STUDIES ON THE FAUNA OF CURAÇAO AND OTHER CARIBBEAN ISLANDS: No. 145.

CARIBBEAN LAND MOLLUSCS: BULIMULIDAE
I. BULIMULUS

by

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INTRODUCTION

"The species of this subgenus [*Bulimulus* s.s.] are among the most difficult *Bulimuli* to distinguish, being founded in most cases on slight and inconspicuous differences."

PILSBRY 1897–8, p. 36.

This series of papers is based on the Bulimulidae collected by dr. P. WAGENAAR HUMMELINCK during several trips to the West Indies, and additional material from several museum collections.

The species dealt with in this series have previously been treated in part by several authors and in particular monographically by PILSBRY in the *Manual of Conchology* (second series, vol. 10–12, 14). Thanks to additional information and access to previously unknown type material, it is now possible to present a revision of this family in the Lesser Antilles and Puerto Rico.

Sixteen (sub)species are treated, including two new ones: *Bulimulus gittenbergeri* and *B. hummelincki*. References, (re)description, measurements, distribution, as well as figures, are given for each species.

The following new synonymies are proposed: *Bulimus nichollsi* Angas = *Bulimulus limnoides* (Férussac); *Thaumastus exilis* var. *concolor* Piaget = *Bulimulus guadalupensis* (Bruguière); *Bulimulus Houelmontensis* Crosse = *Bulimulus diaphanus fraterculus* (Potiez & Michaud); *Bulimulus semicinctus* Pilsbry = *Bulimulus lherminieri* (Fischer); *Bulimus Barbadensis* Pfeiffer = *Bulimulus fuscus* Guilding.

Finally some zoogeographical remarks are given.

The Bulimulidae form a relatively large family, mainly confined to South America. At present the family includes 144 genera and subgenera. The number of specific and subspecific names available is estimated at about 3000.

According to BAKER (1956) the family name should be Orthalicidae, if priority rules are applied. No attention has been paid to this proposal because of the unstable state of taxonomy of this family.

At present several genera are included in this family, which may

better be placed elsewhere. The genus *Aillya* Odhner, occurring in Cameroon (West Africa), is placed in the Amphibuliminae by ODHNER (1928) on account of the anatomy. BAKER (1955) placed the Aillyidae in the Heterurethræ, near the Succineidae. Re-examination of the type species, *Aillya camerunensis* Odhner, should clarify the status of this genus.

Another African genus included in the Amphibuliminae is *Prestonella* Connolly. It occurs in South Africa and its anatomy is unknown. BAKER suggests that it may also be a heterurethrous snail (SOLEM 1959a, p. 123).

WEYRAUCH (1967) described a monotypical genus from Perú, *Pseudoglandina*. The morphology of the shell suggests that it belongs to the Bulimulidae, but from a note of the collector (in WEYRAUCH), mr. J. M. SCHUNKE, it might be concluded that the species is a predator, and perhaps should be included in the Oleacinidae. The anatomy of *Pseudoglandina agitata* is unknown and the present status of the genus uncertain.

On conchological, ecological and zoogeographical grounds WEYRAUCH (1958) removed the genus *Geoceras* Pilsbry from the Bulimulidae to the Urocoptidae. As the anatomy was not taken into consideration, a study on this subject may be worthwhile.

The Bulimulidae *s.l.* (see below) are here considered to be a family, although it still has to be proved that they form a monophyletic unit. The family is not easily characterized because of the great variation in shell form (see ZILCH 1959–1960, fig. 1668–1814); usually the shells are ovate-conic to cylindric. The genitalia seem to be simple, but VAN MOL (1971) has shown that the internal structure, especially of the penis and epiphallus, is quite complex.

The subdivision of the family into Bulimulinae, Amphibuliminae, Placostylinae, Odontostominae, and Orthalicinae is mainly based on shell features. This *sensu lato* conception of the Bulimulidae was already held by PILSBRY (*Man. Conch.*, 1895–1902) and THIELE (1931), and is also favoured by the present author. More recent authors, *e.g.* ZILCH (1960), gave family rank to the subfamilies, the Placostylinae excepted. However, the differences between the subfamilies are slight, *e.g.* the Amphibuliminae seem to differ from the

Bulimulinae only in the palleal organs and the free retractor muscle system (see VAN MOL 1971). VAN MOL (pers. comm.) is of the opinion that they should not even be separated on subfamily level, because the organ systems show progressive transformations.

The distribution of the Bulimulidae is discussed and figured by PILSBRY 1946, SOLEM 1959b (fig. 15), and PARODIZ 1969 (map 6). In Table 1 the number of (sub)genera in the various areas is summarized for the Bulimulinae and Placostylinae [= Bulimulidae *s.s.*]. The latter subfamily is entirely confined to the Australian Region. Regarding the Bulimulinae, the marked endemism in Perú, Brasil and Ecuador is very striking. Comparative many endemic (sub)genera occur in México.

Fossil records of Bulimulidae *s.l.* are available from Patagonia, Argentina (Paleocene and Eocene, PARODIZ 1946), Brasil (Miocene, PARODIZ 1969, or Early Paleocene – Late Cretaceous, FERREIRA & SANTOS COELHO 1971), and Florida (Miocene, DALL 1890). The Bulimulidae, originally autochthonous in South America have migrated since the Miocene (or Pliocene?) towards Central America, the West Indies and North America. [For details on migration of Tertiairy mollusk faunas, see PARODIZ 1969, p. 189 ff.]

Shells vary from approx. 10–150 mm, the largest to be found in the genus *Placostylus*. In the taxonomy of this family the sculpture of the protoconch is used mainly at (sub)generic level; other types of sculpture (spiral striae, axial riblets, fine knobs or costulae) mainly at species level. The majority of the species have no apertural dentition, but most Odontostominae and some species of Bulimulidae *s.s.* have one or more denticles and/or lamellae in the aperture.

Anatomical data are few. The major features in the anatomy of the Bulimulinae are: a long male tract, simple externally, internally complicated (VAN MOL 1971, fig. 13–17); a moderately long spermathecal duct, which is unbranched; the free retractor muscles are united near junction on the columella.

Authors in the past generally only considered jaw, radula and gross anatomy of the genitalia (*e.g.* BINNEY 1884, FISCHER & CROSSE 1870–1902, SEMPER 1874). More recently additional features have been taken into account (*e.g.* LANZIERI & REZENDE 1965, PILSBRY 1901–1902, VAN MOL 1971).

The Bulimulidae are adapted to various kinds of habitat (*e.g.* trees, rock-faces,

shrubs and litter), which even can be occupied by species of the same genus (*cf.* the adaptive radiation of *Naesiotus* on the Galápagos).

Data on the taxonomy and zoogeography of the family are widely scattered in literature. Only PILSBRY (1895–1896 ... 1901–1902) has made a monographic attempt, but this great work is badly in need of revision.

Summarizing publications of parts of the family, in a taxonomical or geographical sense, are those of MARTENS 1873, 1890–1901, PARODIZ 1942, 1943, SIMPSON 1929, and STREBEL 1909.

DESCRIPTION

Although PILSBRY often presented valuable descriptions in his *Manual of Conchology*, the present author preferred giving a redescription of each species in order to facilitate comparison.

All descriptions are based on material examined, unless otherwise stated.

References are as complete as possible, but generic synonymy has been omitted. For each species localities only have been mentioned if they are new to science. Misidentifications are only indicated by a question-mark if the reference obviously falls outside the distribution of the species, as in most cases it is impossible to trace the material which the author had at hand. References without further details mean that only the name of the species was given.

In the distributional range following each description new localities are followed by an exclamation-mark. If a locality is followed by a reference no material from that particular island was examined.

Among the terms used in this series, some need definition, while others are already well defined (*fide* COX 1955, BROOKES KNIGHT *et al.* 1960). Highly subjective and indefinable ones remain *e.g.* form of the aperture and colour.

PROTOCONCH: The initial whorls formed before hatching. – In this family these whorls are smooth or variously sculptured, a feature commonly used for identification on the genus level (*cf.* PILSBRY 1896), but in the present study it also proved to be useful on the species level.

LOWER SIDE OF THE PROTOCONCH: The abapical part of each protoconch whorl (Fig. 4).

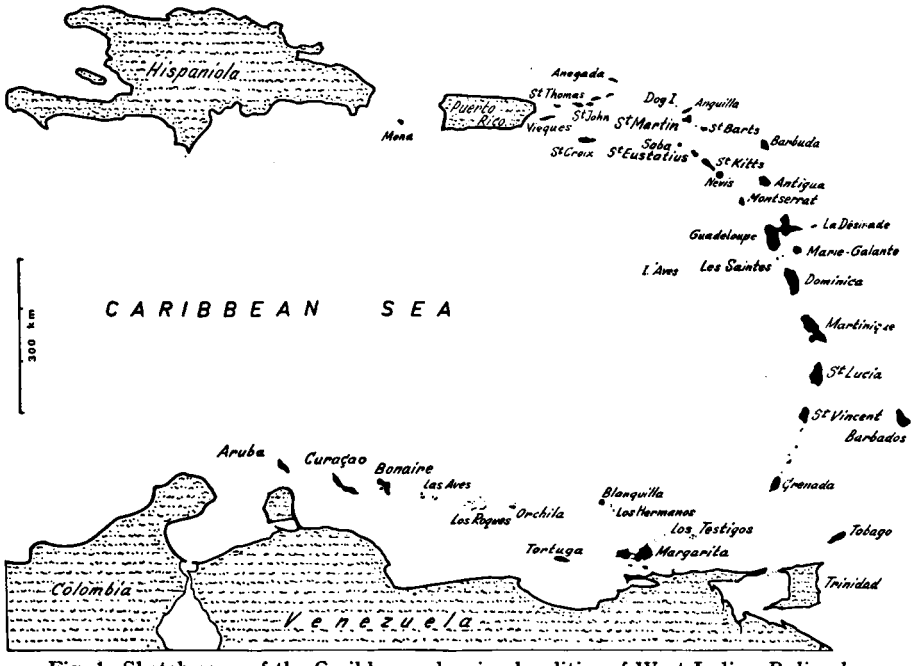

Fig. 1. Sketch map of the Caribbean, showing localities of West Indian *Bulimulus* treated in this paper.

UPPER SIDE OF THE PROTOCONCH: The adapical part of each protoconch whorl (Fig. 4).

COLUMELLAR MARGIN (c.m. in Fig. 5b): The adaxial part of the peristome, running from the base of the columella to the junction at the ultimate whorl. The latter point is sometimes not clearly defined, because of a gradual transition to the parietal region.

PARIETAL REGION (p.r. in Fig. 5b): The part of the aperture formed by the basal surface ot the ultimate whorl.

PALATAL MARGIN (p.m. in Fig. 5b): The abaxial part of the peristome, running from the base of the columella to the suture of penultimate and ultimate whorls. The basal part, also called BASAL MARGIN (b.m. in Fig. 5b), lies below an imaginary line through the base of the columella, perpendicular to the axis of shell.

WEST INDIES: Antilles, Bahamas, Florida Keys, Bermuda, Cayman Islands, Swan Island, Old Providence, St. Andrews.

CARIBBEAN AREA: The part of the West Indies bordering the Caribbean Sea, including the adjacent mainland coast.

ANTILLES: Islands from Cuba to Trinidad and Aruba.

GREATER ANTILLES: Islands from Cuba to Puerto Rico.

LESSER ANTILLES: Islands from Virgin Islands to Trinidad and Aruba. WINDWARD GROUP, from Virgin Islands to Grenada. LEEWARD GROUP, from Los Testigos to Aruba and Los Monges.

METHODS

The measurements taken by means of a metal sliding gauge with vernier are (Fig. 2): height of shell (H); diameter of shell (D); height of aperture (HA); width of aperture (WA); height of ultimate whorl (U); height of penultimate whorl (P).

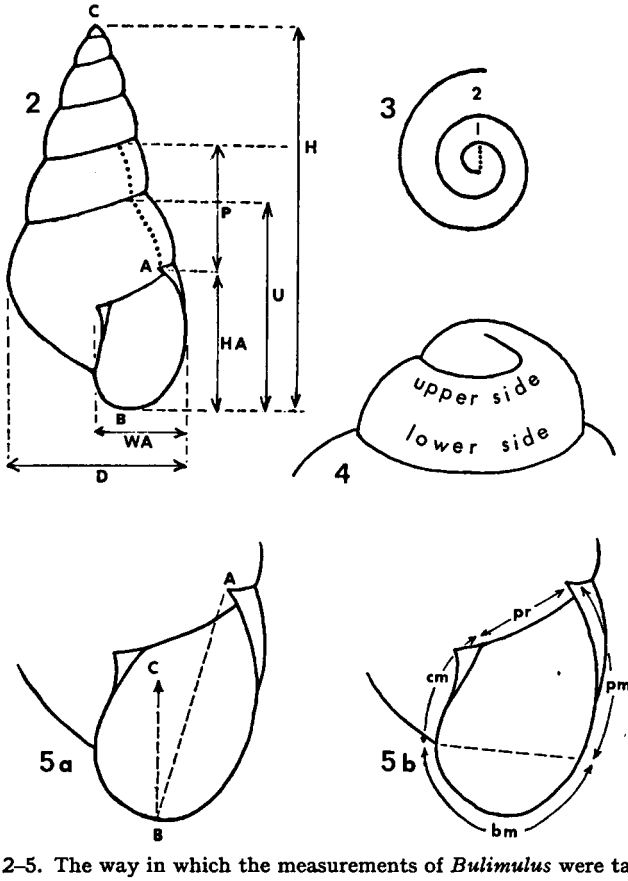

Fig. 2–5. The way in which the measurements of *Bulimulus* were taken.

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 Fig. 3.

From the available material of a locality a maximum of 20 adults were taken at random and measured. Specimens having a certain number of whorls an/or a full-grown peristome were considered adult.

Measurements are given as sample means with 0.95 confidence limits (cl) for the population mean, assuming a normal distribution, as well as the observed range (R). All calculations were made by means of the Hewlett-Packard 9100B Calculator, with hand-written programs.

For most of the species the "apertural deviation" was measured, which is defined as the angle ABC in Fig. 5a, point A being the juncture of the palatal margin to the shell, B the middle of the basal margin, C the top of the shell.

Variation is briefly discussed for most species. Geographical varation is generally not treated exhaustively. It is obvious that most of the species require further study at this level.

Most drawings were made with a camera lucida attachment to a Wild M5 microscope.

The major part of the photographs were taken at the Zoological Laboratory of the State University of Utrecht. Plate I fig. 6 and Pl. V fig. 5 are by courtesy of dr. R. ROBERTSON, Philadelphia.

MATERIAL

The following abbreviations are used in the text to refer to the locations of the specimens:

AMNH – American Museum of Natural History, New York.
ANSP – Academy of Natural Sciences, Philadelphia.
BMNH – British Museum (Natural History), London.
FMNH – Field Museum of Natural History, Chicago.
IRSN – Institut Royal des Sciences Naturelles, Bruxelles.
MCZ – Museum of Comparative Zoology, Cambridge (Mass.).
MNHN – Muséum National d'Histoire Naturelle, Paris.
NMB – Naturhistorisches Museum, Basel.
NRS – Naturhistoriska Riksmuseet, Stockholm.
RMNH – Rijksmuseum van Natuurlijke Historie, Leiden.
SMF – Senckenberg Museum, Frankfurt a. M.
USNM – United States National Museum, Washington.
UZMK – Universitetets Zoologiske Museum, København.
ZMA – Zoölogisch Museum, Amsterdam.

Numbers of specimens studied:

Bulimulus		*Bulimulus*	
fuscus	34	*gittenbergeri*	34
cacticolus	76	*guadalupensis*	4580

constrictus	15	*hummelincki*	129
d. diaphanus	49	*lehmanni*	653
d. fraterculus	69	*lherminieri*	19
dysoni	3	*limnoides*	35
erectus	30	*riisei*	438
eyriesii	47	*stenogyroides*	—

Each description is followed by a list of the material examined.

The localities visited by dr. P. WAGENAAR HUMMELINCK, indicated by station numbers, are described in HUMMELINCK's lists of habitats (1940d, 1953), and in a forthcoming paper in these *Studies*. His material has been deposited in the Rijksmuseum van Natuurlijke Historie at Leiden, unless otherwise stated.

Unfortunately, the material at hand only allows a conchological treatment of the species.

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Most of all I am indebted to dr. P. WAGENAAR HUMMELINCK who kindly allowed me to study the Bulimulidae from his collections. His encouragement, constructive critisism, generous support and valuable comments on the draft manuscript were of great help to my study.

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Prof. dr. W. ADAM and dr. J. VAN GOETHEM showed me the Dautzenberg-collection when I visited the Institut Royal des Sciences Naturelles, in Brussels, whilst dr. J.-J. VAN MOL kindly allowed me to re-examine the material used for his studies on the anatomy of Bulimulidae.

I am grateful to drs. N. NIESER for his patient help during statistical evaluation on the measurements.

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This study could not have been completed without the facilities offered by the Zoological Laboratory of the State University of Utrecht and the "Foundation for Scientific Research in Surinam and the Netherlands Antilles."

SYSTEMATICS

Bulimulus Leach, 1814

LEACH 1814, p. 42. Type species, by original designation: *Helix exilis* Gmelin = *Bulimulus* (*B.*) *guadalupensis* (Bruguière).

Diagnosis – Shell ovate to oblong; uniform brown to yellowish, rarely with bands. Surface usually only with fine spiral striae and growth lines, sometimes with series of hairs. Protoconch generally wrinkled or granulate. Aperture (sub)ovate. Peristome not expanded to slightly reflexed.

Distribution – Antilles, Venezuela, Guyanas, Brasil, Paraguay, Uruguay, Argentina, Perú, Central America.

The genus is represented by two subgenera in the area treated.

KEY TO THE SUBGENERA OF *Bulimulus*

(based on the material dealt with in this paper)

a Surface smooth or with spiral striae; protoconch wrinkled or granulate; peristome not or slightly expanded . *Bulimulus* s.s.
b Surface with spiral series of hairs; protoconch wrinkled zigzag; peristome expanded . . . . . *Rhinus* (p. 49)

The Caribbean species of *Bulimulus* s.s. dealt with in this paper form a homogeneous group of which the representatives are only slightly differentiated. Thirteen species occur in the area treated. The main characteristics are presented in Table 2. The author ventures only to give the following unsatisfactory key.

KEY TO THE CARIBBEAN SPECIES OF *Bulimulus* S.S.

(based on the material dealt with in this paper)

1a Shell solid or rather solid 2
1b Shell thin or rather thin 7

2a Apertural deviation 5–10°, aperture subovate. 3
2b Apertural deviation 0–5°, aperture ovate or squarish-ovate 5

3a Surface of shell with irregular coarse growth riblets . . . . . *B. lehmanni*
Dog Island, Anguilla
3b Surface of shell smooth, except growth lines 4

4a Narrowly perforated; suture rather deep . . . . . *B. dysoni*
?Margarita, Central American mainland
4b Not narrowly perforated; suture well impressed . *B. cacticolus*
Margarita, South American nainland

5a Widely perforated; sides straight; colour white . . . . . fossil specimens of *B. riisei*
?St. Thomas, ?St. John, St. Croix
5b Not widely perforated; sides rather convex; colour not white 6

6a Colour uniformly russetbrown; shell height up to 34 mm . . . *B. limnoides*
Guadeloupe, Dominica, St. Vincent
6b Colour pale yellowish brown, with or without dark brown bands; shell height up to 23.5 mm . . . . . *B. guadalupensis*
Jamaica and Hispaniola – Grenada and Barbados

7a Surface of shell smooth, except growthlines 8
7b Surface of shell sculptured 10

8a Sides rather convex . . . . . *B. guadalupensis*
Jamaica and Hispaniola – Grenada and Barbados
8b Sides straight or slightly convex 9

9a Aperture broadly ovate; margins not converging . . . . . *B. hummelincki*
Barbuda

9b Aperture subovate; margins converging . . . . . *B. erectus*
Margarita, South American mainland

10a Surface with spiral striae 11

10b Surface with crestlike striae . . recent specimens of *B. riisei*
St. Thomas, St. Croix

11a Apertural deviation 10–15°; shell height up to 17.5 mm . . . . . *B. diaphanus*
Hispaniola – Guadeloupe

11b Apertural deviation 5–10°; shell height more than 17.5 mm 12

12a Peristome slightly expanded; ultimate whorl with pale narrow band . . . . . *B. lherminieri*
Guadeloupe

12b Peristome not expanded; ultimate whorl uniformly coloured 13

13a Colour yellowish to greyish white; aperture white inside . . . . . *B. gittenbergeri*
St. Kitts

13b Colour pale russetbrown; inside aperture coloured like outside . . . . . *B. fuscus*
Barbados

Bulimulus (Bulimulus) limnoides (Férussac, 1832)

Pls. I fig. 1–6, VI fig. 6.

Helix (*Cochlogena*) *limnoides* FÉRUSSAC, 1821, p. 53. [Guadeloupe, St. Vincent. Nomen nudum]

Helix limnoides FÉRUSSAC, 1832 [FÉRUSSAC & DESHAYES 1820–51], pl. 142 fig. 9–10. [Indication; Guadeloupe – type locality! (now restricted), lectotype (now): MNHN]

Bulimulus limnoides Férussac, DESHAYES 1838, p. 260. [Description, measurements, references; Martinique]

Bulimus limnoides Desh., PFEIFFER 1841, p. 23. [Refer.]

Bulimus Limnoides Férussac, CATLOW & REEVE 1845, p. 156. [Refer.]

Bulimus limnoides Férussac, PFEIFFER 1848, p. 224. [Descr., refer.]

Bulimus lymnoides Fér., REEVE 1849 [1848–50], pl. 70 fig. 510. [Descr., refer.]
Bulimus (Leptomerus) limnoides Fér., ALBERS 1850, p. 166.
Bulimus limnoides Férussac, DESHAYES 1851 [FÉRUSSAC & DESHAYES 1820–51], p. 71.[Descr., refer.]
Bulimus Limnoides Fér., JAY 1852, p. 200. [Refer.]
Bulimus limnoides Fér., PFEIFFER 1853, p. 433. [Refer.]
Orthalicus (Leptomerus) limnoides Férus., ADAMS & ADAMS 1855 [1853–58], p. 156.
Bulimus limnoides Férussac, PFEIFFER 1855 [KÜSTER & PFEIFFER 1840–65], p. 235, pl. 63 fig. 3–4. [Descr., refer.]
Bulimus (Bulimulus) limnoides Fér., PFEIFFER 1856, p. 161.
Bulimus limnoides Fér., PFEIFFER 1859, p. 498. [Refer.]
Bulimus (Leptomerus) limnaeoides Fér., MARTENS 1860, p. 222. [Type of *Leptomerus*]
Bulimus Limnoides F., BLAND 1861, p. 354, 359.
Bulimus limnoides Fér., PFEIFFER 1868, p. 146. [Refer.]
Bulimus limnoïdes Lamarck?, SCHRAMM 1869, p. 17.
[?] *Bulimus limnaeoides* Fér., BINNEY & BLAND 1875, p. 186, pl. 16 fig. A–B. [St. Kitts]
Bulimus limnoides Fér., PFEIFFER 1877, p. 178. [Refer.]
Bulimus limnoides Lam., KOBELT 1880, p. 282.
Bulimus limnoides Fér., KOBELT 1880, p. 284.
Bulimus limnaeoides Férussac, KOBELT 1880 [1876–81], p. 266, pl. 80 fig. 13.
Bulimus (Leptomerus) limnoides Fér., PFEIFFER & CLESSIN 1881, p. 233. [Refer.]
Bulimus nichollsii BROWN, 1881, p. 57. [Nomen nudum]
Bulimus limnoides Férussac, MAZÉ 1883, p. 20. [Remarks]
Bulimus limnoides Fér., PAETEL 1883, p. 144.
Bulimus nichollsi [Brown ms.] ANGAS, 1884, p. 596, fig. 2–3. [Descr., measurements; Dominica – type locality!, lectotype: ANSP 9958. New synonymy]
[?] *Leptomerus limnaeoides* Fér., BINNEY 1884, p. 123, pls. 12 fig. E, 16 fig. I. [Jaw, radula; St. Kitts]
Bulimus (Thaumastus) nichollsi Brown, SMITH 1888, p. 231. [Refer.]
Bulimulus limnoides Fér., PAETEL 1889, p. 227.
[?] *Bulimulus limnoides* Férussac, MAZÉ 1890, p. 26. [Descr., remarks; St. Martin, "Mirigot, Philisbourg ... rare."]
Bulimulus nichollsii Brown, PILSBRY 1892, p. 357.
Bulimulus (Leptomerus) limnoides (Férussac), SMITH 1895, p. 305. [Refer.]
Bulimulus nichollsi (Brown), PILSBRY 1897 [1897–8], p. 40, pl. 9 fig. 55–56. [Descr., refer., remarks]
Bulimulus limnoides (Férussac), PILSBRY 1897 [1897–8], p. 42, p. 9 fig. 59–60. [Descr. (Deshayes), refer., remarks]
[?] *Bulimulus limnoides* Fér., VERNHOUT 1914, p. 181. [St. Martin]
[?] *Bulimulus (Bulimulus) limnoides* (Férussac), COOMANS 1967, p. 137. [Refer.; St. Martin]
Bulimulus limnoides, VAN MOL 1971, p. 215, fig. 17. [Genitalia]

Shell *up to 34 mm*, 1.8 times as long as wide; more or less narrowly perforated, acute with rather convex sides; *solid and strong. Colour russetbrown*, with a tendency to be somewhat darker on the upper

whorls, sometimes with a pale spiral band on the middle of the ultimate whorl.

Surface slightly shining, densely sculptured with distinct, rather irregular axial riblets, which are interrupted at irregular distance by shallow spiral furrows, thus forming puckered bands.

Protoconch densely and very shallowly sculptured with rather irregular axial furrows.

Whorls about 6.5, slightly convex; upper whorls not rarely denuded of the epidermis; ultimate whorl about 2/3 shell height. Suture well impressed.

Aperture 4/10–1/2 shell height, 1.6–1.7 times as long as wide; *squarish-ovate*, pinkish inside, whitish towards the peristome; apertural deviation 5(–10°).

Peristome solid, acute; basal and part of palatal margin expanded; columellar margin well reflexed and dilated.

Distribution – Guadeloupe [type locality], Dominica, Martinique (DESHAYES 1838), St. Vincent.

This species closely resembles *Bulimulus guadalupensis*, but differs in its greater size, solidness, uniform russetbrown colour and sculpture of the whorls. *Bulimulus guadalupensis* and *B. lherminieri* (on Guadeloupe) also occur in the distributional area of *B. limnoides*.

The measurements of *Bulimulus limnoides* are given in Table 3. This species is striking, both in colour and form. Only in a few specimens was a pale band on the middle of the ultimate whorl observed.

In the Muséum National d'Histoire Naturelle at Paris I could trace the specimen figured by FÉRUSSAC in his *Histoire naturelle*, which is now designated as the lectotype. It is a not quite adult specimen and somewhat aberrant in form of the aperture, but otherwise typical.

Thanks to this discovery it is now possible to place *Bulimus nichollsi* Angas in the synonymy of this species.

DESHAYES' description of *Bulimulus limnoides* is rather misleading and apparently this was the reason why it was not recognized by subsequent authors. In collections this species was confused with *Bulimulus guadalupensis* and *Protoglyptus chrysalis*. Originally it was

described as thin and transparent, while solidity may be considered as characteristic. The sole specimens which are somewhat thinner than the others are from Guadeloupe, Massif de la Soufrière.

The record of *Bulimulus limnoides* from St. Martin is probably based on a wrong identification.

GUADELOUPE. "Massif de la Soufrière, zone de transition à vegetation basse," 19.XI. 1970, 10 sp. IRSN, J.-J. Van Mol leg. – Guadeloupe, 8 sp. MNHN ex Férussac [incl. lectotype].

DOMINICA. Dominica, 5 sp. ANSP 325066, A. D. Brown leg., 1 sp. FMNH 78816 [paratypes of *B. nichollsi* Angas]; 3. sp. BMNH; 2 sp. FMNH 31284 ex Webb ex Ritchie jr.; 4.II.1968, 2 sp. FMNH 157124; 1 sp. IRSN ex Dautzenberg ex Ancey ex Sowerby; 2 sp. USNM 707513 ex Henderson; 4 sp. USNM 707514 ex Henderson ex Ford; 4 sp. USNM 124527 ex Nicholls.

ST. VINCENT. St. Vincent, 3 sp. MNHN ex Férussac ex Lesueur.

Locality? 1 sp. BMNH.

Bulimulus (Bulimulus) guadalupensis (Bruguière, 1789)

Fig. 6–60, Pl. II.

Helix acuta CHEMNITZ, 1786, pl. 134 fig. 1224.1.2. [non *Helix acuta* sensu Müller, 1774, fide PFEIFFER 1840]
KÄMMERER 1786, pl. 12 fig. 2–3.
Bulimus Guadalupensis BRUGUIÈRE, 1789 [1789–92], p. 313. [Description; Guadeloupe – type locality!]
Helix exilis GMELIN, 1791 [1788–92], p. 3668. [Descr.; non *Helix exilis* Gmelin, p. 3616 nec Müller, 1774]
Helix dentrita MONTAGU, 1803, p. 384, pl. 11 fig. 1. [Descr.; no type locality]
Bulimulus trifasciatus LEACH, 1814, p. 42, pl. 18 upper figs. [Descr.; "West Indian" – type locality!]
Bulimulus acutus, LEACH 1814, p. 41, pl. 18 lower figs. [Descr., referring to CHEMNITZ 1786]
Helix Guadaloupensis, DILLWYN 1817, p. 957. [Descr., references]
Helix (Cochlogena) guadalupensis Bruguière, FÉRUSSAC 1821, p. 54. [Puerto Rico, St. Barts, Martinique]
Bulimus Guadelupensis, LAMARCK 1822, p. 123. [Descr., refer.]
Bulimus Guadelupensis, Bosc 1824, p. 94. [Descr., refer.]
Cochlogena guadaloupensis, SOWERBY 1825, p. 39.
Bulimus Guadelupensis Féruss., GUÉRIN-MÉNEVILLE 1829–43, p. 15. [Remarks]
Bulimus guadalupensis Fér., GUÉRIN-MÉNEVILLE 1829–43, pl. 6 fig. 11.
Bulimus guadalupensis Br., MENKE 1830, p. 27.

Bulimus Guadaloupensis, GRIFFITH & PIDGEON 1833–4, pl. 27 fig. 1. [teste PILSBRY 1897–8]
Bulimulus simplex BECK, 1837, p. 66. [Referring to CHEMNITZ 1786 and KÄMMERER 1786; Antilles – type locality!]
Bulimulus Gouadaloupensis, BECK 1837, p. 66. [Refer.]
Bulimus Guadalupensis Brug., DESHAYES 1838, p. 232. [Descr., refer.]
Bulimus exilis Desh., ANTON 1839, p. 42. [Descr., refer.]
Bulimulus trifasciatus, SOWERBY 1839a, p. 14, fig. 283.
[?] *Bulini Guadalupensis* var. *alba* SOWERBY, 1839b, p. 144, pl. 38 fig. 13. [Descr.; Brasil – type locality!]
Bulimulus Antiguensis Guilding, in SWAINSON 1840, p. 335. [Nomen nudum]
Bulimus guadeloupensis, PFEIFFER 1840, p. 29. [Referring to CHEMNITZ 1786]
Bulimus exilis Gmelin, KÜSTER 1841 [KÜSTER & PFEIFFER 1840–65], pl. 10 fig. 14–15.
Bulimus guadeloupensis Brug., PFEIFFER 1841, p. 23. [Refer.]
Bulimus Antiguensis Guilding, CATLOW & REEVE 1845, p. 150. [Refer.]
Bulimus guadaloupensis Bruguière, CATLOW & REEVE 1845, p. 155. [Refer.]
Bulimulus trifasciatus Leach, SOWERBY 1846, p. 87, fig. 283.
Bulimus exilis Gmelin, PFEIFFER 1848, p. 223. [Descr., refer.; St. Vincent, ?Brasil]
Bulimus rubrifasciatus REEVE, 1848 [1848–50], pl. 44 fig. 277. [Descr.; no type locality]
Bulimus exilis, REEVE 1848 [1848–50], pl. 46 fig. 292. [Descr., refer.]
Bulimus Guadaloupensis, REEVE 1848 [1848–50], pl. 46 fig. 294a–b. [Descr., refer.]
Bulimus (*Leptomerus*) *exilis* Gmel., ALBERS 1850, p. 166.
Bulimus exilis, BLAND 1852, p. 219. [teste PILSBRY 1897–8]
Bulimus Antiguensis Guild., JAY 1852, p. 189. [Refer.; St. Vincent]
Bulimus exilis Gmel., JAY 1852, p. 195. [Refer.]
Bulimus Guadalaloupensis Brug., JAY 1852, p. 198.
Bulimus (*Bulimulus*) *exilis* Gm., MÖRCH 1852, p. 23. [St. Thomas]
Bulimus exilis Gmel., PFEIFFER 1853, p. 433. [Refer.]
Bulimus Guadalupensis Brug., SHUTTLEWORTH 1854a, p. 44. [Remarks]
Bulimus Guadalupensis Brug., SHUTTLEWORTH 1854b, p. 69.
Orthalicus (*Leptomerus*) *exilis* Gmel., ADAMS & ADAMS 1855 [1853–8], p. 156.
Bulimus exilis Gmelin, PFEIFFER 1855 [KÜSTER & PFEIFFER 1840–65], pl. 63 fig. 15–18.
Helix Guadaloupensis, HANLEY 1856 [1842–56], p. 174, pl. 35 fig. 157.
Helix substriata Wood, HANLEY 1856 [1842–56], p. 174, pl. 35 fig. 158. [Non GMELIN 1791]
Bulimus (*Bulimulus*) *exilis* Gm., PFEIFFER 1856, p. 161.
Bulimus Guadalupensis Brug., BEAU 1857, p. 492.
Bulimus exilis Gmel., DROUËT 1859, p. 62. [Cayenne]
Bulimus exilis Gmel., PFEIFFER 1859, p. 498. [Refer.]
Bulimulus (*Thaumastus*) *guadelupensis* Brug., MARTENS 1860, p. 215. [Barbados]
Bulimus exilis Gm., BLAND 1861, p. 351, 354, 358–360. [Vieques, St. Martin, St. Kitts, Antigua]
Bulimus exilis Gmelin, PFEIFFER 1865? [KÜSTER & PFEIFFER 1840–65], p. xvii.
Bulimulus exilis Gmelin, BLAND 1868, p. 191. [Grenada]
Bulimulus exilis Gmelin, GUPPY 1868, p. 431. [Remarks; Dominica]
Bulimus exilis Gmel., PFEIFFER 1868, p. 145. [Refer.]
Bulimulus exilis Gmel., BLAND 1869, p. 238.

Bulimulus guadeloupensis Brug., PAETEL & SCHAUFUSS 1869, p. 81.
Bulimus exilis var. Müller, SCHRAMM 1869, p. 17.
Bulimus Guadalupensis Bruguière, SCHRAMM 1869, p. 17.
Bulimus Guadalupensis, FISCHER 1872, p. 293. [Jaw, radula]
Bulimulus Guadelupensis Brug., MARTENS 1873, p. 178. [Jaw, radula]
Bulimus Guadeloupensis Brug., PAETEL 1873, p. 100.
Bulimulus guadelupensis Brug., SEMPER 1874 [1870–85], p. 154, pl. 17 fig. 14. [Genitalia, jaw, radula]
Bulimulus exilis Gmelin, MAZÉ 1874, p. 164.
Bulimus exilis, BLAND 1875, p. 200. [Montserrat]
Bulimulus guadalupensis, FISCHER & CROSSE 1875 [1870–1902], p. 470, pl. 19 fig. 13–16. [Genitalia, jaw, radula]
Bulimulus exilis Gmel., MARTENS 1877, p. 351. [Refer., remarks]
Bulimus exilis Gmel., PFEIFFER 1877, p. 177. [Refer.]
Bulimulus exilis Gm., GIBBONS 1879, p. 130. [St. Lucia]
Bulimulus exilis Gmel., KOBELT 1880, p. 276, 278, 280–284.
Bulimulus (*Thaumastus*) *exilis* Gmelin, KOBELT 1880 [1876–81], p. 266, pl. 81 fig. 11.
Bulimus exilis Gmelin, BROWN 1881, p. 56. [Remarks]
Bulimulus (*Thaumastus*) *exilis* Gmel., PFEIFFER & CLESSIN 1881, p. 246. [Refer.]
Bulimulus exilis Gmelin, FISCHER 1883 [1880–7], p. 474.
Bulimulus exilis, GUNDLACH 1883, p. 41. [Refer., remarks]
Bulimulus exilis Gmelin, MAZÉ 1883, p. 17, 43, 48, 52. [Remarks; Saintes, Désirade, Marie-Galante]
Bulimulus Eyriesi Drouët, MAZÉ 1883, p. 17. [Remarks; Guadeloupe]
Bulimulus exilis Gm., PAETEL 1883, p. 144.
Bulimulus exilis var. *Guadaloupensis* Gdlch., PAETEL 1883, p. 144.
Bulimus (*Leptomerus*) *exilis* Gmelin, ANGAS 1884, p. 596. [Remarks]
Bulimulus exilis Gmelin, SMITH 1884, p. 277.
Bulimus (*Thaumastus*) *exilis* (Gmelin), SMITH 1888, p. 231, 419. [Remarks]
Bulimulus exilis Gmel., JOHNSON 1890, p. 60.
Bulimulus exilis Gmelin, MAZÉ 1890, p. 24. [Refer., remarks]
Bulimulus Eyriesi Drouët, MAZÉ 1890, p. 24. [Remarks; St. Martin]
Bulimus exilis, SHARP 1890a & b, p. 124 & 148. [Remarks]
Bulimulus exilis Gmelin, CROSSE 1891, p. 129. [Refer., remarks; Hispaniola]
Bulimulus exilis Gmelin, MARTENS 1891, p. 132.
Bulimulus exilis (Gmelin), SMITH & FEILDEN 1891, p. 252. [Refer., remarks]
Bulimulus exilis Gmelin, CROSSE 1892, p. 24. [Refer., remarks]
Bulimulus exilis Gmel., PILSBRY 1892, p. 357.
Bulimus exilis, ROPER 1895, p. 14. [Jamaica, "Castleton, not far from the botanical gardens".]
Bulimulus (*Thaumastus*) *exilis* (Gmelin), SMITH 1895, p. 305.
Bulimulus exilis (Gmelin), PILSBRY 1897 [1897–8], p. 37, pl. 9 fig. 61–67. [Descr., refer., remarks]
Bulimulus exilis var. *eyriesii* (Drouët), PILSBRY 1897 [1897–8], pl. 12 fig. 54–60. [Fig. 53, descr., type locality, and all refer. excl., except MAZÉ 1883, 1890; Guadeloupe]
Bulimulus (*Thaumastus*) *exilis* Gml., VENDRYES 1899, p. 599.
Bulimulus (*Orthotomium*) *exilis* Gmelin, DAUTZENBERG 1900, p. 152.

Bulimulus guadalupensis (Brug.), PILSBRY 1901 [1901–2], p. 143, pl. 52 fig. 24, pl. 53 fig. 31, pl. 59 fig. 3. [Replacement of *B. exilis*; anatomy]
Bulimulus exilis Gmelin, DALL & SIMPSON 1902, p. 378, pl. 53 fig. 3. [Descr., refer.]
Bulimulus exilis var. *eyriesii* Drouët, DALL & SIMPSON 1902, p. 378. [Diagn., refer.; Puerto Rico]
Thaumastus exilis, PIAGET 1914, p. 262. [Refer.]
Thaumastus exilis var. *trifasciatus*, PIAGET 1914, p. 262. [Diagn. only]
Thaumastus exilis var. *rubrifasciata*, PIAGET 1914, p. 262. [Diagn. only; "Brot ms., in coll."]
Thaumastus exilis var. *concolor* [Brot ms.] PIAGET, 1914, p. 262. [Descr. No type locality. New synonymy]
Bulimulus guadalupensis Brug., VERNHOUT 1914, p. 181.
Bulimulus guadalupensis eyriesii Drouët, VERNHOUT 1914, p. 181. [St. Martin]
Bulimulus guadelupensis Brug., SCHEPMAN 1915, p. 480.
Bulimulus guadalupensis (Brug.), H. B. BAKER 1926, p. 38. [Genitalia]
Bulimulus guadeloupensis Brug., CLENCH & AGUAYO 1937, p. 73.
Bulimulus exilis (Gmelin), VAN DER SCHALIE 1948, p. 87, pl. 7 fig. 1–1d. [Remarks, distribution on Puerto Rico (map 55); incl. var. *eyriesi* (Drouët)]
Bulimulus exilis Gmelin, ODHNER 1950, p. 262, fig. 13 non 12l. [Genitalia]
Bulimulus guadalupensis Bruguière, CLENCH 1950, p. 273. [Refer.]
Bulimulus guadalupensis eyriesii Drouët, CLENCH 1950, p. 273. [Refer., remarks; Mona]
Bulimulus exilis Gmelin, JAUME 1952, p. 624.
Bulimulus guadeloupensis (Brug.), CLENCH 1956, p. 69–70. [Barbuda]
Bulimulus (*Bulimulus*) *guadalupensis* (Bruguière), ZILCH 1960 [1959–60], p. 484, fig. 1704.
Bulimulus guadalupensis guadalupensis Brug., AGUAYO 1961, p. 95.
Bulimulus guadalupensis eyriesii Drouët, AGUAYO 1961, p. 95.
Bulimulus exilis, MALEK 1965, p. 38.
Bulimulus guadalupensis guadalupensis Bruguière, AGUAYO 1966, p. 4.
Bulimulus guadalupensis eyriesii Drouët, AGUAYO 1966, p. 4.
Bulimulus quadeloupensis Bruguière, COOMANS 1966, p. 18. [Puerto Rico, Magueyes Id., indian site]
Bulimulus (*Bulimulus*) *guadaloupensis* (Bruguière), COOMANS 1967, p. 136. [Refer., remarks]
Bulimulus (*Bulimulus*) *guadaloupensis eyriesi* (Drouët), COOMANS 1967, p. 137. [Refer.]
Bulimulus guadalupensis (Bruguière), JACOBSON 1968, p. 23. [Refer., remarks; St. Croix]
Bulimulus guadalupensis eyriesii (Drouët), JACOBSON 1968, p. 23. [Refer., remarks; St. Croix]
Thaumastus exilis Gmel., S. G. A. JAECKEL 1969, p. 802. ["Guiana"]
Bulimulus (*Bulimulus*) *guadalupensis* Bruguière, CLENCH 1970, p. 59. [Refer.; Saba]
Bulimulus guadalupensis, VAN MOL 1971, p. 215, 218, fig. 7A. [Genitalia]

Shell up to 23.5 mm, 1.8–2.3 as long as wide; narrowly perforated or with clefty umbilicus, acute with *rather convex sides*; rather thin to solid. Colour pale yellowish brown, *commonly with distinct brown*

spiral bands (1–2 3 4–5 and 0 0 3 0 0); less common with indistinct bands or none whatsoever (0 0 0 0 0), usually with darker apex; rarely uniformly dark-brown (1–2–3–4–5); generally with a pale zone below the suture.

Surface lustreless, almost smooth; sometimes numerous, delicate striae may be observed.

Protoconch generally densely granulated on lower side, changing into zigzag wrinkles on upper side.

Whorls about 6, slightly convex; ultimate whorl about 7/10 shell height. Suture well impressed.

Aperture about 4/10 shell height, 1.4–2.0 as long as wide; subovate to squarish-ovate, whitish and somewhat shining inside or with the same colour pattern of the outside; palatal margin often flattened; basal margin very slightly expanded. Apertural deviation 0–5°, in some specimens slightly more.

Peristome usually *more or less thickened*, rarely thin; slightly sinuous; margins sometimes joined by a thin callus; columellar margin well reflexed, more or less dilated.

Distribution – Jamaica, Hispaniola, Mona, Puerto Rico, Vieques, St. Thomas, St. John!, Anegada!, St. Croix, Anguilla!, St. Martin, St. Barts, Saba, St. Eustatius!, St. Kitts, Nevis!, Barbuda, Antigua, Montserrat, Guadeloupe [type locality], La Désirade, Marie-Galante, Iles des Saintes, Dominica, Martinique, St. Lucia, St. Vincent, Grenada, Barbados. – Doubtful: Guyane française, Cayenne (DROUËT 1859); Brasil (SOWERBY 1839b).

Bulimulus guadalupensis differs from *B. limnoides* in its size, its colour, its smooth surface and the sculpture of the protoconch; from *B. gittenbergeri* in its rather convex sides and its apertural deviation of 0–5°.

The species is very variable, both in form of shell and aperture (Fig. 6–59), and in colour. The colour patterns, as described above, are not restricted to a geographical area, and in a single population usually more than one pattern occurs. Although the shells are usually solid and pale yellowish brown, some specimens from Puerto Rico (Sta. 698, 699, 700 and 702) are thin, and pale dirty brown when fresh. Probably this is an ecological form, as in only these particular localities is limestone absent in the subsoil. This form may be identi-

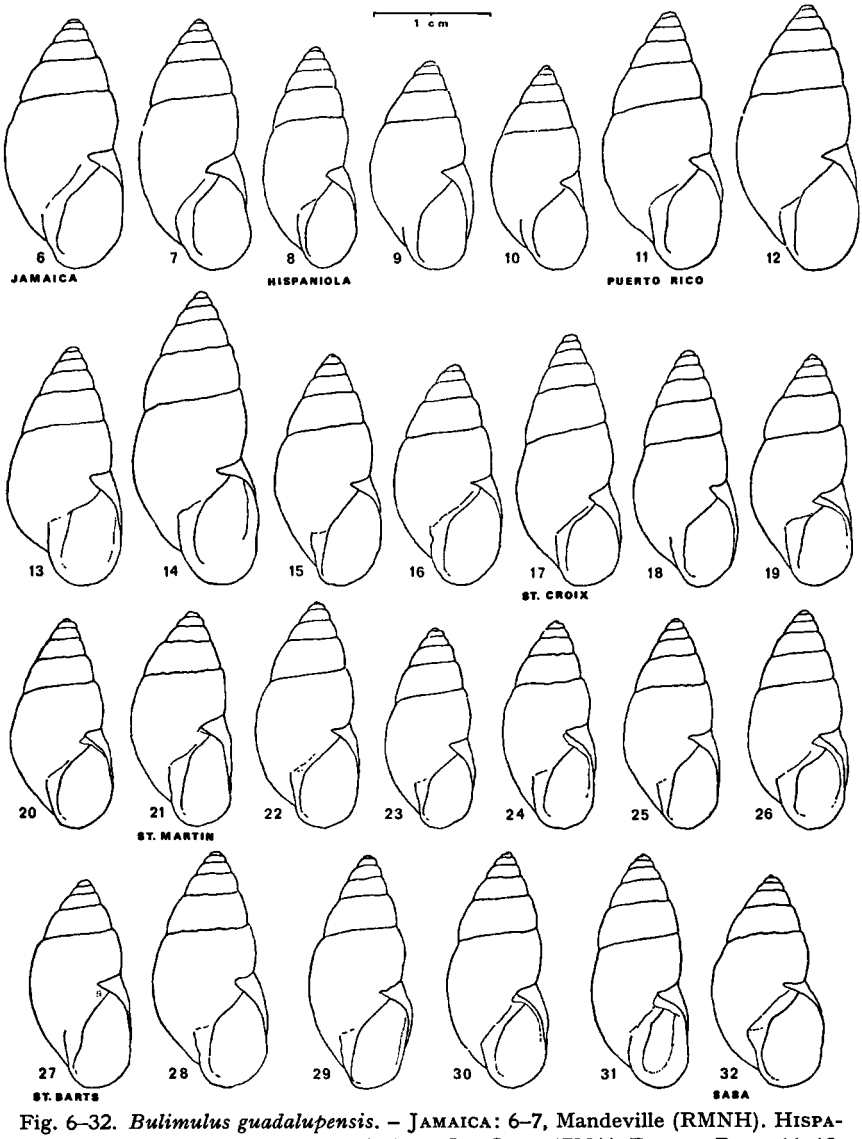

Fig. 6–32. *Bulimulus guadalupensis*. – JAMAICA: 6–7, Mandeville (RMNH). HISPANIOLA: 8, Riv. de Port Sabut (ZMA); 9–10, Les Cayes (ZMA). PUERTO RICO: 11–12, Aguadilla (USNM 464288); 13, Lares (USNM 393025); 14–15, Mayagüez (ANSP 225244); 16, id. (USNM 424052). ST. CROIX: 17, Upper Bethlehem (Sta. 612); 18–20, Fredensborg Hill (Sta. 615). ST. MARTIN: 21, Old Battery (Sta. 461a); 22–23, Point Blanche Bay (Sta. 606a); 24–25, Fort Willem's Ruines (Sta. 709); 26, Pt. Blanche Pond (Sta. s.n.). ST. BARTS: 27–29, Gustavia (Sta. 449); 30–31, Public (Sta. 451). SABA: 32, (RMNH).

cal with the variety *eyriesi* of VAN DER SCHALIE (1948, p. 88). Ten specimens from Sta. 702 showed the following anatomical differences, compared with those from St. Martin and Guadeloupe: 1) male tract not contorted; 2) penial retractor more distally attached. However, these differences are slight and may prove to be individual.

The measurements of *Bulimulus guadalupensis* are given in Table 4 and Fig. 60. From these data it can be concluded that no infraspecific differentiation occurs. It is obvious that this species can adapt itself easily to various habitats, resulting in a widespread distribution in the Antilles.

Bulimulus guadalupensis is usually found on shrubs and tree trunks. According to HUMMELINCK's samples the species is common on limestone, but also occurs on diabase, cherts, diorite, andesitic tuffs and other volcanic rocks.

JAMAICA. Ulster Spring (Trelawny), 7 sp. SMF 22643 ex MCZ, L. Perkins leg. – Mandeville, 1936, 10 sp. RMNH ex MCZ, Grisom leg.; II.1950, 55 sp. RMNH ex Venmans. – Jamaica, 2 sp. UZMK.

HISPANIOLA. Haiti, Aux Cayes, 3 + 3 sp. SMF 22645/6 ex Von Moellendorff. – Mouth of Rivière des Port Sabut, Dept. du Sud, 22 sp. ZMA, Orcutt leg. – Near Les Cayes, Dept. du Sud, V.1929, 11 sp. ZMA, Orcutt leg. – Port-au-Prince, 3 sp. SMF 92402 ex Soelner. – Haiti, 5 sp. UZMK ex Krebs. – Santo Domingo, Santa Barbara de Samaná, 9 sp. RMNH ex MCZ, Clench, Russell & McLean leg. – S. Domingo, Puerto Sosua, VII.1937, 41 sp. RMNH ex MCZ, Clench, Russell & McLean leg. – St. Domingo, 4 sp. UZMK, Riise leg.; 1 sp. UZMK ex Swift.

MONA. Mona Isl., 31 sp. MCZ 171035, H. A. Beatty leg.; 1950, 6 sp. USNM 596591, C. A. Kaye leg.

PUERTO RICO. Las Mesas, E of Mayagüez, 300 m, leaf decay of mango, 20.IX.1963 (Sta. 695), 14 sp. – W slope of Cerro Papayo, E of La Parguera, 20–100 m, rocky slope without limestone, 19.IX.1963 (Sta. 698), 72 sp. – Saliña Papayo, E of La Parguera, sandy mud flat, 13.IX.1963 (Sta. 699), 33 sp. – Magueyes Id., 30.I.1963, 28 sp. ZMA, J. H. Stock leg. – Isla Magueyes, La Parguera, 15–23 m, rocks without limestone, 10.IX.1963 (Sta. 700), 50 sp. – Isla Cueba, Parguera, SE coast, 12 m, limestone, 11.IX.1963 (Sta. 701), 4 sp. – Isla Cueba, NW part, 2–5 m, sandy mud and limestone, 11.IX.1963 (Sta. 701A), 16 sp. – Ensenada, northern hill near former lagoon, 20–30 m, rocky slope without limestone, 15.IX.1963 (Sta. 702), 44 sp. – Guánica, Ensenada Pt., 15 sp. MCZ 137632, J. L. Peters leg. – Guánica, 5 sp. MCZ 90697, P. J. Darlington leg. – Yabucoa, 8 sp. NMB 4260*h* ex ZMB ex Paravicini;

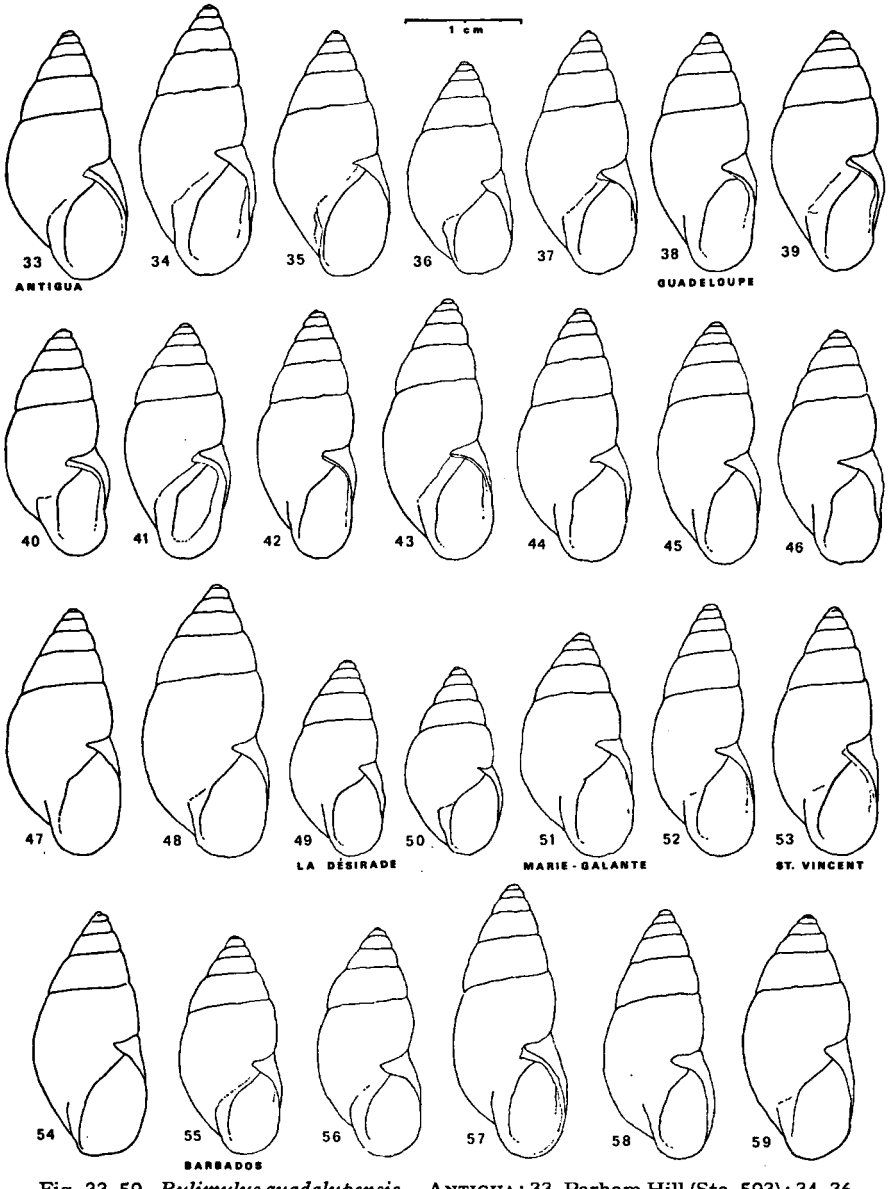

Fig. 33–59. *Bulimulus guadalupensis*. – ANTIGUA: 33, Parham Hill (Sta. 593); 34–36, Friars Hill (Sta. 594); 37, id. (Sta. 595A). GUADELOUPE: 38–41, Ravine de Boisvin (Sta. 724); 42–46, Usine Gardel (Sta. 726); 47, Petit-Bourg (Sta. s.n.); 48, Guadeloupe (UZMK). LA DÉSIRADE: 49–50, Grande Anse (Sta. 732). MARIE-GALANTE: 51, Grelin (Sta. 746); 52, Falaise des Sources (Sta. 748). ST. VINCENT: 53–54, (BMNH). BARBADOS: 55, Hackleton's Cliff (Sta. 774); 56–58, Welchman Hall's Gully (Sta. 776); 59, Christchurch (NMB).

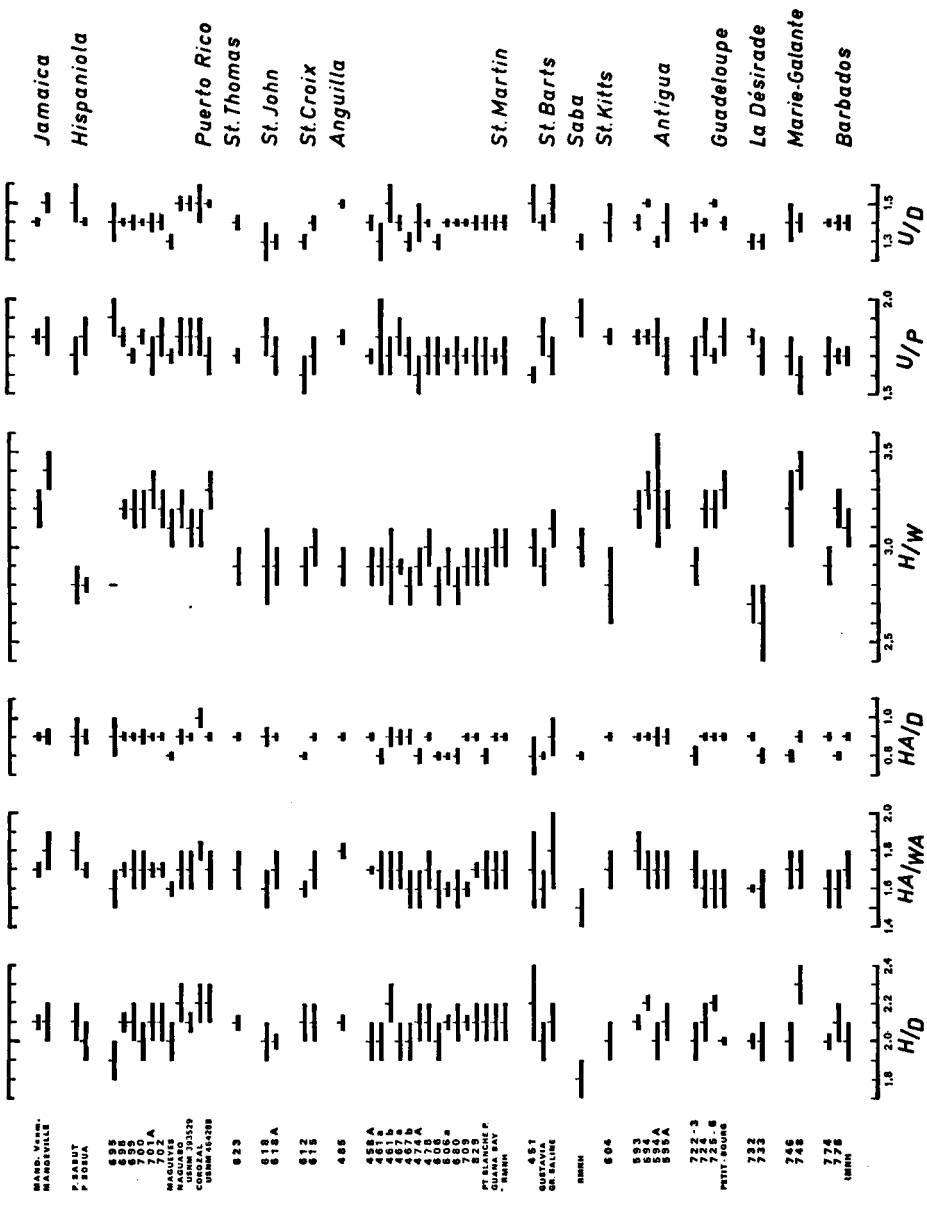

Fig. 60. Measurements in *Bulimulus guadalupensis*.

5 sp. SMF 92408 ex ZMB. – Humacao, 26.VI.1929, 10 sp. USNM 393539, P. Bartsch leg. – Naguabo, cemetery, 21.VII.1931, 316 sp. USNM 419622, Gallardo leg. – Ceiba, 2 + 21 sp. NMB 4260*i*+*n* ex Boissier. – Luquillo, near beach, 23.VI.1929, 215 sp. USNM 393400, Bartsch leg. – ½ mi. W of Luquillo, hill side with boulders, 1 sp. USNM 474182, Bartsch leg. – Cangrejos Pt., 4 sp. USNM 707510 ex Henderson. – San Juan, 3 sp. NMB 4260*k* ex Boissier, Blauner leg.; 11 sp. NMB 4260*l* ex Schneider; 4 sp. USNM 159672 ex U.S. Fish Comm.; 1 sp. USNM 161593 ex U.S. Fish Comm.; 93 sp. USNM 393529, Bartsch leg.; wall School Trop. Medic., 2.VII. 1929, 90 sp. USNM 393822, Bartsch leg. – First hill beyond [W] Bayamón, 1 sp. USNM 393270, Bartsch leg. – Puenta Fuco, road Bayamón-Arecibo, 6.VII.1929, 1 sp. USNM 393609, Bartsch leg. – N of Corozal, XII.1940, 5 sp. ZMA. H. Van der Schalie leg. – Arecibo, near Dorado, rocky foothills, 27.II.1936, 1 sp. USNM 428711, ex E. V. Cowdry jr. leg. – Aguadilla, 109 sp. USNM 464288, Gallardo leg.; 1 sp. USNM 161595 ex U.S. Fish Comm. – Lares, 7.VII.1929, 64 sp. USNM 393025, Bartsch leg.; 7 sp. USNM 519568, W. H. Weeks leg. – Río Blanco, Sierra de Caduros, 3 sp. SMF 22644 ex Boettger, Goldfuss leg. – Mayagüez, 40 sp. ANSP 225224, Warmke leg.; Agric. Exp. Sta., 8 sp. USNM 424052, Van Volkenberg leg. – "Mogote Celestina Realte," 9 sp. USNM 393490, Bartsch leg.; VI.1929, 8 sp. USNM 393638, Bartsch leg. – "El Factor," 6.VII.1929, 20 sp. USNM 393567, Bartsch leg.; 19.VII. 1929, 25 sp. USNM 393612, Bartsch leg. – "El Morro and Casa Blanca gardens," 81 sp. USNM 430727 ex Johnson-Smiths. Deepsea Exp. – "road from Pueblo Viejo," 34 sp. USNM 430910 ex Johnson-Smiths. Deepsea Exp. – Puerto Rico, 12 sp. AMNH 62115 ex Crooke; 10 sp. NMB 4260*o* ex Schneider; 1 sp. SMF 92406, Azpeitia leg.; 2 sp. SMF 92410 ex Boettger; 2 sp. USNM 492691 ex Henderson ex Redfield; 6 sp. USNM 492692 ex Henderson ex Webb.

VIEQUES. E of Isabel Sequenda, 1929, 16 sp. ZMA, P. Bartsch leg. – Vieques, 6 sp. USNM 492693 ex Henderson ex Redfield; 22 + 2 + 8 sp. UZMK, Riise leg.

ST. THOMAS. Drake Seat, near Charlotte Amalie, 300 m, cherts and conglomerates, 16.III.1937 (Sta. 300), 2 sp. – Magens Bay, 1–3 m, sandy, 20.VI.1955 (Sta. 623), 63 sp. – St. Thomas, 6 sp. BMNH, A. S. Kennard leg.; 6 sp. SMF 22648 ex Von Moellendorff; 5 sp. SMF 45580, H. Eberwein leg.; 3 sp. SMF 92398 ex Krüper; 4 sp. SMF 92409 ex Boettger; 1 + 2 + 5 sp. UZMK, Riise leg.

ST. JOHN. Chocolate Hole, 30 m, diabase-like rocks and cherts, 19.VI.1955 (Sta. 618), 5 sp. – Chocolate Hole, 30 m, bark of Tamarindus, 19.VI.1955 (Sta. 618A), 56 sp. – St. John, 7 sp. MCZ 90406 ex Bland ex Amherst College.

ANEGADA. Anegada, 29.XI.1954, 4 sp. MCZ 203771, R. M. Bond leg.

ST. CROIX. Upper Bethlehem, eastern hill slope, marly limestone, 14.VI.1955 (Sta. 612), 50 sp. – Southern slope of Fredensborg Hill, marly limestone, 11.VI.1955 (Sta. 615), 69 sp. – Canaän stream valley, volcanic rock with limestone, 10.VI.1955 (Sta. 616), 1 sp. – Canaän, garden, volcanic rock, 22.VI.1955 (Sta. 617), 8 sp. – Concordia, 1 sp. MCZ 110334, H. A. Beatty leg. – St. Nicholas, 6 sp. MCZ 110333, Beatty leg. – St. Croix, 4 sp. FMNH 19133 ex Hall.

ANGUILLA. N of Sandy Ground, northern slope at shore, 5–10 m, limestone, 16.VI. 1949 (Sta. 485), 100 sp. – Sandy Ground, 2–5 m, sandy, 19.VI.1949 (Sta. s.n.), 6 sp. – Valley, RMNH, G. A. Seaman leg. – Anguilla, 6 sp. BMNH ex Gregory.

ST. MARTIN. Old Battery Hill (Signal Hill), SE of Philipsburg, western slope, 80 m, mainly limestone, 17.III.1937 (Sta. 299), 4 sp. – Point Blanche, W slope, 60 m, chiefly limestone, 29.VIII.1967 (Sta. 458a), 2 sp. – Point Blanche, W. top, 100 m, mainly limestone, 25.VII.1955 (Sta. 458A), 29 sp. – Old Battery, SE Philipsburg, 5 m, chiefly limestone, 2.VI.1955 (Sta. 461a), 6 sp.; 7.X.1963 (Sta. 461b), 16 sp. – St. Peter, Cul-de-Sac, Agr. Exp. Sta., 20 m, 29.VI.1955 (Sta. 467a), 13 sp.; 2.X.1963 (Sta. 467b), 22 sp. – Meschrine Hill (Corner Hill), W slope, 30 m, limestone, 2.VIII. 1967 (Sta. 473a), 14 sp. – Devils Hole in western base of Meschrine Hill, 1–5 m, limestone debris, 27.VII.1955 (Sta. 474A), 15 sp. – Little Key, island in Simson Lagoon, 1–2 m, chiefly tuffoid rock, 2.VIII.1949 (Sta. 478), 30 sp. – Point Blanche Bay near E. shore, 5–10 m, coral sandstone, 5.VI.1955 (Sta. 606), 22 sp.; 26.IX.1963 (Sta. 606a), 250 sp. – Little Bay Pond, near shore, sandy debris, 4.VI.1955 (Sta. 680), 13 sp. – Fort Hill, Fort Willem's Ruines, W of Philipsburg, 220 m, chiefly limestone, 2.X.1963 (Sta. 709), 300 sp. – Point Blanche Bay, 10 m, coral sandstone terrace, 29.VII.1967 (Sta. 829), 30 sp. – Old Battery Hill, 5.VI.1955 (Sta. s.n.), 2 sp. – Point Blanche Pond, 5.VI.1955 (Sta. s.n.), 28 s.p. – Meschrine Hill, 26.VII.1955 (Sta. s.n.), 4 sp. – Flamingo Pond, Simson Lagoon, 27.VI.1955 (Sta. s.n.), 6 sp. – Oysterpond, SE, 13.X.1963 (Sta. s.n.), 5 sp. – Marigot Hill, 43 sp. ZMA, Hummelinck leg. – Guana Bay, 6.IX.1962, 125 sp. RMNH, Louise J. van der Steen leg. – Simson Bay, 16 + 5 sp. RMNH ex Venmans. – St. Martin, 17.VII.1971, 46 sp. RMNH, Fr. M. Arnoldo leg.; 3 sp. AMNH 13008 ex Crooke; 1 + 1 sp. MNHN ex H. Fischer ex Crosse ex Mazé; 15.V.1890, 3 sp. USNM 492689 ex Henderson ex Prime, A. D. Brown leg.

ST. BARTS. Yard in Gustavia, 10 m, diorite rock debris, 5.VI.1949 (Sta. 449), 60 sp. – Roadside at cape S of Public, 5–10 m, diorite, 4.VI.1949 (Sta. 451), 5 sp. – Gustavia, 4.VI.1949 (Sta. s.n.), 24 sp. – Grande Saline, 3.VI.1949 (Sta. s.n.), 13 sp. – St. Barts, 1 sp. SMF 92399; 8 + 6 sp., UZMK ex Hjalmarson; 2 sp. UZMK ex Krebs; 19 sp. UZMK, Riise leg.

SABA. Road to Bottom, 150 m, andesitic rock, 6.X.1963 (Sta. 298C), 19 sp. – Bottom, 1949 (Sta. s.n.), 4 sp. – Windwardside, 400 m, andesitic rock, 6.X.1963 (Sta. s.n.), 3 sp. – Saba, 8 sp. MCZ 279957, F. Lagois leg.; 24.VII.1971, 18 sp. RMNH, Fr. M. Arnoldo leg.

ST. KITTS. Timothy Hill at Frigate Bay, 5–20 m, andesitic tuff, 20.VII.1955 (Sta. 604), 19 sp. – Frigate Bay beach, 20.VII.1955 (Sta. s.n.), 1 sp. – Between Jugate Bay and Basseterre, VII.1937, 2 sp. RMNH ex Venmans. – Phillips, 1000 ft, 1 + 6 sp. MCZ 213547/8, G. A. Seaman leg. – St. Kitts, 6 sp. BMNH, A. S. Kennard leg.; 58 sp. MCZ 74556; 12 sp. MCZ 90408 ex Bland ex Swift; 7 sp. UZMK, Riise leg.

NEVIS. Nevis, 5 sp. MCZ 90407 ex Bland ex Rawson.

BARBUDA. Martello Tower, 1–2 m, sand and limestone, 8.VII.1955 (Sta. 596), 1 sp. – Low Pond, N of Codrington Village, limestone flat, 21.VII.1967 (Sta. 647a), 3 sp. – Barbuda, 11 sp. BMNH; 1 sp. MCZ 80508, D. Fairchild leg.

ANTIGUA. Parham Hill, southern slope, 50 m, limestone, 14.VII.1955 (Sta. 593), 18 sp. – Friars Hill, S. of Agr. Exp. Sta., 50–70 m, weathered rock, 16.VII.1955 (Sta. 594), 32 sp. – Friars Hill, 70–80 m, 16.VII.1955 (Sta. 594A), 6 sp. – Yepton Mill, W

of St. John's, 50 m, rocky slope, 17.VII.1955 (Sta. 595A), 11 sp. – Vernons Pond, 14.VII.1955 (Sta. s.n.), 4 sp. – English Harbour, 4 sp. BMNH, A. S. Kennard leg. – Shirley Heights, 25.II.1931, 82 sp. BMNH, A. K. Totton leg. – Antigua, 5 sp. MCZ 90405 ex Bland ex Rawson, Purvis leg. – 2 sp. FMNH 106440 ex Columbia Univ. ex Brand.

MONTSERRAT. Montserrat, Galway, 1 sp. ZMA, R. Pinchon leg.

GUADELOUPE. Cave d'Autre Bord, E of Moule, 20 m, limestone, 29.I.1964 (Sta. 722 + 723), 9 sp. – Ravine de Boisvin, S of Moule, 100 m, tuffoid rocks with limestone, 29.I.1964 (Sta. 724), 100 sp. – Usine Gardel, E of Moule, 50 m, weathered soil on limestone, 30.I.1964 (Sta. 725 + 726), 200 sp. – Petit-Bourg, andesitic rock, 5.II. 1964 (Sta. s.n.), 17 sp. – Guadeloupe, 3 sp. BMNH, A. S. Kennard leg.; 3 sp. MNHN ex Dautzenberg, Marie leg.; 8 + 1 sp. MNHN ex H. Fischer ex Crosse ex Mazé; 5 sp. SMF 22641; 3 sp. SMF 92400 ex Zellweger; 1 sp. SMF 92405 ex Caziot; 2 sp. UZMK ex Cuming; 5 sp. UZMK ex Morelet; 5 sp. UZMK ex Dietz.

LA DÉSIRADE. North of Grande Anse, 30 m, limestone, 23.I.1964 (Sta. 732), 100 sp. – North of Grande Anse, 150 m, limestone, 26.I.1964 (Sta. 733), 36 sp. – North of Grande Anse, Le Calvert, 250 m, limestone, 26.I.1964 (Sta. 735), 43 sp.

MARIE-GALANTE. Grelin, 50 m, limestone, 1.II.1964 (Sta. 746), 9 sp. – Ravine du Vieux Fort, Vangout, 10 m, limestone, 31.I.1964 (Sta. 747), 7 sp. – Falaise des Sources, 20–40 m, limestone, 1.II.1964 (Sta. 748), 31 sp. – Grand-Pierre, 21.VIII. 1953, 2 sp. ZMA, R. Pinchon leg.

ILES DES SAINTES. Saintes, 4 sp. MNHN ex H. Fischer.

DOMINICA. Roseau, Botanical Gardens, 50 m, 14.VII.1967 (Sta. 843), 5 sp. – Dominica, 3 sp. FMNH 94856 ex Nelson.

MARTINIQUE. La Pagerie, near Trois Ilets, 30 m, andesitic rock, 10.II.1964 (Sta. 763), 1 sp. – Martinique, 1 sp. SMF 155709 ex Weyrauch.

ST. LUCIA. St. Lucia, 1 sp. MCZ 72316; XII.1928, 2 sp. SMF 92407; 6 sp. UZMK ex Dietz; 7 sp. UZMK, Riise leg.

ST. VINCENT. St. Vincent, 55 sp. BMNH.

GRENADA. Mineral Springs near River Sallee, 9.VII.1967 (Sta. 859), 5 sp.

BARBADOS. Hackleton's Cliff at Horse Hill, 100 m, marly limestone, 20.II.1964 (Sta. 774), 2 sp. – Welchman Hall's Gully, S of bridge, 50 m, limestone, 20.II.1964 (Sta. 776), 53 sp. – Blowers, XI. 1935, 5 sp. NMB 4260*b*, H. G. Kugler leg. – Eastcoast, VII.1932, 12 sp. NMB 4260*f*, Kugler leg. – Christchurch, Hastings, first coral rock terrace, 8.IV.1950, 24 sp. NMB 4260*g*, Kugler leg. – Barbados, 7 sp. BMNH; 4 sp. FMNH 31125 ex Webb; 4 sp. FMNH 94847 ex Nelson; X.1944, 17 sp. RMNH, D. C. Geijskes leg.; 4 + 2 + 2 sp. SMF 92401/3/4, Brown leg.; 1 sp. SMF 92411 ex Boettger.

Bulimulus (Bulimulus) gittenbergeri, sp. n.

Pls. V fig. 10–13, VII fig. 3.

St. Kitts, limestone slabs NW Brimstone Hill, 60 m – type locality!, holotype: RMNH 54903.

Shell up to 20.5 mm, 1.9–2.0 times as long as wide; very narrowly perforated, acute with *straight* sides; rather thin. Colour *yellowish* to greyish white, usually with slightly darker apex.

Surface lustreless, with numerous indistinct epidermal striae, and weak growth riblets at irregular intervals.

Protoconch with alternating rows of granules or sometimes with short wrinkles on upper side.

Whorls about 6, slightly convex; ultimate whorl about 2/3 shell height. Suture well impressed.

Aperture about 3/7 shell height, 1.7–1.8 times as long as wide; subovate, somewhat truncated below, whitish inside; palatal margin somewhat flattened. Apertural deviation 5–10°.

Peristome thin; margins sometimes joined by a thin callus; columellar margin reflexed and well dilated above.

Distribution – St. Kitts (Saint Christopher).

Bulimulus gittenbergeri closely resembles *B. guadalupensis*, also occurring on St. Kitts, but differs in having straight sides, a uniform yellowish to greyish white colour, a more granulated protoconch (Pl. VII fig. 3) and an apertural deviation of 5–10°.

The measurements are given in Table 5.

This species was collected among shrubs. It is not confined to limestone soils.

Named in honour of dr. E. GITTENBERGER, Leiden.

ST. KITTS. Wingfield River, 300 m N of bridge, 50 m, andesitic rock, 30.VI.1949 (Sta. 420), 5 sp. – Top of Brimstone Hill, 250 m, andesitic rock, few pieces of limestone, 30.VI.1949 (Sta. 421), 11 sp. – Limestone slabs NW Brimstone Hill, 60 m, 30.VI.1949 (Sta. 422), 10 sp. [incl. holotype], 4 sp. FMNH 174171, 4 sp. SMF 225900.

Bulimulus (Bulimulus) hummelincki, sp. n.

Figs. 61–71, Pl. III fig. 1–5.

Barbuda, River Quarter W of Bull Hole, 1–2 m, limestone flat – type locality!, holotype: RMNH 54905.

Shell up to 22.5 mm, somewhat elongated, 1.9–2.0 times as long as wide; rather narrowly perforated, acute with straight or slightly

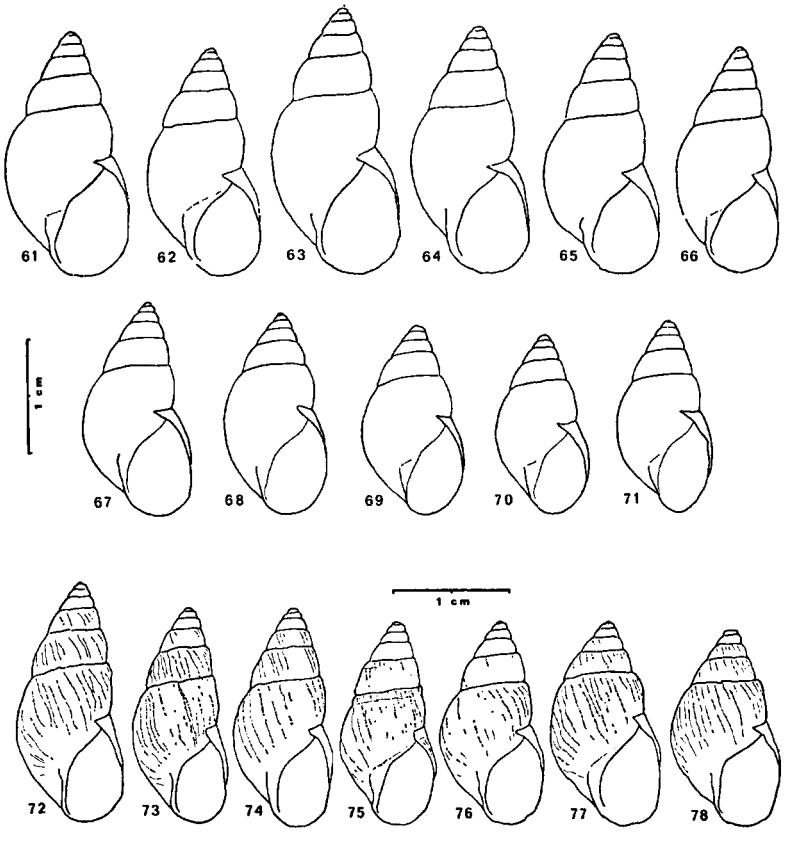

Fig. 61–71. *Bulimulus hummelincki*. – BARBUDA: 61–64, River Quarter (Sta. 597); 65–66, Highlands near Dark Cave (Sta. 598); 67–71, N of Codrington Village (Sta. 602).

Fig. 72–78 *Bulimulus lehmanni*. – ANGUILLA: Crocus Bay (USNM 707515).

convex sides; thin, translucent when fresh. Colour russet to pale brown, darker on the upper whorls, the apex being intense brown; a pale zone below the suture.

Surface lustreless, smooth.

Protoconch densely sculptured with anastomosing wrinkles on lower side, more sinuous wrinkles on upper side.

Whorls about 6, rather convex; ultimate whorl about 2/3 shell height. Suture rather deeply impressed.

Aperture about 1/2 shell height, 1.5–1.6 times as long as wide; broadly ovate, or subovate, brownish inside; palatal margin slightly flattened. Apertural deviation 0–10°.

Peristome thin, slightly sinuous; margins joined by a thin callus; columellar margin reflexed and but slightly dilated above.

Distribution – Barbuda.

Bulimulus hummelincki is allied to *B. diaphanus fraterculus*, but differs in its size, the pale zone below the suture, the broadly ovate aperture and the apertural deviation of 0–10°. *Bulimulus guadalupensis* and *B. diaphanus fraterculus* also occur in the distributional area of *B. hummelincki*.

Young specimens especially may be confused with *Bulimulus diaphanus fraterculus* as they do not already possess a broadly ovate aperture. However, the colour and the general proportions are characteristic of *hummelincki*.

In fresh specimens the colour varies only little, but the form of the aperture is fairly variable (Fig. 61–71). The measurements are given in Table 6.

This species is found among xerophytic shrubs and in fissures in limestone with plant decay.

Named in honour of dr. P. WAGENAAR HUMMELINCK, Utrecht.

BARBUDA. River Quarter W of Bull Hole, 1–2 m, limestone flat, 9.VII.1955 (Sta. 597), 6 sp. [incl. holotype], 4 sp. FMNH 174172, 2 sp. SMF 225901. – Highlands near Dark Cave, 20 m, limestone terrace, 6.VII.1955 (Sta. 598), 75 sp. – North of Codrington Village, 2 m, limestone, 11.VII.1955 (Sta. 602), 16 sp. – Northwest of Codrington Village, limestone flat near Great Lagoon, 1 m, 5.VII.1955 (Sta. 603), 5 sp. – Barbuda, 21 sp. MCZ 279958, D. Fairchild leg.

Bulimulus (Bulimulus) diaphanus (Pfeiffer, 1855)

This species is now divided into two subspecies, *Bulimulus diaphanus diaphanus* and *B. diaphanus fraterculus*. Together with *Bulimulus hummelincki* they may be called the *diaphanus*-complex.

KEY TO THE SUBSPECIES OF *Bulimulus diaphanus*

a Surface with delicate striae; protoconch rather coarsely pit-reticulated . . . . . *B. diaphanus diaphanus*
Hispaniola to and including St. Croix

b Surface with indistinct striae; protoconch densely and minutely pit-reticulated; usually with a dark- to russetbrown apex . . . . . *B. diaphanus fraterculus*
St. Martin to and including Iles des Saintes

Bulimulus (Bulimulus) diaphanus diaphanus (Pfeiffer, 1855)

Pls. III fig. 11–14, VI fig. 2, VII fig. 2.

Bulimus diaphanus PFEIFFER, 1855a, p. 125. [Description, measurements; St. Thomas – type locality!, syntypes: BMNH]
Bulimus (Leptomerus) diaphanus Pfr., PFEIFFER 1856, p. 160. [References]
Bulimus diaphanus Pfr., PFEIFFER 1859, p. 505. [Descr., refer.]
Bulimulus (Leptomerus) fraterculus Fér., MARTENS 1860, p. 222. [Puerto Rico, St. Thomas, St. Croix]
Bulimus fraterculus F., BLAND 1861, p. 358–360. [Puerto Rico, Vieques, St. Thomas, St. John, St. Croix]
Bulimus diaphanus P., BLAND 1861, p. 359.
Bulimus diaphanus Pfr., PFEIFFER 1868, p. 153.
Bulimus tenuissimus Fér., BLAND 1869, p. 238. [Anegada; Trinidad excl.]
[?] *Bulimulus diaphanus* Pfr., PAETEL & SCHAUFUSS 1869, p. 81. [Lima]
[?] *Bulimulus diaphanus* Pfr., PAETEL 1873, p. 100. [Lima]
Bulimus diaphanus Pfr., PFEIFFER 1877, p. 189. [Refer.]
Bulimulus fraterculus Fér., MARTENS 1877, p. 351. [Refer., remarks; Puerto Rico]
Bulimulus fraterculus Fér., KOBELT 1880, p. 278, 280–281. [Puerto Rico, Vieques, St. Thomas, St. John]
Bulimulus fraterculus Fér., BLAND 1881, p. 123. [St. Croix]
Bulimulus (Leptomerus) fraterculus Fér., PFEIFFER & CLESSIN 1881, p. 235. [Refer.; Puerto Rico, St. Croix; St. Kitts, Guadeloupe excl.]
Bulimulus (Leptomerus) diaphanus Pfr., PFEIFFER & CLESSIN 1881, p. 235. [Refer.]
Bulimulus fraterculus Fér., STREBEL & PFEFFER 1882, p. 56, pl. 12 fig. 16, pl. 13

fig. 1–3, pl. 14 fig. 1 A–D. [Remarks, anatomy, radula, genitalia from a specimen from Puerto Rico]
Bulimulus fraterculus, GUNDLACH 1883, p. 42. [Refer., remarks; Puerto Rico]
[?] *Bulimulus diaphanus* Pfr., PAETEL 1889, p. 224. [Lima]
Bulimulus fraterculus Férussac, CROSSE 1892, p. 23. [Remarks; Puerto Rico]
Bulimulus diaphanus (Pfeiffer), PILSBRY 1897 [1897–8], p. 47, non pl. 9 fig. 44. [Descr., refer., remarks; Saba, St. Eustatius and Barbados excl.]
Bulimulus diaphanus Pfeiffer, DALL & SIMPSON 1902, p. 378, pl. 53 fig. 6. [Descr.]
Bulimulus diaphanus (Pfeiffer), VAN DER SCHALIE 1948, p. 88. [Refer.]
Bulimulus fraterculus (Férussac), VAN DER SCHALIE 1948, p. 88. [Refer, Puerto Rico]
Bulimulus diaphanus Pfr., AGUAYO 1961, p. 95.
Bulimulus fraterculus Fér., AGUAYO 1961, p. 95. [Puerto Rico, Vieques]
Bulimulus diaphanus Pfeiffer, AGUAYO 1966, p. 5.
Bulimulus fraterculus "Férussac" Potiez et Michaud, AGUAYO 1966, p. 5. [Puerto Rico]
Bulimulus diaphanus (Pfeiffer), JACOBSON 1968, p. 24. [Refer., remarks; St. Croix]

Shell up to 17.4 mm, 1.9–2.1 as long as wide; narrowly perforated, acute with straight or very slightly convex sides; thin. Colour brownish.

Surface lustreless, with numerous *delicate striae*, usually rather distinct, often somewhat undulating and more or less alternating in distinctness.

Protoconch *rather coarsely pit-reticulated*, with short irregular wrinkless on upper side.

Whorls about 5.5, slightly convex; ultimate whorl about 2/3 shell height. Suture rather deeply impressed.

Aperture about 1/2 shell height, 1.6–1.8 as long as wide; subovate, brownish inside. Apertural deviation 10–15°.

Peristome thin; columellar margin reflexed and dilated above.

Distribution – Hispaniola!, Mona, Puerto Rico, Vieques, St. Thomas [type locality], St. John, Anegada!, St. Croix.

The measurements of *Bulimulus diaphanus diaphanus* are given in Table 6. This subspecies is rather variable in form, but the sculpture of the protoconch is a constant feature.

The specimens in the British Museum may be considered as syntypes (PEAKE, in litt.). They are not accompanied by a label in L. PFEIFFER's handwriting.

HISPANIOLA. St. Domingo, 6 sp. USNM 105056 ex Lea.

MONA. Mona Isl., 3 sp. MCZ 187435.

PUERTO RICO. Caguas, 1 sp. USNM 159671 ex U.S. Fish Comm. – Puerto Rico, 2 sp. FMNH 161088 ex Webb ex ZMB; 3 sp. SMF 90229 ex ZMB; 4 sp. UZMK.

ST. THOMAS. St. Thomas, 2 sp. FMNH 102500 ex Button; 11 sp. NRS; 3 sp. SMF 22649 ex Von Moellendorff; 3 sp. UZMK ex Hjalmarson; 2 sp. UZMK. – [St. Thomas?], 2 sp. BMNH [syntypes?].

ST. JOHN. St. John, 4 sp. FMNH 106592 ex Columbia Univ. ex Brand.

ANEGADA. Anegada, III.1917, 1 sp. MCZ 32194, J. L. Peters leg.

ST. CROIX. Salt River, VI.1940, 2 sp. MCZ 137633, H. A. Beatty leg.

VIRGIN ISLANDS. Iles Vierges, 1 sp. IRSN ex Dautzenberg ex Géret ex Ancey.

Bulimulus (Bulimulus) diaphanus fraterculus
(Potiez & Michaud, 1835)

Pls. III fig. 6–10, VII fig. 1.

Helix (Cochlogena) fraterculus FÉRUSSAC, 1821, p. 54. [Nomen nudum]
Bulimus fraterculus Fér. POTIEZ & MICHAUD, 1835 [1835–8], p. 14, pl. 13 fig. 7–8. [Indication]
Bulimulus fraterculus Fér., BECK 1837, p. 67. ["Antill."]
Bulimus fraterculus Fér., POTIEZ & MICHAUD 1838 [1835–8], p. 141. [Description; Guadeloupe – type locality!, lectotype (now): MNHN]
Bulimus fraterculus Fér., PFEIFFER 1842, p. 13.
Bulimus fraterculus Férussac, CATLOW & REEVE 1845, p. 154. [References]
[?] *Bulimus fraterculus* Férussac, PFEIFFER 1848, p. 220. [Descr. of specimen from Guadeloupe, received from Paris Museum]
Bulimus fraterculus, REEVE 1849 [1848–50], pl. 63 fig. 438. [Descr., refer., remarks]
Bulimus (Leptomerus) fraterculus Fér., ALBERS 1850, p. 166.
Bulimus fraterculus Fér., JAY 1852, p. 196. [Refer.]
Bulimus fraterculus Fér., PFEIFFER 1854 [KÜSTER & PFEIFFER 1840–65], p. 163, pl. 49 fig. 5–6. [Descr., refer.]
Bulimus (Leptomerus) fraterculus Fér., PFEIFFER 1856, p. 160.
Bulimus fraterculus F., BLAND 1861, p. 351, 358–359. [Antigua, St. Kitts; Barbados and Trinidad excl.]
Bulimus fraterculus Fér., BLAND 1869, p. 238. [St. Barts]
[?] *Bulimulus fraterculus* Fér., PAETEL & SCHAUFUSS 1869, p. 81. [Martinique]
[?] *Bulimulus fraterculus* Fér., PAETEL 1873, p. 100. [Martinique]
Bulimulus fraterculus Fér., KOBELT 1880, p. 282, 284. [Barbados excl.]

Bulimulus (*Leptomerus*) *fraterculus* Fér., PFEIFFER & CLESSIN 1881, p. 235. [Refer.; Puerto Rico and St. Croix excl.]
Bulimulus fraterculus Fér., PAETEL 1883, p. 144.
Bulimulus Houelmontensis [Crosse ms.] MAZÉ, 1883, p. 19, pl. 1 fig. 6. [Descr., measurements; Guadeloupe, Vieux-Fort, Houelmont, Monts Caraïbes, appr. 586 m – type locality!, holotype: MNHN. New synonymy]
Bulimulus Houelmontensis Crosse, MAZÉ 1883, p. 43. [Remarks; Saintes]
[non] *Bulimulus* (*Leptomerus*) *fraterculus* Fér., MARTENS 1885, p. 163. ["Rio Tocantinas, Gegend von Baiao"; unlike to belong to *B. fraterculus* because of distribution]
Bulimulus Houelmontensis Cross., PAETEL 1889, p. 226. [Refer.]
Bulimulus fraterculus Férussac, MAZÉ 1890, p. 25. [Descr., remarks; St. Martin]
[?] *Bulimulus* (*Leptomerus*) *fraterculus* Férussac, SMITH & FEILDEN 1891, p. 252. [Refer., remarks; Barbados]
[?] *Bulimulus* (*Leptomerus*) *fraterculus* Férussac, SMITH 1896, p. 241. [Trinidad]
Bulimulus houelmontensis Crosse, PILSBRY 1897 [1897–8], p. 45, pl. 9 fig. 45–46. [Descr. (Crosse), refer., remarks]
Bulimulus fraterculus ("Fér.," Potiez & Michaud), PILSBRY 1897 [1897–8], p. 46, pl. 11 fig. 24–25. [Descr. (P. & M.), refer., remarks]
Bulimulus diaphanus (Pfeiffer), PILSBRY 1897 [1897–8], p. 47, pl. 9 fig. 44. [Descr., refer., remarks; Saba and St. Eustatius only]
[?] *Bulimulus fraterculus* Férussac, BROWN 1903, p. 269. [Barbados]
Bulimulus fraterculus "Fér.," Potiez & Michaud, VERNHOUT 1914, p. 182.
Bulimulus diaphanus Pfr., VERNHOUT 1914, p. 183–185. [Saba, St. Eustatius]
Bulimulus fraterculus Fér., SCHEPMAN 1915, p. 480.
Bulimulus diaphanus Pp., SCHEPMAN 1915, p. 480. [Saba]
Bulimulus (*Bulimulus*) *diaphanus* (Pfeiffer), COOMANS 1967, p. 137. [Remarks; St. Martin]
Bulimulus (*Bulimulus*) *fraterculus* (Potiez & Michaud), COOMANS 1967, p. 137. [Refer., remarks]
Bulimulus (*Bulimulus*) *diaphanus* (Pfeiffer), CLENCH 1970, p. 59. [Refer.; Saba]

Shell up to 15.5 mm, 1.8–2.1 times as long as wide; narrowly perforated, acute with straight or slightly convex sides; thin. Colour pale brownish, usually with a distinctly *dark- to russetbrown apex.*

Surface lustreless, with numerous delicate, often *indistinct* or even invisible *striae.*

Protoconch *densely and minutely pit-reticulated,* often finely wrinkled on upper side.

Whorls about 5.5, slightly convex; ultimate whorl about 2/3 shell height. Suture well impressed.

Aperture 4/10–1/2 shell height, 1.5–1.7 times as long as wide; subovate, pale brownish inside, rarely whitish. Apertural deviation 10–15°.

Peristome thin; columellar margin reflexed and well dilated above.

Distribution – St. Martin, St. Barts (BLAND 1869), St. Kitts (BLAND 1861), Barbuda!, Antigua (BLAND 1861), Guadeloupe [type locality], Iles des Saintes (MAZÉ 1883).

This subspecies differs from the nominal one in usually having a dark- to russetbrown apex, less distinct striae and a densely and minutely pit-reticulated protoconch (Pl. VII fig. 1). Usually it is slightly smaller in size. From *Bulimulus hummelincki* it differs in size, the presence of striae and an apertural deviation of 10–15°.

The measurements of *Bulimulus diaphanus fraterculus* are given in Table 8. It varies in colour and in form.

The records from Barbados and Trinidad are very doubtful. The few specimens, named *fraterculus*, from Trinidad (BMNH) appeared to be incorrectly identified.

In the collection of the Muséum National d'Histoire Naturelle some specimens – labelled "MM. Potiez & Michaud" – may probably be considered as type material. From this series a lectotype has been chosen.

The holotype of *Bulimulus houelmontensis* Crosse is somewhat aberrant in form, but otherwise quite typical.

ST. MARTIN. Oysterpond, 10.VI.1959, 1 sp. ZMA, H. E. Coomans leg. – St. Martin, 2 sp. AMNH 13008 ex Crooke; 2 sp. IRSN ex Dautzenberg ex Crosse ex Mazé; 2 sp. MNHN ex H. Fischer; 5 sp. ZMA ex Van Heukelom.

SABA. The Bottom, 200 m, volcanic rock, 18.III.1937 (Sta. 298), 2 sp. – Saba, 3 sp. MCZ 83524, F. Lagois leg.

ST. EUSTATIUS. Toby Gut, S. slope of Quill, 30 m, andesitic tuffs, 14.VII.1949 (Sta. 423), 2 sp. – Big Gut, near White Wall, 20 m, debris of andesite and limestone, 6.VII.1949 (Sta. 424), 1 sp. – Quill, above White Wall, 300 m, andesitic rock, 6.VII. 1949 (Sta. 426), 1 sp. – St. Eustatius, 11 sp. ANSP 25611 ex Swift ex Cleve; 18/19.I. 1968, 12 sp. FMNH 157128.

BARBUDA. Highlands near Dark Cave, 20 m, limestone, 6.VII.1955 (Sta. 598), 1 sp.

GUADELOUPE. Vieux-Fort, Houelmont, Monts Caraïbes, 586 m, 1 sp. MNHN [holotype of *B. Houelmontensis* Crosse]. – Guadeloupe, 2 sp. IRSN ex Dautzenberg ex Dupuy; 1 sp. MCZ 90404 ex Bland ex Amherst College, Marie leg.; 4 sp. USNM 492633 ex Henderson ex Webb; 10 sp. USNM 492634 ex Henderson.

Locality? 12 sp. MNHN ex Potiez & Michaud [incl. lectotype].

Bulimulus (Bulimulus) lehmanni (Pfeiffer, 1865)

Fig. 72–78, Pls. IV fig. 9–11, VI fig. 5.

Bulimus Lehmanni PFEIFFER, 1865, p. 123. [Description, measurements; Anguilla – type locality!]
Bulimus Lehmanni Pfr., PFEIFFER 1866 [1860-6], p. 281, pl. 69 fig. 7–8. [Descr., references]
Bulimus Lehmanni Pfr., PFEIFFER 1868, p. 116. [Descr., refer.]
Bulimus Lehmanni Pfr., BLAND 1869, p. 238.
Bulimus Lehmanni Pfr., PFEIFFER 1877, p. 153. [Refer.]
Bulimulus Lehmanni Pfr., PAETEL 1883, p. 144.
Bulimulus Lehmanni Pfr., PAETEL 1889, p. 227.
Bulimulus Lehmanni Pfeiffer, MAZÉ 1890, p. 25. [Descr., remarks; St. Martin, "Baie de Simson!...rare."]
Bulimulus lehmanni (Pfeiffer), PILSBRY 1897 [1897–8], p. 42, pl. 9 fig. 40–43. [Descr., refer., remarks.]
Bulimulus lehmanni Pfr., VERNHOUT 1914, p. 181.
Bulimulus Lehmanni Pfr., SCHEPMAN 1915, p. 480.
Bulimulus (Bulimulus) lehmanni (Pfeiffer), COOMANS 1967, p. 137. [Refer.]

Shell up to 18.5 mm, 1.9–2.3 times as long as wide; usually more or less narrowly perforated, acute with almost straight sides; rather *solid*. Colour of large specimens without epidermis opaque white, sometimes greyish white with darker apex; young specimens mostly covered with a pale brown, spirally striated epidermis.

Surface slightly shining, with irregular, *coarse growth-riblets*, and with very fine, numerous, undulating, spirally engraved lines. Often a faint constriction at a short distance below the suture.

Whorls about 6–6.5, slightly convex; ultimate whorl about 2/3 shell height. Suture well impressed.

Aperture 4/10–1/2 shell height, 1.6–1.7 times as long as wide; subovate or even subtruncate below, sometimes slightly oblique, white inside. Apertural deviation 5–10°.

Peristome thin; columellar margin slightly reflexed and dilated above.

Distribution – Dog Island!, Anguilla [type locality], St. Martin (MAZÉ 1890).

The measurements of this species are given in Table 9. The prominence of the riblets and the perforation is variable.

The record from St. Martin (MAZÉ 1890) is not confirmed by any material and remains doubtful; however, on zoogeographical grounds this species may be expected on that island.

DOG ISLAND. At saltpond near landing, limestone, 17.VI.1949 (Sta. 487), 6 sp. – Limestone terrace at north coast near well, 10–20 m, 17.VI.1949 (Sta. 489), 1 sp.

ANGUILLA. North of Sandy Ground, northern slope at shore, 5–10 m, limestone, 16.VI.1949 (Sta. 485), 150 sp. – Valley, 14.X.1954, 20 sp. RMNH, G. A. Seaman leg. – Crocus Bay, 348 sp. USNM 707515 ex Henderson ex Vaughan. – Anguilla, 8 sp. AMNH 62122 ex Crooke; 4 sp. ANSP 4319 ex Brown; 3 sp. BMNH; 7 sp. IRSN ex Dautzenberg, Marie leg.; 6 sp. UZMK.

Bulimulus (Bulimulus) lherminieri (Fischer, 1857)

Fig. 79–80 [page 80], Pl. V fig. 5–7.

Bulimus Lherminieri FISCHER, 1857, p. 355, pl. 12 fig. 6–7. [Description, measurements; Guadeloupe, mountains of Petit-Bourg, over 800 m. – type locality!]
Bulimus Lherminierii Fisch., BEAU 1857, p. 492.
Bulimus Lherminieri Fischer, PFEIFFER 1859, p. 399. [Descr. (Fischer), references]
Bulimus Lherminieri Fisch., BLAND 1861, p. 354.
Bulimus Lherminieri Fisch., PFEIFFER 1868, p. 47. [Refer.]
Bulimus Lherminieri Fischer, SCHRAMM 1869, p. 17.
Bulimus Lherminieri Fisch., PFEIFFER 1877, p. 60. [Refer.]
Bulimus Lherminieri Fischer, KOBELT 1880, p. 282.
Bulimulus (*Leptomerus*) *Lherminieri* Fisch., PFEIFFER & CLESSIN 1881, p. 233. [Refer.]
Bulimulus Lherminieri Fischer, MAZÉ 1883, p. 17. [Remarks]
Bulimulus chrysalis var. β, MAZÉ 1883, p. 19. [Remarks; Guadeloupe]
Bulimulus L'Herminieri Fschr., PAETEL 1889, p. 227. [Refer.]
Bulimulus semicinctus PILSBRY, 1897 [1897–8], p. 44, pl. 12 fig. 63. [Descr., meas.; Guadeloupe – type locality!, lectotype: ANSP 25602. New synonymy]
Bulimulus lherminieri (Fischer), PILSBRY 1897 [1897–8], p. 44, pl. 11 fig. 20–21. [Descr. (Fischer), refer.]

Shell up to 20 mm, 1.8–2.0 times as long as wide; narrowly perforated, acute with straight or slightly convex sides; thin. Colour brownish, with a *pale*, more yellowish *band on the middle of the ultimate whorl.*

Surface slightly shining, with fine, delicate, somewhat undulating epidermal striae, and indistinct, very fine striae between.

Protoconch shallowly pitted on lower side with undulating furrows on upper side.

Whorls about 5.5, slightly convex; ultimate whorl about 3/4 shell height. Suture well impressed.

Aperture about 1/2 shell height, 1.6–1.9 times as long as wide; ovate, *elongated; palatal margin usually flattened.* Apertural deviation 5–10°.

Peristome thin and pale, slightly sinuous; basal and part of palatal margin slightly expanded; columellar margin narrowly reflexed and somewhat dilated above.

Distribution – Guadeloupe.

The species differs from *Bulimulus barbadensis*, in having a pale band on the middle of the ultimate whorl and a vertical columellar margin.

It is quite variable in form, especially the from of the aperture, and in the prominence of the band on the ultimate whorl. The measurements are given in Table 10.

The type material was not present in the collection of the Journal de Conchyliologie at the Museum in Paris, and may probably be considered to be lost. On account of the original figures of *Bulimulus lherminieri* (Fig. 79–80), *B. semicinctus* Pilsbry is placed in the synonymy of this species.

In FISCHER's description white dots are mentioned, which I could not observe in the specimens studied. The pale band was not mentioned by FISCHER, but the form of aperture in his specimen is so typical that I have no doubt about the identification of the material at hand.

GUADELOUPE. Massif de la Soufrière, 19.XI.1970, 7 sp. IRSN, J.-J. Van Mol leg. – Guadeloupe, 1 sp. ANSP 325064, E. Marie leg. [paratype of *B. semicinctus* Pilsbry]; 1 sp., FMNH 78818, A. Schramm leg.; 1 sp. IRSN ex Dautzenberg ex Crosse ex Mazé; 3 sp. IRSN ex Dautzenberg, E. Marie leg.; 1 + 1 sp. MNHN ex H. Fischer ex Crosse ex Mazé; 4 sp. MNHN ex H. Fischer.

Locality? 3 sp. MNHN ex Musée des Colonies.

Bulimulus (Bulimulus) fuscus Guilding, 1828

Pls. V fig. 1–4, VII fig. 5.

Bulimulus fuscus GUILDING, 1828, p. 170. [Incomplete description; "insulae Barbadensis" – type locality!]
Bulimus fuscus Guilding, CATLOW & REEVE 1845, p. 154. [Refer.]
Bulimus fuscus Guilding, PFEIFFER 1848, p. 229. [Descr. (Guilding)]
Bulimus Barbadensis PFEIFFER, 1853, p. 435. [Descr., measurements, refer. to PFEIFFER 1854; Barbados – type locality!, lectotype (now): BMNH. New synonymy]
Bulimus barbadensis PFEIFFER 1854, p. 61. [Descr.]
Bulimus (Leptomerus) Barbadensis Pfr., PFEIFFER 1856, p. 160.
Bulimus Barbadensis Pfr., PFEIFFER 1859, p. 500. [Refer.]
Bulimus (Leptomerus) barbadensis Pfr., MARTENS 1860, p. 222. [St. Croix excl.]
Bulimus Barbadensis P., BLAND 1861, p. 351, 359. [St. Thomas excl.]
Bulimus fuscus Guild., BLAND 1861, p. 351.
Bulimus Barbadensis Pfr., PFEIFFER 1868, p. 148. [Refer.]
Bulimus Barbadensis Pfr., PFEIFFER 1877, p. 181. [Refer.]
Bulimulus fuscus Guildg., KOBELT 1880, p. 284.
Bulimulus (Leptomerus) Barbadensis Pfr., PFEIFFER & CLESSIN 1881, p. 233. [Refer.]
Bulimulus Barbadensis Pfr., PAETEL 1889, p. 222.
Bulimulus tenuissimus Férussac, SMITH & FEILDEN 1891, p. 252. ["I have compared the types of *B. barbadensis* with specimens of this species and they appear to be inseparable."]
Bulimulus tenuissimus (Férussac), SMITH 1895, p. 316. [Grenada]
Bulimulus barbadensis (Pfeiffer), PILSBRY 1897 [1897–8], p. 48, pl. 12 fig. 61. [Descr., refer., remarks]
Bulimulus tenuissimus Férussac, BROWN 1903, p. 268.

Shell up to 21.5 mm, 1.8–2.1 as long as wide; *narrowly perforated*, acute with *straight* sides; rather thin. Colour pale russetbrown.

Surface hardly or somewhat shining, with numerous scarcely visible, faint striae.

Protoconch sculpture variable, generally with anastomosing wrinkles, forming a reticulate pattern on lower side, and sinuous wrinkles on upper side; between the wrinkles sometimes extremely faint spiral striae may be observed.

Whorls about 5.5, slightly convex; ultimate whorl about 7/10 shell height. Suture slightly impressed.

Aperture about 1/2 shell height, 1.6–1.7 times as long as wide; subovate, brownish inside; palatal margin often somewhat flattened. Apertural deviation 5–10°.

Peristome thin, slightly sinuous; columellar margin reflexed and dilated above.

Distribution – Grenada (SMITH 1895), Barbados [type locality].

Bulimulus barbadensis (Pfeiffer, 1853) and *B. fuscus* Guilding, 1828 prove to be subjective synonyms and as the specific name *barbadensis* Pfeiffer, 1853 is thus a junior synonym of the name *fuscus* Guilding, 1828, it should be replaced by *fuscus*. Unfortunately the latter term cannot be qualified as a forgotten name, as *barbadensis* was not used at least ten times by at least five authors during the last fifty years (fide *Bull. zool. Nomencl. 29*, p. 185–186).

PILSBRY (1897–8, p. 49) stated for *Bulimulus fuscus* "insufficient description." This is not quite correct. From GUILDING's description it appears that he had a *Bulimulus* species at hand with excessively fine striae. This feature excludes *Bulimulus guadalupensis*, the sole other *Bulimulus* species inhabiting Barbados.

Bulimulus fuscus differs from *B. lherminieri* in its uniform colour, oblique columellar margin and more slightly impressed suture. Compared with *Bulimulus guadalupensis* there are the following differences: 1) sides less convex, 2) inner side of aperture always coloured like the outside, 3) columellar margin less dilated, 4) apertural deviation 5–10°.

The measurements of *Bulimulus fuscus*, a rather constant species, are given in Table 11.

The specimens in the British Museum are the syntypes, as they were accompanied by a label in L. PFEIFFER's handwriting (Pl. VII).

According to the list of material all specimens were collected in the past century. Further collecting will show whether this species is extinct or not.

BARBADOS. Barbados, 9 sp. ANSP 25612 ex Swift; 2 sp. FMNH 31198 ex Webb; 3 sp. FMNH 106505 ex Columbia Univ. ex Brand; 2 sp. FMNH 106599 ex Columbia Univ. ex Brand; 6 sp. USNM 57804 ex Stearns ex Rawson; 1 sp. USNM 492636 ex Henderson ex Th. Gill; 4 sp. USNM 492638 ex Henderson ex Webb; 4 sp. USNM 492639 ex Henderson. – [Barbados], 3 sp. BMNH [incl. lectotype].

Bulimulus (Bulimulus) riisei (Pfeiffer, 1855)

Fig. 81–94; Pls. I fig. 7–13, III fig. 15–17, VI fig. 3–4, VII fig. 4.

Bulimulus Riisei PFEIFFER, 1855b, p. 103, pl. 4 fig. 7–8. [Description, measurements; St. Croix, plantation "La Grange," near Frederiksted – type locality!; fossil]

Bulimulus Riisei Pfr., BLAND 1881, p. 122.
Bulimulus riisei (Pfeiffer), PILSBRY 1897 [1897–8], p. 41, pl. 9 fig. 38–39, pl. 14 fig. 1–2. [Descr., references, remarks]
Bulimulus riisei (Pfeiffer), JACOBSON 1968, p. 24. [Refer., remarks]

Shell up to 27.5 mm, 1.8–2.0 times as long as wide; broadly perforated in fossil specimens, more or less narrowly in recent ones; acute with straight sides; rather thin to solid. Colour white in fossil specimens, brownish yellow or with a dark brown epidermis in recent ones.

Surface lustreless to slightly shining; in fossil specimens smooth, rarely with somewhat undulating, delicate, low spiral threads embossed between the growth lines; in recent specimens with interrupted epidermal striae, often crestlike between growth lines.

Protoconch with spiral rows of rather coarse small knobs on lower side, changing into undulating, radiate wrinkles on upper side.

Whorls about 6–6.5, slightly or rather convex; ultimate whorl about 3/4 shell height. Suture well impressed.

Aperture about 1/2 shell height, 1.6–1.8 times as long as wide; in fossil specimens very variable in form, generally ovate and widest below the middle; margins converging, especially in larger specimens; in recent specimens ovate, sometimes slightly wider below the middle, whitish inside. Apertural deviation 0–10°.

Peristome thin to solid; in fossil specimens basal and part of palatal margin slightly expanded, in recent specimens not or very slightly expanded at basal margin; margins sometimes joined by a thin callus; columellar margin in fossil specimens well developed, generally more or less oblique, and slightly reflexed; in recent specimens vertical or slightly oblique, reflexed and more or less dilated above.

Distribution – St. Thomas!, St. John, St. Croix [type locality].

Bulimulus riisei does not resemble any of the other Caribbean *Bulimulus* species. It is very variable, especially in the form of the aperture (Fig. 81–94). The measurements are given in Table 12.

From this species – which was only known as "subfossil" from St. Croix – fossil *and* recent material has been found on that island,

which is only provisionally united in one and the same species. Fossil specimens are of unknown geological age, but may possibly be associated with the Kingshill Limestone. [For a geological map of St. Croix, see WEYL 1966, p. 174]

Recent specimens, from old collections, labelled St. Thomas do not differ from recent St. Croix material. Fossil specimens, from two other ancient sources, are said to come from St. Thomas and St. John – localities which need confirmation.

Recent specimens differ from the fossil ones in having a more narrow umbilicus, a lower shell height/diameter ratio and a less developed columellar margin, which is more dilated above. They are smaller compared with fossil specimens with the same number of whorls. The surface in well preserved recent specimens has crestlike striae (Pl. VI fig. 4). One fossil specimen has a surface resembling this sculpture (Pl. VI fig. 3).

The recent specimens were labelled as *Bulimulus guadalupensis*, *B. diaphanus* and *B. barbadensis* in some collections.

Fossil specimens:

ST. THOMAS. St. Thomas, 5 sp. UZMK ex Krebs.

ST. JOHN. St. John, 2 sp. FMNH 102486 ex Button.

ST. CROIX. Southern slope of Fredensborg Hill, marly limestone, 11.VI.1955 (Sta. 615), 6 sp. – Fredensborg, 7.I.1959, 2 sp. MCZ 220799, M. K. Jacobson leg. – Salt River, IX.1937, 5 sp. USNM 472509, H. A. Beatty leg. – La Grange, 1854, 4 sp. UZMK, Riise leg. – St. Croix, 2 sp. IRSN ex Dautzenberg ex Géret; 1 sp. FMNH 78801 ex Swift; 2 sp. FMNH 94776 ex Nelson; 3 sp. FMNH 102485 ex Button; 7 sp. FMNH 107135 ex Columbia Univ. ex Brand; 1856, 23 + 21 + 20 sp. UZMK, Riise leg.; 165 + 51 + 25 sp. UZMK, Riise leg.

Recent specimens:

ST. THOMAS. St. Thomas, 7 sp. MCZ 61652 ex Gray, J. T. Reed leg.; 4 sp. MCZ 90412 ex Bland ex Amherst College, A. Yong leg.

ST. CROIX. Spring Gut, 2.I.1954, 3 sp. RMNH, G. A. Seaman leg. – Prosperity, 1954, 12 sp. RMNH, Seaman leg. – Mt. Eagle, 18 sp. MCZ 110332, H. A. Beatty leg.; 30. VIII.1955, 4 sp. MCZ 186873, Seaman leg. – Sweet Bottom, I.1941, 2 sp. MCZ 179104, Beatty leg. – Sandy Point, 26.V.1954, 5 sp. MCZ 203772, R. M. Bond leg. – St. Croix, 34 sp. MCZ 89103, Beatty leg.; 5 sp. MNHN, Riise leg.

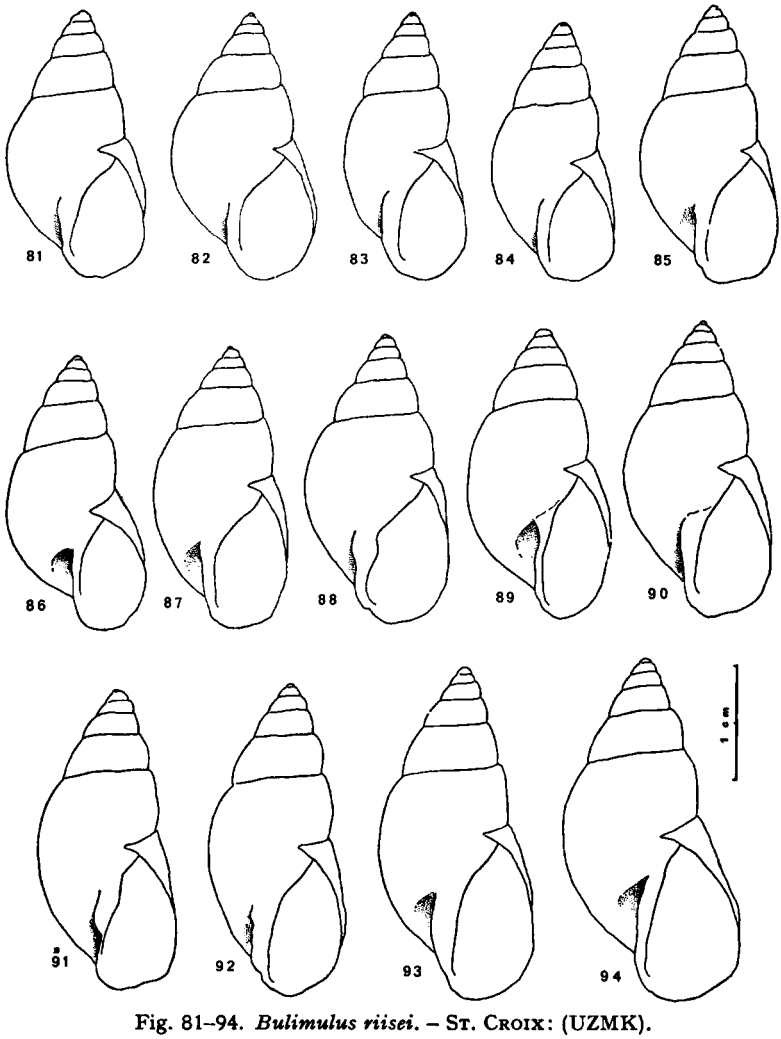

Fig. 81–94. *Bulimulus riisei*. – ST. CROIX: (UZMK).

Bulimulus (Bulimulus) erectus (Reeve, 1849)

Pl. IV fig. 6–8.

Bulimus erectus REEVE, 1849 [1848–50], pl. 58 fig. 392. [Description; Venezuela, Curiana – type locality!]

Bulimus erectus Reeve, PFEIFFER 1853, p. 439. [Descr., references]
Orthalicus (Leptomerus) erectus Reeve, ADAMS & ADAMS 1855 [1853–8], p. 150.
Bulimus erectus Reeve, PFEIFFER 1859, p. 504. [Refer.]
Bulimus erectus Reeve, PFEIFFER 1868, p. 152. [Refer.]
Bulimus erectus Reeve, PFEIFFER 1877, p. 187. [Refer.]
Bulimulus (Leptomerus) erectus Reeve, PFEIFFER & CLESSIN 1881, p. 234. [Refer.]
Bulimulus erectus Rv., PAETEL 1889, p. 225.
Bulimulus erectus (Reeve), PILSBRY 1897 [1897–8], p. 60, pl. 10 fig. 99. [Descr. (Pfr.), refer., remarks]
Bulimulus (Bulimulus) erectus (Reeve), BAKER 1914, p. 620, 635. [Refer.; "Brasil: Arumanduba; Paraná de Almeirim (Goeldi Museum)"]
Bulimulus erectus Rve, VANATTA 1915, p. 82. [Venezuela, Cariaquita]
Bulimulus cacticolus erectus Reeve, RICHARDS & HUMMELINCK 1940, p. 6, 13. [Margarita]
Bulimulus erectus (Reeve), MORRETES 1949, p. 147.
Bulimulus (Bulimulus) erectus Reeve, HAAS 1951, p. 504. [Venezuela, Toas Island, Edo. Zulia]
Bulimulus (Bulimulus) erectus (Reeve), S. H. JAECKEL 1952, p. 7. [NE Brasil]
Bulimulus erectus Reeve, S. G. A. JAECKEL 1969, p. 806, 807.

Shell up to 24 mm, *elongated*, 2.2 times as long as wide; narrowly perforated, acute with straight or very slightly convex sides; *thin*. Colour pale brown.

Surface slightly shining, almost smooth; sometimes with numerous faint striae and delicate more irregular scratches.

Protoconch shallowly and densely sculptured with alternating rows of small knobs or irregular wrinkles on lower side, changing to irregular short wrinkles on upper side.

Whorls about 6.5, rather convex; ultimate whorl about 2/3 shell height. Suture well impressed.

Aperture about 4/10 shell height, 1.7 times as long as wide; subovate, pale brown inside; *margins converging*. Apertural deviation 0–5°.

Peristome thin; columellar margin slightly reflexed and dilated above.

Distribution – Margarita, Venezuelan mainland, Brasil.

As no material from Venezuela or Brasil could be studied, the specimens from Margarita were only provisionally identified as *Bulimulus erectus* (Reeve). The measurements are given in Table 13.

The species is characterized by its elongated spire and short parietal region of the aperture. PILSBRY (1897) stated that *Bulimulus erectus* differs from *B. cacticolus* only in being somewhat more slender, with stronger longitudinal and spiral sculpture, suggesting its being only a form of *B. cacticolus*.

Comparing the material from both species at hand, the following can be noted: 1) The ultimate whorl in *Bulimulus cacticolus* is more swollen, while in *B. erectus* the spiral striation is somewhat more prominent. 2) The form of the aperture is quite different, *B. erectus* being characterized by the converging margins. 3) No transition between both species was observed, though occurring on the same island.

MARGARITA. Southeastern slope of El Piache, SE of El Valle, 100 m, marble schists, 13.I.1964 (Sta. 798), 30 sp.

Bulimulus (Bulimulus) cacticolus (Reeve, 1849)

Pl. IV fig. 12–15.

Bulimus cacticolus REEVE, 1849 [1848–50], pl. 58 fig. 393. [Description; Venezuela, Curiana – type locality!]
Bulimus cacticolus Reeve, PFEIFFER 1853, p. 439. [Descr., references]
Bulimus (*Leptomerus*) *cacticolus* Rv., PFEIFFER 1856, p. 160.
Bulimus cacticolus Reeve, PFEIFFER 1859, p. 504. [Refer.]
Bulimulus (*Leptomerus*) *cacticolus* Reeve, MARTENS 1860, p. 222.
Bulimus cacticolus Reeve, PFEIFFER 1868, p. 152. [Refer.]
Otostomus? (*Leptomerus*) *cacticolus*, MARTENS 1873, p. 187. [Diagn., refer., remarks; Puerto Cabello, Caracas; incl. var. *minor*]
Bulimus cacticolus Reeve, PFEIFFER 1877, p. 187. [Refer.]
Bulimulus (*Leptomerus*) *cacticolus* Reeve, PFEIFFER & CLESSIN 1881, p. 234. [Refer.]
Bulimulus cacticolus Rv., PAETEL 1889, p. 222. [Refer.]
Bulimulus cacticolus (Reeve), PILSBRY 1897 [1897-8], p. 60, pl. 10 fig. 89–90. [Descr., refer., remarks; Venezuela, Yaracuy River]
Bulimulus cacticolus (Reeve), PILSBRY 1901 [1901–2], p. 144. [Remarks]
Bulimulus (*Leptomerus*) *cacticolus*, PIAGET 1914, p. 260. [Refer.; Colombia, "Angelopolis (pres Titiribi, prov. Antiquia, 1970 m.)"]
Bulimulus cacticolus Rve, VANATTA 1915, p. 82. [Venezuela, Cariaquita]
Bulimulus cacticolus (Reeve), HUMMELINCK 1940b & c, p. 99 & 116. [Refer.; Margarita]
Bulimulus cacticolus Reeve, RICHARDS & HUMMELINCK 1940, p. 6, 13. [Remarks]

Shell up to 31.5 mm, 2.0–2.1 times as long as wide; rather narrowly perforated, acute with straight or slightly convex sides; *rather solid.* Colour uniformly greyish-*white* or with some axial brown streaks.

Surface slightly shining, smooth, sometimes with indistinct traces of many delicate striae.

Protoconch shallowly sculptured with spiral rows of coarse oblong knobs and short zigzag or irregularly curved wrinkles.

Whorls about 7, slightly convex; ultimate whorl about 2/3 shell height; fairly *swollen.* Suture well impressed.

Aperture 4/10–1/2 shell height, 1.6–1.7 times as long as wide; subovate or somewhat obtuse below. Apertural deviation 5–10°.

Peristome thin; columellar margin somewhat reflexed and more or less dilated above.

Distribution – Margarita, Venezuelan mainland.

This species resembles *Bulimulus erectus* and is characterized by being rather solid, whitish and by having a rather swollen ultimate whorl.

The measurements of *Bulimulus cacticolus* are given in Table 14. It appears to be a rather variable form.

Specimens from Barquisimeto, Venezuela (FMNH 14624, 109690), – considered belong to this species – are whitish-beige, with a dark brown apex and axial streaks on the whorls.

MARGARITA. Western escarpment of Cerro de Marmoleta, northeast of El Valle, 150 m, chiefly marble, 13.V.1936 (Sta. 139), 1 sp. – Northeastern foot of Cerro del Piache, southeast of El Valle, 100 m, marble-schists, 10.VII.1936 (Sta. 140), 1 sp. – Entrance of Cueva Honda del Piache, 300 m, marble-schists, 10.VII.1936 (Sta. 141), 2 sp. – Punta Mosquito, S of Porlamar, 20 m, shales and limestones, 4.VI.1936 (Sta. 152), 7 sp. RMNH, 50 sp. ZMA. – Gaiquire island in lagoon NE of Porlamar, 10 m, shales and limestones, 8.VII.1936 (Sta. 153), 1 sp.

VENEZUELAN MAINLAND. Barquisimeto (Edo. Lara), 2 sp. FMNH 14624 ex Pittier; 3 sp. FMNH 109690, R. Wright Barker leg. – Caracas (D.F.), San José de Avila, 1500 m, 1940, 1 sp. FMNH 14968, C. Vogl leg. – Caracas, 2 sp. FMNH 31287 ex Webb ex ZMB, A. Ernst leg. – La Guaira (D.F.), 1 sp. IRSN ex Dautzenberg ex Géret ex Ancey. – Sebucan (Edo. Miranda), VI.1957, 1 sp. FMNH 115842 ex Caracas

Museum, Matos leg. – Naricual, near Barcelona (Edo. Anzoategui), 1 sp. IRSN ex Dautzenberg ex Ancey.

Locality? 3 sp. BMNH.

Bulimulus (Bulimulus) eyriesii (Drouët, 1859)

Pl. IV fig. 1–3.

Bulimus Eyriesii DROUËT, 1859, p. 63, pl. 1 fig. 12–13. [Description, measurements; Guyane française, Ilet-la-Mère – type locality!]
Bulimus Eyriesii Drouët, PFEIFFER 1868, p. 152. [Descr. (Drouët), references]
Bulimus Eyriesii Drouët, PFEIFFER 1877, p. 187. [Refer.]
Bulimulus Eyriesii Drouët, PAETEL 1883, p. 144. [Cayenne]
Bulimulus exilis var. *eyriesii* (Drouët), PILSBRY 1897 [1897–8], p. 39, pl. 12 fig. 53 non 54–60. [Descr. (Drouët), referring to Drouët, other refer. excl., remarks; Guadeloupe excl.]

Shell up to 27.5 mm, *elongated*, 2.0–2.3 times as long as wide; *narrowly perforated*, acute with straight or slightly convex sides, rather thin. Colour pale brownish-yellow.

Surface slightly shining, almost smooth, with indistinct traces of epidermal striae.

Protoconch densely and shallowly sculptured with alternating spiral rows of small knobs; irregularly sculptured on highest part of whorl.

Whorls *about 7*, slightly convex; ultimate whorl about 2/3 shell height. Suture well impressed.

Aperture about 4/10 shell height, 1.6–1.7 times as long as wide; subovate, brownish-yellow inside. Apertural deviation 5–10°.

Peristome thin; columellar margin slightly reflexed, dilated above.

Distribution – Guyane française.

This species was described from Ilet-la-Mère, an islet off the coast of French Guyana. As the collector of the original material, Mr. EYRIES, visited the French Antilles as well and apparently mixed up the shells from the two areas [cf. *Bulimulus guadalupensis* from Cayenne!], it is not surprising that subsequent authors attached the name *eyriesii* to the uniformly pale yellowish brown coloured form

of *Bulimulus guadalupensis*. However, the true *Bulimulus eyriesii* is a much more elongated species, with straight sides, a thin peristome and an apertural deviation of 5–10°; its aperture is never subquadrate as often in *B. guadalupensis*.

MARTENS (1873) already noted the striking resemblance of *Bulimulus eyriesii* to *B. cacticolus*. It differs from the latter species by being thinner, and having a pale brownish-yellow colour. The aperture seems to be smaller; the ultimate whorl is less swollen than in *Bulimulus cacticolus*. With the material at hand it is impossible to judge whether *Bulimulus eyriesii* should be considered only as a subspecies of *B. cacticolus* or not.

The measurements are given in Table 15.

GUYANE FRANÇAISE. Cayenne, 2 sp. BMNH; 15 sp. IRSN ex Dautzenberg, Marie leg.; 2 sp. MNHN, jardins; 2 sp. MNHN ex Vimont; 6 sp. MNHN ex H. Fischer; 3 sp. MNHN ex Morgan; 4 sp. MNHN ex Jousseaume; 6 sp. SMF 22819; 1899, 2 sp. SMF 90227, Conéménes leg. – Guyane française, 1 sp. IRSN ex Dautzenberg ex Crosse ex Mazé; 2 sp. MNHN; 1 sp. MNHN ex Letellier; 1 sp. MNHN ex Lavezzari.

Bulimulus (Bulimulus) dysoni (Pfeiffer, 1846)

Pl. IV fig. 4–5.

Bulimus Dysoni PFEIFFER, 1846, p. 39. [Description, measurements; Honduras – type locality!, syntypes: BMNH]

Bulimulus dysoni (Pfeiffer), PILSBRY 1897 [1897–8], p. 56, pl. 10 fig. 83. [Descr., references, remarks; Venezuela, Ciudad Bolívar; Yucatan]

Bulimulus dysoni (Pfr.), PILSBRY 1901 [1901–2], p. 144. [Remarks; not occurring in Yucatan]

[?] *Bulimulus dysoni* Pfeiffer, HUMMELINCK 1940b & c, p. 99 & 116. [Refer.; Margarita, Los Vagras]

[?] *Bulimulus dysoni* Pfeiffer, RICHARDS & HUMMELINCK 1940, p. 6, 13. [Remarks]

Shell narrowly perforated, acute with straight sides; rather solid. Colour pale brown.

Surface slightly shining, smooth.

Protoconch indistinctly sculptured with spiral rows of rather coarse small knobs on lower side, changing into more elongated wrinkles on higher part of same whorl.

Whorls rather convex. Suture rather deep.

Aperture subovate, pale brown inside; apertural deviation 5–10°. Peristome thin; columellar margin slightly reflexed.

Distribution – Margarita (HUMMELINCK 1940b), Venezuelan mainland (PILSBRY 1897–8), Colombia?, Guatemala (PFEIFFER 1877), Honduras [type locality].

This species is reported from Margarita (HUMMELINCK 1940b, RICHARDS & HUMMELINCK 1940), but probably incorrectly. As I could not verify RICHARDS' identification only a short description is given of the syntypes, which were accompanied by a label in L. PFEIFFER's handwriting (Pl. VII).

COLOMBIA. "4 mi. N of Bonda," 17.XI.1900, 1 sp. FMNH 78785, H. H. Smith leg.

HONDURAS. Honduras, 3 sp. BMNH [syntypes]; 1 sp. FMNH 78829 ex Bland; 1 sp. FMNH 94886 ex Nelson.

NOMEN DUBIUM

Bulimulus stenogyroides Guppy, 1868

Bulimulus stenogyroides GUPPY, 1868, p. 431. [Description, measurements; Dominica – type locality!]
Bulimus stenogyroides Guppy, PFEIFFER 1877, p. 132. [Descr. (Guppy), refer.]
Bulimulus stenogyroides Guppy, KOBELT 1880, p. 283.
Bulimus (Peronaeus) stenogyroides Guppy, SMITH 1888, p. 231. [Refer.]
Bulimulus stenogyroides Guppy, PILSBRY 1897 [1897–8], p. 49. [Descr. (Guppy), refer., remarks]

"A rimate, turrited, elongate cylindrical, scarcely shining shell, whitish-horn coloured under a brown epidermis, striae of growth somewhat sinuate; whorl (? about five or six), little convex, the last narrow and forming half or more of the length of the shell; aperture narrow, rather produced anteriorly, elongate-oval; peristome simple, a little effuse anteriorly, its margins joined by a thin callus on the body-whorl; columella reflexed over the narrow umbilical fissure.

Alt. ?, diam. 5½ mill.; alt. of aperture 6; width 2½ mill.; alt. of last whorl 10 mill."

Distribution – Dominica (GUPPY 1868).

This species was described from a single, broken specimen by GUPPY, whose description is repeated above. No new data were added by subsequent authors.

The original material is probably lost (*fide* DANCE 1966, p. 288). Studying the description, especially the measurements, it even is doubtful whether this species belongs to the Bulimulidae. Therefore the name *stenogyroides* ought to be considered as a *nomen dubium*.

Rhinus Albers, 1860

Albers ms., MARTENS 1860, p. 223. Type species, by original designation: *Helix heterotricha* Moricand = *Bulimulus* (*Rhinus*) *heterotrichus* (Moricand).

Diagnosis – Shell ovate to oblong, uniform (pale) brown, rarely with bands. Surface with spiral series of hairs, or with rows of little knobs when denuded of epidermis. Protoconch with interrupted waves, longitudinal fine striae, or zigzag wrinkles. Aperture ovate. Peristome expanded or slightly reflexed.

Distribution – Margarita, Venezuelan mainland, Guyanas, Brazil.

In the area treated this subgenus is represented only by the species *Bulimulus* (*Rhinus*) *constrictus* (Pfr.).

Bulimulus (Rhinus) constrictus (Pfeiffer, 1841)

Pls. V fig. 8–9, VI fig. 1, VII fig. 6.

Bulimus constrictus PFEIFFER, 1841, p. 41, 43. [Description, measurements; Angostura [= Venezuela, Ciudad Bolívar.] – type locality!]
Bulimus Angosturensis GRUNER, 1841, p. 278, pl. 11 fig. 3. [Descr., meas., remarks; "Venezuela, prov. Orinoco" – type locality!]
Bulimus angosturensis Grüner, CATLOW & REEVE 1845, p. 150. [References]
Bulimus constrictus Pfr., PFEIFFER 1848, p. 110. [Descr., refer.]
[non] *Bulimus constrictus* REEVE 1848 [1848–50], pl. 47 fig. 307.
Bulimus constrictus, REEVE 1849 [1848–50], pl. 59 fig. 402. [Descr., refer.]
Bulimus (*Leptomerus*) *constrictus* Pfr., ALBERS 1850, p. 166.
Bulimus constrictus Pfr., PFEIFFER 1853, p. 347. [Refer.]

Bulimus constrictus Pfr., PFEIFFER 1854 [KÜSTER & PFEIFFER 1840–65], p. 149, pl. 39 fig. 8–9. [Descr., refer.]
Orthalicus (*Leptomerus*) *constrictus* Pfeiff., ADAMS & ADAMS 1855 [1853–8], p. 156.
Bulimus constrictus Pfr., PFEIFFER 1859, p. 413. [Refer.]
Bulimulus (*Rhinus*) *constrictus* Pfr., MARTENS 1860, p. 223. [Caracas]
Bulimus constrictus Pfr., PFEIFFER 1868, p. 57. [Refer.]
Bulimulus constrictus Pfr., PAETEL & SCHAUFUSS 1869, p. 81.
Bulimulus constrictus Pfr., MARTENS 1873, p. 178, pl. 2 fig. 17a. [Refer., remarks, jaw, radula; La Guaira, "Neu Grenada"]
Bulimulus constrictus Pfr., PAETEL 1873, p. 100.
Bulimus constrictus var. *tateanus* GUPPY, 1875, p. 322. [Descr. meas.; Venezuelan Guiana – type locality!]
Bulimus constrictus Pfr., PFEIFFER 1877, p. 70. [Refer.]
Bulimus (*Rhinus*) *constrictus* Pfr., PFEIFFER & CLESSIN 1881, p. 228. [Refer.]
Bulimulus constrictus Pfr., PAETEL 1883, p. 140.
Bulimulus constrictus Pfr., PAETEL 1889, p. 223.
Bulimulus (*Rhinus*) *constrictus* (Pfeiffer), PILSBRY 1897 [1897–8], p. 80, pl. 13 fig. 10–14. [Descr., refer., remarks]
Bulimulus constrictus Pfeiffer, HUMMELINCK 1940b & c, p. 99 & 116. [Refer.; Margarita]
Bulimulus constrictus Pfeiffer, RICHARDS & HUMMELINCK 1940, p. 6, 13. [Remarks]
Bulimulus (*Rhinus*) *constrictus* (Mor.), S. H. JAECKEL 1952, p. 7. [NE Brasil]
[?] *Bulimulus* (*Rhinus*) *constrictus* Pfr., S. G. A. JAECKEL 1969, pl. 2 fig. 27.

Shell up to 23 mm, 1.8–1.9 times as long as wide; rather broadly perforated, acute with straight sides or weakly convex, apex obtuse; rather solid, somewhat translucent. Colour palebrown.

Surface slightly shining, with numerous spiral rows of *little knobs* in a regular pattern, generally encircled by a shallow depression. In fresh specimens there are corresponding rows of epidermal *hairs*.

Protoconch with several spiral rows of oblique wrinkles, which together give a regular *zig zag* appearance with sharp angles on lower side, more obtuse angles and less regular appearance on upper side.

Whorls about 6, slightly convex; ultimate whorl about 2/3 shell height. Suture well impressed.

Aperture about 4/10–1/2 shell height, 1.4–1.5 times as long as wide; subovate, whitish inside. Apertural deviation 10–15°.

Peristome thin, pale; basal and palatal margin expanded; columellar margin reflexed and dilated.

Distribution – Margarita, Venezuelan mainland, Brasil.

Bulimulus constrictus apparently is a rather invariable species. The measurements are given in Table 16.

The specimens from Margarita are smaller than those from the mainland. However, with the little material at hand no definite conclusions can be drawn.

MARGARITA. Northeastern foot of Cerro del Piache, southeast of El Valle, 100 m, marble-schists, 10.VII.1936 (Sta. 140), 3 sp. ZMA – Entrance of Cueva Honda del Piache, 300 m, marble-schists, 10.VII.1936 (Sta. 141), 1 sp. ZMA.

VENEZUELAN MAINLAND. "2 km S of Zamuro, Bolivar, Zulia," 6 sp. FMNH 109689, R. Wright Barker leg. – La Guaira, 2 sp. FMNH 78789 ex ANSP ex Swift – "Orinoco," 1 sp. NMB 1428*a* ex Merian – Ciudad Bolivar, 1 sp. NMB 1428*b* ex Bohny ex Boissier ex Parreyss – Venezuela, 1 sp. FMNH 31214 ex Webb ex Sowerby & Fulton.

BRASIL. Rio Branco, 3 sp. IRSN ex Dautzenberg ex Staudinger.

Locality? 5 sp. BMNH.

ZOOGEOGRAPHICAL REMARKS

Studying the distribution of the species of *Bulimulus* treated in this paper (see Table 17), the following remarks may be made.

The most common species in the region is undoubtedly *Bulimulus guadalupensis*. This species does not occur on the Caribbean islands of the Leeward Group or on the adjacent South American mainland. It has been mentioned as being imported in Jamaica, as it possibly is in Hispaniola as well. Data from literature give the impression that this species originally occurred on the islands of the Windward Group, and later spread rapidly by human agency.

Bulimulus diaphanus may be mentioned as another common species, at least in as far as distribution on various islands is concerned. Two subspecies may be distinguished, of which the nominal one is confined to the western part of the area, while the subspecies *fraterculus* is characteristic of the eastern part, the boundary of both subareas being between St. Croix and Anguilla.

Besides these two common species, several others may be considered to be endemic to more restricted areas.

Bulimulus limnoides only occurs in well-wooded parts of Guadeloupe, Dominica, and possibly Martinique and St. Vincent.

In comparable ecological circumstances on Guadeloupe *Bulimulus lherminieri* has been found.

On the small islands of St. Kitts and Barbuda, in a more arid landscape, *Bulimulus gittenbergeri* and *B. hummelincki* respectively were collected. In more or less comparable limestone habitats with a scanty vegetation *Bulimulus lehmanni* (on Anguilla and Dog Island) and *B. riisei* (on St. Thomas and St. Croix) have been found.

Bulimulus fuscus – possibly extinct – is confined to Barbados.

The other species mentioned in Table 17 are all common to the South American mainland, with the exception of *Bulimulus stenogyroides* from Dominica, which probably does not belong to the Bulimulidae.

Finally attention is drawn to the fact that no *Bulimulus* species have been found on Curaçao, Aruba and Bonaire, and other islands of the Leeward Group, with the exception of Margarita which, like Trinidad and Tobago, may be considered to possess an impoverished continental fauna.

According to the distribution of the species, three areas may be distinguished:

1) Puerto Rico and Virgin Islands, including St. Croix; characterized by the common occurrence ot *Bulimulus diaphanus diaphanus*, by *B. riisei*, which is endemic to the Virgin Islands, and by the absence of species, which are peculiar to the islands of the Windward Group, such as *B. lehmanni*.

2) The islands of the Windward Group; characterized by *Bulimulus diaphanus fraterculus* in the northern part and by the occurrence of several species which are endemic to small islands (*B. lehmanni, gittenbergeri, hummelincki, lherminieri* and *fuscus*).

3) Margarita and the adjacent mainland, including Trinidad and Tobago; characterized by the absence of "Caribbean species."

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TABLE 1

DISTRIBUTION AND ENDEMISM OF BULIMULIDAE S.S.

Area	Number of (sub)genera	Endemic
WEST INDIES	7	— (0%)
SOUTH AMERICA	67	55 (82%)
Venezuela	12	2 (17%)
Brasil	16	8 (50%)
Uruguay	5	— (0%)
Argentina	13	3 (23%)
Chile	7	1 (14%)
Bolivia	8	2 (25%)
Perú	39	25 (64%)
Ecuador	25	14 (56%)
Colombia	12	— (0%)
CENTRAL AMERICA	9	4 (44%)
Panamá	3	— (0%)
Costa Rica	4	— (0%)
México	9	4 (44%)
U.S.A.	2	— (0%)
AUSTRALIA	1	1 (100%)
NEW ZEALAND	2	2 (100%)
MELANESIA	12	12 (100%)

TABLE 2

CHARACTERISTICS OF *Bulimulus* (*Bulimulus*) SPECIES DEALT WITH IN THIS PAPER

Bulimulus	H/D	perfo-ration	sides	shell	surface	W	HA/DA	aperture	apert. deviat.
limnoides	1.8	rather narrow	rather convex	*solid,* strong	*axial riblets*	6½	1.6–1.7	squarish ovate	5(–10)°
guadalupensis	1.8–2.3	narrow	*rather convex*	thin to solid	smooth/ striae	6	1.4–2.0	sub- to sq. ovate	0– 5°
gittenbergeri	1.9–2.0	narrow	*straight*	rather thin	striae	6	1.7–1.8	sub- to sq. ovate	5–10°
hummelincki	1.9–2.0	rather narrow	straight	thin	smooth	6	1.5–1.6	*broadly ovate*	0–10°
diaphanus	1.8–2.1	narrow	straight	thin	striae	5½	1.5–1.8	subovate	*10–15°*
lehmanni	1.9–2.3	rather narrow	straight	rather solid	*coarse riblets*	6–6½	1.6–1.7	subovate	5–10°
lherminieri	1.8–2.0	narrow	straight	thin	striae	5½	1.6–1.9	ovate, *elongated*	5–10°
fuscus	1.8–2.1	narrow	*straight*	rather thin	smooth/ striae	5½	1.6–1.7	subovate	5–10°
riisei	1.8–2.0	rather narrow to broad	straight	rather thin to solid	smooth/ prickly	6–6½	1.6–1.8	*ovate*	0–10°
erectus	*2.2*	narrow	straight	thin	smooth/ striae	6½	1.7	subovate	*0– 5°*
cacticolus	2.0–2.1	rather narrow	straight	*rather solid*	smooth	7	1.6–1.7	subovate	5–10°

TABLE 3

MEASUREMENTS IN *Bulimulus limnoides* (FÉRUSSAC)

in mm, average values in italics.

Localities & Spec. measured		H±cl R	D±cl R	HA±cl R	WA±cl R	U±cl R	P±cl R	W±cl R
GUADELOUPE								
MNHN	3	*30.3* 31.0–29.0	*15.0* 15.5–14.8	*13.4* 14.6–12.7	*8.0* 8.2–7.7	*21.0* 21.5–20.5	*11.8* 12.5–11.2	*6.2* 6.3–6.1
DOMINICA								
ANSP	5	*30.9*± 3.6 34.0–28.0	*15.8*± 1.3 17.0–14.2	*13.5*± 0.9 14.7–13.0	*8.2*±0.6 8.7–7.5	*21.0*± 1.9 23.0–19.5	*11.5*± 2.2 13.3– 9.6	*6.4*±0.5 7.0–6.1
FMNH	1	27.5	15.5	12.9	8.3	19.5	9.4	6.0
BMNH	1	28.5	14.0	12.0	7.2	23.5	10.0	6.7
	1	31.0	17.0	15.0	9.0	22.0	10.7	6.3
USNM 124527	3	*31.5* 33.0–30.5	*15.5* 16.0–15.0	*13.0* 13.5–13.0	*7.6* 7.7–7.5	*21.0* 21.5–20.0	*11.5* 12.4–11.0	*6.5* 6.7–6.2
USNM 707513	2	*29.0* 30.5–27.5	*15.3* 16.0–14.6	*12.7* 12.8–12.5	*7.7* 8.0–7.4	*19.0* 19.5–18.5	*10.5* 11.3– 9.6	*6.5* 6.6–6.3
USNM 707514	4	*29.5* 30.0–29.0	*15.2* 16.0–14.6	*13.5* 13.6–13.4	*8.0* 8.3–7.6	*20.5* 20.5–20.0	*10.7* 11.0–10.1	*6.2* 6.3–6.0
LECTOTYPE		29.0	14.8	12.8	8.1	21.0	11.5	6.1

TABLE 4

MEASUREMENTS IN *Bulimulus guadalupensis* (BRUGUIÈRE)

in mm, average values in italics.

In this table the maximum values (M) of each measurement is given instead of the range; the totals for the islands only include samples with 5 specimens or more.

Localities & Spec. measured		M--H±cl	M−D±cl	M−HA±cl	M−WA±cl	M−U±cl	M−P±cl	M−W±cl
JAMAICA								
Mand. RMNH	10	22.0−*20.2*±1.0	10.1−*9.6*±0.3	9.2−*8.6*±0.4	5.5−*4.9*±0.3	15.0−*14.2*±0.5	8.9−*7.9*±0.5	6.3−*6.0*±0.1
id. (Venm.)	20	23.0−*19.3*±0.8	10.5−*9.4*±0.3	8.9−*8.3*±0.2	5.2−*4.9*±0.2	15.5−*13.4*±0.4	9.0−*7.7*±0.3	6.5−*6.0*±0.2
	30	*19.6*±0.6	*9.4*±0.2	*8.4*±0.2	*4.8*±0.2	*13.7*±0.4	*7.8*±0.2	*6.0*
HISPANIOLA								
S. Barb. RMNH	7	20.5−*17.9*±1.3	9.6−*8.4*±0.6	8.5−*7.6*±0.5	5.1−*4.6*±0.3	13.5−*12.2*±0.8	7.7−*6.9*±0.7	6.2−*5.8*±0.2
P. Sosua RMNH	19	19.5−*16.5*±0.4	9.4−*8.3*±0.2	8.3−*7.2*±0.3	5.0−*4.3*±0.2	12.5−*11.4*±0.3	7.8−*6.3*±0.3	6.5−*5.8*±0.1
Cayes ZMA	7	18.0−*17.4*±0.8	9.1−*8.3*±0.5	8.6−*7.5*±0.8	5.2−*4.6*±0.4	12.5−*12.0*±0.5	7.1−*6.6*±0.3	5.9−*5.8*±0.1
P. Sabut ZMA	10	10.0−*16.1*±0.8	8.5−*7.6*±0.3	7.6−*6.8*±0.4	4.4−*3.9*±0.2	12.4−*11.1*±0.5	7.3−*6.5*±0.4	6.2−*5.7*±0.2
	43	*16.8*±0.4	*8.2*±0.2	*7.2*±0.2	*4.3*±0.1	*11.5*±0.2	*6.3*±0.3	*5.8*±0.1
PUERTO RICO								
Sta. 695	6	18.0−*16.7*±1.2	9.1−*8.7*±0.5	8.1−*8.0*	5.1−*4.9*±0.2	12.6−*11.8*±0.8	7.1−*6.3*±0.6	5.7−*5.6*±0.1
Sta. 698	20	24.0−*19.4*±0.6	10.6−*9.3*±0.2	9.0−*8.3*±0.2	5.4−*4.8*±0.2	15.5−*13.2*±0.4	8.9−*7.1*±0.8	6.7−*6.0*±0.2
Sta. 699	20	22.0−*19.1*±0.7	10.3−*9.1*±0.3	9.3−*7.9*±0.2	5.4−*4.7*±0.2	14.7−*12.7*±0.4	8.7−*7.4*±0.3	6.8−*6.1*±0.1
Sta. 700	20	22.5−*19.3*±0.7	10.5−*9.7*±0.2	9.4−*8.2*±0.3	5.5−*4.9*±0.1	15.0−*13.5*±0.4	8.9−*7.6*±0.3	6.6−*6.0*±0.2
Sta. 701	4	21.0−*20.2*	10.2−*9.9*	8.6−*8.4*	5.5−*5.1*	14.0−*13.7*	8.2−*8.0*	6.4−*6.2*

Table 4 (*continued*)

Localities & Spec. measured		M−H±cl	M−D±cl	M−HA±cl	M−WA±cl	M−U±cl	M−P±cl	M−W±cl
Sta. 701A	12	23.5−*20.4*±0.8	11.0−*9.8*±0.4	9.5−*8.5*±0.4	5.6−*5.0*±0.3	16.0−*14.2*±0.6	9.4−*8.2*±0.4	6.7−*6.1*±0.2
Sta. 702	21	22.3−*19.1*±0.8	11.0−*9.1*±0.4	9.5−*8.2*±0.3	5.7−*4.9*±0.2	14.3−*12.9*±0.5	9.6−*7.4*±0.4	7.2−*6.0*±0.2
Magueyes ZMA	19	22.0−*18.9*±0.6	10.5−*9.7*±0.2	9.3−*8.0*±0.3	5.9−*5.0*±0.2	14.4−*12.9*±0.5	9.0−*7.6*±0.3	6.6−*6.0*±0.1
Naguabo ZMA	9	21.0−*20.1*±0.7	10.1−*9.2*±0.3	9.0−*8.2*±0.4	5.6−*4.9*±0.3	15.0−*13.8*±0.5	8.5−*7.8*±0.4	6.5−*6.2*±0.1
USNM 393529	10	19.5−*17.9*±0.7	9.3−*8.5*±0.4	8.7−*7.9*±0.6	5.0−*4.6*±0.3	13.4−*12.5*±0.5	7.7−*7.2*±0.3	6.2−*5.8*±0.2
Corozal ZMA	5	19.0−*18.1*±1.1	9.1−*8.3*±0.6	8.2−*8.1*±0.1	4.7−*4.6*±0.1	13.1−*12.6*±0.5	7.5−*6.9*±0.5	6.0−*5.8*±0.2
USNM 464288	20	23.0−*20.4*±0.7	10.2−*9.4*±0.2	10.0−*8.5*±0.3	5.7−*5.1*±0.1	15.5−*13.9*±0.4	9.7−*8.1*±0.1	6.5−*6.1*±0.1
	166	*19.3*±0.3	*9.4*±0.2	*8.2*±0.1	*4.9*±0.1	*13.2*±0.2	*7.5*±0.1	*6.0*
VIEQUES								
Isabel Seq.	4	17.5−*16.9*	8.6−*8.0*	7.2−*7.1*	4.7−*4.3*	12.2−*11.6*	7.0−*6.6*	6.0−*5.8*
ST. THOMAS								
Sta. 623	16	19.0−*17.3*±0.6	9.0−*8.2*±0.2	8.0−*7.0*±0.3	4.9−*4.2*±0.2	13.0−*11.3*±0.5	7.4−*6.7*±0.2	6.6−*5.9*±0.2
ST. JOHN								
Sta. 618	8	18.0−*16.9*±1.4	9.2−*8.4*±0.7	8.2−*7.2*±0.8	5.1−*4.6*±0.4	12.6−*11.3*±1.2	7.2−*6.3*±0.5	6.1−*5.9*±0.1
Sta. 618A	21	18.5−*16.8*±0.5	9.0−*8.3*±0.2	8.0−*7.1*±0.3	4.9−*4.2*±0.2	12.1−*11.1*±0.4	7.0−*6.4*±0.3	6.4−*5.9*±0.1
	29	*16.8*±0.5	*8.3*±0.2	*7.2*±0.3	*4.3*±0.2	*11.1*±0.4	*6.4*±0.2	*5.9*±0.1
ST. CROIX								
Sta. 612	18	22.0−*17.6*±1.1	9.5−*8.2*±0.4	7.9−*6.8*±0.3	5.0−*4.2*±0.2	13.3−*10.9*±0.5	9.0−*6.9*±0.5	6.6−*6.0*±0.2
Sta. 615	19	20.5−*17.5*±0.8	10.3−*8.5*±0.3	9.5−*7.1*±0.6	5.9−*4.2*±0.3	14.4−*12.0*±0.6	8.5−*7.0*±0.3	6.2−*5.8*±0.1
Sta. 616	1	16.5	8.4	6.5	4.3	11.5	7.0	5.6

Table 4 (*continued*)

Localities & Spec. measured		M−H±cl	M−D±cl	M−HA±cl	M−WA±cl	M−U±cl	M−P±cl	M−W±cl
Sta. 617	1	16.0	8.3	6.4	4.4	11.1	6.6	5.4
	37	*17.6*±0.6	*8.4*±0.2	*6.9*±0.3	*4.2*±0.2	*11.5*±0.4	*6.9*±0.3	*5.9*±0.1
ANGUILLA								
Sta. 485	35	20.0−*17.4*±0.5	9.5−*8.3*±0.2	8.8−*7.4*±0.2	4.9−*4.1*±0.1	14.0−*12.1*±0.3	8.4−*6.9*±0.2	6.5−*5.9*±0.1
S. Ground	1	23.0	10.1	8.9	4.5	14.5	8.3	6.6
ST. MARTIN								
Sta. 299	4	17.5−*17.1*	8.1−*7.8*	7.2−*6.8*	4.4−*4.2*	12.1−*11.5*	7.2−*6.8*	6.1−*5.9*
Sta. 458a	1	17.5	8.6	8.5	5.0	12.3	6.4	6.0
Sta. 458A	16	18.5−*16.4*±0.6	9.1−*8.1*±0.3	7.8−*7.1*±0.3	4.7−*4.2*±0.2	13.0−*11.4*±0.4	7.5−*6.6*±0.3	6.0−*5.7*±0.1
Sta. 461a	6	18.0−*17.3*±0.5	9.5−*8.9*±0.4	8.0−*7.4*±0.5	4.6−*4.4*±0.2	12.6−*11.7*±0.5	7.4−*6.5*±0.7	6.1−*5.9*±0.2
Sta. 461b	9	20.0−*17.1*±1.2	8.1−*7.7*±0.3	7.5−*7.0*±0.3	4.5−*4.2*±0.3	13.3−*11.7*±0.8	8.5−*6.9*±0.8	6.4−*5.9*±0.2
Sta. 467a	17	18.5−*16.3*±0.5	8.8−*8.1*±0.2	7.5−*7.2*±0.2	4.9−*4.3*±0.2	12.6−*11.2*±0.3	7.2−*6.3*±0.3	6.1−*5.7*±0.1
Sta. 467b	9	16.5−*15.3*±0.5	8.5−*7.7*±0.3	7.1−*6.6*±0.2	4.5−*4.1*±0.2	11.4−*10.2*±0.5	6.6−*5.9*±0.3	5.8−*5.6*±0.1
Sta. 474A	7	18.5−*16.7*±1.3	8.5−*7.9*±0.4	7.2−*6.4*±0.6	4.5−*4.1*±0.3	12.3−*10.8*±1.0	7.6−*6.9*±0.6	6.2−*5.9*±0.3
Sta. 478	14	21.0−*18.7*±0.9	10.0−*8.9*±0.4	8.3−*7.6*±0.3	5.0−*4.5*±0.3	13.4−*12.4*±0.5	8.1−*7.2*±0.3	6.7−*6.2*±0.2
Sta. 606	16	18.0−*16.1*±0.8	8.6−*8.1*±0.3	7.8−*6.8*±0.4	4.8−*4.2*±0.2	12.0−*10.9*±0.5	7.4−*6.3*±0.4	6.1−*5.8*±0.1
Sta. 606a	23	20.0−*16.8*±0.6	8.8−*8.2*±0.2	7.8−*6.7*±0.3	5.0−*4.3*±0.2	13.4−*11.3*±0.4	8.0−*6.7*±0.3	6.3−*5.7*±0.1
Sta. 680	13	20.0−*16.6*±0.9	8.9−*7.9*±0.4	8.0−*6.7*±0.4	4.5−*4.1*±0.2	12.9−*11.0*±0.6	7.5−*6.6*±0.4	6.3−*5.9*±0.1
Sta. 709	33	19.0−*16.9*±0.4	8.8−*8.0*±0.2	7.9−*7.0*±0.2	5.0−*4.3*±0.1	13.0−*11.5*±0.3	7.1−*6.6*±0.2	6.2−*5.9*±0.1
Sta. 829	19	19.5−*17.1*±0.6	9.7−*8.5*±0.3	8.6−*7.2*±0.3	5.5−*4.4*±0.2	14.0−*11.8*±0.4	7.9−*6.9*±0.3	6.1−*5.8*±0.1
Battery H.	1	19.0	8.9	7.0	4.2	12.4	8.0	6.3
P. Blanche	10	19.0−*16.5*±1.1	8.9−*8.0*±0.4	8.5−*6.7*±0.6	4.4−*3.9*±0.3	12.5−*11.3*±0.5	7.0−*6.6*±0.3	6.1−*5.7*±0.2

Table 4 (*continued*)

Localities & Spec. measured		M−H±cl	M−D±cl	M−HA±cl	M−WA±cl	M−U±cl	M−P±cl	M−W±cl
Flamingo Pt.	5	18.5−*17.3*±1.0	8.6−*8.2*±0.6	8.7−*7.1*±1.0	4.2−*3.9*±0.3	12.5−*11.4*±0.8	7.0−*6.6*±0.3	6.2−*6.0*±0.2
Oysterpond	4	19.0−*17.5*	9.0−*8.6*	7.9−*7.3*	4.5−*4.3*	13.1−*11.8*	7.1−*6.9*	6.2−*5.9*
Guana Bay	17	21.0−*17.8*±0.8	9.4−*8.5*±0.2	8.5−*7.4*±0.2	5.1−*4.1*±0.2	14.3−*11.9*±0.5	8.5−*7.0*±0.4	6.4−*5.9*±0.1
St. M. RMNH	16	20.0−*18.1*±0.8	9.0−*8.4*±0.3	8.5−*7.6*±0.3	5.0−*4.6*±0.2	14.0−*12.2*±0.5	8.2−*7.1*±0.4	6.4−*6.1*±0.2
	230	*16.9*±0.2	*8.1*±0.1	*7.0*±0.1	*4.2*±0.1	*11.4*±0.1	*6.7*±0.1	*5.8*±0.1
St. Barts								
Sta. 448	1	17.0	8.1	6.9	4.1	11.2	6.5	6.1
Sta. 451	6	20.0−*18.3*±1.9	8.9−*8.3*±0.4	8.0−*7.0*±0.7	4.6−*4.1*±0.4	13.1−*12.4*±0.8	8.2−*7.6*±0.6	6.6−*6.1*±0.4
Gustavia	16	20.5−*17.3*±0.9	9.5−*8.5*±0.3	8.3−*7.2*±0.3	5.0−*4.4*±0.2	13.8−*11.6*±0.5	8.0−*6.6*±0.5	6.4−*5.9*±0.2
Gr. Saline	9	21.0−*18.7*±1.1	10.0−*8.8*±0.7	9.1−*8.1*±0.6	5.2−*4.4*±0.4	14.0−*12.9*±0.7	8.8−*7.6*±0.6	6.4−*5.9*±0.2
	32	*17.9*±0.6	*8.6*±0.3	*7.4*±0.3	*4.4*±0.2	*12.1*±0.3	*7.1*±0.3	*5.9*±0.1
Saba								
Sta. 298C	2	*16.0*	8.1−*8.0*	7.1−*6.8*	*4.1*	*10.5*	6.7−*6.3*	5.9−*5.7*
Bottom	3	*17.0*	8.7−*8.5*	7.5−*7.3*	4.6−*4.5*	12.1−*11.6*	6.6−*6.5*	*5.9*
Windwards.	1	17.5	8.9	7.4	4.3	12.0	6.8	5.8
Saba RMNH	10	18.5−*16.3*±0.7	10.0−*9.2*±0.3	8.6−*7.6*±0.4	5.7−*5.1*±0.2	13.0−*11.8*±0.5	7.1−*6.2*±0.4	6.0−*5.7*±0.1
St. Kitts								
Sta. 604	13	21.5−*16.5*±1.4	9.9−*8.4*±0.5	9.3−*7.3*±0.6	5.5−*4.4*±0.4	15.5−*11.5*±1.1	8.4−*6.3*±0.6	6.1−*5.9*±0.1
Frigate Bay	1	19.0	9.4	7.9	5.0	12.8	7.4	6.4

Table 4 (*continued*)

Localities & Spec. measured		M–H±cl	M–D±cl	M–HA±cl	M–WA±cl	M–U±cl	M–P±cl	M–W±cl
BARBADU								
Sta. 597	1	14.6	7.4	6.9	4.3	10.2	4.9	6.0
Sta. 674a	1	15.0	7.5	6.6	4.1	10.0	5.8	5.7
ANTIGUA								
Sta. 593	17	22.5–*19.9*±0.9	11.1–*9.7*±0.4	10.3–*8.8*±0.5	6.1–*5.0*±0.2	15.5–*13.7*±0.6	8.5–*7.4*±0.3	6.5–*6.1*±0.1
Sta. 594	21	23.0–*20.6*±0.8	10.2–*9.5*±0.3	10.3–*8.8*±0.4	5.9–*5.1*±0.2	15.5–*14.0*±0.5	8.7–*7.7*±0.3	6.9–*6.3*±0.2
Sta. 594A	5	22.5–*20.1*±2.4	10.7–*9.9*±0.9	10.0–*8.6*±1.1	5.7–*5.1*±0.6	14.5–*13.3*±1.4	8.1–*7.6*±0.9	6.4–*6.2*±0.3
Sta. 595A	10	21.0–*19.2*±1.0	10.2–*9.3*±0.3	9.5–*8.3*±0.5	5.7–*5.0*±0.2	14.8–*13.1*±0.8	8.4–*7.7*±0.5	6.2–*5.9*±0.1
Vernon's Pd	1	18.0	9.1	7.8	5.0	12.5	6.4	5.7
	53	*20.1*±0.4	*9.8*±0.2	*8.8*±0.2	*5.1*±0.1	*13.8*±0.3	*7.6*±0.2	*6.2*±0.1
MONTSERRAT								
Galway	1	22.0	10.4	9.8	5.9	15.5	8.5	6.1
GUADELOUPE								
Sta. 722–723	9	18.5–*16.9*±1.0	8.6–*8.3*±0.2	7.3–*6.8*±0.3	4.7–*4.0*±0.3	12.1–*11.2*±0.3	7.5–*6.7*±0.4	6.1–*5.8*±0.2
Sta. 724	17	22.0–*18.8*±1.9	9.5–*8.8*±0.2	8.3–*7.6*±0.3	5.0–*4.7*±0.2	14.1–*12.6*±0.4	8.8–*7.2*±0.4	6.5–*5.8*±0.2
Sta. 725–726	18	22.0–*19.4*±0.8	10.1–*8.9*±0.2	8.4–*7.8*±0.2	5.8–*4.8*±0.2	14.3–*12.9*±0.4	9.4–*7.8*±0.5	6.5–*6.0*±0.1
Petit-Bourg	9	20.5–*18.6*±0.9	10.1–*9.3*±0.4	8.5–*7.9*±0.5	5.4–*4.9*±0.4	14.2–*12.8*±0.7	8.3–*7.2*±0.5	6.1–*5.7*±0.2
	53	*18.7*±0.4	*8.8*±0.1	*7.5*±0.1	*4.6*±0.1	*12.5*±0.2	*7.3*±0.2	*5.9*±0.1
LA DÉSIRADE								
Sta. 732	22	18.0–*14.1*±1.5	8.2–*7.4*±0.2	7.2–*6.4*±0.2	4.6–*4.1*±0.1	12.0– *9.8*±1.0	6.8–*5.7*±0.2	6.1–*5.6*±0.1

Table 4 (*continued*)

Localities & Spec. measured		M−H±cl	M−D±cl	M−HA±cl	M−WA±cl	M−U±cl	M−P±cl	M−W±cl
Sta. 733	5	15.0−*14.3*±0.7	7.5−*7.1*±0.3	6.2−*6.0*±0.1	4.0−*3.7*±0.3	10.2− *9.4*±0.5	6.0−*5.4*±0.5	5.8−*5.6*±0.2
Sta. 735	4	19.5−*15.4*	8.2−*7.0*	7.8−*6.3*	4.2−*3.7*	13.0−*10.4*	7.7−*6.1*	6.3−*5.8*
	27	*14.9*±0.4	*7.4*±0.2	*6.3*±0.2	*4.0*±0.2	*10.0*±0.4	*5.6*±0.2	*5.6*
MARIE-GALANTE								
Sta. 746	7	20.5−*18.5*±1.2	10.1−*9.1*±0.6	8.5−*7.6*±0.5	5.1−*4.6*±0.4	14.0−*12.5*±0.9	8.9−*7.2*±0.8	6.2−*5.9*±0.2
Sta. 747	1	19.5	9.4	7.8	5.0	13.6	8.1	5.7
Sta. 748	11	22.5−*20.7*±1.0	10.0−*9.1*±0.4	9.1−*8.1*±0.4	6.0−*4.8*±0.4	14.7−*13.4*±0.5	9.5−*8.2*±0.5	6.5−*6.1*±0.2
	18	*19.9*±0.7	*9.1*±0.3	*7.9*±0.3	*4.8*±0.3	*13.0*±0.4	*7.8*±0.4	*6.0*±0.1
DOMINICA								
Sta. 843	1	15.0	7.8	6.6	4.5	10.2	5.9	5.5
Sta. 845	3	16.5−*16.0*	8.6−*7.8*	7.1−*6.7*	4.5−*4.2*	11.0−*10.7*	6.1−*5.8*	6.0−*5.7*
MARTINIQUE								
Sta. 763	1	17.5	8.9	6.9	5.0	12.2	7.1	5.5
GRENADA								
Sta. 859	1	20.0	10.4	9.8	5.8	14.5	7.0	5.8
BARBADOS								
Sta. 774	21	20.5−*16.6*±0.6	9.5−*8.2*±0.3	8.4−*7.1*±0.3	4.8−*4.3*±0.2	14.4−*11.3*±0.5	8.0−*6.7*±0.3	6.1−*5.8*±0.1
Sta. 776	18	21.0−*18.8*±0.9	10.0−*9.0*±0.3	8.3−*7.4*±0.3	5.1−*4.6*±0.2	14.3−*12.4*±0.5	9.3−*7.5*±0.4	6.4−*5.9*±0.2
	39	*17.8*±0.2	*8.5*±0.2	*7.4*±0.1	*4.5*±0.1	*12.0*±0.2	*7.1*±0.1	*5.8*

TABLE 5

MEASUREMENTS IN *Bulimulus gittenbergeri* SP. N.

in mm, average values in italics.

Localities & Spec. measured	H±cl R	D±cl R	HA±cl R	WA±cl R	U±cl R	P±cl R	W±cl R
ST. KITTS							
Sta. 420 7	*17.9*± 1.4 20.5–16.5	*9.1*±0.4 10.0–8.8	*8.1*±0.6 9.1–7.2	*4.6*±0.3 5.1–4.0	*12.8*± 0.9 14.4–11.3	*7.0*±0.6 8.0–5.9	*5.8*±0.3 6.4–5.5
Sta. 422 18	*18.0*± 0.7 20.5–17.0	*9.0*±0.2 9.9–8.3	*7.8*±0.3 8.8–7.4	*4.7*±0.2 5.7–4.2	*11.7*±0.4 14.2–10.2	*6.8*±0.2 7.7–6.0	*5.9*±0.1 6.4–5.7
HOLOTYPE	20.7	8.9	8.8	5.7	14.2	7.7	6.4

TABLE 6

MEASUREMENTS IN *Bulimulus hummelincki* SP. N.

in mm, average values in italics.

Localities & Spec. measured	H±cl R	D±cl R	HA±cl R	WA±cl R	U±cl R	P±cl R	W±cl R
BARBUDA							
Sta. 597 13	*19.7*± 0.8 22.5–17.5	*10.1*±0.3 11.0–9.4	*9.0*±0.4 10.1–7.7	*6.0*±0.2 6.5–5.6	*13.5*± 0.6 15.5–12.1	*7.1*±0.4 8.4–6.5	*6.2*±0.1 6.4–5.9
Sta. 598 10	*18.1*± 0.9 20.5–17.0	*9.3*±0.4 10.0–8.3	*8.3*±0.2 8.8–7.9	*5.4*±0.2 5.9–5.0	*12.4*± 0.5 13.8–11.5	*6.5*±0.5 6.8–5.8	*6.0*±0.1 6.3–5.7
Sta. 602 16	*16.5*± 0.4 18.0–15.5	*8.8*±0.3 9.9–7.8	*7.9*±0.3 8.7–7.0	*5.0*±0.2 5.6–4.3	*11.5*± 0.3 12.5–10.7	*5.8*±0.2 6.1–5.0	*5.8*±0.1 6.1–5.6
HOLOTYPE	19.1	9.9	8.9	6.0	12.1	6.8	6.2

TABLE 7

MEASUREMENTS IN *Bulimulus diaphanus diaphanus* (PFEIFFER)

in mm, average values in italics.

Localities & Spec. measured	H±cl R	D±cl R	HA±cl R	WA±cl R	U±cl R	P±cl R	W±cl R
HISPANIOLA							
USNM 5	*14.0*± 1.4 14.6–12.9	*7.1*±0.7 7.8–6.5	*6.0*±0.8 6.8–5.2	*3.7*±0.4 4.0–3.4	*9.7*± 0.9 10.5– 8.9	*5.7*±0.5 6.1–5.1	*5.3*±0.4 5.8–5.1
MONA							
MCZ 2	*15.5* 16.0–15.0	*8.1* 8.2–8.0	*7.0* 7.2–6.8	*4.3* 4.4–4.2	*10.7* 11.1–10.2	*5.7* 5.9–5.5	*5.5*
PUERTO RICO							
USNM 1	15.0	7.3	6.9	4.2	10.4	5.6	5.3
FMNH 2	*16.5* 17.5–15.5	*8.6* 8.9–8.2	*7.8* 8.0–7.5	*4.7* 5.0–4.4	*11.5* 12.0–11.0	*6.1* 6.3–5.8	*5.6* 5.7–5.4
ST. THOMAS							
FMNH 2	*15.8* 16.0–15.5	*7.5* 7.7–7.3	*7.2* 7.2–7.1	*4.0* 4.1–3.9	*11.0* 11.0–10.9	*5.9* 6.0–5.7	*5.8* 5.9–5.7
NRS 4	*14.2* 15.3–13.4	*6.9* 7.5–6.4	*6.1* 6.8–5.7	*3.6* 4.1–3.1	*9.3* 10.2– 8.7	*5.2* 5.7–4.6	*5.7* 5.8–5.5
UZMK 3	*14.3* 15.0–13.8	*7.3* 7.6–7.0	*6.5* 6.7–6.1	*3.9* 4.2–3.6	*9.6* 9.8– 9.3	*5.5* 6.0–5.0	*5.5* 5.8–5.3
BMNH 2 SYNTYPES	13.5 12.8	6.4 6.5	5.3 5.5	3.2 3.4	8.8 8.6	5.2 4.9	5.5 5.5
ST. JOHN							
FMNH 3	*15.1* 16.6–14.0	*7.3* 7.5–7.1	*6.3* 6.9–6.0	*4.0* 4.4–3.7	*9.9* 10.7– 9.4	*5.6* 6.4–4.8	*5.8* 6.0–5.6

TABLE 8

MEASUREMENTS IN *Bulimulus diaphanus fraterculus* (POTIEZ & MICHAUD)

in mm, average values in italics.

Localities & Spec. measured		H±cl R	D±cl R	HA±cl R	WA±cl R	U±cl R	P±cl R	W±cl R
ST. MARTIN								
ZMA	5	*12.4*± 0.8	*6.7*±0.5	*5.4*±0.5	*3.4*±0.3	*8.2*±0.5	*4.7*±0.4	*5.4*±0.2
		13.2—11.6	7.4—6.4	5.9—5.3	3.7—3.1	8.9—7.8	5.2—4.4	5.6—5.2
SABA								
Sta. 298	1	17.0	7.8	7.2	4.5	11.4	6.4	6.0
ST. EUSTATIUS								
Sta. 423	2	*11.5*	*6.2*	*5.2*	*3.5*	*7.9*	*4.4*	*5.2*
		12.0—11.0	6.4—6.0	5.5—4.8	3.6—3.3	8.3—7.4		5.4—5.0
Sta. 424	1	12.5	6.7	5.5	3.5	9.0	5.0	5.2
Sta. 426	1	13.0	6.9	6.0	3.7	9.3	5.1	5.2
ANSP	2	*14.0*	*6.7*	*6.0*	*3.6*	*9.2*	*5.4*	*5.5*
		14.2—13.7	6.8—6.5		3.6—3.5	9.3—9.1	5.5—5.3	5.6—5.4
FMNH	4	*14.6*	*7.2*	*6.0*	*3.7*	*9.8*	*5.6*	*5.6*
		15.0—14.0	7.3—6.9	6.5—5.7	3.9—3.5	10.3—9.2	5.8—5.5	5.7—5.5
BARBUDA								
Sta. 598	1	13.0	6.6	6.1	3.8	8.6	4.5	5.4
GUADELOUPE								
USNM 492633	2	*12.3*	*6.3*	*4.9*	*3.2*	*8.1*	*4.6*	*5.6*
		12.5—12.0	6.5—6.1	4.9—4.8	3.4—3.0	8.3—7.9	4.7—4.5	
USNM 492634	3	*12.5*	*6.9*	*6.0*	*3.7*	*9.3*	*4.9*	*5.1*
		13.0—12.2	7.2—6.3	6.2—5.7	3.9—3.6	9.7—9.0	5.0—4.7	5.2—4.9
MNHN	1	15.5	7.0	7.0	3.8	10.8	5.9	5.2
Locality?								
MNHN	5	*13.3*± 1.0	*7.1*±0.6	*5.8*±0.5	*3.6*±0.3	*9.1*±0.8	*5.2*±0.5	*5.2*±0.2
		14.2—12.4	7.6—6.5	6.1—4.2	3.9—3.3	9.8—8.4	5.5—4.5	5.4—5.0
LECTOTYPE		13.7	6.8	5.9	3.7	9.6	5.4	5.1

TABLE 9

MEASUREMENTS IN *Bulimulus lehmanni* (PFEIFFER)

in mm, average values in italics.

Localities & Spec. measured	H±cl R	D±cl R	HA±cl R	WA±cl R	U±cl R	P±cl R	W±cl R
DOG ISLAND							
Sta. 487 3	*14.9* 15.4–14.2	*7.4* 7.6–7.3	*6.7* 7.0–6.1	*4.1* 4.3–3.9	*10.4* 10.8–10.1	*5.6* 6.0–5.2	*5.7* 5.9–5.5
Sta. 489 1	18.0	8.1	6.7	4.3	11.7	7.1	6.5
ANGUILLA							
Sta. 485 11	*14.8*± 0.7 16.0–13.0	*7.8*±0.4 9.0–7.0	*6.9*±0.4 8.0–6.1	*4.2*±0.2 4.7–3.8	*10.3*± 0.5 11.5– 9.2	*5.3*±0.3 6.0–4.6	*5.7*±0.2 6.1–5.5
RMNH 5	*14.4*± 1.1 15.5–13.2	*7.6*±0.9 8.5–6.9	*6.5*±0.5 7.1–6.0	*4.2*±0.4 4.6–3.9	*9.9*± 0.8 10.7– 9.3	*5.3*±0.6 5.9–4.7	*5.6*±0.1 5.7–5.5
AMNH 7	*16.3*± 1.2 18.5–14.8	*8.0*±0.5 8.5–6.9	*7.1*±0.6 7.5–6.0	*4.1*±0.3 4.6–3.7	*11.0*± 0.9 12.3– 9.6	*6.0*±0.4 7.0–5.6	*5.9*±0.2 6.2–5.5
ANSP 2	*16.5*	*8.2* 8.6–7.7	*7.5*	*4.3*	*11.3* 11.3–11.2	*6.0*	*6.0* 6.0–5.9
UZMK 5	*17.3*± 1.4 18.5–16.0	*8.4*±0.5 9.1–8.0	*7.5*±0.5 8.0–7.0	*4.6*±0.3 4.8–4.3	*11.5*± 0.4 12.0–11.0	*6.5*±0.7 7.2–6.0	*6.1*±0.4 6.5–6.0

TABLE 10

MEASUREMENTS IN *Bulimulus lherminieri* (FISCHER)

in mm, average values in italics.

Localities & Spec. measured		H±cl R	D±cl R	HA±cl R	WA±cl R	U±cl R	P±cl R	W±cl R
GUADELOUPE								
ANSP	1	19.0	9.4	10.0	5.0	14.0	6.2	5.3
FMNH	1	18.0	9.6	9.0	5.3	13.2	6.0	5.0
MNHN	1	19.0	9.8	9.4	6.0	13.7	6.4	5.3
	1	17.0	9.5	9.4	5.4	12.8	5.0	5.0
	2	*18.5* 19.0—18.0	*10.0* 10.9— 9.1	*9.3* 9.9—8.7	*5.4* 5.8—5.0	*13.0* 13.8—12.1	*6.2* 6.2—6.1	*5.5* 5.7—5.3
	1	17.5	9.4	9.7	5.1	13.3	5.4	5.0
	2	*19.8* 20.0—19.5	*10.1* 10.2—10.0	*9.7* 10.0—9.4	*5.5* 5.8—5.2	*14.0* 14.2—13.8	*6.9* 7.2—6.6	*5.4* 5.5—5.2

TABLE 11

MEASUREMENTS IN *Bulimulus fuscus* GUILDING

in mm, average values in italics.

Localities & Spec. measured		H±cl R	D±cl R	HA±cl R	WA±cl R	U±cl R	P±cl R	W±cl R
BARBADOS								
ANSP	9	*18.7*± 1.4 21.0–15.0	*10.1*± 0.7 11.5– 8.3	*9.6*±0.7 10.5–7.8	*6.1*±0.5 7.2–4.9	*13.8*± 1.1 15.5–11.0	*6.5*±0.6 7.6–5.0	*5.3*±0.2 5.6–5.0
FMNH 31198	1	17.5	9.5	8.8	5.5	12.4	5.8	5.2
FMNH 106505	3	*17.2* 17.5–17.0	*9.1*	*8.4* 8.6–8.2	*5.1* 5.3–4.9	*12.4* 12.9–12.0	*5.9* 6.3–5.5	*5.3* 5.3–5.2
FMNH 106599	1	20.5	10.9	9.9	5.9	14.4	7.3	5.9
USNM 492637	3	*20.0* 21.5–18.0	*9.5* 10.1– 9.1	*10.0* 10.7–9.2	*5.8* 6.4–5.5	*14.7* 15.5–13.5	*7.3* 7.7–6.6	*5.4* 5.5–5.4
USNM 492639	1	21.0	11.2	10.8	6.4	15.5	6.9	5.6
USNM 57804	4	*18.0* 19.0–17.0	*9.6* 10.0– 9.0	*9.3* 9.8–8.7	*5.7* 6.0–5.4	*13.3* 14.2–12.5	*6.0* 6.7–5.3	*5.2* 5.3–5.1
BMNH	3	*20.3* 21.5–19.5	*11.0* 11.6–10.6	*10.4* 10.8–9.8	*6.4* 6.7–6.0	*14.9* 15.5–14.0	*7.0* 7.4–6.7	*5.4* 5.7–5.1
LECTOTYPE		21.5	10.8	10.8	6.7	15.7	7.4	5.7

TABLE 12

MEASUREMENTS IN *Bulimulus riisei* (PFEIFFER)

in mm, average values in italics.

Localities & Spec. measured		H±cl R	D±cl R	HA±cl R	WA±cl R	U±cl R	P±cl R	W±cl R
Fossil:								
ST. CROIX								
Sta. 615	2	*22.3* 24.0–22.5	*12.3* 13.0–11.5	*10.5* 11.0–10.0	*6.3* 6.5–6.0	*16.3* 17.0–15.5	*8.3* 8.5–8.0	*6.3* 6.3–6.2
USNM	4	*25.9* 27.5–24.0	*13.9* 15.0–12.8	*12.7* 13.5–11.0	*7.4* 7.7–6.8	*18.7* 19.5–17.0	*8.8* 9.3–8.5	*6.3* 6.5–6.1
UZMK	8	*24.5*± 1.5 27.0–21.5	*12.9*± 0.9 14.5–11.3	*11.7*± 0.9 13.2–10.1	*6.8*±0.5 7.6–5.9	*17.5*± 1.2 19.0–15.0	*8.6*±0.8 9.9–7.2	*6.3*±0.1 6.5–6.1
UZMK	16	*25.2*± 0.6 27.5–23.5	*12.5*± 0.4 14.0–11.2	*11.6*± 0.4 12.7–10.3	*6.5*±0.4 7.7–5.5	*17.6*± 0.5 19.5–16.5	*8.9*±0.3 9.8–8.1	*6.3*±0.1 6.5–6.0
Recent:								
ST. CROIX								
Spring Gut	2	*20.2* 23.5–18.5	*11.1* 12.0–10.1	*10.5* 12.0– 9.5	*6.4* 7.0–5.7	*15.2* 17.0–13.3	*7.0* 7.6–6.3	*5.8* 6.1–5.5
Prosperity	4	*16.3* 17.0–15.5	*8.7* 9.3– 7.9	*8.5* 8.7– 8.2	*4.9* 5.0–4.7	*11.8* 12.1–11.3	*5.4* 5.9–4.8	*5.4* 5.5–5.4
UZMK	3	*18.2* 19.0–17.5	*10.0* 10.2– 9.8	*9.6* 9.7– 9.3	*5.8* 5.9–5.7	*13.3* 13.9–12.6	*6.0* 6.7–5.5	*5.5* 5.6–5.4
MCZ 89103	7	*17.4*± 0.6 18.0–17.0	*9.1*± 0.2 9.5– 8.8	*8.2*± 0.3 8.7– 7.7	*4.9*±0.2 5.1–4.6	*12.2*± 0.4 12.8–11.8	*6.3*±0.3 6.7–5.6	*5.8*±0.2 6.0–5.4

TABLE 13

MEASUREMENTS IN *Bulimulus erectus* (REEVE)

in mm, average values in italics.

Localities & Spec. measured	H±cl R	D±cl R	HA±cl R	WA±cl R	U±cl R	P±cl R	W±cl R
Sta. 798 13	*19.6*± 1.8 24.0–17.5	*9.0*±0.4 10.0–7.8	*8.4*±0.3 9.6–7.7	*5.0*±0.2 5.6–4.6	*12.6*± 0.6 14.6–11.5	*7.0*±0.4 8.6–5.9	*6.4*±0.2 6.8–6.1

TABLE 14

MEASUREMENTS IN *Bulimulus cacticolus* (REEVE)

in mm, average values in italics.

Localities & Spec. measured	H±cl R	D±cl R	HA±cl R	WA±cl R	U±cl R	P±cl R	W±cl R
MARGARITA							
Sta. 139 1	25.5	12.0	11.2	6.9	16.5	8.7	7.1
Sta. 141 1	21.5	10.1	9.2	5.6	14.6	7.9	6.3
Sta. 152 20	*27.3*± 0.7 31.5–25.5	*13.1*± 0.2 14.0–12.0	*12.0*± 0.3 13.5–11.2	*7.1*±0.2 7.9–6.2	*18.2*± 0.5 21.0–17.0	*9.7*±0.4 11.8–8.9	*7.1*±0.1 7.4–6.8
VENEZUELAN MAINLAND							
FMNH 109690 1	26.5	13.2	13.0	7.8	19.0	9.3	6.6

TABLE 15

MEASUREMENTS IN *Bulimulus eyriesii* (DROUËT)

in mm, average values in italics.

Localities & Spec. measured		H±cl R	D±cl R	HA±cl R	WA±cl R	U±cl R	P±cl R	W±cl R
GUYANE FRANÇAISE								
MNHN	2	*24.5* 24.5—24.0	*10.5* 11.0—10.0	*10.5*	*6.5* 6.5—6.0	*16.0*	*8.5* 9.0—8.0	*7.1* 7.2—6.9
MNHN	1	21.0	10.5	9.0	5.8	14.2	7.8	6.6
MNHN	1	21.5	11.0	9.5	6.0	14.5	7.5	6.5
MNHN Cayenne	2	*26.5* 27.5—25.5	*12.5* 12.5—12.0	*11.9* 12.0—11.7	*7.1* 7.2—7.0	*17.5* 18.0—17.0	*9.5* 10.0—9.0	*6.9*
MNHN Cayenne	4	*20.6* 21.5—19.0	*10.0* 11.0— 9.0	*9.5* 10.0— 9.0	*5.6* 6.0—5.0	*14.3* 15.0—13.0	*7.6* 8.2—7.0	*6.3* 6.5—6.0
MNHN Cayenne	3	*22.8* 23.5—21.5	*10.9* 11.3—10.5	*9.9* 10.5— 8.8	*5.8* 6.3—5.0	*15.3* 16.0—14.5	*8.3* 8.5—8.0	*6.7* 6.8—6.6
MNHN Cayenne	5	*22.2*± 2.5 26.0—19.0	*10.6*± 0.6 12.0— 9.5	*9.9*± 0.7 10.8— 9.1	*6.1*±0.7 7.0—5.2	*15.2*± 1.2 17.0—14.6	*8.2*±1.4 10.0—6.6	*6.6*±0.4 7.0—6.0

TABLE 16

MEASUREMENTS IN *Bulimulus constrictus* (PFEIFFER)

in mm, average values in italics.

Localities & Spec. measured		H±cl R	D±cl R	HA±cl R	WA±cl R	U±cl R	P±cl R	W±cl R
MARGARITA								
Sta. 140	1	16.5	8.9	7.1	4.9	10.9	6.2	6.0
Sta. 141	1	16.5	9.1	6.9	5.0	10.8	6.2	5.9
VENEZUELAN MAINLAND								
FMNH 109689	3	*20.5* 23.0—18.5	*10.6* 11.5—10.0	*8.6* 9.5—8.0	*5.7* 6.0—5.5	*13.4* 14.9—12.5	*7.5* 8.2—6.9	*6.3* 6.6—6.1
NMB 1428a	1	19.0	10.2	8.2	5.5	12.4	7.3	5.9
NMB 1428b	1	17.5	9.4	7.2	5.0	11.5	7.0	5.8

TABLE 17

DISTRIBUTION OF *Bulimulus* IN THE AREA DEALT WITH IN THIS PAPER

× material examined; ○ from literature; ? doubtful references.

Bulimulus	Jamaica	Hispaniola	Mona	Puerto Rico	Vieques	St. Thomas	St. John	Anegada	St. Croix	Dog Island	Anguilla	St. Martin	St. Barts	Saba	St. Eustatius	St. Kitts	Nevis	Barbuda	Antigua	Montserrat	Guadeloupe	La Désirade	Marie-Galante	Les Saintes	Dominica	Martinique	St. Lucia	St. Vincent	Grenada	Barbados	Margarita	S. American mainland	Central America
guadalupensis	×	×	×	×	×	×	×	×	×		×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×			?	
d. diaphanus		×	×	×	×	×	×	×	×																								
riisei						×	×	?	×																								
lehmanni										×	×	○																					
d. fraterculus												×	○	×	×	○		×	○		×			○		?							
gittenbergeri																×																	
hummelincki																		×															
lherminieri																					×												
limnoides												?									×				×	○	×						
stenogyroides																									○								
fuscus																												○	×				
erectus																															×	×	
cacticolus																															×	×	
constrictus																															×	×	
eyriesii																																×	
dysoni																															?	○	×

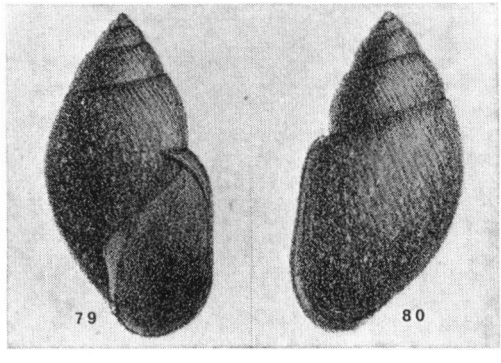
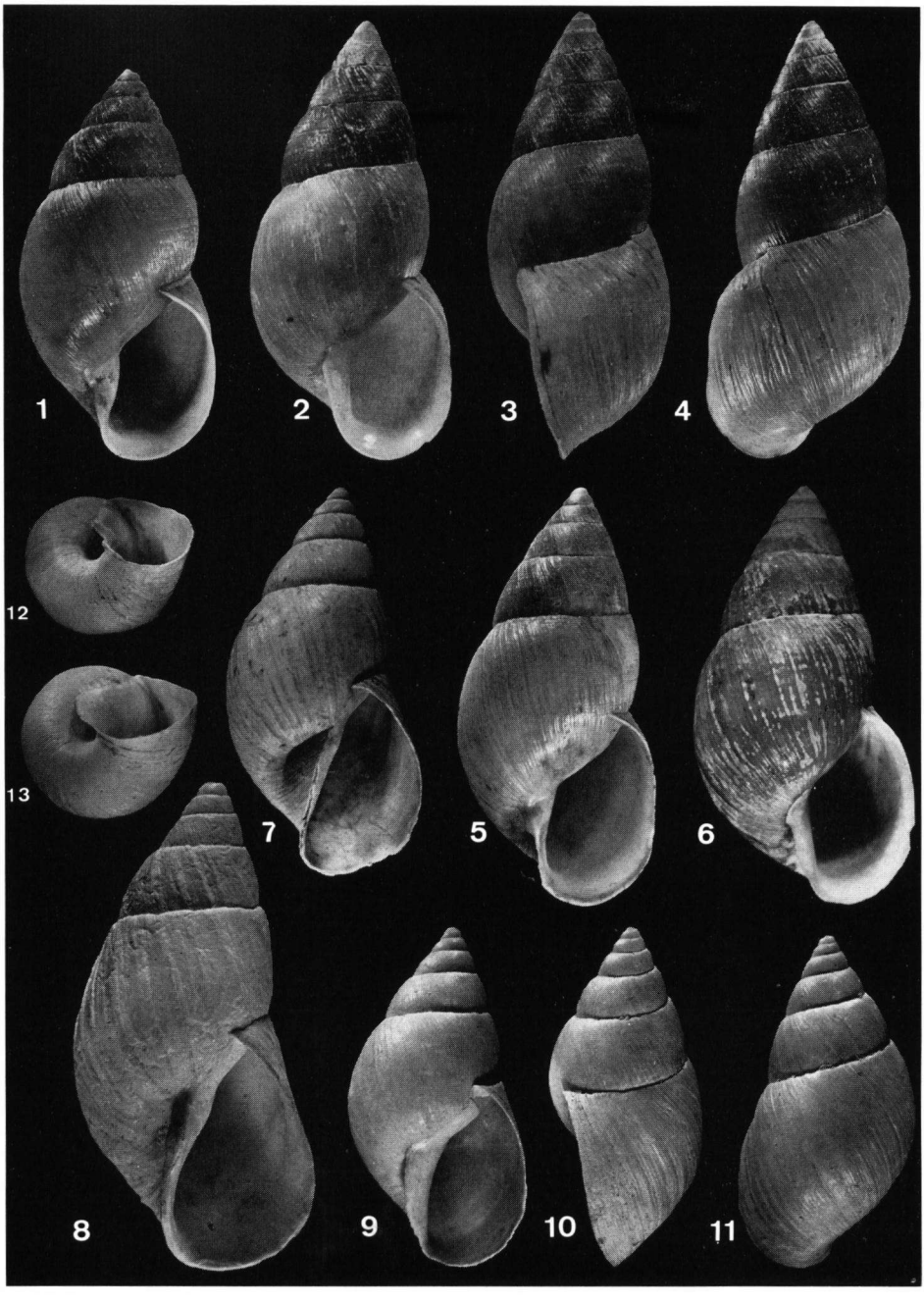
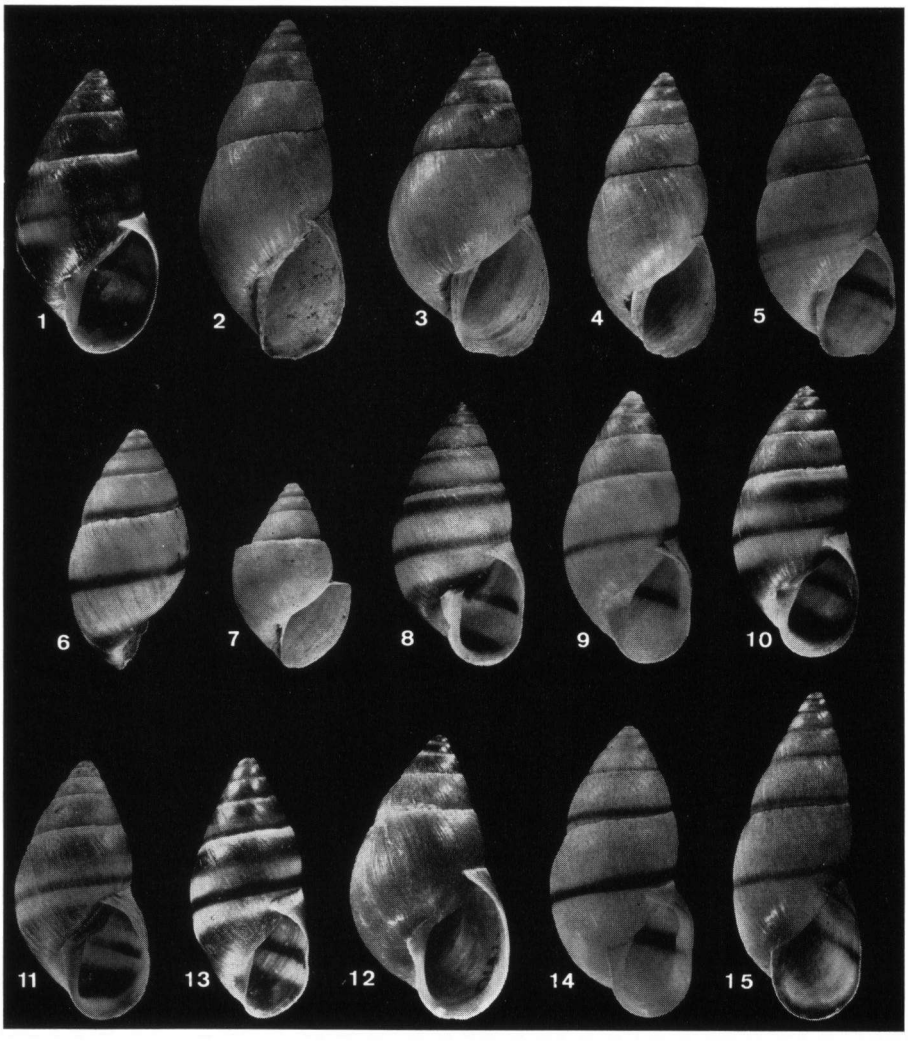


Fig. 79–80. Original figures of *Bulimulus lherminieri*.

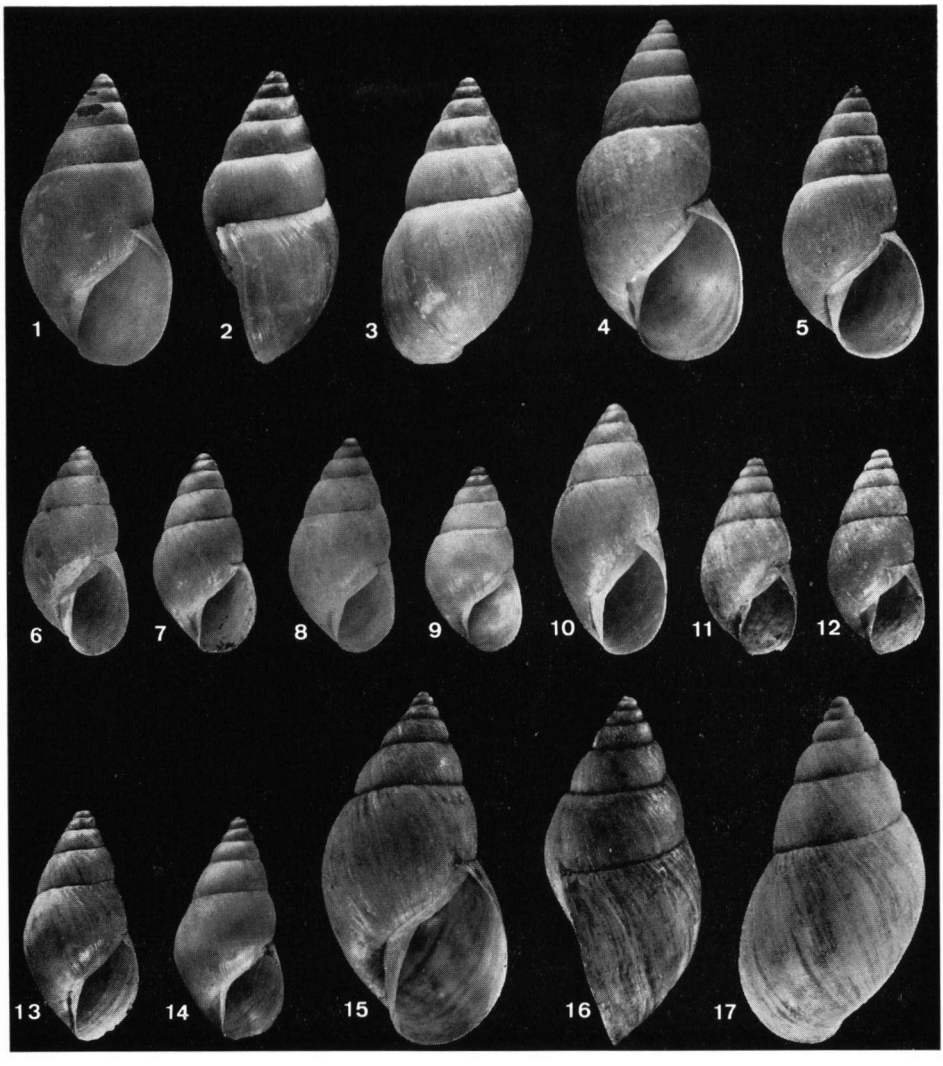


Bulimulus limnoides – 1, 5, GUADELOUPE (MNHN, resp. lecto- and paralectotype); 2–4, 6, DOMINICA (ANSP, resp. paralecto- and lectotype of *B. nichollsi*), fig. 6 phot. by K. Sosnowski and G. Specht.
Bulimulus riisei – 7–13, ST. CROIX (UZMK).
All specimens on Plates I-V: × 2.

PLATE II

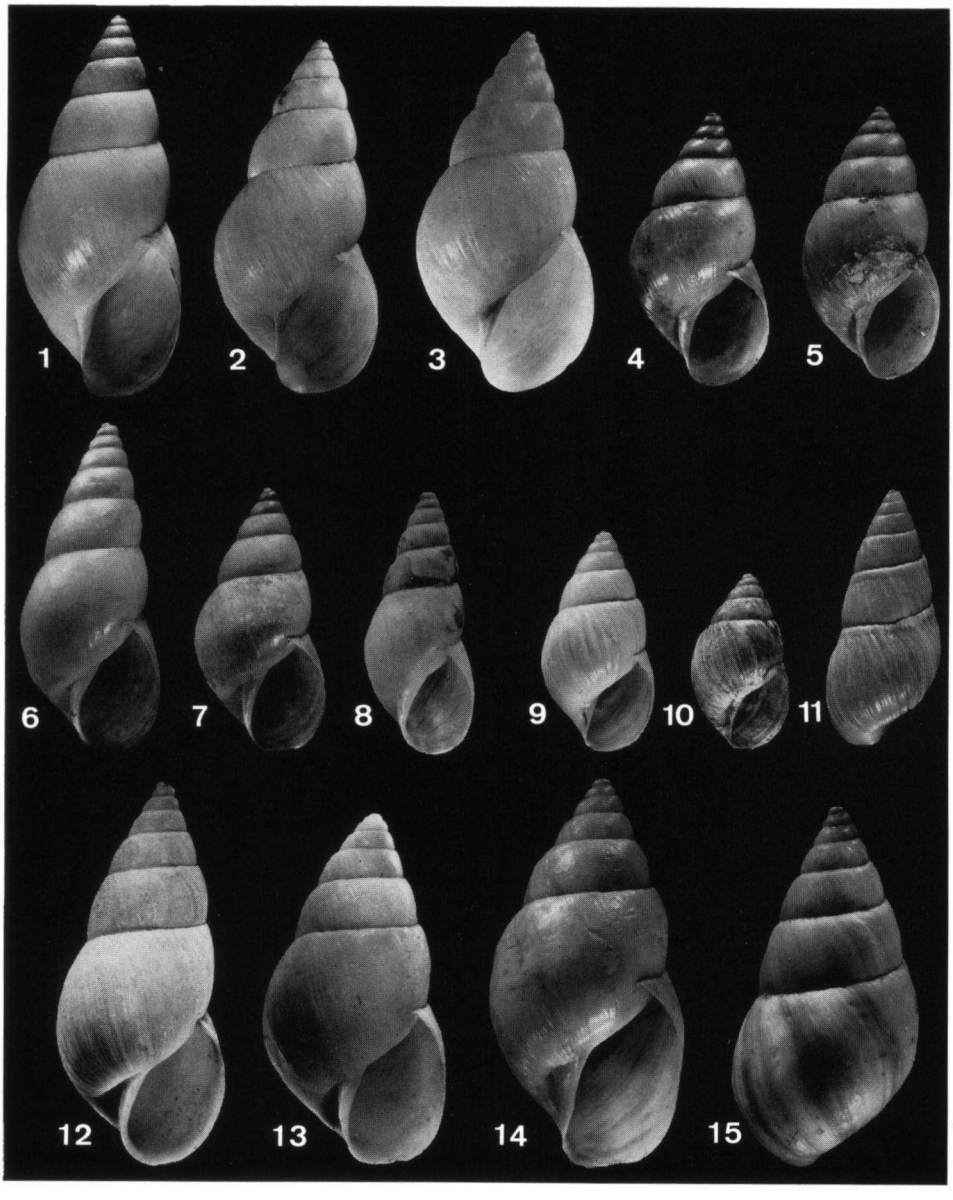


Bulimulus guadalupensis – 1–4, PUERTO RICO; 1, Mayagüez (USNM 424052); 2–4, Ensenada (Sta. 702); 5, ANGUILLA, Sandy Ground (Sta. 485); 6–10, ST. MARTIN; 6, Marigot Hill (ZMA); 7, Pt. Blanche Pond (Sta. s.n.); 8, Pt. Blanche Bay (Sta. 606a); 9, Fort Willem's Ruines (Sta. 709); 10, Guana Bay (Sta. s.n.); 11, SABA (RMNH); 12, ANTIGUA (FMNH 106440); 13–14, GUADELOUPE; 13, Usine Gardel (Sta. 726); 14, Ravine de Boisvin (Sta. 724); 15, MARIE-GALANTE, Falaise des Sources (Sta. 748).

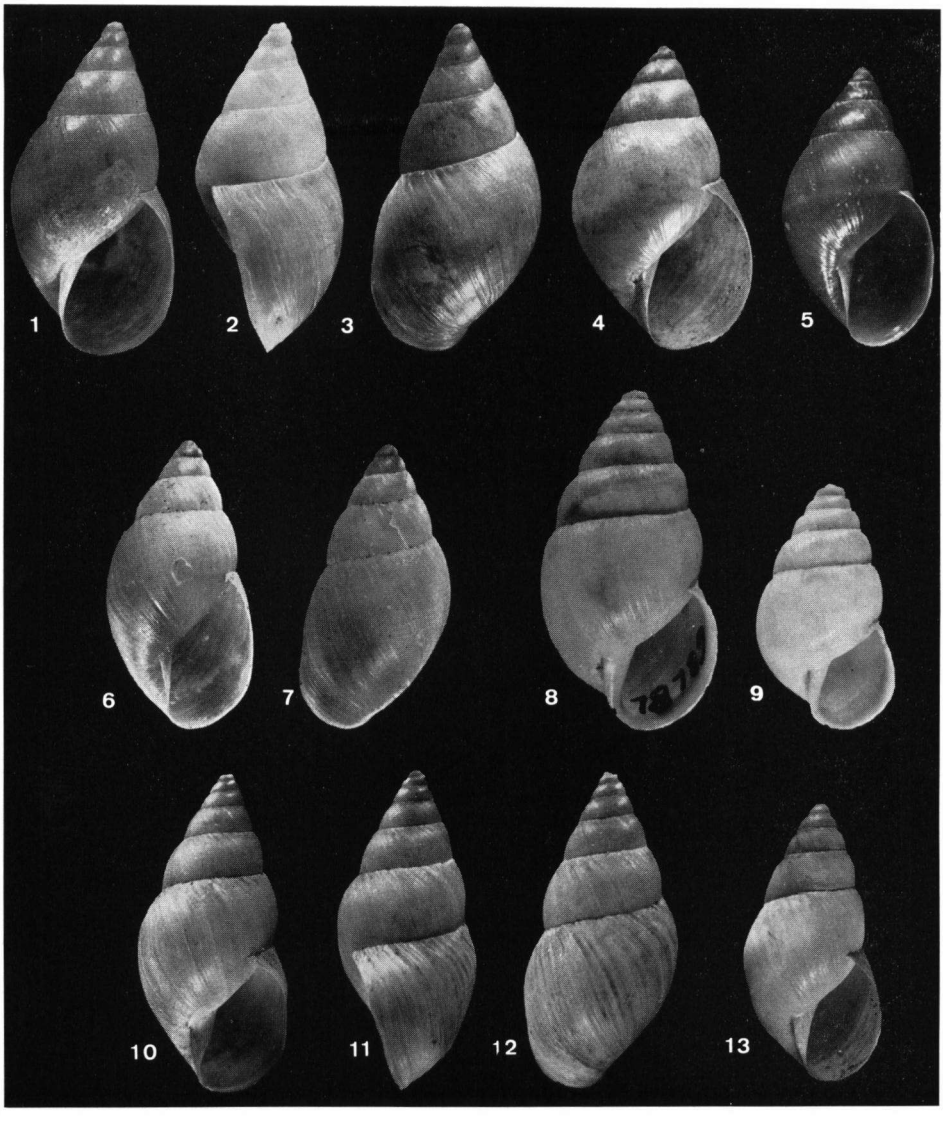


Bulimulus hummelincki – 1–5, BARBUDA; 1–4, River Quarter (Sta. 597, holo- and paratype); 5, Highlands near Dark Cave (Sta. 598).
Bulimulus diaphanus fraterculus – 6, 9–10, GUADELOUPE; 6 (MNHN, lectotype); 9 (USNM 492634); 10, Vieux-Fort, Houelmont (MNHN, holotype of *B. houelmontensis*); 7, ST. MARTIN (ZMA); 8, ST. EUSTATIUS (FMNH 157128).
Bulimulus diaphanus diaphanus – 11–12 (BMNH, syntypes); 13, PUERTO RICO, Caguas (USNM 159671); 14, ST. THOMAS (NRS).
Bulimulus riisei – 15–17, St. Croix, Spring Gut (RMNH).

PLATE IV



Bulimulus eyriesii – 1–3, GUYANE FRANÇAISE, Cayenne (MNHN).
Bulimulus dysoni – 4–5, HONDURAS (BMNH, syntypes).
Bulimulus erectus – 6–8, MARGARITA, El Piache (Sta. 798).
Bulimulus lehmanni – 9–11, ANGUILLA; 10, Sandy Ground (Sta. 485); 9, 11, (UZMK).
Bulimulus cacticolus – 12–13, MARGARITA, Punta Mosquito (Sta. 152); 14–15, VENEZUELAN MAINLAND, Barquisimeto (FMNH 10990).



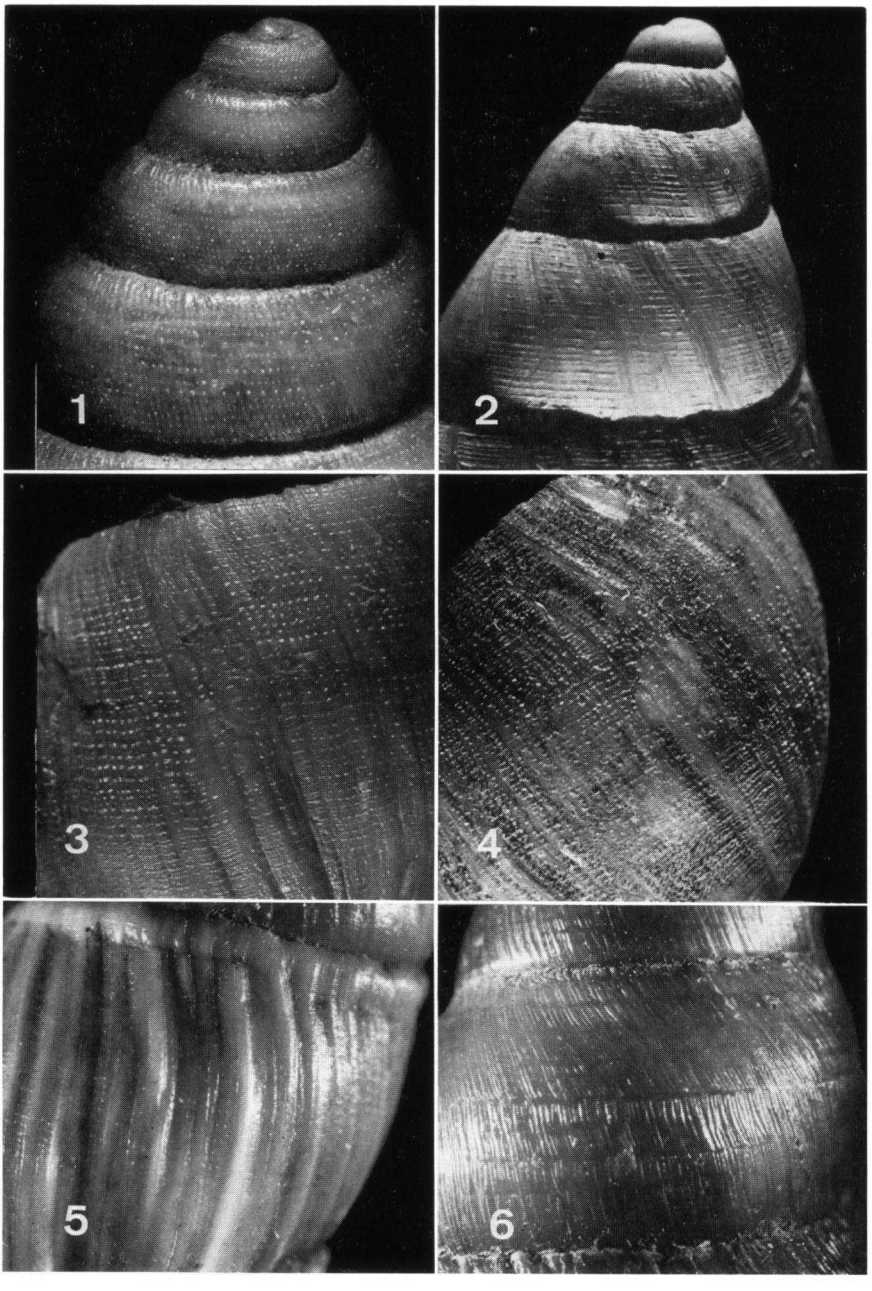
Bulimulus fuscus – 1–4, BARBADOS (BMNH, lecto- and paralectotype of *B. barbadensis*).

Bulimulus lherminieri – 5–7, GUADELOUPE (ANSP 25602, lectotype and ANSP 325064, paralectotype of *B. semicinctus*), fig. 5 phot. by K. Sosnowski and G. Specht.

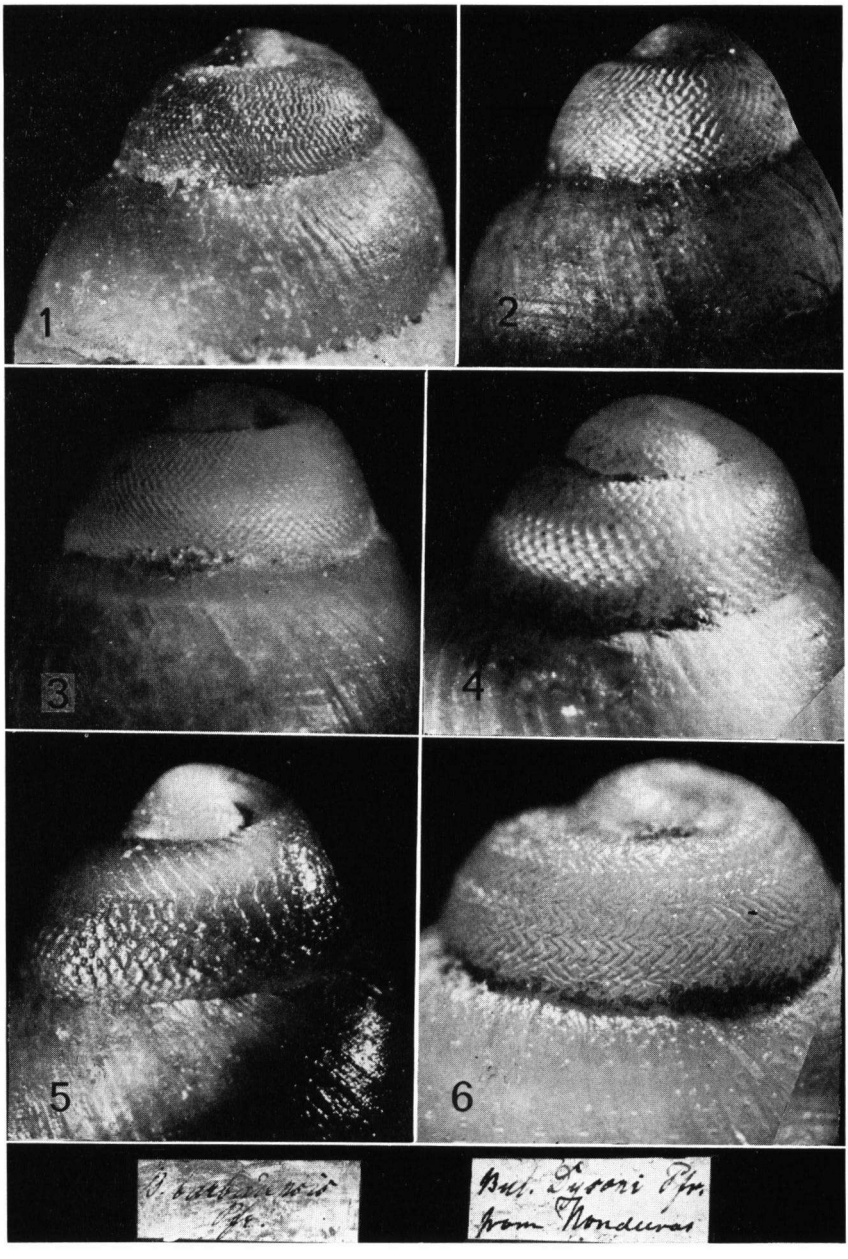
Bulimulus (*Rhinus*) *constrictus* – 8, VENEZUELAN MAINLAND, La Guaira (FMNH 78789); 9, MARGARITA, Cueva Honda del Piache (Sta. 141).

Bulimulus gittenbergeri – 10–13, ST. KITTS, Brimstone Hill (Sta. 422, holo- and paratype).

PLATE VI



Details of shell-surface in: 1, *Bulimulus (Rhinus) constrictus*; 2, *Bulimulus diaphanus diaphanus*; 3–4, *Bulimulus riisei*; 5, *Bulimulus lehmanni*; 6, *Bulimulus limnoides*.



Sculpture of protoconch in: 1, *Bulimulus diaphanus fraterculus*; 2, *Bulimulus diaphanus diaphanus*; 3, *Bulimulus gittenbergeri*; 4, *Bulimulus riisei*; 5, *Bulimulus fuscus*; 6, *Bulimulus* (*Rhinus*) *constrictus*; 7–8, original labels in L. Pfeiffer's handwriting.