SPIXIANA	37	1	27–34	München, August 2014	ISSN 0341–8391

Record of *Basilissopsis* for the bathyal region of the South Atlantic (Brazil) based on the description of a new species and the designation of a lectotype for *B. rhyssa*

(Vetigastropoda, Trochidae)

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Lima, S. F. B., Christoffersen, M. L. & Villacampa, Y. 2014. Record of *Basilissopsis* for the bathyal region of the South Atlantic (Brazil) based on the description of a new species and the designation of a lectotype for *B. rhyssa* (Vetigastropoda, Trochidae). Spixiana 37 (1): 27–34.

This paper records the genus *Basilissopsis* Dautzenberg & Fischer, 1897 for the South Atlantic Ocean. *Basilissopsis bassa* spec. nov. is described from deep waters off the state of São Paulo, Brazil. The new species is diagnosed by whorls with prominent shoulder angulation, a broadly flattened subsutural ramp, a strong spiral cord in the supramedian position and a greatly expanded peripheral keel. *Basilissopsis bassa* is compared with *B. oxytropis* (Watson, 1879), *B. watsoni* Dautzenberg & Fischer, 1897 and *B. rhyssa* (Dall, 1927). The type material of the last two species is also figured in this study. In addition, a lectotype for *B. rhyssa* is designated herein.

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Introduction

Vetigastropoda Salvini-Plawen, 1980 is one of the least studied gastropod groups on the Atlantic coast of South America, although some of its species have been the subject of recent studies in this region (Simone & Cunha 2006, Barros et al. 2008, Absalão 2009, Dornellas 2012, Lima et al. 2013). The richness of families, genera and species thus is likely to be underestimated, especially with regard to deep sea microvetigastropods (<5 mm in size). Anatomidae McLean, 1989, Calliostomatidae Thiele, 1924, Chilodontidae Wenz, 1938, Seguenziidae Verrill, 1884, Skeneidae Clark, 1851, Solariellidae Powell, 1951 and Trochidae Rafinesque, 1815 are the few families of minute to small vetigastropods with data published for deep waters in this ecoregion (Quinn 1979, 1983a, 1992, Absalão et al. 2001, Souza & Pimenta 2002, Absalão & Pimenta 2005, Zelaya et al. 2006, Zelaya & Geiger 2007, Barros et al. 2008, Absalão 2009, Rios 2009, Geiger 2012, Lima et al. 2013).

During the study of specimens of vetigastropods deposited at the Museu Oceanográfico Prof. Eliézer de Carvalho Rios (Rio Grande do Sul, Brazil), the existence of misidentified specimens belonging to an undescribed species became evident. The depressed trochiform shell and prominent shoulder angulation on all teleoconch whorls, which are axially and

spirally sculptured, classified such specimens in the genus *Basilissopsis* Dautzenberg & Fischer, 1897. Only six species of *Basilissopsis* have been described from deep waters (538 to 5762 m) worldwide (Watson 1886, Dautzenberg & Fischer 1897, Dall 1927, Marshall 1983, 1991, Kurihara & Ohta 2008). To date, only *B. rhyssa* (Dall, 1927) has been described for the western Atlantic (USA and Cuba, 538 to 1472 m) (Dall 1927, Abbott 1974, Quinn 1979, 1991).

Basilissopsis traditionally has been classified within Seguenziidae based on shell morphology (Quinn 1983b, 1987, 1991, Marshall 1983, 1988, 1991, Warén 1996, Kurihara & Ohta 2008). Based on molecular data Kano (2008) recognized *Seguenzia* Jeffreys, 1876, *Fluxinella* Marshall, 1983 and *Hadroconus* Quinn, 1987 as derived groups of Vetigastropoda, forming a clade that is nested within Trochidae. In this study, we provisionally place *Basilissopsis* within the Trochidae, until more anatomical and molecular analyses of vetigastropods are presented.

This paper describes a new *Basilissopsis* for the bathyal region of the southwestern Atlantic (Brazil). To the best of our knowledge, there has been no previous information published on this group for the South Atlantic.

Material and methods

The specimens studied here were dredged up in June 1971 by the oceanographic vessel Prof. W. Besnard on the continental slope off the state of São Paulo (southeastern Brazil), at a depth of 3049 m. The generic identification is based on Quinn (1991) and Warén (1996). The terminology used for shell description of *Basilissopsis* is based on Marshall (1991).

Shells of the new species were mounted on stubs and photographed under a Scanning Electron Microscope (QUANTA 200 FEG) belonging to the "Centro de Tecnologias Estratégicas do Nordeste (CETENE), Recife, Pernambuco".

Basilissopsis rhyssa specimen (Fig. 3A–D) was photographed under a Scanning Electron Microscope (Leica Stereoscan 440 Lab6) at the Smithsonian Institution, National Museum of Natural History (USNM), Washington, USA.

Abbreviations

HL	Hans Larsen Collection, Reykjavik, Iceland
IMNH	Icelandic Museum of National History, Reykjavik, Iceland
MNRJ	Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil
MOM	Oceanographic Museum of Monaco, Monaco
MORG	Museu Oceanográfico Prof. Eliézer de Carvalho Rios, Universidade Federal do Rio Grande, Rio Grande, Rio Grande do Sul, Brazil
MZSP	Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil
NHMUK	The Natural History Museum, London, Great Britain
RBINS	Royal Belgian Institute of Natural Sciences, Brussels, Belgium
USNM	National Museum of Natural History, Smithsonian Institution, Washington, DC, USA

Taxonomy

Vetigastropoda Salvini-Plawen, 1980
Trochoidea Rafinesque, 1815
Trochidae Rafinesque, 1815

Basilissopsis Dautzenberg & Fischer, 1897

Type-species by monotypy: *B. watsoni* Dautzenberg & Fischer, 1897. Recent, northeastern Atlantic.

Basilissopsis bassa spec. nov.

Fig. 1

Type material. Holotype (3 mm wide × 1.8 mm high), MORG 21178; 1 paratype (2.2 mm wide × 1.2 mm high), MNRJ 31268; 1 paratype (3.9 mm wide × 2 mm high), MZSP 110360. All from type locality.

Type locality. Off the state of São Paulo (southeastern Brazil), 'Besnard' collector (24°12'S, 40°23'W, 3049 m, vi.1971).

Etymology. From bassa (lat. = small stature), an adjective, referring to its depressed trochiform shell.

Diagnosis. Teleoconch whorls with prominent shoulder angulation limited by strong, rounded spiral cord in supramedian position. First two whorls with strong, sharp shoulder angulation, flattened above and weakly concave below spiral cord. Subsutural ramp broadly flattened on last two whorls usually sculptured with axial riblets.

Description

Shell up to 3.9 mm wide and 2.0 mm high, broader than high, depressed trochiform, thin, glossy, whitish, nacreous through thin, translucent outer shell layer (Fig. 1A–C, F). Protoconch of 1.25 to 1.375 whorls, smooth (Fig. 1D). Proto-teleoconch transition marked by appearance of axial riblets (Fig. 1D). Teleoconch granulated (Fig. 1D–E), of up to 4.5 whorls, greatly expanding (Fig. 1A–C, F), shoulder angulation strongly supramedian (Fig. 1A–B, F), axially ornamented with well-spaced, thin, narrow, low, rounded, prosocline, weakly flexuous riblets; spirally ornamented with a strong, rounded spiral cord limiting shoulder angulation (Fig. 1A–B, E–F).

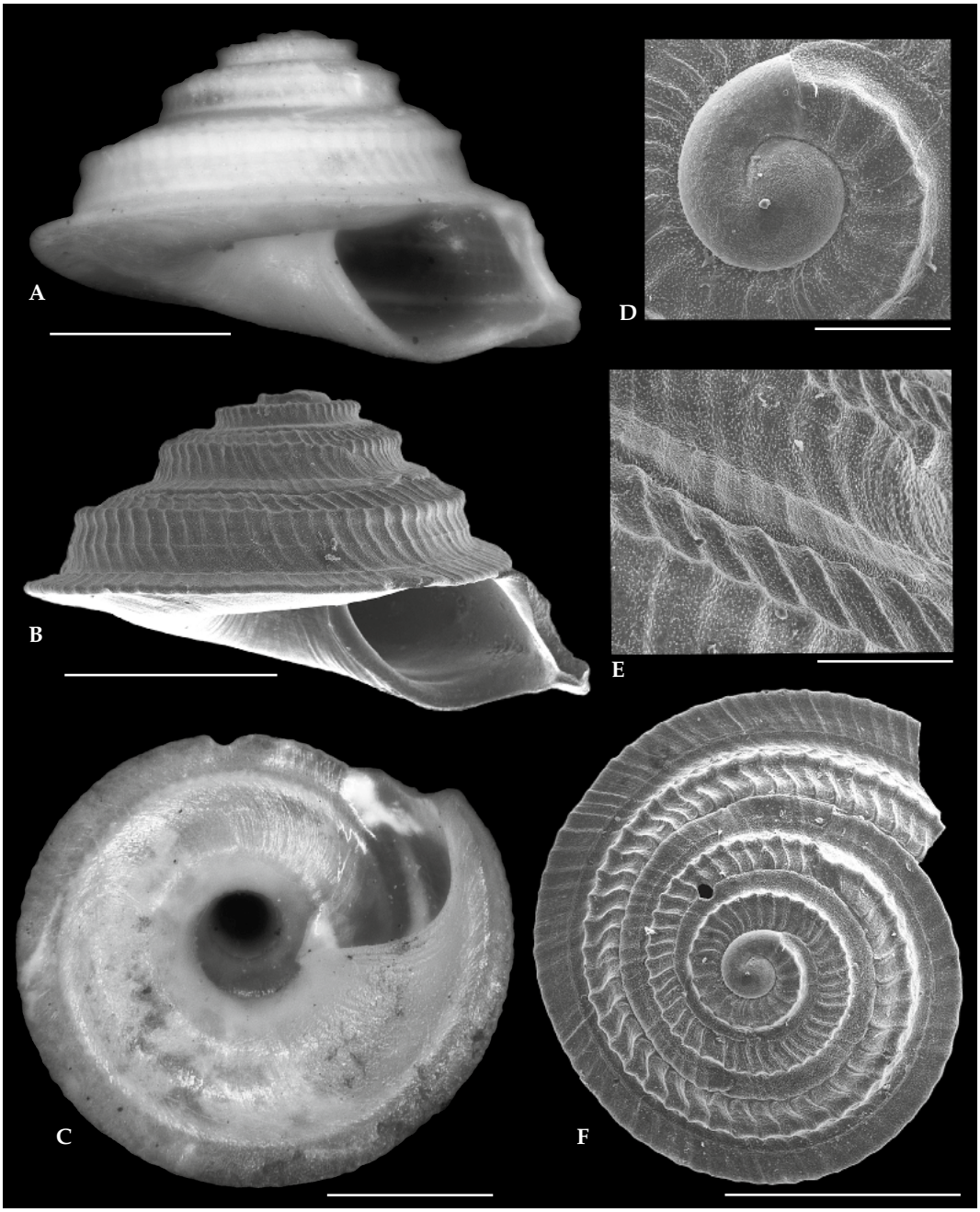

Fig. 1. *Basilissopsis bassa* spec. nov. (A–C. holotype, MORG; D–F. paratype, MNRJ). **A–B.** ventral view; **C.** umbilical view; **D.** protoconch; **E.** detail of ornamentation; **F.** apical view. Scale bars: A–C, F 1 mm; D, E 200 µm.

Holotype with up to two very weak spiral lines below the spiral cord on last whorls (Fig. 1B). First, second, third and fourth whorls with about 28, 52, 60 and 70 axial riblets (Fig. 1D, F), respectively. Intersection with riblets and cord raised small, slight, rounded nodules (Fig. 1B, E–F). First two whorls with sharp shoulder angulation, flattened above and weakly concave below spiral cord (Fig. 1A–B). Shoulder

angulation weakening on third and fourth whorls, which are slightly concave just below and above spiral cord, and shallowly convex beyond the concave region (Fig. 1A–B). Subsutural ramp proportional with overall shell size (Fig. 1A, E); sculptured with faint axial riblets (Fig. 1A–B, F) and a weak spiral line on upper edge (Fig. 1B, F). Suture distinct. Base delimited by greatly expanded, smooth, thin, flange-like peripheral keel (Fig. 1A–C, F); slightly convex, smooth, apart from fine growth lines (Fig. 1A–C). Umbilicus deep, smooth inside, funnel-shaped (diameter about 20 % of shell diameter) with rim smooth, rounded (Fig. 1A–C). Aperture subquadrate (Fig. 1A–B). Outer lip thin, simple, fragile at rim (Fig. 1B–C), posterior notch shallow, concave, narrow (Fig. 1B–C). Parietal region weakly convex, glaze thin (Fig. 1A–C). Inner lip weakly thickened, rather straight, simple, very slightly flexed towards umbilicus (Fig. 1A–C).

Distribution. Known only from the type locality.

Remarks. *Basilissopsis bassa* resembles *B. oxytropis* (Watson, 1879) [Ascension Island] in having a sharp shoulder angulation, not close-set flexuous axial riblets, riblet-cord intersections forming nodules and a deep umbilicus. The new species has a depressed trochiform shell, whorls with a conspicuous, large, peripheral carina, sculpture intersections forming slight nodules, a subsutural ramp proportional on the teleoconch whorls and an umbilicus with a smooth, rounded rim. In contrast, *Basilissopsis oxytropis* has a conical shell, two carinated projections on the teleoconch whorls, the intersections of ribs and carina forming strong nodules, a narrowly delineated subsutural ramp, a not greatly expanded peripheral keel and an umbilicus with a contracted sharp edge (see Watson 1886: 104, pl. 7, fig. 9; Tryon 1889: 426, pl. 36, figs 8–9).

Watson (1886) characterized *B. oxytropis* as incomplete, due to the lack of information on the suture, base and aperture morphology. Subsequently, nothing relevant has been presented for a better characterization of the species (Tryon 1889: 426 compiled Watson 1886, Quinn 1983b: 729 listed only). Syntypes of *B. oxytropis* are deposited in the NHMUK and represented by fragmented shells. There is no additional material of the species in the general collection of this institution (Mrs. Andreia Salvador, personal communication, July 2013).

Basilissopsis bassa is distinguished from *B. watsoni* Dautzenberg & Fischer, 1897 [Iceland to the Azores] by the thin, low, axial riblets, lower spire (type material – 2.2, 3, 3.9 mm wide / 1.2, 1.8, 2 mm high: 1.6 to 1.9 mm), conspicuous peripheral carina and subsutural ramp on the teleoconch whorls, absence of a prominent spiral sculpture between the cord and peripheral keel, subquadrate aperture, weakly convex parietal region and umbilicus with a smooth, rounded rim. In contrast, *B. watsoni* has a coarsely sculptured teleoconch with moderately thickened axial riblets (Fig. 2A–B, D–E, G–I), higher spire (Dautzenberg & Fischer 1897 – 2.1 mm wide / 1.7 mm high: 1.2 mm) (Fig. 2A–B, D, G), a narrowly delineated subsutural ramp on the last whorl (Fig. 2A–B, G), robust, thick not greatly expanded peripheral keel (Fig. 2A–D, F–G), a prominent spiral sculpture between the cord and peripheral keel (Fig. 2A–B, G), rather subrectangular aperture, straight parietal region (Fig. 2A, C–D, F) and an umbilicus with a sharply angulate rim (Fig. 2A, C–D, F) (Dautzenberg & Fischer 1897: 40, Dautzenberg 1927: 200–201, pl 6, figs 35–37, Quinn 1983b: 730–731, fig. 12, Warén 1996: 208, fig. 8f).

Dautzenberg & Fischer (1897) and Dautzenberg (1927) provide identical descriptions of *Basilissopsis watsoni*. Dautzenberg (1927) figured the species, but he did not offer any specifications of the material examined. Quinn (1983b: 729, fig. 12) listed and poorly reproduced the photo of the taxon from Dautzenberg (1927: pl. 6, fig. 36). Warén (1996) studied a specimen from the HL collection collected on the Reykjanes Ridge (off southwestern Iceland), which was supposedly donated to the IMNH after the death of Hans Larsen (Dr. Anders Warén, personal communication, June 2013). These publications characterize and/or illustrate *B. watsoni* unequivocally. Some type material of this species was deposited in the MOM (Warén 1996: 206) and has not been found for the moment (Mrs. Michèle Bruni, personal communication, July 2013). Two paratypes of *B. watsoni* deposited in the RBINS collection (lot i163272) are illustrated here (Fig. 2A–I). In this study, *B. watsoni* is further characterized as having: a protoconch with about 1.5 whorls, proto-teleoconch transition marked by appearance of axial riblets (Fig. 2E, H); teleoconch rather regularly expanding, shoulder angulation strongly supramedian (Fig. 2A–B, D–E, G); a well-spaced, rounded axial riblets (Fig. 2I); a strong spiral cord limiting shoulder angulation (Fig. 2A–B, D–E, G–I); intersection with riblets and cord raised prominent, rounded nodules (Fig. 2A–B, D–E, G); first teleoconch whorls with sharp shoulder angulation weakly concave below spiral cord (Fig. 2D–E, G–I); suture distinct (Fig. 2A–B, D, G, I); base sculptured with about 9 spiral cords (Fig. 2A, C–D, F) and fine growth lines (Fig. 2F).

Basilissopsis bassa can be distinguished from *B. rhyssa* by having a depressed trochiform shell with a non-coarse sculpture, a sunken protoconch, a lack of prominent spiral sculpture between the subsutural region and carina, sculpture intersections forming

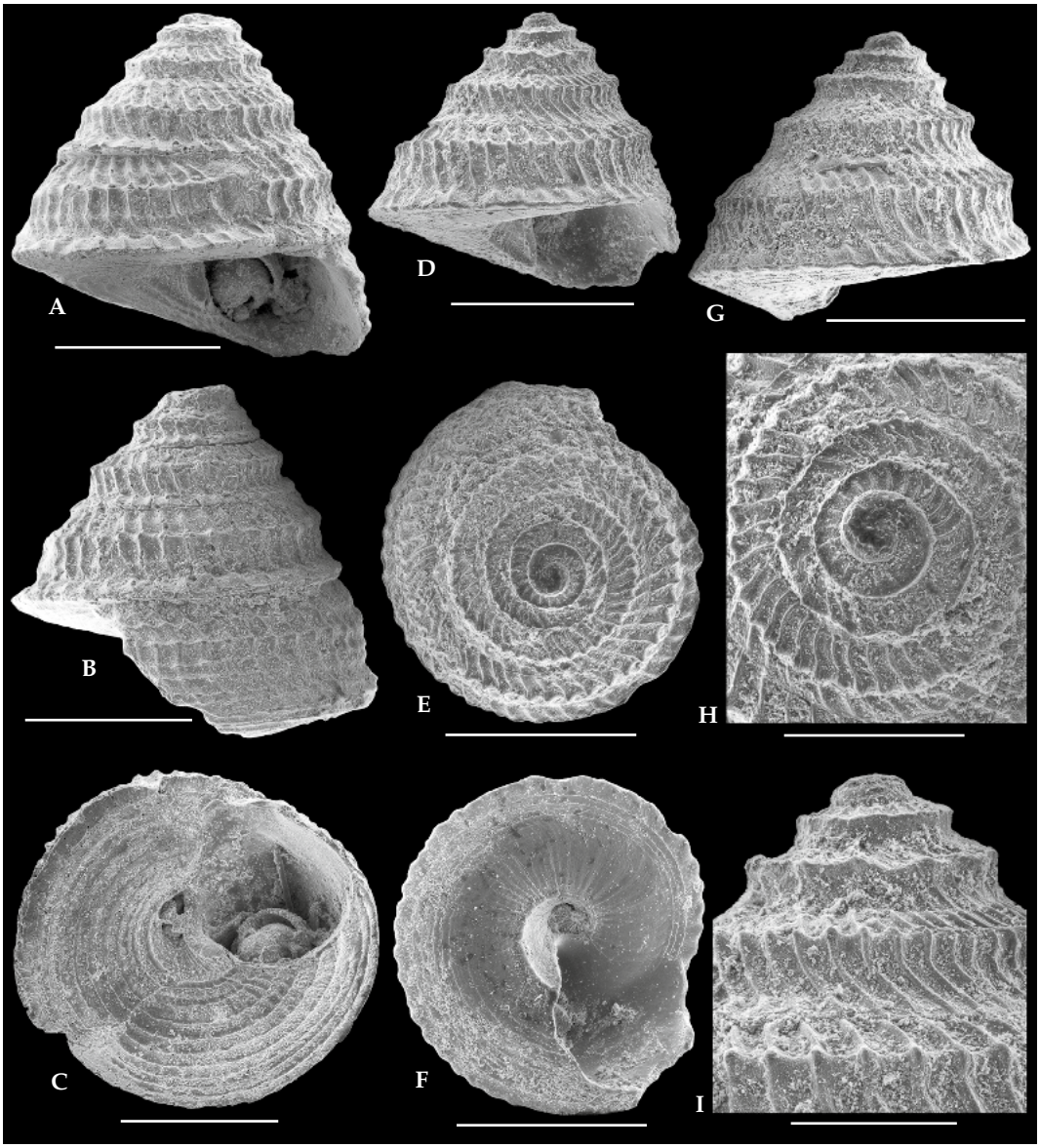

Fig. 2. *Basilissopsis watsoni* (A–I. paratype, RBINS i163272). **A, D.** ventral view; **B.** lateral view; **C, F.** umbilical view; **E.** apical view; **G.** dorsal view; **H.** protoconch; **I.** protoconch and ornamentation of the first post-nuclear whorl. Scale bars: A–G 1 mm, H 500 µm, I 400 µm.

slight, rounded nodules, smooth, expanded peripheral keel and an umbilicus with a smooth, rounded rim. In contrast, *B. rhyssa* has a turbinate shell (more tall-spired) (Dall 1927 – 2.1 mm wide / 2 mm high: ≈1 mm) with a rather coarser sculpture, a more projected protoconch, spiral sculpture with up to two prominent keels between the suture and carina, sculpture intersections forming strong, acute nodules, coarse non-expanded peripheral keel and an umbilicus with a rim angulate bounded by a spiral cord (see Dall 1927: 121, Quinn 1979: 51, 1991: 577, fig. 1A–C).

In the original description of *Basilissopsis rhyssa* Dall (1927: 121) states that the type material (USNM 108145) of this taxon was collected from off Georgia, Fernandina and Cuba (Boss et al. 1968). An examination of this lot by Quinn (1979: 51) revealed three

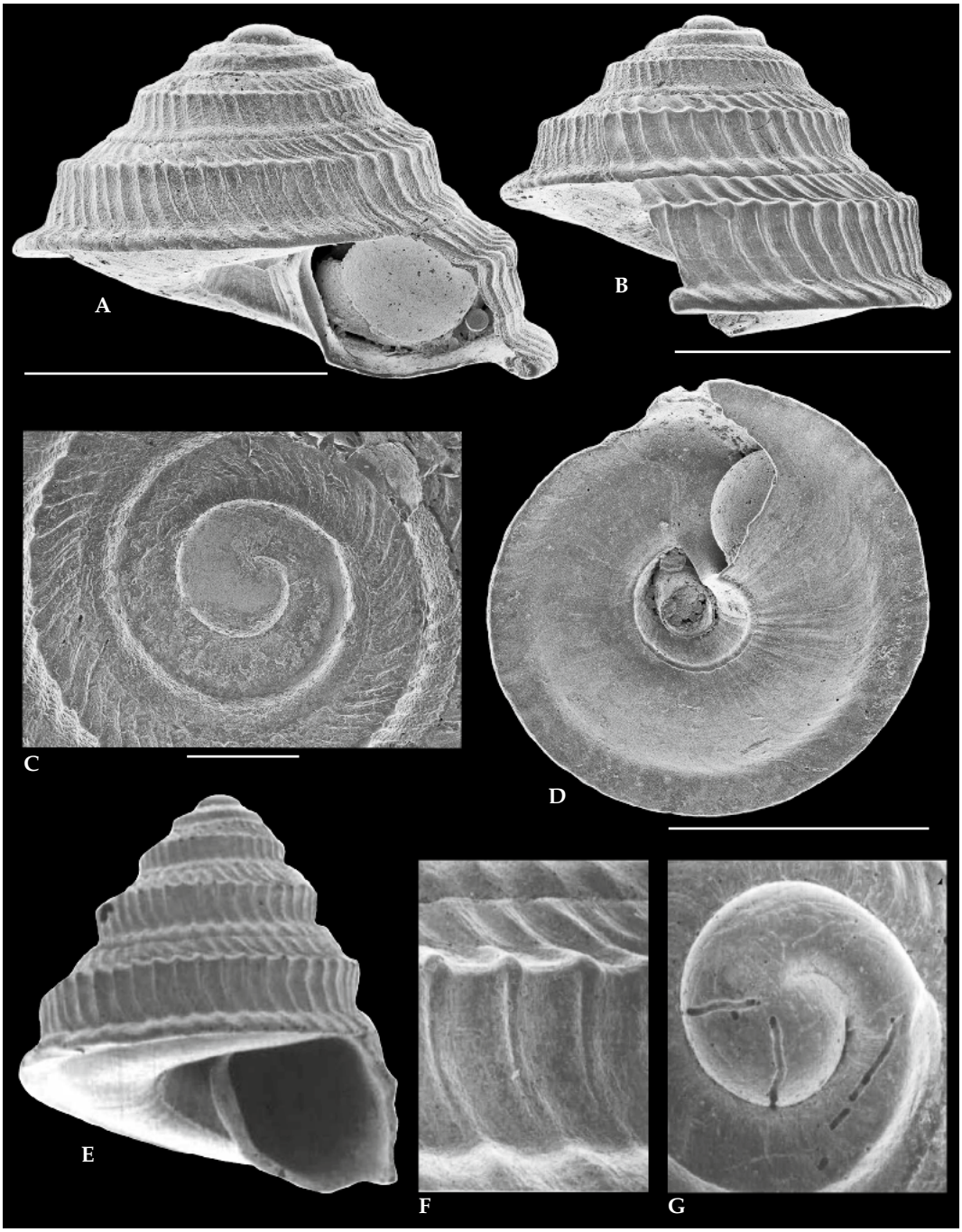

Fig. 3. *Basilissopsis rhyssa* (A–D. lectotype, USNM 108145; E–G. specimen figured by Quinn 1991: 577, fig. 1A–C, USNM 108395). **A, E.** ventral view; **B.** lateral view; **C, G.** protoconch; **D.** umbilical view; **F.** detail of ornamentation. Scale bars and magnification: A, B and D 1 mm, C 200 µm, E–G. scale bars not provided by Quinn (1991).

syntypes to be present, all under the same catalogue number and from the type locality (off Fernandina, Florida, 'Albatross', sta. 2668, 30°58'30"N, 79°38'30"W, 538 m). The catalogue ledger confirmed that three specimens were present in this lot when the USNM catalogue number was assigned. Dall (1927) provides measurements for a single specimen of *B. rhyssa* (2.1 mm width × 2 mm height). This specimen does have a part of the body whorl broken off, there is a hole visible at the suture above the body whorl and the aperture shows some wear on the outer edges. The other shell is smaller, about 1 mm, mostly intact, but with some breaks on the outer lip. The type specimen of *B. rhyssa* here figured (Fig. 3A–D) is smaller, about 1 mm, and it is in excellent condition with only a slight wear on the outer lip. This specimen is here designated as the lectotype (USNM 108145) (Article 74.7.3, ICZN, 1999).

The lectotype has a depressed trochiform outline (Fig. 3A–B: subadult specimen) and the shell studied by Quinn (1991: fig. 1A–C) from off northeastern Florida [USNM 108395, 'Albatross', sta. 2415 (Quinn 1979: 51)] shows a turbinate outline (Fig. 3E–G) due to differences in the number of teleoconch whorls. Dall (1927: 121) states that *B. rhyssa* has an "umbilicus with no keel at the edge". However, we observed an umbilical keel in the specimens illustrated here (Fig. 3A, D–E), which is similar to *B. watsoni* (Fig. 2A). Quinn (1979: 51) characterized *B. rhyssa* similarly to the description of Dall (1927) from types and additional material examined. Subsequently, Quinn (1991: fig. 1A–C) provided SEM images from specimen examined in 1979, definitely making the identification of the taxon most reliable.

Acknowledgements

The authors are grateful to Dr. Paula S. Oliveira (MORG) for the loan of material deposited in their institution; to Dr. Bruce A. Marshall (Museum of New Zealand Te Papa, Tongarewa, Wellington) for the generic placement of the species described herein and sending literature; to Dr. Gerhard Haszprunar (Zoologische Staatssammlung München, Germany) and Dr. Cleo D. C. Oliveira (MNRJ) for help in obtaining literature; to "Laboratório de Microscopia e Microanálise (LAMM/CETENE)" for the SEM photographs; to Dr. Carolina N. Liberal (DSE/UFPB) for taking a photo of the holotype; to Dr. Daniel L. Geiger (Santa Barbara Museum of Natural History, USA), Dr. Michael Schrödl (Zoologische Staatssammlung München, Germany), Dr. Luiz R. L. Simone (MZSP), Dr. Carlo M. Cunha (MZSP) and to an anonymous reviewer for their contribution to the revision and correction of the manuscript; to Dr. Anders Warén (Department of Invertebrate Zoology, Swedish Museum of Natural History) and Dr. Alexandre D. Pimenta (MNRJ) for providing additional information; to Dr. Rafael J. Araujo (Assistant Editor, Bulletin of Marine Science) who kindly allowed us to reproduce figures published in the journal; we are greatly indebted to Mrs. Andreia Salvador (Curator's Assistant, NHMUK), Mrs. Michèle Bruni (Curator's Assistant, Scientific Collections Department, Oceanographic Museum of Monaco, Monaco), Dr. Ellen Strong (Curator of Marine Mollusca, Department of Invertebrate Zoology, USNM), Dr. Yves Samyn (RBINS/Conservator Invertebrates Collection – non insects) and Mr. Julien Cillis (RBINS) for providing information and/or SEM images of type material.

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