

## NOTES ON AND DESCRIPTIONS OF BULIMULIDAE (MOLLUSCA, GASTROPODA)

by

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With 421 text-figures, 3 tables and 22 plates

### ABSTRACT

The following new taxa are described: *Plekocheilus* (*Eurytus*) *bruggeni*, *Thaumastus* (*Scholvienea*) *bambamarcaensis*, T. (S.) *gittenbergerorum*, *Bostryx* *aileenae*, *B. arcuatus*, *B. carinatus*, *B. c. trochiformis*, *B. circuliportus*, *B. c. rimacensis*, *B. coelhoi*, *B. cracentis*, *B. cunyacensis*, *B. frederici*, *B. fuligineus*, *B. hirsutus*, *B. huanucensis*, *B. h. povelii*, *B. inaquosum*, *B. kathiae*, *B. lentiformis*, *B. louisae*, *B. mordani*, *B. multilineatus*, *B. olmosensis*, *B. pauli*, *B. placitus*, *B. ploegerorum*, *B. spiculatus paucicostatus*, *B. s. pumilus*, *Bulimulus wiebesi*, *Sphaeroconcha*, *Naesiotus cleeforum*, *N. florschuetzi*, *N. subcostatus maranonensis*, *N. willinki*, *Scutalus* (*Vermiculatus*), S. (V.) *aureus*, S. (V.) *costifer naggsi*, S. (V.) *minutus*, S. (V.) *peakei*, S. (V.) *pyramidalis*, S. (*Suniellus*), S. (S.) *chillu*, *Discoleus*, *Neopetraeus catamarcanus orientalis*.

The following taxa are placed in synonymy: *Bulimus lamarckianus* Pfeiffer, 1848 = *Plekocheilus* (*Eurytus*) *coloratus* (Nyst, 1845); *Bulimus scytodes* Pfeiffer, 1853 = *Plekocheilus* (*Aeropictus*) *veranyi* (Pfeiffer, 1848); *Antitragus* Oberwimmer, 1931 = *Plekocheilus* (*Eudolichotis*) Pilsbry, 1896; *Tholus* Strebel, 1909 = *Atahualpa* Strebel, 1910 = *Thaumastus* (*Thaumastus*) Albers, 1860; *Megalobulimus* (*Microborus*) *incarum* Pilsbry, 1944 = *Thaumastus* (*Paeniscutalus*) *crenellus* (Philippi, 1867); *Kionoptyx* Haas, 1966 = *Floreziellus* Weyrauch, 1967 = *Naesiotellus* Weyrauch, 1967 = *Bostryx* Troschel, 1847; *Bulimulus* (*Lissoacme*) *rudistriatus* Haas, 1955 = *Bostryx abancayensis* Pilsbry, 1944; *Bulimus reconditus* Reeve, 1849 = *Bostryx nigropileatus* (Reeve, 1849); *Bulimulus* (*Scutalus*) *punctilineatus* Haas, 1951 = *Naesiotus* (*Reclasta*) *tarmensis* Weyrauch, 1967 = *Bostryx pictus* (Pfeiffer, 1855); *Buliminus styliiger* Beck, 1837 = *Bostryx vittatus* (Broderip, 1832); *Loboa* Ihering, 1917 = *Bulimulus* Leach, 1814; *Xenothauma* Fulton, 1896 = *Scutalus* (*Scutalus*) Albers, 1850; *Bulimulus* (*Drymaeus*) *baroni* Fulton, 1897 = *Scutalus* (S.) *cretaceus* (Pfeiffer, 1855); *Bulimus revinctus* Hupé, 1857 = *Scutalus* (*Vermiculatus*) *gayi* (Pfeiffer, 1857); *Bulimulus atahualpa* Dohrn, 1863 = *Neopetraeus tessellatus perincrassatus* Pilsbry, 1898 = *Neopetraeus weyrauchi* Pilsbry, 1944 = *Neopetraeus cremnobates* 'Pilsbry' H. B. Baker, 1963 = *Neopetraeus tessellatus* (Shuttleworth, 1852); *Drymaeus* (*Leiostracus*) *ruthveni* H. B. Baker, 1926 = *Leiostracus demerarensis* (Pfeiffer, 1861); *Drymaeus obliquus poecilogramma* Ancey, 1901 = *Leiostracus obliquus* (Reeve, 1849); *Vitrina salomonina* Pfeiffer, 1853 = *Simpulopsis* (S.) *rufovirens* (Moricand, 1846); *Pseudoglandina* Weyrauch, 1967 = *Simpulopsis* (*Eudiopthus*) Albers, 1860; *Pseudoglandina agitata* Weyrauch, 1967 = *Simpulopsis* (*Eudiopthus*) *citrinovitrea* (Moricand, 1836).

Anatomical data are presented for 94 species, new locality records are given for 50 species and 22 species are redescribed.

## INTRODUCTION

During research for a generic revision of the subfamily Bulimulinae a considerable amount of material has passed through my hands. This has enabled me to gather additional information on previously described species as well as to recognize several novelties.

The following abbreviations are used to refer to the location of the specimens:

BMNH — British Museum (Natural History), London; DGM — Divisão de Geologia e Mineralogia, Departamento Nacional da Produção Mineral, Rio de Janeiro; EPN — Escuela Politécnica Nacional, Quito; FMNH — Field Museum of Natural History, Chicago; IML — Instituto Miguel Lillo, Tucumán, Argentina; MACN — Museo Argentino de Ciencias Naturales, Buenos Aires; IRSN — Institut Royal des Sciences Naturelles, Brussels; MHNG — Muséum d'Histoire Naturelle, Geneva; MN — Museu Nacional, Rio de Janeiro; MNHN — Muséum National d'Histoire Naturelle, Paris; NRS — Naturhistoriska Riksmuseet, Stockholm; RMNH — Rijksmuseum van Natuurlijke Historie, Leiden; SMF — Natur-Museum Senckenberg, Frankfurt a.M.; UF — Florida State Museum, Gainesville, U.S.A.; WAM — Western Australian Museum, Perth.

Moreover, the following abbreviations are used to refer to parts of the anatomy: AG, albumen gland; EP, epiphallus; FL, flagellum; GA, genital atrium; N, nerve; OD, ovotestis duct; OV, oviduct; P, penis; PR, prostate; RM, retractor muscle; SD, spermathecal duct; SOV, spermoviduct; SP, spermatheca; V, vagina; VD, vas deferens.

Drawings were made with a camera lucida attachment to a Wild M5 stereo microscope or with a drawing prism attached to a Wild M20 compound microscope.

The histology was studied at our department with the following methods: after embedding in paraffin the material was sectioned at 7  $\mu$ m and stained with 1% Alcian Blue after kalium permanganate oxidation, followed by staining with Haemalum and 0.8% Phloxine. Several sections were stained with Haemalum and Eosin-Erythrosin in ethanol 80%. The slides were mounted in malinol and have been deposited in the Leiden museum.

The measurements taken by means of a metal sliding gauge with vernier are (Breure, 1974: fig. 2): height of shell (H); diameter of shell (D); height of aperture (HA); width of aperture (WA); height of last whorl (LW). Up to 15 mm the measurements have an accuracy of 0.1 mm, above 15 mm of 0.5 mm. The number of whorls (W) is counted as in Breure, 1974: fig. 3. The number of ribs on the penultimate whorl is abbreviated with R/P, the diameter of the umbilicus with U. Measurements are given as sample means (M) with 0.95 confidence limits (s), assuming a normal distribution,

as well as the observed range (max, min). Principal component analysis and cluster analysis were carried out on an IBM 370/158 computer at the Central Mathematical Institute (CRI) of Leiden University. The BIOPAT-program of Hogeweg & Hesper was used.

This research was made possible by grants W 87-96, WR 87-110 and WR 87-135 of the Foundation for the Advancement of Tropical Research (WOTRO), for which I want to express my sincere gratitude.

Without the generous help of the staff of the British Museum (Natural History), Mollusca Section, I could not have completed the task of tracing type specimens of Bulimulidae in their collections. Most of all I am indebted to Mrs. Kathy M. Way, Mr. Fred Naggs, and Miss Aileen Blake for their extensive technical assistance. Many thanks are also due to Mr. John F. Peake and Dr. Peter Mordan for their constructive criticism.

I am much indebted to Dr. Fred G. Thompson (Gainesville), who was kind enough to entrust me with the identification of the bulimulids collected by him on his trips to Colombia, Mexico and Peru. The following persons deserve my sincere gratitude as they kindly lent me material from the collections under their charge: Messrs. S. Tillier and H. Chevallier (Paris), Dr. A. Solem (Chicago), Drs. A. Willink and Z. Tomsic (Tucumán) and Dr. A. Zilch (Frankfurt).

I wish to express a special word of thanks to Prof. dr. J. T. Wiebes (Leiden) for his stimulating interest. I am most grateful to Mr. G. D. E. Povel (Leiden) for his help with the computer analysis. For technical assistance with my research I am much obliged to Mr. S. Ploeger of our department. For assistance with the photographs and drawings I wish to thank here Messrs. A. 't Hooft, H. Heijn and A. Bos. Dr. A. C. van Bruggen (Leiden) has been kind enough to read through the manuscript and gave linguistic assistance, for which I am highly grateful.

#### SYSTEMATICS

##### ***Auris illheocola*** (Moricand, 1836)

One specimen was received from the Museu Nacional, Rio de Janeiro, collected near Ilhéus, State of Espírito Santo. The genitalia of this species are comparable to those of *Auris bilabiata* (Broderip & Sowerby, 1829) (Jurberg, 1964): the penis is broadly club-shaped with a short sheath covering ca. one fifth of the length of the penis proper; the epiphallus, which is half as long as the penis, is tapering towards the end. The flagellum, to which the penial retractor muscle is attached terminally, is of uniform width.

**Plekocheilus (Plekocheilus) aurissileni** (Born, 1780) (fig. 1)

Genitalia. — Penis without a sheath, subcylindrical, the distal part swollen. Epiphallus subcylindrical, slender, about half as long as the penis. The flagellum is as broad as and slightly shorter than the epiphallus. A short retractor muscle is inserted at the distal end of the flagellum. The vagina is relatively short, ca 1/8 the length of the phallus. The spermathecal duct is tapering and the spermatheca is globose.

Material. — West Indies, St. Vincent, 11 miles WSW Stubbs (UF).

**Plekocheilus (Plekocheilus) blainvilleanus linterae** (Sowerby, 1890)  
(fig. 2)

This taxon was described by Sowerby (1890: 582) as a subspecies of *Plekocheilus* (*P.*) *fulminans* (Nyst, 1843). Examination of the type material in the British Museum (Natural History) shows that this classification is incorrect. The specimen figured by Sowerby (1890: pl. 56 fig. 12) is here designated lectotype (shell height 43 mm, diameter 23 mm); it is labelled 'Mount Roraima, British Guiana', and registered BMNH 1889.4.25.1.

A new locality for this subspecies is: Venezuela, Estado Bolívar, Yurani-tepuy near Roraima (UF 24413/1).

Genitalia. — Penis without sheath, the proximal part is swollen, otherwise subcylindrical. There is no external differentiation between the penis and epiphallus. The flagellum is rather long (ca. 1/4 the length of the phallus), very slender and attached to the diaphragm with an extremely short retractor muscle. The vas deferens is much shorter than the penis and epiphallus, which are strongly contorted. The spermathecal duct is long and tapering, the spermatheca is elongate-globose.

The nominate subspecies of *Plekocheilus blainvilleanus* (Pfeiffer, 1848) is recorded from Venezuela, Estado Mérida, Zaji (= probably Jají, ca. 22 km W Mérida); Estado Carabobo, 'Puerto Cabello' (both from Pilsbry, 1895: 67); Estado Aragua, cloud forest near Rancho Grande (Breure, 1976).

**Plekocheilus (Plekocheilus) blainvilleanus loveni** (Pfeiffer, 1848)

The original material was traced in the British Museum (Natural History) and is labelled 'La Colonia de Tovar' (ex Cuming). One specimen is here designated lectotype (shell height 43.5 mm, diameter 24 mm; BMNH 1975285).

This subspecies was collected in high tropical cloud forest near Colonia Tovar, Venezuela (Sta. 202, Breure, 1975a). The nominate subspecies has been found under similar ecological conditions 35 km west of this locality.



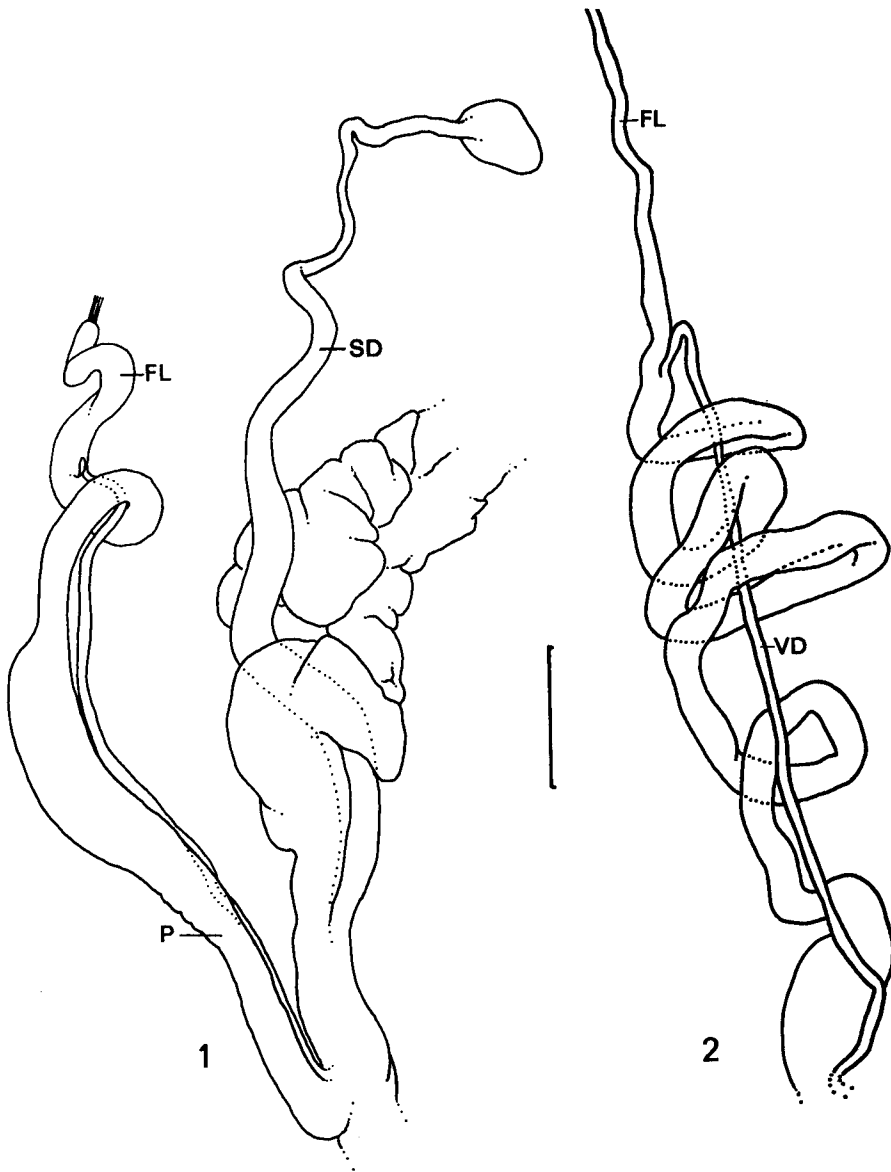


Fig. 1. *Plekocheilus (Plekocheilus) aurissileni* (Born), genitalia. West Indies, St. Vincent, 11 miles WSW Stubbs (UF). Scale line = 5 mm. Fig. 2. *Plekocheilus (Plekocheilus) blainvillaeus linterae* (Sowerby), penis. Venezuela, Yurani-tepui (UF 24413). Scale line = 5 mm.

Genitalia. — Penis without a sheath, the proximal part is slightly swollen, but otherwise subcylindrical. There is no external differentiation between the penis and the epiphallus. The vas deferens is about as long as penis and epiphallus together. The flagellum is rather long (ca. 1/5 the length of the phallus) and is tapering; a short retractor muscle is distally attached. The vagina is relatively short. The spermathecal duct is more or less subcylindrical; the spermatheca is globose.

Histology. The region adjacent to the genital atrium has an elongate lumen, which is lined by pseudostratified epithelium (cell height ca. 20-35  $\mu\text{m}$ ). In the subepithelial tissue large cells are observed filled with granules staining dark blue with Alcian Blue. The proximal part of the penis has a rather wide lumen; the epithelium is cylindrical and ca. 25  $\mu\text{m}$  high. Parallel to the central lumen a number of small parallel tubes are present; their epithelium is ca. 8-15 (-20)  $\mu\text{m}$  high, with rather large, basal nuclei (diameter of nuclei 3-5  $\mu\text{m}$ ). More distally the lumen is made up of pouches lined by high cylindrical epithelium (cell height 40  $\mu\text{m}$ ). The apical part of the epithelium cells is eosinophile and staining lilac with Alcian Blue. Some small secretion granules were observed staining dark blue with Alcian Blue. In the most distal part of the penis the epithelium is 25-35  $\mu\text{m}$  high. The epithelium of the epiphallus is low cylindrical (cell height ca. 18  $\mu\text{m}$ ). The subepithelial tissue is made up of numerous large cells filled with secretion granules staining dark blue with Alcian Blue. These Alcian Blue-positive cells are also present in the subepithelial tissue of the flagellum.

***Plekocheilus (Plekocheilus) plectostylus*** (Pfeiffer, 1848)

One specimen, shell height 36 mm, diameter 22 mm (labelled 'Chachopo province of Merida New Granada \*'); ex Cuming ex Funck) is here designated lectotype (BMNH 1975287).

***Plekocheilus (Plekocheilus) speciosus*** (Pfeiffer, 1855)

This species was described by Pfeiffer (1855: 290) from 'Sierra Nevada de S. Marta' [Colombia] (ex Cuming ex Schlim). One specimen from this locality is here designated lectotype (shell height 58 mm, diameter 35 mm; BMNH 1975300).

***Plekocheilus (Eurytus) ampullaroides*** (Mousson, 1873) (fig. 3)

Genitalia. — Penis without sheath, its proximal part rather slender. The distal part of the penis is wider and more or less subcylindrical, passing

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\*) New Granada, a former political unity, comprised present Panama, Colombia, Venezuela and part of Ecuador.

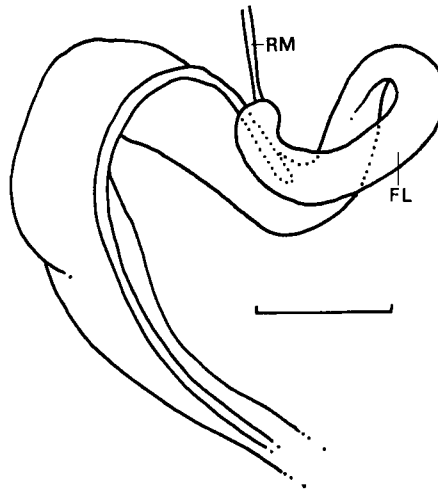


Fig. 3. *Plekocheilus (Eurytus) ampullaroides* (Mousson), penis. Colombia, Nariño, El Palusar (NRS 2754). Scale line = 5 mm.

without external differentiation into the epiphallus. The flagellum is rather slender and ca.  $\frac{2}{5}$  the length of the phallus; a thin retractor muscle is distally attached.

Material. — Colombia, Nariño, El Palusar, 1300 m (NRS 2754).

***Plekocheilus (Eurytus) auriformis* (Da Costa, 1904)**

The holotype is preserved in the British Museum (Natural History). The holotype measures: shell height 74 mm, diameter 37.5 mm, height of aperture 42 mm, width 24.5 mm (BMNH 1907.11.21.112).

Redescription. — Shell rimate, with straight sides, elongate, solid. Colour lightbrown with darker brown spots. Surface rather shining, granulate and with very indistinct spiral lines. Whorls 4.7, rather convex; suture well impressed. Aperture inversed ear-shaped, purplish-white coloured inside. Peristome thickened, reflexed; purple. Columellar margin purple. Columella with a strong fold.

***Plekocheilus (Eurytus) bruggeni* sp.n. (pl. 6 figs. 5-7)**

Description. — Shell up to 40.5 mm, 2.0 times as long as wide, imperforate, with straight sides, moderately elongate, rather solid. Colour light brown with irregularly placed reddish-brown dots. Surface hardly shining, with numerous cuticular spiral striae. Whorls 4.5, nearly flat; suture well impressed, descending in front. Aperture subovate, with a pearly luster inside, 1.7 times as

long as wide, 0.54 times total length. Peristome thin and simple, flesh-coloured. Columellar margin hardly dilated, white. A semi-transparent, whitish callus on the parietal region.

Measurements (in mm):

| H    | D    | HA   | WA   | W   |                |
|------|------|------|------|-----|----------------|
| 39.0 | 19.5 | 22.0 | 12.2 | 4.5 | holotype       |
| 39.0 | 20.0 | 22.0 | 13.1 | 4.4 | paratype, BMNH |
| 38.5 | 19.0 | 20.0 | 11.9 | 4.4 | do., do.       |
| 40.5 | 20.5 | 20.5 | 12.5 | 4.6 | do., RMNH      |

Type material. — Peru, Dept. Pasco, Huancabamba. Holotype BMNH 1911.11.2.88 (ex Preston). Paratypes BMNH 1911.11.2.89-90 and RMNH 55122/1, same data.

Remarks. — Resembles *Plekocheilus* (*Eurytus*) *piperitus* (Sowerby, ?1838) [described from Peru, 'Rio Huallaga'], but differs in (1) being smaller, (2) having a darker colour, (3) having the aperture relatively narrower and (4) having the suture, less descending in front.

Etymology. — Named after my colleague Dr. A. C. van Bruggen (Leiden) for his stimulating interest in my research.

***Plekocheilus* (*Eurytus*) *castaneus* (Pfeiffer, 1845)**

The specimen figured by Reeve (1848: pl. 32 fig. 197) is here designated lectotype: shell height 69.5 mm, diameter 47 mm (BMNH 1975279). The lectotype and one paralectotype (BMNH 1975280) are both labelled 'Vegas of the River Quenden' (ex Cuming). I have been unable to trace this locality, which is in Colombia.

This species has also been recorded from 'near Fresno and Santa Ana' and 'Upper Magdalena Valley', Colombia (Pilsbry, 1895: 86). A new locality for this species is: Colombia, Dept. Cundinamarca, Guayabetal (on the road between Bogotá and Villavicencio), RMNH/1.

***Plekocheilus* (*Eurytus*) *coloratus* (Nyst, 1845)**

*Bulimus lamarckianus* Pfeiffer (1848a: 229) proves to be a junior subjective synonym of *Bulimus coloratus* Nyst, 1845. The type material of *Bulimus lamarckianus*, labelled 'Andes of New Granada' (ex Cuming ex Funck), was examined in the British Museum (Natural History). One specimen, shell height 62.5, diameter 39.0 mm (figured by Reeve, 1848: pl. 24 fig. 156) is here designated lectotype (BMNH 1975295).

New localities for this species are: (1) Colombia, Dept. Nariño, El Palusar, 1300 m (NRS 2754/1, NRS 2755/2); (2) Colombia, Dept. Tolima, Toche [ca. 55 km NW Ibagué, 2500 m] (NRS 2752/1).

**Genitalia.** — The penis is subcylindrical, its distal part dilated and passing without external differentiation into the epiphallus. The flagellum is subcylindrical, ca.  $\frac{3}{8}$  the length of the phallus. A relatively thin retractor muscle is inserted at the distal end of the flagellum. The vagina is relatively short and swollen. The spermathecal duct is subcylindrical.

**Plekocheilus (Eurytus) corticosus** (Sowerby, 1895)

The specimen figured by Sowerby (1895: pl. 13 fig. 2) is here designated lectotype (shell height 35.5 mm, diameter 16.5 mm; BMNH 1907.11.21.110); it is labelled 'Bogotá' [Colombia].

**Plekocheilus (Eurytus) dalmasi** Dautzenberg, 1900

Pilsbry (1901: 128) correctly assumed that the Sierra Nevada de Santa Marta is the type locality of this species, as proven by two syntypes (IRSN) labelled with this locality (ex Dalmás).

Measurements (in mm):

| H    | D    | HA   | WA  | LW   | W   |
|------|------|------|-----|------|-----|
| 22.5 | 13.0 | 13.0 | 8.7 | 19.0 | 3.7 |
| 25.0 | 14.4 | 14.8 | 9.0 | 20.5 | 3.7 |

**Plekocheilus (Eurytus) elaeodes** (Pfeiffer, 1853)

The original description (Pfeiffer, 1853: 256) was copied by Pilsbry (1896: 86); this species is not imperforate and the shells are often paler in colour than described. In my opinion this species is characterized by (1) the transverse submalleation of the shell; (2) the ovate aperture; (3) the pink peristome and columella; and (4) the narrowly reflexed peristome.

**Plekocheilus (Eurytus) episcopalis** (Pfeiffer, 1855)

The specimen registered as BMNH 1953.11.30.1 is here designated lectotype (shell height 58.0 mm, diameter 33.5 mm). Two paralectotypes (BMNH 1953.11.30.2-3) bear the same labels: 'Bogotá' [Colombia], 'New Granada' (ex Cuming).

**Plekocheilus (Eurytus) eros** (Angas, 1878)

The holotype of this species is in the British Museum (Natural History), registered as BMNH 1878.1.21.2.

**Redescription.** — Shell rimate, with slightly convex sides, rather thin. Colour green-creamy with spots and interrupted longitudinal streaks of a darker colour. Surface lustreless, densely and evenly granulate. Whorls 3.8, hardly convex; suture hardly impressed. Aperture ovate, slightly oblique,

whitish coloured inside with the spots and streaks shining through the shell in lightbrown. Peristome thin, expanded and narrowly reflexed; pink. Columellar margin reflexed; pink. Parietal callus dark green.

Measurements: shell height 35.5 mm, diameter 18.5 mm, height of aperture 23.0 mm.

**Plekocheilus (Eurytus) floccosus** (Spix, 1827) (figs. 4-5)

A new locality additional to those of Pilsbry (1895, 1896: 92-93, 199) and Weyrauch (1967b: 462) is: Peru, Dept. San Martín, Ramal de Aspozana, 86.2 km NNE Tingo María, 590 m (Breure, 1975a: sta. 161; RMNH/2).

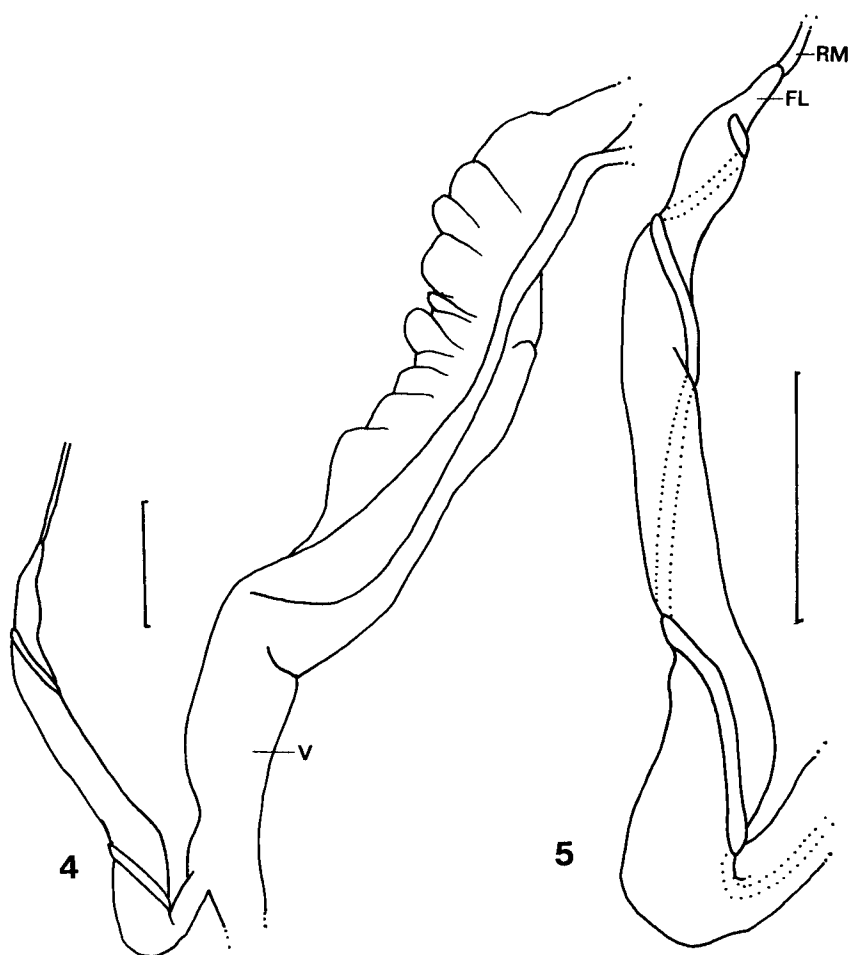


Fig. 4-5. *Plekocheilus (Eurytus) floccosus* (Spix), genitalia. Peru, Amazonas, Rio Cenepa, Huampami (UF 24929). Scale line = 5 mm.

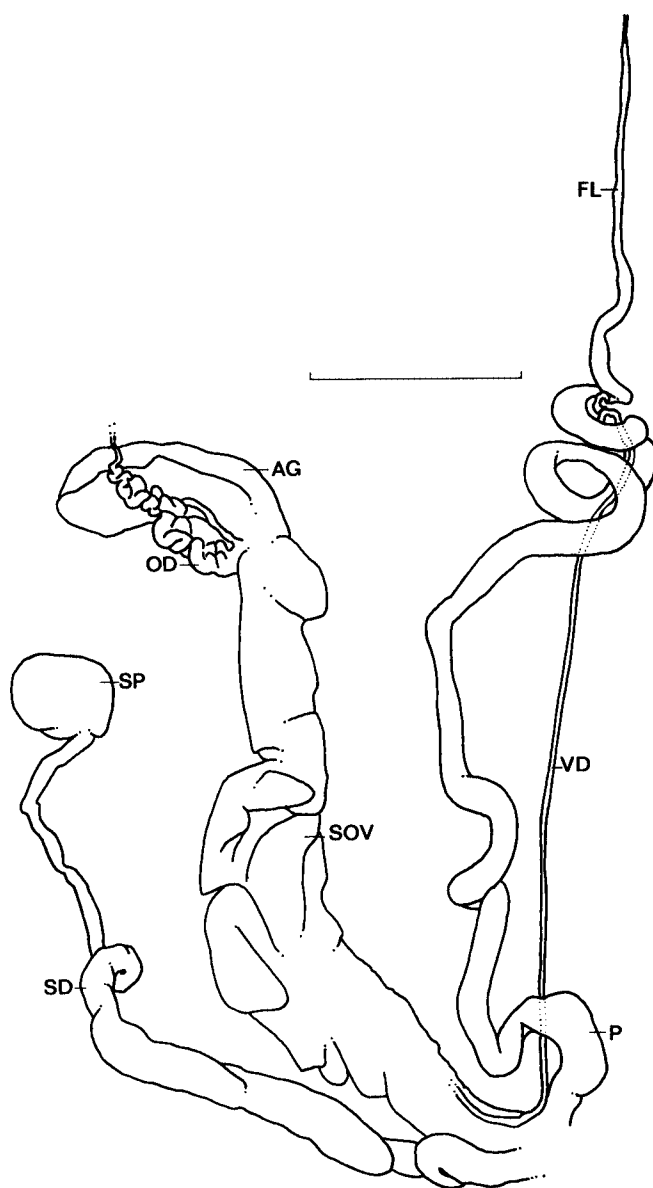


Fig. 6. *Plekocheilus (Eurytus) juliani* Haas, genitalia. Venezuela, Bolívar, Apacará-tepui (FMNH 49737). Scale line = 1 cm.

Genitalia. — Penis without a sheath, more or less subcylindrical and passing without external differentiation into the epiphallus. The flagellum is relatively very short. The vagina is broad and relatively long.

Material. — Peru, Dept. Amazonas, Río Cenepa, Huampami (UF).

***Plekocheilus (Eurytus) juliani* Haas, 1955 (fig. 6)**

The type material (FMNH 49737) has been examined and one specimen dissected.

Genitalia. — Proximal part of penis slightly swollen; the distal part of the penis is more slender and subcylindrical. No external transition to the epiphallus, which is more or less contorted and tapering towards the transition to the flagellum. The flagellum, to which the penial retractor muscle is attached terminally, is tapering. The proximal part of the spermathecal duct is subcylindrical, whereas the intermediate part is slightly widened; the distal part of this duct tapers towards the ovate spermatheca.

***Plekocheilus (Eurytus) mundiperditi* Haas, 1955 (fig. 7)**

The type material of this species (FMNH 52436) has been investigated anatomically. The genitalia closely resemble those of *Plekocheilus (Eurytus)*

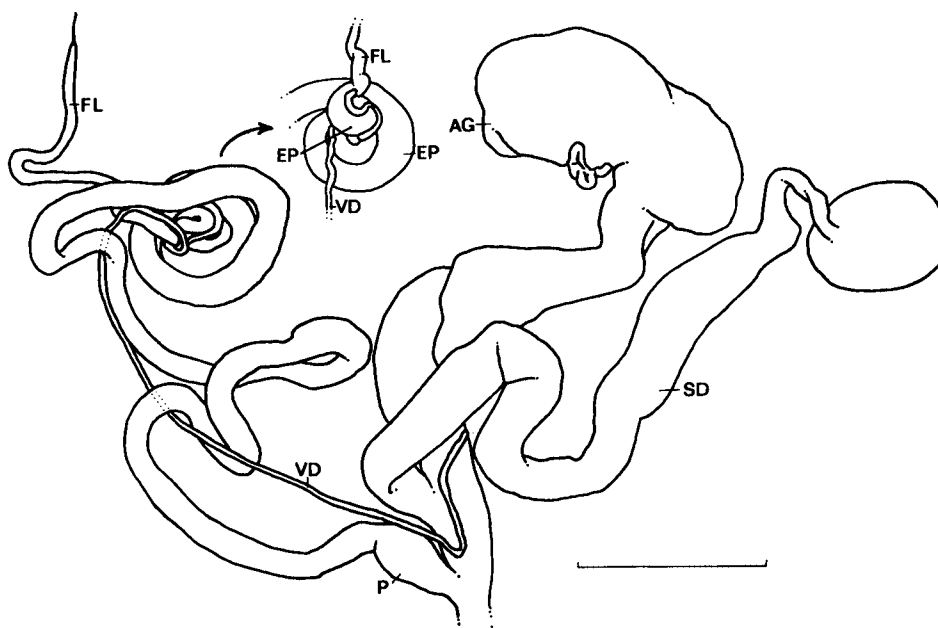


Fig. 7. *Plekocheilus (Eurytus) mundiperditi* Haas, genitalia. Venezuela, Bolívar, Chimantá-massif near Río Tirica (FMNH 52436). Scale line = 1 cm.



*juliani* Haas, 1955. Both the phallus and the spermathecal duct are relatively longer and the former is much more contorted. Characteristic for both species is the absence of a penis sheath, the contorted phallus (especially the epiphallus) and the free running vas deferens.

***Plekocheilus (Eurytus) phoebus* (Pfeiffer, 1862) (pl. 11 fig. 6)**

A syntype of this species, which has not been figured before, was found in the British Museum (Natural History). This specimen is designated lectotype: shell height 30.5 mm, diameter 17.5 mm. The label reads 'Ecuador' (ex Cuming).

This species is characterized by (1) the blunt apex, (2) the colour pattern, (3) the pink lip and (4) the last whorl which is not descending in front.

***Plekocheilus (Eurytus) piperitus* (Sowerby, ?1838) (figs. 8-11)**

A new locality for this species is: Peru, Dept. Loreto, Santa Maria, 3 miles downstream from Iquitos on the Río Amazonas (UF/1).

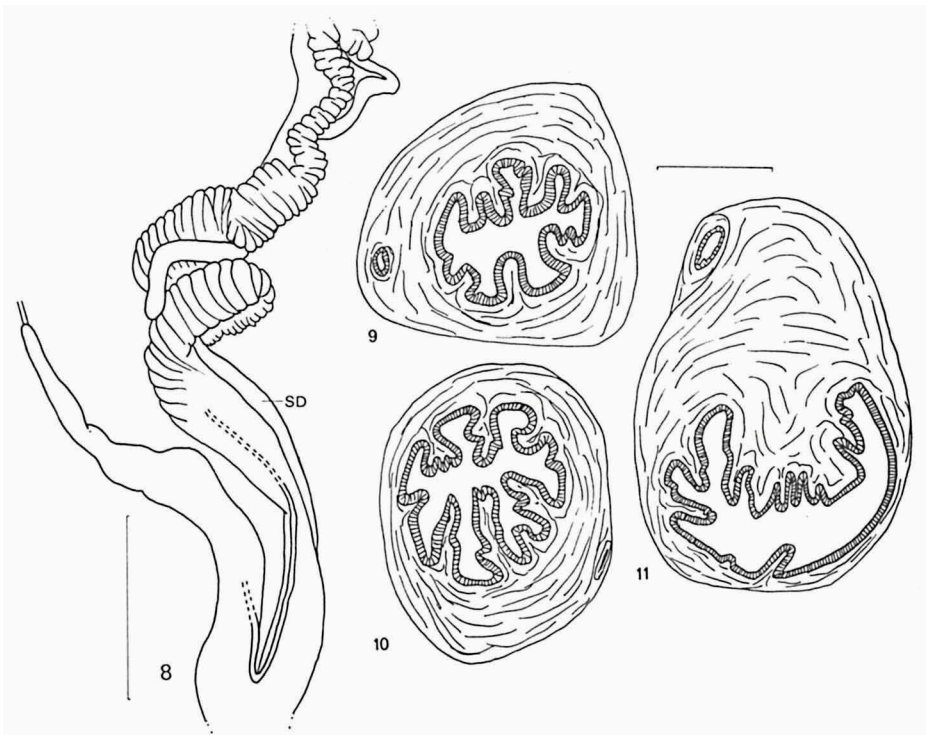


Fig. 8. *Plekocheilus (Eurytus) piperitus* (Sowerby), genitalia. Peru, Loreto, Santa Maria (UF). Scale line = 5 mm. Fig. 9-11. *Plekocheilus (Eurytus) piperitus* (Sowerby). Peru, Loreto, Santa Maria. Transverse sections of penis (slides H 3664, 3670, 3677, respectively). Scale line = 0.5 mm.

Genitalia. — The penis is more or less subcylindrical, and passing without external differentiation into the epiphallus, which is tapering. The flagellum is slender and subcylindrical, ca.  $1/3$  the length of the phallus, with a short distal retractor muscle. The vagina is rather short. The spermathecal duct is subcylindrical.

Histology. The penis has a wide lumen, more or less narrowed by infoldings. The epithelium is pseudostratified, ca.  $30\text{ }\mu\text{m}$  high. The epithelium of the epiphallus is ca.  $20\text{ }\mu\text{m}$  high.

***Plekocheilus (Eurytus) pulicarius* (Reeve, 1848)**

The specimen figured by Reeve (1848: pl. 42 fig. 267) is here designated lectotype: shell height 31.5 mm, diameter 19.5 mm (BMNH 1975281). Together with two paralectotypes (BMNH 1975282) this material bears the label 'New Granada' (ex Cuming).

***Plekocheilus (Eurytus) roseolabrum* (Smith, 1877)**

The original material, labelled 'Malacatos, S. Ecuador', was found in the British Museum (Natural History). One specimen is designated lectotype: shell height 42.0 mm, maximum diameter 22.5 mm, minimum diameter 18.0 mm (BMNH 1975135). The paralectotype is numbered BMNH 1877.3.28.2.

***Plekocheilus (Eurytus) superstriatus* (Sowerby, 1890)**

The specimen figured by Sowerby (1890: pl. 56 fig. 9) has been traced in the British Museum (Natural History) and is here designated lectotype (BMNH 1889.11.19.1). The measurements as given by Sowerby appear to be incorrect and actually are: shell height 64.5 mm, diameter 31.0 mm. The specimen is labelled 'Yquitos, Peru' (ex Cuming).

When more material of *Plekocheilus superstriatus* becomes available, that species may be shown to be a synonym of *Plekocheilus (Eurytus) floccosus* (Spix, 1827).

***Plekocheilus (Eurytus) taylorianus* (Reeve, 1849)**

The specimen figured by Reeve (1849: pl. 81 fig. 602) is here designated lectotype: shell height 58.5 mm, diameter 31.0 mm (BMNH 1975142). The specimen is labelled 'Quito, Ecuador' (ex Taylor).

New localities for this species are (all in Ecuador, Prov. Pichincha): (1) Nanegal [ca. 75 km NW Quito, ca. 1500 m], EPN/2; (2) Pacto [ca. 80 km NW Quito, ca. 1400 m], EPN/1; (3) Pintag [ca. 25 km SE Quito (as the crow flies)], EPN/1.

**Plekocheilus (Aeropictus) argenteus** (Jousseaume, 1900)

Material of this species has been found in the Brussels museum. The specimens are labelled 'Venezuela' (ex Ancey).

Measurements (in mm):

| H    | D    | HA   | WA   | LW   | W   |
|------|------|------|------|------|-----|
| 24.0 | 14.9 | 14.7 | 10.0 | 20.5 | 4.3 |
| 21.5 | 13.3 | 12.5 | 8.2  | 17.5 | 4.3 |
| 20.0 | 12.8 | 12.0 | 8.1  | 17.0 | 3.9 |

**Plekocheilus (Aeropictus) calliostomus** (Dohrn, 1882) (figs. 12-13)

Genitalia. — Penis with a short sheath (ca. 1/9 the length of the phallus), subcylindrical, passing without external differentiation into the epiphallus. The flagellum is short (ca. 1/12 the length of the phallus); with a relatively

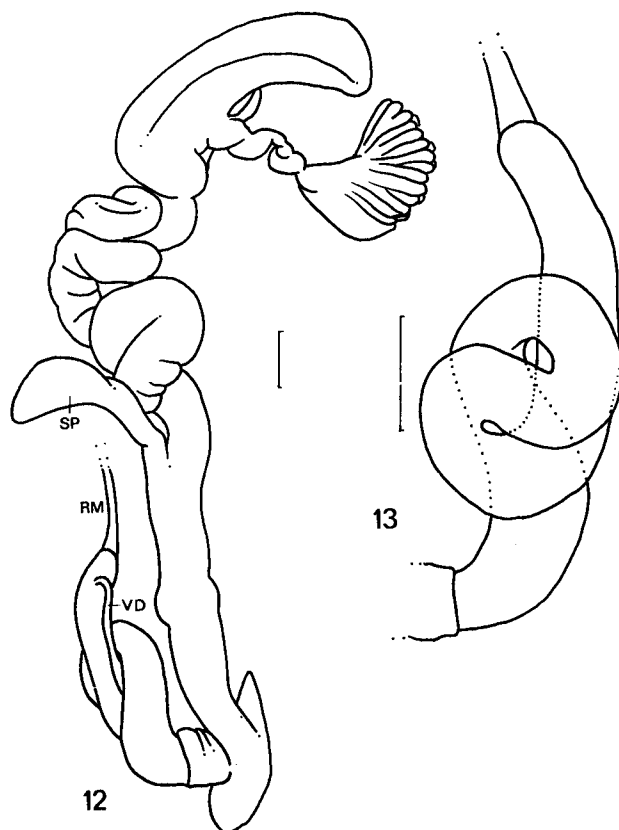


Fig. 12-13. *Plekocheilus (Aeropictus) calliostomus* (Dohrn), genitalia. Colombia, Boyacá, 10 km NE Villa de Leiva (RMNH). Scale line = 2 mm.

very long, distal retractor muscle. The vagina is comparatively long, its median part swollen. The spermathecal duct is very short. The spermatheca is elongate-globose, not clearly differentiated from the spermathecal duct.

Material. — Colombia, Dept. Boyacá, 10 km NE Villa de Leiva (Breure, 1975a: sta. 179; RMNH).

**Plekocheilus (Aeropictus) cathcartiae** (Reeve, 1848) (pl. 11 fig. 7)

The type material of this species, labelled 'New Granada' (ex Cuming), was examined in the British Museum (Natural History). One specimen is here designated lectotype: shell height 45.5 mm, diameter 27.0 mm (BMNH 1975288; figured by Reeve, 1848: pl. 42 fig. 265a-b). Four paralectotypes (BMNH 1975289) include the specimen figured as fig. 265c by Reeve (op.cit.).

Redescription. — Shell up to 48.5 mm, rimate, with slightly convex sides, rather thin. Colour tawny to yellowish-brown with dots and oblique streaks of reddish-brown, sometimes with oblique waving streaks almost from suture to suture, and with a complex pattern of subcuticular cavities filled with air, viz., (1) as spiral lines of small dots or small streaks at irregular distances of each other, or (2) with axial lines or blotches as well. Surface slightly shining, with fine granulation arranged according to growth striae. Whorls 4.5, rather convex; suture well impressed. Aperture ovate, more or less inverted ear-shaped. The inside of the aperture is shining, showing the colour pattern of the outside. Peristome thickened, expanded and narrowly reflexed; whitish-pink. Columellar margin narrowly reflexed, hardly dilated and receding above. Parietal region with a black-brown callus.

Measurements (in mm):

| H    | D    | HA   | LW   | W   |               |
|------|------|------|------|-----|---------------|
| 45.5 | 27.0 | 29.0 | 17.5 | 4.2 | lectotype     |
| 48.5 | 25.0 | 31.0 | 16.5 | 4.4 | paralectotype |
| 43.5 | 25.5 | 27.5 | 16.5 | 4.2 | do.           |

**Plekocheilus (Aeropictus) delicatus** (Pilsbry, 1935) (figs. 14-16)

Additionally to Breure, 1977a: 264, fig. 6, the genitalia can be described as follows: the penis has a short sheath (ca. 1/9 the length of the phallus) and is subcylindrical. The epiphallus is relatively short, its internal longitudinal ridges weakly visible at the outside. The flagellum is very short (ca. 1/12 the length of the phallus). The vagina is relatively long. The vas deferens is much shorter than the penis and epiphallus together. The spermathecal duct is slightly tapering.

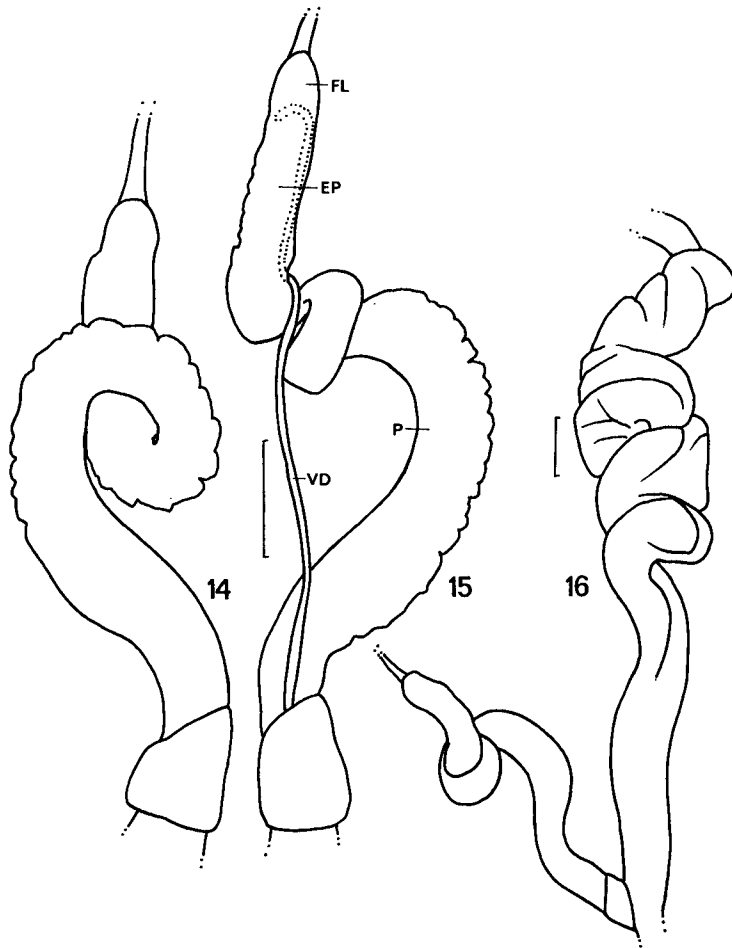


Fig. 14-16. *Plekocheilus (Aeropictus) delicatus* (Pilsbry), genitalia. Colombia, Cundinamarca, near Mosquera (RMNH). Scale line = 2 mm.

***Plekocheilus (Aeropictus) dissimulans*** (Preston, 1909) (fig. 17)

The type material of this species has been found in the British Museum (Natural History). A specimen (BMNH 1914.4.3.37) is designated lectotype: shell height 30.0 mm, diameter 17.0 mm. It is labelled 'Merida, Venezuela'. A second specimen labelled with this locality is preserved in alcohol (BMNH 1912.5.4.20) and has been dissected.

**Genitalia.** — Penis without a sheath, subcylindrical and long, passing without external differentiation into the epiphallus. The flagellum is relatively very short (ca. 1/15 the length of the phallus) and tapering; a short retractor

muscle is distally inserted. The genital atrium is swollen. The vagina is relatively short. The spermathecal duct is more or less subcylindrical, its distal part narrower.

**Plekocheilus (*Aeropictus*) latilabris** (Pfeiffer, 1855)

The type specimens of this species have been found in the British Museum (Natural History). One specimen is designated lectotype: shell height 49.0 mm, diameter 28.5 mm (BMNH 1975127). There are two paralectotypes

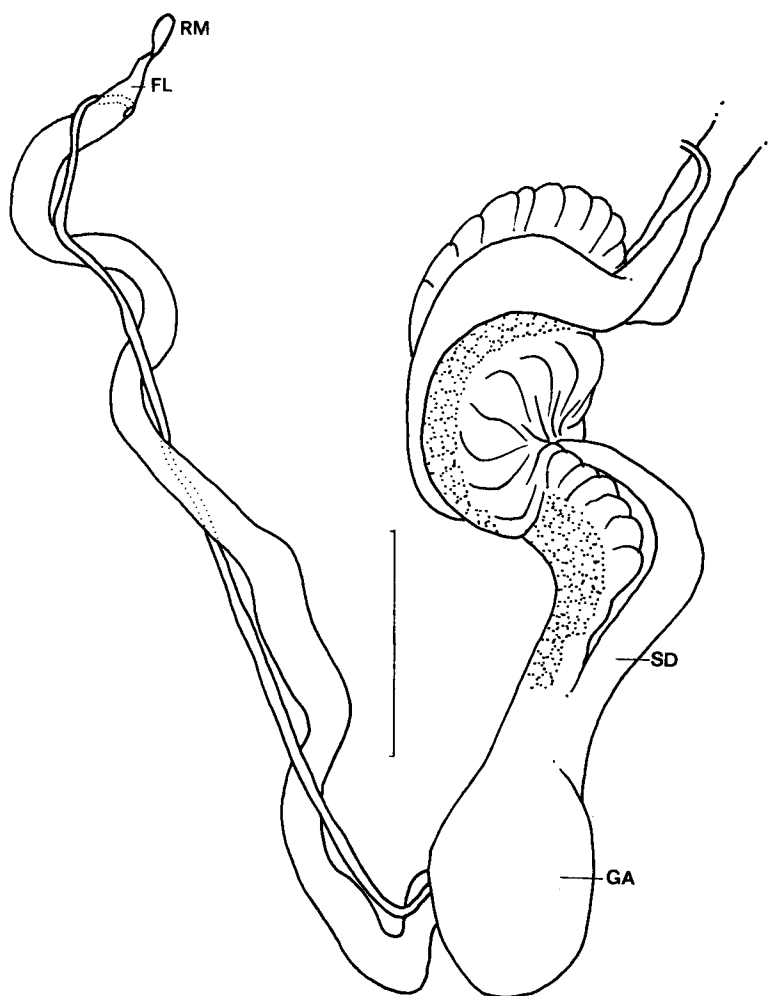


Fig. 17. *Plekocheilus (Aeropictus) dissimulans* (Preston), genitalia. Venezuela, Mérida (BMNH 1912.5.4.20). Scale line = 5 mm.

(BMNH 1895.5.1.1). The material is labelled 'New Granada' (ex Cuming). The material at hand is not conclusive about whether this taxon should be regarded as a subspecies of *Plekocheilus* (*A.*) *succineoides* (Petit) or not.

***Plekocheilus* (*Aeropictus*) *quadricolor*** (Pfeiffer, 1848)

The specimen figured by Philippi (1849 [1847-1851]: pl. 8 fig. 4) is here designated lectotype: shell height 30.5 mm, diameter 17.0 mm (BMNH 1975283). Two paralectotypes, also labelled 'New Granada' (ex Cuming) have been registered BMNH 1975284.

The relationship between this species and *Plekocheilus* (*A.*) *veranyi* (Pfeiffer, 1848), both reported from Venezuela, Estado Mérida, Chachopo, needs further investigation as the differences are but slight.

***Plekocheilus* (*Aeropictus*) *rhodocheilus*** (Reeve, 1848) (pl. 9 fig. 15)

This species was hitherto considered a representative of *Strophocheilus* Spix, 1827 (see Pilsbry, 1895: 8). The type was found in the British Museum (Natural History) and it now appears that this species has to be classified with the subgenus *Aeropictus* of *Plekocheilus*. The specimen, labelled 'Brazil' (ex Cuming), is here designated lectotype: shell height 55.0 mm, diameter 28.5 mm (BMNH 1975129) and corresponds to Reeve, 1848: pl. 28 fig. 173. The (generalized) type locality 'Brazil' is somewhat outside the range of this subgenus (viz., Andean region of Ecuador, Colombia and W. Venezuela) and requires confirmation.

***Plekocheilus* (*Aeropictus*) *veranyi*** (Pfeiffer, 1848) (fig. 18; pl. 9 fig. 6)

The type material, labelled 'Chachopo province of Merida New Granada' (ex Cuming ex Funck), was investigated in the British Museum (Natural History). The specimen figured by Philippi (1849 [1847-1851]: pl. 8 fig. 9) is designated lectotype: shell height 33.0 mm, diameter 19.5 mm (BMNH 1975297). Two paralectotypes, one of which has been figured by Reeve (1848: pl. 42 fig. 262), are registered BMNH 1975298.

*Bulimus scytodes* Pfeiffer, 1853a (:256; type locality 'Andes of Colombia') is now considered a junior subjective synonym of *Plekocheilus veranyi*. Pilsbry (1895: 84) already writes 'I am unable to find characters in this separating it [*Bulimus scytodes* Pfr.] from *P. veranyi*', which is corroborated by the study of the type material of *Plekocheilus veranyi* and topotypes in the Leiden museum.

Specimens from Venezuela, Estado Mérida, Laguna Grande (UF) are tentatively referred to this species and have been dissected. The penis is without sheath, more or less subcylindrical and passing without external differentiation into the epiphallus. The flagellum is rather slender and subcylindrical, with a distal retractor muscle. The vagina is relatively long and partly swollen. The spermathecal duct is more or less subcylindrical, with an elongate-globose spermatheca at its distal end.

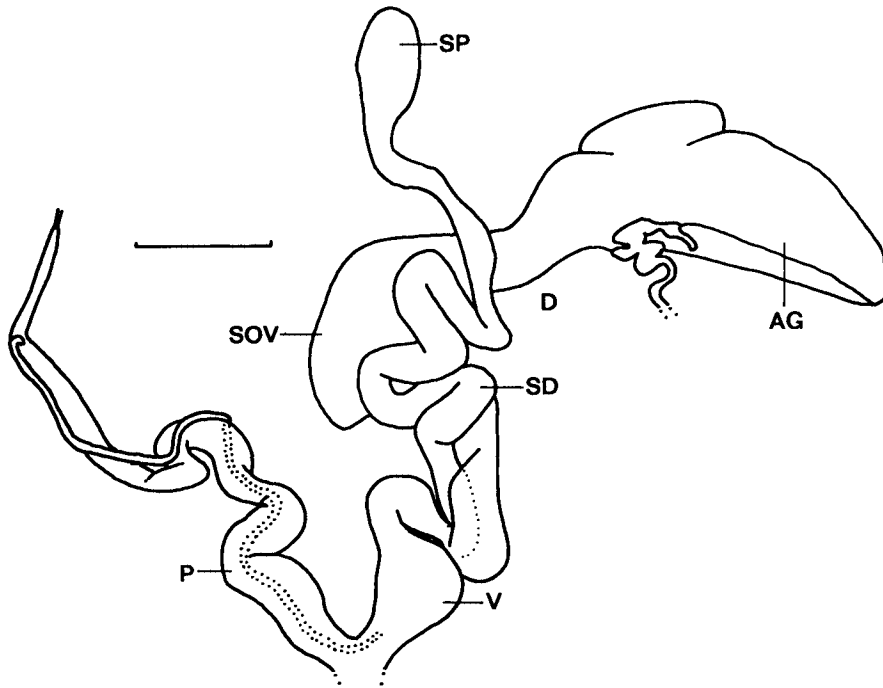


Fig. 18. *Plekocheilus (Aeropictus) veranyi* (Pfeiffer), genitalia. Venezuela, Mérida, Laguna Grande (UF). Scale line = 2 mm.

***Plekocheilus (Sparnotion) hauxwelli* (Crosse, 1872)**

This species seems to be intermediate between *Plekocheilus (Aeropictus)* and *P. (Eudolichotis)*. The subcuticular cavities filled with air are characteristic of *Aeropictus*, whereas the shape of the aperture and the finely granulate shell surface are characteristic of *Eudolichotis*. The subcuticular cavities filled with air as figured by Pilsbry (1896: pl. 44 fig. 78) are, however, not present in the paratype (MCZ 202073).



**Plekocheilus (Eudolichotis) Pilsbry, 1896**

*Eudolichotis* was hitherto considered a separate genus (e.g., Zilch, 1960). Study of the anatomy (genitalia: figs. 19-21; radula: see Appendix) and the shell has shown that the similarities between these two taxa are more conspicuous than the dissimilarities. *Eudolichotis* is now tentatively considered, therefore, a subgenus of *Plekocheilus*.

**Plekocheilus (Eudolichotis) aurissciuri** (Guppy, 1866) (fig. 19)

Nine syntypes of this species are in the British Museum (Natural History), registration number 1975309, and labelled 'Trinidad' (ex Guppy).

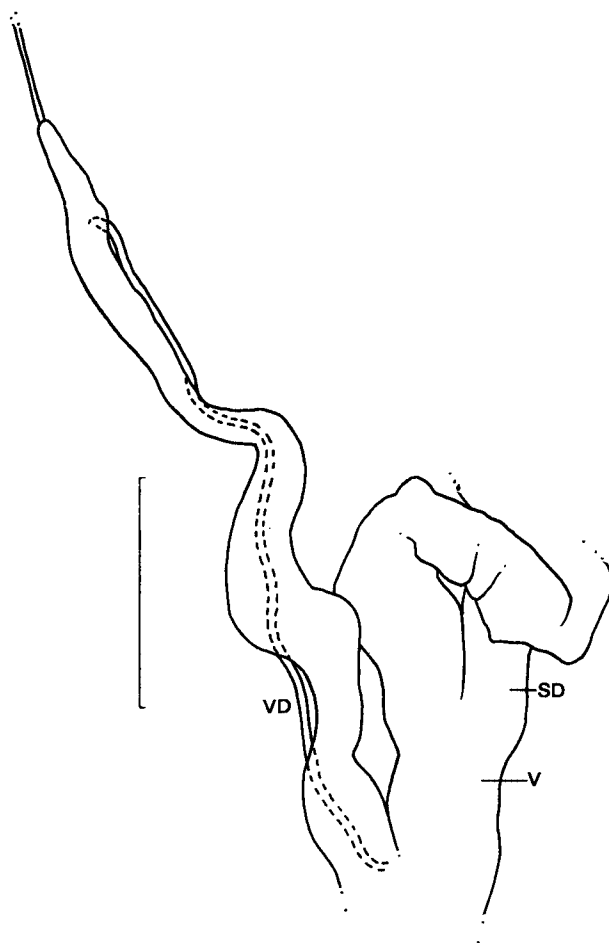


Fig. 19. *Plekocheilus (Eudolichotis) aurissciuri* (Guppy), genitalia. Surinam, Paramaribo (RMNH). Scale line = 5 mm.

Material from Surinam, Paramaribo (RMNH) has been dissected.

Genitalia. — Penis without a sheath, more or less subcylindrical, passing without external differentiation into the epiphallus. The flagellum is short (ca. 1/7 the length of the phallus) and tapering; a rather long retractor muscle is distally attached. The vagina is rather broad and long. The spermathecal duct is tapering.

**Plekocheilus (Eudolichotis) dillwynianus** (Pfeiffer, 1853)

The type material of this species is preserved in the British Museum (Natural History). One specimen is designated lectotype (BMNH 1975144). There are two paralectotypes (BMNH 1975145) and the material is labelled 'Andes of New Granada' (ex Cuming).

Redescription. — Shell narrowly perforate, with convex sides, rather elongate, solid. Colour creamy with brown dots and variegations. Surface slightly shining, with longitudinal striae and some diamond-shaped granules. Whorls rather convex; suture well impressed. Aperture slightly oblique, elongate-ear-shaped. Peristome thickened, narrowly reflexed; white. Columellar margin reflexed; white. Columella with a strong fold.

Measurements (in mm):

| H    | D    | HA   | WA   | W   |               |
|------|------|------|------|-----|---------------|
| 39.5 | 18.5 | 20.0 | 8.5  | 5.1 | lectotype     |
| 39.5 | 18.5 | 21.0 | 10.2 | 4.7 | paralectotype |
| 36.5 | 17.0 | 17.5 | 9.5  | 4.9 | do.           |

**Plekocheilus (Eudolichotis) euryomphalus** (Jonas, 1844)

*Bulimus otostomus* Pfeiffer, 1855, is a junior subjective synonym of this species. The type material of *B. otostomus* has been found in the British Museum (Natural History) and the specimen figured in Pfeiffer (1855: pl. 8 fig. 12-13 [in Pfeiffer, 1854-1860]) is designated lectotype (BMNH 1975307): shell height 31.5 mm, diameter 13.8 mm. There are two paralectotypes (BMNH 1975308) and the material is labelled 'Venezuela' (ex Cuming).

**Plekocheilus (Eudolichotis) gibber** (Oberwimmer, 1931)

Examination of the holotype (SMF 5143) has led me to classify this species with *Eudolichotis* instead of with *Auris*. The structure of the shell is different from that in *Auris* species (which are restricted to eastern Brazil), but closely resembles the shell-structure of *Eudolichotis* species.

Consequently, *Antitragus* Oberwimmer, 1931 (type species by monotypy

*Auris* (*A.*) *gibber* Oberwimmer) is now considered a junior subjective synonym of *Eudolichotis* Pilsbry, 1896.

***Plekocheilus (Eudolichotis) glaber glaber* (Gmelin, 1791) (fig. 20)**

Genitalia. — Penis without a sheath, more or less subcylindrical, passing without external differentiation into the epiphallus. The flagellum is rather short (ca.  $1/4$ – $1/5$  the length of the phallus); a retractor muscle is distally inserted. The vagina is short. The spermathecal duct is subcylindrical, its distal part tapering.

Material. — Trinidad, Port-of-Spain (BMNH 1956.7.5.1).

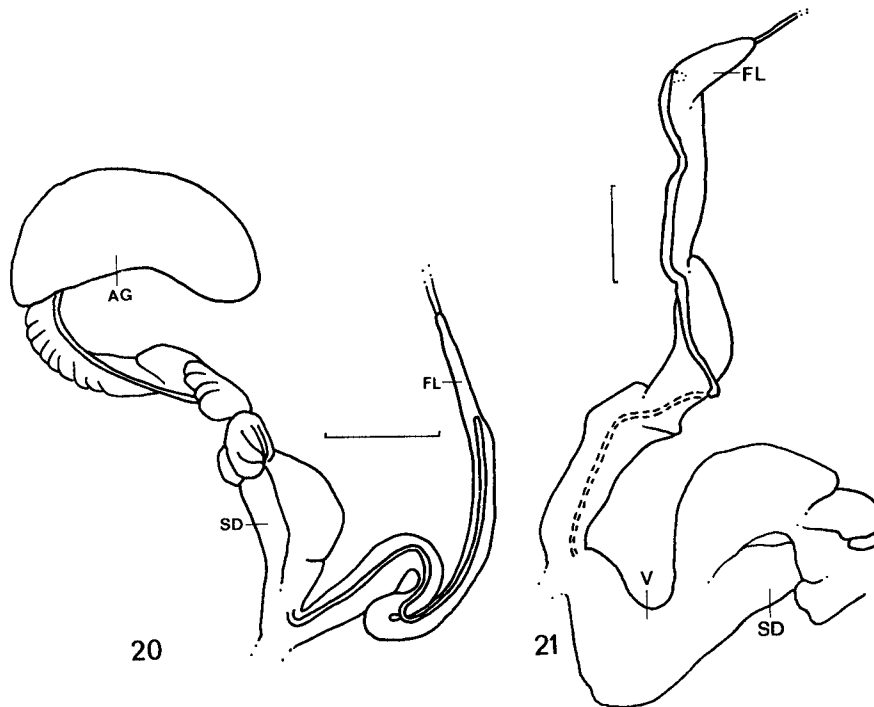


Fig. 20. *Plekocheilus (Eudolichotis) glaber glaber* (Gmelin), genitalia. Trinidad, Port-of-Spain (BMNH 1956.7.5.1-8). Scale line = 5 mm. Fig. 21. *Plekocheilus (Eudolichotis) glaber grenadensis* (Guppy), genitalia. West Indies, Grenada, 0.8 miles NE Grand Etang (UF). Scale line = 2 mm.

***Plekocheilus (Eudolichotis) glaber grenadensis* (Guppy, 1868) (fig. 21)**

Genitalia. — Penis without a sheath, more or less subcylindrical, passing without external differentiation into the epiphallus. The flagellum is relatively short (ca.  $1/7$  the length of the phallus) and tapering; the retractor muscle

is distally inserted. The vagina is relatively rather long. The spermathecal duct is tapering.

Material. — West Indies, Grenada, 0.8 mile NE Grand Etang (UF).

***Plekocheilus (Eudolichotis) lacertus*** (Pfeiffer, 1855)

The type specimens of this species have been located in the British Museum (Natural History). One specimen is designated lectotype: shell height 32.5 mm, diameter 14.6 mm (BMNH 1975303). Additionally there are two paralectotypes (BMNH 1975304). All are labelled 'Para' [Brazil] (ex Cuming ex Yates).

***Plekocheilus (Eudolichotis) perdix*** (Pfeiffer, 1848) (pl. 9 fig. 7)

The type specimens of this species have been found in the British Museum (Natural History). One specimen is designated lectotype (BMNH 1975305). Its measurements are: shell height 33.5 mm, diameter 17.0 mm. Two paralectotypes are registered BMNH 1975306. The material is labelled 'Agua de Obispa New Granada' (ex Cuming ex Funck).

***Dryptus guerini*** (Pfeiffer, 1846)

The type specimens of this species are preserved in the British Museum (Natural History). One specimen is here designated lectotype: shell height 41.0 mm, maximum diameter 22.0 mm, minimum diameter 18.5 mm (BMNH 1975272). There are two paralectotypes (BMNH 1975273).

***Dryptus marmoratus*** (Dunker, 1844)

One specimen, designated lectotype, is preserved in the London museum. Its measurements are: shell height 86.0 mm, diameter 45.0 mm. The specimen is labelled 'Venezuela' (ex Cuming ex Dunker) in Dunker's handwriting.

***Thaumastus (Thaumastus) ascendens*** (Pfeiffer, 1853)

The specimen figured by Pfeiffer (1855: pl. 66 fig. 7 [in Küster & Pfeiffer, 1840-1865]) is here designated lectotype: shell height 92.0 mm (apex lost), diameter 39.0 mm (BMNH 1975274). The specimen is labelled 'Brazils' (ex Cuming).

**?*Thaumastus* (?*Thaumastus*) blanfordianus** (Ancey, 1903) (pl. 11 fig. 3)

The type specimen of this species, which is described from Bolivia, Iquico, is in the Brussels museum. The species is certainly not a *Bulimulus*, as described by Ancey, but possibly a *Thaumastus*. The species is here figured for the first time.

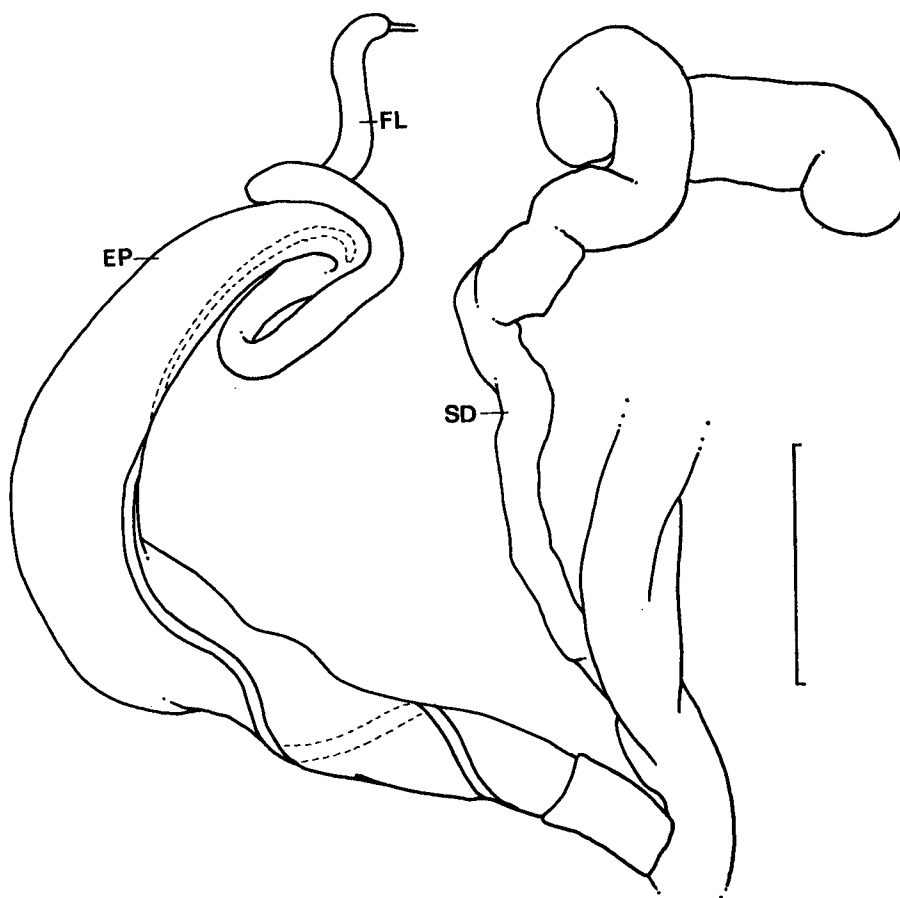


Fig. 22. *Thaumastus* (*Thaumastus*) *foveolatus* (Reeve), genitalia. Peru, Junín, 19.5 km WNW San Ramón (RMNH).

***Thaumastus* (*Thaumastus*) *buckleyi* (Higgins, 1872)**

*Orthalicus* (*Porphyrobaphe*) *buckleyi* Higgins, 1872, was hitherto considered a member of *Tholus* Strebel, 1909. The shell shape and protoconch sculpture demonstrate that this species is more properly placed in *Thaumastus*. *Tholus* Strebel, 1909 (type species: *Orthalicus buckleyi* Higgins) is thus a junior subjective synonym of *Thaumastus* Albers, 1860.

Two syntypes of this species are in the collection of the British Museum (Natural History), registered as 1872.5.22.6. The measurements of the specimen figured by Higgins are: shell height 92.0 mm, diameter 36.0 mm, height of aperture 37.0 mm, width 20.5 mm [not 17 mm as stated by Higgins]; number of whorls 6 [not 7].

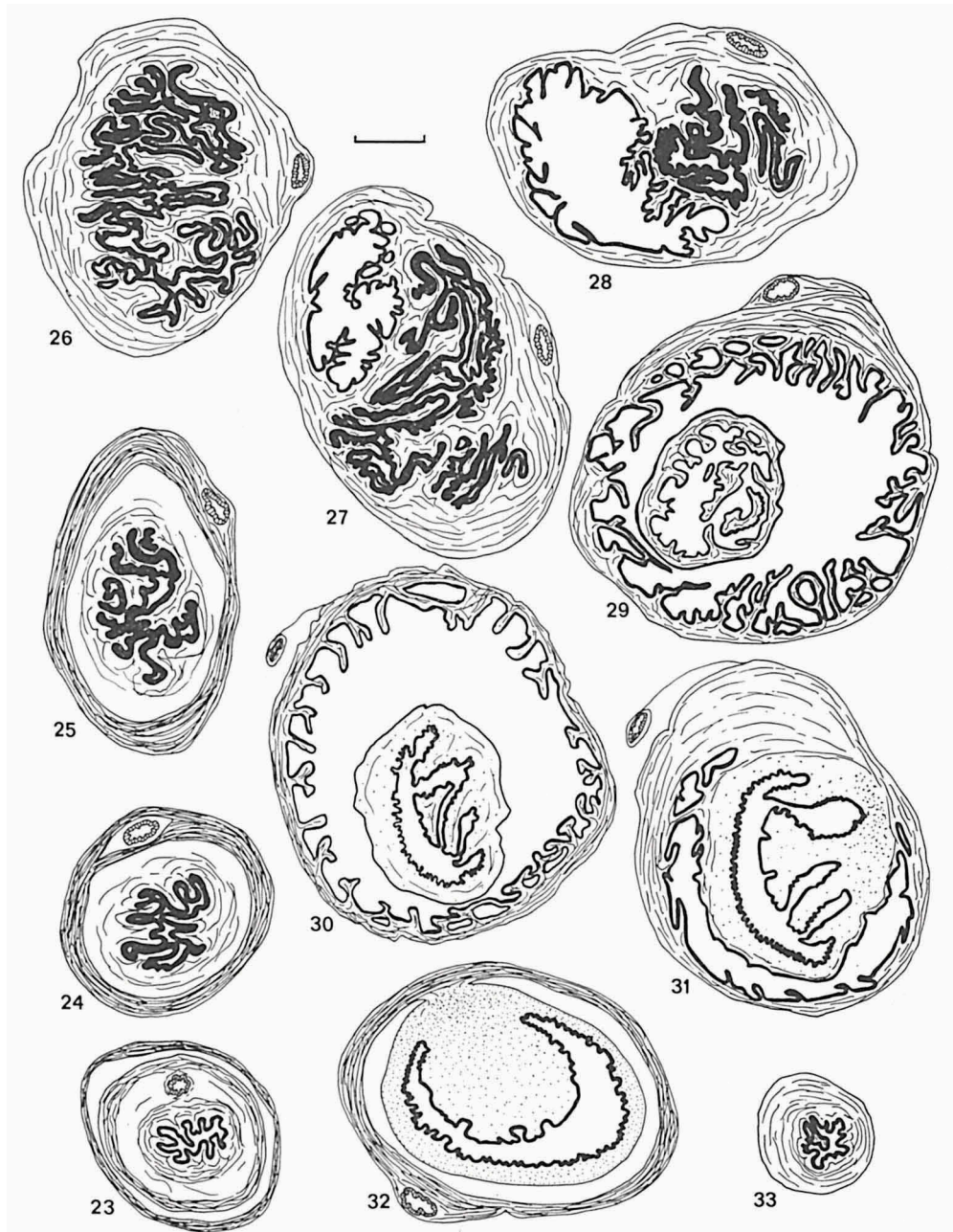


Fig. 23-33. *Thaumastus* (*Thaumastus*) *foveolatus* (Reeve). Peru, Junin, 19.5 km WNW San Ramón. Transverse sections of penis (fig. 23-31, slides H 2409, 2416, 2420, 2424, 2430, 2433, 2440, 3277, 3282), epiphallus (fig. 32, slide H 2452) and flagellum (fig. 33, slide H 2483). Solid black lines is epithelium. Scale line = 1 mm.

**Thaumastus (Thaumastus) contortuplicatus** (Reeve, 1850)

One specimen in the Brussels museum, labelled 'Brésil' (ex Preston), fits the description (cf. also Pilsbry, 1895: 71) and the original figure (Reeve, 1850: pl. 88 fig. 658). Until now this species has been misidentified as a *Plekocheilus* (*Eurytus*).

Measurements: shell height 66.5 mm, diameter 30.5 mm, height of aperture 35.5 mm, width 19.0 mm, height of last whorl 53.5 mm; 5 whorls.

**Thaumastus (Thaumastus) foveolatus** (Reeve, 1849) (figs. 22-33)

Specimens collected in Peru, Dept. Junín, 2.3 km below Mina Pichita Caluga (= 19.5 km WNW San Ramón), 1850 m (Breure, 1975a: sta. 144), have been investigated anatomically.

Genitalia. — Penis with a very short sheath (ca. 1/13 the length of the phallus), subcylindrical and slightly widening in its distal part where the transition to the epiphallus is without external differentiation. The epiphallus is tapering, with distally a slender, subcylindrical flagellum. The vagina is short, about as long as the penis sheath. The spermathecal duct is gradually dilating towards the distal end. The spermatheca is not clearly demarcated.

Histology. The proximal part of the penis has a high cylindrical epithelium (cell height ca. 35  $\mu\text{m}$ , with small, basal nuclei) and lines an irregularly zigzag lumen. More distally the epithelium is pseudostratified and the nuclei are large (diameter ca. 8-10  $\mu\text{m}$ ), the cells are ca. 35  $\mu\text{m}$  high; they stain only weakly griseous with Alcian Blue. The distal part of the penis has a wide, semicircular lumen, which is lined by high cylindrical epithelium (cell height 30-45  $\mu\text{m}$ ); the nuclei are elongate (length ca. 10  $\mu\text{m}$ ). The apical part of the epithelium cells is filled with secretion granules staining griseous with Alcian Blue. The epiphallus penetrates in the distal part of the penis. The epithelium of the epiphallus is ciliated and cubic to low cylindrical (cell height 10-25  $\mu\text{m}$ ). These cells do not positively stain with Alcian Blue.

The specimen figured by Reeve (1849: pl. 73 fig. 526) is here designated lectotype: shell height 71.5 mm, diameter 37.0 mm (BMNH 1975275; paralectotype 1975276; both labelled 'Peru', ex Cuming).

**Thaumastus (Thaumastus) hartwegi** (Pfeiffer, 1846)

The original specimen was examined in the British Museum (Natural History) and is considered a syntype (shell height 57.0 mm, diameter 30.0 mm). The shell is labelled 'El Catamajja near Loxa' [= Loja, S. Ecuador] (ex Cuming ex Hartweg).

***Thaumastus (Thaumastus) inca*** (d'Orbigny) (pl. 8 figs. 9-11)

The type specimens of this species are in the Paris museum and are considered syntypes.

This taxon was hitherto considered a member of the subgenus *Atahualpa* Strebel, 1910 [type species: *Atahualpa brunneus* Strebel = *Thaumastus inca* (d'Orbigny)]. This subgenus is characterized by the small apex and the acute shell shape (cf. Zilch, 1960: 477). I have compared the specimens of *T. (T.) inca* to other *Thaumastus* species and conclude that the above-mentioned characteristics are too slight to warrant a subgeneric status for *Atahualpa*, which I now consider a junior subjective synonym of *Thaumastus* Albers, 1860.

***Thaumastus (Thaumastus) insolitus*** (Preston, 1909) (fig. 34)

Living specimens of this species were collected near Carpapata, 33.2 km NE Tarma, Dept. Junín, Peru, at an elevation of 2200 m (Breure, 1975a: sta. 139).

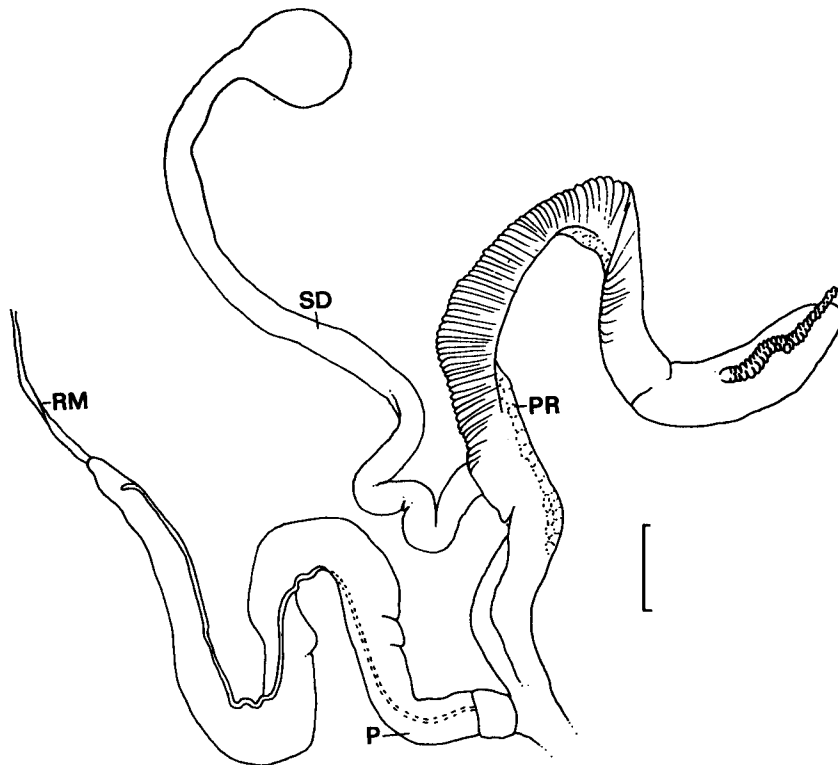


Fig. 34. *Thaumastus (Thaumastus) insolitus* (Preston), genitalia. Peru, Junín, 33.2 km NE Tarma (RMNH). Scale line = 1 cm.



Genitalia. — Penis with a short proximal sheath, which is ca. 1/16 the length of the phallus. Penis and epiphallus are more or less subcylindrical, the epiphallus is but slightly tapering towards its distal end. The flagellum is very short (in length comparable to the penis sheath) and tapering; the long retractor muscle is distally inserted. The vagina is extremely short. The subcylindrical spermathecal duct bears a globose spermatheca at its distal end.

***Thaumastus (Thaumastus) integer* (Pfeiffer, 1855)**

One specimen of the original material, preserved in the London museum, is designated lectotype: shell height 81.5 mm, diameter 42.0 mm (BMNH 1975244). The material is labelled 'Quito' (ex Cuming) and also includes a paralectotype (BMNH 1975245).

***Thaumastus (Thaumastus) magnificus* (Grateloup, 1839)**

The type specimen of this species was purchased by the British Museum (Natural History) with the collection of S. I. Da Costa and is here designated lectotype (shell height 78.0 mm, diameter 36.0 mm; BMNH 1907.11.21.24; labelled 'Brésil', ex Da Costa ex Grateloup). This species is possibly synonymous with *Thaumastus (T.) taunaisii* (Férussac, 1821), which is recorded from Brazil, Rio de Janeiro (Pilsbry, 1895: 48).

***Thaumastus (Thaumastus) plumbeus* (Pfeiffer, 1855) (pl. 11 fig. 1)**

A lectotype is here designated from among the type material in the London museum: shell height 93.0 mm, diameter 40.5 mm; it has been catalogued as BMNH 1975130. The paralectotype bears the number 1975131. Both specimens are from the Cuming collection, labelled 'Venezuela'. Until now this species had not been figured.

Redescription. — Shell imperforate, with slightly convex sides, elongate, solid. Colour creamy white, with greenish hues on the last whorl and reddish-brown axial streaks. Surface shining, obliquely malleate and with spiral impressions. Whorls slightly convex, last whorl somewhat ascending in front; suture hardly impressed. Aperture subovate, grey-brown coloured and shining inside. Peristome thickened, narrowly reflexed. Both peristome and columellar margin greyish. Parietal region with a transparent callus.

***Thaumastus (Thaumastus) requieni* (Pfeiffer, 1853)**

The specimen figured by Pfeiffer (1855: pl. 66 fig. 8 [in Küster & Pfeiffer, 1840-1865]) is here designated lectotype: shell height 62.0 mm, diameter 29.0 mm (BMNH 1975301). The material is labelled 'Brazils' (ex Cuming) and includes one paralectotype (1975302).

***Thaumastus (Thaumastus) sangoae* (Tschudi, 1852) (fig. 35)**

This species which is known from the Chanchamayo region, was collected 16.8 km WNW San Ramón [Río Chanchamayo basin], Dept. Junín, Peru (Breure, 1975a: sta. 143).

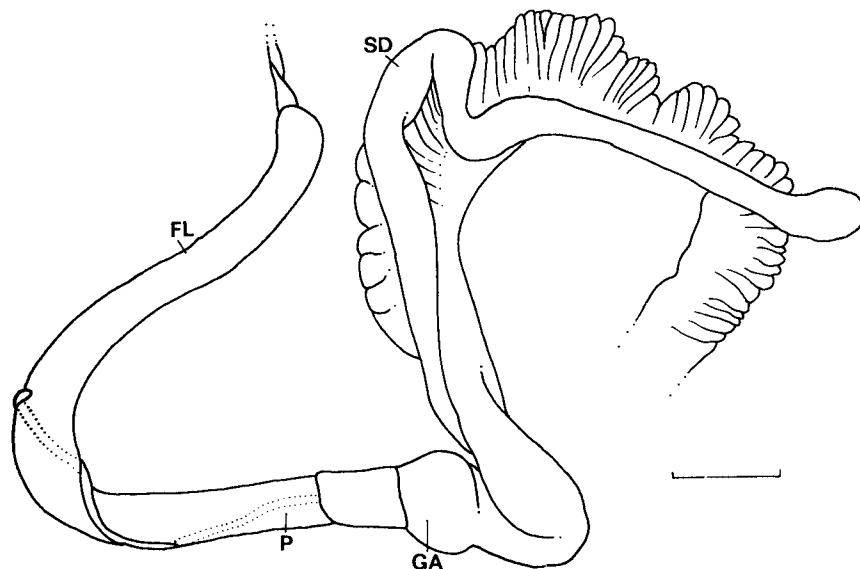


Fig. 35. *Thaumastus (Thaumastus) sangoae* (Tschudi), genitalia. Peru, Junín, 16.8 km WNW San Ramón (RMNH). Scale line = 5 mm.

Genitalia. — Penis with a short sheath (ca. 1/7 the total phallus length). The phallus is subcylindrical, only tapering at the distal end where the retractor muscle is inserted. The flagellum is about as long as penis + epiphallus (which cannot be distinguished externally). The vagina is short, about as long as the penis sheath. The spermathecal duct is more or less subcylindrical; the spermatheca is ovate and small.

***Thaumastus (Thaumastus) taunaisii achilles* (Pfeiffer, 1853) (fig. 36)**

The specimen figured by Pfeiffer (1855: pl. 66 fig. 9 [in Küster & Pfeiffer, 1840-1865]) is here designated lectotype: shell height 58.0 mm, diameter 25.5 mm (BMNH 1975268). The type material, which also includes two paralectotypes (1975269), is labelled 'Banks of Amazon' (ex Cuming).

Specimens from Brazil, State of Rio de Janeiro, Arrairal do Cabo Frio (RMNH and MN) were investigated anatomically.

Genitalia. — Penis with a subproximal sheath (ca. 1/4 the length of the phallus), swollen above the distal termination of the sheath. The epiphallus

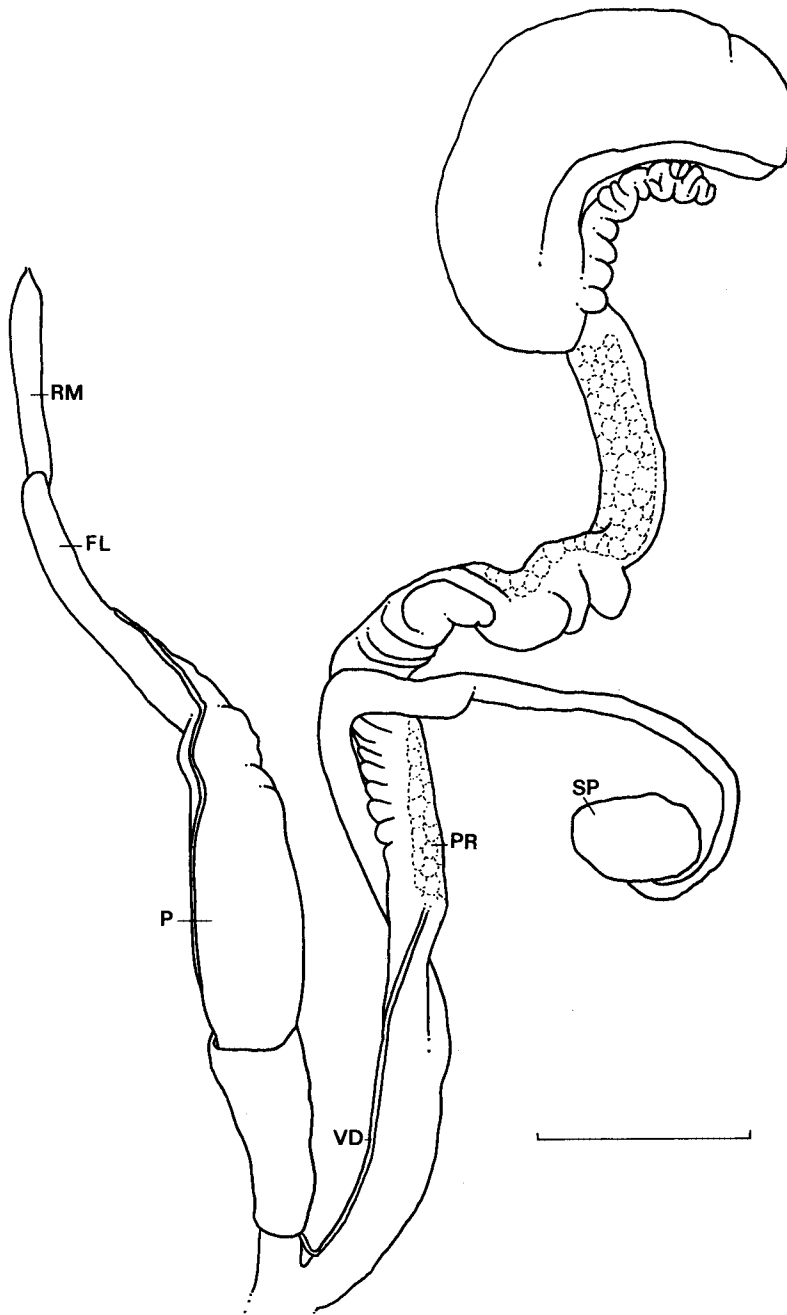


Fig. 36. *Thaumastus (Thaumastus) taunaisii achilles* (Pfeiffer), genitalia. Brazil, Rio de Janeiro, Arrairal do Cabo Frio (RMNH). Scale line = 1 cm.

is tapering towards the transition to the flagellum, which is about as long as the epiphallus and which is subcylindrical in shape. The retractor muscle is distally attached and about as long as the flagellum. The vagina is relatively long, about  $1/3$  the total length of the phallus. The proximal half of the spermathecal duct is subcylindrical and slender, the distal part is about half as broad as the proximal part.

***Thaumastus (Kara) thompsoni* (Pfeiffer, 1845)**

The type material of this species has been found in the London museum. The specimen figured by Reeve (1848: fig. 158) is designated lectotype: shell height 71.0 mm, diameter 32.0 mm. The measurements given in the original publication (height 41 mm, diameter 21 mm) were corrected in Pfeiffer (1848b: 141) to shell height 70 mm, diameter 31 mm. The material is labelled 'Quito' (ex Cuming). In fact this species is found around Cuenca, Prov. Azuay, Ecuador (EPN).

***Thaumastus (Kara) yanamensis* (Morelet, 1863)**

The specimen figured by Morelet (1863: pl. 8 fig. 3) is here designated lectotype: shell height 55.5 mm, diameter 29.5 mm (MHNG 1154/39). The specimen is labelled 'Yanama'. A second lot in the same collection and from the same locality consists of 53 specimens. Moreover, two paralectotypes have been located in the London museum.

According to Stichlich (1922: 1160-1161) there are sixteen localities in Peru called 'Yanama'. The type locality is probably in the Río Mantaro basin, either in the Dept. Huancavelica or in Dept. Junín.

***Thaumastus (Paeniscutalus) crenellus* (Philippi, 1867) (figs. 37-41)**

The type locality of this species is Peru, Hacienda Unigambal, which is in Dept. La Libertad, Distr. Santiago de Chuco. *Megalobulimus (Microborus) incarum* Pilsbry, 1944 (type locality: Huaraz [Dept. Ancash]) is now considered a junior subjective synonym of *Thaumastus crenellus*, after examination of topotypic material (IML).

Material from the following localities has been examined: Dept. Ancash: (1) Carhuás, 3000 m (SMF/4); (2) Hacienda Llaguén, Potrero Nuevo, 2800 m (IML/2); (3) between Huaráz and Caráz (IML/4); (4) near Colcabamba ( $9^{\circ}36' S$   $77^{\circ}49' W$ ), 2600-2700 m (SMF/6); (5) basin of Río Huarmey, Hacienda San Damián, Paja, 2600 m (SMF/4 + 2 juv.); (6) Do., Pacap, 1860 m (SMF/3); (7) Shaurama near Huaráz [topotypes of

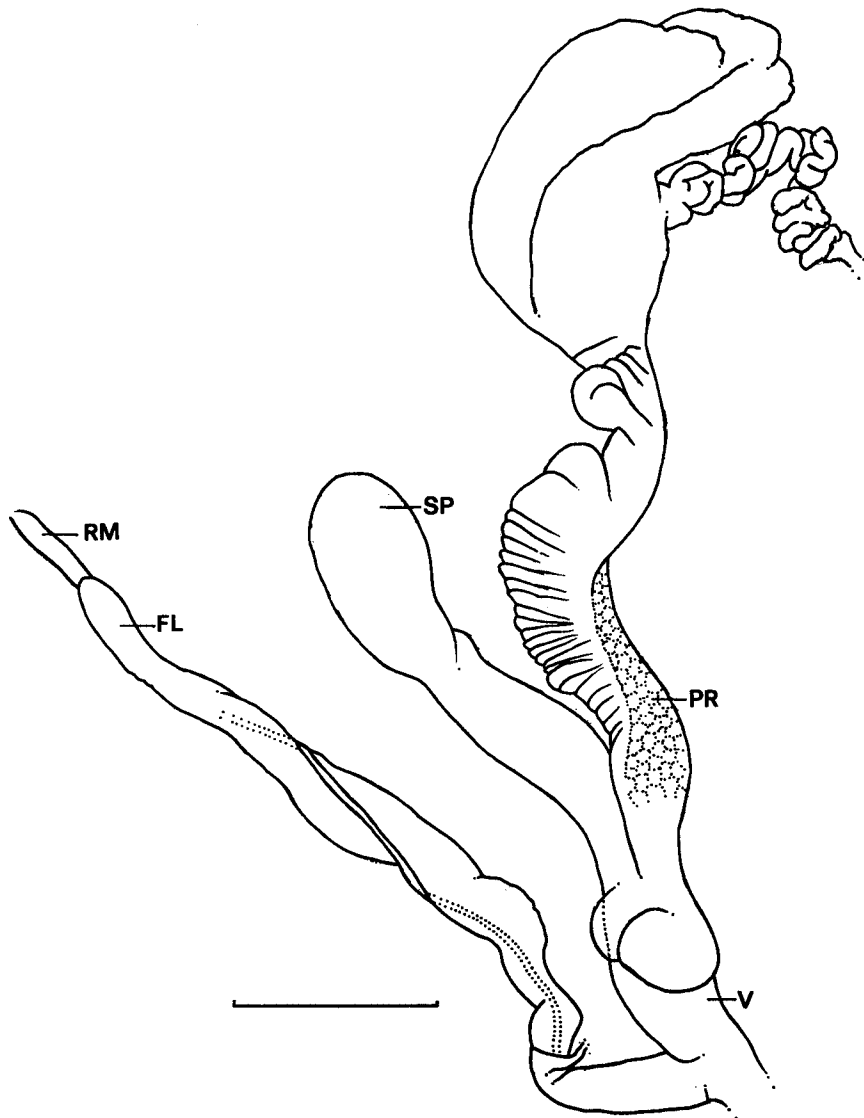


Fig. 37. *Thaumastus* (*Paeniscutalus*) *crenellus* (Philippi), genitalia. Peru, Ancash, Tappacocha (SMF 157536). Scale line = 5 mm.

*Megalobulimus incarum*] (IML/18); (8) basin of Río Fortaleza, Tapacocha, 3200-3300 m (IML/21, SMF/1); (9) Do., Ayancoto near Cajacay, 2800 m (IML/14); (10) Do., Carancayoc near Cajacay, 2650 m (IML/12); (11) basin of Río Pativilca, 10 km N Chiquián, Aquia, 3200 m (IML/7). — Dept. Lima: (12) Río Santa Eulalia, Autisha, 2100 m (IML/7); (13) near Yánac (SMF/3); (14) Huariquiña near Matucana, 2500-2600 m (SMF/5); (15) near San Barlotomé, 2000-2850 m (SMF/9).

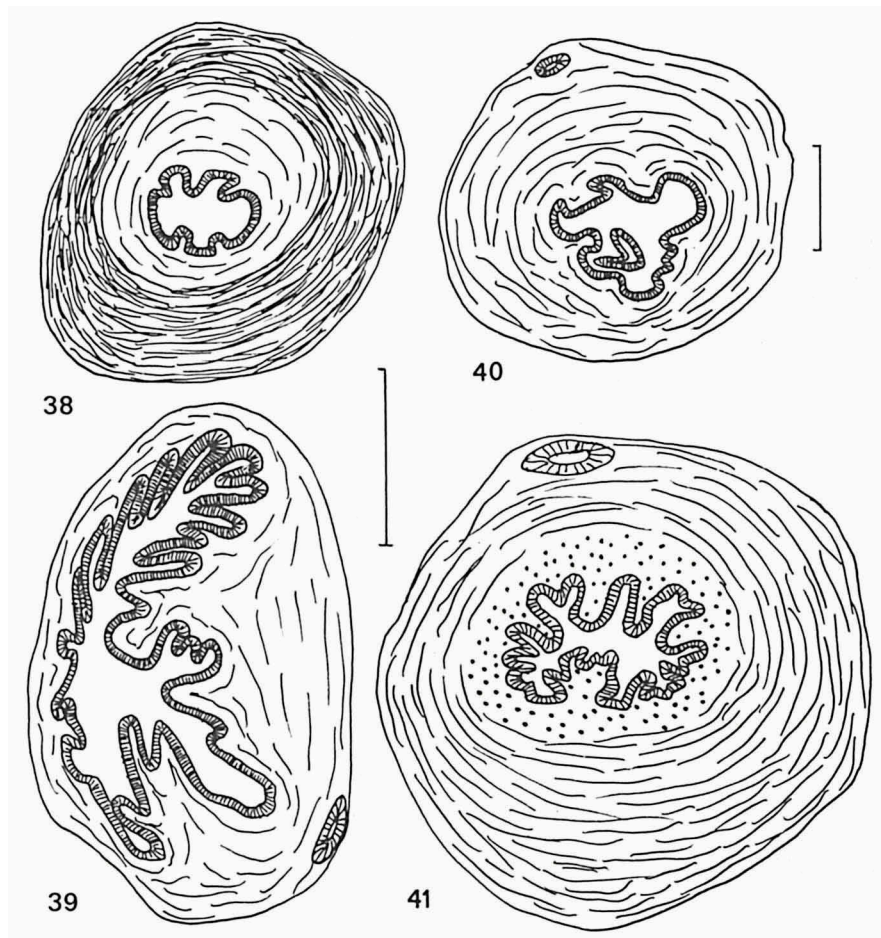


Fig. 38-41. *Thaumastus (Paeniscutalus) crenellus* (Philippi). Peru, Ancash, Tapacocha. Transverse sections of penis (fig. 38-40, slides H 4472, 4477, 4481) and epiphallus (fig. 41, slide H 4482). Scale line = 0.5 mm.

## Measurements (in mm) and statistics of characters and ratios:

|                                   | H     | D     | HA    | WA    | LW    | H/D  | HA/WA | HA/H | LW/H |
|-----------------------------------|-------|-------|-------|-------|-------|------|-------|------|------|
| Peru, Ancash, Colcabamba (N = 5): |       |       |       |       |       |      |       |      |      |
| M                                 | 34.80 | 18.40 | 18.20 | 12.56 | 29.00 | 1.89 | 1.45  | 0.52 | 0.83 |
| s                                 | 1.75  | 0.65  | 0.76  | 0.45  | 0.94  | 0.07 | 0.04  | 0.01 | 0.02 |
| max                               | 36.5  | 19.0  | 19.0  | 13.2  | 30.0  | 2.00 | 1.49  | 0.54 | 0.86 |
| min                               | 32.0  | 17.5  | 17.0  | 12.1  | 27.5  | 1.83 | 1.39  | 0.50 | 0.82 |
| Peru, Ancash, San Damián (N = 6): |       |       |       |       |       |      |       |      |      |
| M                                 | 34.50 | 18.75 | 20.08 | 12.83 | 29.58 | 1.84 | 1.57  | 0.58 | 0.86 |
| s                                 | 2.24  | 0.82  | 0.97  | 0.59  | 1.32  | 0.07 | 0.08  | 0.01 | 0.02 |
| max                               | 37.0  | 20.0  | 21.5  | 13.5  | 31.0  | 1.90 | 1.65  | 0.60 | 0.88 |
| min                               | 31.5  | 18.0  | 19.0  | 12.0  | 27.5  | 1.70 | 1.44  | 0.57 | 0.84 |

The anatomy has been described by Wurtz (1947), but I take the opportunity to redescribe the genitalia of a specimen from Tapacocha (SMF 157536).

Genitalia. — Penis with a sheath (ca. 1/5 the length of the phallus), more or less subcylindrical and passing without external differentiation into the epiphallus. The flagellum is rather short (about as long as the penis sheath), subcylindrical and relatively thick; a broad retractor muscle is distally inserted. The spermathecal duct is relatively short (about half the length of the spermoviduct) and thick. The spermatheca is elongate-globose, hardly differentiated from the spermathecal duct.

Histology. The proximal part of the penis has a more or less lobed lumen, which is lined by low cylindrical epithelium (cell height 22–28  $\mu\text{m}$ ). The cytoplasm stains purple with Alcian Blue and the apical part of the cells contains secretion granules staining light blue with Alcian Blue. The transition to the epiphallus, where the epithelium is ca. 20  $\mu\text{m}$  high, is gradual.

***Thaumastus (Quechua) taulisensis* Zilch, 1953 (figs. 42–46)**

Genitalia. — Penis without a sheath, slender near the genital atrium, but rapidly dilating above; somewhat constricted at the transition to the epiphallus, which is short and subcylindrical. The flagellum is slightly longer than penis and epiphallus together and is more or less subcylindrical; the retractor muscle is distally inserted. The vagina is relatively long. The spermathecal duct is rather short and subcylindrical, with a globose spermatheca at its distal end.

Histology. The most proximal part of the penis with a narrow lumen, which is lined by pseudostratified, high cylindrical epithelium (ca. 45  $\mu\text{m}$  high). Slightly more distally the main lumen is more or less W-shaped and many small tubes are situated parallel to the main lumen. The epithelium of

these small tubes is high cylindrical (ca.  $25\text{--}50\text{ }\mu\text{m}$ ), with basal nuclei and Alcian Blue-positive secretion granules in the apical part of the cells. The epithelium of the epiphallus is ca.  $28\text{ }\mu\text{m}$  high, with Alcian Blue-negative cytoplasm. In the subepithelial tissue large, rounded cells have been observed.

Material. — Peru, Dept. Cajamarca, Hacienda Taulis [ $6^{\circ}57' \text{ S } 79^{\circ}01' \text{ W}$ ] (SMF/1).

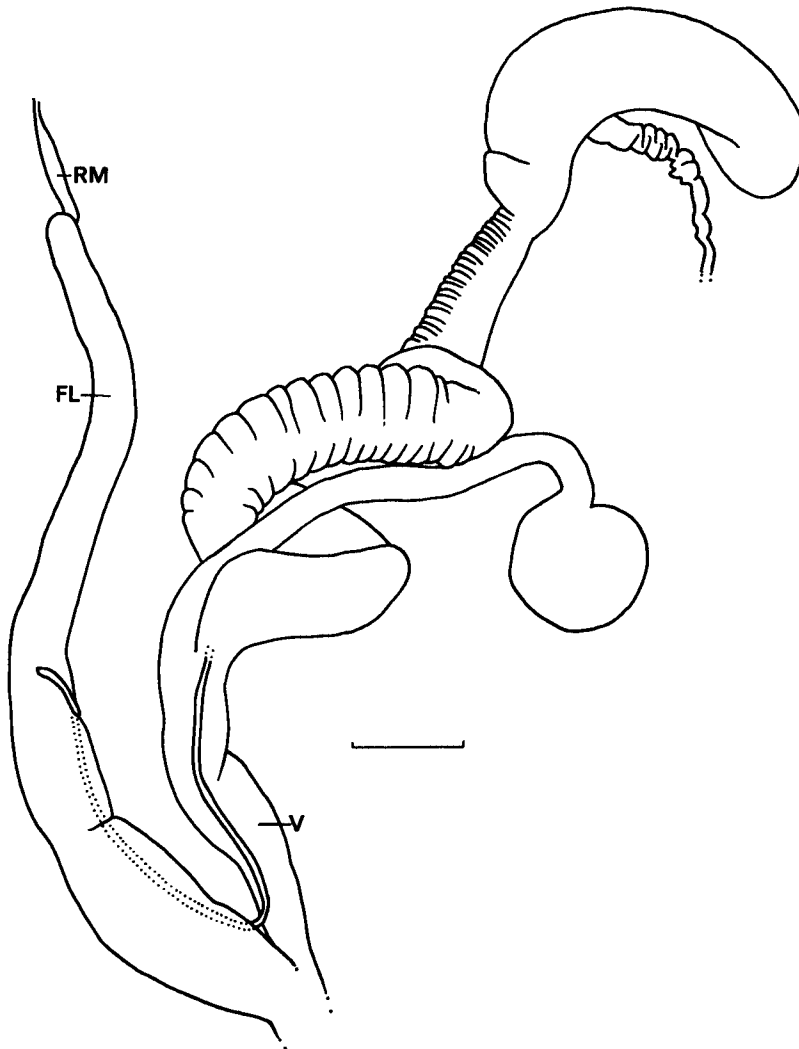


Fig. 42. *Thaumastus (Quechua) taulisensis* Zilch, genitalia. Peru, Cajamarca, Hacienda Taulis (SMF). Scale line = 5 mm.



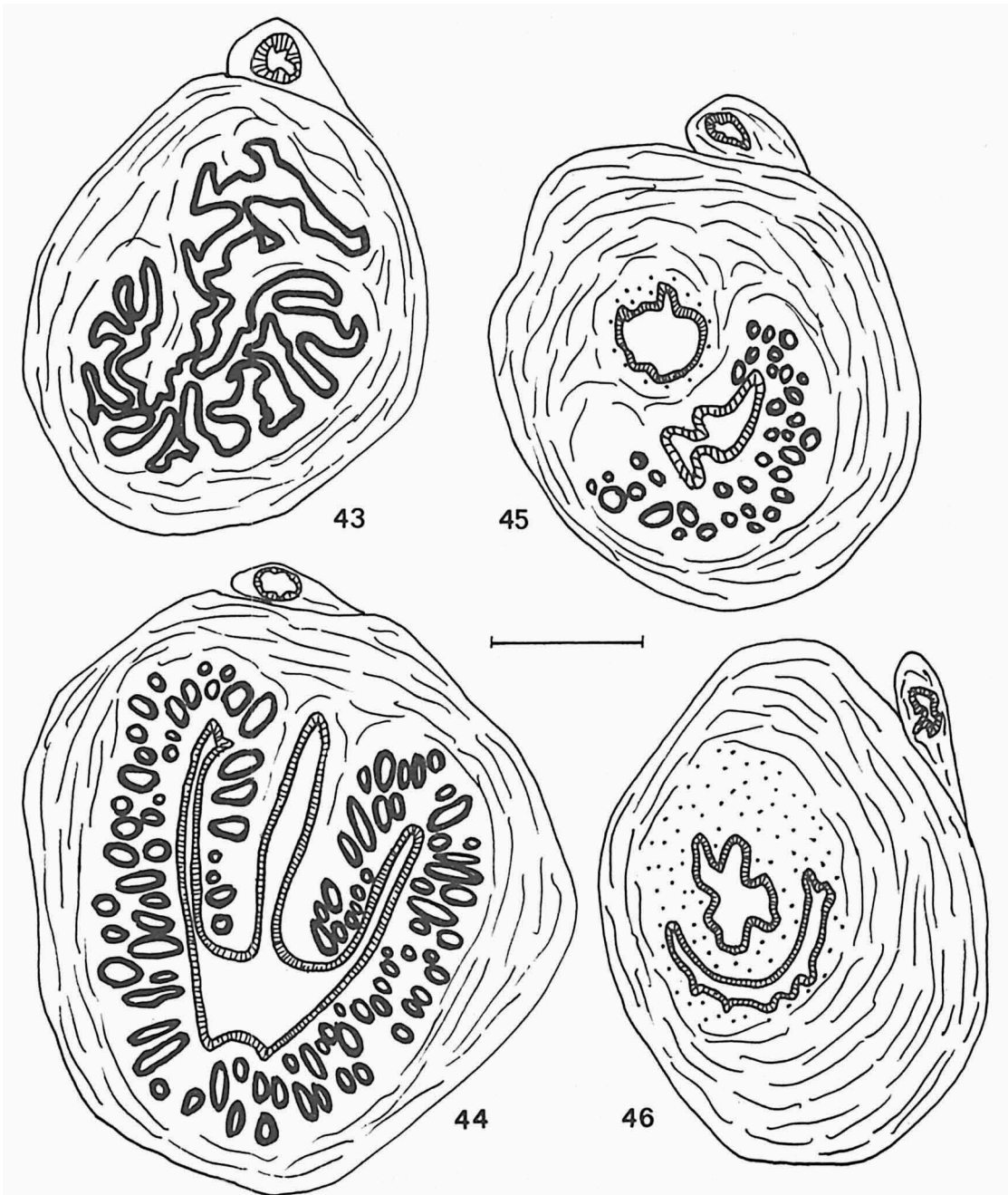


Fig. 43-46. *Thaumastus (Quechua) taulisensis* Zilch. Peru, Cajamarca, Hda. Taulis. Transverse sections of penis (fig. 43-45, slides H 4628, 4636, 4645) and epiphallus (fig. 45-46, slides H 4645, 4649). Solid black lines is also epithelium. Scale line = 1 mm.

***Thaumastus (Scholvienia) alutaceus* (Reeve, 1850) (fig. 47)**

The original material consists of two specimens, of which one is here designated lectotype: shell height 35.5 mm, diameter 16.5 mm (BMNH 1975148; paralectotype 1975149). The specimens are labelled 'Cuzco' (ex Cuming), which is the type locality given by Reeve (1850: 99). In fact the species is only found around Tarma, Dept. Junín, where I have collected it at several localities.

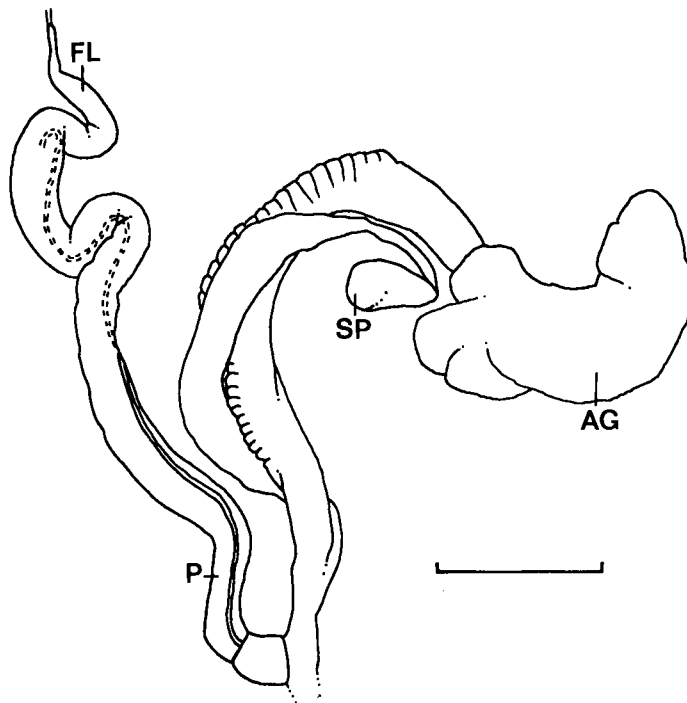


Fig. 47. *Thaumastus (Scholvienia) alutaceus* (Reeve), genitalia. Peru, Junín, 13.1 km W Tarma (RMNH). Scale line = 5 mm.

Genitalia. — Penis with a very short sheath (ca. 1/15 total phallus length), subcylindrical and passing without external differentiation into the epiphallus. The flagellum is short (ca. 1/6 total phallus length) and tapering. The vas deferens is free of penis and epiphallus. The vagina is short. The median part of the spermathecal duct is subcylindrical and both the proximal and distal parts are tapering. The spermatheca is elongate-globose.

***Thaumastus (Scholvienia) bambamarcaensis* sp.n. (pl. 6 fig. 8)**

Description. — Shell up to 44 mm, 2.1 times as long as wide, rather narrowly perforate, with convex sides, moderately elongate, solid. Colour chesnut brown with irregular whitish to yellowish axial streaks; at the periphery of the last whorl a more or less continuous brown band, which is slightly darker than the ground colour. Surface rather shining, the growth striae incrassate. Protoconch with more or less undulating axial riblets, often broken into short wrinkles. Whorls 6.0, nearly flat; suture hardly impressed. Aperture subovate, 1.5 times as long as wide, 0.45 times total length. Peristome slightly thickened, simple, whitish to faintly purple. Columellar margin hardly reflexed, somewhat dilated above and of the same colour as the peristome. Parietal callus more or less transparent.

Measurements (in mm) and statistics of characters and ratios (N = 10):

|     | H     | D     | HA    | WA    | LW    | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|-------|-------|-------|-------|------|-------|------|------|
| M   | 39.55 | 18.75 | 17.90 | 11.77 | 29.05 | 2.12 | 1.52  | 0.45 | 0.74 |
| s   | 2.10  | 1.57  | 1.31  | 0.69  | 1.48  | 0.08 | 0.10  | 0.01 | 0.01 |
| max | 44.0  | 21.5  | 20.0  | 13.0  | 31.5  | 2.23 | 1.79  | 0.48 | 0.76 |
| min | 36.5  | 16.5  | 16.0  | 11.0  | 26.5  | 1.95 | 1.44  | 0.43 | 0.71 |

Measurements of holotype: shell height 44.0 mm, diameter 21.5 mm, height of aperture 20.0 mm, width 11.2 mm, height of last whorl 31.5 mm; six whorls.

Type material. — Peru, Dept. Cajamarca, 7 km SW Bambamarca, 2920 m (F. G. Thompson leg., 20-IV-1972). Holotype UF 22752. Paratypes UF 22778/14, RMNH 55188/9, same data. Additional localities: (1) Peru, Dept. Cajamarca, Cerro Machaipungo, 4 km NW Bambamarca, 3000 m (paratypes RMNH 55187/2, 55313/6, IML 2011/21); (2) Peru, Dept. Cajamarca, Peña Rota, 8 km NE Bambamarca, 2700 m (paratypes RMNH 55314/2, IML 1804/4, IML 2046/4).

Remarks. — This species differs from *Thaumastus (Scholvienia) gittenbergerorum* sp.n. in (1) the more inflated shell; (2) the different colour pattern. The new species may be distinguished from *Thaumastus (Scholvienia) porphyrius* (Pfeiffer, 1847) by (1) the more convex sides; (2) the different colour pattern; (3) the smaller size; (4) the relatively larger aperture and (5) being less elongate.

***Thaumastus (Scholvienia) bitaeniatus* (Nyst, 1845) (figs. 48-56)**

This species was collected alive at 19.5 km WNW San Ramón, Dept. Junín, Peru. The material was dissected.

Genitalia. — Penis with a proximal sheath (ca. 1/6 the length of the

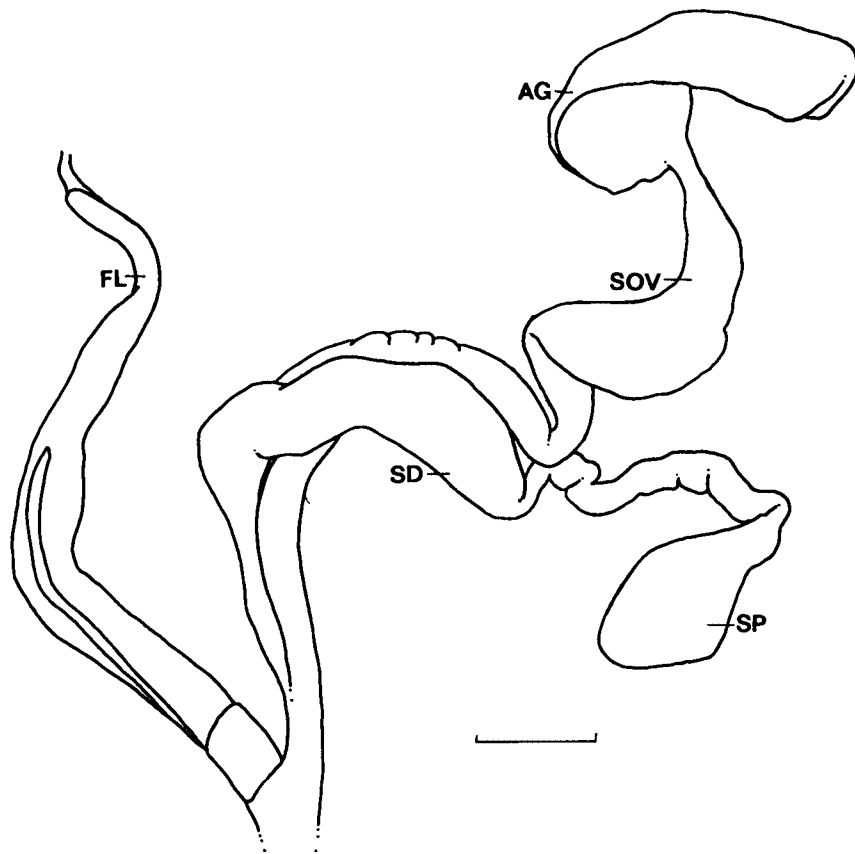


Fig. 48. *Thaumastus* (*Scholvenia*) *bitaeniatus* (Nyst), genitalia. Peru, Junín, 19.5 km WNW San Ramón (RMNH). Scale line = 5 mm.

phallus), subcylindrical and passing without external differentiation into the epiphallus, which is also subcylindrical. The flagellum is nearly as long as penis and epiphallus together and is tapering. A short retractor muscle is subterminally attached. The proximal part of the spermathecal duct is broad and widened, the distal part is tapering; spermatheca elongate-globose.

Histology. The lumen of the penis is zigzag C-shaped, very narrow and lined by a cubic epithelium (cell height 10-12  $\mu\text{m}$ ). More distally the lumen is more or less S-shaped. The epithelium of the epiphallus is shortly ciliated, the cells are cubic and ca. 12  $\mu\text{m}$  high. The lumen is more or less star-shaped, with many infoldings. The epithelium of the flagellum is of the same type as in the epiphallus.

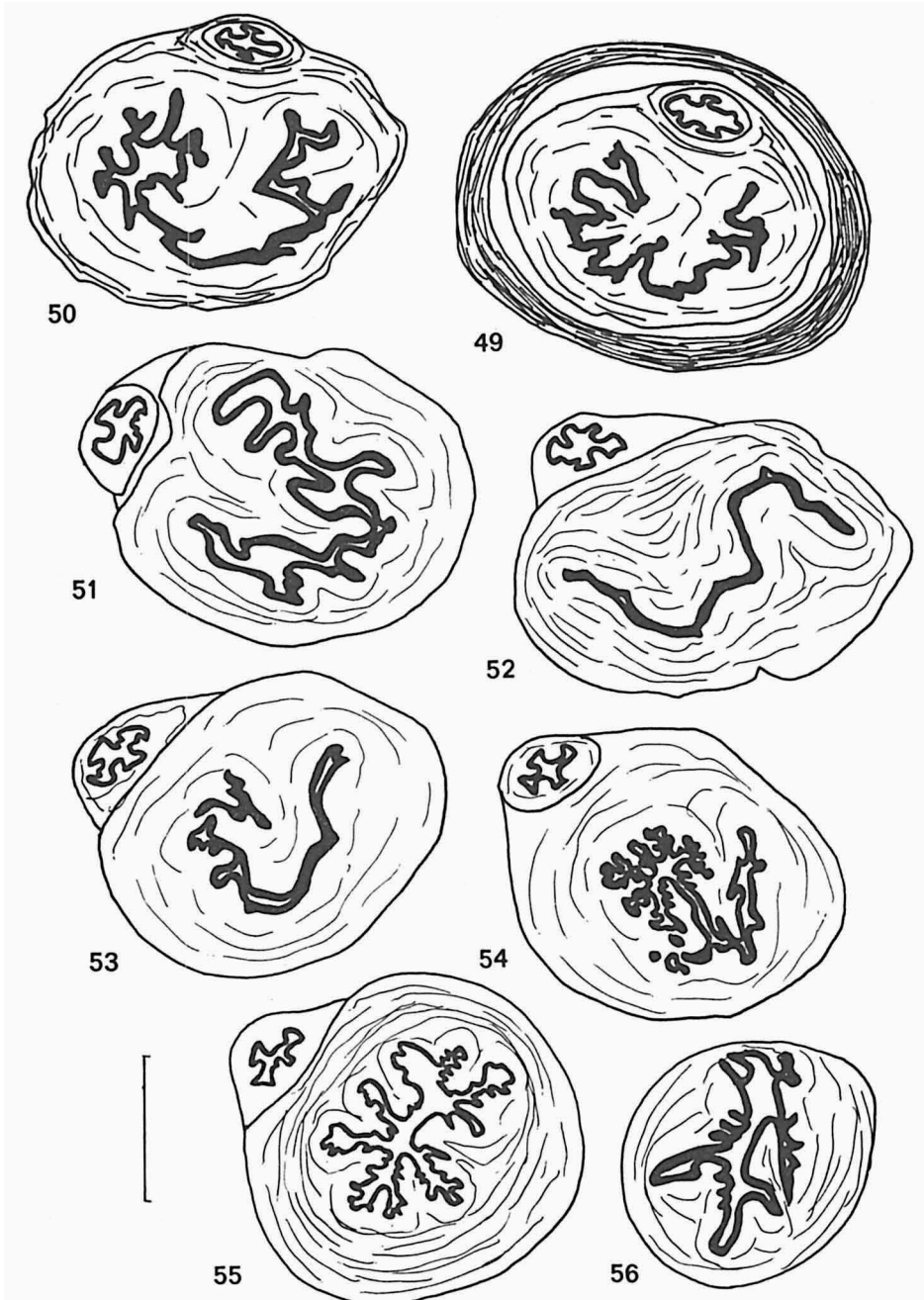


Fig. 49-56. *Thaumastus* (*Scholvenia*) *bitaeniatus* (Nyst). Peru, Junin, 19.5 km WNW San Ramón. Transverse sections of penis (fig. 49-54, slides H 2579, 2585, 2595, 2599, 2601, 2603), epiphallus (fig. 54-55, slides H 2603, 2604) and flagellum (fig. 56, slide H 2609). Solid black lines is epithelium. Scale line = 1 mm.

***Thaumastus (Scholvenia) brephoides* (d'Orbigny, 1835)**

This species is reported from the 'Peruvian Andes' and 'Prov. Huancajo, Peru' (Pilsbry, 1895: 57). Bleached specimens from Peru, Dept. Apurimac, Río Pincos valley, Hacienda San Carlos, 2225 m (Breure, 1975a: sta. 119; RMNH/2 + 2 juv.) are tentatively referred to this species.

***Thaumastus (Scholvenia) gittenbergerorum* sp.n. (fig. 57; pl. 6 figs. 1-4)**

Description. — Shell up to 45 mm, 2.3 times as long as wide, perforate, with slightly convex sides, rather elongate, moderately solid. Colour uniform dark brown (somewhat paler on the upper whorls) with a subsutural yellowish band. Surface slightly shining, sculptured with incrassate growth striae, which are crossed by shallow spiral lines thus forming puckered bands. Protoconch with rather strong axial riblets, discontinuous and/or anastomosing, especially on lower part of whorl. Whorls 6.0, nearly flat; suture well impressed. Aperture subovate, 1.6 times as long as wide, 0.45 times total length, whitish coloured inside. Peristome hardly thickened, simple, white. Columellar margin reflexed and slightly dilated above, white to bluish. Parietal callus transparent.

Measurements (in mm) and statistics of characters and ratios:

|                                                      | H     | D     | HA    | WA    | LW    | H/D  | HA/WA | HA/H | LW/H |
|------------------------------------------------------|-------|-------|-------|-------|-------|------|-------|------|------|
| Peru, Dept. Huánuco, 10.8 km W Huancapallac (N = 5): |       |       |       |       |       |      |       |      |      |
| M                                                    | 41.90 | 18.20 | 18.30 | 11.18 | 29.30 | 2.30 | 1.64  | 0.44 | 0.70 |
| s                                                    | 0.82  | 0.27  | 0.57  | 0.40  | 0.57  | 0.02 | 0.05  | 0.01 | 0.01 |
| max                                                  | 43.0  | 18.5  | 19.0  | 11.6  | 30.0  | 2.32 | 1.71  | 0.45 | 0.71 |
| min                                                  | 41.0  | 18.0  | 17.5  | 10.7  | 28.5  | 2.28 | 1.58  | 0.43 | 0.69 |
| Peru, Dept. Huánuco, 9.2 km S Tingo María (N = 5):   |       |       |       |       |       |      |       |      |      |
| M                                                    | 42.30 | 18.50 | 18.80 | 11.66 | 29.10 | 2.29 | 1.61  | 0.45 | 0.69 |
| s                                                    | 1.75  | 0.61  | 0.27  | 0.21  | 1.14  | 0.07 | 0.03  | 0.02 | 0.01 |
| max                                                  | 45.0  | 19.0  | 19.0  | 14.4  | 31.0  | 2.37 | 1.65  | 0.47 | 0.71 |
| min                                                  | 40.5  | 17.5  | 18.5  | 11.0  | 28.0  | 2.19 | 1.58  | 0.42 | 0.67 |

Measurements of holotype: shell height 41.0 mm, diameter 18.0 mm, height of aperture 17.5 mm, width 10.7 mm, height of last whorl 28.5 mm; six whorls.

Type material. — Peru, Dept. Huánuco, 10.8 km W Huancapallac, 2950 m (F. G. Thompson leg., 9-III-1969). Holotype UF 22119; paratypes UF 22119a/3, 22119b/3, RMNH 55191/3, same data. Additional localities: (1) Peru, Dept. Huánuco, 9.2 km S Tingo María, 800 m (paratypes UF 22751a/3, 22751b/5, 22751c/3, RMNH 55189/4); (2) Peru, Dept. Amazonas, 21 km ENE Balsas, 1850 m (paratypes UF 22753/16, RMNH 55190/3).

Comparisons. — The species of the subgenus *Scholvenia* resemble each other closely. This novelty may be compared to *Thaumastus* (*Scholvenia*) *bitaeniatus* (Nyst, 1845), but differs in (1) being smaller (length 45 vs. 58 mm), (2) having the aperture less ear-shaped, (3) having but one (sub-sutural) colour band, (4) having the apex less subexcavated. From *Thaumastus* (*S.*) *jelskii* (Lubomirski, 1880) this species differs in (1) having but one colour band, (2) being more slender, (3) having the columellar margin more broadly reflexed, (4) being more broadly perforate. *Thaumastus* (*S.*) *gittenbergerorum* may also be compared with *T.* (*S.*) *weyrauchi* Pilsbry, 1944, from which it may be distinguished by (1) being broader, (2) having a different colour pattern. Finally this species may be compared to *Thaumastus* (*S.*) *taeniolus* (Nyst, 1845) from which it differs in (1) being smaller, (2) having the last whorl less swollen.

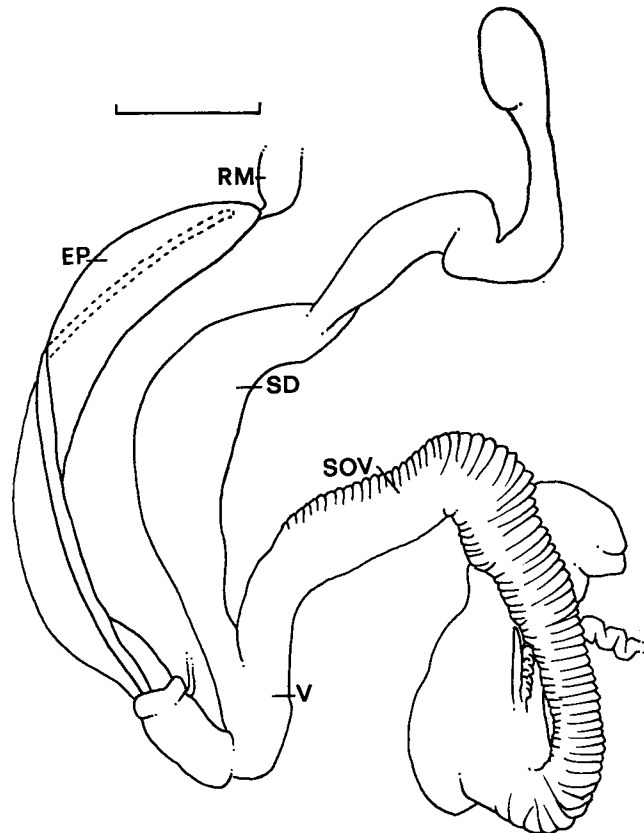


Fig. 57. *Thaumastus* (*Scholvenia*) *gittenbergerorum* sp.n., genitalia. Peru, Huánuco, 10.8 km W Huancapallac (UF 22119). Scale line = 5 mm.

Genitalia. — Penis with a sheath, which is about 1/5 the total length of the phallus. Penis and epiphallus are broadly subcylindrical, without externally visible transition. The flagellum has not been observed. The penis retractor muscle is broad and distally inserted. The vagina is as long as the penis sheath. The spermathecal duct is wide in its proximal part, then tapering towards the squarish-ovate spermatheca.

Etymology. — This species is dedicated to Drs. Adri & Edi Gittenberger (Leiden).

***Thaumastus (Scholvienia) iserni* (Philippi, 1867)**

This species is known from Peru, Dept. Junín, 'La Oroya and Chanchamayo' (type locality; cf. Pilsbry, 1895: 58). A more exact locality is: Dept. Junín, Huancabamba, 3300 m (IRSN/1 + 1 juv.). The measurements of this specimen are: shell height 54.5 mm, diameter 23.5 mm, height of aperture 23.0 mm, width 13.9 mm, height of last whorl 36.5 mm; six whorls.

***Thaumastus (Scholvienia) porphyrius* (Pfeiffer, 1847)**

The specimen figured by Reeve (1848: pl. 15 fig. 89) is now selected lectotype: shell height 51.5 mm, diameter 22.0 mm (BMNH 1975277). Two paralectotypes are also present in the London museum, registered 1975278. The material is accompanied by a label in Pfeiffer's handwriting giving the identification and as locality 'Bolivia', which is probably erroneous. Another label reads 'andes of Caxamarca [=Cajamarca], Peru' (ex Cuming), which is also erroneous as this species is only found in southern Peru. Morelet (1863) has recorded *Thaumastus porphyrius* from Andahuaylas [Dept. Apurímac].

New locality records for this species are: (1) Peru, Dept. Ayacucho, Tambo-Apurímac road, below Tambo [74° W 12°55' S], Ccarapa, 2400 m (UF 21976/2 + 1 juv.); (2) Dept. Apurímac, Abancay, 2450 m (J. Huis & H. Hooghiemstra leg., RMNH/5).

***Bostryx* \*) *abancayensis* Pilsbry, 1944**

A new locality record for this species, which is only known from the type locality 'Abancay', is: Peru, Dept. Apurímac, Río Pincos valley, near Pincos, 2650 m (Breure, 1975a: sta. 118); estivating on shrubs (RMNH/13).

*Bulimulus (Lissoacme) rudistriatus* Haas, 1955 (type locality: Peru, Dept. Apurímac, Andahuaylas, Hacienda Palmira) is now considered a junior subjective synonym of *Bostryx abancayensis* Pilsbry.

\*) Although I can recognize several species groups within *Bostryx* which could be considered subgenera, a considerable number of species cannot be classified in coherent groups. I prefer, therefore, to treat this genus here *sensu lato*.



***Bostryx acalles*** (Pfeiffer, 1853) (figs. 58-62)

The type locality of this species is 'Peruvian Andes'. Specimens tentatively referred to this species have been found at Pampa Calquiche near Chagual, Río Marañón valley, Dept. La Libertad (IML/5, RMNH/2).

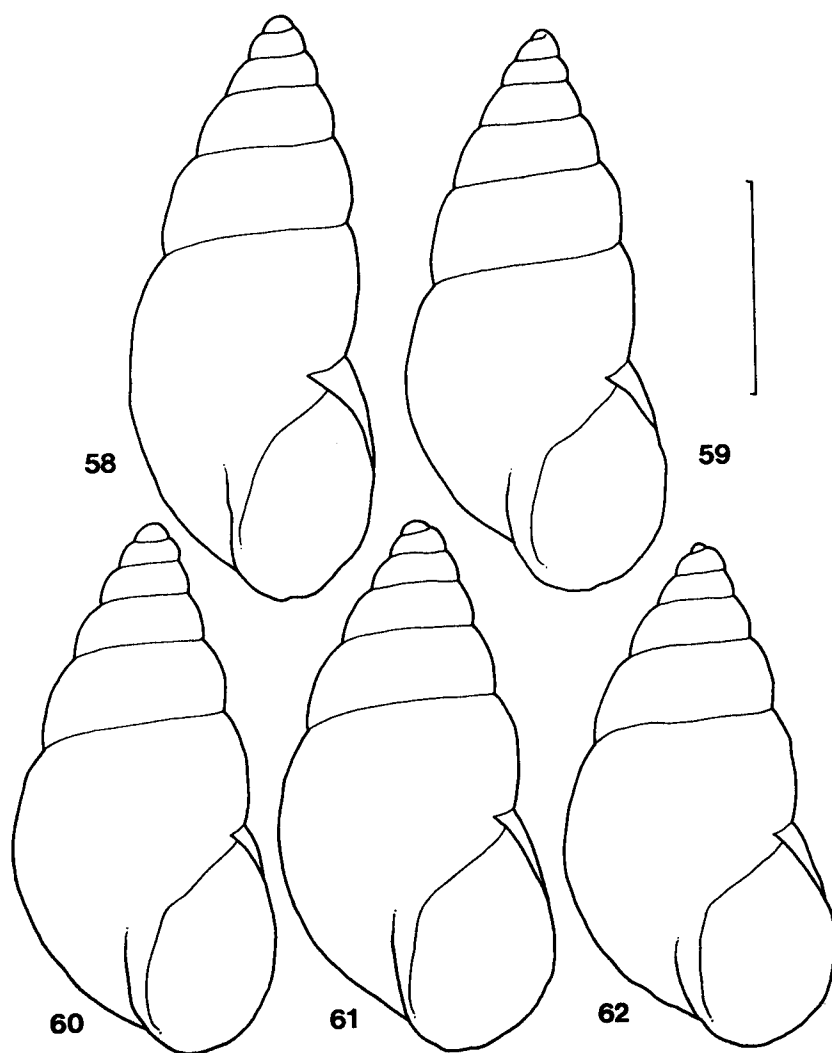


Fig. 58-62. *Bostryx acalles* (Pfeiffer). Peru, La Libertad, Chagual (IML). Scale line = 5 mm.

## Measurements (in mm) and statistics of characters and ratios (N=7):

|     | H     | D    | HA   | WA   | LW   | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|------|------|------|------|------|-------|------|------|
| M   | 13.18 | 6.48 | 5.32 | 3.36 | 8.46 | 2.04 | 1.59  | 0.40 | 0.64 |
| s   | 0.73  | 0.25 | 0.16 | 0.15 | 0.35 | 0.19 | 0.08  | 0.02 | 0.02 |
| max | 14.2  | 6.7  | 5.5  | 3.6  | 9.0  | 2.33 | 1.69  | 0.43 | 0.67 |
| min | 12.3  | 6.1  | 5.1  | 3.2  | 8.1  | 1.84 | 1.50  | 0.38 | 0.61 |

***Bostryx acromelas*** (Morelet, 1863) (figs. 63-68)

This species has been described from Peru, 'la vallée d'Ayacucho et dans celle de l'Urubamba' (Morelet, 1863: 203). The first exact locality is: Peru, Dept. Cuzco, Río Vilcanota valley, 4.8 km SE Urubamba (Sta. III, Breure, 1975a; RMNH).

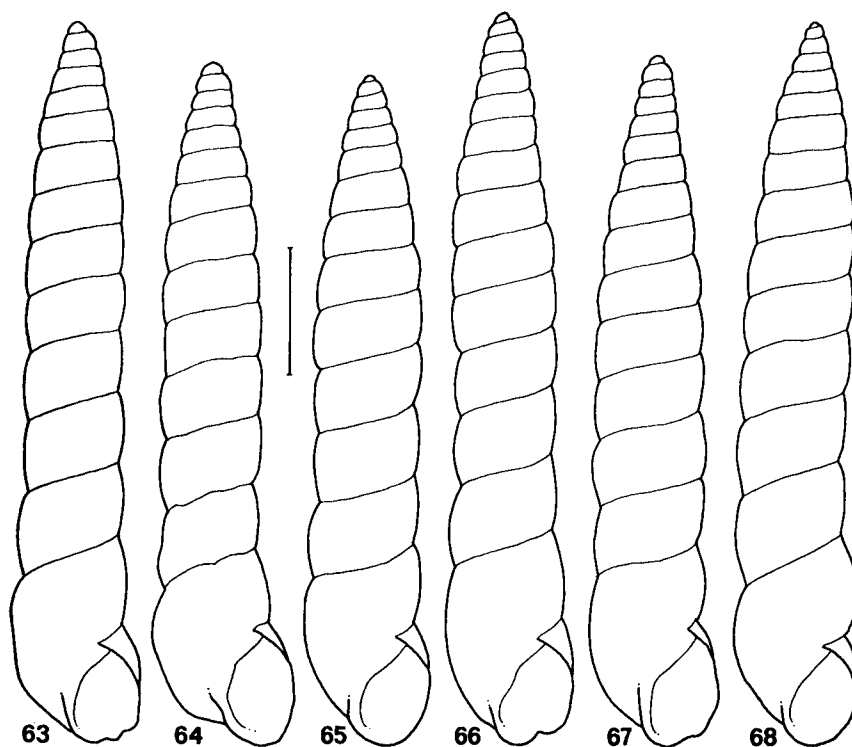


Fig. 63-68. *Bostryx acromelas* (Morelet). Peru, Cuzco, 4.8 km SE Urubamba (RMNH). Scale line = 5 mm.

Redescription. — Shell rimate to imperforate, cylindrical, the first six whorls tapering towards the apex; solid. Colour whitish, the upper whorls brownish or violet. Surface rather shining, smooth. Protoconch with numerous

finely incised spiral lines and low axial wrinkles at irregular intervals. Whorls slightly convex; suture hardly impressed. Aperture subovate. Peristome thin and simple. Columellar margin hardly dilated above.

Measurements (in mm) and statistics of characters and ratios (N=10):

|     | H     | D    | HA   | WA   | LW   | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|------|------|------|------|------|-------|------|------|
| M   | 25.75 | 4.89 | 3.55 | 2.48 | 7.06 | 5.28 | 1.43  | 0.14 | 0.27 |
| s   | 1.46  | 0.33 | 0.30 | 0.16 | 0.55 | 0.41 | 0.07  | 0.01 | 0.02 |
| max | 27.5  | 5.6  | 4.3  | 2.8  | 8.0  | 5.85 | 1.54  | 0.16 | 0.30 |
| min | 23.0  | 4.4  | 3.2  | 2.2  | 6.0  | 4.64 | 1.32  | 0.13 | 0.24 |

***Bostryx aileenae* sp.n. (pl. 1 fig. 6)**

Description. — Shell up to 15.5 mm, 2.1 times as long as wide, rimate, with straight sides, rather elongate, thin. Colour whitish with axial streaks of light- to dark-brown. Surface shining, the growth striae cut into elongate granules by spiral lines, especially above the periphery of the last whorl. Protoconch smooth. Whorls 5.7, hardly convex; suture hardly to well impressed. Aperture ovate, about 1.8 times as long as wide, 0.43 times total length. Peristome thin and simple. Columellar margin hardly dilated above, white.

Measurements (in mm) and statistics of characters and ratios (N=6):

|     | H     | D    | HA   | WA   | LW    | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|------|------|------|-------|------|-------|------|------|
| M   | 14.48 | 7.00 | 6.17 | 3.52 | 10.03 | 2.07 | 1.76  | 0.43 | 0.69 |
| s   | 0.69  | 0.33 | 0.28 | 0.12 | 0.27  | 0.10 | 0.10  | 0.02 | 0.03 |
| max | 15.5  | 7.6  | 6.6  | 3.7  | 10.5  | 2.21 | 1.89  | 0.45 | 0.72 |
| min | 13.7  | 6.6  | 5.9  | 3.4  | 9.8   | 1.96 | 1.64  | 0.39 | 0.65 |

Measurements of holotype: shell height 14.9 mm, diameter 7.6 mm, height of aperture 6.1 mm, width 3.7 mm, height of last whorl 10.1 mm; 5.9 whorls.

Type material. — Peru, Dept. Lima, Río Cañete valley, 1 km above Puente Auco, 2070 m (A. S. H. Breure leg., 5-II-1975; sta. 79). RMNH 55158: holotype. Paratypes RMNH 55157/12, BMNH 1975229/3, same data.

Comparisons. — This novelty differs from *Bostryx pruinosus* (Sowerby, 1833) in (1) the different colour pattern, (2) the less impressed suture and (3) in being less perforate. *Bostryx aileenae* may also be compared to *B. reconditus* (Reeve, 1849), from which it differs in (1) the axial colour streaks, which continue from suture to suture and (2) in being decidedly smaller (length 14.5 vs. 20 mm).

Etymology. — This species is dedicated to Miss Aileen Blake (London), to express my sincerest gratitude for her cooperation during my research on the types of Bulimulidae in the British Museum (Natural History).

***Bostryx albicolor* (Morelet, 1863)**

The type material of this species is preserved in the Geneva museum and the British Museum (Natural History). The specimens are considered syntypes. The specimens in the Geneva museum (MHNG 1155/12) consist of five lots: (a) 'Pérou, Carahuasi', three specimens; (b) 'Pérou, Yzouchaca' [= probably Izcuchaca, Río Mantaro valley], three specimens; (c) 'Pérou, Hauteurs de Huanta', one specimen; (d) 'Pérou, Huanta', two specimens; (e) 'Pérou, Hauteurs de l'Apurimac', two specimens. The specimens in the London museum are labelled 'Pérou' (ex Morelet), and registered BMNH 1893.2.4.169-170.

***Bostryx anachoreta* (Pfeiffer, 1856) (fig. 69)**

Genitalia. — Penis with a proximal sheath (ca. 1/6 total phallus length), swollen above the distal end of the sheath and constricted at the transition to the epiphallus, which is about as broad as the distal part of the penis. The flagellum is more or less tapering and rather long (about half the length of the phallus). A thin retractor muscle is distally inserted. The spermathecal duct is narrow and subcylindrical, the spermatheca is globose.

Material. — Chile, Prov. Antofagasta, N of Paposo (RMNH).

***Bostryx andoicus* (Morelet, 1863)**

The type material of this species has been traced in the London museum. One specimen is designated lectotype: shell height 30.0 mm, diameter 12.4 mm (BMNH 1893.2.4.171). There is one paralectotype (1893.2.4.172), and the material is labelled 'Pérou, Pomacoche' (ex Morelet). Two additional paralectotypes are in the Geneva museum, labelled 'Pérou, Cocharcas' [they correspond to Morelet, 1863: pl. 11 fig. 13, lower figures]. According to C. Vaucher (in litt.) there are four other lots of type material in the MHNG-collection (from Cocharcas and Pucra).

This species is characterized by the broad perforation and the elongate, small aperture.

New localities are: (1) Peru, Dept. Apurimac, Río Pampas valley, 118 km W Andahuaylas (6 km S of Pampas bridge), 2100 m (Sta. 122: Breure, 1975a; RMNH/9); (2) Peru, Dept. Ayacucho, Ninabamba (ca. 2 km W of Pampas bridge), 2100 m (RMNH/10).

***Bostryx angrandianus* (Pilsbry, 1897)**

Pilsbry substituted this name for *Bulimus radiatus* Morelet, 1863, not Bruguière, 1789. The type material of *Bulimus radiatus* Morelet has been

located in the British Museum (Natural History). One specimen is here designated lectotype: shell height 24.0 mm, diameter 11.8 mm (BMNH 1893.2.4.198). There are two paralectotypes (1893.2.4.199-200) and the material is accompanied by a label 'Charillas, Pérou' (ex Morelet).

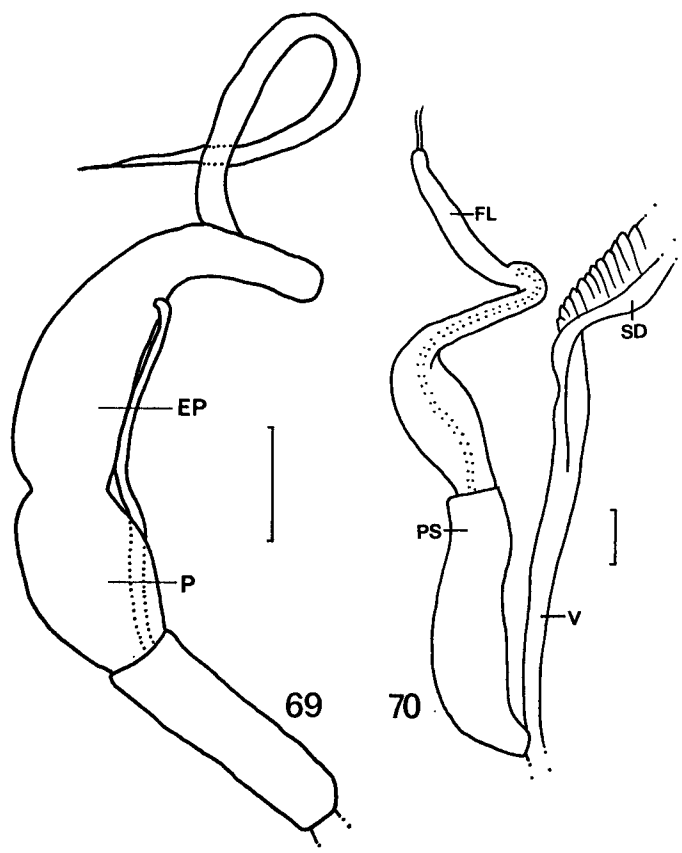


Fig. 69. *Bostryx anachoreta* (Pfeiffer), penis. Chile, Antofagasta, N of Paposo (RMNH). Scale line = 1 mm. Fig. 70. *Bostryx anomphalus* Pilsbry, genitalia. Peru, Lima, 43 km ENE Lima (RMNH). Scale line = 1 mm.

***Bostryx anomphalus* Pilsbry, 1944 (fig. 70)**

This species has been described from Peru, [Dept. Lima,] Santa Eulalia valley, near Chosica. New localities (in the same area) are: (1) Río Rimac valley, 43 km ENE Lima, 1100 m (Sta. 73, Breure 1975a; RMNH/10); (2) Río Santa Eulalia valley, 55 km NE Lima, 1480 m (Sta. 70; RMNH/37); (3) Idem, 60 km NE Lima, 1700 m (Sta. 69; RMNH/14).

Redescription. — Shell rimate, with straight sides, elongate, rather solid.

Colour brown, with numerous little dark brown spots; the last whorl with a whitish spiral band at the periphery and below the suture; upper whorls dark bluish. Surface hardly shining, smooth. Protoconch with numerous fine spiral lines and low axial riblets, the latter unevenly spaced. Whorls hardly convex; suture hardly impressed. Aperture subovate, more or less angled at baso-columellar margin; pink coloured inside. Peristome thin and simple. Columellar margin narrowly dilated above.

Measurements (in mm) and statistics of characters and ratios (N=10):

|     | H     | D    | HA   | WA   | LW   | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|------|------|------|------|------|-------|------|------|
| M   | 19.55 | 6.10 | 4.60 | 3.10 | 8.40 | 3.21 | 1.48  | 0.24 | 0.43 |
| s   | 1.46  | 0.42 | 0.43 | 0.24 | 0.78 | 0.14 | 0.07  | 0.01 | 0.01 |
| max | 22.5  | 6.6  | 5.2  | 3.4  | 9.8  | 3.52 | 1.59  | 0.26 | 0.45 |
| min | 18.0  | 5.5  | 4.0  | 2.8  | 7.5  | 2.95 | 1.37  | 0.21 | 0.41 |

Genitalia. — Penis with a sheath (ca. 1/3 the length of the phallus), swollen above the distal end of the sheath. The epiphallus is subcylindrical, rather slender and somewhat swollen at the transition to the flagellum, which is as broad as the epiphallus and which has a short distal retractor muscle. The vagina is relatively long. The spermooviduct, spermathecal duct and spermatheca were not full grown in the specimens dissected.

***Bostryx arcuatus* sp.n. (pl. 7 figs. 6-7)**

Description. — Shell up to 22.5 mm, 2.57 times as long as wide, narrowly perforate, with slightly convex sides, elongate, rather thin. Colour light yellowish- to reddish-brown with whitish axial streaks. Surface moderately shining, the growth striae incrassate. Protoconch almost smooth, only very faint traces of numerous spiral lines and some axial wrinkles could be observed. Whorls 7, nearly flat; suture hardly impressed, slightly descending in front. Aperture subovate, 1.83 times as long as wide, 0.35 times total length. Peristome thin, slightly expanded at the basal margin. Columellar margin hardly reflexed and narrowly dilated above; whitish.

Measurements (in mm) and statistics of characters and ratios (N=7):

|     | H     | D    | HA   | WA   | LW    | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|------|------|------|-------|------|-------|------|------|
| M   | 21.50 | 8.39 | 8.64 | 4.74 | 13.49 | 2.57 | 1.83  | 0.35 | 0.63 |
| s   | 0.91  | 0.38 | 0.24 | 0.28 | 0.48  | 0.12 | 0.08  | 0.03 | 0.01 |
| max | 22.5  | 8.8  | 9.0  | 5.1  | 14.2  | 2.69 | 1.91  | 0.40 | 0.65 |
| min | 20.0  | 7.8  | 8.3  | 4.4  | 12.9  | 2.35 | 1.74  | 0.32 | 0.61 |

Measurements of holotype: shell height 21.0 mm, diameter 7.9 mm, height of aperture 8.3 mm, width 4.6 mm, height of last whorl 12.9 mm; seven whorls.

Type material. — Peru, Dept. Cajamarca, Hacienda Monteseo [ $6^{\circ}52' S$   $79^{\circ}05' W$ ] (H. W. Koepcke leg.). SMF 249625: holotype. Paratypes SMF 249626/5, RMNH 55321/1, same data.

Comparisons. — This new species differs from *Bostryx olmosensis* sp.n. by (1) being more slender ( $H/D = 2.57$  vs.  $2.14$ ); (2) having slightly convex sides; (3) having the umbilicus narrower; (4) having a rather shining shell surface.

Etymology. — (L.) arcus, bow; referring to the slightly convex sides of the shell.

### ***Bostryx atacamensis*** (Pfeiffer, 1856)

From among the type specimens in the London museum one is here designated lectotype: shell height 19.0 mm, diameter 6.3 mm (BMNH 1975312). There are two paralectotypes (1975128) and the material is labelled 'Desert of Atacama, Chile' (ex Cuming).

*Bulimus longurio* Crosse, 1869, is considered a synonym of this species by Pilsbry (1896: 140). The type material of *Bulimus longurio* is in the Paris museum.

### ***Bostryx balsanus*** (Morelet, 1863)

The type material of this species has been found in the British Museum (Natural History). One specimen is designated lectotype: shell height 18.0 mm, diameter 9.0 mm (BMNH 1893.2.4.173). There is one paralectotype (1893.2.4.174) and the material is labelled 'Balsa de Cocharcas' (ex Morelet).

### ***Bostryx bermudezae*** Weyrauch, 1967

Genitalia. — Penis with a sheath (ca.  $1/4$  the length of the phallus), swollen above the distal end of the sheath and passing without external differentiation into the epiphallus, which is rather slender. The flagellum is half as broad as the epiphallus and as long as the penis sheath. A short and thin retractor muscle is distally inserted. The vagina is relatively short. The spermathecal duct is more or less subcylindrical, its distal part narrow. The spermatheca is globose.

Material. — Peru, Dept. Lima, Río Cañete valley, Quichao, 3450 m (Sta. 75; RMNH).

### ***Bostryx bicolor*** (Weyrauch, 1967)

This species has been described as a member of *Naesiotus* Albers, 1850. The protoconch, however, is only sculptured with numerous spiral lines. There are no traces of a regular pattern of rather strong axial riblets as commonly observed in *Naesiotus* and, therefore, this taxon is now transferred to *Bostryx*.

The type locality is Sicuani in the Dept. Cuzco, Peru. A new locality in the same area is: 13.7 km S Sicuani, 3730 m (Sta. 87; RMNH/many).

***Bostryx bilineatus*** (Sowerby, 1833)

Additionally to the localities mentioned in Pilsbry (1896: 187) this species is now reported from Ecuador, Prov. Guayas: (1) 31 miles N Santa Elena, in 'coastal cactus forest' (UF, RMNH); (2) Santa Elena, Cerro de Ballenita (EPN/many); (3) Punta Carnero [SW Santa Elena] (EPN/1); (4) La Caleta, Libertad [between Santa Elena and Salinas] (EPN/2).

***Bostryx bonneti*** (Ancey, 1902) (pl. 11 fig. 11)

In the collection of the Brussels museum five specimens have been found which originate from Mr. Bonnet, who got them from Mr. Favre. These specimens, labelled 'Bolivie', might be considered syntypes. There is one additional specimen with the same locality label (ex Ancey ex Geret) in the IRSN-collection.

Measurements (in mm) and statistics of characters and ratios (N=6):

|     | H     | D     | HA    | WA   | LW    | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|-------|-------|------|-------|------|-------|------|------|
| M   | 21.17 | 13.70 | 11.73 | 7.78 | 16.00 | 1.55 | 1.51  | 0.56 | 0.76 |
| s   | 0.82  | 0.78  | 0.63  | 0.69 | 0.71  | 0.10 | 0.08  | 0.03 | 0.02 |
| max | 22.0  | 14.9  | 12.5  | 8.7  | 17.0  | 1.69 | 1.63  | 0.58 | 0.78 |
| min | 20.0  | 12.7  | 10.7  | 7.2  | 15.0  | 1.48 | 1.42  | 0.50 | 0.72 |

***Bostryx bromeliarum grandiportus*** Weyrauch, 1958 (fig. 71)

Genitalia. — Penis with a sheath (ca. 1/4 the length of the phallus), subcylindrical, its distal part slightly swollen. Epiphallus and flagellum are half as broad as the penis and are subcylindrical. A short retractor muscle is distally attached. The spermoviduct, spermathecal duct and spermatheca were not full grown in the specimen dissected.

Material. — Peru, Dept. Lima, Río Rimac valley, Tambo Viso (IML).

***Bostryx carinatus*** sp.n. (pl. 10 figs. 3-5)

Description. — Shell up to 14.2 mm diameter, 0.51 times as long as wide, broadly perforate, with slightly convex sides; rather thin. Colour whitish-brown, with a narrow brown band on the upper whorls and a broader band below the keel on the first half of the last whorl; the apex is corneous. The surface is rather shining, somewhat malleate, the growth striae are incassate. Protoconch with numerous finely incised spiral lines. Whorls 4.2, the first two whorls slightly convex, the following ones rather flat and distinctly



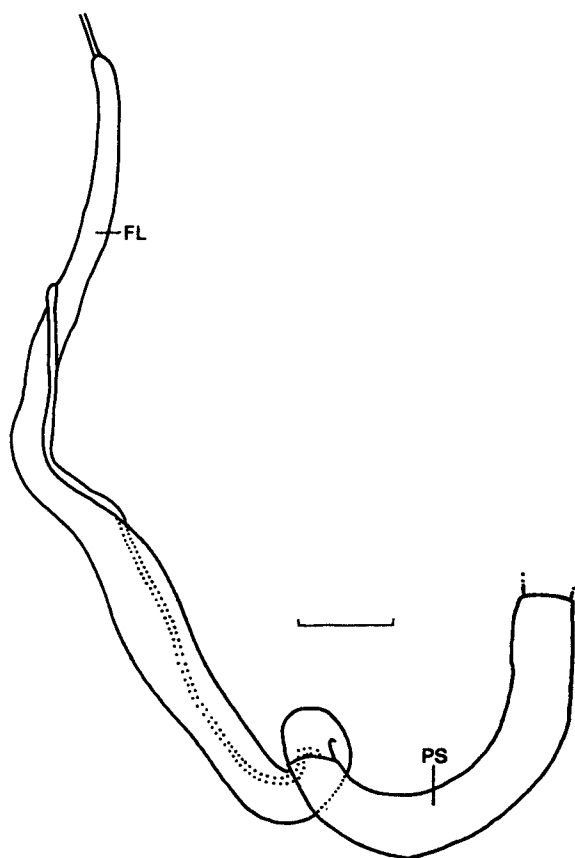


Fig. 71. *Bostryx bromeliarum grandiportus* Weyrauch, genitalia. Peru, Lima, Tambo Viso (IML). Scale line = 1 mm.

keeled. The keel is descending on the last half of the last whorl, which has a second, hardly perceptible keel around the umbilicus. The suture is hardly impressed. The aperture is subtriangular, with a short sulcus at the keel; whitish coloured inside. Peristome thin, simple, the basal margin sinuous. Columellar margin hardly dilated.

Measurements (in mm) and statistics of characters and ratios (N=10):

|     | H    | D     | HA   | WA   | U    | H/D  | HA/WA | HA/H | U/D  |
|-----|------|-------|------|------|------|------|-------|------|------|
| M   | 6.75 | 13.36 | 4.54 | 6.39 | 2.71 | 0.51 | 0.71  | 0.67 | 0.20 |
| s   | 0.33 | 0.38  | 0.18 | 0.43 | 0.21 | 0.02 | 0.04  | 0.04 | 0.02 |
| max | 7.1  | 14.2  | 4.9  | 7.3  | 3.1  | 0.54 | 0.78  | 0.73 | 0.23 |
| min | 6.3  | 12.9  | 4.3  | 5.8  | 2.3  | 0.47 | 0.63  | 0.61 | 0.18 |

Measurements of holotype: shell height 7.1 mm, diameter 14.2 mm, height of aperture 4.6 mm, width 7.3 mm, diameter of umbilicus 2.7 mm; 4.3 whorls.

Type material. — Peru, Dept. Ancash, 5 km SW Chavin de Huantar, 3300 m (F. G. Thompson leg., 2/7-IV-1972). Holotype: UF 22795. Paratypes UF 22796/13, 22797/6, RMNH 55162/7.

Comparisons. — Although this new species is possibly not directly related to other carinate *Bostryx* species, it is compared to these forms awaiting a more definite conclusion about their relationships. *Bostryx carinatus* sp.n. may thus be compared to *B. eremothaumus* (Pilsbry, 1896) and *B. fisheri* Pilsbry, 1956, from which it differs by (1) being flatter, (2) having a smaller umbilicus, (3) being smoother, (4) the weak keel around the umbilicus, (5) the different shape of the aperture. From *Bostryx cuyanus* (Pfeiffer, 1867) and *B. doelloi* Hylton Scott, 1953, this new species may be distinguished by (1) being larger, (2) the stronger keel at the periphery of the last whorl, (3) being flatter, (4) the relatively smooth surface, (5) the different shape of the aperture.

***Bostryx carinatus trochiformis* ssp.n. (pl. 10 fig. 6)**

Diagnosis. — Differs from *Bostryx c. carinatus* ssp.n. in (1) being more elongate ( $H/D = 0.70$  vs.  $0.51$ ), (2) being more slender ( $D = 11.9$  vs.  $13.4$ ), (3) the relatively smaller aperture ( $HA/H = 0.53$  vs.  $0.67$ ).

Measurements (in mm) and statistics of characters and ratios ( $N=8$ ):

|     | H    | D     | HA   | WA   | LW   | U    | H/D  | HA/WA | HA/H | U/D  | LW/H |
|-----|------|-------|------|------|------|------|------|-------|------|------|------|
| M   | 8.35 | 11.89 | 4.43 | 5.30 | 5.94 | 2.55 | 0.70 | 0.84  | 0.53 | 0.21 | 0.71 |
| s   | 0.70 | 0.69  | 0.28 | 0.33 | 0.35 | 0.44 | 0.08 | 0.06  | 0.05 | 0.03 | 0.03 |
| max | 9.2  | 12.8  | 4.9  | 5.8  | 6.5  | 3.0  | 0.83 | 0.96  | 0.61 | 0.25 | 0.76 |
| min | 7.4  | 10.9  | 4.0  | 4.6  | 5.4  | 1.8  | 0.58 | 0.75  | 0.48 | 0.17 | 0.66 |

Measurements of holotype: shell height 8.4 mm, diameter 11.6 mm, height of aperture 4.0 mm, width 5.3 mm, height of last whorl 6.1 mm; 4.5 whorls.

Type material. — Peru, Dept. Ancash, Río Pativilca valley, opposite Aquia [ca.  $10^{\circ}$  S  $77^{\circ}05'$  W], Racrachaca, 3600-3800 m (Y. Espinosa leg.). Holotype: SMF 162086. Paratypes SMF 164005/1, IML/13, RMNH 55259/4.

***Bostryx cereicolus* (Morelet, 1863)**

Two type specimens have been located in the British Museum (Natural History) and are considered syntypes (BMNH 1893.2.4.175-176). The material is labelled 'Abancay, Pérou' (ex Morelet). 21 additional syntypes from the same locality are in the Geneva museum (MHNG 1153/90).

***Bostryx ceratacme* (Pfeiffer, 1855)**

The type specimen of this species is preserved in the British Museum (Natural History) and is designated lectotype: shell height 18.5 mm, diameter 6.4 mm (BMNH 1975347). The label reads 'Peru' (ex Cuming).

***Bostryx chagualensis* Pilsbry, 1932**

This species has been described from near Chagual, Río Marañon valley, Dept. La Libertad. New locality records for this species are: (1) Dept. Cajamarca, 4 km WSW Balsas, 1150 m (UF/7, RMNH/2); (2) Dept. Amazonas, 10-12 km (NE) Balsas, 1200-1500 m (UF/2, RMNH/1); (3) Dept. Amazonas, 16 km ENE Balsas, 1650 m (UF/2); (4) Dept. Amazonas, 6 km NNW Tingo, 1750 m (UF/1).

Specimens from the following localities differ from typical *Bostryx chagualensis* in (a) being less cylindrical, (b) the absence of the columellar fold, (c) having a different colour pattern: (5) Dept. Amazonas, 12 km ENE Balsas, 1600 m (RMNH/1); (6) Dept. Amazonas, 15 km SSE Tingo, 1840 m (RMNH/1).

***Bostryx circuliportus* sp.n. (figs. 72-76; pl. 2 fig. 10)**

Description. — Shell up to 20.0 mm, 2.0 times as long as wide, broadly perforate, with straight sides, elongate, rather solid. Colour whitish with axial streaks of brownish and bluish tints and interrupted spiral bands of light brown; usually darker towards the aperture and on the upper whorls. Surface lustreless, the growth striae crossed by finely incised spiral lines. Protoconch

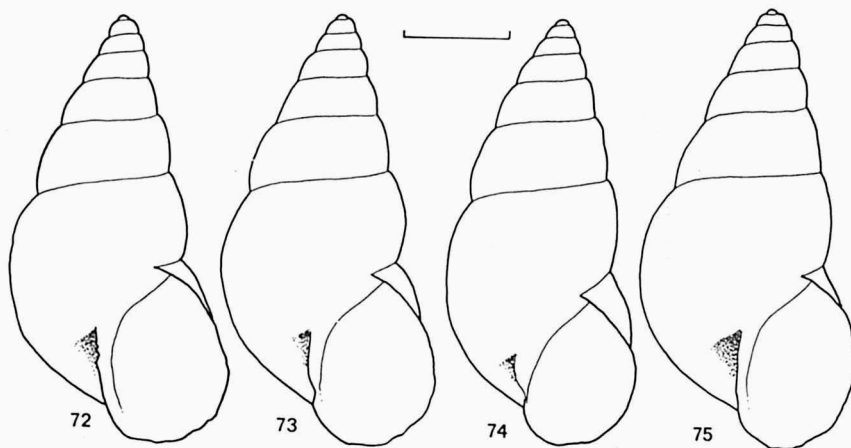


Fig. 72-75. *Bostryx circuliportus circuliportus* sp.n. Peru, Lima, 11.5 km SW Canta. Holotype (fig. 72) and paratypes (fig. 73-75: RMNH 55183). Scale line = 5 mm.

smooth. Whorls 6.7, nearly flat; suture well impressed. Aperture ovate to semicircular, dark brown coloured inside, about 1.5 times as long as wide, 0.39 times the total length. Peristome thin and simple. Columellar margin slightly dilated above, brownish-white.

Measurements (in mm) and statistics of characters and ratios (N=8):

|     | H     | D    | HA   | WA   | LW    | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|------|------|------|-------|------|-------|------|------|
| M   | 19.69 | 9.71 | 7.64 | 5.19 | 12.31 | 2.03 | 1.47  | 0.39 | 0.63 |
| s   | 0.37  | 0.49 | 0.18 | 0.24 | 0.31  | 0.11 | 0.05  | 0.01 | 0.01 |
| max | 20.0  | 10.2 | 7.8  | 5.5  | 12.8  | 2.22 | 1.53  | 0.40 | 0.64 |
| min | 19.0  | 8.8  | 7.3  | 4.8  | 12.0  | 1.92 | 1.42  | 0.37 | 0.61 |

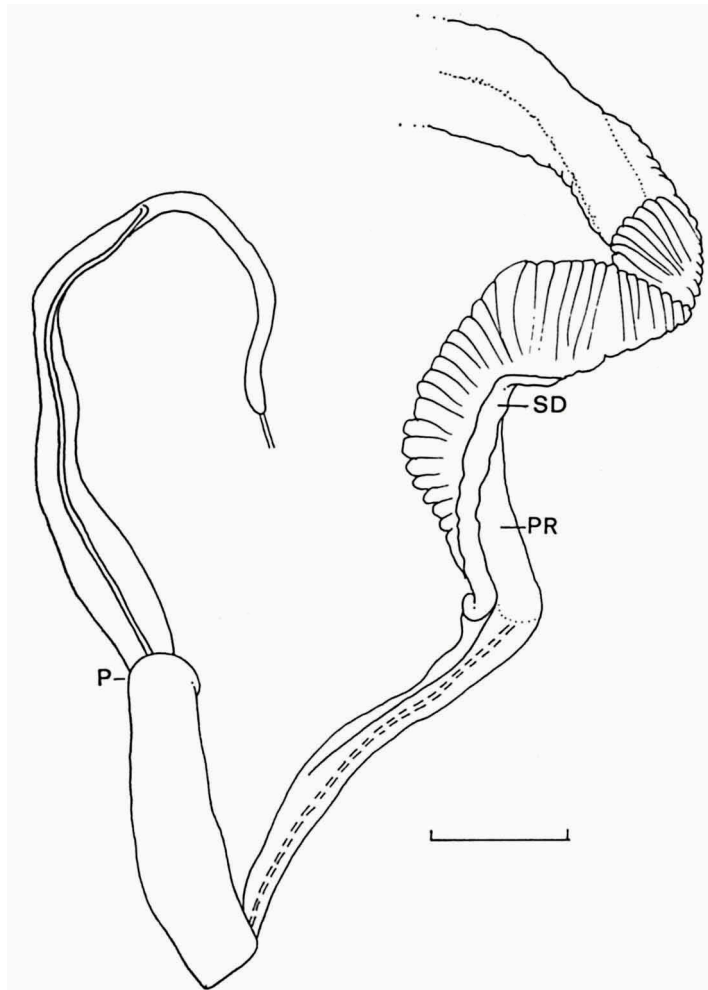


Fig. 76. *Bostryx circuliportus circuliportus* sp.n., genitalia. Peru, Lima, 11.5 km SW Canta (RMNH). Scale line = 2 mm.

Measurements of holotype: shell height 19.5 mm, diameter 10.1 mm, height of aperture 7.8 mm, width 5.5 mm, height of last whorl 12.0 mm; 6.8 whorls.

Type material. — Peru, Dept. Lima, Río Chillón valley, 11.5 km SW Canta, 2270 m (A. S. H. Breure leg., 2-II-1975; sta. 63A). Holotype: RMNH 55169. Paratypes RMNH 55183/16, 9038/many (alcohol material), IML/2, same data. Additional localities: (1) Dept. Lima, Río Chillón valley, 10 km SW Canta, 2300 m (Sta. 63; RMNH 55166/7, 9039/many (alcohol material), ZMA/10); (2) Dept. Lima, Río Chillón valley, ca. 15 km SW Canta, 1950 m (Sta. 65; RMNH 55167/2, 9040/many); (3) Dept. Lima, Río Chillón valley, 25.5 km SW Canta, 1660 m (Sta. 64; RMNH 55168/1 + 13 juv.); (4) Dept. Lima, Río Chillón valley, Puente El Diablo, 2200 m (IML/4).

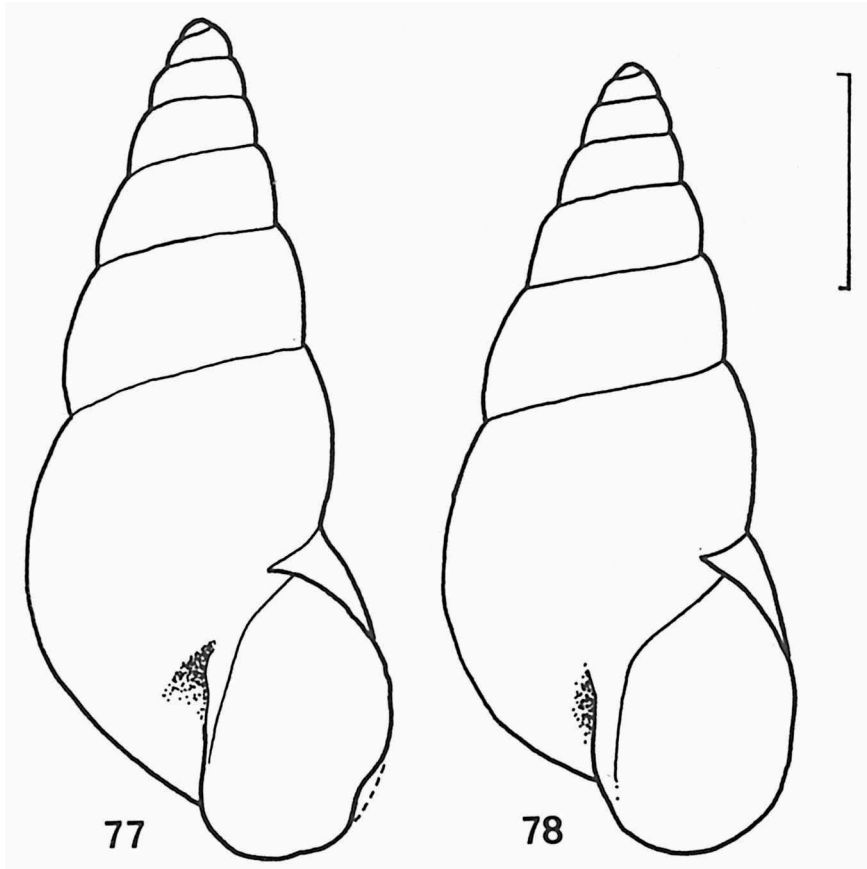


Fig. 77-78. *Bostryx circuliportus rimacensis* ssp.n. Peru, Lima, E Surco. Holotype (fig. 77) and paratype (RMNH 55171). Scale line = 5 mm.

Comparisons. — This species resembles *Bostryx ignobilis* (Philippi, 1867) but differs in (1) being smaller ( $H = 19.7$  vs.  $25.5$ ), (2) being more slender, (3) usually having a dark apex, (4) the shape and colour of the aperture and (5) the broad perforation. This novelty may also be compared to *Bostryx obeliscus* Zilch, 1954, from which it may be distinguished by (1) being less cylindrical, (2) being smaller (shell height up to  $20.0$  vs.  $26.7$  mm), (3) being stouter ( $H/D = 2.03$  vs.  $3.75$ ) and (4) the relatively larger aperture.

Genitalia. — Penis with a sheath (ca.  $1/4$  the length of the phallus), sub-cylindrical and slightly swollen above the distal end of the sheath, passing into the epiphallus without external differentiation. The epiphallus is tapering, about half as long as the penis. The flagellum is subcylindrical, as long as the epiphallus and with a short retractor muscle at the distal end.

***Bostryx circuliportus rimacensis* ssp.n. (figs. 77-78)**

This subspecies differs from *Bostryx c. circuliportus* ssp.n. in (1) being more slender, (2) having the last whorl less inflated, (3) the different colour pattern, viz. paler without the darker colours on the last whorl near the peristome.

Measurements (in mm):

| H    | D   | HA  | WA  | LW   |                      |
|------|-----|-----|-----|------|----------------------|
| 19.5 | 8.2 | 6.4 | 3.9 | 11.1 | holotype, 7 whorls   |
| 18.0 | 8.1 | 6.7 | 4.3 | 10.6 | paratype, 6.9 whorls |

Type material. — Peru, Dept. Lima, Río Rimac valley, few km E Surco (ca. 75 km ENE Lima), 2100 m (A. S. H. Breure leg., 25-I-1975; sta. 72). Holotype: RMNH 55170. Paratypes RMNH 55171/1 + 11 juv., same data.

Remarks. — *Bostryx circuliportus circuliportus* and *B. c. rimacensis* are vicariant subspecies occurring in two parallel river valleys. A similar distribution is known for e.g. *Bostryx bromeliarum bromeliarum* (Pilsbry, 1930) and *B. b. grandiportus* Weyrauch, 1958.

***Bostryx climacographus* (Holmberg, 1912) (fig. 79)**

Genitalia. — Penis with a rather long sheath (ca.  $1/3$ - $1/4$  total phallus length), slightly swollen above the distal end of the sheath, otherwise sub-cylindrical and passing without external differentiation into the epiphallus. The flagellum is slender, ca.  $1/6$  the length of the phallus; the retractor muscle is terminally attached. The spermathecal duct is tapering, with a globose spermatheca at its distal end.

Material. — Argentina, between Salta and Tucumán (IML).

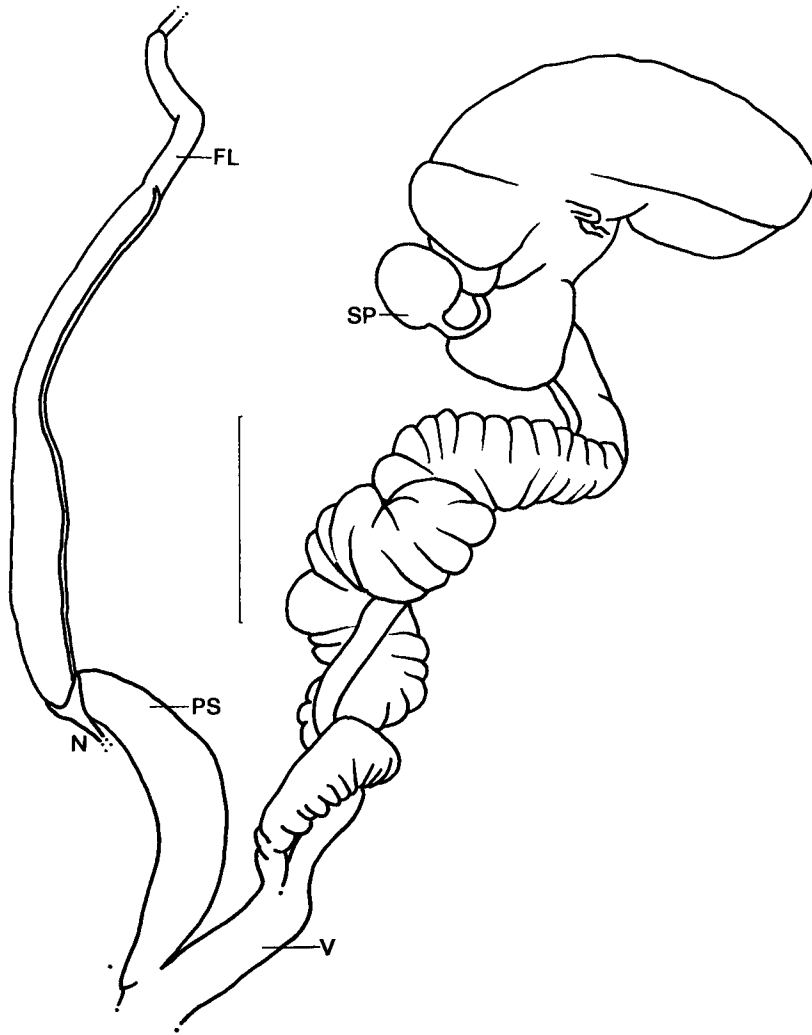


Fig. 79. *Bostryx climacographus* (Holmberg), genitalia. Argentina, between Salta and Tucumán (IML). Scale line = 5 mm.

***Bostryx coelhoi* sp.n. (figs. 80-85)**

Description. — Shell up to 17.0 mm, 2.2 times as long as wide, narrowly perforate, with hardly convex sides, elongate, rather thin. Colour whitish; the upper whorls with light brown spots in spiral series and the protoconch uniformly light brown. Surface rather shining, with incrassate growth striae; the growth striae on the penultimate and antepenultimate whorl are crossed by spiral lines, thus forming puckered bands. Protoconch with numerous spiral lines and low axial riblets which are more or less undulating and not always

continuous from suture to suture. Whorls 6.1, nearly flat; suture hardly impressed. Aperture subovate, about 1.8 times as long as wide, 0.42 times the total length. Peristome thin and simple. Columellar margin narrowly dilated above.

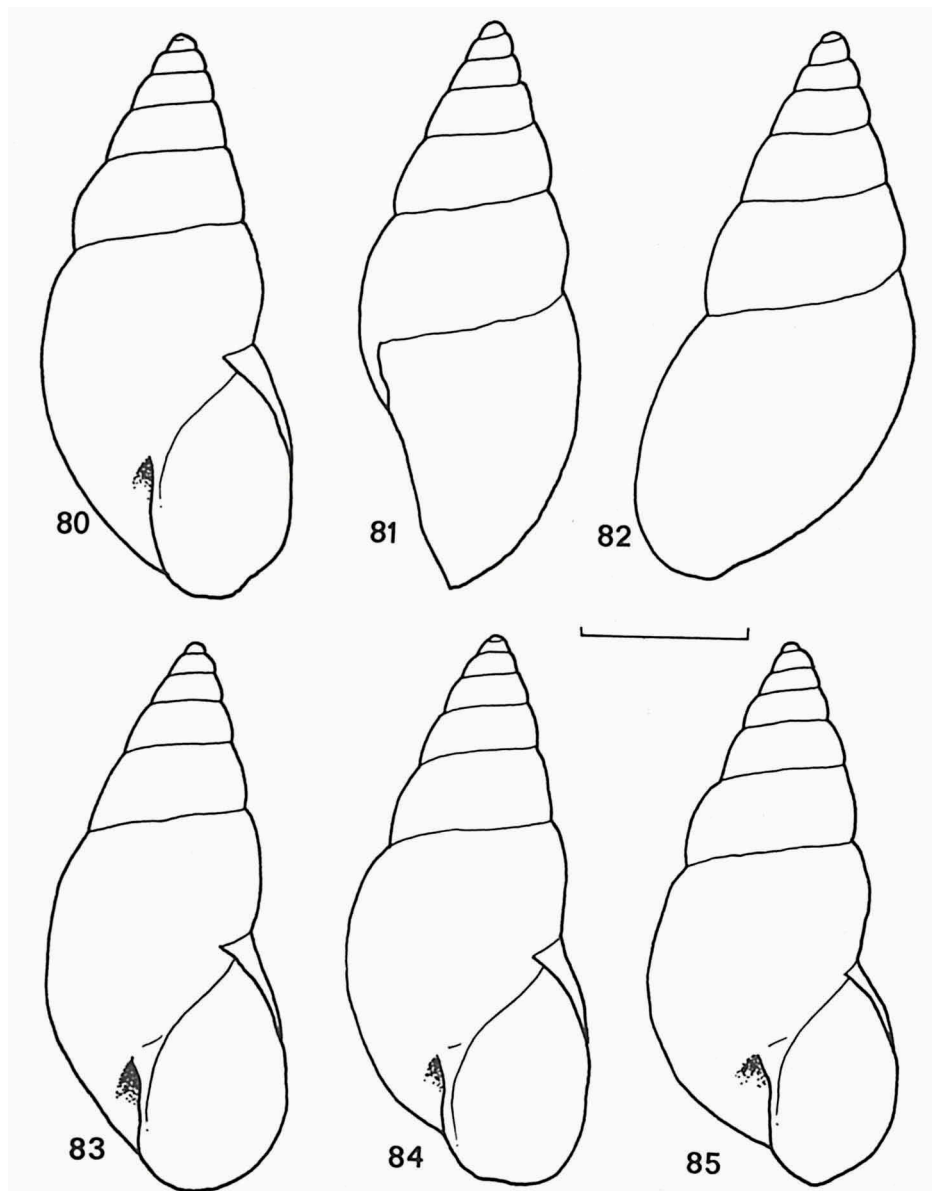


Fig. 80-85. *Bostryx coelhoi* sp.n. Peru, Ancash, 7 km NE San Marcos. Holotype (fig. 80-82) and paratypes (fig. 83-85; RMNH). Scale line = 5 mm.



Measurements (in mm) and statistics of characters and ratios (N = 10):

|     | H     | D    | HA   | WA   | LW    | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|------|------|------|-------|------|-------|------|------|
| M   | 15.71 | 7.15 | 6.54 | 3.59 | 10.25 | 2.20 | 1.82  | 0.42 | 0.65 |
| s   | 0.87  | 0.32 | 0.43 | 0.22 | 0.53  | 0.08 | 0.08  | 0.02 | 0.02 |
| max | 17.0  | 7.7  | 7.2  | 4.0  | 11.2  | 2.32 | 1.94  | 0.44 | 0.67 |
| min | 14.1  | 6.7  | 6.0  | 3.3  | 9.4   | 2.07 | 1.71  | 0.38 | 0.63 |

Measurements of holotype: shell height 17.0 mm, diameter 7.7 mm, height of aperture 7.2 mm, width 3.7 mm, height of last whorl 11.2 mm; 6.4 whorls.

Type material. — Peru, Dept. Ancash, 7 km NE San Marcos, 2720 m (F. G. Thompson leg., 7-IV-1972). Holotype: UF 22798. Paratypes UF 22799/24, RMNH 55159/7, same data. Additional locality: Peru, Dept. Ancash, 16 km NNE San Marcos, 2640 m, paratypes UF 22800/10, RMNH 55155/2.

Comparisons. — This species differs from *Bostryx stenacme* (Pfeiffer, 1856) in (1) being smaller (H = 14-17 vs. 21-28 mm), (2) having a coarser sculpture, (3) having a less inflated last whorl. *Bostryx coelhoi* sp.n. differs from *B. nigropileatus* (Reeve, 1849) in (1) being slightly smaller (H = 14-17 vs. 21 mm), (2) the light brown apex, (3) the rimate umbilicus.

Etymology. — Dedicated to my colleague Prof. Arnaldo dos Santos Coelho (Rio de Janeiro) for his helpful cooperation.

### ***Bostryx coerulescens*** (Pfeiffer, 1858) (fig. 86; pl. 10 fig. 2)

This species has been described from 'Peru, Andes of Prov. Patas'. A more exact locality is Dept. La Libertad, Río Chusgón valley, Hacienda Santa Elena, 1550-1650 m (SMF 155724, IML 699).

This taxon has been considered until now a member of *Kionoptyx* Haas, 1966, resembling the type species *K. sagasteguii* Haas. Study of the shell morphology and anatomy of '*Kionoptyx*' *coerulescens* (Pfr.) has led me to the conviction that this genus and its taxa should be included in *Bostryx* Troschel, 1847 sensu lato.

The protoconch is sculptured with low axial riblets, which are slightly undulating and partly broken into granules (especially on lower part of whorl), and numerous, very fine spiral lines.

Measurements (in mm) and statistics of characters and ratios:

|                                    | H     | D     | HA    | WA   | LW    | H/D  | HA/WA | HA/H | LW/H |
|------------------------------------|-------|-------|-------|------|-------|------|-------|------|------|
| 'Pérou, Huaylillas' (IRSN, N = 8): |       |       |       |      |       |      |       |      |      |
| M                                  | 32.38 | 12.59 | 12.39 | 7.15 | 19.00 | 2.57 | 1.74  | 0.38 | 0.59 |
| s                                  | 1.58  | 0.42  | 0.26  | 0.46 | 0.38  | 0.12 | 0.13  | 0.02 | 0.02 |
| max                                | 34.0  | 13.0  | 12.7  | 7.7  | 19.5  | 2.67 | 2.01  | 0.42 | 0.63 |
| min                                | 29.5  | 12.0  | 11.9  | 6.2  | 18.5  | 2.30 | 1.61  | 0.36 | 0.56 |

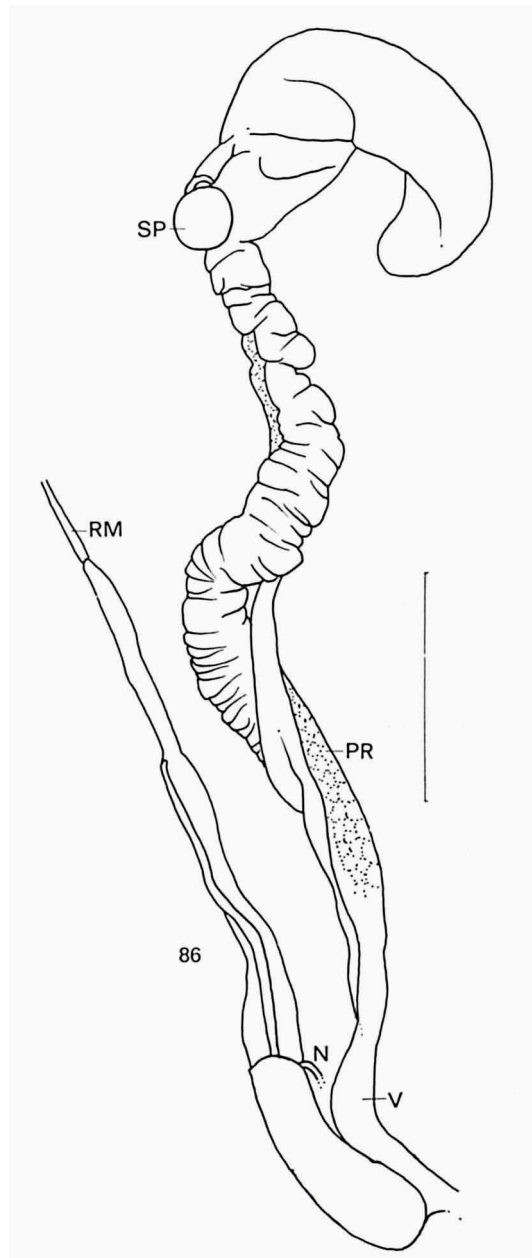


Fig. 86. *Bostryx coerulescens* (Pfeiffer), genitalia. Peru, La Libertad, Hacienda Santa Elena (SMF 155724). Scale line = 5 mm.

'Pérou' (IRSN) :

|      |      |      |     |      |      |      |      |      |
|------|------|------|-----|------|------|------|------|------|
| 35.5 | 12.7 | 13.5 | 7.0 | 21.0 | 2.79 | 1.93 | 0.38 | 0.59 |
| 37.5 | 12.9 | 16.0 | 7.9 | 23.5 | 2.90 | 2.03 | 0.43 | 0.63 |

Hacienda Santa Elena (SMF) :

|      |      |      |     |      |      |      |      |      |
|------|------|------|-----|------|------|------|------|------|
| 29.0 | 11.2 | 11.8 | 6.9 | 17.5 | 2.59 | 1.71 | 0.41 | 0.60 |
|------|------|------|-----|------|------|------|------|------|

Genitalia. — Penis with a proximal sheath (ca. 1/4 the length of the phallus), slightly swollen above the distal end of the sheath and passing without external differentiation into the epiphallus, which is more or less

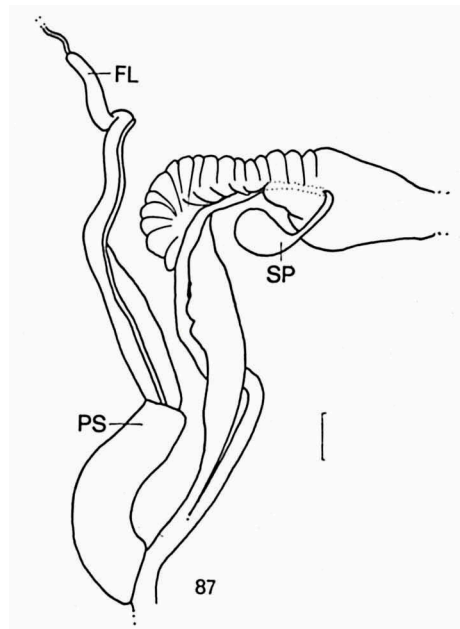


Fig. 87. *Bostryx cordillerae* (Strobel), genitalia. Argentina, Mendoza, Quebrada de las Pircas (RMNH). Scale line = 1 mm.

subcylindrical. The flagellum is about half as broad as the epiphallus; with a distal retractor muscle. The spermathecal duct is subcylindrical, but swollen in its median part. The spermatheca is globose.

Histology. — Proximal part of penis with a narrow lumen, which is lined by cubic epithelium (cell height ca. 5  $\mu$ m). More distally the lumen is semi-circular, changing into a ring-shaped lumen by the presence of a central tissue, which has a lobed lumen. The outer epithelium of the ring-shaped lumen is ca. 10  $\mu$ m high, the inner epithelium 5  $\mu$ m. More distally the ring-shaped lumen is divided into separate blind-ending branches; the outer epithelium is then ca. 40  $\mu$ m high, the inner epithelium ca. 13  $\mu$ m. The cells

have large, basal nuclei and few, rather large secretion granules (diameter up to 3  $\mu\text{m}$ ); the cytoplasm is light-coloured. The epithelium of the central tissue is also ca. 40  $\mu\text{m}$  high, but the cytoplasm of these cells is darker, with many small secretion granules (diameter ca. 1  $\mu\text{m}$ ). The epithelium of the epiphallus is high cylindrical (ca. 25  $\mu\text{m}$  high). The subepithelial tissue is made up of rather large cells.

**Material.** — Peru, Dept. La Libertad, Hacienda Santa Elena (SMF 155724/1 [alcohol material]); 'Pérou, prov. Patas, Huaylillas' (IRSN/14); 'Pérou' (IRSN/2).

***Bostryx columellaris* (Reeve, 1849)**

This species is recorded from Peru, 'au pont de l'Apurimac ou de la Banca, à 70 lieues [ca. 280 km] de Cocabambilla' (Morelet, 1863). According to Stichlich (1922: 250) Cocabambilla is in the Río Urubamba valley [ca. 12°45' S 72°45' W]. The type locality, 'Andes of Caxamarca' [sic, Caxamarca, northern Peru], is far outside the range of the species and probably erroneous. New locality records for this species are: (1) Dept. Cuzco, 5 km E Puente Cunyac, 95.5 km W Cuzco, 2075 m (Sta. 113); (2) Dept. Apurimac, Puente Cunyac, 96.5 km ENE Abancay, 2000 m (Sta. 114).

**?*Bostryx compactus* (Fulton, 1901) (pl. 11 figs. 9-10)**

Topotypes (from Bolivia, Chicani) show that the sculpture of the protoconch consists of numerous, fine spiral lines. This taxon is, therefore, tentatively placed in *Bostryx* Troschel, 1847.

Measurements (in mm; all material in IRSN-collection):

| H    | D   | HA  | WA  | LW  | W   |
|------|-----|-----|-----|-----|-----|
| 14.5 | 6.3 | 5.8 | 3.2 | 9.3 | 5.9 |
| 14.7 | 6.9 | 6.2 | 3.4 | 9.8 | 5.7 |
| 14.3 | 7.0 | 5.8 | 3.3 | 9.4 | 5.9 |
| 13.6 | 7.3 | 6.3 | 3.7 | 9.1 | 5.3 |

***Bostryx conspersus* (Sowerby, 1833)**

This species has been described from 'near Lima, Peru' (cf. Pilsbry, 1896: 160). The first exact localities are: (1) Peru, Dept. Arequipa, lomas near Atiquipa, 300-900 m (IML/6); (2) Do., Lomas de Capa near Chala, km 651 Panamericana Sur, 270-500 m (IML/4).

***Bostryx cordillerae* (Strobel, 1874) (fig. 87)**

**Genitalia.** — Penis with a sheath (ca. 1/3 the length of the phallus), slightly swollen above the distal end of the sheath, passing without external

differentiation into the epiphallus. The flagellum is rather short, slender, slightly tapering; the retractor muscle is distally inserted. The vagina is short. The spermathecal duct is subcylindrical, with an ovoid spermatheca at its distal end.

Material. — Argentina, Prov. Mendoza, near Villavicencio, Quebrada de las Pircas (MACN).

***Bostryx cracentis* sp.n. (figs. 88-93)**

Description. — Shell up to 17.7 mm, 4.14 times as long as wide, narrowly perforate, with straight sides, elongate, rather solid. Colour whitish with irregularly spaced axial, blackish streaks; the upper whorls usually dark. Surface moderately shining, the growth striae incrassate. Protoconch with

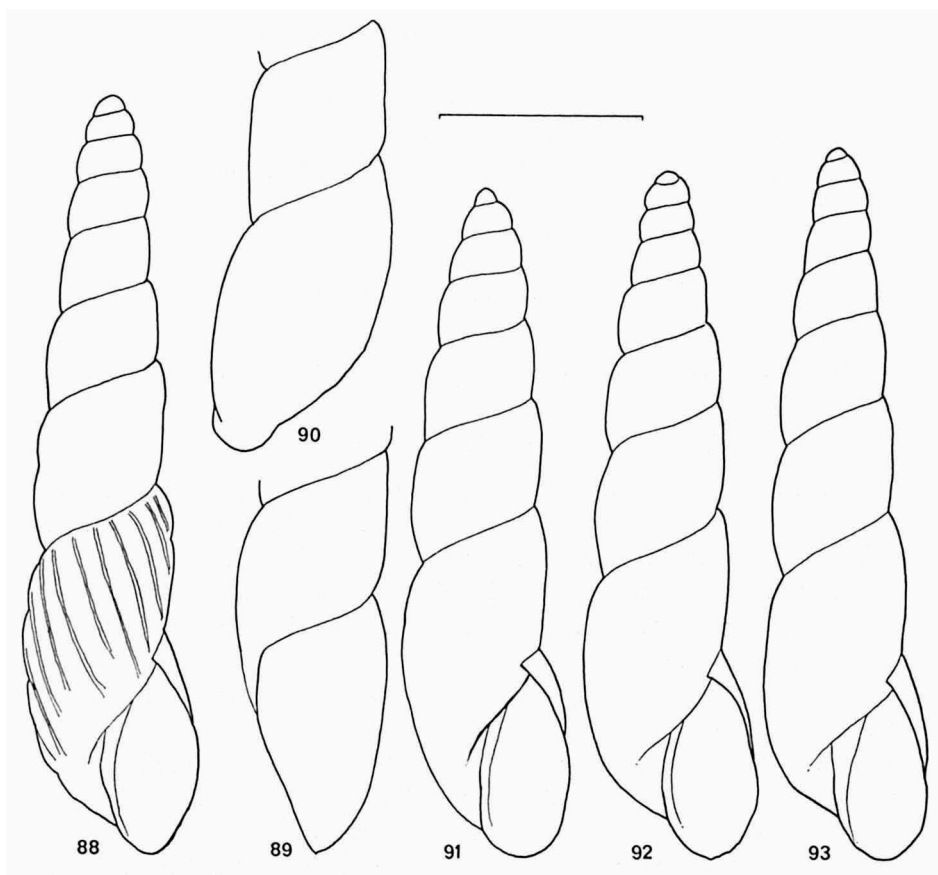


Fig. 88-93. *Bostryx cracentis* sp.n. Peru, Ancash, 5 km SW Chavin de Huantar. Holotype (fig. 88-90) and paratypes (UF). Scale line = 5 mm.

numerous fine spiral lines and low, irregular axial riblets. Whorls 8, slightly convex; suture well impressed. Aperture elongate-ovate, skewed, about 2 times as long as wide, 0.27 times the total length. Peristome thin and simple. Columellar margin narrowly dilated above.

Measurements (in mm) and statistics of characters and ratios (N=8):

|     | H     | D    | HA   | WA   | LW   | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|------|------|------|------|------|-------|------|------|
| M   | 15.75 | 3.81 | 4.25 | 2.13 | 7.74 | 4.14 | 2.01  | 0.27 | 0.49 |
| s   | 1.29  | 0.36 | 0.32 | 0.18 | 0.33 | 0.20 | 0.16  | 0.02 | 0.04 |
| max | 17.7  | 4.2  | 4.7  | 2.3  | 8.3  | 4.42 | 2.35  | 0.30 | 0.57 |
| min | 13.8  | 3.3  | 3.7  | 1.8  | 7.3  | 3.86 | 1.83  | 0.25 | 0.45 |

Measurements of holotype: shell height 17.7 mm, diameter 4.2 mm, height of aperture 4.5 mm, width 2.3 mm, height of last whorl 8.3 mm; 8.3 whorls.

Type material. — Peru, Dept. Ancash, 5 km SW Chavin de Huantar, 3300 m (F. G. Thompson leg., 2-IV-1972). Holotype: UF 22816. Paratypes UF 22817/22, RMNH 55322/6, same data.

Comparisons. — This new species may be compared to *Bostryx ploegerorum* sp.n., from which it differs in (1) being more elongate ( $H/D = 4.14$  vs. 2.83), (2) having the growth striae more strongly incassate, (3) the narrower perforation.

Etymology. — (L.) cracentis, slender.

#### ***Bostryx crucilineatus* Weyrauch, 1967**

The type locality of this species is: Río Santa Eulalia valley, Peru. A new locality is: Río Rimac valley, ca. 75 km ENE Lima, 2100 m (Sta. 72; RMNH/2).

#### ***Bostryx cunyacensis* nom. n. (figs. 94-99)**

Genitalia. — Penis with a sheath (ca.  $1/4$ - $1/5$  the length of the phallus), subcylindrical, swollen above the distal end of the sheath. There is no external differentiation between penis and epiphallus. The flagellum is more or less tapering and ca.  $1/5$  the length of the phallus. The vagina is relatively very short. The spermathecal duct is swollen at the base, but otherwise subcylindrical. The spermatheca is globose.

Histology. — Proximal part of the penis with a narrow lumen, lined by high cylindrical epithelium (max. 45  $\mu$ m high). More distally the lumen is constricted by infoldings and the (cubic) epithelium is ca. 5  $\mu$ m high; above the constriction the lumen is rather wide. The distal part of the penis with a ring-shaped gland (the epithelium is made up of cylindrical cells, ca. 29  $\mu$ m high) and a central lumen with low to high cylindrical glandular cells (ca. 10-15  $\mu$ m proximally, ca. 45  $\mu$ m in the distal part of the gland). In the single

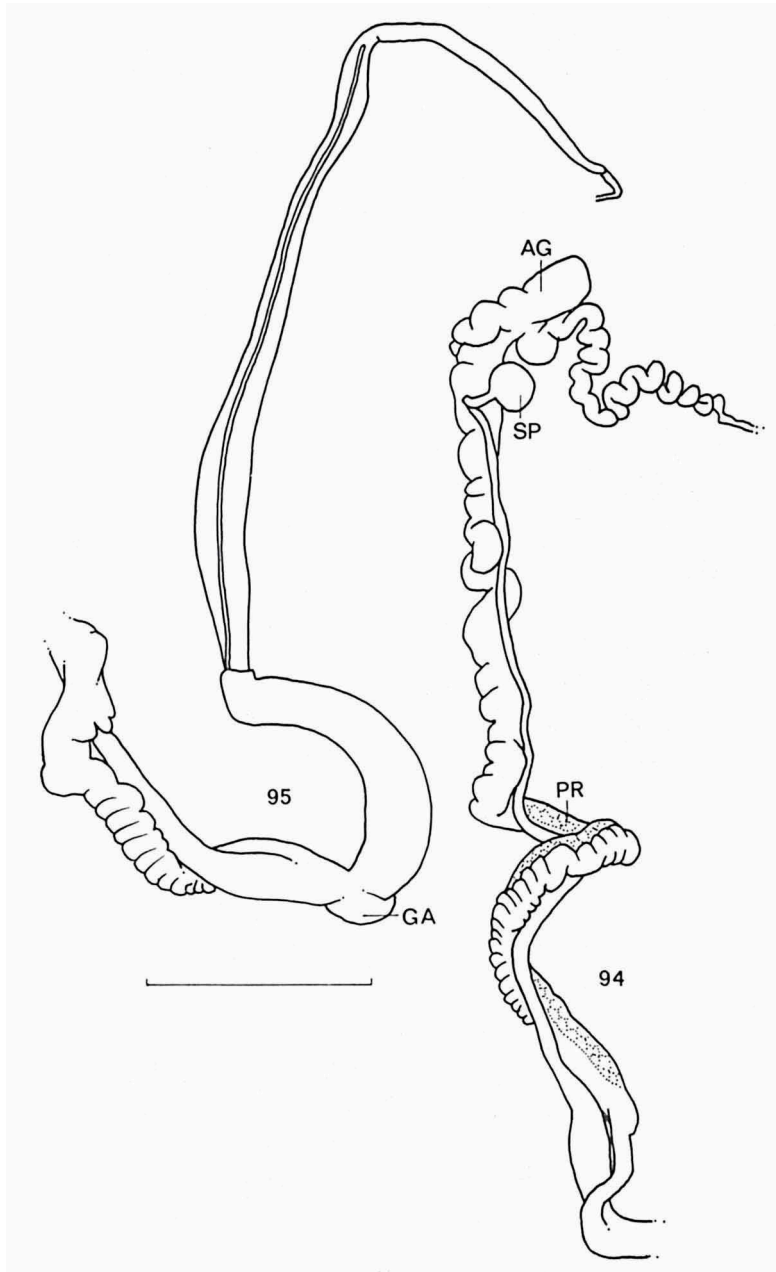


Fig. 94-95. *Bostryx cunyacensis* nom.n., genitalia. Peru, Apurimac, Puente Cunyac (IML). Scale line = 5 mm.

specimen investigated the lumen of the epiphallus was deformed by the presence of a spermatophore.

Material. — Peru, Dept. Apurimac, Puente Cunyac (IML, paratype).

Remarks. — On account of the anatomy described above the genus *Floreziellus* Weyrauch, 1967, is now considered a junior subjective synonym of *Bostryx* Troschel, 1847. The classification of *Floreziellus* as an urocoptid genus (Weyrauch, 1967b) is certainly erroneous [see, e.g., Breure, 1977b, for a description of anatomy and histology of urocoptid species].

*Bostryx cunyacensis* is here proposed as a new name for *Floreziellus florezi* Weyrauch (1967b: 489) not *Phenacotaxus* (*Ataxiellus*) *florezi* Weyrauch (1967a: 369) [= *Bostryx spiculatus florezi* (Weyrauch)].

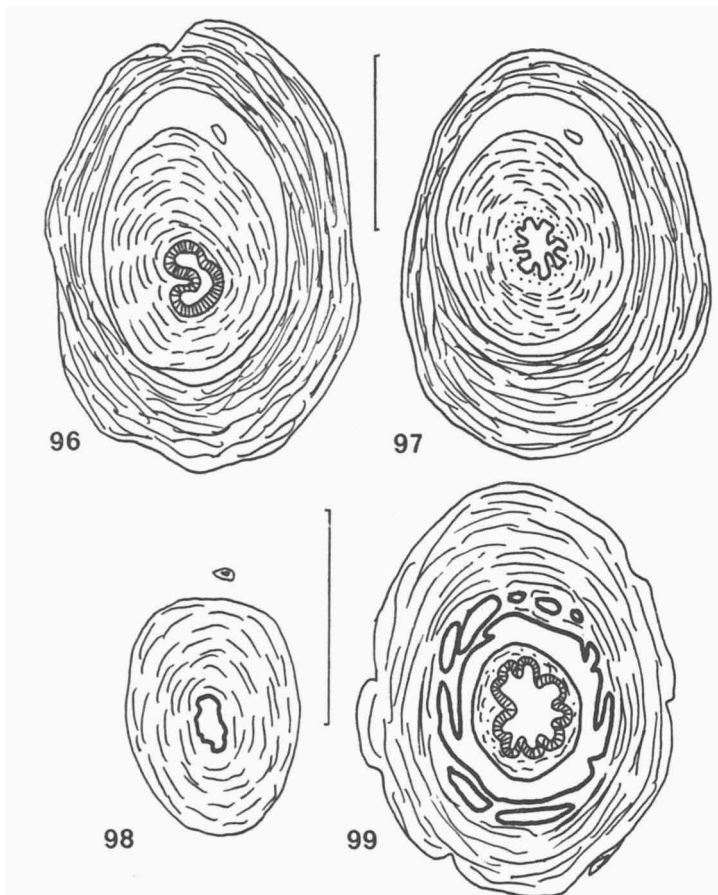


Fig. 96-99. *Bostryx cunyacensis* nom.n. Peru, Apurimac, Puente Cunyac. Transverse sections of penis (slides H 4707, 4709, 4712, 4714). Solid black lines is also epithelium. Scale line = 0.5 mm.



**Bostryx cuyanus** (Pfeiffer, 1867) (pl. 10 figs. 7, 11)

The correct authorship has been misinterpreted so far, by citing Strobel as the author and referring to his 1874 publications. In that publication, *nota bene*, Strobel himself refers to Pfeiffer.

A footnote in Strobel (1868: 548) shows how the authorship should be interpreted: Strobel sent specimens to R. A. Philippi in Santiago de Chile, who, in turn, sent some material to L. Pfeiffer. The description is thus based on material originating from Strobel, but Pfeiffer was the first to describe this species. The synonymy is thus:

*Helix cuyana* Pfeiffer, 1867 (March), Malak. Bl., 14: 79 (type locality: 'in provincia Mendoza Peruviae' [sic, Argentina]; Pfeiffer, 1867 (October), Novit. Conch., 3: 332, pl. 79 figs. 16-18; Pfeiffer, 1868, Monogr. helic. viv., 6: 260; Strobel, 1868, Atti Soc. it. Sci. nat., 11: 548; Strobel, 1874, Mater. malac. Argent.: 11, pl. 1 fig. 2.

*Bostryx* (*Platybostryx*) *cuyana*, Hylton Scott, 1953, Physis, 20: 409, figs. 5-6.

*Platybostryx cuyana*; Parodiz, 1957, Nautilus, 71: 24.

Redescription. — Shell deeply and widely perforate, with slightly convex sides, thin. Colour pale pink-brownish. Surface lustreless, with relatively low, irregular, oblique riblets. Protoconch with numerous fine spiral lines and indistinct, irregular axial wrinkles. Whorls nearly flat, the last whorl distinctly keeled at the periphery; suture hardly impressed. Aperture squarish-ovate, oblique, skewed (45 degrees to shell axis); a sulcus at the basal-palatal margin. Peristome thin and simple. Columellar margin slightly dilated above. The parietal callus is thin and transparent.

Measurements (in mm):

| H   | D    | HA  | WA  | U   | W   |
|-----|------|-----|-----|-----|-----|
| 8.0 | 19.0 | 4.7 | 9.7 | 3.5 | 4.2 |
| 7.8 | 17.0 | 4.5 | 7.9 | 3.2 | 4.1 |
| 8.2 | 17.0 | 4.7 | 7.8 | 3.0 | 0   |
| 6.9 | 18.0 | 4.8 | 8.2 | 3.3 | 4.1 |

Material. — Argentina, Prov. Mendoza, near and above Villavicencio, 1900 m (IML 1212/3, RMNH/1; topotypes).

**Bostryx delumbis** (Reeve, 1849)

Two type specimens of this species have been found in the London museum and one is here designated lectotype: shell height 22.0, diameter 14.0 mm (BMNH 1975124); the other is a paralectotype (1975558) and the material is labelled 'Peru + Bolivia' (ex Cuming).

Specimens tentatively referred to this species are from Peru, Dept. Cajamarca, 6 km SSE Cajamarca, 2920 m (UF, RMNH). This species resembles

very closely *Bostryx depstus* (Reeve, 1849), occurring in the same area, but seems to differ in being less elongate and having the last whorl slightly more inflated.

***Bostryx dendritis* (Morelet, 1863)**

The specimen figured by Morelet (1863: pl. 9 fig. 5) has been located in the Geneva museum and is here designated lectotype: shell height 21.0 mm, diameter 7.6 mm (labelled 'Huiro, val St. Ana Pérou'). Ten paralectotypes in the same collection originate from 'Pont de Chahuillay, valle de Santa Anna, Pérou' (2 specimens), 'Vilcabamba' (2 specimens) and 'Huatquina' (6 specimens). One paralectotype is in the London museum (BMNH 1893.2.4.237), labelled 'Miota, vallée de Sta Anna'.

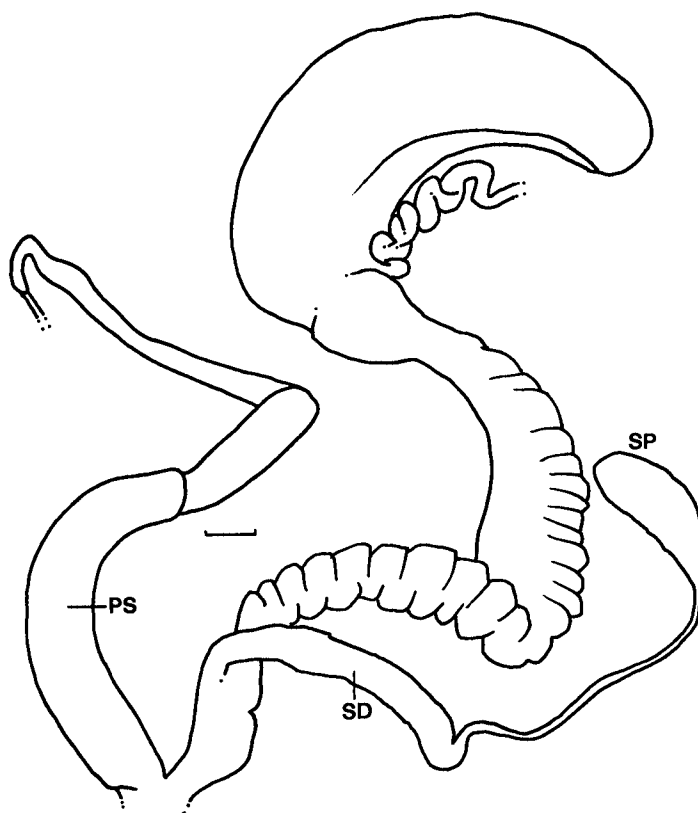


Fig. 100. *Bostryx depstus* (Reeve), genitalia. Peru, 5 km S Cajamarca (RMNH).  
Scale line = 1 mm.

***Bostryx depstus*** (Reeve, 1849) (fig. 100)

The specimen figured by Reeve (1849: pl. 73 fig. 525) is designated lectotype: shell height 19.0 mm, diameter 10.1 mm (BMNH 1975318). Additionally there are two paralectotypes in the same collection (1975319). The material is labelled 'Peru' (ex Cuming).

Genitalia. — Penis with a sheath (ca.  $\frac{2}{5}$  the length of the phallus), subcylindrical, passing without external differentiation into the epiphallus, which is slightly more slender. The flagellum is as broad as the epiphallus, with a distal retractor muscle. The vagina is short. The spermathecal duct is more or less subcylindrical, its distal part narrow. The spermatheca is elongate-globose.

Material. — Peru, Dept. Cajamarca, 5 km S Cajamarca, road to San Juan, 2900 m (Sta. 214; RMNH).

***Bostryx devians*** (Dohrn, 1863) (pl. 9 fig. 4)

One specimen, which fits the original description and measurements, was found in the British Museum (Natural History). This species, which has not been figured before, probably belongs to the *Bostryx bermudezae*-group; its locality is unknown.

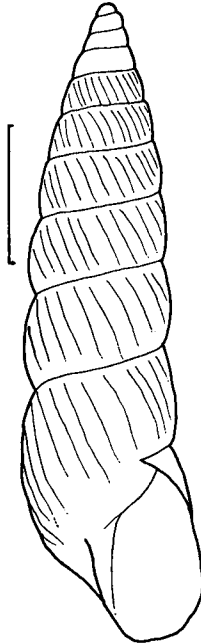


Fig. 101. *Bostryx emaciatius* (Morelet). Peru, Apurimac, Hacienda San Carlos (RMNH). Scale line = 5 mm.

***Bostryx emaciatus* (Morelet, 1863) (fig. 101)**

The type material has been located in the Geneva museum and one specimen, which corresponds to Morelet, 1863: pl. 11 fig. 10 upper figures, is designated lectotype: shell height 21.5 mm, diameter 5.7 mm. The same lot, which is labelled 'Acobamba, Pérou', comprises two paralectotypes. Additional paralectotypes in the same collection originate from Paucara (two specimens), Cocharcas (three specimens), Andahuailas (two specimens), Pucra (eleven specimens), Ollantaïtambo (three specimens); 69 specimens are present without exact locality.

Type material has also been found in the British Museum (Natural History): three specimens labelled 'Pérou' (ex Morelet; BMNH 1893.2.4. 248-250).

Redescription. — Shell rimate, with hardly convex sides, elongate (turritid), rather thin. Colour whitish. Surface slightly shining, with irregular axial costulae. Protoconch smooth. Whorls rather convex; suture deeply impressed. Aperture subovate, slightly oblique, attenuated at the base. Peristome thin and simple. Columellar margin hardly dilated.

A new locality is: Peru, Dept. Apurimac, Río Pincos valley, Hacienda San Carlos, 2225 m (Sta. 119; RMNH/1).

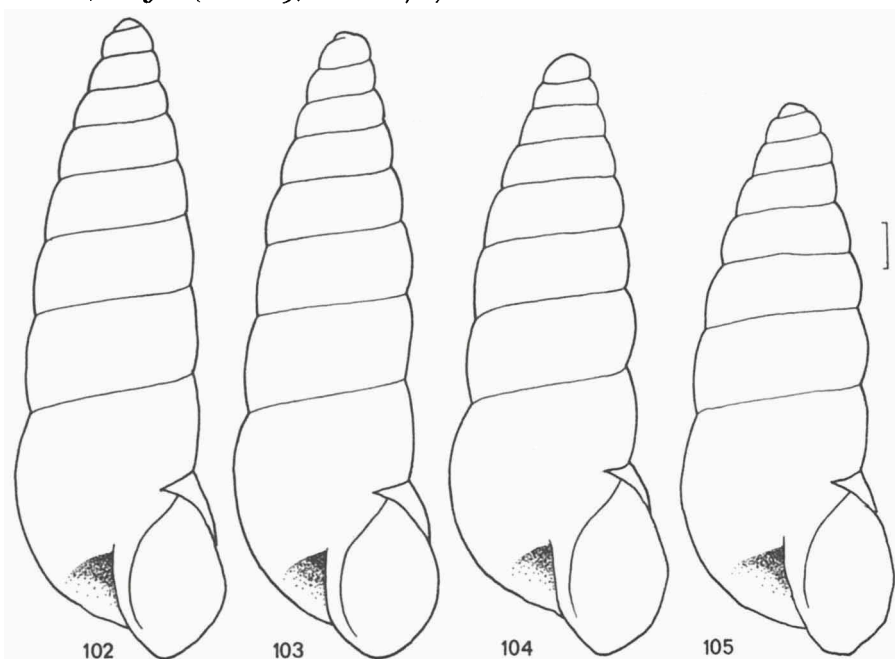


Fig. 102-105. *Bostryx endoplax* Pilsbry. Peru, Ayacucho, Hacienda Ninabamba (IML). Scale line = 1 mm.

***Bostryx endoplax*** Pilsbry, 1944 (figs. 102-105)

Topotypes from Peru, Dept. Ayacucho, Hacienda Ninabamba, Cerro Huachulla, 2100 m (IML/37, RMNH/10) enable me to refigure this species.

Measurements (in mm) and statistics of characters and ratios (N=10):

|     | H     | D    | HA   | WA   | LW   | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|------|------|------|------|------|-------|------|------|
| M   | 12.02 | 4.37 | 3.13 | 1.97 | 5.00 | 2.76 | 1.60  | 0.26 | 0.42 |
| s   | 0.56  | 0.23 | 0.01 | 0.18 | 0.15 | 0.20 | 0.13  | 0.01 | 0.02 |
| max | 13.0  | 4.6  | 3.2  | 2.3  | 5.2  | 3.07 | 1.88  | 0.28 | 0.44 |
| min | 11.1  | 4.0  | 3.0  | 1.7  | 4.7  | 2.48 | 1.48  | 0.24 | 0.38 |

***Bostryx extensus*** (Haas, 1955) (figs. 106-111)

Living specimens of this species were collected at Hacienda San Carlos, Río Pincos valley, Dept. Apurimac, Peru (Sta. 119/119A).

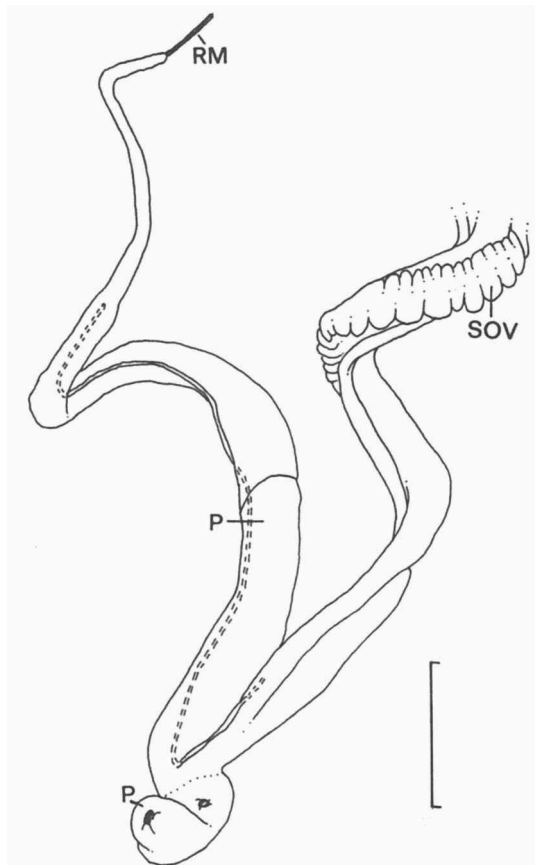


Fig. 106. *Bostryx extensus* (Haas), genitalia. Peru, Apurimac, Río Pincos valley (RMNH). Scale line = 5 mm.

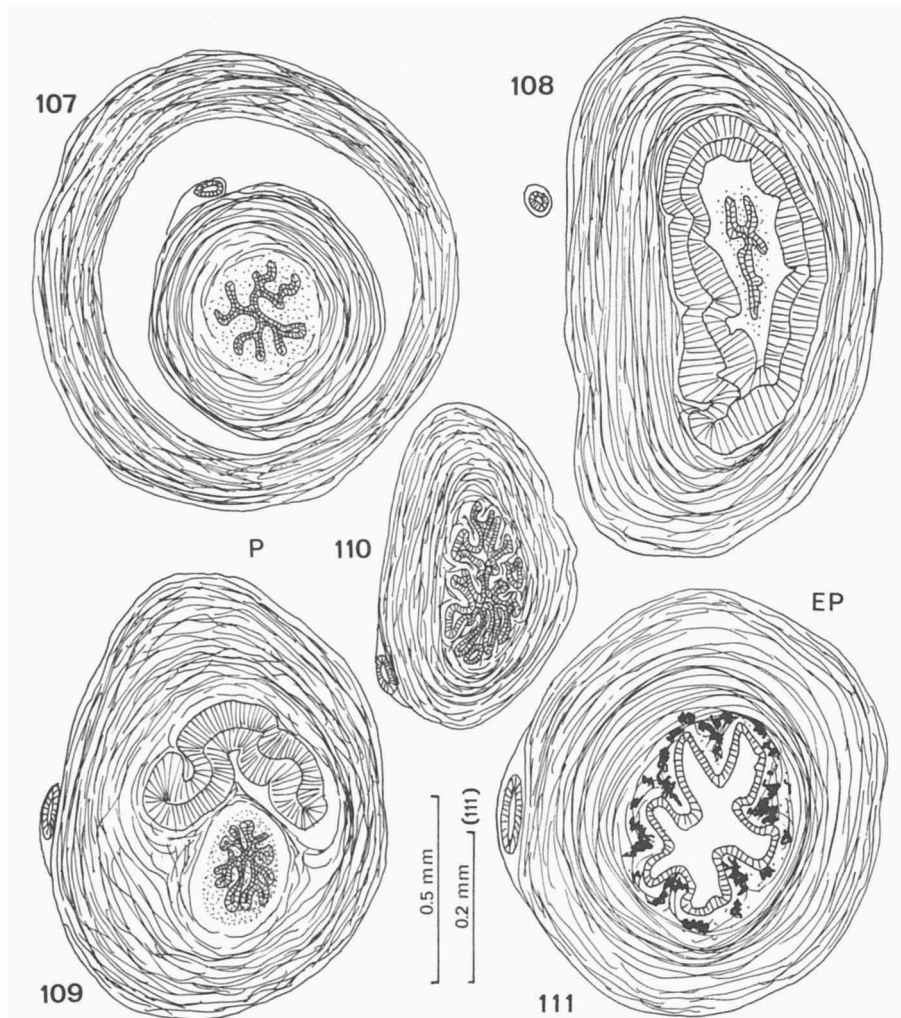


Fig. 107-111. *Bostryx extensus* (Haas). Peru, Apurimac, Río Pincos valley. Transverse sections of penis (fig. 107-110, slides H 1357, 1363 (2x), 1365) and epiphallus (fig. 111, slide H 1367).

Genitalia. — Penis with a long sheath (ca.  $\frac{1}{3}$  the length of the phallus). The penis and epiphallus, which cannot be distinguished externally, are tapering. The flagellum is subcylindrical with a long and slender retractor muscle at its distal end. The vagina is short, ca.  $\frac{1}{4}$  the length of the penis sheath. The spermathecal duct is tapering.

Histology. The proximal part of the penis with a narrow, star-shaped lumen, which is lined by cubic epithelium (cell height  $8\ \mu\text{m}$ ). The underlying

tissue is made up of connective tissue, longitudinal and circular muscle fibers. The median part of the penis with a star-shaped lumen (the cubic epithelium is 5  $\mu\text{m}$  high), surrounded by a subcircular gland, which is made up of an outer and an inner epithelium. These epithelia consist of highly cylindrical cells (cell height varying from 35-70  $\mu\text{m}$ ), which are filled with secretion granules (diameter 2-4  $\mu\text{m}$ ) staining light blue with Alcian Blue. Distally of the gland the central lumen becomes more prominent; still star-shaped and narrow it shows more ramifications with a low cylindrical epithelium (cell height 11  $\mu\text{m}$ ). There is a gradual transition to the epiphallus, of which the lumen is broadly star-shaped with a shortly ciliated cubic epithelium (cell height ca. 5  $\mu\text{m}$ ). Glandular cells staining light blue with Alcian Blue are dispersed in the subepithelial tissue.

***Bostryx ferrugineus*** (Reeve, 1849)

The type lot is in the London museum and comprises subadult specimens. One of these is designated lectotype: shell height 19.0 mm, diameter 10.7 mm (BMNH 1975380). There are two paralectotypes (1975381). The material is labelled 'Peru' (ex Cuming).

***Bostryx frederici*** sp.n. (figs. 112-116; pl. 3 figs. 7-9)

Description. — Shell up to 9.2 mm, 1.1 times as long as wide, widely perforate, with straight sides, rather thin. Colour creamy white with irregular reddish-brown axial streaks, the upper whorls uniformly light brown. Penultimate whorl with a white band at the base of the whorl; this band is continuing at the last whorl slightly below the periphery; a second white band is present around the umbilicus. Surface nearly lustreless, the growth striae incassate. Protoconch with extremely low axial, anastomosing wrinkles, which are crossed by finer spiral lines. Whorls 5.3, rather convex, generally ascending in front; suture well impressed. Aperture rather variable in form, generally ovate; length axis of aperture forming an angle of ca. (30-)45 degrees with the axis of the shell; about 1.1 times as long as wide, 0.52 times the total length. Peristome thin and simple. Columellar margin hardly dilated above.

Measurements (in mm) and statistics of characters and ratios (N=11):

|     | H    | D    | HA   | WA   | LW   | H/D  | HA/WA | HA/H | LW/H |
|-----|------|------|------|------|------|------|-------|------|------|
| M   | 8.42 | 7.75 | 4.42 | 4.02 | 5.57 | 1.09 | 1.11  | 0.53 | 0.66 |
| s   | 0.44 | 0.44 | 0.32 | 0.24 | 0.41 | 0.09 | 0.10  | 0.02 | 0.02 |
| max | 9.2  | 8.5  | 4.7  | 4.3  | 6.3  | 1.28 | 1.33  | 0.56 | 0.69 |
| min | 7.7  | 6.8  | 4.0  | 3.3  | 4.8  | 0.98 | 0.96  | 0.48 | 0.63 |

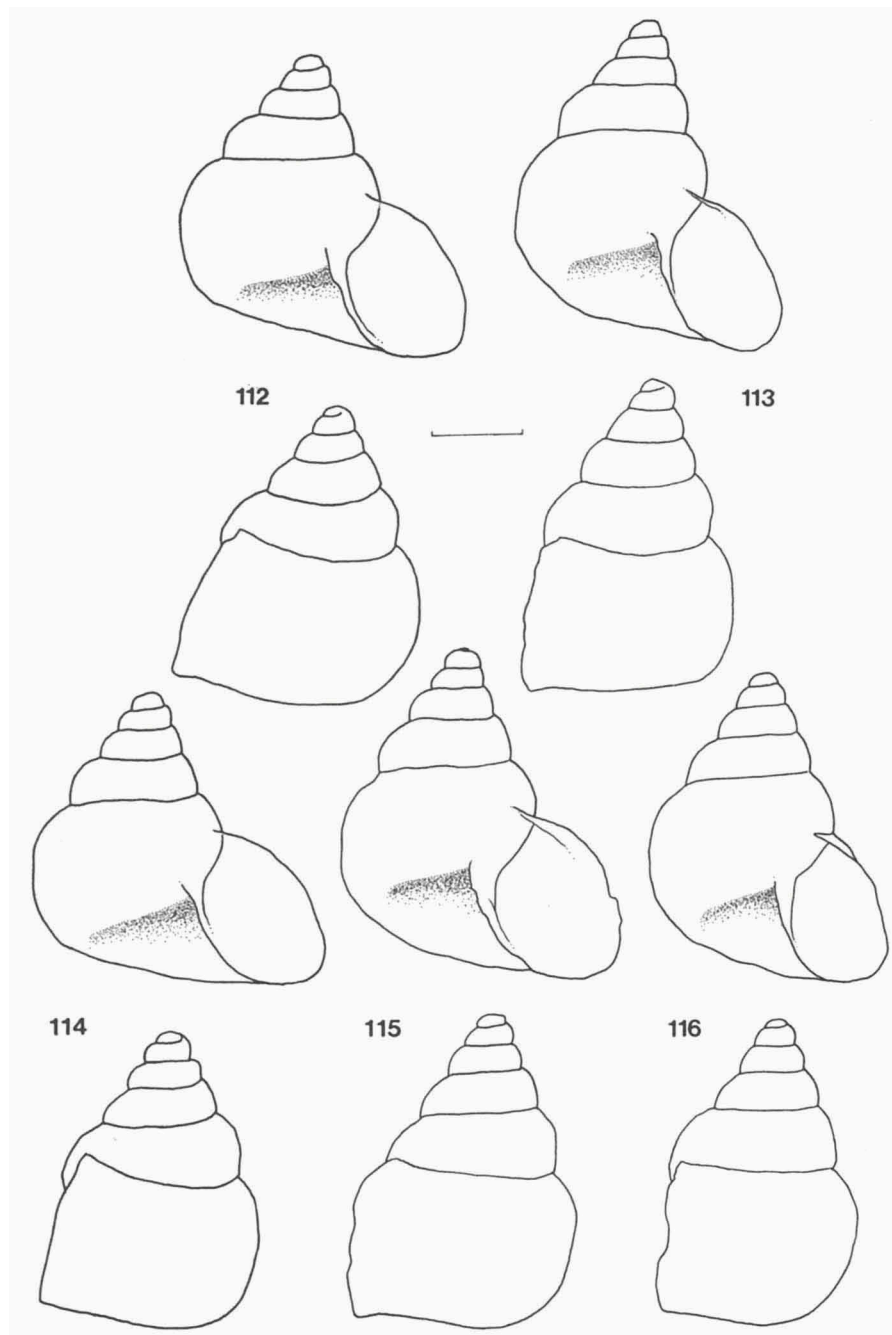


Fig. 112-116. *Bostryx frederici* sp.n. Peru, Ancash, 5 km SW Chavin de Huantar. Paratypes (UF 22802). Scale line = 2 mm.



Measurements of holotype: shell height 8.8 mm, diameter 4.5 mm, height of aperture 4.5 mm, width 4.3 mm, height of last whorl 5.7 mm; 5.4 whorls.

Type material. — Peru, Dept. Ancash, 5 km SW Chavin de Huantar, 3300 m (F. G. Thompson leg., 2-IV-1972). Holotype: UF 22801. Paratypes UF 22802/44, RMNH 55160-1/15, same data.

Comparisons. — This new species closely resembles *Bostryx metagyra* Pilsbry & Olsson, 1949 (described from 'Peru'), but differs in (1) the absence of the strong sculpture on the last two whorls, (2) the more open umbilicus, (3) the more regular whorls (especially the last whorl is less projecting from the spire).

Etymology. — It is with much pleasure that I dedicate this novelty to my colleague Dr. Fred G. Thompson (Gainesville), who has collected a considerable amount of new material during his trips and who has been kind enough to entrust me with the identification of the Bulimulidae.

***Bostryx fuliginus* sp.n. (pl. 2 figs. 5-9)**

Description. — Shell up to 34.0 mm, 2.4 times as long as wide, (narrowly) perforate, with straight sides, elongate, rather thin. Colour (a) whitish with interrupted spiral lines of reddish-brown to -purple, coalescing on the last whorl and becoming darker towards the aperture, or (b) whitish with a dark patch of reddish-purple near the aperture; the umbilicus is usually encircled by a dark reddish-brown band. Protoconch with indistinct spiral lines. Whorls 7.4, hardly convex; suture well impressed, descending in front in several specimens. Aperture subovate, the margins converging, 1.8 times as long as wide, 0.42 times the total length; purplish coloured inside. Peristome thin and simple. Columellar margin narrowly dilated above, whitish.

Measurements (in mm) and statistics of characters and ratios (N=6):

|     | H     | D     | HA    | WA   | LW    | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|-------|-------|------|-------|------|-------|------|------|
| M   | 29.42 | 12.15 | 12.18 | 6.77 | 19.36 | 2.37 | 1.81  | 0.42 | 0.65 |
| s   | 3.43  | 1.01  | 1.02  | 0.74 | 1.95  | 0.24 | 0.11  | 0.08 | 0.04 |
| max | 34.0  | 14.3  | 13.2  | 8.2  | 23.0  | 2.81 | 2.02  | 0.53 | 0.71 |
| min | 25.5  | 11.6  | 11.1  | 6.2  | 17.0  | 2.14 | 1.71  | 0.34 | 0.60 |

Measurements of holotype: shell height 29.0 mm, diameter 12.9 mm, height of aperture 12.0 mm, width 6.7 mm, height of last whorl 19.0 mm; 7.4 whorls.

Type material. — Peru, Dept. Ancash, 6 km NE San Marcos, 2730 m (F. G. Thompson leg., 7-IV-1972). Holotype: UF 22788. Paratypes UF 22789/11, RMNH 55185/3, same data.

Comparisons. — This species is readily distinguished from all other species of *Bostryx* in this area by its large size, its elongate shape and by the colour pattern.

Etymology. — (L.) fuliginus, sooty; referring to the colour pattern.

***Bostryx gayi*** (Rehder, 1945) (pl. 10 fig. 14)

This species has not been figured before. Dr. Rosewater has been kind enough to supply a photograph of the holotype (USNM 537831).

***Bostryx hamiltoni*** (Reeve, 1849) (figs. 117-124)

The type specimens of this species have been found in the London museum. One specimen is designated lectotype: shell height 17.0 mm, diameter 6.7 mm (BMNH 1975329). There are four paralectotypes (1975330); the material is labelled 'Bolivia' (ex Cuming).

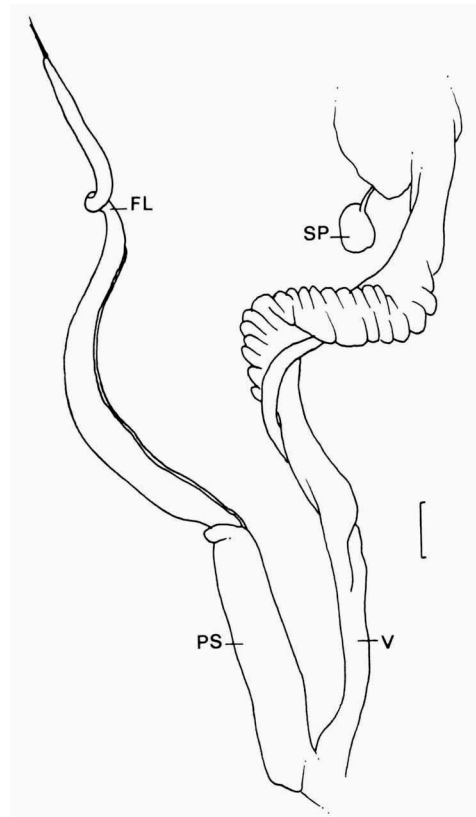


Fig. 117. *Bostryx hamiltoni* (Reeve), genitalia. Peru, Puno, E of Huanta (RMNH).  
Scale line = 1 mm.

The species is common around Lake Titicaca and has also been reported from Hacienda Mozobamba, Dept. Apurimac by Haas (1955: 325). Another locality in this region is: Río Pincos valley, Hacienda San Carlos (RMNH/2).

Genitalia. — Penis with a rather long sheath (ca. 1/3 the length of the

phallus), subcylindrical, passing without external differentiation into the epiphallus, which is slightly more slender. The flagellum is slender and rather long (as long as the penis sheath); with a distal retractor muscle. The vagina is relatively rather long. The spermathecal duct is tapering, with a globose spermatheca at its distal end.

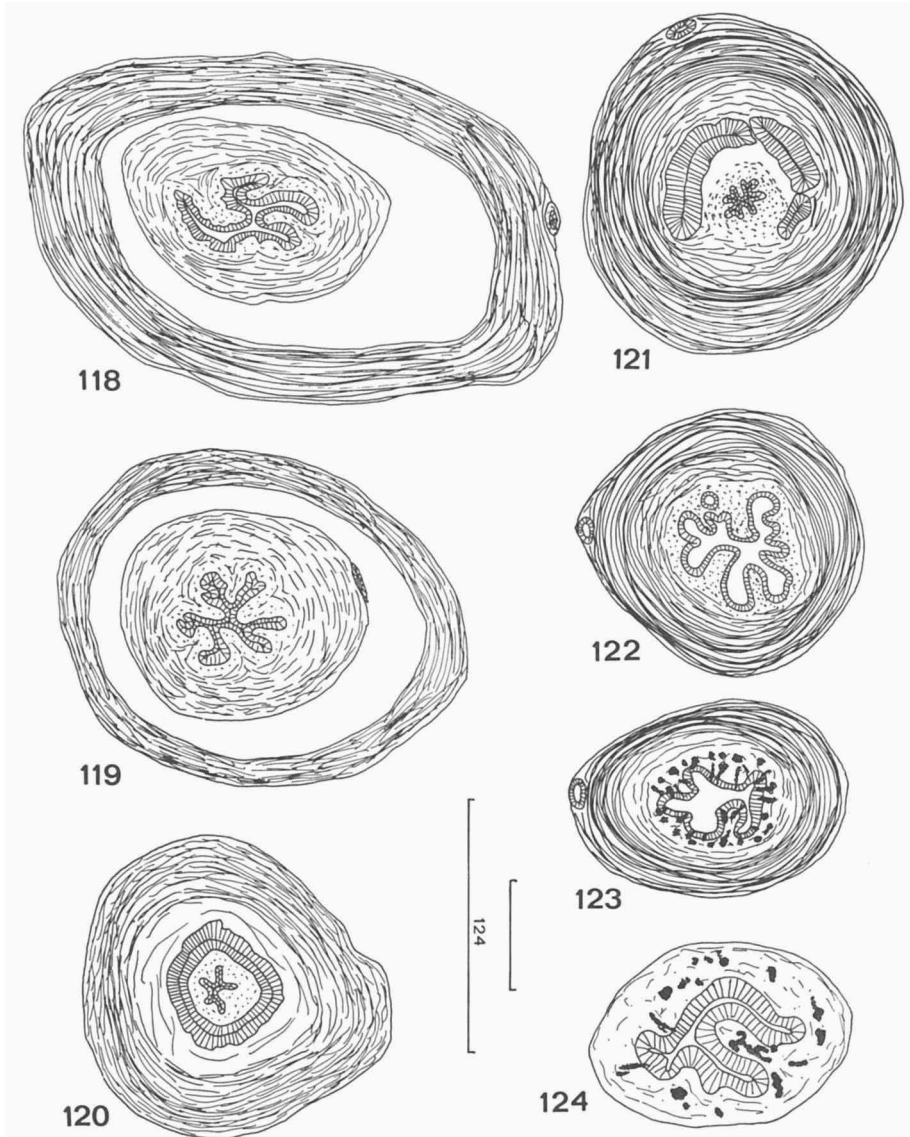


Fig. 118-124. *Bostryx hamiltoni* (Reeve). Peru, Puno, E of Huanta. Transverse sections of penis (fig. 118-122, slides H 1247, 1249, 1252, 1253, 1254), epiphallus (fig. 123, slide H 1256) and flagellum (fig. 124, slide H 1256). Scale line = 0.2 mm.

Histology. The proximal part of the penis has a narrow lumen, which is lined by cubic to low cylindrical epithelium (cell height 10-20  $\mu\text{m}$ ). In the distal part of the penis the very narrow lumen is circular and lined by high cylindrical epithelium (up to 60  $\mu\text{m}$  high), forming a ring-shaped gland. The epithelium cells contain small secretion granules, which stain light blue with Alcian Blue. The central lumen is more or less star-shaped and lined by cubic epithelium (ca. 4  $\mu\text{m}$  high). There is a gradual transition to the epiphallus, where the epithelium is low cylindrical and ca. 11  $\mu\text{m}$  high. Glandular cells are dispersed in the subepithelial tissue.

***Bostryx hennahi* (Gray, 1830)**

This species is known from 'Peru, at Arica and Tacna' (Pilsbry, 1896: 157). A new locality is: Peru, Dept. Arequipa, ca. 21 km S Atico, km 722 Panamericana Sur, 20-30 m (Sta. 81; RMNH/7).

***Bostryx hirsutus* sp.n. (figs. 125-127; pl. 12 fig. 1)**

Description. — Shell up to 11.8 mm, 1.92 times as long as wide, perforate, with straight sides, rather elongate, thin. Colour light brownish. Surface somewhat shining, with spiral series of little knobs. In fresh specimens with corresponding rows of epidermal hairs. Protoconch sculptured with numerous fine spiral lines and very low axial riblets at irregular intervals. Whorls 6.2,

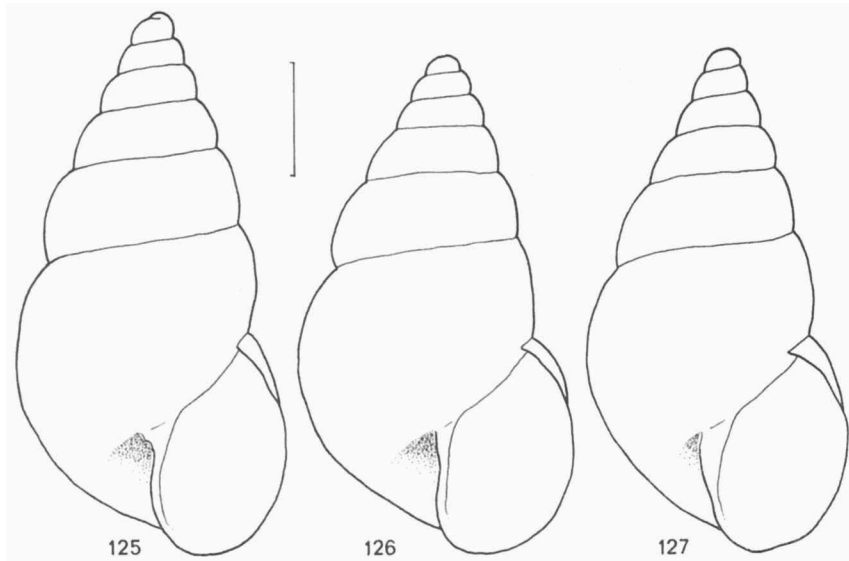


Fig. 125-127. *Bostryx hirsutus* sp.n. Peru, Cajamarca, near Chilete (IML). Scale line = 5 mm.

rather convex; suture well impressed. Aperture subovate, 1.60 times as long as wide, 0.39 times the total length. Peristome thin and simple. Columellar margin slightly reflexed and narrowly dilated above.

Measurements (in mm):

| H    | D   | HA  | WA  | LW  | W   |               |
|------|-----|-----|-----|-----|-----|---------------|
| 11.8 | 5.8 | 4.6 | 2.8 | 7.0 | 6.5 | holotype      |
| 10.8 | 5.8 | 4.3 | 2.8 | 6.8 | 6.2 | paratype, IML |
| 10.8 | 6.1 | 4.5 | 2.8 | 6.8 | 6.0 | do., RMNH     |

Type material. — Peru, Dept. Cajamarca, Río Jequetepeque valley, near Chilete, Tambo Tingo, 1000 m (W. Weyrauch leg.). Holotype and four paratypes in IML-collection, one paratype RMNH 55319.

Comparisons. — This species may be compared to *Bostryx acalles* (Pfeiffer, 1853) from which it differs in (1) the sculpture of the teleoconch, (2) being slightly more slender ( $H/D = 1.92$  vs.  $2.03$ ), (3) being smaller with the same number of whorls ( $H/W = 1.82$  vs.  $2.15$ ).

Remarks. — The sculpture of the protoconch resembles that of *Naesiotus* species, but the pattern in *hirsutus* is very irregular and the riblets are very low. The material was found with the identification '*Naesiotus hirsutus* Weyrauch' [MS.], but classification with *Bostryx* Troschel, 1847, seems to be most appropriate.

Etymology. — (L.) *hirsutus*, rough; referring to the epidermal hairs which give the shell a rough appearance.

### ***Bostryx holostomus* (Pfeiffer, 1846)**

The type specimens have been traced in the London museum and are considered syntypes (BMNH 1975345). The material is labelled 'Cobija, Bolivia' [now Chile] (ex Cuming).

### ***Bostryx huanucensis* sp.n. (figs. 128-130; pl. 1 figs. 1-4)**

Description. — Shell up to 26.5 mm, 1.9 times as long as wide, narrowly perforate, with straight to slightly convex sides, elongate, rather thin. Colour extremely variable; ground colour whitish to light yellowish with yellowish to brownish spots arranged in spiral rows that are rather equally distributed and that sometimes form axial streaks at the same time; some specimens show only axial streaks, either continuous or consisting of numerous spots; a pink band around the umbilicus and/or pink axial band at the peristome have/has been observed. Surface slightly shining, smooth. Protoconch with numerous finely incised spiral lines. Whorls 6.9, rather convex; suture well impressed. Aperture subovate, margins slightly converging; 1.6 times as long

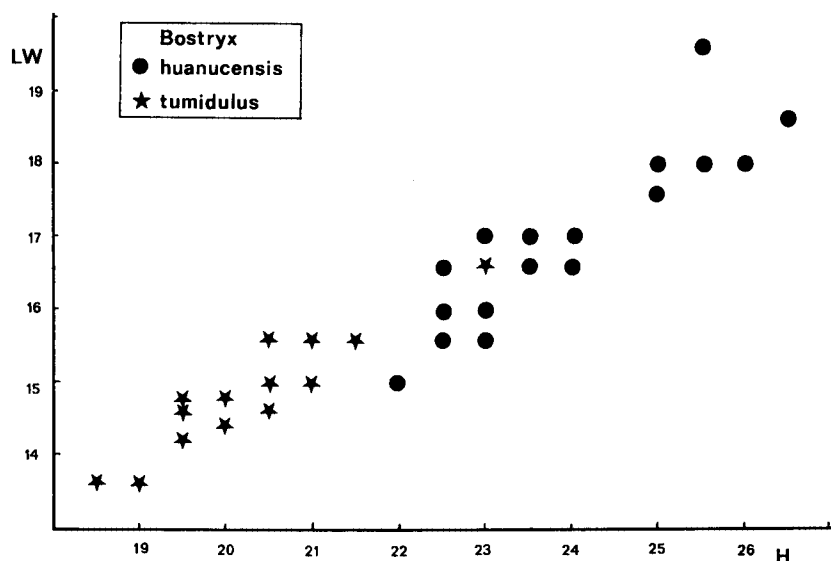


Fig. 128. Ratio of shell height (H) and height of last whorl (LW) in *Bostryx h. huanucensis* sp.n. and *B. tumidulus* (Pfeiffer).

as wide, 0.47 times total length. Peristome thin and simple. Columellar margin hardly reflexed and broadly dilated above, pink.

Measurements (in mm) and statistics of characters and ratios (N=20):

|     | H     | D     | HA    | WA   | LW    | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|-------|-------|------|-------|------|-------|------|------|
| M   | 23.83 | 12.33 | 11.22 | 6.81 | 16.88 | 1.94 | 1.65  | 0.47 | 0.71 |
| s   | 1.46  | 0.78  | 0.82  | 0.61 | 1.21  | 0.12 | 0.07  | 0.02 | 0.02 |
| max | 26.5  | 14.2  | 13.0  | 8.2  | 19.5  | 2.25 | 1.83  | 0.51 | 0.76 |
| min | 21.0  | 11.1  | 10.0  | 6.1  | 15.0  | 1.76 | 1.51  | 0.43 | 0.67 |

(N.B. Data on specimens from different populations have been summarized in this table).

Measurements of holotype: shell height 25.0 mm, diameter 12.5 mm, height of aperture 11.5 mm, width 6.3 mm, height of last whorl 17.5 mm; seven whorls.

Type material. — Peru, Dept. Huánuco, 13.1 km N Huánuco, 2040 m (F. G. Thompson leg., 6-IX-1968). UF 22757: holotype. Paratypes UF 22758/4, RMNH 55179/2, same data. Additional localities: (1) 13.0 km N Huánuco, 2060 m, UF 22760/6; (2) 12.5 km N Huánuco, 2040 m, UF 22783/30, RMNH 55180/3; (3) 12.0 km N and 2.0 km W Huánuco, 2060 m, UF 22762/4; (4) 6.9 km N Huánuco, 2060 m, UF 22763/4, RMNH 55178/1; (5) 1.9 km SE Huánuco, 2060 m, UF 22761/49, RMNH 55181/15; (6)

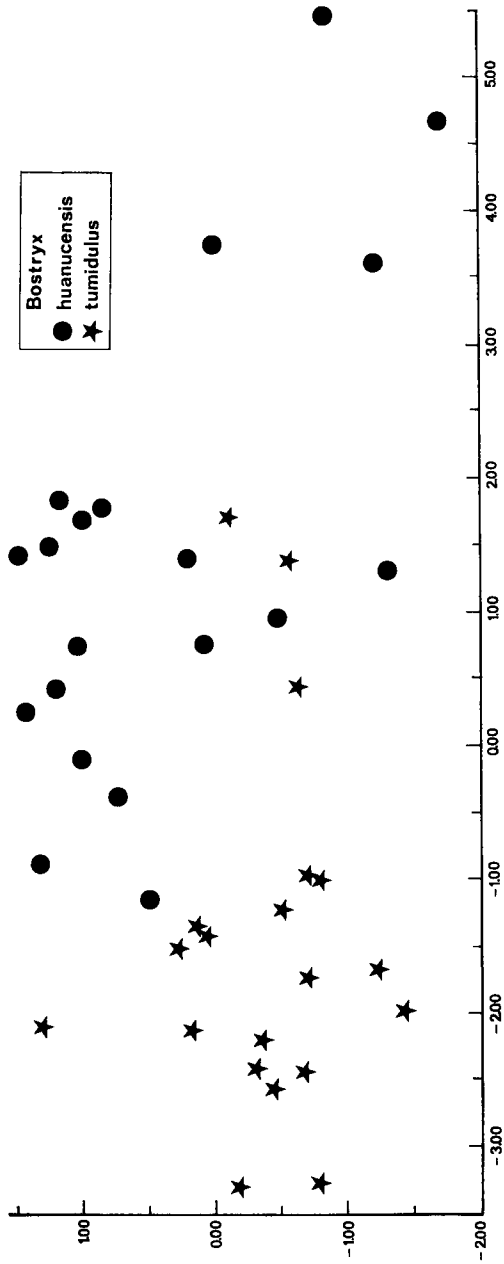


Fig. 129. Principal component analysis of *Bostryx h. huanucensis* sp.n. and *B. tumidulus* (Pfeiffer). First component explains 78% of the total variation and is principally influenced by the height of the aperture and the height of the last whorl. The second component explains 13% of the total variation and is principally influenced by the number of whorls and the width of the aperture.

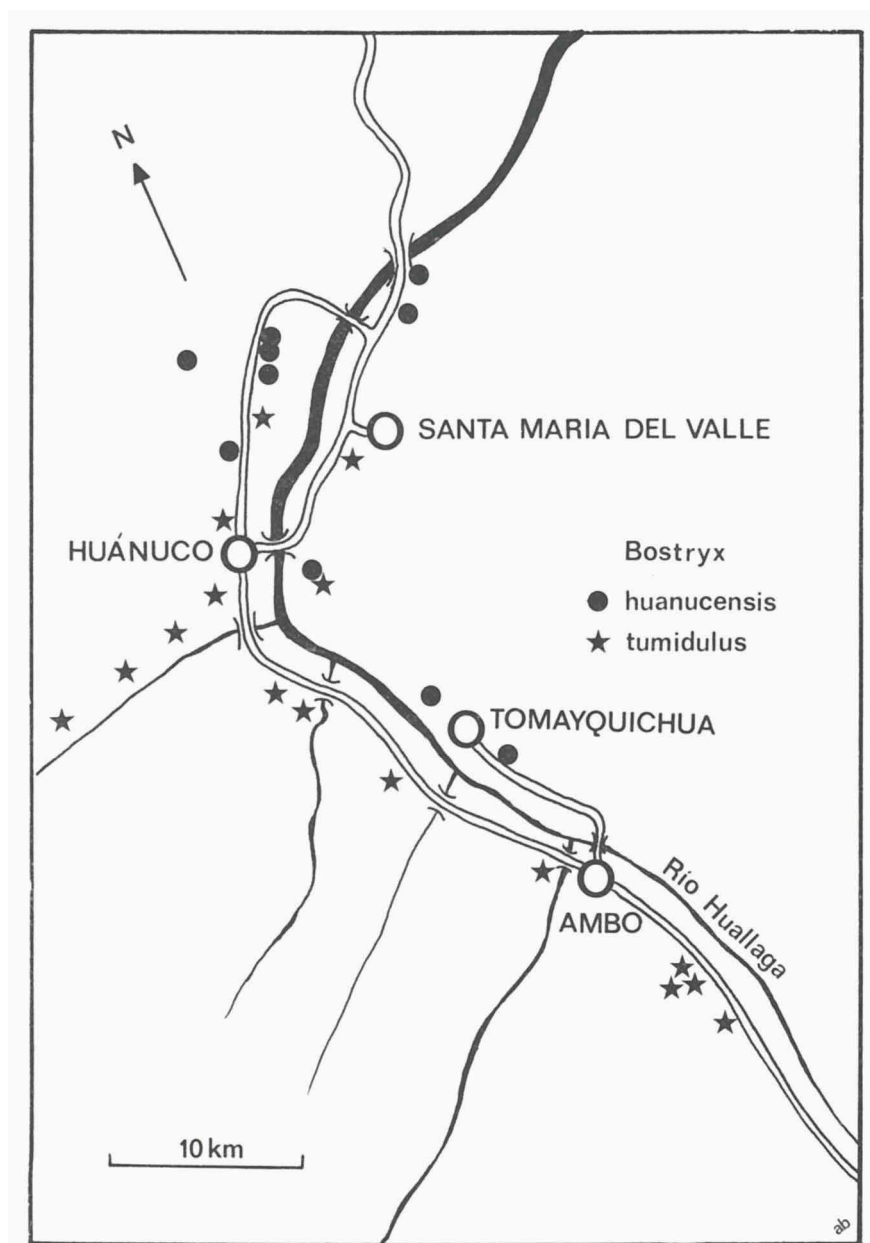


Fig. 130. Distribution of *Bostryx h. huanucensis* sp.n. and *B. tumidulus* (Pfeiffer) around Huánuco, Peru.



2.5 km N Tomayquichua, 2160 m, UF 22759/2; (7) 1.7 km S Tomayquichua, 2160 m, UF 22785/1; (8) 11 km NE Santa Maria del Valle, 1770 m, UF 22786/19, RMNH 55177/5; (9) 9.3 km NE Santa Maria del Valle, 1800 m, UF 22787/2.

Comparisons. — This species closely resembles *Bostryx tumidulus* (Pfeiffer, 1842), but differs in (1) being more elongate, (2) having the suture more impressed, (3) having the last whorl less inflated, (4) a slightly different colour pattern, (5) the ratio of the last whorl and the total length (fig. 128). Fig. 129 shows the result of principal component analysis of these two species.

Remarks. — *Bostryx huanucensis* sp.n. and *B. tumidulus* (Pfr.) seem to be very closely related. In the population 1.9 km SE Huánuco both species are found together and specimens from that locality tend to show intermediate characters. Further to the north, however, both species are found completely separated. Fig. 130 shows the distribution of both species in the region of Huánuco.

***Bostryx huanucensis povelii* ssp.n. (fig. 131-136; pl. 1 fig. 5)**

Description. — Shell up to 13.7 mm, 1.9 times as long as wide, narrowly perforate, with slightly convex sides, moderately elongate, rather thin. Colour yellowish with irregular axial streaks of (reddish-)brown, which are crossed by more or less interrupted brown spiral bands; a pink band around the umbilicus and/or a pink axial band at the peristome have/has been observed. Surface slightly shining, the growth striae slightly incrassate and crossed by spiral lines (8-9 on penultimate whorl), thus forming oblong granules. Protoconch with finely incised spiral lines. Whorls 5.5, nearly flat; last whorl slightly descending in front; suture hardly impressed. Aperture subovate, 1.7 times as long as wide, 0.46 the total length. Peristome thin and simple. Columellar margin narrowly reflexed above, whitish to pink.

Measurements (in mm) and statistics of characters and ratios (N=11):

|     | H     | D    | HA   | WA   | LW   | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|------|------|------|------|------|-------|------|------|
| M   | 12.30 | 6.50 | 5.75 | 3.47 | 8.74 | 1.90 | 1.66  | 0.46 | 0.71 |
| s   | 0.79  | 0.60 | 0.60 | 0.39 | 0.69 | 0.10 | 0.05  | 0.03 | 0.02 |
| max | 13.7  | 7.3  | 6.7  | 4.1  | 9.7  | 2.07 | 1.73  | 0.49 | 0.73 |
| min | 11.4  | 5.7  | 4.9  | 2.9  | 7.7  | 1.80 | 1.56  | 0.42 | 0.67 |

Measurements of holotype: shell height 12.5 mm, diameter 6.1 mm, height of aperture 5.3 mm, width 3.2 mm, height of last whorl 9.0 mm; 5.4 whorls.

Type material. — Peru, Dept. Pasco, 42.5 km NNE Cerro de Pasco, 2800 m (Sta. 152, A. S. H. Breure leg., 13-III-1975). Holotype RMNH 55199.

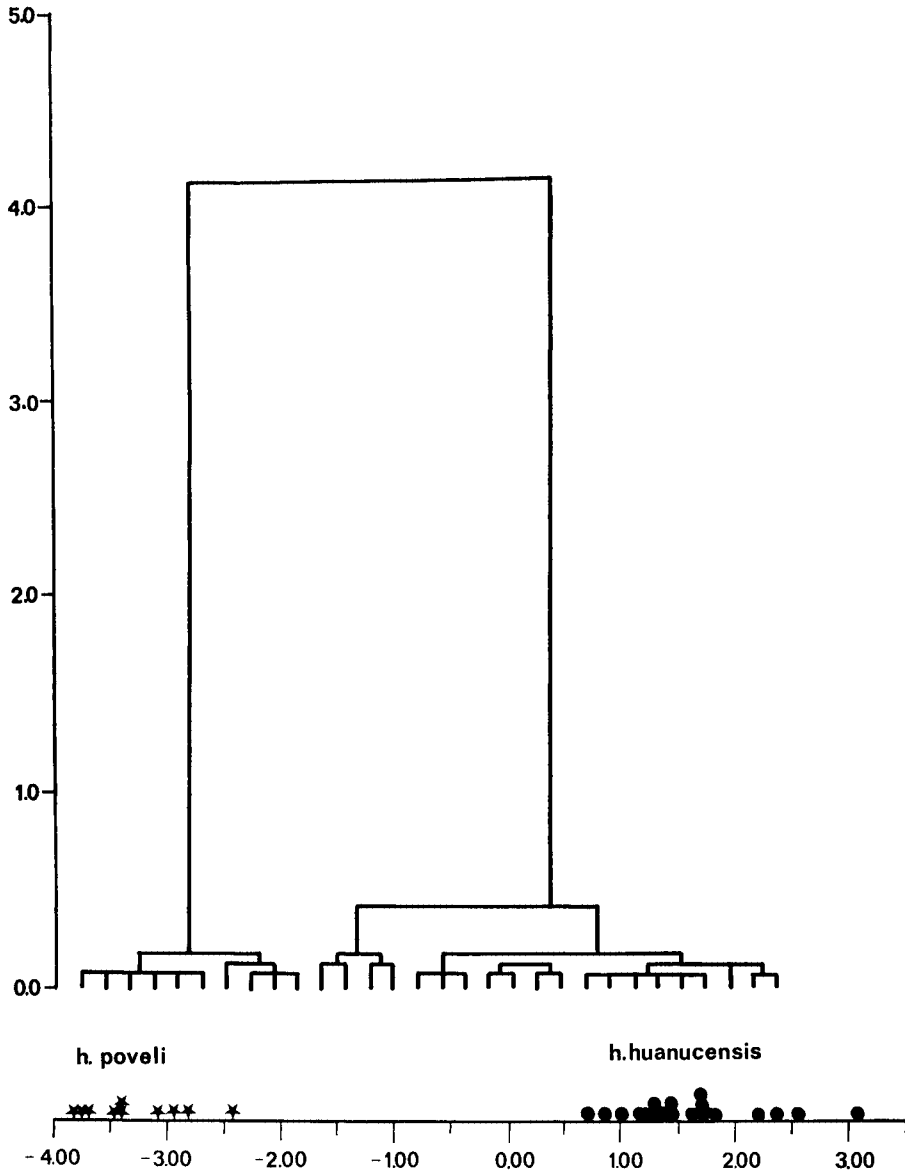


Fig. 131. Cluster analysis and principal component analysis of *Bostryx h. huanucensis* sp.n. and *B. h. povelii* ssp.n. Cluster analysis, using standardized data, with mean square distances in Q-mode. The first component (in the principal component analysis) explains 97% of the total variation and is principally influenced by the height of the aperture and the height of the shell.

Paratypes RMNH 55202/38, FMNH/2, SMF/2, same data. Additional localities: (1) Dept. Pasco, 26.7 km NNE Cerro de Pasco, 3250 m (Sta. 151), RMNH 55201/8; (2) Dept. Huánuco, 10.8 km N San Rafael, 2520 m, UF 22776/25, RMNH 55200/4.

Comparisons. — The new subspecies differs from *Bostryx huanucensis huanucensis* mainly in size (maximum shell height 13.7 vs. 26.5 mm). Cluster analysis and principal component analysis (fig. 131), however, show that both taxa are clearly separated.

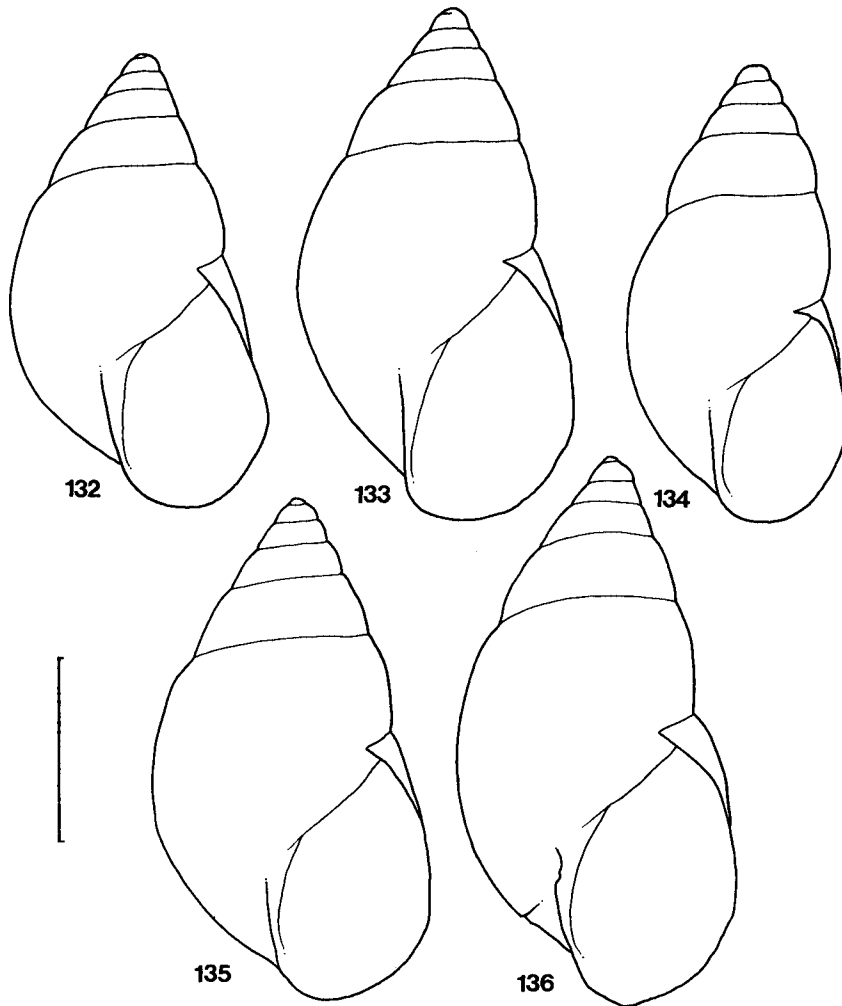


Fig. 132-136. *Bostryx huanucensis povelii* ssp.n. Paratypes from Peru, Pasco, 42.5 km NNE Cerro de Pasco (fig. 132-134) and Peru, Huánuco, 10.8 km N San Rafael (fig. 135-136). All material in RMNH. Scale line = 5 mm.

Remarks. — *Bostryx h. huanucensis* is recorded from 1770-2160 m and *B. h. povelii* from 2520-3250 m, both in the Río Huallaga valley. There is thus a clear altitudinal replacement.

Etymology. — I have much pleasure in dedicating this new subspecies to my colleague Drs. David Povel (Leiden), who introduced me to the use of cluster and principal component analysis.

***Bostryx huarazensis* Pilsbry, 1944 (pl. 3 fig. 1)**

Redescription. — Shell narrowly perforate, with straight to slightly convex sides, rather solid. The following colour patterns occur (roughly classified): (a) entirely white; (b) white with 3-6 narrow, interrupted, brown spiral bands; (c) do., but with alternating narrow and broad bands; (d) do., with two broad bands. In all patterns the umbilicus is encircled by a broad brown band. Surface hardly shining, smooth. Protoconch with interrupted low axial wrinkles and numerous fine spiral lines. Whorls moderately convex, especially in the more globose forms; suture well impressed. Aperture (broadly) ovate, the margins more or less converging. Peristome thin and simple. Columellar margin slightly dilated above.

Measurements (in mm) and statistics of characters and ratios (N=15):

|     | H     | D     | HA    | WA   | LW    | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|-------|-------|------|-------|------|-------|------|------|
| M   | 22.13 | 12.97 | 10.67 | 6.81 | 16.32 | 1.71 | 1.57  | 0.48 | 0.74 |
| s   | 1.26  | 0.89  | 0.68  | 0.54 | 0.90  | 0.14 | 0.07  | 0.03 | 0.03 |
| max | 24.5  | 14.2  | 11.8  | 7.6  | 18.0  | 1.92 | 1.71  | 0.53 | 0.80 |
| min | 20.0  | 11.2  | 9.4   | 5.5  | 15.0  | 1.45 | 1.44  | 0.44 | 0.70 |

This species has been described from 'Peru, Santa valley, Huaraz [sic]'. New locality records for this species are (all Peru, Dept. Ancash): (1) 2 km N Monterrey, 3000 m (UF/38, RMNH/9); (2) 1 km E Monterrey, 3200 m (UF/32, RMNH/12); (3) 10 km E Llapash, 3740 m (UF/26, RMNH/5); (4) 16 km E Yungay, 3240 m (UF/5); (5) Guitarrero Cave, 2 km from Mantos, 52 km N Huaráz (UF/1); (6) 3 km S Macará, 2700 m (UF/11, RMNH/4).

The species resembles *Bostryx tumidulus* (Pfeiffer, 1842), *B. pauli* sp.n. and *B. huanucensis* sp.n.

***Bostryx huascensis* (Reeve, 1848)**

From the type material in the British Museum (Natural History) the specimen figured by Reeve (1848: pl. 23 fig. 147) is here designated lecto-type: shell height 19.5 mm, diameter 10.3 mm (BMNH 1975159). Four paralectotypes have been registered 1975160. The material is labelled 'Chili' (ex Cuming).

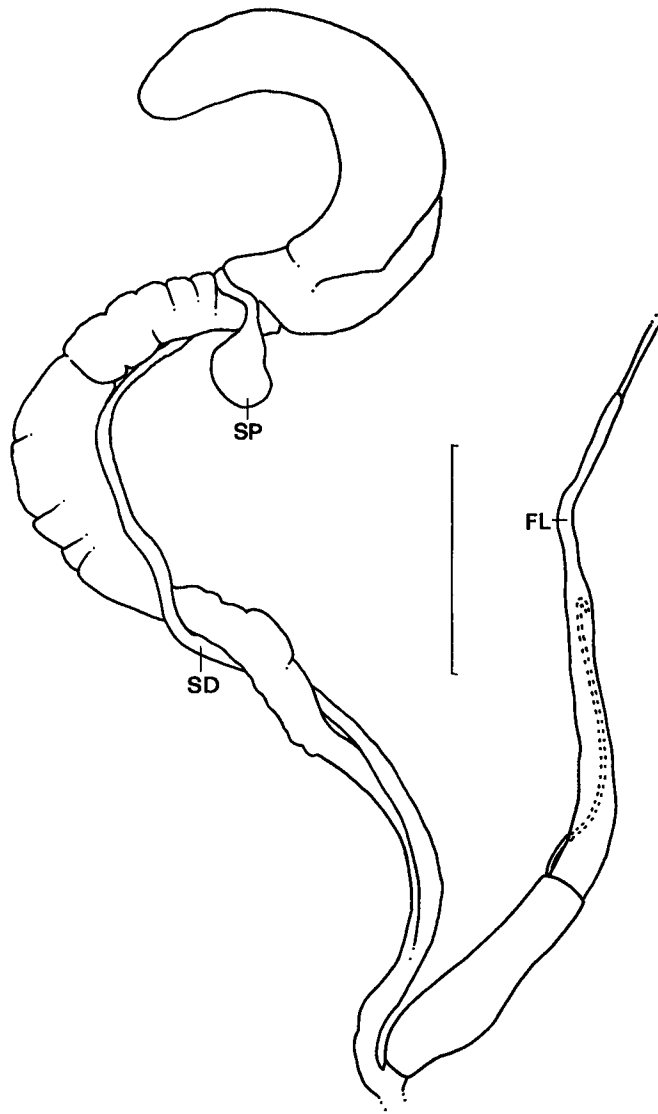


Fig. 137. *Bostryx infundibulum infundibulum* (Pfeiffer), genitalia. Peru, Apurimac, 6 km S Puente Pampas (RMNH). Scale line = 5 mm.

***Bostryx huayaboensis*** (Dautzenberg, 1901) (pl. 7 figs. 16-17)

Specimens of this species which are in the Dautzenberg-collection (IRSN) are considered syntypes. The species is refigured.

***Bostryx ignobilis*** (Philippi, 1867)

This species has been described from 'Chanchamayo, Peru'. It is rather common in the region around Tarma, Dept. Junín, at altitudes of ca. 3000-3500 m.

***Bostryx inaquosum*** nom.n. (pl. 10 fig. 13)

A new name is required for *Peronacus philippii* Rehder, 1945, not *Bulimus philippi* Pfeiffer, 1842 (also a *Bostryx* species).

The type locality of this species, which has not been figured before, is Chile, near Copiapó. A new locality is: Chile, 10 km N Antofagasta, Quebrada La Chimba, 350 m (IML, RMNH).

Etymology. — (L.) inaquosum, desert; referring to the habitat of the species.

***Bostryx infundibulum infundibulum*** (Pfeiffer, 1853) (fig. 137)

From among the type specimens in the British Museum (Natural History) one specimen is designated lectotype: shell height 18.5 mm, diameter 7.7 mm (BMNH 1975163). There are two paralectotypes (1975164) and the material is labelled 'Peru + Bolivia' (ex Cuming).

Specimens tentatively referred to this species have been collected 6 km S Puente Pampas, Dept. Apurímac (Sta. 122/122A; RMNH).

Genitalia. — Penis with a rather long sheath (ca. 1/3 the length of the phallus), subcylindrical, passing without external differentiation into the epiphallus. The flagellum is slender, as long as the penis sheath; with a distal retractor muscle. The vagina is relatively short. The spermathecal duct is subcylindrical, with an elongate-globose spermatheca at its distal end.

***Bostryx kathiae*** sp n. (figs. 138-141)

Description. — Shell up to 18.5 mm, 2.0 times as long as wide, narrowly perforate, with slightly convex sides, rather elongate, thin. Colour light brown to whitish. Surface with incrassate growth striae and spiral lines. Protoconch with low oblique, curved axial riblets and numerous fine spiral lines in between. Whorls 6.5, rather convex; suture well impressed. Aperture sub-ovate, 1.5 times as long as wide, 0.4 times the total length. Peristome thin and simple.

Measurements (in mm):

| H    | D   | HA  | WA  | LW   | W    |          |
|------|-----|-----|-----|------|------|----------|
| 18.5 | 9.4 | 7.3 | 5.2 | 12.4 | 6.5  | holotype |
| 17.5 | 8.8 | 7.3 | 4.5 | 11.6 | 6.4  | BMNH     |
| 15+  | 8.5 | 6.8 | 4.3 | 10.9 | 3.5+ | RMNH     |

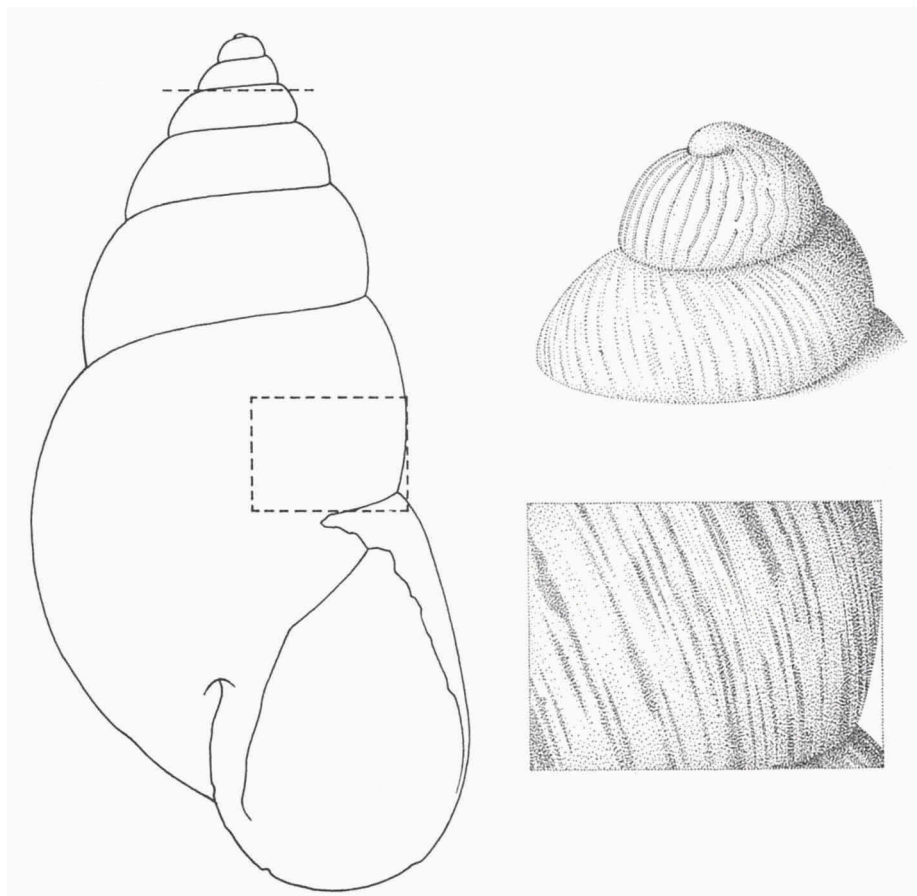


Fig. 138. *Bostryx kathiae* sp.n. Peru, Lima, 1 km above Puente Auco (RMNH). Holotype. Shell height 18.5 mm. H. Heijn del.

Type material. — Peru, Dept. Lima, Río Cañete valley, 1 km above Puente Auco, 2070 m (A. S. H. Breure leg., 5-II-1975; sta. 79). Holotype RMNH 55175. Paratypes 55174/2, BMNH 1975228/1, same data.

Comparisons. — *Bostryx kathiae* resembles *B. pruinosis* (Sowerby, 1833) but differs in (1) being more elongate, (2) being unicoloured, (3) being narrowly perforate, (4) having a broader aperture. The new species also resembles *Bostryx limensis* (Reeve, 1849), but may be distinguished by (1) being less acute, (2) having slightly convex sides, (3) being narrowly perforate, (4) having more impressed sutures. Finally this novelty may be compared to *Bostryx rouaulti* (Hupé, 1854), from which it differs in (1)

being more elongate, (2) having a less prominent last whorl, (3) having a subovate aperture.

Etymology. — I have much pleasure in dedicating this species to Mrs. Kathy M. Way (London) as a token of my deep gratitude for her generous cooperation during my research on the types of *Bulimulidae* in the London museum.

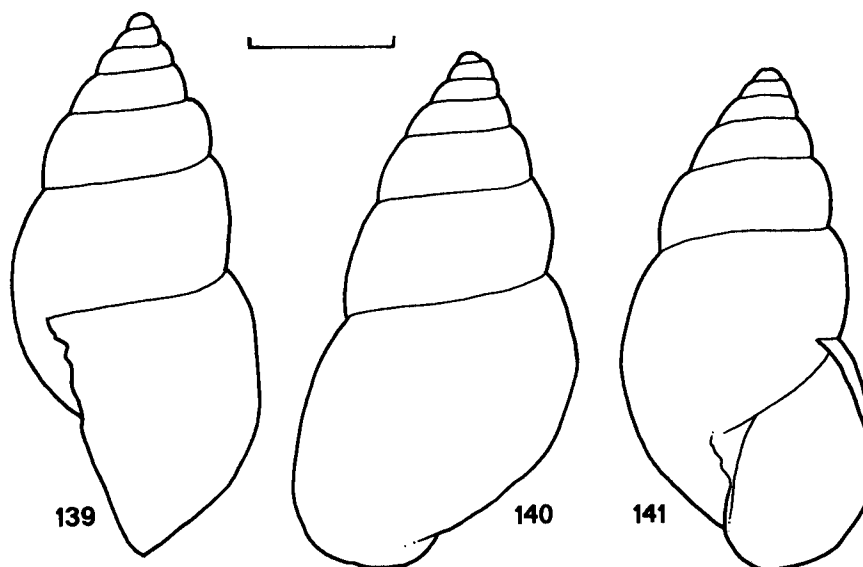


Fig. 139-141. *Bostryx kathiae* sp.n. Peru, Lima, 1 km above Puente Auco. Holotype (fig. 139-140) and paratype (RMNH). Scale line = 5 mm.

#### ***Bostryx kugleri* (Forcart, 1954)**

This species was hitherto placed in *Leiostracus* Albers, 1850. The sculpture of the protoconch of that genus is more coarse and the shape of the shells is completely different: more conical, aperture semicircular and skewed, etc. This species is here tentatively placed in *Bostryx* Troschel, 1847.

The species has been described from 'Venezuela, Est. Falcón, Distr. Colina, Porta Juella near Cumarebo', 'Est. Falcón, Distr. Zamora, Cumarebo Field', 'Est. Falcón, Distr. Acosta, near Río Tocuyo'. New locality records are (all Venezuela, Estado Falcón): (1) Paraguaná, N of Santa Ana (RMNH/2); (2) Paraguaná, E of Santa Ana, Cerro de Machuruca (RMNH/6); (3) 84.9 km S Coro, 400 m (Sta. 193; RMNH/2).

#### ***Bostryx latecolumellaris* (Weyrauch, 1967) (fig. 142)**

This species was described as *Naesiotus* (*Naesiotellus*) *latecolumellaris* by Weyrauch (1967a) [erroneously mentioned as *columellaris* on page 415]. The sculpture of the protoconch, however, consists of numerous spiral lines and



very low axial riblets at irregular intervals and largely restricted to the upper part of the whorl. This is clearly different from the regular and rather strong sculpture of the protoconch in *Naesiotus* species. *Naesiotellus* Weyrauch, 1967, is thus considered a junior subjective synonym of *Bostryx* Troschel, 1847.

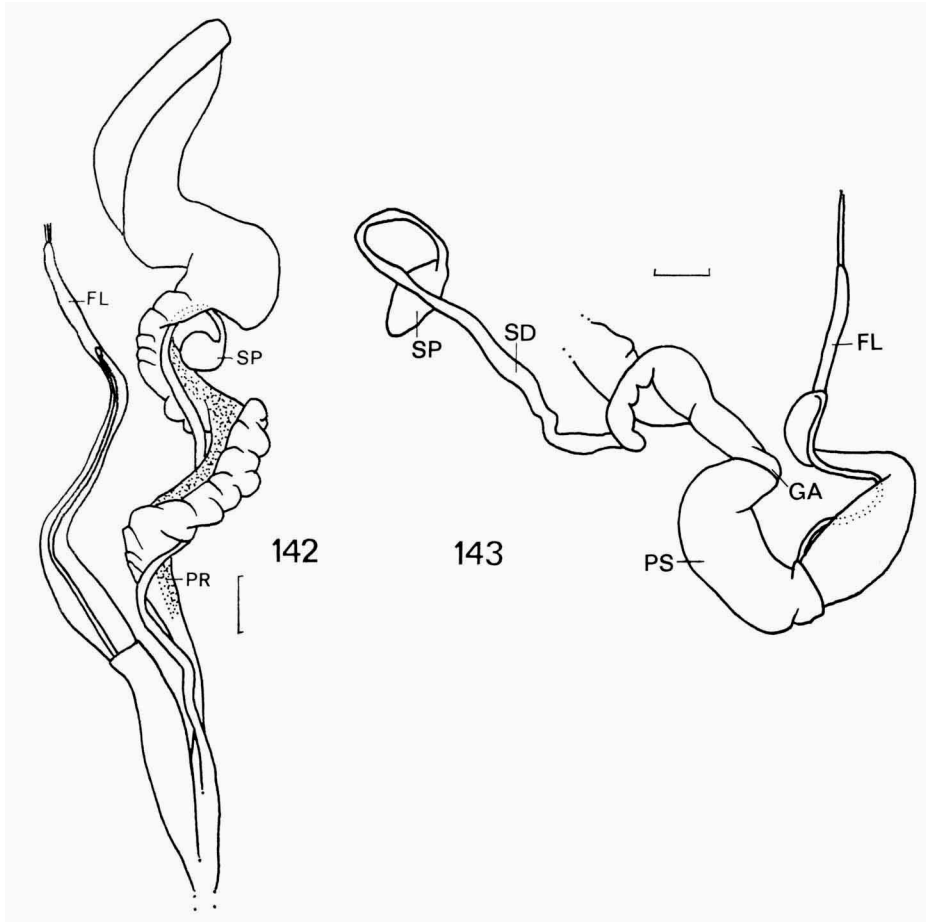


Fig. 142. *Bostryx latecolumellaris* (Weyrauch), genitalia. Peru, Lima, 1 km above Puente Auco (RMNH). Scale line = 1 mm. Fig. 143. *Bostryx lentiformis* sp.n., genitalia. Argentina, San Juan, Sierra de Tontal (MACN 12113). Scale line = 1 mm.

The species was collected alive at the type locality. The specimens have been dissected.

Genitalia. — Penis with a rather long sheath (ca. 1/3 the length of the phallus), swollen in its proximal part and above the distal end of the sheath;

passing without external differentiation into the epiphallus, which is slender. The flagellum is as slender as the epiphallus and ca.  $1/4$  the length of the phallus; with a short distal retractor muscle. The vagina is relatively short. The spermathecal duct is slender, subcylindrical and with a more or less globose spermatheca at its distal end.

Histology. The proximal part of the penis with a cubic epithelium (cell height  $10\text{ }\mu\text{m}$ ), becoming lower (ca.  $5\text{ }\mu\text{m}$ ) more distally, where the lumen is X-shaped. In the median part of the penis the lumen is ring-shaped and lined by glandular epithelium (cell height  $15\text{--}20\text{ }\mu\text{m}$ ); in its most distal part the gland is divided into separate small tubes.

***Bostryx lentiformis* sp.n.** (fig. 143; pl. 10 figs. 8-10)

Description. — Shell up to 8.5 mm high, 13.6 mm diameter, 0.60 times as long as wide, widely and deeply perforate, with straight to slightly convex sides, rather solid. Colour whitish. Surface lustreless, with coarse, oblique, irregular riblets, partly bifurcate. Protoconch with numerous fine spiral lines. Whorls 4.2, subcarinate below the suture, the last whorl distinctly keeled at the periphery and subcarinate at the umbilicus; suture hardly impressed. Aperture squarish-ovate, oblique, skewed ( $45^\circ$  to shell axis); a sulcus at the basal-palatal margin; 0.73 times as long as wide, 0.56 times the total length. Peristome thin and simple. Columellar margin hardly dilated above. The parietal callus is thin and transparent.

Measurements (in mm) and statistics of characters and ratios ( $N=7$ ):

|     | H    | D     | HA   | WA   | U    | H/D  | HA/WA | HA/H | U/D  |
|-----|------|-------|------|------|------|------|-------|------|------|
| M   | 7.69 | 12.80 | 4.31 | 5.93 | 2.26 | 0.60 | 0.73  | 0.56 | 0.18 |
| s   | 0.68 | 0.61  | 0.24 | 0.57 | 0.15 | 0.05 | 0.06  | 0.04 | 0.01 |
| max | 8.5  | 13.6  | 4.8  | 6.9  | 2.5  | 0.65 | 0.81  | 0.60 | 0.19 |
| min | 6.8  | 12.0  | 4.1  | 5.3  | 2.1  | 0.52 | 0.62  | 0.50 | 0.16 |

Measurements of holotype: shell height 8.5 mm, diameter 13.6 mm, height of aperture 4.8 mm, width 6.3 mm, diameter of umbilicus 2.4 mm; 4.2 whorls.

Type material. — Argentina, Prov. San Juan, Sierra del Tontal, 3500 m (E. Budin leg., 3-III-1921). Holotype MACN 12113a. Paratypes MACN 12113/5 + 8 subadult and juveniles, RMNH 55325/2.

Genitalia. — Penis with a proximal sheath (ca.  $2/7$  the length of the phallus), slightly swollen above the distal end of the sheath. The epiphallus is rather slender, subcylindrical. The flagellum is subcylindrical and with a long retractor muscle at the distal end. The spermathecal duct is rather swollen in its proximal part, whereas the median and distal part are narrow and subcylindrical. The spermatheca is elongate-globose.

Histology. Proximal part of the penis with an X-shaped lumen, which is lined by a very low cylindrical epithelium (ca. 5  $\mu\text{m}$  high). More distally the lumen is circular and the epithelium is 18-20  $\mu\text{m}$  high. The distal penis gland is made up of high cylindrical epithelium (ca. 30  $\mu\text{m}$  high); the cells have large basal nuclei (diameter ca. 8  $\mu\text{m}$ ) and a granulose cytoplasm. The epithelium of the epiphallus is ca. 15  $\mu\text{m}$  high and cylindrical. The lumen of the flagellum is lined by cubic to low cylindrical epithelium, 10-20  $\mu\text{m}$  high.

Comparisons. — This new species may be compared to *Bostryx doelloi* Hylton Scott, 1953, from which it differs in (1) being larger (diameter 12.8 vs. 10.8 mm), (2) being distinctly keeled at the periphery of the last whorl, (3) the whorls being subcarinate below the suture. This novelty may be distinguished from *Bostryx cuyanus* (Pfeiffer, 1867) by (1) being smaller (diameter 12.8 vs. 17.8 mm), (2) the stronger sculpture of the whorls.

Etymology. — (L.) *lentis*, shaped like a lentil; referring to the shape of the shell.

#### ***Bostryx lesueureanus* (Morelet, 1860)**

Two type specimens have been found in the British Museum (Natural History) and are considered syntypes (BMNH 1893.2.4.1182-1183). The material is labelled 'Pomacocha, Pérou'. A third syntype from this locality is preserved in the Geneva museum. Two additional syntypes from 'Laja de Cocharcas' are also in the MHNG-collection.

#### ***Bostryx leucostictus* (Philippi, 1856) (figs. 144-145)**

Genitalia. — Penis with a short sheath (ca. 1/8 the length of the phallus), rather swollen above the distal end of the sheath and more or less constricted at the transition to the epiphallus. The epiphallus is as broad as the penis and rather short. The flagellum is tapering, about half the length of the phallus and with a thin retractor muscle at its distal end. The spermathecal duct is slender and subcylindrical; the spermatheca is globose.

Material. — Chile, Prov. Antofagasta, N of Paposo (RMNH).

#### ***Bostryx limensis* (Reeve, 1849) (pl. 9 fig. 1)**

The specimen figured by Reeve (1849: pl. 77 fig. 563) is here designated lectotype: shell height 20.0 mm, diameter 10.5 mm (BMNH 1975326). Three paralectotypes (1975327) are also labelled 'Peru' (ex Cumming).

Redescription. — Shell perforate, with straight sides, moderately elongate, thin. Colour creamy with (reddish-)brown axial streaks. Surface lustreless, the growth striae incrassate, forming riblets at irregular intervals. Protoconch with finely incised spiral lines. Whorls slightly convex; suture well impres-

sed. Aperture subovate, the margins converging. Peristome thin and simple. Columellar margin dilated above, white.

***Bostryx lizarasoae* Weyrauch, 1967**

The type locality of this species is: Peru, [Dept. Huánuco] Ambo, Cerro Arcupumco, 2200 m. New localities in the same region are: (1) 6.7 km S Vichaycoto, 2100 m (UF, RMNH); (2) 7.4 km S Ambo, 2400 m (UF); (3) 7.7 km S Ambo, 2300 m (UF).

***Bostryx longinquus* (Morelet, 1863)**

From among the type material in the Geneva museum one specimen is here designated lectotype: shell height 30.0 mm, diameter 13.5 mm. This specimen (Morelet, 1863: pl. 11 fig. 2a) was collected at 'Yucaí (valle de Urubamba)'. A paralectotype in the same collection originates from 'Piré (Altos del valle Silque)' (l.c.: pl. 11 fig. 2b). Three additional paralectotypes, labelled 'Ollantaitambo', are in the London museum (BMNH 1893.2.4.185-187).

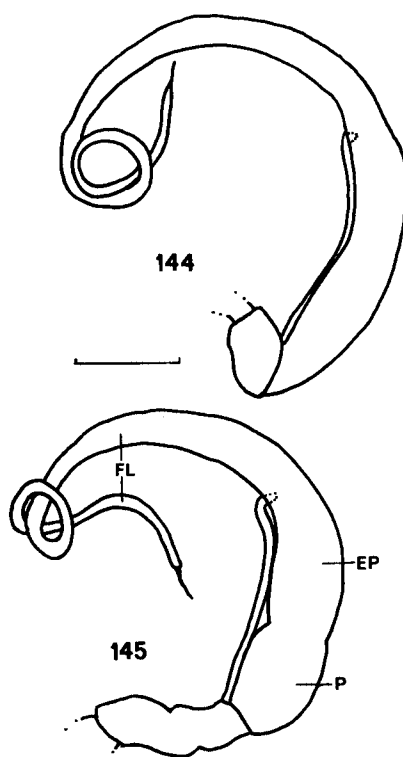


Fig. 144-145. *Bostryx lecostictus* (Philippi), genitalia. Chile, Autofagasta, N. of Paposo (RMNH). Scale line = 1 mm.

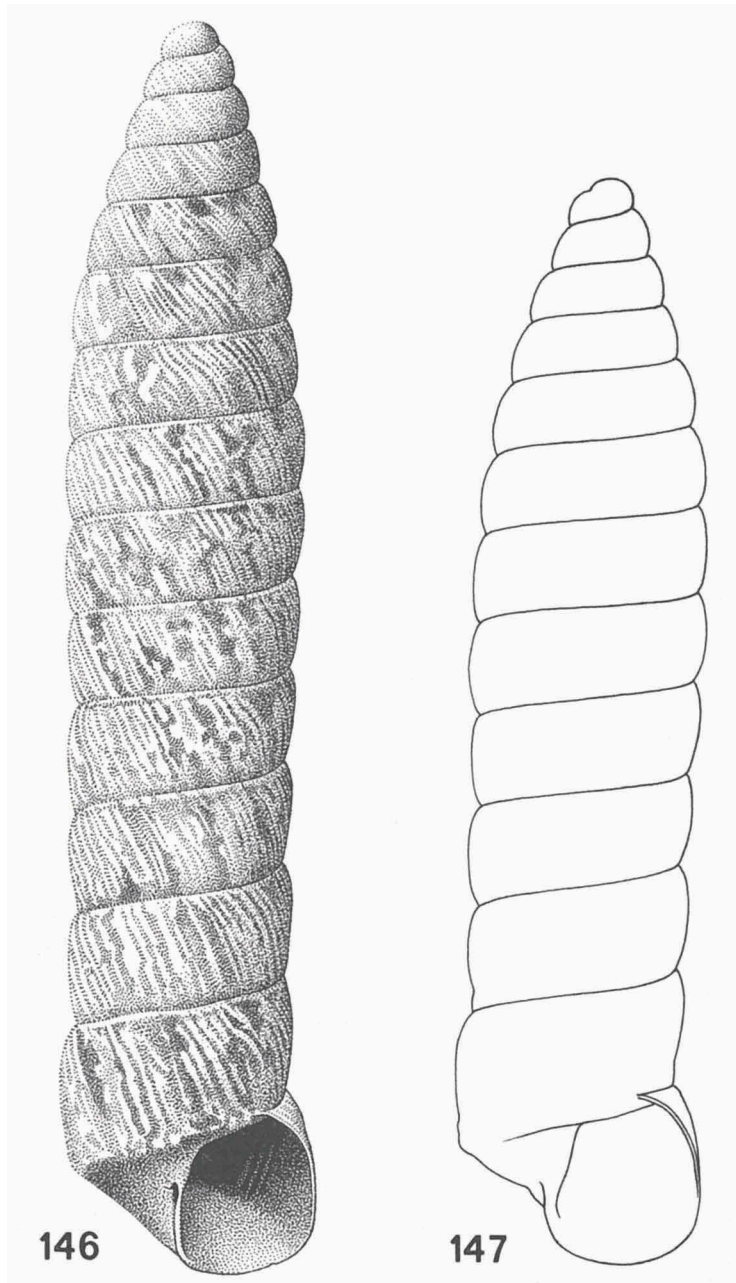


Fig. 146-147. *Bostryx lousiae* sp.n. Peru, Apurimac, 19.5 km SW Abancay. Holotype (fig. 146) and paratype (RMNH 55213). Shell height of holotype 15.5 mm. H. Heijn del.

***Bostryx louisae* sp.n.** (figs. 146-147)

Description. — Shell up to 15.5 mm, 5.2 times as long as wide, imperforate, thin; cylindrical, the first four whorls strongly increasing in diameter, shell reaching the greatest width after 7-8 whorls. Colour whitish, with an irregular pattern of corneous axial streaks. Surface shining, with incrassate growth striae. Protoconch smooth. Whorls 13.5, nearly flat, the last whorl subcarinate (in some specimens with an impressed line above the keel); suture hardly impressed. Aperture squarish-ovate, oblique, 1.2 times as long as wide, 0.13 times total length. Peristome thin and simple.

Measurements (in mm) and statistics of characters and ratios (N=9):

|     | H     | D    | HA   | WA   | LW   | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|------|------|------|------|------|-------|------|------|
| M   | 14.63 | 2.80 | 1.94 | 1.62 | 3.26 | 5.23 | 1.20  | 0.13 | 0.22 |
| s   | 0.67  | 0.11 | 0.23 | 0.13 | 0.25 | 0.28 | 0.13  | 0.02 | 0.02 |
| max | 15.5  | 3.0  | 2.3  | 1.8  | 3.6  | 5.67 | 1.33  | 0.17 | 0.26 |
| min | 13.6  | 2.7  | 1.5  | 1.5  | 2.8  | 4.83 | 0.94  | 0.11 | 0.18 |

Measurements of holotype: shell height 15.5 mm, diameter 3.0 mm, height of aperture 2.0 mm, width 1.8 mm, height of last whorl 3.4 mm; 13.5 whorls.

Type material. — Peru, Dept. Apurimac, 19.5 km SW Abancay, 1960 m (A. S. H. Breure leg., 26-II-1975; sta. 116). Holotype RMNH 55212. Paratypes RMNH 55213/20, 9063/1 [alcohol material], UF 22790/2, same data. Additional locality: Dept. Apurimac, 12 km W Abancay, 1750 m. Paratypes RMNH 55192/7, 9064/8 [alcohol material].

Comparisons. — Resembles *Bostryx iocosensis* (Dautzenberg, 1901) and *B. baeri* (Dautzenberg, 1901) but differs from both species in (1) having a more cylindrical shape, (2) having only the first four whorls strongly increasing in diameter, (3) having the aperture squarish-ovate, (4) having a lower whorls/shell height ratio (11/14.5 and 11/13 for *B. baeri* and *B. iocosensis*, respectively, vs. 13.3/14.6 for *louisae*). *Bostryx louisae* differs from all other species of the *Bostryx columellaris*-group in its small size, its cylindrical shape and its colour pattern.

Etymology. — I dedicate this species to Dr. Loek van der Molen (Leiden) as a token of my gratitude for her keen interest in my research and her multiple advice.

***Bostryx martinezi* (Hylton Scott, 1965)** (figs. 148-149)

Material from the type locality (Argentina, Prov. Córdoba, Sierra de Pocho; IML) has been dissected.

Genitalia. — Penis with a rather long sheath (ca. 1/3 the length of the phallus), slightly swollen above the distal end of the sheath, passing without external differentiation into the epiphallus, which is subcylindrical. The

flagellum is relatively short (ca. 1/7 the length of the phallus) and slender; a short retractor muscle is distally inserted. The vagina is relatively very short. The spermathecal duct is subcylindrical, its distal part tapering towards the globose spermatheca.

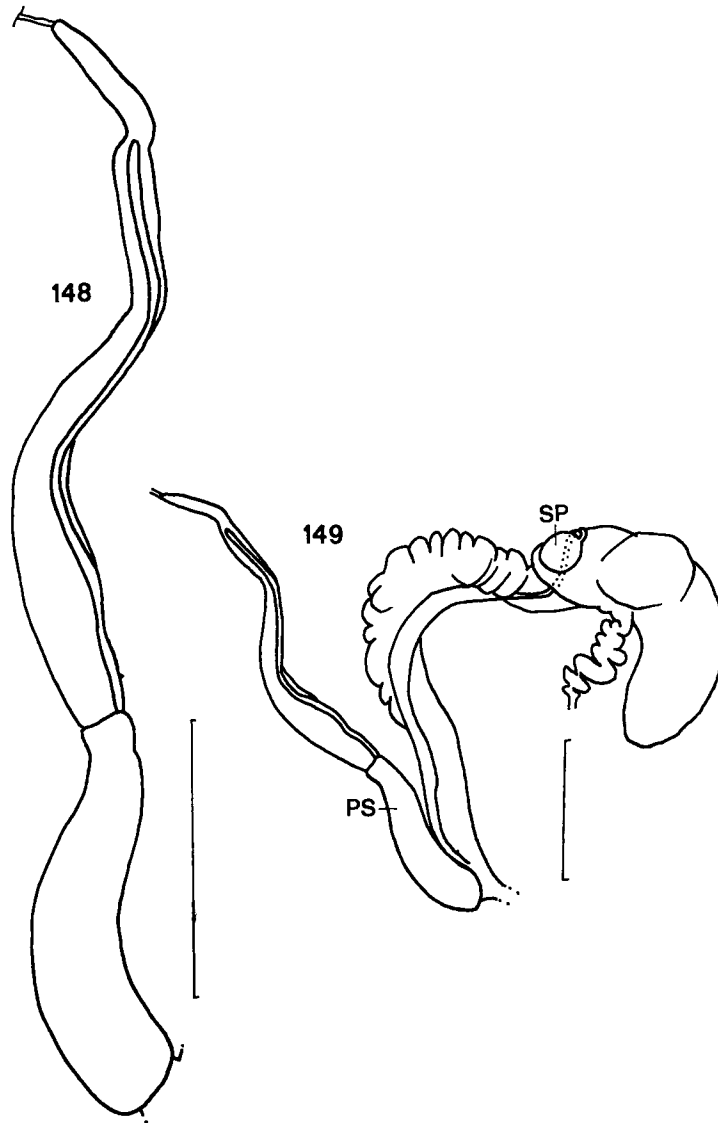


Fig. 148-149. *Bostryx martinezi* (Hylton Scott), genitalia. Argentina, Córdoba, Las Palmas-Chicani (IML). Scale line = 5 mm.

***Bostryx mejillonensis* (Pfeiffer, 1857)**

The type material of this species is in the collection of the British Museum (Natural History). One specimen is designated lectotype: shell height 25.0 mm, diameter 12.6 mm (BMNH 1975322). There are two paralectotypes (1975323). The material is labelled 'Desert of Atacamas' (ex Cuming).

***Bostryx modestus* (Broderip, 1832)**

The type locality of this species is 'Huacho and Lima' (cf. Pilsbry, 1896: 162). Weyrauch (1960: 31) has described a subspecies, *Bostryx modestus angelmaldonadoi*, from the Lomas 35 km SE Lima. In my opinion this is a highly variable species and I doubt if it is justified to recognize any subspecies. The variation of the species is shown in Table 1.

TABLE 1. Measurements (in mm) and statistics of characters and ratios in *Bostryx modestus* (Broderip).

|                                                                   | H     | D     | HA    | WA   | LW    | H/D  | HA/WA | HA/H | LW/H |                                                                  |       |       |       |      |       |      |      |      |      |
|-------------------------------------------------------------------|-------|-------|-------|------|-------|------|-------|------|------|------------------------------------------------------------------|-------|-------|-------|------|-------|------|------|------|------|
| Peru, 'Huacho and Lima' (SMF 9978; paratypes) (N = 3)             |       |       |       |      |       |      |       |      |      | Peru, Dept. Lima, Rfo Santa Eulalia valley (RPMH) (N = 5)        |       |       |       |      |       |      |      |      |      |
| M                                                                 | 21.50 | 11.13 | 10.27 | 6.03 | 14.97 | 1.95 | 1.71  | 0.48 | 0.70 | M                                                                | 18.00 | 9.75  | 7.88  | 5.02 | 12.08 | 1.85 | 1.57 | 0.44 | 0.67 |
| s                                                                 | 1.78  | 0.56  | 0.84  | 0.68 | 1.19  | 0.07 | 0.07  | 0.01 | 0.02 | s                                                                | 0.50  | 0.23  | 0.24  | 0.11 | 0.37  | 0.03 | 0.05 | 0.01 | 0.01 |
| x <sub>max</sub>                                                  | 24.0  | 11.9  | 11.4  | 7.0  | 16.5  | 2.02 | 1.79  | 0.49 | 0.72 | x <sub>max</sub>                                                 | 18.5  | 9.9   | 8.2   | 5.2  | 12.5  | 1.87 | 1.64 | 0.45 | 0.69 |
| x <sub>min</sub>                                                  | 20.0  | 10.6  | 9.4   | 5.5  | 13.6  | 1.88 | 1.63  | 0.47 | 0.68 | x <sub>min</sub>                                                 | 17.5  | 9.4   | 7.7   | 4.9  | 11.6  | 1.81 | 1.52 | 0.42 | 0.66 |
| Peru, Dept. Lima, Sayán, near Casa Vieja (SMF 147512) (N = 6)     |       |       |       |      |       |      |       |      |      | Peru, Dept. Ancash, Rfo Huarmey valley, San Damián (SMF) (N = 4) |       |       |       |      |       |      |      |      |      |
| M                                                                 | 25.00 | 13.63 | 11.88 | 7.53 | 17.16 | 1.83 | 1.58  | 0.47 | 0.69 | M                                                                | 29.88 | 14.10 | 13.32 | 7.92 | 20.12 | 2.12 | 1.68 | 0.45 | 0.67 |
| s                                                                 | 0.41  | 0.42  | 0.33  | 0.20 | 0.24  | 0.04 | 0.06  | 0.01 | 0.01 | s                                                                | 1.31  | 0.71  | 0.70  | 0.22 | 1.25  | 0.05 | 0.06 | 0.01 | 0.02 |
| x <sub>max</sub>                                                  | 25.5  | 14.1  | 12.5  | 7.8  | 17.5  | 1.91 | 1.64  | 0.49 | 0.69 | x <sub>max</sub>                                                 | 31.0  | 15.0  | 13.9  | 8.2  | 21.5  | 2.13 | 1.74 | 0.45 | 0.69 |
| x <sub>min</sub>                                                  | 24.5  | 12.8  | 11.5  | 7.2  | 17.0  | 1.79 | 1.49  | 0.46 | 0.68 | x <sub>min</sub>                                                 | 28.0  | 13.4  | 12.3  | 7.7  | 18.5  | 2.07 | 1.60 | 0.44 | 0.66 |
| Peru, Dept. Lima, Lomas Pachacamac, SE Lima (RPMH) (N = 4)        |       |       |       |      |       |      |       |      |      | Peru, Dept. Ancash, Rfo Casma, near Yantán (SMF) (N = 10)        |       |       |       |      |       |      |      |      |      |
| M                                                                 | 24.87 | 11.40 | 10.55 | 6.25 | 16.50 | 2.17 | 1.69  | 0.42 | 0.67 | M                                                                | 29.95 | 16.15 | 14.32 | 9.47 | 20.50 | 1.85 | 1.52 | 0.48 | 0.69 |
| s                                                                 | 2.09  | 0.90  | 0.72  | 0.26 | 1.00  | 0.07 | 0.08  | 0.01 | 0.02 | s                                                                | 1.57  | 0.71  | 0.52  | 0.54 | 1.05  | 0.13 | 0.09 | 0.02 | 0.02 |
| x <sub>max</sub>                                                  | 28.0  | 12.5  | 11.6  | 6.6  | 18.0  | 2.24 | 1.76  | 0.43 | 0.68 | x <sub>max</sub>                                                 | 33.0  | 17.0  | 15.5  | 10.0 | 22.5  | 2.03 | 1.66 | 0.50 | 0.71 |
| x <sub>min</sub>                                                  | 23.5  | 10.6  | 10.2  | 6.0  | 16.0  | 2.09 | 1.59  | 0.41 | 0.64 | x <sub>min</sub>                                                 | 28.5  | 14.5  | 13.5  | 8.5  | 19.0  | 1.68 | 1.40 | 0.44 | 0.66 |
| Peru, Dept. Lima, Rfo Rimac valley, 43 km ENE Lima (RPMH) (N = 7) |       |       |       |      |       |      |       |      |      | Peru, Dept. Ancash, near Pariacoto (SMF) (N = 9)                 |       |       |       |      |       |      |      |      |      |
| M                                                                 | 24.79 | 13.75 | 11.54 | 7.55 | 17.14 | 1.79 | 1.53  | 0.47 | 0.69 | M                                                                | 27.88 | 14.07 | 13.02 | 8.11 | 19.33 | 1.98 | 1.61 | 0.47 | 0.70 |
| s                                                                 | 0.76  | 0.76  | 0.30  | 0.42 | 0.85  | 0.05 | 0.09  | 0.02 | 0.02 | s                                                                | 0.65  | 0.69  | 0.59  | 0.33 | 0.66  | 0.09 | 0.05 | 0.02 | 0.01 |
| x <sub>max</sub>                                                  | 26.0  | 15.0  | 11.9  | 8.3  | 18.5  | 1.87 | 1.63  | 0.49 | 0.72 | x <sub>max</sub>                                                 | 29.0  | 15.1  | 13.7  | 8.5  | 20.5  | 2.13 | 1.67 | 0.49 | 0.71 |
| x <sub>min</sub>                                                  | 23.5  | 12.6  | 11.1  | 7.0  | 16.0  | 1.73 | 1.42  | 0.45 | 0.68 | x <sub>min</sub>                                                 | 27.0  | 12.7  | 12.4  | 7.7  | 18.5  | 1.89 | 1.50 | 0.44 | 0.68 |

*Bulimus philippi* Pfeiffer, 1842 is generally accepted as a junior synonym of this species. Three specimens of *philippi* in the London museum are considered syntypes (BMNH 1975348). The material is labelled 'Peru' (ex Cuming).

***Bostryx moniezi* (Dautzenberg, 1896) (pl. II figs. 13-14)**

In the Brussels museum ten adult and six juvenile specimens of this species have been found, which are probably syntypes. The material is labelled 'Andes du Pérou'.



***Bostryx mordani* sp.n. (pl. 3 fig. 3)**

Description. — Shell up to 23.5 mm, 2.5 times as long as wide, rimate, with straight sides, elongate, thin. Colour whitish, with light brown axial streaks at irregular intervals. Surface hardly shining, with incrassate growth striae. Protoconch smooth. Whorls 7.5, nearly flat; suture hardly impressed. Aperture inverted ear-shaped, 1.8 times as long as wide, 0.45 times the total length. Peristome thin and simple. Columellar margin broadly dilated above, whitish.

Measurements of holotype and the paratype in the London museum respectively: shell height 23.5, 22.5 mm, diameter 9.1, 8.9 mm, height of aperture 9.6, 9.4 mm, width 5.2, 5.0 mm, height of last whorl 14.3, 13.9 mm.

Type material. — Peru, Dept. Lima, Río Santa Eulalia valley, 3 km above Autisha, 2500 m (A. S. H. Breure leg., I-II-1975, sta. 67). Holotype RMNH 55205. Paratypes RMNH 55206/1 + 6 subadults, BMNH 1975266/1, same data.

Comparisons. — *Bostryx mordani* differs from *B. peruvianus* (Pilsbry, 1944) in (1) being more slender, (2) having straight sides, (3) having less impressed sutures, (4) the different shape of the aperture, (5) the absence of a white and brown girdle around the umbilicus.

Etymology. — I have much pleasure in naming this species after Dr. Peter Mordan (London), who has been extremely helpful during my visit to the London museum.

***Bostryx multilineatus* sp.n. (pl. 7 figs. 11-13)**

Description. — Shell up to 31.5 mm, 2.06 times as long as wide, rather broadly perforate, with nearly straight sides, elongate, solid. Colour yellowish-brown to whitish with (reddish-)brown spiral bands; there may be up to 9 bands, leaving narrow yellowish-white bands in between, which latter are sometimes slightly undulating; the growth striae are white. Surface lustreless, with incrassate growth striae. Protoconch smooth. Whorls 6.8, hardly convex; suture well impressed. Aperture subovate, the margins converging, 1.70 times as long as wide, 0.45 times total length. Peristome thin and simple. Columellar margin broadly dilated above, white.

Measurements (in mm) and statistics of characters and ratios (N=8):

|     | H     | D     | HA    | WA   | LW    | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|-------|-------|------|-------|------|-------|------|------|
| M   | 29.00 | 14.11 | 13.15 | 7.75 | 19.50 | 2.06 | 1.70  | 0.45 | 0.67 |
| s   | 1.22  | 0.63  | 0.75  | 0.44 | 1.07  | 0.07 | 0.06  | 0.01 | 0.01 |
| max | 31.5  | 15.5  | 14.6  | 8.7  | 21.5  | 2.17 | 1.81  | 0.48 | 0.68 |
| min | 27.5  | 13.6  | 12.2  | 7.4  | 18.0  | 1.98 | 1.63  | 0.44 | 0.65 |

Measurements of holotype: shell height 29.5 mm, diameter 14.0 mm, height of aperture 13.2 mm, width 8.0 mm, height of last whorl 20.0 mm; 6.9 whorls.

Type material. — Peru, Dept. Ancash, below Colca, 2100 m (W. Weyrauch leg.). Holotype IML 3080a. Paratypes IML 3080/9, 5248/4, RMNH 55318/5.

Comparisons. — This species is transitional between the groups of *Bostryx serotinus subroseus* (Philippi) and *B. erythrostomus* (Sowerby). It differs from *Bostryx huarazensis* Pilsbry, 1944, in (1) being larger (H 27.5-31.5 vs. 20.0-24.5), (2) being more slender (H/D = 2.06 vs. 1.71), (3) the presence of incrassate growth striae which produce white axial lines over the pattern of spiral colourbands. The new species may also be compared to *Bostryx vittatus* (Broderip, 1832), from which it differs in (1) being more slender (D = 14.1 vs. 18.0 mm), (2) the presence of incrassate growth striae, (3) the white columellar margin.

#### ***Bostryx multivolvis* Pilsbry, 1944**

This species has been described from Peru, Ninabamba [Río Pampas valley, Dept. Ayacucho]. Two new localities in the same region are: (1) Dept. Ayacucho, 3.8 km W Puente Pampas, 2100 m (Sta. 124; RMNH); (2) Dept. Apurimac, 6 km S Puente Pampas, road to Andahuaylas, 2100 m (IML, RMNH).

#### ***Bostryx nigropileatus* (Reeve, 1849) (pl. 1 figs. 7-9)**

The type material of this species has been found in the London museum. The specimen figured by Reeve (1849: pl. 73 fig. 524) is designated lectotype: shell height 20.5 mm, diameter 10.1 mm (BMNH 1975335). The material, which also includes two paralectotypes (1975336), has been received from Mr. Cuming and is not accompanied by a locality label.

*Bulimus reconditus* Reeve, 1849, is now placed in the synonymy of this species (*B. nigropileatus* has page preference over *B. reconditus*: fig. 524 vs. fig. 549 in Reeve, l.c.). The lectotype of *reconditus* (here designated) has the following measurements: shell height 20.0 mm, diameter 9.9 mm (BMNH 1975189). There is one paralectotype (1975190) and both specimens are labelled 'Peru' (ex Cuming).

*Bostryx nigropileatus* is recorded from 'Chachapoyas' [Dept. Amazonas] and 'Chota' [Dept. Cajamarca, ca. 50 km NNW Cajamarca] (both from Pilsbry, 1896: 182). New locality records for this species are: (1) Dept. Cajamarca, 2 km SW Encañada [ca. 15 km NE Cajamarca], 3040 m (UF/many, RMNH/5); (2) Dept. Cajamarca, 2 km NE Encañada, 3140 m (UF/12).

Redescription. — Shell rimate, with straight to slightly convex sides, rather elongate, solid. Colour whitish; in several specimens with brown spiral bands: a brown band just below the periphery on the last whorl and around the umbilicus; other bands broken up into spots which are arranged in spiral or axial series. Surface nearly lustreless, with incrassate growth striae. Protoconch with numerous finely incised spiral lines. Whorls slightly convex to nearly flat; suture well impressed. Aperture (elongate-) subovate, whitish to pink coloured inside. Peristome thin and simple. Columellar margin somewhat dilated above, whitish. Apex dark blue, brownish or white.

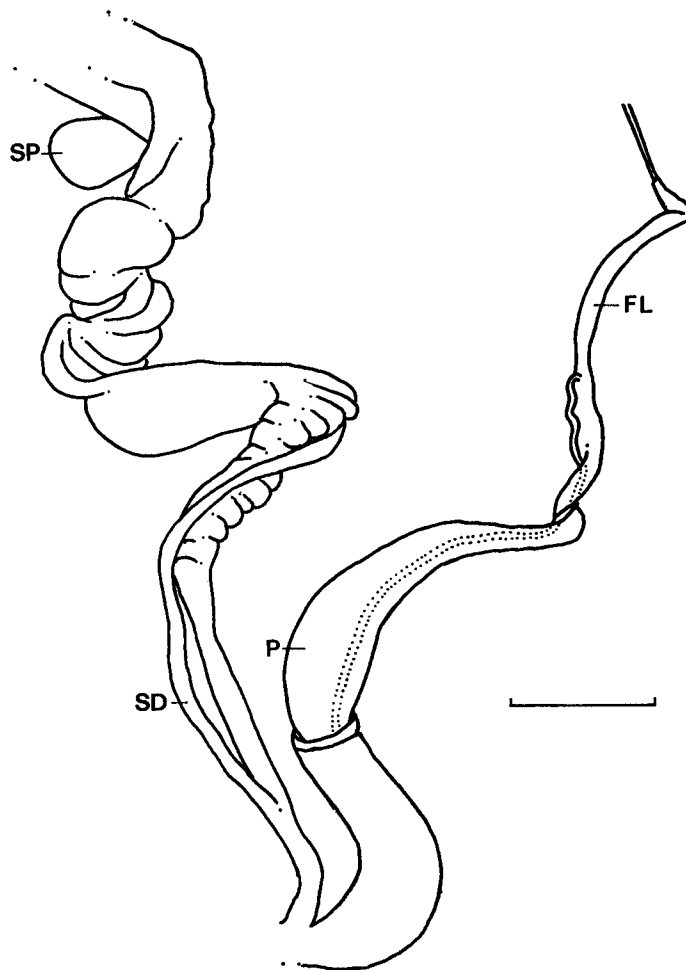


Fig. 150. *Bostryx obeliscus* Zilch, genitalia. Peru, Lima, 5 km above Huinco (RMNH).  
Scale line = 5 mm.

Measurements (in mm) and statistics of characters and ratios (N=10):

|     | H     | D     | HA    | WA   | LW    | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|-------|-------|------|-------|------|-------|------|------|
| M   | 26.30 | 12.18 | 11.67 | 6.54 | 18.00 | 2.16 | 1.79  | 0.44 | 0.68 |
| s   | 1.11  | 0.81  | 0.87  | 0.54 | 0.82  | 0.10 | 0.07  | 0.03 | 0.02 |
| max | 28.0  | 13.4  | 12.8  | 7.2  | 19.0  | 2.31 | 1.88  | 0.48 | 0.71 |
| min | 24.5  | 10.8  | 10.0  | 5.6  | 17.0  | 2.01 | 1.67  | 0.38 | 0.65 |

***Bostryx obeliscus*** Zilch, 1954 (fig. 150)

Genitalia. — Penis with a proximal sheath (ca. 1/4 the length of the phallus), swollen above the distal end of the sheath, passing without external differentiation into the epiphallus, which is more slender and subcylindrical. The flagellum is about as slender as the epiphallus, ca. 1/4 the length of the phallus; with a distal retractor muscle. The spermathecal duct is subcylindrical; the spermatheca is elongate-globose.

Material. — Peru, Dept. Lima, Río Santa Eulalia valley, 5 km above Huinco, 2150 m (Sta. 68; RMNH); Do., 3 km above Autisha, 2500 m (Sta. 67; RMNH).

***Bostryx olmosensis*** sp.n. (pl. 7 figs. 8-9)

Description. — Shell up to 23.5 mm, 2.14 times as long as wide, perforate, with straight sides, elongate, thin. Colour yellowish-brown with whitish longitudinal lines, somewhat darker on the upper whorls. Surface lustreless, the growth striae incrassate, and with epidermal spiral striae. Protoconch sculptured with numerous fine spiral lines and very low axial riblets at irregular intervals. Whorls about 7, rather convex; suture well impressed. Aperture ovate, about 1.70 times as long as wide, 0.43 times the total length. Peristome thin, slightly expanded at basal and lower palatal margins. Columellar margin reflexed and dilated above, white.

Measurements (in mm):

| H    | D    | HA   | WA  | LW   | W   |                |
|------|------|------|-----|------|-----|----------------|
| 23.5 | 10.2 | 10.2 | 5.9 | 15.0 | 7.3 | paratype, RMNH |
| 23.5 | 10.3 | 9.8  | 5.6 | 14.9 | 7+  | holotype       |
| 20.0 | 9.8  | 8.2  | 5.0 | 12.0 | 7.3 | paratype, SMF  |
| 20.5 | 10.5 | 9.1  | 5.4 | 13.2 | 6.7 | do.            |

Type material. — Peru, Dept. Lambayeque, road Olmos - Jaén [ca. 21 km ENE Olmos], 500-700 m. Holotype SMF 249627. Paratypes SMF 249628/4, 249629/2, RMNH 55320/1.

Comparisons. — This new species differs from *Bostryx delicatulus* (Philippi, 1867) in (1) being more slender ( $H/D = 2.14$  vs. 1.55), (2) the slightly expanded peristome, (3) the relatively smaller aperture ( $HA/H$

= 0.43 vs. 0.53). From *Bostryx arcuatus* sp.n. it may be distinguished by (1) being stouter ( $H/D = 2.14$  vs. 2.57), (2) having straight sides, (3) the relatively broad perforation, (4) having the shell surface lustreless.

### ***Bostryx orophilus* (Morelet, 1863)**

From the syntypes in the British Museum (Natural History) one specimen is here designated lectotype: shell height 21.5 mm, diameter 10.7 mm (BMNH 1893.2.4.188; ex Morelet). Two paralectotypes (189-190) belong to the same lot, which is labelled 'Mollepata'. According to Stichlich (1922: 693) there are 19 localities in Peru called 'Mollepata'. The type locality is here restricted to Peru, Dept. Cuzco, Prov. Anta, Distr. Limatambo, Mollepata.

Other paralectotypes in the London museum are labelled 'Ollantaitambo' (182-184) and 'Talavera' (191). Thirteen lots of paralectotypes are, moreover, in the Geneva museum. The specimens have been collected at Curahuasi, Mollepata, Silque, Incahuasi, Quiquijana, Andahuaylillos, Talavera and 'Valle de San Anna' (31 specimens in total).

### ***Bostryx pauli* sp.n. (fig. 151; pl. 3 figs. 4-6)**

Description. — Shell up to 15 mm, 1.51 times as long as wide, narrowly perforate, with straight to slightly convex sides, thin. Colour whitish to yellowish with (a) narrow brown spiral bands (four on the penultimate whorl), or (b) axial streaks of brownish crossed by narrow, interrupted spiral bands. Surface slightly shining, with incrassate growth striae. Protoconch with finely incised spiral lines. Whorls 5, rather convex; suture well impressed. Aperture broadly ovate, 1.3 times as long as wide, 0.52 times the total length. Peristome thin and simple. Columellar margin narrowly dilated above.

Measurements (in mm) and statistics of characters and ratios:

|                                             | H     | D    | HA   | WA   | LW    | H/D  | HA/WA | HA/H | LW/H |
|---------------------------------------------|-------|------|------|------|-------|------|-------|------|------|
| Peru, Dept. Ancash, 1 km N Recuay (N = 4):  |       |      |      |      |       |      |       |      |      |
| M                                           | 14.30 | 9.73 | 7.40 | 5.43 | 10.80 | 1.47 | 1.37  | 0.52 | 0.76 |
| s                                           | 0.29  | 0.25 | 0.20 | 0.28 | 0.27  | 0.01 | 0.05  | 0.01 | 0.01 |
| max                                         | 14.7  | 10.0 | 7.7  | 5.7  | 11.2  | 1.49 | 1.43  | 0.52 | 0.76 |
| min                                         | 14.0  | 9.4  | 7.3  | 5.1  | 10.6  | 1.46 | 1.30  | 0.51 | 0.75 |
| Peru, Dept. Ancash, 20 km W Huaráz (N = 4): |       |      |      |      |       |      |       |      |      |
| M                                           | 13.28 | 9.38 | 6.58 | 5.15 | 10.30 | 1.42 | 1.33  | 0.52 | 0.78 |
| s                                           | 1.31  | 1.10 | 0.42 | 0.53 | 1.01  | 0.05 | 0.07  | 0.03 | 0.01 |
| max                                         | 15.0  | 10.6 | 7.3  | 5.6  | 11.6  | 1.48 | 1.42  | 0.56 | 0.79 |
| min                                         | 12.2  | 8.3  | 6.3  | 4.6  | 9.4   | 1.36 | 1.25  | 0.49 | 0.76 |

Peru, Dept. Ancash, 6 km NE San Marcos (N = 6) :

|     |       |      |      |      |      |      |      |      |      |
|-----|-------|------|------|------|------|------|------|------|------|
| M   | 13.15 | 8.18 | 6.35 | 4.48 | 9.63 | 1.61 | 1.42 | 0.48 | 0.73 |
| s   | 1.05  | 0.31 | 0.25 | 0.28 | 0.67 | 0.11 | 0.05 | 0.03 | 0.03 |
| max | 14.3  | 8.6  | 6.6  | 4.7  | 10.2 | 1.77 | 1.48 | 0.52 | 0.78 |
| min | 11.7  | 7.8  | 5.9  | 4.0  | 8.4  | 1.48 | 1.37 | 0.45 | 0.71 |

Measurements of holotype: shell height 14.2 mm, diameter 9.7 mm, height of aperture 7.3 mm, width 5.3 mm, height of last whorl 10.6 mm; 5.1 whorls.

Type material. — Peru, Dept. Ancash, 1 km N Recuay, 3410 m (F. G. Thompson leg., 21-III-1972). Holotype UF 22812. Paratypes UF 22813/5, RMNH 55220/1, same data. Additional localities: (1) Dept. Ancash, 20 km

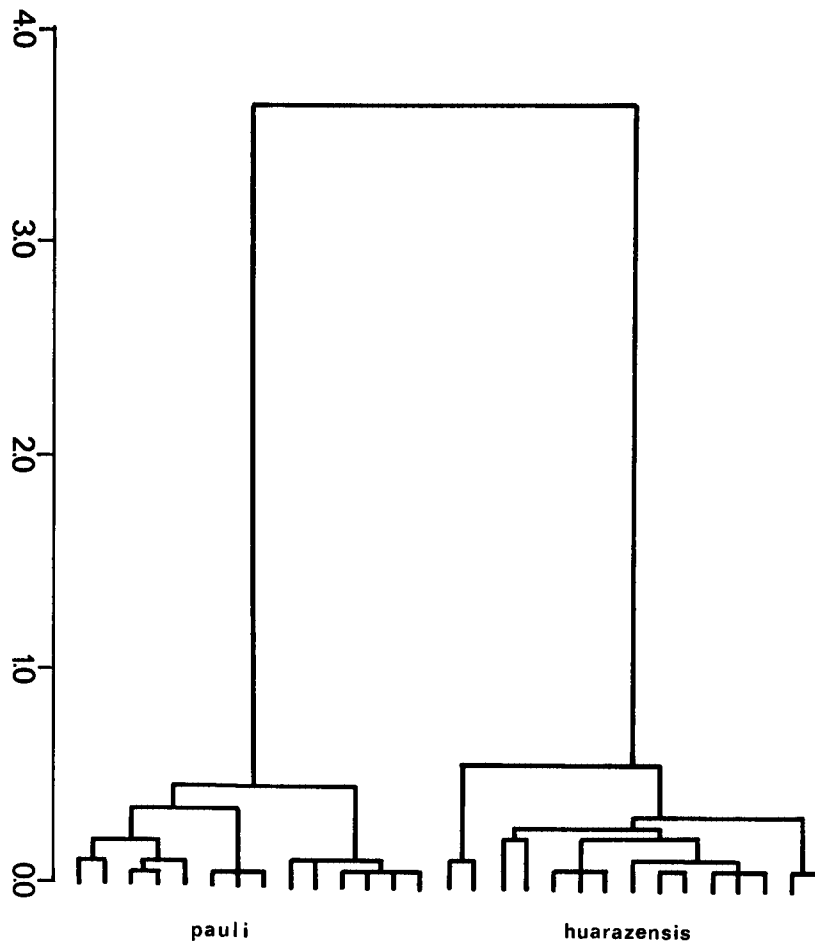


Fig. 151. Cluster analysis, using standardized data, of *Bostryx huarazensis* Pilsbry and *B. pauli* sp.n. Mean square distances in Q-mode.

W Huaráz, 3750 m, UF 22814/12, RMNH 55221/4; (2) Dept. Ancash, 6 km NE San Marcos, 2730 m, UF 22815/14, RMNH 55228/7.

Remarks. — Specimens from 6 km NE San Marcos are more slender and slightly more elongate and are only tentatively referred to this species.

Comparisons. — This species differs from *Bostryx huarazensis* Pilsbry, 1944 in (1) having the aperture relatively broader ( $HA/WA = 1.37$  vs.  $1.57$ ), (2) being stouter, (3) the slightly more impressed suture and (4) the slightly more convex whorls.

Etymology. — Dedicated to Mr. Paul Smeur (Breda, the Netherlands).

***Bostryx peliostomus*** (Philippi, 1867) (pl. 7 figs. 4-5)

Three specimens in the IML-collection are 'from the original series' and were collected by A. Raimondi 'entre Jocos y Rio Marañon'. The species is now refigured.

***Bostryx peruvianus*** (Pilsbry, 1944)

This species has been described from 'Peru, Santa Valley, Huaraz' as *Drymaeus torallyi peruvianus*. Unlike Pilsbry (1944: 126) I want to separate the Peruvian material at the species level. The type material of *Bulimus torallyi* d'Orbigny, 1835, in the Paris and London museum proved to comprise two species: *Drymaeus draparnaudi* (Pfeiffer, 1847) and *Bostryx torallyi* (d'Orbigny, 1835), both occurring in central Bolivia. *Bostryx peruvianus* (Pilsbry) resembles indeed *B. torallyi* (d'Orbigny); the differences between the Bolivian and Peruvian material warrant, however, species status for both taxa.

Material from the localities mentioned below has been compared for me with the holotype (ANSP 180008) by Dr. R. Robertson, who writes: 'the holotype is just slightly longer and fatter than any of the specimens you sent. The lot from Recuay also seems to me to be the same, although as you can see these specimens tend to be slightly more elongate . . .' (in litt., 17-IX-1976).

New locality records for this species are (all Peru, Dept. Ancash): (1) 20 km W Huaráz, 3750 m (UF, RMNH); (2) 3 km S Huaráz, 3100 m (UF); (3) 1 km N Recuay, 3410 m (UF, RMNH).

***Bostryx pictus*** (Pfeiffer, 1855) (fig. 152; pl. 10 fig. 15)

One of the type specimens which have been located in the London museum is here designated lectotype: shell height 22.5 mm, diameter 12.1 mm (BMNH 1975545). The material, which also comprises two paralectotypes, is labelled 'Peru' (ex Cuming).

This species has been wrongly placed in the synonymy of *Drymaeus poecilus* (d'Orbigny, 1835) by Pilsbry (1898: 286).

After comparison of specimens the following taxa are now considered junior subjective synonyms of *Bostryx pictus* (Pfeiffer): (a) *Bulimulus* (*Scutalus*) *punctilineatus* Haas, 1951; (b) *Naesiotus* (*Reclasta*) *tarmensis* Weyrauch, 1967. These misidentifications are possibly caused by the sculpture of the protoconch, which consists of axial, rather straight wrinkles (partly broken into oblong granules) and fine spiral lines. This sculpture is not quite common in *Bostryx* species and has a superficial resemblance to the protoconch sculpture found in *Naesiotus* and *Scutalus* species.

The distribution is remarkably disjunct (but confined to the eastern escarpments of the Andes): (1) Dept. Cuzco, Río Urubamba valley, Sahuayaco, 800 m [type locality of *punctilineatus* Haas]; (2) Dept. Cuzco, Río Urubamba valley, Quillabamba, 1050 m (Weyrauch, 1967b: 498); (3) Dept.

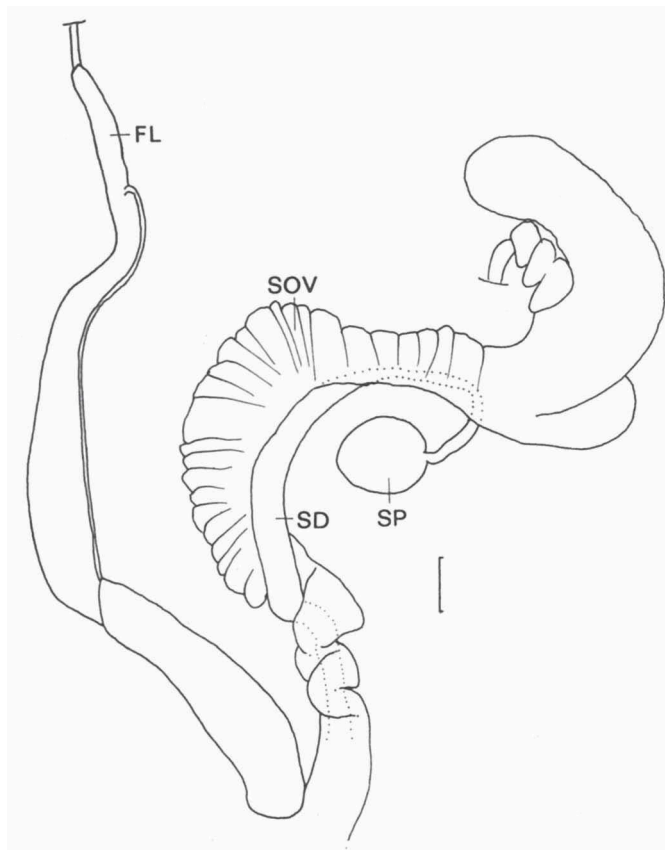


Fig. 152. *Bostryx pictus* (Pfeiffer), genitalia. Peru, Junín, Puente Herrería (RMNH).  
Scale line = 1 mm.



Junín, between Palca and Tarma, 2900-3100 m (cf. Weyrauch, 1967b: 480; type locality of *tarmensis* Weyrauch); (4) Dept. Junín, Río Chanchamayo, Puente Herrería, 5.7 km N San Ramón, 800-850 m (Sta. 145; RMNH).

Genitalia. — Penis with a sheath (ca.  $\frac{1}{3}$  the length of the phallus), slightly swollen above the distal end of the sheath and passing without external differentiation into the epiphallus. The flagellum is rather short and slender; with a distal retractor muscle. The vagina is relatively short. The

0.24 times the total length. Peristome thin and simple, narrowly expanded at lower palatal and basal margin. Columellar margin narrowly dilated above.

Measurements (in mm) and statistics of characters and ratios (N = 2).

ranged in axial and spiral series; the spots are partly fused to form axial

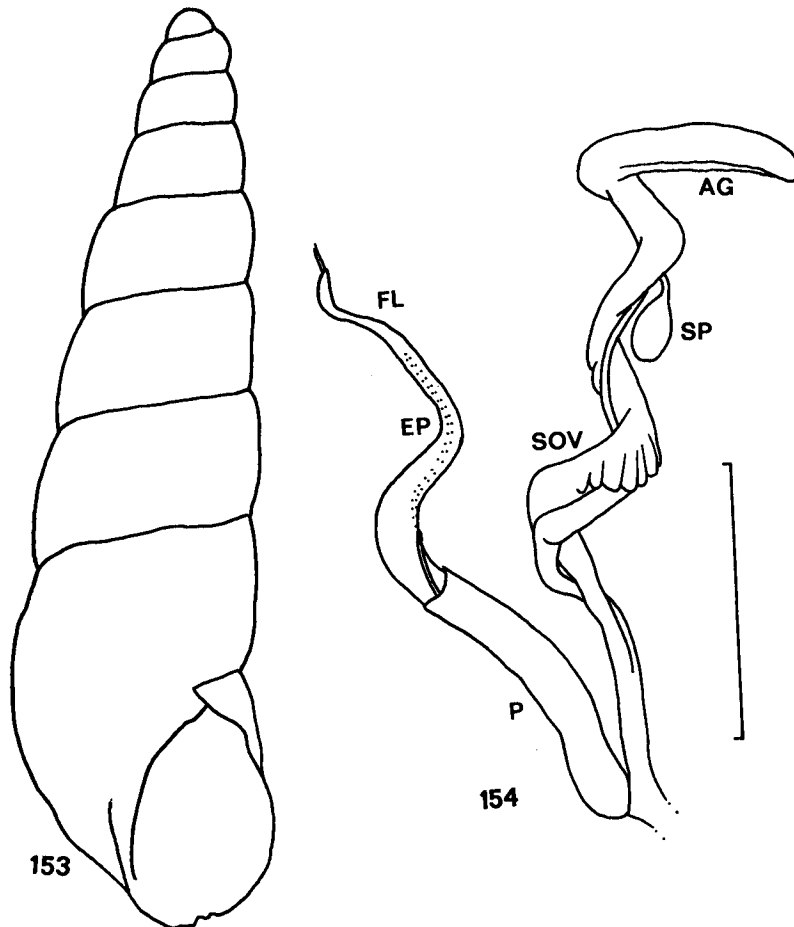


Fig. 153-154. *Bostryx placitus* sp.n. Peru, 7.6 km S of Ambo (RMNH). Holotype and genitalia. Scale line = 5 mm.

being larger (height 15.5 vs. 12.4 mm), (2) being more slender ( $H/D = 3.4$  vs. 2.4), (3) the different colour pattern, (4) the more plicated surface.

Etymology. — (L.) placitum, charming; referring to the shell shape and colour pattern.

***Bostryx planissimus* Pilsbry & Olsson, 1949 (figs. 155-162)**

The first exact locality for this species is: Peru, Dept. Ancash, 3 km S Macará, 2700 m (UF/many, RMNH/17). This material was dissected.

Genitalia. — Penis with a sheath (ca.  $1/3$  the length of the phallus), subcylindrical and slightly swollen in its distal part. The epiphallus and flagellum are subcylindrical, both half as long as the penis. The spermathecal duct is tapering in its proximal part, otherwise slender and bearing a globose spermatheca.

Histology. Proximal part of the penis with a very narrow lumen, which is lined by cubic epithelium (cell height  $3\text{ }\mu\text{m}$ ). The median part with a circular gland, which is made up of an outer, low cylindrical epithelium ( $12\text{ }\mu\text{m}$  high) and an inner, flat epithelium (cell height  $2\text{ }\mu\text{m}$ ). The central lumen is low cubic (cell height  $3\text{ }\mu\text{m}$ ). Slightly more distally in the median part the cells of the outer epithelium are  $15\text{ }\mu\text{m}$  high and the large nuclei, which are situated in the central part of the cells, are up to  $8\text{ }\mu\text{m}$  long. The central lumen is here relatively large. The lumen of the epiphallus is relatively wide and lined with a shortly ciliated, low cylindrical epithelium (cell height  $13\text{ }\mu\text{m}$ ).

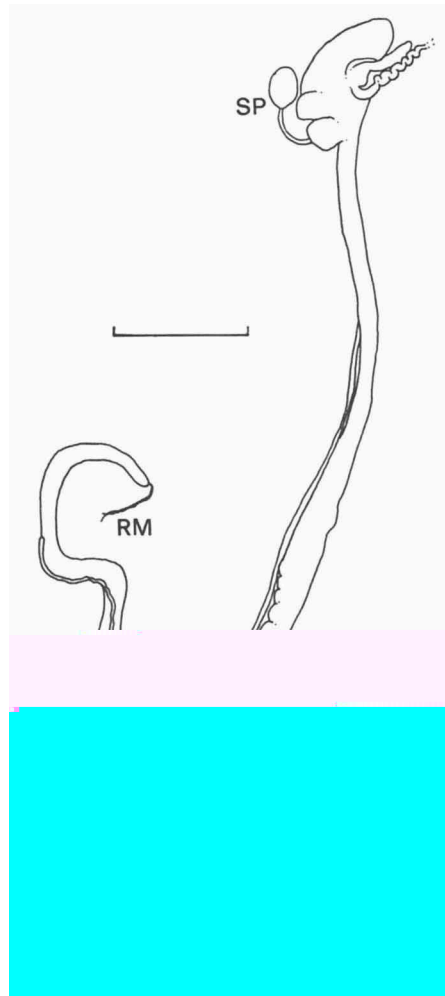


Fig. 155. *Bostryx planissimus* Pilsbry & Olsson, genitalia. Peru, Ancash, 3 km S Macará (UF). Scale line = 2 mm.

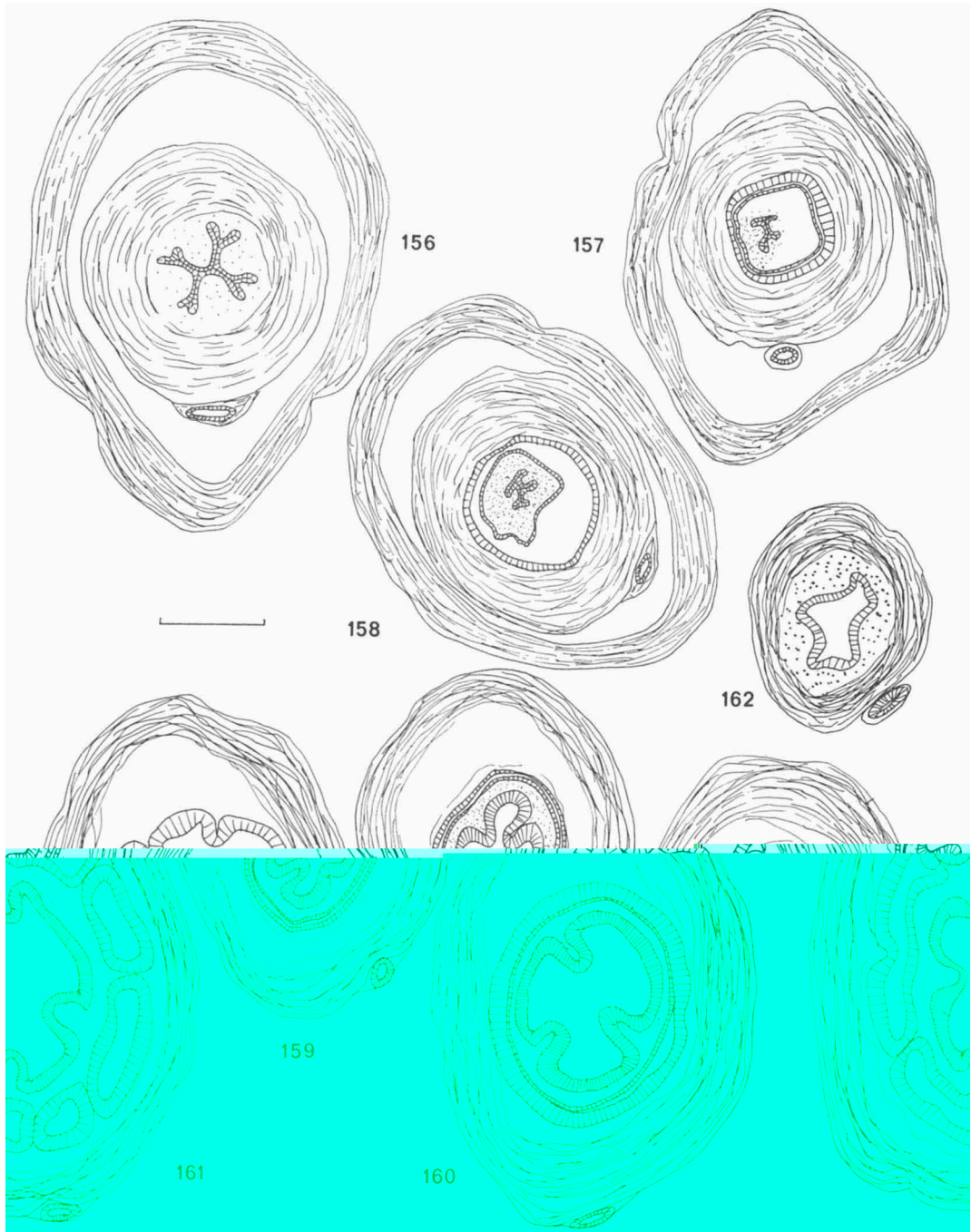


Fig. 156-162. *Bostryx planissimus* Pilsbry & Olsson. Peru, Ancash, 3 km S Macará. Transverse sections of penis (fig. 156-161, slides H 1430, 1432-1436, respectively) and epiphallus (fig. 162, slide H 1437). Scale line = 2 mm.

***Bostryx ploegerorum* sp.n.** (figs. 163-166; pl. 2 fig. 4)

Description. — Shell up to 15.8 mm, 2.8 times as long as wide, with a narrow but distinct perforation, with straight sides, elongate, rather thin. Colour whitish with axial streaks at irregular distances varying in colour from yellowish to dark brown; rarely a narrow spiral band at the periphery of the last whorl. Surface rather shining, with incrassate growth striae. Protoconch smooth. Whorls 7.1, nearly flat; suture hardly impressed. Aperture subovate to elliptical, the margins converging, 1.7 times as long as wide, 0.33 times the total length. Peristome thin and simple. Columellar margin vertical, narrowly dilated above.

Measurements (in mm) and statistics of characters and ratios (N=10):

|     | H     | D    | HA   | WA   | LW   | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|------|------|------|------|------|-------|------|------|
| M   | 14.34 | 5.09 | 4.73 | 2.73 | 7.47 | 2.83 | 1.74  | 0.33 | 0.52 |
| s   | 0.96  | 0.45 | 0.14 | 0.16 | 0.38 | 0.15 | 0.12  | 0.02 | 0.02 |
| max | 15.8  | 5.9  | 5.0  | 3.0  | 8.2  | 3.04 | 2.00  | 0.37 | 0.55 |
| min | 13.0  | 4.3  | 4.5  | 2.4  | 6.8  | 2.67 | 1.60  | 0.31 | 0.50 |

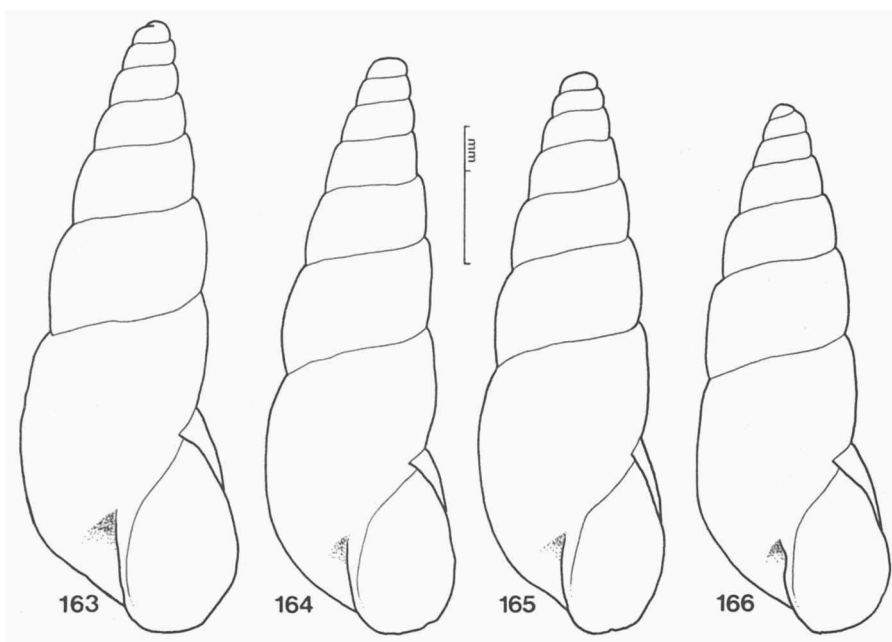


Fig. 163-166. *Bostryx ploegerorum* sp.n. Peru, Ancash, 5 km SW Chavin de Huantar. Holotype (fig. 163) and paratypes (fig. 164-166, RMNH 55154). Scale line = 3 mm.

Measurements of holotype: shell height 15.8 mm, diameter 5.9 mm, height of aperture 5.0 mm, width 2.9 mm, height of last whorl 8.2 mm; 7.5 whorls.

Type material. — Peru, Dept. Ancash, 5 km SW Chavin de Huantar, 3300 m (F. G. Thompson leg., 2-IV-1972). Holotype UF 22791. Paratypes UF 22792/50, 22793/11, 22794/7, RMNH 55154/25, 55153/7, same data.

Comparisons. — This novelty differs from *Bostryx subelatus* (Haas, 1948) in (1) being more slender, (2) being more elongate, (3) the different colour pattern, (4) a more elliptical aperture. *Bostryx ploegerorum* sp.n. may also be compared to *B. zilchi* Weyrauch, 1958, from which it differs in (1) being smaller, (2) the different colour pattern, (3) the less convex whorls.

Etymology. — Named in honour of Simon and Pauline Ploeger (Leiderdorp, the Netherlands).

#### ***Bostryx pumilio* Rehder, 1945**

Seven syntypes of *Bulimus nanus* Reeve, 1849, not Lamarck, 1804, are in the London museum (BMNH 1975463) and labelled 'Chile' (ex Cuming).

Redescription. — Shell narrowly perforate, with slightly convex sides, elongate, thin. Colour corneous, darker towards the apex, which is usually reddish-brown. Surface lustreless, smooth. Protoconch with fine spiral lines and low axial wrinkles. Whorls rather convex, the last whorl less convex; suture well impressed. Aperture subovate, angular at the basal margin. Peristome thin and simple. Columellar margin dilated above.

#### ***Bostryx rhodolarynx rhodolarynx* (Reeve, 1849)**

The specimen figured by Reeve (1849: fig. 518) is designated lectotype: shell height 34.5 mm, diameter 20.0 mm (BMNH 1975434). The material, which also comprises two paralectotypes (1975435), is labelled 'Andes of Peru' (ex Cuming).

#### ***Bostryx rhodolarynx papillatus* (Morelet, 1860) (fig. 167)**

Three type specimens are present in the London museum and are considered syntypes (BMNH 1893.2.4.192-194). The material is labelled 'Pérou, Pucra' (ex Morelet). Other syntypes are in the Geneva museum: 23 specimens collected at Parcos, Vilcas Huaman, Pucra and 'Hauteurs de la Laja de Cocharcas'.

Genitalia. — Penis with a sheath ( $1/3-1/4$  the length of the phallus), more or less subcylindrical, passing without external differentiation into the epiphallus, which is somewhat more slender. The flagellum is subcylindrical and slender, ca.  $1/3$  the length of the phallus; with a distal retractor muscle. The vagina is relatively rather long. The spermathecal duct bears an elongate-globose spermatheca at its distal end.

Material. — Peru, Dept. Ayacucho, 137 km SE Ayacucho, ravine near Pajonal, 2050 m (Sta. 125; RMNH).

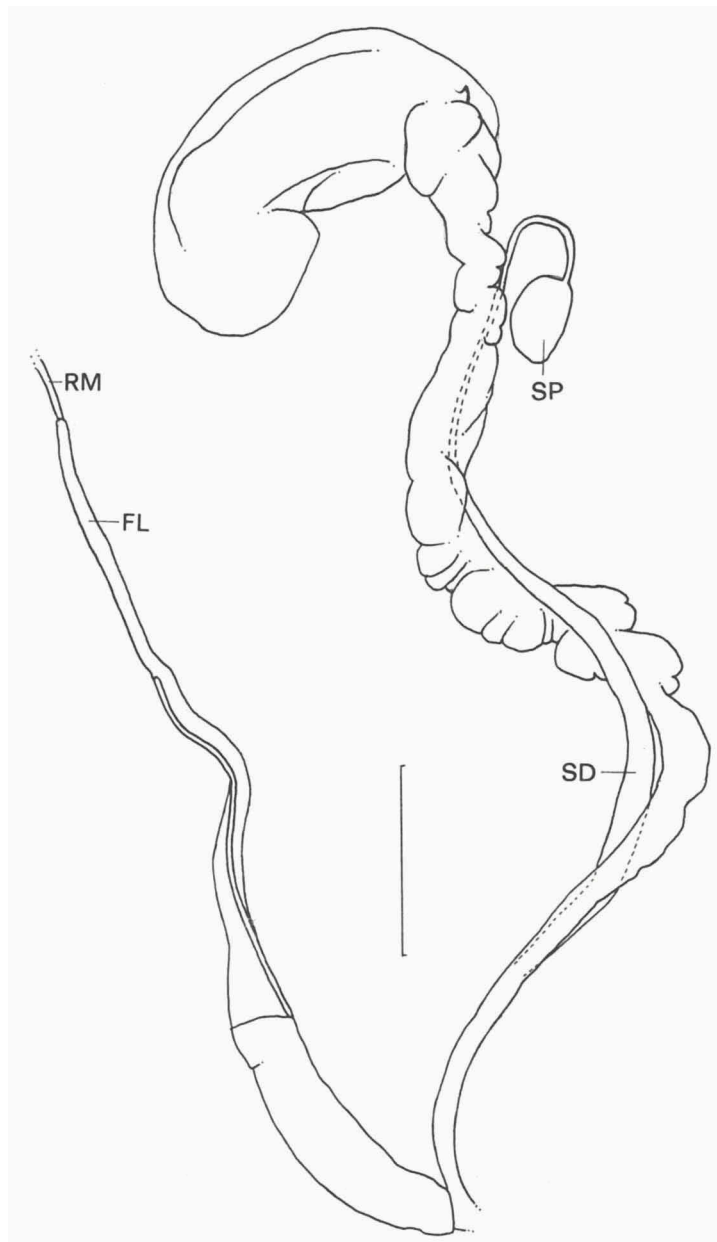


Fig. 167. *Bostryx rhodolarynx papillatus* (Morelet), genitalia. Peru, Ayacucho, near Pajonal (RMNH). Scale line = 5 mm.

***Bostryx rodriguezae*** Weyrauch, 1967 (figs. 168-175; pl. 12 fig. 3)

This species has been collected alive at the type locality: Peru, Dept. Lima, Río Cañete basin, 4.5 km W Laraos, footpath to Quichao, 3500 m (Sta. 76; RMNH).

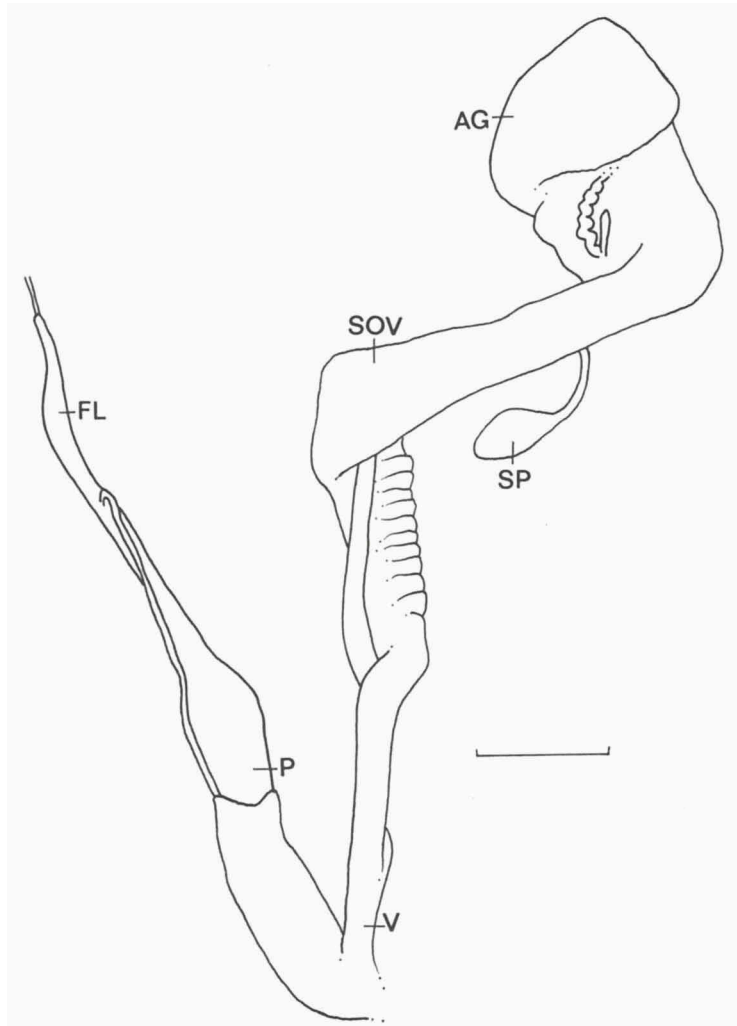


Fig. 168. *Bostryx rodriguezae* Weyrauch, genitalia. Peru, Lima, 5 km from Laraos, Quichao (RMNH). Scale line = 5 mm.

Genitalia. — Penis with a sheath (ca.  $1/3$ - $1/4$  the length of the phallus), slightly swollen above the distal end of the sheath, tapering towards the epiphallus. The epiphallus is about half as long as the penis. The flagellum



is as broad and as long as the epiphallus, but tapering towards the distal end where the retractor muscle is inserted. The spermathecal duct is tapering, bearing an ovoid spermatheca.

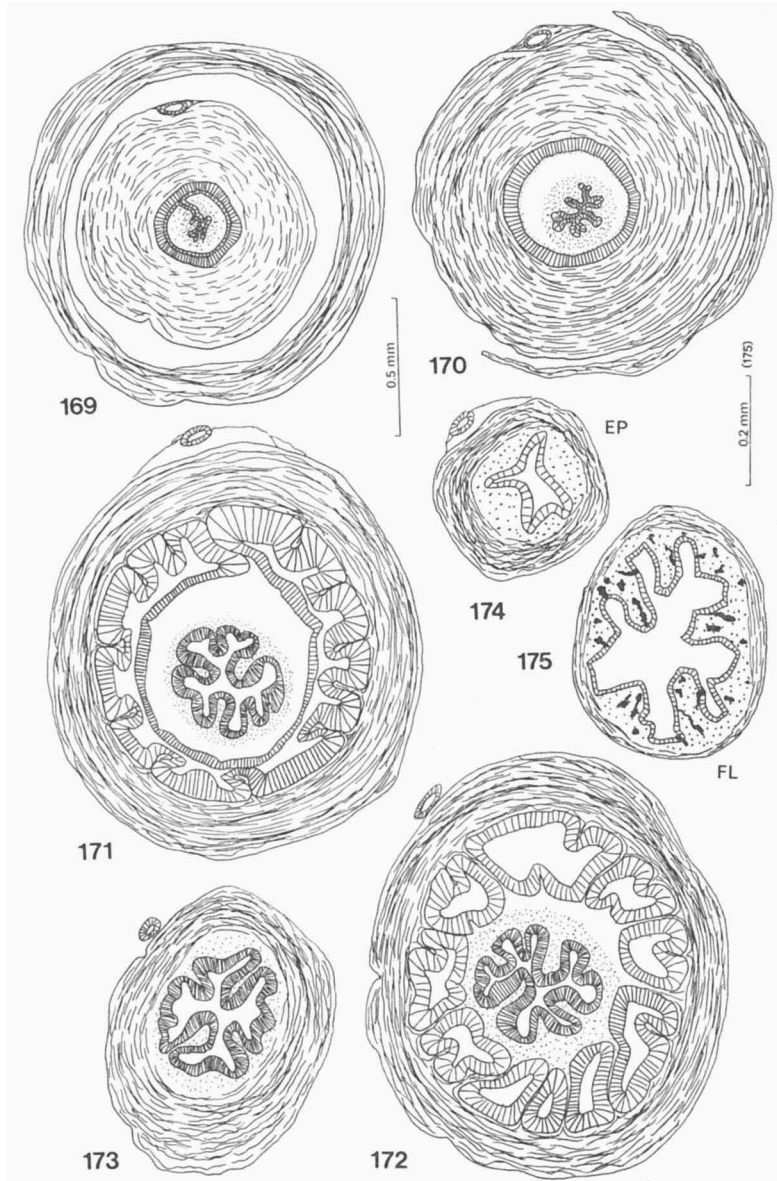


Fig. 169-175. *Bostryx rodriguezae* Weyrauch. Peru, Lima, 5 km from Laraos, Quichao. Transverse sections of penis (fig. 169-173, slides H 1157, 1159, 1161, 1162, 1164), epiphallus (fig. 174, slide H 1164) and flagellum (fig. 175, slide H 1166).

Histology. Proximal part of the penis with a narrow lumen, which is lined by a low cylindrical epithelium (cell height 12  $\mu\text{m}$ ). Median part with a ring-shaped gland, made up of an outer epithelium (cell height 20-35  $\mu\text{m}$ ) and an inner epithelium (cell height ca. 10  $\mu\text{m}$ ). Three cell types may be distinguished, all of them consisting of high cylindrical cells with a large (max. 11  $\mu\text{m}$  high), ovate, basal nucleus. Type 1 is made up of cylindrical to cylindric-inflated cells with relatively very little cytoplasm staining positively with Alcian Blue. Secretion granules are mainly present in the apical part of these cells. The second type consists of cylindrical cells relatively rich in positively staining cytoplasm and with the secretion granules always clearly inside a larger vacuole. The third type is possibly only a modification of the second one and consists of compressed cylindrical cells also relatively rich in positively staining cytoplasm. The lumen of the epiphallus is star-shaped and lined by a low cylindrical (20  $\mu\text{m}$  high) to cubic (cell height 10  $\mu\text{m}$ ) epithelium. Subepithelial glandular cells are mainly confined to the distal part of the epiphallus.

***Bostryx sandwicensis*** (Pfeiffer, 1846) (pl. 11 fig. 2)

This species has been described from the 'Sandwich Islands'. Pfeiffer 1848b: 114), however, already placed this taxon among bulimulid species; the original description makes it, moreover, probable that this taxon should be classified with the Chilean species of the *atacamensis*-group. In the Brussels museum I found two specimens from Bolivia [correctly] identified by Ancy as *sandwicensis* Pfeiffer. I now assume that the type locality is incorrect and regard this taxon a member of *Bostryx* Troschel, 1847, *sensu lato*.

Measurements (in mm) of IRSN-material:

| H    | D   | HA  | WA  | LW  | W    |
|------|-----|-----|-----|-----|------|
| 17.0 | 5.5 | 4.6 | 3.0 | 6.7 | 11.0 |
| 16.0 | 5.1 | 4.2 | 3.1 | 6.4 | 9.2  |

***Bostryx simpliculus*** (Pfeiffer, 1855)

A lectotype is designated from among the specimens located in the London museum: shell height 19.0 mm, diameter 9.6 mm (BMNH 1975340). There are two paralectotypes (1975341). The material is labelled 'Peru + Bolivia' (ex Cuming).

***Bostryx solutus*** (Troschel, 1847) (fig. 176)

Genitalia. — Penis with a sheath (ca. 1/3 the length of the phallus), swollen above the distal end of the sheath, passing without external differentiation into the epiphallus, which is more slender than the penis. The

flagellum is about as slender as the epiphallus, ca.  $1/4$  the length of the phallus; with a distal retractor muscle. The vagina is relatively short. The spermathecal duct is more or less subcylindrical, with a globose spermatheca at its distal end.

Material. — Peru, Dept. Lima, Río Rimac valley, El Infernillo, ca. 3300 m (SMF 155606).

***Bostryx sordidus* (Lesson, 1826)**

The type locality of this species is Cerro Christoval near Lima. A new locality record is: Peru, Dept. Ancash, N of Chimbote, Cerro Coshco, 200 m (IML, RMNH). This is ca. 425 km north of the type locality.

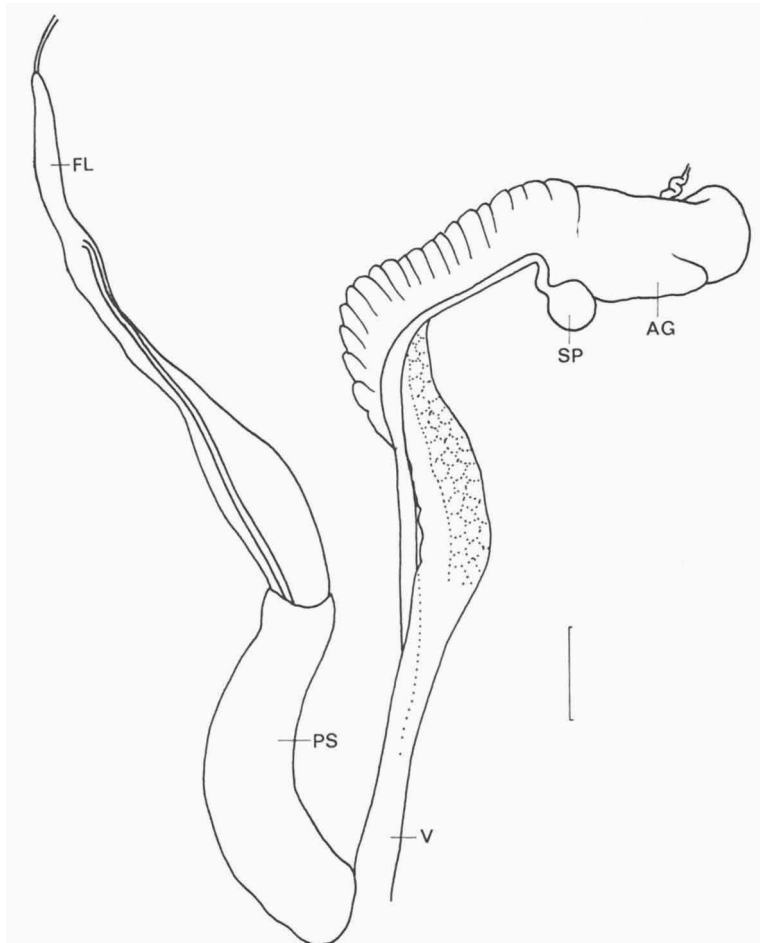


Fig. 176. *Bostryx solutus* (Troschel), genitalia. Peru, Lima, El Inferniello (SMF 155606). Scale line = 1 mm.

***Bostryx spiculatus spiculatus* (Morelet, 1860) (fig. 177)**

Type specimens of this species have been located in the London museum and one of them is designated lectotype: shell height 23.5 mm, diameter 5.6 mm (BMNH 1893.2.4.1156). The material, which comprises four paralectotypes (.1157-1160), is labelled 'Ollantaytambo'. Three additional paralectotypes from the same locality are in the Geneva museum.

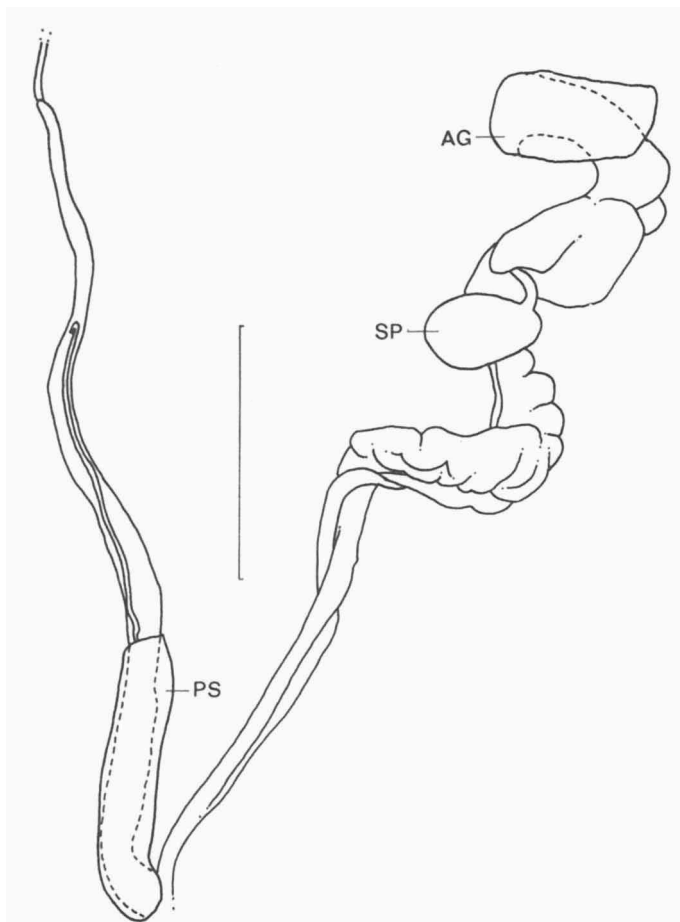


Fig. 177. *Bostryx spiculatus spiculatus* (Morelet), genitalia. Peru, Cuzco, Ollantaytambo (RMNH). Scale line = 5 mm.

This taxon has been collected at the type locality (Sta. 107; RMNH) and at two other localities nearby: 4.0 km WNW Ollantaytambo (Sta. 108) and 2.1 km ESE Ollantaytambo (Sta. 106).

Ecology. — This species has been found exclusively on steep rock-faces among *Tillandsia* spec.

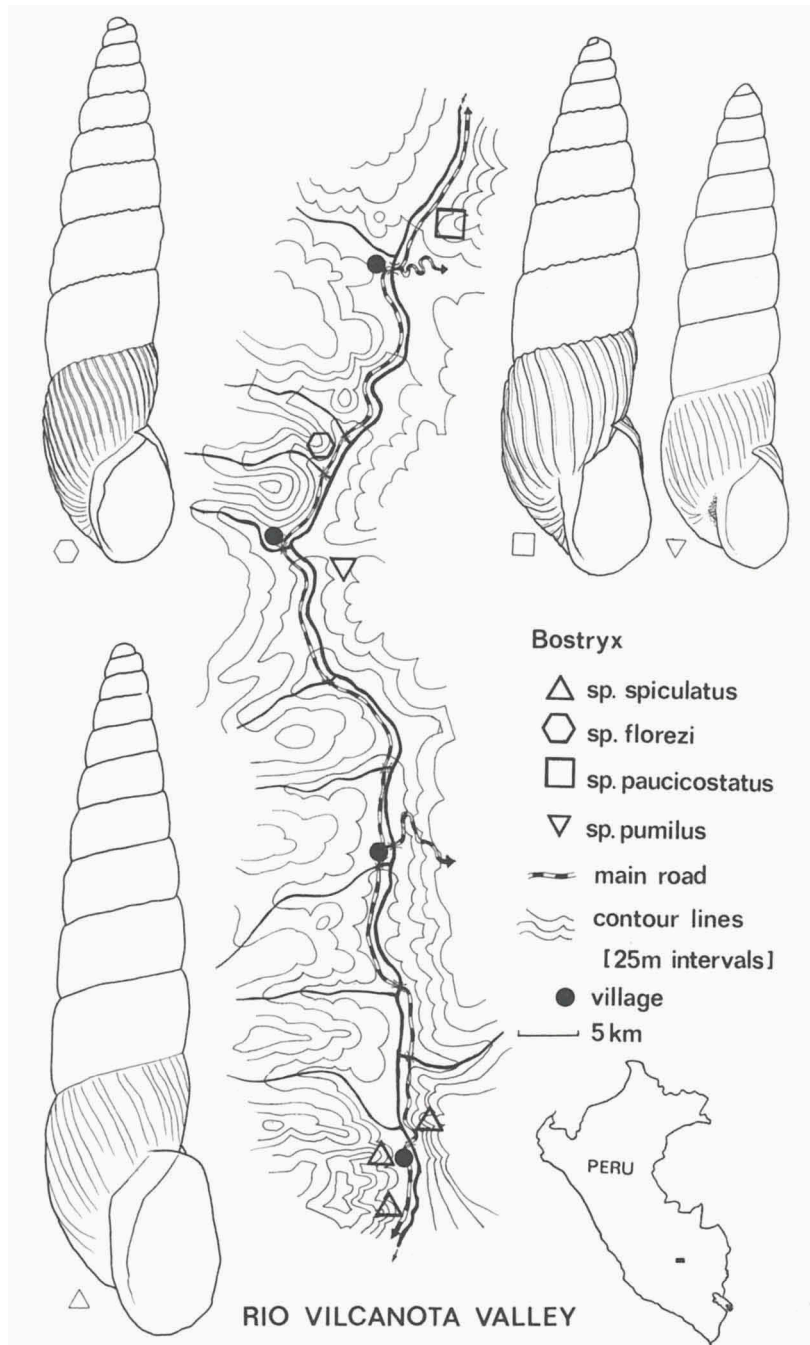


Fig. 178. Distribution of the *Bostryx spiculatus*-complex in the Río Vilcanota/Urubamba valley.

## Measurements (in mm) and statistics of characters and ratios (N=6):

|     | H     | D    | HA   | WA   | LW   | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|------|------|------|------|------|-------|------|------|
| M   | 22.58 | 5.70 | 5.65 | 3.15 | 8.46 | 3.97 | 1.79  | 0.25 | 0.37 |
| s   | 0.80  | 0.23 | 0.22 | 0.15 | 0.46 | 0.24 | 0.10  | 0.01 | 0.02 |
| max | 23.8  | 6.0  | 6.0  | 3.4  | 9.3  | 4.30 | 1.93  | 0.27 | 0.40 |
| min | 21.7  | 5.3  | 5.4  | 3.0  | 8.1  | 3.65 | 1.65  | 0.24 | 0.35 |

**Genitalia.** — Penis with a sheath (ca.  $\frac{1}{3}$  the length of the phallus), subcylindrical, passing without external differentiation into the epiphallus. The flagellum is slender, as long as the penis sheath; with a distal retractor muscle. The vagina is relatively short. The spermathecal duct is subcylindrical, with an elongate-globose spermatheca at its distal end.

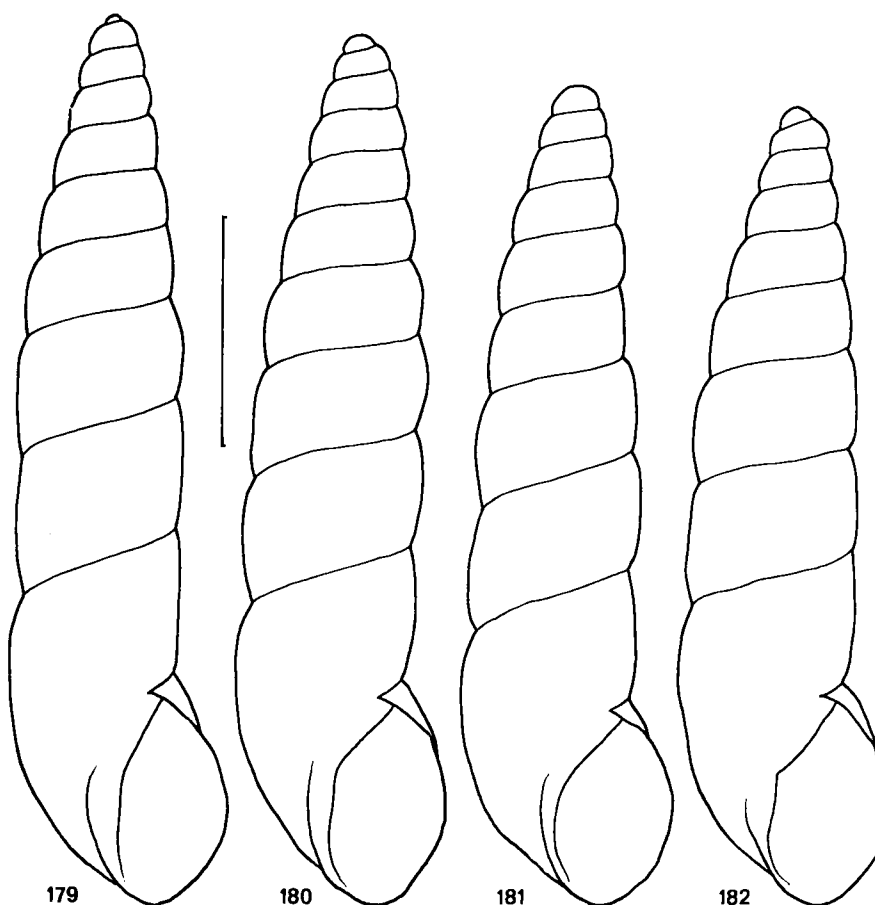


Fig. 179-182. *Bostryx spiculatus florezi* (Weyrauch). Peru, Cuzco, 13.3 km NW Pisac (RMNH). Scale line = 5 mm.

***Bostryx spiculatus florezi* (Weyrauch, 1967) (figs. 179-182)**

The type locality is Peru, [Dept. Cuzco, Río Vilcanota valley] Pisac, 3100 m. This subspecies has been found at localities northwest of Pisac, e.g. 13.3 km NW Pisac (Sta. 103/103a; RMNH) and also in the Río Calca valley [affluent of Río Vilcanota], Hacienda Paullo Grande, 2900 m (SMF 163373-4/26).

Ecology. — Same as in *Bostryx spiculatus spiculatus* (Morelet).

Measurements (in mm) and statistics of characters and ratios (N=20):

|     | H     | D    | HA   | WA   | LW   | H/D  | HA/WA | HA/H | LW/H | R/P   |
|-----|-------|------|------|------|------|------|-------|------|------|-------|
| M   | 16.16 | 4.20 | 3.88 | 2.45 | 6.50 | 3.85 | 1.59  | 0.24 | 0.40 | 36.20 |
| s   | 0.75  | 0.18 | 0.16 | 0.13 | 0.25 | 0.17 | 0.08  | 0.01 | 0.02 | 2.73  |
| max | 17.9  | 4.5  | 4.2  | 2.6  | 7.0  | 4.16 | 1.74  | 0.27 | 0.42 | 43.0  |
| min | 15.2  | 3.9  | 3.6  | 2.2  | 6.1  | 3.44 | 1.44  | 0.22 | 0.37 | 33.0  |

Genitalia. — As in the nominal subspecies.

***Bostryx spiculatus paucicostatus* ssp.n. (figs. 183-186)**

This new subspecies differs from *Bostryx spiculatus florezi* (Weyrauch, 1967) in (1) being less cylindrical and being stouter ( $H/D = 3.44$  vs. 3.85),

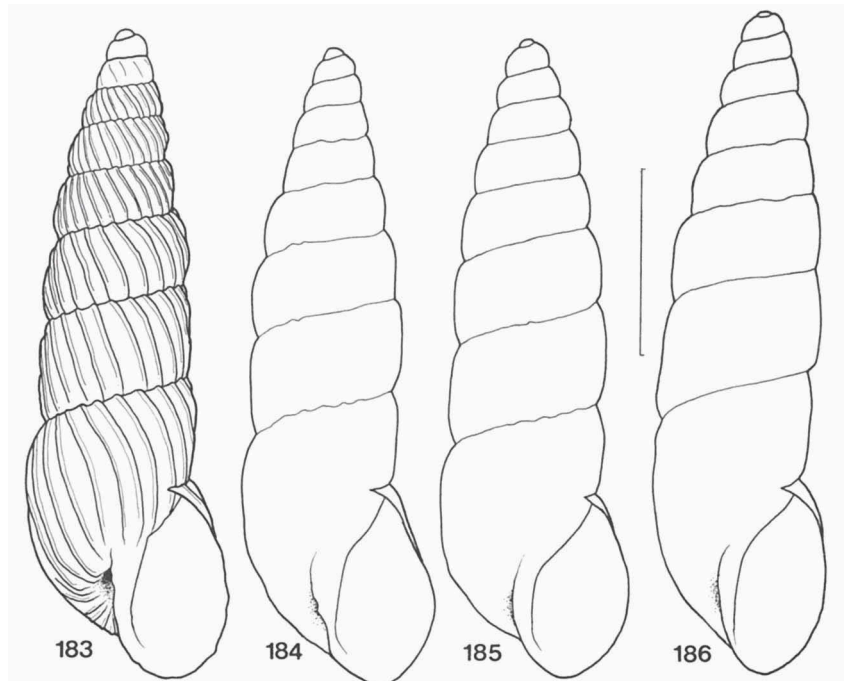


Fig. 183-186. *Bostryx spiculatus paucicostatus* ssp.n. Peru, Cuzco, 2.8 km SE Pisac (RMNH). Holotype (fig. 183) and paratypes. Scale line = 5 mm.

(2) the relatively larger aperture ( $HA/H = 1.75$  vs.  $1.59$ ), (3) the fewer number of ribs (21.0 ribs on the penultimate whorl vs. 36.2), (4) having the broadest part of the columellar lamella in the last whorl instead of in the penultimate whorl.

Measurements (in mm) and statistics of characters and ratios ( $N=20$ ):

|     | H     | D    | HA   | WA   | LW   | H/D  | HA/WA | HA/H | LW/H | R/P   |
|-----|-------|------|------|------|------|------|-------|------|------|-------|
| M   | 16.52 | 4.81 | 4.45 | 2.55 | 6.99 | 3.44 | 1.75  | 0.27 | 0.43 | 20.95 |
| s   | 0.60  | 0.23 | 0.26 | 0.18 | 0.31 | 0.14 | 0.11  | 0.01 | 0.01 | 2.37  |
| max | 17.7  | 5.2  | 5.2  | 2.8  | 7.7  | 3.63 | 2.05  | 0.29 | 0.45 | 26.0  |
| min | 15.5  | 4.4  | 4.0  | 2.2  | 6.5  | 3.13 | 1.59  | 0.24 | 0.40 | 17.0  |

Measurements of holotype: shell height 16.3 mm, diameter 5.2 mm, height of aperture 4.3 mm, width 2.7 mm, height of last whorl 7.0 mm; 8.9 whorls; 21 ribs on the penultimate whorl.

Type material. — Peru, Dept. Cuzco, 2.8 km SE Pisac, 2980 m (A. S. H. Breure leg., 15-II-1975; sta. 102). Holotype RMNH 55197. Paratypes 55198/many, 9062/13 [alcohol material], SMF/10, BMNH/10, USNM/10, IML/10, MCZ/10, FMNH/10.

Ecology. — The specimens have been found on a rather steep hillslope with rock-outcrop, under stones.

#### ***Bostryx spiculatus pumilus* ssp.n. (figs. 187-190)**

This new taxon differs from the nominate subspecies in (1) being smaller (height 13.0 vs. 22.6 mm), (2) the ribbed surface, (3) being slightly stouter ( $H/D = 3.55$  vs.  $3.97$ ). From *Bostryx spiculatus florezi* (Weyrauch, 1967) this novelty may be distinguished by (1) being smaller (height 13.0 vs. 16.2 mm), (2) the fewer number of ribs ( $R/P = 30.3$  vs. 36.2). Finally this new subspecies may be compared to *Bostryx spiculatus paucicostatus* ssp.n., from which it differs in (1) being smaller (height 13.0 vs. 16.5 mm), (2) the greater number of ribs ( $R/P = 30.3$  vs. 21.0).

Measurements (in mm) and statistics of characters and ratios ( $N=10$ ):

|     | H     | D    | HA   | WA   | LW   | H/D  | HA/WA | HA/H | LW/H | R/P   |
|-----|-------|------|------|------|------|------|-------|------|------|-------|
| M   | 13.00 | 3.69 | 3.00 | 1.83 | 4.89 | 3.55 | 1.65  | 0.23 | 0.38 | 30.30 |
| s   | 0.50  | 0.13 | 0.18 | 0.14 | 0.23 | 0.14 | 0.10  | 0.02 | 0.02 | 1.49  |
| max | 13.6  | 4.0  | 3.2  | 2.1  | 5.2  | 3.71 | 1.78  | 0.26 | 0.41 | 32.0  |
| min | 12.2  | 3.5  | 2.7  | 1.6  | 4.5  | 3.38 | 1.43  | 0.21 | 0.35 | 28.0  |

Measurements of holotype: shell height 13.0 mm, diameter 3.8 mm, height of aperture 3.0 mm, width 1.9 mm, height of last whorl 4.8 mm; 8.9 whorls; 32 ribs on the penultimate whorl.



Type material. — Peru, Dept. Cuzco, near Calca on the left side of the Río Vilcanota [ca. 2900 m] (W. Weyrauch leg., 12-I-1969). Holotype IML 1707a. Paratypes IML 1707, 14066/5.

Ecology. — Unknown.

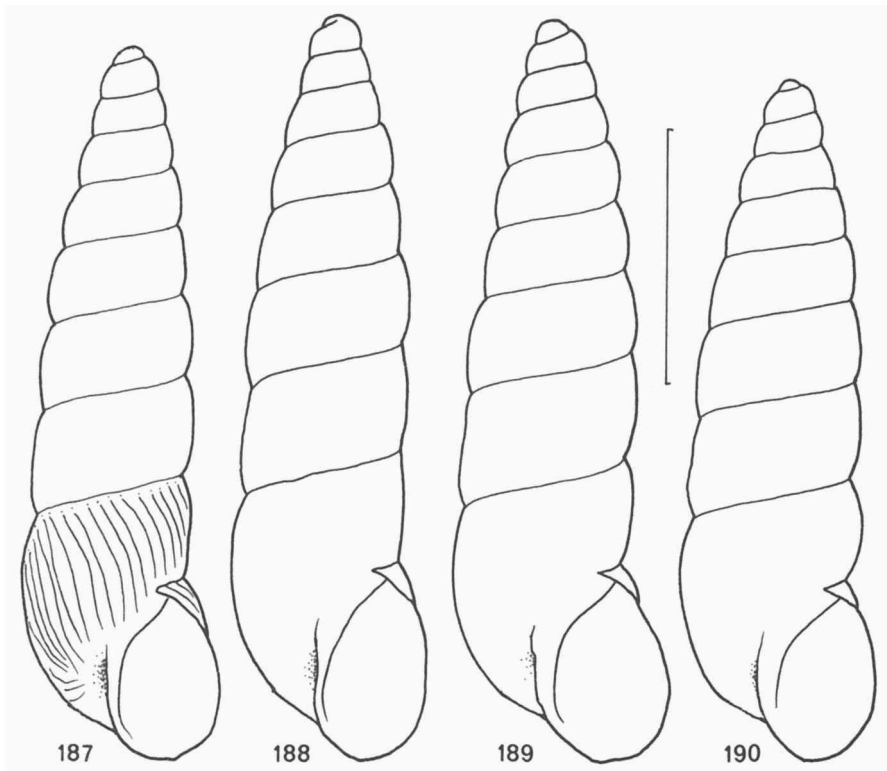


Fig. 187-190. *Bostryx spiculatus pumilus* ssp.n. Peru, Cuzco, near Calca (IML). Holotype (fig. 187) and paratypes. Scale line = 5 mm.

***Bostryx stelzneri stelzneri* (Dohrn, 1875) (figs. 191-199)**

Genitalia. — Penis with a sheath (ca.  $1/3$ - $1/4$  the length of the phallus), swollen above the distal end of the sheath, passing without external differentiation into the epiphallus, which is subcylindrical and slightly more slender than the penis. The flagellum is about as slender as the epiphallus, as long as the penis sheath and with a retractor muscle distally inserted. The vagina is relatively short. The spermathecal duct is tapering, its distal part subcylindrical. The spermatheca is globose.

Histology. Proximal part of the penis with high cylindrical, more or less pseudostratified epithelium (cell height ca.  $25\ \mu\text{m}$ ). The median part of the

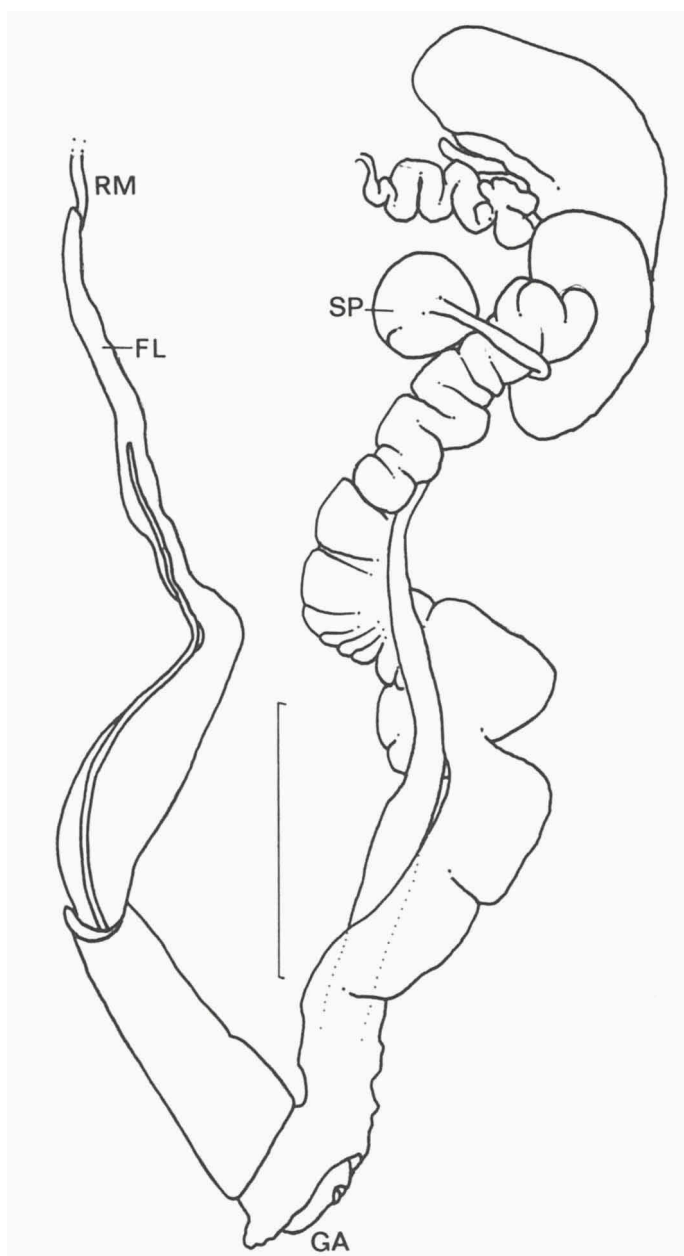


Fig. 191. *Bostryx stelzneri stelzneri* (Dohrn), genitalia. Argentina, Tucumán (IML).  
Scale line = 5 mm.

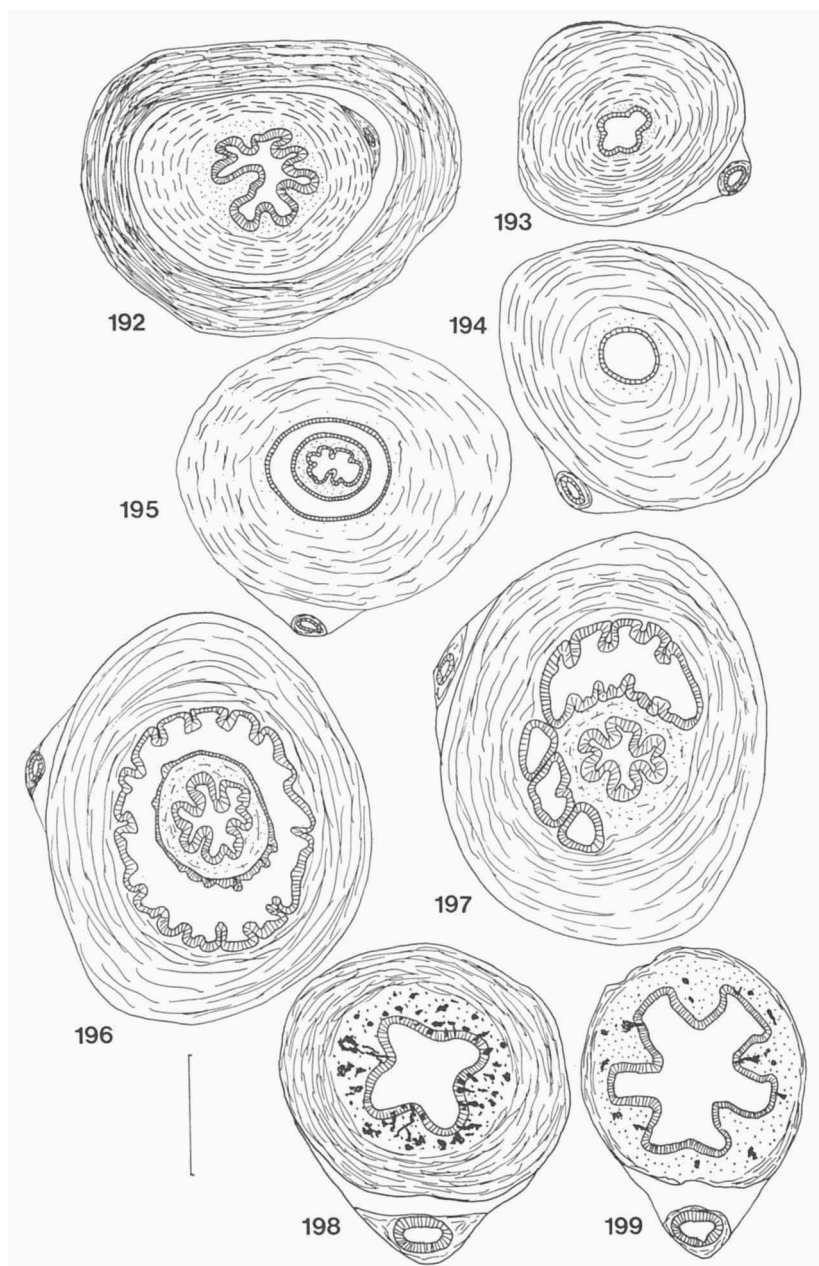


Fig. 192-199. *Bostryx stelzneri stelzneri* (Dohrn). Argentina, Tucumán. Transverse sections of penis (fig. 192-197, slides H 1103, 1107, 1108, 1109, 1111, 1112) and epiphallus (fig. 198-199, slides H 1117, 1120). Scale line = 0.5 mm.

penis with a ring-shaped gland, which is made up of high cylindrical epithelium (cell height up to 26  $\mu\text{m}$ ), filled with secretion granules staining light blue with Alcian Blue. The central lumen is lobed and lined by cubic (12  $\mu\text{m}$  high) to pseudostratified high cylindrical epithelium (cell height ca. 35  $\mu\text{m}$ ). The lumen of the epiphallus is more or less star-shaped and lined by low cylindrical epithelium (cell height 15  $\mu\text{m}$ ), of which the cells are vacuolized. The subepithelial tissue is made up of large, rounded, vacuolized cells with eccentric nucleus and glandular cells in between.

Material. — Argentina, Tucumán (IML).

***Bostryx stelnzeri peristomatus*** (Doering, 1879) (pl. 7 figs. 1-3)

This subspecies has been described from Argentina, Prov. Córdoba, Sierra de Pocho. Specimens from this locality are preserved in the Frankfurt museum (SMF 164179/5 + 1 juv.). This taxon is here figured for the first time.

***Bostryx stenacme*** (Pfeiffer, 1857) (pl. 9 fig. 5)

The type material of this species is preserved in the British Museum (Natural History). One specimen is here designated lectotype: shell height 28.0 mm, diameter 12.8 mm (BMNH 1975342). There are two paralectotypes (1975343) and the material is labelled 'Province of Patas, Andes of Peru' [Dept. La Libertad] (ex Cuming ex Farris). A second lot comprises three paralectotypes (1975344) and the label reads 'Peru' (ex Cuming). Both lots have the identification in Pfeiffer's handwriting.

***Bostryx subelatus*** (Haas, 1948)

Redescription. — Shell rimate, with nearly straight sides, rather thin. Colour whitish to tawny with irregular and somewhat undulating brownish axial streaks, which are either continuous or made up of small spots; below the periphery of the last whorl four spiral bands. Surface lustreless, with spiral series of small knobs and corresponding short epidermal hairs (about 30 rows at the peristome). Protoconch with fine spiral lines and, in some specimens, irregular low axial riblets. Whorls nearly flat; suture well impressed. Aperture subovate. Peristome thin and simple. Columellar margin hardly reflexed and shortly dilated above.

Measurements (in mm) and statistics of characters and ratios (N=7):

|     | H     | D    | HA   | WA   | LW   | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|------|------|------|------|------|-------|------|------|
| M   | 11.97 | 4.99 | 4.21 | 2.41 | 7.13 | 2.40 | 1.75  | 0.35 | 0.60 |
| s   | 0.33  | 0.19 | 0.30 | 0.13 | 0.26 | 0.12 | 0.11  | 0.02 | 0.02 |
| max | 12.4  | 5.2  | 4.6  | 2.6  | 7.4  | 2.60 | 1.92  | 0.38 | 0.61 |
| min | 11.4  | 4.7  | 3.8  | 2.2  | 6.6  | 2.29 | 1.62  | 0.33 | 0.57 |

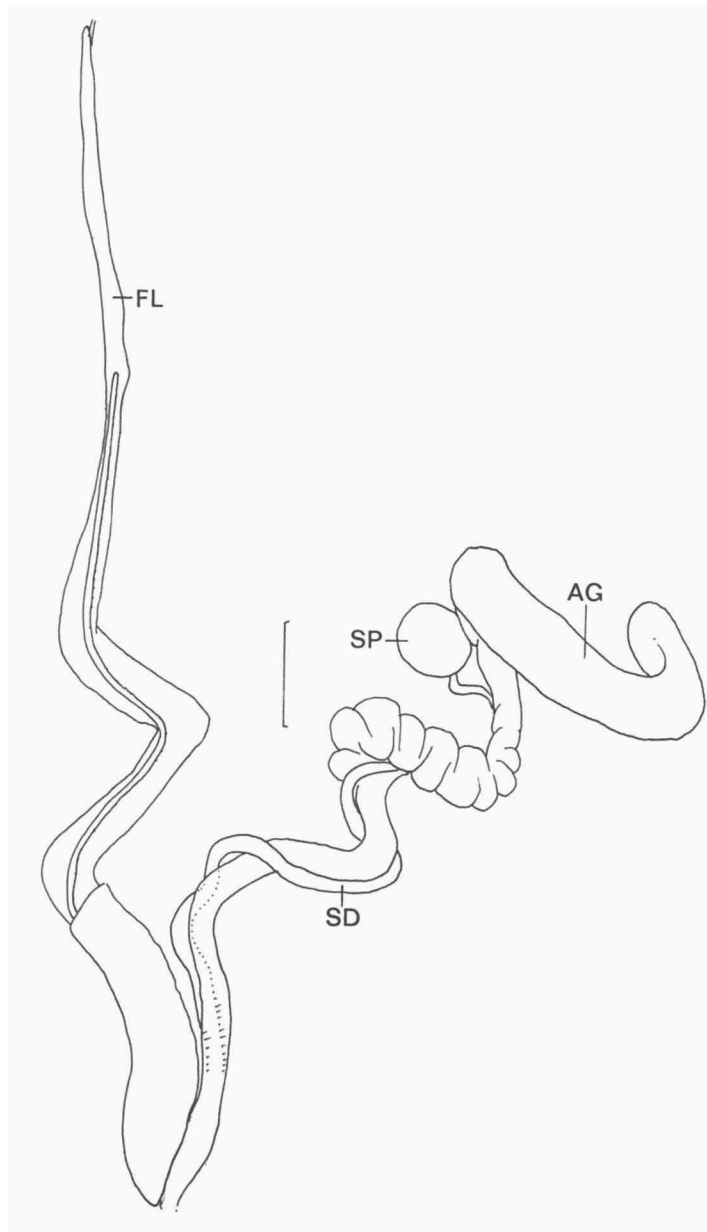


Fig. 200. *Bostryx tschudii* (Troschel), genitalia. Peru, 8 km NE Huánuco (RMNH).  
Scale line = 1 mm.

A new locality record for this species is: Peru, Dept. Huánuco, 6.1 km S Vichaycoto, 3100 m (UF/13, RMNH/3).

***Bostryx tricinctus*** (Reeve, 1848)

The type specimens of this species, which is not mentioned by Pilsbry in the Manual of Conchology, have been found in the London museum. One specimen, which corresponds to Reeve, 1848: fig. 380, is designated lectotype: shell height 19.5 mm, diameter 9.4 mm (BMNH 1975182). There are two paralectotypes (1975183). The label accompanying the material does not give a locality, but indicates that the material is from the Cuming collection.

Redescription. — Shell narrowly perforate, with straight sides, elongate, thin. Colour creamy white with (purplish-)brown narrow, more or less interrupted, spiral bands; on the last whorl at least three bands are present, the upper one broadest, the lower one around the umbilicus; up to five narrow bands may be present on the upper part of the last whorl. Surface slightly shining, smooth. Protoconch smooth. Whorls rather convex; suture well impressed. Aperture subovate, the margins slightly converging. Peristome thin and simple. Columellar margin hardly dilated above.

Measurements (in mm):

| H    | D   | HA  | WA  | W   |               |
|------|-----|-----|-----|-----|---------------|
| 19.5 | 9.4 | 8.4 | 4.9 | 6.7 | lectotype     |
| 19.5 | 9.7 | 8.3 | 5.0 | 7.2 | paralectotype |
| 19.0 | 9.3 | 8.0 | 4.6 | 6.6 | do.           |

***Bostryx tschudii*** (Troschel, 1852) (fig. 200)

Genitalia. — Penis with a sheath (ca. 1/4 the length of the phallus), subcylindrical but slightly swollen above the distal end of the sheath, passing without external differentiation into the epiphallus. The flagellum is slender, as long as the penis sheath; with a subdistal retractor muscle. The vagina is relatively short. The spermathecal duct is subcylindrical, with a globose spermatheca at its distal end.

Material. — Peru, Dept. Huánuco, 8 km NE Huánuco, 1900 m (Sta. 156; RMNH).

***Bostryx tubulatus scalaricostus*** (Morelet, 1860) (figs. 201-206)

The type specimens of this subspecies have been found in the British Museum (Natural History). One specimen is designated lectotype: shell height 15.5 mm, diameter 5.7 mm (BMNH 1893.2.4.1170). The material, which comprises one paralectotype, is labelled 'Huerta de Yuca' (ex Morelet).

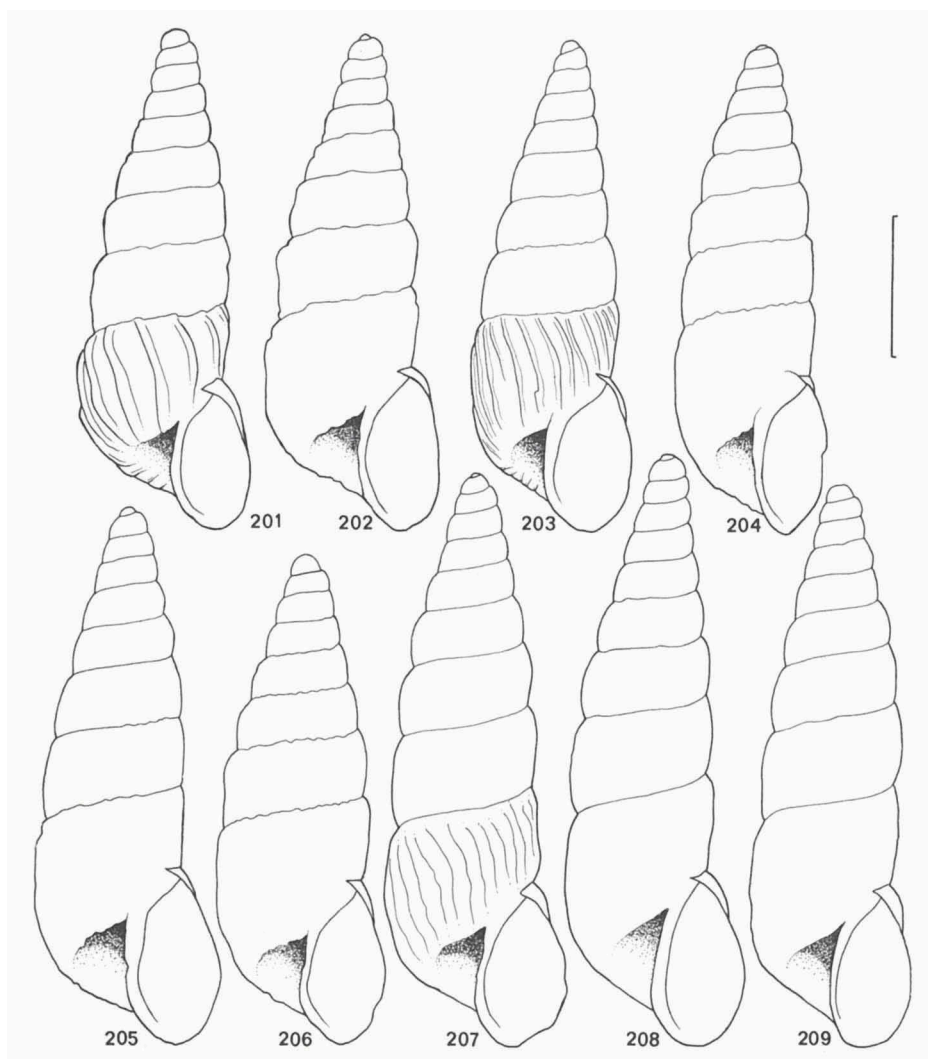


Fig. 201-206. *Bostryx tubulatus scalaricostus* (Morelet). Peru, Cuzco, 4.8 km S Urubamba (fig. 201-202), and Cerro Huaillacollo (fig. 203-206) (RMNH). Scale line = 5 mm.  
 Fig. 207-209. *Bostryx tubulatus tubulatus* (Morelet). Peru, Cuzco, 2.6 km SE Ollantaytambo (RMNH). Scale line = 5 mm.

This subspecies has been collected at Peru, Dept. Cuzco, 4.8 km S Urubamba, 3120 m (Sta. III; RMNH) and between Urubamba and Calca, Cerro Huaillacollo, 2900 m (IML, RMNH).

## Measurements (in mm) and statistics of characters and ratios:

|                                                 | H     | D    | HA   | WA   | LW   | H/D  | HA/WA | HA/H | LW/H |
|-------------------------------------------------|-------|------|------|------|------|------|-------|------|------|
| Peru, Dept. Cuzco, 4.8 km S Urubamba (N = 20) : |       |      |      |      |      |      |       |      |      |
| M                                               | 15.60 | 5.55 | 4.58 | 2.07 | 7.09 | 2.81 | 2.23  | 0.29 | 0.45 |
| s                                               | 0.83  | 0.30 | 0.04 | 0.02 | 0.04 | 0.08 | 0.20  | 0.02 | 0.02 |
| max                                             | 17.8  | 6.2  | 5.4  | 2.6  | 8.0  | 2.95 | 2.63  | 0.32 | 0.48 |
| min                                             | 14.7  | 5.0  | 3.8  | 1.7  | 6.2  | 2.67 | 1.91  | 0.26 | 0.41 |

Peru, Dept. Cuzco, Cerro Huailacollo (N = 10) :

|     | H     | D    | HA   | WA   | LW   | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|------|------|------|------|------|-------|------|------|
| M   | 15.50 | 5.37 | 4.70 | 2.39 | 7.01 | 2.89 | 1.97  | 0.30 | 0.45 |
| s   | 0.86  | 0.28 | 0.37 | 0.14 | 0.39 | 0.17 | 0.13  | 0.02 | 0.02 |
| max | 17.2  | 5.9  | 5.1  | 2.6  | 7.6  | 3.12 | 2.14  | 0.34 | 0.48 |
| min | 14.3  | 5.0  | 4.1  | 2.2  | 6.5  | 2.61 | 1.68  | 0.28 | 0.41 |

***Bostryx tubulatus tubulatus*** (Morelet, 1860) (figs. 207-209)

This subspecies has been collected at Peru, Dept. Cuzco, 2.6 km ESE Ollantaytambo, 2860 m (Sta. 105; RMNH).

## Measurements (in mm) and statistics of characters and ratios (N=10):

|     | H     | D    | HA   | WA   | LW   | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|------|------|------|------|------|-------|------|------|
| M   | 18.24 | 5.78 | 5.08 | 2.39 | 7.85 | 3.16 | 2.13  | 0.28 | 0.43 |
| s   | 0.63  | 0.38 | 0.25 | 0.12 | 0.34 | 0.17 | 0.11  | 0.01 | 0.01 |
| max | 19.1  | 6.3  | 5.5  | 2.6  | 8.4  | 3.43 | 2.39  | 0.29 | 0.44 |
| min | 17.3  | 5.3  | 4.7  | 2.3  | 7.4  | 2.95 | 2.00  | 0.26 | 0.42 |

***Bostryx tumidulus*** (Pfeiffer, 1842) (figs. 211-221; pl. 12 fig. 4)

A specimen from the type material in the British Museum (Natural History) is here designated lectotype: shell height 23.0 mm, diameter 12.6 mm (BMNH 1975324; figured by Reeve, 1848: fig. 111b). The material is labelled 'Peru' (ex Cuming) and includes two paralectotypes (BMNH 1975325).

This species has been collected at twenty localities in the region of Huánuco and Ambo, Dept. Huánuco, Peru (UF, RMNH). See fig. 130.

## Measurements (in mm) and statistics of characters and ratios (N=20):

|     | H     | D     | HA    | WA   | LW    | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|-------|-------|------|-------|------|-------|------|------|
| M   | 20.38 | 11.67 | 10.18 | 6.39 | 14.90 | 1.75 | 1.59  | 0.50 | 0.73 |
| s   | 1.20  | 0.66  | 0.55  | 0.30 | 0.78  | 0.07 | 0.06  | 0.02 | 0.01 |
| max | 23.0  | 12.9  | 11.5  | 7.0  | 16.5  | 1.85 | 1.71  | 0.55 | 0.76 |
| min | 18.5  | 11.0  | 9.3   | 5.8  | 13.5  | 1.59 | 1.47  | 0.47 | 0.71 |

(N.B. Data on specimens from different populations have been summarized in this table).

Genitalia. — Penis with a sheath (ca. 1/4 the length of the phallus), sub-cylindrical but slightly swollen in its distal part. Epiphallus and flagellum are



subcylindrical, both  $1/3-1/2$  the length of the penis. A short retractor muscle is inserted at the distal end of the phallus. The spermathecal duct is tapering, with a globose spermatheca at the distal end.

Histology. Proximal part of penis with a rather narrow lumen, which is lined with a low cylindrical epithelium (cell height  $13\text{ }\mu\text{m}$ ). At the transition of proximal and median part bifurcate projections of the lumen are observed, lined with a flat epithelium ( $3\text{ }\mu\text{m}$  high). The outer epithelium of the ring-shaped gland is high cylindrical ( $15-50\text{ }\mu\text{m}$  high), the inner epithelium is flat (at least in the proximal part of the gland). The epithelium of the central lumen is ca.  $30\text{ }\mu\text{m}$  high and filled with secretion granules staining light purple with Alcian Blue. The wide lumen of the epiphallus is star-shaped and lined with a low cylindrical epithelium (cell height ca.  $16\text{ }\mu\text{m}$ ).

***Bostryx turritus* (Broderip, 1832) (fig. 210)**

Genitalia. — Penis sheath not clearly observed in the specimens dissected, but possibly present and ca.  $1/7$  the length of the phallus. The penis is more or less subcylindrical and passing without external differentiation into the epiphallus, which is slightly more slender. The flagellum is relatively short and tapering; with a thin, distal retractor muscle. The vagina is rather long. The spermathecal duct is subcylindrical, its distal part narrow and bearing a globose spermatheca.

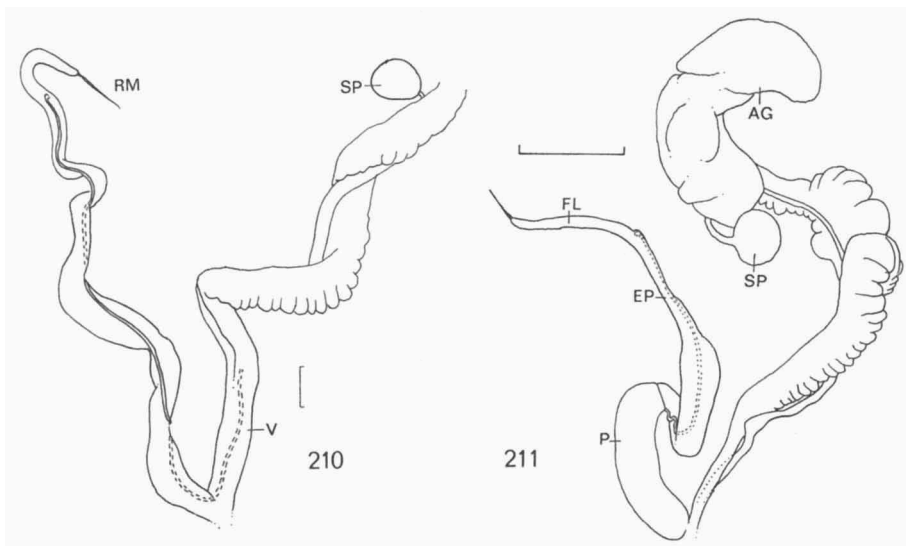


Fig. 210. *Bostryx turritus* (Broderip), genitalia. Peru, Cajamarca, near Magdalena (RMNH). Scale line = 1 mm. Fig. 211. *Bostryx tumidulus* (Pfeiffer), genitalia. Peru, Huánuco, 12 km S Huánuco (RMNH). Scale line = 5 mm.

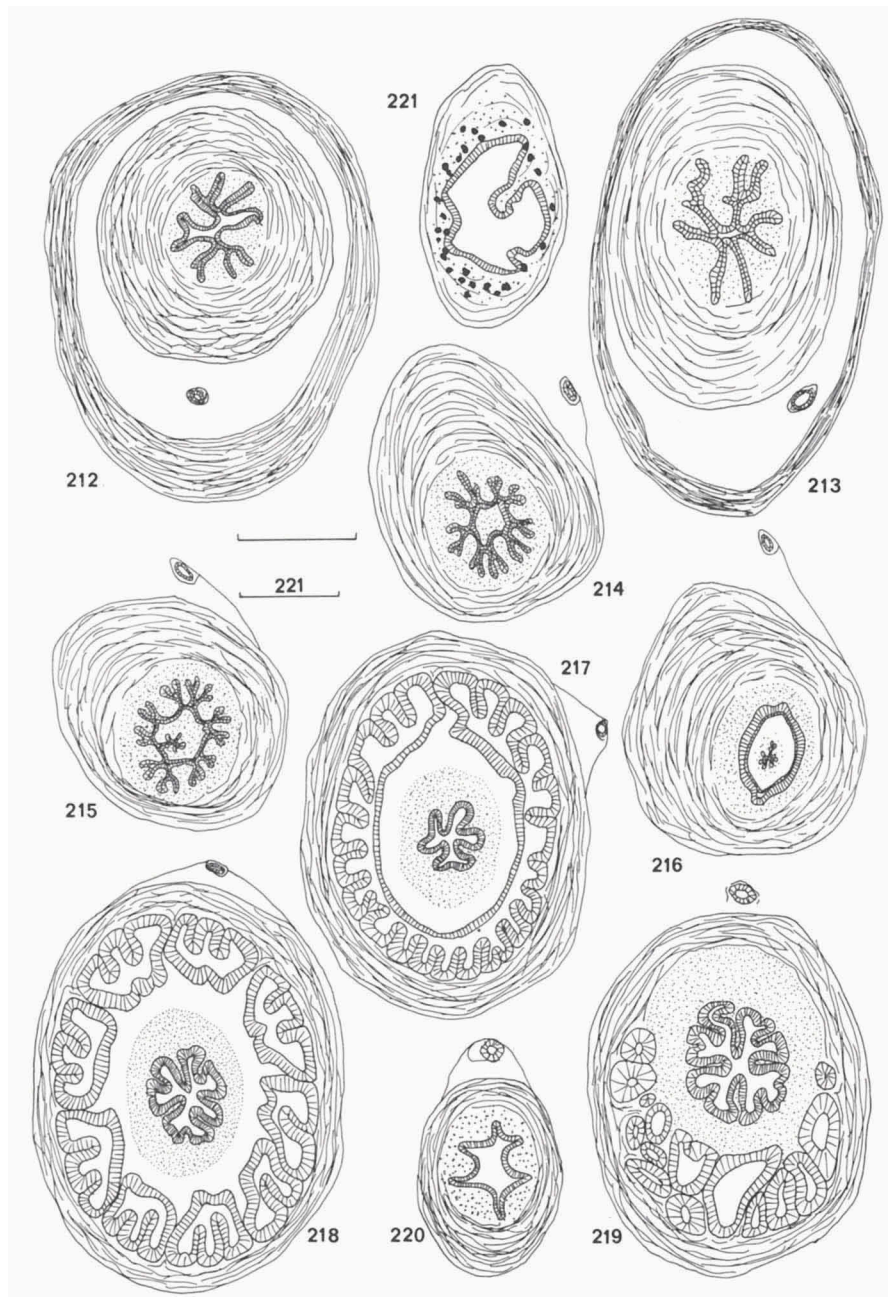


Fig. 212-221. *Bostryx tumidulus* (Pfeiffer). Peru, 12 km S Huánuco. Transverse sections of penis (fig. 212-219, slides H 1147, 1155, 1460 (3x), 1465, 1470), epiphallus (fig. 220, slide H 1470) and flagellum (fig. 221, slide H 1474). Scale line = 0.5 mm and (fig. 221) 0.2 mm.

Material. — Peru, Dept. Cajamarca, Río Jequetepeque valley, near Magdalena, 1450 m (RMNH).

***Bostryx tyleri* (Dall, 1912) (figs. 222-223)**

The first exact localities for this species are: (1) Peru, Dept. Cuzco, 3.4 km NE Quillabamba, 1200 m (Sta. 110; RMNH); (2) Peru, Dept. Cuzco, Sahuayaco, 800 m (IML/1 + 3 juv.).

The protoconch of this species is sculptured with rather strong axial wrinkles and fine spiral lines. It resembles thus the protoconch sculpture of some *Bulimulus* species, but the anatomy shows that this taxon belongs to *Bostryx* Troschel, 1847.

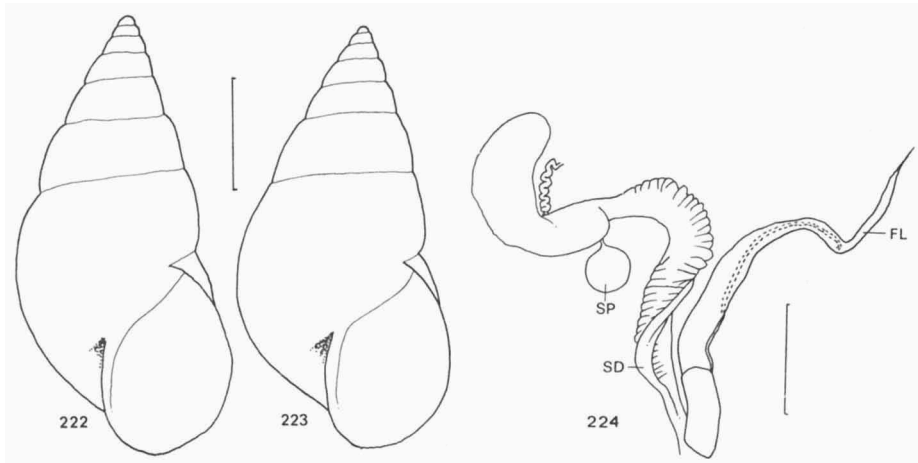


Fig. 222-223. *Bostryx tyleri* (Dall). Peru, Cuzco, 3.4 km of Quillabamba (RMNH). Scale line = 5 mm. Fig. 224. *Bostryx tyleri* (Dall), genitalia. Peru, Cuzco, 3.4 km of Quillabamba (RMNH). Scale line = 5 mm.

Genitalia. — Penis with a sheath (ca. 1/4 the length of the phallus), more or less subcylindrical, passing without external differentiation into the epiphallus, which is slightly more slender. The flagellum is slender, about 1/4 the length of the phallus and with a short, distal retractor muscle. The vagina is relatively very short. The spermathecal duct is subcylindrical, with a globose spermatheca at its distal end.

***Bostryx umbilicaris*-group**

Zilch (1960: 480) arranged the species of this group in three different subgenera, viz. *Ataxus* Albers, 1850, *Phenacotaxus* Dall, 1912, and *Ataxellus* Dall, 1912. The differences between these "subgenera" being the presence

or absence of a columellar lamella within the penultimate whorl and the width of the umbilicus. A study of all the species of this group shows that the width of the umbilicus is quite variable, but that this character alone does not justify a division in subgenera. Similarly, the absence of a columellar lamella is the only character that separates *Bostryx umbilicaris* (Souleyet) from the other members of this group. I am of the opinion, therefore, that *Ataxellus*, *Phenacotaxus* and *Ataxus* are synonyms; they are now arranged under *Bostryx* sensu lato (see page 44).

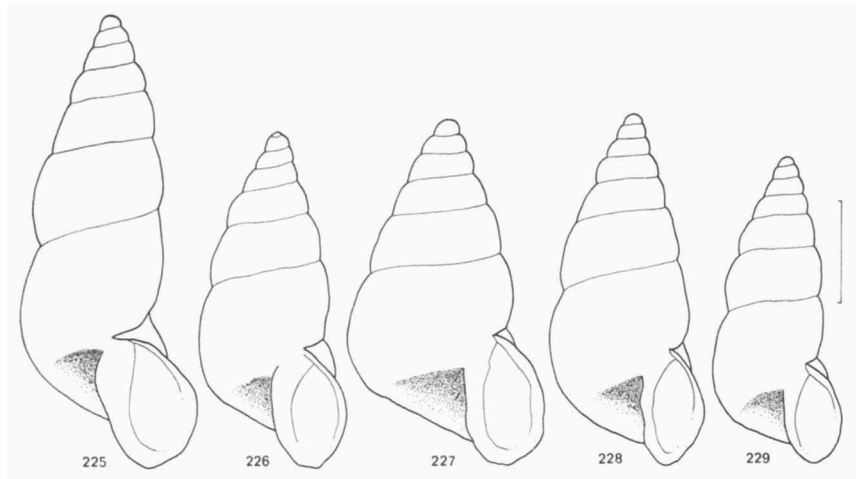


Fig. 225-229. *Bostryx umbilicaris* (Souleyet). Chile (IRSN, fig. 226-229; holotype, MNHN, fig. 225). Scale line = 5 mm.

Key to the species of the *Bostryx umbilicaris*-group:

- 1a Shell narrowly elongate (diameter 6.5 mm or less) . . . . . 2
- 1b Shell rather stout (diameter more than 6.5 mm) . . . . . 10
- 2a Shell broadly perforate . . . . . 3
- 2b Shell narrowly perforate to rimate . . . . . 6
- 3a Shell height up to 14 mm . . . . . 4
- 3b Shell height more than 14 mm . . . . . 5
- 4a Shell height up to 13 mm, surface smooth . . . . . *endoplax*
- 4b Shell height up to 14 mm, 35 riblets on the penultimate whorl (last whorl in some specimens free from penultimate whorl and descending in front) . . . . . *moniezi*
- 5a Shell height up to 19 mm, surface rather smooth (some incrassate growth striae) . . . . . *tubulatus tubulatus*

- 5b Shell height up to 17.5 mm, surface with axial riblets (interstices varying from as broad as to 5-6 times the width of the riblets)  
 . . . . . *tubulatus scalaricostus*
- 6a Shell height 21.0-24.0 mm, surface smooth (some incrassate growth striae) . . . . . *spiculatus spiculatus*
- 6b Shell height up to 18.0 mm, surface with axial riblets . . . . . 7
- 7a Shell up to 14 mm, with 30 riblets on the penultimate whorl  
 . . . . . *spiculatus pumilus*
- 7b Shell height more than 15 mm . . . . . 8
- 8a Shell very slender ( $H/D = 8.2$ ),  $HA/H = 0.10$  . . . . . *virgulus*
- 8b Shell relatively stout ( $H/D = 3.1-4.2$ ),  $HA/H = 0.22-0.29$  . . . . . 9
- 9a Shell with very weak axial riblets (40 on the penultimate whorl)  
 . . . . . *spiculatus florezi*
- 9b Shell with rather strong riblets (20 on the penultimate whorl)  
 . . . . . *spiculatus paucicostatus*
- 10a Columella smooth, basal margin of peristome rounded . . . . . *umbilicaris*
- 10b Columella with a broad lamella within the penultimate (and earlier) whorls, basal margin of peristome angled . . . . . 11
- 11a Shell with incrassate growth striae . . . . . *infundibulum umbilicatellus*
- 11b Shell smooth or with hardly incrassate growth striae . . . . . 12
- 12a Shell uniformly white . . . . . *infundibulum infundibulum*
- 12b Shell with axial streaks of (reddish-)brown . . . . . *infundibulum perforatus*

***Bostryx virgultorum*** (Morelet, 1863) (fig. 230)

The specimen which correspond to Morelet, 1863: pl. 10 fig. 1, lowest figure, is here designated lectotype: shell height 30.5 mm, diameter 15.0 mm (MHNG; labelled 'Urubamba'). Paralectotypes are labelled 'Ccorihuara-china (Cabras de Val de Sta Ana)', 'Sicuni', 'Ollantañambo', 'Puenta del Rey (Valle de Palavera)' and 'Urubamba' (40 specimens in total).

*Bostryx virgultorum* was collected at several localities in the Río Urubamba valley, e.g., 3.4 km NE Quillabamba (Sta. 110) and 10 km N Calca (Sta. 104). Specimens of the latter locality were dissected.

Genitalia. — Penis sheath ca.  $1/4$  the length of the phallus. The penis is subcylindrical and passing without external differentiation into the epiphallus, which is slightly more slender. The flagellum is slender, nearly  $1/3$  the total phallus length. A retractor muscle is inserted at the distal end of the flagellum. The vagina is about half as long as the penis sheath. The spermathecal duct is subcylindrical, its distal part tapering towards the elongate-globose spermatheca.

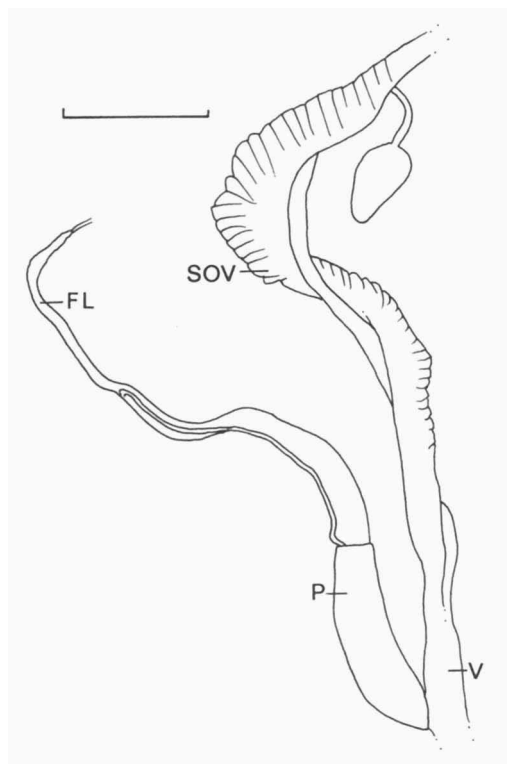


Fig. 230. *Bostryx virgultorum* (Morelet), genitalia. Peru, Cuzco, 10 km N Calca (RMNH). Scale line = 5 mm.

### ***Bostryx vittatus* (Broderip, 1832)**

Pilsbry (1896: 156) has suppressed *Bulinus vittatus* Broderip in favour of *Buliminus styliger* Beck, 1837, on account of the existence of *Bulinus vittatus* Spix, 1827. According to ICZN Art. 56(a) a one-letter difference is sufficient for 'these two names . . . not to be considered homonyms'. *Buliminus styliger* Beck, 1837, is thus a junior synonym of *Bulinus vittatus* Broderip, 1832.

### ***Bostryx williamsi* (Pfeiffer, 1858)**

This species is known from 'Catamarca [sic], Andes of Peru'. New localities are: (1) Peru, Dept. Cajamarca, 5 km WSW Balsas (UF, RMNH); (2) Peru, Dept. Cajamarca, 10 km WSW Balsas, 1300 m (Sta. 217; RMNH).

***Bulimulus apodemetes*** (d'Orbigny, 1835) (fig. 231)

The type material of *Bulimus pessulatus* Reeve, 1848, a junior synonym of *apodemetes* d'Orbigny, has been found in the London museum and is considered syntypical (BMNH 1975313/3). The material is labelled 'Bolivia' (ex Cuming).

Genitalia. — Penis with a relatively large sheath (ca. 1/4 the length of the phallus), stout. Epiphallus about half as wide and as long as the penis. The flagellum is slender, ca. 1/3 the length of the phallus; a retractor muscle is subdistally attached. The vagina is relatively long. The spermathecal duct is tapering, with a globose spermatheca at its distal end.

Material. — Argentina, Prov. Salta, Urundel (RMNH).

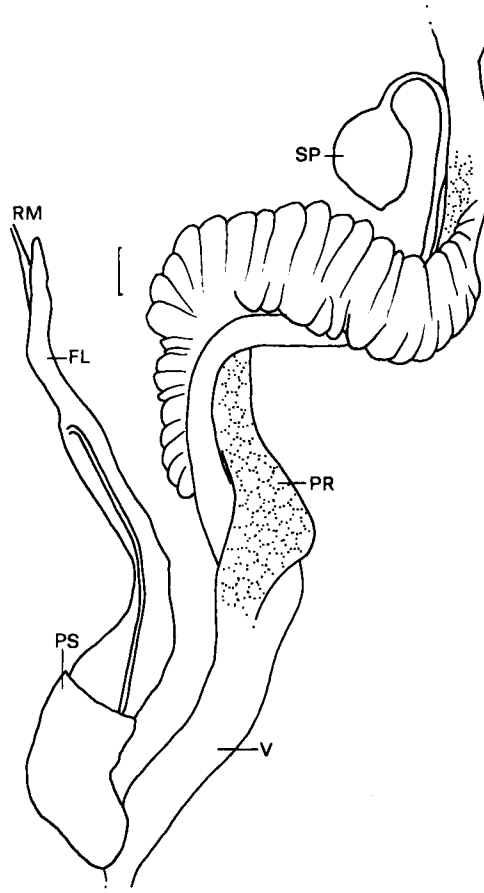


Fig. 231. *Bulimulus apodemetes* (d'Orbigny), genitalia. Argentina, Salta, Urundel (RMNH). Scale line = 1 mm.

***Bulimulus bonaerensis sporadicus*** (d'Orbigny, 1835)

The specimen figured by Reeve (1849: fig. 553) of *Bulimus gelidus* Reeve, 1849 [a junior synonym of *sporadicus* d'Orbigny], is preserved in the London museum and considered a syntype (BMNH 1975402; labelled 'C. America' [sic], ex Cuming collection).

***Bulimulus brunoï*** (Ihering, 1917) (figs. 232-235)

This species was described from 'the Island of Trinity' [= Ilha da Trindade], off Brazil. Becker collected this species on that island between Morro das Tartugas and Pico Nuestro Santa de Lourdes (MN, RMNH/14).

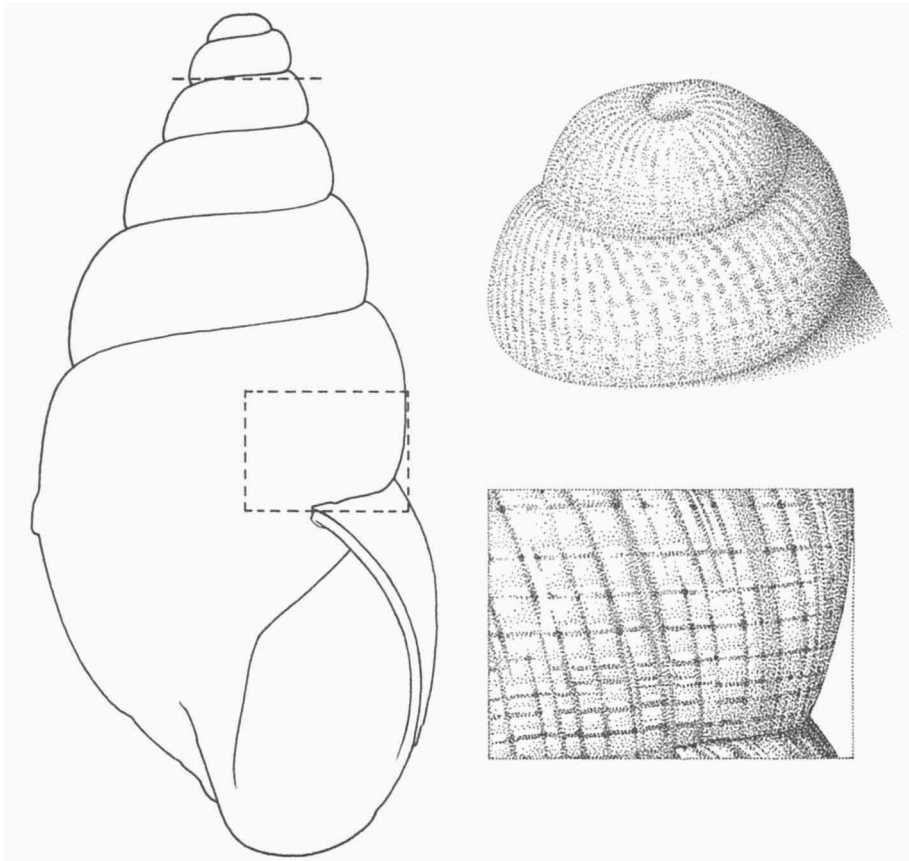


Fig. 232.

Redescription. — Shell elongate-ovate, with slightly convex sides, rimate, rather solid. Colour whitish. Surface with incrassate growth striae and spiral rows of little knobs. Protoconch with axial wrinkles, partly broken into



granules. Whorls slightly to moderately convex; suture hardly to well impressed, slightly descending in front. Aperture relatively small, subovate. Peristome simple.

Remarks. — *Loboa* Ihering, 1917 (type species by monotypy: *Loboa brunoï* Ihering) is now considered a junior subjective synonym of *Bulimulus* Leach, 1814, on account of the shell characters.

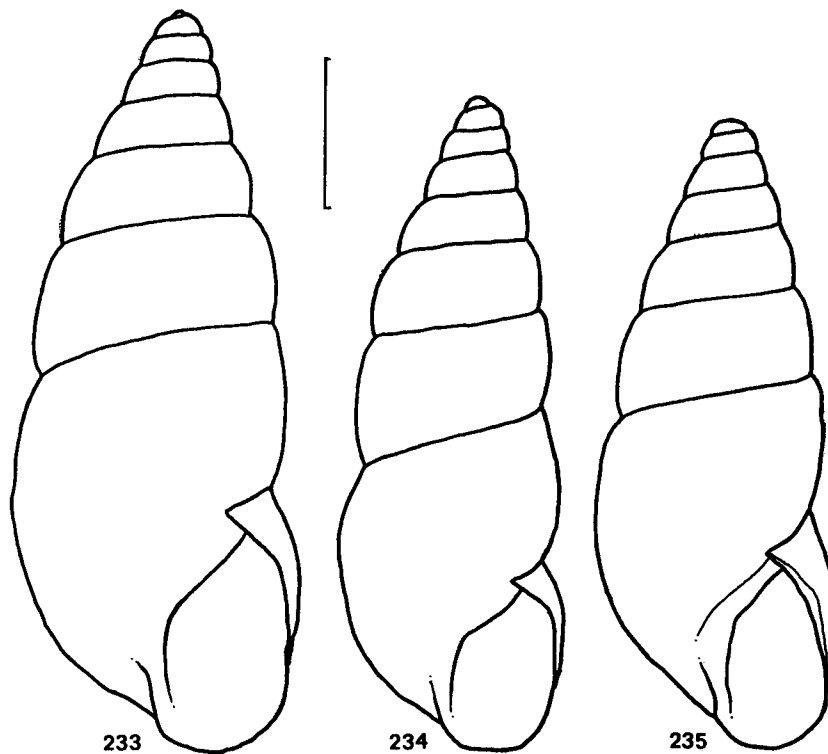


Fig. 232-235. *Bulimulus brunoï* (Ihering). Brazil, Ilha da Trindade (RMNH). Scale line = 5 mm (fig. 233-235). Fig. 232 drawn by H. Heijn.

***Bulimulus effeminatus*** (Reeve, 1848) (pl. 9 figs. 10-11)

One specimen from among the type material in the British Museum (Natural History) is designated lectotype: shell height 31.5 mm, diameter 14.2 mm (BMNH 1975508). There are two paralectotypes (1975509). This species has been described by Reeve without mentioning a locality. The type specimens, however, are labelled 'valley of the Madeleine, N. Grenade' [= Río Magdalena, Colombia].

**?*Bulimulus ehippium*** Ancey, 1904 (pl. 11 fig. 8)

Syntypes of this species have been found in the London and Brussels museum. Both specimens are from Brazil, Bahia (ex Ancey).

Redescription. — Shell rimate, with nearly straight sides, thin. Colour pale tawny. Surface slightly shining, smooth. Protoconch sculptured with numerous, fine spiral lines and very indistinct axial wrinkles, most noticeable on upper part of whorl. Whorls rather convex; suture well impressed, sharply descending in front. Aperture ovate, oblique and skewed. Peristome thin and simple. Columellar margin dilated above.

Measurements (in mm):

| H    | D    | HA   | WA  | LW   | W   |                    |
|------|------|------|-----|------|-----|--------------------|
| 20.5 | 13.4 | 10.9 | 7.7 | 0    | 5.0 | BMNH 1905.12.30.12 |
| 19.5 | 12.5 | 10.0 | 7.1 | 15.0 | 5.4 | IRSN               |

The classification of this species remains doubtful. The sculpture of the protoconch is not characteristic for *Bulimulus* Leach, 1814; this species may prove to belong to *Bostryx* Troschel, 1847, *sensu lato*.

***Bulimulus diaphanus fraterculus*** (Potiez & Michaud, 1835)

The synonymy and distribution of this subspecies have been extensively reviewed by Breure (1974). New localities are: (1) La Désirade (UF); (2) Dominica, 1 mi W Rosalie (UF/4); (3) Dominica, Rosalie (UF/9, RMNH/4); (4) Dominica, 2.2 mi S Marigot (UF/2).

***Bulimulus haplochrous*** (Pfeiffer, 1855)

A lectotype is here designated: shell height 28.5 mm, diameter 13.1 mm (BMNH 1975405). Two paralectotypes are registered 1975405 and all material is labelled 'New Granada' (ex Cuming).

***Bulimulus inutilis*** (Reeve, 1850)

A specimen in the collection of the British Museum (Natural History), labelled 'Central America' (ex Cuming), corresponds to the original figure and measurements and is here designated lectotype: shell height 16.5 mm, diameter 8.9 mm (BMNH 1975162).

***Bulimulus jujuyensis*** (Holmberg, 1909) (fig. 236)

Genitalia. — Penis with a sheath (ca. 1/4 the length of the phallus), sub-cylindrical, stout. The epiphallus is about half as broad as the penis and relatively short. The flagellum is about half as broad as the epiphallus, sub-

cylindrical and with a subdistal retractor muscle. The spermathecal duct is swollen in its median part, but distally tapering; the spermatheca is globose.

Material. — Argentina, Prov. Jujuy, road Ciudad Jujuy-Reyes (RMNH).

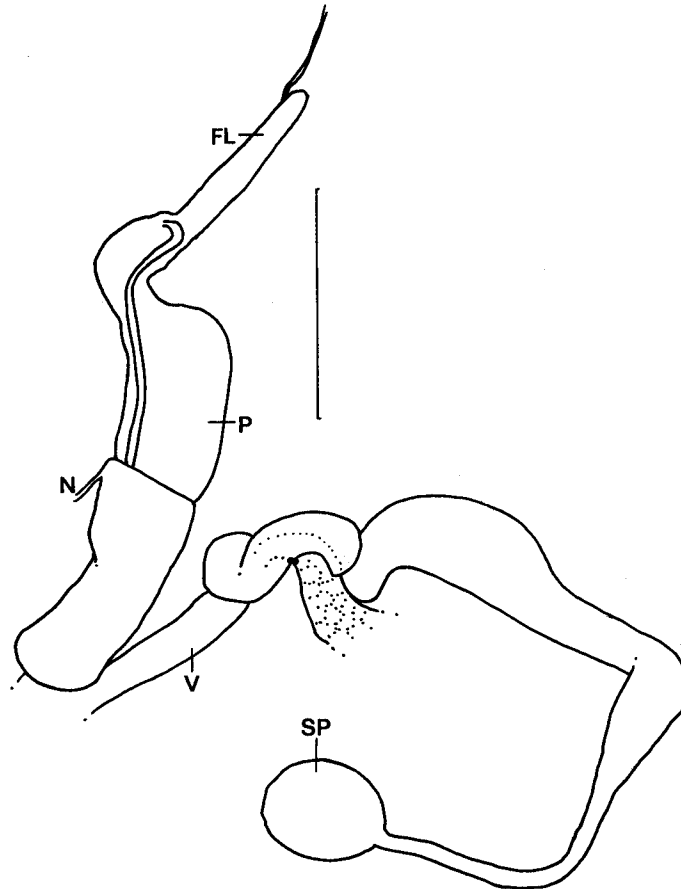


Fig. 236. *Bulimulus jujuyensis* (Holmberg), genitalia. Argentina, Jujuy, road Ciudad Jujuy-Reyes (RMNH). Scale line = 5 mm.

***Bulimulus juvenilis* (Pfeiffer, 1855)**

A type specimen of this species has been traced in the London museum and is here designated lectotype: shell height 19.5 mm, diameter 8.7 mm (BMNH 1975161). The specimen is labelled [Colombia] 'Santa Fé de Bogota' (ex Cuming).

***Bulimulus mollicellus*** (Reeve, 1849)

A lectotype is here designated for this species, corresponding to the original figure (Reeve, 1849: fig. 565): shell height 17.5 mm, diameter 7.9 mm (BMNH 1975185). The paralectotype is catalogued as BMNH 1975186. The type locality of the species is unknown and the material is not accompanied by a locality label.

This species resembles some forms of *Bulimulus guadalupensis* (Bruguère, 1789) in size and shape. The fold and the receding columella seem to be individual characters of the lectotype shell rather than of the species.

**?*Bulimulus orbigny*** (Pfeiffer, 1846) (pl. 9 figs. 2-3)

This species, hitherto considered a synonym of *Bostryx modestus* (Broderip, 1832), is now tentatively placed in *Bulimulus* Leach, 1814. The type material has been examined and a lectotype is here designated: shell height 18.5 mm, diameter 9.1 mm (BMNH 1975349). Two paralectotypes are registered 1975350 and the material is labelled 'Bolivia' (ex Cuming).

Redescription. — Shell rather widely perforate, with slightly convex sides, hardly elongate. Colour creamy with irregular patches of horny brown, the last whorl decidedly darker below the periphery. Surface lustreless, the growth striae incrassate, but not continuous from suture to suture and in part bifurcate. Protoconch with slightly undulating axial riblets, sometimes anastomosing and separated by intervals which are two times as broad as the riblets. Whorls rather convex; suture well impressed. Aperture subovate, slightly angled at base. Peristome thin and simple. Columellar margin triangularly dilated above.

Measurements (in mm):

| H    | D   | HA  | WA  | W   |               |
|------|-----|-----|-----|-----|---------------|
| 18.5 | 9.1 | 7.5 | 4.5 | 6.6 | lectotype     |
| 17.0 | 9.4 | 7.4 | 4.3 | 5.9 | paralectotype |
| 17.0 | 8.9 | 6.5 | 3.9 | 6.1 | do.           |

***Bulimulus pervius*** (Pfeiffer, 1853)

The type specimen in the British Museum (Natural History), which corresponds to the measurements given by Pfeiffer (1854: 50), is here designated lectotype: shell height 24.0 mm, diameter 12.9 mm (BMNH 1975165). No type locality is given by Pfeiffer, but the species closely resembles *Bulimulus riisei* (Pfeiffer, 1855) from St. Croix, West Indies. If these taxa prove to be synonyms then the name *pervius* will have priority over *riisei*.

**Bulimulus plicatulus** (Pfeiffer, 1856)

A label in the handwriting of L. Pfeiffer accompanies three specimens in the British Museum (Natural History). One of the specimens corresponds to the original measurements (shell height 23.0 mm, diameter 12.4 mm) and is here designated lectotype (BMNH 1975390). The two paralectotypes, also labelled 'Bolivia' (ex Cuming), are registered BMNH 1975391.

**Bulimulus prosopidis** (Holmberg, 1912) (figs. 237-238; pl. 7 figs. 14-15)

Genitalia. — Penis with a sheath (ca.  $\frac{1}{3}$  the length of the phallus), sub-cylindrical, stout. The epiphallus is about half as broad as the penis and swollen at the transition to the flagellum, which is more or less tapering and relatively short; the retractor muscle is subdistally attached. The vagina is comparatively short. The spermathecal duct is more or less subcylindrical, its distal part tapering towards the globose spermatheca.

Histology. Proximal part of the penis with a star-shaped lumen, which is lined by low cylindrical epithelium (ca.  $13\ \mu\text{m}$  high). More distally the epithelium is ca.  $25\ \mu\text{m}$  high and the subepithelial tissue is made up by large, rounded cells, which partly stain purple with Haemalum-Eosin. The distal part of the penis consists of large tubes parallel to each other and to the central lumen. The epithelium of these tubes is high cylindrical (cell height ca.  $50\ \mu\text{m}$ ); in one of the tubes the cytoplasm stains dense pink with Haemalum-Eosin, whereas the cytoplasm of the other tubes hardly stains with this dye.

Material. — Bolivia, 3-4 km W Villamontes, 400 m (IML, RMNH).

**Bulimulus transparens** (Reeve, 1849)

The protoconch of this species shows close but somewhat indistinct spiral striae between the axial undulating wrinkles.

The specimen figured by Reeve (1849: fig. 566) is here designated lectotype: shell height 18.5 mm, diameter 8.5 mm (BMNH 1975397). This specimen is probably not fully mature. Neither Reeve nor Pilsbry (1897: 73) has given a locality, but the label accompanying the specimen reads 'Venezuela' (ex Cuming).

**Bulimulus unicolor unicolor** (Sowerby, 1833)

The specimen of *Bulimus ignavus* Reeve, 1849, figured by Reeve, 1849: pl. 77 fig. 562, is here designated lectotype: shell height 17.0 mm, diameter

8.8 mm (BMNH 1975411). *Bulimus ignavus* was considered a variety of *Bulimulus dysoni* (Pfeiffer, 1846) by Pilsbry (1897: 57), but Thompson (1967, 1969) has convincingly shown that *Bulimulus ignavus* is an ecological form of *B. unicolor* (Sowerby).

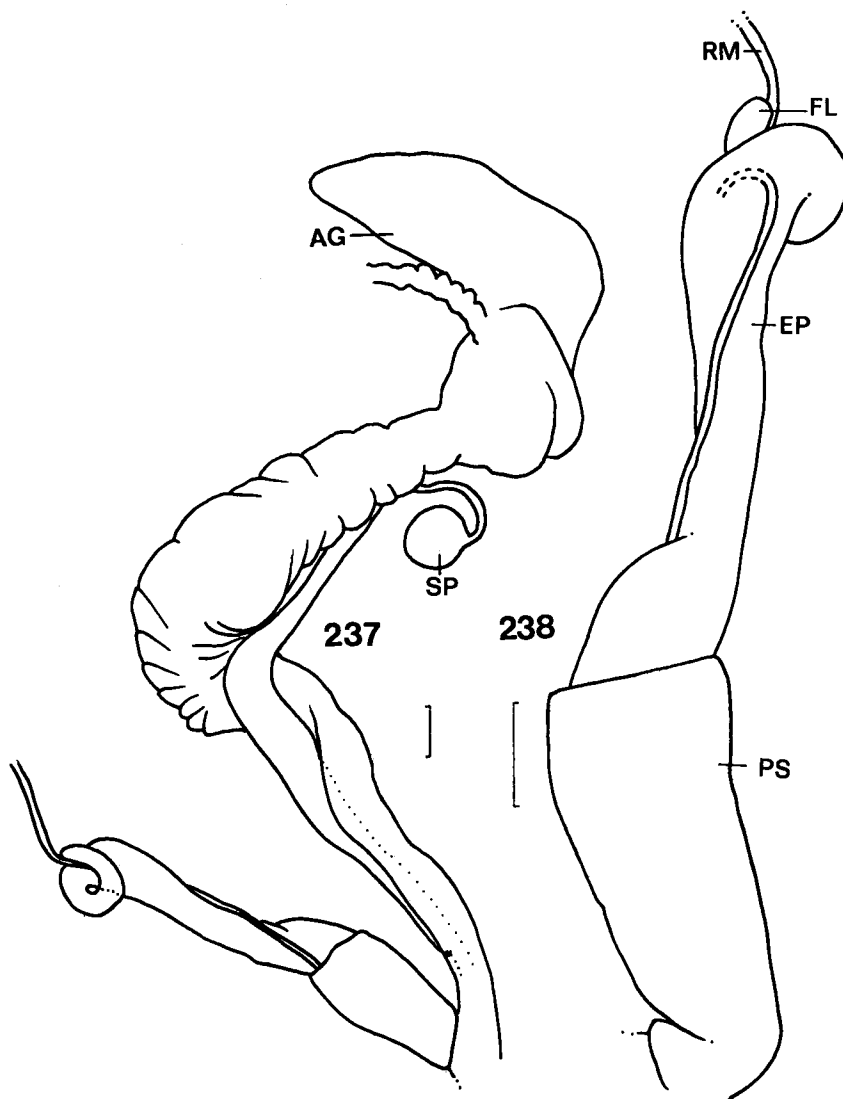


Fig. 237-238. *Bulimulus prosopidis* (Holmberg), genitalia. Bolivia, 4 km W Villamontes (IML). Scale line = 1 mm.

**Bulimulus unicolor petenensis** (Morelet, 1851)

Three specimens of this subspecies were found in the London museum, bearing Morelet's label 'Savane de Peten' [Guatemala]. The specimens are considered syntypes (BMNH 1893.2.4.1176-1178).

**Bulimulus vesicalis** (Pfeiffer, 1853)

The specimen figured by Pfeiffer (1855: pl. 70 figs. 23-24 [in Küster & Pfeiffer, 1840-1865]) is here designated lectotype (shell height 25.0 mm, diameter 12.8 mm; BMNH 1975395). The material, which also comprises two paralectotypes (1975396), according to the label originates from 'Brazil' (ex Cuming). This species resembles *Bulimulus bonaerensis sporadicus* (d'Orbigny, 1835), with which it is possibly synonymous.

**Bulimulus viatorum** Holmberg, 1909 (pl. 7 fig. 10)

A new locality for this species is: Bolivia, foothills west of Santa Cruz de la Sierra (IML/6, RMNH/2).

Measurements (in mm):

| H    | D    | HA   | WA  | LW   | W   |
|------|------|------|-----|------|-----|
| 30.0 | 11.5 | 11.2 | 6.9 | 17.0 | 9.0 |
| 28.5 | 11.1 | 10.4 | 5.8 | 16.0 | 8.9 |
| 33.5 | 12.2 | 11.9 | 6.2 | 18.0 | 9.5 |

**Bulimulus wiebesi** sp.n. (figs. 239-245)

Description. — Shell up to 23.5 mm, 2.0 times as long as wide, narrowly perforate to rimate, with slightly convex sides, rather elongate, rather thin. Colour pale brownish-yellow; most specimens with a pale spiral band at the periphery of the last whorl; russet brown towards the apex. Surface rather shining, smooth; in some specimens with traces of indistinct epidermal striae. Protoconch sculptured with oblique wrinkles, anastomosing on lower part of whorl and giving the impression of alternating rows of granules. Whorls 6,7, nearly flat; suture hardly impressed. Aperture more or less obliquely subovate, 1.5 times as long as wide, 0.47 times total length. Peristome thin and simple. Columellar margin broadly dilated above and appressed. Margins more or less converging, with a parietal callus in some specimens.

Measurements (in mm) and statistics of characters and ratios (N=10):

|     | H     | D     | HA    | WA   | LW    | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|-------|-------|------|-------|------|-------|------|------|
| M   | 22.00 | 11.14 | 10.24 | 6.64 | 15.42 | 1.98 | 1.54  | 0.47 | 0.70 |
| s   | 1.18  | 0.46  | 0.52  | 0.34 | 0.78  | 0.07 | 0.04  | 0.01 | 0.01 |
| max | 23.5  | 12.0  | 11.0  | 7.1  | 16.5  | 2.06 | 1.59  | 0.49 | 0.73 |
| min | 20.5  | 10.5  | 9.5   | 6.2  | 14.4  | 1.83 | 1.48  | 0.45 | 0.69 |

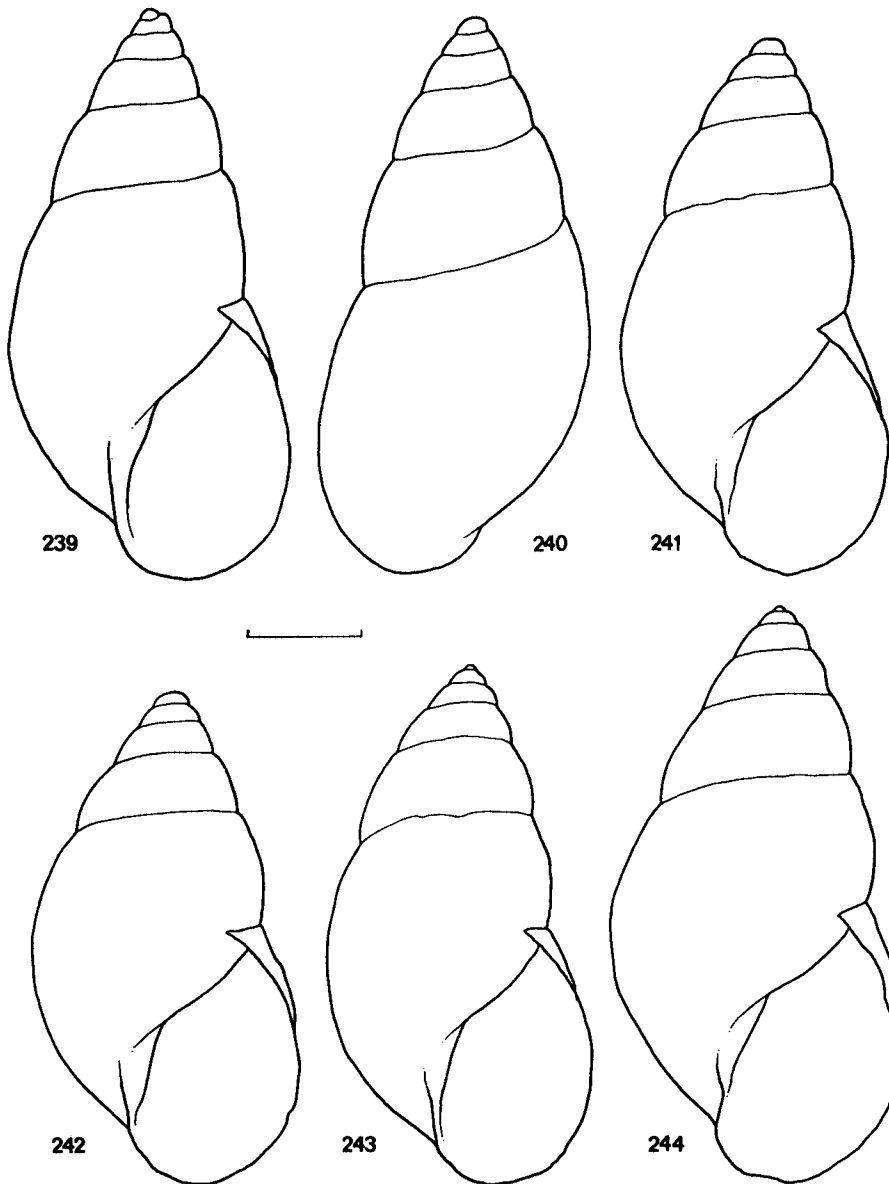


Fig. 239-244. *Bulimulus wiebesi* sp.n. West Indies, Grenada, 2.1 mi S St. George's (fig. 239-240: holotype; 241-243); idem, 1.6 mi W Woburn (fig. 244). Scale line = 5 mm.



Measurements of holotype: shell height 23.5 mm, diameter 11.4 mm, height of aperture 11.0 mm, width 6.9 mm, height of last whorl 16.5 mm; 5.8 whorls.

Type material. — West Indies, Grenada, St. George Parish, 2.1 mi S St. George's (F. G. Thompson leg., 9-V-1968). Holotype UF 22764. Paratypes UF 22765/36, RMNH 55186/12, RMNH 9044 [alcohol material], same data. Additional localities: (1) Grenada, St. David Parish, 1.3 mi SSW St. David (UF 22766/14); (2) Grenada, St. George Parish, 1.6 mi W Woburn (UF 22767/9, RMNH 55182/4); (3) Grenada, St. George Parish, 0.3 mi E Grand Anse (UF 22768/6).

Genitalia. — Penis with a sheath (ca. 1/5 the length of the phallus), swollen above the distal end of the sheath and tapering at the transition to the epiphallus, which is subcylindrical and slightly shorter in length as the penis proper. The flagellum is slender, subcylindrical, as long as the penis proper. The median part of the spermathecal duct is widened, otherwise this duct is slender. The spermatheca is elongate-globose.

Comparisons. — This species may be compared to *Bulimulus cacticolus* (Reeve, 1849) from which it differs in (1) the less inflated last whorl and (2) the uniform tawny colour. *Bulimulus wiebesi* sp.n. also resembles *B. crectus* (Reeve, 1849), differing in (1) being less elongate and (2) having the margins less converging. Finally this species may be compared to *Bulimulus eyriesii* (Drouët, 1859), from which it differs in (1) the less inflated last whorl and (2) the peristome, which is more regularly rounded.

Etymology. — I have much pleasure in naming this new West Indian *Bulimulus* species, like *B. hummelincki* Breure, 1974, and *B. gittenbergeri* Breure, 1974, to one of my teachers in systematic zoology, viz., Prof. dr. J.T. Wiebes (Leiden).

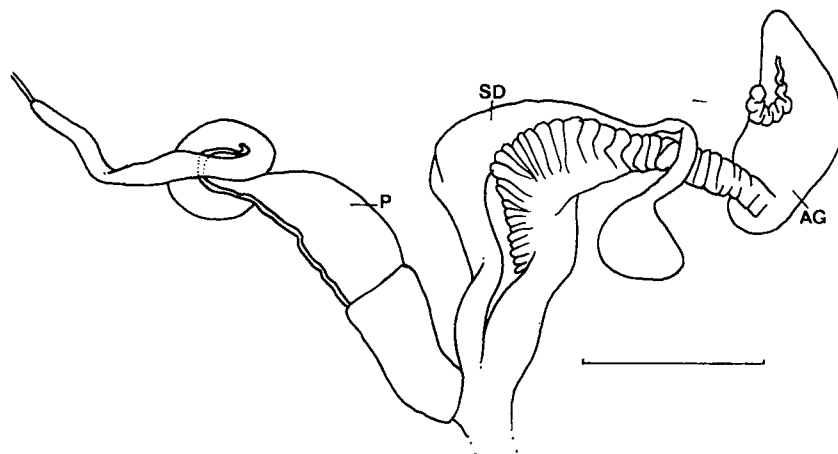


Fig. 245. *Bulimulus wiebesi* sp.n., genitalia. West Indies, Grenada, 2.1 mi S St. George's (UF). Scale line = 5 mm.

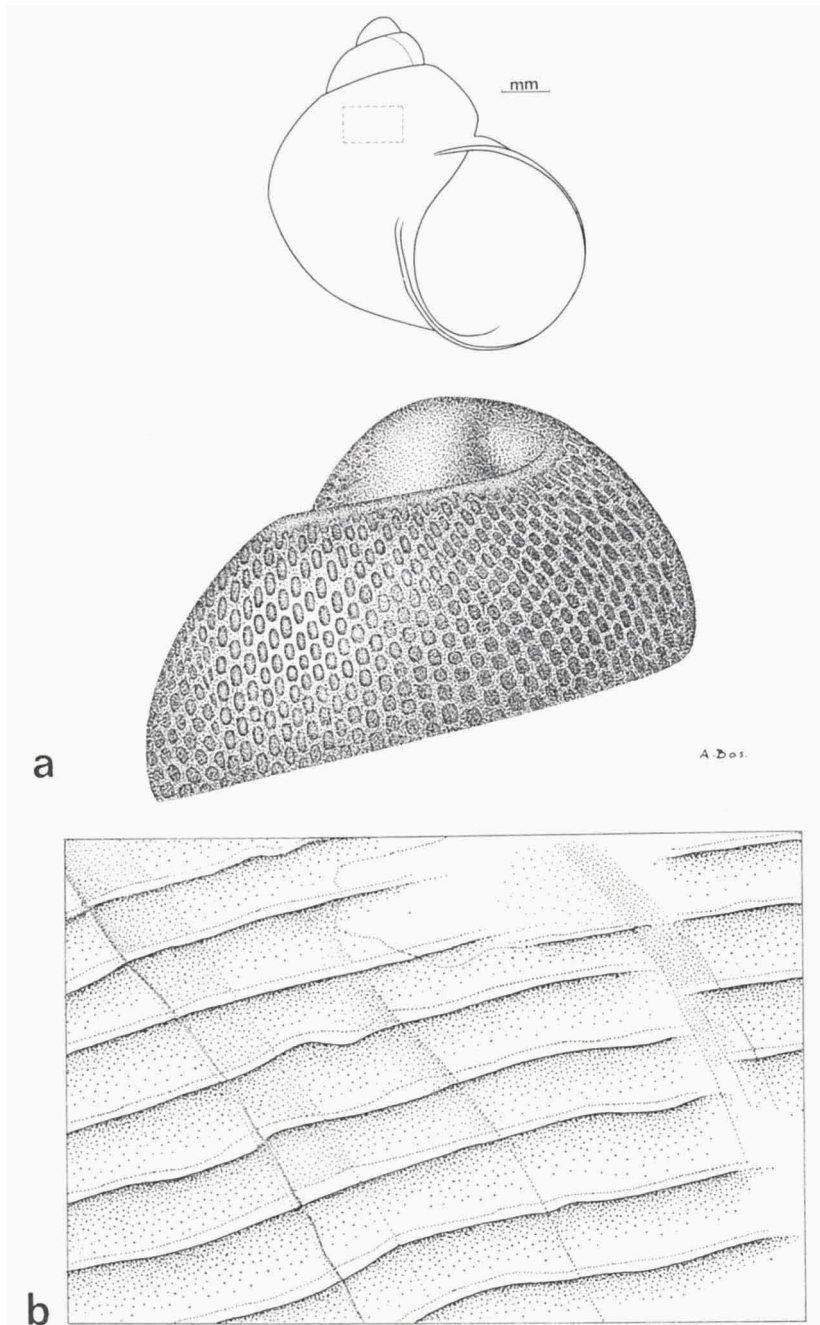


Fig. 246. *Sphaeroconcha araozi* (Weyrauch). Peru, Huánuco, 5.5 km N and 2.0 km NE Tingo Maria (UF). A. Bos del.

**Sphaeroconcha** gen.n.

Diagnosis. — The genus is characterized by the globose shell shape, the sculpture of the protoconch, the subcircular shape of the aperture, the absence of a penis sheath, the absence of parallel tubes in the penis and the structure of the radula. Type species by monotypy: *Bulimulus* (*Bulimulus*) *araozi* Weyrauch, 1956.

Description. — Shell globose, rimate, with nearly straight sides, thin. Colour uniform brownish. Surface rather shining, with epidermal spiral

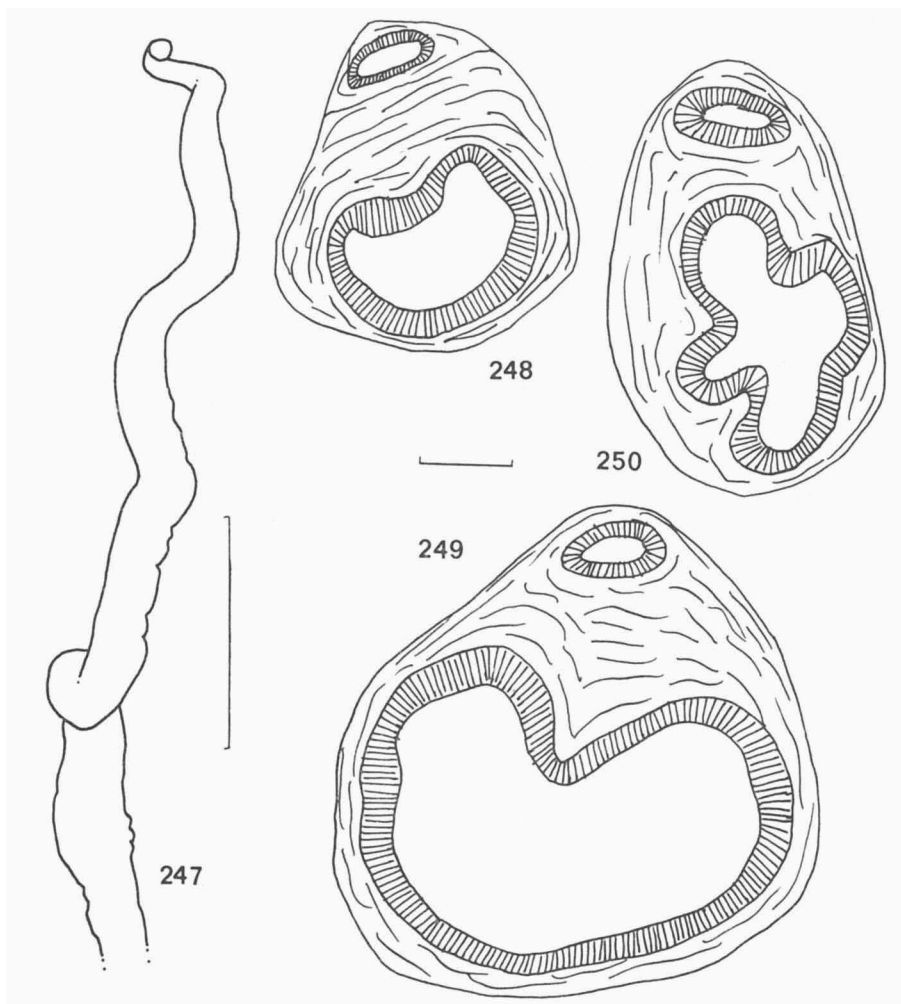


Fig. 247-250. *Sphaeroconcha araozi* (Weyrauch), penis. Peru, Huánuco, 5.5 km N and 2.0 km NE Tingo Maria. Morphology (fig. 247) and transverse sections (fig. 248-250, slides H 4381 (2x) and 4382). Scale line = 1 mm (fig. 247) and 0.1 mm (fig. 248-250).

striae. Protoconch pit-reticulate. Whorls rather convex; suture well impressed. Aperture subcircular, relatively large. Peristome slightly thickened, simple.

Comparisons. — *Sphaeroconcha* gen.n. differs from *Bulimulus* Leach, 1814, in (1) the sculpture of the protoconch, (2) the shape of the shell (globose, with a subcircular aperture), (3) the structure of the radula, (4) the absence of a penis sheath, (5) the structure of the penis: a rather undifferentiated lumen, with the absence of parallel tubes.

Etymology. — (L.) *sphaera*, ball and (L.) *concha*, shell; referring to the shape of the shell.

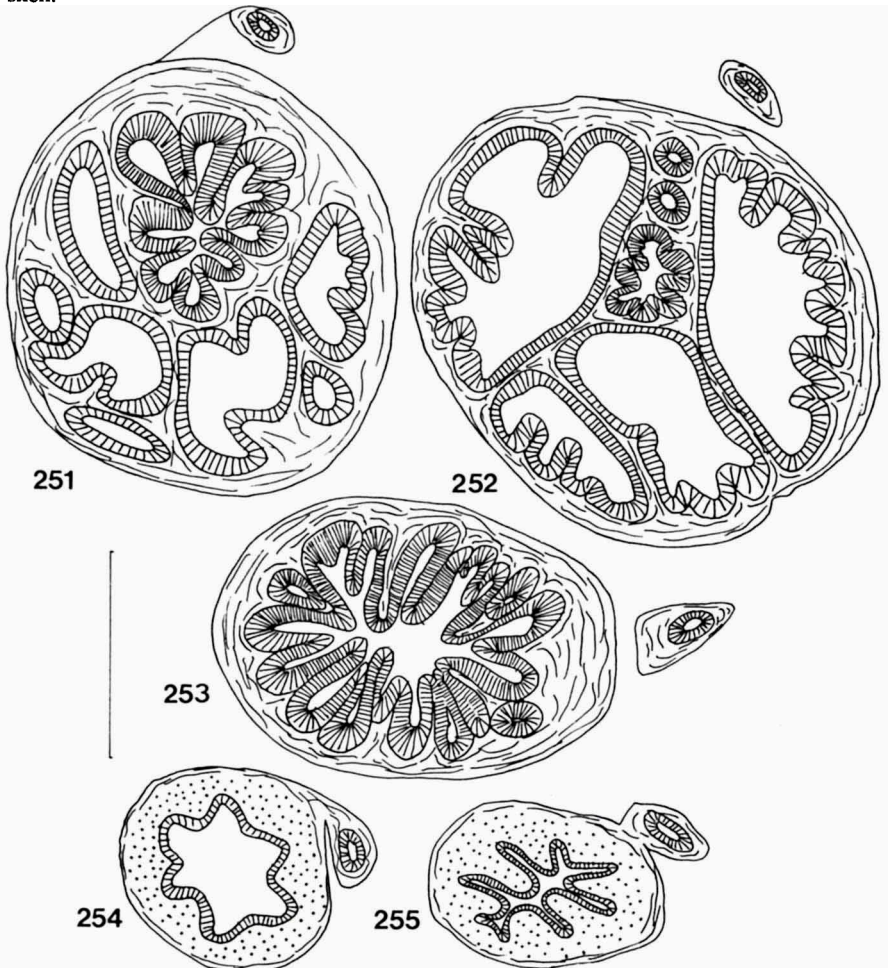


Fig. 251-255. *Rabdotus mooreanus* (Binney). USA, Texas, Austin. Transverse sections of penis (fig. 251-253, slides H 105, 109, 112) and epiphallus (fig. 254-255, slides H 115, 211). Scale line = 0.5 mm.

**Sphaeroconcha araozi** (Weyrauch, 1956) (figs. 246-250)

A new locality for this species is: Peru, Dept. Huánuco, Boquerón del Padre Abad, 550 m (RMNH/1).

Genitalia. — Penis without sheath, more or less subcylindrical. Histologically the penis has a rather wide lumen, lined by low cylindrical epithelium (cell height ca. 15  $\mu$ m). The fixation of the single specimen studied does not permit to draw definite conclusions, but probably there is only one glandular cell type present.

Material. — Peru, Dept. Huánuco, 5.5 km N and 2.0 km NE Tingo Maria (UF) [a second unpublished locality].

**Rabdodus mooreanus** (Pfeiffer, 1868) (figs. 251-255)

Histology. Proximal part of penis with a rather wide lumen lined by cubic epithelium; in the subepithelial tissue dispersed glandular cells have been observed (Alcian Blue-positive). More distally the lumen is wide and divided into several parallel tubes. The epithelium is high cylindrical, the nuclei are situated in the basis of the cells. The distal part of the penis is characterized by a narrow lumen and a strongly folded epithelium, which is high cylindrical. The large nuclei are in the median part of the cells. The epiphallus and flagellum have glandular cells dispersed in the subepithelial tissue.

Material. — USA, Texas, Austin (RMNH).

**Spartocentrum digueti** (Mabille, 1895) (figs. 256-258)

The type material, which has been studied in the Paris museum, consists of the lectotype designated by Hanna & Smith (1968: 396) [not labelled as such by them], a paralectotype and two additional specimens. The material is labelled 'Plateau de San Javier' [Mexico, Baja California, ca. 25°50' N 111°30' W] (ex Diguet).

Redescription. — Shell cylindrical, tapering towards the apex, subrimate-perforate, rather thin. Colour (grayish-)whitish. Surface lustreless, sculptured with obtuse axial riblets (the interstices about as broad as the riblets), 50 riblets on the penultimate whorl. Protoconch slightly club-shaped, the third whorl narrower than the first two whorls; first 2½ whorls with axial riblets (the interstices about as broad as the riblets) and numerous fine spiral lines in between, the riblets more closely set at the transition to the last whorl (of the protoconch) which is sculptured with spiral series of granules. Whorls 20, slightly convex, slowly and regularly increasing, the last equal to the penultimate and slightly exceeding the antepenultimate in width; suture well impressed; the last whorl rounded, slightly tapering, adnate or free and descending in front, acutely keeled above and obtusely keeled around the umbilicus.

Aperture subcircular-ovate, angulated at the parietal-palatal margin and the basal-columellar margin; 1.1 times as long as wide, 0.13 times total length. Peristome continuous, thin, expanded. Columella twisted-arcuate, with a slightly granulose spiral swelling.

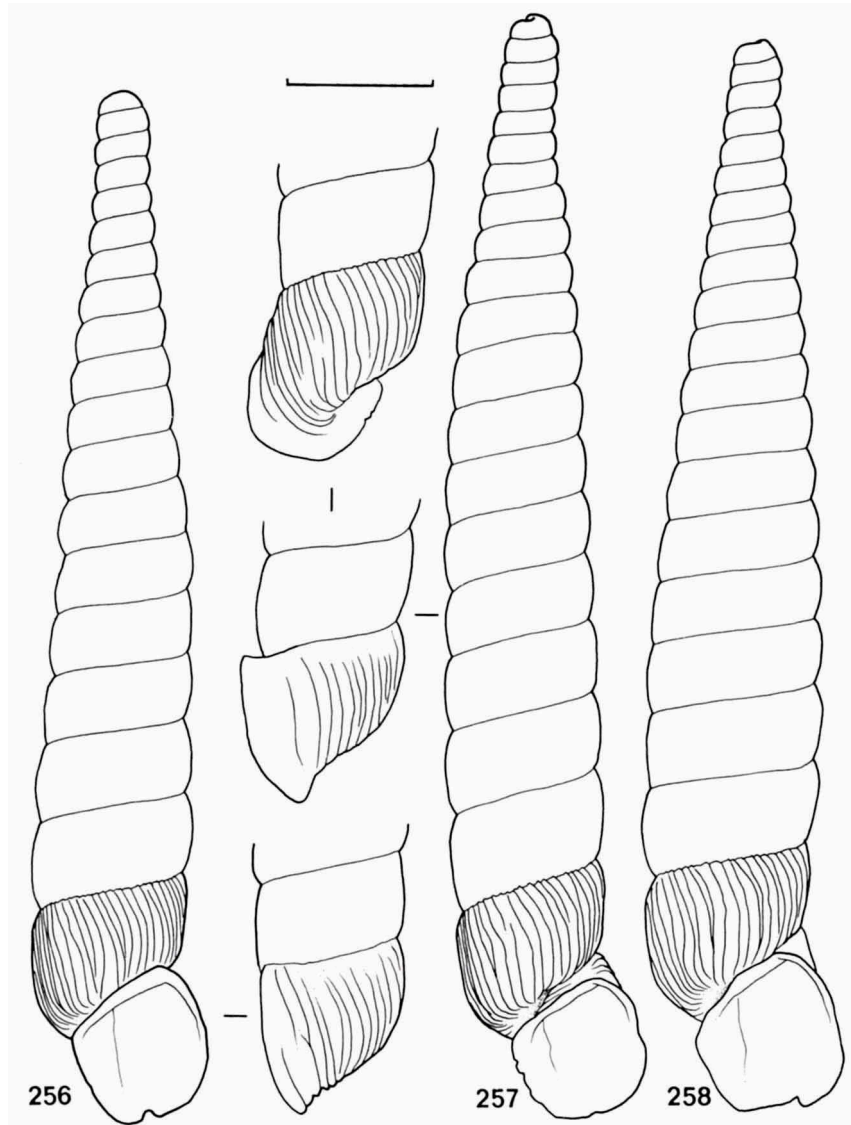


Fig. 256-258. *Spartocentrum digueti* (Mabille). Mexico, Baja California, plateau de San Javier (MNHN). Scale line = 5 mm.



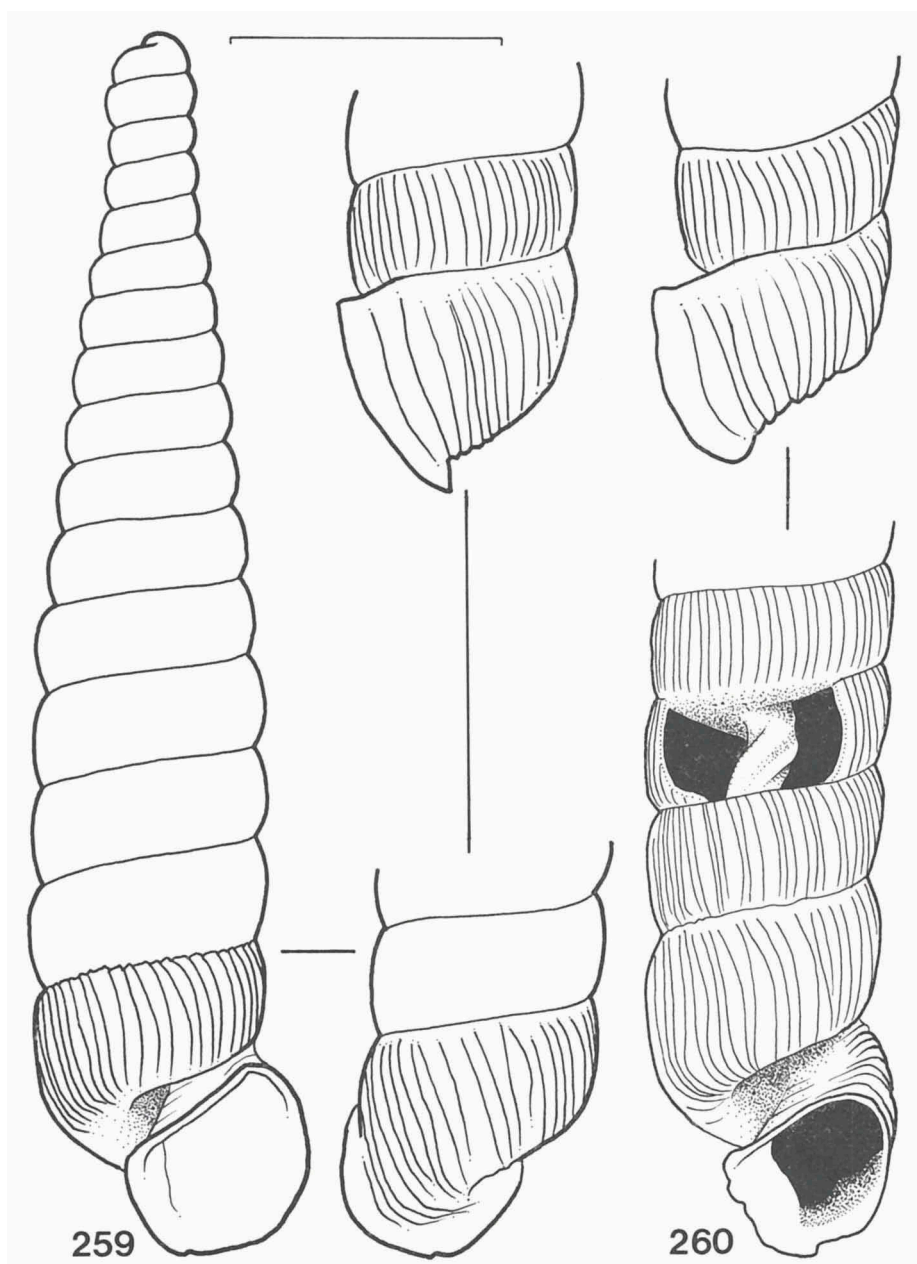


Fig. 259-260. *Spartocentrum minorina* (Mabille). Mexico, Baja California, Arroyo de Purissima (MNHN). Scale line = 5 mm.

Measurements (in mm):

| H    | D <sub>max</sub> | D <sub>min</sub> | HA  | WA  | LW  | R/P | W    |               |
|------|------------------|------------------|-----|-----|-----|-----|------|---------------|
| 33.0 | 6.3              | 4.4              | 3.8 | 3.7 | 7.2 | 47  | 20.5 | lectotype     |
| 31.9 | 6.7              | 4.8              | 4.5 | 4.1 | 7.6 | 50  | 20.5 | paralectotype |
| 30.8 | 5.4              | 4.6              | 4.1 | 3.6 | 6.8 | 51  | 19.5 |               |
| 30.5 | 6.6              | 4.8              | 4.3 | 3.6 | 7.0 | 52  | 19.5 |               |

***Spartocentrum minorina*** (Mabille, 1895) (figs. 259-260)

The type material of this species has been studied in the MNHN-collection and comprises the lectotype designated by Hanna & Smith (1968: 396) [not labelled as such by them] and three paralectotypes. The material has been collected 'au dessus de l'arroyo de Purissima' [Mexico, Baja California, ca. 26°15' N 112° W] (ex Diguët).

Redescription. — Shell perforate, cylindrical, tapering towards the apex, rather thin. Colour whitish to dirty brown. Surface slightly shining, sculptured with obtuse axial riblets (the interstices about 1-1½ times as broad as the riblets), 55 riblets on the penultimate whorl. Protoconch slightly club-shaped, the third whorl narrower than the first two whorls; first 2½ whorls with axial riblets (the interstices as broad as the riblets) and fine spiral lines in between; the riblets are more closely set at the transition to the last 1½ whorl of the protoconch which is sculptured with spiral series of granules. Whorls 16, slightly convex, slowly and regularly increasing, the last equal to the penultimate and slightly exceeding the antepenultimate whorl in width; suture well impressed; the last whorl rounded, slightly tapering, free and somewhat descending in front, acutely keeled above and obtusely keeled around the umbilicus. Aperture subcircular-ovate, angled at the parietal-palatal margin and the basal-columellar margin, 0.9 times as long as wide, 0.12 times the total length. Peristome continuous, thin, expanded. Columella hollow, twisted-arcuate, with a slightly granulose spiral swelling.

Measurements (in mm):

| H    | D <sub>max</sub> | D <sub>min</sub> | HA  | WA  | LW  | R/P | W   |           |
|------|------------------|------------------|-----|-----|-----|-----|-----|-----------|
| 20.2 | 4.6              | 3.9              | 2.5 | 2.5 | 4.7 | 55  | 15½ | lectotype |
| 20.5 | 0                | 3.8              | 0   | 0   | 4.6 | 0   | 16¾ |           |
| 0    | 4.1              | 3.9              | 2.1 | 2.5 | 5.5 | 0   | 0   |           |
| 0    | 4.9              | 4.0              | 2.2 | 2.5 | 5.0 | 54  | 0   |           |

***Spartocentrum vanduzeei*** (Hanna, 1923) (pl. 12 figs. 5-8)

The genitalia of this species have recently been figured by Christensen & Miller (1975: figs. 2-3).

Histology. Proximal part of the penis with a rather wide lumen, lined by



low cylindrical epithelium (cell height ca. 10  $\mu\text{m}$ ). More distally the central lumen is lined by cubic epithelium (ca. 8  $\mu\text{m}$  high); the subepithelial tissue is made up of large, rounded cells staining dark purple with Haemalum-Eosin. Parallel to this lumen several tubes parallel to each other are observed; their epithelium is high cylindrical (ca. 24-35  $\mu\text{m}$  high) and stains partly light blue with Alcian Blue, the other cells staining reddish-purple. The epithelium of the epiphallus is flat and ca. 3  $\mu\text{m}$  high.

Material. — Mexico, Baja California, Juncalito (RMNH).

***Berendtia taylori*** (Pfeiffer, 1861) (fig. 261)

One specimen from San Javier, Baja California, Mexico (RMNH) has been dissected. The genitalia correspond to Christensen & Miller (1975: fig. 1), except that the penis is not swollen above the distal end of the sheath.

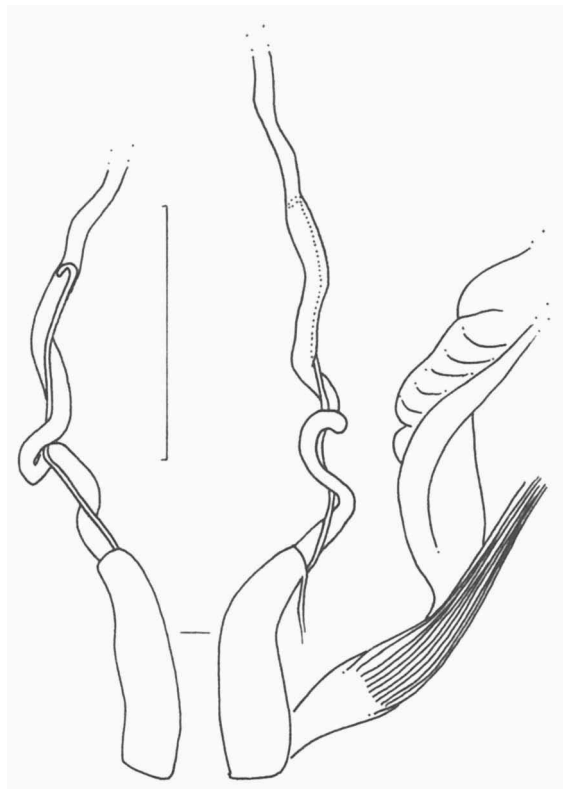


Fig. 261. *Berendtia taylori* (Pfeiffer), anterior part of genitalia. Mexico, Baja California, San Javier (RMNH). Scale line = 5 mm.

**Naesiotus cleeforum** sp.n. (pl. 2 fig. 1)

Description. — Shell up to 18.0 mm, 2.0 times as long as wide, with open umbilicus, with hardly to slightly convex sides, rather thin. Colour greyish-brown with irregular whitish axial streaks. Surface lustreless, with traces of numerous indistinct epidermal striae. Protoconch sculptured with straight axial riblets (the interstices ca. four times as broad as the riblets), with very fine spiral lines in between. Whorls 5.9, nearly flat; suture well impressed. Aperture elliptic-ovate, 1.6 times as long as wide, 0.41 times the total length. Peristome thin and simple. Columellar margin hardly dilated.

Measurements (in mm) and statistics of characters and ratios (N=5):

|     | H     | D    | HA   | WA   | LW    | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|------|------|------|-------|------|-------|------|------|
| M   | 16.60 | 8.42 | 6.88 | 4.22 | 10.90 | 1.97 | 1.63  | 0.41 | 0.66 |
| s   | 0.82  | 0.26 | 0.33 | 0.24 | 0.69  | 0.09 | 0.09  | 0.02 | 0.02 |
| max | 18.0  | 8.7  | 7.3  | 4.5  | 12.1  | 2.07 | 1.69  | 0.44 | 0.68 |
| min | 16.0  | 8.2  | 6.5  | 3.9  | 10.4  | 1.84 | 1.48  | 0.39 | 0.63 |

Measurements of holotype: shell height 16.5 mm, diameter 8.2 mm, height of aperture 6.5 mm, width 4.4 mm, height of last whorl 10.4 mm; 6 whorls.

Type material. — Colombia, Dept. Valle, 9 km N Dagua, Atunceto, 3500 feet [= 1200 m] (F. G. Thompson leg., I-III-1969). Holotype UF 22769. Paratypes UF 22770/3, RMNH 55173/2, same data. Additional locality: Colombia, Dept. Valle, Cali, Balneario Santa Rita, 1000 feet [= 330 m]: UF 22771/44, RMNH 55172/7.

Comparisons. — *Naesiotus cleeforum* resembles *N. jullensorum* Breure, 1977, but differs in (1) being smaller (height 18.0 vs. 20.5 mm), (2) being less slender (H/D = 2.0 vs. 2.5).

Etymology. — Named in honour of Drs. Toine & Mieke Cleef (Bussum, the Netherlands).

**Naesiotus florschuetzi** sp.n. (pl. 2 fig. 2)

Description. — Shell up to 22.5 mm, 2.4 times as long as wide, widely perforate, with slightly convex sides, elongate, rather solid. Colour whitish; the upper whorls greyish, ornamented with yellowish-brown axial streaks at irregular intervals. Surface lustreless, with epidermal spiral striae which are dissolved into series of oblong, narrow granules. Protoconch with straight axial riblets (the interstices 4-5 times the width of the riblets) and numerous fine spiral lines in between. Whorls 7.9, slightly convex, the last whorl somewhat inflated; suture well impressed. Aperture elongate- to squarish-ovate, 1.8 times as long as wide, 0.36 times the total length. Peristome thin and simple. Columellar margin reflexed and somewhat dilated above. Parietal region with a transparent callus.

Measurements (in mm) and statistics of characters and ratios (N=10):

|     | H     | D    | HA   | WA   | LW    | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|------|------|------|-------|------|-------|------|------|
| M   | 20.95 | 8.66 | 7.44 | 4.21 | 11.95 | 2.42 | 1.77  | 0.36 | 0.57 |
| s   | 0.85  | 0.39 | 0.39 | 0.20 | 0.34  | 0.10 | 0.08  | 0.01 | 0.01 |
| max | 22.5  | 9.1  | 8.1  | 4.5  | 12.4  | 2.56 | 1.95  | 0.38 | 0.59 |
| min | 20.0  | 7.9  | 6.8  | 3.9  | 11.4  | 2.22 | 1.67  | 0.34 | 0.55 |

Measurements of holotype: shell height 22.5 mm, diameter 9.0 mm, height of aperture 8.1 mm, width 4.4 mm, height of last whorl 12.4 mm; 8.1 whorls.

Type material. — Ecuador, Prov. El Oro, 31 km N Santa Rosa, in mangrove-scrub forest (K. Campbell leg., 15-II-1970). Holotype UF 22772. Paratypes UF 22773/45, RMNH 55184/10, same data.

Comparisons. — *Naesiotus florschuetzi* resembles several species from the Galápagos. It differs from *Naesiotus calvus* (Sowerby, 1833) in (1) being more elongate, (2) having more whorls (7.9 vs. 7.0), (3) the thinner peristome, (4) the more elongate aperture. The new species differs from *Naesiotus perspectivus* (Pfeiffer, 1846) in (1) being larger (max. height 22.5 vs. 17.0 mm), (2) having more whorls (7.9 vs. ca. 7), (3) the absence of a peripheral colour band on the last whorl, (4) having the aperture elongate-ovate to subquadrate. *Naesiotus florschuetzi* also resembles *N. rugulosus* (Sowerby, 1839), but may be distinguished by (1) the different colour pattern, (2) the less impressed suture, (3) the more regular whorls. Finally, this species may be compared to *Naesiotus turritus* Weyrauch, 1967, from northern Peru, from which it is differing in (1) having the last whorl less inflated, (2) having a different sculpture of the surface, (3) having more whorls.

Etymology. — This species is dedicated to the late Dr. P. Florschütz (formerly at the University of Utrecht), who has taught me the principles of botany, a person loved and admired by everyone who knew him.

#### ***Naesiotus subcostatus maranonensis* ssp.n. (pl. 2 fig. 3)**

This new subspecies differs from *Naesiotus s. subcostatus* (Haas, 1948), living near Jaén [Peru, Dept. Cajamarca], in having (1) the last whorl more inflated, (2) the upper whorls of the teleoconch longitudinally plicate and crossed by four spiral lines (the surface of the other whorls is nearly smooth), (3) the aperture broadly ovate.

*Naesiotus subcostatus maranonensis* ssp.n. may also be compared to *N. s. chamayensis* Weyrauch, 1967, described from Chamaya [Dept. Cajamarca, near Jaén], from which it is differing in (1) being smaller (height 12.3 vs. 18.5 mm), (2) the inside of the aperture pink, (3) the relatively smaller aperture (HA/H = 0.28-0.34 vs. 0.34-0.40).

Measurements (in mm) and statistics of characters and ratios (N=5):

|     | H     | D    | HA   | WA   | LW   | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|------|------|------|------|------|-------|------|------|
| M   | 12.26 | 5.32 | 3.74 | 2.58 | 6.60 | 2.30 | 1.45  | 0.31 | 0.54 |
| s   | 0.86  | 0.13 | 0.25 | 0.13 | 0.33 | 0.12 | 0.07  | 0.03 | 0.03 |
| max | 13.8  | 5.5  | 4.1  | 2.7  | 7.0  | 2.51 | 1.52  | 0.34 | 0.56 |
| min | 11.8  | 5.2  | 3.5  | 2.4  | 6.1  | 2.20 | 1.35  | 0.28 | 0.51 |

Measurements of holotype: shell height 11.8 mm, diameter 5.2 mm, height of aperture 3.5 mm, width 2.4 mm, height of last whorl 6.5 mm; seven whorls.

Type material. — Peru, Dept. Cajamarca, 25 km E Celendín, 2510 m (F. G. Thompson leg., 23-IV-1972). Holotype UF 22774. Paratypes UF 22775/5, RMNH 55156/3, same data.

Remarks. — Both *Naesiotus s. subcostatus* and *N. s. chamayensis* live ca. 150 km N of Celendín.

***Naesiotus willinki* sp.n.** (figs. 262-269; pl. 12 fig. 2)

Description. — Shell up to 24.5 mm, 3.1 times as long as wide, narrowly perforate to rimate, with slightly convex sides, elongate, rather solid. Colour whitish, with irregular axial streaks of brown. Surface shining (in fresh specimens), smooth. Protoconch with oblique axial riblets and numerous fine spiral lines in between; the interstices ca. 4 times as broad as the riblets. Whorls 8.5, rather convex; suture well impressed. Aperture elongate-ovate, the basal-columellar margin angled; whitish coloured inside; 1.75 times as long as wide, 0.32 times the total length. Peristome thickened inside the aperture, slightly expanded at the basal margin only. Columellar margin well dilated above.

Measurements (in mm) and statistics of characters and ratios:

|                                              | H     | D    | HA   | WA   | LW    | H/D  | HA/WA | HA/H | LW/H |
|----------------------------------------------|-------|------|------|------|-------|------|-------|------|------|
| Argentina, Salta, Estancia Lumbrera (N = 9): |       |      |      |      |       |      |       |      |      |
| M                                            | 22.00 | 7.04 | 6.94 | 3.98 | 11.13 | 3.12 | 1.75  | 0.32 | 0.51 |
| s                                            | 1.44  | 0.45 | 0.56 | 0.37 | 0.82  | 0.13 | 0.08  | 0.02 | 0.02 |
| max                                          | 24.5  | 7.9  | 8.0  | 4.6  | 12.5  | 3.33 | 1.91  | 0.34 | 0.53 |
| min                                          | 20.0  | 6.5  | 6.2  | 3.4  | 10.3  | 2.94 | 1.68  | 0.29 | 0.48 |

Argentina, Salta, 24 km of Matán (N = 3):

|      |     |     |     |      |      |      |      |      |
|------|-----|-----|-----|------|------|------|------|------|
| 20.0 | 6.4 | 6.4 | 3.5 | 10.0 | 3.13 | 1.83 | 0.32 | 0.50 |
| 20.5 | 6.6 | 6.1 | 3.6 | 10.0 | 3.11 | 1.69 | 0.30 | 0.49 |
| 20.5 | 6.4 | 6.2 | 3.5 | 10.0 | 3.20 | 1.77 | 0.30 | 0.49 |

Measurements of holotype: shell height 21.5 mm, diameter 6.6 mm, height of aperture 6.2 mm, width 3.6 mm, height of last whorl 10.3 mm; nine whorls.

Type material. — Argentina, Prov. Salta, Estancia Lumbrera, 750 m (W.

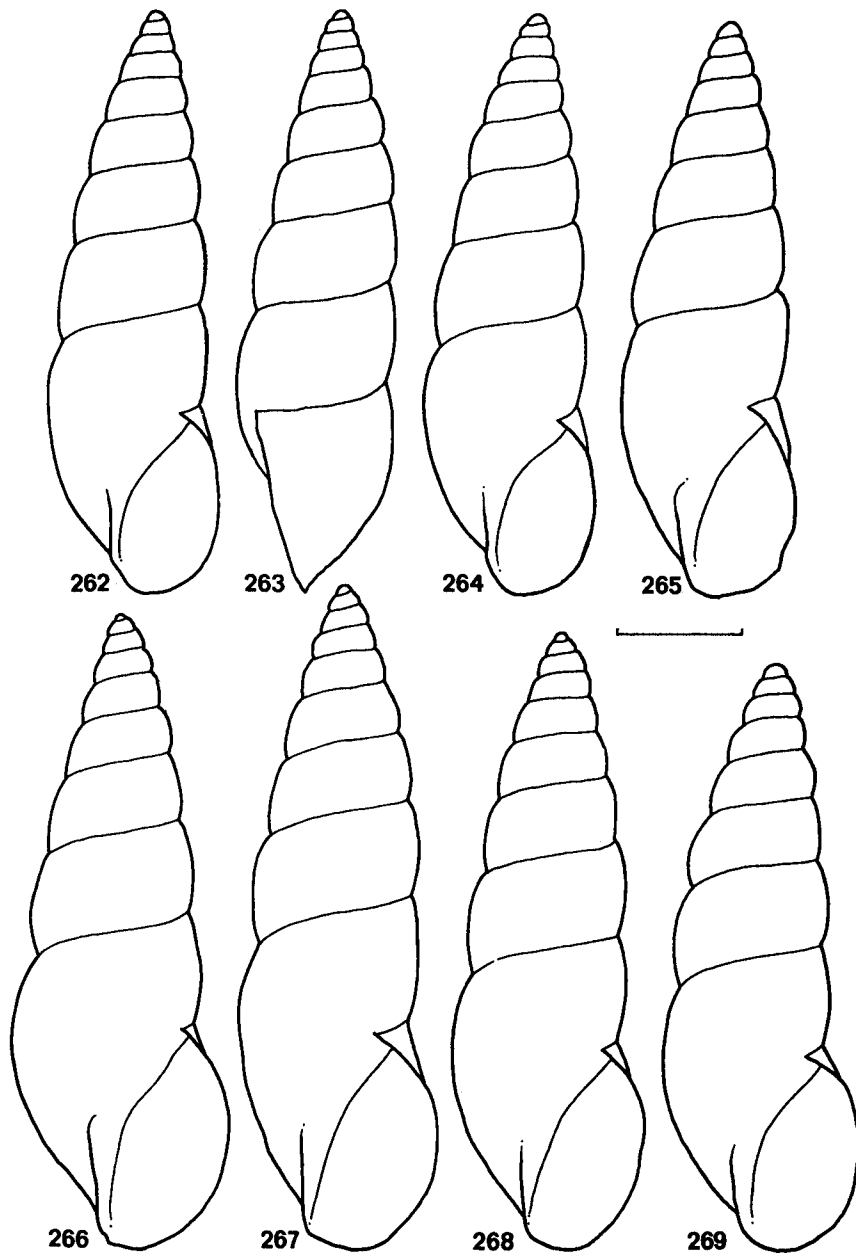


Fig. 262-269. *Naesiotus willinki* sp.n. Argentina, Salta, Lumbrera (IML). Holotype (fig. 262-263) and paratypes. Scale line = 5 mm.

Weyrauch leg.). Holotype IML 1263a. Paratypes IML 1263/11, 815/14 + 27 juv., RMNH 55323/10, same data. Additional locality: Argentina, Prov. Salta, 24 km from Matán, on the road to Galpón, 680 m (IML 1264/8 + 5 juv., RMNH 55324/5).

Comparisons. — This new species differs from *Naesiotus punctustriatus* (Parodiz, 1946) in (1) being larger (max. height 24.5 vs. 16 mm), (2) being narrowly perforate to rimate, (3) being more slender ( $H/D = 3.1$  vs. 2.3).

Etymology. — Named in honour of Dr. A. Willink (Tucumán), to express my most sincere thanks for his extensive cooperation and kind hospitality.

### **Scutalus (Scutalus) baroni** (Fulton, 1896) (figs. 270-276)

The type material of this species has been located in the London museum and one specimen is designated lectotype: shell height 12.0 mm, diameter 29.0 mm (BMNH 1896.6.23.1). The paralectotype is registered 1896.6.23.2 and the material is labelled [Peru, Dept. Cajamarca] 'Rio Yonan, 4000 feet' (ex Fulton ex Baron).

The species has been collected near the type locality and the material has been dissected.

Histology. The lumen of the proximal part of the penis is very narrow and lined by a cubic to low cylindrical epithelium (8-12  $\mu\text{m}$  high). The subepithelial tissue is made up of longitudinal and circular muscle fibers and connective tissue. More distally the lumen is C-shaped and the epithelium is ca. 20  $\mu\text{m}$  high. The distal part of the penis has a rather wide lumen, lined by high cylindrical epithelium (cell height 33-48  $\mu\text{m}$ ); the cells have small, basal nuclei and are filled with secretion granules. The lumen of the epiphallus is star-shaped; its epithelium is ca. 35  $\mu\text{m}$  high. In the subepithelial tissue a few small glandular cells have been observed. The epithelium of the flagellum is ca. 15-22  $\mu\text{m}$  high; with glandular cells dispersed in the subepithelial tissue.

Remarks. — The anatomy (genitalia already figured by Pilsbry & Olsson, 1949) shows that *Helix* (*Xenothauma*) *baroni* Fulton, 1896, belongs to *Scutalus* (*Scutalus*) Albers, 1850. *Xenothauma* Fulton, 1896, is thus a junior subjective synonym of *Scutalus* Albers, 1850.

Specimens from one population show a remarkable large variation in shell shape; typical *baroni* is nearly continuously connected with *Scutalus cretaceus* (Pfeiffer, 1855), but the differences are sufficiently constant to regard both taxa as valid species. *Xenothauma nobilis* Pilsbry & Olsson, 1949 (type locality: above Tembladera, Cerro de Sapo) falls within the range of the shell shape of *Scutalus* (*S.*) *baroni* (Fulton, 1896) and is now considered a junior subjective synonym of this species.

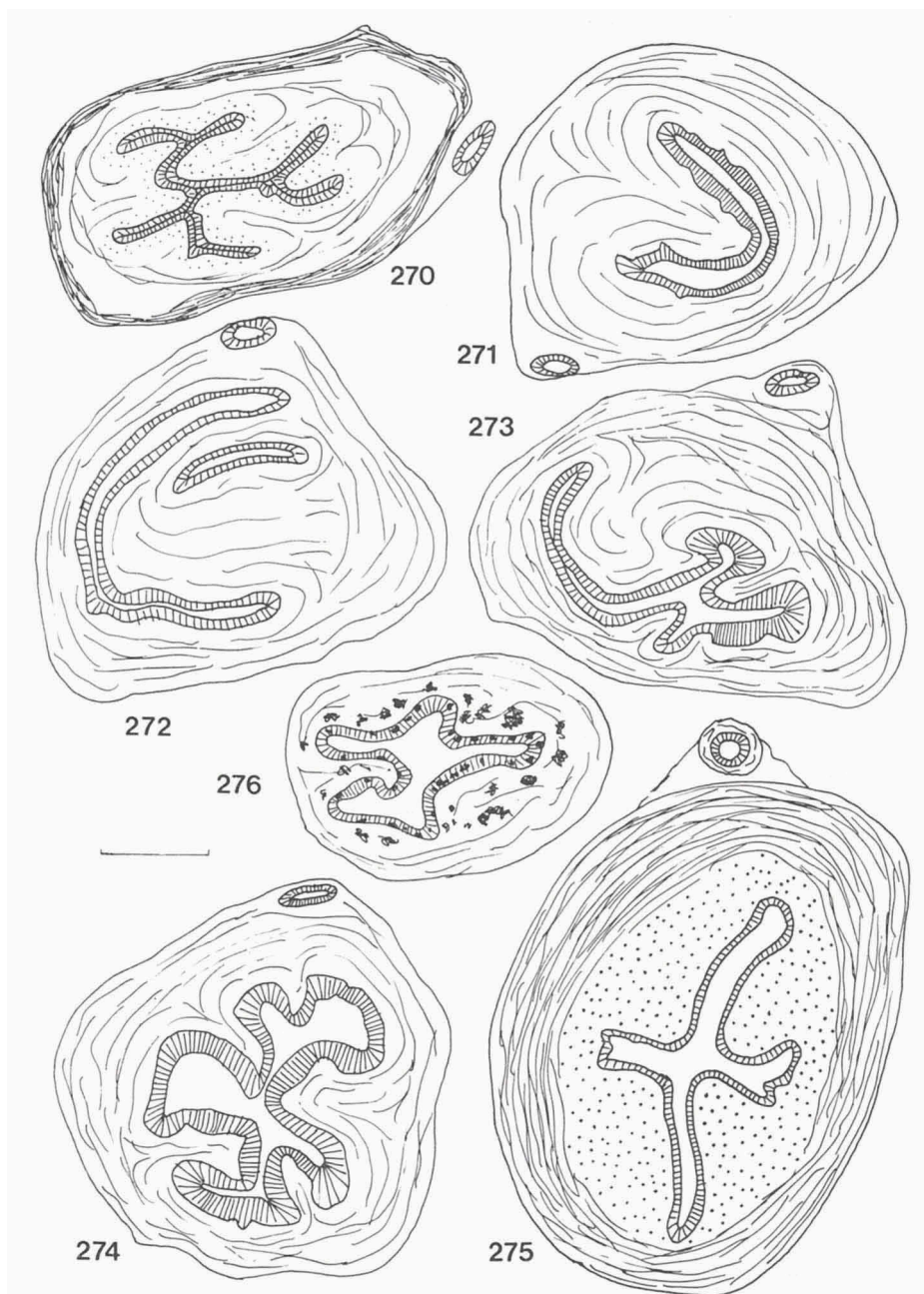


Fig. 270-276. *Scutalus (Scutalus) baroni* (Fulton). Peru, Cajamarca, Tembladera. Transverse sections of penis (fig. 270-274, slides H 2090, 2096, 2097 (2x), 2099), epiphallus (fig. 275, slide H 2101) and flagellum (fig. 276, slide H 2103). Scale line = 0.2 mm.

**Scutalus (Scutalus) cretaceus** (Pfeiffer, 1855)

(figs. 227-278; pl. 8 fig. 7)

One specimen from the type material in the London museum is here designated lectotype: shell height 35.0 mm, diameter 23.0 mm (BMNH 1975388). There is one paralectotype (1975389) and the material is labelled 'Eastern Islands' [sic!] (ex Cuming ex Keppell).

This species has been collected at several localities in the lower Río Jequetepeque valley (N-Peru), near Tembladera. *Bulimulus (Drymaeus) baroni* Fulton, 1897, is now considered a junior subjective synonym.

Genitalia. — Penis with a short sheath (ca. 1/9 the length of the phallus), more or less subcylindrical, slightly swollen in its distal part. The epiphallus and flagellum are subcylindrical, both ca. 1/4 the length of the phallus. A retractor muscle is inserted at the distal end of the flagellum.

**Scutalus (Scutalus) mutabilis** (Broderip, 1832) (fig. 279)

Genitalia. — Penis with a rather short sheath (ca. 1/5 the length of the phallus), more or less subcylindrical, its distal part slightly swollen. The epiphallus and flagellum are subcylindrical, both ca. 1/3 the length of the phallus. The retractor muscle is distally inserted. The vagina is relatively very short. The spermathecal duct is more or less subcylindrical, with a globose spermatheca at the distal end.

Material. — Peru, Dept. La Libertad, Cerro Chiputuc near Trujillo (SMF 164400).

**Scutalus (Vermiculatus) sg.n.**

*Scutalus (Vermiculatus)* Weyrauch, 1967a: 384 [nomen nudum].

Diagnosis. — A subgenus of *Scutalus* Albers, 1850, characterized mainly by the protoconch sculpture of axial wrinkles and the simple peristome. Type species: *Bulinus bicolor* Sowerby, 1835.

Description. — Shell up to 52 mm, with straight to slightly convex sides, globose to elongate, rather thin to solid. Colour whitish to yellowish, with or without spiral bands or variegated colours. Surface rather shining, growth striae sometimes incrassate, or with axial riblets. Protoconch with (anastomosing) axial wrinkles. Whorls rather flat, the last whorl more or less inflated; suture well impressed. Aperture subovate. Peristome thin (to slightly thickened), simple or hardly expanded.

Distribution. — Bolivia, Peru, Ecuador.

Ecology. — The species live mainly in montane steppe. The vertical distribution is 2600-5000 m.

Etymology. — (L.) *vermiculatus*, variegated; referring to the colour pattern of most species.



**Scutalus (Kuschelenia)** Hylton Scott, 1951

Diagnosis. — A subgenus of *Scutalus* Albers, 1850, characterized by the protoconch sculpture of axial wrinkles, the short spermathecal duct and the structure of the radula. Type species: *Kuschelenia simulans* Hylton Scott, 1951.

Description. — Shell up to 75 mm high, with slightly convex sides, elongate, (rather) solid. Colour yellowish to light brown, uniformly coloured or, usually, with darker spiral bands. Surface rather shining, with incrassate growth striae. Protoconch with (anastomosing) axial wrinkles. Whorls rather flat; suture well impressed. Aperture (sub)ovate. Peristome thin to slightly thickened, simple or hardly expanded.

Distribution. — N-Argentina, Bolivia, S- and C-Peru, ?Ecuador.

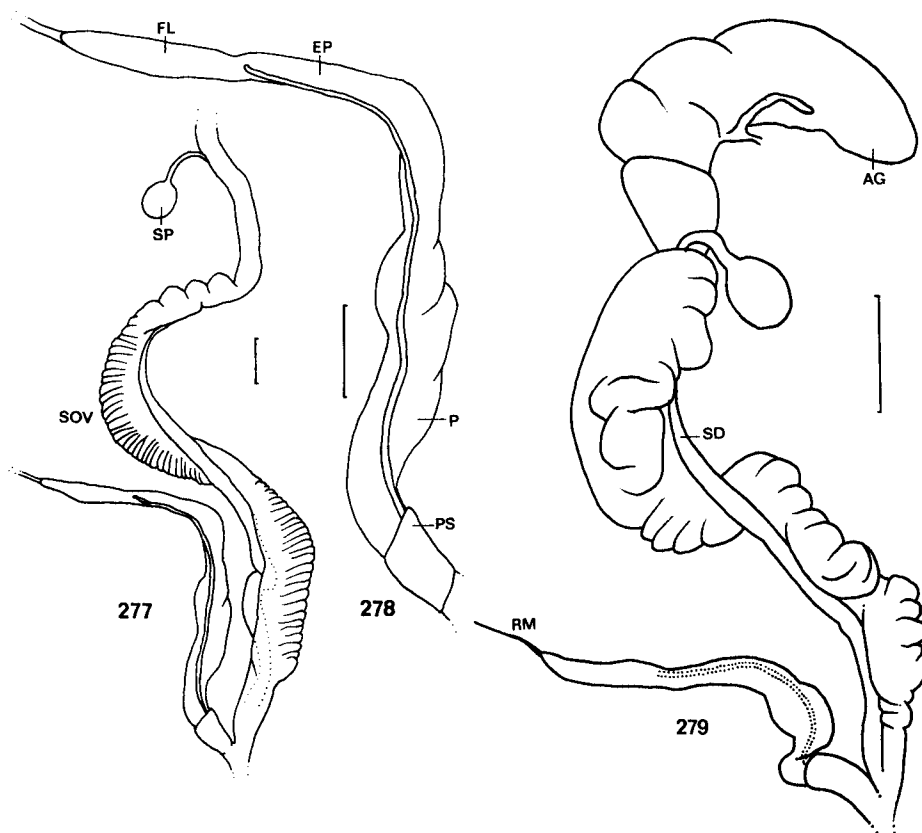


Fig. 277-278. *Scutalus (Scutalus) cretaceus* (Pfeiffer), genitalia. Peru, Cajamarca, Tembladera (RMNH). Scale line = 2 mm. Fig. 279. *Scutalus (Scutalus) mutabilis* (Broderip), genitalia. Peru, La Libertad, Trujillo, Cerro Chiputuc (SMF 164400). Scale line = 5 mm.

Ecology. — The species live mainly in montane steppe. The vertical distribution is (600-) 3100-5000 m.

***Scutalus (Vermiculatus) aequatorius* (Pfeiffer, 1855)**

The specimen figured by Pfeiffer (1855: pl. 33 figs. 1-2 [in Küster & Pfeiffer, 1840-1965]) is designated lectotype (shell height 38.0 mm, diameter 18.5 mm; BMNH 1975377) and is labelled 'Mountain Schinchulagua, Ecuador' (ex Cuming ex Bourcier). Two paralectotypes (1975378) are labelled 'Chimborazo, Ecuador' (ex Cuming ex Bourcier).

***Scutalus (Kuschelenia) alaudus* (Hupé, 1857) (figs. 280-283)**

New localities, additional to those mentioned by Pilsbry (1897: 23), for this species are: (1) Peru, Dept. Hunacavelica, 7.2 km SE Izcuchaca, 2875 m (Sta. 129; RMNH/4); (2) Dept. Junín, 36 km SE La Oroya, 3600 m (Sta. 133; RMNH/8); (3) Dept. Junín, near Tarma, ca. 3400 m (RMNH/3); (4) Dept. Junín, Inca Pirca, 34 km N Junín, 4250 m (Sta. 149; RMNH/6).

Genitalia. — Penis with a short sheath (ca. 1/16 the length of the phallus), slender, swollen in its median part, passing without external differentiation

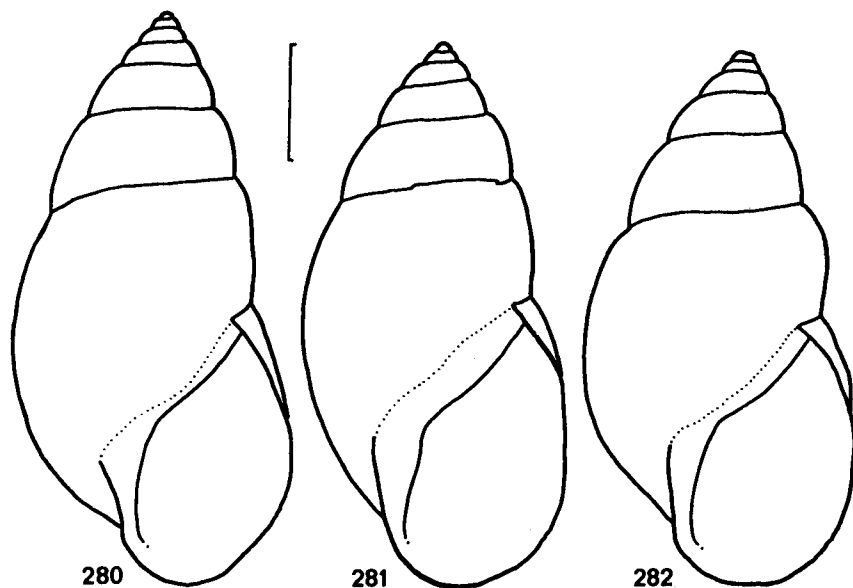


Fig. 280-282. *Scutalus (Kuschelenia) alaudus* (Hupé). Peru, Junín, near Tarma (RMNH).  
Scale line = 1 cm.

into the epiphallus, which is more or less tapering. The flagellum is sub-cylindrical, ca.  $1/5$ - $1/6$  the length of the phallus; with a distal retractor muscle. The spermathecal duct is relatively very short, subcylindrical; the spermatheca is more or less globose, but not clearly differentiated from the spermathecal duct.

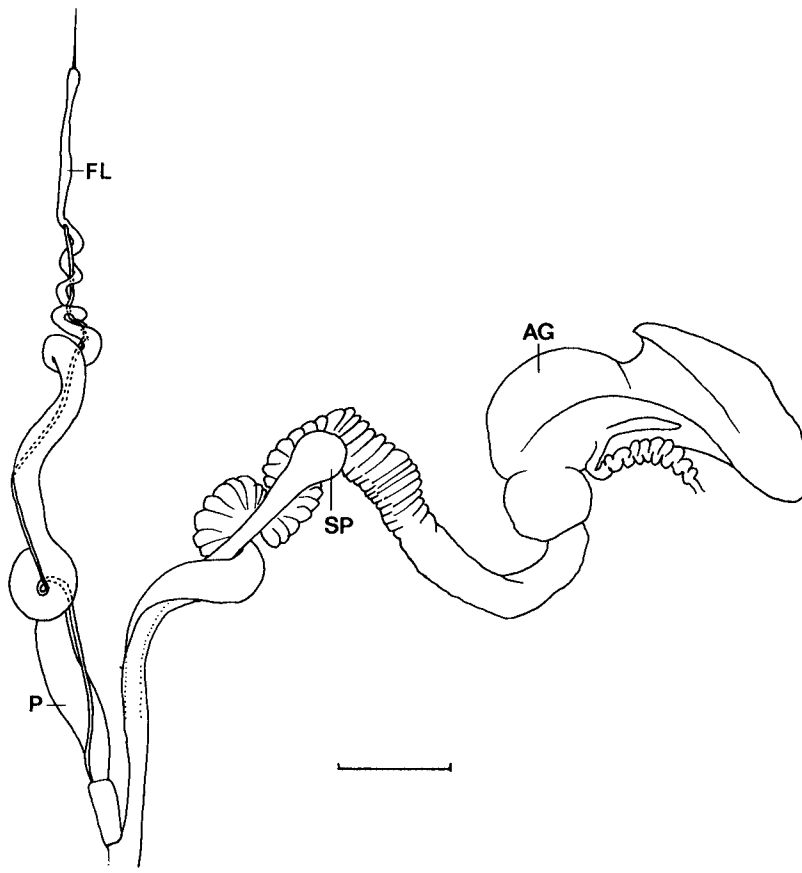


Fig. 283. *Scutalus (Kuschelenia) alaudus* (Hupé), genitalia. Peru, 36 km SE La Oroya, Junín (RMNH). Scale line = 5 mm.

***Scutalus (Vermiculatus) angrandi* (Morelet, 1860) (figs. 284-287)**

A new locality for this species is: Peru, Dept. Ayacucho, Prov. Huamanga, Pikimachay (also spelled Piqui Machay) (UF, RMNH).

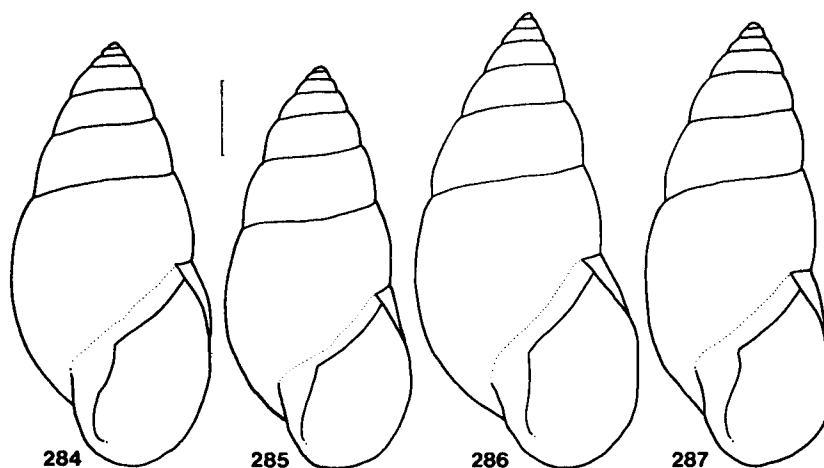


Fig. 284-287. *Scutalus (Vermiculatus) angrandi* (Morelet). Peru, Ayacucho, Pikimachay (RMNH). Scale line = 1 cm.

***Scutalus (Vermiculatus) anthisanensis*** (Pfeiffer, 1853) (pl. 8 fig. 8)

The specimen figured by Pfeiffer (1855: pl. 33 fig. 20 [in Küster & Pfeiffer, 1840-1865]) is designated lectotype: shell height 40.5 mm, diameter 19.5 mm. The material, which comprises two paralectotypes, is labelled 'Anthisana, 14000 feet high' (ex Cuming ex Bourcier).

This species is possibly not synonymous with *Scutalus cotopaxiensis* (Pfeiffer, 1853) as Weyrauch (1967a: 385) suggested. Parodiz (pers. comm.) is of the opinion that *Bulimus anthisanensis* is partly synonymous with *Naesiotus quitensis* (Pfeiffer, 1847).

***Scutalus (Vermiculatus) aquilus*** (Reeve, 1848)

The specimen figured by Reeve (1848: fig. 138) is designated lectotype: shell height 27.0 mm, diameter 14.9 mm (BMNH 1975376). It is labelled 'Peru' (ex Cuming).

***Scutalus (Vermiculatus) aureus*** sp.n. (pl. 10 fig. 12)

Description. — Shell up to 48.5 mm, 2.0 times as long as wide, rimate, with slightly convex sides, elongate, rather solid. Colour brown with irregular whitish and yellowish streaks and spots, which are more or less arranged in axial rows. Surface rather shining, the growth striae incrassate; especially on the last whorl spiral striae may be observed which form granules and puckered spiral bands. Protoconch sculptured with very fine wrinkles, anastomosing mainly on lower part of whorl, the interstices about as broad as the

wrinkles. Whorls 6.6, hardly convex; suture well impressed. Aperture sub-ovate to inversed ear-shaped, 1.7 times as long as wide, 0.5 times the total length. Peristome thin and simple. Columellar margin slightly reflexed and narrowly dilated above. Columella with a slight fold inside the aperture. Parietal region with a callus.

Measurements (in mm) and statistics of characters and ratios (N=7):

|     | H     | D     | HA    | WA    | LW    | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|-------|-------|-------|-------|------|-------|------|------|
| M   | 43.57 | 21.85 | 21.71 | 12.71 | 32.21 | 2.00 | 1.71  | 0.50 | 0.74 |
| s   | 3.18  | 1.73  | 1.78  | 0.84  | 2.64  | 0.11 | 0.07  | 0.02 | 0.01 |
| max | 48.5  | 24.5  | 25.0  | 14.0  | 36.5  | 2.15 | 1.81  | 0.53 | 0.75 |
| min | 40.5  | 19.5  | 20.0  | 11.7  | 29.5  | 1.83 | 1.63  | 0.47 | 0.71 |

Measurements of holotype: shell height 47.0 mm, diameter 23.0 mm, height of aperture 23.0 mm, width 13.5 mm, height of last whorl 35.0 mm; seven whorls.

Type material. — Peru, Dept. Cajamarca, 26 km NE Encañada, 3650 m (F. G. Thompson leg.). Holotype UF 22754. Paratype RMNH 55165/1, same data. Additional localities: (1) 15 km NE Encañada, 3540 m, paratypes UF 22784/8, RMNH 55164/3; (2) 30 km NE Encañada, 3550 m, paratypes UF 22756/1, RMNH 55163/1.

Comparisons. — This new species may be compared to *Scutalus (Vermiculatus) pyramidalis* sp.n., from which it differs in (1) the more inflated last whorl, (2) the different shape of the aperture (less ear-shaped), (3) the different colour pattern, (4) the finer wrinkles on the protoconch, (5) being stouter (H/D = 2.0 vs. 2.5).

Etymology. — (L.) aureus, golden; referring to the white-yellowish streaks and spots.

### ***Scutalus (Vermiculatus) bicolor* (Sowerby, 1835) (fig. 288)**

One specimen of the type material, which is preserved in the British Museum (Natural History), is here designated lectotype: shell height 23.5 mm, diameter 11.2 mm (BMNH 1975151). The material, which also comprises two paralectotypes (1975152), is labelled 'Peru' (ex Cuming).

Redescription. — Shell narrowly perforate, with slightly convex sides, rather solid. Colour whitish with four reddish-brown spiral bands, which leave on the last whorl a narrow white girdle below the suture and a wide area around the umbilicus. Surface slightly shining, the growth striae hardly incrassate. Protoconch with axial, undulating and anastomosing wrinkles, branching especially below the periphery of the whorl and giving a somewhat pitted appearance. Whorls nearly flat; suture well impressed. Aperture sub-ovate, margins converging. Peristome thin and simple. Columellar margin hardly reflexed and slightly dilated above, white (as is the peristome).

Genitalia. — Penis with a very short sheath (ca.  $1/15$  the length of the phallus), subcylindrical, passing without external differentiation into the epiphallus. Flagellum subcylindrical, ca.  $1/3$  the length of the phallus; with a distal retractor muscle. The spermathecal duct is more or less subcylindrical, its distal part narrow; the spermatheca is elongate-globose.

Histology. The proximal part of the penis has a narrow, lobed lumen lined by cubic to low cylindrical epithelium ( $15\text{--}28\text{ }\mu\text{m}$  high; pseudostratified). More distally the cells are ca.  $30\text{ }\mu\text{m}$  high, with basal nuclei and the cytoplasm staining griseous with Alcian Blue; the lumen is rather wide. At the transition to the distal part of the penis the lumen is small and narrow, the epithelium is ca.  $10\text{ }\mu\text{m}$  high and the nuclei are relatively large (diameter ca.  $5\text{--}7\text{ }\mu\text{m}$ ). The distal part of the penis has a rather wide lumen narrowed by infoldings. The epithelium is ca.  $23\text{ }\mu\text{m}$  high; the nuclei are subbasally situated and the

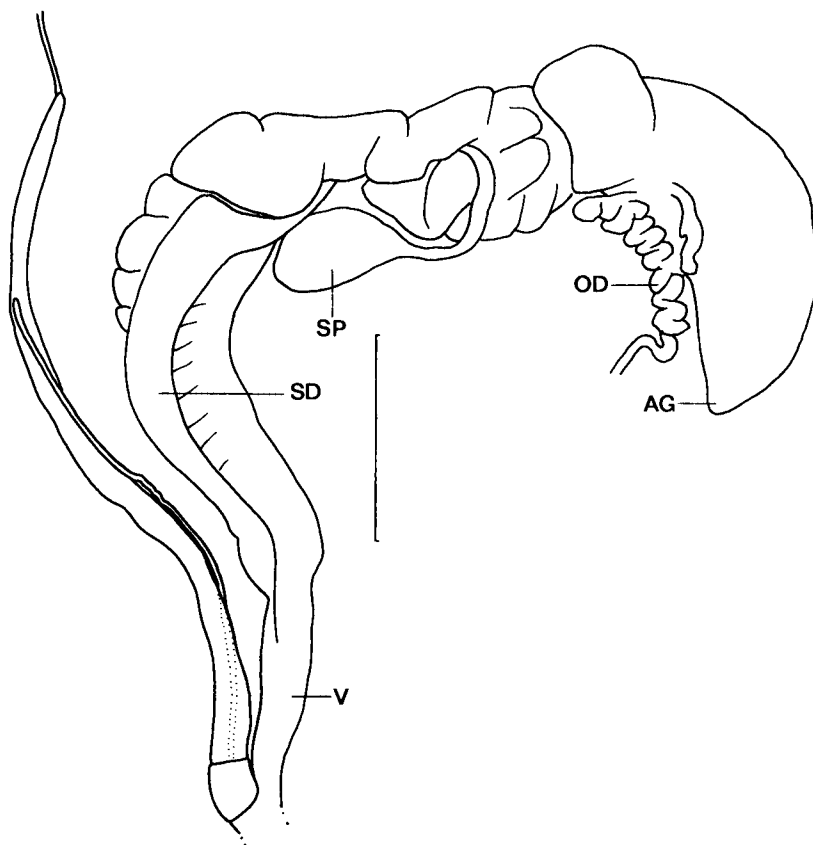


Fig. 288. *Scutalus (Vermiculatus) bicolor* (Sowerby), genitalia. Peru, Junín, Abra Cochás (RMNH). Scale line = 5 mm.

apical part of the cells is Alcian Blue-positive. The transition to the epiphallus is gradual.

Material. — Peru, Dept. Junín, Abra Cochac (Sta. 134; RMNH).

***Scutalus (Vermiculatus) coagulatus* (Reeve, 1849)**

The specimen figured by Reeve (1849: fig. 558) is designated lectotype: shell height 15.5 mm, diameter 9.6 mm (BMNH 1975351); it is an immature specimen.

***Scutalus (Vermiculatus) confusus* (Reeve, 1848)**

The type material of this taxon has been found in the British Museum (Natural History). One specimen is designated lectotype: shell height 29.0 mm, diameter 13.1 mm (BMNH 1975194). This species has been described without locality, but the type material, which also comprises two paralectotypes (1975195), is labelled 'New Granada' (ex Cuming). Crawford (1939: 328) has synonymized this taxon with *Scutalus culmineus* (d'Orbigny, 1835).

***Scutalus (Vermiculatus) costifer naggsi* ssp.n. (pl. 11 fig. 15)**

This new subspecies differs from *Scutalus c. costifer* (Pilsbry), described from Peru, Dept. Junín, Llocllapampa [ca. 65 km S La Oroya], in (1) the absence of strong ribs, (2) having a blunt apex, (3) being stouter ( $H/D = 1.98$  vs. 2.26).

Measurements (in mm) and statistics of characters and ratios ( $N=6$ ):

|     | H     | D     | HA    | WA   | LW    | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|-------|-------|------|-------|------|-------|------|------|
| M   | 22.08 | 11.18 | 10.38 | 6.37 | 16.10 | 1.98 | 1.63  | 0.47 | 0.73 |
| s   | 0.74  | 0.40  | 0.77  | 0.30 | 0.87  | 0.04 | 0.09  | 0.03 | 0.03 |
| max | 23.0  | 11.8  | 11.4  | 6.7  | 17.5  | 2.05 | 1.73  | 0.50 | 0.76 |
| min | 21.0  | 10.7  | 9.2   | 6.0  | 15.3  | 1.95 | 1.52  | 0.41 | 0.69 |

Measurements of holotype: shell height 22.0 mm, diameter 11.1 mm, height of aperture 10.0 mm, width 6.6 mm, height of last whorl 15.3 mm; 5.5 whorls.

Type material. — Peru, Dept. Pasco, 1 km NE Cerro de Pasco, 4100 m (F. G. Thompson leg., 8-III-1969). Holotype UF 22803. Paratypes UF 22804/4, RMNH 55216/2, same data.

Etymology. — Named in honour of Mr. Fred Naggs (London). Without his kind cooperation my research on the bulimulid type material in the London museum could not have been completed.

***Scutalus (Vermiculatus) costulatus* Weyrauch, 1967 (fig. 289)**

This species has been collected at two localities which are situated in the same general area as the type locality (Huarmipuquio near Junín): (1) 17

km NW Junín, 4100 m (Sta. 148; RMNH/10); (2) Inca Pirca, 34 km N Junín, 4250 m (Sta. 149; RMNH).

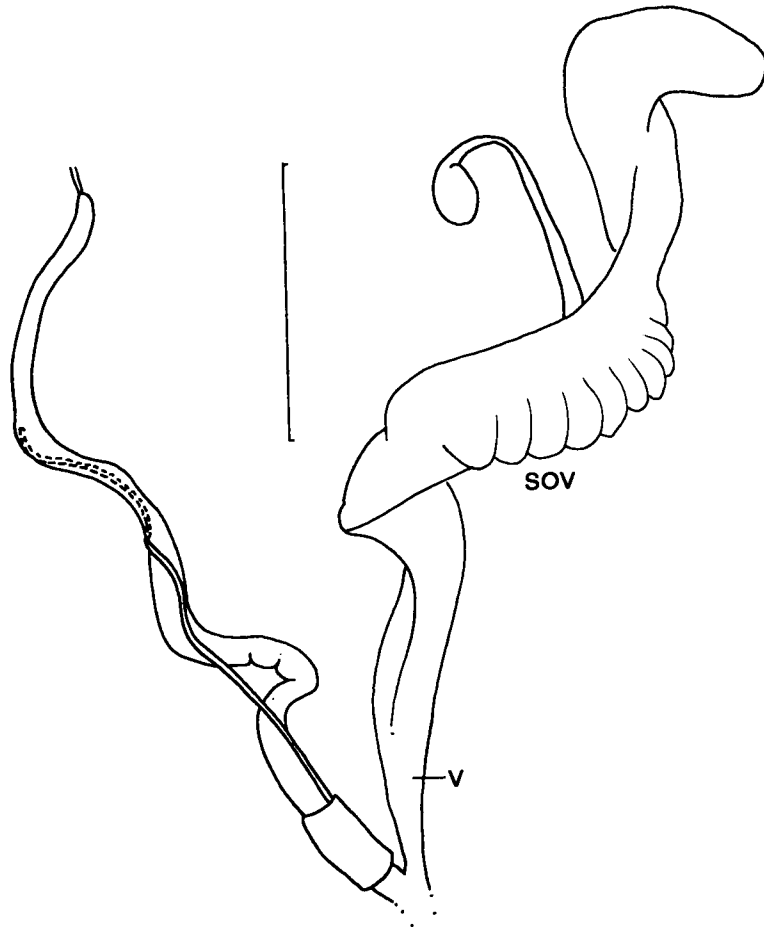


Fig. 289. *Scutalus (Vermiculatus) costulatus* Weyrauch, genitalia. Peru, Junín, 34 km N Junín (RMNH). Scale line = 5 mm.

Genitalia. — Penis with a short sheath (ca. 1/10 the length of the phallus), subcylindrical, passing without external differentiation into the epiphallus, which is slightly swollen at the transition to the flagellum. The flagellum is subcylindrical and rather slender, ca. 1/4 the length of the phallus; a retractor muscle is distally inserted. The spermathecal duct is more or less tapering, with a globose spermatheca at the distal end.



***Scutalus (Vermiculatus) cotopaxiensis*** (Pfeiffer, 1853) (pl. 9 fig. 9)

The type material of this taxon is in the British Museum (Natural History) and the specimen figured by Pfeiffer (1855: pl. 33 fig. 9 [in Küster & Pfeiffer, 1840-1865]) is designated lectotype: shell height 39.0 mm, diameter 17.5 mm (BMNH 1975370). The material, which also comprises two paralectotypes (1975371), is labelled 'Cotopaxi, Ecuador' (ex Cuming ex Bourcier). Three other paralectotypes, of which one corresponds to pl. 33 fig. 10 (Pfeiffer, op. cit.), are labelled 'Mont<sup>n</sup> Cayembe, Ecuador' (ex Cuming ex Bourcier; BMNH 1975366-1975367).

***Scutalus (Kuschelenia) culmineus culmineus*** (d'Orbigny, 1835)  
(figs. 290-298)

Genitalia. — Penis with a very short sheath (ca. 1/15 the length of the phallus), subcylindrical, passing without external differentiation into the

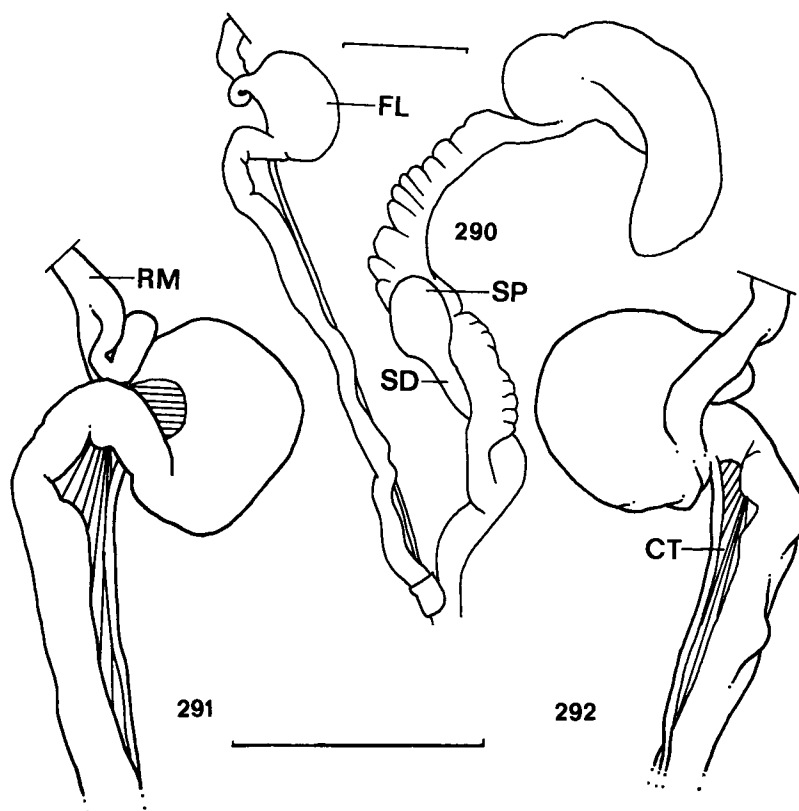


Fig. 290-292. *Scutalus (Kuschelenia) culmineus* (d'Orbigny), genitalia. Peru, Puno, E of Huanta (RMNH). CT, connective tissue. Scale line = 5 mm.

epiphallus. The flagellum is very short and swollen; a short retractor muscle is subdistally inserted. The spermathecal duct is relatively short (ca.  $1/3$  the length of the spermoviduct) and the spermatheca is ovoid.

Histology. Proximal part of the penis with a rather narrow lumen, lined by high cylindrical epithelium (cell height ca.  $31-38\ \mu\text{m}$ ). More distally the lumen is wider. The distal part of the penis has a small lumen, narrowed by infoldings. The epithelium is cubic and ca.  $5\ \mu\text{m}$  high. The distal part of the epiphallus and the flagellum are embedded in a thick muscle layer.

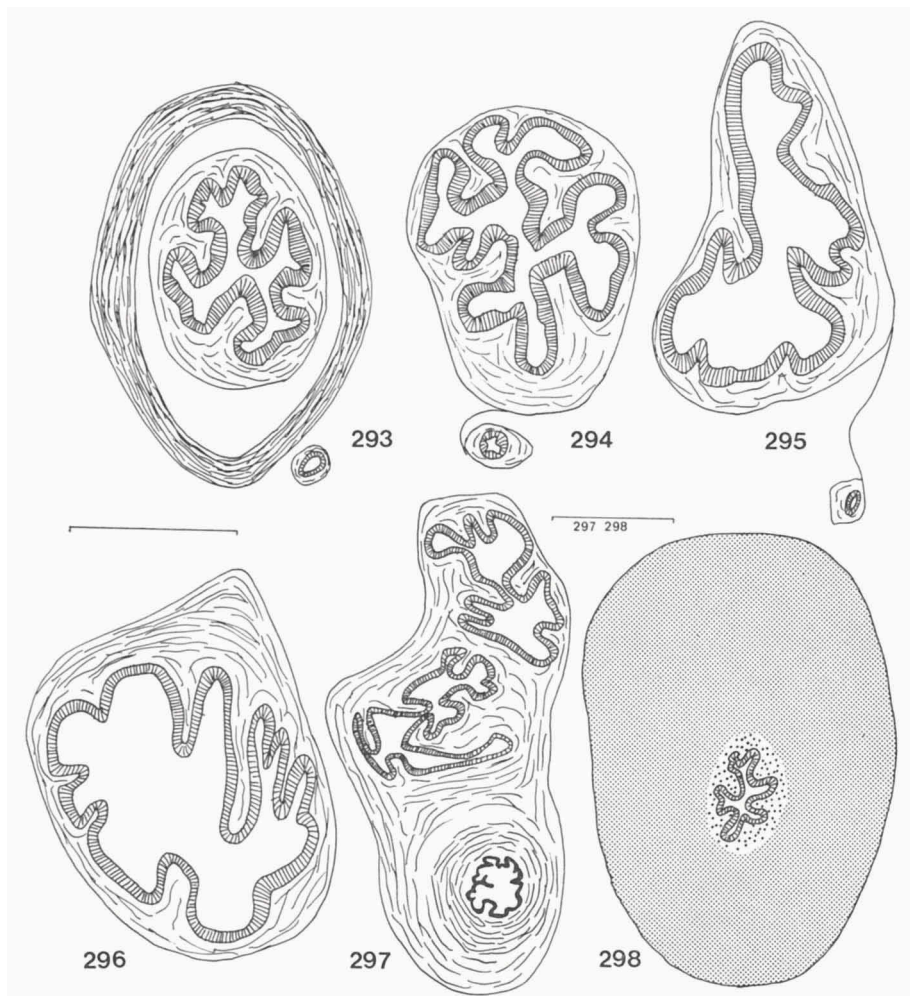


Fig. 293-298. *Scutalus (Kuschelenia) culmineus* (d'Orbigny). Peru, Puno, E of Huanta. Transverse sections of penis (fig. 293-297, slides H 3734, 3740, 3745, 3751, 3753) and epiphallus (fig. 298, slide H 3755). Scale line = 0.5 mm.

Material. — Peru, Dept. Puno, E of Huanta (Sta. 82; RMNH).

A synonym of this taxon is *Bulimus jussieui* Pfeiffer, 1846, of which the type material is in the London museum: two syntypes (BMNH 1975170), labelled 'Cuzco, Peru' (ex Cuming).

**Scutalus (Kuschelenia) gayi** (Pfeiffer, 1857) (figs. 299-304)

One of the two type specimens in the London museum is here designated lectotype: shell height 28.0 mm, diameter 16.5 mm (BMNH 1975382; paralectotype 1975383). The material is labelled 'Bolivia' and originates from the Cuming collection.

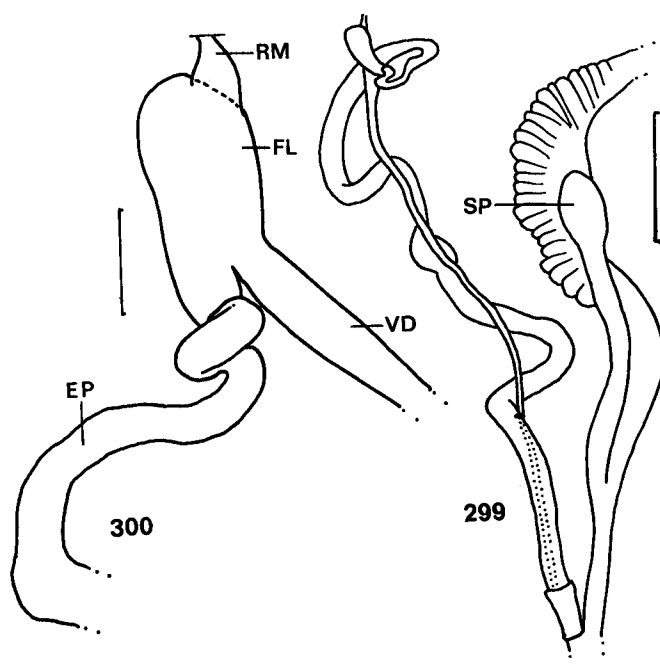


Fig. 299-300. *Scutalus (Kuschelenia) gayi* (Pfeiffer), genitalia. Peru, Puno, E of Huanta (RMNH). Scale line = 5 mm (fig. 299) and 1 mm (fig. 300).

*Bulimus revinctus* Hupé, 1857, is now considered a junior subjective synonym of *Bulimus gayi* Pfeiffer, 1857. Pfeiffer's description was published on 8-V-1857 (Duncan, 1937) and has thus preference over the publication of Hupé, which has to be dated on 31-XII-1857 [ICZN, Art. 21 (b) (ii)].

New localities for this species are: (1) Peru, Dept. Puno, E of Huanta (Sta. 82; RMNH); (2) Dept. Puno, near Caracoto (Sta. 83; RMNH).

Genitalia. — Penis with a very short sheath (ca. 1/15 the length of the phallus), subcylindrical, passing without external differentiation into the epiphallus. The flagellum is very short and swollen. The vas deferens is free

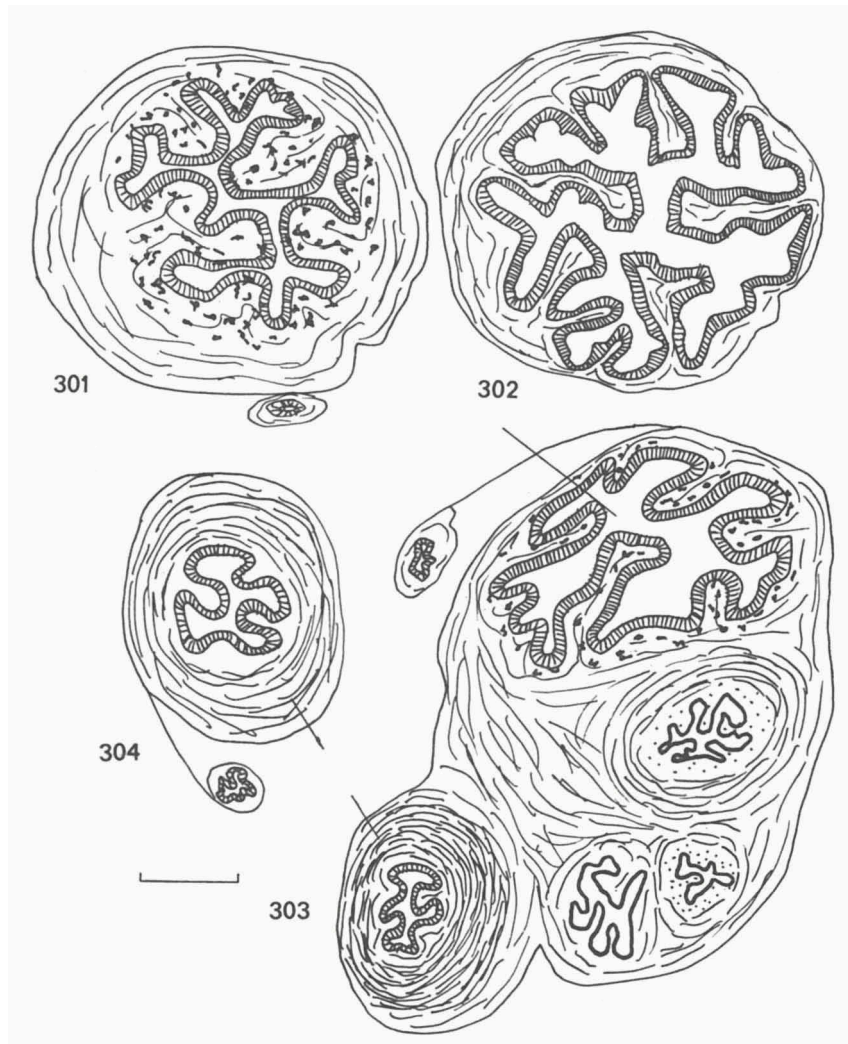


Fig. 301-304. *Scutalus (Kuschelenia) gayi* (Pfeiffer). Peru, Puno, E of Huanta. Transverse sections of penis (slides H 3779, 3785, 3794 (2x)). Scale line = 0.2 mm.

of the phallus and much shorter than penis and epiphallus together. The vagina is comparatively long. The spermathecal duct is half as long as the spermoviduct and subcylindrical in form; the spermatheca is ovoid.

Histology. Proximal part of the penis with a rather narrow, more or less lobed lumen. The epithelium is cubic to low cylindrical; Alcian Blue-positive material (staining bright blue) has been observed in between some epithelium-cells and in the subepithelial tissue. More distally the lumen is rather wide and the epithelium is up to  $28\text{ }\mu\text{m}$  high. At the transition to the distal part of the penis the lumen is narrow and the epithelium is ca.  $10\text{ }\mu\text{m}$  high; the apical part of these cells is Alcian Blue-positive. The subepithelial tissue is made up of large rounded cells. The epithelium of the epiphallus is low cylindrical and ca.  $10\text{ }\mu\text{m}$  high.

***Scutalus (Vermiculatus) minutus* sp.n.** (figs. 305-307; pl. 10 fig. 1)

Description. — Shell up to 11.7 mm, 1.72 times as long as wide, rimate, with straight sides, rather elongate, thin. Colour yellowish with axial whitish streaks. Surface nearly lustreless, the growth striae incassate. Protoconch

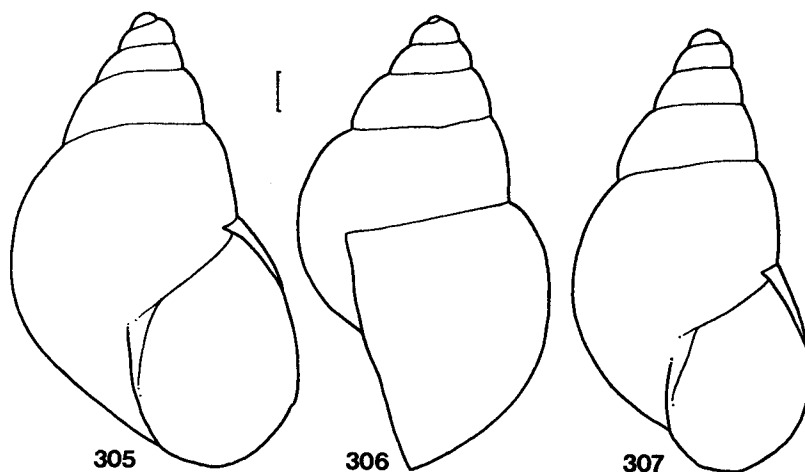


Fig. 305-307. *Scutalus (Vermiculatus) minutus* sp.n. Peru, Amazonas, 11 km SSW Leimebamba. Holotype (fig. 305-306, UF) and paratype (RMNH). Scale line = 1 mm.

with axial wrinkles, anastomosing especially on lower part of whorl, thus forming pit-reticulation. Whorls 5, slightly convex; suture well impressed. Aperture ovate, 1.43 times as long as wide, 0.45 times the total length. Peristome thin and simple.

Measurements (in mm):

| H     | D   | HA  | WA  | LW  | W   |                |
|-------|-----|-----|-----|-----|-----|----------------|
| 11.7  | 7.2 | 5.5 | 3.7 | 8.3 | 4.8 | holotype       |
| 11.3  | 6.0 | 4.6 | 3.4 | 7.6 | 5.1 | paratype, RMNH |
| 11.5+ | 6.9 | 5.5 | 3.8 | 8.2 | 4+  | do., UF        |

Type material. — Peru, Dept. Amazonas, 11 km SSW Leimebamba, 2180 m (F. G. Thompson leg., 25-IV-1972). Holotype UF 22805. Paratypes UF 22806/3, RMNH 55219/1, same data.

Comparisons. — This new species is smaller than all other *Scutalus* species and has a relatively low sculpture on the teleoconch.

Etymology. — (L.) minutus, small; referring to the size.

***Scutalus (Vermiculatus) nucus* (Reeve, 1850)**

The specimen figured by Reeve (1850: fig. 629) is designated lectotype: shell height 37.0 mm, diameter 18.0 mm (BMNH 1975379). The material, which originates from the Cuming collection, has no locality label.

***Scutalus (Vermiculatus) ochraceus* (Morelet, 1863)**

The specimen figured by Morelet (1863: pl. 7 fig. 6) has been located in the Geneva museum and is here designated lectotype: shell height 38.5 mm, diameter 20.5 mm. The specimen is labelled 'Salcantai'. Additional paralectotypes are labelled 'Salcantai' (two specimens) and 'Soraï' (four specimens). Three other paralectotypes from the latter locality are in the London museum (BMNH 1893.2.4.164-166).

***Scutalus (Vermiculatus) omisus* Weyrauch, 1967**

This species has been described from Shaurama, some km SE Huaráz, Dept. Ancash, Peru. Additional localities are: (1) 52 km N Huaráz, Guitarro Cave (UF/4, RMNH/1); (2) 4 km S Macará, 2800 m (UF/3, RMNH/1); (3) 3 km S Macará, eastern side of Río Santa, 2700 m (UF/7, RMNH/2); (4) 2 km SW Macará, 2800-2900 m (UF/10, RMNH/4).

***Scutalus (Vermiculatus) peakei* sp.n. (figs. 308-313; pl. 10 fig. 20)**

Description. — Shell up to 29.5 mm, 1.68 times as long as wide, narrowly perforate, with straight to slightly convex sides, rather solid. Colour yellowish with brown axial streaks at irregular intervals. Surface shining, the growth striae incassate and crossed by shallow spiral furrows. Protoconch with axial, partly bifurcate wrinkles. Whorls 5.1, hardly convex, the last whorl slightly descending in front; suture well impressed. Aperture ovate, 1.52 times as long as wide, 0.53 the total length, whitish coloured inside. Peristome thin and simple. Columellar margin broadly dilated above.

## Measurements (in mm) and statistics of characters and ratios:

|                                                | H     | D     | HA    | WA   | LW    | H/D  | HA/WA | HA/H | LW/H |
|------------------------------------------------|-------|-------|-------|------|-------|------|-------|------|------|
| Peru, Dept. Ancash, 20 km W Huaráz (N = 10)    |       |       |       |      |       |      |       |      |      |
| M                                              | 25.60 | 15.27 | 13.48 | 8.90 | 20.45 | 1.68 | 1.52  | 0.53 | 0.80 |
| s                                              | 1.43  | 0.58  | 0.91  | 0.52 | 1.38  | 0.10 | 0.09  | 0.02 | 0.02 |
| max                                            | 28.0  | 16.0  | 15.1  | 9.8  | 23.0  | 1.81 | 1.69  | 0.56 | 0.83 |
| min                                            | 24.0  | 14.5  | 12.5  | 8.2  | 18.5  | 1.50 | 1.40  | 0.49 | 0.77 |
| Peru, Dept. Ancash, 10-12 km NE Huaráz (N = 3) |       |       |       |      |       |      |       |      |      |
|                                                | 28.0  | 17.5  | 16.0  | 10.4 | 23.5  | 1.60 | 1.54  | 0.57 | 0.84 |
|                                                | 28.0  | 17.5  | 15.5  | 10.2 | 23.5  | 1.60 | 1.52  | 0.55 | 0.84 |
|                                                | 27.0  | 17.5  | 16.5  | 10.6 | 23.0  | 1.54 | 1.56  | 0.61 | 0.85 |
| Peru, Dept. Ancash, 1 km N Recuay (N = 1)      |       |       |       |      |       |      |       |      |      |
|                                                | 29.5  | 17.5  | 16.5  | 9.7  | 23.0  | 1.69 | 1.70  | 0.56 | 0.78 |

Measurements of holotype: shell height 28.0 mm, diameter 15.5 mm, height of aperture 15.1 mm, width 9.2 mm, height of last whorl 23.0 mm; 5.2 whorls.

Type material. — Peru, Dept. Ancash, 20 km Huaráz, 3750 m (F. G. Thompson leg., 31-III-1972). Holotype UF 22807. Paratypes UF 22808/18, RMNH 55217/13, BMNH 1975270/3. Additional localities: (1) Dept. Ancash, 10-12 km NE Huaráz, 3700-3900 m, paratypes UF 22809/3; (2) Dept. Ancash, 1 km N Recuay, 3410 m, paratypes UF 22811/3, RMNH 55218/1; (3) Dept. Ancash, 3 km S Catac, 3750 m, paratypes UF 22810/3.

Comparisons. — This species may be compared to *Scutalus (Vermiculatus) omissus* Weyrauch, 1967, from which it differs in (1) being smaller (height 29.5 vs. 39.0 mm), (2) being slightly stouter ( $H/D = 1.68$  vs.  $1.78$ ), (3) having a more regular colour pattern.

Etymology. — Named in honour of Mr. J. F. Peake (London).

***Scutalus (Vermiculatus) petiti* (Pfeiffer, 1846)**

The type specimens of this species have been located in the London museum. One specimen, which corresponds to Reeve, 1848: fig. 222, is designated lectotype: shell height 36.0 mm, diameter 18.5 mm (BMNH 1975374). There is one paralectotype (1975375) and the material is labelled 'Bolivia' (ex Cuming). Another label glued on the board indicates 'Chachopo' [N-Peru], which is in accordance with the type locality (Peru). The original shell height as given by Pfeiffer (1846: 31) is 26 mm, but Pilsbry (1897: 21) stated 36 mm and this figure is confirmed by the type material.

***Scutalus (Vermiculatus) pilosus* Weyrauch, 1967**

The type locality of this species is Inca Pirca, not 43 km W [as given by Weyrauch], but 34 km N Junín, Peru. A new locality is Huarmipuquio, 5.5

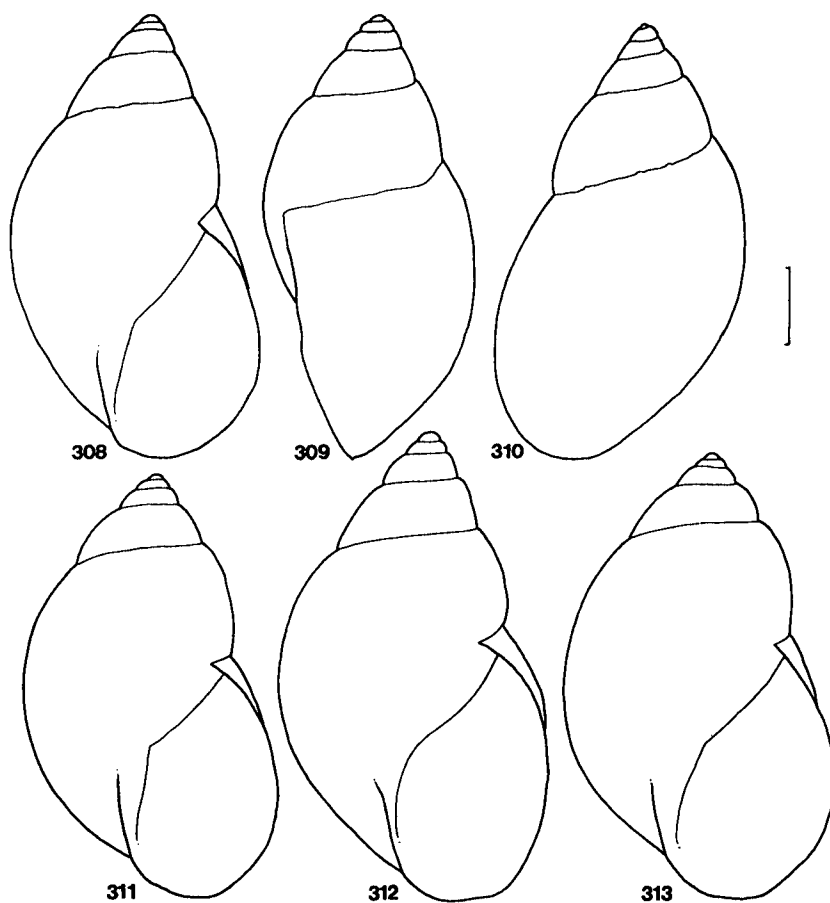


Fig. 308-313. *Scutalus (Vermiculatus) peakei* sp.n. Peru, Ancash, 20 km W Huaráz (fig. 308-310: holotype, fig. 311: paratype); idem, 1 km N Recuay (fig. 312); idem, 10-12 km NE Huaráz (fig. 313). All UF. Scale line = 5 mm.

km W Junín, 4200 m (Sta. 147; RMNH). The specimens from this locality are larger than those from the type locality and they lack the spiral lines and granulation of the type material (cf. Weyrauch, 1967a: fig. 41).

Measurements (in mm) and statistics of characters and ratios (N=8; RMNH-material):

|     | H     | D    | HA   | WA   | LW    | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|------|------|------|-------|------|-------|------|------|
| M   | 18.56 | 9.01 | 7.90 | 4.76 | 13.15 | 2.06 | 1.66  | 0.43 | 0.71 |
| s   | 1.05  | 0.37 | 0.31 | 0.32 | 0.57  | 0.09 | 0.08  | 0.02 | 0.02 |
| max | 20.0  | 9.6  | 8.2  | 5.2  | 13.7  | 2.15 | 1.82  | 0.46 | 0.73 |
| min | 17.0  | 8.4  | 7.2  | 4.3  | 12.4  | 1.93 | 1.57  | 0.39 | 0.69 |



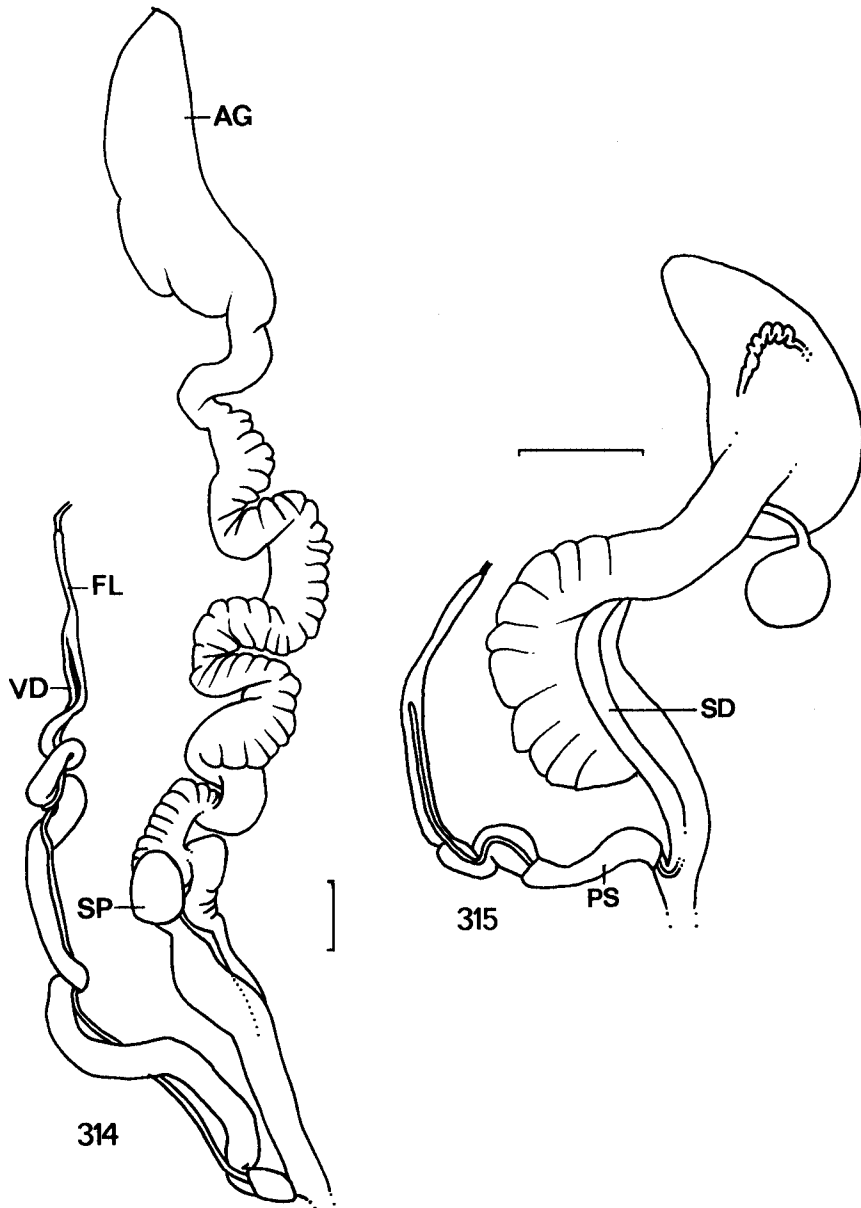


Fig. 314. *Scutalus (Kuschelenia) pluto* (Crosse), genitalia. Argentina, Tucumán, Cerro San Javier (IML). Scale line = 5 mm. Fig. 315. *Scutalus (Vermiculatus) pyramidalis* sp.n., genitalia. Peru, Pasco, 4.7 km S Huariaca (UF). Scale line = 5 mm.

**Scutalus (Kuschelenia) pluto** (Crosse, 1869) (fig. 314; pl. 8 fig. 3)

Genitalia. — Penis with a very short sheath (ca. 1/15 the length of the phallus), more or less subcylindrical and passing without external differentiation into the epiphallus, which is tapering. The flagellum is slender and relatively short; a retractor muscle is distally inserted. The vas deferens is free of the phallus and slightly shorter in length than penis and epiphallus together. The vagina is relatively long. The spermathecal duct is short (ca. 1/5 the length of the spermoviduct), thick and with a globose spermatheca at the distal end.

Material. — Argentina, Prov. Tucumán, Cerro San Javier near San Miguel de Tucumán, 650 m (IML/1; W. Weyrauch det.).

**Scutalus (Vermiculatus) promethus** (Crosse, 1869) (pl. 8 fig. 4)

The holotype of this species is in the Paris museum and is labelled 'Amer. du Sud'. The specimen measures: shell height 35.5 mm, diameter 17.5 mm; it is refigured.

**Scutalus (Vermiculatus) purpuratus** (Reeve, 1849)

The specimen figured by Reeve (1849: fig. 517) is here designated lectotype: shell height 37.5 mm, diameter 18.0 mm (BMNH 1975364). There are two paralectotypes (1975365) and the material is labelled 'Andes of Caxamarca' [sic, Cajamarca, N-Peru] (ex Cuming).

**Scutalus (Vermiculatus) pyramidalis** sp.n. (fig. 315; pl. 10 figs. 16-19)

Description. — Shell up to 45.5 mm, 2.53 times as long as wide, narrowly perforate to rimate, with straight sides, elongate, acute, rather solid. Colour yellowish, paler on the upper whorls, with irregular pale brown axial streaks. Surface hardly shining, the growth striae incrassate. Protoconch with axial wrinkles, more or less anastomosing on lower part of whorl and forming a reticulate pattern. Whorls 6.9, flat, the last whorl slightly inflated; suture hardly impressed. Aperture subovate to inversed ear-shaped, 1.79 times as long as wide, 0.45 times the total length, whitish coloured inside. Peristome thin and simple, slightly sinuous. Columellar margin reflexed, broadly dilated above; bluish. Columella with a fold inside the aperture. Parietal region with a thin, transparent callus.

Measurements (in mm) and statistics of characters and ratios (N=10):

|     | H     | D     | HA    | WA    | LW    | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|-------|-------|-------|-------|------|-------|------|------|
| M   | 42.80 | 16.95 | 19.04 | 10.66 | 29.75 | 2.53 | 1.79  | 0.45 | 0.70 |
| s   | 1.53  | 0.98  | 1.40  | 0.50  | 1.36  | 0.14 | 0.10  | 0.03 | 0.02 |
| max | 45.5  | 18.2  | 20.5  | 11.2  | 31.5  | 2.74 | 1.91  | 0.47 | 0.72 |
| min | 40.0  | 15.5  | 15.7  | 9.7   | 27.5  | 2.29 | 1.62  | 0.38 | 0.68 |

Measurements of holotype: shell height 43.5 mm, diameter 18.2 mm, height of aperture 19.8 mm, width 10.4 mm, height of last whorl 29.5 mm; 7.1 whorls.

Type material. — Peru, Dept. Pasco, 4.7 km S Huariaca, 3000 m (F. G. Thompson leg., 23-III-1969). Holotype UF 22117. Paratypes UF 22117a/6 + 4. Additional locality: Dept. Pasco, 4.8 km S Huariaca, 3000 m, paratypes UF 22755/8, RMNH 55194/3.

Comparisons. — This new species differs from *Scutalus (Vermiculatus) aureus* sp.n. in (1) the straight sides, (2) being more slender ( $H/D = 2.5$  vs. 2.0), (3) the less inflated last whorl. The combination of the elongate shape, the straight sides, the large size and the ear-shaped aperture is not found in any other species of this subgenus.

Genitalia. — Penis with a sheath (ca. 1/4 the length of the phallus), slightly swollen above the distal end of the sheath and with a constriction at the transition to the epiphallus, which is subcylindrical. The flagellum is hardly tapering and with a short retractor muscle at the distal end. The vagina is relatively short. The spermathecal duct is more or less subcylindrical, its distal part narrow, and with a globose spermatheca at the distal end.

Etymology. — (L.) pyramidis; referring to the shell shape.

#### ***Scutalus (Vermiculatus) sanborni* (Haas, 1947)**

This species has been described from 'Peru, Dept. Loreto [sic, Dept. Junín], basin of Lake Junín, Carhuamayo'. A new locality is: Dept. Junín, near Laguna Alcacocho, 4300 m (SMF/8, RMNH/3).

#### ***Scutalus* (?*Kuschelenia*) *subfasciatus* (Pfeiffer, 1853) (pl. 9 fig. 8)**

The type material of this taxon is in the London museum. The specimen corresponding to Pfeiffer, 1855: pl. 33 fig. 19 [in Küster & Pfeiffer, 1840-1865] is designated lectotype: shell height 31.0 mm, diameter 16.0 mm (BMNH 1975368). The material, which also comprises two paralectotypes (1975369), is labelled 'Anthisana, Ecuador' (ex Cuming ex Bourcier). According to Weyrauch (1967a: 385) this taxon, together with *Bulimus anthisanensis* Pfeiffer, 1853, is a synonym of *Bulimus cotopaxiensis* Pfeiffer, 1853. If this proves to be correct then the name *anthisanensis* will have priority (ICZN, Recommendation 24A).

**Scutalus (Kuschelenia) tupacii** (d'Orbigny, 1835) (fig. 316)

Genitalia. — Penis with a short sheath (ca. 1/12 the length of the phallus), subcylindrical and passing without external differentiation into the epiphallus, which is distally tapering. The flagellum is very short and slender, with a distal retractor muscle. The vagina is relatively long. The spermatheca is very short (ca. 1/6 the length of the spermooviduct), thick; the spermatheca is elongate-globose.

Material. — Argentina, Prov. Tucumán, Horco Molle (MACN 26689).

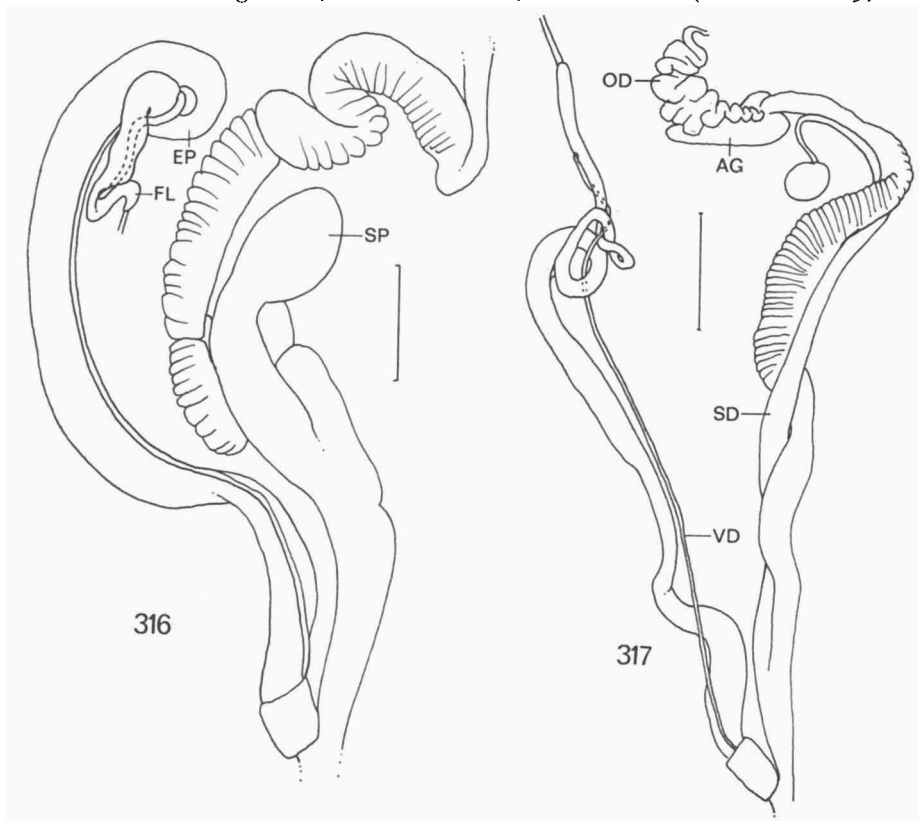


Fig. 316. *Scutalus (Kuschelenia) tupacii* (d'Orbigny), genitalia. Argentina, Tucumán, Horco Molle (MACN 26689). Scale line = 5 mm. Fig. 317. *Scutalus (Vermiculatus) weddellii* (Hupé), genitalia. Peru, Cuzco, 11.4 km S Yaurisque (RMNH). Scale line = 5 mm.

**Scutalus (Vermiculatus) weddellii** (Hupé, 1857) (figs. 317-322)

This species has been collected at two localities in Peru, Dept. Cuzco: (1) 11.4 km S Yaurisque (Sta. 95; RMNH/6); (2) Tambomachay near Cuzco (Sta. 97; RMNH/3).

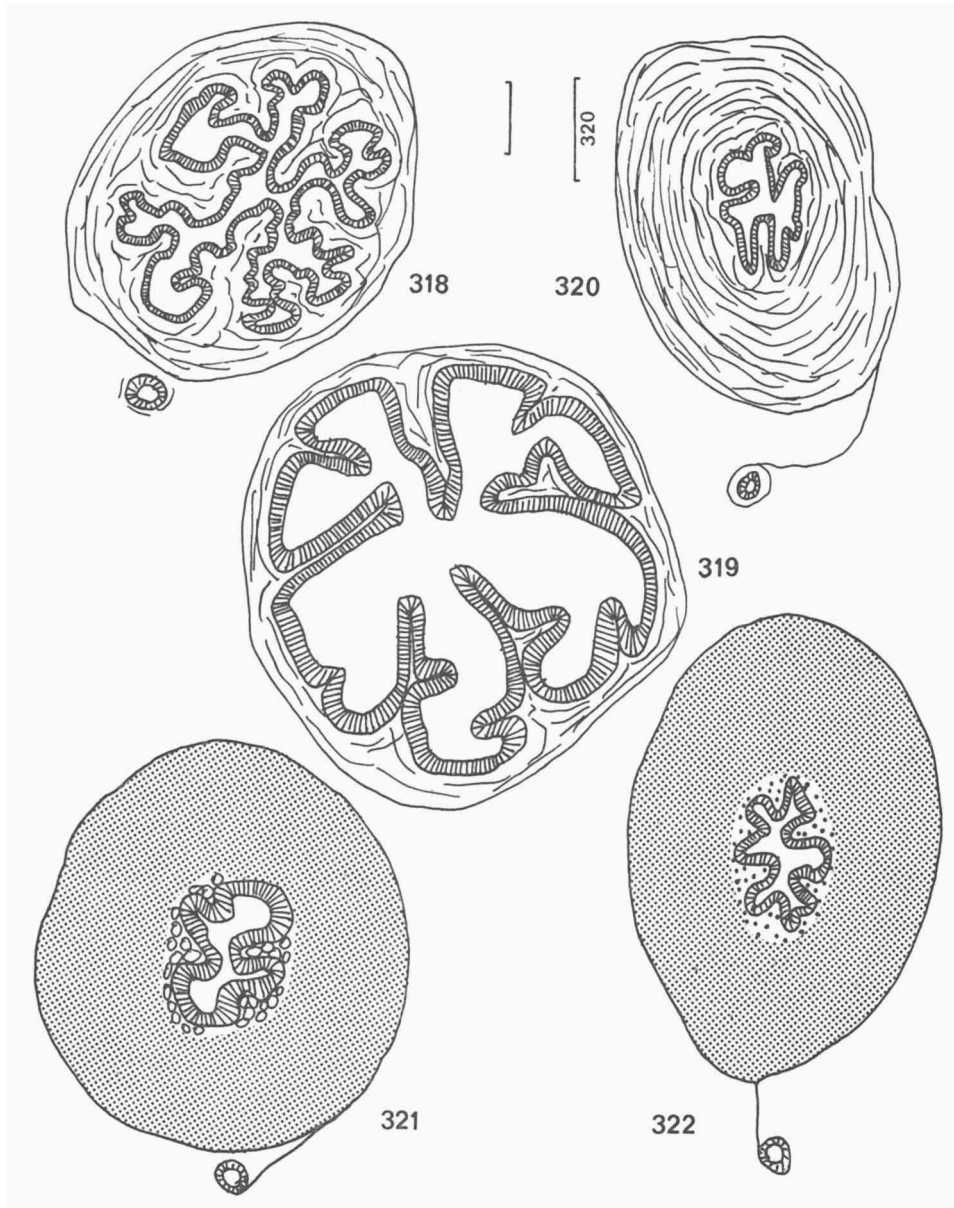


Fig. 318-322. *Scutalus (Vermiculatus) weddellii* (Hupé). Peru, Cuzco, 11.4 km S Yaurisque. Transverse sections of penis (fig. 318-321, slides H 3842, 3845, 3849, 3854) and epiphallus (fig. 322, slide H 3859). Scale line = 0.2 mm.

Genitalia. — Penis with a very short sheath (ca. 1/16 the length of the phallus), slightly swollen in its proximal part, otherwise more or less sub-cylindrical and passing without external differentiation into the epiphallus, which is distally tapering. The flagellum is very short and with a retractor muscle distally inserted. The vas deferens is free of the phallus and much shorter than the penis and epiphallus together. The vagina is rather short. The spermathecal duct is tapering, with a globose spermatheca at the distal end.

Histology. Proximal part of the penis with a narrow lumen, more or less lobed and lined by a cubic to low cylindrical epithelium which is up to ca. 25  $\mu\text{m}$  high. More distally the lumen is rather wide and the epithelium is ca. 45  $\mu\text{m}$  high, with large (sub)basal nuclei (6-10  $\mu\text{m}$  long); the cytoplasm is Alcian Blue-negative. At the transition to the distal part of the penis the lumen is narrow and lined by low cylindrical cells (ca. 20  $\mu\text{m}$  high) of which the apical part is Alcian Blue-positive. Slightly more distally the cell height increases (up to ca. 40  $\mu\text{m}$ ) and in the subepithelial tissue large rounded cells may be observed of which the cytoplasm stains weakly light blue with Alcian Blue. There is a gradual transition to the epiphallus, where the epithelium is ca. 22  $\mu\text{m}$  high.

#### **Scutalus (Suniellus) sg.n.**

Diagnosis. — A subgenus of *Scutalus* Albers, 1850, characterized by the dark colour of the shell, the crenulate suture, the relatively long penis sheath and the internal structure of the penis. Type species: *Scutalus (Suniellus) chillu* sp.n.

Description. — Shell up to 24.5 mm, rimate to imperforate, with slightly convex sides, ovate-conic to globose, thin. Colour yellowish to black-brown, uniformly coloured or, usually, with lighter axial streaks. Surface (slightly) shining, the growth striae (partly) incrassate, often broken into oblong granules. Protoconch with axial wrinkles, sometimes more or less anastomosing. Whorls hardly convex; suture well impressed, crenulate. Aperture sub-ovate. Peristome thin and simple.

Distribution. — Bolivia, Peru.

Ecology. — Unknown. The vertical distribution is 2600-4100 m.

Etymology. — (Quechua) suni, high [referring to those places which have, on account of their altitude, a cold climate].

#### **Scutalus (Suniellus) chillu** sp.n. (fig. 323; pl. 11 fig. 5)

Description. — Shell up to 15.2 mm, 1.87 times as long as wide, rimate to imperforate, with slightly convex sides, rather elongate, thin. Colour uniformly chesnut- to black-brown, the upper whorls somewhat lighter. Surface

shining, the growth striae slightly incrassate. Protoconch sculptured with close axial wrinkles, the interstices as broad as the wrinkles. Whorls 4.3, hardly convex; suture well impressed, rather crenulate. Aperture elongate-ovate, 1.66 times as long as wide, 0.54 times the total length. Peristome thin and simple. Columellar margin narrowly dilated above.

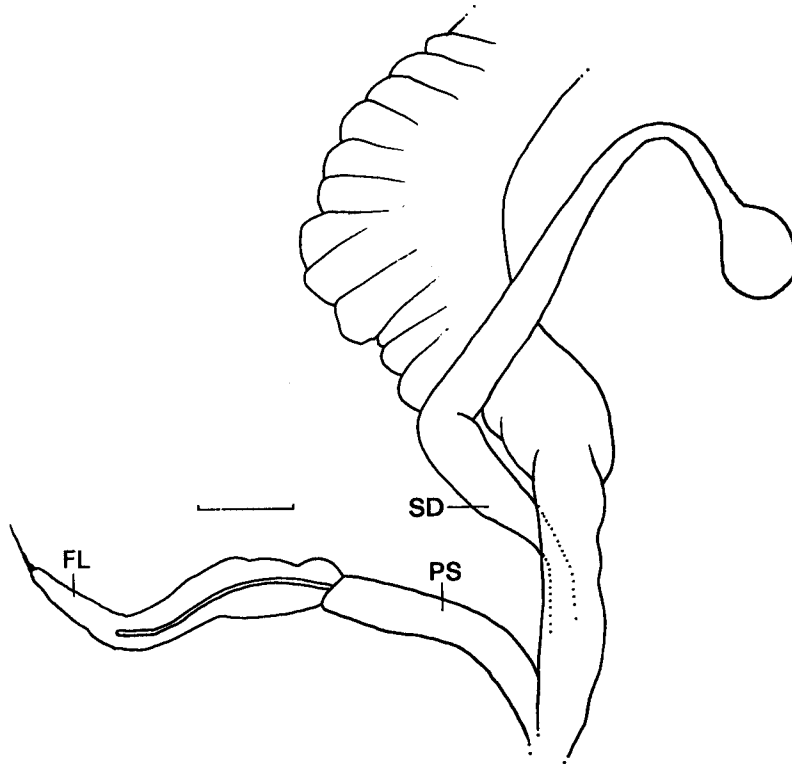


Fig. 323. *Scutalus* (*Sumiellus*) *chillu* sp.n., genitalia. Bolivia, Río Songo, Cuticucho (SMF). Scale line = 1 mm.

Measurements (in mm):

| H    | D   | HA  | WA  | LW   | W   |          |
|------|-----|-----|-----|------|-----|----------|
| 13.5 | 7.3 | 8.2 | 4.5 | 11.0 | 4.2 |          |
| 13.5 | 7.5 | 6.8 | 4.7 | 10.7 | 4.2 |          |
| 15.2 | 7.8 | 7.7 | 4.5 | 11.8 | 4.3 | holotype |

Type material. — Bolivia, Río Songo, Cuticucho [ $16^{\circ}11'S$   $68^{\circ}09'W$ ], 3800-4100 m (Schindler leg., 1-XII-1953/21-I-1954). Holotype SMF 249640. Paratypes SMF 249641/2, same data.

Comparisons. — This new species differs from all other species of the

subgenus in (1) the small size, (2) the elongate shape, (3) the uniform dark brown colour.

Genitalia. — Penis with a long sheath (ca. half the length of the phallus), somewhat swollen above the distal end of the sheath. The epiphallus is sub-cylindrical. The flagellum is relatively short and tapering; a thin retractor muscle is distally inserted. The spermathecal duct is rather short, more or less subcylindrical and with a globose spermatheca at the distal end.

Etymology. — (Quechua) chillu, black; referring to the dark colour.

**Scutalus (Suniellus) troscheli** (Philippi, 1867) (pl. 11 fig. 4)

Redescription. — Shell imperforate, with slightly convex sides, thin. Colour dark brown with lighter axial streaks, the upper whorls lightly yellowish. Surface rather shining, the upper whorls with spiral series of oblong (epidermal) granules. Protoconch with axial undulating wrinkles, anastomosing especially on lower part of whorl. Whorls moderately convex; suture well impressed. Aperture ovate, whitish coloured inside. Peristome thin and simple. Columellar margin narrowly dilated above; bluish-white. Parietal callus transparent.

Measurements: shell height 24.5 mm, diameter 13.9 mm, height of aperture 12.6 mm, width 8.3 mm, height of last whorl 19.0 mm; five whorls.

Material. — Peru, Dept. La Libertad, 18 km ESE Yamabamba, 3390 m (UF/1 + 6 juv., RMNH/juv.).

**Scutalus (Suniellus) sp. A** (fig. 324)

Subadult specimens of an apparently new species were collected by H. W. Koepcke at (1) Peru, Dept. Lima, near Zárate, 2600-2900 m (SMF/6 + 4 juv.); (2) Dept. Ancash, near Colcabamba ( $9^{\circ}36' S$   $77^{\circ}49' W$ ), 2600-2700 m (SMF/2 juv.).

Genitalia. — Penis with a short sheath (ca. 1/9 the length of the phallus), subcylindrical. The epiphallus is about half as broad and half as long as the penis, subcylindrical. The flagellum is as broad and as long as the epiphallus; a thin retractor muscle is distally inserted. The vagina is very short. The spermathecal duct is more or less subcylindrical, its distal part narrow. The spermatheca is elongate-ovate.

Histology. Proximal part of the penis with high cylindrical cells (ca.  $40\ \mu m$  high). The cytoplasm of this epithelium stains faintly griseous with Alcian Blue. More distally the epithelium is ca.  $32\ \mu m$  high and the cytoplasm stains gray-blue. In the distal part of the penis the epithelium cells are 20-28  $\mu m$  high; the subepithelial tissue is made up of rather large, rounded cells staining purple with Haemalum-Eosin.



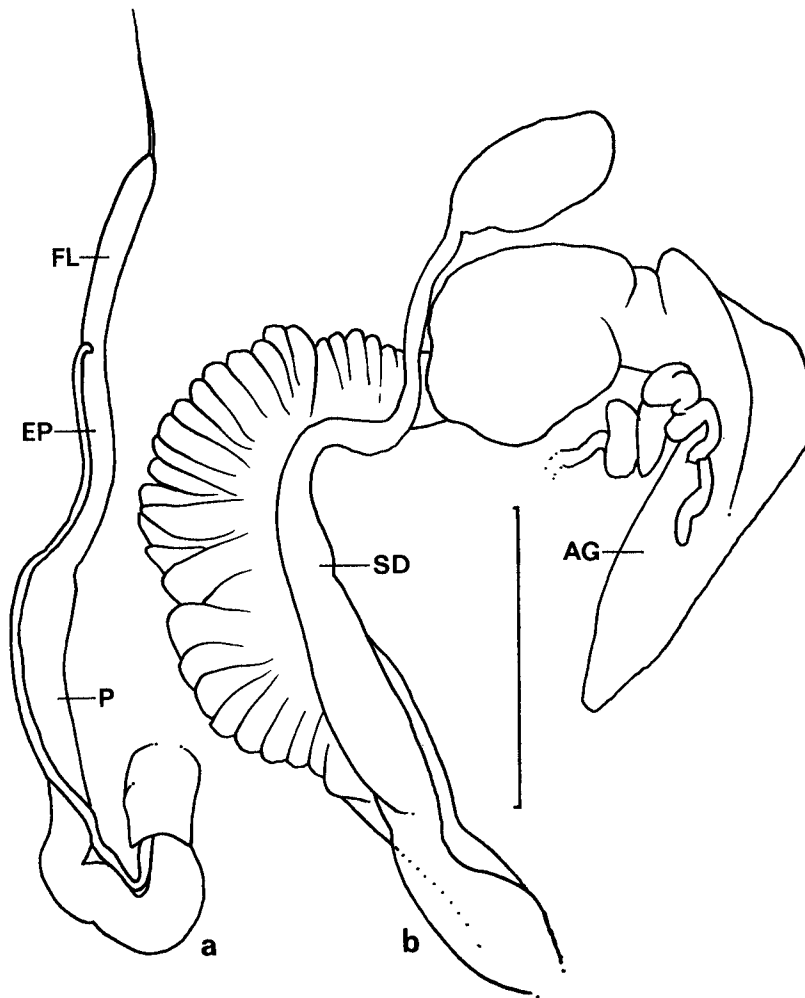


Fig. 324. *Scutalus (Suniellus)* sp. A, genitalia. Peru, Lima, Zárate (SMF 249648). Scale line = 5 mm.

***Scutalus (Suniellus)* sp. B (figs. 325-329)**

One subadult and one juvenile specimen of this undescribed species were collected at Peru, Dept. Cajamarca, Hacienda Taulis [6°57' S 79°01' W] by H. W. Koepcke (SMF).

**Genitalia.** — Penis more or less subcylindrical (penis sheath not observed); passing without external differentiation into the epiphallus, of which the distal part is rather strongly swollen. The flagellum is tapering; a retractor

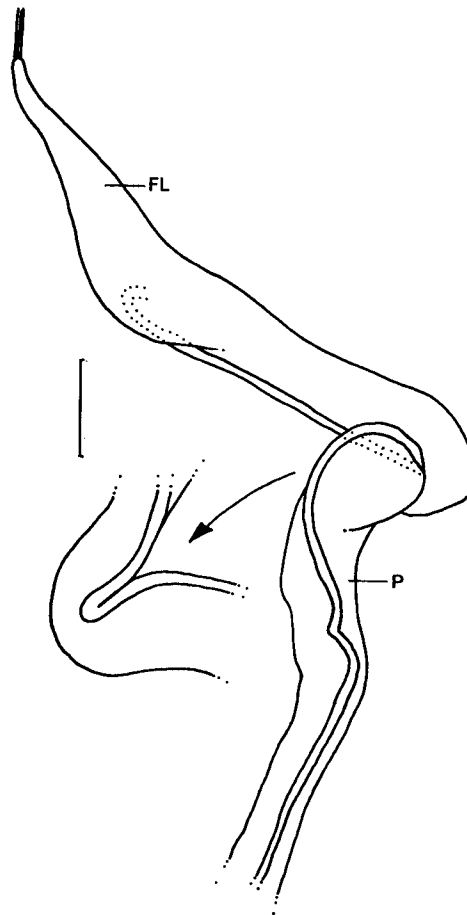


Fig. 325. *Scutalus (Sunellus)* sp. B, genitalia. Peru, Cajamarca, Hacienda Taulis (SMF 249652). Scale line = 1 mm.

muscle is distally inserted. The spermathecal duct is more or less subcylindrical, with a globose spermatheca at the distal end.

Histology. Penis with an irregularly shaped lumen, lined by a high cylindrical epithelium (cell height ca.  $30\ \mu\text{m}$ ). The cytoplasm of this epithelium stains dark pink with Haemalum-Eosin. In the distal part of the penis the cytoplasm of the epithelium cells stains hardly with this dye; the cell height is here ca.  $20\ \mu\text{m}$ . The epithelium of the epiphallus, which intrudes the distal part of the penis, is ca.  $15\text{--}20\ \mu\text{m}$  high and lines a star-shaped lumen.

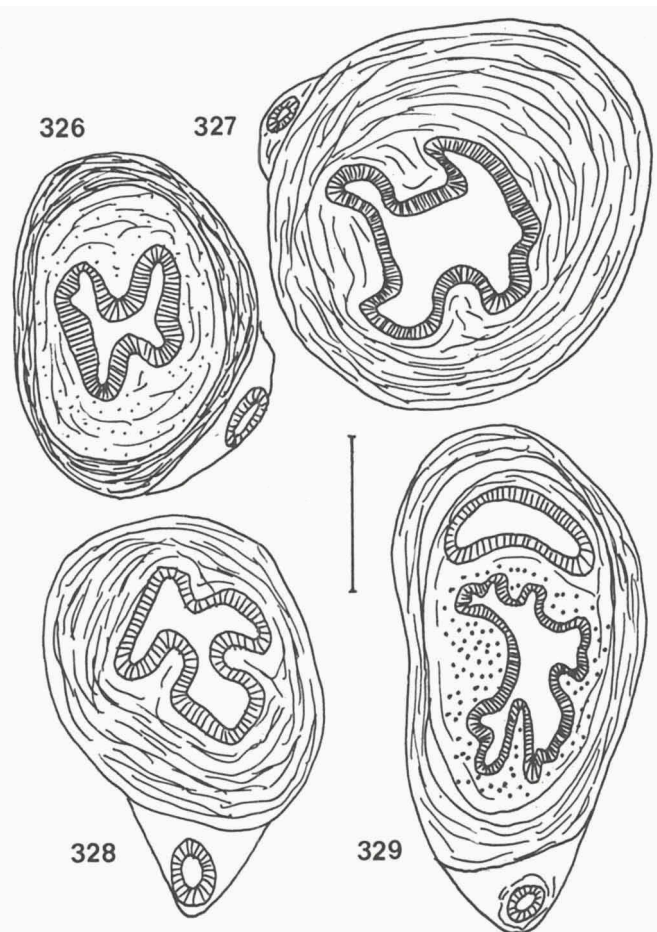


Fig. 326-329. *Scutalus* (*Suniellus*) sp. B. Peru, Cajamarca, Hacienda Taulis. Transverse sections of penis (fig. 326-329, slides H 4876, 4881, 4883, 4884) and epiphallus (fig. 329). Scale line = 0.2 mm.

***Scutalus* (*Suniellus*) sp. C (figs. 330-334)**

The third unidentified species of *Suniellus* has been collected at the headwaters of Río Manú [Dept. Madre de Dios], Peru [ca. 12°10' S 72°30' W] (SMF/2).

Genitalia. — Penis with a sheath (ca. 1/3 the length of the phallus), subcylindrical and passing without external differentiation into the epiphallus. The flagellum is as broad as the epiphallus and relatively short (ca. 1/7 the length of the phallus); a short retractor muscle is distally inserted. The vagina is relatively long. The spermathecal duct is tapering, with an elongate-globose spermatheca at the distal end.

Histology. Proximal part of the penis with high cylindrical epithelium (ca.  $35\text{ }\mu\text{m}$  high), which lines a lumen narrowed by infoldings. More distally the lumen is very narrow and irregularly shaped. The epithelium is ca.  $28\text{ }\mu\text{m}$  high with large basal nuclei (up to  $8\text{ }\mu\text{m}$  long). The distal part of the penis is partly made up by a short C- to T-shaped gland (in transverse sections). The epithelium of this gland is ca.  $45\text{ }\mu\text{m}$  high and the nuclei are relatively small (ca.  $5\text{ }\mu\text{m}$  long). The transition to the epiphallus is gradual; the epithelium is ca.  $20\text{ }\mu\text{m}$  high. The lumen of the epiphallus is star-shaped; the epithelium of both the epiphallus and the flagellum is cubic to low cylindrical (cell height  $8\text{--}12\text{ }\mu\text{m}$ ).

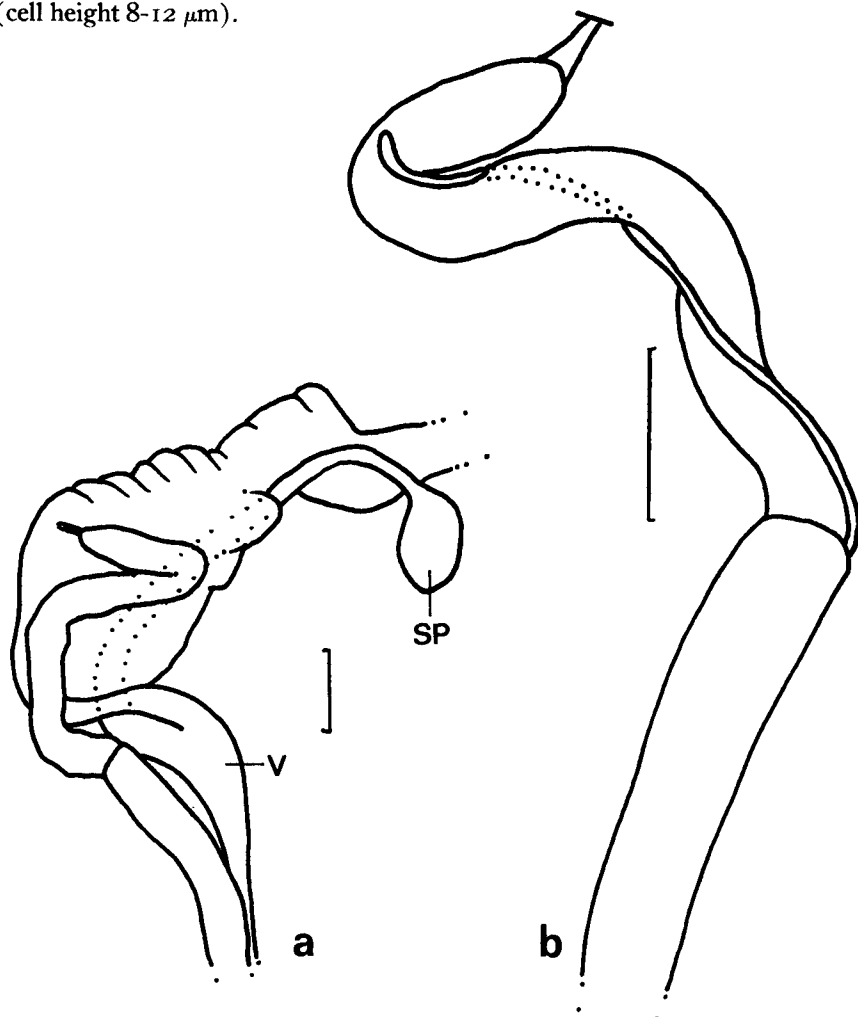


Fig. 330. *Scutalus* (*Sumiellus*) sp. C, penis. Peru, Río Manú (SMF 249653). Scale line = 1 mm.

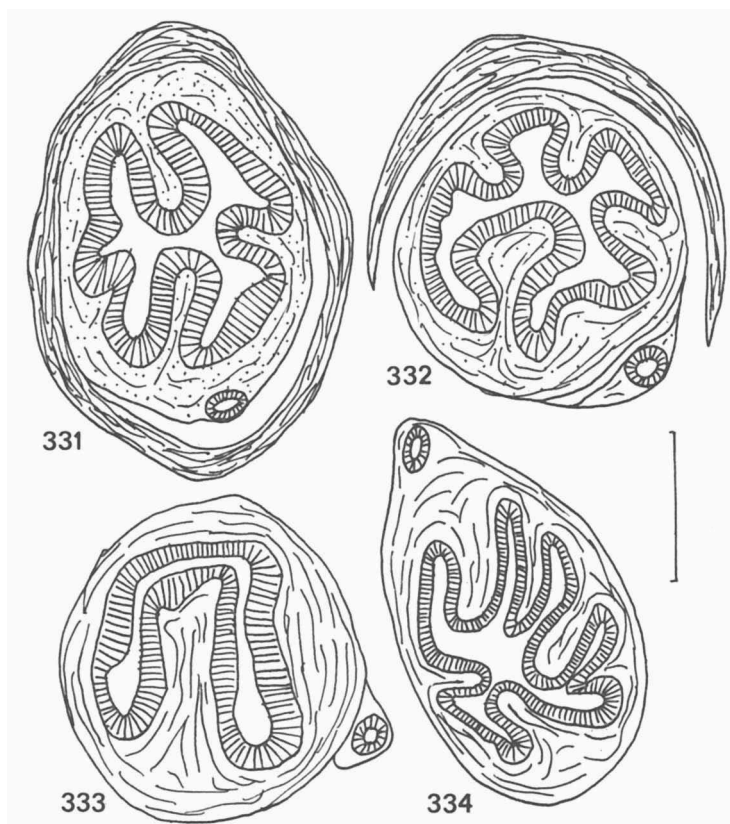


Fig. 331-334. *Scutalus (Sumiellus)* sp. C. Peru, Río Manú. Transverse sections of penis (slides H 4892, 4894 (2x), 4895). Scale line = 0.2 mm.

### **Discoleus** gen.n.

**Diagnosis.** — The species of this genus are characterized by the conical shell shape, the inflated last whorl, the absence of a penis sheath and the shape of the marginal teeth of the radula. Type species: *Eudioptus aguirrei* Doering, 1884.

**Description.** — Shell rimate, with slightly convex sides, conical, (rather) thin. Colour yellowish, usually with brownish axial streaks at irregular intervals. Surface shining, the growth striae more or less incrassate (and partly broken into oblong granules). Protoconch with numerous fine spiral lines. Whorls hardly convex, the last whorl inflated; suture well impressed. Aperture subovate. Peristome thin and simple. Columellar margin hardly dilated above.

**Distribution.** — Eastern Argentina (Prov. Buenos Aires and La Pampa).

**Etymology.** — (L.) dis, without and (L.) coleus, sheath; referring to the phallus.

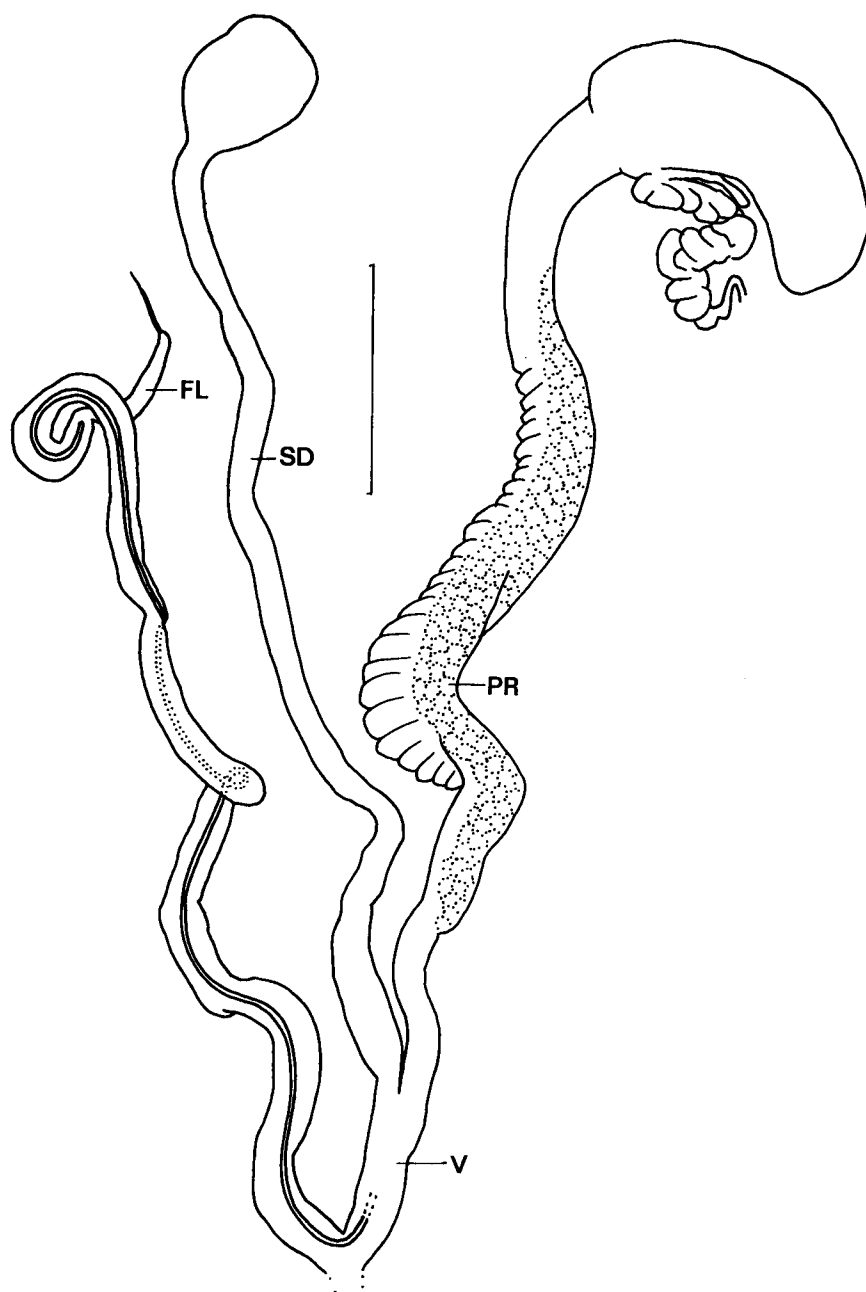


Fig. 335. *Discoleus aguirrei* (Doering), genitalia. Argentina, Buenos Aires, Sierra de la Ventana (RMNH). Scale line = 5 mm.

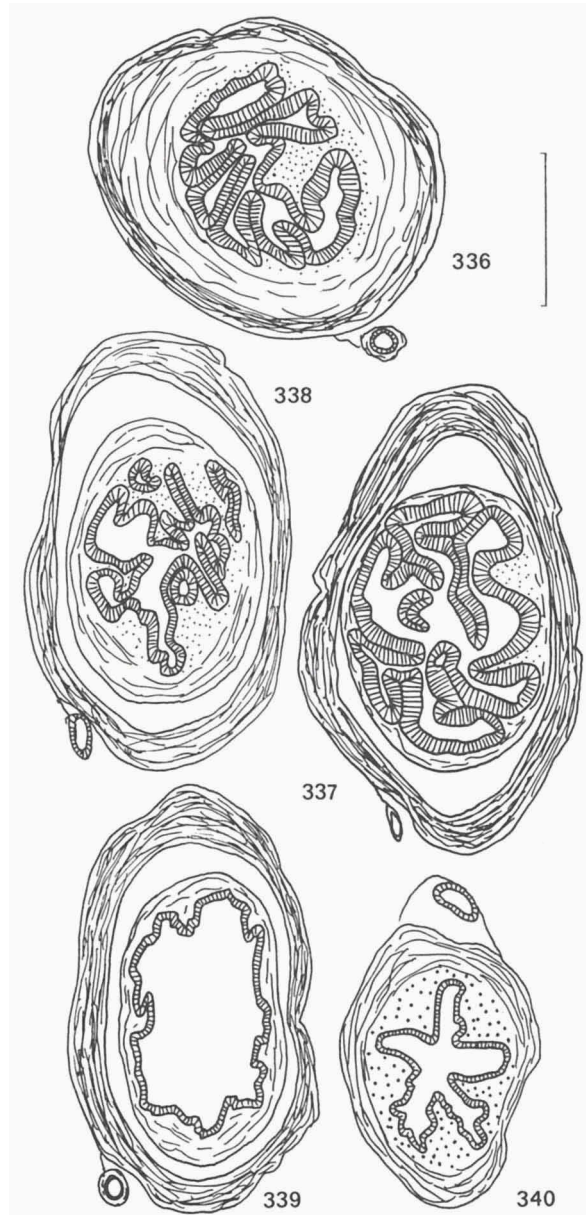


Fig. 336-340. *Discoleus aguirrei* (Doering). Argentina, Buenos Aires, Sierra de la Ventana. Transverse sections of penis (fig. 336-339, slides H 3023, 3025, 3026, 3026) and epiphallus (fig. 340, slide H 3037). Scale line = 0.5 mm.

**Discoleus aguirrei** (Doering, 1884) (figs. 335-340)

The anatomy of this species has been described by Fernandez (1969). I take the opportunity to redescribe briefly the genitalia and to add some data on the histology.

**Genitalia.** — Penis without sheath, subcylindrical, passing without external differentiation into the epiphallus. The flagellum is relatively short, ca. 1/10 the length of the phallus. The spermathecal duct is subcylindrical, with a globose spermatheca at the distal end.

**Histology.** Proximal part of the penis with a rather narrow lumen, zigzag in transverse sections. The epithelium is high cylindrical (cell height ca. 40  $\mu\text{m}$ ); the nuclei are relatively large (6-8  $\mu\text{m}$  in length) and subbasal. More distally the width of the lumen increases, but the size of the infoldings increases proportionally and the lumen remains narrow. The transverse sections show that the muscle layer surrounding the penis is divided into an inner and an outer layer, which are unconnected with each other over the greater length of the penis. The 'spermatophore' reported on by Fernandez (1969: fig. 4, e) is most probably the outside of the inner muscle layer, visible when the outer muscle layer is cut open. At the transition to the epiphallus the lumen is wide and the epithelium is low cylindrical (ca. 12  $\mu\text{m}$  high). The lumen of the epiphallus is star-shaped and lined with a cubic epithelium (ca. 11  $\mu\text{m}$  high).

**Material.** — Argentina, Prov. Buenos Aires, Abra del Pantanosa (MACN 26624); Prov. Buenos Aires, Sierra de la Ventana (RMNH); Prov. Buenos Aires, Tandil (RMNH).

**Discoleus azulensis** (Doering, 1884) (fig. 341)

Fernandez (1970) has described the anatomy of this species. I take the opportunity to redescribe briefly the genitalia.

**Genitalia.** — Penis without a sheath, subcylindrical and passing without external differentiation into the epiphallus, which is tapering distally. The flagellum is relatively short, ca. 1/11 the length of the phallus; a thin retractor muscle is distally inserted. The spermathecal duct is subcylindrical, rather thick and short, its distal part narrow; the spermatheca is truncate-globose.

**Material.** — Argentina, Prov. La Pampa, Sierra de Licuelcael (RMNH).

**Plectostylus coquimbensis coquimbensis** (Broderip, 1832) (fig. 342)

**Genitalia.** — Penis without a sheath, swollen in its proximal part, tapering towards the epiphallus (the transition, however, is not differentiated externally), which is subcylindrical. The flagellum is more or less subcylindrical,



ca. 1/3 the length of the phallus; the retractor muscle is distally inserted. The vagina is relatively short. The spermathecal duct more or less subcylindrical, its distal part narrow; the spermatheca is globose.

Material. — Chile, Prov. Antofagasta, N of Paposo (RMNH).

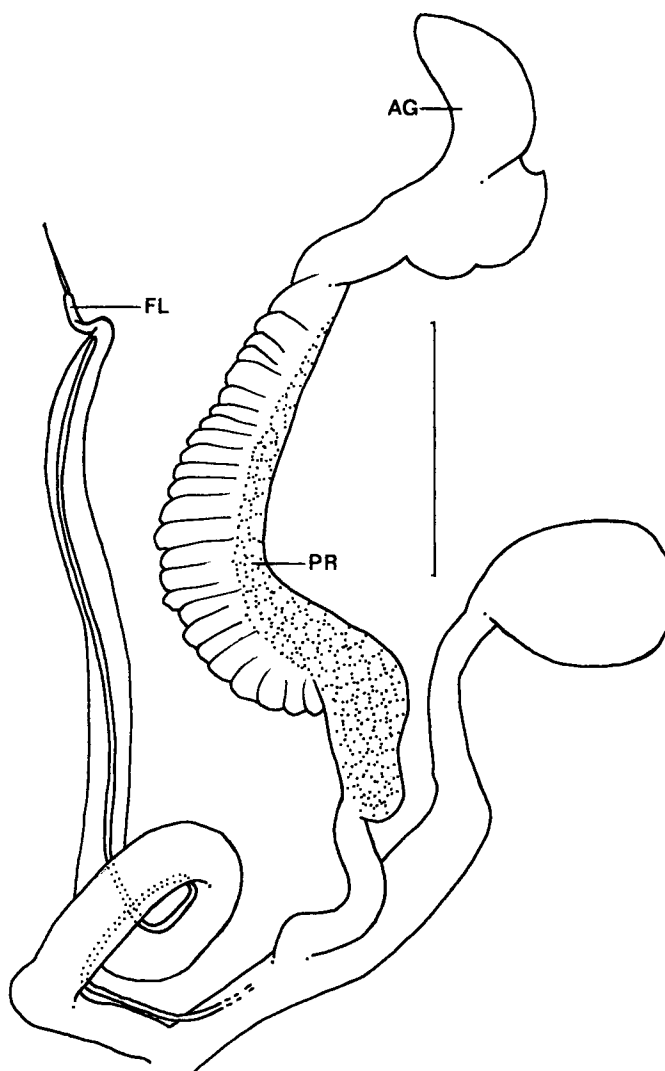


Fig. 341. *Discoleus azulensis* (Doering), genitalia. Argentina, La Pampa, Sierra de Licuelcael (RMNH). Scale line = 5 mm.

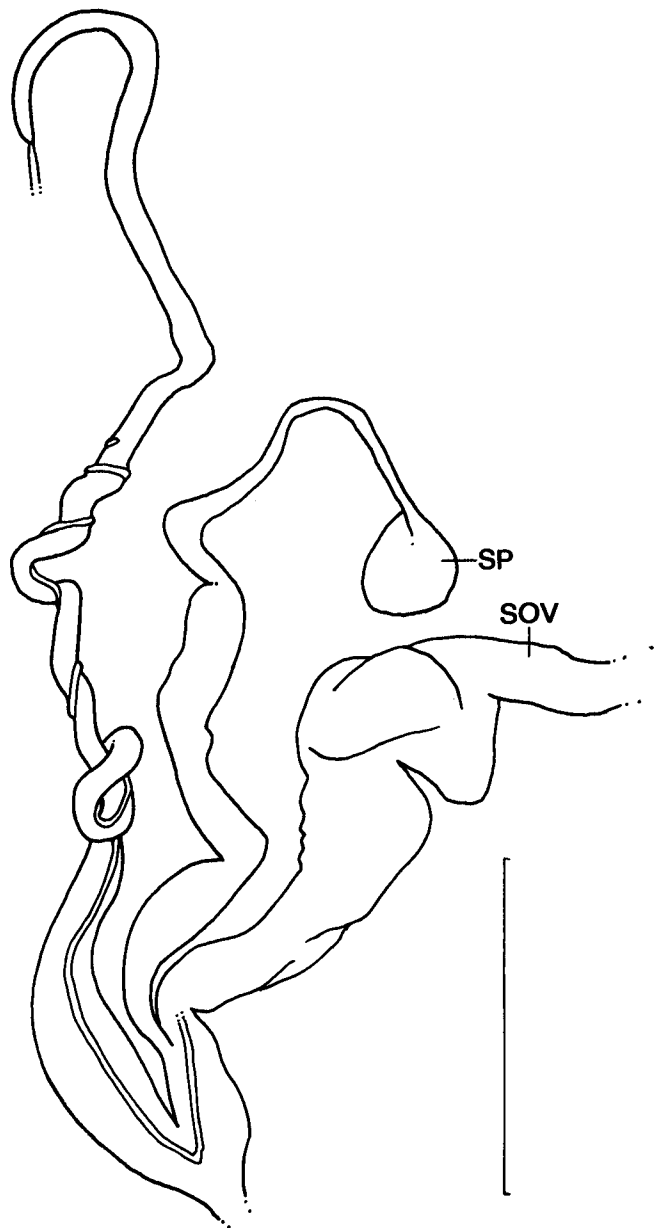


Fig. 342. *Plectostylus coquimbensis* (Broderip), genitalia. Chile, Antofagasta, N of Paposo (RMNH). Scale line = 5 mm.

***Plectostylus coquimbensis perelegans*** (Pilsbry, 1897) (pl. 9 fig. 14)

The type material of *Succinea elegans* Pfeiffer, 1842 (not Risso, 1826; replaced by *perelegans* Pilsbry) has been found in the London museum. The specimen figured by Pfeiffer (1855: pl. 60 fig. 7 [in Küster & Pfeiffer, 1840-1865]) is designated lectotype: shell height 30.0 mm, diameter 16.5 mm (BMNH 1975360). Three paralectotypes have been catalogued 1975361 and the material is labelled 'Questa de Arenas, Huasco, Chili' (ex Cuming ex Bridges).

***Plectostylus peruvianus*** (Bruguière, 1789) (fig. 343)

Genitalia. — Penis without a sheath, rather swollen, tapering towards the epiphallus and passing into this structure without external differentiation. The flagellum is short [?, the vas deferens was difficult to observe]; a retractor muscle is distally attached.

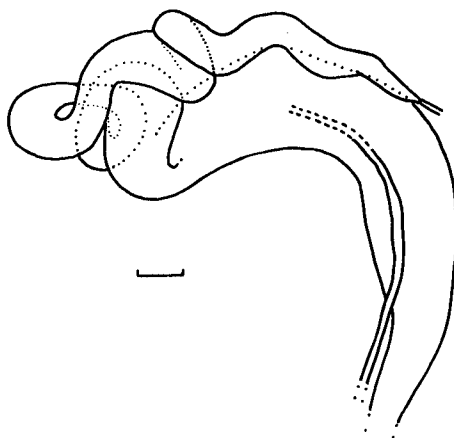


Fig. 343. *Plectostylus peruvianus* (Bruguière), penis. Chile, Arauco, Colico Norte (RMNH). Scale line = 1 mm.

Histology. The lumen of the proximal part of the penis is large and semi-circular, with 6-7 infoldings. The epithelium is high cylindrical (cell height ca. 55  $\mu\text{m}$ ). In the distal part of the penis the epithelium is irregular in height (30-50  $\mu\text{m}$ ), but is not different in structure. The lumen of the epiphallus is star-shaped and lined by low cylindrical epithelium (ca. 10  $\mu\text{m}$  high). Glandular cells, which stain light blue with Alcian Blue, are dispersed in the sub-epithelial tissue. The epithelium of the flagellum is low cylindrical and ca. 8  $\mu\text{m}$  high.

Material. — Chile, Prov. Arauco, Colico Norte (RMNH).

**Plectostylus reflexus** (Pfeiffer, 1842) (pl. 9 figs. 12-13)

The type specimens are preserved in the British Museum (Natural History) and one of them is designated lectotype: shell height 36.5 mm, diameter 15.5 mm (BMNH 1975358). There are three paralectotypes (1975359) and the material is labelled 'Pichidanque, near Coquimbo, Chili, found on the leaves of *Fourretia Coarctata*' (ex Cuming ex Bridges).

**Plectostylus variegatus** (Pfeiffer, 1842) (pl. 9 figs. 17-18)

The specimen figured by Pfeiffer (1855: pl. 60 figs. 3-4 [in Küster & Pfeiffer, 1840-1865]) is designated lectotype: shell height 46.0 mm, diameter 25.5 mm (BMNH 1975362). The material, which also comprises three paralectotypes (1975363), is labelled 'valleys north of Coquimbo' (ex Cuming ex Bridges).

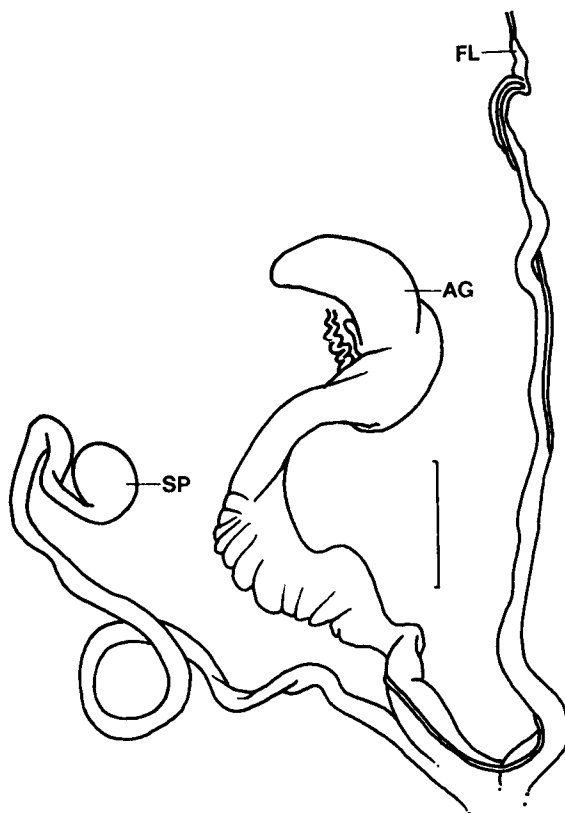


Fig. 344. *Bothriembryon* (*Bothriembryon*) *bullae* (Menke), genitalia. Australia, Sorrento (WAM 338-73). Scale line = 5 mm.

**Bothriembryon (Bothriembryon) bulla** (Menke, 1843) (fig. 344)

Genitalia. — Penis without sheath, slightly swollen proximally but otherwise subcylindrical and passing without external differentiation into the epiphallus. The flagellum is very short (ca.  $1/12$  the length of the phallus) and slender; a retractor muscle is distally inserted. The vagina is relatively short. The spermathecal duct is subcylindrical, with a globose spermatheca at the distal end.

Material. — Western Australia, Sorrento (WAM 338-73).

**Bothriembryon (Bothriembryon) costulata** (Lamarck, 1822)

Genitalia. — Penis without a sheath, slightly swollen at the base, subcylindrical and passing without external differentiation into the epiphallus. The flagellum is slender and rather long, ca.  $1/3$  the length of the phallus; the retractor muscle is distally attached. The vas deferens is free of the phallus and shorter in length than penis and epiphallus together. The vagina is relatively short. The spermathecal duct is subcylindrical, with a globose spermatheca at the distal end.

Material. — Western Australia, Shark Bay, Carrarang Station (WAM 1514-70).

**Bothriembryon (Bothriembryon) dux** (Pfeiffer, 1861)

The type material of this species has been found in the London museum and one specimen is here designated lectotype: shell height 48.5 mm, diameter 28.0 mm (BMNH 19598). There are two paralectotypes (19599) and the material is labelled 'King George's Sound'.

A new locality is: Western Australia, Belladonia (Great Eastern Highway), RMNH/10.

**Bothriembryon (Bothriembryon) glauerti** Iredale, 1939 (fig. 345)

Genitalia. — Penis without a sheath, tapering basally, but otherwise subcylindrical and passing without external differentiation into the epiphallus. The flagellum is slender, ca.  $1/3$  the length of the phallus. The vagina is relatively short. The spermathecal duct is subcylindrical, its distal part slightly more slender. The spermatheca is globose.

Material. — Western Australia, Stirling Range, northern side of Bluff knoll (WAM 336-73).

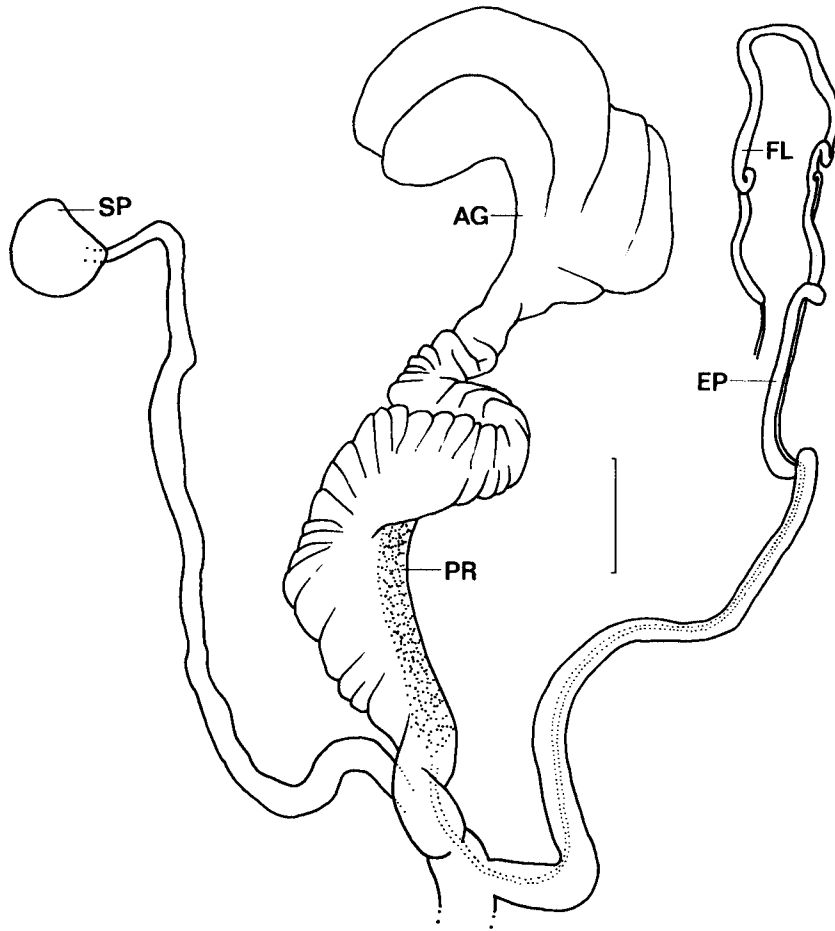


Fig. 345. *Bothriembryon (Bothriembryon) glauerti* Iredale, genitalia. Australia, Stirling Range (WAM 336-73). Scale line = 5 mm.

***Bothriembryon (Bothriembryon) indutus* (Menke, 1843) (figs. 346-349)**

Genitalia. — As described for *Bothriembryon (B.) glauerti* Iredale.

Histology. Penis with a rather wide lumen with infoldings. The epithelium is low cylindrical, with rather large nuclei, throughout the penis. There is a gradual transition to the epiphallus.

Material. — Western Australia, Darling Range, Walyunga (WAM 1453-70).

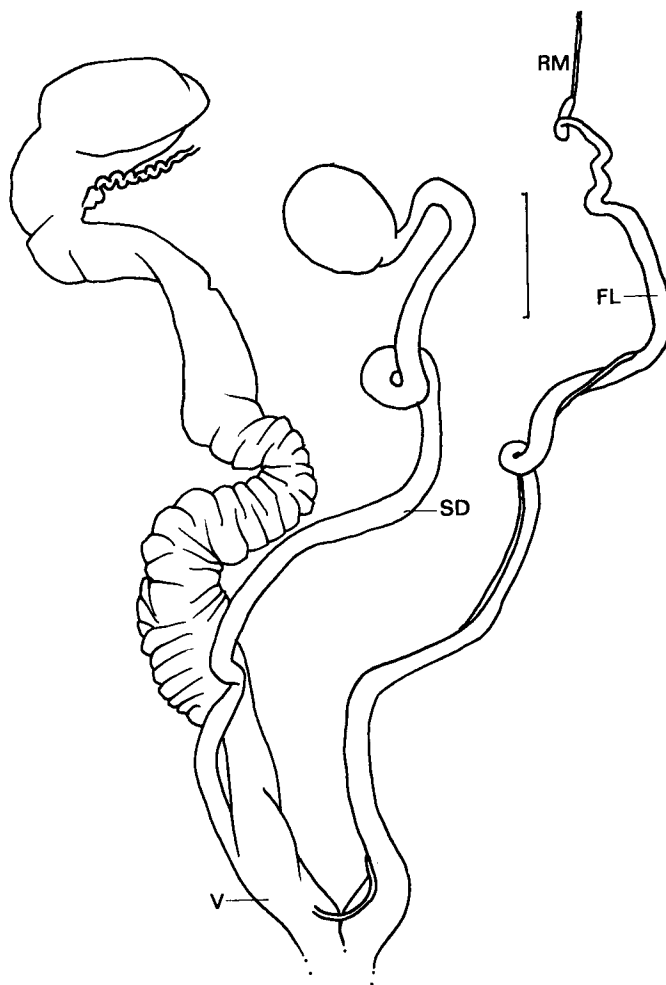


Fig. 346. *Bothriembryon (Bothriembryon) indutus* (Menke), genitalia. Australia, Darling Range (WAM 1453-70). Scale line = 5 mm.

***Bothriembryon (Bothriembryon) kingii* (Gray, 1825)**

From the type material, which is preserved in the British Museum (Natural History), one specimen is here designated lectotype: shell height 24.5 mm, diameter 10.6 mm (BMNH 195910). There is one paralectotype and the material is labelled 'Australia' (ex P. P. King).

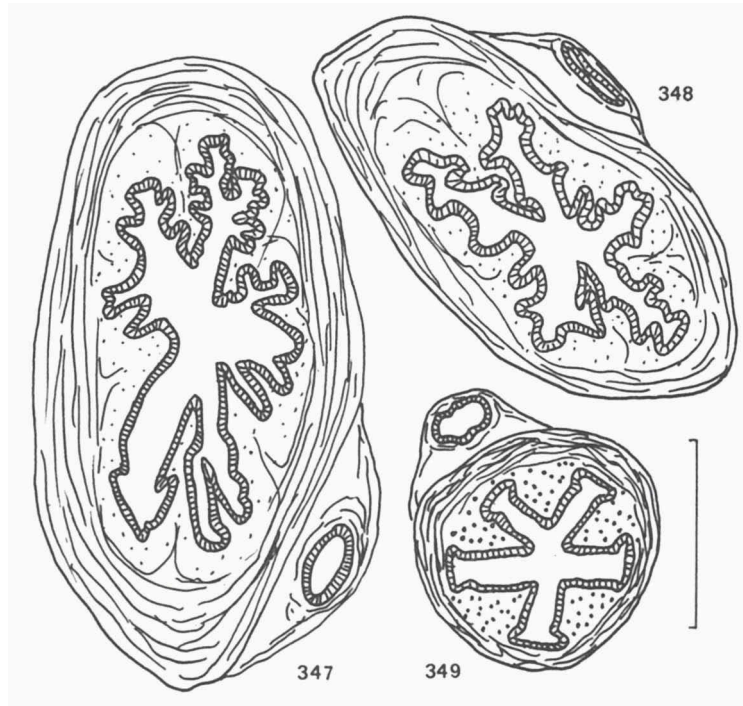


Fig. 347-349. *Bothriembryon (Bothriembryon) indutus* (Menke). Australia, Darling Range. Transverse sections of penis (fig. 347-348, slides H 2342, 2348) and epiphallus (fig. 349, slide H 2357). Scale line = 0.5 mm.

***Bothriembryon (Bothriembryon) leeuwinensis* (E. A. Smith, 1894)**

One specimen from among the type material, which is in the London museum, is here designated lectotype: shell height 27.0 mm, diameter 14.1 mm (BMNH 1891.11.21.128). There are four paralectotypes (.129-132) and the material is labelled 'Cape Leeuwin, SW Australia' (ex Walter).

***Bothriembryon (Bothriembryon) mastersi* (Cox, 1867)**

Genitalia. — Penis without a sheath, slightly swollen at the base but otherwise subcylindrical and passing without external differentiation into the epiphallus. The flagellum is slightly tapering, ca. 1/5 the length of the phallus and with a distal retractor muscle. The spermathecal duct is subcylindrical, with a globose spermatheca at the distal end.

Material. — South Australia, Eyre Peninsula, Streaky Bay (BMNH).



**Bothriembryon (Bothriembryon) onslowi** (Cox, 1864) (fig. 350)

Genitalia. — Penis without a sheath, swollen proximally, slightly tapering in its distal part and passing without external differentiation into the epiphallus. The vas deferens is slightly shorter than penis and epiphallus together. The flagellum is slender, rather long (ca.  $\frac{1}{3}$  the length of the phallus) and with a distal retractor muscle. The vagina is relatively rather long. The spermathecal duct is more or less subcylindrical, with an elongate-globose spermatheca at the distal end.

Material. — Western Australia, Shark Bay, 7 miles S Shark Bay Salt Company (WAM 2232-67).

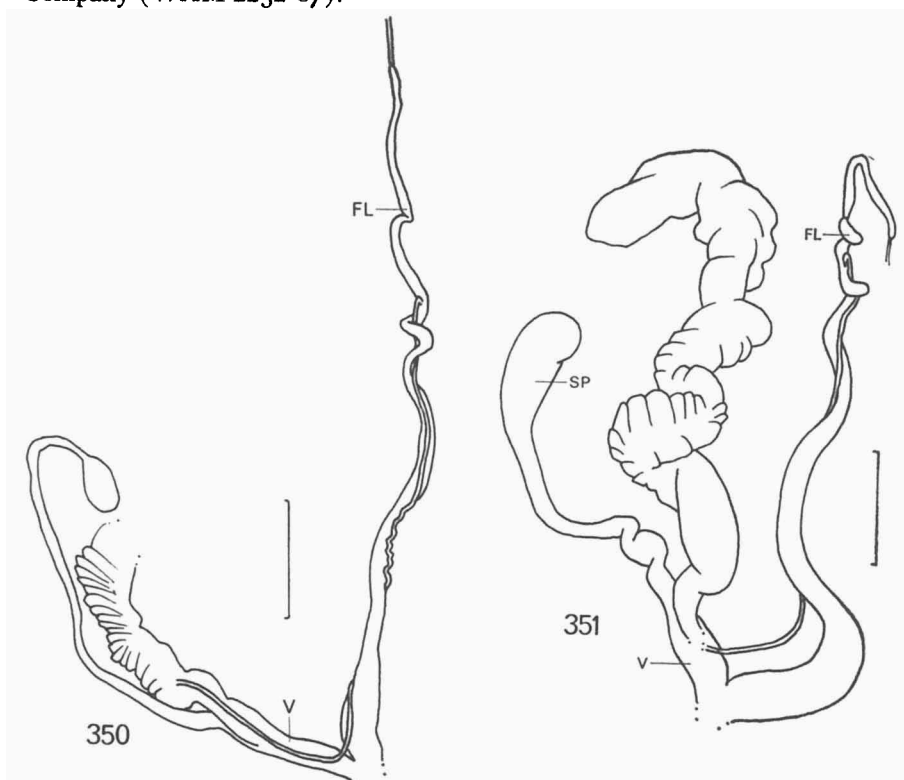


Fig. 350. *Bothriembryon (Bothriembryon) onslowi* (Cox), genitalia. Australia, Shark Bay (WAM 2232-67). Scale line = 5 mm.

Fig. 351. *Bothriembryon (Tasmanembryon) gunnii* (Sowerby), genitalia. Tasmania, Coles Bay (RMNH). Scale line = 5 mm.

**Bothriembryon (Bothriembryon) rhodostomus** (Gray, 1834)

One of the type specimens in the London museum is designated lectotype: shell height 31.5 mm, diameter 18.0 mm (BMNH 1874.10.28.1). There is one paralectotype (1975222) and the material is labelled 'Australia' (ex Gray).

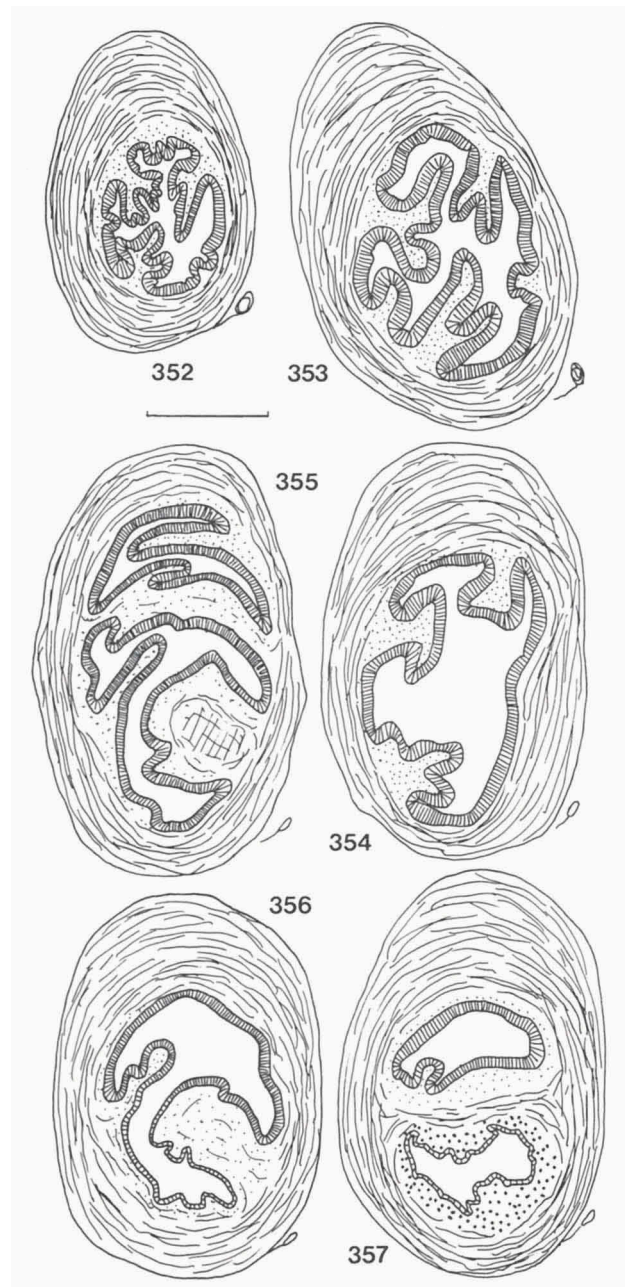


Fig. 352-357. *Bothriembryon* (*Tasmanembryon*) *gunnii* (Sowerby). Tasmania, Coles Bay. Transverse sections of penis (slides H 2950, 2954, 2955, 2958 (3x)) and epiphallus (fig. 357, slide H 2958). Scale line = 0.5 mm.

Redescription. — Shell perforate, with rather convex sides, rather solid. Colour faded in the type specimens, but probably whitish with light brown axial streaks at irregular intervals and two reddish-brown spiral bands, one at the suture and the other shortly below. Surface rather shining, the growth striae incrassate. Whorls slightly convex; suture well impressed. Aperture subovate. Peristome thin and simple. Columellar margin broadly dilated above.

**Bothriembryon (Tasmanembryon) gunnii** (Sowerby, 1845)  
(figs. 351-357)

Genitalia. — Penis without a sheath, more or less subcylindrical (slightly broader at the base) and passing without external differentiation into the epiphallus. The flagellum is slender and subcylindrical, ca. 1/5 the length of the phallus. The vagina is relatively short. The spermathecal duct is comparatively broad, rather short (ca. 3/4 the length of the spermooviduct) and with a broadly elongate-globose spermatheca at the distal end.

Histology. The lumen of the penis is rather narrow, with few infoldings and lined by a high cylindrical epithelium (cell height 25-50  $\mu$ m). The cytoplasm of these cells is granulose and stains light purple with Haemalum-Eosin, except the apical part of the cells where the cytoplasm is not granulose and staining pink.

Material. — Tasmania, Coles Bay (RMNH).

**Neopetraeus altoperuvianus** (Reeve, 1849) (pl. 8 figs. 1-2)

The specimen figured by Reeve (1849: fig. 521a) is here designated lectotype: shell height 46.5 mm, diameter 26.0 mm (BMNH 1975437). The material, which also comprises one paralectotype (1975438), is labelled 'Province of Catamarca, Peru' (ex Cuming).

New localities for this species are (all Peru, Dept. Amazonas): (1) 15 km SSE Tingo, 1840 m (UF, RMNH); (2) 10 km SE Tingo, 1820 m (UF/5, RMNH/2); (3) 6 km SE Tingo, 1800 m (UF/5, RMNH/1); (4) 7 km NNW Tingo (UF/2); (5) 12 km NNW Tingo, 1720 m (UF/5, RMNH/3).

Specimens from the following localities differ in (a) the darker ground colour of the shells, (b) being smaller, (c) having a thicker peristome. The differences are but slight and seem not to be sufficient enough to separate this material at the subspecies level (all localities from Dept. Cajamarca): (6) 3 km E Celendín, 2800 m (UF, RMNH); (7) 3 km ESE Celendín, 2800 m (UF/5); (8) 25 km E Celendín, 2510 m (UF/3, RMNH/1) [spec-

imens from this locality have a rather strong fold in the columella]; (9) road from Chiclayo to Cutervo, Chontabamba near Huambos (IML).

The measurements of this material are given in Table 2.

TABLE 2. Measurements (in mm) and statistics of characters and ratios in *Neopetraeus altoperuvianus* (Reeve).

|                                                | H     | D     | HA    | WA    | LW    | H/D  | HA/WA | HA/H | LM/H |                                                 |       |       |       |       |       |      |      |      |      |
|------------------------------------------------|-------|-------|-------|-------|-------|------|-------|------|------|-------------------------------------------------|-------|-------|-------|-------|-------|------|------|------|------|
| Peru, Dept. Amazonas, 15 km SSE Tingo (N = 15) |       |       |       |       |       |      |       |      |      | Peru, Dept. Amazonas, 12 km NNW Tingo (N = 5)   |       |       |       |       |       |      |      |      |      |
| M                                              | 45.50 | 23.53 | 23.30 | 14.99 | 32.23 | 1.94 | 1.57  | 0.52 | 0.71 | M                                               | 44.30 | 21.90 | 21.90 | 14.34 | 31.50 | 2.03 | 1.53 | 0.49 | 0.72 |
| s                                              | 3.51  | 2.23  | 1.40  | 1.34  | 2.19  | 0.09 | 0.07  | 0.02 | 0.01 | s                                               | 1.35  | 1.52  | 1.19  | 0.51  | 1.06  | 0.09 | 0.04 | 0.02 | 0.03 |
| x <sub>max</sub>                               | 51.0  | 26.5  | 26.0  | 17.0  | 36.0  | 2.15 | 1.70  | 0.54 | 0.73 | x <sub>max</sub>                                | 46.5  | 24.5  | 23.5  | 14.9  | 32.5  | 2.12 | 1.58 | 0.52 | 0.75 |
| x <sub>min</sub>                               | 40.5  | 19.5  | 20.5  | 12.9  | 29.5  | 1.80 | 1.45  | 0.46 | 0.69 | x <sub>min</sub>                                | 43.0  | 21.0  | 20.5  | 13.5  | 30.0  | 1.90 | 1.46 | 0.46 | 0.67 |
| Peru, Dept. Amazonas, 10 km SE Tingo (N = 3)   |       |       |       |       |       |      |       |      |      | Peru, Dept. Cajamarca, 3 km E Celendin (N = 20) |       |       |       |       |       |      |      |      |      |
|                                                | 43.0  | 21.0  | 23.0  | 14.4  | 30.5  | 1.87 | 1.60  | 0.53 | 0.71 | M                                               | 37.15 | 19.33 | 17.85 | 12.63 | 24.75 | 1.93 | 1.41 | 0.48 | 0.67 |
|                                                | 41.5  | 21.0  | 22.0  | 14.3  | 30.0  | 1.98 | 1.54  | 0.53 | 0.72 | s                                               | 1.62  | 1.31  | 1.36  | 0.99  | 1.40  | 0.08 | 0.04 | 0.02 | 0.02 |
|                                                | 40.5  | 19.5  | 20.0  | 12.8  | 28.5  | 2.08 | 1.56  | 0.49 | 0.70 | x <sub>max</sub>                                | 40.5  | 23.5  | 20.5  | 14.5  | 27.5  | 2.03 | 1.50 | 0.54 | 0.70 |
|                                                |       |       |       |       |       |      |       |      |      | x <sub>min</sub>                                | 34.5  | 17.5  | 16.0  | 10.9  | 22.5  | 1.72 | 1.36 | 0.43 | 0.63 |
| Peru, Dept. Amazonas, 6 km SE Tingo (N = 6)    |       |       |       |       |       |      |       |      |      | Peru, Dept. Cajamarca, Chontabamba (N = 5)      |       |       |       |       |       |      |      |      |      |
| M                                              | 42.67 | 21.67 | 22.25 | 14.28 | 30.75 | 1.97 | 1.56  | 0.52 | 0.72 | M                                               | 38.40 | 19.20 | 18.50 | 12.48 | 25.90 | 2.00 | 1.48 | 0.48 | 0.67 |
| s                                              | 3.74  | 1.99  | 1.70  | 1.27  | 2.42  | 0.14 | 0.05  | 0.01 | 0.01 | s                                               | 1.43  | 0.97  | 1.22  | 0.85  | 1.08  | 0.12 | 0.09 | 0.03 | 0.02 |
| x <sub>max</sub>                               | 47.5  | 25.0  | 25.0  | 16.5  | 33.5  | 2.20 | 1.62  | 0.54 | 0.73 | x <sub>max</sub>                                | 40.0  | 20.5  | 19.5  | 13.8  | 26.5  | 2.16 | 1.59 | 0.52 | 0.69 |
| x <sub>min</sub>                               | 38.0  | 19.0  | 20.5  | 12.7  | 28.0  | 1.77 | 1.52  | 0.50 | 0.71 | x <sub>min</sub>                                | 36.5  | 18.0  | 16.5  | 11.6  | 24.0  | 1.83 | 1.36 | 0.45 | 0.66 |

### *Neopetraeus binneyanus* (Pfeiffer, 1857)

The type material of this species has been traced in the London museum and one specimen is here designated lectotype: shell height 25.5 mm, diameter 22.0 mm (BMNH 1975426). Two paralectotypes are in the same lot, which is labelled 'Province of Patas, Andes of Peru' [Dept. La Libertad] (ex Cuming ex Farris).

### *Neopetraeus camacho* Weyrauch, 1967 (figs. 358-363)

One specimen from the type locality, Peru, [Dept. Cajamarca] Río Chotano, Cuesta de Chuguid, was dissected (SMF).

Genitalia. — Penis with a very short sheath (ca. 1/17 the length of the phallus), more or less subcylindrical, passing without external differentiation into the epiphallus, which is slightly tapering. The flagellum is slender; with a short, distal retractor muscle. The vagina is relatively long. The spermathecal duct is subcylindrical, with a globose spermatheca at the distal end.

Histology. The lumen of the penis is more or less lobed to subcircular with infoldings and is lined by low cylindrical epithelium (cell height ca. 21-30  $\mu$ m). There is a gradual transition to the epiphallus.

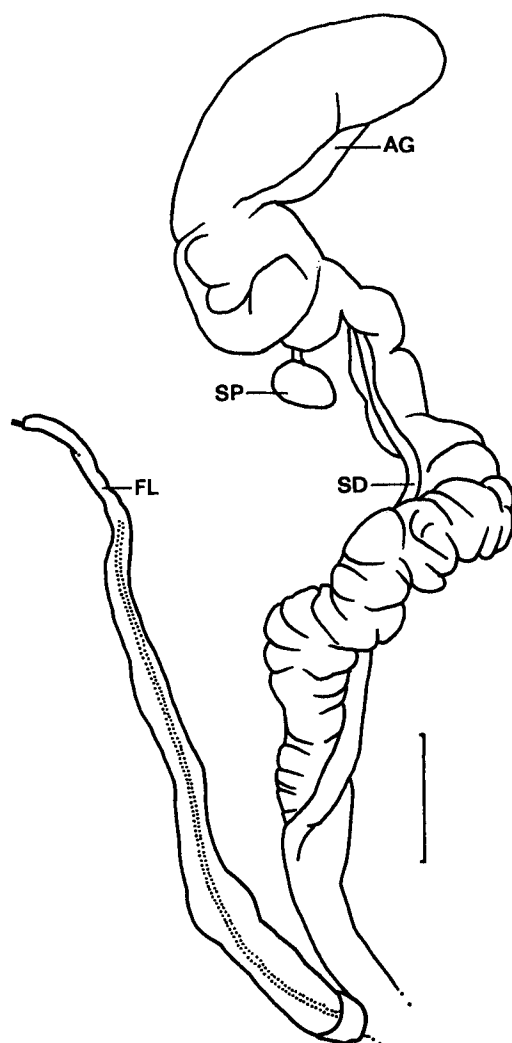


Fig. 358. *Neopetraeus camachoi* Weyrauch, genitalia. Peru, Cajamarca, Cuesta de Chuguid (SMF). Scale line = 5 mm.

Measurements (in mm) and statistics of characters and ratios:

|                                                       | H     | D     | HA    | WA    | LW    | H/D  | HA/WA | HA/H | LW/H |
|-------------------------------------------------------|-------|-------|-------|-------|-------|------|-------|------|------|
| Peru, Dept. Cajamarca, Cuesta de Chuguid (IML; N = 9) |       |       |       |       |       |      |       |      |      |
| M                                                     | 34.89 | 19.00 | 18.00 | 12.70 | 24.44 | 1.84 | 1.42  | 0.52 | 0.70 |
| s                                                     | 1.85  | 1.15  | 1.06  | 1.15  | 0.98  | 0.11 | 0.12  | 0.02 | 0.02 |
| max                                                   | 37.0  | 20.5  | 19.5  | 14.9  | 25.5  | 2.00 | 1.65  | 0.56 | 0.74 |
| min                                                   | 31.5  | 17.5  | 16.0  | 11.5  | 22.5  | 1.69 | 1.28  | 0.49 | 0.66 |

Peru, Dept. Cajamarca, near Chancay (IML; N = 4)

|     |       |       |       |       |       |      |      |      |      |
|-----|-------|-------|-------|-------|-------|------|------|------|------|
| M   | 36.13 | 19.25 | 17.88 | 12.45 | 24.63 | 1.88 | 1.44 | 0.49 | 0.68 |
| s   | 2.50  | 1.26  | 1.93  | 1.09  | 1.80  | 0.03 | 0.10 | 0.02 | 0.00 |
| max | 38.0  | 20.5  | 19.0  | 13.9  | 26.0  | 1.92 | 1.53 | 0.51 | 0.68 |
| min | 32.5  | 17.5  | 15.0  | 11.3  | 22.0  | 1.85 | 1.32 | 0.46 |      |

Specimens from Dept. Cajamarca, Río Huancabamba, above Pucará (IML) are smaller, but otherwise identical (N = 20):

|     |       |       |       |       |       |      |      |      |      |
|-----|-------|-------|-------|-------|-------|------|------|------|------|
| M   | 31.33 | 17.23 | 15.99 | 11.26 | 22.28 | 1.82 | 1.42 | 0.51 | 0.71 |
| s   | 0.89  | 0.68  | 0.66  | 0.49  | 0.68  | 0.07 | 0.06 | 0.02 | 0.02 |
| max | 33.0  | 18.5  | 17.5  | 12.5  | 24.0  | 1.91 | 1.50 | 0.55 | 0.74 |
| min | 29.0  | 16.0  | 14.7  | 10.3  | 21.0  | 1.69 | 1.29 | 0.49 | 0.67 |

### ***Neopetraeus catamarcanus catamarcanus* (Pfeiffer, 1858)**

(pl. 4 figs. 1-2)

The type locality of this taxon is 'Andes of the province Caxamarca [sic], Peru'. A new locality record is: Peru, Dept. Cajamarca, 4 km WSW Balsas, 1600 m (UF/8, RMNH/2). Comparing this material to the original descriptions of *Bulimus catamarcanus* Pfeiffer (1858: 256) and that of *Otostomus millegranus* Martens (1885: 177; type locality: Peru, Dept. Cajamarca, Río Marañón valley, Balsas) I agree with Weyrauch (1967a: 343 [mentioned in summary only]) that there are no specific differences between these two taxa.

Measurements (in mm) and statistics of characters and ratios (N=8):

|     | H     | D     | HA    | WA    | LW    | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|-------|-------|-------|-------|------|-------|------|------|
| M   | 40.94 | 25.38 | 22.50 | 17.94 | 28.75 | 1.61 | 1.26  | 0.55 | 0.70 |
| s   | 1.84  | 0.95  | 1.10  | 1.35  | 1.31  | 0.04 | 0.06  | 0.01 | 0.03 |
| max | 43.5  | 26.5  | 24.5  | 19.5  | 31.5  | 1.67 | 1.39  | 0.58 | 0.73 |
| min | 39.0  | 24.0  | 21.5  | 15.5  | 27.5  | 1.57 | 1.18  | 0.54 | 0.65 |

### ***Neopetraeus catamarcanus orientalis* ssp.n.**

(fig. 364; pl. 4 figs. 3-4, pl. 5)

Description. — Shell up to 53.5 mm, 1.6 times as long as wide, rimate to widely perforate, with nearly straight sides, rather elongate, rather solid. Shell yellowish to pink, with a pattern of brownish streaks. Surface lustreless, sculpture varying from (a) numerous spiral rows of granules, to (b) upper whorls irregularly plicate and the last whorl weakly malleate. Whorls 6.2, nearly flat; suture hardly impressed. Aperture broadly ovate, 1.3 times as long as wide, 1.56 times the total length. Peristome thin, broadly expanded and narrowly reflexed; upper part of palatal margin regularly rounded, rarely straight; margins converging. Columellar margin reflexed and broadly dilated throughout; white (as is the peristome).

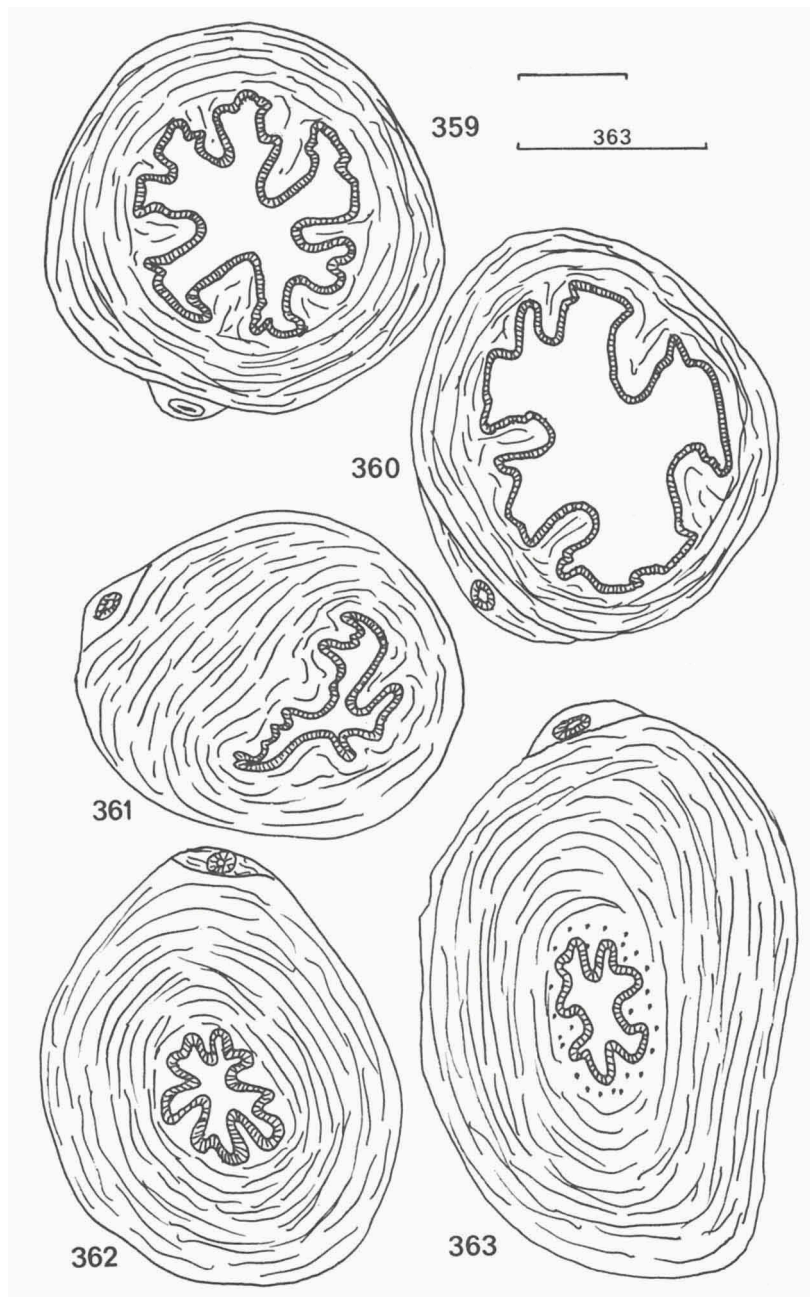


Fig. 359-363. *Neopetraeus camachoi* Weyrauch. Peru, Cajamarca, Cuesta de Chuguid. Transverse sections of penis (fig. 359-362, slides H 4454, 4456, 4458, 4461) and epiphallus (fig. 363, slide H 4465). Scale line = 0.5 mm.

## Measurements (in mm) and statistics of characters and ratios:

|                                                | H     | D     | HA    | WA    | LW    | H/D  | HA/WA | HA/H | LW/H |
|------------------------------------------------|-------|-------|-------|-------|-------|------|-------|------|------|
| Peru, Dept. Amazonas, 12 km ENE Balsas (N = 6) |       |       |       |       |       |      |       |      |      |
| M                                              | 44.50 | 30.17 | 28.00 | 22.42 | 33.58 | 1.48 | 1.25  | 0.63 | 0.76 |
| s                                              | 1.61  | 1.99  | 1.61  | 1.46  | 1.39  | 0.09 | 0.06  | 0.04 | 0.03 |
| max                                            | 46.0  | 33.5  | 30.5  | 24.0  | 35.0  | 1.56 | 1.33  | 0.69 | 0.80 |
| min                                            | 42.0  | 28.0  | 26.0  | 20.0  | 32.0  | 1.31 | 1.16  | 0.57 | 0.70 |
| Peru, Dept. Amazonas, 18 km ENE Balsas (N = 7) |       |       |       |       |       |      |       |      |      |
| M                                              | 47.93 | 30.79 | 29.43 | 23.00 | 34.64 | 1.56 | 1.28  | 0.62 | 0.72 |
| s                                              | 2.64  | 1.44  | 1.10  | 0.96  | 0.85  | 0.11 | 0.06  | 0.03 | 0.03 |
| max                                            | 52.0  | 33.0  | 31.0  | 24.0  | 35.5  | 1.70 | 1.36  | 0.66 | 0.76 |
| min                                            | 44.5  | 28.5  | 28.5  | 21.0  | 33.5  | 1.42 | 1.21  | 0.55 | 0.67 |
| Peru, Dept. Amazonas, 20 km ENE Balsas (N = 7) |       |       |       |       |       |      |       |      |      |
| M                                              | 49.50 | 30.36 | 28.86 | 22.29 | 35.29 | 1.63 | 1.30  | 0.58 | 0.71 |
| s                                              | 3.04  | 1.77  | 1.44  | 1.19  | 1.70  | 0.09 | 0.02  | 0.02 | 0.02 |
| max                                            | 53.5  | 33.0  | 31.5  | 24.5  | 38.0  | 1.78 | 1.32  | 0.62 | 0.73 |
| min                                            | 45.0  | 27.5  | 27.5  | 21.0  | 33.0  | 1.50 | 1.24  | 0.55 | 0.69 |

Measurements of holotype: shell height 47.5 mm, diameter 30.5 mm, height of aperture 28.0 mm, width 22.0 mm, height of last whorl 34.0 mm; 6.5 whorls.

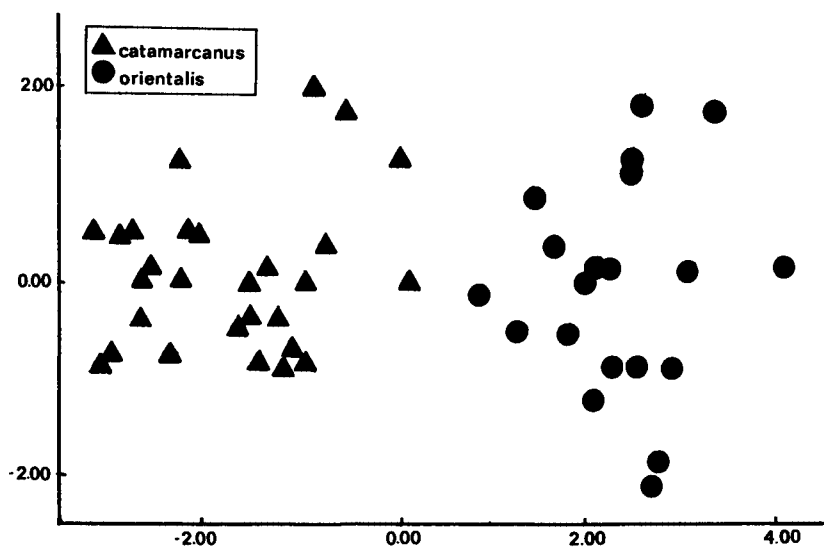


Fig. 364. Principal component analysis of *Neopetraeus catamarcanus catamarcanus* (Pfeiffer) and *N. c. orientalis* ssp.n. The first component explains 79% of the total variation and is principally influenced by the height of the aperture and the height of the last whorl. The second component explains 18% of the total variation and is influenced by the shell height and the number of whorls.



Type material. — Peru, Dept. Amazonas, 18 km ENE Balsas, 1880 m (F. G. Thompson leg., 28-IV-1972). Holotype UF 22779. Paratypes UF 22780/16, RMNH 55209/7, same data. Additional localities: (1) 12 km ENE Balsas, 1600 m (UF 22781/9, RMNH 55211/5); (2) 20 km ENE Balsas, 1850 m (UF 22782/11, RMNH 55210/7).

Comparisons. — Differs from *Neopetraeus c. catamarcanus* (Pfeiffer, 1858) in (1) being larger (height 53.5 vs. 43.5 mm), (2) being smoother, (3) having a colour pattern with more regular axial brown streaks. Principal component analysis of the material of both subspecies is shown in fig. 364.

Etymology. — (L.) *orientalis*, eastern; referring to the distribution of the subspecies, viz., east of the Río Marañón.

### ***Neopetraeus decussatus* (Reeve, 1849)**

The specimen figured by Reeve (1849: fig. 519) has been traced in the British Museum (Natural History) and is here designated lectotype: shell height 38.0 mm, diameter 17.0 mm (BMNH 1975180). There is one paralectotype and the material is labelled 'Andes of Carcamarca [sic], Peru' (ex Cuming).

The type material of the junior synonym *Bulimus myristicus* Reeve, 1849, has also been found in the London museum. The specimen figured by Reeve (1849: fig. 520) is here designated lectotype: shell height 40.5 mm, diameter 17.5 mm (BMNH 1975433; 'Andes of Peru', ex Cuming).

### ***Neopetraeus excoriatus* (Pfeiffer, 1855) (pl. 3 fig. 2)**

This species, incorrectly placed in *Drymaeus* by Pilsbry (1898: 227), is possibly only a synonym of *Neopetraeus c. catamarcanus* (Pfeiffer, 1858). The type material at hand does not allow a definite conclusion.

A lectotype is here designated, shell height 38.5 mm, diameter 24.5 mm (BMNH 1975500), and the species is figured here for the first time. The label reads 'Andes of Peru' (ex Cuming ex Keppell).

### ***Neopetraeus filiulus* (Pilsbry, 1897)**

This species was simply described from 'Peru'. The first exact localities are (all Peru, Dept. Ancash): (1) 6 km NE San Marcos, 2730 m (UF, RMNH); (2) 7 km NE San Marcos, 2720 m (UF/2); (3) 5 km SW Chavin de Huantar, 3300 m (UF/1 juv.).

### ***Neopetraeus lobbii* (Reeve, 1849) (fig. 365)**

The specimen figured by Reeve (1849: fig. 516a-b) is here designated lectotype: shell height 44.5 mm, diameter 19.5 mm (BMNH 1975431). The

material includes two paralectotypes and is labelled 'Banks of Amazon near Balsas, Peru' (ex Cuming).

Genitalia. — Penis with a proximal sheath, slightly swollen above the distal end of the sheath but otherwise more or less subcylindrical and passing without external differentiation into the epiphallus. The flagellum is rather slender, ca.  $1/4$  the length of the phallus; with a distally attached retractor muscle. The vagina is relatively short. The spermathecal duct is subcylindrical, with a globose spermatheca at the distal end.

Material. — Peru, Dept. Cajamarca, 10 km WSW Balsas (RMNH).

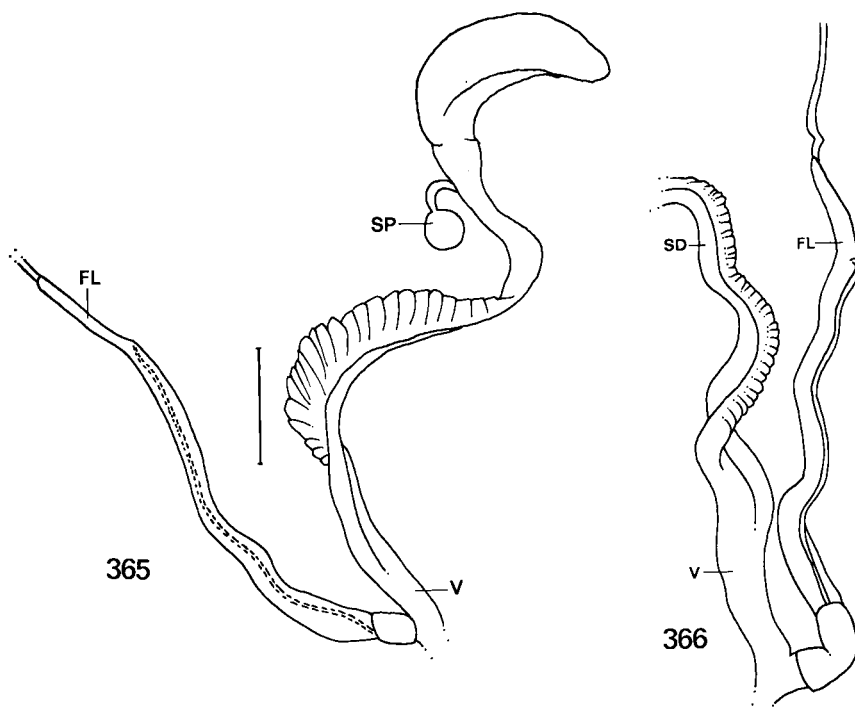


Fig. 365. *Neopetraeus lobbii* (Reeve), genitalia. Peru, Cajamarca, E of Celendín (RMNH). Scale line = 5 mm.

Fig. 366. *Newboldius angiportus* Weyrauch, genitalia. Peru, Junín, 19.5 km WSW San Ramón (SMF). Scale line = 5 mm.

### ***Neopetraeus patasensis* (Pfeiffer, 1858)**

The specimen figured by Pfeiffer (1858: pl. 42 fig. 6) is here designated lectotype: shell height 47.0 mm, diameter 28.0 mm (BMNH 1975439). The material is labelled 'Province of Patas, Andes of Peru' (ex Cuming ex Farris) and includes two paralectotypes.

***Neopetraeus platystomus*** (Pfeiffer, 1858) (pl. 8 figs. 5-6)

The type material is present in the British Museum (Natural History) and one specimen (corresponding to Pfeiffer, 1858: pl. 42 fig. 2) is here designated lectotype: shell height 34.5 mm, diameter 22.0 mm (BMNH 1975428). Two paralectotypes are registered 1975429 and the material is labelled 'Province of Patas, Andes of Peru' (ex Cuming ex Farris).

***Neopetraeus Ptychostylus*** (Pfeiffer, 1858) (pl. 9 fig. 16)

The type specimen of this species, which closely resembles *Neopetraeus lobbii* (Reeve, 1849), was located in the London museum and is here designated lectotype: shell height 47.0 mm (apex lost), diameter 20.5 mm (BMNH 1975430). The label reads 'Province of Patas, Andes of Peru' (ex Cuming ex Farris).

***Neopetraeus tessellatus*** (Shuttleworth, 1852)

The following taxa are now considered subjective junior synonyms, after having compared (type)material and descriptions: (a) *Bulimulus atahualpa* Dohrn, 1863 [syntypes BMNH 1975436/3, labelled 'Huallaga', ex Dohrn]; (b) *Neopetraeus tessellatus perincrassatus* Pilsbry, 1898 [holotype ANSP 72113; type locality: Peru]; (c) *Neopetraeus weyrauchi* Pilsbry, 1944 [holotype ANSP 179980; type locality: Dept. Ancash, Huaráz]; (d) *Neopetraeus cremnobates* 'Pilsbry' H. B. Baker, 1963 [This species was figured by Pilsbry (1949: pl. 3 fig. 9) without verbal description and is, according to ICZN Art. 13, a nomen nudum. H. B. Baker (1963: 227) has given 'a statement that purports to give characters differentiating the taxon' and is thus the author of *cremnobates*. Holotype ANSP 185841a; type locality: hydroelectric plant on Río Santa, near southern edge of Dept. la Libertad, Peru].

New localities for this species are (both Peru, Dept. Ancash): (1) 2 km SW Macará, 2800-2900 m (UF/12, RMNH/4); (2) Río Santa, above Huallanca, Cañon del Pato, 2300-2500 m (IML/15).

***Newboldius angiportus*** Weyrauch, 1960 (figs. 366-371)

The holotype (SMF 162045) has been dissected and proved to be sub-adult.

Genitalia. — Penis with a sheath (ca. 1/7 the length of the phallus), sub-cylindrical and passing without external differentiation into the epiphallus. The flagellum is slightly tapering, about as long as the penis sheath. The rather long retractor muscle is distally inserted. The vagina is relatively long. The spermathecal duct is subcylindrical.

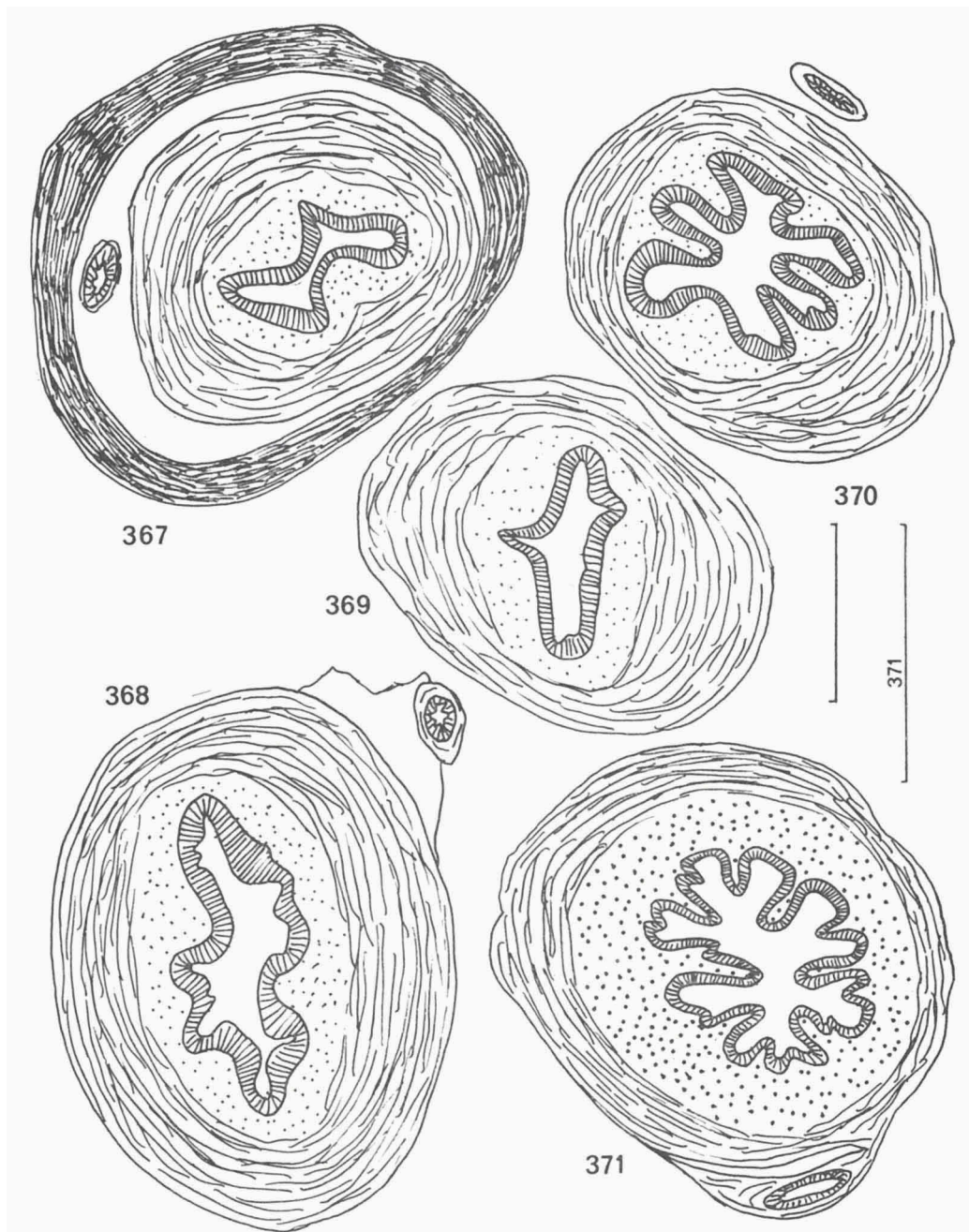


Fig. 367-371. *Newboldius angiportus* Weyrauch. Peru, Junin, 19.5 km WNW San Ramón. Transverse sections of penis (fig. 367-370, slides H 4253, 4258, 4261, 4262) and epiphallus (fig. 371, slide H 4264). Scale line = 0.5 mm.

Histology. Proximal part of the penis with pseudostratified, cylindrical epithelium (cell height ca. 28-60  $\mu\text{m}$ ). The distal part of the penis with a more or less star-shaped lumen which is lined by pseudostratified epithelium (ca. 45  $\mu\text{m}$  high; with relatively small nuclei). The epithelium of the epiphallus is low cylindrical, ca. 20  $\mu\text{m}$  high, with relatively large nuclei.

***Stenostylus meleagris*** (Pfeiffer, 1853) (figs. 372-378; pl. 7 fig. 18)

The type locality of this species is 'Andes of Colombia'. Additional localities are: (1) Peru, Dept. Piura, 23 miles E Canchaque, road to Huancabamba, 9400 feet (UF/1); (2) Peru, Dept. Cajamarca, Hacienda Taulis [6°57' S 79°01' W], 1700-2500 m (SMF/2); (3) Peru, Dept. Cajamarca, Hacienda Udimá [6°49' S 79°06' W], 1700 m (SMF/1).

Measurements (in mm) of the SMF-material:

| H    | D    | HA   | WA   | LW   | W   |
|------|------|------|------|------|-----|
| 27.5 | 13.4 | 17.5 | 9.6  | 24.5 | 4.8 |
| 32.0 | 15.0 | 19.5 | 11.2 | 26.0 | 5.1 |
| 37.0 | 20.0 | 22.5 | 14.5 | 31.5 | 5.3 |

Genitalia. — Penis with a sheath (ca. 1/5 the length of the phallus), more or less subcylindrical in its proximal part, but swollen near the transition to the epiphallus, which is subcylindrical. The flagellum is very short; with a distal retractor muscle.

Histology. Proximal part of the penis with a lobed lumen lined by cubic to cylindrical epithelium (10-30  $\mu\text{m}$  high). The epithelium cells have rather large, basal nuclei and nearly all cells contain secretion granules staining light blue with Alcian Blue. More distally the lumen is irregularly subcircular and the epithelium high cylindrical (ca. 50  $\mu\text{m}$  high), partly secreting Alcian Blue-positive material. At the transition to the epiphallus the lumen is subquadrate. The epithelium is filled with secretion granules staining dark blue with Alcian Blue; these granules probably originate in the subepithelial tissue which is made up by large rounded cells totally filled by these granules. The lumen of the epiphallus is more or less star-shaped and the epithelium is ca. 20  $\mu\text{m}$  high. A few Alcian Blue-positive cells have been observed in the subepithelial tissue. The epithelium of the flagellum is cubic to low cylindrical (8-12  $\mu\text{m}$  high).

***Stenostylus nigrolimbatus*** (Pfeiffer, 1853)

One specimen of the type material in the London museum is designated lectotype: shell height 28.0 mm, diameter 16.0 mm (BMNH 1975549). The material, which includes one paralectotype (1975550), is labelled 'Andes, N. Granada' (ex Cuming).

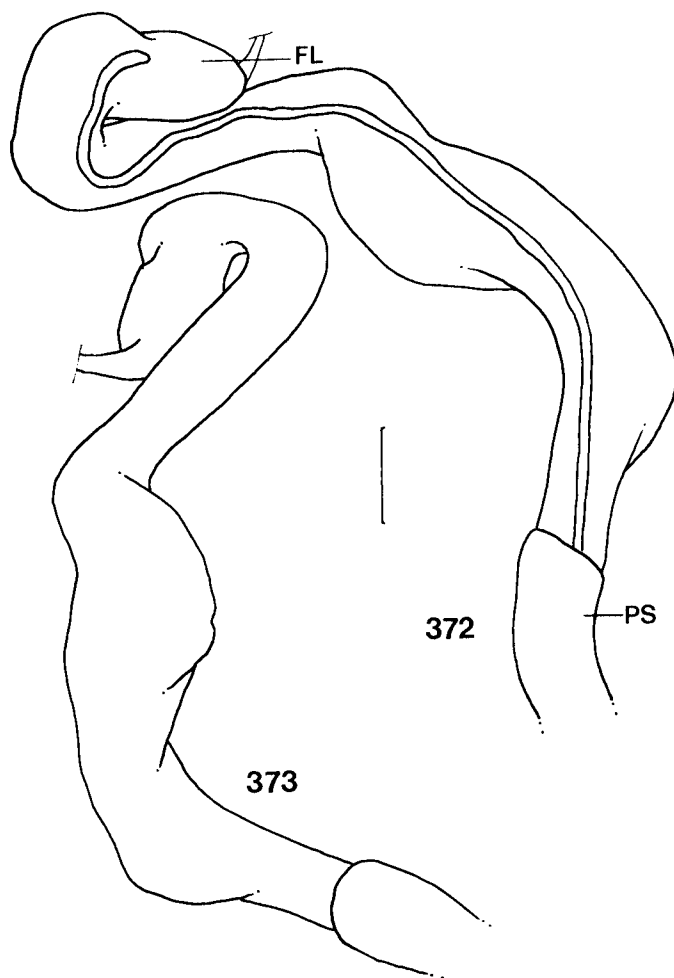


Fig. 372-373. *Stenostylus meleagris* (Pfeiffer), genitalia. Peru, Piura, 23 mi E Chanchaque (UF). Scale line = 1 mm.

***Stenostylus zilchi* Weyrauch, 1956 (figs. 379-384)**

Genitalia. — Penis with a short sheath (ca. 1/11 the length of the phallus), subcylindrical and passing without external differentiation into the epiphallus. The flagellum is subcylindrical, slightly more slender than the epiphallus and ca. 1/4 the length of the phallus. The rather long retractor muscle is distally inserted. The vagina is relatively short. The spermathecal duct is more or less subcylindrical, with an elongate-globose spermatheca at the distal end.

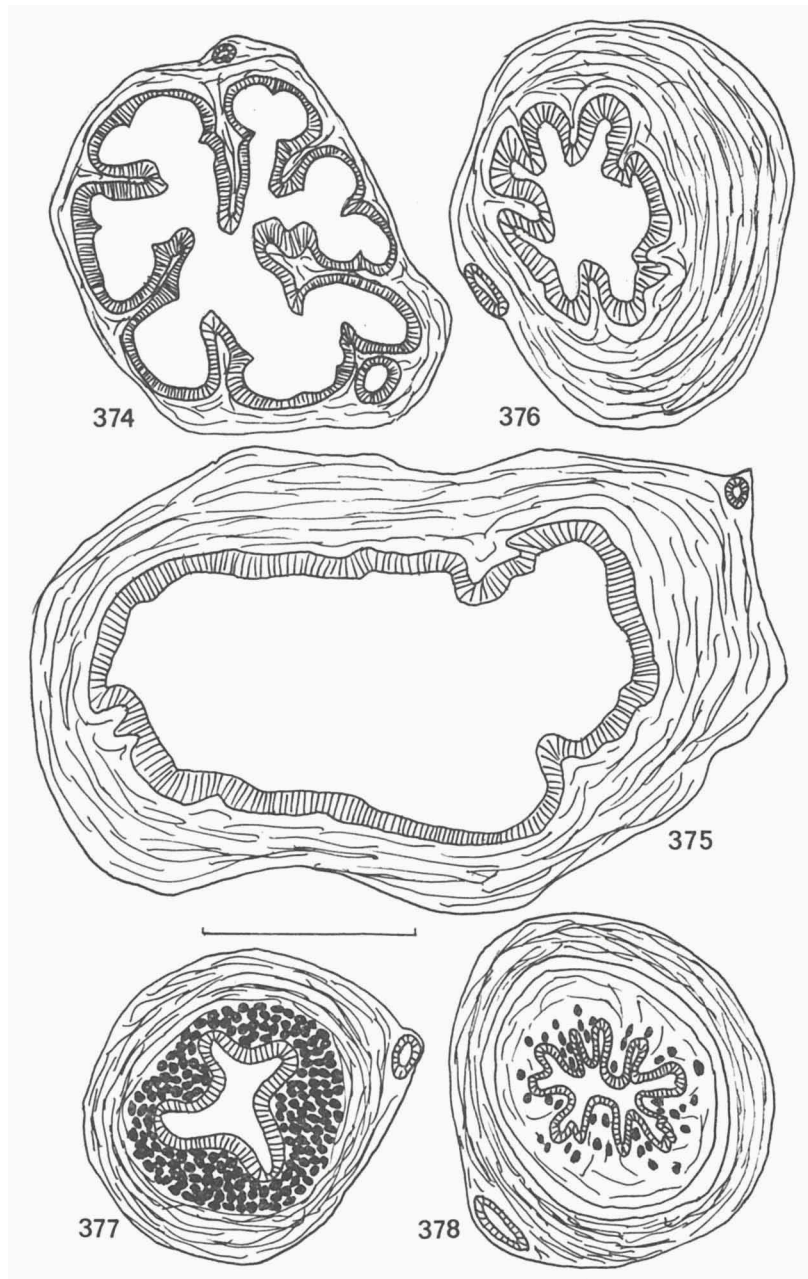


Fig. 374-378. *Stenostylus meleagris* (Pfeiffer). Peru, Piura, 23 mi E Chanchaque. Transverse sections of penis (fig. 374-377, slides H 4902, 4907, 4909, 4910) and epiphallus (fig. 378, slide H 4912). Scale line = 0.5 mm.

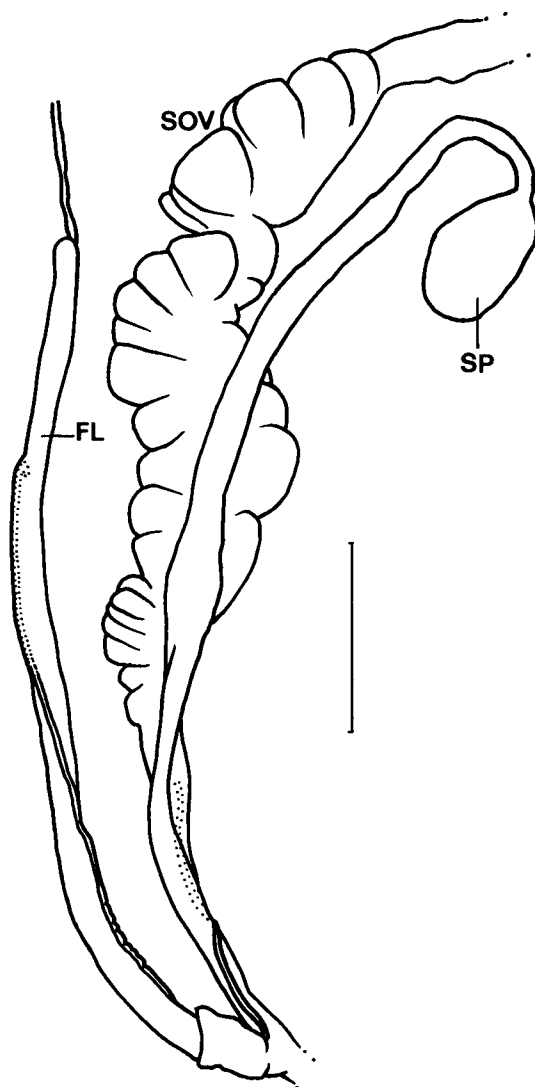


Fig. 379. *Stenostylus zilchi* Weyrauch, genitalia. Peru, Lima, Zárate (SMF). Scale line = 1 cm.

Histology. Proximal part of the penis with a rather wide lumen, which is lined by pseudostratified high cylindrical epithelium (cell height ca.  $55\ \mu\text{m}$ ). At the transition to the distal part the lumen is narrow and more or less C-shaped. The distal part of the penis with pseudostratified epithelium, which is ca.  $40\ \mu\text{m}$  high. The apical part of the epithelium cells is filled with small



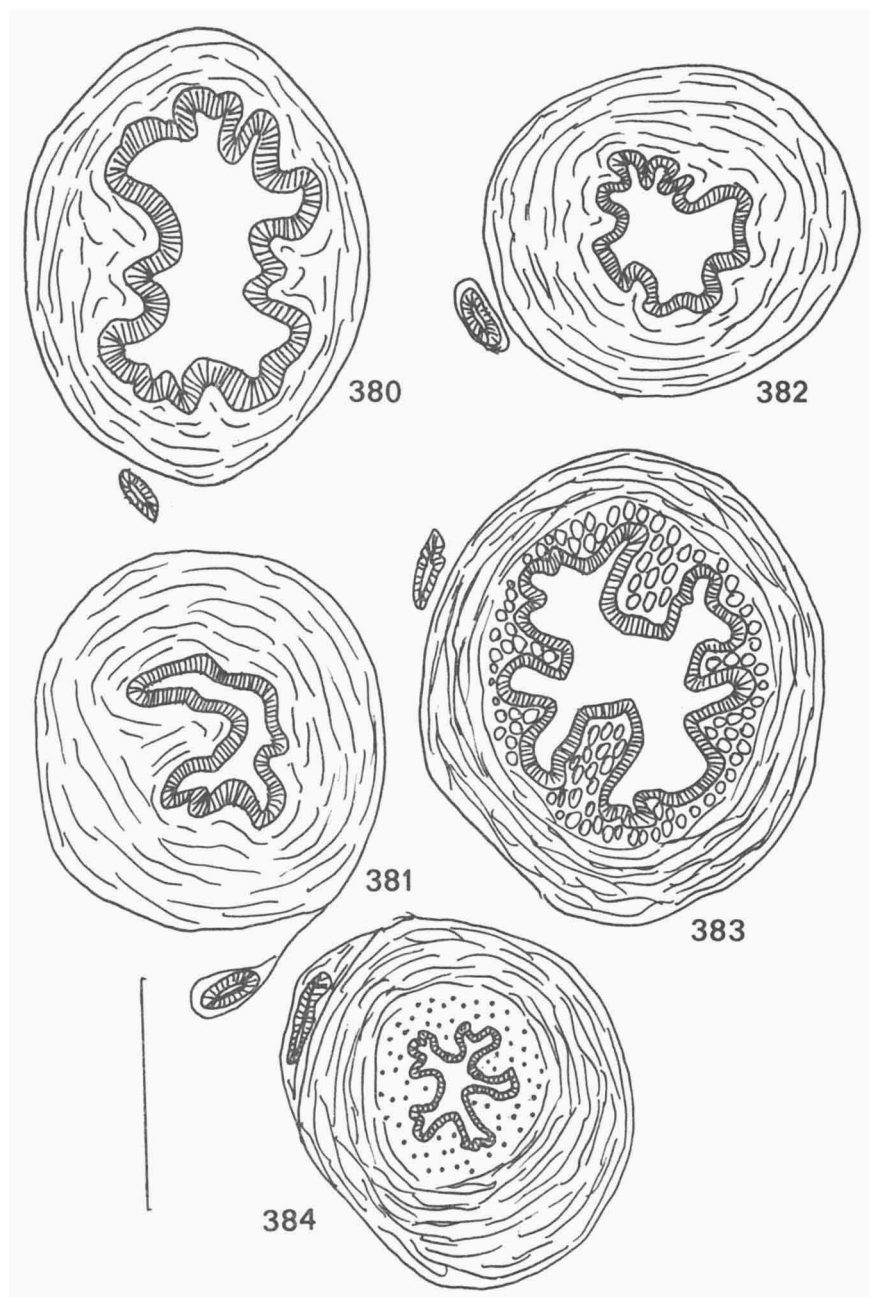


Fig. 380-384. *Stenostylus zilchi* Weyrauch. Peru, Lima, Zárate. Transverse sections of penis (fig. 380-383, slides H 4335, 4345, 4350, 4354) and epiphallus (fig. 384, slide H 4358). Scale line = 1 mm.

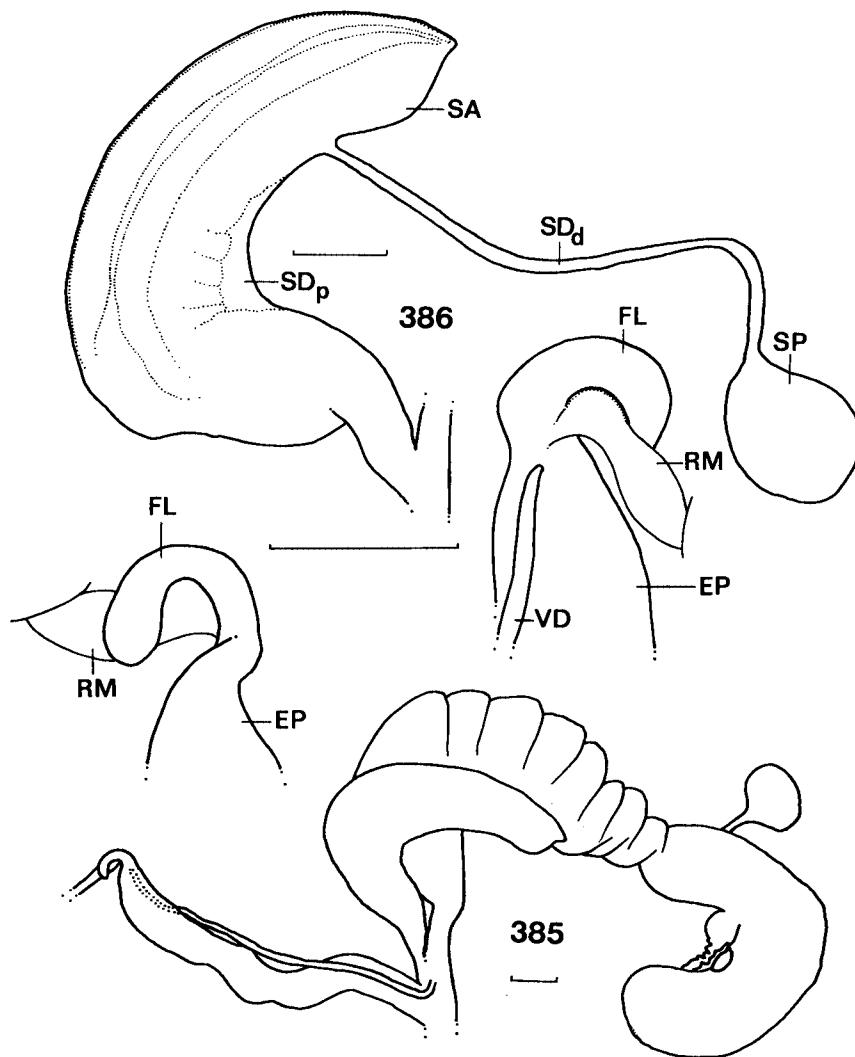


Fig. 385-386. *Leiostracus (Leiostracus) cinnamomeolineatus* (Moricand), genitalia. Brazil, Espírito Santo, Baixo Guandú (RMNH). SA, spermathecal appendix; SD<sub>d</sub>, distal part of spermathecal duct; SD<sub>p</sub>, proximal part of spermathecal duct. Scale line = 1 mm.

secretion granules staining light blue with Alcian Blue. The subepithelial tissue is largely made up by rounded cells.

Material. — Peru, Dept. Lima, Río Bartolomé (affluent Río Rimac), Zárate (SMF/1).

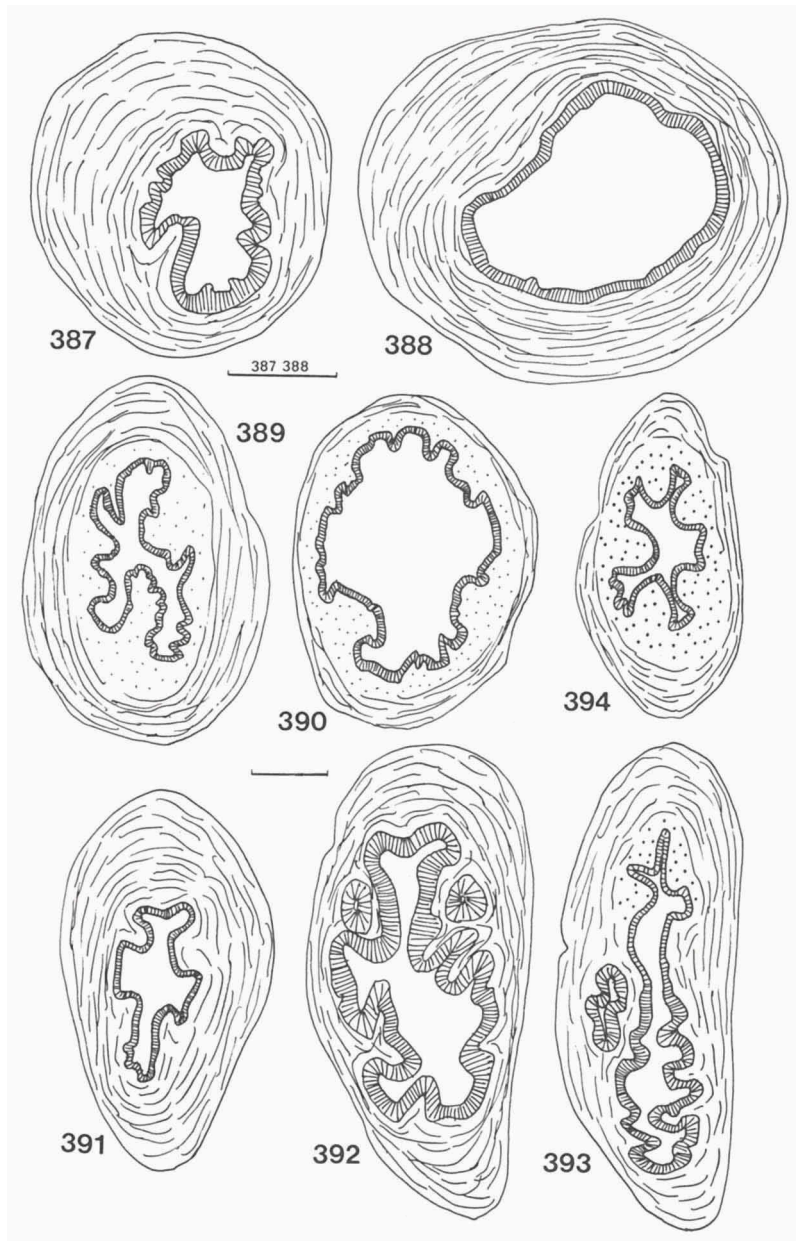


Fig. 387-394. *Leiostracus* (*Leiostracus*) *cinnamomeolineatus* (Moricand). Brazil, Espírito Santo, Baixo Guandú. Transverse sections of penis (fig. 387-393, slides H 3535, 3537, 3538, 3539, 3541, 3542, 3543) and epiphallus (fig. 393-394, slides H 3543, 3544). Scale line = 0.2 mm.

***Leiostracus (Leiostracus) cinnamomeolineatus*** (Moricand, 1841)  
(figs. 385-394)

Genitalia. — Penis without a sheath, subcylindrical and passing without external differentiation into the epiphallus. The flagellum is very short and slender. The retractor muscle is inserted at the transition between epiphallus and flagellum. The vagina is relatively short. The proximal part of the spermathecal duct is swollen, with a triangular-globose spermathecal appendix; the distal part of the duct is long and narrow. The spermatheca is globose.

Histology. Proximal part of the penis with high cylindrical epithelium (cell height ca. 35  $\mu\text{m}$ ). The lumen is subcircular to lobed. More distally the epithelium is low cylindrical (ca. 15-20  $\mu\text{m}$ ), with elongate nuclei (up to 8  $\mu\text{m}$  long). The distal part of the penis with a ca. 20-28  $\mu\text{m}$  high epithelium, staining purple with Alcian Blue. The epiphallus intrudes the distal part of the penis.

Material. — Brazil, State Espírito Santo, Baixo Guandú (RMNH).

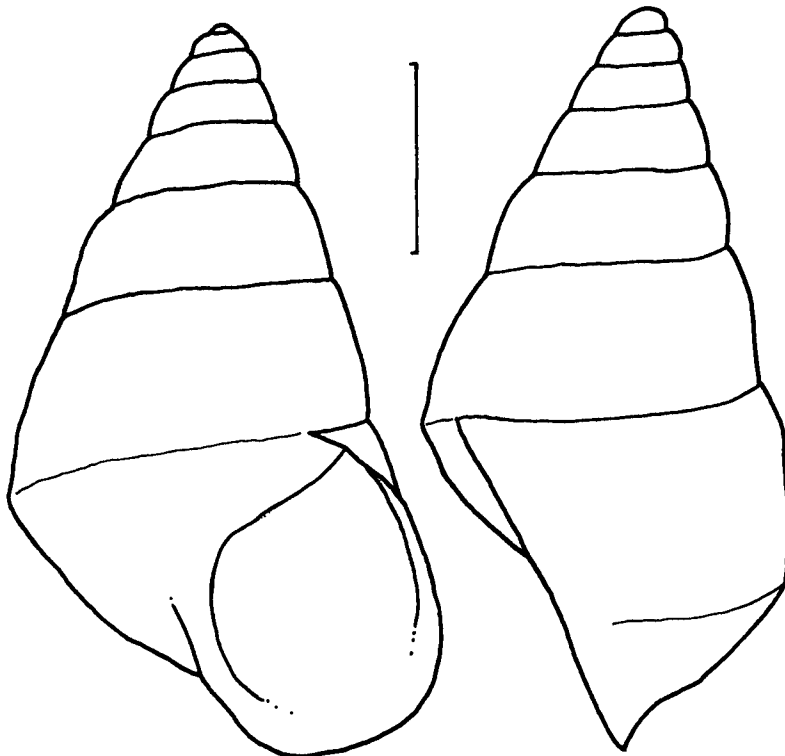


Fig. 395. *Leiostracus (Leiostracus) goniotropis* (Ancey). Brazil, Espírito Santo (IRSN).  
Scale line = 5 mm.

***Leiostracus (Leiostracus) clouei* (Pfeiffer, 1857)**

One of the type specimens in the London museum is here designated lectotype: shell height 22.5 mm, diameter 11.3 mm (BMNH 1975491). The material, which also comprises one paralectotype, is labelled 'Brazils' (ex Cuming ex Cloué).

***Leiostracus (Leiostracus) demerarensis* (Pfeiffer, 1861)**

The type specimen of this species has been found in the collection of the London museum (shell height 20.5 mm, diameter 11.0 mm; BMNH 1975501). It is labelled 'Demerara' (ex Cuming). *Drymaeus (Leiostracus) ruthveni* H. B. Baker, 1926, is now considered a junior subjective synonym of *Bulimus demerarensis* Pfeiffer, 1861.

***Leiostracus (Leiostracus) goniotropis* (Ancey, 1904) (fig. 395)**

A specimen in the Brussels museum is considered a syntype. Its measurements are: shell height 20.0 mm, diameter 11.4 mm, height of aperture 8.5 mm, width 6.8 mm, height of last whorl 12.9 mm; 6.6 whorls. The specimen is labelled 'Espírito Santo, Brésil' (ex Ancey ex Géret). The species is here figured for the first time.

***Leiostracus (Leiostracus) obliquus* (Reeve, 1849)**

The specimen figured by Reeve (1849: fig. 551) is designated lectotype: shell height 23.0 mm, diameter 12.1 mm (BMNH 1975493); it is labelled 'Brazil' (ex Cuming).

Two specimens of the colourform *poecilogramma* Ancey [syn.n.] give the first exact localities for this species: Brazil, State Espírito Santo, Baixo Guandú (RMNH/1) and Itaguassú (RMNH/1).

***Leiostracus (Leiostracus) sarcochilus* (Pfeiffer, 1857) (figs. 396-402)**

The type specimens of this species have been located in the London museum and one of them is designated lectotype: shell height 25.0 mm, diameter 13.2 mm (BMNH 1975398). The material, which also comprises one paralectotype, is labelled 'North of Brazils' (ex Cuming ex Miers).

The following redescription is mainly based on the ZSBS- and MNHN-material (see below), which is tentatively referred to this species.

Redescription. — Shell up to 27.0 mm, 1.88 times as long as wide, narrowly perforate, with straight sides, elongate, rather thin. Colour uniformly white to tawny. Surface shining, nearly smooth (only traces of spiral lines observed). Protoconch with numerous fine spiral lines; very delicate axial

wrinkles on the upper part of whorl. Whorls 7.4, nearly flat, the last whorl rather convex and keeled; suture hardly impressed. Aperture broadly ovate, skewed, 1.26 times as long as wide, 0.39 times the total length. Peristome expanded. Columellar margin reflexed, triangularly dilated above.

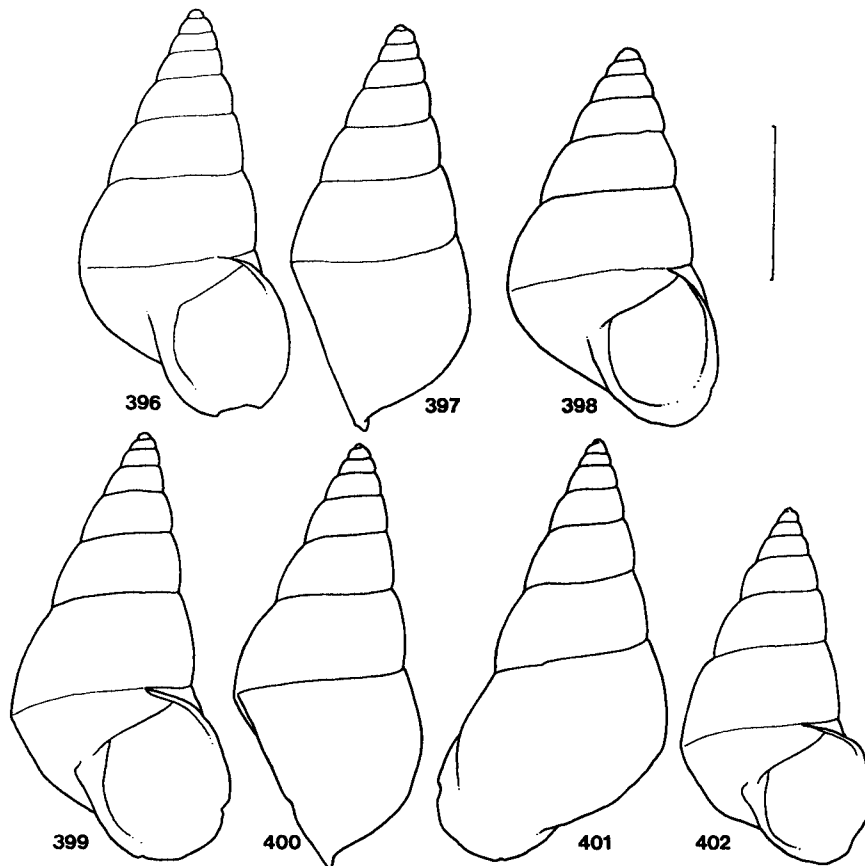


Fig. 396-402. *Leiostracus* (*Leiostracus*) *sarcohilus* (Pfeiffer). Lectotype (fig. 396-397, BMNH); fig. 398: Brazil (IRSN); fig. 399-401: Brazil, Espirito Santo, Colonia Santa Izabel near Victoria (ZSBS); fig. 402: Rio de Janeiro (MNHN). Scale line = 1 cm.

Measurements (in mm):

| H    | D    | HA   | WA  | LW   | W   |                 |
|------|------|------|-----|------|-----|-----------------|
| 27.0 | 13.9 | 10.4 | 7.8 | 17.5 | 7.3 | ZSBS            |
| 26.5 | 13.7 | 9.9  | 7.6 | 17.0 | 7.4 | do.             |
| 23.5 | 12.8 | 9.3  | 7.8 | 14.5 | 0   | MNHN            |
| 21.5 | 11.9 | 8.9  | 7.2 | 13.2 | 6.7 | IRSN            |
| 25.0 | 13.2 | 9.9  | 8.0 | 14.6 | 7.3 | BMNH, lectotype |

The first exact locality for this species is: Brazil, State Espírito Santo, Colonia Santa Izabel, near Victoria, Braço do Sul (ZSBS/2). The material from the Paris and Brussels museums is labelled 'Rio de Janeiro' and 'Brésil', respectively.

Genitalia (MNHN-material). — Penis without a sheath, more or less subcylindrical and passing without external differentiation into the epi-

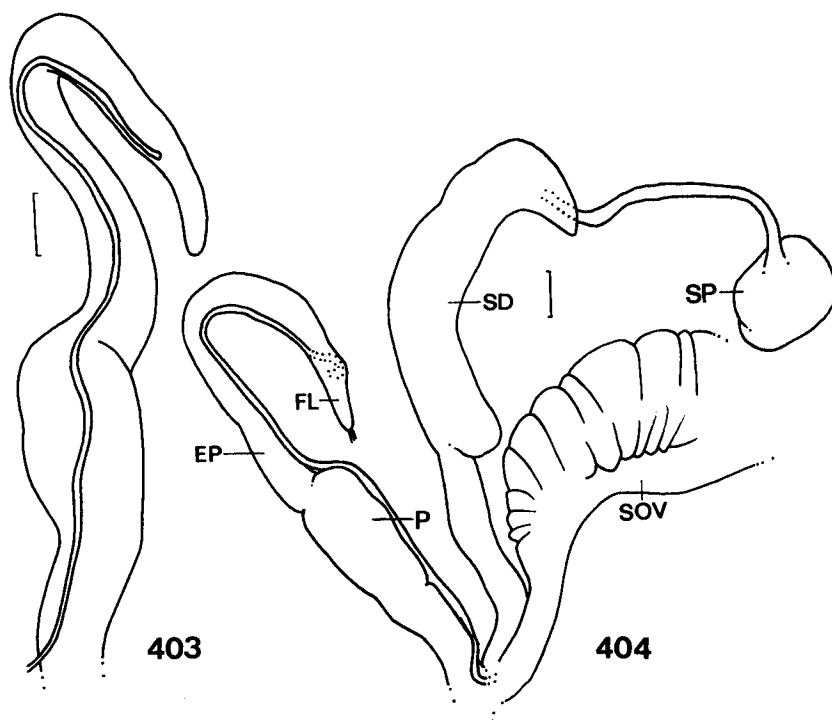


Fig. 403-404. *Rhinus ciliatus* (Gould), genitalia. Brazil, Rio de Janeiro (MNHN). Scale line = 1 mm.

phallus, which is slightly tapering distally. The flagellum is very short; no retractor muscle could be observed. The vagina is relatively long. The spermathecal duct is more or less subcylindrical, its median part slightly swollen and the distal part very narrow; the spermatheca is elongate-globose.

***Leiostracus (Leiostracus) vimineus* (Moricand, 1833)**

This species has been described from Brazil, State of Bahia. The first exact locality within that state is: Itamaraju, Fazenda Panbrasil (RMNH/3).

**Leiostracus (Pseudozychona) pileiformis** (Moricand, 1836)

Four syntypes of this species are in the Geneva museum. Dr. Gittenberger made the following notes on this material: shell rimate, with straight sides; surface with numerous spiral striae; protoconch with numerous spiral lines (ca. 30 on last whorl) and axial riblets (ca. three times as strong as the spiral lines), the interstices being three times the width of the riblets; last whorl distinctly keeled.

Measurements (in mm):

| H    | D    | W  |
|------|------|----|
| 21.6 | 14.9 | 7¼ |
| 19.8 | 13.3 | 7¼ |
| 18.2 | 12.5 | 7  |
| 18.4 | 12.7 | 7  |

**Rhinus argentinus** (Ancey, 1901) (pl. 11 fig. 12)

Type specimens of this species are preserved in the collection of the Brussels museum and are considered syntypes. The species is now figured for the first time.

**Rhinus ciliatus** (Gould, 1846) (figs. 403-410)

Three specimens of this species were collected by Gaudichaud in 1838 at 'Rio de Janeiro'. This material, which is preserved in the Paris museum, gives me the opportunity to describe the anatomy of this species.

Genitalia. — Genital atrium very short. Penis without sheath and club-shaped. The epiphallus is as long as and half as broad as the distal part of the penis, subcylindrical and slightly swollen towards the transition to the flagellum. The flagellum is short (ca. 1/3 the length of the epiphallus) and tapering toward the distal end, where the short retractor muscle is inserted. The vagina is very short. The median part of the spermathecal duct is twice as broad as the proximal part. The distal part of this duct, which bears the ovoid spermatheca, is relatively narrow and originates below the distal end of the median part, which thus possesses a spermathecal appendix (cf. Breure, 1975b: 100).

Histology. Proximal part of the penis with a narrow lumen lined by epithelium of ca. 28 µm high. In between the epithelium cells inclusion-like structures have been observed, which are made up of Alcian Blue-positive material. More distally the epithelium is up to 65 µm high (pseudostratified?), with subbasal nuclei. The epiphallus, which intrudes the distal part of the penis, has an epithelium of ca. 30 µm high.



Remarks. — *Rhinus* Albers, 1860, was hitherto considered a subgenus of *Bulimulus* Leach, 1814. Assuming that the above-mentioned anatomical data are characteristic for this group, it seems justified to give *Rhinus* generic rank on account of the differences with *Bulimulus* (s.str.) species.

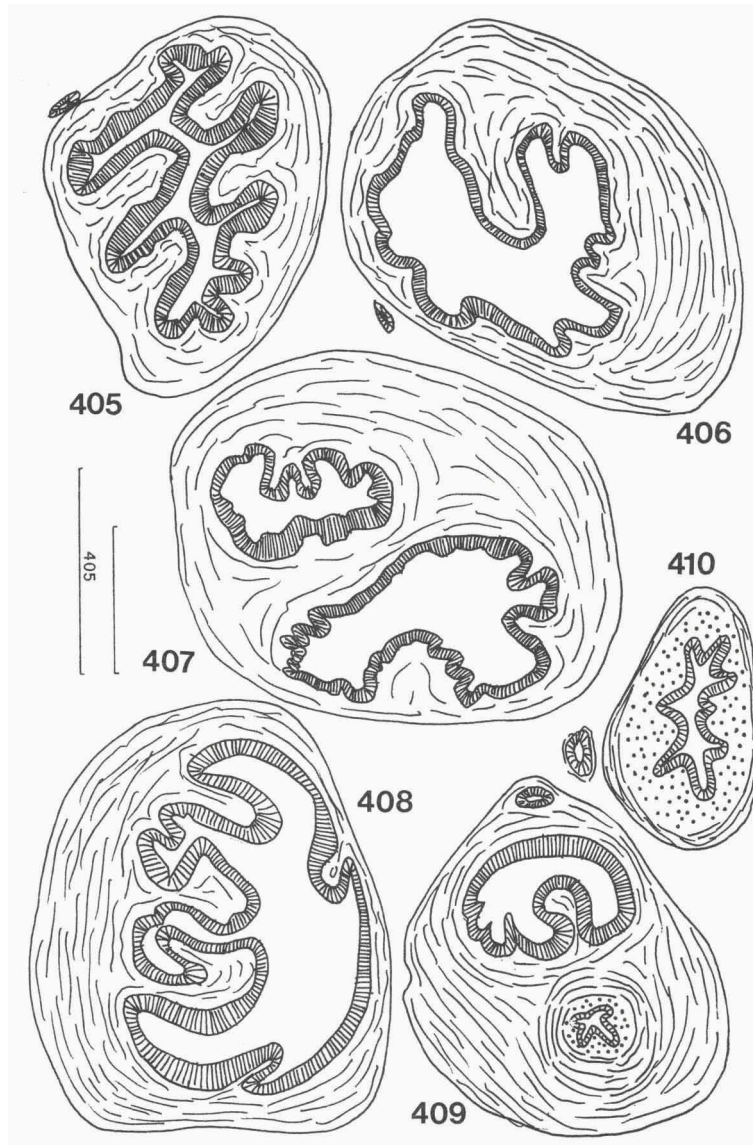


Fig. 405-410. *Rhinus ciliatus* (Gould). Brazil, Rio de Janeiro. Transverse sections of penis (fig. 405-409, slides H 4372, 4373 (2x), 4374, 4375) and epiphallus (fig. 409-410, slides H 4375, 4376). Scale line = 0.5 mm.

**Rhinus constrictus** (Pfeiffer, 1841)

A new synonym for this species is *Bulimus hyaloideus* Pfeiffer, 1855, of which I have examined the type material in the British Museum (Natural History). A lectotype of *hyaloideus* is here designated: shell height 20.5 mm, diameter 11.3 mm (BMNH 1975412); labelled 'Mendez, Andes of Granada [Colombia]' (ex Cuming). There is one paralectotype. The measurements as given by Pfeiffer in the original publication appear to be incorrect, but the material is from the type locality and is accompanied by Pfeiffer's original label.

In addition to the localities mentioned by Breure (1974: 51) *Rhinus constrictus* may now also be recorded from Venezuela, Estado Aragua, 5 km N Barbacoas, on damp forest floor. Ten specimens were collected in 1954 by C. Beets and have been deposited in the Leiden museum.

**Rhinus ovulum** (Reeve, 1849)

The specimen figured by Reeve (1849: fig. 556) is here designated lectotype: shell height 20.0 mm, diameter 12.5 mm (BMNH 1975416). Two paralectotypes are registered 1975417 and the material is labelled 'Pernambuco' [Brazil] (ex Cuming).

**Simpulopsis (Simpulopsis) decussata** (Pfeiffer, 1856)

The type specimen has been found in the London museum and measures: shell height 14.3 mm, diameter 12.5 mm (BMNH 1975488). The material is labelled 'Petropolis Rio' (ex Cuming ex Miers).

Like in *Simpulopsis (S.) sulculosa* (Férussac) the surface of *S. (S.) decussata* has 'numerous revolving dull and lustreless bands about as broad as the glossy intervals' (Pilsbry, 1899: 214).

**Simpulopsis (Simpulopsis) rufovirens** (Moricand, 1846)

The type specimen of *Vitrina salomonina* Pfeiffer, 1853 (figured by Pfeiffer, 1854: pl. 6 figs. 17-19 [in Küster & Pfeiffer, 1840-1865]) has been found in the London museum and is designated lectotype: shell height 11.7 mm, diameter 10.7 mm (BMNH 1975485). The material is labelled 'Salomons Isls' (ex Cuming). Pilsbry (1899: 226) already writes: 'Has the appearance of a Brazilian shell, and possibly the locality is erroneous'. The specimen corresponds to the description and figures of *Simpulopsis (S.) rufovirens* (Moricand) and *Vitrina salomonina* is now placed in its synonymy.

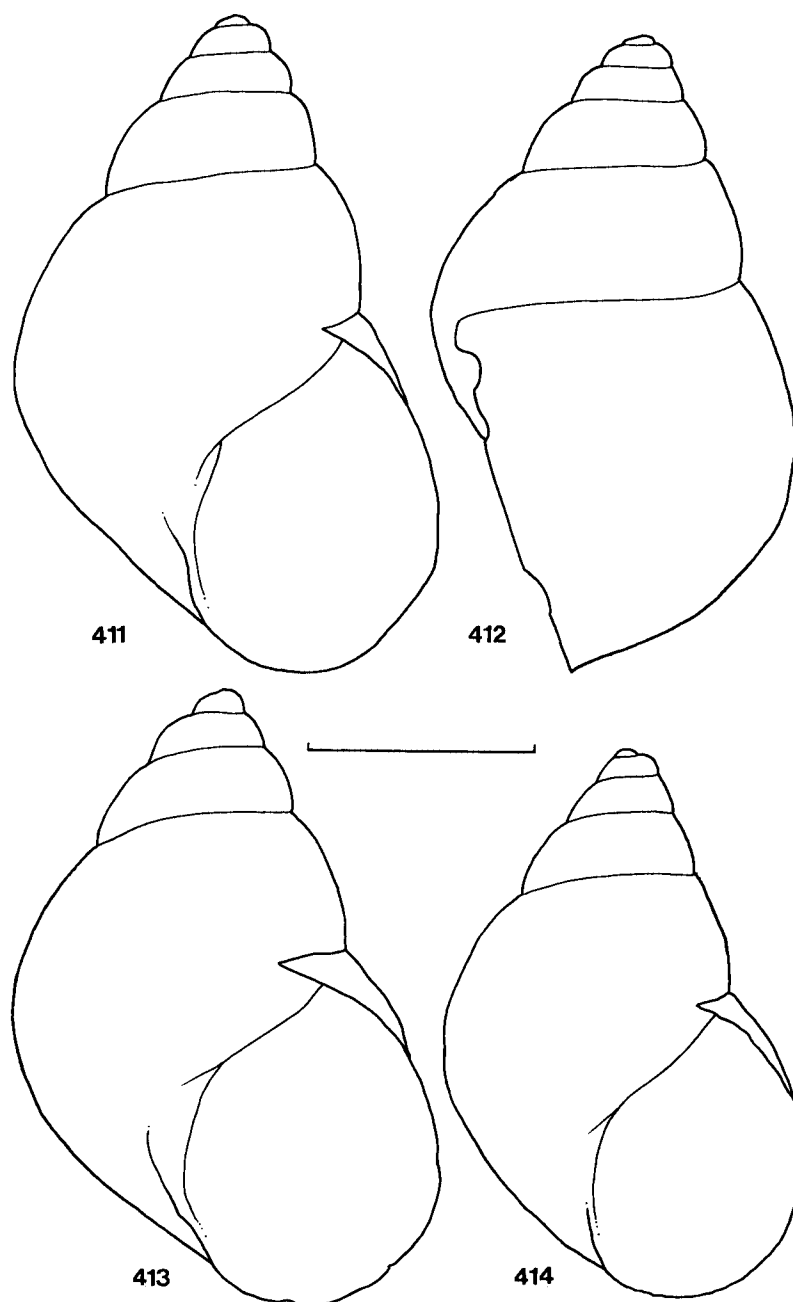


Fig. 411-414. *Simpulopsis* (*Eudiotus*) *citrinovitrea* (Moricand). Fig. 411-412: Ecuador, Pichincha, 59 km W Machachi (RMNH); fig. 413-414: Colombia, Valle, 3 km W Atuncelo (UF, RMNH). Scale line = 5 mm.

***Simpulopsis (Eudioptus) citrinovitrea*** (Moricand, 1836) (figs. 411-415)

The species, described from Brazil, State of Bahia, near Salvador, was collected by me in Ecuador, Prov. Pichincha, 59 km W Machachi at 1250 m elevation on leaves in a cloud forest (RMNH/1). Afterwards I found the species in material from Colombia, Dept. Valle, 3 km W Atuncelo, 1500 m (F. G. Thompson leg., UF/2, RMNH/1) and Dept. Cauca, Quilichao (IRSN/1). An additional specimen in the Brussels museum is from 'Nlle Grenade'. The specimens in the IRSN-collection were identified as *Bulimulus marmatensis* (Pfeiffer) and *Drymaeus (Stenostylus) guttula* (Pfeiffer), respectively.

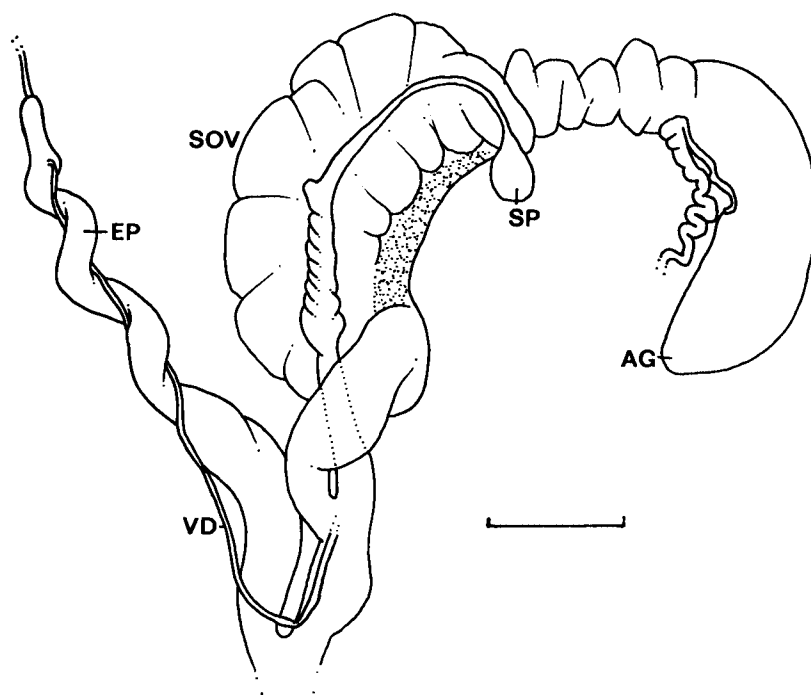


Fig. 415. *Simpulopsis (Eudioptus) citrinovitrea* (Moricand), genitalia. Ecuador, Pichincha, 59 km W Machachi (RMNH). Scale line = 2 mm.

Careful comparison of this material with data from the literature (Araujo, 1971) could not bring to light any significant differences regarding the shell and genitalia (figs. 411-415) or radula (Breure & Ploeger, 1977: figs. 12-15).

## Measurements (in mm):

| H    | D    | HA  | WA  | LW   | W   |                  |
|------|------|-----|-----|------|-----|------------------|
| 16.8 | 11.8 | 9.2 | 7.0 | 13.3 | 3+  | UF, Colombia     |
| 0    | 9.5  | 7.0 | 5.5 | 10.0 | 0   | do.              |
| 15.0 | 9.8  | 8.0 | 5.8 | 11.5 | 4.8 | RMNH, Colombia   |
| 17.7 | 11.7 | 9.3 | 6.9 | 13.6 | 5.3 | RMNH, Ecuador    |
| 15.0 | 10.2 | 7.9 | 6.0 | 11.3 | 4.7 | IRSN, Cauca      |
| 14.1 | 9.6  | 7.4 | 5.4 | 11.0 | 4.6 | IRSN, N. Grenada |

Weyrauch (1967b: 485 ff.) described a species from N- and C-Peru, *Pseudoglandina agitata*, which he did not know to place in a certain family. He ascribed carnivorous habits to the species on account of a note from the collector ('when you catch one, they do not withdraw in their shells, but try to frighten, turning themselves around in your hand and finally bite you gently...'). The fact that snails do not withdraw in their shells when you collect them is not uncommon (according to my own experience) and to relate this phenomenon to a carnivorous habit seems not entirely to be justified. Although I do not have material for anatomical studies to prove my point of view, I am convinced that *Pseudoglandina agitata* Weyrauch, 1967, is a junior subjective synonym of *Simpulopsis* (*Eudioptus*) *citrinovitrea* (Moricand, 1836), after having compared a paratype of *Pseudoglandina agitata* with data from the literature and specimens of *Simpulopsis citrinovitrea* in the collection of the Leiden museum. *Pseudoglandina* Weyrauch, 1967, is then a synonym of *Eudioptus* Albers, 1860.

The distribution of this species is thus remarkably disjunct: S- and NE-Brazil, SW-Colombia, C-Ecuador, N- and C-Peru.

***Simpulopsis* (*Eudioptus*) *pseudosuccinea*** (Moricand, 1836)  
(figs. 416-417)

Five specimens in the Paris museum are probably syntypes; they are labelled 'Donné par M. Moricand, 1836'.

## Measurements (in mm):

| H    | D    | HA   | WA  | LW   | W   |
|------|------|------|-----|------|-----|
| 22.7 | 10.4 | 12.1 | 6.8 | 17.4 | 5.2 |
| 21.1 | 10.1 | 11.3 | 6.3 | 16.5 | 4.9 |

†*Itaborahia* Maury, 1935

This genus has been considered hitherto a subgenus of *Bulimulus* Leach, 1814 (Zilch, 1960: 485) or a synonym of that genus (Brito, 1967; Palma & Brito, 1974). The structure of the protoconch (fig. 421) shows that this

classification is incorrect. The shape of the shells is also totally unlike that of *Bulimulus* species.

Type species by original designation: *Itaborahia lamegoi* Maury, 1935.

Distribution. — Brazil, State of Rio de Janeiro, Itaboraí, Fazenda São José, fossil beds (probably Miocene).

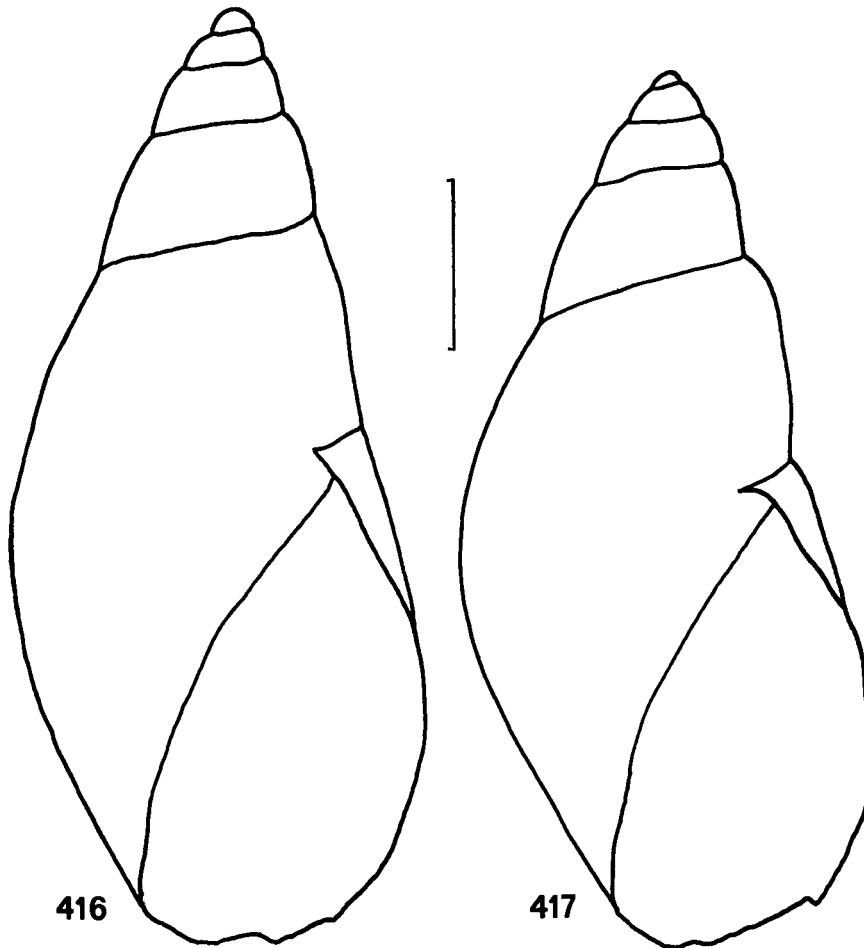


Fig. 416-417. *Simpulopsis* (*Eudiotus*) *pseudosuccinea* (Moricand). (MNHN). Scale line = 5 mm.

†***Itaborahia fazendicus*** (Maury, 1935) (figs. 418-420)

The material of the MN- and DGM-collections has been restudied. I disagree with Trindade (1956), Brito (1967) and Palma & Brito (1974), who

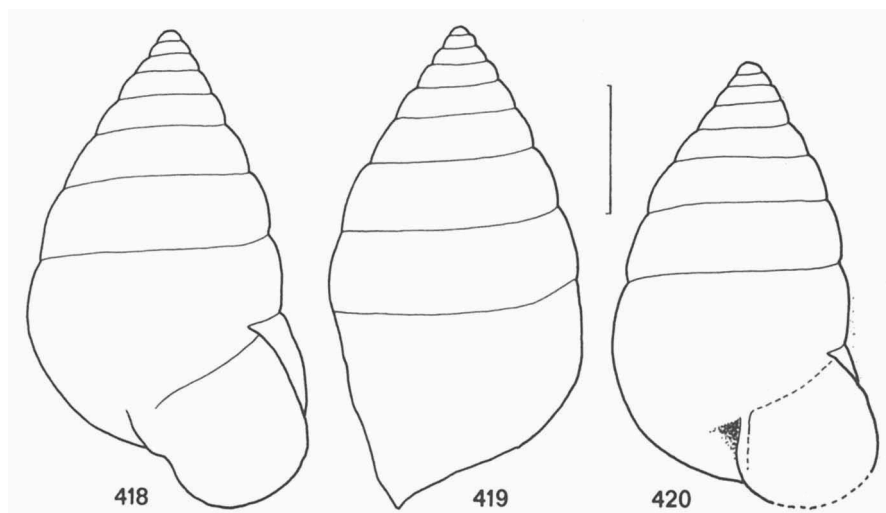


Fig. 418-420. †*Itaborahia fazendicus* (Maury). Brazil, Rio de Janeiro, São José de Itaboraí (DGM). Scale line = 5 mm.

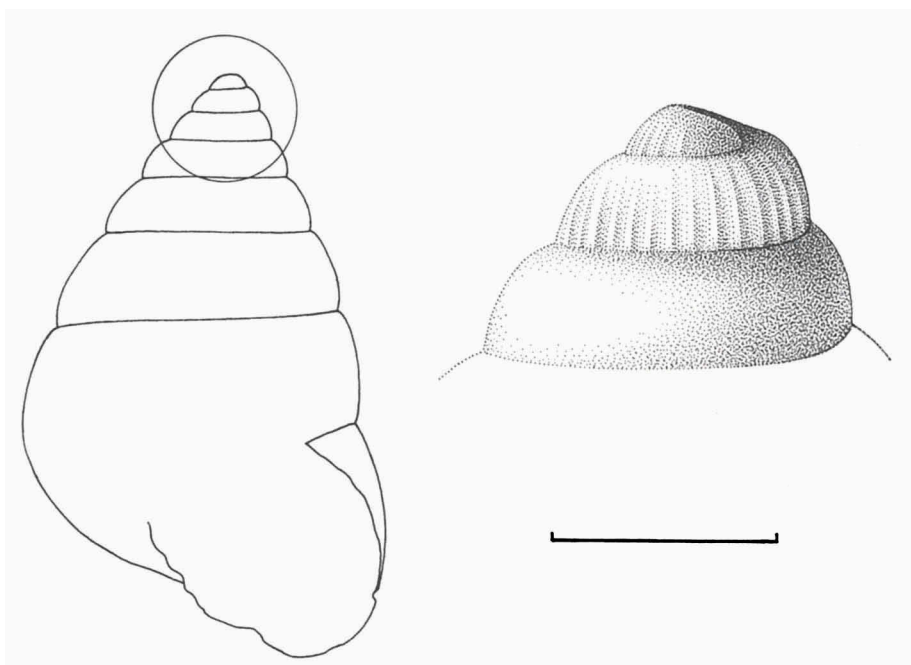


Fig. 421. †*Itaborahia ferreirai* (Palma & Brito). Brazil, Rio de Janeiro, São José de Itaboraí (DGM 4993). Scale line = 5 mm. H. Heijn del.

placed this species in *Bulimulus*, and consider this taxon a member of *Itaborahia* Maury, 1935.

Measurements (in mm) and statistics of characters and ratios (N=5):

|     | H     | D     | HA   | WA   | LW   | H/D  | HA/WA | HA/H | LW/H |
|-----|-------|-------|------|------|------|------|-------|------|------|
| M   | 17.70 | 10.52 | 5.90 | 5.17 | 9.68 | 1.69 | 1.17  | 0.34 | 0.55 |
| s   | 1.04  | 0.76  | 0.74 | 0.55 | 0.51 | 0.06 | 0.03  | 0.03 | 0.02 |
| max | 18.5  | 11.3  | 7.0  | 5.8  | 10.4 | 1.78 | 1.21  | 0.38 | 0.57 |
| min | 16.0  | 9.6   | 5.4  | 4.8  | 9.1  | 1.64 | 1.15  | 0.30 | 0.53 |

†*Itaborahia ferreirai* (Palma & Brito, 1974) (fig. 421)

The type material and three additional specimens (DGM 4993) have been studied. The sculpture of the protoconch shows that this species belongs to *Itaborahia* Maury, 1935.

Measurements (in mm):

| H    | D   | HA  | WA  | LW  | W            |
|------|-----|-----|-----|-----|--------------|
| 12.3 | 8.1 | 4.1 | 4.1 | 6.8 | 7.0 DGM 4993 |
| 11.1 | 7.1 | 0   | 0   | 6.2 | 6.5 do.      |
| 12.0 | 7.3 | 0   | 0   | 6.3 | 6.7 do.      |

#### APPENDIX

The radula of 121 taxa has been studied with the Scanning Electron Microscope (SEM). A Cambridge II-SEM was used and the photographs were taken by Mr. S. Ploeger and the author (the method of preparation has been described by Ploeger & Breure, 1977), with the expert assistance of Messrs. W. C. Laurijssen and F. van Sandijk.

Most species are treated more extensively in this paper, except those of *Naesiotus* (see Breure & Coppo, 1978) and *Drymaeus* (a paper on this genus is in preparation).

The structure of the species studied is presented in Table 3, using the following abbreviations:

Central teeth.

C-1 — The teeth are tricuspid, with acute lanceolate to wedge-shaped mesocones and ovate to deltoid ectocones, which are clearly differentiated and  $1/3-1/2$  the length of the mesocones.

C-2 — The teeth are tricuspid, with ovate to conical mesocones and ovate to deltoid ectocones, which are hardly differentiated and  $1/3-1/2$  the length of the mesocones.



TABLE 3. Survey of radula structure in Bulimulinae (exclusive of *Drymaeus*).

| Species                                         | Components                                | Formula                |
|-------------------------------------------------|-------------------------------------------|------------------------|
| <i>Auris bilabiata</i>                          | C-4, LM-6(16), LM-7(14)                   | C/3 + LM 30/2          |
| <i>Auris illicocota</i>                         | C-4, LM-6(20), LM-7(12)                   | C/3 + LM 32/2          |
| <i>Plekocheilus (Eurytus) ampullaroides</i>     | C-6, L-3(6), LM-10(16), LM-11(42)         | C/1 + L 6/1 + M 58/2   |
| <i>Plekocheilus (Eudolichotis) aurissacuri</i>  | C-6, L-3(1), LM-10(15), LM-11(x)          | C/1 + L 1/1 + M 15+x/2 |
| <i>Plekocheilus (F.) aurissilent</i>            | C-6, L-3(1), LM-10(38), LM-11(12)         | C/1 + L 1/1 + M 50/2   |
| <i>Plekocheilus (Aeropiatus) calliostomus</i>   | C-6, L-3(1), LM-10(6), LM-11(99)          | C/1 + L 1/1 + M 106/2  |
| <i>Plekocheilus (Aeropiatus) delicatus</i>      | C-6, L-3(2), LM-10(8), LM-11(62)          | C/1 + L 2/1 + M 70/2   |
| <i>Plekocheilus (Aeropiatus) dissimulans</i>    | C-6, L-3(2), LM-10(16), LM-11(57)         | C/1 + L 2/1 + M 73/2   |
| <i>Plekocheilus (Eudolichotis) distortus</i>    | C-6, L-3(1), LM-10(15), LM-11(23)         | C/1 + L 1/1 + M 38/2   |
| <i>Plekocheilus (Eurytus) elaeodes</i>          | C-6, L-3(1), LM-10(13), LM-11(36)         | C/1 + L 1/1 + M 49/2   |
| <i>Plekocheilus (Aeropiatus) veranyi</i>        | C-6, L-3(3), LM-10(13), LM-11(41)         | C/1 + L 3/1 + M 54/2   |
| <i>Plekocheilus (Eudolichotis) g. glaber</i>    | C-6, LM-10(20), LM-11(35)                 | C/1 + LM 55/2          |
| <i>Plekocheilus (F.) glaber grenadensis</i>     | C-6, LM-10(16+x), LM-11(x)                | C/1 + LM 16+x/2        |
| <i>Plekocheilus (Eurytus) mondiperditi</i>      | C-6, LM-10(15), LM-11(44)                 | C/1 + LM 59/2          |
| <i>Plekocheilus (Eurytus) piperitus</i>         | C-6, LM-10(21), LM-11(32)                 | C/1 + LM 53/2          |
| <i>Thaumastus (Paeniscutalus) orenellus</i>     | C-4, LM-6(30), LM-7(8)                    | C/3 + LM 38/2          |
| <i>Thaumastus (Thaumastus) foveolatus</i>       | C-4, LM-6(16), LM-7(18)                   | C/3 + LM 34/2          |
| <i>Thaumastus (Thaumastus) insolitus</i>        | C-4, LM-6(26), LM-7(17)                   | C/3 + LM 43/2          |
| <i>Thaumastus (Thaumastus) sangoae</i>          | C-4, LM-6(20), LM-7(20)                   | C/3 + LM 40/2          |
| <i>Thaumastus (Thaumastus) taumaei achilles</i> | C-4, LM-6(18), LM-7(14)                   | C/3 + LM 32/2          |
| <i>Thaumastus (Quechua) taulisensis</i>         | C-6, L-3(2), LM-6(24), LM-7(12)           | C/1 + L 2/1 + M 36/2   |
| <i>Thaumastus (Schoelvenia) bitaeniatius</i>    | C-7, LM-1(17), LM-7(14)                   | C/3 + LM 31/2          |
| <i>Thaumastus (Schoelvenia) spec.</i>           | C-7, LM-1(15), LM-7(23)                   | C/3 + LM 38/2          |
| <i>Thaumastus (Thaumastiella) sarcocrochus</i>  | C-7, LM-1(15), LM-7(24)                   | C/3 + LM 39/2          |
| <i>Bostryx anachoreta</i>                       | C-1, LM-1(9), LM-2(4), LM-3(4), LM-4(5)   | C/3 + LM 22/2          |
| <i>Bostryx bermudezae</i>                       | C-1, LM-1(5), LM-2(3), LM-3(6), LM-4(5)   | C/3 + LM 19/2          |
| <i>Bostryx columellaris</i>                     | C-1, LM-1(7), LM-2(5), LM-3(5), LM-4(3)   | C/3 + LM 20/2          |
| <i>Bostryx hamiltoni</i>                        | C-1, LM-1(7), LM-2(6), LM-3(4), LM-4(3)   | C/3 + LM 20/2          |
| <i>Bostryx leucostictus</i>                     | C-1, LM-1(8), LM-2(4), LM-3(1), LM-4(7)   | C/3 + LM 20/2          |
| <i>Bostryx obeliscus</i>                        | C-1, LM-1(13), LM-2(6), LM-3(5), LM-4(5)  | C/3 + LM 29/2          |
| <i>Bostryx plaetius</i>                         | C-1, LM-1(8), LM-2(4), LM-3(4), LM-4(7)   | C/3 + LM 23/2          |
| <i>Bostryx spiculatus spiculatus</i>            | C-1, LM-1(8), LM-2(6), LM-3(5), LM-4(4)   | C/3 + LM 23/2          |
| <i>Bostryx tubulatus acalariacostus</i>         | C-1, LM-1(7), LM-2(4), LM-3(1), LM-4(4)   | C/3 + LM 16/2          |
| <i>Bostryx tschudii</i>                         | C-1, LM-1(7), LM-2(3), LM-3(2), LM-4(6)   | C/3 + LM 18/2          |
| <i>Bostryx tyleri</i>                           | C-1, LM-1(9), LM-2(6), LM-3(6), LM-4(7)   | C/3 + LM 28/2          |
| <i>Bostryx anomphalus</i>                       | C-1, LM-1(9), LM-2(4), LM-3(9)            | C/3 + LM 22/2          |
| <i>Bostryx coeruleoena</i>                      | C-1, LM-1(9), LM-2(11), LM-3(10)          | C/3 + LM 30/2          |
| <i>Bostryx cordillerae</i>                      | C-1, LM-1(10), LM-2(4), LM-3(13)          | C/3 + LM 27/2          |
| <i>Bostryx onycaensis</i>                       | C-1, LM-1(10), LM-3(25)                   | C/3 + LM 35/2          |
| <i>Bostryx extensus</i>                         | C-1, LM-1(9), LM-2(4), LM-3(15)           | C/3 + LM 28/2          |
| <i>Bostryx ignobilis</i>                        | C-1, LM-1(11), LM-2(4), LM-3(13)          | C/3 + LM 28/2          |
| <i>Bostryx infundibulum infundibulum</i>        | C-1, LM-1(9), LM-2(3), LM-3(12)           | C/3 + LM 24/2          |
| <i>Bostryx martinesi</i>                        | C-1, LM-1(10), LM-2(7), LM-3(13)          | C/3 + LM 30/2          |
| <i>Bostryx modestus</i>                         | C-1, LM-1(11), LM-2(3), LM-3(8)           | C/3 + LM 22/2          |
| <i>Bostryx pictus</i>                           | C-1, LM-1(7), LM-2(4), LM-3(20)           | C/3 + LM 31/2          |
| <i>Bostryx planissimus</i>                      | C-1, LM-1(8), LM-2(4), LM-3(10)           | C/3 + LM 22/2          |
| <i>Bostryx rodriguezae</i>                      | C-1, LM-1(8), LM-2(4), LM-3(11)           | C/3 + LM 23/2          |
| <i>Bostryx tumidulus</i>                        | C-1, LM-1(10), LM-2(5), LM-3(11)          | C/3 + LM 26/2          |
| <i>Bostryx turritus</i>                         | C-1, LM-1(10), LM-2(4), LM-3(7)           | C/3 + LM 21/2          |
| <i>Bostryx bromeliarum grandiportus</i>         | C-3, L-1(7), LM-2(5), LM-3(18)            | C/1 + L 7/1 + M 23/2   |
| <i>Bostryx latecolumellaris</i>                 | C-3, L-1(5), LM-2(8), LM-3(10)            | C/1 + L 5/1 + M 18/2   |
| <i>Bostryx lentiformis</i>                      | C-3, L-1(9), LM-3(31)                     | C/1 + L 9/1 + M 31/2   |
| <i>Bostryx rhodolarynx papillatus</i>           | C-3, L-1(15), LM-2(10), LM-3(21)          | C/1 + L 15/1 + M 31/2  |
| <i>Bostryx esolatus</i>                         | C-3, L-1(6), LM-2(3), LM-3(10)            | C/1 + L 6/1 + M 13/2   |
| <i>Bostryx stelnneri stelnneri</i>              | C-3, L-1(19), LM-2(4), LM-3(20)           | C/1 + L 19/1 + M 24/2  |
| <i>Bulimulus guadalupensis</i>                  | C-1, LM-1(7), LM-2(3), LM-3(3), LM-4(7)   | C/3 + LM 20/2          |
| <i>Bulimulus jujuyensis</i>                     | C-1, LM-1(9), LM-2(5), LM-3(5), LM-4(12)  | C/3 + LM 31/2          |
| <i>Bulimulus prosopidis</i>                     | C-1, LM-1(10), LM-2(4), LM-3(10), LM-4(4) | C/3 + LM 28/2          |
| <i>Sphaerocoma araozi</i>                       | C-5, LM-8(9), LM-9(44)                    | C/3 + LM 53/2-6        |
| <i>Rabdotus durangoanus</i>                     | C-1, LM-1(13), LM-2(3), LM-3(13)          | C/3 + LM 29/2          |
| <i>Rabdotus mooreanus</i>                       | C-1, LM-1(11), LM-2(5), LM-3(12)          | C/3 + LM 28/2          |
| <i>Rabdotus pallidior</i>                       | C-1, LM-1(16), LM-2(5), LM-3(15)          | C/3 + LM 36/2          |
| <i>Barendtia taylori</i>                        | C-1, LM-1(12), LM-2(4), LM-3(18)          | C/3 + LM 34/2          |
| <i>Spartacentrum vanduseei</i>                  | C-1, LM-1(8), LM-2(3), LM-3(6), LM-4(6)   | C/3 + LM 24/2          |

TABLE 3. (continued).

|                                                |                                               |                        |
|------------------------------------------------|-----------------------------------------------|------------------------|
| <i>Naesiotes adelphus</i>                      | C-1, LM-1 (8), LM-2 (4), LM-3 (6), LM-4 (16)  | C/3 + LM 34/2          |
| <i>Naesiotes akamatus</i>                      | C-1, LM-1 (10), LM-2 (3), LM-3 (4), LM-4 (x)  | C/3 + LM 17+x/2        |
| <i>Naesiotes alethorhytidus</i>                | C-1, LM-1 (7), LM-2 (3), LM-3 (2), LM-4 (11)  | C/3 + LM 23/2          |
| <i>Naesiotes blombergi</i>                     | C-1, LM-1 (10), LM-2 (6), LM-3 (2), LM-4 (9)  | C/3 + LM 27/2          |
| <i>Naesiotes chemnitzoides</i>                 | C-1, LM-1 (7), LM-2 (2), LM-3 (2), LM-4 (10)  | C/3 + LM 21/2          |
| <i>Naesiotes eos</i>                           | C-1, LM-1 (9), LM-2 (3), LM-3 (2), LM-4 (14)  | C/3 + LM 28/2          |
| <i>Naesiotes eschariferus</i>                  | C-1, LM-1 (10), LM-2 (3), LM-3 (3), LM-4 (13) | C/3 + LM 29/2          |
| <i>Naesiotes oehneri</i>                       | C-1, LM-1 (10), LM-2 (4), LM-3 (3), LM-4 (11) | C/3 + LM 28/2          |
| <i>Naesiotes rugiferus</i>                     | C-1, LM-1 (7), LM-2 (2), LM-4 (10)            | C/3 + LM 19/2          |
| <i>Naesiotes zilchi</i>                        | C-1, LM-1 (9), LM-2 (2), LM-3 (2), LM-4 (11)  | C/3 + LM 24/2          |
| <i>Naesiotes carlucci</i>                      | C-1, LM-1 (9), LM-2 (4), LM-3 (15)            | C/3 + LM 28/2          |
| <i>Naesiotes crepidius</i>                     | C-1, LM-1 (9), LM-2 (3), LM-3 (18)            | C/3 + LM 30/2          |
| <i>Naesiotes cavagnaroi</i>                    | C-1, LM-1 (10), LM-2 (5), LM-3 (16)           | C/3 + LM 31/2          |
| <i>Naesiotes haasi</i>                         | C-1, LM-1 (10), LM-2 (4), LM-3 (15)           | C/3 + LM 29/2          |
| <i>Naesiotes lopei</i>                         | C-1, LM-1 (12), LM-2 (5), LM-3 (11)           | C/3 + LM 28/2          |
| <i>Naesiotes oxylabris</i>                     | C-1, LM-1 (9), LM-2 (9), LM-3 (5+x)           | C/3 + LM 23+x/2        |
| <i>Naesiotes quitensis</i>                     | C-1, LM-1 (9), LM-2 (6), LM-3 (18)            | C/3 + LM 33/2          |
| <i>Naesiotes wolffi</i>                        | C-1, LM-1 (7), LM-2 (3), LM-3 (15)            | C/3 + LM 25/2          |
| <i>Scutalus (Vermiculatus) bicolor</i>         | C-1, LM-1 (10), LM-2 (4), LM-3 (13), LM-4 (6) | C/3 + LM 33/2          |
| <i>Scutalus (Suntellus) ohili</i>              | C-1, LM-1 (11), LM-2 (2), LM-3 (2+x)          | C/3 + LM 15+x/2        |
| <i>Scutalus (Vermiculatus) costulatus</i>      | C-1, LM-1 (8), LM-2 (4), LM-3 (8), LM-4 (6)   | C/3 + LM 26/2          |
| <i>Scutalus (Vermiculatus) pyramidalis</i>     | C-1, LM-1 (19), LM-2 (4), LM-3 (11), LM-4 (3) | C/3 + LM 33/2          |
| <i>Scutalus (Vermiculatus) weddellii</i>       | C-1, LM-1 (12), LM-2 (4), LM-3 (9), LM-4 (3)  | C/3 + LM 28/2          |
| <i>Scutalus (Suntellus) spec. A</i>            | C-1, LM-1 (12), LM-2 (5), LM-3 (13), LM-4 (6) | C/3 + LM 36/2          |
| <i>Scutalus (Suntellus) spec. B</i>            | C-1, LM-1 (16), LM-2 (4), LM-3 (23)           | C/3 + LM 43/2          |
| <i>Scutalus (Suntellus) spec. C</i>            | C-1, LM-1 (12), LM-2 (x), LM-3 (y)            | C/3 + LM 34/2          |
| <i>Scutalus (Kuschelentia) culmineus</i>       | C-2, LM-5 (12), LM-2 (3), LM-3 (18), LM-4 (2) | C/3 + LM 35/2          |
| <i>Scutalus (Kuschelentia) gayi</i>            | C-2, LM-5 (14), LM-2 (2), LM-3 (21)           | C/3 + LM 37/2          |
| <i>Scutalus (Kuschelentia) cf. subfaustus</i>  | C-2, LM-5 (18), LM-3 (29), LM-4 (2)           | C/3 + LM 49/2          |
| <i>Scutalus (Kuschelentia) tupaciti</i>        | C-2, LM-5 (23), LM-2 (3), LM-3 (28)           | C/3 + LM 54/2          |
| <i>Scutalus (Scutalus) cretaceus</i>           | C-3, L-1 (16), LM-2 (10), LM-3 (21)           | C/1 + L 16/1 + M 31/2  |
| <i>Scutalus (Scutalus) mutabilis</i>           | C-3, L-1 (10), LM-2 (8), LM-3 (7), LM-4 (14)  | C/1 + L 10/1 + M 29/2  |
| <i>Diacoleus aguirrei</i>                      | C-11, LM-1 (9), LM-17 (29)                    | C/3 + L 9/2 + M 29/3   |
| <i>Diacoleus azulensis</i>                     | C-11, LM-1 (9), LM-17 (28)                    | C/3 + L 9/2 + M 28/3   |
| <i>Plectostylus coquimbensis</i>               | C-3, L-8 (16), LM-17 (56)                     | C/1 + L 16/1 + M 56/3  |
| <i>Plectostylus peruvianus</i>                 | C-3, L-2 (6), LM-17 (55)                      | C/1 + L 6/2 + M 55/3   |
| <i>Bothriembryon (Bothriembryon) oostulata</i> | C-11, L-2 (12), LM-17 (32)                    | C/3 + L 12/2 + M 32/3  |
| <i>Bothriembryon (Bothriembryon) glauerti</i>  | C-11, L-2 (13), LM-17 (21)                    | C/3 + L 13/2 + M 21/3  |
| <i>Bothriembryon (Bothriembryon) melo</i>      | C-11, L-2 (8), LM-17 (36)                     | C/3 + L 8/2 + M 36/3   |
| <i>Bothriembryon (Bothriembryon) onelowi</i>   | C-11, L-2 (9), LM-17 (36)                     | C/3 + L 9/2 + M 36/3   |
| <i>Bothriembryon (Tasmanembryon) guoviti</i>   | C-11, L-2 (5), LM-17 (60)                     | C/3 + L 5/2 + M 60/3   |
| <i>Neopetracus camacho</i>                     | C-8, L-4 (2), LM-12 (84)                      | C/1 + L 2/1 + M 84/3   |
| <i>Neopetracus lobbi</i>                       | C-8, L-4 (6), LM-12 (76)                      | C/1 + L 6/1 + M 76/3   |
| <i>Newboldius angiportus</i>                   | C-8, L-4 (1), LM-12 (54)                      | C/1 + L 1/1 + M 54/3   |
| <i>Stenostylus meleagris</i>                   | C-8, L-4 (8), LM-12 (34+x)                    | C/1 + L 8/1 + M 34+x/3 |
| <i>Stenostylus zilchi</i>                      | C-8, L-4 (7), LM-12 (64)                      | C/1 + L 7/1 + M 64/3   |
| <i>Otostomus signatus</i>                      | C-9, LM-14 (42)                               | C/1 + LM 42/3          |
| <i>Oxychona bifasciata</i>                     | C-9, LM-13 (37)                               | C/1 + LM 37/2          |
| <i>Rhinus ciliatus</i>                         | C-8, LM-13 (13), LM-14 (19)                   | C/1 + LM 32/2-3        |
| <i>Simulopsis (Simulopsis) brasiliensis</i>    | C-9, LM-14 (15), LM-15 (20)                   | C/1 + LM 35/3          |
| <i>Simulopsis (Simulopsis) decussata</i>       | C-8, L-5 (9), LM-16 (28)                      | C/1 + L 9/2 + M 28/3   |
| <i>Simulopsis (Simulopsis) sulcaulosa</i>      | C-8, L-5 (7), LM-16 (24)                      | C/1 + L 7/2 + M 24/3   |
| <i>Simulopsis (Simulopsis) spec.</i>           | C-8, L-5 (10), LM-16 (31)                     | C/1 + L 10/2 + M 31/3  |
| <i>Leiostracus (L.) cinnamomeolineatus</i>     | C-8, L-5 (8), LM-16 (29)                      | C/1 + L 8/2 + M 29/3   |
| <i>Leiostracus (Leiostracus) perlucidus</i>    | C-8, L-6 (8), LM-16 (17)                      | C/1 + L 8/2 + M 17/3   |
| <i>Leiostracus (Pseudoxychona) pileiformis</i> | C-10, L-7 (8), LM-16 (18)                     | C/1 + L 8/1 + M 18/3   |
| <i>Leiostracus (Pseudoxychona) spec.</i>       | C-10, L-7 (8), LM-16 (16)                     | C/1 + L 8/1 + M 16/3   |

- C-3 — The teeth are monocuspid, with blunt conical to deltoid mesocones.  
C-4 — The teeth are tricuspid, with rather acute, ovate mesocones and elongate-truncate ectocones, which are  $1/2-2/3$  the length of the mesocones.  
C-5 — The teeth are tricuspid, with very acute, conical to lanceolate mesocones and relatively small, acute, triangular ectocones.  
C-6 — The teeth are monocuspid, with triangular to ovate mesocones and hardly developed ectocones (visible as slight lateral protuberances).  
C-7 — The teeth are tricuspid, with acute, wedge-shaped mesocones and relatively small, triangular ectocones, which are ca.  $1/3$  the length of the mesocones.  
C-8 — The teeth are monocuspid, relatively small, with blunt, elongate to triangular mesocones and rudimentary ectocones (in some species).  
C-9 — The teeth are monocuspid, with rather blunt, spatula-shaped mesocones.  
C-10 — The teeth are monocuspid, with deltoid to triangular mesocones of which the apex is acute and pointed.  
C-11 — The teeth are tricuspid, with acute, ovate mesocones and hardly differentiated, more or less triangular ectocones.

#### Lateral teeth.

- L-1 — The teeth are monocuspid, with blunt, conical to slightly deltoid mesocones.  
L-2 — The teeth are dicuspid, with blunt to acute, elongate to lanceolate mesocones and slightly acute, deltoid ectocones.  
L-3 — The teeth are monocuspid (tending to dicuspid), with very acute, lanceolate mesocones.  
L-4 — The teeth are dicuspid, slightly shifted, with (rather) blunt, elongate to lanceolate mesocones and small triangular to deltoid ectocones.  
L-5 — The teeth are dicuspid, with acute, spatula- to wedge-shaped mesocones and triangular to deltoid ectocones, which are posteriorly situated at the basal plate.  
L-6 — The teeth are dicuspid, with blunt, subquadrate to truncate mesocones and acute, elongate to triangular ectocones.  
L-7 — The teeth are monocuspid, with triangular mesocones which are acute and pointed.  
L-8 — The teeth are monocuspid, shifted, with blunt, elongate mesocones.

#### Lateromarginal teeth.

- LM-1 — The teeth are dicuspid, with elongate to wedge-shaped mesocones and acute, ovate to deltoid ectocones.

LM-2 — The teeth are dicuspid, with acute, lanceolate mesocones and deltoid ectocones; the base of the teeth is broad.

LM-3 — The teeth are dicuspid, with acute, lanceolate mesocones and deltoid ectocones; the base of the teeth is broad.

LM-4 — As LM-3, but the ectocones are serrated, i.e. divided into several small cones.

LM-5 — The teeth are dicuspid, with acute, elongate to deltoid mesocones (with rudimentary endocones) and relatively small, deltoid ectocones.

LM-6 — The teeth are dicuspid, with rather blunt, elongate mesocones (with rudimentary, wing-like endocones) and elongate-truncate ectocones; with supporting denticles.

LM-7 — The teeth are dicuspid, with rather blunt to acute, elongate mesocones and (rather) acute, elongate to ovate ectocones; without supporting denticles.

LM-8 — The teeth are dicuspid, with acute, elongate to lanceolate mesocones and acute, deltoid ectocones.

LM-9 — The teeth are multicuspid, with acute, elongate to lanceolate mesocones and 2-6 acute, triangular ectocones.

LM-10 — The teeth are dicuspid, with (rather) acute, truncate to spatula-shaped mesocones and acute, ovate to deltoid ectocones.

LM-11 — The teeth are dicuspid, shifted, with rather blunt spatula-shaped to elongate mesocones and acute, deltoid to triangular ectocones, which may be bifid in the outermost teeth.

LM-12 — The teeth are tricuspid, shifted, with rather blunt, ovate mesocones, acute elongate-ovate endocones and acute, deltoid ectocones, which may be bifid in the outermost teeth.

LM-13 — The teeth are dicuspid, with blunt, spatula-shaped mesocones and small, (rather) acute, ovate to triangular ectocones which are posteriorly situated at the basal plate.

LM-14 — The teeth are tricuspid, with blunt, spatula-shaped mesocones, acute, curved elongate endocones and (rather) acute, ovate to triangular ectocones which are posteriorly situated at the basal plate.

LM-15 — As LM-14, with endo- and ectocones serrated.

LM-16 — The teeth are tricuspid, shifted, with elongate mesocones, curved, elongate endocones which are but slightly smaller than the mesocones, and triangular ectocones which may be serrated.

LM-17 — The teeth are tricuspid, shifted, with elongate mesocones, slightly curved endocones which are but slightly smaller than the mesocones, and triangular ectocones; the base of the teeth is relatively narrow.

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Abbreviations: g, genitalia; h, histology; LT, lectotype designated; R, redescrptions; r, radula; \*, figured.

Names in italics are synonyms.

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Fig. 1. *Bostryx huanucensis* sp.n., Perú, Huánuco, 13.1 km N Huánuco; shell height 25.0 mm; holotype (UF).

Figs. 2-4. *Bostryx huanucensis* sp.n., Peru, Huánuco, 11 km NE Santa Maria; shell height 22.0, 21.5 and 21.0 mm respectively; paratypes (RMNH).

Fig. 5. *Bostryx huanucensis povelii* ssp.n., Peru, Pasco, 42.5 km NNE Cerro de Pasco; shell height 12.5 mm; holotype (RMNH).

Fig. 6. *Bostryx aileenae* sp.n., Peru, Lima, 1 km above Puente Auco; shell height 14.9 mm; holotype (RMNH).

Fig. 7-9. *Bostryx nigropileatus* (Reeve), Peru, Cajamarca, 2 km SW Encañada; shell height 27.0, 27.0 and 28.0 mm respectively; (RMNH).

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Fig. 4. *Bostryx ploegerorum* sp.n., Peru, Ancash, 5 km SW Chavin de Huantar; shell height 15.8 mm; holotype (UF).

Fig. 5-6. *Bostryx fuliginus* sp.n., Peru, Ancash, 6 km NE San Marcos; shell height 29.0 mm; holotype (UF).

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Fig. 1. *Thaumastus (Thaumastus) plumbeus* (Pfeiffer), Venezuela; shell height 93.0 mm; lectotype (BMNH).

Fig. 2. *Bostryx sandwicensis* (Pfeiffer), Bolivia; shell height 16.0 mm; (IRSN).

Fig. 3. ?*Thaumastus* (?*Thaumastus*) *blanfordianus* (Ancey), Bolivia, Iquice; shell height 52.5 mm; syntype (IRSN).

Fig. 4. *Scutalus (Suniellus) troscheli* (Philippi), Peru, La Libertad, 18 km ESE Yamabamba; shell height 18.5 mm; (UF).

Fig. 5. *Scutalus (Suniellus) chillu* sp.n., Bolivia, Cuticucho; shell height 15.2 mm; holotype (SMF).

Fig. 6. *Plekocheilus (Eurytus) phoebus* (Pfeiffer), Ecuador; shell height 30.5 mm; lectotype (BMNH).

Fig. 7. *Plekocheilus (Aeropictus) cathcartiae* (Reeve), New Granada; shell height 45.5 mm; lectotype (BMNH).

Fig. 8. ?*Bulimulus ephippium* Ancey, Brazil, Bahia; shell height 19.5 mm; syntype (IRSN).

Fig. 9-10. ?*Bostryx compactus* (Fulton), Bolivia, Chicani; shell height 14.5 and 14.7 mm respectively; topotypes (IRSN).

Fig. 11. *Bostryx bonneti* (Ancey), Bolivia; shell height 21.0 mm; syntype (IRSN).

Fig. 12. *Rhinus argentimus* (Ancey), Argentina; shell height 20.0 mm; syntype (IRSN).

Fig. 13-14. *Bostryx moniezi* (Dautzenberg), "Andes du Pérou"; shell height 16.0 and 14.6 mm respectively; syntypes (IRSN).

Fig. 15. *Scutalus (Vermiculatus) costifer naggsi* ssp.n., Peru, 1 km NE Cerro de Pasco; shell height 21.0 mm; paratype (RMNH).

#### PLATE I2

Fig. 1. *Bostryx hirsutus* sp.n., protoconch, 32X.

Fig. 2. *Naesiotus willinki* sp.n., protoconch, 32X.

Fig. 3. *Bostryx rodriguezae* Weyrauch, distal part of penis (Haemalum-Eosin; slide H 1162) X 300.

Fig. 4. *Bostryx tumidulus* (Pfeiffer), distal part of penis (Haemalum-Eosin; slide H 1469) X 600.

Fig. 5-6. *Spartocentrum vanduzeei* (Hanna), proximal and median part of penis respectively (Haemalum-Eosin; slide H 4283) X 300.

Fig. 7-8. *Spartocentrum vanduzeei* (Hanna), distal part of penis and epiphallus respectively (Haemalum-Eosin; slide H 4284) X 300.

Abbreviations: EP, epiphallus; PS, penis sheath; VD, vas deferens.

#### PLATE I3

Fig. 1-2. *Auris ilheocola* (Moricand). 1, central part of radula (905-4) X 290; 2, lateromarginal teeth (905-6) X 55.

Fig. 3-4. *Thaumastus* (*Thaumastus*) *foveolatus* (Reeve). 3, central and four lateral teeth (889-17)  $\times 125$ ; 4, marginal teeth (889-20)  $\times 127$ .

Fig. 5-6. *Thaumastus* (*Thaumastus*) *sangoae* (Tschudi). 5, central and four lateral teeth (908-36)  $\times 122$ ; 6, lateromarginal teeth (909-4)  $\times 122$ .

Fig. 7-8. *Thaumastus* (*Quechua*) *taulisensis* Zilch. 7, central and five lateral teeth (1118-24)  $\times 125$ ; 8, 21st-34th lateral teeth (1118-28)  $\times 125$ .

#### PLATE 14

Fig. 1-2. *Plekocheilus* (*Plekocheilus*) *aurissileni* (Born). 1, central part of radula (928-3)  $\times 290$ ; 2, 18th-22nd lateral teeth (928-8)  $\times 310$ .

Fig. 3-4. *Plekocheilus* (*Aeropictus*) *calliostomus* (Dohrn). 3, central and four lateral teeth (1068-27)  $\times 275$ ; 4, 18th-25th lateral teeth (1068-29)  $\times 275$ .

Fig. 5-6. *Plekocheilus* (*Eurytus*) *mundiperditi* Haas. 5, central part of radula (932-30)  $\times 120$ ; 6, outer marginal teeth (932-36)  $\times 120$ .

Fig. 7-8. *Plekocheilus* (*Eudolichotis*) *glaber* (Gmelin). 7, central and three lateral teeth (1009-27)  $\times 125$ ; 8, lateral teeth (1009-30)  $\times 310$ .

#### PLATE 15

Fig. 1-2. *Thaumastus* (*Scholvienia*) sp. 1, central teeth (984-2)  $\times 575$ ; 2, 8th-16th lateral teeth (984-5)  $\times 117$ .

Fig. 3-4. *Bostryx* *hamiltoni* (Reeve). 3, central and three lateral teeth (927-15)  $\times 600$ ; 4, 15th-20th lateral teeth (927-20)  $\times 600$ .

Fig. 5-6. *Bostryx* *coerulescens* (Pfeiffer). 5, central and six lateral teeth (1060-20)  $\times 275$ ; 6, 7th-14th lateral teeth (1060-21)  $\times 275$ .

Fig. 7. *Bostryx lentiformis* sp.n., median part of radula (915-19)  $\times 105$ .

Fig. 8. *Bostryx solutus* (Troschel), central-median part of radula (1068-11)  $\times 270$ .

#### PLATE 16

Fig. 1. *Bulimulus prosopidis* (Holmberg), central and six lateral teeth (1057-29)  $\times 300$ .

Fig. 2. *Bulimulus guadalupensis* (Bruguère), 8th-18th lateral teeth (915-31)  $\times 275$ .

Fig. 3-6. *Sphaeroconcha araozi* (Weyrauch). 3, central and eight lateral teeth (920-2)  $\times 600$ ; 4, 8th-16th lateral teeth (920-3)  $\times 600$ ; 5, 16th-24th lateral teeth (920-4)  $\times 600$ ; 6, intersection between transverse rows (920-9)  $\times 1250$ .

#### PLATE 17

Fig. 1-2. *Rabdatus mooreanus* (Pfeiffer). 1, central and seven lateral teeth (434-26)  $\times 250$ ; 2, 7th-15th lateral teeth (434-27)  $\times 250$ .

Fig. 3-4. *Berendtia taylori* (Pfeiffer). 3, central and six lateral teeth (1056-20)  $\times 285$ ; 4, 21st-31st lateral teeth (1056-23)  $\times 285$ .

Fig. 5-6. *Spartocentrum vanduzeei* (Hanna). 5, central and three lateral teeth (1056-29)  $\times 575$ ; 6, 10th-15th lateral teeth (1056-31)  $\times 575$ .

#### PLATE 18

Fig. 1-2. *Scutalus* (*Scutalus*) *mutabilis* (Broderip). 1, central and six lateral teeth (1069-8)  $\times 275$ ; 2, 9th-16th lateral teeth (1103-28)  $\times 280$ .

Fig. 3-4. *Scutalus* (*Vermiculatus*) *pyramidalis* sp.n. 3, central and five lateral teeth (951-5)  $\times 280$ ; 4, 12th-18th lateral teeth (951-7)  $\times 280$ .

Fig. 5-6. *Scutalus* (*Kuschelenia*) *culmineus* (d'Orbigny). 5, central and five lateral teeth (1022-29)  $\times 290$ ; 6, 19th-28th lateral teeth (1021-37)  $\times 285$ .

Fig. 7-8. *Scutalus* (*Kuschelenia*) *tupacii* (d'Orbigny). 7, central and four lateral teeth (933-30)  $\times 290$ ; 8, 37th-39th lateral teeth (933-38)  $\times 290$ .



## PLATE 19

Fig. 1-2. *Simpulopsis* (*Simpulopsis*) *decussata* (Pfeiffer). 1, central and eight lateral teeth (1108-10)  $\times$  275; 2, 15th-22nd lateral teeth (1108-14)  $\times$  275.

Fig. 3-4. *Simpulopsis* (*Simpulopsis*) *brasiliensis* (Moricand). 3, central part of radula (1104-30)  $\times$  700; 4, 31st-35th lateral teeth (1107-28)  $\times$  285.

Fig. 5-6. *Rhinus ciliatus* (Gould). 5, central and first lateral teeth (1057-18)  $\times$  600; 6, 13th-24th lateral teeth (1057-21)  $\times$  117.

Fig. 7-8. *Leiostracus* (*Leiostracus*) *cinnamomeolineatus* (Moricand). 7, central and three lateral teeth (1010-4)  $\times$  625; 8, 12th-15th lateral teeth (1010-8)  $\times$  625.

## PLATE 20

Fig. 1-2. *Scutalus* (*Suniellus*) sp. B. 1, central and five lateral teeth (1108-31)  $\times$  290; 2, 18th-24th lateral teeth (1108-34)  $\times$  290.

Fig. 3-4. *Stenostylus meleagris* (Pfeiffer). 3, central and eight lateral teeth (1109-5)  $\times$  290; 4, 18th-26th lateral teeth (1109-8)  $\times$  290.

Fig. 5. *Newboldius angiportus* Weyrauch, median part of radula (1061-8)  $\times$  115.

Fig. 6. *Neopetraeus camacho* Weyrauch, marginal teeth (1060-34)  $\times$  280.

## PLATE 21

Fig. 1, 3, 5. *Otostomus signatus* (Spix). 1, 11th-21th lateral teeth (924-22)  $\times$  115; 3, median part of radula (924-16)  $\times$  29; 5, intersection of transverse rows (924-19)  $\times$  290.

Fig. 2. *Oxychona bifasciata* (Burrow), lateral teeth (908-26)  $\times$  122.

Fig. 4, 6, 8. *Leiostracus* (*Pseudoxychona*) *pileiformis* (Moricand). 4, median part of radula (933-7)  $\times$  30; 6, intersection of transverse rows (933-28)  $\times$  575; 8, central and three lateral teeth (933-10)  $\times$  300.

Fig. 7. *Leiostracus* (*Leiostracus*) *perlucidus* (Spix), central and nine lateral teeth (1063-23)  $\times$  110.

## PLATE 22

Fig. 1-2. *Bothriembryon* (*Bothriembryon*) *glauerti* Iredale. 1, central and two lateral teeth (628-8)  $\times$  575; 2, 20th-30th lateral teeth (628-10)  $\times$  285.

Fig. 3-4. *Bothriembryon* (*Tasmanembryon*) *gunnii* (Sowerby). 3, central and three lateral teeth (919-17)  $\times$  325; 4, 29th-39th lateral teeth (919-22)  $\times$  320.

Fig. 5. *Plectostylus coquimbensis* (Broderip), central and four lateral teeth (970-7)  $\times$  305.

Fig. 6. *Plectostylus peruvianus* (Bruguière), 23rd-28th lateral teeth (970-19)  $\times$  305.

Fig. 7. *Discoleus aguirrei* (Doering), central and five lateral teeth (915-2)  $\times$  275.

Fig. 8. *Discoleus azulensis* (Doering), 37th lateral teeth (915-7)  $\times$  1100.

