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Fossil Pleurotomaria and Haliotis from Barbados and Carriacou, West Indies

by PETER JUNG, Basel[1])

With 14 figures in the text

Introduction

In May 1937 Mr. J. ROSE collected a block from the basal Coralrock Fm. of Ragged Point, southeast Barbados, with a *Pleurotomaria* and a *Haliotis* attached to it (Figs. 1, 2). In July of the same year he presented this block to the Department of Palaeontology, British Museum (Natural History). In August 1937 TRECHMANN published descriptions of *Haliotis* (*Padollus*) *barbadensis* n. sp. and *Pleurotomaria* cf. *quoyana* FISCHER and BERNARDI, both from the Coralrock Fm. of Barbados as well. But at that time TRECHMANN did not have knowledge of the block collected by ROSE yet.

In this paper these forms are redescribed and the best specimens figured. Their occurrences and their relationships with their living counterparts are discussed.

All the specimens of *Pleurotomaria* and *Haliotis* known from the Coralrock Fm. of Barbados have no shell material preserved. Only internal moulds and impressions have been found. A specimen of *Pleurotomaria* from the late Miocene to Pliocene Upper Tuffs Fm. of Carriacou, which is described below, has parts of its shell preserved and some sculptural details are recognizable.

Acknowledgments

I am greatly obliged to Mr. D. L. F. SEALY of the Department of Palaeontology, British Museum (Natural History), for sending photographs of specimens collected by TRECHMANN and of the block with *Pleurotomaria* and *Haliotis* collected by ROSE. Dr. F. M. BAYER of the Institute of Marine Science, Miami, kindly sent his publications on Recent Pleurotomarias otherwise not available in Switzerland. I am grateful to Mr. R. R. TALMADGE of Eureka, California, for suggestions and for sending literature on haliotids.

Descriptions

Genus Pleurotomaria DEFRANCE

DEFRANCE, 1826, Dictionnaire Sci. Nat., vol. 41, p. 381.

Type species (by subsequent designation, S. P. WOODWARD, 1851, A Manual of the Mollusca, p. 147), *Trochus anglicus* J. SOWERBY. Middle Lias, England. See Opinion 582, Bull. Zool. Nomenclature, vol. 17, pp. 276–280, 1960.

[1]) Naturhistorisches Museum, Augustinergasse 2, 4051 Basel

Subgenus Perotrochus FISCHER

FISCHER, 1885, Manuel de Conchyliologie et de paléontologie conchyliologique, p. 845.

Type species (by original designation), *Pleurotomaria quoyana* FISCHER and BERNARDI. Recent, West Indies.

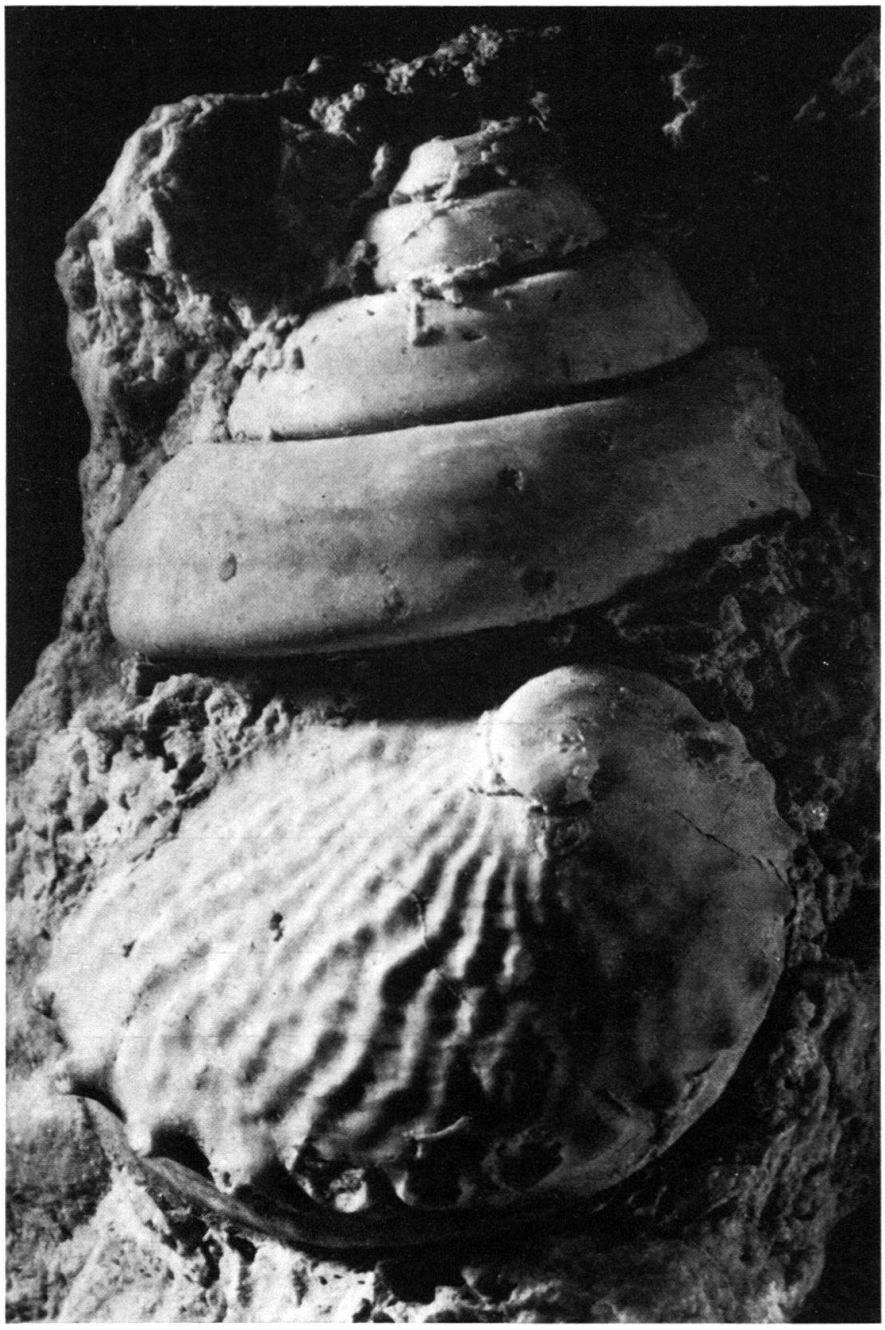

Fig. 1 *Pleurotomaria* (*Perotrochus*) cf. *quoyana* FISCHER and BERNARDI and *Haliotis barbadensis* TRECHMANN. Basal Coralrock Fm., Ragged Point, Barbados. 2×. British Museum (Natural History), Dept. of Palaeontology, No. G 61913. Courtesy of the British Museum (Natural History).

Pleurotomaria (*Perotrochus*) cf. *quoyana* FISCHER and BERNARDI

Figs. 1–6

TRECHMANN's description (1937, p. 351, pl. 12, fig. 6) of *Pleurotomaria* cf. *quoyana* is based on a piece of limestone from the Coralrock Fm. of Whitehaven, Barbados, with an impression of part of the spire (Fig. 3). His figure represents an artificial cast of that impression, which is too small for the recognition of details. A silicone rubber cast prepared from the same impression is figured here at a greater magnification

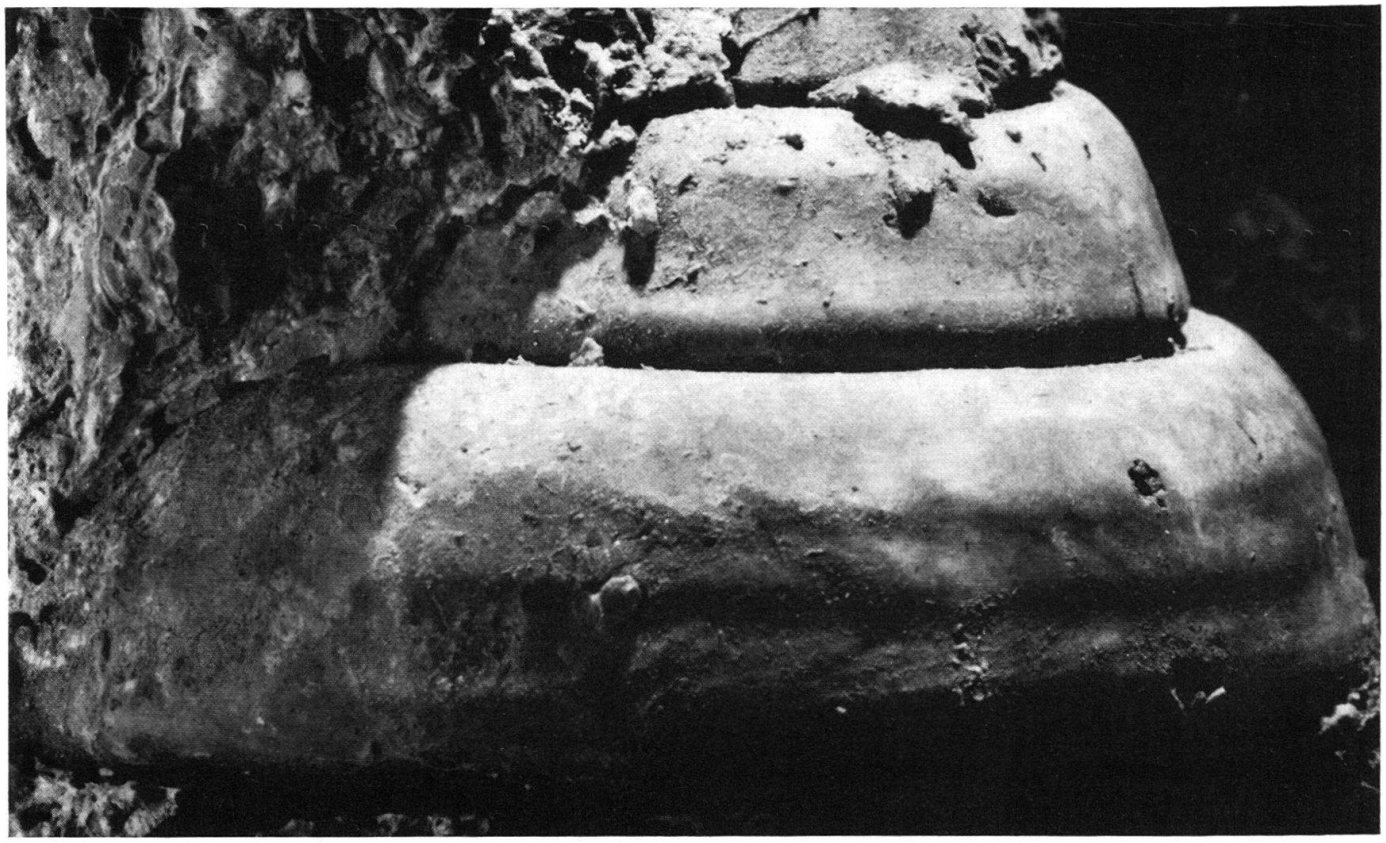

Fig. 2 *Pleurotomaria* (*Perotrochus*) cf. *quoyana* FISCHER and BERNARDI. Same specimen as in Fig. 1. 4×. Courtesy of the British Museum (Natural History).

(Fig. 4). At still higher magnification this cast shows details of sculpture (Fig. 5). As stated by TRECHMANN already the selenizone is situated at about the middle of the whorl. It is sculptured by fine opisthocyrt threads, whereas the threads immediately above and below the selenizone are rather prosocyrt.

The remarkable history of the holotype of the Recent West Indian *P. quoyana* FISCHER and BERNARDI (1856, p. 165, pl. 5, figs. 1–3) has been traced by BOUVIER and FISCHER (1899, p. 87) and DANCE (1966, pp. 213–214). It has been well figured in recent years by DANCE (1966, pl. 14b) and BAYER (1966, p. 764, fig. 17). Its whorls are markedly convex even in young stages. The whorls of TRECHMANN's specimen, however, are straight or even somewhat concave in profile. The same applies to the specimen figured by DALL (1889, pl. 37, fig. 5). BAYER (1966) has figured several specimens of *P. quoyana*. It is apparent from these illustrations that *P. quoyana* is variable to some degree in general shape and coarseness of sculpture. Specimens with flat or

slightly concave early whorls have a smaller apical angle than the holotype. The shell of *P. quoyana* from Bermuda first recorded by TURNER (1961, p. 162) has been illustrated by BAYER (1966, p. 767, fig. 20). BAYER identified this specimen as *P. quoyana* with doubt only stating that it might represent immature *P. amabilis* (BAYER (1963, p. 489, fig. 1).

The *Pleurotomaria* collected by ROSE from the basal Coralrock Fm. (late Pliocene) of Ragged Point and referred to in the introduction is preserved as an internal mould,

Fig. 3 *Pleurotomaria* (*Perotrochus*) cf. *quoyana* FISCHER and BERNARDI. Impression of part of the spire. Basal Coralrock Fm., Whitehaven, Barbados. $1^1/_2\times$. British Museum (Natural History), Dept. of Palaeontology, No. G 69017. Courtesy of the British Museum (Natural History).

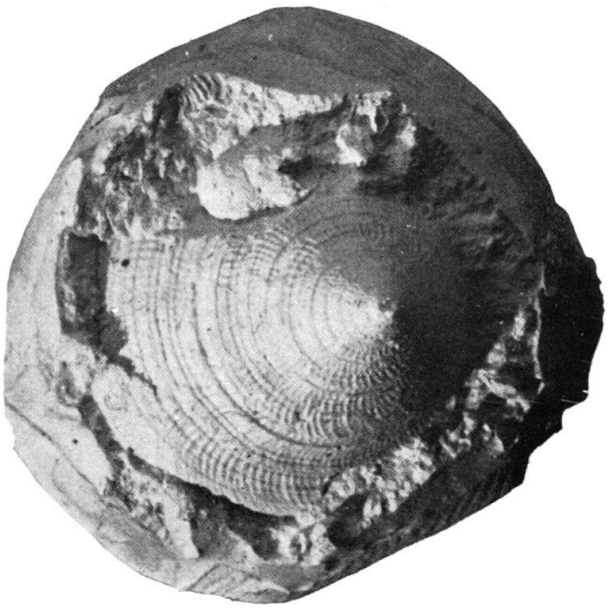

Fig. 4 *Pleurotomaria* (*Perotrochus*) cf. *quoyana* FISCHER and BERNARDI. Silicone rubber cast from impression shown in Fig. 3. $3\times$. Courtesy of British Museum (Natural History).

but its early whorls are missing. The position of its selenizone can be recognized on its last preserved whorl (Fig. 2). It is tentatively identified as *P.* cf. *quoyana*, although its state of preservation does not allow to assign it to any particular subgenus. This identification is based mainly on the general similarity with the specimen from Carriacou to be described below.

Another specimen of *Pleurotomaria* identified as *P.* cf. *quoyana* has been collected by E. LEHNER in 1935 in the northeastern part of Carriacou, Grenadines, about 500 feet northnorthwest of Limlair Point (= Point St. Hilaire = Point St. Helene). The beds cropping out at this locality are included in the Upper Tuffs Fm. (late Miocene or Pliocene) by the Lexique stratigraphique international, Amérique Latine, Fasc. 2b, Antilles, p. 151, 1956, and by MARTIN-KAYE (1958).

This specimen (Fig. 6) represents an internal mould, but almost half of the shell is preserved. The early whorls are broken off; preserved whorls 4 in number. The

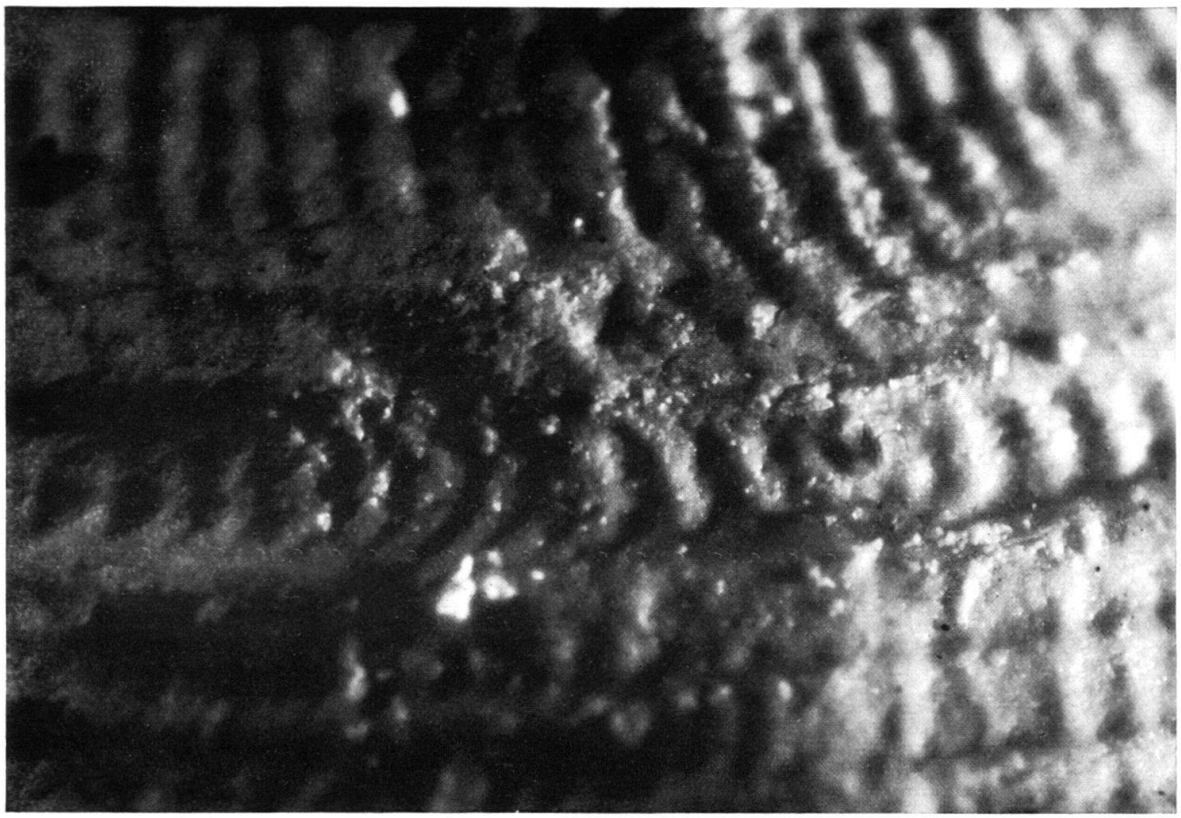

Fig. 5 *Pleurotomaria* (*Perotrochus*) cf. *quoyana* FISCHER and BERNARDI. Part of cast shown in Fig. 4. Much enlarged. Courtesy of the British Museum (Natural History).

selenizone is situated a little below the middle of the whorl. Traces of the slit itself can be observed on the last portion of the last preserved whorl, where the surface of the matrix is not as smooth as on the remainder of the surface (Fig. 6b). The surface of the shell material is somewhat worn. The selenizone is crossed by fine, opisthocyrt threads. The area above the selenizone is sculptured by 9 spirals of two magnitudes on the last whorl. Below the selenizone there are 7 spirals on the penultimate whorl. All the spirals carry small beads, but those above the selenizone are somewhat coarser. The sculpture on the base consists of numerous spirals. Due to erosion the slightly sigmoid growth lines crossing the basal spirals are hardly visible.

The dimensions of the Carriacou fossil are: height 37,2 mm, greatest diameter 48,5 mm. These measurements and the general shape are similar to those of the holotype of *P. quoyana*. The whorls of the Carriacou specimen are somewhat shouldered above the selenizone and the periphery of the last preserved whorl is angulated, whereas in the holotype of *P. quoyana* it is more rounded. Other shells of *P. quoyana* figured by BAYER (1966, p. 765, fig. 18), however, have an angulated periphery on the body whorl like the fossil specimen.

The occurrences of the Recent *P. quoyana* have been plotted on a map given by BAYER (1967, p. 396, fig. 6). Fossil occurrences of *Pleurotomaria* are rare. Besides the occurrences in Barbados and Carriacou mentioned in this paper two other species

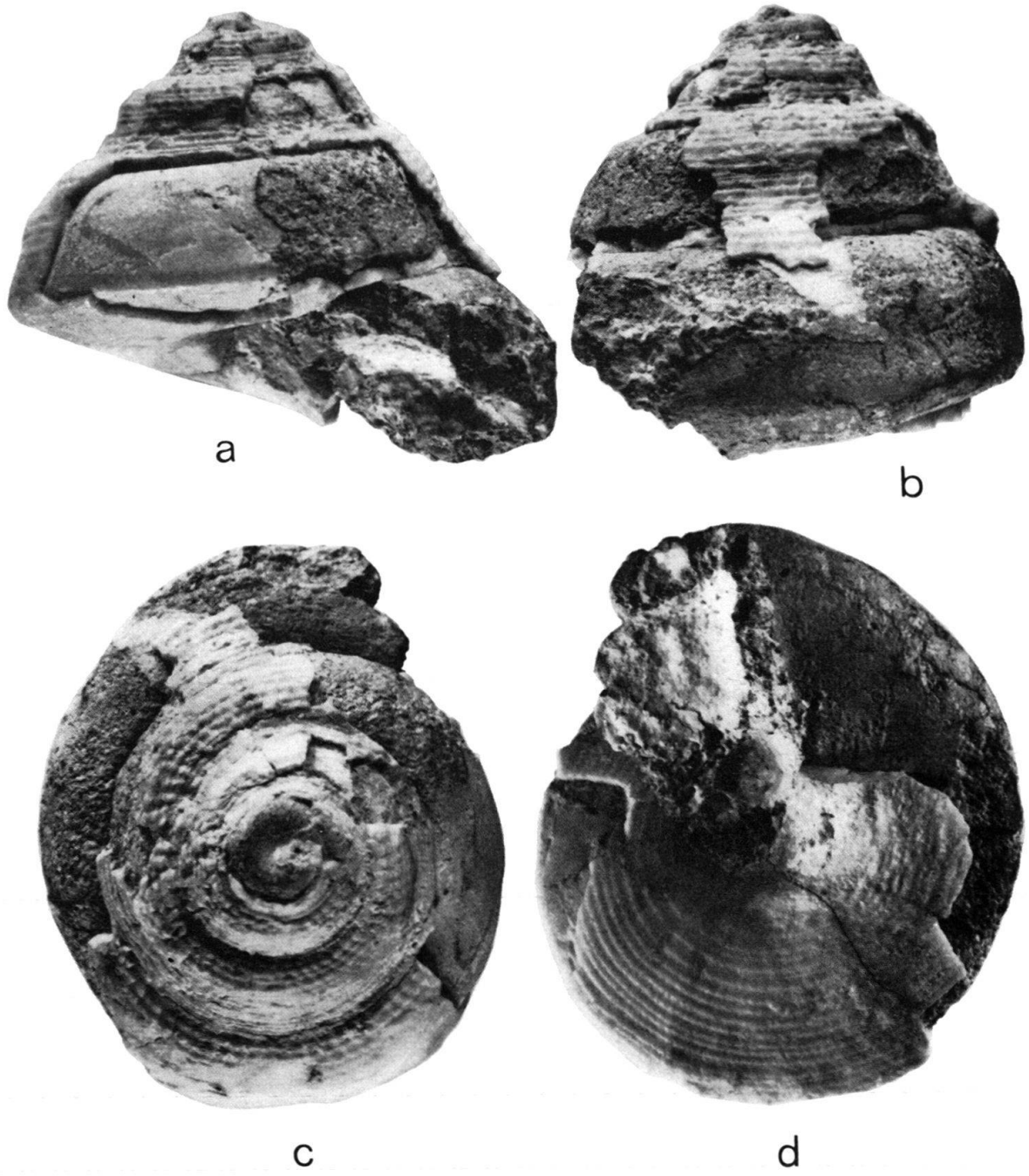

Fig. 6 *Pleurotomaria* (*Perotrochus*) cf. *quoyana* FISCHER and BERNARDI. Naturhistorisches Museum Basel locality No. 10109: Carriacou, Upper Tuffs Fm. $1^1/_2\times$. Naturhistorisches Museum Basel No. H 15413. a. front, b. right side, c. top, d. base. Height 37,2 mm, greatest diameter 48,5 mm.

have been recorded[2]). SCHRAMM (1869, p. 9) described *Pleurotomaria duchassaingi* from the Quaternary of Guadeloupe, and MAYER (1877, p. 43) listed *P. fischeri* MAYER (MS) from the «Madreporentuff (Saharian ?)» of Guadeloupe. BOUVIER and

[2]) A single internal mould possibly representing a species of *Pleurotomaria* has been collected from the Morne Diablo limestone of Trinidad, which was described by R. Rutsch in a private report. The Morne Diablo limestone represents a reef facies. The part containing the questionable *Pleurotomaria* and other mollusks is considered to be of late Oligocene age.

FISCHER (1899, p. 84) stated that both of these species were not well defined. FISCHER (1958, p. 77) probably referred to these two forms as well, when he mentioned two species from the Quaternary of the Antilles. I do not know anything about the repository of *P. duchassaingi*. *P. fischeri* MAYER should be considered as a *nomen nudum*. It has never been described or figured, and the collection of MAYER-EYMAR does not contain any *Pleurotomaria* from Guadeloupe.

The two specimens of *Pleurotomaria* from Barbados have been collected from the base of the Coralrock Fm. (late Pliocene). They are associated with *Haliotis barbadensis*, an unidentified species of *Meiocardia*, and *Amphistegina* limestones. In analogy with the Recent *H. pourtalesii H. barbadensis* is thought to have lived at considerable depth. The rare living *Meiocardia agassizi* DALL (1886, p. 271), which the fossil species resembles most, also lives in deeper water. The specimens of *P. quoyana* listed by BAYER (1966, pp. 767–768) have been obtained from depths of 73 to 615 fathoms. According to TRECHMANN (1937, p. 358) the faunule of the basal Coralrock Fm. «may have lived at a depth of 700 to 1000 feet».

The *Pleurotomaria* from the Upper Tuffs Fm. of Carriacou is associated with a near-shore molluscan fauna which includes some large gastropods and even some land forms apparently washed in (LEHNER, 1935, p. 5; TRECHMANN, 1935, p. 554). This *Pleurotomaria*, therefore, does not quite fit into this fauna ecologically. It may be noted in this connection that immature *Pleurotomaria* seems to prefer shallower water and that the ecologic range of *Pleurotomaria* has shifted from shallow water in older geological times to deeper water in Recent seas (KANNO, 1961, pp. 112–115).

Genus Haliotis LINNE

LINNE, 1758, Systema Naturae, ed. 10, p. 779.

Type species (by subsequent designation, MONTFORT, 1810, Conchyliologie systématique, vol. 2, p. 119), *Haliotis asinina* LINNE. Recent, Japanese and Chinese waters.

Subgenus Sulculus H. and A. ADAMS

ADAMS, H. and A., June 1854, The Genera of Recent Mollusca, vol. 1, p. 443.

Type species (by subsequent designation, COSSMANN, 1918, Essais de paléoconchologie comparée, onzième livraison, p. 315), *Haliotis incisa* REEVE. Recent, ? Japan.

FLEMING (1952, p. 230) redescribed and discussed the subgenus *Sulculus*.

Haliotis (*Sulculus*) *pourtalesii* DALL

Figs. 7–9

1881 *Haliotis* (*Padollus*) *pourtalesii* DALL, Bull. Mus. Comp. Zool., vol. 9, No. 2, p. 79.
1890 *Haliotis pourtalesii* DALL, CAMPBELL, Nautilus, vol. 4, No. 9, p. 104.
1915 *Haliotis* (*Padollus*) *pourtalesii* DALL, HENDERSON, Proc. U.S. Nat. Mus., vol. 48, No. 2091, p. 660, pls. 45 and 46 (upper figures). For further citations see this publication.
1946 *Haliotis pourtalesii* DALL, FOSTER, Johnsonia, vol. 2, No. 21, p. 38, pl. 22.
1951 *Haliotis pourtalesii* DALL, SMITH, East Coast Marine Shells, p. 78, pl. 29, figs. 3a, 3b. Fourth edition. Ann Arbor, Michigan.

1954 *Haliotis pourtalesii* DALL, ABBOTT, American Seashells, p. 94. New York, D. van Nostrand Company, Inc.
1966 *Haliotis pourtalesii* DALL, HARRY, Veliger, vol. 8, No. 4, p. 207, pl. 30.

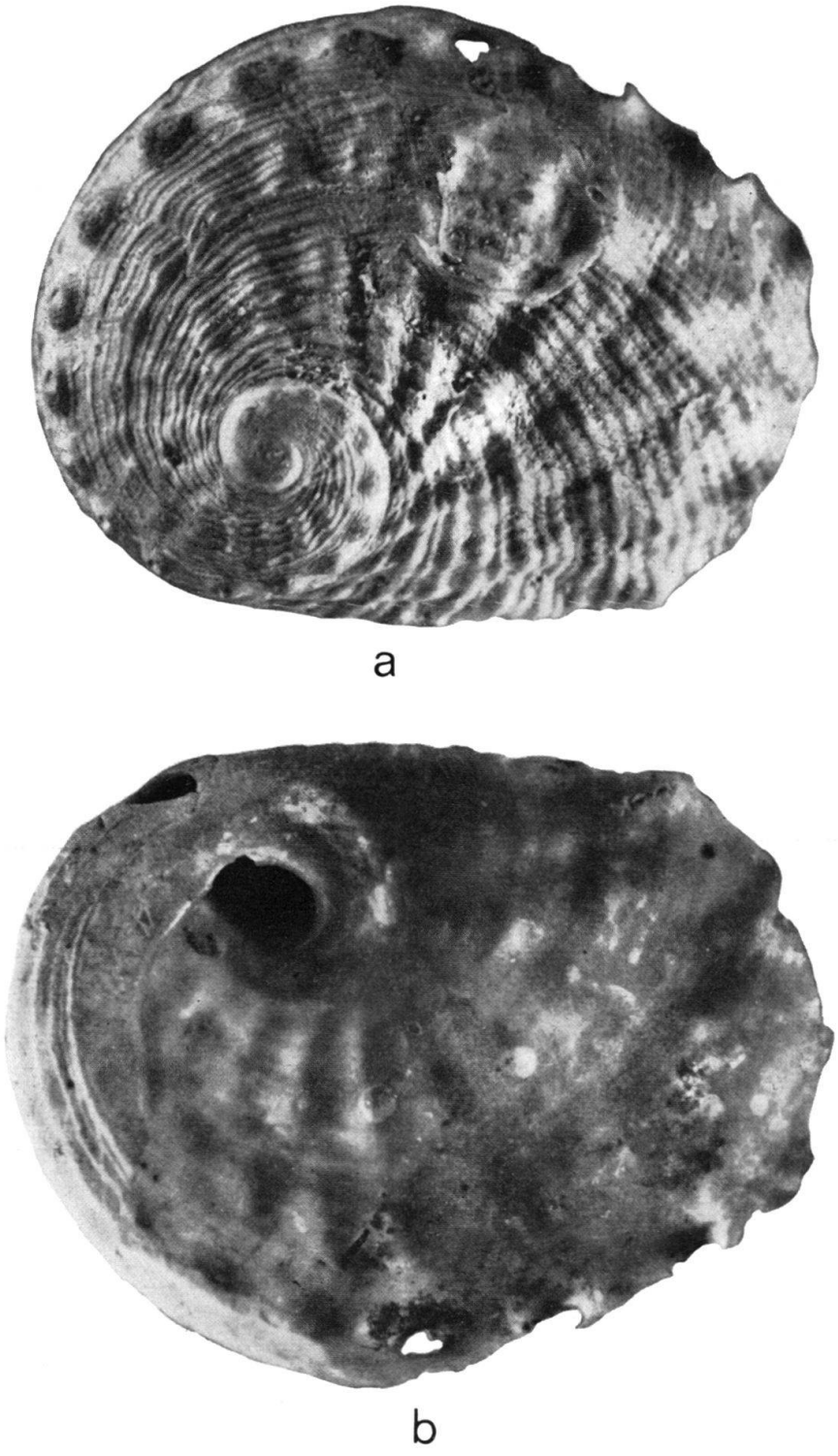

Fig. 7 *Haliotis* (*Sulculus*) *pourtalesii* DALL. Naturhistorisches Museum Basel locality No. 10658: Recent, east of Mississippi Delta, in 54 fathoms. 5×. Naturhistorisches Museum Basel No. H 15410. a. top, b. base. Length 17,7 mm, width 14,0 mm.

Neotype – U.S. National Museum, No. 271601.
Type locality. – Three miles off Sand Key, Florida; in 90 fathoms.

In 1957 R. F. RUTSCH had completed a private report for Gulf Research and Development Company, in which he discussed nearly a hundred species of mollusks. The fauna had been dredged at several localities east of the Mississippi Delta ranging in depth from 3 to 106 fathoms.

Fig. 8 *Haliotis* (*Sulculus*) *pourtalesii* DALL. Same locality as Fig. 7. 5×. Naturhistorisches Museum Basel No. H 15411. Length 9,0 mm, width 8,1 mm.

Fig. 9 *Haliotis* (*Sulculus*) *pourtalesii* DALL. Same locality as Fig. 7. 5×. Naturhistorisches Museum Basel No. H 15412. Length 10,5 mm.

This fauna has yielded 3 specimens of *H. pourtalesii* from a locality east of the Mississippi Delta, about 83 nautical miles southsoutheast of Mobile. Coordinates: Lat. 29° 20′ 32″ North; Long. 87° 46′ 51″ West. Depth 54 fathoms.

All 3 specimens are small and somewhat damaged. The largest specimen reaches a length of 17,7 mm and consists of 3 whorls including the protoconch. The colours are not well preserved, i.e. no pattern is recognizable. The somewhat irregular radial swellings are slightly coarser than those of the specimens figured by FOSTER (1946, pl. 22). However, there seems to be some variation as to the coarseness of sculpture. The radial swellings are almost lacking on the neotype (HENDERSON, 1915, pls. 45, 46, upper figures). But otherwise the specimens here figured for comparison with *H. barbadensis* agree well with the descriptions given by HENDERSON and FOSTER.

The geographic range of *H. pourtalesii* includes the shelf along the Florida Keys. But it has been extended considerably by HARRY (1966, p. 207, pl. 30), who recorded a specimen from off the northeast corner of the Yucatan Peninsula (depth 67 fathoms).

Haliotis barbadensis TRECHMANN

Figs. 10–14

1937 *Haliotis* (*Padollus*) *barbadensis* TRECHMANN, Geol. Mag., vol. 74, No. 878, p. 348, pl. 12, figs. 1–5.

Of small to medium size. Spire elevated. Body whorl with about 16 holes. Row of holes forming a sharp angulation in early stages, which is less accentuated on body whorl. Spiral sculpture consisting of threads of different magnitudes numbering

about 25 on body whorl. Area between row of holes and peripheral carina sculptured by 3 to 4 fine spirals. Two (possibly 3) additional spirals are situated on the base close to the peripheral carina. The radial swellings on the upper surface of the whorl may be quite regular or irregular. Halfway between row of holes and suture they are usually interrupted and become more regular toward the periphery.

Fig. 10 *Haliotis barbadensis* TRECHMANN. Lectotype. Basal Coralrock Fm., Whitehaven, Barbados. 3×. British Museum (Natural History), Dept. of Palaeontology, No. G 69015. Courtesy of the British Museum (Natural History).

Lectotype (herewith selected). – Dept. of Palaeontology, British Museum (Natural History), No. G 69015. This is the specimen figured by TRECHMANN (1937, pl. 12, fig. 1).

Type locality. – Whitehaven, Barbados. Base of Coralrock Fm. (late Pliocene).

H. barbadensis is known from internal moulds and impressions only. Silicone rubber casts of impressions show a somewhat variable sculpture especially as to the coarseness and regularity of the radial swellings. In late stages the form of the upper surface of the whorl is variable too. A topotype collected by TRECHMANN carries a spiral ridge about midway between suture and periphery (Fig. 11) in this respect

Fig. 11 *Haliotis barbadensis* TRECHMANN. Topotype. 2×. British Museum (Natural History), Dept. of Palaeontology, No. GG 4001. Courtesy of the British Museum (Natural History).

resembling the Recent *H. dalli* HENDERSON (1915, p. 661, pls. 45, 46, lower figures) from the Galapagos Islands, which is assigned to the subgenus *Padollus* MONTFORT by HENDERSON and FOSTER (1946, p. 39). Another specimen, however, has a shallow spiral depression at the corresponding location. Whether these differences are of taxonomic importance or not can be decided only, when more and better material is available.

Fig. 12 *Haliotis barbadensis* TRECHMANN. Naturhistorisches Museum Basel locality No. 10661: Basal Coralrock Fm., Barbados. 3×. Silicone rubber cast from Naturhistorisches Museum Basel No. H 15419.

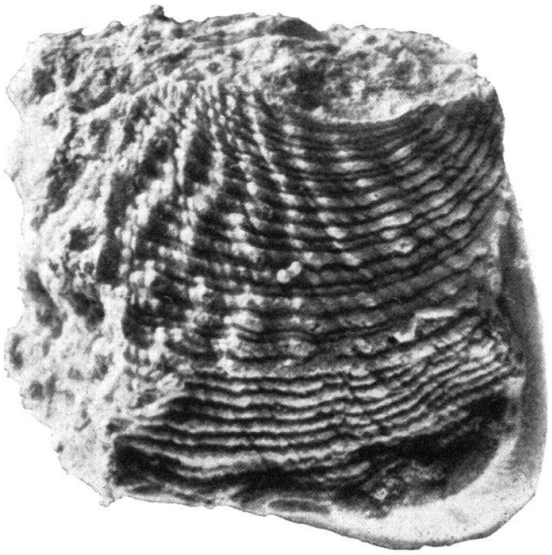

Fig. 13 *Haliotis barbadensis* TRECHMANN. Naturhistorisches Museum Basel locality No. 10660: Basal Coralrock Fm., Barbados. 3×. Silicone rubber cast from Naturhistorisches Museum Basel No. H 15418.

H. barbadensis closely resembles the Recent *H. pourtalesii*. In fact there is a silicone rubber cast of an impression (Fig. 12) which is hardly distinguishable from the largest specimen of *H. pourtalesii* figured here (Fig. 7). The dimensions of both species are comparable. DALL (1881, p. 79) indicates "about an inch and a half in diameter" for

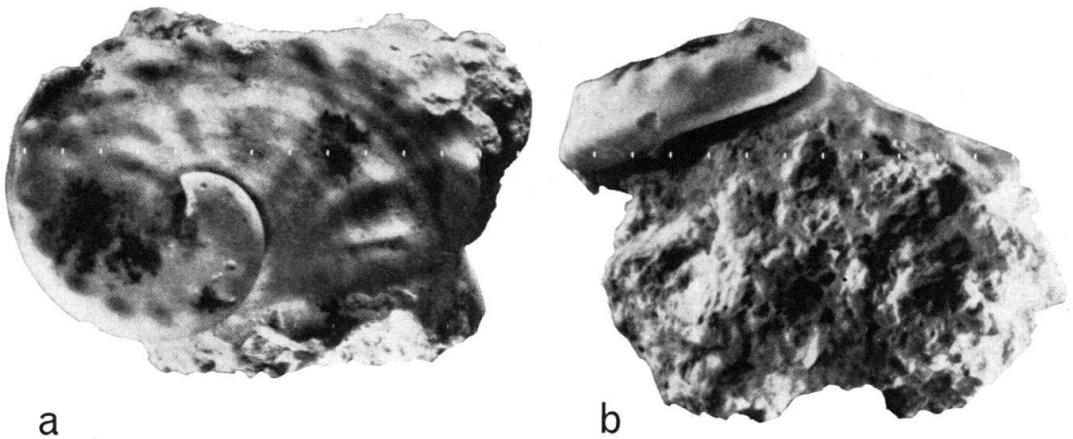

Fig. 14 *Haliotis barbadensis* TRECHMANN. Naturhistorisches Museum Basel locality No. 10101: Basal Coralrock Fm., Barbados. 3×. Naturhistorisches Museum Basel No. H 15414. a. top, b. front. Length 16,5 mm, height 7,1 mm.

the now destroyed original shell of *H. pourtalesii* and FOSTER (1946, p. 38) recorded a fragment "which must have come from a specimen at least 1 inch in length". TRECHMANN (1937, p. 348) had specimens of *H. barbadensis* measuring more than 30 mm in length. Were it not for the uncertainty as to the variability of both species and the lack of well preserved *H. barbadensis*, one might be tempted to consider them as one species.

The Recent Brasilian *H. barbouri* FOSTER (1946, p. 40, pl. 23), which is known from the holotype only, is mainly distinguished from *H. pourtalesii* and *H. barbadensis* by its much coarser sculpture.

Occurrence. – Naturhistorisches Museum Basel localities 10101, 10104, 10659, 10660, 10661.

Distribution. – Known from the basal Coralrock Fm. (late Pliocene) of Barbados only.

List of localities

Material from the following Naturhistorisches Museum Basel localities is included in this paper:

10101 Barbados. Parish of St. Peter. Waterwell Haymans No. 3 at 161–162½ feet. Base of Coralrock Fm. Coll. A. SENN, October 11, 1944.

10104 Barbados. Parish of St. Peter. Waterwell Rock Hall No. 1 at 168–170½ feet. Extreme base of Coralrock Fm. Coll. A. SENN, March 1, 1945.

10109 Carriacou, Grenadines, Lesser Antilles. Northeast coast, about 500 feet northnorthwest of Limlair Point. Upper Tuffs Fm. Coll. E. LEHNER, March 8, 1935.

10658 East of Mississippi Delta, about 83 nautical miles southsoutheast of Mobile. Coordinates: Lat. 29° 20′ 32″ North; Long. 87° 46′ 51″ West. Dredged from 54 fathoms.

10660 Barbados. Parish of St. Philipp. Waterwell Pollards at 48–50 feet. Base of Coralrock Fm. Coll. A. SENN, February 19, 1945.

10661 Barbados. Parish of Christ Church. Waterwell Kent at 190–190½ feet. Base of Coralrock Fm. Coll. A. SENN, March 12, 1945.

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