (*Vertigo*) *scotti* Brazier, 1874; OD.

Shell dextral, short-cylindrical, thin, of about 5 slightly convex whorls. Aperture rounded, with simple margins except broadly expanded columellar. Angular lamella absent, parietal thin, in middle of parietal wall. Columellar lamella rounded, near parieto-columellar angle. Palatal wall with 3 small tubercular teeth. Height 1.8, diam. 1.0 mm.

DISTRIBUTION. North Queensland (Fitzroy Island). 1 sp.

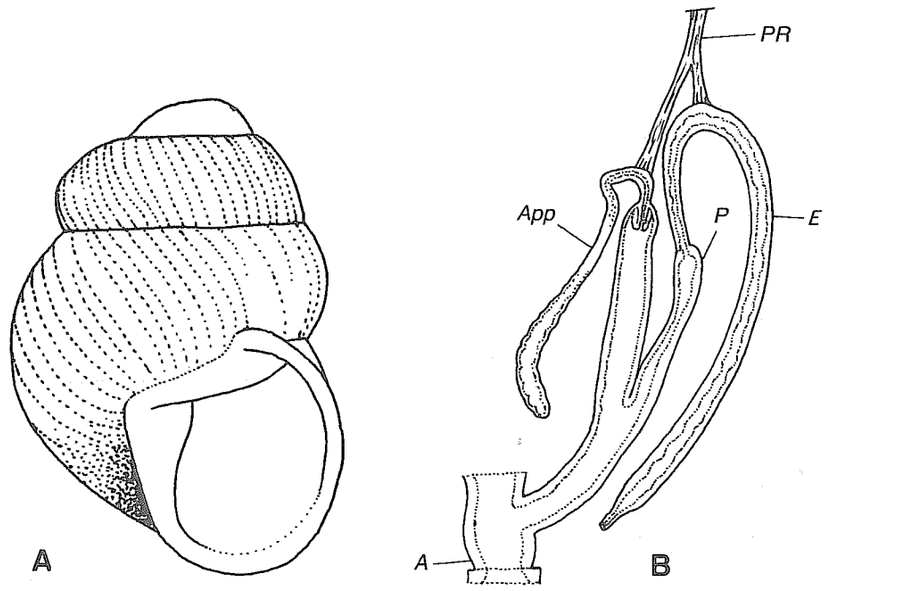


Fig. 185. ***Pronesopupa (Edentulopupa) admodesta*** (Mighels, 1845).
A — shell. After Pilsbry, 1921 (1920-1921). B — distal part of male division. After Pilsbry, 1935 (1927-1935).

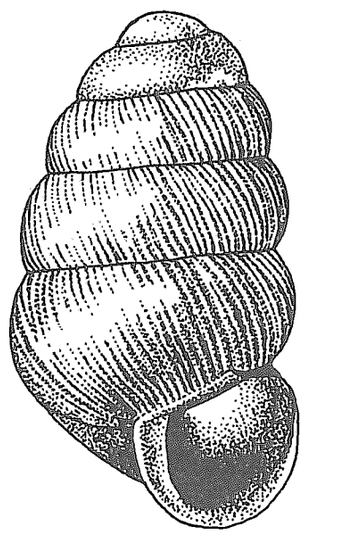


Fig. 186. ***Pronesopupa (Sericipupa) frondicola*** Pilsbry et Cooke, 1920.
Ainahow, Haleakala, Maui. Paratype. **Phil.** No. 46345.

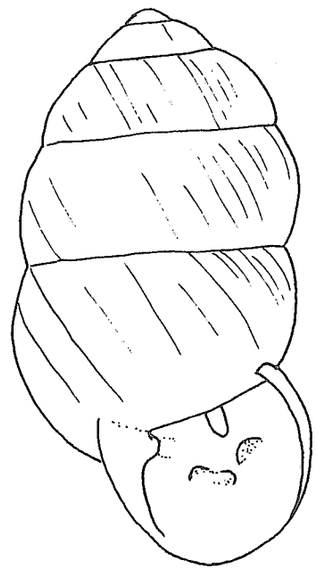


Fig. 187. ***Somniopupa scotti*** (Brazier, 1874).
After Pilsbry, 1921 (1920-1921).

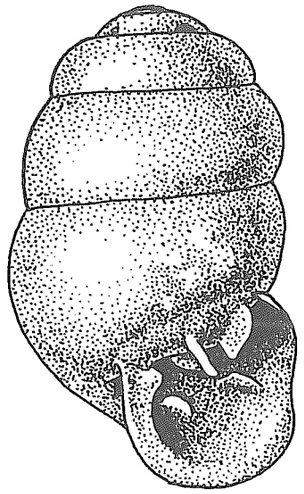


Fig. 188. ***Sterkia (Metasterkia) antillensis*** Pilsbry, 1920.
El Abra, Viñales, Cuba. Holotype. **Phil.** No. 46244.

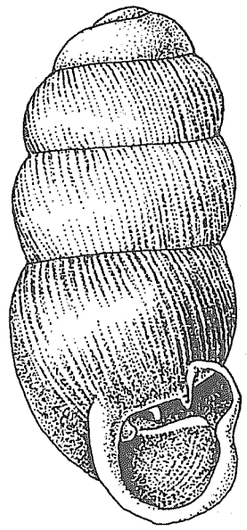


Fig. 189. ! ***Sterkia (Sterkia) hemphilli*** (Sterki, 1890).
Santa Ana River wash, San Bernardino Co., California. **Moscow** No. Lc-23296 (**StB**).

VERTIGININAE Pilsbry, 1918

Penial appendix missing, penial retractor uniramous.

DISTRIBUTION. Holarctic, Central America, Caribbean region.

Sterkia Pilsbry, 1898.

Pilsbry, 1898a: 119. Coney & Hochberg, 1989: 31.

TYPE SPECIES — *Pupa calamitosa* Pilsbry, 1889; OD.

Shell minute, cylindrical, thin, with very short apical part and obtuse summit. Whorls 4.5-5.5, convex. Color brown to whitish. Surface nearly glabrous, or delicately radially wrinkled, or rib-striated. Aperture rounded, peristome insertions widely remote; margins variously expanded or reflexed. Angular and parietal lamellae long, not connected, angular running to posterior termination of apertural margin. Columellar plate short. Palatal wall with 2 or 3 plicae.

DISTRIBUTION. Southern and Lower California; S Florida to Guatemala and Guyana.

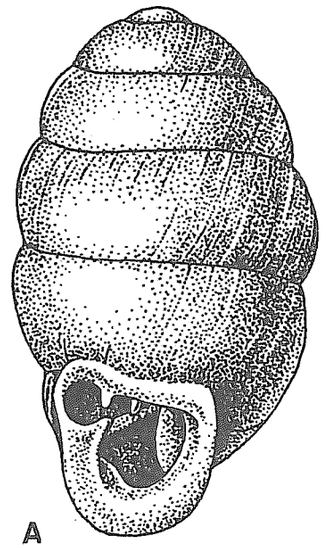
Sterkia (*Metasterkia* Pilsbry, 1920)
Fig. 188

Pilsbry, 1920 (1920-1921): 50 (*Sterkia* sect.).

TYPE SPECIES — *Sterkia antillensis* Pilsbry, 1920; OD.

Shell shortly cylindrical, thin, of about 4.5-5 rather convex whorls. Color corneous to light-brown. Sculpture virtually absent. Aperture irregularly rounded, with light palatal depression and non-reflexed margins except columellar. Angular and parietal plates thin, lamellate, former obliquely seated, latter directed towards palatal wall. Columellar lamella subhorizontal or turned upward within, occupying uppermost portion of columellar margin. Palatal plicae 2, not very large, all visible at apertural view. Height 1.6-1.9, diam. 0.7-1.0 mm (1.8 × 1.0 mm).

DISTRIBUTION. California, Florida, Cuba, Jamaica, Guyana. 4-6 spp. & subspp.



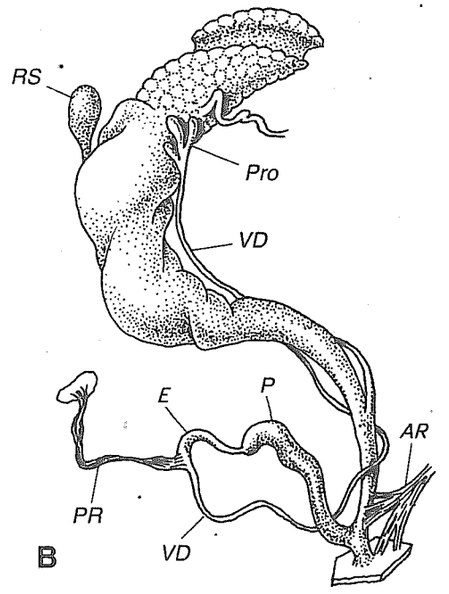


Fig. 190. ***Vertilla angustior*** (Jeffreys, 1830). Cheghem Gorge, N Caucasus, May 16, 1969.
A — shell; B — reproductive tract. **Moscow** No. Lc-23324 .

Sterkia (*Sterkia* s.str.)
Fig. 189

Shell slender, thin, of 5-5.5 convex whorls. Color corneous. Postembryonic whorls distinctly rib-striated. Aperture rounded, with palatal depression. Aperture teeth moderate to large; angular and parietal lamellae of about equal size; inner end of columellar lamella usually bent vertically downward. Palatal plica 1, in upper position, long. Height 1.5-2.0, diam. 0.75-0.85 mm (1.80 × 0.75 mm).

DISTRIBUTION. Lower California. 2 spp., one with 2 subspp.

Vertilla Moquin-Tandon, 1855
Fig. 190

Moquin-Tandon, 1855: 408 (*Vertigo* subg.).

TYPE SPECIES — *Vertigo plicata* Moquin-Tandon, 1855 (=*Vertigo angustior* Jeffreys, 1830); SD Pilsbry, 1920.

Shell sinistral, ovate, thin, glossy, translucent, of 4-4.5 convex whorls. Color corneous to rich-brown. Aperture with palatal impression, its margins thin, reflexed. Parietal wall with 2 nearly equal parallel lamellae. Columellar lamella vertical, in form of thin, deeply entering lobe. Basal tooth small, tuberculiform, sometimes absent. Lower palatal plica tubercular, upper palatal long, lamellate, deep inside body whorl hooked; its posterior end seen through wall of shell. Ridge of upper palatal plica closely approaching ridge of parietal lamella, defining circular sinulus. Neck thickening well developed. Height 1.5-1.8, diam. 0.8-0.9 mm (1.7 × 0.9 mm).

Talon, a simple curvature of hermaphroditic duct. Prostata of a few acini. Vas deferens entering epiphallus without marked boundary. Penis rather long, irregularly cylindrical, internally with weak longitudinal plicae; penial verge absent. Penial retractor inserting onto vas deferens/epiphallus boundary. Spermathecal stalk thin, long; reservoir small, subglobular.

DISTRIBUTION. Europa, Caucasus. Probably 1 variable sp.

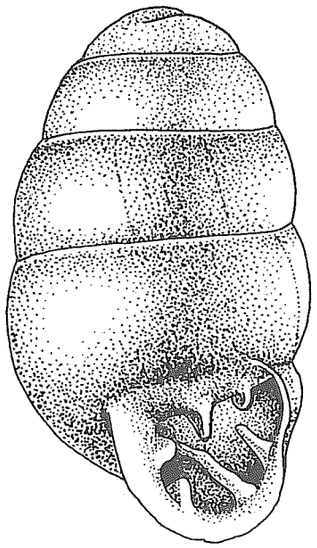


Fig. 191. ***Vertigo (Angustula) milium*** (Gould, 1840).
Near South Truro, Massachusetts. **Phil.** No. 44602.

Vertigo Müller, 1774

Müller, 1774: 124.

— *Alaea* Jeffreys, 1830: 357 [t.-sp. *Alaea palustris* Jeffreys, 1830 (= *Pupa antivertigo* Draparnaud, 1801); SD Gray, 1847].

— *Haplopupa* Pilsbry, 1898a: 119 (pro sect.; t.-sp. *Vertigo dalliana* Sterki, 1890; OD).

TYPE SPECIES — *Vertigo pusilla* Müller, 1774; monotypy.

Shell ovate to cylindrical-oblong, fragile. Apex blunt. Surface mostly smooth, rarely finely radially wrinkled or rib-striated. Aperture relatively large, its palatal wall straightened or looped inward in middle. Initially there are 6 teeth, none of them concrescent; some or all of them often wanting; angular lamella, when present, not reaching margin.

Lower tentacles absent.

DISTRIBUTION. Holarctic.

Vertigo (*Angustula* Sterki, 1888)
Fig. 191

Sterki, 1888: 378.

TYPE SPECIES — *Pupa milium* Gould, 1840; SD Pilsbry, 1920.

Shell dextral, short-ovate, glossy, of 4.5-5 rather convex whorls. Palatal wall of aperture with median impression; so, outer margin biarcuate. Elements of apertural armature strongly developed. Angular lamella short, parietal substantially longer and higher. Columellar lamella crescentic, entering horizontally at first, then curved downward. Basal fold a little immersed, high, short. Lower palatal plica very strong, passing to dorsal side, where curved downward. Upper palatal fold much shorter, slightly curved. Suprapalatal fold, when present, small, tubercular. Height 1.4-1.8, diam. 0.8-1.0 mm (1.78 × 0.82 mm).

DISTRIBUTION. North America, Mexico, Jamaica, Haiti, Bermuda. 2-3 spp.

Vertigo (*Vertigo* s.str.)
Fig. 192

Shell dextral or sinistral, ovate to somewhat oblong, of 4.5-5 moderately to strongly convex whorls. Surface of postembryonic whorls nearly smooth to rib-striated. Aperture usually with 5-7 teeth; parietal wall with 2-3 lamellae. Height 1.5-2.2, diam. 1.0-1.3 mm (1.9 × 1.1 mm).

Talon, a curvature of hermaphroditic duct. Prostata of 2-3 acini. Vas deferens entering slender epiphallus terminally. Epiphallus initially scarcely expanded, then tapering towards penis. Penial retractor attached to vas deferens/epiphallus junction. Vagina short. Spermathecal stalk thin, long; reservoir ovate, small.

DISTRIBUTION. Europe, N and E Asia, Japan, Central and N America, Caribbean region, Bermuda. Over 50 spp., subspp. & forms.

Vertigo (*Ptychalaea* O.Boettger, 1889)
Fig. 193

Boettger O., 1889b: 293 (*Vertigo* sect.).

TYPE SPECIES — *Pupa (Vertigo) flexidens* Reuss, 1860; OD.

Shell dextral, ovate, rather thin, of 4-4.5 slightly convex whorls. Surface practically smooth. Aperture rounded-triangular, with somewhat thickened margins. Angular lamella connected by curved callous ridge

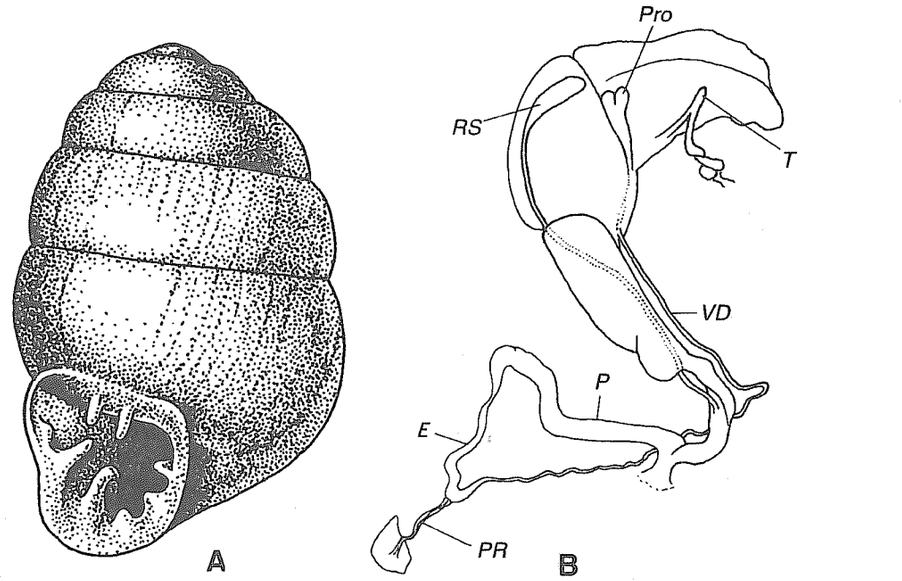


Fig. 192. ***Vertigo (Vertigo) pusilla*** Müller, 1774.
A — shell: Valley of Tekhuri River, NW Caucasus. **Moscow** No. Lc-23322. B — reproductive tract. After Steenberg, 1925.

with place of insertion of palatal margin. Parietal lamella stronger then angular. Columellar plate moderately developed. Palatal margin with 2 tubercular plicae on lip. Neck thickening rounded, circular, behind aperture. Height 1.5-1.8, diam. 0.8-1.1 mm (1.8 × 1.1 mm).

DISTRIBUTION. Bonin Island. 1 Recent sp. Also Miocene of Europe.

Vertigo (*Isthmia* Gray, 1821)
Fig. 194

Gray, 1821: 239.

— *Dexiogyra* Stabile, 1864: 104 (pro sect.; t.-sp. *Pupa moulinsiana* Dupuy, 1849; designated here).

TYPE SPECIES — *"Helix Isthmia cylindrica"* Gray, 1821 (=*Pupa pygmaea* Draparnaud, 1801); OD.

Shell dextral, shortly ovate to conic-ovate, thin, of 4.5-5.5 convex whorls. Surface only slightly sculptured. Aperture subcircular to rounded-triangular. Aperture armament tending to reduction down to complete disappearance. Parietal wall with 1 lamella or

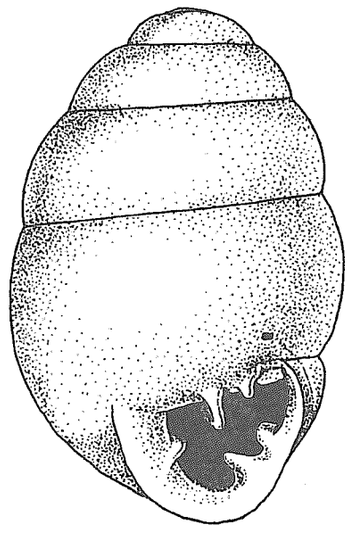


Fig. 193. ***Vertigo (Ptychalaea) flexidens*** (Reuss, 1860).
"Böhm. Miocän, Juhorschitz von Knetl". **Vienna** No. E 4766.

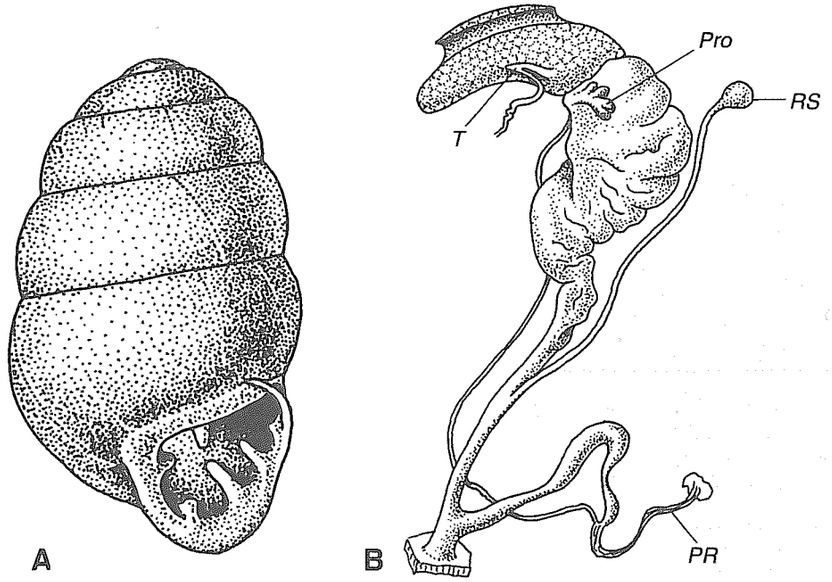


Fig. 194. ***Vertigo (Isthmia) pygmaea*** (Draparnaud, 1801).
A — shell: Romashkovo near Moscow. **Moscow** No. Lc-23321. B — reproductive tract. After Schileyko, 1984.

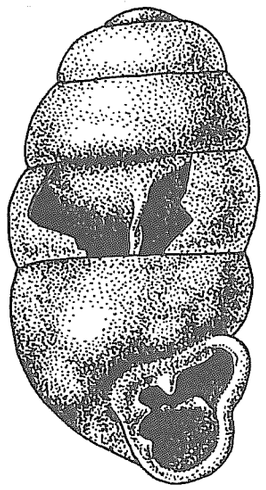


Fig. 195. ***Vertigo (Alloptyx) hinkleyi*** Pilsbry, 1921.

Cave Canyon, Huachuca Mts., Arizona. Holotype. **Phil.** No. 46243.

none. Height 1.5-3.0, diam. 0.7-2.0 mm (2.2 × 1.2 mm).

DISTRIBUTION. Holarctic. 20-25 spp., subspp. & forms.

Vertigo (*Alloptyx* Pilsbry, 1953)
Fig. 195

Pilsbry, 1953: 164.

TYPE SPECIES — *Vertigo hinkleyi* Pilsbry, 1921; OD.

Shell dextral, oblong-cylindrical, very thin, of 5.5-6 strongly convex whorls; last three whorls forming more or less cylindrical portion; body whorl tapering to narrow base. Surface nearly smooth, glossy. Color cinnamon-buff. Aperture shortly pyriform, with well defined sinulus, limited below by deeply bent in and thickened angle of palatal margin. Peristome slightly expanded around sinulus, elsewhere strongly so. Parietal lamella low in front, high within, and deeply entering. Columellar lamella not very long, deeply lying, ascending a little inwardly. Subcolumellar tubercle, as Pilsbry (1948: 947) believed, is probably shifted basal fold. Lower palatal fold short and deeply immersed; upper palatal much longer and deeply entering. Height 1.55-1.75, diam. 0.75-0.77 mm (1.75 × 0.77 mm).

DISTRIBUTION. South Arizona (Huachuca Mts.) and Mexico (Chihuahua). 1 sp.

Vertigo (*Vertillaria* Pilsbry, 1920)
Fig. 196

Pilsbry, 1920: 144.

TYPE SPECIES — *Vertigo oscariana* Sterki, 1890; OD.

Shell dextral, oblong-ovate, thin, fragile, delicately but rather sharply and regularly striated (rarely striation obsolete). Aperture weakly biarcuate, its margins nearly straight, thin. Angular lamella absent or very weak, parietal short and rather high. Columellar lamella in form of blunt subvertical plate. Basal tubercle stands deeply, rather weak. Very small palatal fold sometimes present. Height 1.4-1.6, diam. 0.8-0.9 mm (1.5×0.8 mm).

DISTRIBUTION. North America, from Florida to Texas. 1 sp.

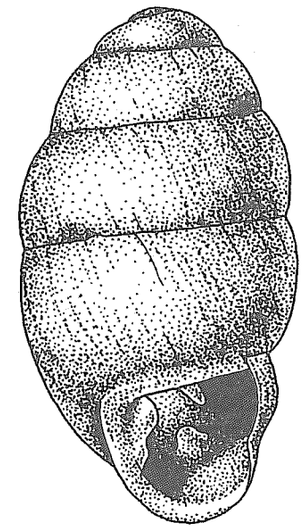


Fig. 196. ***Vertigo (Vertillaria) oscariana*** Sterki, 1890.
Volusia Co., Florida. Holotype. **Phil.** No. 60463a.

Vertigo (*Nearctula* Sterki, 1892)
Fig. 197

Sterki, 1892: 5. Coney & Hochberg, 1989: 31.

TYPE SPECIES — *Pupa californica* Rowell, 1861; OD.

Shell ovate-cylindrical, generally dull, often rib-striated. Aperture with 4-1 teeth: parietal lamella usually tuberculiform, always present; columellar lamella short; basal tooth located at short distance from edge; palatal plica small, very close to edge. Height 1.75-2.65, diam. 1.05-1.35 mm (2.30 × 1.20 mm).

Vas deferens entering penis subapically at sharp angle. Epiphallus not expressed. Penial retractor inserted terminally. Prostate of 2-3 acini at base of albumen gland. Minute reservoir of spermatheca nearly reaching albumen gland.

DISTRIBUTION. California, Baja California and Channel Islands. 8 spp. & subspp.

Vertigo (*Staurodon* Lowe, 1852)
Fig. 198

Lowe, 1852: 278 (*Pupa* group).

TYPE SPECIES — *Pupa saxicola* Lowe, 1852; SD Pilsbry, 1919.

Shell elongated-ovate, of 4.5-5 moderately convex whorls, last whorl scarcely ascending in front. Embryonic whorls smooth, rest rather regularly radially striated. Body whorl without neck thickening. Aperture nearly free due to well developed callus, margins shortly reflexed. Angular lamella minute, tuberculiform, standing upon callus, close to termination of palatal margin, with short continuation inside aperture, or without it. Parietal lamella high; inner end of columellar lamella curved upward. Basal plica short, palatal pointed; both located at some distance from edge. Height 1.5-1.8, diam. 0.7-0.9 mm (1.7×0.8 mm).

DISTRIBUTION. Madeira. 1 sp.

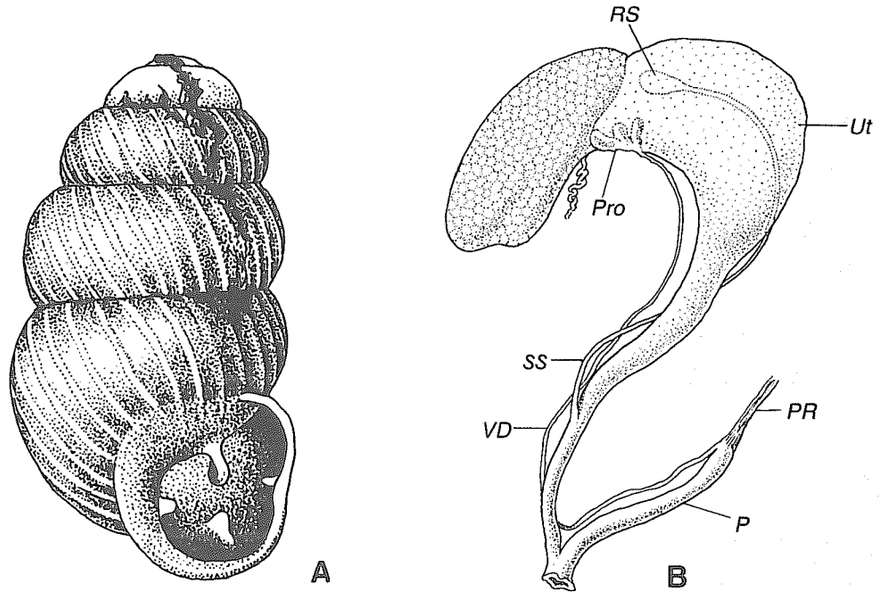


Fig. 197. ***Vertigo (Nearctula) californica*** (Rowell, 1861).
Ocean Beach Park near Lompoc, California. A — shell. B — reproductive tract. **Moscow** No. Lc-23272.

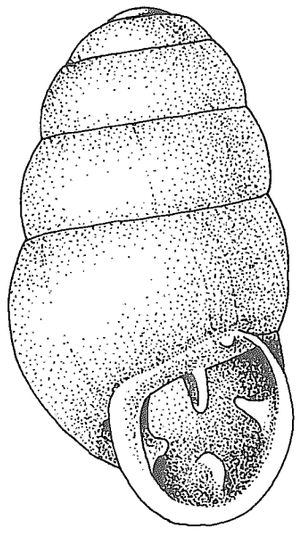


Fig. 198. ***Vertigo (Staurodon) saxicola*** (Lowe, 1852).
Madeira. **SPb**.

TRUNCATELLINIDAE Steenberg, 1925

Steenberg, 1925: 201 (Vertiginidae subf.).

Shell cylindrical to ovate-cylindrical, light corneous to reddish. Angular tubercle absent; parietal lamella, when present, not bilobed, tuberculiform.

Penis short, without appendages. Epiphallus short to very short; annular sphincter between penis and epiphallus wide.

DISTRIBUTION. Throughout all continents except Australia and Antarctica.

COLUMELLINAE Schileyko, subfam. nov.

Shell cylindrical to ovate-cylindrical, thin, fragile, dark colored. Postembryonic sculpture usually very weak. Aperture toothless, with thin and simple margins.

Epiphallus elongated, clavate.

The new subfamily well differs from the nominotypical one in the structure of apertural margins and the shape of epiphallus.

DISTRIBUTION. Holarctic.

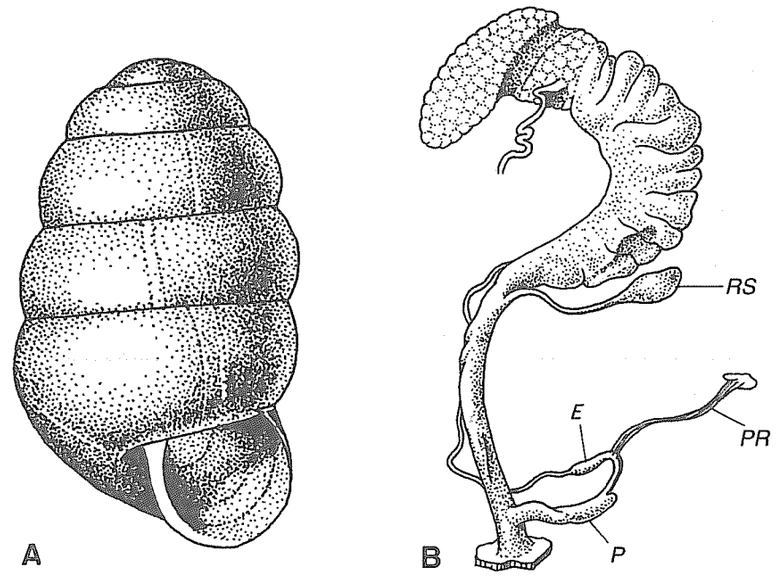


Fig. 199. ***Columella edentula*** (Draparnaud, 1805).
Env. of Kursk, Russia, July 1967. **Moscow** No. Lc-23302.

Columella Westerlund, 1878
Fig. 199

Westerlund, 1878 (1877-1878): 193.

— *Paludinella* Lowe, 1852: 206 (nom. praeocc., non L.Pfeiffer, 1841; *Pupa* subg.; t.-sp. *Pupa edentula* Draparnaud, 1805; monotypy).

— *Edentulina* Clessin, 1876 (1876-1877): 208 (nom. praeocc., non L.Pfeiffer, 1855; *Pupa* "Gruppe"; t.-sp. *Pupa edentula* Draparnaud, 1805; monotypy).

— *Paludellina* Tryon, 1884: 72 (nom. err. pro *Paludinella* Lowe, 1852).

TYPE SPECIES — *Pupa inornata* Michaud, 1831 (=*Pupa edentula* Draparnaud, 1805); SD Westerlund, 1887.

Shell cylindrical to turrited, fragile, of 5-8 moderately convex whorls. Color light-corneous to cherry or chestnut. Embryonic whorls smooth, rest nearly smooth to delicately rib-striated. Aperture rounded, toothless, without lip or neck thickening. Margins of aperture thin, simple, nearly straight; columellar margin somewhat expanded. Umbilicus, a minute perforation. Height 2.2-3.5, diam. 1.2-1.5 mm (2.8 × 1.3 mm).

Vas deferens entering slightly swollen end of short, clavate epiphallus. Penis irregularly cylindrical, with a short process of upper end. Penial retractor inserts to middle of epiphallus. Vagina very long. Spermathecal stalk rather short, reservoir ovate.

DISTRIBUTION. Holarctic. 7-8 spp.

Negulus O.Boettger, 1889
Fig. 200

Boettger O., 1889b: 268. Van Bruggen, 1994: 6.

TYPE SPECIES — *Pupa reinhardti* Jickeli, 1874; OD.

Shell dextral (sinistral specimens known), ovate-cylindrical, thin, with obtuse apex. Whorls 4.25-6.5, convex, covered with fine sculpture of irregular wrinkles to delicate costulation. Aperture toothless, comparatively wide, ovate; its margins thin, slightly expanded and somewhat thickened. Umbilicus minutely open and deep, or rimate. Height 1.6-2.6, diam. 0.9-1.4 mm.

DISTRIBUTION. E Africa and West African island of Fernando Poo (Bioko). 4 spp.

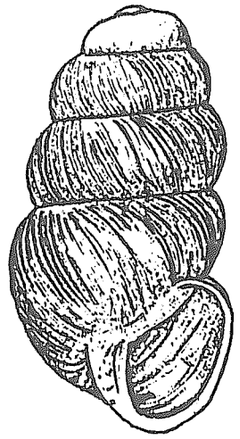


Fig. 200. ***Negulus reinhardti*** (Jickeli, 1874). After Van Bruggen, 1994.

TRUNCATELLININAE Steenberg, 1925

Steenberg, 1925: 201 (Vertiginidae subf.).

Shell cylindrical, comparatively solid, mostly light-colored. Postembryonic sculpture of strong, regular, radial riblets. Aperture with 0-3 tubercular teeth; margins usually thickened and shortly reflexed.

Epiphallus short, conic.

DISTRIBUTION. Canary and Cape Verde Islands, Europe, Caucasus, Central Asia, E and S Africa.

Truncatellina Lowe, 1852
Fig. 201

Lowe, 1852: 275 (*Pupa* subg.).

— *Isthmia* Reinhardt, 1879: 133 (non Gray, 1821).

— *Laurinella* Hesse, 1915: 53 [t.-sp. *Pupa minutissima* auct. (=*Vertigo cylindrica* Férussac, 1807); SD Pilsbry, 1920].

— Franzia Blume, 1965: 9 (t.-sp. Franzia sinistrorsa Blume, 1965; OD: Verdcourt, 1970b).

TYPE SPECIES — *Pupa linearis* Lowe, 1852; monotypy.

Shell ovate-cylindrical to cylindrical, fragile to relatively solid, of 5-6 convex whorls. Apex obtuse. Color pale-brown to corneous, monochromatic or ribs lighter. Postembryonic sculpture of sharp radial costulation. Aperture with lip or with thickened reflexed peristome, usually with neck thickening. Apertural armament consisting of 0-3 tubercular teeth located deep inside aperture. Maximal set includes parietal, columellar and deeply lying palatal tubercules. Height 1.2-2.5, diam. 0.6-1.1 mm (1.52 × 0.75 mm).

DISTRIBUTION. As of subfamily. About 15 spp.

ADDITION TO VERTIGINOIDEA:

Systenostoma Bavay et Dautzenberg, 1909
Fig. 202

Bavay, Dautzenberg, 1909: 243 (*Helix* subg.).

TYPE SPECIES — *Systenostoma pauperrima* Bavay et Dautzenberg, 1909; SD Pilsbry, 1917 (1916-1918).

Shell microhelicoid, thin, of 5 convex whorls. Last whorl straight. Color asphalt (greyish). Embryonic whorls smooth, later vaguely granulate, with widely spaced very weak spiral threads and very fine radial striae. Aperture uninterrupted due to well developed parietal callus, rounded, toothless, subvertical to well oblique, with thin, scarcely reflexed margins. Palatal margin slightly arched forward. Umbilicus relatively broad, cylindrical. Height 1.8-2.0, diam. 1.8-2.0 mm (1.9 × 1.8 mm).

DISTRIBUTION. Indochina. 2 or 3 spp.

REMARK. The taxonomic position of this genus is enigmatic. Pilsbry (1917 (1916-1918): 224) wrote: "if we may to express it, toothless Boysidias". I have inspected type material of the type species and I would say that *S. pauperrima* has nothing common with *Boysidia*. On the other hand, this species is not similar to any other species known to me. I can suggest that *Systenostoma* may be

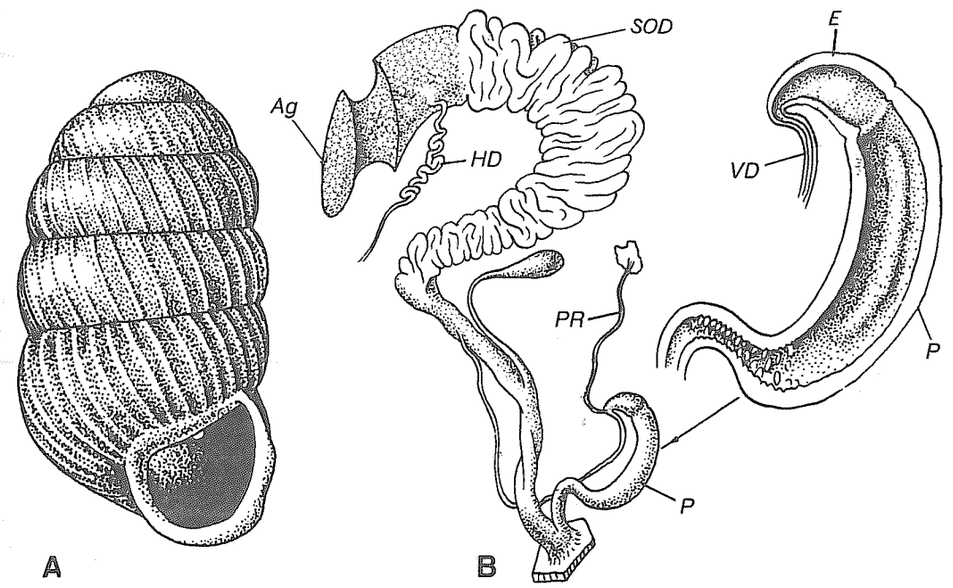


Fig. 201. A — ***Truncatellina linearis*** (Lowe, 1852).
Shell: Caniçal, Madeira. Syntype. **Phil.** No. 97303.
B — ! ***Truncatellina cylindrica*** (Férussac, 1807).
Reproductive tract and interior of penis. Env. of Aghveran near Erevan, Armenia, September 25, 1975. **Moscow** No. Lc-3480.

placed among endodontoid groups (for example, as an aberrant representative of Helicodiscidae) because of its characteristic spiral sculpture. But, since anatomy of any species of *Systenostoma* is unknown, I refrain from definite decision.

ENOIDEA Woodward, 1903

Woodward, 1903: 354, 358 (pro fam.).

Shell mostly medium-sized, ovate to turrited or fusiform. Embryonic whorls smooth or (rarely) with spiral threads; subsequent whorls variously sculptured. Aperture armed or (more often) toothless; if teeth present, they formed only at subadult stage. Margins of aperture simple to reflexed and expanded, often with lip. Umbilicus narrowly open to closed.

Head with two pairs of tentacles.

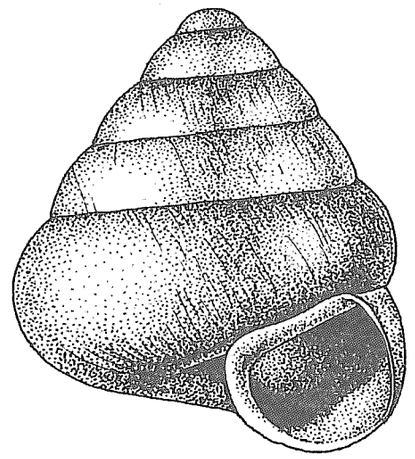


Fig. 202. ***Systenostoma pauperrima*** Bavay et Dautzenberg, 1909.
Phu-Quoc-Oai, N Vietnam. Holotype. **Paris.**

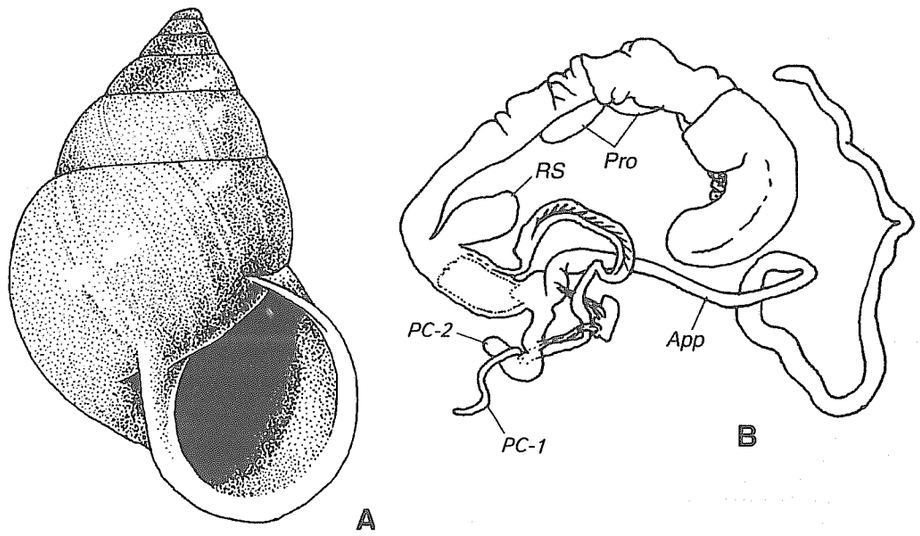


Fig. 203. ***Altenaia connivens*** (L. Pfeiffer, 1847).
A — shell: Benguela, Angola. **Senck.** No. 224238. B — reproductive tract. After Zilch, 1972.

Seminal vesicles not expressed externally or separated from hermaphroditic duct and seat circumferencially around proximal portion of duct below hermaphroditic gland. Prostate compact, of numerous acini, ribbon-like. Epiphallus with caecum and often with flagellum. Penis internally mostly with verge and/or relief of longitudinal pilasters. Penial appendix primarily present; penial retractor biramous. Spermathecal stalk usually with diverticle.

DISTRIBUTION. Eurasia, Africa, N Australia.

PACHNODIDAE Steenberg, 1925

— Pachnodinae Steenberg, 1925: 202 (Enidae subf.).

— Cerastinae Wenz, 1923: 1072 (Enidae subf.).

— Cerastuidae Wenz, 1930: 3034 (Enidae subf.; nom. emend. pro pro Cerastinae Wenz, 1923).

Nordsieck, 1986: 97. Mordan, 1992 (Cerastidae).

Shell mostly ovate-conic, white to chestnut, sometimes with bright bands (up to 5 in number) or zigzagged pattern. Aperture mostly toothless, only in *Passamaella* with columellar tooth and tooth-like depression on palatal margin.

Vesiculae seminalis not separated from hermaphroditic duct. Flagellum absent. Epiphallic caecum wanting, so, spur of spermatophore absent. Penis usually with short conic or long vermiform process (rarely with both) and sheath encircling penis above level of appendix insertion. Vagina more or less swollen, mostly lined with loose, spongy tissue and pigmented. Spermatheca short, often sessile; spermathecal stalk, when present, without diverticle.

Spermatophores with many processes of complex shape.

DISTRIBUTION. Tropical and subtropical regions of Africa south of Sahara, S Arabia and Sokotra Island, Seychelles, W India, Sri Lanka, N Australia, SE New Guinea; ?St. Helena Island.

REMARK. The situation with nomenclature of this family is somewhat complicated. Wenz (1923) established a subfamily Cerastinae. This name was based on the invalid name *Cerastus* (see below) and is thus unavailable (ICZN, Art. 11). Subsequently, in 1930, Wenz introduced a new name Cerastuinae for this taxon, based on the replacement name *Cerastus*. However, Steenberg established the name Pachnodinae in 1925. Despite the absence of any diagnosis, the introduction of Pachnodinae was accompanied by an "indication" in the sense of ICZN [Art. 12 (b) (4)], and this makes it available. Therefore, Pachnodidae is the earliest available name for the family considered.

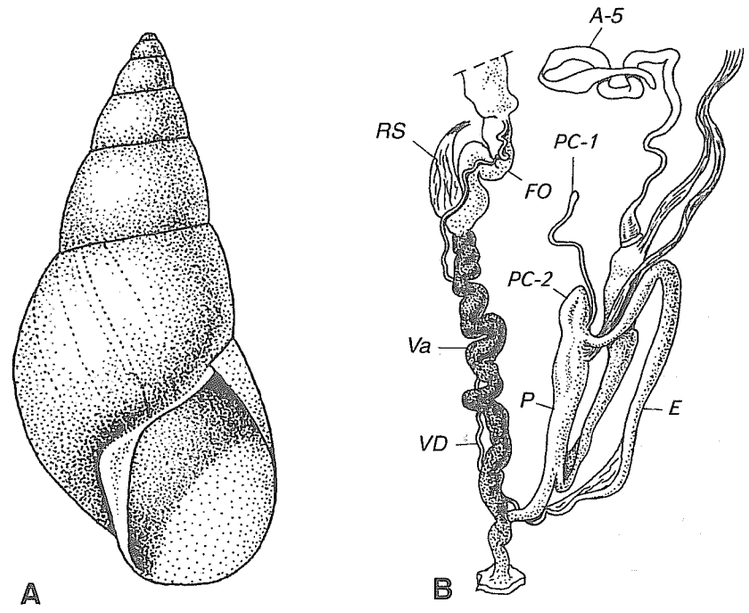


Fig. 204. ***Archeorachis pulcher*** (Gray, 1825). Colombo, Sri Lanka.
A — shell; B — reproductive tract. **Vienna** No. 41.432 [(as *Rachis mavortius* (Reeve, 1849)].

Altenaia Zilch, 1972
Fig. 203

Zilch, 1972: 164.

TYPE SPECIES — *Bulimus connivens* L.Pfeiffer, 1847; OD.

Shell ovate-conic, rather solid, of 6.5 convex whorls. Last whorl straight. Color white, upper whorls darker. Embryonic whorls smooth, later with smoothed, not very prominent wrinkles being stronger on earlier whorls; there are also elements of spiral striations, predominantly on body whorl. Aperture rounded, slightly oblique, with reflexed and expanded margins. Umbilicus cylindrical, comparatively broad. Height 17.4-19.7, diam. 11.2-13.0 mm (19.2 × 13.0 mm).

Vas deferens very short, entering epiphallus excentrically. Epiphallus long, narrowed towards distal end. Penis short, with two processes (caeca): one conic (PC-2), other slender, vermiform (PC-1). Penial appendix very long, indistinctly divided into sections. Arms of penial retractor arising from diaphragm separately, penial arm inserted on penis at entry of epiphallus, the other — to base of penial appendix. Vagina rather short, swollen, heavily pigmented. Spermatheca sessile.

DISTRIBUTION. SW Africa (Angola and Namibia). 2 spp.

Archeorachis Schileyko, gen. nov.
Fig. 204

TYPE SPECIES — *Bulimus pulcher* Gray, 1825.

Shell high-conic, moderately solid, of

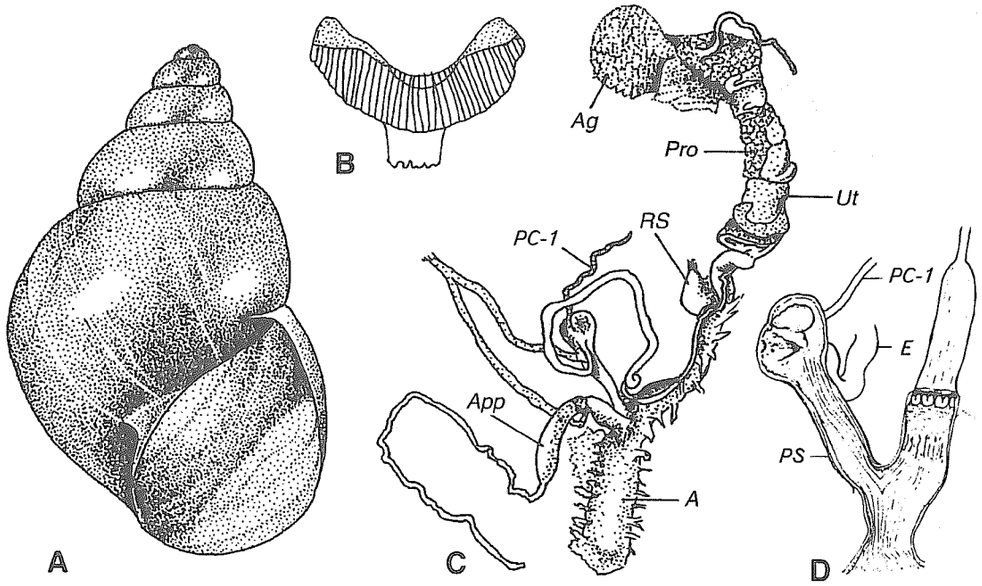


Fig. 205. ***Amimopina macleayi*** (Brazier, 1876).
A — shell: 4 km W of King Cascade, W Kimberley, WA, Australia. **Moscow** No. Lc-23318 (**Chicago**). B — jaw; C — reproductive tract; D — interior of penis and of basal section of penial appendix. After Solem, 1964.

about 6 weakly convex whorls. Last whorl scarcely or not descending. Color uniformly whitish or yellowish, or with 1-4 pinkish bands and/or speckled; apex often blackish; columella sometimes pinkish. Embryonic whorls smooth, subsequent weakly, irregularly, radially wrinkled. Aperture ovate, slightly oblique, with simple margins; columellar margin expanded. Umbilicus closed or nearly so. Height 14.5-23.0, diam. 7.2-10.0 mm (22.8 × 9.8 mm).

Vas deferens entering epiphallus apically. Epiphallus rather long. Penis short, internally with a few longitudinal smoothed folds running to epiphallus. There are two penial processes (as in *Altenaia*): one (PC-2) large, fleshy, ovate-conic; the other (PC-1) long, slender, vermiform. A-1 very long, clavate, A-2 + A-3 short, conic, A-4 unusually short, A-5 long, convoluted. Inside A-1, in its upper portion there is series of short longitudinal folds forming a sort of sphincter. Appendical arm of penial retractor attached to A-1 just below A-2 + A-3, penial arm — to epiphallus at base of vas deferens. Penial retractor arising from diaphragm as common branch; appendical arm inserted on upper portion of A-1, the other — on penis at entrance of epiphallus. Free oviduct short. Vagina enormously long, strongly convoluted, covered with loose, heavily pigmented, finely granulated tissue. Spermatheca sessile, with apical ligament.

The genus is anatomically related to *Altenaia* in having two penial caeca. It differs from *Altenaia* in slender shell, strongly convoluted, very long vagina, much longer penis, and quite distinct differentiation of penial appendix into sections.

DISTRIBUTION. Sri Lanka and southern India. 1 sp. (if *Rachis mavortius* is a synonym of *Bulimus pulcher*).

Amimopina Solem, 1964
Fig. 205

Iredale, 1933: 42 (nom. nud.). Solem, 1964: 118.

TYPE SPECIES — *Bulimus macleayi* Brazier, 1876; OD.

Shell conic, thin, fragile, translucent,

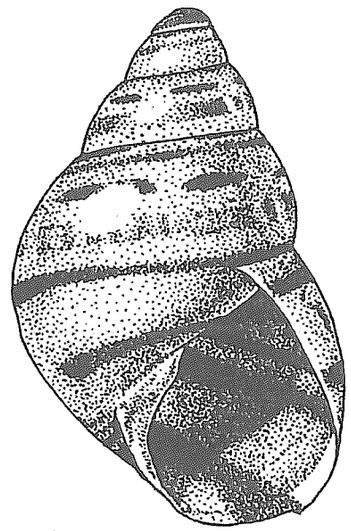


Fig. 206. ***Rachispeculum bidwilli*** (Cox, 1868).
Mackay, Queensland. **Chicago** No. 41692.

somewhat shining, of 5-6 convex whorls. Last whorl not descending. Color uniformly light corneous. Embryonic whorls vaguely granulate, later finely irregularly radially striated; basal surface with delicate, microscopic, crowded, spiral striation. Aperture ovate, with simple sharp margins; columellar margin reflexed over very narrow umbilicus. Height 8.2-15.0, diam. 8-9 mm (14.4 × 8.9 mm).

Kidney with closed ureter.

Flagellum thin, long, vermiform. Penis with lateral entrance of epiphallus, which longitudinally folded internally. Epiphallus entering penis laterally and subapically through large, soft, very pliable pilaster occupying nearly entire lumen of upper penial bulb. Upper portion of thin-walled penis weakly corrugated inside, gradually coalescing into small longitudinal pilasters in lower two-thirds; apical region with rather weak transverse glandular patch. Penial retractor arising from diaphragm, splitted, with one branch inserting just above middle of penis and the other branch attaching to A-2 of penial appendix. Latter branched off from basal portion of penis. Atrium long. Spermatheca sessile.

DISTRIBUTION. N Australia and SE New Guinea; ? Cambodia. 2 or 3 sp.

? *Rachispeculum* Iredale, 1933
Fig. 206

Iredale, 1933: 42. Solem, 1959b: 60 (as syn. of *Rhachistia* Conolly, 1925).

TYPE SPECIES — *Bulimus bidwilli* Cox, 1868; OD.

Shell ovate-conic, rather thin, shining, of about 5 whorls. Last whorl rounded at periphery, not descending in front. Apex black, bright; rest surface white, with three dark chestnut and one fulvous band. Embryonic whorls smooth, subsequent nearly so. Aperture rounded-ovate, margins thin, sharp; columellar margin dilate. Umbilicus closed. Height 16-19, diam. 9-12 mm (18.1 × 11.0 mm).

DISTRIBUTION. Queensland. 1 sp.

Rhachistia Connolly, 1925
Fig. 207

Connolly, 1925: 163.

— *Eorrhachis* Tomlin et Peile, 1930: 153 (t.-sp. *Eorrhachis sulphurea* Tomlin et Peile, 1930; OD).

TYPE SPECIES — *Buliminus rhodotaenia* Martens, 1901; OD.

Shell high conic, rather solid, only slightly glossy, of 6-7 moderately convex whorls. Apex violet-black, rest surface white, often with fulvous peripheral zone or band. Embryonic whorls polished, smooth, subsequent whorls nearly so. Aperture ovate, with thin margins; columellar margin a little dilate. Umbilicus closed. Height 10-30, diam. 5-14 mm (24.5 x 12.5 mm).

Vas deferens entering epiphallus apically. Epiphallus very long. Penis globular, with unusually long process and short sheath attached by its upper edge. Penis with well-developed transverse glandular patch inside. Penial retractor arising from diaphragm as two independent muscles: one inserted on apical portion of A-1, the other — on lower part of penis. Free oviduct and vagina long. Spermatheca sessile.

DISTRIBUTION. Africa southward of Sahara, Madagascar, W India, Sri Lanka, nu-

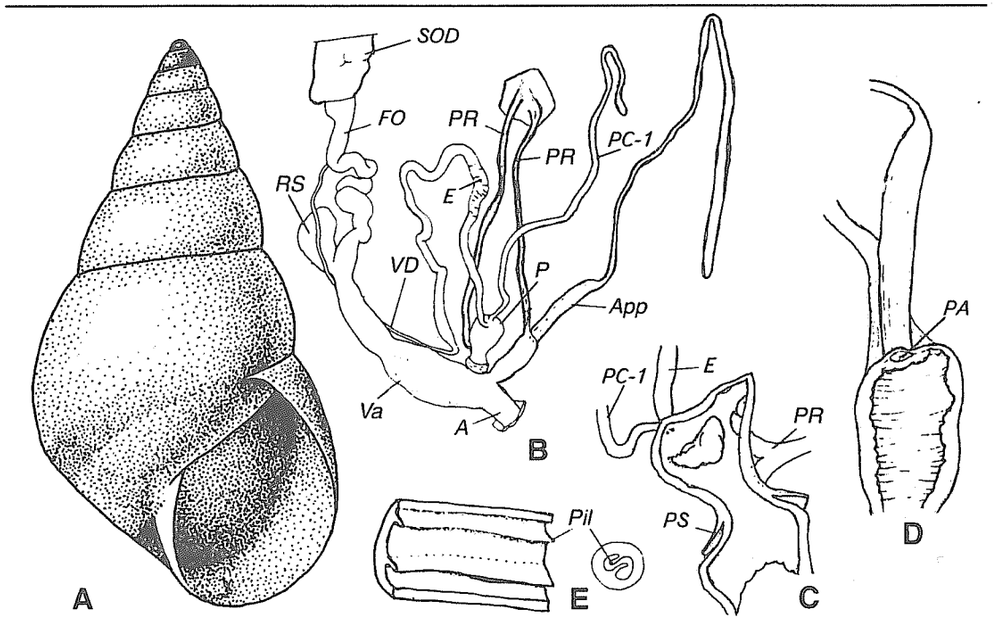


Fig. 207. ***Rhachistia rhodotaenia*** (Martens, 1901).
A — shell: Central Africa. **Phil.** No. 72583. B — reproductive tract; C — interior of penis; D — interior of A-1; E — longitudinal section of epiphallus. After Mordan, 1992.

merous islands of the Indo-West Pacific. Over 25 spp.

Rhachidina Thiele, 1911
Fig. 208

Thiele, 1911: 201 (pro "Gruppe").

TYPE SPECIES — *Bulinus tumefactus* Reeve, 1848; OD.

Shell ovate, inflated, thin, shining, of about 5 moderately convex whorls. Last whorls evenly rounded at periphery, not descending. Color light-corneous, yellowish, or whitish, usually with dark bands or minute dark dots. Embryonic whorls smooth, two first postapical with distinct and sharp radial wrinkles, becoming vague and irregular on later whorls. Aperture ample, rounded, slightly oblique, with thin, fragile margins; columellar margin reflexed. Umbilicus very small. Height 12-25, diam. 9.5-16.0 mm (17.3 × 12.3 mm).

Vas deferens entering short epiphallus apically. Penis short, with sheath and short vermiform process. All sections of penial appendix normally developed except A-3; A-4 and A-5 rather short. Penial retractor initially united, splitted rather low; penial arm attached near base of penial caecum, appendical arm — to A-1. Vagina considerably swollen. Spermatheca sessile.

DISTRIBUTION. Africa. 2-4 spp.

Conulinus Martens, 1895
Fig. 209

Martens, 1895: 180 (*Buliminus* sect.).

TYPE SPECIES — *Buliminus ugandae* Martens, 1895; SD Woodward, 1896.

Shell shortly ovate-turriform, thin, glossy, more or less transparent, usually without strong sculpture. Whorls 6-7, rather convex; last straight. Color corneous-brown or buff. Embryonic whorls smooth, postnuclear sculpture of fine, irregular, radial striation or gentle radial wrinkles; besides, wavy spiral grooves present. Aperture large, irregularly ovate, with simple, sharp margins; co-

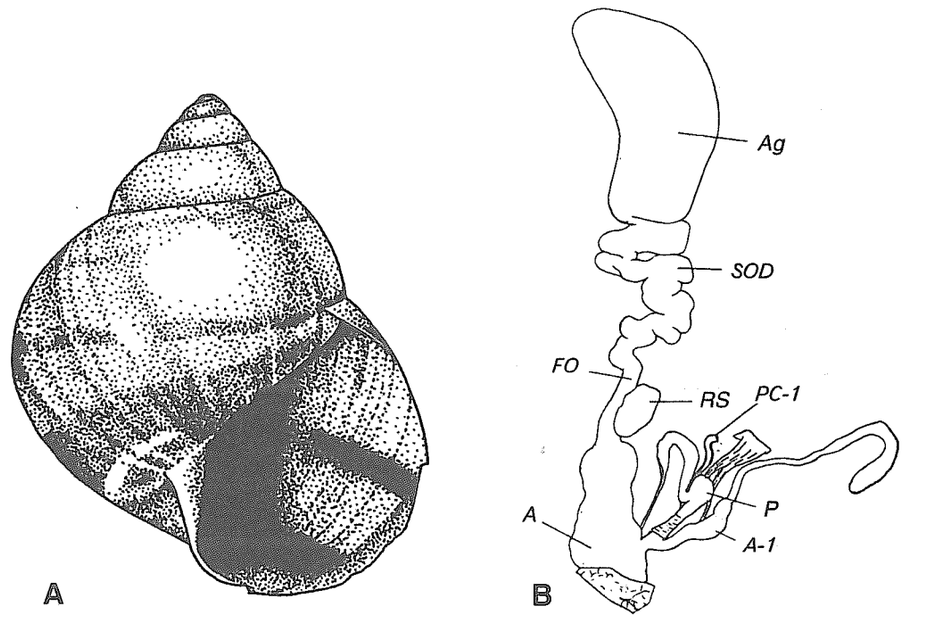


Fig. 208. A — ***Rhachidina tumefacta*** (Reeve, 1848).
Shell: Golden Coast, W Africa. **Leiden** No. 52611. B — ! ***Rhachidina histrio*** (L.Pfeiffer, 1854). Reproductive tract. After Mordan, 1992.

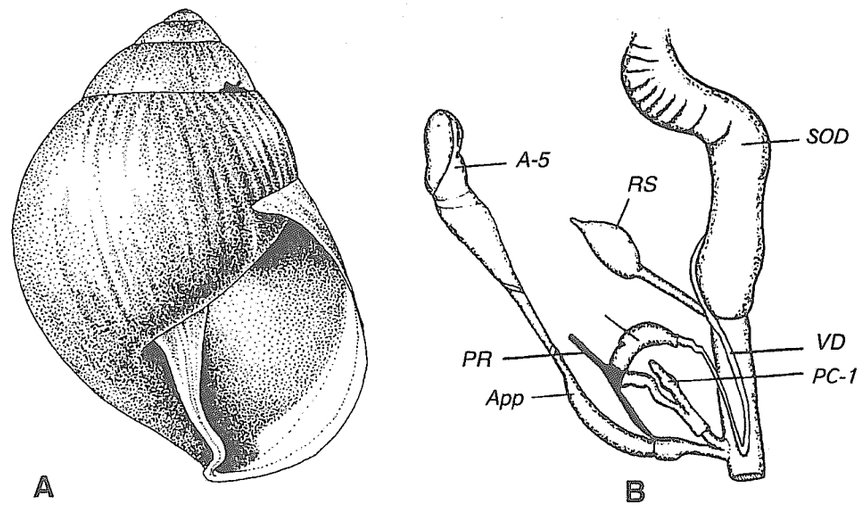


Fig. 209. A — ! ***Conulinus daubenbergeri*** (Dautzenberg, 1908). Shell: Kibosho, SE Kilimandjaro. Syntype. **Paris**.
B — ***Conulinus ugandae*** (Martens, 1895). Reproductive tract. After Verdcourt, 1966.

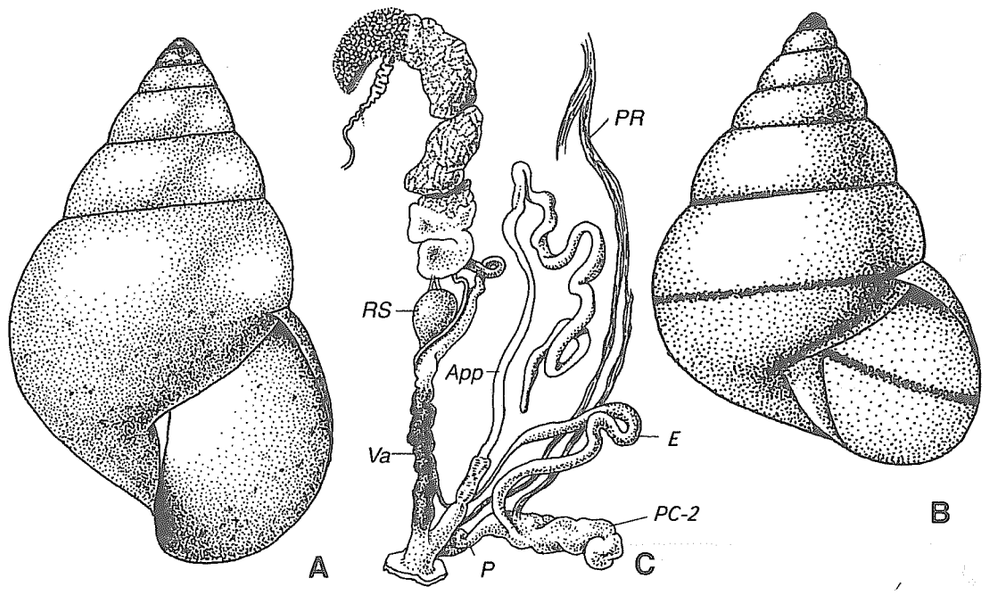


Fig. 210. A — ***Edouardia conulus*** (Reeeve, 1849). Shell: Zululand. **Phil**. No. 118147.
B, C — ! ***Edouardia meridionalis*** (L.Pfeiffer, 1847). Lake Sibayi area of Tongaland, South Africa, December 1972. B — shell, C — reproductive tract. **Leiden**.

lumellar margin expanded, more or less sinuous at baso-columellar angle. Umbilicus dot-like to relatively wide. Height 10.5-17, diam. 6.5-11.5 mm (16.7 × 11.5 mm).

Vas deferens entering epiphallus terminally. Epiphallus subcylindrical or fusiform. Penis rather short, with well-developed slender caecum. Penial appendix rather vaguely divided into sections, but sometimes all 5 traditional sections recognizable. Penial appendix arising from diaphragm by united bundle and forked near attachment to male ducts: penial arm very short, inserted to penis/epiphallus junction, appendical branch attached near lower portion of appendix. Vagina moderately long, more or less swollen. Spermathecal stalk short.

DISTRIBUTION. E Africa. 4 spp.

REMARK. Martens described this taxon for three species: *ugandae* Martens, 1895, *hildebrandti* Martens, 1895 (= *sordidulus* Martens, 1878) and *metula* Martens, 1895. In 1897 he designated *Bulimus conulus* Reeve, 1849 as the type species. However, Woodward has designated *Buliminus ugandae* as the type species in 1896 in the Zoological Record for 1895. Species *sordidulus* and *metula* are currently placed in the genus *Edouardia*.

Edouardia Gude, 1914
Fig. 210

Gude, 1914: 280 [nom. nov. pro *Conulinus* Martens, 1895, non *Conulina* Bronn, 1835 (Polyzoa); unnecessary replacement name].

TYPE SPECIES — *Bulimus conulus* L.Pfeiffer in Reeve, 1849; OD.

Shell acuminate-ovate to ovate-conic, thin, translucent to semitransparent, of 6-7 moderately convex whorls. Last whorl straight, evenly rounded or with light peripheral angle. Color yellowish to chestnut, uniform or with one dark peripheral band. Embryonic whorls with very delicate engraved spiral lines, sculpture of remaining whorls with weak irregular radial wrinkles and sometimes with delicate wavy spiral striation. Aperture semicircular to ovate, moderately oblique, with simple sharp margins; columellar margin more or less dilate. Umbilicus, a minute perforation. Height 6-22, diam. 4-20 mm (*E. conulus* — 14.0 × 8.5 mm, *E. meridionalis* — 15.5 × 10.0 mm).

Vas deferens entering epiphallus apically without distinct demarcation. Epiphallus slender, rather long, cylindrical. Penial process voluminous, conic or of irregular shape. Penis internally with transverse glandular patch at apical region. Penial appendix very long, A-1 short, A-2 + A-3 fused, muscularized, boundary between A-4 and A-5 poorly visible. Penial retractor arising from diaphragm as common bundle, but soon branched; penial arm inserted on base of caecum, the other arm — on base of penis. Vagina long, folded, covered with loose dark brown tissue. Spermatheca globose, sessile; there is a thin ligament between apex of spermatheca and spermoviduct.

DISTRIBUTION. S and E Africa, Madagascar, India. About 25 spp. & subspp.

Limicena Connolly, 1925
Fig. 211

Connolly, 1925: 169.

TYPE SPECIES — *Buliminus (Conulinus) nyasana* Smith, 1899; OD.

Shell bulimoid, conic, thin, of 6 convex whorls. Last whorl not descending in front, evenly rounded at periphery. Color greyish. Embryonic whorls with 8-9 spiral riblets, rest surface weakly radially striated. Aperture subcircular, moderately oblique, margins thin, reflexed; columellar widely expanded, not truncate. Umbilicus open, cylindrical. Height 21-22, diam. 15-16 mm (21.0 × 15.2 mm).

DISTRIBUTION. E Africa: Malawi, Zimbabwe, Tanzania. Probably 1 variable sp.

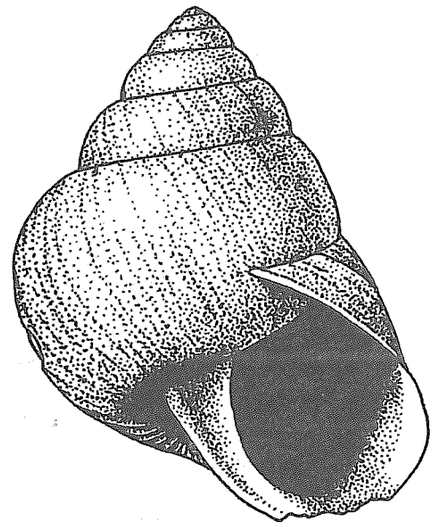


Fig. 211. ***Limicena nyasana*** (E. Smith, 1899). Songwe River, near Lake Rukwa, Mbeya, Tanzania. **Chicago** No. 153353.

Achatinelloides Nevill, 1878
Fig. 212

Nevill, 1878: 131.

— *Ovella* L.Pfeiffer, 1879 (1878-1881): 284 (t.-sp. *Bulimus socotrensis* L.Pfeiffer, 1845; monotypy).

Mordan, 1986: 253.

TYPE SPECIES — *Bulimus socotrensis* L.Pfeiffer, 1845; monotypy.

Shell ovate, solid, opaque, of 6 slightly convex whorls; last not descending. Color of 2-3 early whorls corneous, later white or creamy, with conspicuous pattern of zigzag-ging streaks and short spiral marks. Embryonic whorls smooth, rest surface with radial, delicate, regular riblets. Aperture ample, pointed above, places of its insertion not approached and connected by thin callus. Internally aperture ochraceous. Aperture margins somewhat thickened, not reflexed except for columellar margin. Umbilicus relatively wide, cylindrical. Height 10-22, diam. 7-15 mm (10.8 × 7.1 mm).

Vas deferens entering epiphallus terminally. Epiphallus rather short, with delicate semicircular incisions, narrowing towards penis. Penis very short, with well-developed sheath. Penial caecum thin-walled, large, blunt-conic. Sections of penial appendix scarcely distinct, only three sections can be recognized: basal (probably A-1 + A-2 + A-3), thin A-4 and a little swollen A-5. Penial retractor arising from diaphragm as widely spaced bands: penial branch inserted on lower portion of epiphallus, appendical — on upper portion of basal part. Free oviduct and vagina not long. Spermatheca not sessile, with short, expanded stalk.

DISTRIBUTION. Socotra Island and South Yemen. 3-4 spp.

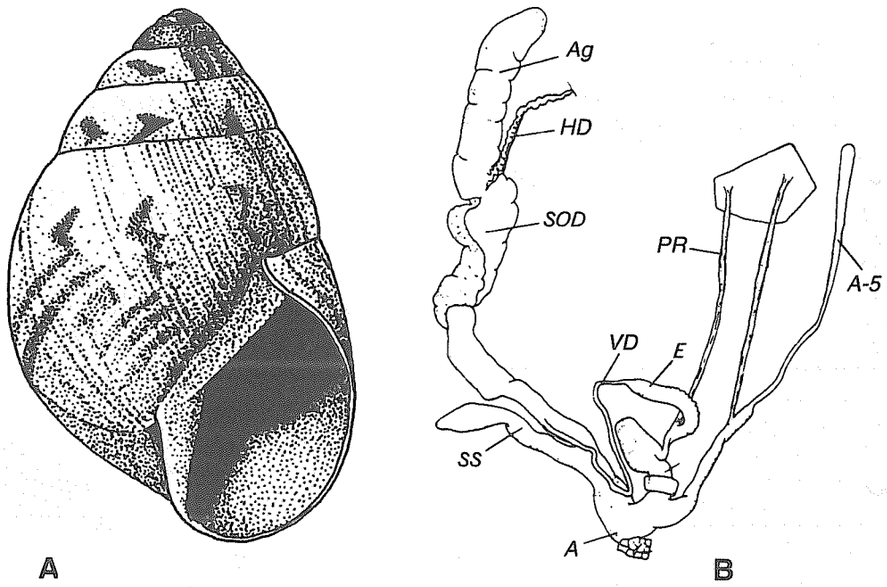


Fig. 212. ***Achatinelloides socotrensis*** (L. Pfeiffer, 1845).
A — shell: Socotra. **Moscow** No. Lc-23298. B — reproductive tract. After Mordan, 1992.

Zebrinops Thiele, 1931
Fig. 213

Thiele, 1931: 525. Mordan, 1986: 254.

TYPE SPECIES — *Limicolaria revoili* Bourguignat, 1882; OD.

Shell high-conic, *Zebrina*-like, solid, shining, of about 7 moderately convex whorls. Last whorl not descending, evenly rounded at periphery. Apex dark, rest surface whitish or yellowish, with brown irregular radial streaks. Embryonic and postembryonic whorls smooth. Aperture ovate, pointed above, with simple margins and thin lip inside. Umbilicus closed or nearly so. Height 20-35, diam. 8.5-17.5 mm (22.0 x 9.2 mm).

Vas deferens entering epiphallus terminally. Epiphallus moderately short, with glandular walls. Penis very short, with conic process and well-developed sheath. Inner surface of penis covered with weak longitudinal plicae. Internally penial process with short transverse folds. Penial appendix consists of 4 divisions: A-1 + A-2 small, A-3 short, with papilla protruding into lumen of A-1 + A-2, A-4 and A-5 without distinct boundary between them. Penial arm of retractor attached to lower portion of epiphallus, appendicular — to A-3. Free oviduct and vagina of moderate length. Spermathecal stalk short, strongly expanded, reservoir voluminous, sac-like. Spermatophore with many forked spines.

DISTRIBUTION. S Arabia, Ethiopia, Somalia. 3-4 spp.

Rachis Albers, 1850
Fig. 214

Albers, 1850: 182 (*Bulimus* subg.).

— *Rhachis* Martens in Albers, 1860: 230 (nom. emend. pro *Rachis* Albers, 1850).

— *Rachisellus* Bourguignat, 1889: 68 (t.-sp. *Bulimus punctatus* Anton, 1839; OD).

TYPE SPECIES — *Bulimus punctatus* Anton, 1839; SD Martens in Albers, 1860.

Shell high-conic, slender, thin, of 6-7 flattened whorls. Last whorl not descending, evenly rounded at periphery. Color white or yellowish, often with brown or blackish band and small dark spots. Embryonic and

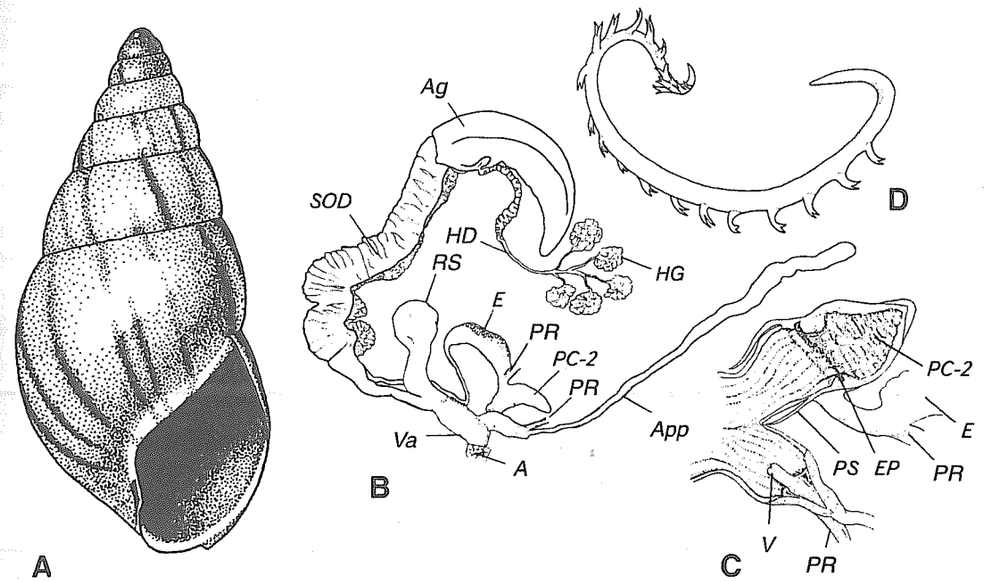


Fig. 213. A — ***Zebrinops revoili*** (Bourguignat, 1882). Shell: Between Majoro and Adallih, Somalia. **Leiden** No. 52661.
B, C, D — ! ***Zebrinops albata*** (Férussac, 1827). B — reproductive tract; C — interior of distal male part; D — spermatophore. After Mordan, 1986.

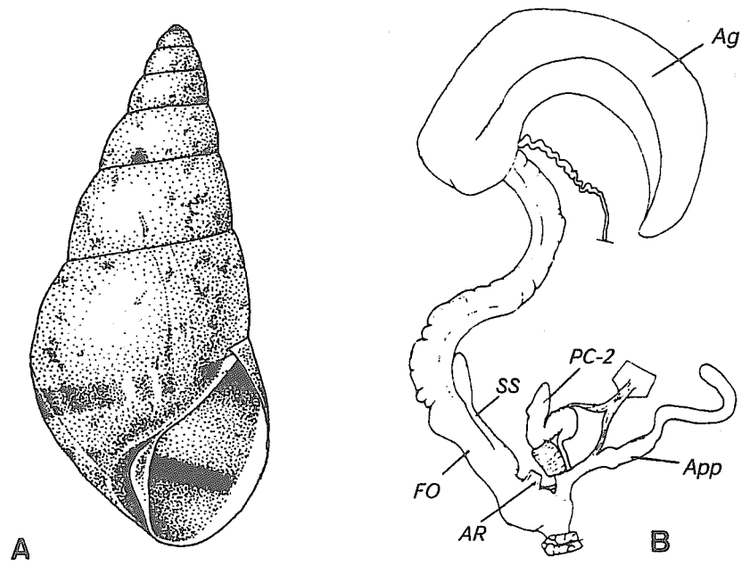


Fig. 214. ***Rachis punctata*** (Anton, 1839).
A — shell: Southern India. **Leiden** No. 52590. B — reproductive tract. After Mordan, 1992.

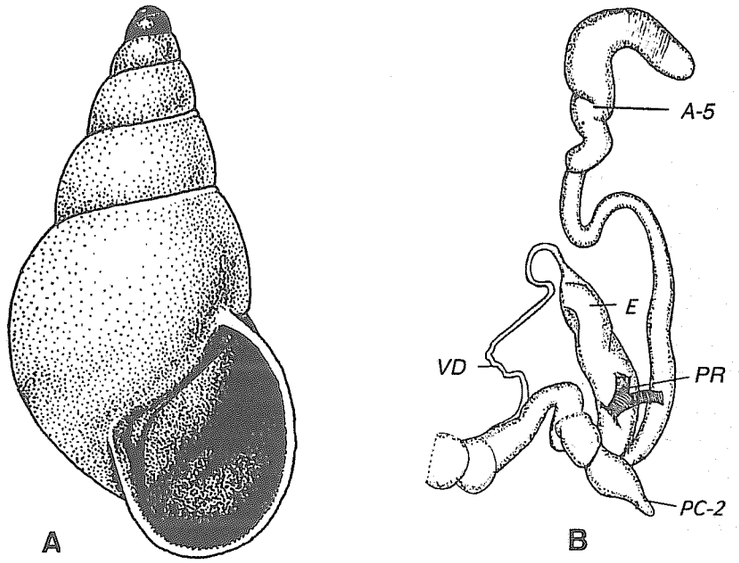


Fig. 215. ***Paracerastus drymaeoides*** (Thiele, 1911).
A — shell: Tshibinda, near Lake Kivu, Belgian Congo. **Phil.** No. 158847. B — male section of reproductive tract. After Verdcourt, 1970a.

postembryonic whorls without peculiar sculpture. Aperture ovate, with thin, simple margins. Umbilicus very narrow, semicovered. Height 10-25, diam. 6-13 mm (16.0 × 7.2 mm).

Vas deferens rather short. Epiphallus and penis very short. Penial process conic, internally folded. Penis internally without transverse patch. Penial sheath well developed, attached by its lower edge. All divisions of penial appendix normally expressed; A-3 opens into A-2 by short papilla. Penial retractor arising from diaphragm by one bundle, appendical arm attached to A-1 just below A-2; penial arm — to midway of epiphallus. Free oviduct and vagina rather short. Spermathecal stalk thin, short, reservoir small, elongate.

DISTRIBUTION. Africa, India. About 15 spp.

? *Paracerastus* Thiele, 1933
Fig. 215

Thiele, 1933: 308 (*Cerastus* subg.). Verdcourt, 1970a: 18, 20 (syn. of *Cerastua*).

TYPE SPECIES — *Ena (Rachisellus) drymaeoides* Thiele, 1911; OD.

Shell high-conic, moderately thin, of 6-6.5 convex whorls. Last whorl not descending in front. Color whitish, with dark dots; apex blackish, aperture dark brown inside. Embryonic whorls smooth or slightly radially wrinkled; postnuclear whorls with delicate, well spaced, spiral grooves. Aperture ovate, only slightly oblique, with shortly reflexed margins. Parietal callus rather distinct. Umbilical crack very narrow. Height 23-31, diam. 11-15 mm (23.0 × 11.0 mm).

Gross anatomy (Fig. 215 B), judging by data of Verdcourt (1970a), much similar to that of *Cerastua*. I refrain from synonymizing this taxon with *Cerastua* because of conchological differences and until more careful anatomical investigation is conducted.

DISTRIBUTION. Central Africa. 4-6 spp.

Cerastua Strand, 1928
Fig. 216

Strand, 1928: 67 (nom. nov. pro *Cerastus* Martens in Albers, 1860).

— *Cerastus* Martens in Albers, 1860: 232 [nom. praeocc., non Dejean, 1821 (Coleoptera); *Buliminus* subg.; t.-sp. *Buliminus distans* L.Pfeiffer, 1856; OD].

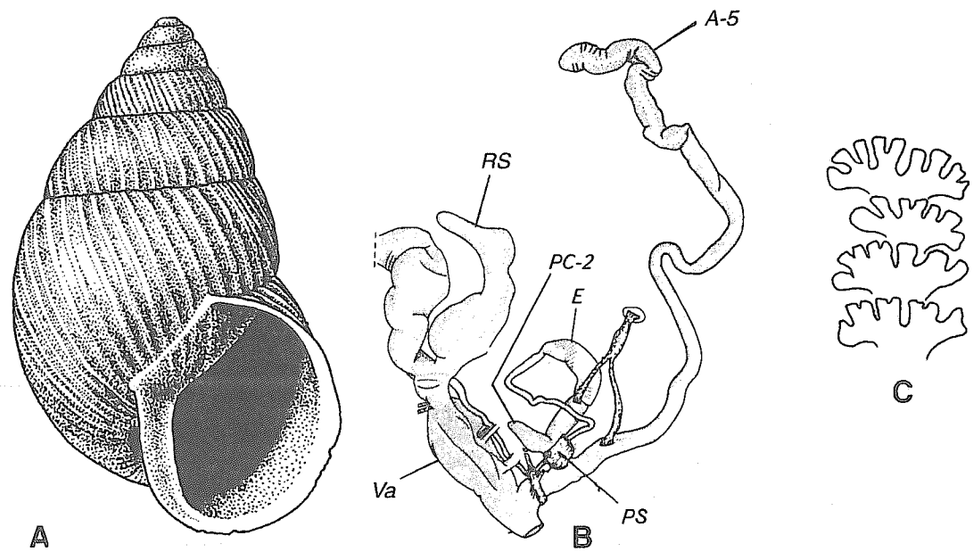


Fig. 216. A — ***Cerastua distans*** (L. Pfeiffer, 1856). Shell: "Persia" [? — A.Sch.]. **Cardiff.**
B — ! ***Cerastua flavicans*** Goethem et Adam, 1978. Paratype. Reproductive tract. After Goethem et Adam, 1978.
C — ! ***Cerastua schweinfurthi*** (Martens, 1895). Fragment of spermatophore. After Hesse, 1933.

TYPE SPECIES — *Bulimus distans* L.Pfeiffer, 1856; OD.

Shell pointed-ovate, inflated, moderately solid, of about 6 slightly convex whorls. Last whorl straight. Color grey or yellowish-grey. Embryonic whorls smooth, later radially regularly ribbed; body whorl also with spiral grooves, being quite regular and sometimes crossing ribs. Aperture ovate, only slightly oblique. Margins thin, shortly reflexed. Umbilicus comparatively broad. Height 15-55, diam. 9-35 mm (19.2 × 11.3 mm).

Vas deferens entering epiphallus apically. Epiphallus moderately long. Penis short, with sheath and conic process. Penial appendix long, its divisions indistinct. Penial retractor arising from diaphragm as common band, appendical arm inserted on basal portion of appendix, the other arm — on penis/epiphallus junction. Vagina more or less inflated. Spermatheca voluminous, of irregular shape, sessile or nearly so.

DISTRIBUTION. From S Arabia and N Ethiopia southwards as far as N Mozambique, and westwards to the Congo; W India. 10-15 spp.

Pleurorhachis Connolly, 1939
Fig. 217

Connolly, 1939: 437 (*Rachis* sect.).

TYPE SPECIES — *Bulimus petersi* L. Pfeiffer, 1855; OD.

Shell acuminate-ovate, fairly solid, moderately smooth and glossy, of 6.5 more or less convex whorls. Apex acute. Coloration: first 3 whorls brown, later creamy, with narrow brown streaks about as broad as intervals between them. Embryonic whorls with strong, nearly equidistant radial riblets; postnuclear sculpture of fairly regular, rather coarse radial striae; on last whorl this sculpture becomes much weaker. Aperture nearly vertical, subovate, margins simple, not reflexed, columellar margin partially overhanging over comparatively wide umbilicus. Height 11-12, diam. 6.0-6.5 mm (11.9 × 6.3 mm).

DISTRIBUTION. Mozambique. 1 sp.

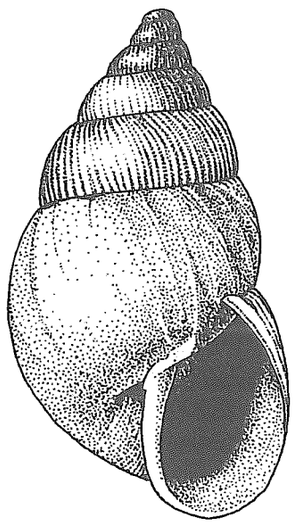


Fig. 217. ***Pleurorhachis petersi*** (L.Pfeiffer, 1855). Tette, Mozambique. "Type". **London** No. 1986221.

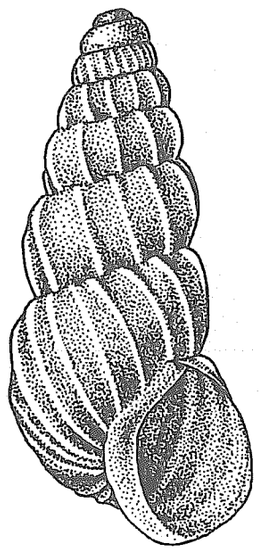


Fig. 219. ***Polychordia pulcherrima*** Connolly, 1941. Taiz, S Yemen, Wadi Thabad, N side of Jebal Sabr. **Phil.** No. 329990.

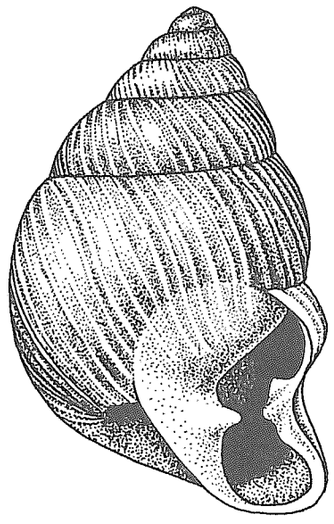


Fig. 218. ***Passamaella passamaiana*** (Petit, 1853). Socotra. **Cardiff.**

Passamaella L. Pfeiffer, 1877
Fig. 218

Pfeiffer L., 1877: 5 (*Ennea* sect.).

— *Passamaiella* Martens, 1881: 144 (nom. err. pro *Passamaella* L. Pfeiffer, 1878).

TYPE SPECIES — *Pupa passamaiana* Petit, 1853; monotypy.

Shell pointed-ovate, rather thin but solid, only slightly translucent, of 6 convex whorls; last inflated, scarcely and gradually ascending in front. Color light corneous to grey, ribs white. Embryonic whorls smooth, sculpture of later whorls of radial, rather coarse, regular, rounded ribs. Aperture subvertical, of irregular shape. Parietal callus well developed, often semitransparent. Columellar margin with prominent lamella; palatal wall with deep depression and tooth of irregular shape. Margins a little reflexed, columellar broadly reflexed and expanded. Umbilical rim sinuous and deep. Height 8-23, diam. 5.5-15.5 mm (11.6 × 7.5 mm).

DISTRIBUTION. Socotra Island. 7 spp.

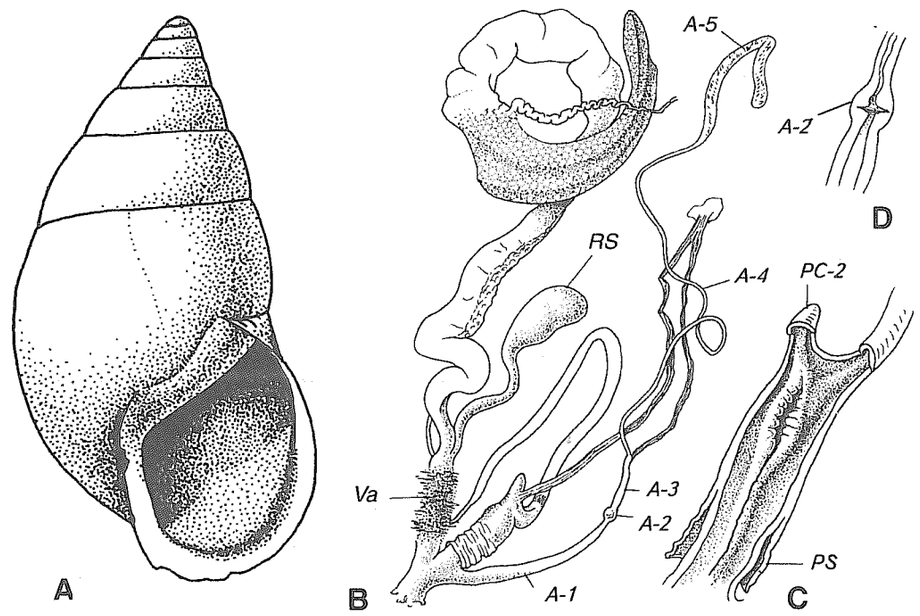


Fig. 220. ***Euryptyxis candidus*** (Lamarck, 1822).
A — shell: El-Daala near Aden, S Yemen. **Moscow** No. Lc-7183. B — reproductive tract; C — interior of penis; D — schematic longitudinal section of part of penial appendix. Sultanat Oman, December 15, 1981. **Paris**.

Polychordia Connolly, 1941
Fig. 219

Connolly, 1941: 28. Mordan, 1986: 228 [as probable syn. of *Cerastus* (sic!)].

TYPE SPECIES — *Polychordia pulcherrima* Connolly, 1941; OD.

Shell elongate conic, thin, of 7-8 convex whorls. Last whorl evenly rounded at periphery, not descending in front. Color pale brown, ribs whitish. Embryonic whorls smooth, later with thin, lamellate, regular, widely spaced riblets. Aperture ovate, slightly oblique, with thin, fragile margins; columellar margin reflexed. Umbilicus narrowly open, cylindrical. Height 12-16, diam. 4.8-5.2 mm (12.0 × 4.8 mm).

DISTRIBUTION. South Arabia. 1 sp.

Euryptyxis P.Fischer, 1883
Fig. 220

Fischer P., 1883: 479 (*Buliminus* sect.).

— *Petraeocerastus* Kobelt, 1902: 890 (*Buliminus* subg.; t.-sp. *Buliminus labiosus* Müller, 1774; monotypy).

Mordan, 1986: 229.

TYPE SPECIES — *Pupa candida* Lamarck, 1822; monotypy.

Shell acuminated-ovate, moderately to strongly solid, glossy, of 6-7 weakly convex whorls. Last whorl straight. Color white to light corneous. Embryonic whorls smooth, subsequent smooth to irregularly ribbed and delicately spirally striated. Aperture ovate to subcircular, with clearly developed flared lip. Umbilicus closed, but deep umbilical rim present. Height 20-35, diam. 10-18 mm (30.0 × 15.2 mm).

Vas deferens relatively thin, entering epiphallus terminally. Epiphallus long, slender, cylindrical. Conic penial caecum situated at boundary between epiphallus and penis. Penis with sheath which is free at lower end. Internally penis with strong longitudinal pilaster bearing deep corrugated groove. A-1 long and slender, A-2 minute, with very short and blunt papilla inside, A-3 clearly expressed, A-4 very long, A-5 short. Origin

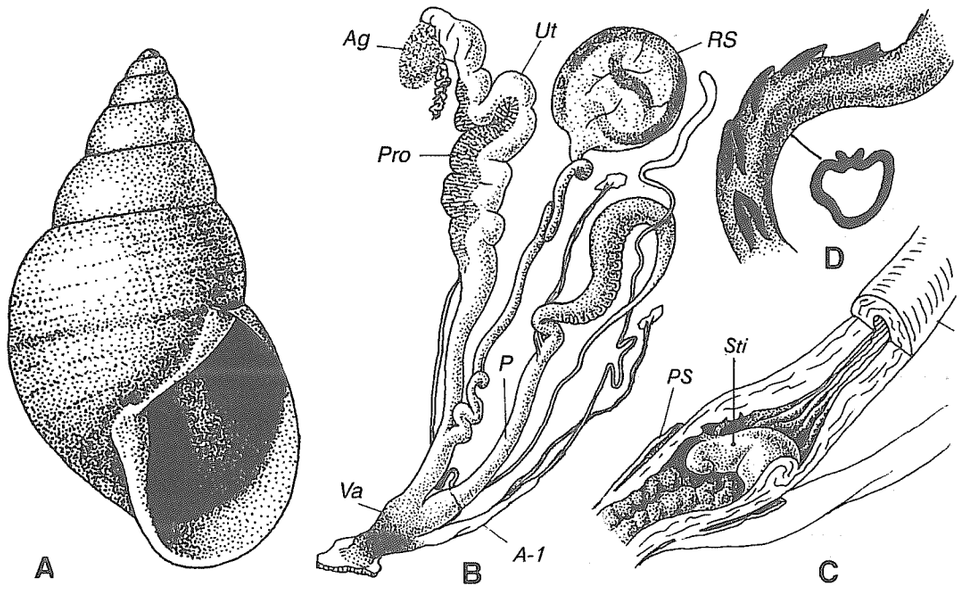


Fig. 221. ***Nesiocerastus ornatus*** (Dufo, 1840).
Vallée de Mai, Praslin Island, Seychelles, August 29, 1984. A — shell (subadult), B — reproductive tract, C — interior of penis, D — fragment of spermatophore. **Moscow** No. Lc-20719.

of penial and appendicular arms of penial retractor separate or adjacent; penial branch inserted at base of caecum, appendicular — on upper section of A-3. Free oviduct and vagina not long; vagina coated by intensively pigmented spongy tissue. Spermathecal stalk short, elongated, reservoir voluminous. Spermatophore with many broad leaf-shaped processes, having deep incisions on their margins.

DISTRIBUTION. S Arabia, Ethiopia, Somalia. 5-6 spp.

Nesiocerastus
Van Mol et Coppois, 1980
Fig. 221

Van Mol & Coppois, 1980: 44 (*Pachnodus* subg.).

TYPE SPECIES — *Bulimus ornatus* Dufo, 1840; OD.

Shell conic, solid, of 6-7 moderately convex whorls; last not descending. Color brownish to olivaceous, uniform or with narrow peripheral dark band. Embryonic whorls smooth, later with distinct, widely spaced engraved spiral lines. Aperture ovate, moderately oblique, with well reflexed and expanded margins; columellar margin strongly expanded. Umbilicus minutely open. Height 18.0-32.3, diam. 14.0-20.6 mm (29.0 × 15.7 mm).

Vas deferens long, evenly slender, gradually passing to epiphallus. Epiphallus long, of two sections: proximal, having semicircular folds, and cylindrical distal. Penis small, internally with conic fleshy stimulator. Penial process absent. Penial appendix long, thin, all its sections well expressed. Arms of penial retractor arising from diaphragm separately; penial arm attached to upper portion of distal section of penis, the other arm inserted on boundary between A-1 and A-2. Oviduct rather long, vagina markedly shorter. Basal portion of spermathecal stalk more or less twisted, stalk long, slender; reservoir voluminous. Spermatophore with Y-shaped processes.

DISTRIBUTION. Seychelles. 5 spp.

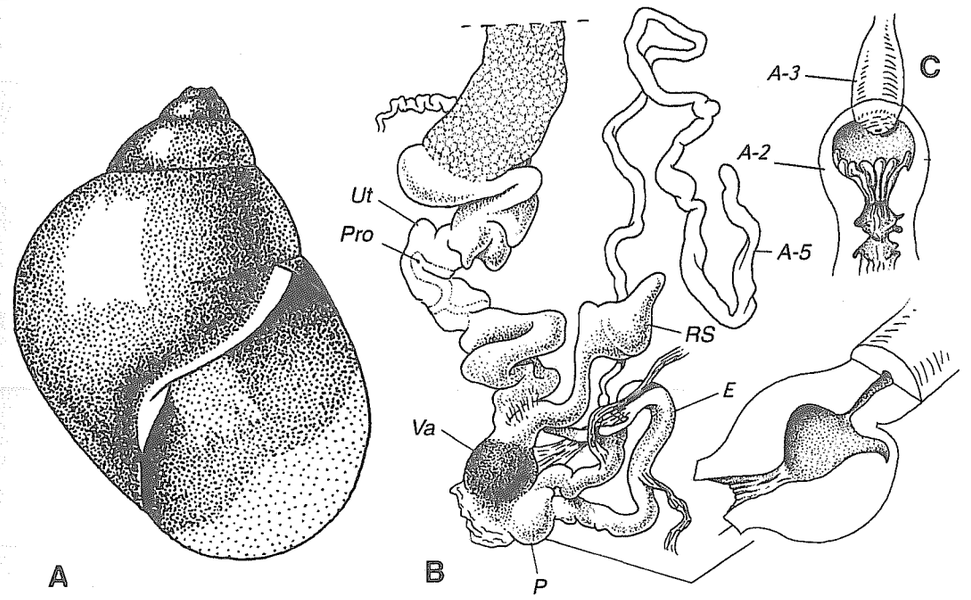


Fig. 222. ***Pachnodus velutinus*** (L. Pfeiffer, 1841).
Mahé Island, Agriculture Experimental Station, Seychelles. August 1, 1984. A — shell; B — reproductive tract and interior of penis; C — interior of A-2. **Moscow**. No. Lc-23294.

Pachnodus Albers, 1860
Fig. 222

Albers, 1860: 230 (*Buliminus* subg.).

— *Pachnodes* Martens in Martens & Wiegmann, 1898: 20 (nom. err. pro *Pachnodus* Martens in Albers, 1860).

TYPE SPECIES — *Bulimus velutinus* L. Pfeiffer, 1841; OD.

Shell ovate-conic, thin, fragile, translucent, shining, with conic outline of spire and narrow apex. Whorls 4.5-5, last straight, ample. Color uniformly yellowish-corneous to dark brown. Embryonic whorls smooth, rest with distinct spiral threads-like riblets and vague radial striation. Aperture ovate, weakly oblique to nearly vertical; places of its insertion not approached, margins thin, straight, practically not reflexed. Umbilicus dot-like or absent. Height 10-40, diam. 7-32 mm (14.4 × 10.0 mm).

Vas deferens short, markedly swollen in middle portion, entering epiphallus excentrically. Flagellum as such absent. Epiphallus cylindrical, penis globose, small, thick-walled, internally smooth, without verge or stimulator. Penis lacking process. Penial chamber internally with slit-like semicircular depression. Arms of penial retractor arising from diaphragm separately, penial arms attached to middle of epiphallus; appendical arm inserted on A-1. Besides, there is additional muscular band connecting vagina and epiphallus. Penial appendix entering very base of penis, all its sections distinctly expressed. A-2 internally with distinct, short, longitudinal folds; A-3 with short papilla. A-4 + A-5 unusually long. Free oviduct rather long, vagina short, inflated, heavily pigmented. Spermathecal stalk short, reservoir ovate to conic. Spermatophore with head of complex shape and tiny simple or forked processes.

DISTRIBUTION. Seychelles. 3 spp.

? *Nesobia* Ancey, 1887
Fig. 223

Ancey, 1887: 39.

— *Helenopachnodus* Germain, 1932: 9 (t.-sp. *Bulimus helena* Quoy et Gaimard, 1832; OD).

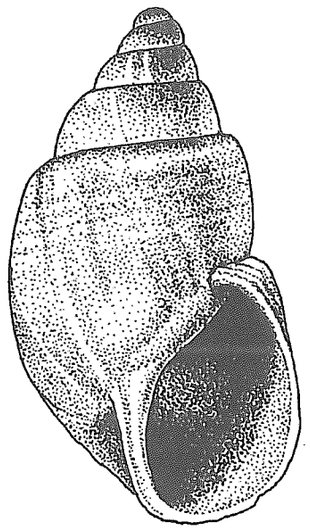


Fig. 223. ***Nesobia helena*** (Quoy et Gaimard, 1832).

St. Helena. **Vienna.**

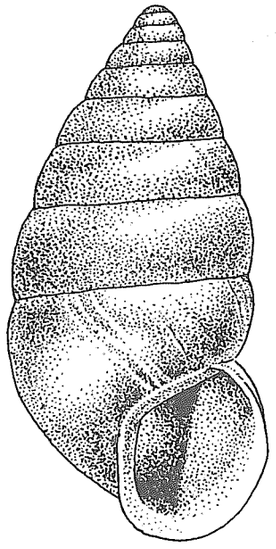


Fig. 224. ***Apoecus colonus*** (Moellendorff, 1895). Constantinhafen, New Guinea. Lectotype. **Senck.** No. 37492.

Baker, 1961a: 250.

TYPE SPECIES — *Bulimus helena* Quoy et Gaimard, 1832; OD.

Shell acuminated-ovate, rather thin, not glossy, of 6 shouldered whorls; last not descending. Initial whorls reddish-chestnut, remaining brown. Embryonic whorls smooth, shining, later with irregular radial wrinklets and rather widely spaced, spiral, uneven cordlets. Aperture subvertical, with slightly thickened margins. Umbilicus narrow, ovate, deep, encircled by obtuse ridge. Height 16-18, diam. 9.2-9.8 mm (17.0 × 9.4 mm).

DISTRIBUTION. St. Helena Island. 1 sp.

REMARK. The taxonomic position of this peculiar monotypic genus is unclear. Geographical position of St. Helena Island may indicate that *Nesobia* belongs to Pachnodidae rather than to Enidae.

? *Apoecus* Kobelt, 1902
Fig. 224

Kobelt, 1902: 887 (*Buliminus* subg.). Solem, 1959a: 153, 157.

TYPE SPECIES — *Buliminus (Ena) colonus* Moellendorff, 1895; OD.

Shell elongate-ovoid, rather solid, slightly translucent, of 9.25-10 moderately convex whorls. Last whorl not descending. Color yellowish-grey. Embryonic whorls microscopically spirally striated, sculpture of subsequent whorls of fine, irregular, radial wrinkles. Aperture moderately oblique, rounded-ovate, with scarcely reflexed margins. Parietal callus well developed. Umbilicus very narrow, hidden by reflection of columellar margin. Height 19.1-20.9, diam. 9.6-10.4 mm (20.6 × 9.6 mm).

DISTRIBUTION. New Guinea. 1 or 2 spp.

Remark. It is possible that this genus is an aberrant representative of Camaenidae.

ENIDAE Woodward, 1903

Woodward, 1903: 354, 358.

— Buliminidae L. Pfeiffer, 1879 (1878-1881): 282 [as fam. Buliminida; nom. praeocc., non Jones in Griffith et Henfrey, 1875 (Foraminifera)].

Schileyko, 1984: 238 (Buliminidae).

Shell ovate to slender, cylindrical, uniformly whitish, yellowish, corneous, brown or chestnut; sometimes with radial streaks, very rarely bicolored. Spiral bands never present. Aperture mostly simple, sometimes toothed (up to 7 teeth).

Vesiculae seminalis usually separated from hermaphroditic duct and situated circumferentially around proximal portion of duct (vesiculae seminalis not separated in Buliminuinae and Spelaeoconchinae). Flagellum usually present; if absent, vas deferens entering epiphallus excentrically. Epiphallus with not long tiberculiform caecum, in which spur of spermatophore is formed; sometimes caecum wanting. Penis lacking distinct process or sheath (exception: in Buliminuinae upper end of penis protruding in short process). Vagina not swollen, with solid, not pigmented walls. Spermatheca long, never sessile, spermathecal stalk primarily and mostly with diverticle.

Spermatophores with or (rarely) without one or two principal conic processes ("spurs"); sometimes there is also a number simple additional processes.

DISTRIBUTION. Europe but northern and north-eastern regions, Canary Islands, Azores, Cape Verde Islands, N Africa, Asia Minor, Arabia, Caucasus, Central and SE Asia, Japan.

REMARK. Bank & Neubert (1998) divided this family into two subfamilies: Bulimininae and Eninae, without discussing the taxonomic characters which had been used by Schileyko (1984) (see diagnoses of subfamilies below). Problems of taxonomic structure of this family will be discussed in the final part of the present book.

BULIMINUINAE Schileyko, nom. nov.

Pfeiffer L., 1879 (1878-1881): 282 (fam. Buliminida; see synonymy of the family).

Shell bullet-shaped, surface nearly smooth to tuberculate. Aperture toothless. Embryonic whorls glabrous.

Epiphallus with long flagellum. Epiphallic caecum absent. Penis internally with folds, without verge (except for *Mordania*) and prismoconic tubercles; its proximal (posterior) part enlarged and elongated as conic process. Penial appendix and diverticle of spermathecal duct present or absent.

DISTRIBUTION. N Africa, Asia Anterior with Arabia, N Iran, Transcaucasia.

REMARK. I have changed the name of the subfamily for one letter to avoid homonymy.

Buliminus Beck, 1837
Fig. 225

Beck, 1837 (1837-1838): 68.

— *Bulimina* Ehrenberg, 1831: 16 [nom. praeocc., non A.Orbigny, 1826 (Foraminifera); t.-sp. *Buliminus labrosus* Olivier, 1804; monotypy].

— *Petraeus* Albers, 1850: 183 (t.-sp. *Buliminus labrosus* Olivier, 1804; SD Martens in Albers, 1860).

Heller, 1975.

TYPE SPECIES — *Buliminus labrosus* Olivier, 1804; SD Gray, 1847.

Shell elongated-ovate, moderately solid, with wide rounded upper part. Whorls 6-6.5, weakly convex, body whorl practically straight. Apex rounded. Color whitish, corneous, or light-chestnut, sometimes with pinkish tint. Embryonic whorls finely granulate, rest also granulate, with irregular rather weak radial wrinkles. Aperture ample, ovate, its margins thin, widely reflexed and expanded. Columellar margin occupied by slack spiral thickening. Umbilicus very narrow. Height 12-40, diam. 4.8-18.0 mm (39.8 × 18.0 mm).

Vas deferens entering epiphallus at some angle. Penis with short sac-like proximal process, its inner surface with 2 wide longitudinal folds. All sections of penial appendix clearly expressed, except A-3. Penial branch of penial retractor attached at lower portion of penis, appendical branch — to A-1 well below A-2. Free oviduct much longer than vagina. Atrial retractor strong. Basal portion of spermathecal stalk more or less convoluted, diverticle longer than reservoir.

DISTRIBUTION. Asia Minor, N Iran, S Transcaucasia. 12-15 spp. & subspp.

Pene Pallary, 1929
Fig. 226

Pallary, 1929: 18. Heller, 1974: 258.

TYPE SPECIES — *Bulimus syriacis* L. Pfeiffer, 1846; SD Hesse, 1933.

Shell cylindrical-conic to ovate-conic, moderately solid, glossy, slightly translu-

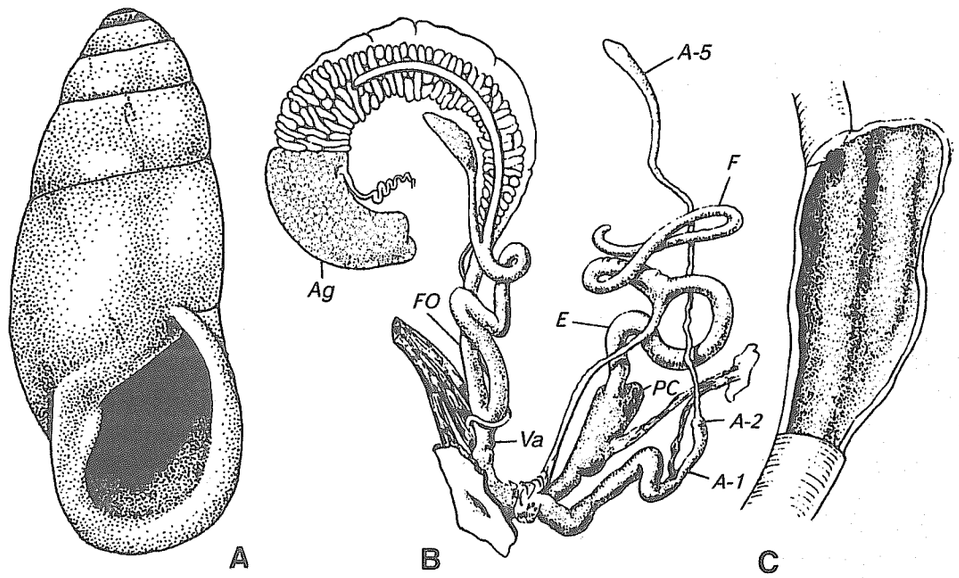


Fig. 225. ***Buliminus labrosus*** (Olivier, 1804).
A — shell: Syria. **Phil.** No. 3273. B — reproductive tract; C — interior of penis. Shefaram, Israel. **Moscow** No. Lc-23306. After Schileyko, 1978.

cent. Whorls 7-10.5, weakly convex, last a little and gradually ascending in front. Apex protruded. Color corneous-brown or purple to light-bluish, sometimes with indistinct radial streaks. Embryonic whorls smooth, rest surface covered with irregular radial wrinkles; body whorl with elements of malleate sculpture and scattered spiral strikes. Aperture ovate, parietal callus distinct, margins reflexed. Umbilicus, a narrow rim. Height 12.7-20.0, diam. 4.5-8.5 (16.8 × 5.9 mm).

Flagellum cylindrical, with blunt tip. Epiphallus more or less narrowing at its lower part. Penis clavate, with not long but quite distinct caecum, internally with relief of sinuous folds two of which run to penial caecum. All sections of penial appendix normally developed. Arms of penial retractor arising on diaphragm side-by-side, one of them attached to middle part of penis, the other — to A-1 near its middle. Free oviduct much longer than very short vagina. Spermathecal shaft very long, strongly convoluted, diverticle markedly longer than reservoir.

DISTRIBUTION. Asia Anterior. 6-8 spp. & subspp.

Paramastus Hesse, 1933
Fig. 227

Hesse, 1933: 181 (?*Ena* sect.). Heller, 1971: 264.

TYPE SPECIES — *Bulimus episoma* Bourguignat, 1857; OD.

Shell dextral (sinistral specimens known), pointed-ovate, solid, of 6.25-8 nearly flat whorls. Body whorl straight. Apex protruding. Color olive-green to yellow or corneous-reddish. Embryonic whorls smooth, postapical with reticulate sculpture, consisting of coarse irregular wrinkles, crossed by spiral grooves. Aperture rounded, toothless, places of its insertion not approached. Apertural margins thickened, reflexed. Height 15.8-22.1, diam. 7.5-10.3 mm.

Flagellum short to very short, conic.

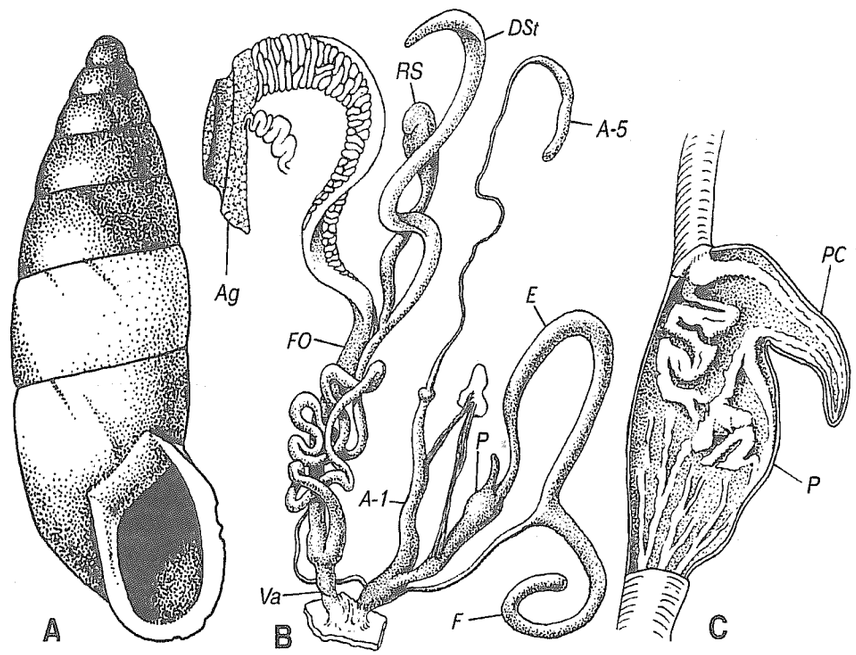


Fig. 226. ***Pene syriacus*** (L. Pfeiffer, 1846).
Metulla, Israel. A — shell; B — reproductive tract; C — interior of penis. **Moscow** No. Lc-23308. After Schileyko, 1978.

Epiphallus of moderate length, with small caecum. Penial process rather long. Penial appendix of normal structure, branched off from lower portion of penis. Penial retractor arising from diaphragm by one extremely short band, which soon splitting: one arm attached to penis at various distance below epiphallus insertion, other — to upper section of A-1. Free oviduct somewhat longer than vagina. Diverticle of spermathecal stalk longer than reservoir.

DISTRIBUTION. Syria, Palestina, Lebanon, Israel, S Asia Minor, Cyprus. 2-3 spp. & several subspp.

Cyrenaeus Heller, 1971
Fig. 228

Heller, 1971: 271.

TYPE SPECIES — *Buliminus (Mastus) attenuatus* f. *edentata* Sturany, 1908; OD.

Shell as in *Paramastus*. Height 13.3-22.0, diam. 6.2-12.2 mm (17.0 × 7.5 mm)

Anatomically differs from *Paramastus* by absence of epiphallic caecum, penial appendix and, correspondingly, by uniramous penial retractor.

DISTRIBUTION. Cyrenaica. 5 spp.

Mordania Bank et Neubert, 1998

Bank & Neubert, 1998: 80.

TYPE SPECIES — *Buliminus omanensis* E.Smith, 1894; OD.

Shell elongated-ovate to elongated-conic, rather solid, of 5-7 flattened whorls. Color light-corneous to whitish. Sculpture weak. Aperture ample.

Flagellum and epiphallic caecum absent. Epiphallus short, penis consisting of subcylindrical proximal and swollen distal parts, containing large grooved verge. Penial appendix present or absent. Free oviduct and vagina rather long. Spermathecal shaft short, diverticle long and expanded; neck of reservoir rather long.

DISTRIBUTION. W Iran, N Oman.

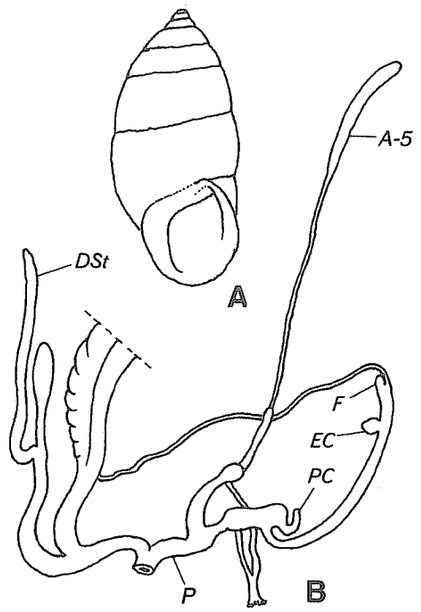


Fig. 227. A — ***Paramastus episomus*** (Bourguignat, 1857). Shell. After Heller, 1971.
B — ! ***Paramastus cyprius*** Zilch, 1951. Reproductive tract. After Hesse, 1933 (as *episomus*).

Mordania (*Iranopsis* Bank et Neubert, 1998)
Fig. 229

Bank & Neubert, 1998: 81.

TYPE SPECIES — *Bulimus carduchus* Martens, 1874; OD.

Shell ovate-conic. Aperture margins slightly to moderately reflexed. Height 16-19, diam. 8-10 mm (18.3 × 8.9 mm).

Penial appendix present, penial retractor biramous. Flagellum absent.

DISTRIBUTION. W Iran. 1 sp.

Mordania (*Mordania* s.str.)
Fig. 230

Shell ovate, pupiform. Aperture margins strongly reflexed and flared. Height 10.8-24.0, diam. 7.0-12.2 mm (23.9 × 12.2 mm).

Penial appendix absent, penial retractor uniramous. Flagellum present, very short.

DISTRIBUTION. N Oman. 1 sp.

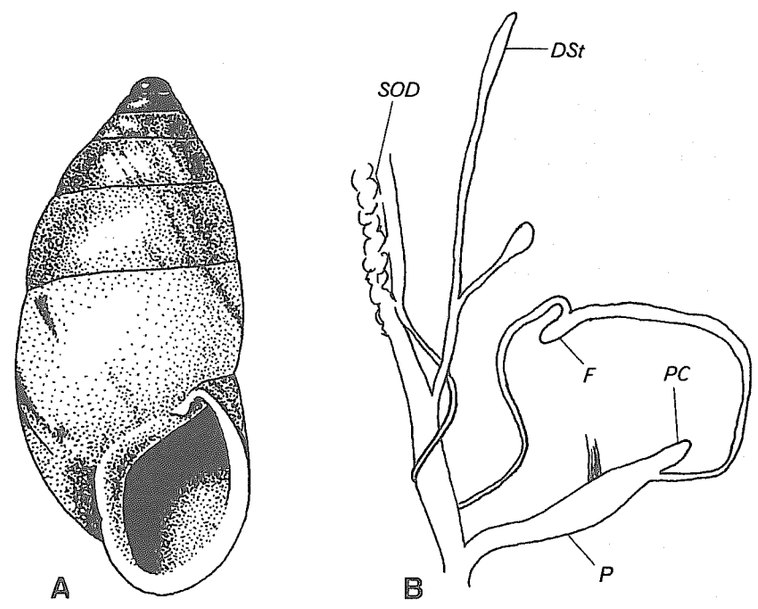
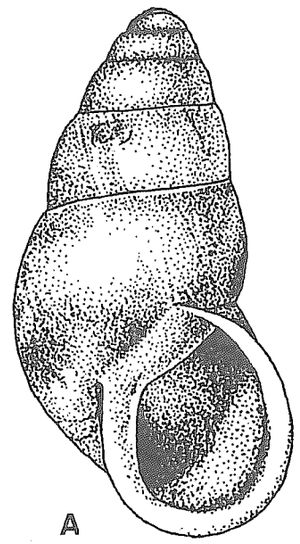


Fig. 228. ! ***Cyrenaeus dernensis*** (Zilch, 1951).
A — shell: Cyrene, Cyrenaica, Libya. **Leiden** No. 52372. B — reproductive tract. After Brandt, 1958.



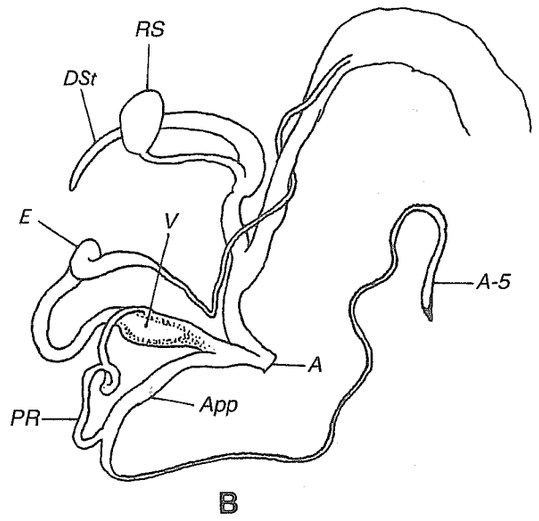


Fig. 229. ***Mordania (Iranopsis) carduchus*** (Martens, 1874).
A — shell: Gendj-Nameh, Kuh-e-Alvand, Bakhtaran Prov., Iran. **Paris**. B — reproductive tract. After Forcart, 1962.

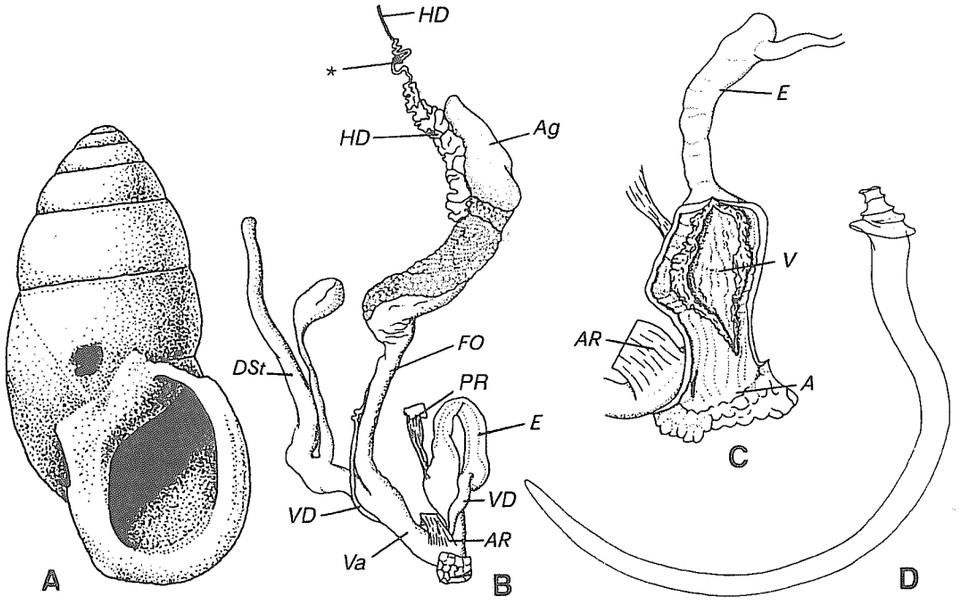


Fig. 230. ***Mordania (Mordania) omanensis*** (E.Smith, 1894).
A — shell: Green Mountain, Jebel Akhdar. Lectotype. **London** No. 1894.3.22.5. B — reproductive tract; C — interior of penis; D — spermatophore. After Mordan, 1986. Asterisk — seminal vesicles separated from hermaphroditic duct.

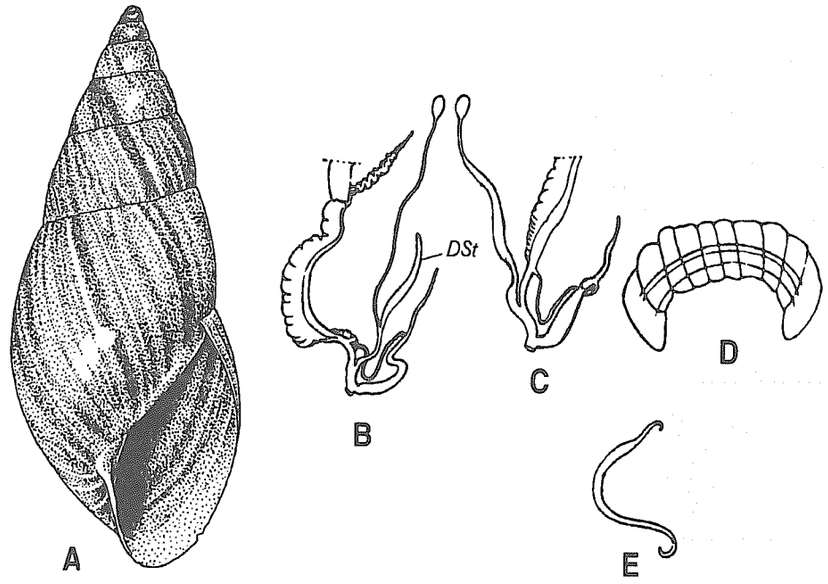


Fig. 231. ***Adzharia renschi*** Hesse, 1933.
A — shell: "Passhöhe bei Chula", Adjaria. Lectotype. **Berlin** No. Moll. 75 980a. B — reproductive tract of lectotype; C — same of paralectotype; D — jaw; E — spermatophore. After Hesse, 1933.

? Adzharia Hesse, 1933
Fig. 231

Hesse, 1933: 158.

TYPE SPECIES — *Adzharia renschi* Hesse, 1933; monotypy.

Shell ovate-conic, rather thin and fragile, translucent, of 7-8 slightly convex whorls. Last straight, evenly rounded at periphery. Color yellowish-creamy, with somewhat darker radial narrow strikes. Embryonic whorls with smoothed microgranulate sculpture; later whorls almost smooth, just with weak irregular radial wrinkles and widely spaced spiral incised lines, which locally obsolete. Aperture nearly ovate, moderately oblique, pointed at angular region; margins simple, sharp, not reflexed, except for columellar. Umbilicus very narrow, semicovered. Height 19.0-20.8, diam. 9.7-10.0 mm (20.8 × 9.7 mm).

Flagellum long, vermiform. Epiphallus short, without caecum. Penis fusiform-cylindrical, lacking proximal process. Penial appendix and penial retractor absent. Free oviduct and vagina of about equal length. Spermathecal stalk with or without diverticle.

DISTRIBUTION. Transcaucasia (Adjaro-Imerety Range). 1 sp.

REMARK. The taxonomic position of this genus is unclear. A single species of the genus is known from only two specimens, one of them has a diverticle of spermathecal stalk, the other without a diverticle. After all, the jaw of this species is of odontognathous type, thus, it differs from any other Enidae. Spermatophore is also not characteristic of Enidae, since it is fusiform and has smooth surface. I repeatedly tried to find some additional specimens in the type locality but all my efforts were resultless.

PSEUDONAPAEINAE
Schileyko, 1978

Schileyko, 1978: 843.

Shell variously sculptured. Embryonic

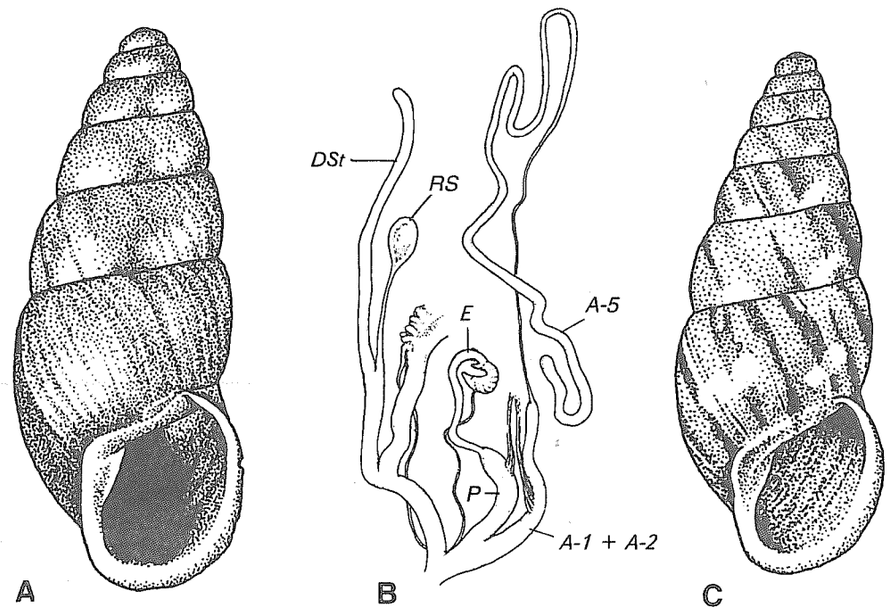


Fig. 232. A — ***Yakuena nesiotica*** (Pilsbry et Hirase, 1909). Shell: Jakujima, Osumi. **Phil.** No. 95769.
B — reproductive tract. After Minato, 1977.
C — ! ***Yakuena eucharista luchuana*** (Pilsbry, 1901). Shell: Yonaginijima Island, Okinawa, **Moscow** No. Lc-23291.

whorls smooth. Aperture toothless, rarely 1-3 teeth or palatal plica present.

Vas deferens entering epiphallus excentrically. Epiphallus with or without flagellum; when flagellum absent, epiphallus widely rounded at its blind end. Epiphallic caecum well developed. Penis in *Ottorosenia* thread-like, in species of rest genera internally with longitudinal folds, which may be grouped in 1-2 V-shaped pilasters or in 2-3 circular ridges. Sometimes grooved verge (stimulator) present. Prismoconic tubercles inside penis and penial caecum absent. Penial appendix present, diverticle of spermathecal stalk initially and mostly present.

DISTRIBUTION. Transcaucasia, Turkey, Iran, Afghanistan, India, Nepal, Central and SE Asia, Korean Peninsula, Java, Japan.

Yakuena Habe, 1955
Fig. 232

Habe, 1955: 264.

— *Luchuena* Habe, 1955: 265 (t.-sp. *Buliminus eucharista* Pilsbry, 1901; OD).

TYPE SPECIES — *Ena nesiotica* Pilsbry et Hirase, 1909; OD.

Shell elongated-ovate to turrited, thin, somewhat translucent, of about 7-9 slightly to moderately convex whorls. Last whorl straight. Color light corneous, reddish-brown or greenish, usually with white radial streaks. Embryonic whorls smooth or vaguely granulate, subsequent with distinct spiral engraved lines; on body whorl they sometimes turned to fragmentary malleation. Aperture rounded, slightly oblique, toothless, with moderately reflexed margins. Umbilicus minute, semicovered. Height 14-19, diam. 5.6-7.5 mm (*Y. nesiotica* — 16.5 × 6.4 mm; *Y. eucharista luchuana* — 18.6 × 7.2 mm).

Flagellum rather short, conic. Epiphallic caecum situated a little below entrance of vas deferens; short part of epiphallus between flagellum and caecum markedly enlarged, with semicircular folds. Rest part of epiphallus thin, cylindrical. Penis markedly swollen. Basal section of penial appendix (A-1 + A-2) cylindrical, long; A-3 tiny; A-4 + A-5 very long. Arms of penial retractor aris-

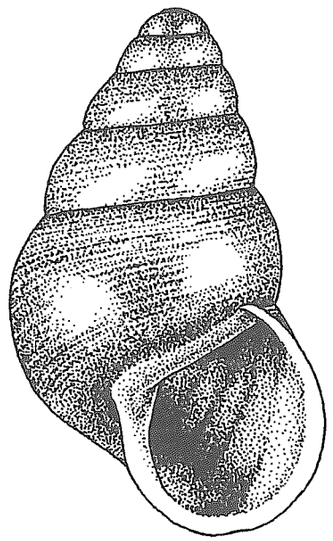


Fig. 233. ***Boninena callistoderma*** (Pilsbry, 1900). Ogasawarajima, Japan. Holotype. **Phil.** No. 78910.

ing from diaphragm independently but very close to each other, penial arm attached to upper half of penis, the other arm — to middle portion of A-1 + A-2. Free oviduct and vagina moderately long. Diverticle of spermatheca longer than reservoir plus its neck.

DISTRIBUTION. Japan. 8 spp. & subspp.

Boninena Habe, 1955
Fig. 233

Habe, 1955: 265.

TYPE SPECIES — *Buliminus callistoderma* Pilsbry, 1900; OD.

Shell ovate-conic, thin, fragile, glossy, translucent, of 6-7.5 slightly to moderately convex whorls. Last whorl scarcely ascending in front. Color yellow to yellowish-greenish. Embryonic whorls indistictly granulate, later with conspicuous sculpture of punctulate spiral grooves. Aperture subcircular, with thin reflexed margins. Umbilicus dot-like. Height 9.3-13.1, diam. 4.8-6.5 mm (10.3 × 5.5 mm).

DISTRIBUTION. Japan. 4 spp. & subspp.

Pupinidius Moellendorff, 1901
Fig. 234

Moellendorff, 1901 (1899-1901): 341 (*Buliminus* subg.).

TYPE SPECIES — *Buliminus pupinidius* Moellendorff, 1901; OD.

Shell shortly cylindrical, mostly keg-like, of 7-8 whorls. Last whorl markedly ascending in front. Coloration consisting of whitish or creamy ground and variously developed, irregularly spaced corneous streaks of radial orientation. Embryonic whorls smooth, postnuclear finely wrinkled (nearly glabrous). Aperture vertical, toothless, places of its insertion somewhat approached; aperture margins with expanded lip, forming a cuff. No umbilicus, but slit-like umbilical depression present. Height 13-23, diam. 6-12 mm (21.2 × 11.0 mm).

Vas deferens entering epiphallus at some distance from top, flagellum short, conic. Epiphallus very long, slender, with well defined caecum. Penis cylindrical, its distal portion internally with thin corrugated folds; proximal portion occupied by thin but high V-shaped pilaster, both arms of which entering lumen of epiphallus. Penial appendix branching off from penis at some distance from atrium; A-1 + A-2 fused, long; A-3 well expressed, short, A-4 gradually passing to A-5. Penial arm of penial retractor attached to boundary between distal and proximal sections of penis, appendical arm — to upper part of A-1 + A-2. Free oviduct and vagina long. Spermathecal stalk strongly convoluted and sinuous, with long diverticle.

DISTRIBUTION. W China and Nepal. 13-14 sp., subsp. & forms.

Serina Gredler, 1898
Fig. 235

Gredler, 1898: 106.

TYPE SPECIES — *Buliminus ser* Gredler, 1898; SD Moellendorff, 1901.

Shell high, slender, turrited, solid, glossy, of 8-11 moderately convex whorls, last more or less descending in front, usually with smoothed spiral peripheral depression. Color yellowish to light-brown, with irregular dark radial streakes; apex rich reddish-brown. Embryonic whorls polished, later with weak, smoothed, irregular radial wrin-

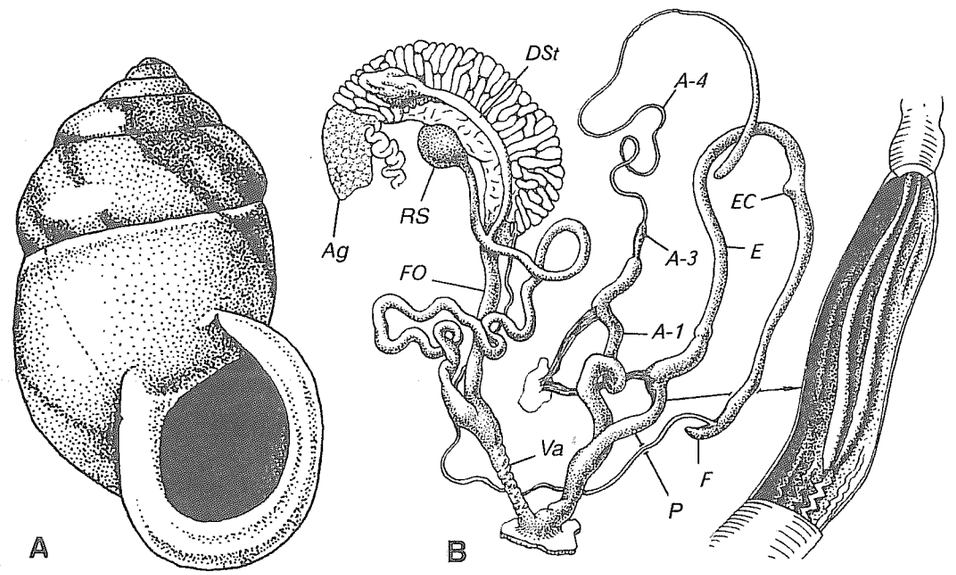


Fig. 234. ***Pupinidius pupinidius*** (Moellendorff, 1901). Dshie-dsheu, Prov. Gansu, China. A — shell. **SPb**. B — reproductive tract and interior of penis. **Moscow** No. Lc-20927 (**SPb**).

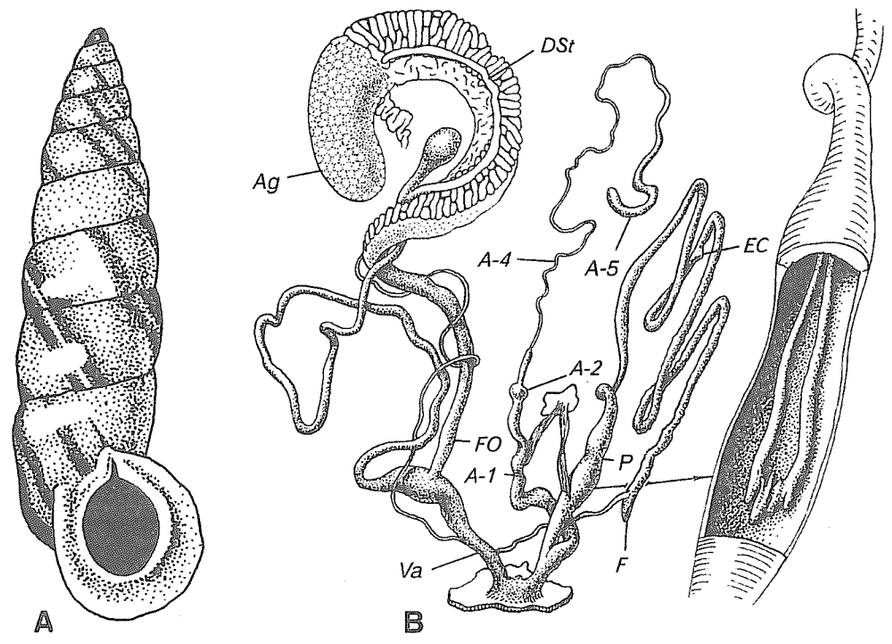


Fig. 235. ***Serina ser*** (Gredler, 1898). Van-chusa-na, Gansu Prov., China, September 12, 1885. A — shell; B — reproductive tract and interior of penis. **Moscow** No. Lc-23295 (**SPb**).

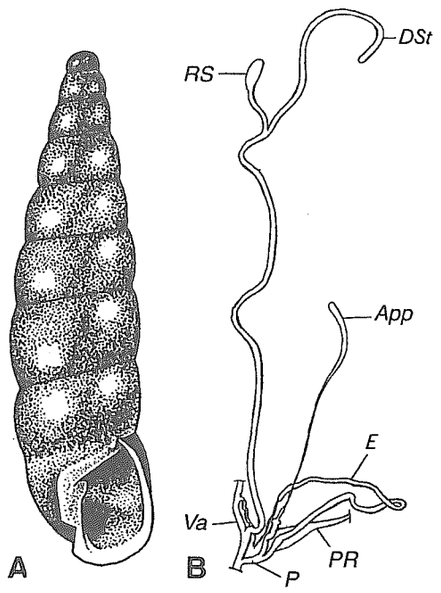


Fig. 236. A — ***Holcauchen sulcata*** (Moellendorff, 1901). Shell: Peishui River, China. **SPb**.
B — ! ***Holcauchen hyacinthi*** (Gredler, 1898). Male section of reproductive tract. After Wiegmann, 1901.

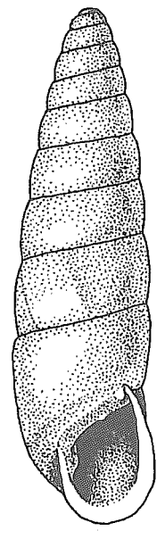


Fig. 237. ***Clausiliopsis szechenyi*** (O. Boettger, 1883).
Quan-Ting, China. **SPb**.

kles. Aperture subvertical, circular, nearly adnate, with widely expanded and reflexed white margins and very narrow, slit-like sinulus. Umbilicus narrowly open. Height 6-14, diam. 1.5-3.7 mm (13.7 × 3.5 mm).

Flagellum short, conic. Epiphallus very long, forming a few loops, with small caecum. Penis irregularly fusiform, with V-shaped pilaster inside, both arms of pilaster running to lumen of epiphallus. A-1 long, A-2 small, globular, A-3 short, A-4 very long and thin, A-5 unusually short. Arms of penial retractor arising from diaphragm close to each other, appendical arm inserted on A-1 above its middle, penial arm — on penis below its middle. Free oviduct very long, vagina markedly shorter. Spermathecal stalk enormously long, convoluted, neck of reservoir very short, diverticle much longer.

DISTRIBUTION. China. 8-10 spp.

Holcauchen Moellendorff, 1901
Fig. 236

Moellendorff, 1901 (1899-1901): 362 (*Buliminus* subg.).

TYPE SPECIES — *Buliminus sulcatus* Moellendorff, 1901; OD.

Shell high, slender, glossy, thin, translucent, of 8 moderately convex whorls; body whorl somewhat ascending immediately behind aperture. Color brown to reddish-brown, nearly uniform. Embryonic whorls polished, rest whorls practically smooth, with only individual fine radial wrinkles. Aperture rather small, with well developed parietal callus, bearing angular tubercle. Baso-columellar part of aperture with weak oblique spiral plica, and one more, much more developed plica above it. Apertural margins thickened, forming white cuff. Neck of aperture white. Body whorl with circular depression behind aperture, corresponding to palatal thickening inside aperture. Umbilicus ovate, tiny. Height 5.6-11.0, diam. 1.8-4.0 mm (9.4 × 2.5 mm).

Flagellum very short or absent. Epiphallus unusually long, cylindrical, without caecum. Penis short, slightly clavate or subcylindrical. All sections of penial appendix well developed. Arms of penial retractor arising on diaphragm independently, but very close to each other. Penial arm attached to penis

above A-1 insertion, the other arm — to A-1 below A-2. Free oviduct and vagina moderately long, subequal. Spermathecal stalk enormously long, diverticle rather long, neck of reservoir short.

DISTRIBUTION. China. About 10 spp.

Clausiliopsis Moellendorff, 1901
Fig. 237

Moellendorff, 1901 (1899-1901): 368 (*Buliminus* subg.).

TYPE SPECIES — *Buliminus (Zebrina) szechenyi* O.Boettger, 1883; OD.

Shell turrited, solid, weakly shining, of about 10 slightly convex whorls, last whorl a little and gradually elevated towards aperture. Color brown to nearly white, sometimes with weak radial dark streakes. Embryonic whorls smooth, rest surface covered by weak irregularly spaced wrinkles, but as generally looking smooth. Aperture small, subvertical, parietal callus weak, although angular tubercle well visible. Columellar margin occupied by oblique lamella, much enlarging inside penultimate whorl, and then disappearing. Apertural margins thickened and widely reflexed, forming a cuff. Umbilicus, a minute, short and narrow slit. Height 12-17, diam. 3.8-5.7 (14.5 × 4.2 mm).

DISTRIBUTION. China. About 10 spp.

Pupopsis Gredler, 1898
Fig. 238

Gredler, 1898: 10.

TYPE SPECIES — *Buliminus pupopsis* Gredler, 1898; OD.

Shell elongate ovate, rather solid, slightly glossy, of 7-8 moderately convex whorls. Last whorl straight, evenly rounded at periphery. Color light corneous to whitish. Apex smooth, subsequent whorls finely irregularly wrinkled. Aperture ovate or auriculate, slightly oblique, with thickened and reflexed margins and 3-4 teeth. Angular tubercle usually well developed, parietal lamella tooth-like; columellar lamella rounded; palatal plica entering nearly full whorl. Umbilicus minute, cylindrical. Height 5.5-14.6, diam. 2.0-5.7 mm (14.6 × 5.7 mm).

DISTRIBUTION. China. 6 sp.

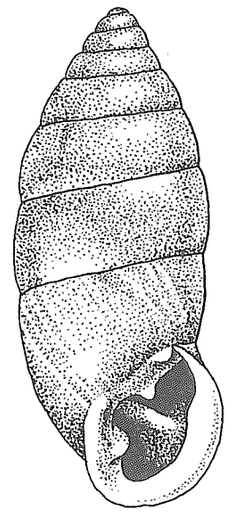


Fig. 238. ***Pupopsis pupopsis*** (Gredler, 1898). Tshiu-dsei-dsy near Hsi-gu-tsheng, China. **Senck.** No. 42080.

Petraeomastus Moellendorff, 1901
Fig. 239

Moellendorff, 1901 (1899-1901): 348 (*Buliminus* subg.).

TYPE SPECIES — *Buliminus heudeanus* Ancey, 1883; OD.

Shell subcylindrical, rather solid, of 8 flattened whorls. Last whorl straight or scarcely descending. Color white to light corneous. Apex smooth, glossy, postembryonic whorls with irregular but sharp radial striation. Aperture ovate, toothless, with more or less thickened margins. Umbilicus, a narrow perforation. Height 16-30, diam. 5-10 mm (30.0 × 10.0 mm).

Flagellum very short, blunt. Epiphallus long, without caecum. Penis relatively short, subcylindrical. All divisions of penial appendix normally expressed. Arms of penial retractor closely approached on diaphragm; penial arm attached to upper portion of penis, appendical arm — to A-1 just below A-2. Free oviduct and vagina subequal,

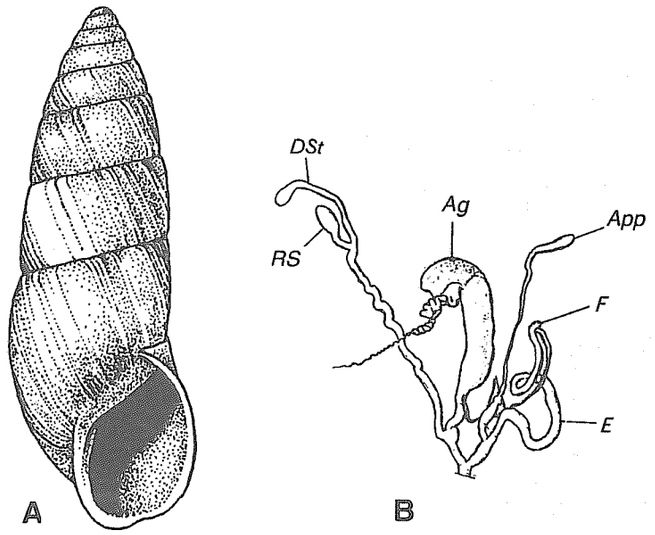


Fig. 239. A — ***Petraeomastus heudeanus*** (Moellendorff, 1901). Shell: Tibet. **Phil.** No. 127763.
B — ! ***Petraeomastus oxyconus*** (Moellendorff, 1901). Reproductive tract. After Wiegmann, 1901.

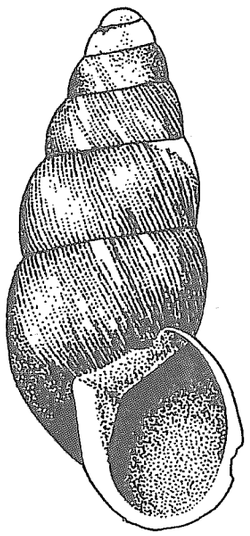


Fig. 240. ***Coccoderma granulata*** (Moellendorff, 1901).
Hammocks. **SPb**.

rather short. Spermathecal stalk long, diverticle well developed, neck of reservoir short.

DISTRIBUTION. W China. 17 spp.

Coccoderma Moellendorff, 1901
Fig. 240

Moellendorff, 1901 (1899-1901): 378 (*Buliminus* subg.).

TYPE SPECIES — *Buliminus granulatus* Moellendorff, 1901; OD.

Shell ovate-conic, rather fragile, slightly glossy. Whorls 6-7, moderately convex, body whorl slightly ascending just behind aperture. Color uniformly dark-corneous. Embryonic whorls virtually smooth, surface of rest whorls with irregular radial wrinkles; in some places wrinkles broken into series of tubercles; elements of spiral and malleate sculpture also present. Places of peristome insertion not approached, margins of aperture white, thin, without lip, widely reflexed and expanded. Umbilicus, a minute perforation. Height 9-23, diam. 3-8 mm (14.0 × 5.0 mm).

DISTRIBUTION. SE Asia, Java. 3-5 spp.

Lophauchen Moellendorff, 1901
Fig. 241

Moellendorff, 1901 (1899-1901): 377 (*Buliminus* subg.).

TYPE SPECIES — *Buliminus cristatellus* Moellendorff, 1901; OD.

Shell subcylindrical, slender, rather solid, slightly translucent, of 9-10.5 moderately convex whorls; last straight or slightly and gradually descending toward aperture. Color uniformly light corneous. Embryonic whorls practically smooth, postapical bear strong rounded ribs with irregular fine radial wrinkles in interspaces. Aperture somewhat oblique, small, rounded, continuous because of strong development of parietal callus. Margins of aperture weakly reflexed, thickened, white. Neck thickening whitish. Umbilicus, a short and narrow slit. Height 9.0-11.5, diam. 3.5-3.7 mm (11.5 × 3.7 mm).

DISTRIBUTION. Provinces Gansu and Sichuan, China. 1 sp.

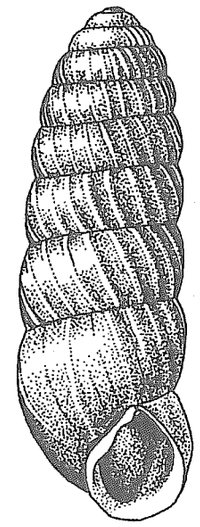


Fig. 241. ***Lophauchen cristatella*** (Moellendorff, 1901).
Sychuan Prov., China. **SPb**.

Mirus Albers, 1850
Fig. 242

Albers, 1850: 184 (*Bulimus* subg.).

TYPE SPECIES — *Bulimus cantori* Philippi, 1844; monotypy.

Shell elongated-ovate, glossy, weakly translucent, moderately solid. Whorls 7-8, slightly to moderately convex, body whorl a little ascending toward aperture. Color corneous. Embryonic whorls practically smooth. Rest surface covered with smoothed irregular radial wrinkles, locally crossed by spiral striae. Aperture elliptic, with white widely reflexed and expanded margins; no lip. Umbilicus, a short and narrow slit, semicovered. Height 8-32, diam. 3-13 mm (23.8 × 9.2 mm).

Flagellum very short or nearly absent. Epiphallus rather long, caecum variously developed. Penis short. All sections of penial appendix normally developed except A-3. Branches of penial retractor arising on diaphragm independently, penial arm inserted near penis/epiphallus junction, appendical arm — on upper portion of A-1. Additional retractor attached apically to epiphallus sometimes present. Free oviduct and vagina moderately long, subequal. Spermathecal shaft rather long, diverticle normally developed.

DISTRIBUTION. E Asia, Japan. More than 20 spp., subspp. & forms.

Pseudonapaeus Westerlund, 1887

Westerlund, 1887 (1884-1890): 66. Schileyko, 1984: 244.

TYPE SPECIES — *Buliminus asiaticus* Martens, 1881; SD Lindholm, 1922.

Shell more or less elongated, of various shape, smooth to radially ribbed. Aperture toothless or with 1-3 teeth, aperture margins reflexed.

Flagellum wanting or vestigial. Epiphallus with distinct caecum. Penis internally with 1-2 V-shaped pilasters. Verge and stimulator absent (exception: subgenus *Aridenus*). Diverticle of spermathecal duct normally developed.

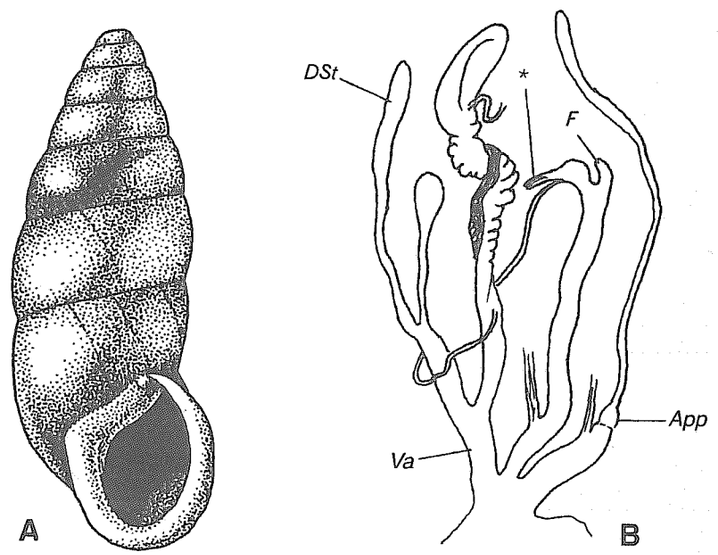


Fig. 242. A — ***Mirus cantori*** (Philippi, 1844). Shell: Hupei, China. **SPb**.
B — ! ***Mirus reinianus*** (Kobelt, 1875). Reproductive tract. After Jacobi, 1898. Asterisk — additional retractor of epiphallus.

DISTRIBUTION. Anterior and Central Asia, NW Hindustan peninsula.

Pseudonapaeus (*Pseudonapaeus* s.str.) Fig. 243

— *Chondrulopsis* Westerlund, 1887 (1884-1890): 66 (t.-sp. *Buliminus sogdianus* Martens, 1874; SD Lindholm, 1925). Muratov, 1992: 43.

— *Sewertzowia* Kobelt, 1888: 40 (t.-sp. *Buliminus dissimilis* Martens, 1882; monotypy).

— *Pseudopetraeus* Westerlund, 1896: 189 (*Buliminus* subg.; t.-sp. *Buliminus albiplicatus* Martens, 1874; SD Lindholm, 1925).

— *Cauliculus* Lindholm, 1925: 27 [*Ena (Pseudopetraeus)* sect., t.-sp. *Buliminus schmitnikovi* Lindholm, 1922; OD].

— *Laeonapaeus* Lindholm, 1925: 27 [*Ena (Pseudopetraeus)* sect., t.-sp. *Buliminus goldfussi* Kobelt, 1893; OD].

— *Oedichilus* Lindholm, 1925: 28 [*Zebrina (Subzebrinus)* sect., t.-sp. *Buliminus merzbacheri* Weber, 1913; OD].

— *Styloptychus* Lindholm, 1925: 28 [*Zebrina (Subzebrinus)* sect., t.-sp. *Buliminus kasnakovi* Westerlund, 1898; OD].

— *Parachondrula* Lindholm, 1925: 30 (*Sewertzowia* subg., t.-sp. *Buliminus retrodens* Martens, 1879; OD).

— *Jaminia* sensu Matiokin, 1966: 112 (non Risso, 1826).

Shell dextral or sinistral, smooth to heavily sculptured, monochromate or radially streaked. Apertural teeth absent or present (1-3 in number), but no palatal elongated plica. Height 5-24 diam. 2.2-9.0 mm (8.0 × 3.6 mm).

Penial verge absent, penis internally furnished with a pair or (rarely) one V-shaped pilaster; sometimes relief of inner walls consists of great number of chaotically scattered folds.

DISTRIBUTION as of genus. Over 40 spp.

REMARK. Muratov (1992) suggested to use the name *Chondrulopsis* Westerlund as a subgenus of *Pseudonapaeus*. However Muratov includes in this subgenus both the species with penial verge (*eremita* Benson, 1849) and without it (*sogdiana* Martens, 1874 and *gut-*

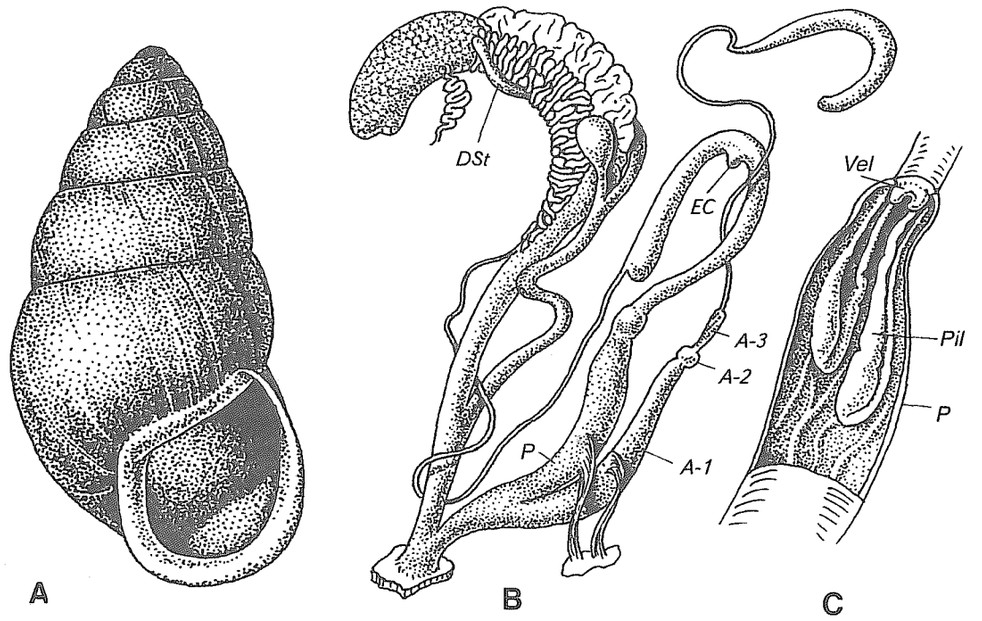


Fig. 243. ***Pseudonapaeus (Pseudonapaeus) asiaticus*** (Martens, 1881).
Karabalty Gorge, Kirghiz Ridge, June 14, 1972. A — shell; B — reproductive tract; C — interior of penis. **Moscow** No. Lc-22490.

tula Muratov, 1992). At the same time, *Pseudonapaeus* differs from *Laevozebrinus* (see below) mainly by the presence/absence of penial verge, and the type species of *Chondrulopsis* undoubtedly belongs to subgenus *Pseudonapaeus*.

Pseudonapaeus (*Siraphorus* Lindholm, 1925) Fig. 244

Lindholm, 1925: 29, 32 (pro gen.). Schileyko, 1984: 269.

TYPE SPECIES — *Buliminus entoptyx* Lindholm, 1925; OD.

Sheil sinistral, turrited to subcylindrical, glossy, of 7-8 slightly convex whorls. Last whorl straight or scarcely ascending to aperture. Color light-brown to reddish-chestnut, apertural margin white. Sculpture very weak. Aperture small, with thickened margins and strong parietal callus, its armament represented by single longitudinal palatal plica, lying deep inside aperture. Umbilicus minute, ovate. Height 7.5-10.0, diam. 2.5-3.0 (9.2 × 2.8 mm).

Penial verge absent, penis internally with two strong V-shaped pilasters.

DISTRIBUTION. W Tien-Shan (Pskem, Talas, Ferghana Ridges). 1 sp.

Pseudonapaeus (*Aridenus* Schileyko, 1984) Fig. 245

Schileyko, 1984: 271.

TYPE SPECIES — *Ena submucronata* Lindholm, 1927; OD.

Shell dextral, nearly smooth, slightly wrinkled, corneous. Aperture large, unarmed. Height 13-17, diam. 7-9 mm (15.0 × 7.1 mm).

Penis internally with single V-shaped pilaster and well developed pivot-like verge (stimulator) bearing a deep groove on its surface. Verge between arms of pilaster.

Distrubution. Tien-Shan (Chatkal Range). 1 sp.

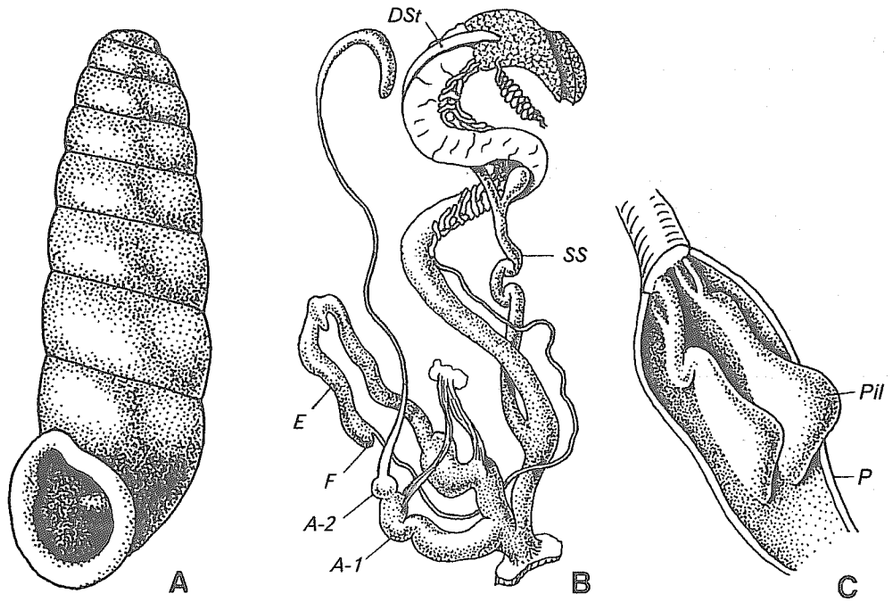


Fig. 244. ***Pseudonapaeus (Siraphorus) entoptyx*** (Lindholm, 1925).
Valley of Pskem River above Nanai village, W Tien-Shan, May 17, 1972. A — shell; B — reproductive tract; C — interior of penis. **Moscow** No. Lc-23288. After Schileyko, 1977.

Laevozebrinus Lindholm, 1925
Fig. 246

Lindholm, 1925: 28 [*Zebrina (Subzebrinus)* sect.].

TYPE SPECIES — *Buliminus urgutensis* Kobelt, 1902; OD.

Shell dextral or sinistral, elongated-ovate to cylindrical, of 7-9 slightly convex whorls. Color uniformly white or with dark radial streaks. Postembryonic whorls often with radial folds and wrinkles, but never ribbed. Aperture without teeth, its margins moderately reflexed, places of their attachment not approached. Height 11.0-28.0, diam. 4.3-12.0 mm (22.2 × 10.8 mm).

Flagellum absent or very short, blunt. Epiphallus long, with distinct caecum. Penis internally with folds and trilobate verge; one of lobes developed much better than two others. A-1 long and slender; A-2 small, A-3 short. Free oviduct and vagina of about equal length. Diverticle of spermathecal stalk present.

DISTRIBUTION. Iran, Afghanistan, mountain regions of Central Asia; perhaps N Pakistan and adjacent territories of India. About 10 spp.

Turanena Lindholm, 1922

Lindholm, 1922: 275 (*Ena* subg.; nom. nov. pro *Pseudonapaeus* Kobelt et Moellendorff, 1902, non Westerlund, 1887).

— *Pseudonapaeus* Kobelt et Moellendorff in Kobelt, 1902: 1021 (non Westerlund, 1887; t.-sp. *Buliminus herzi* O. Boettger, 1889; OD).

Schileyko, 1984: 274.

TYPE SPECIES — *Buliminus herzi* O.Boettger, 1889; OD.

Shell turbinate to high conic, whorls convex to very convex. Embryonic whorls glossy, rest surface weakly sculptured with radial irregular wrinkles. Aperture elliptic, unarmed, with reflexed margins; peristome insertions more or less strongly approached.

Flagellum well developed, conic or spatula-like. Epiphallus with caecum. Penis internally with 1-2 pilasters, which are sometimes modified. Penial verge absent. Diver-

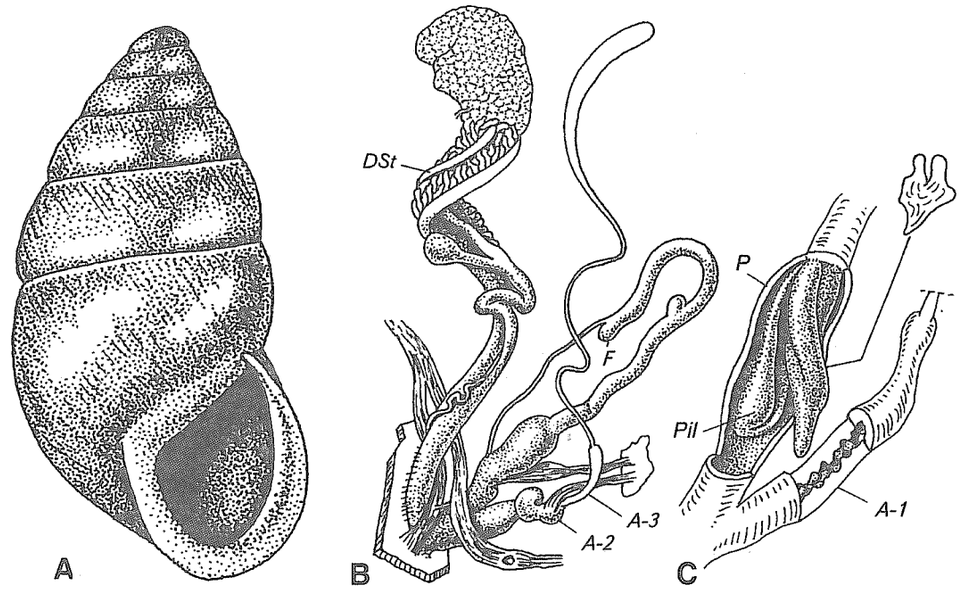


Fig. 245. ***Pseudonapaeus (Aridenus) submucronatus*** (Lindholm, 1927).
A — shell: middle part of Uzun-Akhmat River, Chatkal Ridge. Lectotype. **SPb**. B — reproductive tract; C — interior of penis and of A-1: Valley of Narin River above Tash-Kumyr, W Tien-Shan, May 31, 1972. **Moscow** No. Lc-23310.

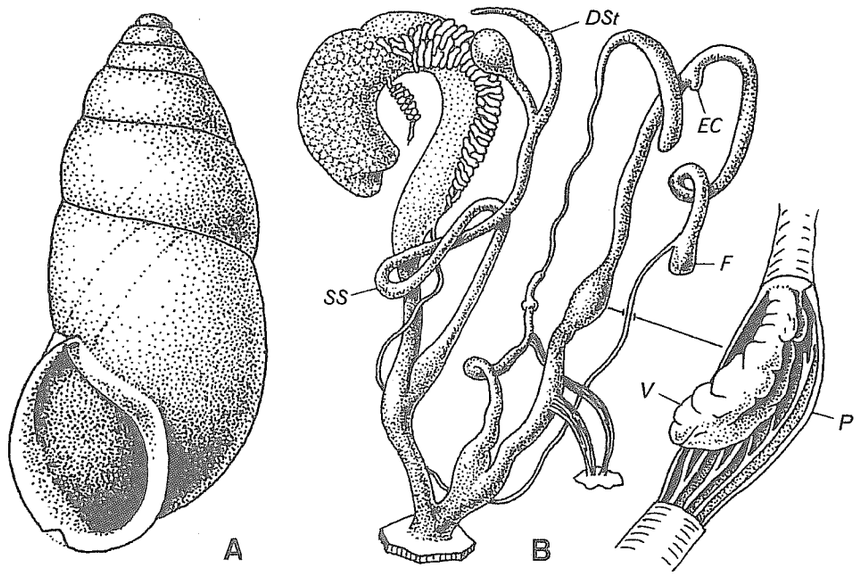


Fig. 246. A — ***Laevozebrinus urgutensis*** (Kobelt, 1902). Shell: Urgut near Samarkand. **SPb**.
B — ! ***Laevozebrinus eremita*** (Benson, 1849): Urgut near Samarkand. Reproductive tract and interior of penis. **SPb**. After Schileyko, 1984.

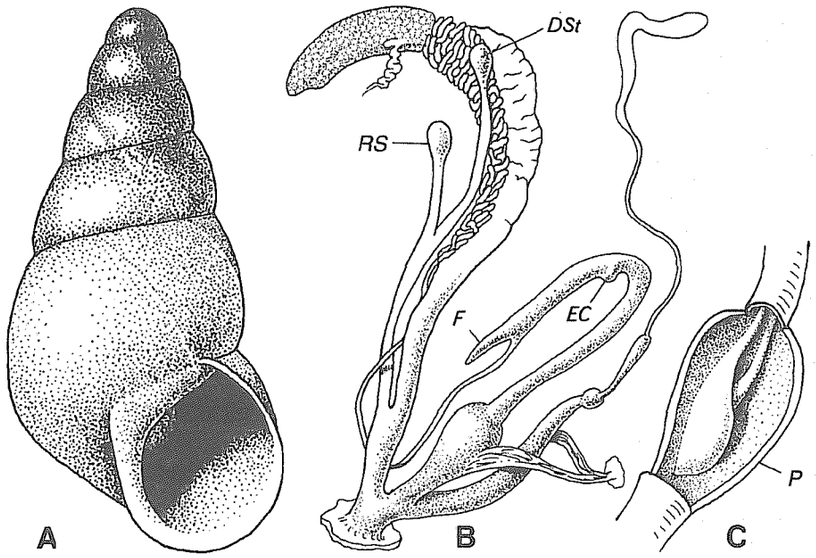


Fig. 247. ***Turanena (Asuranena) leptogyra*** (Lindholm, 1927).
Narrow gorge at right bank of Pskem River above Nanai village, May 21, 1972. **Moscow** No. Lc-23285.

ticle of spermathecal stalk normally developed.

DISTRIBUTION. Asia Minor, Transcaucasia and Central Asia.

Turanena (*Asuranena* Schileyko et Moisseyeva, 1995) Fig. 247

Schileyko, Moisseyeva, 1995: 48.

TYPE SPECIES — *Ena (Turanena) leptogyra* Lindholm, 1927; OD.

Shell dextral or (1 sp.) sinistral. Height 8-19.5, diam. 3.5-11.8 mm (9.7 × 4.5 mm).

Flagellum relatively long, conic, slender, tapering towards its summit. Penis internally with very strong Y-shaped pilaster.

DISTRIBUTION. Mountains of Central Asia. 10 spp.

Turanena (*Turanena* s.str.) Fig. 248

Shell dextral. Height 4.9-12.1, diam. 2.3-6.2 mm (7.5 × 4.4 mm).

Flagellum short to very short, having rounded or blunt apex. Penis internally with poorly pronounced, irregularly V-shaped pilaster.

DISTRIBUTION. Asia Minor, Iranian upland, Transcaucasia. 10 spp.

Subzebrinus Westerlund, 1887 Fig. 249

Westerlund, 1887 (1884-1890): 66. Schileyko, 1984: 272.

TYPE SPECIES — *Buliminus labiellus* Martens, 1881; SD Moellendorff, 1901.

Shell cylindrical to ovate-cylindrical, rather solid, of 6-8 slightly to moderately convex whorls; last scarcely ascending in front. Color white, light-grey or corneous, often with dark streaks. Postembryonic sculpture weak, of irregular gentle radial wrinkles; elements of spiral striation sometimes present. Aperture rounded, slightly oblique, margins a little reflexed and thickened by threshold-like lip lying just behind

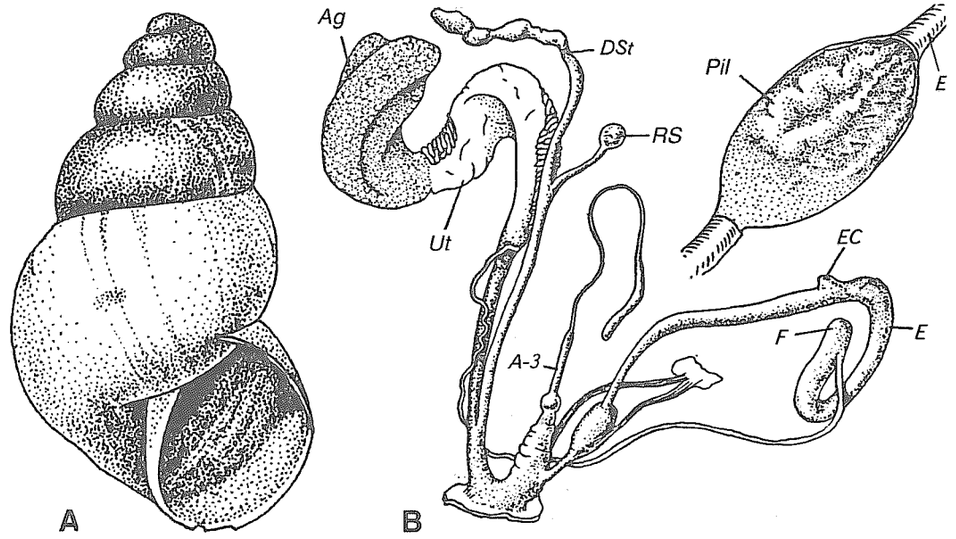


Fig. 248. A — ***Turanena (Turanena) herzi*** (Boettger, 1889).
Shell: Schahrud, N Iran. Lectotype. **Senck.** No. 156687. B, C — ! ***Turanena (Turanena) scalaris*** (Naegele, 1902). B — reproductive tract; C — interior of penis. After Schileyko, 1984.

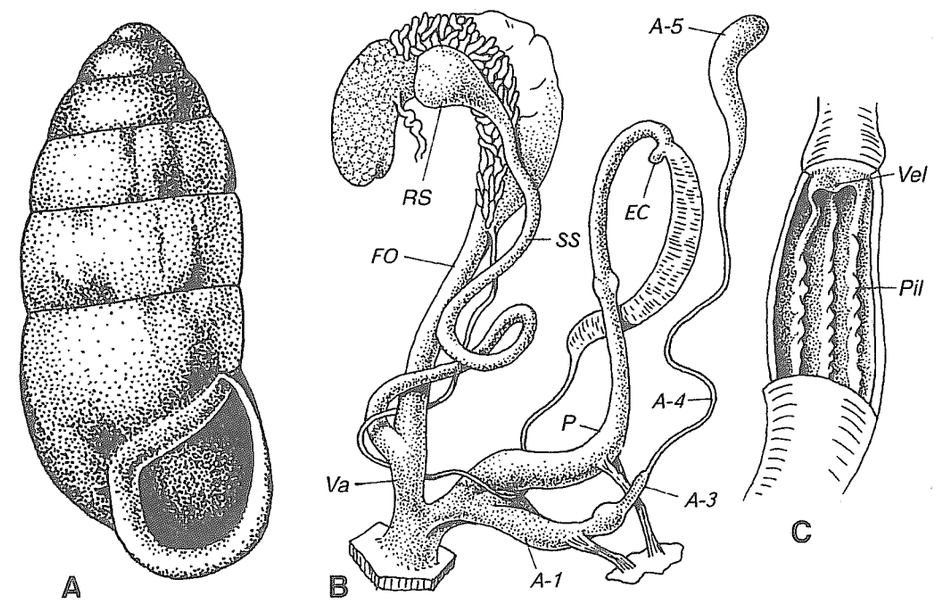


Fig. 249. ***Subzebrinus labiellus*** (Martens, 1881).
Djunghar Ridge, upper part of Charsa-chai River valley, June 12-15, 1969. **SPb**. A — shell; B — reproductive tract; C — interior of penis.

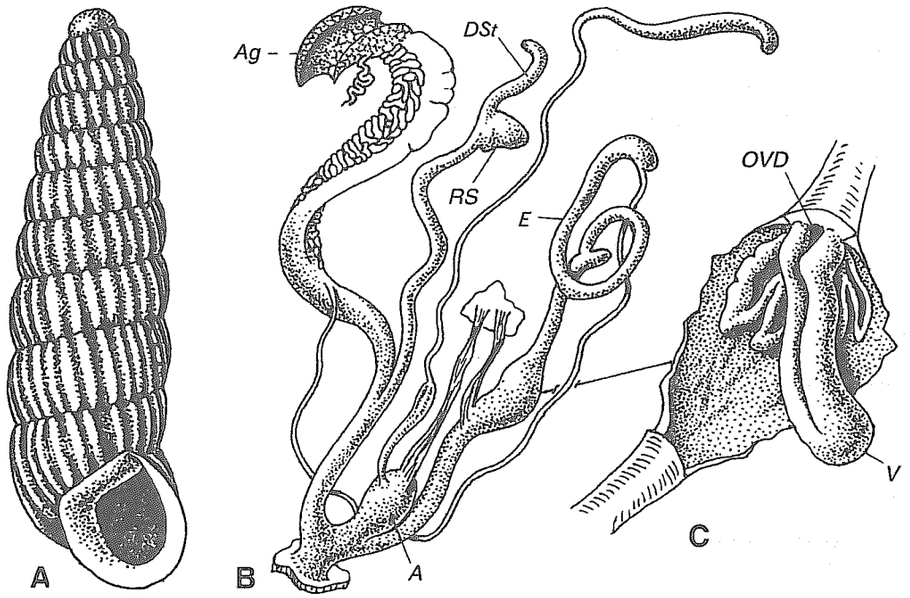


Fig. 250. ***Mastoides albocostatus*** (Westerlund, 1896).
Arslanbob, Ferghana Range, June 20, 1961. A — shell; B — reproductive tract; C — interior of penis. **SPb**.

edge. Umbilicus minutely open. Height 8-16, diam. 4-6 mm (14.8 × 5.0 mm).

Vas deferens entering epiphallus excentrically, but flagellum as such absent. Part of epiphallus between vas deferens and well-developed caecum highly muscularized. Penis internally with 2-3 longitudinal corrugated pilasters; two of them fused at epiphallic pore, forming variously developed velum; one (may absent) pilaster running to lumen of epiphallis. Penial verge wanting. Free oviduct long, vagina very short. Spermathecal stalk long, sleeve-like, loosely convoluted, reservoir without distinct boundary with stalk. Diverticle wanting.

DISTRIBUTION. SE Kazakhstan and adjacent territories of China. Probably 1 highly variable sp.

REMARK. Bank & Neubert (1998) consider this genus as a synonym of *Pseudonapaeus*.

Mastoides Westerlund, 1896
Fig. 250

Westerlund, 1896: 192 (*Buliminus* subg.). Schileyko, 1984: 297.

TYPE SPECIES — *Buliminus albocostatus* Westerlund, 1896; monotypy.

Shell slender, turrited, moderately solid, of 8-11 rather convex whorls. Last whorl markedly ascending toward aperture. Color light-corneous to chestnut, ribs white. Embryonic whorls glabrous, subsequent with strong, regular ribs. Aperture rounded, slightly oblique, margins reflexed and thickened, places of peristome attachment not approached. Parietal callus well developed. Umbilicus in form of wide slit. Height 8.2-14.0, diam. 3.0-4.2 mm (12.2 × 3.6 mm).

Flagellum exceptionally short, rounded. Epiphallus long, with pointed caecum. Penis thin-walled, internally with pivot-like verge (stimulator) bearing groove on its surface; inner walls of penis occupied by folds of roughly circular shape. Basal section of penial appendix (A-1 + A-2) semiglobose, A-3 enters at some distance from apex of basal section. Branches of penial retractor arising from diaphragm independently, appendical branch attached to A-1 + A-2 apically, penial branch — to penis below swollen part of penis containing verge. Diverticle of spermathecal stalk normally developed. Reservoir of spermatheca roundly-triangular, lacking its proper duct (neck) and sitting on spermathecal stalk directly by its broad base.

DISTRIBUTION. Tien-Shan. 3 spp.

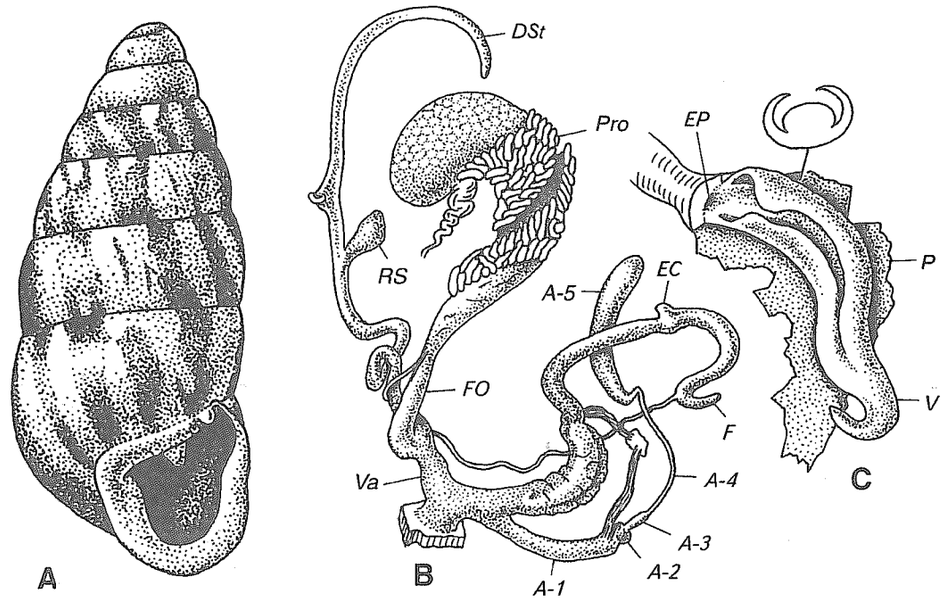


Fig. 251. ***Triangustoma dentatum*** (Likharev, 1967).
Djalala, valley of Kunar River, Afghanistan, February 2, 1958. A — shell of holotype. B, C — paratype. B — reproductive tract; C — interior of penis. **SPb.** After Schileyko, 1984.

Triangustoma Schileyko, 1984
Fig. 251

Schileyko, 1984: 296.

TYPE SPECIES — *Chondrulopsina dentatum* Likharev, 1967; OD.

Shell turrite to subconic, solid, glossy, of 6.25-7.5 flattened whorls. Coloration consisting of light background and radial dark-brown streaks. Sculpture of both embryonic and postembryonic whorls weak. Aperture roundly triangular, armed with rounded-conic parietal tooth and angular tubercle; columellar and palatal teeth looking as local swellings of lip. Aperture margins thickened and reflexed. Height 5.9-7.1, diam. 2.5-2.9 mm (7.1 × 2.8 mm).

Flagellum well developed, conic. Epiphallus moderately long, with well-developed caecum. Penis with very thin, semitransparent walls, internally with long verge having lateral wing-like lobes. A-1 long, A-2 small, globular, A-3 short, A-4 and A-5 relatively short. Free oviduct and vagina short. Diverticle of spermathecal stalk long, neck of reservoir, on the contrary, very short.

DISTRIBUTION. Valley of Kunar River, Afghanistan. 1 sp.

Ottorosenia Muratov, 1992
Fig. 252

Muratov, 1992: 37.

TYPE SPECIES — *Buliminus (Subzebrinus) varenzovi* Rosen, 1893; OD.

Shell cylindrical, ovate-cylindrical or turrited, opaque, of 8-9 moderately convex whorls. Body whorl somewhat ascending just behind aperture. Color uniformly white or with radial brown streaks. Postnuclear whorls weakly radially sculptured. Aperture relatively small, toothless, with thin, not reflexed margins except columellar. Height 6.5-9.0, diam. 2.7-3.0 mm (6.6 × 2.7 mm).

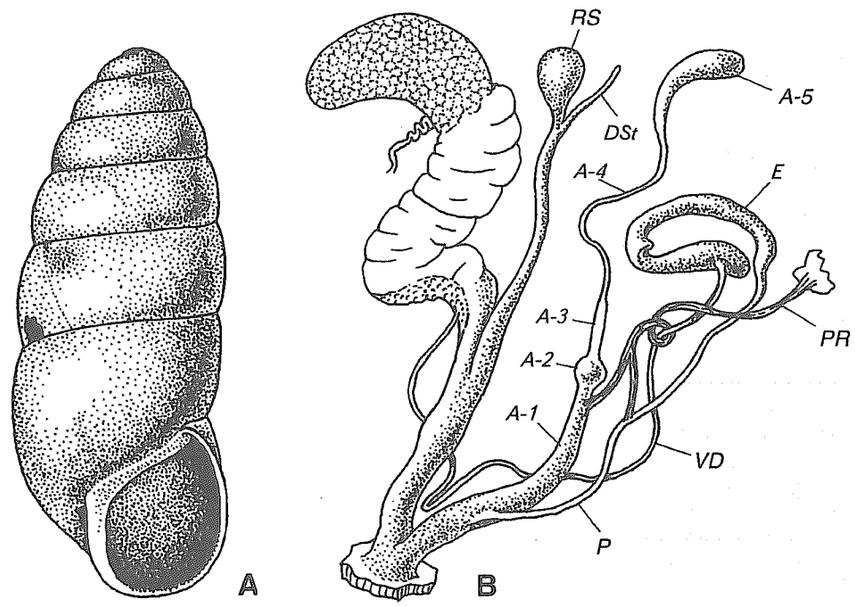


Fig. 252. ***Ottorosenia varenzovi*** (Rosen, 1893).
Haudan Pass, 30 km S of Ashkhabad, Central Kopetdagh, May 22-24, 1990. A — shell; B — reproductive tract. **Moscow** No. Lc-14427.

Flagellum short, subglobular. Epiphallus not long, with distinct caecum. Penis long, very narrow, thread-like, entering A-1; diameter of penis approximately equal to that of vas deferens. All sections of penial appendix normally developed. Free oviduct markedly shorter than vagina. Spermathecal duct of moderate length, with somewhat reduced diverticle; reservoir globular, with very short neck.

DISTRIBUTION. Central Asia, Kopetdagh. 1 sp.

Nepaliena Schileyko et Frank, 1994
Fig. 253

Schileyko & Frank, 1994: 128.

TYPE SPECIES — *Bulimus ceratinus* Benson, 1849; OD.

Shell acuminate-oblong, conic, rather thin, lustreless, of 6-7 convex whorls. Last whorl scarcely ascending toward aperture. Color uniformly dark-grey to greyish-brown. Embryonic whorls with fine, silky, spiral striation, subsequent with rather coarse irregular radial wrinkles and distinct spiral wavy lines. Aperture slightly oblique, places of its insertion remote and connected by well-developed parietal callus. Aperture margins moderately reflexed; adult specimens with thin, sharp neck thickening just behind aperture. Umbilicus minutely open. Height 13-15, diam. 6.0-7.5 (14.0 × 7.0 mm).

Flagellum relatively long, tapering. Epiphallus cylindical, with well-developed caecum. Penis bulbous at its upper end, conic or with narrowing at its middle, globular portion contains very short closed verge, furnished with lateral vermiform process (stimulator). Inner surface of lower portion of penis lined with longitudinal vague folds, inside upper portion there are indistinct tubercles and weakly developed circular folds. Basal part of penial appendix (A-1) closed blindly at its upper end, next division (A-2 + A-3) enters A-1 laterally. Penial retractor splitted just near diaphragm, penial arm inserting just below penial bulb, appendical arm — to blind end of A-1. Free oviduct rather long, vagina shorter. Spermatheca forked, one of its branches somewhat shorter

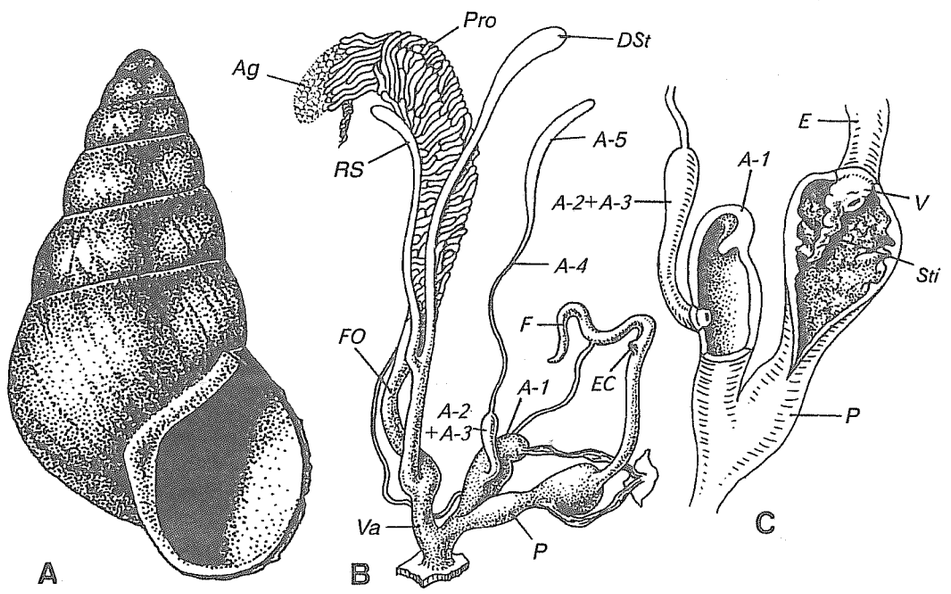


Fig. 253. ***Nepaliena ceratina*** (Benson, 1849).
Environs of Katmandu, Nepal. June 10-20, 1986. A — shell; B — reproductive tract; C — interior of penis and of A-1. **Moscow** No. Lc-19436. After Schileyko & Frank, 1994.

then other; both branches ending by ampulla-like reservoirs.

DISTRIBUTION. Nepal. 2 or 3 spp.

Pseudochondrula Hesse, 1933
Fig. 254

Hesse, 1933: 167.

TYPE SPECIES — *Buliminus florenskii* Rosen, 1914 (=*Pupa seductilis* Rossmaessler, 1837); OD.

Shell dextral or sinistral, cylindrical to ovate-conic, of 7-11 slightly convex whorls. Last whorl not descending. Color whitish to brown. Embryonic whorls smooth, later weakly sculptured with irregular radial wrinklets. Aperture simple or having 1-4 teeth. Aperture margins slightly or not reflexed, places of their insertion widely spaced. Height 7.5-16.0, diam. 3.5-6.0 (9.5 × 3.6 mm).

Flagellum very short, conic or with rounded apex. Epiphallus long, sometimes with semicircular superficial folds. Epiphallic caecum well developed. Penis bulky, internally with 2 V-shaped pilasters and thin velum. Penial verge absent. All divisions of penial appendix normally developed; A-1 short, A-2 globular, A-3 relatively long, A-4 and A-5 short. Free oviduct and vagina rather long, of equal length. Spermatheca sleeve-like, diverticle absent.

DISTRIBUTION. SE Europe, Asia Minor, Arabia, Caucasus. 6-9 spp. with many subspp. & forms.

Geminula Lindholm, 1925
Fig. 255

Lindholm, 1925: 30 (*Jaminia*, sect. *Chondrula*; subsect.).

TYPE SPECIES — *Buliminus didymodus* O.Boettger, 1880 (=*Buliminus isselianus* Bourguignat, 1865); OD.

Shell dextral, ovate-cylindrical to cylindrical, rather solid, of 6.5-8 moderately convex whorls. Color uniformly corneous. Sculpture very weak. Aperture ovate, slightly oblique, armed with 4 tubercular

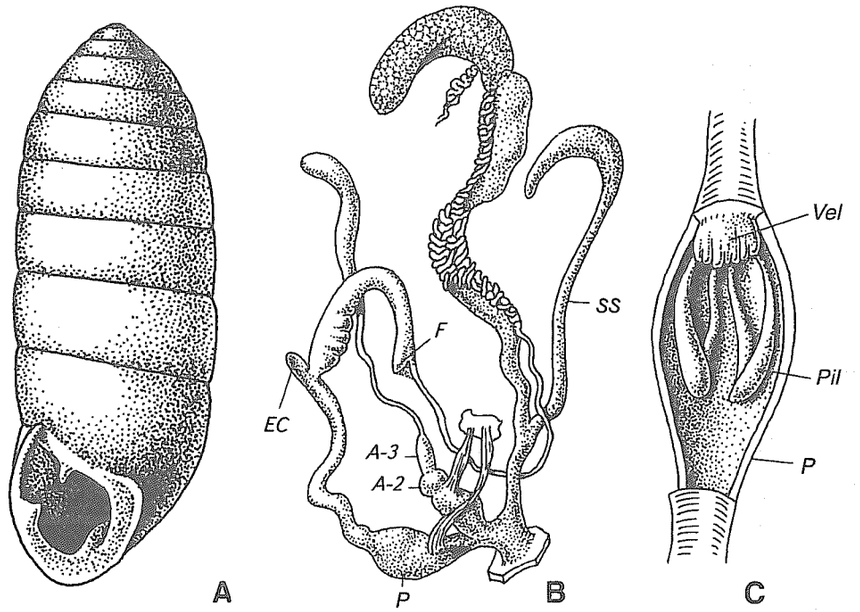


Fig. 254. ***Pseudochondrula seductilis*** (Rossmaessler, 1837).
Leninakan (now Gyumri), Armenia, April 18, 1971. A — shell; B — reproductive tract; C — interior of penis. **Moscow** No. Lc-23309.

teeth: parietal, columellar and 2 palatal. Aperture margins slightly or strongly reflexed, sometimes thickened. Height 6-10, diam. 2.2-4.0 mm (7.6 × 3.4 mm).

Flagellum absent. Epiphallus long, cylindrical, with distinct caecum shifted towards vas deferens. Upper swollen part of penis contains slender grooved verge. A-1 strong, A-3 globular, other sections comparatively short. Free oviduct short, vagina much longer. Diverticle of spermathecal stalk present. Distinct feature of the genus — very short stalk of spermatheca: it forked immediately near its base into long diverticle and shorter neck of reservoir.

DISTRIBUTION. Transcaucasia, N Iran, Great Balhan Mts., Kopetdagh. 2 or 3 spp.

Ljudmilena Schileyko, 1984
Fig. 256

Schileyko, 1984: 309.

TYPE SPECIES — *Chondrus sieversi* Mousson, 1873; OD.

Shell dextral or sinistral, ovate-cylindrical to clavate, of 8-12 whorls, upper convex, 3-4 lower flattened. Color corneous to dark-brown. Sculpture rather weak. Aperture rounded-triangular, slightly oblique, with 3 teeth: parietal, columellar and palatal; columellar sometimes splitted into two plates. Margins of aperture moderately reflexed and thickened. Height 7-11, diam. 2.5-4.0 mm (7.3 × 3.2 mm).

Flagellum very short, pointed. Epiphallus long, with quite distinct caecum. Penis consists of cylindrical distal and swollen proximal sections; proximal chamber contains short tubular verge with broad lumen; verge furnished with vermiform stimulator. Penial appendix of normal structure. Arms of penial retractor arises on diaphragm independently, appendical arm inserts on A-1 below A-2, penial arm — on boundary between distal and proximal sections of penis. Free oviduct longer than vagina. Spermathecal stalk long, slender, diverticle absent, reservoir poorly defined.

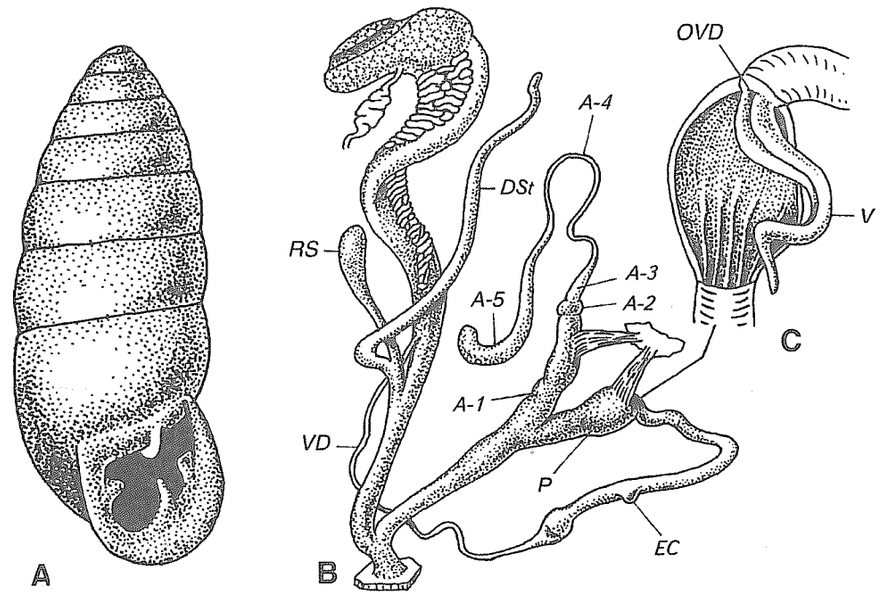


Fig. 255. ***Geminula isseliana*** (Bourguignat, 1865).
A — shell: upper part of Lenkoran-chai River, Talysh Mts., SE Transcaucasia. **Moscow** No. Lc-13186. B, C — Gnishik, Daralages, Armenia. B — reproductive tract; C — interior of penis. **Moscow** No. Lc-23299. After Schileyko, 1984.

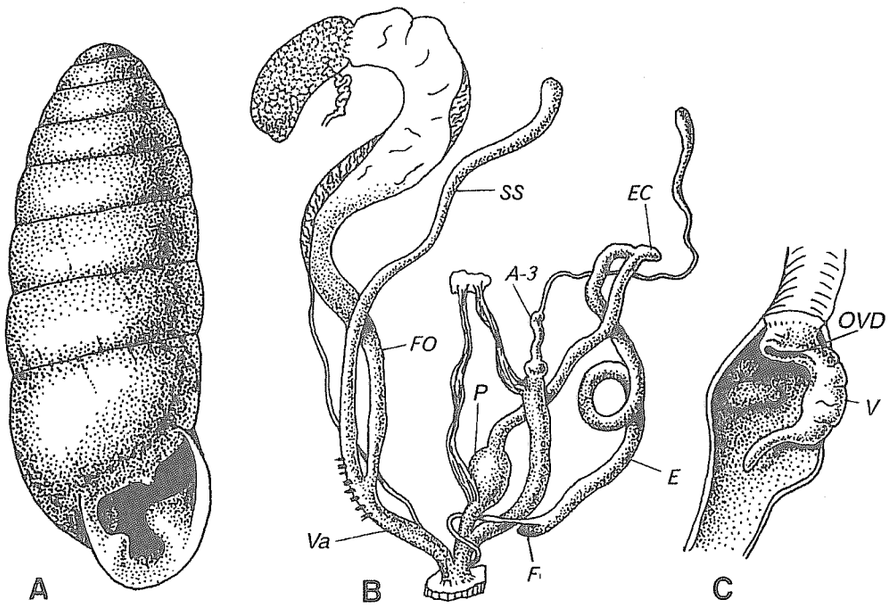


Fig. 256. ***Ljudmilena sieversi*** (Mousson, 1873).
Gnishik, Daralages, Armenia. A — shell; B — reproductive tract; C — interior of penis. **Moscow** No. Lc-23281.

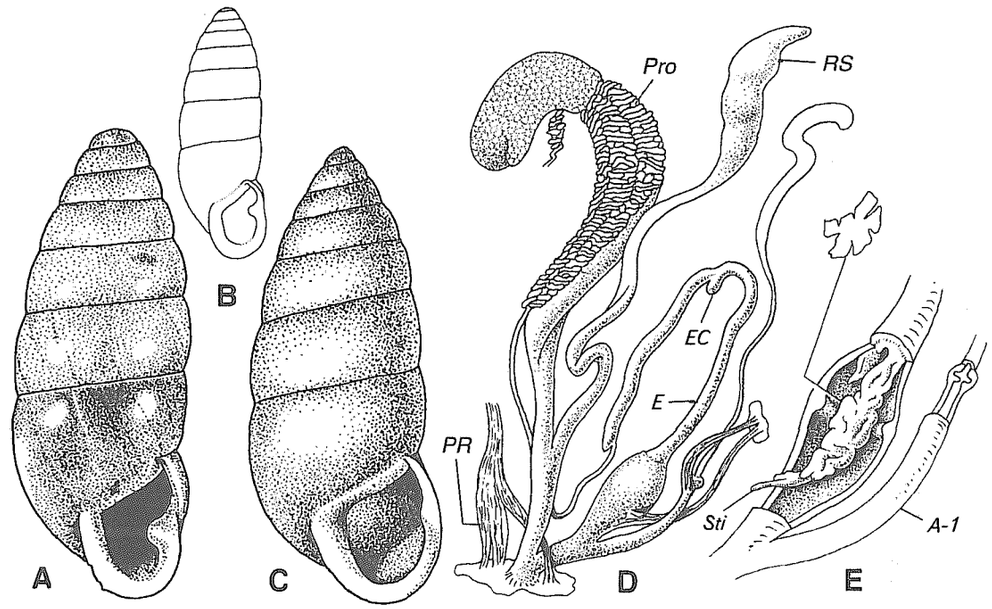


Fig. 257. A — ***Spaniodonta diodon*** (Retowski, 1893). Shell: "Crimèe" [evidently, in the waste on sea-shore]. **Paris.**
B — ! ***Spaniodonta leucodon*** (L.Pfeiffer, 1846). After Bank & Neubert, 1998.
C-E — ! ***Spaniodonta brevior*** (Mousson, 1876): Leninakan (now Gyumri), Armenia, April 19, 1971.
C — shell; D — reproductive tract; E — interior of penis and of A-2. **Moscow** No. Lc-23312.

DISTRIBUTION. Transcaucasia and adjacent territories of Turkey and Iran. 2-3 spp. & several subspp.

Spaniodonta Kobelt et Moellendorff, 1902
Fig. 257

Kobelt & Moellendorff in Kobelt, 1902: 1022.

— *Imparietula* Lindholm, 1925: 30 (*Jaminia*, sect. *Chondrula*; subsect.; t.-sp. *Bulimus leucodon* L.Pfeiffer, 1846; OD).

— *Imparietinia* Lindholm, 1925: 30 (*Jaminia*, sect. *Jaminia* s.str.; subsect.; t.-sp. *Buliminus schelkovnikovi* Rosen, 1914; OD).

Schileyko, 1984: 306.

TYPE SPECIES — *Buliminus diodon* Retowski, 1893; monotypy.

Shell dextral or sinistral, elongated-ovate to subcylindrical, rather thin, of 7-11 flattened to weakly convex whorls. Last whorls straight. Color uniformly yellowish to dark brown. Embryonic whorls smooth, later weakly sculptured with smoothed irregular radial wrinkles. Aperture ovate, subvertical, margins shortly reflexed. Parietal wall with or without a small tubercle. Palatal margin with more or less developed triangular or rounded tooth. Umbilicus comma-like. Height 7-20, diam. 2.5-6.8 mm (*diodon*: 7.5 × 2.7; *leucodon*: height 17.5; *brevior*: 11.7 × 4.3 mm).

Flagellum extremely short, pointed. Epiphallus long, cylindrical, with small but quite distinct caecum on its middle part. Penis ovate or subglobular, thin-walled, containing verge (stimulator) of irregular shape; surface of verge covered with irregular folds and narrow grooves. Epiphallic pore situated at base of stimulator. Inner surface of penis with circular fold or with vestigial V-shaped pilasters. Penial appendix of usual structure; A-3 absent or weakly developed. Branches of penial retractor arising from diaphragm separately, penial arm inserted on penis at its lower portion, appendical arm — to A-1 just below A-2. Free oviduct markedly longer than vagina. Spermathecal stalk

long, reservoir voluminous, diverticle absent.

DISTRIBUTION. SE Europe, Transcaucasia, Asia Minor, Iran. 10-15 spp.

REMARK. Comparison of shells of type species of *Spaniodonta*, *Imparietula*, and *Imparietinia* shows no essential differences; until their anatomy is known, I do not see reasons to separate them as (sub)genera.

Sesteria Bourguignat, 1884
Fig. 258

Bourguignat, 1884: 135.

TYPE SPECIES — *Sesteria gallandi* Bourguignat, 1884; monotypy.

Shell aciculate, slender, of about 10 flattened whorls. Last whorl not descending. Color corneous. Sculpture weak. Aperture ovate, slightly oblique. Parietal callus well developed, margins of aperture simple, slightly reflexed. Columellar margin with strong entering lamella. Columella sinuous inside last whorl. Height 25, diam. 5 mm.

DISTRIBUTION. Mesopotamia. 1 sp.

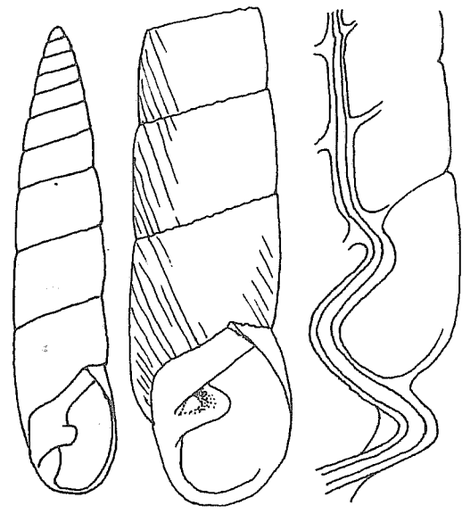


Fig. 258. ***Sesteria gallandi*** Bourguignat, 1884. After Bourguignat, 1884.

Akramovskiella Schileyko, 1984
Fig. 259

Schileyko, 1984: 312.

TYPE SPECIES — *Buliminus umbrosus* Mousson, 1873; OD.

Shell generally elongated-conic, thin, translucent, of 5.5-8 rather convex whorls. Color light-corneous to dark-brown. Embryonic whorls smooth, sculpture of postnuclear whorls vague. Aperture ovate, without teeth, its margins thin, slightly reflexed, peristome insertions slightly approached. Height 6.5-14.0, diam. 3.0-5.5 mm (8.0 × 3.3 mm).

Flagellum very short, subglobular. Epiphallus long, with quite distinct caecum. Distal portion of penis contains grooved pivot-like stimulator, proximal portion internally with additional chamber. All sections of penial appendix normally developed. Arms of penial retractor arise on diaphragm separately; penial branch attached to proximal portion of penis, appendical — to A-1 below its middle. Spermathecal shaft not long, neck of reservoir short; diverticle well developed.

DISTRIBUTION. Caucasian isthmus and N Turkey. 3-4 spp.

Amphiscopus Westerlund, 1887
Fig. 260

Westerlund, 1887 (1884-1890): 3, 55 (*Buliminus* subg.).

— *Euchondrus* Retowski, 1886: 34 (nom. praeocc., non O.Boettger, 1883; *Buliminus* subg.; t.-sp. *Buliminus sturmi* Küster, 1852; SD Lindholm, 1925).

TYPE SPECIES — *Pupa sturmi* Küster, 1852; SD Kobelt, 1902.

Shell slender, turrited, rather solid, of about 10 rather convex whorls. Last whorl straight or scarcely ascending in front. Color light-corneous. Embryonic whorls smooth, later finely, silky, radially, irregularly striated. Aperture relatively small, rounded-triangular, only slightly oblique, with reflexed margins. Parietal callus strongly developed, sometimes thickened in angular region. Pa-

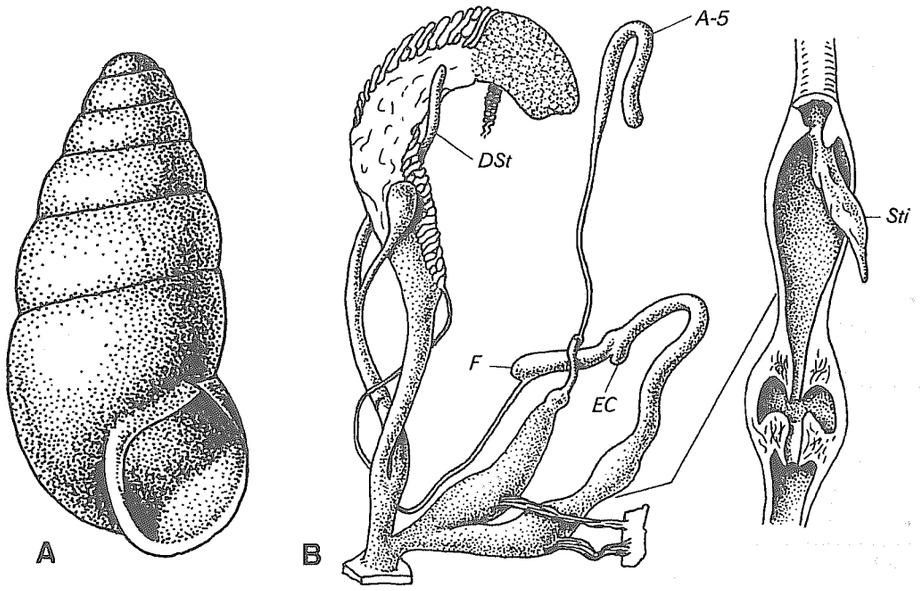


Fig. 259. ***Akramovskiella umbrosa*** (Mousson, 1873).
Gnishik, Daralages, Armenia. A — shell; B — reproductive tract and interior of penis. **Moscow** No. Lc-23297.

rietal wall with short lamella, columellar margin with or without small lamella, palatal margin with tubercular tooth. Height 6-10, diam. 2.2-3.2 mm (8.7 × 2.7 mm).

Vas deferens entering epiphallus apically, flagellum absent. Epiphallus long, with somewhat narrowed distal end. Caecum slightly shifted toward lower end of epiphallus. Penis rather short, internally with weak, smoothed, irregular longitudinal folds; verge minute, bilobed. A-1 + A-2 short, A-3 longer, A-4 and A-5 comparatively short. Penial retractor uniramous, inserting near base of penial appendix. Free oviduct and vagina rather long. Spermathecal stalk without diverticle, reservoir poorly demarcated.

DISTRIBUTION. Asia Anterior, NE Africa. 2 or 3 spp.

Differena Schileyko, 1984
Fig. 261

Schileyko, 1984: 315.

TYPE SPECIES — *Differena leucostoma* Schileyko, 1984; OD.

Shell high-conic, moderately solid, of 5.5-6 slightly convex whorls. Last whorl scarcely or not ascending in front. Color light-corneous or greyish-yellow. Postembryonic whorls with vague irregular radial striation. Aperture toothless, rounded, its margins a little reflexed, thickened by broad but low and diffuse lip. Teeth in aperture absent. Peristome insertions approached. Height 6.5-8.2, diam. 3.3-4.0 mm (8.0 × 3.6 mm).

Flagellum as such nearly absent, represented by wide rounding of epiphallus end. Epiphallus not long, caecum normally developed. Unusually long distal portion of penis internally with numerous folds and tubercles, small proximal chamber contains short stimulator having narrow and shallow groove on its surface. Penial appendix of unusual structure: A-1 + A-2 minute, A-3 longer, A-4 and A-5 rather short. Penial retractor uniramous, attached to penis below inserting of appendix. Spermathecal stalk short, straight, diverticle somewhat longer; reservoir with short neck.

DISTRIBUTION. Eastern part of Caucasus Minor. 1 sp.

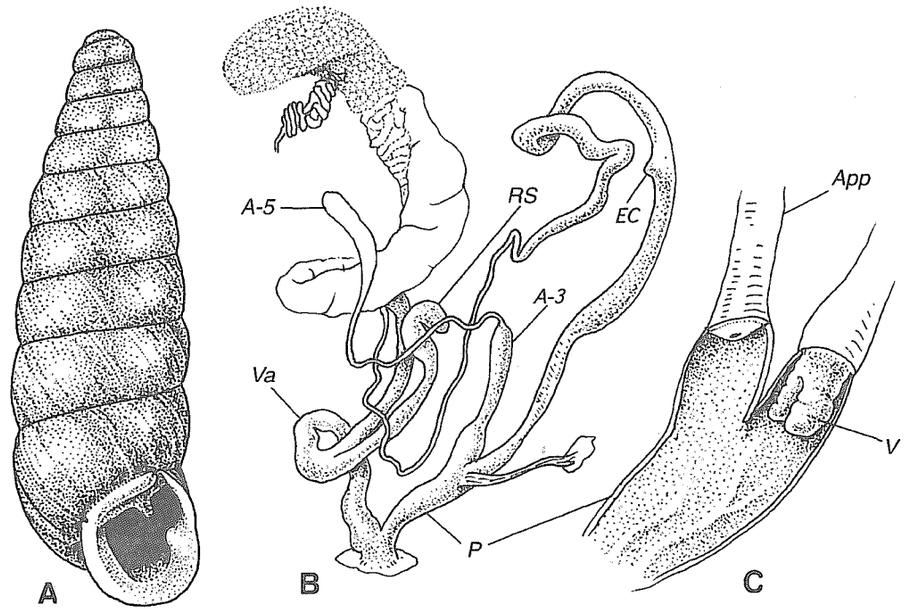


Fig. 260. ***Amphiscopus sturmi*** (Küster, 1852).
A — shell: Bursa, Turkey. **Paris.** B — reproductive tract; C — interior of penis and of A-1 + A-2. Uludagh Ridge, vilayet Bursa, Turkey, June 3, 1997. **Moscow** No. Lc-23275.

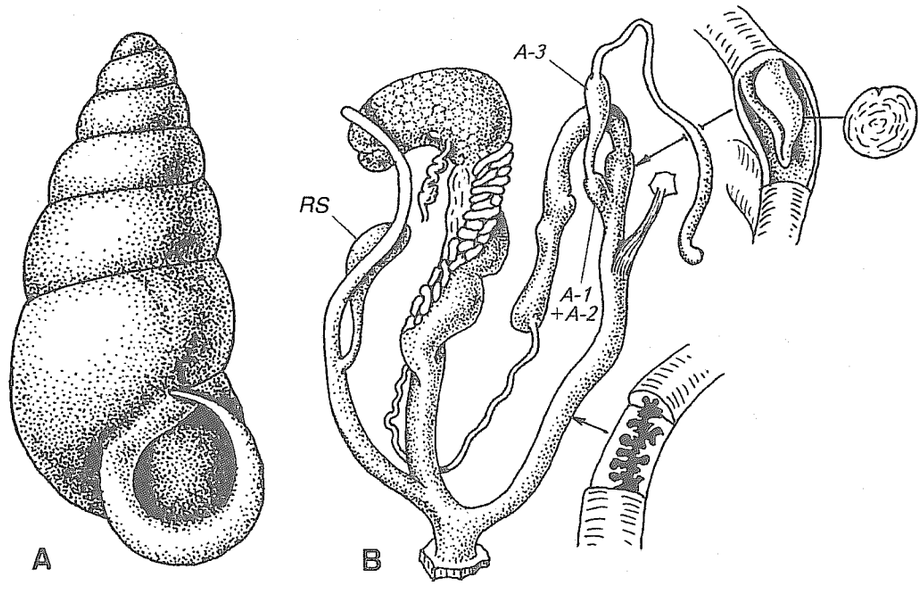


Fig. 261. ***Differena leucostoma*** Schileyko, 1984.
Kiapaz Mt., eastern Lesser Caucasus. A — shell of holotype. B — paratype: reproductive tract and interior of penis. **SPb.** After Schileyko, 1984.

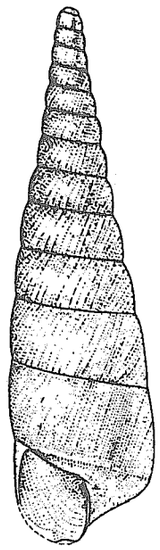


Fig. 262. ***Heudiella oliveriana*** Annandale, 1924. After Annandale & Prashad, 1924.

res with *Heudiella oliveriana* only left-coiled shell. I think that the latter species may belong to *Pseudonapaeus* or *Mirus*.

CHONDRULOPSININAE Schileyko, 1978

Schileyko, 1978: 845.

Shell weakly sculptured. Aperture with teeth, sometimes represented by just palatal swelling of lip or deep-lying palatal plica.

Vas deferens entering epiphallus subapically or laterally. Epiphallus without flagellum, or flagellum very short, globular. Epiphallic caecum well developed. Penis thin-walled, its inner surface smooth. Well expressed closed (tubular) verge present. Prismoconic tubercles and proximal process of penis wanting. Penial appendix present. Diverticle of spermathecal stalk absent or rudimentary.

DISTRIBUTION. Central Asia.

? *Heudiella* Annandale, 1924
Fig. 262

Annandale in Annandale & Prashad, 1924: 37.

TYPE SPECIES — *Heudiella oliveriana* Annandale, 1924; OD.

Shell sinistral, slender, turrited, thin, of 12-13 whorls; upper more convex than lower. Last whorl not descending, with rounded or slightly angled periphery. Color corneous. Embryonic whorls smooth, subsequent with strong radial striae on lower whorls. Aperture small, toothless, vertical, margins thin, not reflexed. Umbilicus closed or slit-like. Height 30, diam. 8 mm (estimated).

DISTRIBUTION. Province Chekiang, China. Probably 1 sp.

REMARK. The taxonomic position of this genus is unclear. Shell characters and figure given in the original description for type species remind some Subulinidae among which sinistral species are known. Species figured by Zilch (1959: 187, Abb. 644) as "*Coccoderma (?Heudiella) phaedusoides krejcii* (Haas)" sha-

Chondrulopsina Lindholm, 1925
Fig. 263

Lindholm, 1925: 30 (*Sewertzowia* subg.).

TYPE SPECIES — *Buliminus haberhaueri* Ancey, 1886 (= *Buliminus intumescens* var. *fedtschenkoi* Ancey, 1886); OD.

Shell cylindrical to elongated-ovate and fusiform, rather solid, of 6-9 slightly convex whorls. Last whorl scarcely or not descending in front. Color creamy to brown, usually with darker diffuse streaks. Aperture with lip, furnished with 3 variously developed tubercle-like teeth; sometimes armament reduced to only palatal swelling of lip. Palatal plica absent. Height 7-11, diam. 2.4-4.5 mm (8.5 × 3.2 mm).

Entrance of vas deferens not shifted down along epiphallus. Lumen of penial verge in cross-section rounded or semilunar. Diverticle of spermathecal stalk absent or rudimentary, in latter case not longer than reservoir.

DISTRIBUTION. Mountain regions of Central Asia. 2 or 3 spp. with a number of subspp.

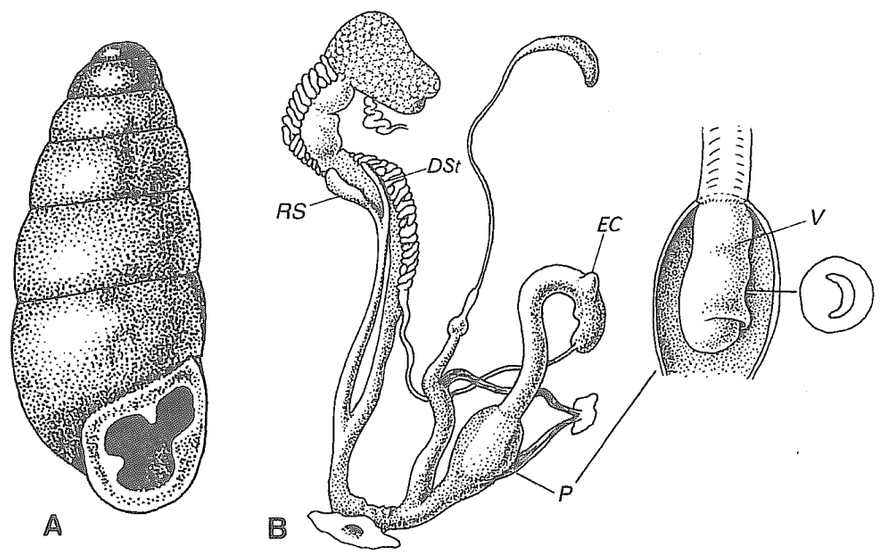


Fig. 263. ***Chondrulopsina fedtschenkoi*** (Ancey, 1886).
Djilissu, Alai Mts. July 16, 1974. A — shell; B — reproductive tract and interior of penis. **SPb**.

Siraphoroides Schileyko, 1977
Fig. 264

Schileyko, 1977: 43.

TYPE SPECIES — *Siraphorus moltschanovi* Likharev et Rammelmeyer, 1952; OD.

Shell ovate-cylindrical to nearly cylindrical, rather thin, of 6-7 flattened whorls. Last whorl scarcely descending. Color grey to greyish-corneous, upper whorls somewhat darker than lower. Embryonic whorls polished, subsequent with irregular smoothed radial wrinklets. Aperture ovate, slightly oblique, furnished with wide and strong lip. Small angular tubercle present. Interior of aperture with entering longitudinal palatal plica. Height 6.7-8.0, diam. 3.0-3.2 mm (7.7 × 3.0 mm).

Flagellum subglobular. Epiphallus not long; caecum shifted to flagellum from middle of epiphallus. Penial verge large, sickle-like in cross section. Free oviduct longer than vagina. Diverticle of spermathecal stalk short, sometimes ridimentary.

DISTRIBUTION. Tien-Shan (Ferghana Range). 1 sp.

JAMINIINAE Thiele, 1931

Thiele, 1931: 517.

Shell sinistral, weakly sculptured. Embryonic whorls smooth. Aperture armed with 1-2 parietal and 2 columellar lamellae and 1 palatal tooth.

Flagellum extremely short, vas deferens entering epiphallus subapically. Epiphallic caecum absent. Penis long, narrow, thread-like, without verge, containing minute horse-shoe-shaped fold. Prismoconic tubercles and proximal process of penis absent. Penial appendix and diverticle of spermathecal stalk normally developed.

DISTRIBUTION. S Europe.

Jaminia Risso, 1826
Fig. 265

Risso, 1826: 88.

— *Chondritortus* Monterosato in Cecconi, 1908: 583 (t.-sp. *Helix quadridens* Müller, 1774; monotypy).

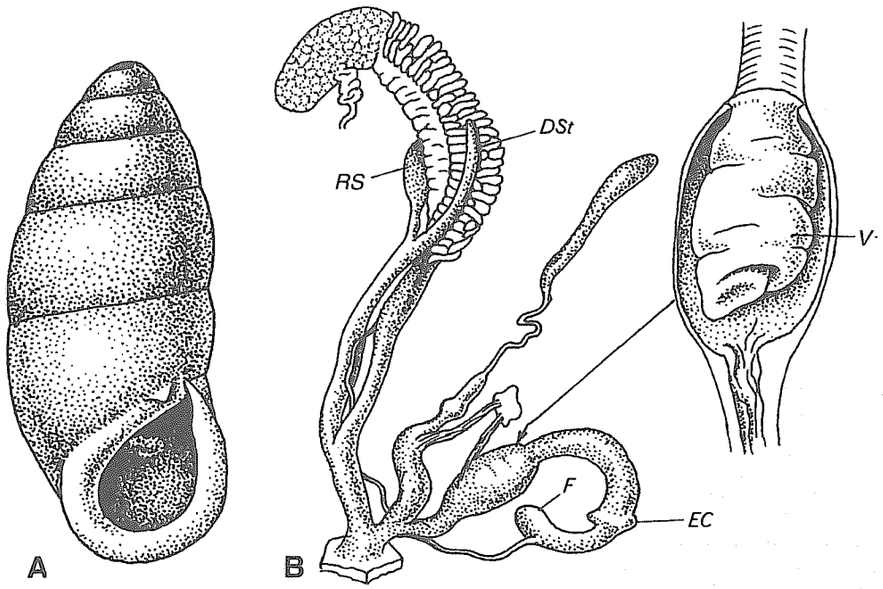


Fig. 264. ***Siraphoroides moltschanovi*** (Likharev et Rammelmeyer, 1952).
Ak-Terek near Arslanbob, Ferghana Range, Tien-Shan, August-September 1937. A — shell, B — reproductive tract and interior of penis. **SPb**. After Schileyko, 1984.

TYPE SPECIES — *Jaminia heterstropha* Risso, 1826 (= *Helix quadridens* Müller, 1774); SD Gray, 1847.

Characters of subfamily. Height 6-12, diam. 2.8-5.5 mm (7.1 × 3.2 mm).

DISTRIBUTION. From S Spain eastwards to Aegeian islands; Pyrenees, S Alps, S Germany. 3-4 spp. with many subspp. & forms.

MERDIGERINAE Schileyko, 1984

Schileyko, 1984: 328.

Shell weakly sculptured. Aperture toothless. Embryonic whorls smooth.

Epiphallus with short rounded flagellum. Epiphallic caecum well developed. Penis short, with very thin transparent walls, containing closed, short, thin-walled verge. Prismoconic tubercles and proximal process of penis absent. A-1 short, A-2 comparatively large, with subglobular papilla similar to penial verge. A-3 rather long. Diverticle of spermathecal stalk well developed.

DISTRIBUTION. Europe, NW Africa.

Merdigera Held, 1837
Fig. 266

Held, 1837: 917.

— *Merdigerus* Albers, 1850: 179 (nom. emend. pro *Merdigera* Held, 1837).

TYPE SPECIES — *Helix obscura* Müller, 1774; SD Herrmannsen, 1847.

Shell ovate-conic, rather thin, dull, of 6.5-8 whorls; upper convex, lower more or less flattened. Last whorl straight. Color yellowish-corneous to chestnut. Embryonic whorls smooth, later with weak irregular radial wrinklets. Aperture ovate, slightly oblique, with moderately reflexed margins. Umbilicus, a broad slit. Height 6.5-11.0, diam. 3-4 mm (8.3 x 3.4 mm).

Anatomical characters of subfamily.

Distribution as of subfamily. 1 or 2 spp. with several forms.

ANDRONAKIINAE Schileyko, subfam. nov.

Shell high-conic, thin, with protruding,

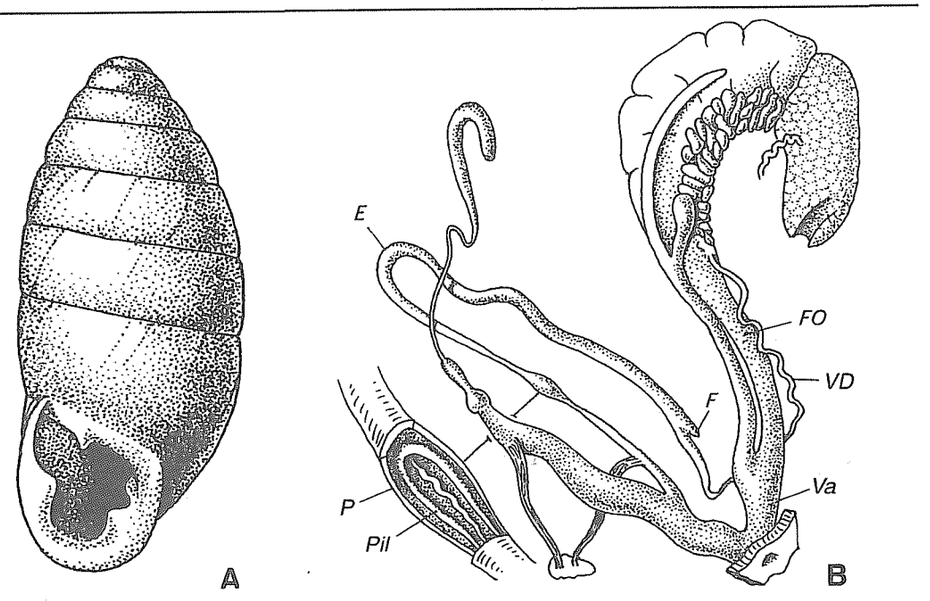


Fig. 265. ***Jaminia quadridens*** (Müller, 1774).
Sion, Dept. Valais, Switzerland. A — shell; B — reproductive tract and interior of penis. **Moscow** No. Lc-23314. (**Basel** No. 450.0)

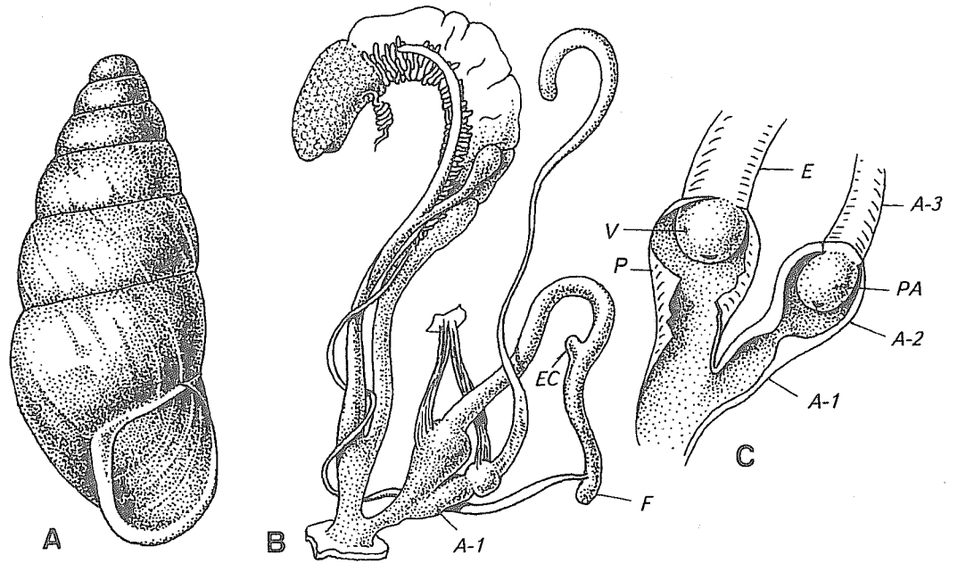


Fig. 266. ***Merdigera obscura*** (Müller, 1774).
Tutayev, Yaroslavl District, Russia, October 3, 1960. A — shell; B — reproductive tract; C — interior of distal parts of male section. **Moscow** No. Lc-23311.

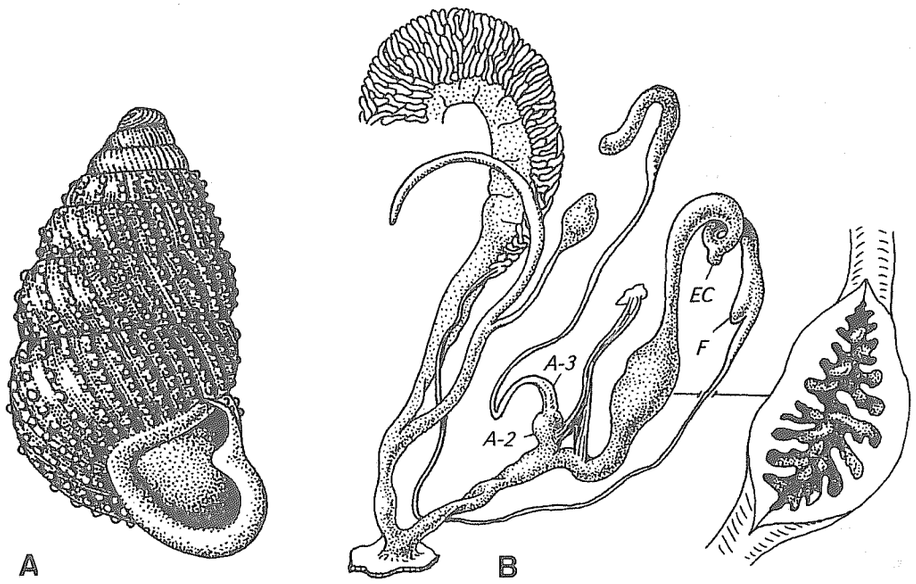


Fig. 267. ***Andronakia catenulata*** (Lindholm, 1913).
A — shell: Batum. Holotype. **SPb**. B — Batum, Adzharia, May 1991. Reproductive tract and interior of penis. **Moscow** No. Lc-15963.

somewhat pointed upper part. Whorls 7.5-8.5, convex. Body whorl not ascending in front. Embryonic whorls with distinct spiral riblets, running nearly parallel to suture. Sculpture of postnuclear whorls represented by regular oblique radial ribs, broken up into rows of distinct rounded tubercles. Aperture generally ovate, with sharp depression of palatal margin. Umbilicus, a minute perforation.

Flagellum very short, epiphallic caecum normally developed. Inner surface of penis covered with numerous chaotically arranged folds and crests. Penial verge and proximal process of penis absent. Diverticle of spermathecal stalk long.

The new subfamily is related to Retowskiinae, differing in presence of very conspicuous tuberculate sculpture; spiral riblets on embryonic whorls running parallel to suture (in Retowskiinae the riblets are located at sharp angle to suture); palatal wall of aperture with depression. Anatomically it differs in the peresence of epiphallic caecum, long A-1, and absence of prismoconic tubercles inside penis which are substituted by high, irregularly arranged folds and crests. Monotypical subfamily.

DISTRIBUTION. Basin of Chorokh River in Turkey and Georgia (Adzharia).

Andronakia Lindholm, 1914
Fig. 267

Lindholm, 1914a: 38.

TYPE SPECIES — *Chondrula* (?) *catenulata* Lindholm, 1913; monotypy.

Characters and distribution as in subfamily. Height 5.5-8.5, diam. 3.3-4.5 mm (8.5 × 4.5 mm).

RETOWSKIINAE Schileyko, 1978

Schileyko, 1978: 849.

Shell cylindrical with narrowly rounded dome-shaped upper part. Whorls 8, weakly convex. Body whorl slightly ascending in front immediately behind aperture. Embryonic whorls covered with distinct spiral

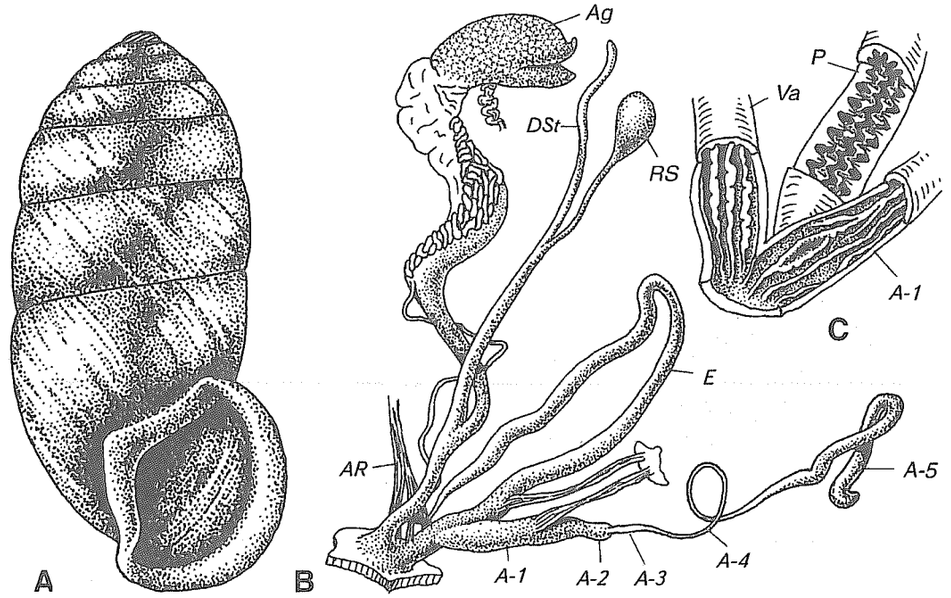


Fig. 268. ***Retowskia schlaeflii*** (Mousson, 1863).
Adigeni village, Adzharo-Imerety Ridge, SW Transcaucasia. July 21, 1973. A — shell; B — reproductive tract; C — interior of distal part of genitalia. **Moscow** No. Lc-23301 (**SPb**).

thread-like riblets, running at sharp angle to suture. Sculpture of postembryonic whorls represented by oblique radial silky wrinkles, broken into rows of minute tubercles. Aperture ovate, oblique, its palatal and basal margins widely reflexed and expanded. Border between basal and columellar margins with conspicuous sinuosity. Umbilicus nearly absent because of very tight contact between inner walls of last whorl.

Flagellum and epiphallic caecum absent. Inner surface of penis with strongly developed prismoconic tubercles. No penial verge or proximal process of penis. Diverticle of spermathecal stalk well developed.

DISTRIBUTION. Mountain regions of W Caucasus.

Retowskia O.Boettger, 1881
Fig. 268

Boettger O., 1881b: 219 (*Buliminus* sect.).

TYPE SPECIES — *Buliminus schlaeflii* Mousson, 1863; monotypy.

Characters and distribution as of subfamily. Height 13.5-23.5, diam. 7.0-9.5 mm. (18.0 × 8.0 mm). 1 sp. with a few forms.

ENINAE Woodward, 1903

Woodward, 1903: 354, 358.

— Chondrulidae Wenz, 1923: 1081; A.Wagner, 1927: 308.

— Napaeinae A.Wagner, 1927: 322.

Surface of shell smooth, rarely with weak sculpture. Embryonic whorls without distinct sculpture. Aperture toothless or with 1-3 teeth.

Epiphallus with caecum and short conic flagellum (latter rarely absent). Penis internally with prismoconic tubercles. Penial verge open, i.e. with longitudinal groove on its surface. Proximal process of penis absent. Diverticle of spermatheca normally developed, penial appendix present (exception: species of *Chondrula*).

DISTRIBUTION. Europe and Mediterranean countries.

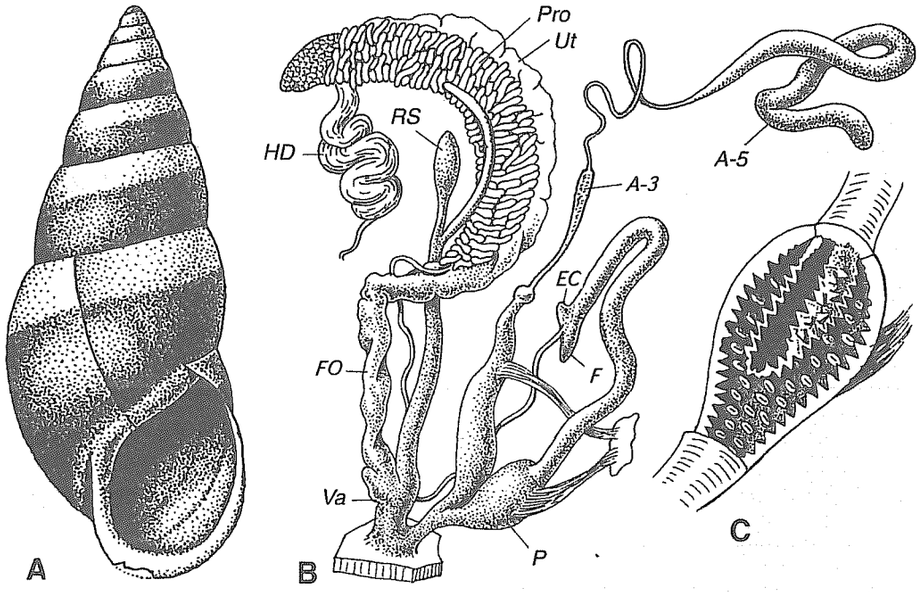


Fig. 269. ***Caucasicola raddei*** (Kobelt, 1880).
A — shell: Nalchik, N Caucasus. **Moscow** No. Lc-23293. B — reproductive tract; C — interior of penis. Env. of Hodzhoh near Maikop, July 12, 1974. **Moscow** No. Lc-5696.

Caucasicola Hesse, 1917
Fig. 269

Hesse, 1917: 122 (nom. nov. pro *Helle* Hesse, 1916).

— *Medea* O.Boettger, 1883: 174 (nom. praeocc., non Eschscholtz, 1829; t.-sp. *Buliminus raddei* Kobelt, 1880; SD Lindholm, 1925).

— *Helle* Hesse, 1916: 124 [nom. praeocc., non Osten-Sacken, 1896 (Insecta); nom. nov. pro *Medea* O.Boettger, 1883].

Schileyko, 1984: 346.

TYPE SPECIES — *Buliminus raddei* Kobelt, 1880; SD Lindholm, 1925.

Shell high conic, solid, of 8-9 flattened whorls. Last whorl slightly ascending immediately behind aperture. Color uniformly yellow or (more often) with wide buff, brown, or lilacish band running above suture. Postembryonic whorls finely sculptured with irregular radial wrinkles and wavy spiral grooves. Aperture ovate, toothless, only slightly oblique, with somewhat reflexed margins. Peristome insertions not approached. Umbilicus slit-like. Height 21-27, diam. 9-13 mm (24.0 x 12.3 mm).

Flagellum short, conic. Epiphallus rather long. Epiphallic caecum close to vas deferens entrance. Penis bulky, internally with very distinct, sharp prismoconic tubercles and spoon-shaped verge covered with numerous sharp tubercles. All divisions of penial appendix distinctly expressed; A-3 unusually long. Arms of penial retractor branched off from diaphragm independently; penial arm attached to upper half of penis, other arm — to A-1 above its middle. Free oviduct very long; vagina unusually short. Spermathecal stalk straight, with diverticle; neck of reservoir short.

DISTRIBUTION. NW Caucasus. 1 sp.

Peristoma Krynicki, 1833
Fig. 270

Krynicki, 1833: 420.

TYPE SPECIES — *Peristoma merdueniana* Krynicki, 1833; monotypy.

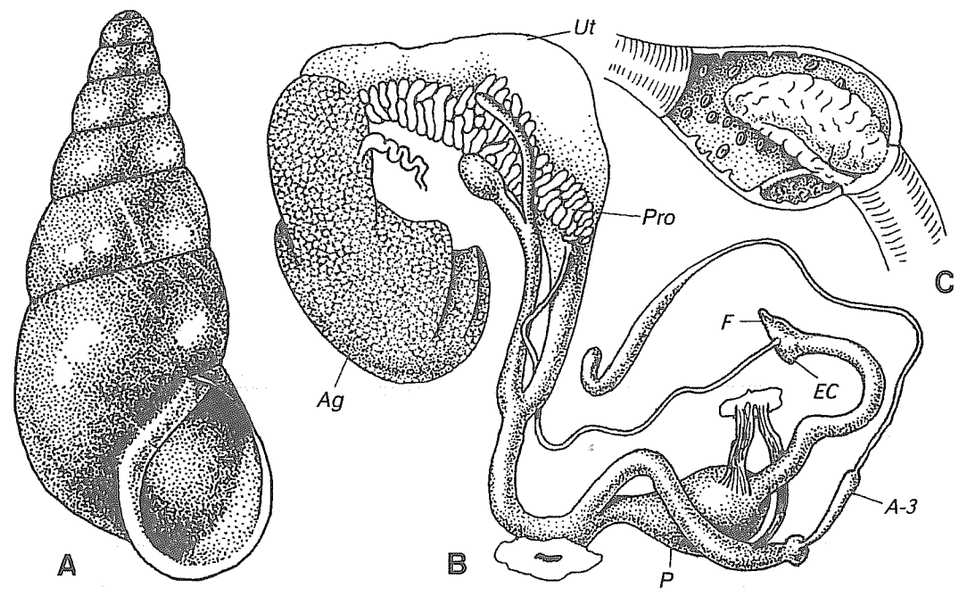


Fig. 270. ***Peristoma merduenianum*** Krynicki, 1833.
A — shell: Mountain Crimea. Lectotype. B — reproductive tract; C — interior of penis. Batiliman, Crimea. **SPb.** After Schileyko, 1978.

Shell high-conic to turrite, rather thin, of 6.5-9 somewhat convex whorls. Color light-corneous to brown and chestnut. Postapical surface sculptured with fine radial wrinkles; spiral striae sometimes also present. Aperture ovate, moderately oblique, with thin, shortly reflexed margins. Peristome insertions somewhat approached. No teeth in aperture. Umbilicus slit-like. Height 12-20, diam. 4.2-9.0 mm (13.0 × 5.1 mm).

Flagellum short, conic. Epiphallus rather short, caecum strongly shifted upward, located next to vas deferens entrance. Penis swollen, ovate, internally with large, scattered prismoconic tubercles and voluminous grooved verge. All divisions of penial appendix well developed. Penial retractor arising on diaphragm by two branches; penial arm attached to penis just below insertion of epiphallus, appendical arm — to A-1 not far from A-2. Free oviduct and vagina of about equal length. Spermathecal shaft comparatively short, diverticle shorter, neck of reservoir even far shorter.

DISTRIBUTION. Mountain Crimea and W Caucasus. 4 spp.

Ena Turton, 1831
Fig. 271

Turton, 1831: 80.

— *Bulinus* Studer, 1820a: 88 (nom. praeocc., non Müller, 1774; *Glischrus* subg.; t.-sp. *Bulimus montanus* Draparnaud, 1801; SD Forcart, 1957b).

— *Napaeus* Martens in Albers, 1860: 233 (non Albers, 1850; t.-sp. *Bulimus montanus* Draparnaud, 1801; OD).

TYPE SPECIES — *Bulimus montanus* Draparnaud, 1801; SD Herrmannsen, 1847.

Shell conic to ovate-conic, moderately thin, of 7-8 moderately convex whorls. Last whorl scarcely ascending just near aperture. Color uniformly corneous to chestnut. Postapical whorls with finely tuberculate sculpture. Aperture ovate to elongate-ovate, simple, slightly oblique, with a little reflexed, thin margins. Peristome insertions not approached. Umbilicus, a wide slit. Height 13-17, diam. 5.0-6.5 mm (16.3 × 6.2 mm).

Flagellum very short, conic, pointed. Epiphallus of moderate length, caecum not

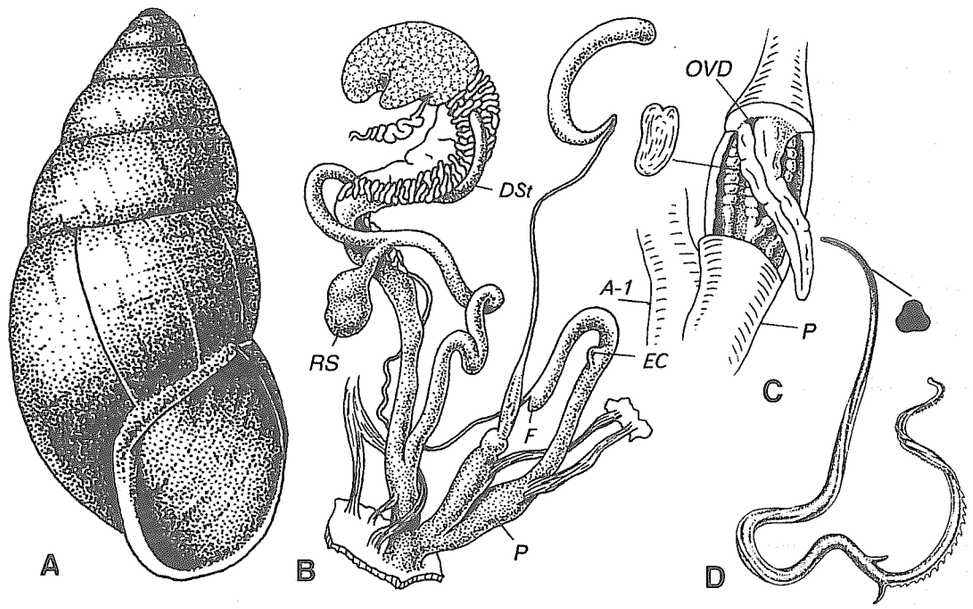


Fig. 271. ***Ena montana*** (Draparnaud, 1801).
Kvassi village near Rakhov, Carpathian Mts., September 8-14, 1969. A — shell; B — reproductive tract; C — interior of penis. **Moscow** No. Lc-23304. D — spermatophore. After Schikow, 1978.

shifted towards vas deferens, in middle of epiphallus. Penis irregularly fusiform, internally with longitudinal folds consisting of more or less distinct tubercles. Penial verge long, with shallow superficial groove. All sections of penial appendix normally expressed. Penial retractor arising on diaphragm by two arms: one attached to upper part of penis, other — to A-1 just below A-2. Free oviduct long, vagina much shorter. Spermathecal stalk long, somewhat convoluted, diverticle long, neck of reservoir very short.

DISTRIBUTION. Europe. 1 sp.

Napaeopsis Sturany et Wagner, 1914
Fig. 272

Sturany & Wagner, 1914: 41 (*Napaeus* subg.).

TYPE SPECIES — *Bulimus cefalonicus* Mousson, 1859; SD Hesse, 1933.

Shell high, ovate-conic, thin, slightly translucent, of 7-8 moderately convex whorls. Last whorl not descending. Color corneous, with more or less developed irregular whitish streaks. Postembryonic whorls with weak, radial, irregular wrinklets. Aperture rounded-ovate, margins thin, simple, variously reflexed; columellar margin expanded. Umbilicus dot-like. Height 15-26, diam. 7-12 mm (15.8 × 7.8 mm).

Flagellum very short, conic. Epiphallus not long, caecum somewhat shifted towards penis from middle of epiphallus. Penis more or less clavate, internally with well developed, rounded tubercles, indistinctly grouped in longitudinal series. Verge minute, conic. A-1 rather long, A-2 small, subglobular, A-3 unusually long, A-4 and, especially, A-5 rather weakly developed. Penial retractor arising on diaphragm by common band, splitting low, penial arm inserted on midway of penis, appendical arm — on midway of A-1. Free oviduct somewhat shorter than vagina. Stalk of spermatheca rather long, lacking diverticle.

DISTRIBUTION. Balkan Peninsula, Greece islands, Asia Minor. 3-4 spp.

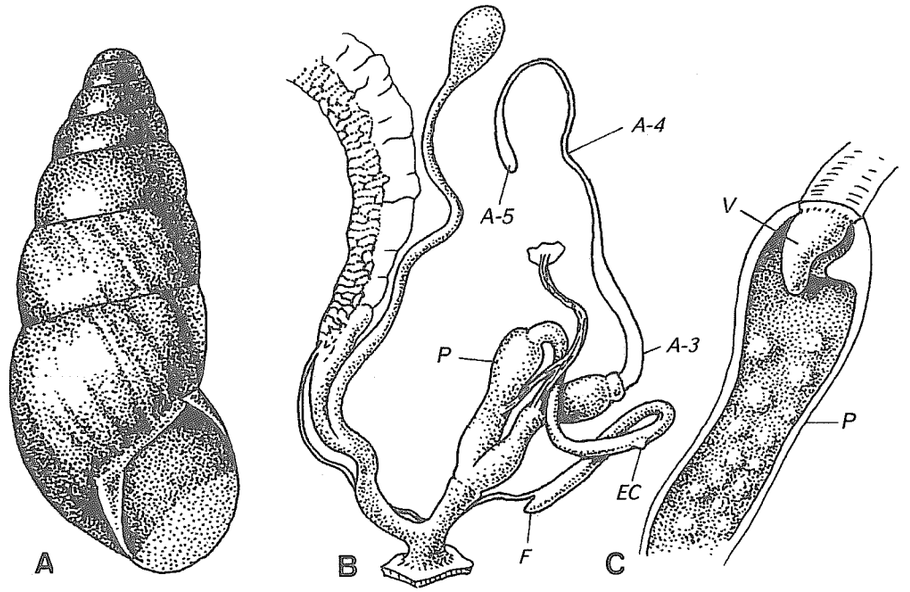


Fig. 272. ***Napaeopsis cephalonicus*** (Mousson, 1859).
Mali Senjt near Oroshi, Nardita, Albania. A — shell; B — reproductive tract; C — interior of penis. **Vienna** No. 41.164.

Napaeinus Hesse, 1933
Fig. 273

Hesse, 1933: 208 (*Napaeus* subg.).

TYPE SPECIES — *Bulimus moquinianus* Webb et Berthelot, 1833; OD.

Shell conic, moderately thin, of 7 flattened whorls; last slightly ascending in front. Color consisting of chestnut background and light radial streaks and marks; sometimes these streaks intensively developed, occupying most of shell surface. Embryonic whorls glossy, rest covered with fine uneven radial wrinkles and, in some places, short spiral striae. Aperture ovate, with shortly reflexed margins, slightly thickened along line of bending. Peristome insertions remote and connected by distinct callus. Umbilicus, a short slit. Height 12-14, diam. 4.5 mm (13.2 × 4.5 mm).

Flagellum absent, vas deferens entering epiphallus apically. Epiphallic caecum markedly shifted upward. Penis subcylindrical. All sections of penial appendix normally developed. Arms of penial retractor arising on diaphragm side-by-side, penial branch attached to middle of penis, appendical branch — to A-1 just below A-2. Free oviduct longer than vagina. Spermathecal shaft and neck of reservoir short, diverticle very long.

DISTRIBUTION. Canary Islands. 3-4 spp.

Napaeus Albers, 1850
Fig. 274

Albers, 1850: 179 (*Bulimus* sect.).

— *Macaronapaeus* Kobelt, 1899: 895 (t.-sp. *Bulimus hartungi* Morelet et Drouet, 1857; SD Bank & Neubert, 1998).

TYPE SPECIES — *Bulimus baeticatus* Férussac in Webb et Berthelot, 1833; SD Moellendorff, 1901.

Shell elongated-conic, thin, rather fragile, of 6-7 rather convex whorls. Last whorl not descending. Apex more or less protruding. Color corneous or brown. Embryonic whorls smooth, later with conspicuous coarse sculp-

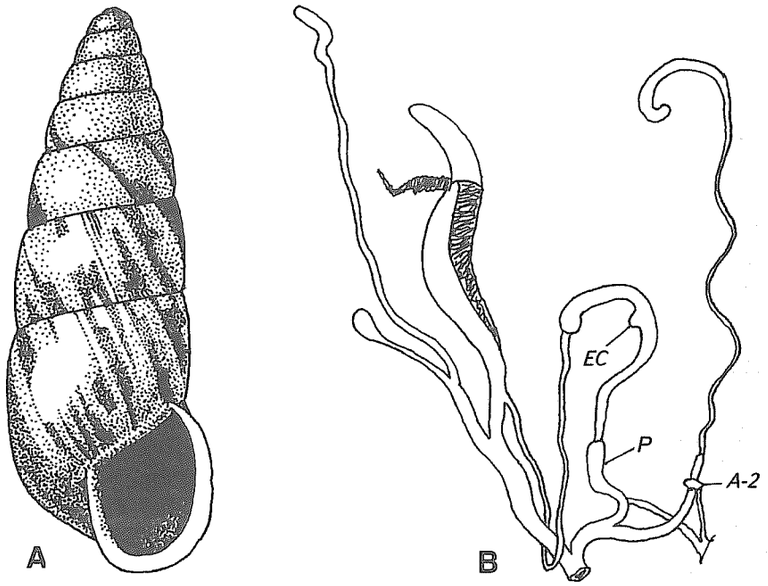


Fig. 273. ***Napaeinus moquinianus*** (Webb et Berthelot, 1833).
A — shell: W of Moya, Los Tilos, Gran Canaria. **Leiden**. B — reproductive tract. After Hesse, 1933.

ture of vermiform wrinkles, forming network. Aperture rounded, subvertical, with thin, shortly reflexed margins. Umbilicus, a short narrow slit. Height 10-26, diam. 5.4-12.8 mm (17.9 × 9.2 mm).

Flagellum very short, rounded. Epiphallus moderately long, with quite distinct caecum. Penis short, its distal part cylindrical, proximal swollen. Internally penis and distal part of epiphallus with thin longitudinal folds, substituted by granules arranged in longitudinal rows, and most proximal portion occupied by rows of elongated pits. Basal section of penial appendix (A-1 + A-2 + A-3) more or less cylindrical, A-4 and A-5 not distinctly differentiated. Penial arm of penial retractor attached below lower border of swollen part of penis, appendical arm — above middle of basal section of appendix. Free oviduct markedly longer than vagina. Spermathecal stalk without diverticle, reservoir poorly defined.

DISTRIBUTION. Canary Islands, Azores. 10 spp.

Zebrina Held, 1837
Fig. 275

Held, 1837: 917.

— *Bulimulus* Risso, 1826: 78 (nom. praeocc., non Leach, 1815; t.-sp. *Bulimus radiatus* Bruguière, 1789; monotypy).

— *Zebrinus* Westerlund, 1887 (1884-1890): 3 (t.-sp. *Helix detrita* Müller, 1774; SD Westerlund, 1902).

— *Rhabdoena* Kobelt, 1902: 1021 (t.-sp. *Buliminus caesius* Kobelt, 1902; OD).

— *Leucomastus* A.Wagner, 1927: 313 (t.-sp. *Leucomastus buresi* Wagner, 1927; OD).

— *Aschera* Pallary, 1939: 40 [*Zebrinus* sect.; t.-sp. *Zebrinus (Aschera) eburneus* L. Pfeiffer, 1846; OD].

TYPE SPECIES — *Helix detrita* Müller, 1774; SD Gray, 1847.

Shell elongated-ovate, rather solid, of 6-7 moderately convex whorls. Last whorl not descending. Color calcareous-white, usually spotted with dark streakes. Embryonic whorls smooth, later weakly sculptured with

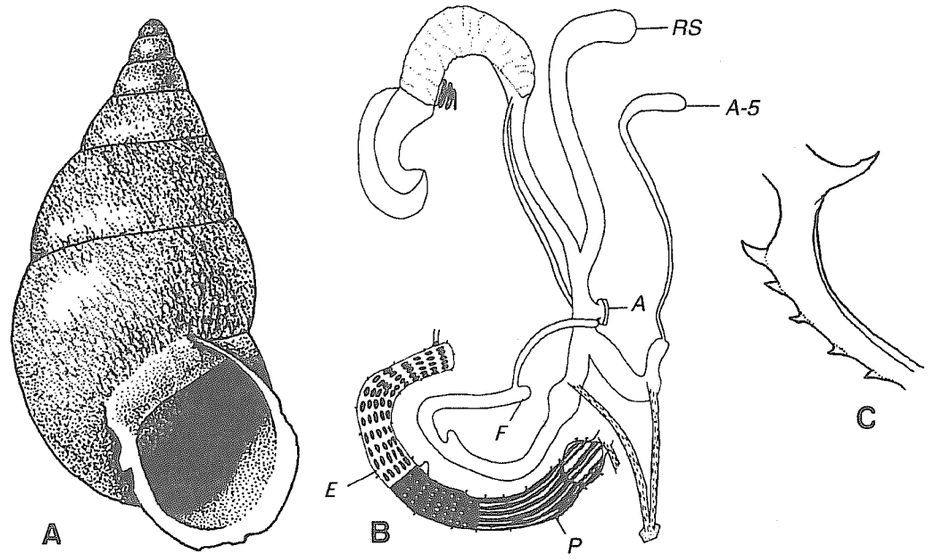


Fig. 274. ***Napaeus baeticatus*** (Férussac, 1833).
A — shell: "I. St. Thomas", Canary Islands. Lectotype. **Paris.** B — reproductive tract and interior of distal male section; C — fragment of spermatophore. After Henriques at al., 1993.

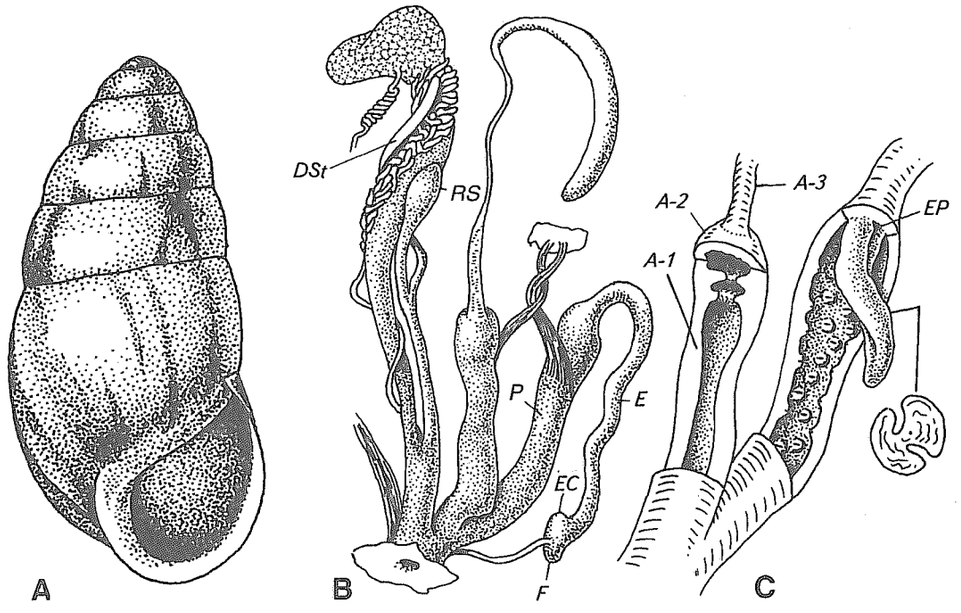


Fig. 275. ***Zebrina detrita*** (Müller, 1774).
Pech, Hungary. A — shell; B — reproductive tract; C — interior of penis and of basal part of penial appendix. July, 1970. **Moscow** No. Lc-23305.

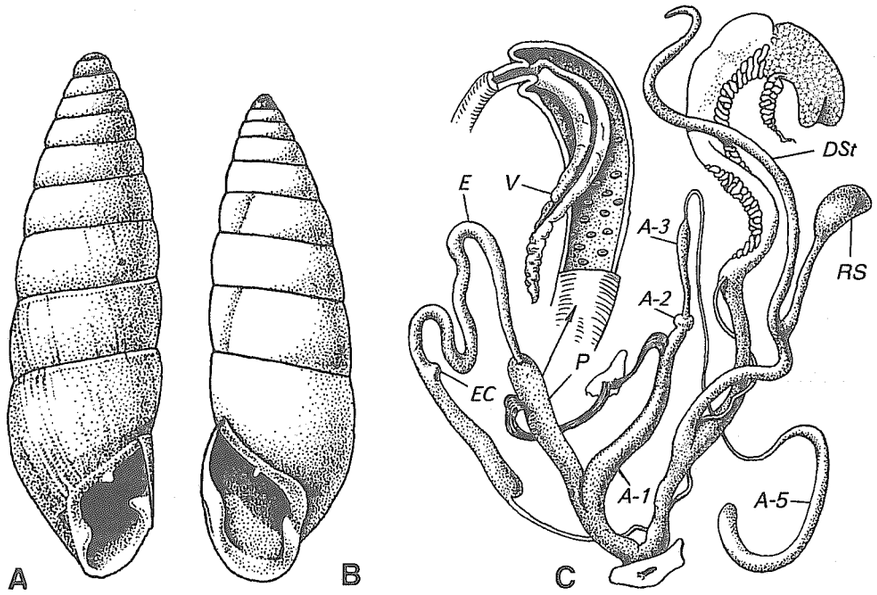


Fig. 276. A — ***Chondrus (Chondrus) zebrula*** (Férussac, 1821). Shell: Gemelek, Turkey. Lectotype. **Paris**.
B, C — ! ***Chondrus tournefortianus*** (Férussac, 1821). Between Amasia and Sivas, Turkey, May 8, 1936. B — shell; C — reproductive tract and interior of penis. **Moscow** No. Lc-20639.

radial wrinkles and spiral grooves. Aperture ample, rounded to ovate, without teeth. Peristome insertions not approached; margins more or less thickened. Umbilicus minute, ovate. Height 14-30, diam. 7-14 mm (20.6 × 9.0 mm).

Flagellum very short, conic. Epiphallus not long. Epiphallic caecum close to vas deferens entrance. Penis rather long, subcylindrical, prismoconic tubercles within it clear, scattered. Verge (stimulator) pivot-like, with 1-2 longitudinal furrows. Penial appendix well developed, A-1 united with A-2. Arms of penial retractor arising on diaphragm close to each other, penial branch attached to upper part of penis, appendical — to A-1 + A-2 near base of A-3. Free oviduct longer than vagina. Spermathecal stalk not long, straight, diverticle somewhat longer, neck of reservoir rather short.

DISTRIBUTION. Europe, except northern regions, Greece, Asia Minor. About 15 spp. & subspp.

Chondrus Cuvier, 1817
Fig. 276

Cuvier, 1817: 408.

— *Clausilia* Blainville, 1825 (1825-1827): 457 (part.; non Draparnaud, 1805).

— *Brephulus* Westerlund, 1887 (1884-1890): 2, 9 (non Beck, 1837).

— *Antichondrus* Lindholm, 1925: 29 (*Chondrus* sect.; t.-sp. *Helix tournefortianus* Férussac, 1821; OD).

TYPE SPECIES — *Bulimus zebra* Olivier, 1801; SD Gray, 1847b (= *Helix zebrula* Férussac, 1821, nom. nov. pro *Bulimus zebra* Olivier, 1801, non Bruguière, 1792: Tillier & Mordan, 1983).

Shell dextral or sinistral, cylindrical to turrited, opaque, of 9-12 flattened whorls. Color calcareous, often with more or less numerous dark streaks; apex usually dark. Embryonic whorls smooth and shining, later with fine sculpture of irregular radial wrinkles and of elements of spiral striation. Aperture roundly triangular, comparatively

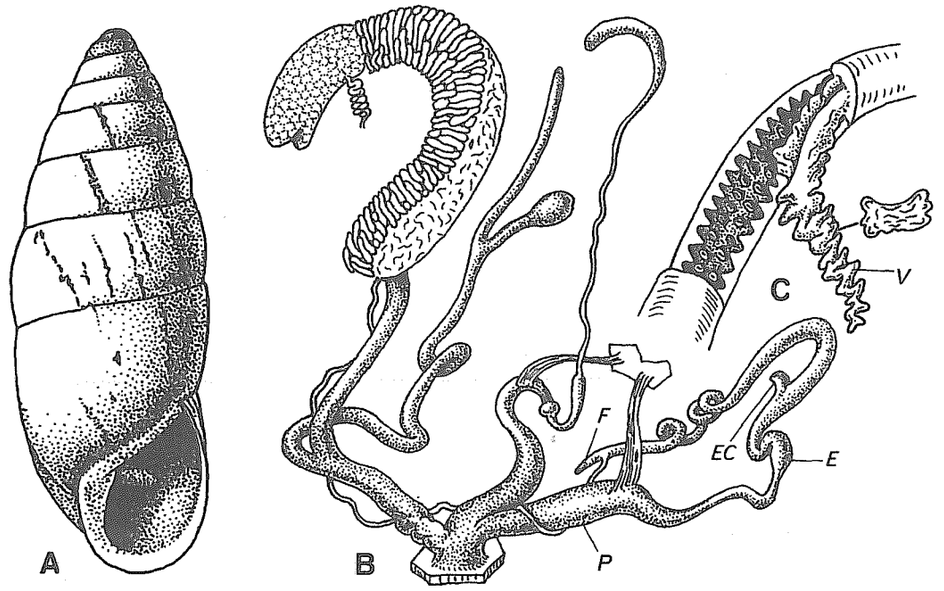


Fig. 277. ***Brephulopsis bidens*** (Krynicki, 1833).
A — shell: Simpheropol, Crimea. Lectotype. **SPb**. B, C — Partizany village near Simpheropol, October 10, 1974. B — reproductive tract; C — interior of penis. **Moscow** No. Lc-23292. After Schileyko, 1984.

small, slightly oblique, with simple, somewhat thickened margins. Peristome insertions not approached. 3-4 variously developed teeth: angular (sometimes absent), parietal, blunt columellar, and palatal. Umbilicus, a short crack. Height 10-27, diam. 3-7 mm (*zebrula*: 17.0 x 4.9; *tournefortianus*: 27.1 × 8.0 mm).

Flagellum vestigial. Epiphallus long, caecum near middle of epiphallus. Penis long, subcylindrical to clavate, with scattered prismoconic tubercles; verge slender, long, with deep groove. All sections of penial appendix normally and proportionally developed. Arms of penial retractor arising on diaphragm very close to each other, penial arm inserting on upper part of penis, the other — to A-1 at short distance from A-2. Free oviduct considerably longer than vagina. Spermathecal stalk of various length, diverticle long, neck of reservoir much shorter.

DISTRIBUTION. Balkan Peninsula, Greece, Asia Minor. 5-6 spp. & subspp.

Brephulopsis Lindholm, 1925
Fig. 277

Lindholm, 1925: 28 [*Zebrina (Zebrina)* sect.; nom. nov. pro *Brephulus* Westerlund, 1902, non Beck, 1837].

TYPE SPECIES — *Bulimus attenuatus* Krynicki, 1833 (= *Buliminus bidens* Krynicki, 1833 — line priority); OD.

Shell high, mostly (sub)cylindrical, shining, of 7-11 weakly convex whorls. Last whorl straight. Color white, mostly with dark radial streaks and marks. Sculpture represented by fine radial wrinkles and weak spiral grooves. Aperture pointed-ovate, slightly oblique, with slightly reflexed and a little thickened margins, with or without deeply lying palatal plica. Umbilicus very narrow, slit-like. Height 12-22, diam. 5-6 mm (16.2 × 5.4 mm).

Epiphallus and spermathecal duct long. Caecum shifted from middle of epiphallus towards penis. Divisions of penial appendix normally developed. Clear prismoconic tu-

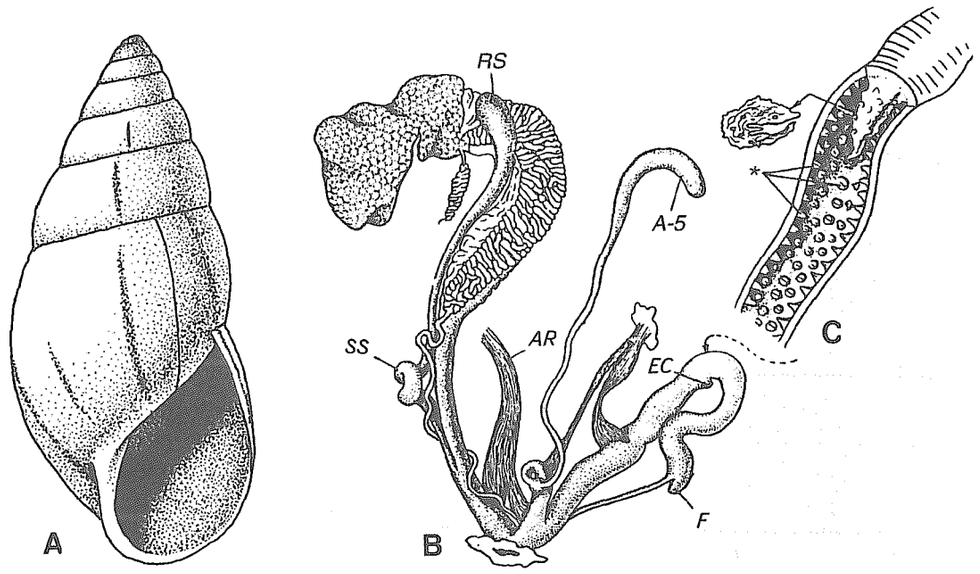


Fig. 278. ***Georginapaeus hohenackeri*** (L.Pfeiffer, 1848).
Valley of Kura River near Akhaltsikhe, April 19, 1971. A — shell; B — reproductive tract; C — interior of penis. **Moscow** No. Lc-23303. After Schileyko, 1984. Asterisk — prismoconic tubercles.

bercles inside penis grouped into series. Penial stimulator (verge) long, slender, corrugated.

DISTRIBUTION. Crimea; locally — N and E coasts of Black Sea. 2 spp.

Georginapaeus Schileyko, gen. nov.
Fig. 278

TYPE SPECIES — *Bulimus hohenackeri* L.Pfeiffer, 1848.

Shell high-conic to ovate-conic, solid, shining, of 8-9 moderately convex whorls. Last whorl weakly or not ascending in front. Color milky-white, often with diffuse radial light-brown or fulvous streaks. Interior of aperture ochraceous. Postembryonic whorls with rather coarse, very irregular, radial wrinkles; occasionally with elements of spiral striation. Aperture ovate, pointed above, slightly oblique, with blunt, a little thickened margins. Columellar margin reflexed, covering very narrow, slit-like umbilicus. Height 20-30, diam. 9-14 mm (23.7 × 9.5 mm).

Flagellum very short, rounded. Epiphallus enlarged, with small caecum. Penis internally with very distinct and sharp prismoconic tubercles and short grooved verge. A-1 rather short, A-2 small, globular, A-3 poorly defined, A-4 and A-5 without clear boundary between them. Penial arm of penial retractor attached to penis/epiphallus junction; appendical arm — to middle of A-1. Atrial retractor very strong. Free oviduct a little longer than vagina. Spermathecal stalk more or less convoluted, without diverticle; reservoir only weakly defined.

The genus is similar to *Zebrina* in conchological characters, and to *Napaeopsis* in the absence of spermathecal diverticle. Anatomically it differs from *Zebrina* by more distal position of epiphallic caecum, absence of spermathecal diverticle, stronger development of prismoconic tubercles, and shorter, tuberculate verge having only one deep superficial groove. It differs from *Napaeopsis* in the inner structure of penis, poorly defined A-3, and insertion of penial retractor to the boundary between penis and epiphallus rather than to middle of penis, as in *Napaeopsis*.

DISTRIBUTION. Northern territories of

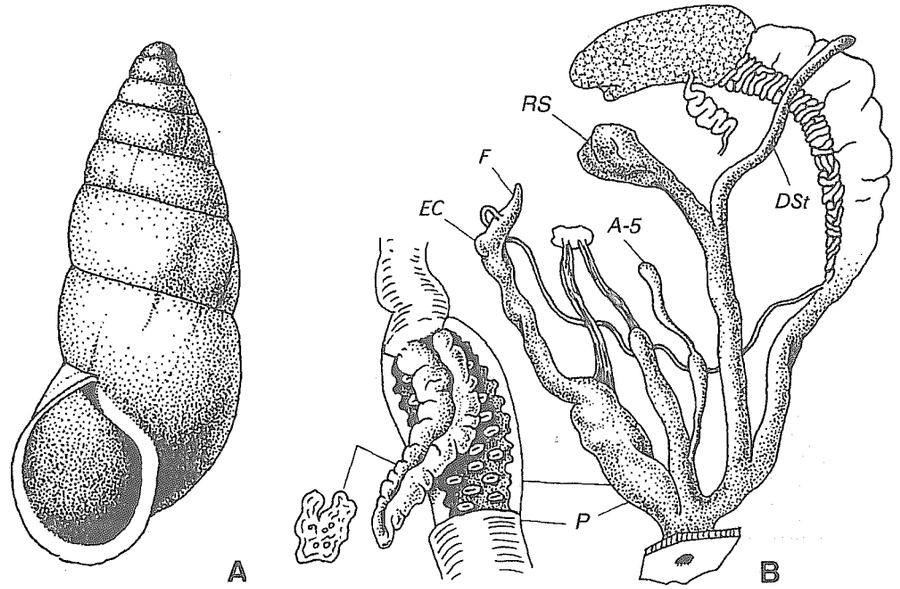


Fig. 279. ***Thoanteus gibber*** (Krynicki, 1833).
Chatyr-Dagh Mts., Crimea, August 17, 1891. A — shell; B — reproductive tract and interior of penis. **SPb**.

Syria, Iran and Iraque, SE and E Turkey, Transcaucasia, central and eastern parts of N Caucasus. Probably 1 variable sp.

Thoanteus Lindholm, 1925
Fig. 279

Lindholm, 1925: 28 [*Zebrina (Zebrina)* sect.]. Schileyko, 1984: 358. Hausdorf, 1993: 89.

TYPE SPECIES — *Bulimus gibber* Krynicki, 1833; OD.

Shell sinistral (dextral specimens known), ovate-conic, opaque, of 7-8 slightly convex whorls. Color whitish to corneous, often with vague darker streaks. Sculpture of not sharp radial and spiral elements. Aperture ovate, with shortly expanded margins; peristome insertions more or less approached. Aperture teeth absent. Umbilicus narrowly slit-like. Height 12.4-22.0, diam. 6.2-10.2 mm (18.2 × 8.2 mm).

Flagellum short, conic. Epiphallus of moderate length, caecum strongly shifted to base of flagellum. Prismoconic tubercles inside penis strong, scattered; verge large, with deep furrow. A-1 fused with A-2. In type species A-3 branched off from basal portion of A-1 + A-2; in other species penial appendix has usual appearance (Hausdorf, 1993). A-4 and A-5 very short. Free oviduct markedly longer than vagina. Spermathecal stalk fat, rather long, diverticle shorter, neck of reservoir far shorter.

DISTRIBUTION. Crimea and N Turkey. 3 spp.

Ramusculus Lindholm, 1925
Fig. 280

Lindholm, 1925: 28 [*Zebrina (Zebrina)* sect.]. Schileyko, 1984: 360.

TYPE SPECIES — *Bulimus subulatus* Rossmaessler, 1837; OD.

Shell slender, aciculate-cylindrical, of 8-11 moderately convex whorls. Color white with variously developed dark radial marks and streaks. Postapical whorls finely sculptured with smoothed radial rugae; spiral elements, when present, very fine. Aperture small, oblique, without teeth, with thin,

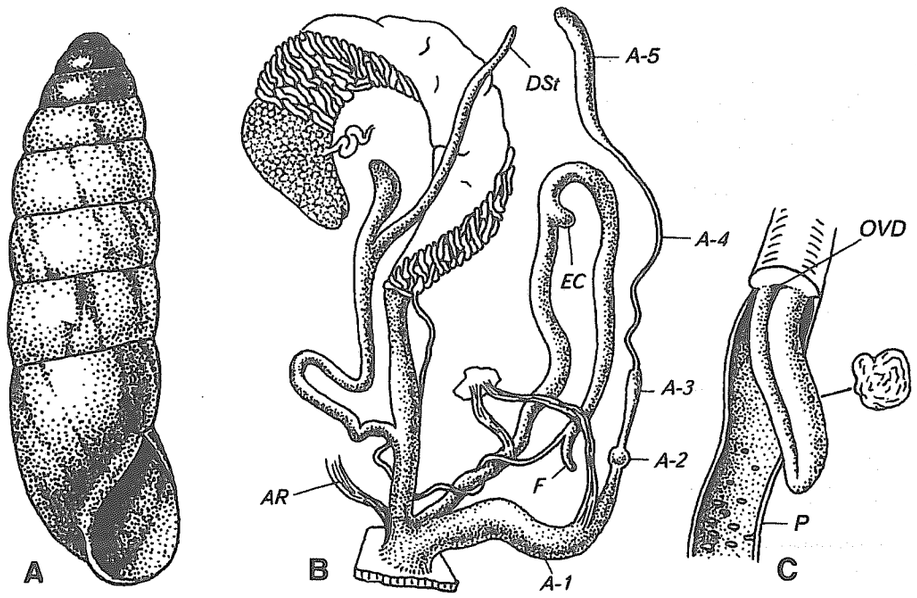


Fig. 280. ***Ramusculus subulatus*** (Rossmaessler, 1837).
Above Perevalnoye, Chatyr-Dagh Mts., Crimea, July 28, 1962. A — shell; B — reproductive tract; C — interior of penis. **Moscow** No. Lc-23274.

sharp, simple margins. Umbilicus, a short slit. Height 9-14, diam. 2.1-3.0 mm (9.5 × 2.2 mm).

Flagellum short, slender. Epiphallus long, with well developed caecum slightly shifted towards penis from middle of epiphallus. Penis short, cylindrical; prismoconic tubercles on inner surface of penis small, scattered, occupying only distal part of organ. Stimultor pivot-like, with smooth surface and shallow superficial groove. Penial appendix of common structure. Arms of penial retractor arising independently but very close to each other; penial branches attached to penis/epiphallus junction, appendical — to A-1 above its middle. Spermathecal shaft long, slightly sinuous, diverticle well developed, neck of reservoir very short.

DISTRIBUTION. Crimea and N Turkey. 2 spp.

Chondrula Beck, 1837

Beck, 1837 (1837-1838): 87.

TYPE SPECIES — *Helix tridens* Müller, 1774; SD Martens in Albers, 1860.

Shell elongated-ovate to nearly cylindrical, rather thin to solid, of 6.5-8 whorls. Color yellowish-corneous to dark-brown. Postapical whorls silky to wrinkled, but never ribbed. Aperture toothless or with 1-6 teeth.

Epiphallus moderately long, spermathecal stalk of various length. Caecum in middle part of epiphallus. Penial appendix absent. Prismoconic tubercles inside penis well developed, scattered. Stimulator pivot-shaped or in form of chute, with tuberculate surface. Diverticle of spermathecal stalk normally developed.

DISTRIBUTION. Europe, Mediterranean countries, Caucasus.

Chondrula (*Chondrula* s. str.)
Fig. 281

Beck, 1837 (1837-1838): 87.

— *Gonodon* Held, 1837: 918 (t.-sp. *Helix tridens* Müller, 1774; SD Gray, 1847b).

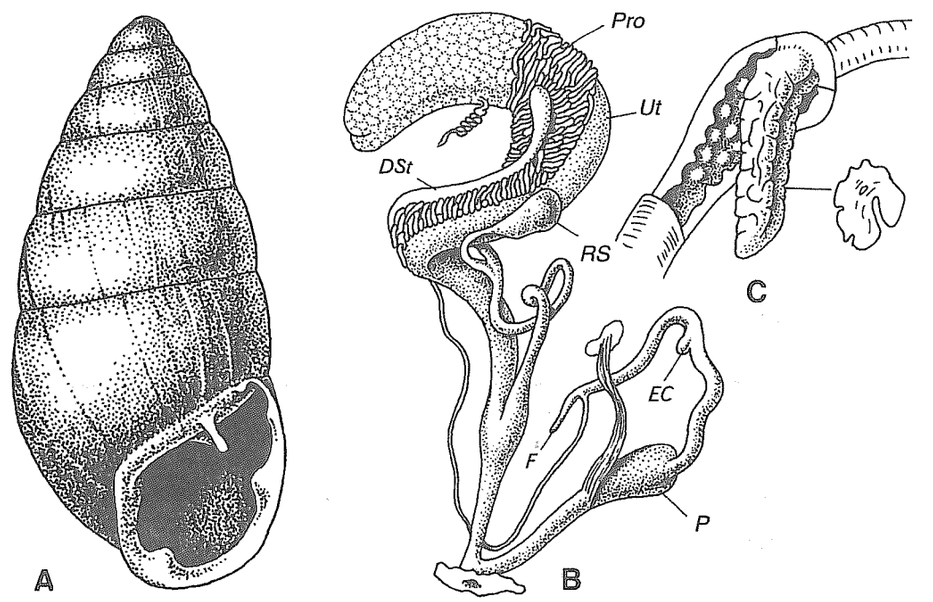


Fig. 281. ***Chondrula (Chondrula) tridens*** (Müller, 1774).
Cheghem valley, N Caucasus, May 14, 1970. A — shell; B — reproductive tract; C — interior of penis. **Moscow** No. Lc-22230.

— *Eucore* Charpentier, 1837: 15 (nom. praeocc., non Hübner, 1816; t.-sp. *Helix tridens* Müller, 1774; SD Dall, 1904).

— ?*Odontalus* Parreyss, 1849 (1850): 99 (see synonymy for *Azeca*).

— *Chondrulus* Westerlund, 1887: 2 (t.-sp. *Helix tridens* Müller, 1774; designated here).

— *Dentistomus* Kimakowicz, 1890: 228 (t.-sp. *Helix tridens* Müller, 1774; SD Lindholm, 1925).

Aperture with 3-6 teeth. Height 7.7-25.2, diam. 3.5-9.2 mm (10.2 x 4.4 mm).

Penial retractor inserting to middle portion of penis.

DISTRIBUTION. Europe, eastern Mediterranean countries, Caucasus, Crimea. 4-6 spp.

Chondrula (*Eubrephulus* A. Wagner, 1927)
Fig. 282

Wagner A., 1927: 310 (*Brephulus* subg.).

TYPE SPECIES — *Bulimus bicallosus* L.Pfeiffer, 1847; SD Forcart, 1940.

Shell dextral. Aperture with 2 teeth: columellar and palatal. Height 15-22, diam. 4.8-5.0 mm (17.2 × 4.8 mm).

Penial retractor attached to penis/epiphallus junction.

DISTRIBUTION. Balkan Peninsula, Asia Minor. 2-3 spp.

Chondrula (*Mastus* Beck, 1837)
Fig. 283

Beck, 1837 (1837-1838): 78.

— *Pseudomastus* O.Boettger, 1889a: 24 (*Buliminus* subg.; t.-sp. *Helix pupa* "Bruguière"; monotypy).

TYPE SPECIES — *Helix pupa* Linnaeus, 1758; SD Herrmannsen, 1847.

Shell dextral. Aperture without teeth or with weak angular tubercle. Height 10-25, diam. 4-9 mm (16.4 × 6.2 mm).

Penial retractor attached to middle or proximal part of penis.

DISTRIBUTION. Eastern Mediterranean countries, W Caucasus, Carpathians. About 10 spp.

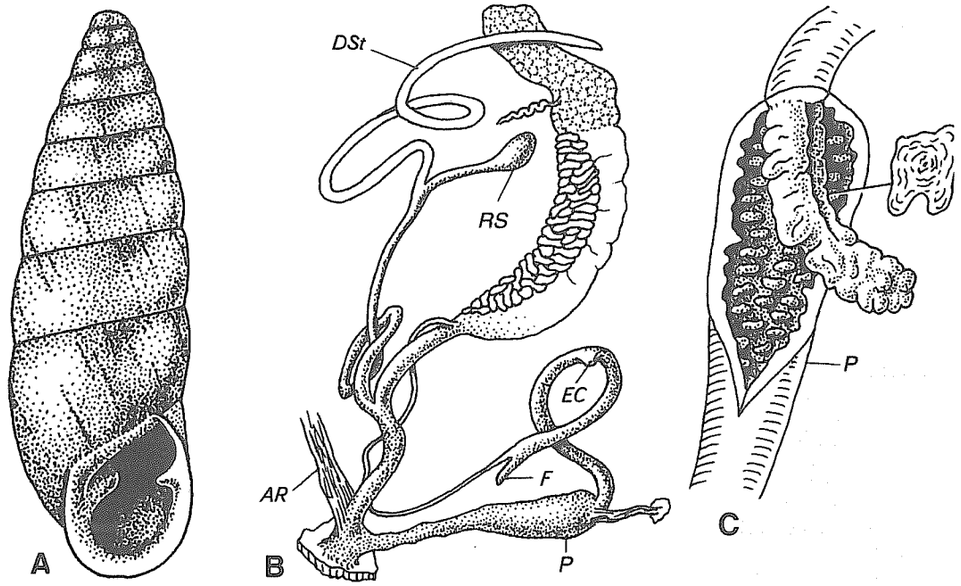


Fig. 282. ***Chondrula (Eubrephulus) bicallosa*** (L. Pfeiffer, 1847).
Strandja Mts., Bulgaria, July 15, 1967. A — shell; B — reproductive tract; C — interior of penis. **SPb**.

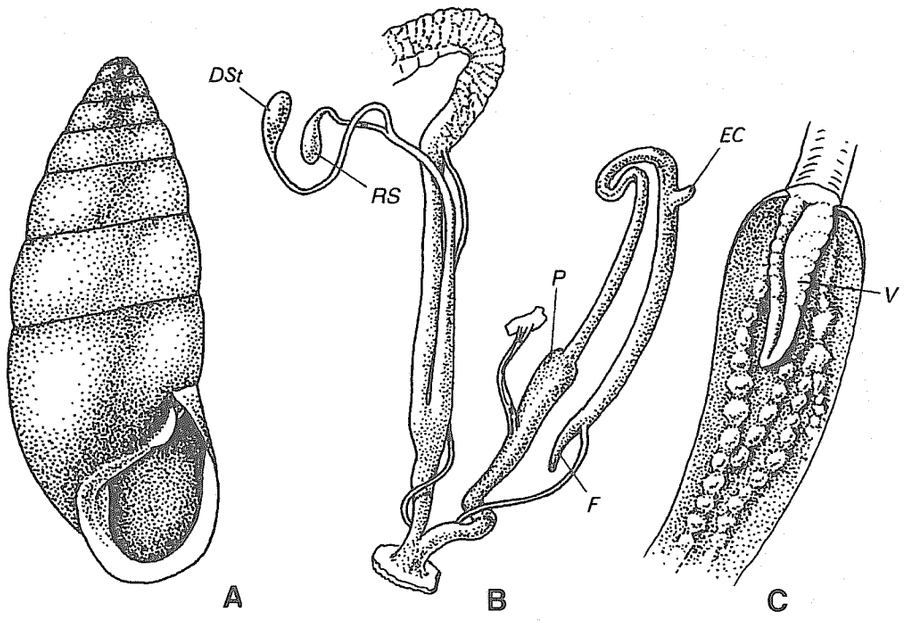


Fig. 283. ***Chondrula (Mastus) pupa*** (Linnaeus, 1758).
A — shell: Cephalonia Island, Greece. **Moscow** No. Lc-23286. B — reproductive tract; C — interior of penis. Lindos, Rhodos Island, March 1972. **Vienna** No. 77.492.

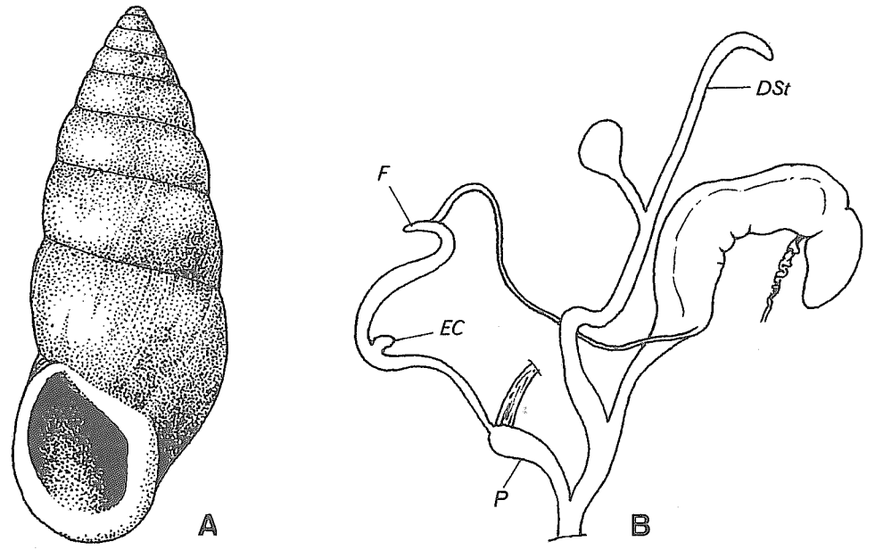


Fig. 284. ***Chondrula (Amphitrorsus) venerabilis*** (L.Pfeiffer, 1853).
A — shell: Transsylvania. **Phil.** No. 23203. B — reproductive tract. After Wagner, 1927.

Chondrula (*Amphitrorsus* Kimakowicz, 1890
Fig. 284

Kimakowicz, 1890: 88 (*Dentistomus* subg.).

TYPE SPECIES — *Bulimus venerabilis* L. Pfeiffer, 1853; monotypy.

Shell sinistral. Aperture toothless or with angular tubercle. Height 18-20, diam. 7.0-8.0 mm (18.0 × 7.2 mm).

DISTRIBUTION. Transsylvania. 1 sp. with 3 forms.

Meijeriella Bank, 1985
Fig. 285

Bank, 1985: 41.

TYPE SPECIES — *Meijeriella canaliculata* Bank, 1985; OD.

Shell dextral, slender, fusiform, rather solid, shining, of 7.75-9.5 flattened whorls. Last whorl with spiral shallow depression at periphery. Color uniformly corneous-brown. Postapical whorls with smoothed radial irregular wrinkles. Aperture small, ovate, with much thickened margins. Aperture armament reduced to more or less developed angular tubercle. Umbilicus, a minute perforation. Height 11.1-14.9, diam. 3.2-3.3 mm (12.1 × 3.2 mm).

Flagellum short, slender. Epiphallus rather long, caecum located above its middle. Penis fusiform, without appendix, retractor attached to penis/epiphallus junction. Free oviduct longer than vagina. Spermathecal stalk rather long, diverticle well developed, neck of reservoir short.

DISTRIBUTION. Mytilini Island (Lesbos) in Aegeian Sea. 1 sp.

Clausilioides Lindholm, 1925
Fig. 286

Lindholm, 1925: 29. Forcart, 1940: 132 (as syn. of *Sesteria* Bourguignat, 1881).

TYPE SPECIES — *Buliminus biplicatus* Retowski, 1889; OD.

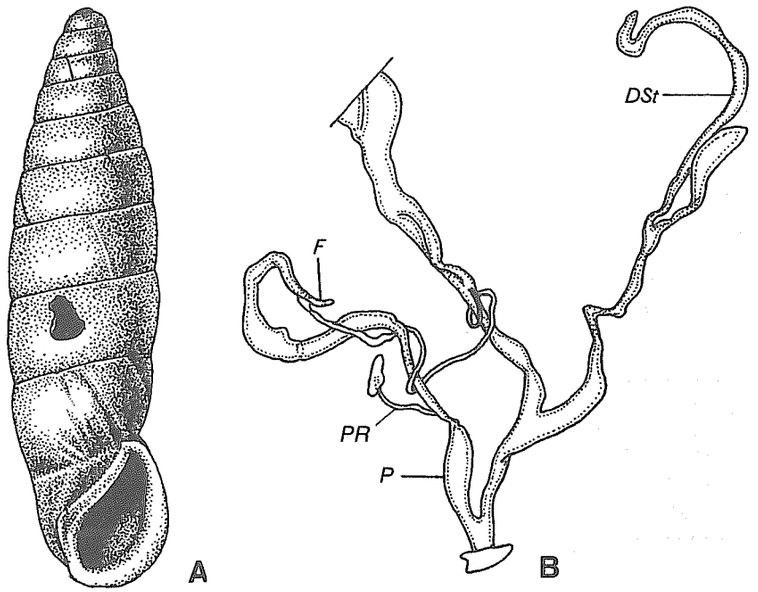


Fig. 285. ***Meijeriella canaliculata*** Bank, 1985.
A — shell: Mylilini Island. Paratype. **Leiden** No. 55673. B — reproductive tract. After Bank, 1985.

Shell slender, conic-cylindrical to fusiform, thin, glossy, translucent. Whorls 11, upper slightly convex, lower nearly flat. Last whorl straight. Color uniformly corneous to dark-brown. Embryonic whorls vaguely fine-granulate, rest sculptured with irregularly spaced, radial, delicate wrinkles. Aperture auriculate, somewhat oblique, peristome insertions not approached, margins white, shortly reflexed. Columella occupied by oblique, rounded in profile lamella entering shell for 0.3-0.5 whorl. Umbilicus, a very narrow slit, semicovered. Height 18-20, diam. 4.0-4.2 mm (20.0 x 4.2 mm).

Flagellum short, rounded. Epiphallus rather long, caecum in its middle. Penis shortly clavate. All sections of penial appendix normally developed. Arms of penial retractor arise on diaphragm independently, penial branch attached to very upper part of penis, appendical — to A-1 just below A-1. Free oviduct much longer than vagina. Spermathecal shaft not very long, short diverticle branched off from voluminous reservoir (!).

DISTRIBUTION. SW Caucasus: . 1 sp.

Mauronapaeus Kobelt, 1899
Fig. 287

Kobelt, 1899: 1021 (*Buliminus* subg.).

TYPE SPECIES — *Bulimus jeannoti* Terver, 1839; SD Kobelt, 1902.

Shell dextral, acuminate-ovate, thin, of 6 moderately convex whorls, slightly enlarged at their lower parts; last whorl slightly and gradually elevated towards aperture. Color corneous, sometimes with lighter spots and streaks. Sculpture of postembryonic whorls of weak irregular wrinkles. Aperture subvertical, rounded, with slightly reflexed, thin, sharp margins. Peristome insertions not approached. Umbilicus dot-like. Height 10-16, diam. 5-8 mm (10.3 × 5.0 mm).

Flagellum exceptionally short, rounded. Epiphallus moderately long, caecum somewhat shifted upward. Penis rather short, clavate to subcylindrical. A-1 + A-2 short, A-3 quite distinguishable, A-4 and A-5 as usual. Arms of penial retractor arising on diaphragm as one very short band, penial arm attached to very upper end of penis, appendical arm — to A-2. Free oviduct and vagina

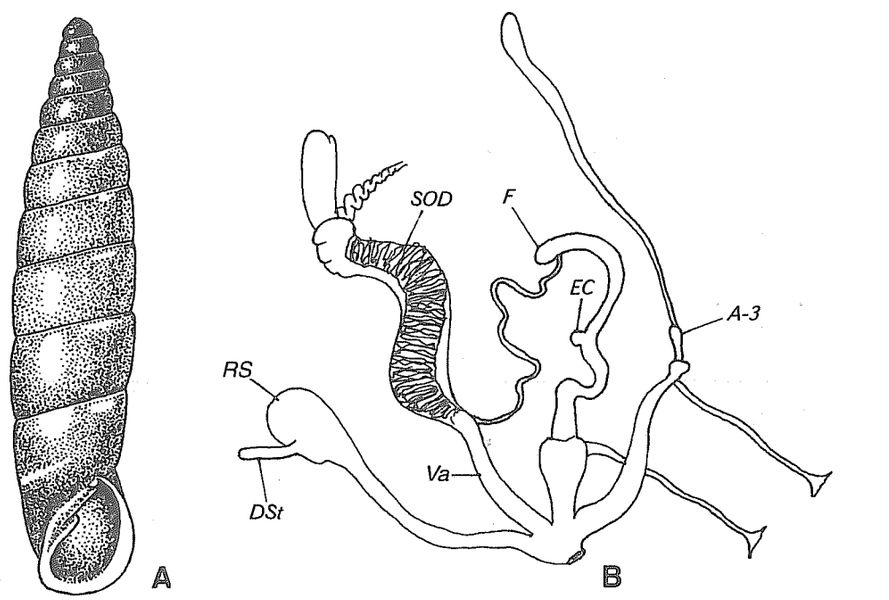


Fig. 286. ***Clausilioides biplicatus*** (Retowski, 1889).
A — shell: Lomashen, N Turkey. **Moscow** No. Lc-4248. B — reproductive tract. After Hesse, 1933.

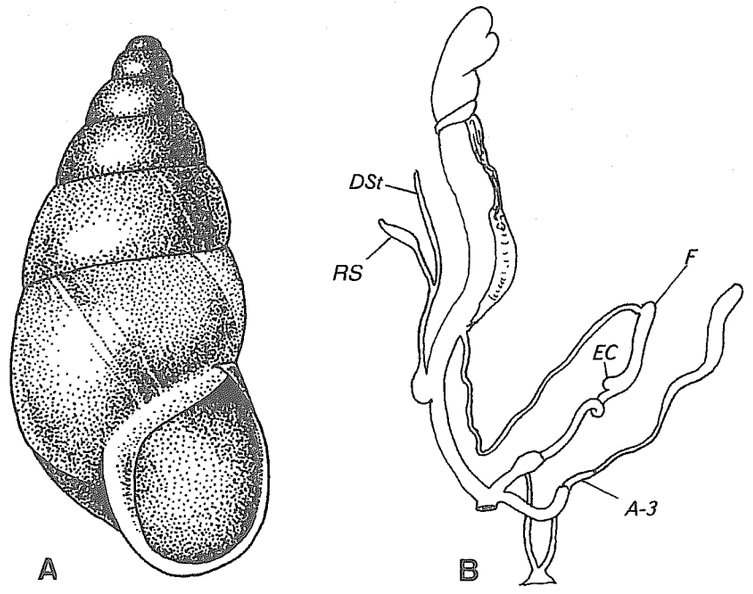


Fig. 287. A — ***Mauronapaeus jeannoti*** (Terver, 1839). Shell: Djebel Gouraya near Bougie, Algeria. **Moscow** No. Lc-23289.
B — ! ***Mauronapaeus cartennensis*** (Kobelt, 1902). Reproductive tract. After Hesse, 1933.

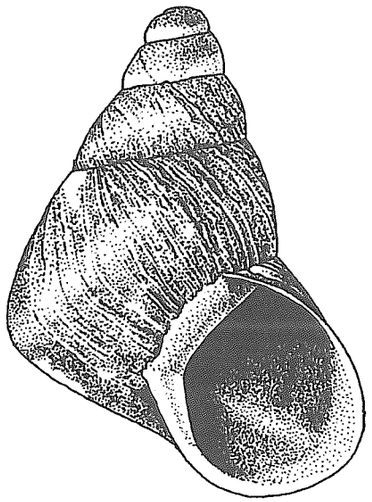


Fig. 288. ***Cirna micelii*** (Kobelt, 1886).
Ach Keul, Tunisia. **Paris.**

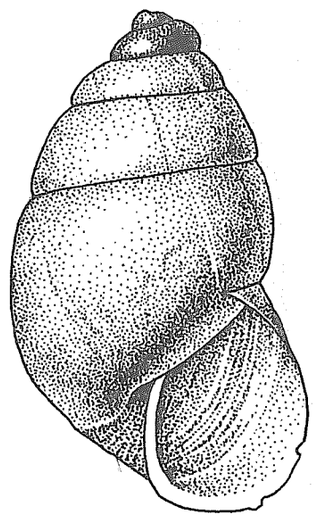


Fig. 289. ***Kabylia bourguignati*** (Letourneux, 1870).
Algeria. **Phil.** No. 78525.

of about equal length, spermathecal stalk short, diverticle also short, reservoir vestigial, on very short neck.

DISTRIBUTION. Algeria, Tunisia. 3-4 sp.

Cirna Pallary, 1928
Fig. 288

Pallary, 1928: 242.

TYPE SPECIES — *Buliminus micelii* Kobelt, 1886; OD.

Shell dextral, rather thin, of about 5 convex whorls. Last whorl with rounded peripheral angle. Color dark-brown to blackish; surface usually covered with particles of mud. Embryonic whorls smooth, later with oblique, irregular, radial wrinkles. Aperture subvertical, with thin, slightly expanded margins. Umbilicus open, comparatively broad, round, cylindrical. Height 8.9-12.0, diam. 6.0-7.5 mm (8.9 × 6.0 mm).

DISTRIBUTION. Tunisia. 2-3 spp.

Kabylia Pallary, 1928
Fig. 289

Pallary, 1928: 243.

TYPE SPECIES — *Bulimus bourguignati* Letourneux, 1870; OD.

Shell dextral, pointed-ovoid, rather solid, of 6-7 moderately convex whorls. Last whorl not elevated. Color whitish, apex fulvous. Embryonic whorls smooth, later with fine spiral striae, rough irregular radial wrinkles, and elements of malleation. Aperture ovate, subvertical, toothless, with thin and simple margins. Umbilicus, a minute perforation. Height 14-18, diam. 8.0-9.5 mm (15.0 × 8.5 mm).

DISTRIBUTION. Algeria. 2-3 sp.

Omphaloconus Westerlund, 1887
Fig. 290

Westerlund, 1887 (1884-1890): 22 (*Buliminus* subg.).

TYPE SPECIES — *Bulimus euryomphalus* Bourguignat, 1876 (non Jonas, 1844, = *Buliminus callomphalus* Bourguignat in Servain, 1891); monotypy.

Shell dextral, turbinate, rather solid, of 5-6 very convex whorls. Last whorl straight. Color calcareous-white, apex corneous. Embryonic whorls smooth, later with coarse irregular radial striation and elements of malleation. Aperture subcircular, slightly oblique, with thin margins, columellar margin broadly reflexed. Peristome insertions more or less drawn together. Umbilicus comparatively broad. Height 6.5-7.0, diam. 4-5 (6.6 × 4.2 mm).

DISTRIBUTION. Algeria. 1 sp.

EUCHONDRINAE Schileyko, nom. nov.

— Multidentulinae Schileyko, 1978: 846 (based on *Multidentula* which is a synonym of *Euchondrus*).

Shell dextral or sinistral, pupiform, ovate or ovate-cylindrical, opaque, rather weakly sculptured. Embryonic whorls smooth. Aperture mostly with 6 tubercular teeth; typically angular, parietal, columellar, basal and 2 palatal teeth present.

Flagellum absent, epiphallic caecum well developed. Inner surface of penis smooth. Penis contains closed globular verge having central canal. Proximal process of penis absent. Diverticle of spermathecal stalk and penial appendix primarily present, secondarily may be absent.

DISTRIBUTION. Balkan Peninsula, Asia Anterior, Caucasus.

REMARK. The genera of this subfamily are reliably distinguished mainly by anatomy.

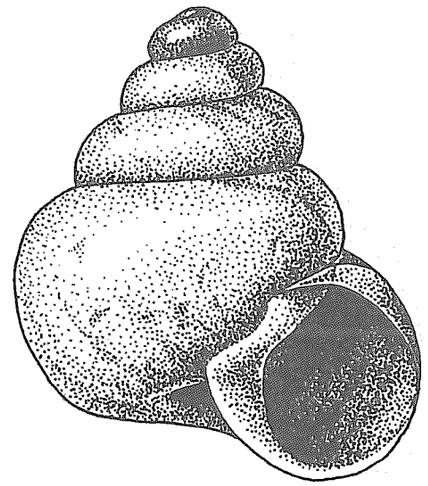


Fig. 290. ***Omphaloconus callomphalus*** (Bourguignat, 1891).
Algeria. **Phil.** No. 78509.

Euchondrus O.Boettger, 1883
Fig. 291

Boettger O., 1883a: 173 (*Buliminus* subg.).

— *Multidentula* Lindholm, 1925: 30 (*Jaminia, Chondrula* sect.; subsect.; t.-sp. *Bulimus ovularis* Olivier, 1801; OD).

— *Multidentinia* Lindholm, 1925: 30 (*Jaminia, Jaminia* s.str. sect.; subsect.; t.-sp. *Pupa chondriformis* Mousson, 1861; OD).

— *Bollingeria* Forcart, 1940: 194 (t.-sp. *Chondrus pupoides* Krynicki, 1833 sensu Forcart; OD).

— *Tokatia* Hudec, 1972: 214 (nom. nov. pro *Bollingeria* Forcart, 1940; t.-sp. *Buliminus lamelliferus* Rossmaessler, 1859; OD).

TYPE SPECIES — *Pupa chondriformis* Mousson, 1861; monotypy.

Conchological characters of subfamily. Height 3.5-14.0, diam. 2.2-5.2 mm (*chondriformis*: 6.8 × 3.0; *ovularis*: 4.5 × 3.6 mm).

Penial appendix and diverticle of spermathecal stalk normally developed.

DISTRIBUTION. Balkan Peninsula, Asia Anterior. About 15 spp. & subspp.

Senaridenta Schileyko, 1978
Fig. 292

Schileyko, 1978: 846.

TYPE SPECIES — *Chondrula nachicevanjensis* Hudec, 1972; OD.

Conchological characters of subfamily. Height 5.0-6.3, diam. 3.0-3.5 (6.0 × 3.3 mm).

Penial appendix wanting, diverticle of spermathecal duct normally developed.

DISTRIBUTION. Transcaucasia (Stepanakert). 1 sp.

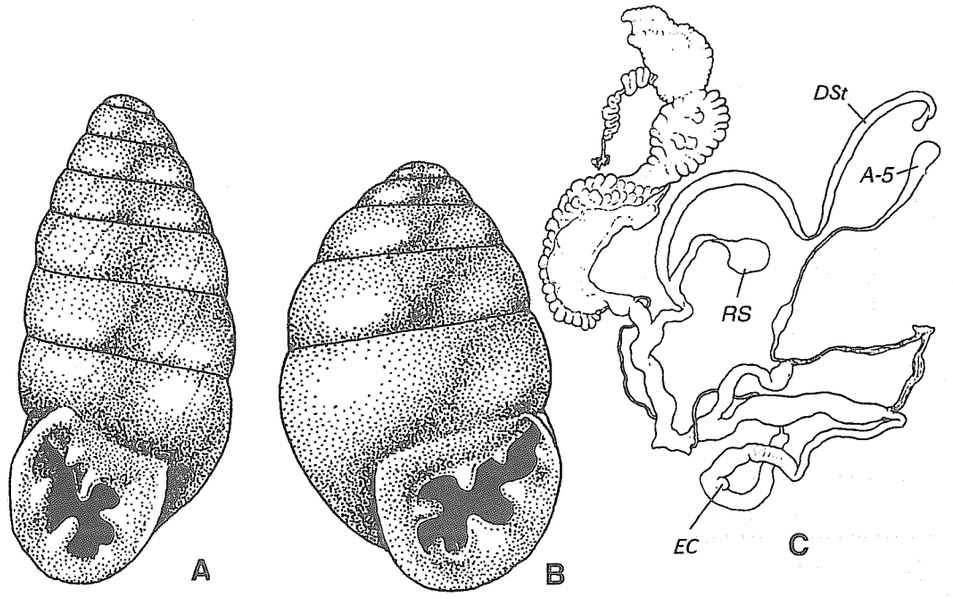


Fig. 291. A — ***Euchondrus chondriformis*** (Mousson, 1861). Shell: Jaffa, Israel. **Phil.** No. 218779.
B, C — ! ***Euchondrus ovularis*** (Olivier, 1801). B — shell: Samsun, Turkey. **SPb**. C — reproductive tract. After Hudec, 1975.

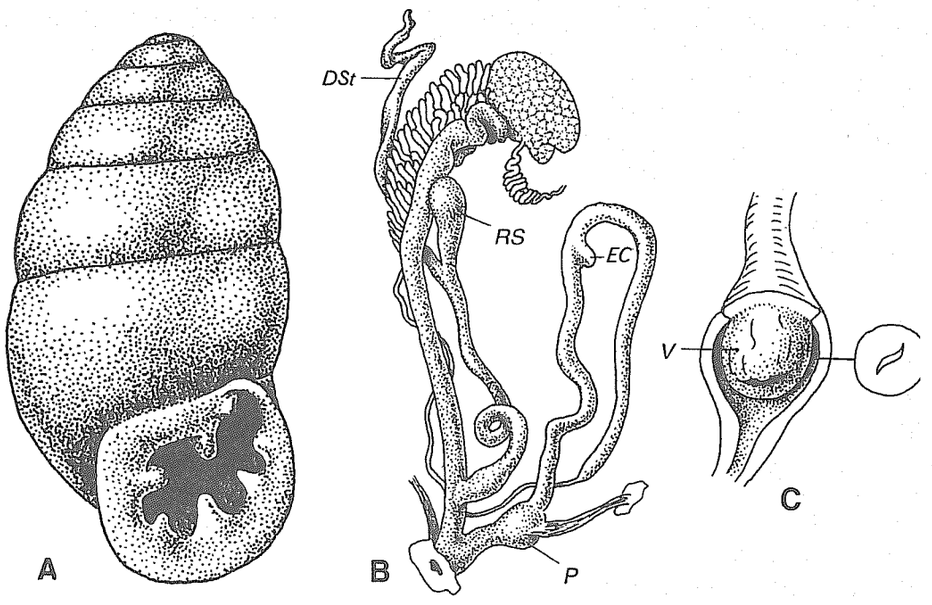


Fig. 292. ***Senaridenta nachicevanjensis*** (Hudec, 1972).
Environs of Stepanakert, Transcaucasia. June 31, 1964. A — shell; B — reproductive tract; C — interior of penis. **Moscow** No. Lc-23279.

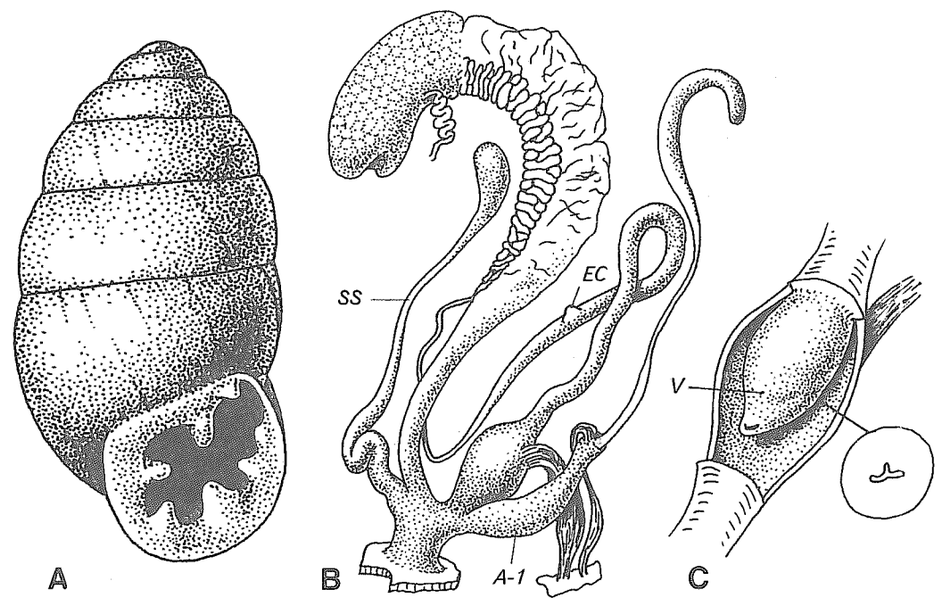


Fig. 293. ***Improvisa pupoides*** (Krynicki, 1833).
Mashuk Mt. near Piatigorsk, N Caucasus. A — shell of lectotype. **SPb**. B — reproductive tract; C — interior of penis. **Moscow** No. Lc-20928.

Improvisa Schileyko, 1978
Fig. 293

Schileyko, 1978: 846.

TYPE SPECIES — *Chondrus pupoides* Krynicki, 1833; OD.

Conchological characters of subfamily. Height 4.0-6.5, diam. 2.2-4.0 mm (5.4 × 2.7 mm).

Penial appendix well developed, diverticle of spermathecal stalk absent.

DISTRIBUTION. N Caucasus and Transcaucasia. Probably 1 sp.

SPELAEOCONCHINAE Wagner, 1927

Wagner, 1927: 318.

Shell dextral, spindle-shaped to turrited, nearly glass-like (when fresh) but rather solid, somewhat translucent, glossy, weakly sculptured. Aperture toothless.

Vas deferens elongate-fusiform: initially thin, then more or less distinctly enlarged, narrowed again towards entering epiphallus. Flagellum well-developed, with rounded tip. Epiphallus very short; penis a little longer, with appendix. A-1 subcylindrical, rather long; A-2 globular, small; A-3 absent; A-4 and A-5 unusually short. Penial retractor arising from diaphragm by one branch; penial (longer) arm inserts on midway of epiphallus, appendical (shorter) arm — on middle of A-1. Free oviduct and vagina rather short, of about equal length. Spermathecal stalk expanded, not long, without a diverticle, reservoir voluminous.

DISTRIBUTION. Herzegovina: Curzola and Brazza islands.

Spelaeoconcha Sturany, 1901
Fig. 294

Sturany, 1902: 14.

TYPE SPECIES — *Spelaeoconcha paganetti* Sturany, 1902; monotypy.

Shell ovate-turrited, thin, of 6-7 weakly convex whorls. Last whorl gradually slightly

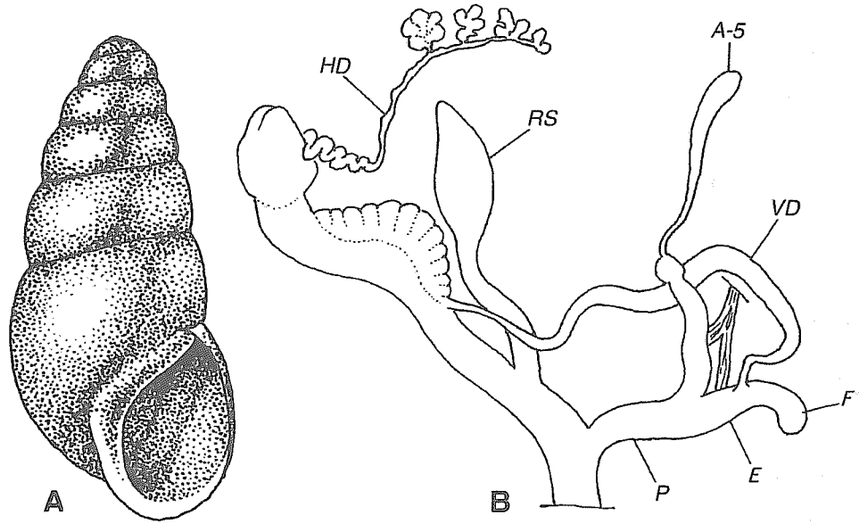


Fig. 294. A — ***Spelaeoconcha paganetti*** Sturany, 1902. Shell: Spisurca jama, Curzola Island, Herzegovina. **Leiden.**
B — ! ***Spelaeoconcha polymorpha*** Wagner, 1914. Reproductive tract. After Wagner, 1927.

ascending in front. Color light-corneous. Surface nearly smooth. Aperture ovate, margins slightly reflexed, thin. Height 3.4-6.5, diam. 1.5-2.6 mm (5.8 × 2.3 mm).

Anatomical characters of subfamily.

DISTRIBUTION. As of subfamily. Snails live in caves. 2 or 3 spp.

Infraorder SAGDOINEI Schileyko et Starobogatov, 1988

Schileyko & Starobogatov in Golikov & Starobogatov, 1988: 75.

Shell flattened, more or less helicoid, or vitrinoid.

Jaw aulacognathous.

Excretory apparatus of non-typical orthurethral type: kidney narrow, band-like, about two times shorter than lung, ureters completed.

Penis with characteristic "pupilloid" appendix (in one genus with three such appendages).

DISTRIBUTION. Caribbean region.

SAGDOIDEA Pilsbry, 1894

Pilsbry, 1894: xxxii (pro subf.).

Characters of infraorder.

DISTRIBUTION. Caribbean region.

REMARK. It is generally accepted that Sagdidae and Thysanophoridae are related taxa. However, I do not know any characters supporting this viewpoint. Therefore I remove Thysanophoridae from Sagdoidea and place them tentatively among endodontoids.

SAGDIDAE Pilsbry, 1894

Pilsbry, 1894: xxxii (Helicidae subfam.).

Shell flat to dome-shaped or vitrinoid, often thin and glass-like, smooth to finely ribbed or rib-striated.

DISTRIBUTION. Caribbean region.

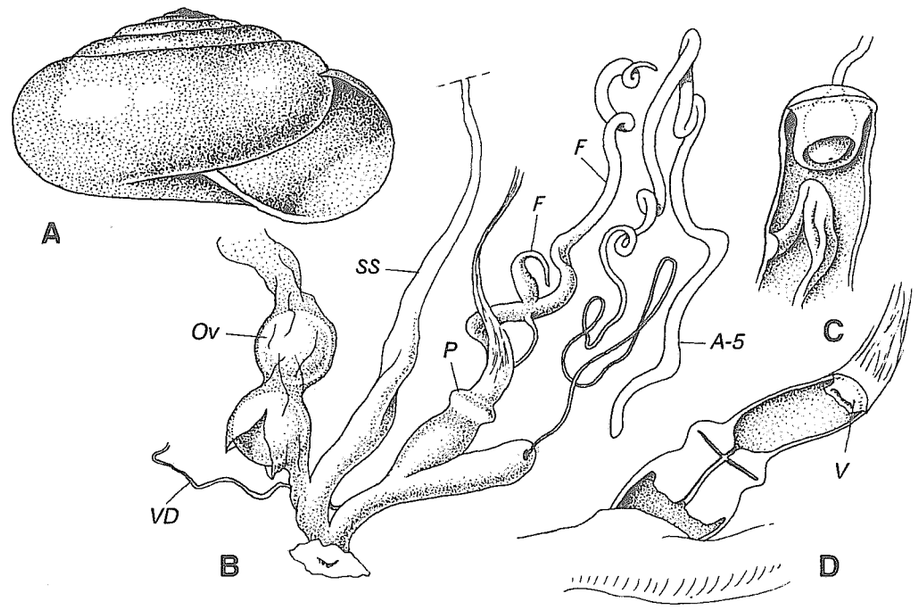


Fig. 295. ***Hyalosagda similis*** (C. Adams, 1849).
Reach Falls on Drivers River, Spring valley, distr. of Manchionial, Portland Parish, Jamaica. May 16, 1988. A — shell; B — reproductive tract; C — interior of basal sections of penial appendix; D — interior of penis and epiphallus. **Moscow** No. Lc-23284.

SAGDINAE Pilsby, 1894

Pilsbry, 1894: xxxii. Baker, 1940: 55.

Shell without tendency to reduction (not vitrinoid).

Lung and kidney not shortened.

Talon obsolescent, carrefour mostly embedded in albumen gland. Principal flagellum large, more or less crescent-shaped and flattened, at least at tip; its lumen sublateral. Penial appendix single.

DISTRIBUTION. Jamaica.

Hyalosagda Martens in Albers, 1860 Fig. 295

Martens in Albers, 1860: 77 (*Sagda* subg.).

TYPE SPECIES — *Helix similis* C.Adams, 1849; OD.

Shell more or less flattened, thin, fragile, very shining, glass-like, transparent, of about 5 moderately convex whorls. Last whorl straight, evenly rounded. Colourless. Embryonic whorls smooth, polished, later nearly so. Aperture ovate, with thin, simple margins; columellar margin scarcely reflexed. Umbilicus narrowly open. Height 2.0-8.0, diam. 4.0-14.5 mm (8.0 × 14.2 mm).

Vas deferens entering epiphallus opposite to base of caecum. Principal of flagellum long, convoluted, with very thin tip. Smaller flagellum consisting of enlarged basal section furnished with minute tubercles and rather long slender "tail". Epiphallus not long, internally smooth, with short verge. Penis/epiphallus junction with strong circular enlargement containing very narrow slit. Penis internally without regular texture, with short verge having very narrow lumen and thick walls. A-1 clavate, internally with strong V-shaped pilster; A-2 and A-3 in dissected specimen protruded into lumen of A-1. A-4 and A-5 as usual. Penial retractor attached to lower section of epiphallus above circular enlargement. Free oviduct and vagina very short. Uterus contains a few (2 in my specimen) eggs. Spermathecal stalk more or less expanded basally.

DISTRIBUTION. Jamaica. 3-4 spp.

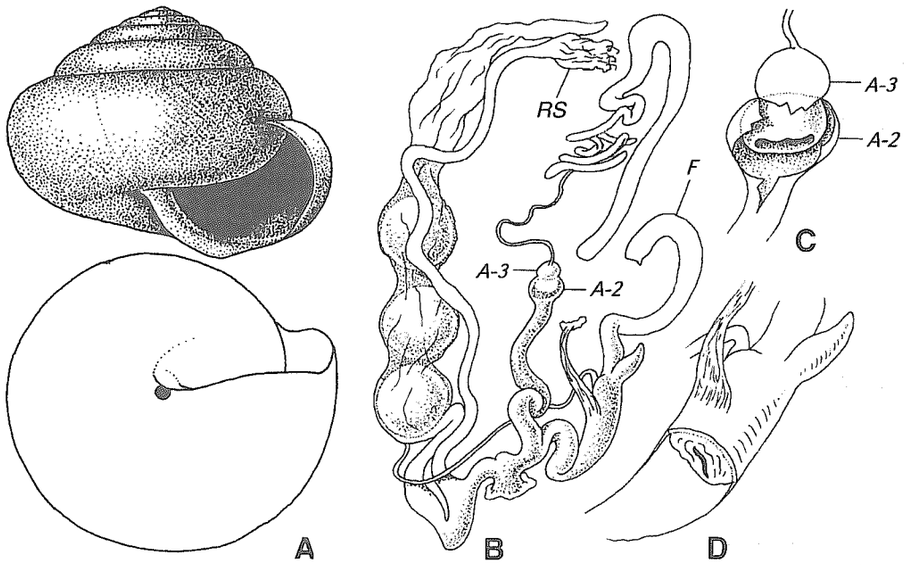


Fig. 296. ***Stauroglypta anthoniana*** (C.Adams, 1849).
A — shell: Somerset, Manchester, Jamaica. **Phil**. No. 101405. B-D: 1.3 mi N of Aberdeen intersection on Quickstep road, St. Elizabeth, Jamaica, February 13, 1997. B — reproductive tract; C — interior of A-2+A-3; D — interior of penis. **Moscow** No. Lc-23315.

Stauroglypta Baker, 1935
Fig. 296

Baker, 1935: 136 (*Hyalosagda* subg.).

TYPE SPECIES — *Helix anthoniana* (C.Adams, 1849); OD.

Shell turbinoid, rather thin, translucent to semitransparent, (dead shells often opaque), shining, of about 6 quite convex whorls. Last whorl not descending, evenly rounded at periphery. Color slightly yellowish. Embryonic whorls smooth, postnuclear whorls covered with delicate reticulate sculpture consisting of very fine oblique striae. Aperture broadly semilunate, columellar and basal margins markedly reflexed and slightly thickened. Umbilicus narrowly open. Height 7.5-8.0, diam. 9-10 mm (7.5 × 9.5 mm).

Vas deferens entering penis at some angle. Principal of flagellum long, fat, blunt but with minute, pointed, conic process occupying excentrical position. Opposite to entrance of vas deferens, at penis/epiphallus junction, there is moderately long, conic smaller flagellum. Penis rather long, very thin-walled, with very short sphincter-like verge having slit-like opening. Penial retractor attached onto penis a little below smaller flagellum. Penial appendix well developed. A-1 long, A-2 spherical, A-3 protruding into cavity of A-2 by broad papilla with very wide orifice. A-3 initially very thin, thread-like, then markedly enlarging. A-5 long, blunt at tip. Vagina very short. Uterus contains a few eggs or embryos. Spermathecal duct nearly cylindrical, long, thin-walled reservoir attending albumen gland.

DISTRIBUTION. Jamaica, Haiti, Grand Cayman Island. 5-6 spp.

Meiophysema Baker, 1935
Fig. 297

Baker, 1935: 136 (*Zaphysema* subg.)

TYPE SPECIES — *Helix lamelliferum* C.Adams, 1849; OD.

Shell depressed-globose, thin, translucent, of 5.5-6 rather convex, slightly shouldered whorls. Last whorl evenly rounded at

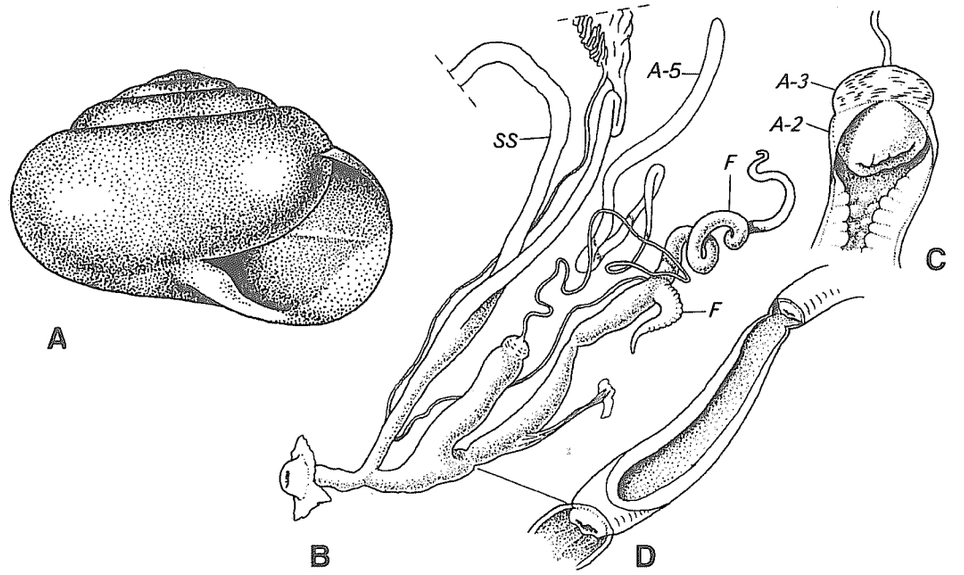


Fig. 297. ***Meiophysema lamellifera*** (C.Adams, 1849).
A — shell: Jamaica. Holotype. **Phil**. No. 28225. B-D: Reach 4.8 mi sta. Portland Parish, September 6, 1996. B — reproductive tract; C — interior of basal section of penial appendix; D — interior of penis. **Moscow** No. Lc-23323.

periphery. Color corneous to yellowish. Embryonic whorls smooth, early postnuclear whorls with smoothed radial wrinklets, later sculpture becoming weaker; fresh shells with numerous, short, rigid hairs; when hairs lost, distinct dots remain. Aperture ovate, slightly oblique, with thin, simple margins; columellar margin well oblique, with more or less developed thickening. Palatal wall with thin entering plica. Umbilicus absent. Height 8.0, diam. 11.5-12.0 mm (8.0 × 11.5 mm).

Vas deferens entering epiphallus at some angle, opposite to base of smaller flagellum. Principal of flagellum long, convoluted, tapering. Smaller flagellum well developed, conic, with small but quite distinct tubercles on its convex surface. Epiphallus rather long. Penis consists of two chambers, each of them internally with very short closed verge. Inner surface of upper (proximal) chamber nearly smooth, surface of lower (distal) chamber with indistinct, irregular, longitudinal folds. Penial appendix entering lower chamber of penis. A-1 fat, long, thick-walled, internally with numerous rounded tubercles; A-2 + A-3 highly musculized, protruding into upper section of A-1 as a short papilla with broad orifice. A-4 and A-5 long. Penial retractor attached to lower part of proximal chamber of penis. Free oviduct and vagina long, oviduct longer. Spermathecal stalk enlarged, long.

DISTRIBUTION. Jamaica. 1 sp.

Proserpinula Martens in Albers, 1860
Fig. 298

Martens in Albers, 1860: 77 (*Sagda* subg.).

— *Proserpinella* Pilsbry, 1949: 43 (nom. err. pro *Proserpinula* Martens in Albers, 1860).

Baker, 1935: 136.

TYPE SPECIES — *Helix discoidea* C.Adams, 1850; OD.

Shell nearly flat, thin, semitransparent, glass-like, shining, of 4-4.5 more or less shouldered whorls. Last whorl with rounded peripheral angle below mid-line. Colorless. Embryonic whorls smooth, polished. Postnuclear whorls also without regular sculpture. Aperture ovate, moderately oblique,

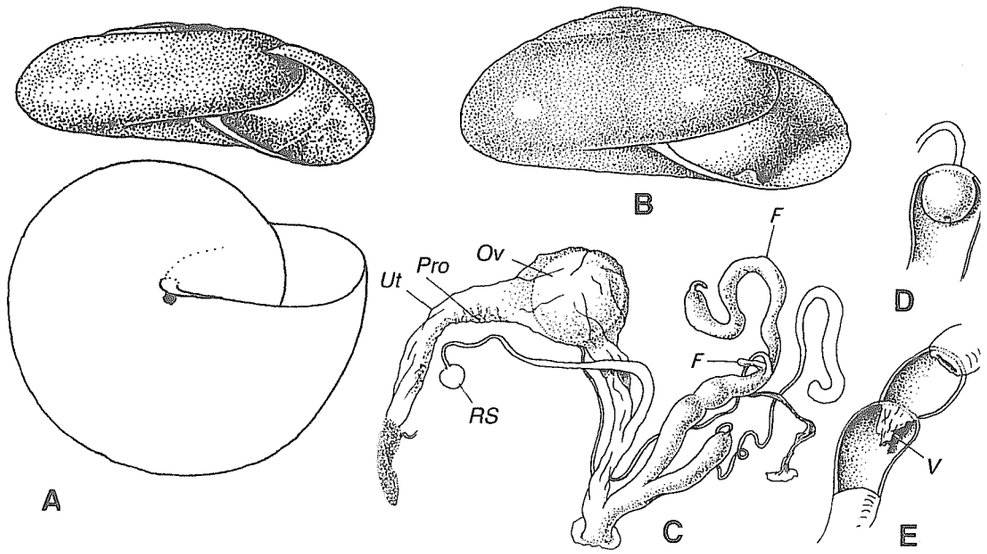


Fig. 298. A — ***Proserpinula discoidea*** (C.Adams, 1850).
Shell: Summits behind Reservoir of Port Antonio, Jamaica. **Phil**. No. 174194.
B-E — ! ***Proserpinula infortunata*** (Bland, 1854): 0.7 mi SE of Bridge over Rio Grande at Alligator Church, Portland Parish. May 15, 1988. B — shell; C — reproductive tract; D — interior of apical part of A-1; E — interior of penis and epiphallus. **Moscow** No. Lc-23273.

with sharp, simple margins. Columellar margin shortly reflexed. Basal wall sometimes with elongated lamella. Umbilicus closed or dot-like. Height 2.8-3.0, diam. 6.0-7.0 mm (*P. discoidea* — 3.0 × 6.8 mm, *P. infortunata* — 2.4 × 5.3 mm).

Carrefour not embedded in albumen gland. Talon, a simple loop of lower portion of hermaphroditic duct. Vas deferens long, not adhering. Principal of flagellum long, convoluted, sometimes with attenuated tip. Epiphallus short, with smaller flagellum opposite to entrance of vas deferens and very short sphincter-like verge. Penis longer than epiphallus, internally nearly smooth, with semitransparent minute verge. Penial appendix well developed, A-1 moderately long, A-2 subglobular, A-3 absent, A-4 passing to A-5 without clear demarcation. Penial retractor attached to upper portion of epiphallus. Spermathecal stalk consisting of two sections: enlarged basal and thin upper; reservoir small, ovate or globular. 2 thin retractors branched off from upper part of basal section and attached to base of albumen gland.

DISTRIBUTION. Jamaica. 3-4 spp.

Volvidens Henderson, 1914
Fig. 299

Henderson, 1914: 41.

TYPE SPECIES — *Helix tichostoma* L.Pfeiffer, 1839; OD.

Shell nearly flat, thin, shining, translucent, of 4.5-5 flattened whorls. Last whorl in adult shells with blunt smoothed angle below mid-line of whorl. Color whitish. Embryonic whorls smooth, later moderately radially striated. Aperture ovate, slightly oblique, with thin, simple margins. At subadult growth stage there is a rounded parietal continuous lamella sometimes seen through aperture in adult shells. Umbilicus broad. Height 2.0, diam. 4.5-6.0 mm (Chicago: 2.0 × 5.0 mm; Phil.: 2.0 × 4.3 mm).

DISTRIBUTION. Cuba. 1 sp.

? *Xenodiscula* Pilsbry, 1919
Fig. 300

Pilsbry, 1919: 206.

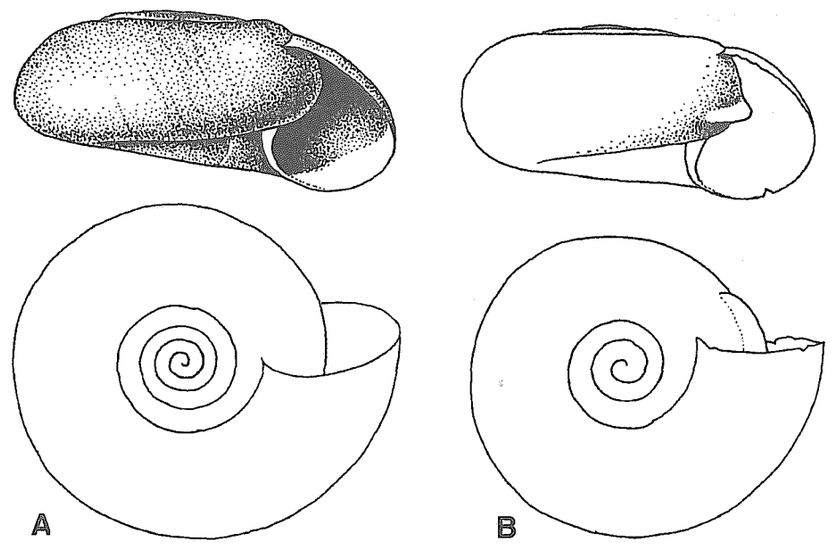


Fig. 299. ***Volvidens tichostoma*** (L. Pfeiffer, 1839).
A — Guane, Cuba. **Chicago** No. 45568; B (subadult) — Habana, Cuba. **Phil**. No. 46076.

TYPE SPECIES — *Xenodiscula venezuelensis* Pilsbry, 1919; OD.

Shell flat, concave above and below, transparent, glossy, of nearly 3 convex (most strongly above) whorls. Last whorl evenly rounded at periphery. Color whitish. Embryonic part (0.5 whorl) smooth, sculpture of subsequent whorls of widely spaced radial grooves; grooves becoming closer near aperture, in fresh shells they occupied there by projecting riblets (which may be partly periostracal and deciduous). Aperture oblique, wide, of irregular shape. Parietal wall with high, thin, median, emerging lamella, penetrating only short distance, and oblique, much smaller lamella near columella. Columellar margin with small blunt tooth followed by more tapering one, and with low prominence in fully adult shells. Basal and palatal walls thickened within; palatal wall above periphery with group of 3 small teeth, upper one largest, other 2 sometimes absent. Umbilicus very broad. Height 0.55, diam. 1.6 mm.

DISTRIBUTION. Venezuela. 2 spp.

REMARK. In original description of the ge-

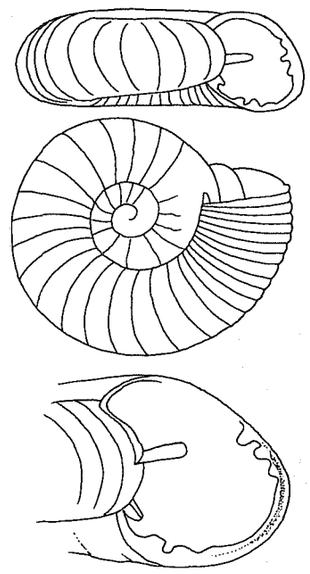


Fig. 300. ***Xenodiscula venezuelensis*** Pilsbry, 1919. After Pilsbry, 1919.

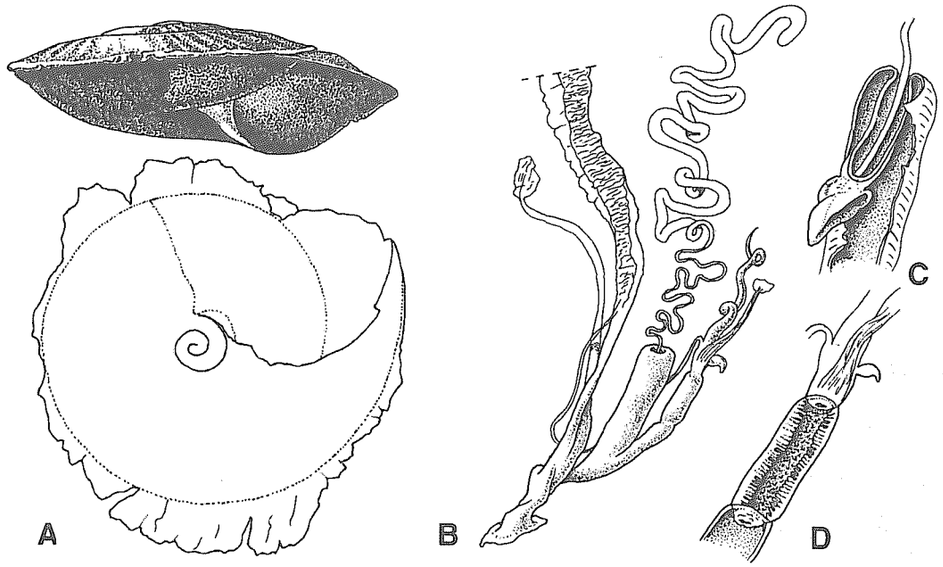


Fig. 301. ***Corneosagda ptychodes*** (L.Pfeiffer, 1846).
1.3 mi north of Aberdeen intersection on Quickstep road, St. Elizabeth, February 13, 1997. A — shell; B — reproductive tract; C — interior of basal section of penial appendix; D — interior of penis and epiphallus. **Moscow** No. Lc-23271.

nus, Pilsbry pointed out that *Xenodiscula* "may provisionally be placed near *Proserpinula* or *Volvidens*, both Antillean genera." I have no additional data on this genus, but it may be noted, that *Xenodiscula* shares some peculiar features with members of zonitoid groups: similar sculpture occurs in *Retinella;* somewhat similar denticulation on basal and palatal sides is observed in many *Paravitrea* at some age stages; parietal and columellar lamellae occur in *Pilsbryna; Hawaiia* has a broad umbilicus. Besides, no doubtless representative of Sagdidae is known from the mainland of American continent. Thus, it is possible that *Xenodiscula* is an aberrant zonitoid genus.

Corneosagda
Muratov et Schileyko, gen. nov.
Fig. 301

TYPE SPECIES — *Helix ptychodes* L.Pfeiffer, 1846.

Shell much depressed to nearly flat, lenticular, thin, translucent, usually covered (when fresh) with easily detached periostracum, of 4.5-5 slightly convex whorls. Last whorl not descending, with more or less sharp peripheral keel which usually furnished with uneven periostracal fringe. Color corneous to yellowish; shell often covered with particles of mud. Embryonic whorls smooth or with very delicate spiral striation. Sculpture of postnuclear whorls of broadly spaced low riblets furnished with periostracal fringes, coarse irregular radial smoothed wrinkles and, in some places, exceptionally fine network of oblique wrinklets. Aperture angled, moderately oblique, with simple margins. Umbilicus rather broad, quite perspective. Height 2.5-5.5, diam. 9.5-13.0 mm (2.7 × 9.8 mm).

Vas deferens entering epiphallus at some angle slightly above and opposite to base of smaller flagellum. Flagellum rather long, moderately convoluted. Smaller flagellum conic, poorly developed, without visible tubercles. Epiphallus very short. Penis consisting of two chambers, each of them internally with very short sphincter-like verge. Distal (lower) chamber smooth inside, proximal with numerous minute papillae. Penial appendix entering lower chamber of penis. A-1 thick, subcylindric, A-2 + A-3 protruding into apical section of A-1; its orifice very broad. A-4 and especially A-5 enormously long, much convoluted. Penial retractor attached to epiphallus between entrance of vas deferens and base of epiphallic caecum. Free oviduct long, vagina very short. Spermathecal shaft rather slender, reservoir small, very thin-walled.

Shell of the genus differs from any other Sagdidae in the presence of a peripheral keel, strongly developed periostracum, and low radial riblets with periostracal fringes. The anatomy of *Corneosagda* is similar to that of *Sagda*, differing by the inner structure of basal part of penial appendix, minutely papillose inner surface of proximal chamber of penis, absence of penial verge, which is a sphincter rather than a true verge. Besides, the smaller flagellum in *Corneosagda* lacks a characteristic inner structure of that of *Sagda.*

DISTRIBUTION. Jamaica. 2 spp. (*Helix ptychodes* L.Pfeiffer, 1846 and *H. immunda* C.Adams, 1849).

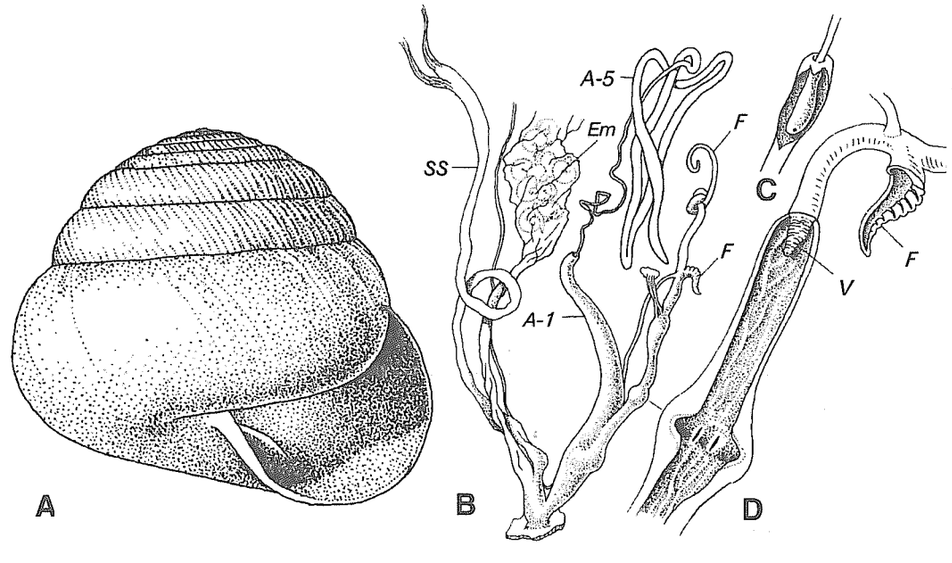


Fig. 302. ***Sagda cookeana*** (Gmelin, 1791).
7.8 mi N of Circle at Albert Town, Trelawny, Jamaica, August 12, 1974. A — shell; B — reproductive tract; C — interior of upper portion of basal section of penial appendix; D — interior of penial tube. **Paris**.

Sagda Beck, 1837
Fig. 302

Beck, 1837 (1837-1838): 9 (*Helix* subg.).

— *Epistylia* Swainson, 1840: 165 (t.-sp. *Epistylia conica* Swainson, 1840; monotypy).

— *Epistyla* Swainson, 1840: 331 (nom. err. pro *Epistylia* Swainson, 1840).

— *Parahelix* Ihering, 1892: 492 (t.-sp. *Helix jayana* C.Adams, 1845; SD Baker, 1935).

TYPE SPECIES — *Sagda alveolata* Beck, 1837 (nom. nud.); SD Herrmannsen, 1848 (1846-1852). Pilsbry, 1894: 59, *Helix cookiana* Gmelin, 1791.

Shell dome-shaped, thin to rather solid, glossy, more or less translucent (sometimes glass-like), of 6-9 closely coiled, rather convex whorls. Last whorl not descending, rounded or slightly angled at periphery. Color whitish, ivory, or yellowish. Embryonic whorls smooth, later weakly sculptured with irregular radial wrinklets. Aperture semilunar, subvertical, with thin margins; columellar margin reflexed. Columella with

spiral lamella. Basal wall with longitudinal fold entering about 1 whorl. Umbilicus absent. Height 8-26 diam. 10-30 mm (17.0 × 19.0 mm).

Vas deferens narrow, entering epiphallus at some angle. Principal of flagellum long, slender. Smaller flagellum situated opposite to insertion of vas deferens. Penis irregularly cylindrical, with local thickening in middle portion. Epiphallus continuing to penis lumen as minute, conic, circularly folded verge. Inner cavity of local thickening of penis with set of short longitudinal slits; inner surface of penis in this place looking glandular. Rest of inner surface of penis irregularly longitudinally folded. A-1 long, subcylindrical; A-2 and A-3 not expressed; A-4 very narrow, protruding into A-1 as rather long clavate papilla; A-5 enormously long. Free oviduct very long, vagina extremely short. Spermathecal stalk long, without diverticle; reservoir lanceolate.

DISTRIBUTION. Jamaica. About 10 spp.

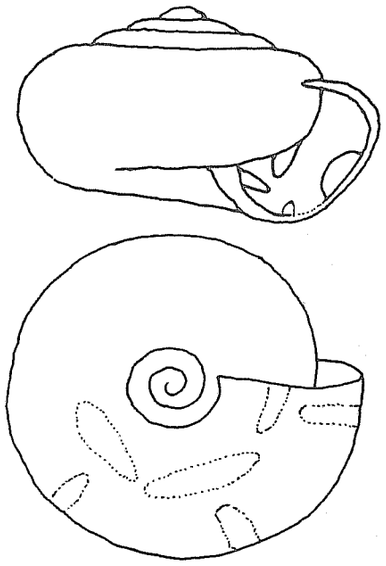


Fig. 303. ! ***Odontosagda hillei*** (L.Pfeiffer, 1870). After Pilsbry, 1894.

? *Odontosagda* Martens, 1860
Fig. 303

Martens in Albers, 1860: 78 (*Sagda* subg.).

TYPE SPECIES — *Sagda polyodon* Weinland et Martens, 1859; monotypy.

Shell depressed, thin, translucent, of 5-6 flattened to moderately convex whorls. Last whorl slightly to strongly angulated at periphery. Color whitish. Embryonic whorls smooth, subsequent whorls nearly so. Aperture lunate, only slightly oblique, with simple, thin margins; columellar margin scarcely reflexed. Inside last whorl there is series of several basal teeth of diametrical orientation. Umbilicus narrowly open. Diam. 4-6 mm.

DISTRIBUTION. Haiti, E Cuba. 3 or 4 sp.

REMARK. The taxonomic position of this strange non-Jamaican taxon may be established only after anatomical study.

Zaphysema Pilsbry, 1894
Fig. 304

Pilsbry, 1894: 65.

TYPE SPECIES — *Helix tenerrima* C.Adams, 1845; OD.

Shell helicoid, moderately solid to rather thin, of about 5 moderately convex, sometimes slightly shouldered whorls. Last whorl a little descending in front. Color corneous or whitish. Embryonic whorls smooth, later nearly so, only with vague irregular radial wrinkles. Aperture well oblique, rounded, with simple and thin margins; columellar margin slightly expanded. Umbilicus absent. Height 16-40, diam. 15-50 mm (13.0 × 16.5 mm).

Vas deferens entering penis at some angle. Principal of flagellum long, tapering. Smaller flagellum rather long, conic caecum. Penis of moderate length, bulky, very thin-walled, with sphincter-like, very short verge having broad orifice. Penial retractor attached onto middle part of penis. Penial appendix comparatively poorly developed. A-1 very short, A-2 + A-3 subglobose, protruded by short papilla into A-1. A-4 and A-5 short. Vagina exceptionally short. Uterus containing numerous eggs. Spermathecal stalk long, reservoir reaching albumen gland.

DISTRIBUTION. Jamaica. About 10 spp.

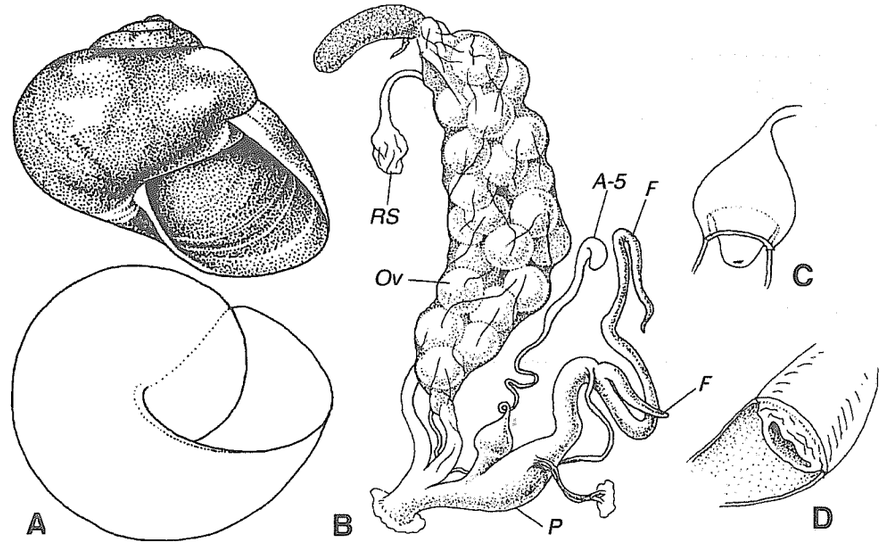


Fig. 304. ***Zaphysema tenerrima*** (C.Adams, 1845).
A — shell: Jamaica. **Leiden**. B-C — Galloway-Whithorn road, ca. 1 mi. from Galloway intersection, Westmoreland, February 11, 1997. B — reproductive tract; C — interior of A-2+A-3; D — interior of penis. **Moscow** No. Lc-23325.

Aerotrochus Pilsbry, 1926
Fig. 305

Pilsbry, 1926: 120 (*Hojeda* subg.).

TYPE SPECIES — *Helix subpyramidalis* C.Adams, 1845; OD.

Shell trochoidal or (sub)pyramidal, thin, translucent, of 5-5.5 quite convex whorls. Last whorl more or less bluntly angulated at periphery, not descending. Color pale-yellow. Embryonic whorls nearly smooth or with irregular pits and obsolete spiral striae. Later whorls with irregular, rather dense, gentle radial wrinklets. Aperture broadly ovate, with simple margins; columellar margin a little reflexed. Umbilicus narrowly open. Height 5-6, diam. 7.0-8.5 mm (5.8 × 8.0 mm).

DISTRIBUTION. Jamaica, Cuba, Haiti. 4-6 spp.

Microsagda Baker, 1935
Fig. 306

Baker, 1935: 136.

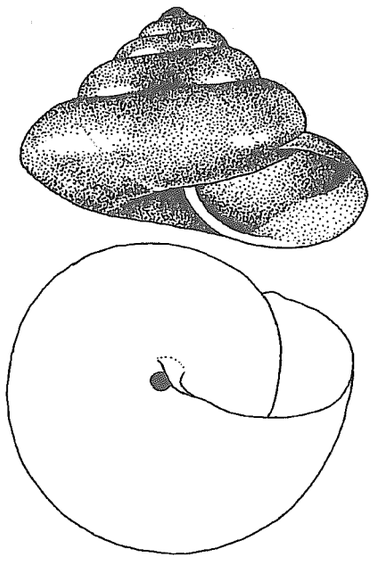


Fig. 305. ***Aerotrochus subpyramidalis*** (C.Adams, 1845).
Near Mandeville, Jamaica. **Phil**. No. 101377.

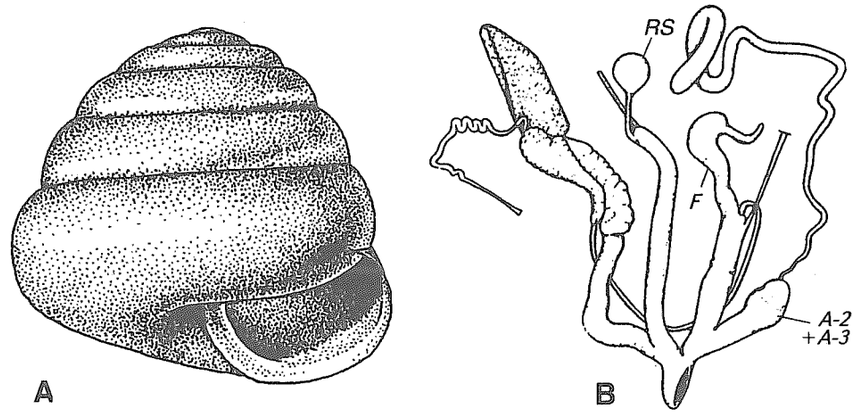


Fig. 306. A — ***Microsagda epistyliulum*** (C.Adams, 1849).
Shell: on direct Road to Mandeville, Jamaica. **Phil**. No. 174195.
B — ! ***Microsagda subaquila*** (Shuttleworth, 1854). Reproductive tract. After Baker, 1940.

TYPE SPECIES — *Helix epistyliulum* C.Adams, 1849; OD.

Shell dome-shaped, rather solid, glossy, of about 6 convex whorls. Last whorl straight. Color whitish. Embryonic whorls smooth, polished or with obsolete spiral striae, subsequent whorls radially, irregularly rib-striated. Aperture broadly ovate, slightly oblique, semilunar, with reflexed margins. Umbilicus dot-like. Height 3.8-4.0, diam. 4.0-4.3 mm (3.8 × 4.0 mm).

Vas deferens entering epiphallus at some angle. It is unclear, if additional organ on penis is principal or smaller flagellum. This organ long, stout, with narrowed apical portion. Epiphallus rather short, vaguely demarcated from penis by weak circular thickening. Penial appendix well developed. A-1 short, A-2 and A-3 pear-shaped, A-4 very gradually passing to A-5. Penial retractor inserted at base of vas deferens and flagellum. Free oviduct long, vagina extremely short. Spermathecal stalk long, enlarged, with its own thin retractor, its upper portion very narrow and short, reservoir globular.

DISTRIBUTION. Jamaica, Puerto Rico. 2 or 3 spp.

REMARK. Baker (1940: 60) stated that "In the genitalia of *H*[*yalosagda*] *epistyliulum*, the type of *Microsagda* (section of *Lacteoluna*), the spermathecal duct, the distance between vas and penial retractor and the undivided penial base are all longer" [than in figured *subaquila* — A.Sch.].

Lacteoluna Pilsbry, 1926
Fig. 307

Pilsbry, 1926: 108.

TYPE SPECIES — *Helix selenina* Gould, 1848;

Shell depressed, thin, translucent to subtransparent, of 5-5.5 very convex whorls. Last whorl not descending, with obtuse peripheral angle. Color nearly absent, whitish, or light corneous. Embryonic sculpture of microscopic spiral striation, except smooth first embryonic whorl. Postnuclear whorls finely, densely, radially striated. Aperture ovate, well oblique, with thin, simple margins. Umbilicus moderately broad, deep, nearly cylindrical. Height 2.4-6.0, diam. 5-13 mm (2.7 × 5.4 mm).

Jaw very thin, of numerous flat narrow plates.

Vas deferens entering epiphallus subterminally. Flagellum long, rather broad and flattened. Flagellum externally not demarcated from very short penis. Long, well-developed appendix attached close to penis base; A-1 + A-2 + A-3 stout, A-4 very narrow, A-5 long, forming a few loops. Penial retractor inserted on epiphallus about midway, widening into sort of thin sheath. Uterus contains several embryos. Free oviduct longer than vagina. Spermathecal shaft long, reservoir rather small, globular.

DISTRIBUTION. Jamaica, Bermuda Islands, Florida. 2-3 spp.

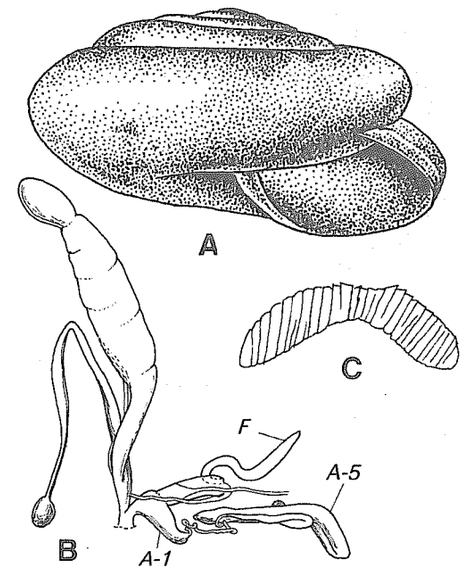


Fig. 307. ***Lacteoluna selenina*** (Gould, 1848).
A — shell: Woods at Harrington House near Baileys Bay, Bermuda. **Moscow** No. Lc-23277 (**Phil.**). B — reproductive tract; C — jaw. After Pilsbry, 1926.

Vilitas Pilsbry, 1926
Fig. 308

Pilsbry, 1926: 117 (*Thysanophora* subg.).

TYPE SPECIES — *Thysanophora omissa* Pilsbry, 1926; OD.

Shell much flattened, thin, translucent, of 4 very convex, slightly shouldered whorls. Last whorl slowly descending in front, with distinct, blunt, rounded angle above midline. Colour whitish-grey. Embryonic whorls with irregularly arranged microscopic papillae, later with weak, unevenly spaced, radial riblets; interspaces with fine, crowded, radial striae. Aperture quite oblique, ovate, with thin margins. Umbilicus broadly open. Height 1.5, diam. 3.1 mm.

DISTRIBUTION. Jamaica. 1 sp.

REMARK. Shell of *Vilitas omissa* is much more similar to *Lacteoluna selenina* (particularly in having conspicious smoothed peripheral angle) then to any species of the genus *Thysanophora*, to which the species was originally assigned.

?*Hojeda* Baker, 1926
Fig. 309

Baker, 1926: 15.

— *Microphysa* Albers, 1860: 82 (nom. praeocc., non Westwood, 1834; *Helix* subg.; t.-sp. *Helix boothiana* L.Pfeiffer, 1839; OD).

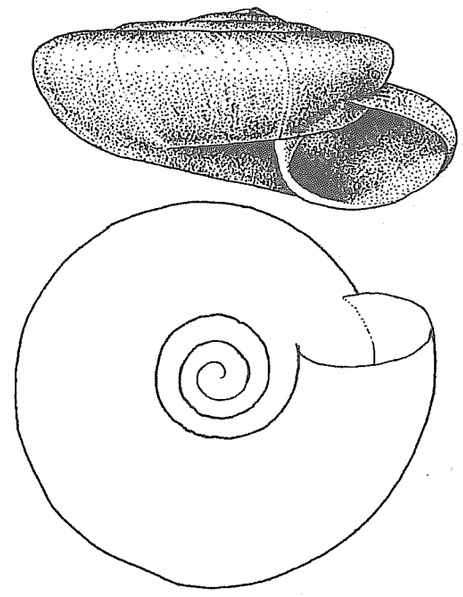


Fig. 308. ***Vilitas omissa*** (Pilsbry, 1926).
Jamaica. Holotype. **Phil**. No. 5612.

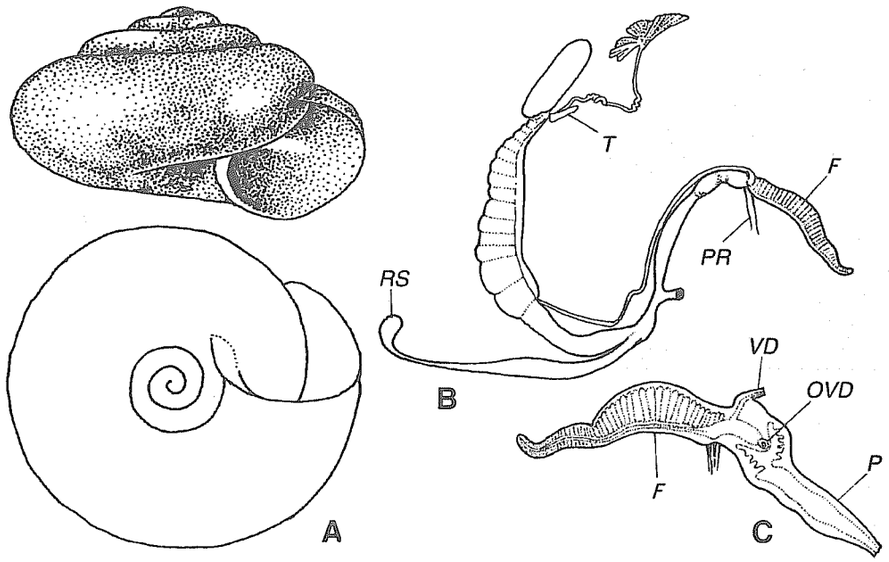


Fig. 309. ***Hojeda vanattai*** (Baker, 1924).
A — shell: Seroe Canashito, Aruba Island. Paratype. **Phil**. No. 133591. B — reproductive tract; C — interior of penial tube. After Baker, 1926.

TYPE SPECIES — *Thysanophora vanattai* Baker, 1924; OD.

Shell depressed, thin, glass-like or nearly so, of 4-4.5 strongly convex whorls. Last whorl straight. Color whitish or absent. Embryonic whorls smooth, later irregularly striatulate to nearly smooth. Aperture rounded, with simple margins. Umbilicus rather broad. Height 1.8-2.0, diam. 3.3-4.0 mm (2.0 × 3.8 mm).

Flagellum one in number, rather long, with canal shifted to one of walls; wall opposite to side containing canal, much thickened, glandular. Flagellum opening to epiphallus through a small conic verge. Penial appendix wanting. Penial retractor attached to base of flagellum opposite to vas deferens insertion. Free oviduct much longer than vagina. Spermathecal stalk rather long.

DISTRIBUTION. From Bahamas and S Florida to Curaçao. 10-15 spp.

REMARK. I place *Hojeda* tentatively in Sagdidae, mainly because of peculiar structure of the flagellum, which is similar to that of smaller flagellum in *Meiophysema* and *Sagda* (Figs. 297 and 302). The absence of principal flagellum and penial appendix is not surprising because there are numerous cases of disappearance of additional organs of reproductive tract among land Pulmonata (in particular, among Pupilloinei).

? *Strialuna* Pilsbry, 1926
Fig. 310

Pilsbry, 1926b: 117 (*Thysanophora* subg.).

TYPE SPECIES — *Helix diminuta* C.Adams, 1849; OD.

Shell depressed, thin, of about 4.5 rather convex whorls. Last whorl not descending. Color light-grey. Embryonic whorls smooth, later finely, regularly, radially ribbed or ribstriated. Aperture subcircular, with thin margins; columellar margin more or less reflexed. Umbilicus rather broad, subcylindrical. Height 1.8-2.0, diam. 3.0-3.5 mm (1.9 x 3.2 mm).

DISTRIBUTION. Jamaica. 2 or 3 spp.

REMARK. As anatomy of *S. diminuta* is unknown, its position in Sagdidae remains questionable.

PLATYSUCCINEINAE Baker, 1940

Baker, 1940: 55.

Shell somewhat reduced (vitrinoid), without hairs.

Lung and kidney shortened.

Flagellum extremely long. Penis has three appendices, with large, very thick-walled basal portions.

DISTRIBUTION. Puerto Rico and Lesser Antilles.

Platysuccinea Ancey, 1881
Fig. 311

Ancey, 1881b: 484.

TYPE SPECIES — *Simpulopsis portoricensis* Shuttleworth, 1854; OD.

Shell paucispiral, thin, fragile, of 2.25-2.5 whorls. Last whorl inflated, scarcely descending in front, rounded at periphery. Color greenish. No peculiar sculpture. Aperture very large, well oblique. Umbilicus absent. Height 6-15, diam. 5-14 mm (15.0 × 13.5 mm).

Carrefour without talon, completely embedded in albumen gland. Vas deferens short, not adherent. Epiphallus with alveolate, annular sheath near base; sheath internally with several, high, thin, fleshy folds. Epiphallus opens through domed verge. Penis rather short, internally with 5 pilasters. Each of 3 penial appendices superficially consists of two divisions: swollen basal (A-1 + A-2 + A-3) and very long apical (A-4 + A-5). Free oviduct and vagina short. Spermathecal stalk extremely long, reservoir bulky.

DISTRIBUTION. Puerto Rico and Lesser Antilles. 1 or 2 spp.

AQUEBANINAE Baker, 1940

Baker, 1940: 55.

Shell not vitrinoid, with short hairs.

Kidney medium to long, ureters complete.

Talon obsolescent, carrefour mostly embedded in albumen gland. Flagella 2 in number, one cylindrical, short or absent; other extremely short. Epiphallus well developed. Penis small. Penial appendix, when present, without greatly swollen base, opening into penis through large papilla. Spermatophore with horny walls, often complex.

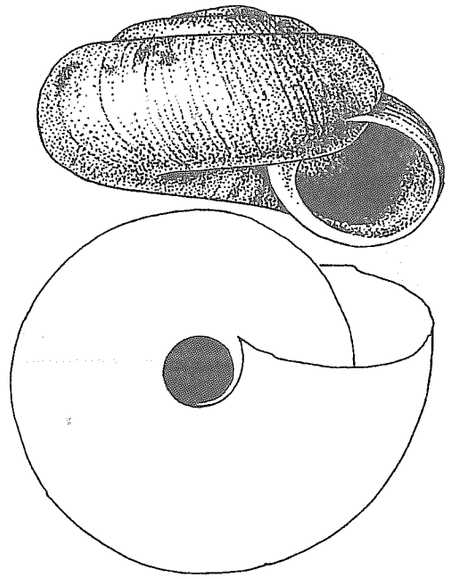


Fig. 310. ***Strialuna diminuta*** (C.Adams, 1849). Jamaica. **Paris**.

DISTRIBUTION. Puerto Rico to Cuba; ? Guatemala.

Aquebana Pilsbry, 1926
Fig. 312

Pilsbry, 1926: 111 (*Suavitas* subg.). Baker, 1940: 58, 59.

TYPE SPECIES — *Helix velutina* Lamarck, 1822; OD.

Shell depressed, thin, translucent, of 4-5 convex whorls. Last whorl straight, rounded at periphery. Color yellowish. Embryonic sculpture of coarse radial wrinkles. Postnuclear whorls with dense radial wrinkles having periostracal outgrowths. Aperture rounded, peristome insertions widely remoted; margins thin and simple except reflexed columellar margin. Umbilicus narrowly open. Height 7-8, diam. 12 mm (8.0 × 12.0 mm).

Vas deferens moderately long, entering epiphallus apically between flagella. Epiphallus surrounded by sheath which is free near base; epiphallus internally with 5 narrow longitudinal pilasters. Penis swollen, thin-walled, short, with verge surrounded by membranous hood. Penial appendix not

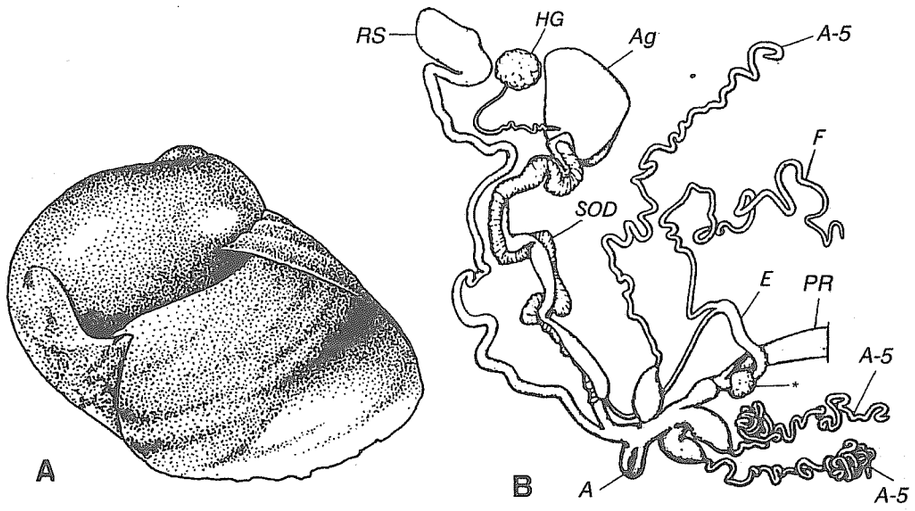


Fig. 311. ***Platysuccinea portoricensis*** (Shuttleworth, 1854).
A — shell: El Yunque, Puerto Rico. **Chicago** No. 126122. B — reproductive tract. After Baker, 1940 (asterisk — annular sheath on epiphallus).

glandular in slenderer base, opening through hard papilla, which attached along inside of vergic hood but protruding briefly. A-1 + A-2 + A-3 short, narrow; A-4 shorter and narrower; A-5 longer and thicker than remaining sections. Penial retractor attached to middle portion of epiphallus. Uterus containing few (six, according to Baker, 1940) eggs. Spermathecal stalk moderately long, reservoir voluminous.

DISTRIBUTION. Puerto Rico. 1 sp.

Exsuavitas Baker, 1939
Fig. 313

Baker, 1939: 143 (*Aquebana* subg.). Baker, 1940: 58, 59.

TYPE SPECIES — *Helix pubescens* L.Pfeiffer, 1850; OD.

Shell much flattened, thin, fragile, of 4.5-5 slightly convex whorls. Last whorl straight, evenly rounded at periphery. Color yellowish. Embryonic whorls finely and densely granulated, subsequent whorls covered with exceptionally fine radial striation and very short, stiff, fulvous, staggered hairs. Aperture rounded, moderately oblique, with thin, fragile margins; columellar margin shortly reflexed. Umbilicus dot-like. Height 5.8-6.0, diam. 10-11 mm (5.8 × 10.0 mm).

Carrefour partially embedded in albumen gland. Talon short and narrow. Vas deferens entering epiphallus terminally. Epiphallus containing U-shaped fold below entrance of vas deferens and with basal half surrounded by thick, alveolate sheath. Penis clavate. Penial appendix glandular throughout length, without visible separation into divisions, opening through long and narrow papilla which protruded into thin-walled penis. Penial retractor inserted on epiphallus just above sheath. Uterus containing large egg. Spermathecal stalk short, reservoir globular.

DISTRIBUTION. Haiti. 1 sp.

REMARK. Baker (1940: 59) stated that "Although distinct enough for recognition as a separate genus, *Exsuavitas* is evidently closest to *Aquebana*."

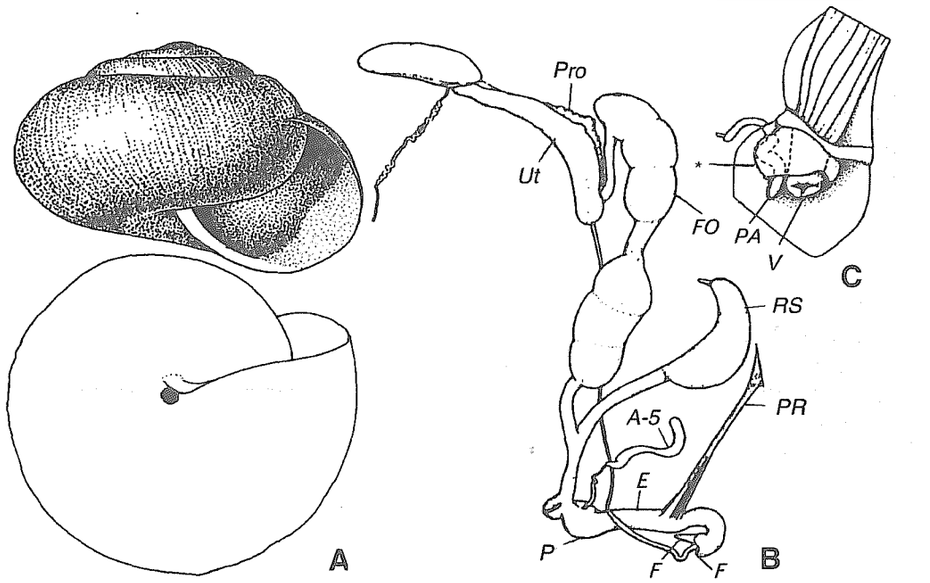


Fig. 312. ***Aquebana velutina*** (Lamarck, 1822).
A — shell: Humacao, Puerto Rico. **Phil.** No. 1187. B — reproductive tract; C — interior of penis. After Baker, 1940. Asterisk — membranous hood around verge.

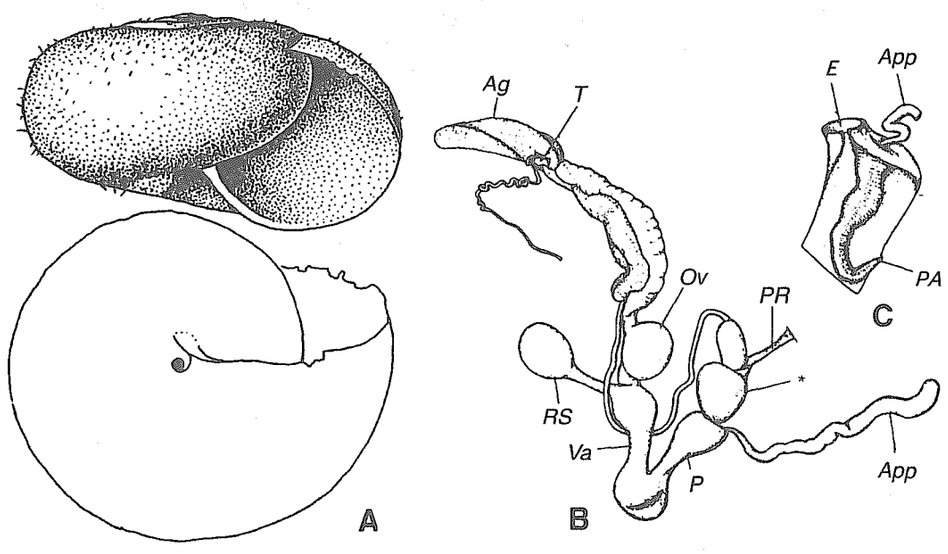


Fig. 313. ***Exsuavitas pubescens*** (L. Pfeiffer, 1850).
A — shell: Haiti. **Phil.** No. 1156. B — reproductive tract; C — interior of penis. After Baker, 1940. Asterisk — sheath of epiphallus.

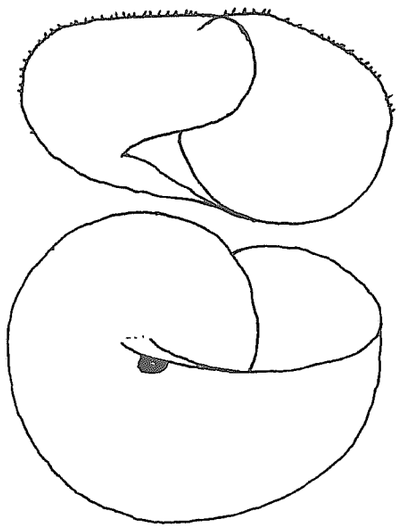


Fig. 314. ***Itzamna sigmoides*** (Morelet, 1851). After Pilsbry, 1887.

? *Itzamna* Pilsbry, 1926
Fig. 314

Pilsbry, 1926: 112.

TYPE SPECIES — *Helix sigmoides* Morelet, 1851; OD.

Shell inflated, very thin, translucent, of 4 convex whorls. Last whorl inflated, evenly rounded at periphery. Color whitish-corneous. Early whorls with dense, minute, irregularly radial, granulo-rugose sculpture, with superimposed, spaced, rounded papillae beginning in middle of second whorl. Last whorl microscopically pilose, with rounded papillae regularly disposed in oblique, retractive and protractive trends. Aperture deeply lunate, ample, with thin and simple margins; columellar margin dilated. Umbilicus dot-like, semicovered. Diam. 19 mm.

DISTRIBUTION. Guatemala. 1 sp.

REMARK. Pilsbry (1926: 113) stated that "... *H. sigmoides* resembles such Cuban species as *Helix suavis* Gundl. and *H. stigmatica* Pfr., and I suspect that its relationships lie in that direction rather than with the *Solaropsis* group." Indeed, *Itzamna sigmoides* has nothing common with *Solaropsis*, but without anatomical investigation it is impossible to establish the taxonomic position of this genus.

YUNQUEINAE Baker, 1961

Baker, 1961: 166.

Shell more or less hygromioid, without hairs.

Kidney rather short, triangular, ureters complete (?).

Talon obsolescent, carrefour embedded in albumen gland. Flagellum 1 in number; terminal enlargement of epiphallus also present. Epiphallus long, convoluted inside sheath. Penis shorter, with domed verge. Penial appendix wanting.

DISTRIBUTION. Puerto Rico.

Yunquea Baker, 1940
Fig. 315

Baker, 1940: 57.

TYPE SPECIES — *Yunquea denselirata* Baker, 1940; OD.

Shell depressed-turbinate, thin, translucent, silky glossy, of 4-5 convex whorls. Last whorl straight, evenly rounded at periphery. Color whitish, dullish but iridescent. Embryonic whorls first smooth, then with sharp, widely spaced, radial wrinklets, with interspaces containing weaker wrinklets becoming stronger up to size subequal to primary wrinklets. Postnuclear whorls above and below with sharply cut but very fine and closely spaced riblets; below also with irregular spiral striae, especially in umbilicus. Aperture crescent-shaped, with sharp margins, noticeably arcuate below; parietal callus fairly strong. Umbilicus rather narrow, subcylindrical. Height 2-3, diam. 3.2-4.0 mm (2.4 × 3.6 mm).

Carrefour embedded in albumen gland. Talon not expressed. Flagellum short, conic, thin-walled. Epiphallus with terminal enlargement; thick-walled, convoluted inside thin sheath, which attached throughout by fibers, receives penial retractor and contains glandular ring near base. Penis cylindrical-clavate, internally with short, domed verge. Free oviduct and vagina moderately long. Spermathecal stalk not long, subcylindrical, reservoir ovate.

DISTRIBUTION. E Puerto Rico. 2 spp.

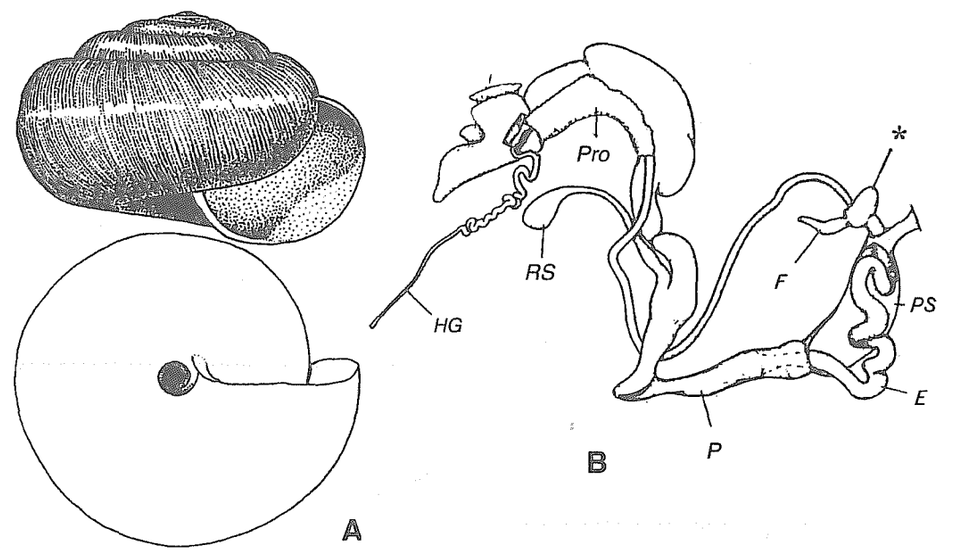


Fig. 315. ***Yunquea denselirata*** Baker, 1940.
A — shell: valley south of El Yunque, Puerto Rico. Holotype. **Phil**. No. 176681. B — reproductuve tract. * — terminal enlargement of epiphallus. After Baker, 1940.

Addition to Vertiginoidea (Hypselostomatidae, next to *Hypselostoma*):

When the text of this part has already been prepared for publication, I have got a paper with description a new genus:

Acinolaemus
Thompson et Upatham, 1997
Fig. 316

Thompson & Upatham, 1997: 223.

TYPE SPECIES — *Acinolaemus ptychochilus* Thompson et Upatham, 1997; OD.

Shell turbinate, fragile, of 4-5.5 quite convex whorls. Last whorl regularly descends or deflected toward aperture. Color light yellowish brown to grayish white. Embryonic whorls with a fine mesh of granular reticulations upon which there are superimposed, evenly spaced, continuous, raised spiral threads. Subsequent whorls with raised spiral threads crossed by oblique axial threads. Aperture auriculate-shaped, free or adnate, more or less turned upward, with expanded margins and a well-defined sinulus formed by enlarged angular lamella and upper palatal plica. Parietal wall has, besides angular, 2 parietal lamellae of which upper developed stronger. Columella with 1 or 2 lamellae. Basal and palatal margins with 1-5 plicae. Umbilicus rather broad, funnel-shaped. Height 0.87-1.61, diam. 0.65-1.92 mm (holotype of type species: 1.45 x 1.30 mm).

DISTRIBUTION. Thailand. 5 spp.

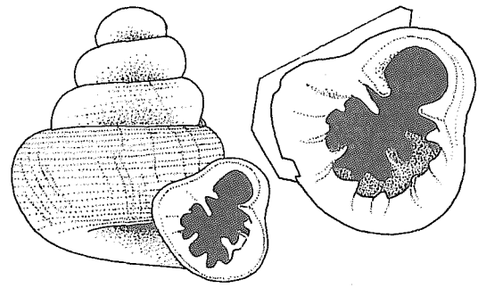


Fig. 316. *Acinolaemus ptychochylus* Thompson et Upatham, 1997.
Holotype. A — shell. B — enlarged aperture. After Thompson & Upatham, 1997.

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