TROCHIDAE FROM THE CONTINENTAL SLOPE OF NORTHEAST BRAZIL, WITH THE DESCRIPTION OF A NEW SPECIES.

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ABSTRACT

Five species of *Solariella* and three species of *Lamellitrochus* were identified from the Continental Shelf and Slope of Northeast Brazil, and were revised based on morphology, the original descriptions and type material. *Solariella quinni* sp. n. is described based on its conchology, presenting wide incidence in coastal areas of Pernambuco off the state. Among the species known thus far for the Eastern Atlantic*, S. quinni* shows affinities with *Solariella cristata* Quinn, 1992 for having a conical, turbinate shell, deep umbilication, weakly convex base and spiral ornaments developed on the body whorl, but may be separated for showing 3 spiral cords on the 1st whorl, compared to 4 to 5 spiral cords in *S. cristata*. *S. quinni* is considered endemic to Northeast Brazil.

Key words: Solariellinae, *Solariella*, *Lamellitrochus*, deep sea, Brazil.

RESUMO

Cinco espécies de *Solariella* e três espécies de *Lamellitrochus* foram identificadas na Plataforma e Talude Continental Nordeste do Brazil, e revisadas com base na morfologia, descrições originais e material tipo. *Solariella quinni* sp. n. é descrita com base em seus caracteres conquiológicos, apresentando ampla incidência nas áreas ao largo do estado de Pernambuco. Entre as espécies conhecidas no Atlântico Oriental*, S. quinni* apresenta afinidades com *Solariella cristata* Quinn, 1992 quanto ao formato cônico, umbílico profundo, base fracamente convexa e ornamentos espirais bem desenvolvidos sobre a volta do corpo, mas pode ser separado por apresentar 3 cordas espirais sobre a 1st volta, comparada a 4 ou 5 cordas espirais de *S. cristata*. *S. quinni* é considerada endêmica do Nordeste do Brasil.

Palavras chaves: Solariellinae, *Solariella*, *Lamellitrochus*, mar profundo, Brasil.

INTRODUCTION

The genus *Solariella* was established by Wood (1842) based on a fossil species, *S. maculata*, from the Crag Formation of England (Quinn, 1979) and was the first known genus for the Upper Cretaceous (Cossmann, 1918 and Davies, 1935, both apud Hickman & McLean, 1990). Species are broadly distributed among all oceans and latitudes, living on unconsolidated sediment in cold waters along the coast. *Lamellitrochus* was established by Quinn, 1991 for a group of 8 species of the East Atlantic and is distinguished from *Solariella* for presenting conical-trubinate shells with angular whorls, ornamentation formed by lamelliform axial ribs that become obscure or absent on the body whorl, a strong, rounded shoulder, strong tubercles that are lamelliform or conical, a smooth or tuberculate peripheral cord and a strong basal cord.

Most authors (Cossmann, 1918; Thiele, 1924; Davies, 1935, Wenz, 1938) have considered *Solariella* to be among the Margaritinae. Finlay (1926) Apud Hickman & McLean (1990) transferred some species of Solariellinae to the Calliostomatidae Thiele, 1924. Conchological characters are related to the Umboniinae and Margaritinae subfamilies, which can be described based on the morphology of the soft parts and the characteristics of the radulae (Hickman & McLean, 1990).

Specimens from both genera were richly represented in sediment of the Continental Slope of Northeast Brazil, where these groups have been little known due to a lack of prospecting studies in deep waters. Only the "Challenger" Expedition (1873-1876) referenced species in this region. Among the work that followed, we can highlight the surveys of Watson (1886); Quinn (1979, 1991, 1992); Clench & Aguayo (1939); Dall (1889); Lopes & Cardoso (1958).

ABREVIATIONS

ANSP: Academy Natural Science of Philadelphia;
DMNH: Delaware Museum of Natural History, Wilmington, Delaware;
IOUSP: Oceanographic Institute of the Universidade de São Paulo;
LMUFRPE: Malacology Laboratory of the Universidade Federal Rural de Pernambuco, PE, Brazil;
MCZ: Museum of Comparative Zoology, Harvard University;
MHNC: Museum aus Haus der Natur Cismar, Brawschwainn;
MNRJ: Nacional Museum of Rio de Janeiro, RJ, Brazil;
MZUSP: Museum of Zoology of the Universidade de São Paulo, SP, Brazil;
UMML: Rosenstiel School of Marine and Atmospheric Science, University of Miami, Miami, Florida.

SYSTEMATICS

Class Gastropod Curvier, 1797
Subclass Prosobranchia M. Edwards, 1848
Order Archaeogastropoda Thiele, 1925
Superfamily Trochoidea Rafinesque, 1815
Family Trochidae Rafinesque, 1815
Generic and subfamily diagnoses were based on Hickman & McLean (1990) and Quinn (1991). Species descriptions were obtained from Quinn (1979 and 1991), Dall (1889) and Watson (1886).
Subfamily Solariellinae Powell, 1951
References: Abbott (1974): 40; Clench & Aguayo (1939): 190; Dall (1889a): 44; Dall (1889b): 378-381; Hickman & McLean, 1990, p.111, figs. 72-75; Lopes & Cardoso (1958): 59-64; Powell, 1951, p.102; Quinn, 1979, p.37-43; Quinn (1991): 81-91; Quinn (1992): 50-54; Rios (1994): p.35.
Solariellinae [Trochidae] Powell, 1951 [Type genus: *Solariella* Wood, 1842]; Minoliinae [Trochidae] Kuroda, Habe & Oyama 1971 [Type genus: *Minolia* A. Adams, 1860].
Type genus: *Solariella* Wood, 1842 [= *Machaeroplax* Friele, 1877].
Genus ***Solariella*** S. V. Wood, 1842
Margarita Leach, 1814 (partim); *Machaeroplax* Friele, 1877.
References: S. V. Wood (1842): 531; Quinn (1979): 37.
Type species: *Solariella maculata* S. V. Wood, 1842; pelo monótipo.

Type location: Formação Crag da Inglaterra (fóssil).
Diagnosis: Shell small, generally less than 10 mm high, trochoid, with tubular whorls, usually widely umbilicate, umbilicus often bounded by a strong nodular keel. Sculpture of spiral cords and collabral striae, or almost smooth.
Remarks: Genus established for the fossil *Solariella maculata* Wood, 1842. *Solariella*, since all *Margarita* [= *Margarites* Gray, 1847] being separated from the catch; has in turn been used as a depository of miscellaneous species. Many of the species assigned to *Solariella* can be placed in *Calliotropis*, *Dentystila* or *Microgaza* (Quinn, 1991).

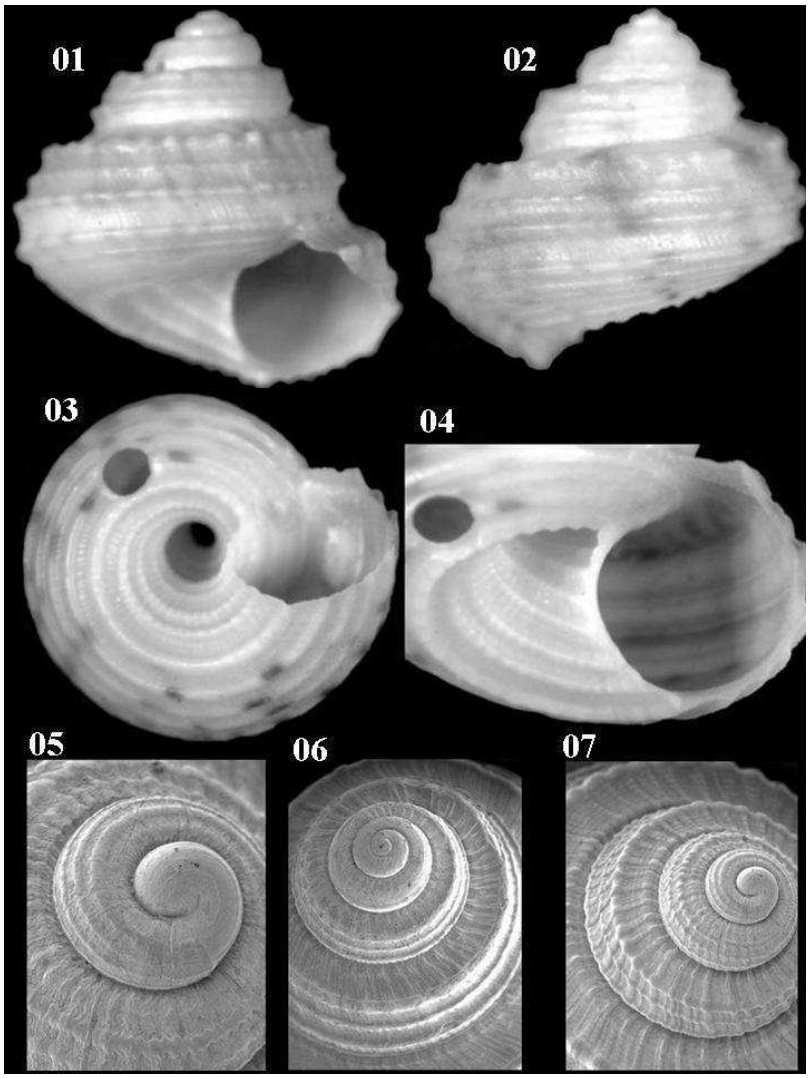
Solariella quadricincta Quinn, 1992
(Figures 01 - 07)

References: Quinn, 1992: p.50-51, figs. 1- 4.
Type material: Holotype, USNM nº. 859437.
Type location: Margarita Island, Venezuela, 11º22.5'N, 64º08.6'W, 60 m.
Material examined: Lt = 4.1 mm , Wt = 4.3 mm, La = 1.9 mm, Wa = 1.7 mm, Wp = 0.36 mm, Wu = 1.3 mm, 4 ¾ whorls MHNC nº. 64508: [01], Dredging 08, 11°58,7' S, 36°49,2' W, 01.XI.00, Sergipe (SE) Brazil, 100m; MNRJ nº. 10581: [01], Dredging 17, 03°45,4' S, 33°12,6' W, 15.X.01, Ceará (CE) Brazil, 159 m; MZUSP nº. 77077: [01], Dredging 03, 09°28' S, 35°04' W, 25.IX.99, Alagoas (AL) Brazil, 175 m; LMUFRPE nº.500: [01], Dredging 21, 04°15' S, 37°12' W, 09.XI.01, CE, Brazil, 177 m.
Remarks: Shell moderately large in size, conical-turbinate, with emerged nucleus, smooth, terminating with the emergence of the axial ribs of the 1st whorl, 4.1 mm x 4.3 mm, light coloration with brown spots and streaks (starting at the suture) on the spiral cords and platform below the suture. Protoconch very small, about 1 whorl. Teleoconch with 4 ¾ whorls, tubular, strongly shouldered. 1st whorl ornamented by weak axial ribs that are distributed from suture to suture and by a spiral cord above the suture a bit stronger than the ribs. 2nd whorl with the formation of the platform below the suture, shoulder and peripheral keel intercalated by broad axial ribs, which form thin nodules in the intersections. Penultimate whorl ornamented by 3 spiral cords. Spiral cords of the penultimate whorl are strong, the middle of which is lower and narrower than the others, all with a weak appearance. Body whorl with a flat suture, bordered by a fine, axially tuberculate spiral cord. Spiral cords are present on this whorl, the thinnest of which is placed below the shoulder. Platform below the suture ornamented by fine axial threads. The interspaces of the subsutural platform are intercalated by strong axial ribs; this platform is broad, flattened, with an adapical elevation from the shoulder to the subsutural cord. Shoulder strongly tuberculate, forming whitish rounded tubercles, displayed spirally. Region below the shoulder with a secondary spiral cord that is narrower than the others and weakly nodular. Peripheral cord with spirally developed tubercles, smaller than those found on the shoulder. The region below the peripheral cord is narrower than the area below the shoulder and equally ornamented by axial threads. Basal cord with a smoother appearance than the previous cords, emerging from the suture on the body whorl. Base convex, strongly ornamented by 3-4 strong spiral cords, basal cord closer to the circumbilical cord. Circumbilical cord strongly tuberculate, terminating below the outer lip, interspaces with fine spiral threads, umbilicus broad, corresponding to approximately 30% of the maximum width. Umbilicus funnel-shaped, with convex inner walls, ornamented by 4-6 strong spiral cords. Aperture sub-circular, inner lip concave. Outer lip fine and angular at the terminations of the axial cords of the body whorl.
Comments: *Solariella quadricincta* shows affinities with *S. carvalhoi* and apparently also with *Solariella staminea* Quinn, 1992 from the Davis Seamont, 60 m; all presenting 4 strong, subequal spiral cords corresponding to the primary spiral cords on the body whorl, which all present a more distinctly nodular shoulder and the surface of the whorls covered entirely by axial growth threads. *S. quadricincta* resembles *S. carvalhoi* for presenting 1 nuclear whorl, sub-circular aperture with concave inner lip and angular outer lip, but *S. quadricincta* has an emerged nucleus with a teleoconch of 5 ½ whorls (5-6 in *S. carvalhoi*), the 1st whorl displaying only one strong cord crossed by weaker axial ribs, the 2nd whorl forming shoulder, peripheral cord and axial ribs with nodules, suture forming a narrow channel bordered by a tuberculate cord, base adorned with 3-4 strong, raised spiral cords (4-5

low spiral cords with axial nodules only in the interspaces), umbilicus with convex walls ornamented with 4-6 spiral cords that are broader and stronger than in *S. carvalhoi*, and weakly tuberculate. In *S. carvalhoi,* the umbilicus is narrower, the inner wall is convex, but with 5-7 spiral cords. The transition from the nuclear whorls to the teleoconch in *S. quadricincta* corresponds to the emergence of the axial ribs, whereas in *S. carvalhoi*, this transition is only marked by growth threads.

Geographic distribution: Northeast Venezuela, Northeast Brazil (this study).

Bathymetry: 26 to 175 m.



Figures 01 - 07. *Solariella quadricincta*, 4.1 x 4.3 mm: 01, ventral view; 02, dorsal view; 03, anterior view; 04, aperture; SEM: 05, protoconch and 1st whorl, 200x; 06, posterior view, 43x; 07, subsutural plataform and shoulder, 80x

Solariella carvalhoi Lopes & Cardoso, 1958
(Figures 08-14)

References: Lopes & Cardoso (1958), p. 59-61, figs. 1-3; Abbott (1974), p.41; Quinn, 1992, p.515, figs. 5, 6; McGinty (1962); Rios (1994), p.35, pr. 10, fig. 105.

Type material: Holotype, IOUSP, n 11-XI-56.

Type location: Brazil (Sao Paulo), 31°35'08"S, 50°50'W, 57 meters.

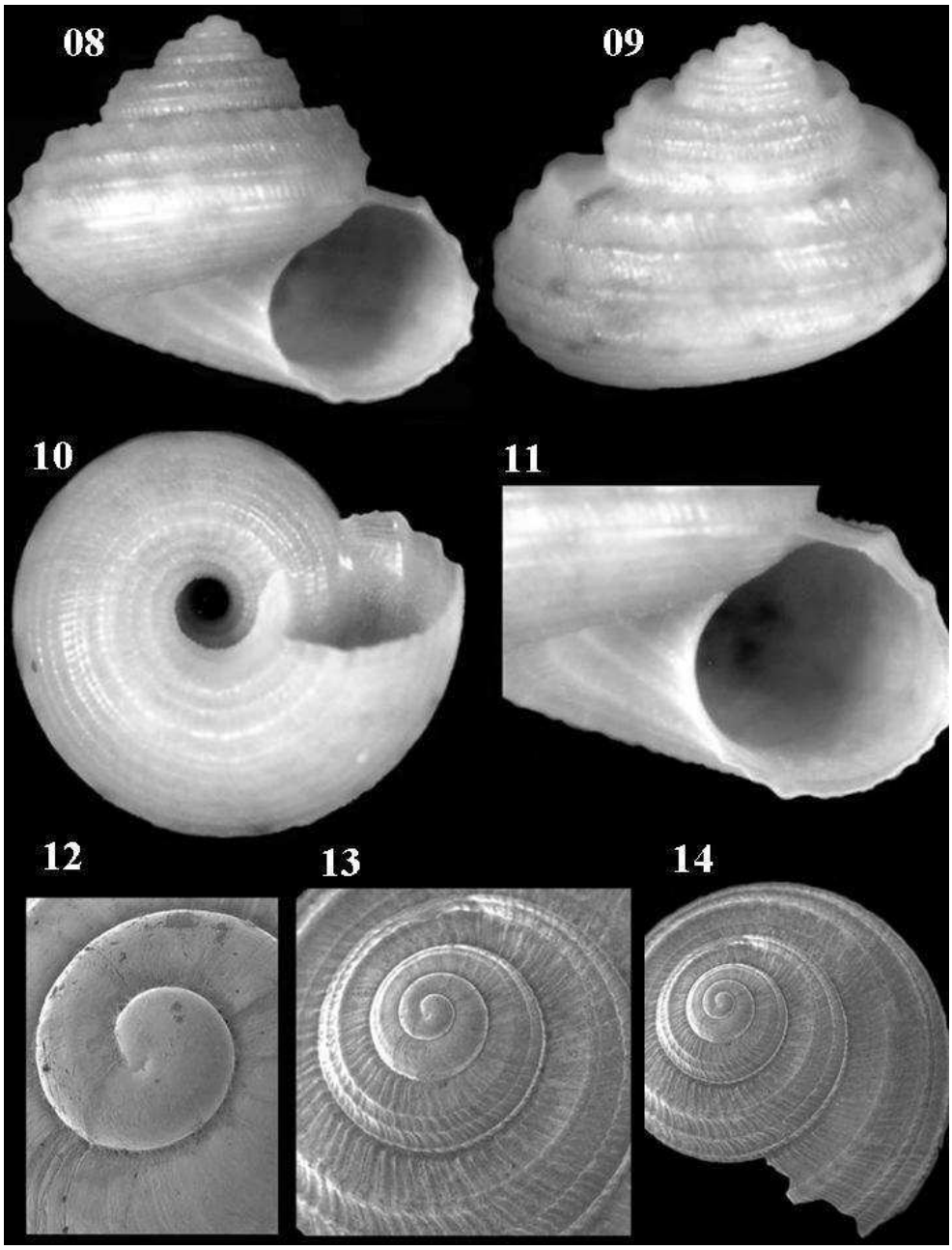
Material examined: Lt = 4.2 mm , Wt = 5.1 mm, La = 2 mm, Wa = 2.2 mm, Wp = 0.2 mm, Wu = 1.7 mm, 4 ½ whorls. MHNC n. 64517: [01], Dredging 05, 10°41,1' S, 36°19,1' W, 27.X.00, Alagoas (AL); Brazil, 130 m; MZUSP n. 77075: [01], Dredging 02, 09°07' S, 34°53' W, 17.IX.99, Alagoas (AL) Brazil, 104 m; [01], Dredging 03, 09°28' S, 35°04' W, 25.IX.99, Alagoas (AL), Brazil, 175 m.

Remarks: Shell small, conical - low turbinate, convex contour, slightly iridescent appearance, brown spots on the spiral cords and subsutural platform measuring 4.2 mm x 5.1 mm, 4 ½ whorls. Protoconch with 1 whorl, smooth, nucleus partially immersed. 1st whorl of glossy aspect, ornamented by fine growth threads. 2nd whorl adorned with 3 spiral cords crossed by axial threads, which form a fine reticulum. Body whorl has a very narrow sutural area, forming a canalicule between the nodules of the axial ribs of the platform below the suture and the region above the suture, corresponding to the space below the peripheral cord of the subsequent whorls. Platform below the suture broad and ornamented by low axial ribs with smooth interspaces, crossed by 2 spiral threads closer to the suture, the innermost of which is ornamented by fine tubercles. Shoulder of a finely undulated appearance with the formation of spirally developed tubercles, which are stronger than those found on the spiral cords of the body whorl. The interspace between the shoulder and the peripheral cord divided nearly in the middle by a poorly tuberculate sub-shoulder cord. Between the cord below the shoulder and the peripheral cord there is a spiral ornament, with the presence of 2 spiral threads equidistant from the peripheral cord. The space between the shoulder and the peripheral cord is twice as large as the space between the peripheral cord and the basal cord. Peripheral cord finely nodular, the space below the peripheral cord is reticulated. Basal cord similar to the peripheral cord. Base convex, with 4-5 spiral cords of same appearance, flattened and obscurely tuberculate. Basal interspaces entirely ornamented by axial nodules. Circumbilical cord strongly ornamented by axial nodules. Umbilicus broad, funnel-shaped. Intraumbilical region ornamented by 5-7 nodular spiral cords with interspaces ornamented by spiral threads, umbilical wall convex. Aperture sub-circular, inner lip amply concave. Outer lip angular.

Comments: *Solariella carvalhoi* Lopes & Cardoso, 1958 is the oldest species of this group. It is described for the southeastern Brazilian coast and can be separated from is congener *Solariella quadricincta* Quinn, 1992 for having 4 spiral cords on the body whorl, the uppermost being subsutural and more weakly nodular. The 2nd whorl presents 3 spiral cords crossed by axial threads forming a clear reticulum; the base is ornamented by 4-5 spiral cords with axially nodular interspaces. The circumbilical cord is tuberculate, as in *S. quadricincta,* but the nodules are lower and less rounded. The subsutural area of *S. carvalhoi* is smaller than that of *S. quadricincta*, being a bit smoother in the latter and adorned by a subsutural spiral cord next to the suture, whereas *S. carvalhoi* has 2 subsutural cords that are more distant from the suture. *S. carvalhoi* lives on sandy substrate and in calcareous algae between depths of 8 and 66 m (Rios, 1994).

Geographic distribution: Cuba; Brazil: Amapá, Alagoas (this study), Rio de Janeiro, São Paulo and Santa Catarina.

Bathymetry: 8 to 175 m.

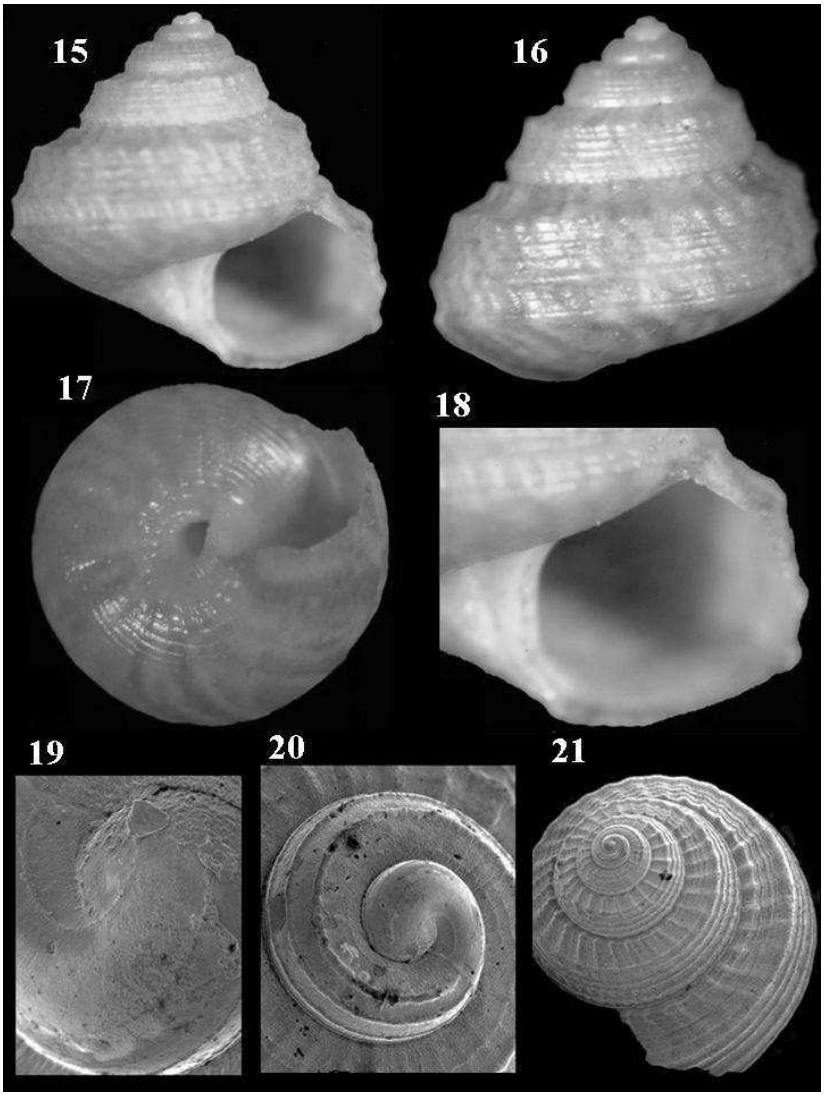


Figures 08 - 14. *S. carvalhoi*: 08, ventral view; 09, dorsal view; 10, anterior view; 11, aperture; SEM: 12, protoconch; 13, protoconch and 1st whorl, 230x; 14, posterior view and part of body whorl, 30x

Solariella quinni new species Barros & Pereira
(Figures 15-21)

Type material: Holotype, MZUSP, n. 77083.
Type location: Pernambuco, Brazil, 51-71m.
Material examined: Lt = 6 mm , Wt = 5.9 mm, La = 2.1 mm, Wa = 2.5 mm, Wp = 0.2 mm, Wu = 0.7 mm, 5 ¾ whorls. MZUSP: [01], Holotype n 77083, 08°09' S, 34°34' W, 19.XII.2004, Pernambuco (PE) Brazil, gravel bottom, 69-71m; n 77084/ 77085, [02], paratypes, 08°11'S, 34°36' W, 19.XII.2004, Pernambuco (PE), Brazil, gravel bottom, 51-60m; n. 77082: [01], specimen, 08°11' S, 34°34' W, 18.XII.04, Pernambuco (PE), Brazil, gravel bottom, 66-71m; ANSP n. 413511: [02], specimens, 08°09' S, 34°34' W, 18.XII.04, Pernambuco (PE), Brazil, gravel bottom, 69-71m; LMUFRPE n. 503: [05], specimens, 08°11' S, 34°34' W, 18.XII.04, Pernambuco (PE), Brazil, gravel bottom, 66-71m; MHNC n. 64503: [02], specimens, 08°11' S, 34°36' W, 18.XII.04, Pernambuco (PE), Brazil, gravel bottom, 51- 60m; MNRJ n.10578/10579 : [02], paratypes , 08°09' S, 34°34' W, 18.XII.04, Pernambuco (PE), Brazil, gravel bottom, 69-71m.
Diagnosis: Conical-turbinate, body whorl weakly widened, shell with raised appearance. Suture reentrant, forming channel. Platform below the suture forming nodules, with 3-5 fine spiral threads. Shoulder with thinner tubercles or smooth appearance. Region below the shoulder with 2 spiral cords. Peripheral cord nodular, with the subperipheral area adorned by 2 fine spiral cords. Basal cord smooth. Circumbilical cord weakly tuberculate. Umbilicus narrow.
Description: Shell conical-turbinate, 6 mm x 5.9 mm, angular contour, without nacre, base light-colored with tan streaks and spots, 5 ¾ whorls, shouldered. Protoconch small and smooth, about one whorl. 1st whorl with 3 spiral cords and the presence of the shoulder below the suture. 2nd whorl and subsequent whorls a bit more reticulated, 4 spiral cords making up the shoulder. Body whorl ample and broad. Suture reentrant, forming a channel in whorls 3 and 4, between the smooth abapical cord and the cord below the strongly nodular suture. The abapical cord forms the peripheral cord on the body whorl Platform below the suture strongly ribbed, forming adapical nodules and the lower part crossed by 3 to 5 fine spiral threads. The axial ornament is always stronger in this region. Shoulder weakly forming tubercles that are weaker than those below the suture or has a smoother appearance, however no specimen has a secondary cord that is stronger than the shoulder. Region between the shoulder and the peripheral cord with the presence of 2 spiral cords of the same appearance, which can vary from fine to broad, in the latter case sub-equal to the shoulder and the peripheral cord. Platform with 2 spiral cords. Between these sub-shoulder secondary spiral cords there are microscopic spiral threads. Peripheral cord weakly nodular or smooth, but in both cases similar to the shoulder. Region below the peripheral cord with 2 sub-equal fine spiral cords. Base broad, slightly convex and ornamented by 10-12 spiral cords, the two innermost of which a bit more weakly tuberculate. Circumbilical cord weakly tuberculate, bordered by a small spiral groove. Intraumbilical region ornamented by 8-12 fine spiral threads intercalated by a fold that is a bit more reinforced. Umbilicus very narrow, corresponding to 11% of the maximum width; funnel-shaped and very sharp. Peristome strong. Inner lip concave, with a final reinforcement on the collumella due to the termination of the circumbilical cord. Aperture sub-circular, with posterior thinning. Outer lip fine. Axial streaks on the platform below the suture and in the region between the shoulder and the peripheral cord.
Geographic distribution: Pernambuco, Brazil.
Bathymetry: 51 to 71 meters.
Comments: Among the *Solariella* described thus far for the Atlantic, *Solariella quinni* sp n. presents greater affinities with *Solariella cristata* Quinn, 1992, p. 52, fig. 7-8, which present a solid conical-turbinate shell, are deeply umbilicated, with a narrow umbilicus, tan streaks, base weakly convex and developed spiral ornaments on the body whorl; but are easily distinguished as *S. quinni* has 3 spiral cords on the 1st whorl (4-5 spiral cords in *S. cristata*), a ample, broad body whorl adorned by 4 primary spiral cords, 3-5 secondary spiral cords below the suture, 2 weaker spiral cords below the shoulder and 2 weak cords below the peripheral cord; a total of 11-13 irregular spiral cords on the body whorl

(there are 14 subequal spiral cords in *S. cristata*); the 2nd whorl is reticulated, form by 4 spiral cords crossed by axial ribs; the base is ample, slightly convex, with 10-12 spiral cords, the 2 innermost being weaker. In *S. cristata,* the base is equally convex, but composed of 7-10 spiral cords. *S. quinni* also presents a weakly nodular circumbilical cord, separated from the other basal cords by a deep spiral groove. The umbilicus is narrow in both species, with 8-12 spiral threads and a strong upper fold in *S. quinni,* and 4-6 nodular spiral cords in *S. cristata*. The width of the umbilicus ranges from 30 % of the maximum width in *S. cristata* to 11 % in *S. quinni*. Despite the occurrence of particular affinities of these species with *S. carvalhoi* and *S. quadricincta*, there are very profound differences, which basically regard the presence of very developed spiral ornaments in *S. quinni*.



Figures 15 - 21: *Solariella quinni*: Paratype 1, 5.1 x 5.2 mm: 15, ventral view; 16 dorsal view; 17, anterior view; 18, aperture; SEM: 19, nucleous of protoconch, 650x; 20, protoconch and 1st whorl, 200x; 21, posterior view and part of body whorl, 23x

Solariella lubrica (Dall, 1881)
(Figures 22-28)

Margarita lubrica Dall, 1881; *Margarita iridea* Dall, 1889.

References: Dall, 1881, p.44; Dall, 1889, p.382; Quinn, 1979, p.42, figs. 68-74; Abbott, 1974, p.41, fig. 290; Rios, 1994, p.36, pr. 10, fig. 109.

Type material: Holotype, USNM nº. 95061.

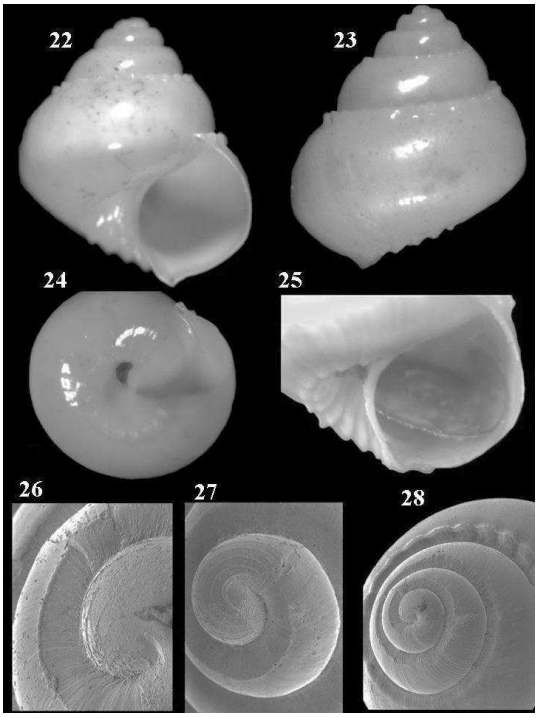
Type location: *Margarita lubrica* Dall, 1881 - Cuba (North of Havana), "Blake", Est. 2, 23°14' N, 82°25' W, 1472 meters.

Material examined: Lt = 3.1 mm , Wt = 2.7 mm, La = 1.1 mm, Wa = 1.3 mm, Wp = 0.28 mm, Wu = 0.36 mm, 4 $^{1}/_{8}$ whorls. LMUFRPE nº. 504: [01], Dredging 31, 10°06' S; 35º46' W; Alagoas (AL), Brazil, 16.XII.2001, muddy bottom, 720 m; MHNC nº. 64519: [01], Dredging 11, 08°46,5' S, 34°44,5' W, 18.XI.00, Pernambuco (PE), Brazil, 690 m; MNRJ nº. 10580: [01], Dredging 09, 08°45,1' S, 35°44,9' W, 12.XI.00, Pernambuco (PE), Brazil, 500 m; MZUSP nº. 77076: [01], Dredging 31, 10°06' S; 35º46' W; 16.XII.01, Alagoas (AL), Brazil, muddy bottom, 720 m.

Remarks: Shell small, 3.1 mm x 2.7 mm, contour conical, inflated, glossy with intense pink color when alive to nacre white when dead, with 4 $^{1}/_{8}$ whorls. Protoconch small, polished, with globose nucleus, emerged, with fine spiral striae, 1 ¼. 1st whorl with the formation of a subsutural tuberculate spiral cord, which forms a narrow platform between the suture and this cord. Tubercles are ornamented by 2 fine spiral threads. Body whorl inflated and smooth. Base strongly convex, with the presence of a funnel-shaped umbilicus, which is bordered by 1-2 tuberculate cicumbilical cords and strong, short axial plications originating from the tubercles and going to the base. Intraumbilical region formed by strong axial folds, umbilicus narrow and deep. Aperture circular, with a dorsal narrowing. Inner lip concave, weakly reflected to the umbilicus. Outer lip fine.

Geographic distribution: Florida Straights, Gulf of Mexico, Southern Caribbean, Brazil: Alagoas (this study) and Rio Grande do Sul.

Bathymetry: 155 to 5633 m.



Figures 22 - 28. *Solariella lubrica*, 3.1 x 2.7 mm: 22, ventral view; 23, dorsal view; 24, anterior view; 25, intraumbilical region and aperture; SEM: 26, posterior view and shoulder of body whorl, 450x; 27, nucleous of protoconch, 450x; 28, dorsal view of protoconch, 230x;

Solariella amabilis (Jeffreys, 1865)
(Figures 29-35)

Not *Trochus cinctus* sp. n, Philippi, 1836; *Margarita elegantula* nom. nud, Jeffreys 186; *Trochus amabilis* Jeffreys, 1865; *Trochus affinis* nom. nud – Jeffreys MS, Friele 1874; *Machaeroplax affinis* sp. n.- Jeffreys MS, Friele, 1877a; *Machaeroplax hidalgoi* sp. n. Fischer, 1882; *Trochus amabilis* var. n. *affinis*, Jeffreys, 1883.

References: Philippi, 1836, p.185, pl. 10; Jeffreys, 1865, p.300; Friele 1874, p.303; Friele 1877a, p.313; Fischer, 1882, p.51; Jeffreys, 1883, p. 97; Fretter & Graham, 1977; Quinn, 1979, p.36, figs. 51-54; Warén, 1993, p.161-162, figs. 2A, B, 7B, 8D.

Type material: Syntype, USNM, n 179512.

Type location: *T. amabilis,* Shetland, Northeast Unst, 155-175 m.

Material examined: Lt = 2.3 mm , Wt = 2.4 mm, La = 1.1 mm, Wa = 1.1 mm, Wp = 0.2 mm, Wu = 0.8 mm, 6 whorls. MHNC n. 64520: [01], Dredging 19, 03°30'51'' S, 37°59'28'' W, CE, Brazil, 07.XI.01, 384 m; MZUSP n. 78952: [01], Dredging 06, 10°41,4'00'' S, 36°18,7'00'' W, AL, Brazil, 28.X.00, 365m.

Remarks: Shell conical-turbinate, with angular shoulder, 2.3 mm x 2.4 mm, translucent when recently dead and without nacre, 3 ¾ whorls. Protoconch small, nucleus a bit inflated and emerged, with spiral threads on the surface of the protoconcha, with 1 whorl. 1st whorl ornamented exclusively by 4 spiral (micro) cords, with the emergence of the platform below the suture. 2nd whorl with 4 spiral cords crossed by fine axial ribs that form small nodules on the cords. The uppermost cord is limited to the platform below the suture. On the 3rd whorl the sharp axial ribs become more raised and are crossed by the shoulder below the suture, by a cord below the shoulder and by the peripheral cord. There is a spiral cord below the suture on the platform, which form nodules in the intersections with the axial ribs. Shoulder finely tuberculate where these nodules coincide with the axial ribs coming from the platform below the suture. Region below the shoulder with a thinner secondary cord, bordered by fine spiral threads from above to below. Peripheral cord thin and smaller than the shoulder, with minute, spirally developed nodules. Space between the shoulder and the peripheral cord is twice as large as the space between the peripheral and basal cords. Region below the peripheral cord and shoulder entirely covered by thin axial ribs. There are about 9 microscopic spiral threads in the region below the peripheral cord. Basal cord lower and smoother than the peripheral cord, with the formation of obscure nodules. Base conical, strongly convex, adorned by 5 spiral cords similar in appearance to the basal cord, the innermost of which a bit stronger and flatter than the others. Circumbilical cord strongly tuberculate axially. Umbilicus narrow, funnel-shaped. Umbilical aperture narrowed. Intraumbilical region ornamented by 6 spiral cords interrupted by axial lamellae coinciding with the nodules of the circumbilical cord; on the innermost side of this cord there is a small depression or spiral groove, which develops to the outer part of the columella, forming a v-shaped reentrance in this region. Aperture quadrangular, inner lip concave, outer lip fine, strongly angular upwardly.

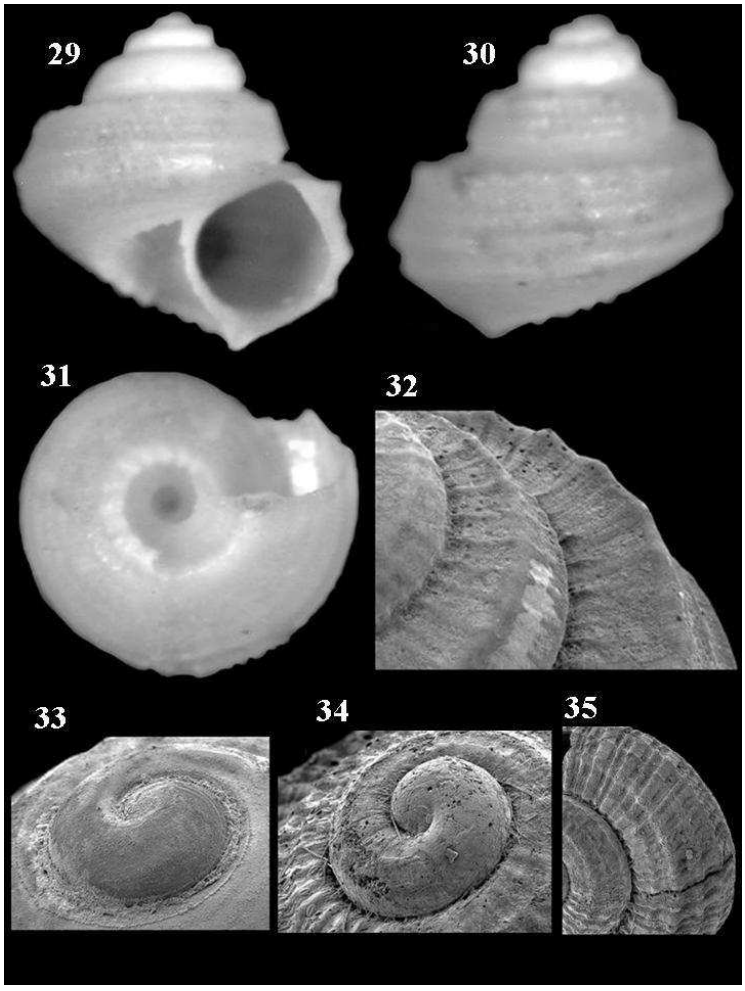
Comments*: Solariella amabilis* (Jeffreys, 1865) has been discussed by a number of authors (Dall, 1889, Friele 1874, Warén, 1993) and all are unanimous in reporting the Nordic distribution, or at most a Mediterranean distribution, for most of the specimens collected, with a bathymetric distribution between 150 and 800 m. *S. amabilis* is one of the first valid names of recent European species. The shells collected off the Brazilian coast exhibit a typical pattern presented by *S. amabilis*, with the strong, sub-equal relatively smooth shoulder and peripheral cord, body whorl with thin axial ribs starting at the platform below the suture forming nodules on the shoulder, sharp carinae with nodules that are smaller than those of the shoulder and are spirally developed; pronounced carinae; the region below the suture is ample and flat; the region below the shoulder has evident spiral cords (which are not well pronounced in the Brazilian material).

Geographic distribution: North Atlantic and Northeast Brazil: Alagoas and Ceará (this study).

Bathymetry: 155 to 800 m.

Genus *Lamellitrochus* Quinn, 1991
References: Quinn, 1991, p. 81-91.
Type species: *Margarita lamellosa* Verril & Smith, 1880.
Type location: Barbados, at 220 m.
Atlantic species included: *Solariella lamellosa* (Verril & Smith, 1880), *Lamellitrochus pourtalesi* (Clench & Aguayo, 1939); *Lamellitrochus inceratus* Quinn, 1991; *L. carinatus* Quinn, 1991; *L. suavis* Quinn, 1991; *L. filosus* Quinn, 1991; *L. fenestratus* Quinn, 1991 and *L. bicoronatus* Quinn, 1991.

Remarks: All shells are distinguished from all other solariellinae genera by their strongly angular whorl profiles and distinctive macro and microsculpture.



Figures 29 - 35. *S. amabilis,* 2.3 x 2.4 mm: 29, ventral view; 30, dorsal view; 31, anterior view; SEM: 32, suture and shoulder of body whorl, 100x; 33, protoconch of 1st exemplar, 330x; 34, protoconch of 2nd exemplar, 250x; 35, axial and spiral ornament of body whorl, 120x;

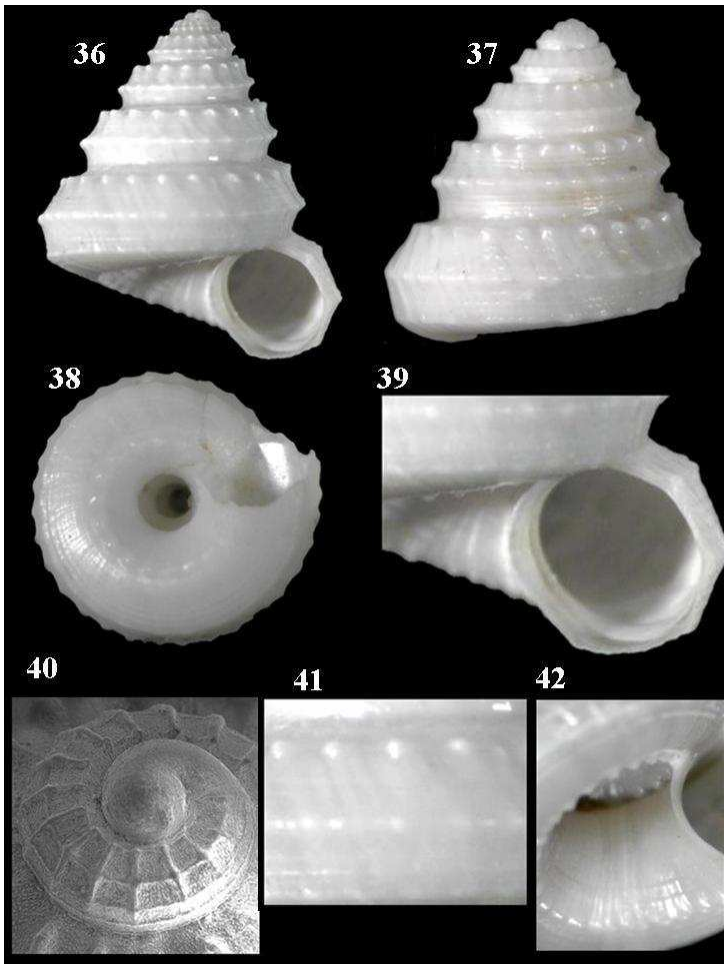
Lamellitrochus inceratus Quinn, 1991
(Figures 36-42)

Calliostoma tiara Watson 1879: Dall, 1889a: 365;
Solariella amabilis Jeffreys 1865: Dall, 1889a: 378, 379;
Solariella lamellosa (Verril & Smith, 1880): Quinn, 1979: 40-42, figs. 61, 62.
References: Quinn, 1991, p. 88-90, figs. 25-27, 36.
Type material: Holotype, USNM nº. 94946.
Type location: Albatross sta. 2644, 25º40'N, 80º00'W, off Cape Florida, Key Biscayne, Florida, at 353 m
Material examined: Lt = 5.8 mm, Wt = 5.5 mm, La = 1.9 mm, Wa = 1.9 mm, Wp = 0.28 mm, Wu = 2.1 mm, 6 whorls. ANSP nº. 413512: [02], Dredging 07, 11°35,5' S, 37°12,3' W, Sergipe (SE), Brazil, 30.X.00, 510 m; LMUFRPE nº. 508: [10], Dredging 10, 09°04,7' S, 34°51,2' W, 17.XI.00, Alagoas (AL), Brazil, 520 m; MHNC nº. 64509: [02], Dredging 04, 08°42,1'00'' S, 34°44,1'00'' W, Pernambuco (PE), Brazil, 25.III.00, 465 m; MNRJ nº. 10586: [05], Dredging 31, 10°06' S; 35º46' W, Alagoas (AL), Brazil, muddy bottom, 16.XII.01, 720 m; MZUSP nº: 77073: [05], Dredging 11, 08°46,5' S, 34°44,5' W, 18.XI.00, Pernambuco (PE), Brazil, 690 m.
Remarks: Shell small, reaching 5.8 mm x 5.5 mm, conical-turbinate, peripherally carinate (similar to a keel), frequently umbilicate, white, lower side with fine nacre and outwardly with a porcelain coating. Protoconch 0.325 mm of maximum width, 1 whorl. Teleoconch with 6 whorls, with one higher segment, forming a carinate keel; first whorl with strong, smooth axial lamellae extending from suture to suture, quickly becoming restricted to the shoulder and peripheral cord on the subsequent whorls; rather weak micro-pustules covering the entire surface of the first 2 whorls; first whorl with 2 to 4 weak spiral threads, two of which interact with the axial lamellae to form an angulation below the tuberculate suture and peripheral cord; 0-5 very weak spiral threads between the angulation below the suture and the peripheral cord. Base flattened, surrounded by a strong, smooth spiral cord; 5- 11 weak, flattened, smooth spiral cords between the basal cord and the strong tuberculate circumbilical cord; umbilicus amply open, 41% of the maximum width of the shell, funnel-shaped and its walls have 0-4 weak spiral cords and weak axial wrinkles. Aperture oblique, circular; Lips narrow; Peristome complete.
Comments: According to Quinn (1991), *Lamellitrochus inceratus* presents affinities with the Atlantic species *Lamellitrochus suavis* Quinn, 1991 recorded for Barbados-Antilles, for having a conical-turbinate contour and similarities in the shape of the sculpture, but *Lamellitrochus suavis* is much smaller and presents little relation to other Atlantic species, except for the group *Lamellitrochus* Quinn, 1991. As a means of quick recognition, the following descriptive characteristics are attributed, which do not appear in the original description: the protoconch is ornamented by microscopic spiral threads; the spiral threads may by absent between the peripheral and basal cords, and if present (a maximum of 2 threads starting at the 4th whorl), it is due to the dissolution of calcium carbonate; after the basal cord, there are 6 adjacent spiral cords; a 7th spiral cord may be absent, and when present is located near the tuberculate cord; the circumbilical cord presents 15-24 tubercles, and the central part of the base is often smooth; the inner lip is reflected on perfect specimens, especially on the median portion. This is the first record of the species for the Southern Atlantic and the 2nd occurrence of the genus *Lamellitrochus* Quinn, 1991. Among the known species, it presents a strong affinity with *Lamellitrochus pourtalesi* (Clench & Aguayo, 1939), in the conical-turbinate contour, strongly pustulous ornamentation and the strongly canaliculate suture, but is easily distinguished by the direction of the ornaments on the first post-embryonic whorl, which are typically axial in *L. inceratus* and spirally developed in. The spiral angle is more acute in *L. inceratus* and the protoconch in *L. pourtalesi* has a much more inflated nucleus. The base in *L. pourtalesi* is much more conical, the basal threads are more raised and ornamented by many raised axial threads; the umbilicus is distinct in both species, being broader, deeper and reaching the inner part of the protoconch in *L. inceratus*. In *L. pourtalesi*, the umbilicus has a broad inner spiral cord that culminates in the projection of the inner lip, which is reflected, giving a more reinforced appearance to the aperture. A very evident angulation formed on the outer lip corresponds to the termination of the shoulder, the peripheral

cord and the basal cord. The tubercles on the shoulder are more rounded and axially developed in *L. inceratus*; in *L. pourtalesi,* the shoulder has spirally developed nodules that are a bit smaller in comparison with *L. inceratus*. The region below the shoulder is relatively smooth, flat and ample in *L. pourtalesi*, whereas this region is ornamented by 0-5 weak spiral threads in *L. inceratus*.

Geographic distribution: Southern Georgia, Florida Straights (Florida Cape to Dry Tortugas), Havana and Honda Bay - Cuba; Yucatan Channel, Old Providence Island, Southeast Cuba, North Porto Rico and the Lesser Antilles from the Dominican Republic to Santa Lucia; Northeast Brazil (this study).

Bathymetry: from 250 to 500 meters.



Figures 36 - 42. *Lamellitrochus inceratus*, 5.8 x 5.5 mm: 36, ventral view; 37, dorsal view; 38, anterior view; 39, protoconch, 180x (SEM); 40, spiral ornament of body whorl; 41, part of base and aperture; 42, intraumbilical region.

Lamellitrochus pourtalesi (Clench & Aguayo, 1939)

(Figures 43-49)

Margarita amabilis Jeffreys 1865; *Solariella pourtalesi* Clench & Aguayo, 1939.

References: Clench & Aguayo 1939, p.190, pl. 28 fig. 02; Quinn, 1979, p.42, figs. 63-64;

Type material: Holotype, MCZ n. 135.108.

Type location: "Atlantis" Station n 2993 (N. Lat 23° 24; W. Long. 80° 44´) off Cardenas, northern Cuba, 1276 m.

Material examined: Lt = 7.5 mm , Wt = 6.5 mm, La = 2.8 mm, Wa = 2.7 mm, Wp = 0.4 mm, Wu = 2 mm, 5 ¼ whorls. ANSP n. 413514: [04], Dredging 11, 08°46,5' S, 34°44,5' W, Pernambuco (PE), Brazil,18.XI.00, 690 m; LMUFRPE n. 507: [05], Dredging 27, 06°14' S, 34°52' W, Rio Grande do Norte (RN) Brazil, 26.XI.01, 500 m;. MHNC n. 64522: [03], Dredging 31, 10°06' S, 35°46' W, Alagoas (AL), Brazil, 16.XII.01, 720 m; MNRJ n. 10584: [06], Dredging 04, 08°42,1'00'' S, 34°44,1'00'' W, PE, Brazil, 25.03.00, 465 m; MZUSP n.77072: [05]: Dredging 10, 09°04,7' S, 34°51,2' W, Alagoas (AL), Brazil, 17.11.00, 520 m; [04], Dredging 12, 04°17,6' S, 33°13,2' W, Ceará (CE), Brazil, 07.X.01, 550 m.

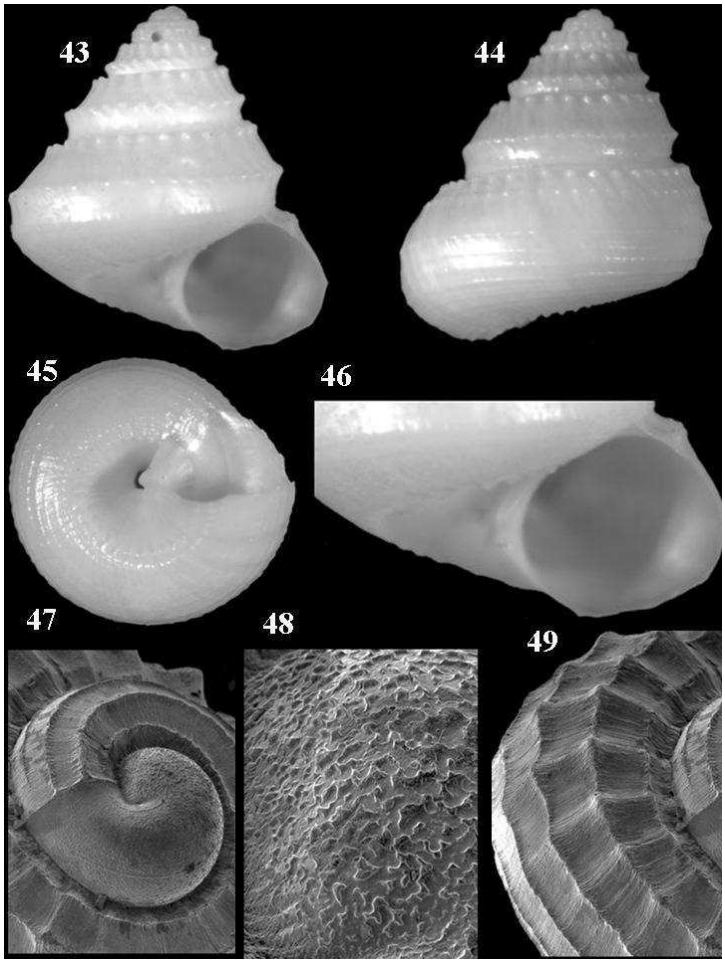
Remarks: Shell small, reaching 7.5 mm x 6.5 mm, conical-turbinate, relatively flat, angled contours, white, with pinkish spots on the spiral, pattern strongly nacre, 5 ¼ whorls. Protoconch globose, with emerged nucleus, probably with spiral micro-sculpture, 1 whorl. 1st half of the 1st whorl without axial ribs, with the upper part presenting incipient ribs. 2nd whorl ornamented by strong axial ribs crossed by 3-4 weaker spiral lines, the uppermost of which forms the shoulder and tubercles are formed in the intersections with the axial ribs; on the following whorls the axial ornaments become less evident and the spiral ornaments become more conspicuous with the development of tubercles, especially on the shoulder and peripheral cord, which are conical, sharp and axially elongated. Platform very narrow between the shoulder and suture and the region between shoulder and the suture is very narrow; the region between the shoulder and the peripheral keel is broader and smoother. Peripheral cord weakly tuberculate, tubercles smaller than those found on the shoulder. Region between the peripheral and basal cords is smooth. Basal cord emerging above the suture of the outer lip, smooth. Body whorl ornamented essentially spirally, with smooth interspaces, but ornamented by axial growth threads. Below the shoulder there is a fine spiral cord, weakly nodular and closer to the shoulder than to the peripheral cord. Formation of rectangular interspaces on the 2nd and 3rd whorls. Suture weakly reentrant, forming a broad channel between the shoulder and peripheral cord on the spiral. Body whorl ornamented adapically by the strongly tuberculate shoulder. Base conical, with 2-7 thin, smooth spiral cords, the innermost of which has a finely tuberculate appearance. Circumbilical cord strongly tuberculate, terminating at the lower part of the columella. Intraumbilical region adorned by axial growth folds, but on the upper part of the narrowed umbilicus, with a strong spiral fold and concave inner lip strongly reflected on its middle portion over the umbilical fold. Aperture sub-circular, weakly angles at the termination of the peripheral keel. Columella fragile, mouth roundly arched.

Comments: Among occurrences in the Southern Atlantic, the species that relates most closely to *Lamellitrochus pourtalesi* appears to be *Lamellitrochus inceratus*. Both were related by Quinn (1991), as was discussed earlier. The two Atlantic species *Lamellitrochus fenestratus* Quinn, 1991 and *Solariella amabilis* (Jeffreys, 1865) present affinities in the general contour of the amply conical shell, the ornamentation pattern on half of the 1st post-nuclear whorl and the tabulation of the whorls. In comparison to *L. fenestratus,* the teleoconch in *L. pourtalesi* is larger, with 5 ¼ whorls (4.6 in *L. fenestratus*); the shoulder is equally nodular, but the nodules are smaller and the area below the shoulder is slightly convex; it does not present a strong spiral ornamentation as that exhibited by *L. fenestratus*. In *L. pourtalesi,* there is a cord below the obscurely nodular shoulder. The distance from the peripheral cord to the basal cord corresponds on both of the species, but the peripheral cord in *L. fenestratus* has much stronger tubercles. The base is conical and developed, which is similar to *L. pourtalesi*, but the circumbilical cord presents a double row of nodules. *L. pourtalesi*, *L. fenestratus* and *S. amabilis* present a protoconch with fine spiral threads and the initial half of the 1st whorl with 4 spiral threads, which probably

unites them into a group with affinities; the nucleus of *L. pourtalesi* resembles that of *S. amabilis* than that of *L. fenestratus*, but is much more inflated in *L. pourtalesi* than in either of the other two species. The teleoconch in *L. pourtalesi* resembles that in *S. aff*. a*mabilis,* especially with regard to the tabulation of the whorls, the depth of the suture and the strongly tuberculate ornamentation, is easily distinguished from *S. amabilis* for possessing a strongly tuberculate shoulder. The nodules found on the teleoconch of *L. pourtalesi* are axially developed, whereas in *S. aff.* a*mabilis* they are minute and spirally developed. The two species resemble one another also in the distribution of the space below the shoulder and the region below the peripheral cord; in both cases the upper region is twice as large as the lower region, but these two regions are covered in thin axial ribs only in *S. aff.* a*mabilis*; in *L. pourtalesi,* there are only spiral ornaments.

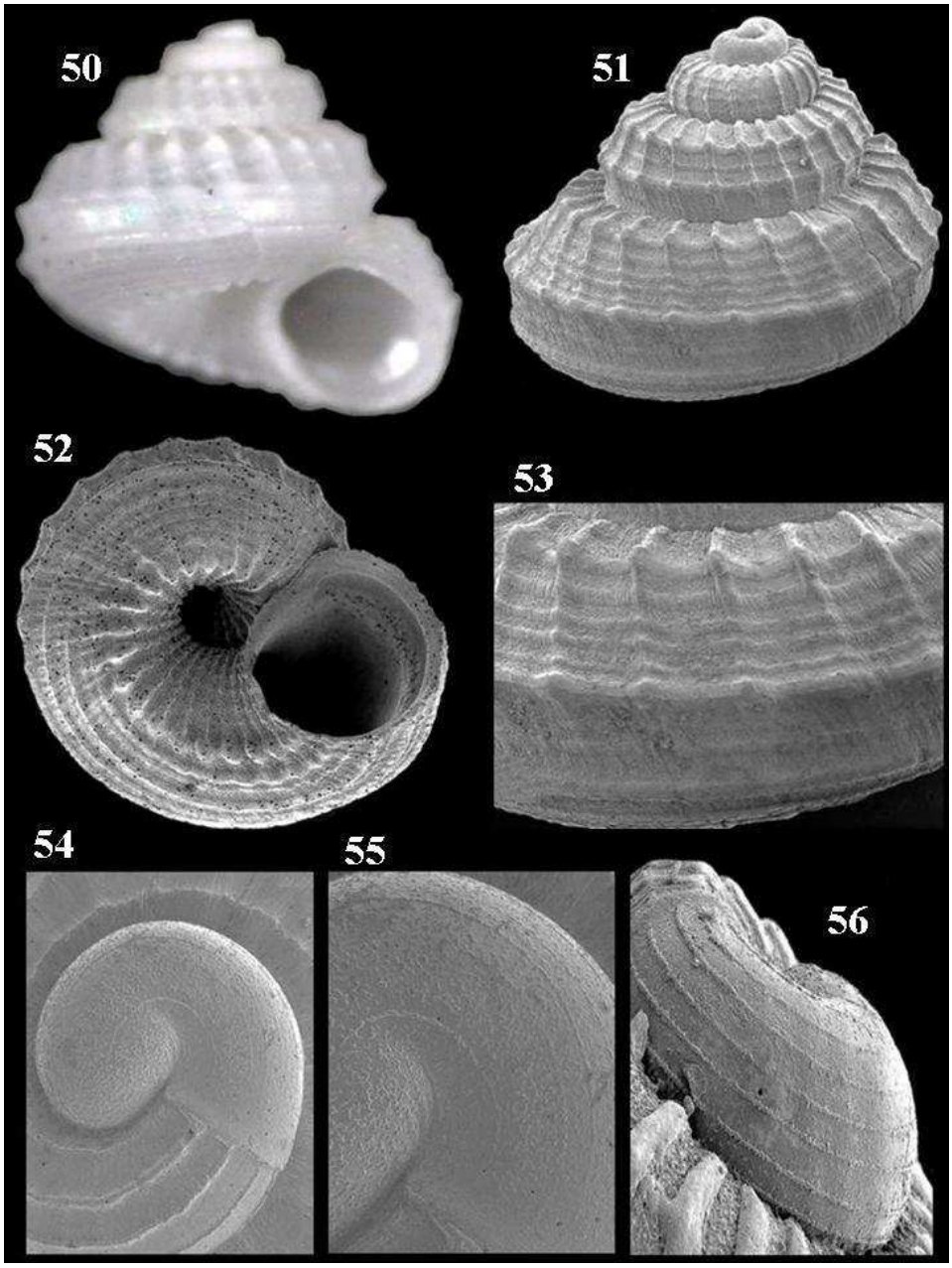
Geographic distribution: Florida (eastern); Yucatan Straights; Cuba (North of Havana, North of Matanzas); Antilles Sea; Northeast Brazil (this study).

Bathymetry: 293 to 2276 meters.



Figures 43 – 49. *Lamellitrochus pourtalesi,* 7.5 x 6.5 mm: 43, ventral view; 44, dorsal view; 45, anterior view; 46, aperture; SEM: 47, protoconch with transition area, 180x; 48, microesculpture of protoconch, 1000x; 49, ornament of body whorl , 160x

Lamellitrochus carinatus Quinn, 1991
(Figures 50 - 56)
References: Quinn, 1991, p. 84-85, figs. 7-12.
Type material: Holotype, DMNH nº. 179393.
Type location: SW of Egmont Key, Florida, 366-421 m.
Material examined: Lt = 2.1 mm , Wt = 2.8mm, La = 0.8 mm, Wa = 0.9 mm, Wp = 0.2 mm, Wu = 0.7 mm, 3 ¾ whorls. ANSP n. 413515: [03], Dredging 24, 04°51'40'' S, 35°08'01'' W, 24.11.01, CE, Brazil, 384 m; LMUFRPE n. 509: [10], Dredging 29, 06°13'22'' S, 34°52'20'' W, RN, Brazil, 26.11.01, 223 m; MHNC n. 64512: [02], Dredging 28, 06°13'39'' S, 34°51'37'' W, RN, Brazil, 26.11.01, 340 m; MNRJ n. 10585: [05], Dredging 04, 08°42,1'00'' S, 34°44,1'00'' W, PE, Brazil, 25.03.00, 465 m; MZUSP n. 77074: [10], Dredging 07, 11°35,5' S, 37°12,3' W, Sergipe (SE), Brazil, 30.X.00, 510 m; [05], Dredging 18, 02°05' S, 41°05' W, 30.X.2001, Ceará (CE) – Piauí, Brazil, 390 m.
Remarks: Shell very small, dimensions: 2.1 mm x 2.8 mm, conical, flattened, 3 ¾ whorls. Protoconch microscopic (0.26 mm), white, smooth, 1 whorl; with nucleus partially immersed. The axial ribs emerge at the suture next to the protoconch and terminate at the suture below. 1st whorl of the teleoconch strongly ornamented by raised axial ribs that predominate in relation to the 2 obscure spiral cords. 2nd whorl with the shoulder and peripheral cord more evident, with the presence of a cord above and below the peripheral cord, the one below may be absent. Formation of stronger pustules on this whorl and the following whorls. The presence of 1-4 weak spiral threads between the shoulder and the peripheral cord and 0-2 weak spiral threads between the peripheral and basal cords. Body whorl inflated, with convex contour or angular whorl, ornamented by raised, slightly prosocline axial ribs that emerge from the suture and extend abapically to near the basal cord, becoming thinner and inconspicuous after the peripheral cord. Suture a bit constricted; region below the suture ornamented solely by the dorsal portion of the axial ribs or with the presence of a spiral cord that is weaker than the shoulder, dividing the pustules in this region through the middle. Presence of either weak or very strong nodules in this region of the shoulder. Platform below the suture either very narrow or as broad as the region below the shoulder. Peripheral cord strong, undulated and ornamented either by weak or strong tubercles aligned spirally Basal cord entirely smooth. Base
slightly convex, with 4-7 spiral cords between the basal cord and the circumbilical cord; circumbilical cord strongly tuberculate with tubercles that are either raised and strong or low and weak. Intaumbilical region ornamented by axial cords crossed by 4-8 fine spiral threads coinciding with the tubercles of the circumbilical cord; umbilicus broad, corresponding to 36 % of the maximum width. Aperture rounded. Inner lip concave, slightly reflected. Outer lip fine and with an inner thickening sheltering its internal part.
Geographic distribution: North Carolina, Florida, Cuba, Porto Rico, Antigua and Barbados; Trinidad Island and Northeast Brazil (this study).
Bathymetry: 100 to 200 meters.
Comments: *Lamellitrochus carinatus* Quinn, 1991 is the most distinct species of Lamellitrochus described untill the present, showing affinities with the genus *Brookula* Iredale, 1912, especially with regard to the conical-flattened shape of the teleoconch and the strong, ribbed, reticulated pattern. However, the species of *Lamellitrochus* are easily separated from this genus for having evident cords and shoulder, constituting strong spiral ornamentation in relation to axial ornamentation. The Brazilian forms are generally smaller than those of the Type material, occasionally presenting a reduced number of spiral ornaments, from 1-4 weak spiral threads in the region below the shoulder (1-7 threads in the Holotype) and 0-2 weak spiral threads in the region below the peripheral cord (0-4 spiral threads in the Holotype). The base is weakly convex in both forms, but the intraumbilical region is adorned by 4-8 fine spiral threads (1- 7 in the Holotype) crossed by axial cords.



Figures 50 - 56. *Lamellitrochus carinatus*, 2.1 x 2.8 mm: 50, ventral view; SEM: 51, dorsal view; 52, anterior view; 53, axial and spiral ornament of body whorl, 100x.54, protoconch, 180x; 55, ornament of nucleous, 370x; 56, dorsal view of protoconch, 350x

Key for *Solariella* and *Lamellitrochus*:

1- Adult shells small to medium sized, deeply umbilicate, conical, conical-globose and conical-turbinate, with strong spiral and secondary axial ornamentation; base convex or flattened, with smooth intraumbilical region and never strongly reticulated _____2

1´- Adult shells of microscopic size, with broad umbilicus, conical-flattened shape, base slightly convex; with strongly reticulated intraumbilical region _____ *Lamellitrochus carinatus*.

2- Base strongly flattened or conical, with rounded aperture, body whorl with strong spiral ornamentation and secondary or equally strong axial ornamentation, forming pustules _____3

2´- Shell conical-globose, base conical and strongly convex, body whorl inflated and smooth, ornamented by a tuberculate subsutural spiral cord _____*Solariella lubrica*

3- Region below the shoulder smooth or ornamented spirally and/or axially, equal to or greater in size than the region below the peripheral cord, umbilicus broad, with spiral ornamentation, basal ornamentation present, first post-embryonic whorl without axial cords _____4

3´- Area below the shoulder with smooth appearance or with up to five spiral threads, approximately equal in size to the area below the peripheral cord, tubercles rounded and axial, umbilicus broad, smooth and deep, obscure basal threads, first post-embryonic whorl with axial cords _____*Lamellitrochus inceratus*

4- Area below the shoulder with smooth appearance, broader than the area below the peripheral cord, umbilicus broad, with an intraumbilical spiral cord, first post-embryonic whorl with strong spiral ornamentation _____*Lamellitrochus pourtalesi*

4´- Area below the shoulder spirally and axially ornamented, umbilicus broad and deep or narrow and deep, with various inner spiral threads, first post-embryonic whorl with fine growth threads and spiral ornamentation _____5

5- Region below the shoulder broader than the area below the peripheral cord, thin secondary cord, circumbilical cord strongly tuberculate, shoulder nodular and axial ribs on the body whorl _____*Solariella amabilis*

5´- Region below the shoulder broader than the area below the peripheral cord, with a weaker secondary cord that can be absent, circumbilical cord smooth or with weak nodules _____6

Base conical, slightly convex, with 10 to 12 weak spiral cords, the innermost weak and the circumbilical cord weakly nodular, forming a periumbilical spiral groove _____*Solariella quinni* sp n.

6´- Base conical, strongly convex, with strong spiral cords ranging from three to five and a strongly tuberculate circumbilical cord forming a groove, umbilicus broad, convex walls, with four to six strong spiral cords, weakly tuberculate___7

7- Umbilicus broad, with convex walls, four to six strong spiral cords, weakly tuberculate, base with three to four strong, raised cords, circumbilical cord tuberculate _____*Solariella quadricincta*

7´- Umbilicus medium-sized, internally constricted, convex walls, with five to seven strong spiral cords, base with four to five strong spiral cords, circumbilical cord with strong axial nodules _____*Solariella carvalhoi*

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