



New data on the Caribbean Triphoridae (Caenogastropoda, Triphoroidea) with the description of 26 new species

Nuevos datos sobre los Triphoridae (Caenogastropoda, Triphoroidea) del Caribe, con la descripción de 26 nuevas especies

Emilio ROLÁN* and Raúl FERNÁNDEZ-GARCÉS**

Recibido el 24-IX-2007. Aceptado el 31-III-2008

ABSTRACT

In the present work 68 taxa of the family Triphoridae from the Caribbean and adjacent areas are studied. Comments are also provided on one invalid taxon and on another that has been erroneously reported from this area. Among these, 30 were previously known species and 26 are described as new (*Metaxia propinqua*, *M. propria*, *M. prompta*, *Isotriphora guanahacabibes*, *Eutriphora auffenbergi*, *Marshallora ostenta*, *Marshallora apexdiversus*, *Inella pseudolongissima*, *I. noduloides*, *I. apexbilitata*, *I. harryleei*, *I. undebermuda*, *I. pseudotortricula*, *I. differens*, *I. slapcinskyi*, *I. faberi*, *Sagenotriphora candidula*, "*T.*" *inaudita*, "*T.*" *pseudonovem*, "*T.*" *yociusi*, "*T.*" *guadaloupensis*, "*T.*" *amicorum*, "*T.*" *turtlebayensis*, "*T.*" *grenadensis*, "*T.*" *abacoensis* and "*T.*" *portoricensis*). Twelve species remain unnamed or are tentatively identified, due to scarcity or inadequacy of available material, or doubtful specific assignment. New information is reported for *Monophorus olivaceus* (Dall, 1889) and *Sagenotriphora osclausum* (Rolán and Fernández-Garcés, 1995) already treated in previous works.

Lectotypes are designated and figured for the following species *Inella bigemma* (Watson, 1880), *Inella inflata* (Watson, 1880), *Inella longissima* (Dall, 1881), *Inella triserialis* (Dall, 1881), *Inella intermedia* (Dall, 1881), *Inella ibex* (Dall, 1881), *Inella tortricula* (Dall, 1881), *Inella colon* (Dall, 1881), *Inella compsa* (Dall, 1927), *Inella enopla* (Dall, 1927), *Inella meteora* (Dall, 1927), *Inella pompona* (Dall, 1927), *Inella dinea* (Dall, 1927), *Inella sentoma* (Dall, 1927), *Inella gaesona* (Dall, 1927), "*Triphora*" *cylindrella* (Dall, 1927), "*Triphora*" *abrupta* (Dall, 1881), "*Triphora*" *caracca* (Dall, 1927), "*Triphora*" *georgiana* (Dall, 1927), "*Triphora*" *indigena* (Dall, 1927), "*Triphora*" *lilacina* (Dall, 1889), "*Triphora*" *pyrrha* (Henderson and Bartsch, 1914), *Triphora atlantica* (E. A. Smith, 1890) and for the western Atlantic species *Triphora aspera* (Jeffreys, 1885).

A list of the names employed for Caribbean species of Triphoridae is given, mentioning mistakes and synonymies.

RESUMEN

En el presente trabajo se estudian 68 taxones de la familia Triphoridae del Caribe y aguas próximas. También se aporta información sobre un taxon que carece de validez y otro erróneamente mencionado para el área. Entre ellos, 30 corresponden a especies previamente conocidas, 26 se describen como nuevas para la ciencia (*Metaxia propinqua*, *M. propria*, *M. prompta*, *Isotriphora guanahacabibes*, *Eutriphora auffenbergi*, *Marshallora ostenta*, *Marshallora apexdiversus*, *Inella pseudolongissima*, *I. noduloides*, *I. apexbilitata*, *I. harryleei*, *I.*

* Museo de Historia Natural, Campus Universitario Sur, 15782, Santiago de Compostela, Spain

** Centro de Estudios Ambientales de Cienfuegos (CEAC), Grupo de Gestión Ambiental (GGA), calle 17, esquina Ave. 46, Cienfuegos, Cuba.

undebermuda, *I. pseudotortricula*, *I. differens*, *I. slapcinskyi*, *I. faberi*, *Sagenotriphora candidula*, "*T.*" *inaudita*, "*T.*" *pseudonovem*, "*T.*" *yociusi*, "*T.*" *guadaloupensis*, "*T.*" *amicorum*, "*T.*" *turtlebayensis*, "*T.*" *grenadensis*, "*T.*" *abacoensis* y "*T.*" *portoricensis*) y a 12 de ellas no se les asigna un nombre definitivo debido a la escasez del material, o al mal estado del mismo, y también a la existencia de dudas sobre su determinación. Además, se aporta nueva información sobre *Monophorus olivaceus* (Dall, 1889) y *Sagenotriphora osclausum* (Rolán y Fernández-Garcés, 1995), especies ya citadas en trabajos previos.

Se designan y figuran lectotipos de las siguientes especies: *Inella bigemma* (Watson, 1880), *Inella inflata* (Watson, 1880), *Inella longissima* (Dall, 1881), *Inella triserialis* (Dall, 1881), *Inella intermedia* (Dall, 1881), *Inella ibex* (Dall, 1881), *Inella tortricula* (Dall, 1881), *Inella colon* (Dall, 1881), *Inella compsa* (Dall, 1927), *Inella enopla* (Dall, 1927), *Inella meteora* (Dall, 1927), *Inella pompona* (Dall, 1927), *Inella dinea* (Dall, 1927), *Inella sentoma* (Dall, 1927), *Inella gaesona* (Dall, 1927), "*Triphora*" *cylindrella* (Dall, 1927), "*Triphora*" *abrupta* (Dall, 1881), "*Triphora*" *caracca* Dall, 1927, "*Triphora*" *georgiana* Dall, 1927, "*Triphora*" *indigena* Dall, 1927, "*Triphora*" *lilacina* (Dall, 1889), "*Triphora*" *pyrrha* Henderson y Bartsch, 1914 y también de la especie atlántica *Triphora aspera* Jeffreys, 1885.

Al final se aporta una lista de los nombres empleados para las especies de Triphoridae del Caribe, señalando los errores habidos y las sinonimias.

KEY WORDS: Triphoridae, Caribbean, new species.

PALABRAS CLAVE: Triphoridae, Caribbean, new species.

INTRODUCTION

Triphoridae J. E. Gray, 1847 is a very diverse family of marine gastropods that occurs world-wide, with about 600 names proposed for the Recent species (MARSHALL, 1983). Triphorids live on rocky substrates from the intertidal fringe to a depth of more than 1000 m. A complete general information on the family Triphoridae is given by MARSHALL (1983) and WELLS (1998), who noted that it is a highly species-rich group, most species being sinistral, with a high spire, numerous whorls, a short to long anterior canal and a posterior apertural notch or canal. The teleoconch sculpture of triphorids is notably variable, and can be beaded, spinose or reticulate, and the shells are small (usually less than 10 mm, although some can be up to 40 mm or more). MARSHALL (1983), in his revision of the Indo-Pacific species, emphasized the importance of the shape and sculpture of the protoconch for taxonomy, and pointed out that "under absolutely no circumstances should further new

species be proposed unless a complete, unworn protoconch can be illustrated".

The family has its maximum diversity in the tropical Indo-Pacific where, according to MARSHALL (1983), there are more than 1000 species. An impression of the wealth of species in this area is afforded by the 174 species found during an extensive sampling in the coral reef lagoon of Koumac, New Caledonia (BOUCHET *ET AL.*, 2002), Triphoridae being the second richest family of molluscs, after Turridae.

Although notably less diverse than in the Indo-Pacific, this family contains many species in the Atlantic Ocean, poorly known in most areas. BOUCHET AND GUILLEMOT (1978) and BOUCHET (1985, 1997) revised the species of this family occurring in the Mediterranean and neighbouring Atlantic, where CLEMAM data base recognised 19 species in 10 genera. Some additional species were described by FERNÁNDEZ AND ROLÁN (1988, 1993) and VAN DER LINDEN (1998) in the Cape Verde Islands,

and ROLÁN AND PEÑAS (2001) from the Canary Is. and the Mediterranean.

Information on triphorids from many Caribbean areas is contained in a number of works, such as those for Jamaica (C. B. ADAMS, 1850a, 1850b, most species represented in CLENCH AND TURNER, 1950), Virgin Islands (NOWELL-USTICKE, 1959 and 1971), Yucatan Peninsula, Mexico (VOKES AND VOKES, 1983), Puerto Rico and nearby Caribbean areas (WARMKE AND ABBOTT, 1961), Curaçao, Aruba and Bonaire (DE JONG AND COOMANS, 1988), Oceanic Islands off Brazil (LEAL, 1991), Colombian Caribbean (DÍAZ MERLANO AND PUYANA HEGEDUS, 1994), the Atlantic and Gulf coasts and West Indies (MORRIS, 1973), and Brazil (RIOS, 1994). ROLÁN AND FERNÁNDEZ-GARCÉS (1993a, 1993b, 1994 and 1995) and ROLÁN AND ESPINOSA (1994) showed the known species from Cuba and described some new species. Besides, other authors described new species from other Caribbean areas, such as DE JONG AND COOMANS (1988), MOOLENBEEK AND FABER (1989), FABER AND MOOLENBEEK (1991), ROLÁN AND CRÚZ-ÁBREGO (1996) and ROLÁN AND LUQUE (1999). More recently a large new species has been described from Brazil (SIMONE, 2006). Many other species were recorded from deep water, and described by WATSON (1880, 1886), DALL (1881, 1889, 1927) and other authors.

Fossil species were mentioned in OLSSON AND HARBISON (1953).

Colour photographs of 33 species, including most of the known shallow-water species and those described during the last 20 years in previously mentioned papers, are provided in a recent paper (ROLÁN AND FERNÁNDEZ-GARCÉS, 2007) together with a list of names assigned to the Caribbean Triphoridae.

Hence, the present work has the following objectives: 1- To give available information on the deeper water species, showing the type material whenever possible; 2- To provide additional colour photographs of the Caribbean species which were not

figured in our previous work (ROLÁN AND FERNÁNDEZ-GARCÉS, 2007); 3- To supply additional information that has recently been obtained on other species already known from shallow water; 4- To describe some new species which have been collected from shallow water; 5- To present an updated list of all the taxa mentioned for the Caribbean and nearby areas, making corrections to our previous list.

MATERIAL AND METHODS

Some of the species presented here are only known from the type material, loaned by several museums (mentioned in Abbreviations and Acknowledgements), or viewed on photographs, provided by their Curators or other personnel. In the collected material, the collector name and the data of collection were referred when both were known. Besides, material loaned by Harry G. Lee from his collection, mainly from deep water, is included in this study. Finally, a few species were collected by the authors and persons who have cooperated with them. Most of the early described species, some of which had never been figured previously or had only been represented by drawings, are photographed here in colour, and whenever possible these figures include the types and also illustrate intraspecific variability. Some photos taken by Sally Diana Kaicher (found in ANSP) were included.

The order of presentation is basically a grouping based on similarity. It was also the authors' intention to include most of the available information on protoconchs, radulae and opercula, but unfortunately this was only possible with a few species. Most of the type material excluded this possibility, and much of the studied material consisted of shells without soft parts. An attempt has been made also to solve taxonomic problems relevant to some of the studied taxa.

None of Dall's descriptions included a designated holotype, although some

seem to have been based on a single shell. Under these circumstances, Dall's material placed in some museums must be considered as syntypes. After examination of available material from these museums, it was therefore decided to designate as lectotypes the shells that were closest to the original description or the original figure (shown in DALL, 1889).

In the description of shells, the spiral beaded cords are frequently referred to as "spiral 1, 2, 3 etc.", spiral 1 being the subsutural cord on the adapical part of the whorl, with subsequent cords on the teleoconch whorls referred to as spirals 2 and 3, following MARSHALL (1983).

Other important characters in the description are, those of the protoconch, such as the diameter, the shape and size of the nucleus (elevated, depressed, large, small, ...), the number of spiral cords (none, 1 or 2), and the presence or absence of axial ribs. We have followed the method of VERDUIN (1976) for counting the number of whorls of the protoconch. On the teleoconch, the number and size of the spiral cords is noted on the first and last whorls, where they are frequently different. Also noteworthy is the position of spiral 2 (closer to spiral 1, equidistant between spirals 1 and 3) and its size (nodules smaller, elongate, etc.). It is important to point out that the nodules, which are formed by the intersection of spirals and axial ribs, are sometimes simply spherical, while other times they are concave above and convex below; in this case they are crossed by a line that represents the spiral cord and appears to cut the nodule: these are referred to as cut

nodules or nodules that are cut in the middle.

Due to the fact that the radula of most species was unavailable, and as this character is very important for generic assignment, it was necessary in many cases to employ generic names very much in a *sensu lato* as "*Triphora*" or "*Inella*". For generic arrangement we mainly follow the works of LASERON (1958), MARSHALL (1983) and BOUCHET (1985).

Abbreviations:

- AMNH: American Museum of Natural History, New York
ANSP: Academy of Natural Sciences, Philadelphia
BMSM: Bailey-Matthews Shell Museum, Sanibel Is., Florida
FLMNH: Florida Museum of Natural History, Gainesville, Florida
IES: Instituto de Ecología y Sistemática, La Habana
MCZ: Museum of Comparative Zoology, Cambridge
MHNS: Museo de Historia Natural, Santiago de Compostela
MNCN: Museo Nacional de Ciencias Naturales, Madrid
USNM: United States National Museum, Washington
CCR: collection of Colin Redfern
CHL: collection of Harry G. Lee
CFG: collection of Raúl Fernández-Garcés
CMK: collection of Marlo Krisberg
sp: specimen with soft parts
s: shell
j: juvenile
f: fragment

RESULTS

I. TAXONOMIC PART

Family TRIPHORIDAE Gray, 1847
Subfamily METAXIINAE Marshall, 1977
Genus *Metaxia* Monterosato, 1884

Type species: *Cerithium rugulosum* C. B. Adams, 1850. According to MARSHALL (1983), this subfamily is formed by dextral triphorids.

Metaxia propinqua spec. nov. Rolán and Fernández-Garcés (Figs. 1C-H)

Type material: Holotype (Figs. 1C, 1D) in FLMNH (154988). Paratypes: 4 s, Louisiana, 27.98568° N 92.6472° W, 65-91 m (FLMNH UF 291348); 5 s, Hillsborough Co., SW Egmont Key, Florida 73-91 m (collector Steger) (FLMNH 238632); 2 s (Figs. 1E, 1F), Palm Beach Co., Florida, off Boynton Inlet, 84-106 m (M. Glockstein, 1980) (FLMNH 47382).

Other material examined: 2 s (with broken protoconch), Louisiana, 27.98568° N, 92.6472° W, 65-91 m (FLMNH UF 291348); 4 s (protoconch lost or eroded), Hillsborough Co., SW Egmont Key, Florida 73-91 m (Steger) (FLMNH 238632); 1 s (protoconch eroded), 2 miles off Virginia Key, Florida, 9 m (FLMNH UF 365086); 1 s (protoconch eroded) (FLMNH).

Type locality: Florida, Monroe Co, WNW Dry Tortugas, 76 m.

Etymology: The specific name derives from the Latin word *propinquus* -a -um which means "close, similar", alluding to the similarity with other species of this genus.

Description: Shell conical, very elongate, relatively solid. Protoconch (Figs. 1G, 1H) white, paucispiral, with a little more than two whorls and about 300 µm in diameter; several spiral threads begin at the apex. These are well defined, a little irregular, four on the first whorl decreasing to two on the second, where numerous axial ribs run from the suture to the upper thread. The teleoconch can be white or light brown. Four spiral cords are present from the beginning, with the subsutural upper one less prominent than the other three. Axial ribs are present on the entire shell, about 10-11 on the first whorls and eighteen on the final one. Suture depressed with a very small spiral thread above. On the base, the profile is slightly concave and one additional cord is present. Aperture

almost round with an open and short siphonal canal.

Dimensions: The holotype measures 6.3 mm.

Distribution: Known from Florida and Louisiana, USA.

Remarks: In order to facilitate comparison of the protoconchs of the *Metaxia* species mentioned here, they have all been presented together in Figure 3.

M. rugulosa has a protoconch (Figs. 3A-3D) with 2 1/2 whorls (see ROLÁN AND REDFERN, 1996), sometimes reaching three whorls, with a spiral sculpture on the first whorl formed by undulating or zigzagging lines; the second protoconch whorl has axial ribs which terminate at a single spiral thread (only exceptionally double); the teleoconch is white. *M. excelsa* and *M. taeniolata* have multispiral protoconchs.

Metaxia propria spec. nov. Rolán and Fernández-Garcés (Figs. 2A-C)

Type material: Holotype (Figs. 2A, 2B) in FLMNH (UF 393603).

Type locality: Florida, Key Largo, 228 m.

Etymology: The specific name derives from the Latin word *proprius* -a -um which means "special, characteristic", alluding to the differential characters of the protoconch that distinguish it from other species of this genus.

Description: Shell conical, very elongate, relatively solid. Protoconch white (Fig. 2C) with a little more than 2 3/4 whorls and about 400 µm in diameter; two well defined spiral cords are crossed by 13-15 axial ribs per whorl which are continuous with those of the subsequent whorl. Teleoconch white. Four spiral cords are present from the beginning, the subsutural upper one being less promi-

nent than the other three. Axial ribs present on the entire shell, with about 10-11 on the first whorls and 13 on the final one. Suture depressed with a very small spiral thread above. On the base, the profile is slightly concave and one additional cord is present. Aperture almost round, with an open siphonal canal.

Dimensions: The holotype measures 5.9 mm.

Distribution: Only known from Florida.

Remarks: Characters of the protoconch provide the main differences between this species and those previously known:

M. rugulosa has a protoconch (Figs. 3A-3D) with 2 1/2 whorls, sometimes reaching 3, with a spiral sculpture on

the first whorl formed by undulating or zigzagging lines; the second protoconch whorl has axial ribs which terminate at a single spiral thread (only exceptionally double).

M. propinqua spec. nov. lacks axial ribs on the first whorl, and they reach only to the upper spiral cord on the second whorl.

Metaxia prompta spec. nov. Rolán and Fernández-Garcés (Figs. 2D-J)

Type material: Holotype (Figs. 2D, 2E) and 2 paratypes (Figs. 2G, 2I) (FLMNH UF 359136).

Type locality: Bermuda, Hamilton Parish, Shelly Bay.

Etymology: The specific name derives from the Latin word *promptus* -a -um which means "evident, available", alluding to the characters of the protoconch that are different from other species of this genus.

Description: Shell conical, very elongate, relatively solid. Protoconch (Figs. 2F, 2H, 2J) white, paucispiral with about 2 1/2 whorls and between 300 and 400 μ m in diameter; a single spiral cord is poorly defined on the first whorl and a little stronger on the second. The axial ribs are numerous but not continuous; they descend from the upper suture and almost disappear just before reaching the spiral cord, reappearing and strengthening on the cord before fading again towards the lower suture. Teleoconch white or light brown. Four spiral cords are present from the beginning, the sub-sutural upper one being less prominent than the other three. Axial ribs are present on the entire shell, varying in number on the early whorls and increasing to about 18 on the final one. Suture depressed with a very small spiral thread above. On the base, the profile is slightly concave. Aperture almost round with an open siphonal canal.

Dimensions: The holotype measures 4.1 mm.

Distribution: Only known from Bermuda Archipelago.

Remarks: Characters of the protoconch easily differentiate this species from related ones:

M. rugulosa has more rounded whorls with zigzagging spiral lines on the first whorl and numerous axial ribs on the second, which only reach the middle of the whorl.

M. espinosai has more angulate, wider whorls, with prominent elongate nodules and is always milky white.

M. propinqua has rounded whorls, with straight spiral cords beginning at the apex and two cords on the second whorl, with axial ribs absent from the lower half of the whorl.

M. propria has almost three whorls, rounded with two spiral cords and with a few widely separated and prominent axial ribs on the first whorls.

Metaxia sp. 1 (Figs. 1A-B)

Material examined: 1 s, Barbados, 183 m (USNM, labeled "*Cerithiopsis abrupta* Watson, 1880").

Remarks: The shell from Barbados in USNM (without any type label) has a paucispiral protoconch of 450 μ m in diameter, differing from *M. abrupta* (Watson, 1880), which has a proto-

conch that is more depressed and also has axial ribs (figured in BOUCHET, 1985).

Dimensions: The shell studied measures 5.0 mm.

BOUCHET (1985) was unable to confirm the existence of *M. abrupta* in the western Atlantic. Probably this species is endemic to the Azores Archipelago. The species studied here could be the one referred to by DALL (1889) as *Cerithiopsis abruptus* (Fig. 36L), but we are not sure.

This species is different from the other two Caribbean species with paucispiral protoconch: *M. espinosai* (described by ROLÁN AND FERNÁNDEZ-GARCÉS, 1993a) has a paucispiral protoconch (Fig. 3E) with a prominent nodulous keeled border; and *M. rugulosa* (C. B. Adams, 1850), which has a narrower protoconch (Figs. 3A-3D) with a different sculpture (ROLÁN AND REDFERN, 1996). However, it must be pointed out here that the protoconch of the taxon *M. rugulosa* is not known, as the apex is missing from the holotype of this

species, represented in CLENCH AND TURNER (1950). Another fragment in BMNH with the label "figured specimen" had no protoconch.

In several works it has been assumed that the protoconchs from Cuba and the Bahamas figured in ROLÁN AND REDFERN (1996) represent the protoconchs of *M. rugulosa*, probably due to the proximity of Cuba to Jamaica, which is the type locality. Similar protoconchs were figured in REDFERN (2001).

The other two known species of Caribbean *Metaxia* (*M. excelsa* and *M. taeniolata*) have multispiral protoconchs.

The present species is probably unknown and unnamed, but as only one shell has been examined, and its protoconch is not in very good condition, it is kept unnamed pending the availability of more material in the future.

Subfamily TRIPHORINAE Gray, 1847
Genus *Monophorus* Granata-Grillo, 1877

Type species (by monotypy): *Trochus perversus* Linnaeus, 1758. Recent, Mediterranean.

Remarks: The main characters (shown in MARSHALL, 1983, BOUCHET, 1985 and ROLÁN AND FERNÁNDEZ-GARCÉS, 1994) are the following: multispiral protoconch, teleoconch whorls flat-sided or shallowly

convex, well defined spiral cords and axial ribs, nodular intersections and a typical radula with central tooth with 3-5 cusps, lateral with 5-6 and numerous marginals with only 2-3 short cusps.

Monophorus olivaceus (Dall, 1889) (Figs. 4B-F, 4H-K)

Triforis decorata var. *olivacea* Dall, 1889. *Bull. M. C. Z.*, 18: 243. [Type locality: Gulf of Mexico, west of Florida, 91 m, Key West, Hemphill].

Triphora ornata auct. non Deshayes (1832).

Type material: One syntype, fragment of 10 mm, here designated as lectotype (Figs. 4C, 4D) (MCZ 7379).

Other material examined: Mexico: 1 s, Cancun, Quintana Roo (Heilman, March, 1963) (ANSP 285517). Florida: 3 s, WSW of John's Pass, 50 m (Steger, 1956) (ANSP 306254); 1 s, Palm Beach Co., Bath and Tennis (McGinty coll./Apr. 1951), 36-55 m (FLMNH 176649); 4 s, Collier Co., SW of Naples, 26 20' N (Powlus/Aug., 1960), 55 m (FLMNH 158202); 9 s, Palm Beach Co., off Palm Beach, 100 m (FLMNH 154886); 3 s, Palm Beach, WOE Radio Towers to Bath and Tennis (McGinty, May/1951) 36-55 m (FLMNH 250132); 1 s, Palm Beach Co., (R/V Triton, Apr. 1950) 40-50 m (FLMNH 204877); 1 s, off Marathon (M. and S. Snyder, Jul. 1966) (ANSP 309744). Bahamas: 1 s, reef NE of North Point, Elbow (Little Guana) Cay, Abaco (Robertson, Aug. 1955) (ANSP 298409); 4 s, Grand Bahama Island, 26° 31' 00" N, 78° 46' 30" W (J.N. Worsfold) (ANSP 373939); 1 s, Grand Bahama Island, 26° 29' 45" N, 78° 37' 15" W (G. Taylor and D. Nilsen) (ANSP 273605); 2 s, Tamarind, Grand Bahama Island 26° 30' 45" N, 78° 36' 00" W (J. Worsfold) (ANSP 368896); 1 s, Bootle Bay, Grand Bahama Island 26°

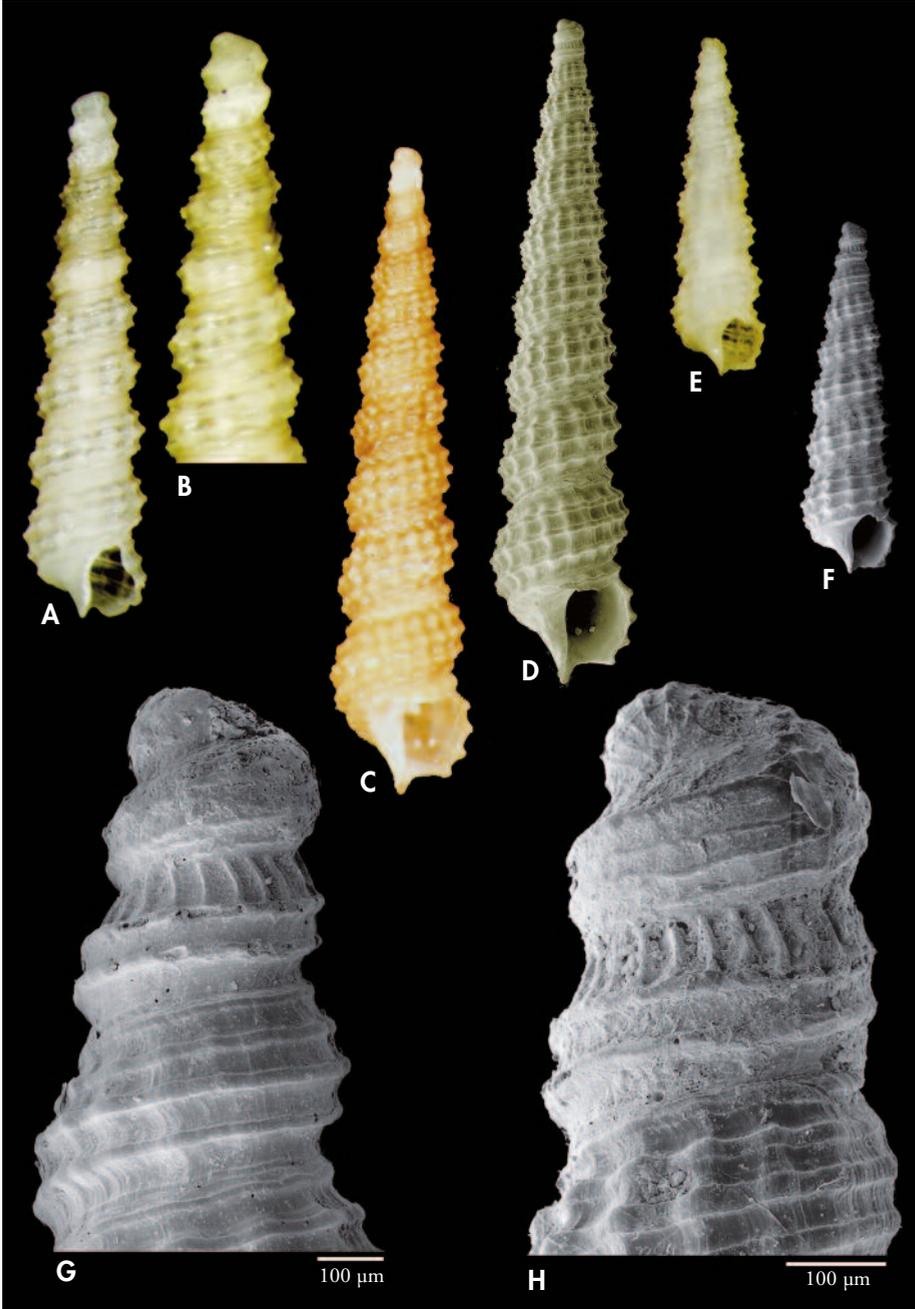


Figure 1. A, B. *Metaxia* sp. 1. A: shell, 5 mm, Barbados, 183 m (USNM); B: protoconch. C-H. *Metaxia propinqua* spec. nov. C, D: holotype, 6.3 mm (FLMNH); E, F: paratype, 3.4 mm (FLMNH); G: protoconch of the paratype; H: detail of the protoconch of the holotype.

Figura 1. A, B. *Metaxia* sp. 1. A: concha, 5 mm, Barbados, 183 m (USNM); B: protoconcha. C-H. *Metaxia propinqua* spec. nov. C, D: holotipo, 6,3 mm (FLMNH); E, F: paratipo, 3,4 mm (FLMNH); G: protoconcha del paratipo; H: detalle de la protoconcha del holotipo.

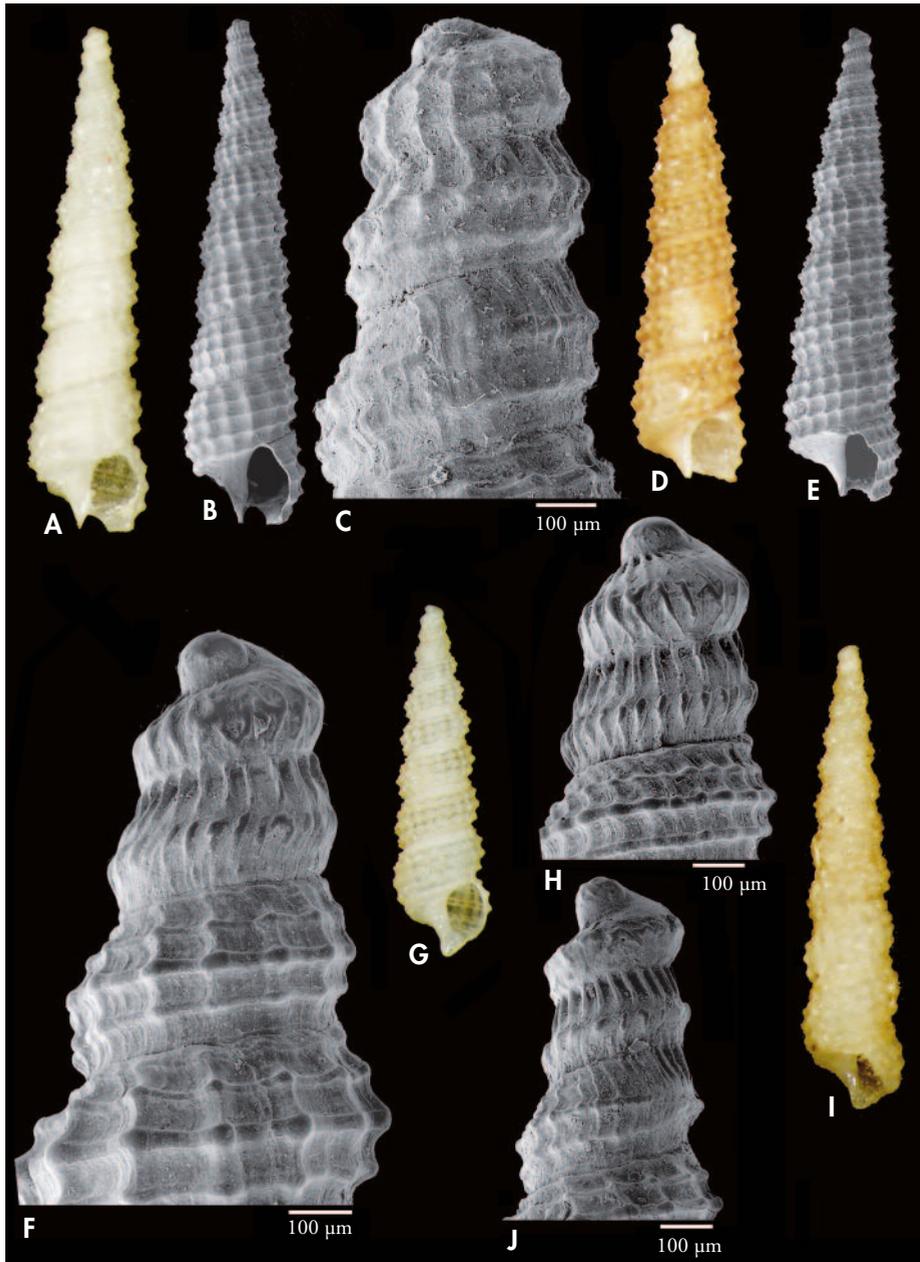


Figure 2. A-C. *Metaxia propria* spec. nov. A, B: holotype, 5.9 mm (FLMNH); C: protoconch of the holotype. D-E: *Metaxia prompta* spec. nov. D, E: holotype, 4.1 mm (FLMNH); F, G: protoconch and shell of paratype, 3.3 mm (FLMNH); H, I: protoconch and shell of paratype, 4.0 mm (FLMNH); J: protoconch of holotype.

Figura 2. A-C. Metaxia propria spec. nov. A, B: holotipo, 5,9 mm (FLMNH); C: protoconcha del holotipo. D-J. *Metaxia prompta* spec. nov. D, E: holotipo, 4,1 mm (FLMNH); F, G: protoconcha y concha de un paratipo, 3,3 mm (FLMNH); H, I: protoconcha y concha de un paratipo, 4,0 mm (FLMNH); J: protoconcha del holotipo.

39° 30' N, 78° 57' 00" W (J. Worsfold) 80 m (ANSP 371846); 1 s, Schooner Cays, NW of Powell Point, Eleuthera 24° 56' 45" N 76° 25' 00" (R. Robertson) (ANSP 363405); 3 s (G. Buchanan) (BMNH 90.11.24.428-34). Venezuela: 4 s, distrito Federal (Berthier, 1935) (ANSP 264204). Grenada: 1 s, mouth of St. George Harbour (Ostheimer, Jan. 1964) 44-66 m (ANSP 297306). Virgin Islands: 3 s, St. Croix (R.E. Griffith) (ANSP 18201). Dutch Antilles: 5 s, (Gray coll.) Saint Vincent (BMNH). No exact locality: 3 s (McAndrew coll.) (BMNH Acc n° 1563); 2 s (R. Sykes coll.) (BMNH acc. n° 1825).

Description: See DALL (1889). It is important to point out some characters: the large size of the beads, spiral 2 being absent from the early whorls and smaller on most of the shell, the colour forming blotches, predominantly on spirals 1 and 2. Spiral 3 is white, but the cord between the beads is usually dark.

Dimensions: The lectotype measures 10 mm.

Distribution: Known throughout the Caribbean.

Remarks: There is considerable confusion regarding this taxon: the species was referred to as *Triphora ornata* by many authors (WARMKE AND ABBOTT, 1961; MORRIS, 1973; RIOS, 1994) until MOOLENBEEK AND FABER (1991) showed the correct name to be *M. olivaceus* (Dall, 1889). The type material of *Triphora ornata* was examined by Faber (pers. comm.) in 1983 from MNHN (Ecole des Mines collection where the Deshayes types should have been). This lot consists of several poor shells, none of which matches the Caribbean species, and one of them in better condition corresponds to a Red Sea species.

The only known type specimen of *Triforis decorata* var. *olivacea* is an atypical and faded shell. It can be confused with some species with axial colour blotches: *Latitriphora albida* (Fig. 4A) has very characteristic smaller nodules, and no confusion is possible; *Nototriphora decorata* may be more similar and requires careful comparison. We have compared

a typical shell of *Nototriphora decorata* (Fig. 4G) with representative shells of *M. olivaceus* (Figs. 4D-F) and with the lectotype of the latter species (Figs. 4B, C). It can be seen that the early whorls of *N. decorata* are narrower than those of the type of *M. olivaceus* and have smaller nodules, whereas the early whorls of representative *M. olivaceus* are very similar to those of the type specimen. As it is necessary for nomenclatural stability to designate a lectotype, we propose as such the only known syntype.

The species *M. olivaceus* is very variable, with large, wide shells sometimes found in the same population as small, narrow ones. Also, the dark colour may vary from almost black to light brown and can be variably distributed, but it is always present on spiral 1 and on a few nodules of spiral 2.

Examination of a shell from Florida (Figs. 4H-4J) revealed a dark subsutural spiral and a dark base. It appeared slightly different from average examples of *M. olivaceus* (like Fig. 4K), as the colour is not only darker but is also slightly differently distributed; spiral 1 has only isolated white beads and the brown color does not form blotches, spiral 2 is mostly white and spiral 3 is totally white, without any brown colour between the beads. Also the beads on spiral 2 become comparatively larger several whorls before the final whorl. However, it is considered to be only a variety.

Genus *Isotriphora* Cotton and Godfrey, 1931

Type species (by original description) *Triforis tasmanica* T. Wood, 1875. Recent, South Australia, Tasmania.

Description: The most important character of this genus is the paucispiral protoconch with nodular spiral cords,

close to that of the genus *Eutriphora* Cotton and Godfrey, 1931, but the latter has axial riblets. Operculum multispiral.

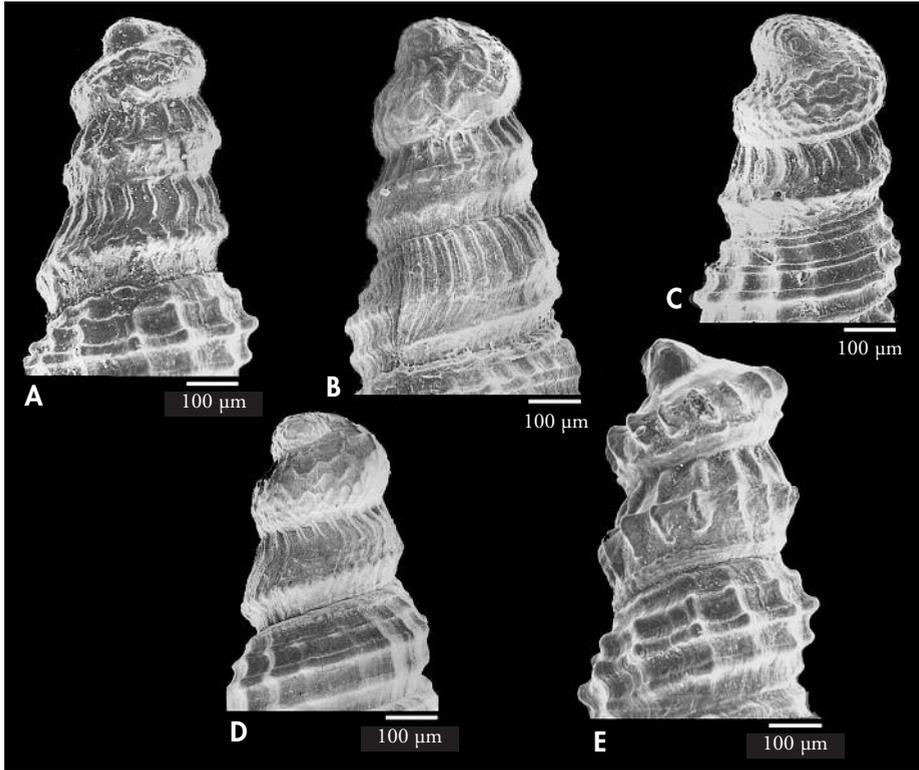


Figure 3. Protoconchs of *Metaxia* species. A-D. *M. rugulosa* (C. B. Adams, 1850) from Cuba (A) and Bahamas (B-D). E. *M. espinosai* Rolán and Fernández-Garcés, 1993, Cuba.

Figura 3. Protoconchas de especies de *Metaxia*. A-D. *M. rugulosa* (C. B. Adams, 1850) de Cuba (A) y Bahamas (B-D). E. *M. espinosai* Rolán y Fernández-Garcés, 1993, Cuba.

Isotriphora guanahacabibes spec. nov. Rolán and Fernández-Garcés (Figs. 5A-H)

Type material: Holotype (Fig. 5A) in MNCN (15.05/15.05/47054) and paratypes in the following collections: MHNS, 2 s (Fig. 5B); IES, 1 s (Fig. 5C); CFG (3 s, 8 f), all from the type locality; 1 f and 1 j, from Cienfuegos, Cuba (MHNS); 1 s, outer slope of beach, W of Georgetown, Cayman Is. 100-115 fms (Tyler, Oct. 1964) (ANSP 300623).

Other material examined: 2 f, Cienfuegos Bay, Cuba 40 m; 1 j, S shore of island, 3 miles E of Southwest Point, Cayman Brac Island (ANSP 397055).

Type locality: From sediment at Cueva de Pipo, Maria la Gorda, Guanahacabibes, Pinar del Río, Cuba, at 35 m.

Etymology: The specific name comes from the type locality.

Description: Shell (Figs. 5A-5C) whitish, conical elongate, solid. Protoconch (Figs. 5D-5F) paucispiral with about 300 µm in diameter, the number of whorls not appreciable due to indeterminate separation from the teleoconch.

The protoconch begins with a very narrow nucleus and the following two whorls have two prominent nodular spirals, with another very small one below the suture. Teleoconch with about 10 whorls and with a straight profile; each

whorl with two widely separated nodulous spiral cords (spirals 1 and 3), the lower one more prominent; about the 6th whorls, a small cord (spiral 2) appears closer to spiral 1 (Fig. 5G). Spiral 2 continues onto the subsequent whorls, becoming narrow, undulating and slightly nodulous towards the end. Spiral 2 is always smaller than spiral 1 and 3 and is closer to the one above. On the last two whorls an additional very small, smooth spiral 4 appears at the suture. The aperture is ovoid, the outer lip fine and prominent. Near the end of the final whorl there is a small hole, located close to the apertural border on the upper part of the whorl.

Siphonal canal closed, curving towards the rear. The colour is totally white, but some specimens can have small areas of light brown (Fig. 5C). Under high magnification spiral striae (Fig. 5H) can be seen between the spirals.

Dimensions: The holotype measures 5.5 x 1.6 mm.

Distribution: Known from the type locality and from the Cayman Islands, down to 183-210 m.

Remarks: This species must be compared with the other congeneric species with a similar protoconch:

Isotriphora peetersae (Moolenbeek and Faber, 1989) is dark brown, except for the protoconch and first whorls of the teleoconch, and the shell is more obese and with fewer whorls. Furthermore, the anal sinus is at the end of the spire and is not closed.

Isotriphora taenialba Rolán and Espinosa, 1994, is similar to *I. peetersae* but a little larger, and always has dark and lighter bands of colour; also the anal sinus is open at the end of the spire.

At first sight it might be confused with species of the genus *Iniforis* Jousseaume, 1884 such as *I. immaculata*, which is totally white, but that species has a protoconch with only one smooth fine cord.

Genus *Eutriphora* Cotton and Godfrey, 1931

Type species (o. d.): *Triphora cana* Verco, 1909, Recent, Australia.

Description: After MARSHALL (1983), similar to the genus *Isotriphora* but with multispiral protoconch with axial riblets. Radula with the rachidian tooth

having three cusps, lateral teeth with 4-5 and numerous marginal teeth with an elongate central cusp. Operculum paucispiral.

Eutriphora auffenbergi spec. nov. Rolán and Lee (Figs. 6A-I)

Type material: Holotype (Figs. 6A-6B) in FLMNH. Paratypes: 1 s (Fig. 6C) (BMSM); 1 s (USNM); 1 s (CHL), all from type locality and ex CHL. Other paratypes: 3 s, 1 j, off Egmont Key, Hillsborough Co., Florida, 76 m (Jim Moore / *Cavalier*, 1962) (CHL); 1 j, 65 miles E St. Augustine, St. Johns Co., Florida (T. Yocius, Jun. 1972), 54 m (CHL); 1 j, 32 miles E St. Augustine, St. Johns Co., Florida (T. Yocius, Jun. 1981), 30 m (CHL); 4 s (Fig. 6D), Florida, (MCZ 356088); 1 s (Fig. 6E), Florida, 5 m (MCZ 356096); 1 s, Hillsborough Co., W of Egmont Key, Florida, 274 m (FLMNH 169703); 1 sp, Palm Beach Co., E of Palm Beach, Florida, 183-578 m (FLMNH 257207).

Other material examined (in bad condition): 1 s, 10 f, Pinellas Co., WSW John's Pass, Florida, (D. Steger) 68 m (FLMNH 238662).

Type locality: West of Dry Tortugas, Monroe Co., Florida, USA (Jim Moore / *Cavalier*, 1972), 90 m.

Etymology: The species is named after Kurt Auffenberg, former Collections Manager in Malacology, Florida Museum of Natural History, USA.

Description: Shell (Figs. 6A-6E) sharp-pointed, elongate, solid, brown or light brown. Protoconch (Fig. 6G) multi-

spiral, with about 4 whorls, the surface of the apex with small tubercles and the subsequent whorls with two small

spiral cords crossed by numerous fine axial ribs that have a slight S-shaped curve. Teleoconch with about 17-18 whorls in large specimens, beginning with spirals 1 and 3, crossed by prosocline axial ribs which form small nodules at the intersection points. On whorls 4-5, spiral 2 appears close to spiral 1; on the subsequent whorls, the three spirals are similar in size but spiral 3 is a little more prominent. An additional spiral cord, appearing on about whorls 10-12, is slightly nodulous, always smaller, and is located just below the suture (Fig. 6F). This cord is more evident on the final whorl, where it occurs near the periphery. Below it there are two more smooth spiral cords, the lower one on the base of the siphonal canal (Fig. 6C). Aperture rounded, columella curved, siphonal canal elongate and recurved, closed at its base by an extension of the aperture.

Dimensions: The holotype measures 21.8 mm, with 20 whorls. Other shells are smaller.

Operculum (Fig. 6H): paucispiral, subcircular, yellowish, rather transparent, with the nucleus subcentral.

Radula (Fig. 6I): relatively large, with a formula 16-1-1-1-16, the rachidian tooth having three prominent cusps; the lateral has 5 cusps of which cusps 2 and 4 are smaller. The marginal teeth have a filiform central elongate cusp, with the other two short and similar in size.

Distribution: The species has been found only in Florida.

Remarks: The generic assignment is based on the similarity of the radula, operculum and protoconch to the type species of the genus *Eutriphora*: *E. armillata* (Verco, 1909) from Australia (see MARSHALL, 1983).

The holotype of *E. auffenbergi* spec. nov. resembles the figure of *T. triserialis* in DALL (1889: pl. 20, fig. 6a) (Fig. 36E), but the following characters of the present species are not coincident: the shell is brown and the protoconch also is darker, typically with 4 whorls and with tubercles on the apex; the siphonal canal is elongate. All these characters are dissimilar from Dall's species (see below).

Comparison and differentiation must be made with the following Caribbean species described here:

"*Triphora*" *abrupta* has a shorter shell, with the nodules less spherical, spiral 1 is very small and close to the suture, almost similar to spiral 4, while in *T. auffenbergi* spiral 1 is similar to the other main two.

"*T.*" *georgiana* has a very small spiral 1 which remains reduced on the final whorls, and the protoconch probably has fewer whorls.

"*T.*" *caracca* has two main spirals and between them a very narrow spiral 2; the axial ribs are very prosocline.

"*T.*" *indigena* has a more convex profile to the whorls; the spiral cords are wider and the nodules at the intersection points are very small, resulting in rectangular pits in the interspaces between cords and ribs.

E. auffenbergi is somewhat similar to *Sagenotriphora osclausum* (Rolán and Fernández-Garcés, 1995) (see below), but the latter species is shorter (usually with no more than 9 teleoconch whorls), and the siphonal canal is also very short and curved.

Other brown species are *Marshallora nigrocincta* (C. B. Adams, 1839) and *M. modesta* (C. B. Adams, 1850), but these species have a shorter spire (not more than 10 whorls), a more convex profile and a very short siphonal canal.

Genus *Marshallora* Bouchet, 1985

Type species: *Murex adversus* Montagu, 1803 (o.d.).

Diagnosis: After BOUCHET (1985), protoconch of 4-5 whorls with two spiral threads, granules on its apical

part, teleoconch with the second cord appearing later, operculum paucispiral and radula with central and lateral teeth

with two groups of cusps. Caribbean species in ROLÁN AND FERNÁNDEZ-

GARCÉS (1995) and ROLÁN AND CRÚZ-ÁBREGO (1996).

Marshallora ostenta spec. nov. Rolán and Fernández-Garcés (Figs. 7A-N, 8E, 8F)

Type material: Holotype (Figs. 7A, 7B) in MNCN (15.05/47055) and a paratype (Fig. 7C) in IES, both from type locality. Other paratypes in the following institutions: 1 s (Fig. 7E), off Mayport, Duval Co., Florida (Yergin, Jan. 99), 30 m (FLMNH, *ex* CHL); 2 s (Figs. 7F, 7G), off Big Pine Key, Monroe Co., Florida, 30-50 m, (K. Sunderland, Aug/91) (BMSC *ex* CHL); 1 s, off Big Pine Key, Monroe Co., Florida, 30-50 m (K. Sunderland, 1991) (CHL, Fig. 7I); 3 s, off Egmont Key, Hillsborough Co., Florida (J. Moore/*Cavalier*, 1962), 72 m (CHL); 1 s (Fig. 7H), 32 miles E. St. Augustine, St. Johns Co., Florida (T. Yocius, 1972) 30 m (USNM *ex* CHL); 8 s, Palm Beach Co., Florida, off Boynton Inlet (D. and H. Akers, Dec. 1969) 33 m (FLMNH 177040); 1 s (Fig. 7J) Miami, Florida, 73 m (FLMNH UF363887); 1 s (Fig. 7K), Palm Beach Co., Florida, off Dodge Estate (R/V Triton, Dec. 1951) (McGinty coll.) (FLMNH 178201).

Other material examined: Cuba: 2 sp (Fig. 7D)(destroyed for radular study), Cienfuegos (MHNS). USA: Florida: 1 sp (destroyed for radular study) and 2 s, Anclote Key, near Tarpon Springs, Pasco Co. (CHL); 1 s, off Dry Tortugas, Monroe Co., Riley Black (*ex* J. Dawley, 1/4/1983), 55 m (CHL) (the last two lots not in good condition); 4 s, off Destin, 25 m (ANSP 252157); 1 s, Palm Beach Co., off Yamato Rocks, (F. B. Lyman/ Apr. 1939) 11 m (FLMNH 10242); 3 s, St. Augustine (FLMNH 286017).

Type locality: Cienfuegos Bay, Cuba.

Etymology: The specific name derives from the Latin past participle *ostentus -a, -um* which means "shown", indicating that the review of material from several collections allowed us to recognize this species.

Description: Shell (Figs. 7A-7K) light, solid, conical elongate. Protoconch (Figs. 8E, 8F) dark brown, multispiral, with between 3 1/2 and 4 whorls; the apex is covered by small tubercles; fine axial ribs are crossed by two spiral cords on the lower whorls and sometimes by a single cord on the first whorl. Teleoconch with 7-10 whorls, the first 4-5 with only two beaded cords (spirals 1 and 3); spiral 2 appears between them on about the fifth or sixth whorl, increasing in size until the three spirals are the same size on the final whorl. Another very small, smooth spiral occurs at the suture. The colour is usually white at the beginning of the teleoconch, sometimes including the first 1-2 whorls; subsequently the colour of the shell is more variable: frequently uniform cream or light brown, darker at the suture; the beaded cords may be different, whitish, cream or light brown, and either the lower or upper cord can be lighter. Aperture rounded; base brown, sometimes only light brown, the darker colour extending to the columella; siphonal canal short and open.

Dimensions: The holotype measures 4.2 mm; some paratypes reach 5.5 mm.

The soft parts (examined in only two specimens) are whitish, slightly translucent, with milk-white spots on the head and a few on the tentacles.

Operculum (Fig. 7N) rounded-ovoid, multispiral, with the nucleus somewhat deviated from the centre.

Radula (Figs. 7L, 7M) studied in one specimen from Cuba and another from Florida, has a formula n-1-1-1-n. The rachidian tooth has two parts with 5-6 sharp cusps at each side; the lateral ones are very similar to the central one; the marginal ones are sharp pointed, very elongate and narrow.

Distribution: Known from Cuba and Florida.

Remarks: In spite of the amount of material examined, it was not possible to arrive at a description that represented all the shells, suggesting that this must be a variable species. There are some differences in the protoconch (number of whorls, one or two spiral threads on the first whorl), but the main differences concern the very variable colour distrib-

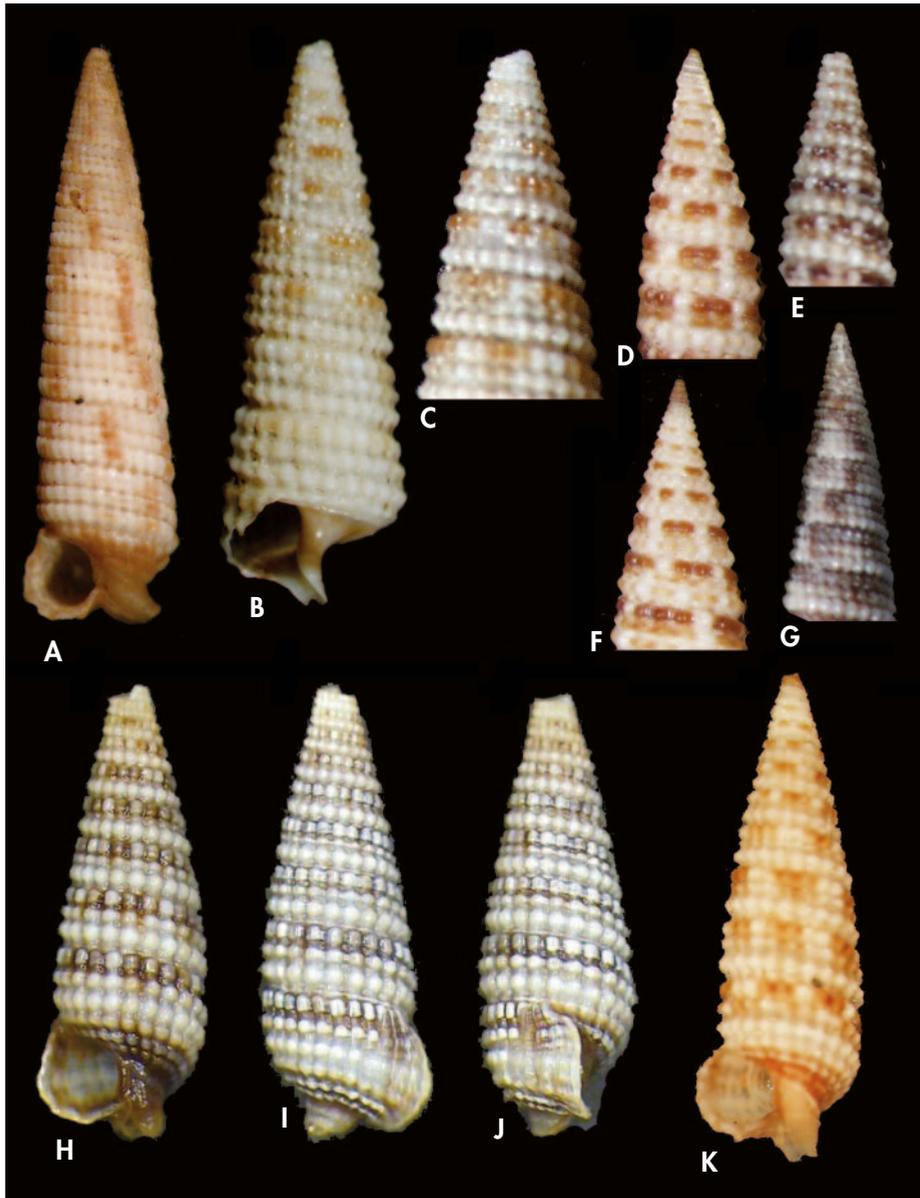


Figure 4. A. *Latitriphora albida* (A. Adams, 1854) (BMNH). B, C. *Monophorus olivaceus* (Dall, 1889), lectotype, 10 mm (USNM). D-F. *M. olivaceus* typical shells from Cuba, all for comparison with the shell of the lectotype. G. *Nototriphora decorata* (C. B. Adams, 1850), Cuba. H-K. *Monophorus olivaceus* (Dall, 1889). H-J: shell, 7.0 mm, Peanut Island, Florida (MHNS); K: shell, 8 mm, Florida (FLMNH).

Figura 4. A. *Latitriphora albida* (A. Adams, 1854) (BMNH). B, C. *Monophorus olivaceus* (Dall, 1889), lectotipo, 10 mm (USNM); D-F. *M. olivaceus*, conchas típicas de Cuba, todas para comparación con la concha del lectotipo. G. *Nototriphora decorata* (C. B. Adams, 1850), Cuba. H-K. *Monophorus olivaceus* (Dall, 1889). H-J: concha, 7,0 mm, Peanut Island, Florida (MHNS); K: concha, 8 mm, Florida (FLMNH).

ution on the teleoconch and the initial appearance of spiral 2 between the 5th and 7th teleoconch whorls. All of this suggested to us that more than one species might be involved in the studied material. Anyway, some shells with clear differences have been separated from the initial lot, and these are described below (the following species). The remainder were considered to represent a single variable species, which future study of live collected material may confirm through observation of the colour of the soft parts and examination of radulae.

Marshallora apexdiversus spec. nov. Rolán and Lee (Figs. 8A-D, 8G)

Type material: Holotype (Fig. 8A) and 3 s (Figs. 8B, 8C), paratypes (FLMNH UF363887) from type locality; 1 s, 1 s (Fig. 8D), Palm Beach Co., Florida, off Dodge Estate (R/V Triton, Dec. 1951) (McGinty coll.) (FLMNH 178201).

Type locality: Miami, Florida, 73 m.

Etymology: The specific name derives from the Latin words *diversus*, which means "different", and *apex*, referring to an important character for separation from other close species.

Description: Shell (Figs. 8A-8D) light, solid, conical elongate. Protoconch (Fig. 8G) light brown, with 5 whorls; the apex is covered by small tubercles and is very narrow; the whorls with fine axial ribs that are crossed by two spiral cords, the upper cord almost in the middle of the whorl and the lower one closer to the suture below. Teleoconch with 8-11 whorls, the first 2-3 with only two beaded cords (spirals 1 and 3); spiral 2 appears between them on about the fourth whorl, increasing in size until the three cords are of equal size on about the fifth or sixth whorls. Another very small, smooth spiral occurs at the suture on the final whorls. The colour is usually white on the first 2 whorls of the teleoconch; on subsequent whorls spiral 1 is light brown, and on some shells (but not on the holotype) this colour also reaches the suture. The nodules are always lighter than the ground colour. Aperture rounded-ovoid; base cream, siphonal canal short and closed at the aperture by an extension of the outer lip.

Dimensions: The holotype measures 6.2 mm.

Distribution: Only known from Florida.

Similiphora intermedia (C. B. Adams, 1850) always has the spiral cords white and brown, with a rather uniform color pattern of a darker upper cord and a dark or light brown middle one; the soft parts are black. The radula has numerous teeth all similar in size.

Marshallora modesta (C. B. Adams, 1850) and *M. nigrocincta* (C. B. Adams, 1839) have similar shells but they are darker brown and never whitish. The protoconchs are somewhat different, being wider and shorter (as can be seen in Figures 8H and 8I).

Remarks: The present species is tentatively included in *Marshallora* due to similarity with the other Caribbean species in this genus. At the beginning of this study the shells included in this taxon were placed in the variable *M. ostenta* spec. nov. Finally, both species were considered different on the basis of the following characters: *M. ostenta* almost always has a dark brown base, the protoconch has fewer whorls (see Figs. 8E, 8F in comparison with Fig. 8G), the apex is wider, the spiral threads on the protoconch are in the middle of the whorl; on the teleoconch, spiral 2 never begins before the fifth whorl, sometimes even later.

Similiphora intermedia (C. B. Adams, 1850) always has very dark colour on spiral 1, while spiral 2 is light or dark brown.

Marshallora modesta (C. B. Adams, 1850) and *M. nigrocincta* (C. B. Adams, 1839), have similar shells but in both cases they are darker brown and never whitish or cream. The protoconchs of both species are rather different, being wider at the apex and shorter (as can be seen in Figures 8H and 8I, in comparison with Fig. 8G).

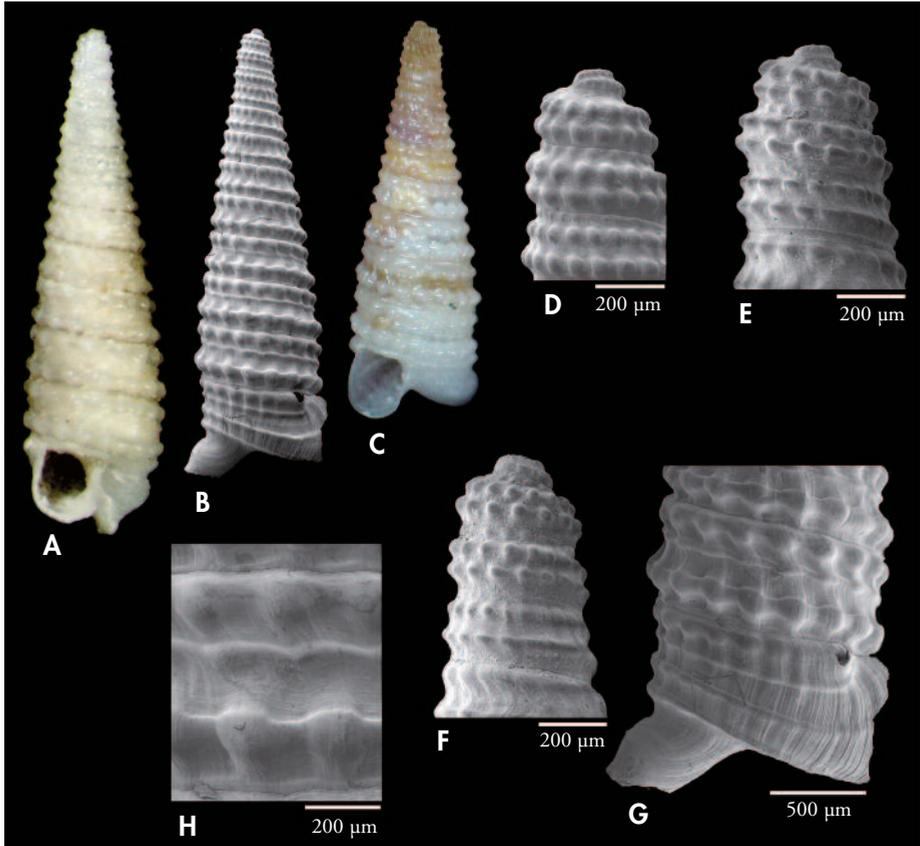


Figure 5. *Isotriphora guanahacabibes* spec. nov. A: holotype, 5.5 mm (MNCN); B: paratype, 4.7 mm (MHNS); C: paratype, 4.35 mm (IES). D-F: protoconchs of paratypes (MHNS); G: detail of the end of the last whorl, paratype in figure B; H: detail of the microsculpture.

Figura 5. Isotriphora guanahacabibes spec. nov. A: holotipo, 5,5 mm (MNCN); B: paratipo, 4,7 mm (MHNS); C: paratipo, 4,35 mm (IES). D-F: protoconchas de paratipos (MHNS); G: detalle del final de la última vuelta, paratipo de la Figura B; H: detalle de la microescultura.

Genus *Inella* Bayle, 1879

Ino Hinds, 1843, p. 17. Type species (subsequent designation of Jousseume 1844: 230): *Triforis (Ino) gigas* Hinds, 1843. Recent, New Guinea.

Inella Bayle, 1879, p. 35. New name for *Ino* Hinds (not *Ino* Samsuelle, 1817).

Remarks: The type species (see MARSHALL, 1983) has a blunt and wide protoconch with between two and three whorls, each with two spiral cords; the shells included in this genus are elongate and usually have two spiral beaded cords at the beginning of the teleoconch (three exceptionally) and

three on the subsequent whorls, frequently with a fourth cord appearing at the suture. MARSHALL (1983) mentioned that the limits of the genus are uncertain, and the radula has numerous small and similar teeth except the rachidian, that has symmetrical cusps.

Inella bigemma (Watson, 1880) (Figs. 9A-B, 36B)

Cerithium (Triforis) bigemma Watson, 1880. Prelim. Report., pt 5. *Journ. Linnean Soc. London*, 15: 101, sp. 2. [Type locality: 18° 38' 30" N, 65° 5' 30" W, Off Culebra Island, 713 m].

Type material: Syntype (BMNH 1887.2.9.1762) (Fig. 9A) here designated as lectotype.

Other material examined: 1 s (Fig. 9B), (BMNH 1915.12.31.199) from Irish Fishery Board.

Description: See WATSON (1881, 1886). The protoconch is unknown. Two spiral cords are present on the first whorls, subsequently with an additional smaller, less prominent cord appearing above them. About 17 whorls on the lectotype.

Dimensions: The lectotype measures 13.5 mm.

Distribution: Only known with certainty from the lectotype, Culebra Island (between Puerto Rico and Virgin Islands).

Remarks: The shell mentioned in the original description as having 0.6 inch (=15 mm) and the original figure (Fig. 36B) are coincident in size and number of whorls with the shell studied by us, and probably it is the same.

The second shell studied (Fig. 9B) has a different profile and could be a different species (BOUCHET AND WARÉN, 1993 are of the opinion that this shell is *Strobiligera brychia*). Without protoconchs it is not possible to make a correct comparison. This species is very similar to *I. torticula* (see below, in *Remarks* for that species).

This taxon is mentioned in DALL (1981, 1989), who suggested that the species *Triforis torticula* could be a variety of *T. bigemma*. As the shells are not in perfect condition and lack protoconchs, not enough information was obtained to decide if they represent different species, but the whorls seem to expand more slowly on the type of *T. torticula*, although not on the other shells studied.

Inella inflata (Watson, 1880) (Figs. 9C, 36G)

Cerithium (Triforis) inflatum Watson, 1880. Prelim. Report., pt 5. *Journ. Linn. Soc.*, 15: 103. [Type locality: 18° 38' 30" N, 65° 5' 30" W, St. Thomas, N of Culebra Island, Danish West Indies, 713 m; indicating: Habitat.- Yucatan Strait, 1170 m (Dall)].

Triforis inflatum Watson: Dall, 1881. *Bull. Mus. Comp. Zool.*, 9: 6.

Triforis (Sychar) inflata Watson: Dall, 1889. *Bull. Mus. Comp. Zool.*, 18: 249.

Type material: Syntype (BMNH 1887.2.9.1766) (Fig. 9C) here designated as lectotype.

Description: See WATSON (1881, 1886). The protoconch is pupoid and perhaps with about two whorls, the first one wider than the second. It may be about 500 μ m in diameter. The teleoconch is in bad condition, but it is possible to see the two main beaded spirals, and one more near the suture. The nodules are concave above and pointed.

Dimensions: The lectotype measures 4.8 mm.

Distribution: Only known from the type locality.

Remarks: No other syntype of this species was found in other museums

and the shell is nearly identical to that represented in the original figure of *I. inflata* (Fig. 36G), for which 13 whorls are mentioned (really 12 including the protoconch) and the correct size of 4.8 mm. Therefore, probably it could be the only type specimen but, as no holotype was mentioned in the original description, this shell is here designated as lectotype. Its protoconch is very different from most others from the Caribbean area, and is therefore a differential character.

DALL (1889) placed his species *T. ibex* as a variety of *I. inflata* Watson. Both

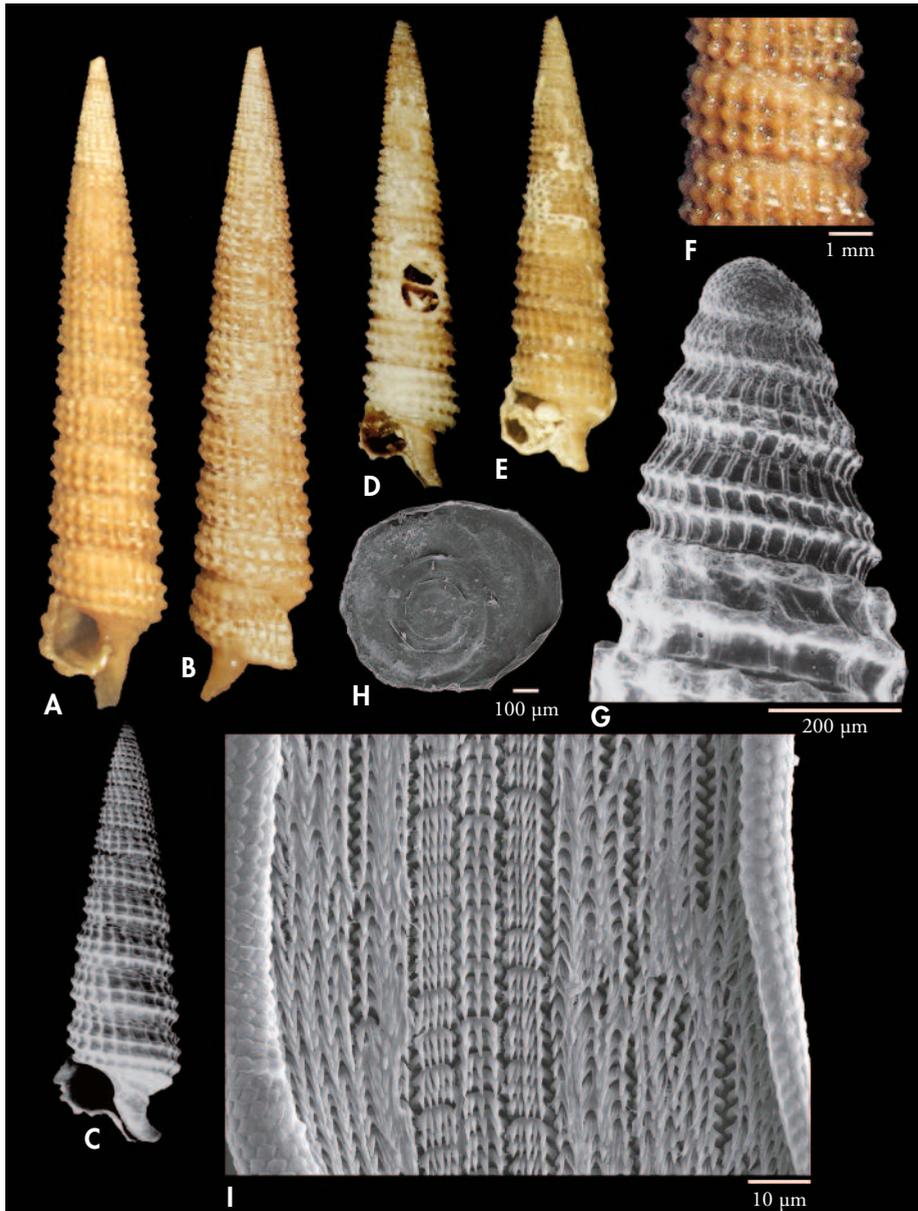


Figure 6. *Eutriphora auffenbergi* spec. nov. A, B: holotype, 21.8 mm, off Dry Tortugas, Florida (FLMNH); C: paratype, 8.4 mm, same locality (BMSM); D: paratype, 13.7 mm, Fla., USA (station 4)(MCZ 356088). E: paratype, 12.1 mm, 14 whorls, Fla., USA, 5.5 m (MCZ 356096). F: detail of sculpture of the holotype; G: protoconch of the paratype in fig. C; H: operculum (of a specimen from Palm Beach, Florida, 100-300 fms (FLMNH); I: radula (from the same specimen).
 Figura 6. *Eutriphora auffenbergi* spec. nov. A, B: holotipo, 21,8 mm, de fuera de Dry Tortugas, Florida (FLMNH); C: paratipo, 8,4 mm, la misma localidad (BMSM); D: paratipo, 13,7 mm, Fla., USA (estación 4) (MCZ 356088). E: paratipo, 12,1 mm, 14 vueltas, Fla., USA, 5,5 m (MCZ 356096). F: detalle de la escultura del holotipo; G: protoconcha del paratipo en la fig. C; H: opérculo (de un ejemplar de Palm Beach, Florida, 100-300 brazas (FLMNH); I: rádula (del mismo ejemplar).

taxa do not appear to be similar: *I. ibex* lacks a protoconch and the type, with 14 whorls, is 10.4 mm; the description of *I. inflata* mentions 13 whorls and 4.8 mm, but the shell is less mature than the type specimens of *I. ibex*. Comparison of the

types shows a different sculpture, the suture is deeper on *I. ibex* and the sutural threads are less prominent.

It is more difficult to distinguish it from other species of *Inella* and this shall be done below.

Inella longissima (Dall, 1881) (Figs. 10A-G, 36D)

Triforis (Ino) longissimus Dall, 1881. *Bull. Mus. Comp. Zool.*, 9: 80. [Type locality: Not stated].

Triforis (Inella) longissima Dall, 1889. *Bull. Mus. Comp. Zool.*, 18: 246, pl. 20, fig. 10. [Habitat: Sigsbee knoll, off Havana, in 320-823 m].

Type material: One syntype, here designated as lectotype (Fig. 10A). Off Havana, Cuba 22° 9' N 82° 21' 30W, 175 m. Blake 1877-1878 Exped. Sta. 56 (MCZ 7381).

Other material studied: Bahamas: 1 f, Tamarind, Grand Bahama Island 26° 30' 45"N, 78° 36' 00" W (J. Worsfold) (ANSP 368279); Florida: 1 j (Fig. 10F) with protoconch, off Alligator Reef Light, lower Florida Keys (J. Moore, 1965) (ANSP 312592); 1 s (Fig. 10B), 1 j, SW of Egmont Key, (D. Steger, 1966) 366-420 m (ANSP 306391); 1 s, Monroe Co., 205° off Sombrero Light, (McGinty, Jul. 1951), 335-367 m (FLMNH 249518).

Description: See DALL (1881). Shell (Fig. 10A) elongate, solid, whitish. The protoconch is not known from the syntype, but a juvenile (Fig. 10F), which could be this species, shows a paucispiral protoconch of about 400 μ m, with a pupoid apex and three whorls with two spiral cords. On this juvenile, the beginning of the teleoconch has only two spirals, but after a few whorls the third very small spiral appears between them. The teleoconch in large shells can reach up to 27 or more whorls (Fig. 10B). The profile of the whorls is straight, with four spirals: spirals 1 and 3 are almost similar in size and between them is spiral 2, which is initially slightly smaller but is subsequently of similar size; very close to the suture there is one more smooth spiral cord (Fig. 10D). Spiral 3 is a little more prominent than spirals 1-2. The nodules are always rounded.

Dimensions: The lectotype measures 26.7 mm.

A larger specimen, supposedly of this species, has a more prominent spiral 3 on the final whorls (Fig. 10B) and the nodules are a little larger.

Distribution: Known from Bahamas, Florida and Cuba.

Remarks: The syntypes with this label from USNM and MCZ were exam-

ined. The problem is that the two lots apparently represent two different species. In this situation, after the description of DALL (1881) was carefully revised, it was decided to designate as lectotype the syntype in MCZ, due to the fact that the characters of this shell more closely matched the original description. In this description, the author pointed out that: "all the shells were decapitated" (which is not the case in the USNM syntype), and he only mentioned three spiral cords; furthermore, the shell designated as lectotype has characters that are more similar to those of the figure of *I. longissima* represented in DALL (1889: pl. 20, fig. 10)(Fig. 36D), and is close to 26 mm in size. The syntype in USNM (with the label *T. longissimus*) has a size of 22 mm, different to the dimensions mentioned by DALL (1881), has a perfect protoconch and has only two spirals on the first 6-7 whorls of the teleoconch; additionally, a third and fourth cord appear, but these differ from the figure in DALL (1889). Also the siphonal canal is larger. For all these differences it was considered to be a separate species, and will be described below as new (*I. pseudolongissima*). The shell from ANSP (Fig. 10B) may be the same species, but spiral 2 is very small



Figure 7. *Marshallora ostenta* spec. nov. A, B: holotype, 4.2 mm, MNCN; C: paratype, 3.6 mm (IES); D: shell, 3.9 mm, specimen destroyed for radular studies; all from Cienfuegos, Cuba; E: paratype, 3.9 mm, off Mayport, Florida (FLMNH); F, G: paratypes, 5.5 and 5.4 mm, off Big Pine Key, Florida (BMSM); H: paratype, 3.5 mm, off St. Augustine, St. Johns Co., Florida (USNM); I: paratype, 5.5 mm, off Big Pine Key (CHL); J: paratype, 5.5 mm, Florida (FLMNH); K: paratype, 5.3 mm, Florida (FLMNH); L: radula from a specimen from Cienfuegos; M: radula from a specimen from Florida; N: operculum, from Cienfuegos.

Figura 7. *Marshallora ostenta* spec. nov. A, B: holotipo, 4,2 mm, MNCN; C: paratipo, 3,6 mm (IES); D: concha, 3,9 mm, ejemplar destruido para estudios radulares; todos de Cienfuegos, Cuba; E: paratipo, 3,9 mm, fuera de Mayport, Florida (FLMNH); F, G: paratipos, 5,5 y 5,4 mm, fuera de Big Pine Key, Florida (BMSM); H: paratipo, 3,5 mm, fuera de St. Augustine, St. Johns Co., Florida (USNM); I: paratipo, 5,5 mm, fuera de Big Pine Key (CHL); J: paratipo, 5,5 mm, Florida (FLMNH); K: paratipo, 5,3 mm, Florida (FLMNH); L: rádula de un ejemplar de Cienfuegos; M: rádula de un ejemplar de Florida; N: opérculo, de Cienfuegos.

from the first teleoconch whorls, and on the final whorls spiral 3 is more prominent than on the lectotype. However, as these minor differences probably only indicate some variation in the species, the shell has been kept in this taxon.

In spite of there being no information about the protoconch of the lectotype of this species, it has been considered to belong to the genus *Inella* on the basis of the protoconch present on a juvenile, which probably represents the same species.

***Inella pseudolongissima* Rolán and Fernández-Garcés spec. nov. (Figs. 11 A-H)**

Type material: Holotype (Fig. 11A), a paratype (Fig. 11D) and a fragment (USNM 87316: syntypes of *Triforis longissimus*) from the type locality; 1 paratype (Fig. 11E), 26° 40' N (M.E. Powlun, July 1960) (McGinty coll.) 77 m, (FLMNH 171183); 1 paratype (Fig. 11G), Hillsborough Co., Tampa, Florida, West of Egmont Key (J. Moore, Jun. 1962) (McGinty coll.) 366 m (FLMNH 158180).

Type locality: Cuba, off Havana, 823 m.

Etymology: The specific name alludes to the similarity with *I. longissima*, with which this species was confused.

Description: Shell (Figs. 11A, 11D, 11E, 11G) very elongate, irregularly white or creamish. Protoconch (Figs. 11B, 11F, 11H) multispiral with nearly 4 whorls, almost 1 mm in height and with a diameter of about 500 μ m, sculptured with 2 spiral cords that are more evident on the last whorls; these two cords are unapparent or only insinuated on the first two whorls. Teleoconch with between 18 and 24 whorls, the first whorls with two beaded spiral cords (spirals 1 and 3), the nodules being rounded; below, on whorls 3-4, a small, very narrow cord (spiral 2) appears between them; this new cord is always smaller than the other two and closer to the upper one; spiral 3 subsequently increases in size and is very clearly the largest on the last 4-5 whorls, the other two being smaller; also an additional small, unbeaded cord appears at the suture. Axial ribs are almost not appreciable; the growth lines

are prosocline. Aperture rhomboid, siphonal canal short and open.

The colour of the holotype is totally white. Paratypes are cream with some areas of light brown.

Dimensions: The holotype measures 22.0 mm.

Distribution: Known from Florida and Cuba.

Remarks: *I. pseudolongissima* may be distinguished from *I. longissima* by teleoconch sculpture, the latter species having three cords of equal size on most of the spire. Also spiral 2 appears on the first whorls of *I. pseudolongissima* but on about the seventh whorl in *I. longissima*. The protoconch of *I. longissima* has three whorls with two well defined cords, while the protoconch of *I. pseudolongissima* has four smooth whorls, and the apex is smaller.

For differentiation from other close species, see below.

***Inella noduloides* spec. nov. Rolán and Fernández-Garcés (Figs. 12 A, B)**

Type material: Holotype (Figs. 12A, 12B) in ANSP (374588).

Type locality: Tamarind, Grand Bahama Island, Bahamas 26° 30' 45"N, 78° 36' 00"W, 500 m (J. Worsfold, May, 1985).

Etymology: The name alludes to the prominent nodules of the whorls.

Description: Shell (Figs. 12A, 12B) small, subcylindrical, elongate, whitish and solid. Protoconch with a pupoid apex of about 380 μ m diameter and 3 whorls, each with

two smooth spiral cords; the lower cord becomes more prominent near the end, where another smooth, less prominent cord appears above the other two, very

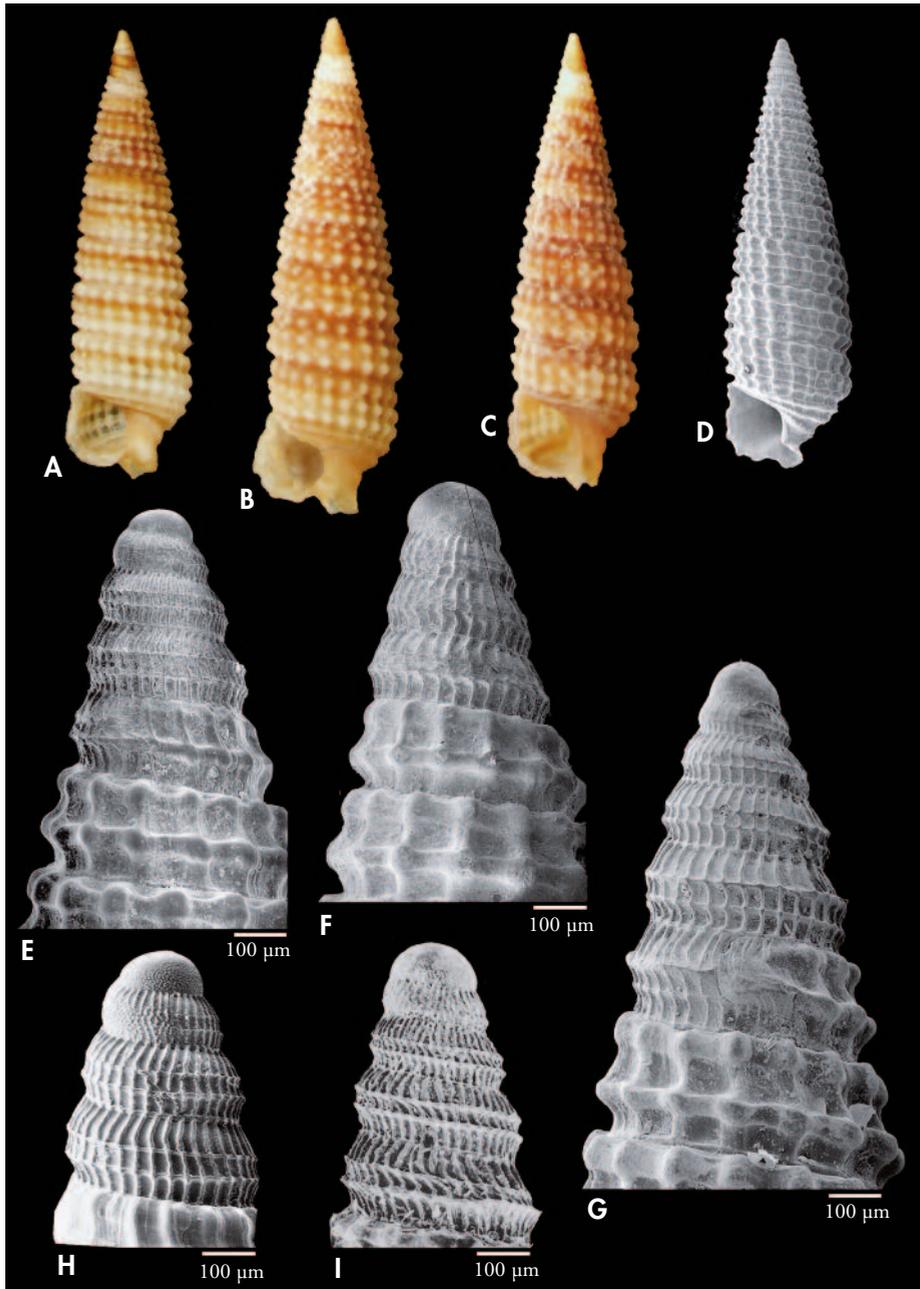


Figure 8. A-D. *Marshallora apexdiversus* spec. nov. A: holotipo, 6,2 mm, Florida (FLMNH); B-D: paratipos, 6,9, 6,5, 4,6 mm, Florida (FLMNH). E-I. Protoconchs of *Marshallora* species. E, F: *M. ostenta*, Florida; G: *M. apexdiversus*, Florida; H: *M. modesta*, Cuba; I: *M. nigrocinta*, Cuba.
 Figura 8. A-D. *Marshallora apexdiversus* spec. nov. A: holotipo, 6,2 mm, Florida (FLMNH); B-D: paratipos, 6,9, 6,5, 4,6 mm, Florida (FLMNH). E-I. Protoconchas de diferentes especies de *Marshallora*. E, F: *M. ostenta*, Florida; G: *M. apexdiversus*, Florida; H: *M. modesta*, Cuba; I: *M. nigrocinta*, Cuba.

close to the suture; under high magnification numerous tubercles can be seen. On the first two whorls of the teleoconch there is one prominent cord in the middle and another smaller one below the suture; both have prominent nodules numbering about 10-11 per whorl. On the subsequent whorls there is a small nodulous cord below the suture with another small, slightly nodulous one below it; these are followed by the most prominent cord, with rather sharply pointed nodules, and one more

below it, close to the lower suture. The aperture is rounded but irregular, as the shell is juvenile.

Dimensions: The holotype measures 2.1 mm.

Distribution: Only known from the type locality.

Remarks: No other species has these characters, with one spiral cord with very prominent nodules and 3 weaker spirals. The closest species may be the new species *I. harryleei* (see below).

Inella apexbilirata spec. nov. Rolán and Fernández-Garcés (Figs. 12C-E)

Type material: Holotype (Fig. 12C) (ANSP 367841); 4 paratypes (ANSP 367840) (Fig. 12D). All from the type locality.

Type locality: Lucaya, Grand Bahama Island, Bahamas 26° 29' 45" N, 78° 37' 15" W (J. Worsfold), 300 m.

Etymology: The specific name alludes to the beginning of the protoconch, with two spirals commencing from the nucleus.

Description: Shell (Figs. 12C, 12D) small, subcylindrical, elongate, shiny, whitish and solid. Protoconch (Fig. 12E), shining white, with a very small nucleus, a diameter of nearly 400 μ m and a height of about 660 μ m, 3 whorls with two smooth spiral cords which begin just on the nucleus. The teleoconch has two main beaded cords, the lower one slightly larger; one smooth smaller cord occurs at the suture. The nodules on the main spirals are pointed and cut at the middle. The axial ribs which connect the nodules are scarcely evident and are slightly prosocline. There are about 13 on the first whorls and 17 on the last. Aperture ovoid, siphonal canal very short and open.

Dimensions: The holotype measures 3.5 mm.

Distribution: Only known from the type locality.

Remarks: The species with two main spirals are the following:

I. bigemma and *I. inflata* have whorls that increase quickly in width, and the latter species has a pupoid protoconch.

I. harryleei spec. nov. (see below) has spirals 1 and 3 at the beginning, spiral 2 appearing later and being smaller.

I. ibex has the same number of nodules in spite of being a more developed shell. Besides the two main spirals there is only one more near the suture.

I. torticula has three spirals on the first whorls and 4-5 on the last ones.

I. colon has two spirals but equidistant from both sutures.

I. compsa also has two main spirals, with spiral 1 being smaller; its protoconch is unknown, but the whorls on this shell increase rapidly in width.

I. enopla and *I. meteora* have a very different wide, pupoid protoconch.

Inella pinarena Espinosa, Ortea and Fernández-Garcés, 2007 (Figs. 12F-J)

Inella pinarena Espinosa, Ortea and Fernández-Garcés, 2007. *Avicennia*, 19: 73, fig. 46. [Type locality: Yemayá, Maria la Gorda, Guanahacabibes, Pinar del Rio, Cuba].

Description: See ESPINOSA, ORTEA AND FERNÁNDEZ-GARCÉS (2007). Shells (Figs.

12F, 12G), are shown in SEM photographs. We add some informations on

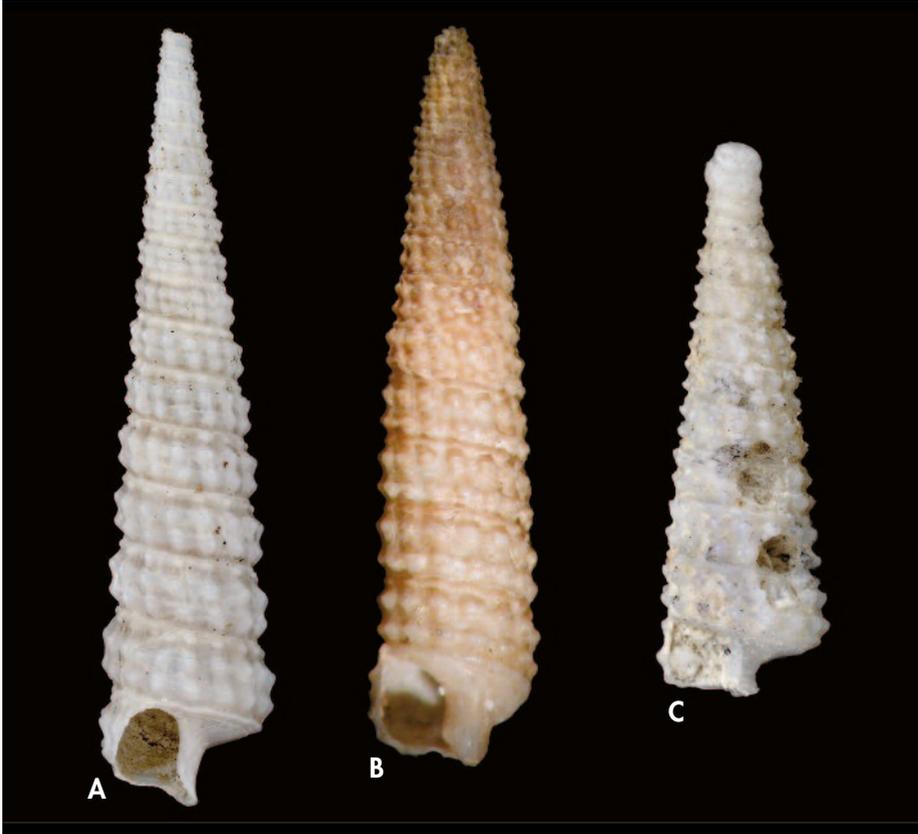


Figure 9. A. *Cerithium bigemma* Watson, 1880, lectotype, 13.5 mm (BMNH). B. *Inella bigemma*, shell, 13.0 mm (BMNH). C. *Cerithium inflatum* Watson, 1880, lectotype, 4.8 mm (BMNH).
 Figura 9. A. *Cerithium bigemma* Watson, 1880, lectotipo, 13,5 mm (BMNH). B. *Inella bigemma*, concha, 13,0 mm (BMNH). C. *Cerithium inflatum* Watson, 1880, lectotipo, 4,8 mm (BMNH).

the protoconch (Figs. 12H, 12I): small tubercles are present on the protoconch surface between the spiral ribs. The microsculpture of the teleoconch (Fig. 12J) is formed by very small spiral striae, more evident on the subsutural part.

Distribution: Only known from the type material.

Remarks: This species was recently described but, in the original description, only one optical photo was presented. More details on the shell, protoconch and microsculpture are here illustrated, showing that there is no similarity with other species of the group in the Caribbean.

Inella harryleei spec. nov. Rolán and Fernández-Garcés (Figs. 13A-K)

Type material: Holotype (Fig. 13A) and 2 (s) paratypes in FLMNH; one more in BSM (Fig. 13B) all ex CHL; another in CHL (Fig. 13C); all from the type locality. Other paratypes: 9 j and f, 28° 4.57' N, 90° 59.99' W, 87.9 m (E.F. Garcia/Pelican, 9/1-5/01) (CHL); 1 j, from the same locality (USNM); 2 j more 26° 06.866' N, 91° 02.418' W, off Louisiana, 59-65 m (E.F. Garcia/Pelican, 6/30/01)(CHL);

1 f, off Alligator Reef Light, Lower Florida Keys (J. Moore, 1965) (ANSP 312593); 3 s, SW of Egmont Key, Florida (D. Steger, 1966) 366-420 m (ANSP 306391); 3 j, W of Tampa Bay, Florida (Richardson) 500 m (ANSP 335492); 1 s, Hillsborough Co., 110 miles SW of Egmont Key, Florida (D. Steger, 1953) 165 m (FLMNH 151609); 1 s (Fig. 13D), Hillsborough Co., SW of Egmont Key, Florida (J. Moore, 1967) 46 m (FLMNH 158178).

Other material examined: 2 f, Stn. 15, Florida (MCZ 356092) which are not in sufficiently good condition to examine all their characters and attribute them with certainty to this species; 1 f (A.M. Norman coll.) (Blake Expedition), West Indies (BMNH acc. n° 2283).

Type locality: off Dry Tortugas, Monroe Co., Florida, 90 m (J. Moore/ *Cavalier*, 1992).

Etymology: The species is named after Harry G. Lee, American malacologist who lent us the material on which this species is based.

Description: Shell (Figs. 13A-13D) elongate, very large for the genus, solid, well sculptured. Protoconch (Figs. 13G-13K) with between 3 and 3 ¹/₄ whorls, bulbous, white, with barely discernible separation from the teleoconch, the first whorl smooth and the next with two spiral cords that are sometimes a little irregular; on the last whorl the lower cord is more prominent, and the upper one may divide in two. The teleoconch has many whorls, 22 in the holotype and 17 in a paratype (Fig. 13B). The first whorls have two spiral nodulous cords (spirals 1 and 3), connected by very narrow prosocline ribs; below, around the fourth or fifth whorls, spiral 2 appears between those cords and remains very narrow for several whorls; after the tenth whorl spiral 3 becomes a little larger, and on the subsequent whorls it is more clearly different and prominent (Fig. 13E). Spiral 2 strengthens but continues to be the smallest cord until the end. The suture is very deep. The axial ribs are slightly prosocline. Aperture (Fig. 13F) ovoid, siphonal canal narrow and large, dark in colour. Shell colour light brown or white with irregular brown axial flammules.

Dimensions: The holotype measures 18.3 mm. The paratypes are smaller.

Distribution: Only known from the type locality.

Remarks: The present species must be compared to and differentiated from the following:

I. longissima is uniformly white and more cylindrical, having three equal spiral cords throughout most of the spire, and another smaller one on the suture which is relatively shallower; the shell sculpture is very similar from the beginning to the end with only a little more prominence of the lowermost cord.

I. pseudolongissima spec. nov. is white with 4 cords, the upper one smooth at the suture, the following two very small, and only the lowermost is clearly prominent; the suture is not deep; the protoconch has more whorls.

I. noduloides spec. nov. has one prominent beaded spiral cord with three more smaller ones which are absent from the first whorls of the teleoconch of *I. harryleei*.

Other elongate deep water species are *Inella colon* Dall, 1881, and *I. ibex* Dall, 1881; both have only two spiral beaded cords per whorl.

Inella aff. *harryleei* (Figs. 14A, B)

Material examined: 1 s, Manatee Co., West of Anna Maria Key, Florida (J. Moore, 1961) (McGinty coll.) 55 m (FLMNH 158177).

Remarks: The specimen studied is in perfect condition and appears rather similar to *I. harryleei* spec. nov., but it differs in the following characters: a more pointed protoconch, with about

two whorls and an angulation on the second whorl, without visible cords; on the teleoconch, spiral 1 is not larger than spiral 2, but is less prominent; on the base, below spiral 3, there is only one

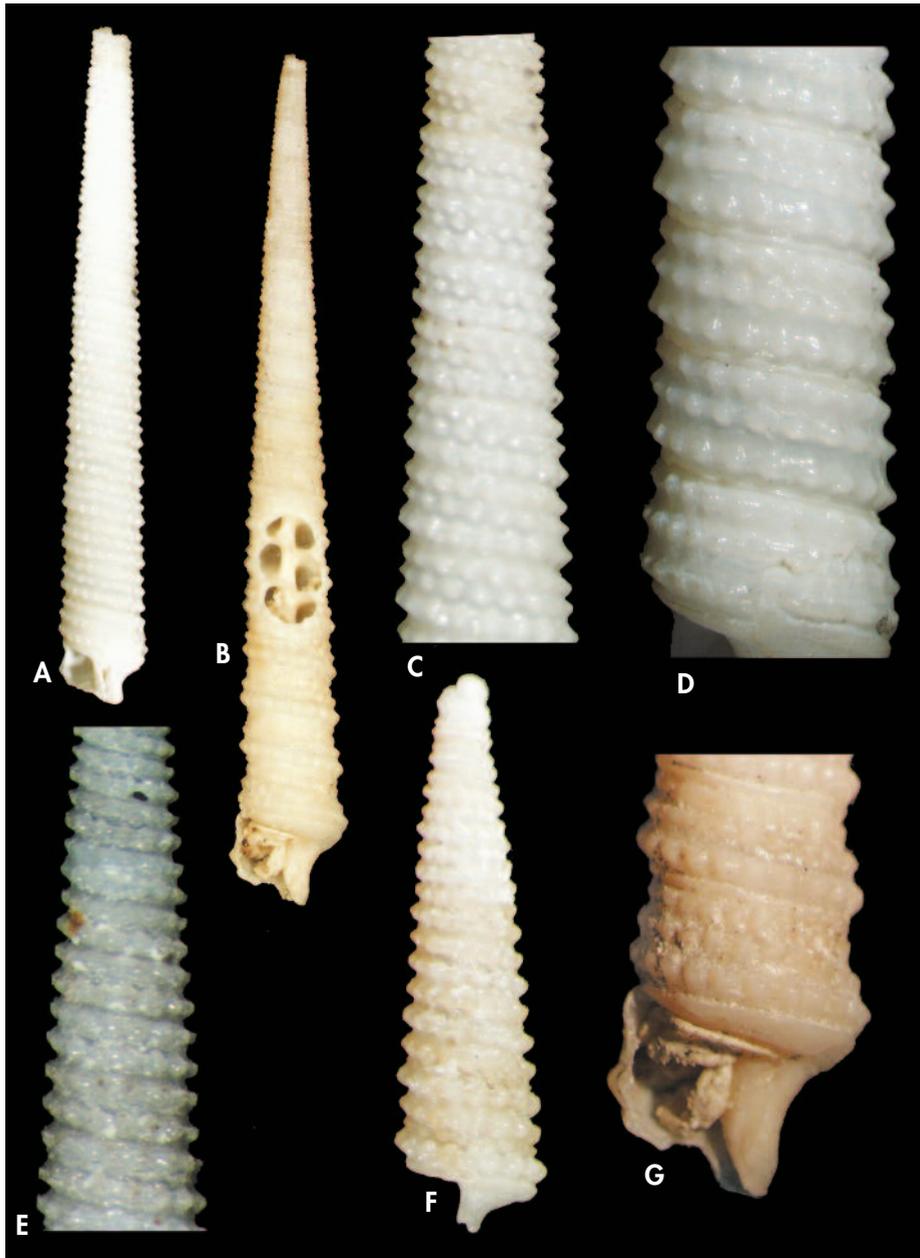


Figure 10. *Inella longissima* (Dall, 1881). A: lectotype, 26.7 mm, off Havana, 175 m (MCZ 7381); B: shell, 27.9 mm (ANSP); C, D: detail of the spire of lectotype; E: fragment of first whorls, 6.3 mm (ANSP); F: juvenile with protoconch (ANSP 312592); G: detail of last whorls of the shell from Figure B.

Figura 10. *Inella longissima* (Dall, 1881). A: lectotipo, 26,7 mm, fuera de La Habana, 175 m (MCZ 7381); B: concha, 27,9 mm (ANSP); C, D: detalle de la espira del lectotipo; E: fragmento de las primeras vueltas, 6,3 mm (ANSP); F: juvenil con protoconcha (ANSP 312592); G: detalle de las últimas vueltas de la concha de la Figura B.

smooth cord and another very small one immediately below. The siphonal canal is shorter.

Dimensions: The only shell studied measures 28.8 mm.

All these differences indicate that this shell may represent a separate species, but they are not enough to justify naming it. Additional material is required.

Inella triserialis (Dall, 1881) (Figs. 14C-E, 36E)

Triforis (Inella) triserialis Dall, 1881. *Bull. Mus. Comp. Zool.*, 9: 84. [Yucatan Strait, 640 fms (1171 m). Off Cape San Antonio, 640 fms (1171 m). Station 2, 805 fms (1472 m)].

Triforis (Inella) triserialis Dall, 1881. In Dall, 1889. *Bull. Mus. Comp. Zool.*, 18: 249, pl. 20, figs. 5a, 6a. *Triphora aspera* auct. non Jeffreys, 1885.

Type material: Two syntypes (USNM 87319), one of them (Fig. 14C) measuring 6.4 mm is here designated as lectotype; the other shell (5.6 mm) would be a paralectotype (Fig. 14D). Both from Cape San Antonio, Cuba, 1170 m; probably, 1 syntype (BMNH Acc. n° 2283), off Havana, 823 m (in very bad condition).

Other material studied: 1 j, SW of Egmont Key, Florida (Steger, 1966) 366-421 m (ANSP 306391).

Description: See DALL (1881). Protoconch paucispiral (Fig. 14E), wide, with about 3 whorls which have two spiral cords, the apex depressed and smooth. The teleoconch begins with three spiral nodulous cords, spiral 2 being smaller and closer to spiral 1. On the following whorls spiral 1 increases in size, with nodules that are larger than those on the other cords and are cut at the middle. These differences continue up to the end of the shell.

Dimensions: The lectotype measures 6.4 mm.

Distribution: Known from Yucatán (Mexico) and Cuba.

Remarks: As with other taxa, the syntype material found in USNM and MCZ has been examined. The material from USNM is coincident in protoconch and teleoconch sculpture with the description of DALL (1881) and with one of the figures in DALL (1898: plate 20, fig. 5a) (Fig. 36E) but not with the other figure (DALL, 1898: plate 20, fig. 6a), which seems to be a different species with a sharply pointed apex. The size of the lectotype is slightly smaller than that

mentioned in the original description (8.25 mm), but it may be that this type could be partially broken. The material from MCZ seems to be what Dall named as var. *intermedia* (see below).

DALL (1898: 246) considered this taxon in relation with *Triphora aspera* Jeffreys, 1885 (preoccupied, renamed *Triphora brychia* Bouchet and Guillemot, 1978; assigned to genus *Strobiligera* Dall, 1924 by Bouchet and Warén, 1985). He therefore referred to *Triforis (Inella) triserialis* var. *aspera* Jeffreys, 1885, which perhaps can correspond with the figure previously mentioned (Fig. 36E). A syntype of Jeffreys' taxon (Fig. 14F, BMNH 85.11.5.2673) has been examined, and is here designated as lectotype. It is a larger and sharply pointed shell with a multispiral protoconch, and there is no indication that this species occurs in the Caribbean.

I. triserialis is different from most of the Caribbean species referred to in this work, mainly due to its spiral 1 having larger nodules. Comparison will be made in the *Remarks* of some species described below (such as *I. sarissa*).

Inella intermedia (Dall, 1881) (Figs. 14G-J, 36F)

Triforis intermedius Dall, 1881. *Bull. Mus. Comp. Zool.*, 9: 85. [Yucatan Strait, 1170 m; off Cape San Antonio, 1170 m; station 2, 1472 m].

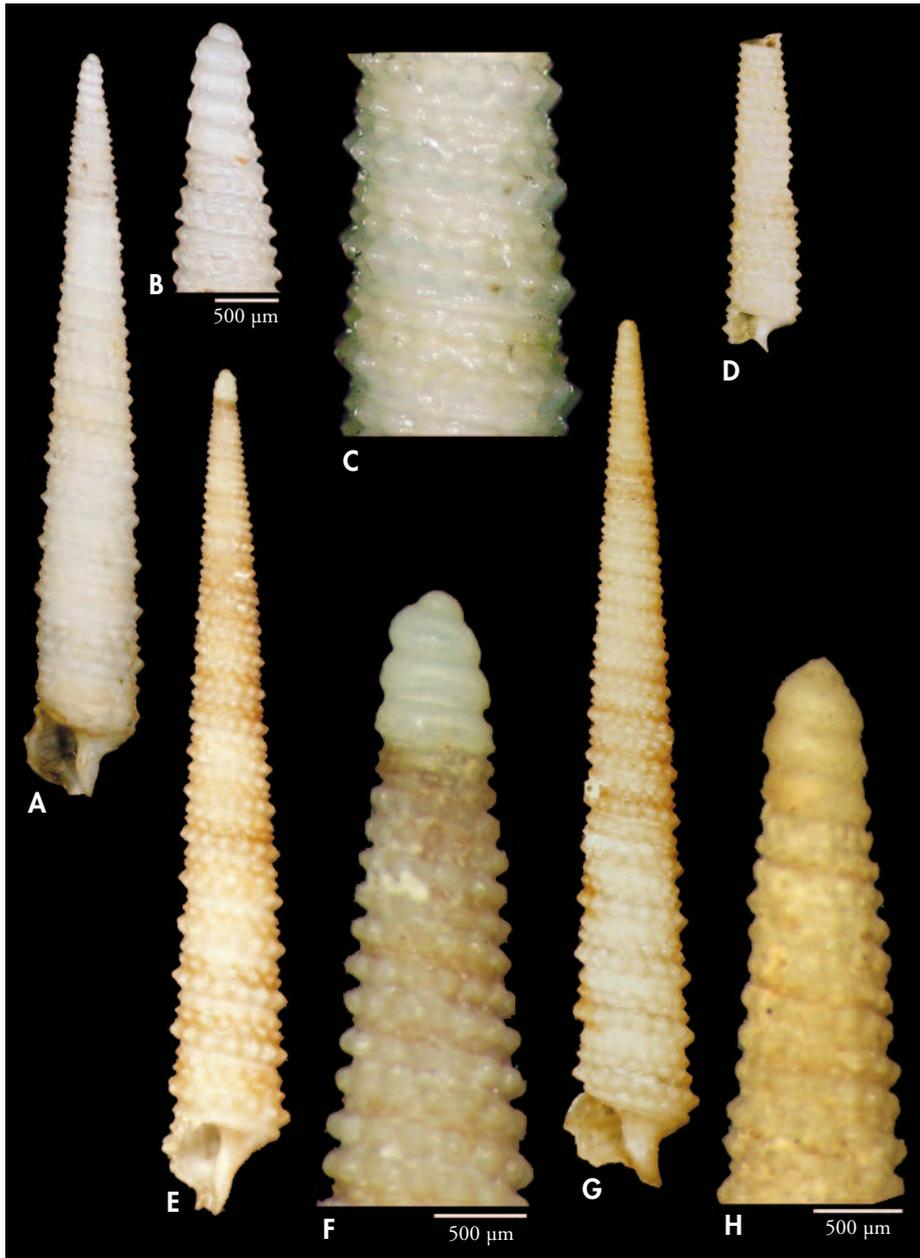


Figure 11. *Inella pseudolongissima* spec. nov. A: holotipo, 22.0 mm, off Havana, 823 m (USNM); B: protoconch of the holotype; C: detalle de la espira; D: paratipo, 10.4 mm (USNM); E: paratipo, 18.5 mm (FLMNH); F: protoconch of this paratipo; G: paratipo, 23.4 mm (FLMNH); H: protoconch of this paratipo.

Figura 11. *Inella pseudolongissima* spec. nov. A: holotipo, 22,0 mm, fuera de La Habana, 823 m (USNM); B: protoconcha del holotipo; C: detalle de la espira; D: paratipo, 10,4 mm (USNM); E: paratipo, 18,5 mm (FLMNH); F: protoconcha de este paratipo; G: paratipo, 23,4 mm (FLMNH); H: protoconcha de este paratipo.

Triforis triserialis var. *intermedia* Dall, 1881. In DALL, 1889. *Bull. Mus. Comp. Zool.*, 18: 287, plate 20, fig. 8. [Habitat: 805 fms (1473 m). Barbados, 183 m].

Triphora clenchi Aguayo, 1935. Unnecessary replacement name *pro Triforis intermedius* Dall, 1881.

Type material: Syntype (Fig. 14G) here designated as lectotype (MCZ 7384) (off Cuba, Yucatan Strait and Cape San Antonio. Depth: 1171 m. Blake 1877-1878 Exped.); one paralectotype (Fig. 14H)(MCZ 7382) (Havana, off Morro Light. Depth: 1473 m. Blake 1877-1878 Exped.). Both shells were labeled *T. triserialis*.

Description: See DALL (1881). No protoconch was known and the author refers to "nucleus missing". Two spirals of similar strength (spirals 1 and 3) are present on the first whorls of the shell; spiral 2 appears below and is clearly smaller up to near the end of the spire, where the three spirals are almost similar in size (Fig. 14I). Axial ribs prosocline, and the nodules are spherical.

Dimensions: The lectotype measures 7.9 mm.

Distribution: From Yucatán, Mexico, Barbados and Cuba.

Remarks: The lectotype here selected is very similar to the shell represented in DALL (1989: pl. 20, fig. 8) (Fig. 36F) but it is not coincident with the description, which refers to a size of 11 mm and 23 whorls; also the figure does not agree with the description, because in spite of the fact that a height of 11 mm is mentioned, there are not more than 15-16 whorls. The shell here selected as lectotype is only 7.9 mm and has 12 whorls, and it may be the original shell which lost some part of the spire. Anyway, it must be kept as lectotype in order to attain nomenclatural stability. The paralectotype is 7.2 mm and has about 13 whorls (MCZ 7382).

The name *Triphora triserialis clenchi* Aguayo, 1935 is an unnecessary replace-

ment name for *Triforis intermedius* Dall, 1881 (which is the same taxon as *Triforis triserialis* var. *intermedia* Dall, 1881 (in DALL, 1889)). This is due to the fact that this name is not preoccupied by *Cerithium intermedium* C. B. Adams, 1850; initially both belonged in different genera and finally the first one is placed in *Inella* and the second was recently placed by ROLÁN AND FERNÁNDEZ-GARCÉS (1995) in the genus *Similiphora* Bouchet, 1985.

Lack of knowledge of the protoconch is a problem when comparing this species to others from the Caribbean. Basing this comparison on the teleoconch, the following species must be taken into account:

Inella longissima has a more cylindrical, more elongate shell, spiral 2 is of similar size to the other two spirals on most of the spire, while in *I. intermedia* it is always smaller.

Inella pseudolongissima spec. nov. has spiral 3 more prominent and with larger nodules.

Inella harryleei spec. nov. has a typically deep suture, spiral 3 being the most prominent, and spiral 1 is also larger than spiral 2, these differences being maintained to the end of the shell.

Inella triserialis has spiral 1 more prominent and with larger nodules.

Inella ibex (Dall, 1881) (Figs. 14K-M, 36G)

Triforis ibex Dall, 1881. *Bull. Mus. Comp. Zool.*, 9: 86. [Type locality: off Cape San Antonio, 1171 m; Yucatan Strait, 1171 m; Sigsbee, off Havana, 823 m].

Triforis (Sychar) inflata var. *ibex* Dall, 1889. *Bull. Mus. Comp. Zool.*, 18: 249, pl. 20, fig. 12b.

Type material: A syntype (f) of 10.4 mm here designated as lectotype (Fig. 14K), off Cuba, Yucatan Strait and Cape San Antonio, 1171 m (MCZ 7391); another syntype, now paralectotype, f of 7.7 mm, off Havana, Cuba 823 m (MCZ 7392). Another paralectotype (Fig. 14L) (USNM 87313), off San Antonio, Cuba, 1189 m.

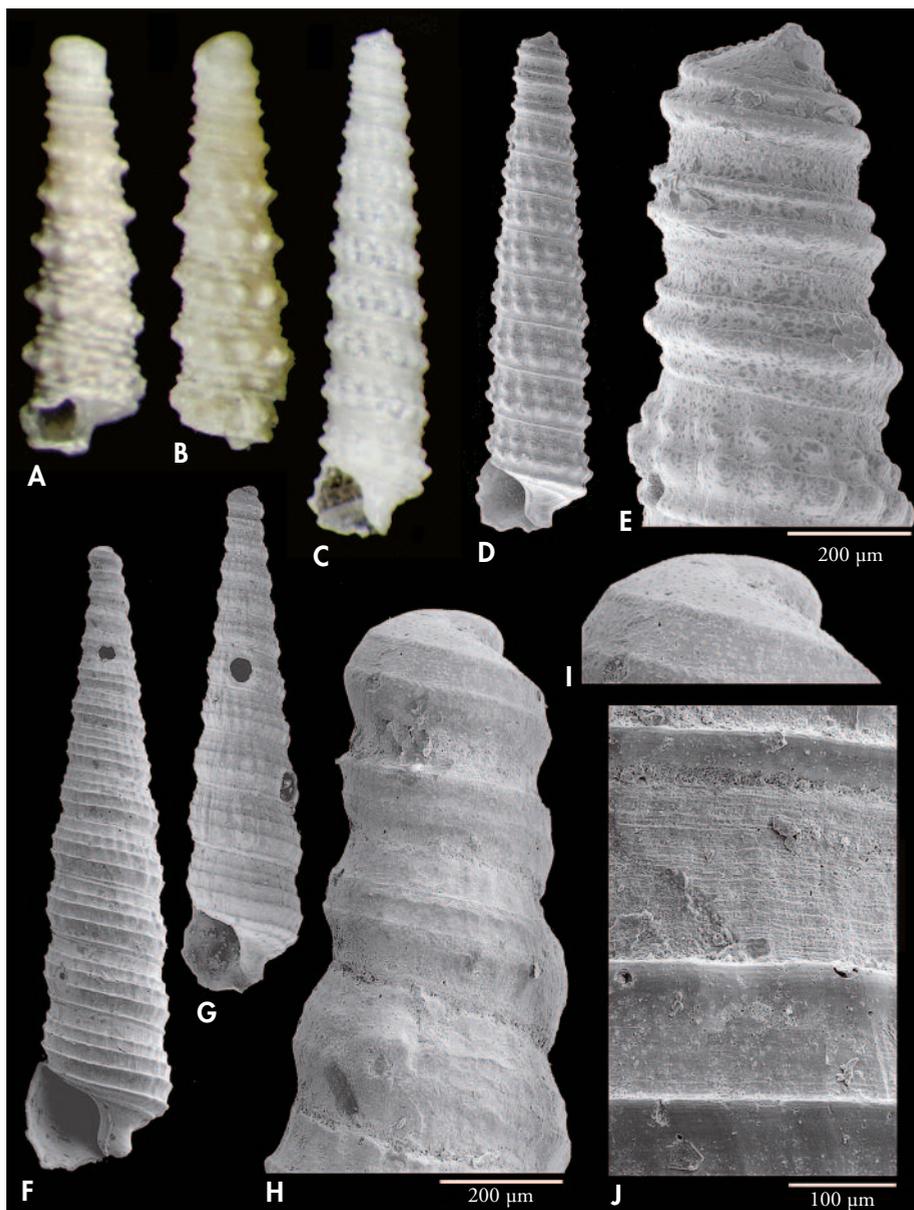


Figure 12 A, B. *Inella noduloides* spec. nov. holotype, 2.1 mm, Grand Bahama Island (ANSP). C-E. *Inella apexbilarata* spec. nov. C: holotype, 3.5 mm, Grand Bahama Island (ANSP); D: paratype, 3.2 mm, Grand Bahama Island (ANSP); E: protoconch of the paratype. F-J. *Inella pinarena* Espinosa, Ortea and Fernández-Garcés, 2007. F: paratype, 6.0 mm (CFG); G: shell, 5.0 mm (MHNS); H: protoconch of the paratype; I: detail of the protoconch; J: microsculpture.

Figura 12. A, B. *Inella noduloides* spec. nov. holotipo, 2,1 mm, Grand Bahama (ANSP). C-E. *Inella apexbilarata* spec. nov. C: holotipo, 3,5 mm, Grand Bahama (ANSP); D: paratipo, 3,2 mm, Grand Bahama (ANSP); E: protoconcha del paratipo. F-J. *Inella pinarena* Espinosa, Ortea and Fernández-Garcés, 2007. F: paratipo, 6,0 mm (CFG); G: concha, 5,0 mm (MHNS); H: protoconcha del paratipo; I: detalle de la protoconcha; J: microescultura.

Type locality: The three localities mentioned in the original description are written on the label of the lectotype, and hence there is no exact information about which locality applies to this type.

Description: See DALL (1881). The original description mentions a nucleus twice as large as that of *I. colon*, smooth, inflated, rounded on top, larger than the succeeding nuclear whorl, which has two inconspicuous narrow keels which are wavy and almost tuberculate at first, and merge almost imperceptibly into the usual sculpture of the shell. The type material studied has no protoconch, which obviously was lost. The most important characters of the teleoconch are: shell (Figs. 14K, 14L) with two rows of nodules throughout the spire and with one more, smaller and not nodulous, occurring at the suture at the end the spire (Fig. 14M). The nodules are cut at the middle. The axial ribs are scarcely appreciable and slightly prosocline.

Dimensions: The lectotype measures 10.4 mm.

Distribution: Known from Yucatan (Mexico) and Cuba.

Remarks: *Triforis ibex* is the type species of the genus *Strobiligera* Dall, 1924. The problem is that we have no image or a good description of the protoconch of this species, and the original description allows us to think that the protoconch is almost smooth, the first whorl wider than the second and with two whorls, which is typical of a protoconch of an *Inella* species. In this case; *Strobiligera* could be a synonym of *Inella*.

The assignment of this species to the genus *Inella* is tentative, The lectotype here designated is similar to the shell represented in DALL (1889, pl. 20, fig. 12b) (Fig. 36G) and also its dimensions are closer to those referred to in the original description.

Comments on the differences of *I. ibex* from other species with two spiral beaded cords can be seen below in *I. colon*, which is the most similar species.

Inella torticula (Dall, 1881) (Figs. 15, 36H)

Triforis torticulus Dall, 1881. *Bull. Mus. Comp. Zool.*, 18: 82. [Type locality: Yucatan Strait, 1170 m].
Triforis (Sychar) torticula Dall, 1881. In DALL, 1889. *Bull. Mus. Comp. Zool.*, 18: 249, pl. 20, fig. 11b.

Type material: One syntype (Fig. 15A) (f) here designated as lectotype, 6.7 mm, off Cuba, Yucatan Strait, 1171 m, Blake 1877-1878 Exped. (MCZ 7390); the syntypes in USNM have been lost (Ellen Strong, pers. comm.).

Other material examined: 1 f (Fig. 15B) (labeled as *Triphora bigemma* Watson, 1880), 9.7 mm, 9 whorls, Yucatan Strait, 1171 m (MCZ 7388); 1 s (Figs. 15C, 15D), 25.0 mm, Straits of Florida, 1000-1200 m (CHL).

Description: See DALL (1881). The most important characters are: 4 spirals, the lowermost spiral 4 very narrow and very close to the suture; spiral 1 smaller than spirals 2 and 3, which are equal in size and prominence. Colour whitish. The study of an almost complete adult shell (without protoconch) with 17.5 whorls (Figs. 15C, 15D) (CHL), allows us to add some information: at the beginning of the shell there are only three spirals, almost similar in size, but the uppermost slightly smaller; later, the differences between spiral 1 and spirals 2-3 are more evident, and at same time

spiral 4 appears; on about whorl 13 (on this shell) the uppermost spiral 1 is divided in two, there being 5 spirals at the end of the shell (Fig. 15E). The ribs are orthocline.

Dimensions: see below.

Distribution: Known from deep water off Florida and Cuba.

Remarks: The placement of this species in the genus *Inella* is tentative, as the protoconch and the aperture are not known.

The syntype in MCZ (Fig. 15A), here designated as lectotype, is a shell fragment that seems to be the one figured in

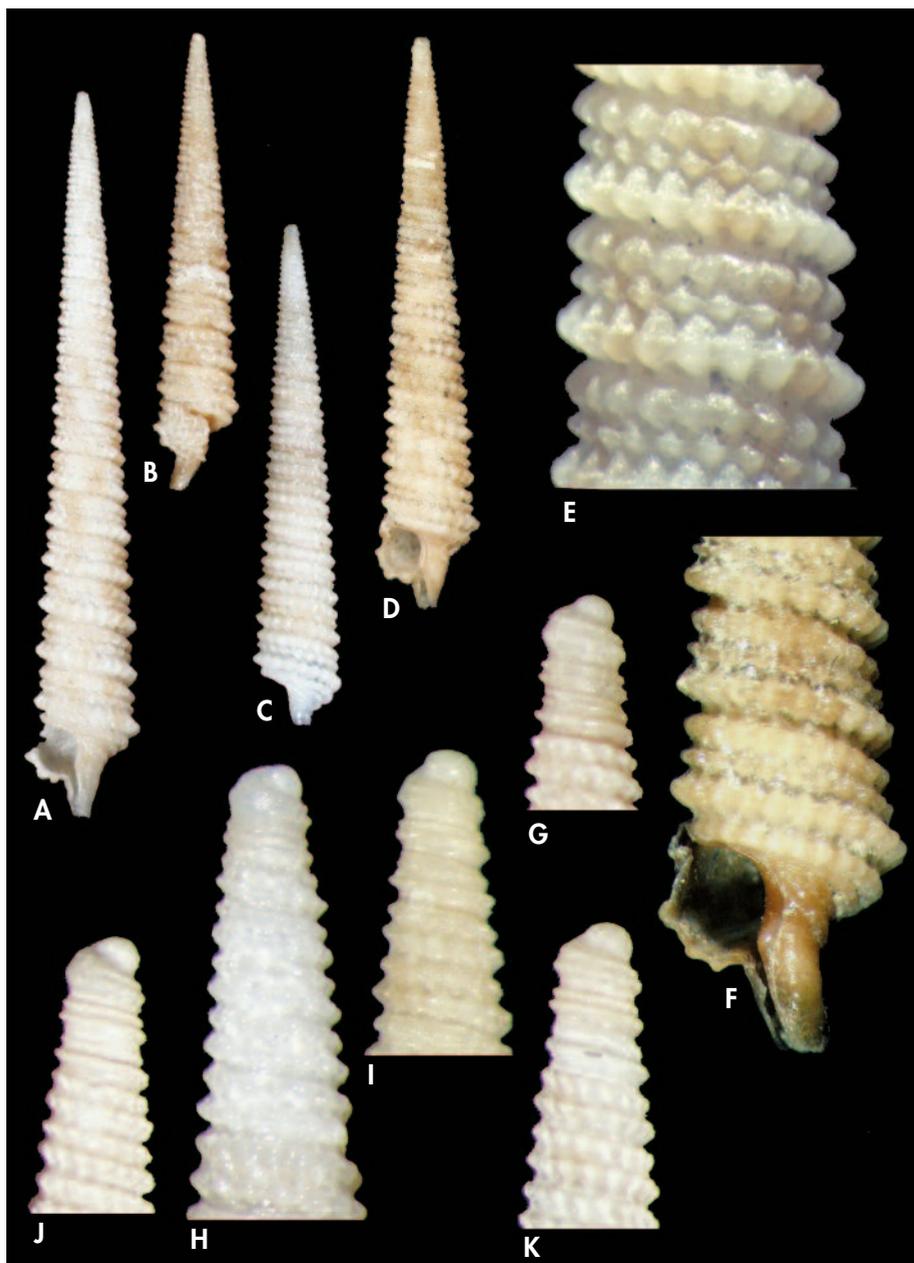


Figure 13. *Inella harryleei* spec. nov. A: holotype, 18.3 mm, off Dry Tortugas, 90 m (CHL); B: paratype 11.7 mm (BMSM); C: paratype, 12.8 mm (CHL); D: paratype, 14.6 mm (FLMNH). E: detail of the spire of the holotype; F: detail of the aperture of the paratype in figure B; G-K: protoconchas of several paratypes (CHL).

Figura 13. *Inella harryleei* spec. nov. A: holotipo, 18,3 mm, fuera de Dry Tortugas, 90 m (CHL); B: paratipo 11,7 mm (BMSM); C: paratipo, 12,8 mm (CHL); D: paratipo, 14,6 mm (FLMNH). E: detalle de la espira del holotipo; F: detalle de la abertura del paratipo de la figura B; G-K: protoconchas de varios paratipos (CHL).

DALL (1889, pl. 20, fig. 11b) (Fig. 36H), although a little more cylindrical, having only 4 whorls instead 6 and measuring 6.7 mm instead of 10.5, which could be due to the loss of two whorls of the shell. As it is compatible with the description, it was thought that it should be designated as lectotype in order to maintain nomenclatural stability. The other shell examined (Fig. 15B) measured 9.7 mm and had 9 whorls, the label without any indication of "type" and with the name *Triphora bigemma*; it is undoubtedly the same species.

The differences with *I. bigemma* Watson are very small, bearing in mind that although the latter species was described as having only two rows of

beads, the figure and the type clearly show three on the final whorls. However, this is a juvenile, and to make a decision it would be necessary to examine the protoconchs and to compare several samples of both species.

The other shell studied (Figs. 15C, 15D) has a profile slightly different from the lectotype, with the whorls expanding more rapidly and with 4-5 spirals on the final whorls. This could represent a different species, but it is rather coincident in some characters with the shell figured by DALL (1889) (Fig. 36H) and for this reason it is considered to be an example of the variability of this taxon, which has differences between the first and the last whorls.

Inella colon (Dall, 1881) (Figs. 16, 36I)

Triforis colon Dall, 1881. *Bull. Mus. Comp. Zool.*, 9: 86. [Type locality: off Havana, Cuba 450 fms (823 m); off Cape San Antonio, 1171 and 1834 m].

Triforis (Inella) colon Dall, 1881. In DALL, 1889. *Bull. Mus. Comp. Zool.*, 18: 249, pl. 20, fig. 12.

Type material: One syntype (Fig. 16A) (f) here designated as lectotype, 12.7 mm, with the label "off Havana, 823 m" (USNM 87315), and another syntype (Fig. 16B) (f) 7.8 mm, now paralectotype, from the same lot. A syntype (Fig. 16C) (f) 8.6 mm, now paralectotype, from Cape San Antonio, 1171-1834 m (MCZ 7387).

Other material examined: 2 f of 16.2 and 5.6 mm, Egmont Key, Florida, Gulf of Mexico, (J. Moore/*Cavalier*, 1968), 180 m (CHL); 1 s (Fig. 16E), Yucatan, 21° 60' N, 86° 80' W, ENW of Contoy Light, off Cape Catoche (Riley Black, Apr. 1967) (McGinty coll.) 366-412 m (FLMNH 170221); 1 s (Fig. 16F), 24° 15' 28"N, 81° 57' 89"W, Monroe Co., Straits of Florida, 236-255 m (FLMNH 26660).

Type locality: With the designation of the lectotype, the type locality is restricted to off Havana, Cuba 823 m.

Description: See DALL (1881). In the original description the protoconch is mentioned as follows: nucleus and first nuclear whorls white, polished, smooth, flattened on top. The most important characters of the teleoconch are: shell almost cylindrical (Figs. 16A-16C), white, with two main very narrow spiral beaded cords and two smaller, smooth, slightly wavy cords located near the suture; one of them above and the other below the suture, this being almost imperceptible. The nodules are small and slightly prominent; the uppermost a little larger. The axial ribs almost inapparent, a little prosocline; whorls very short and flat.

Dimensions: The lectotype measures 12.7 mm.

Distribution: Known from deep water of Florida, Yucatan and Cuba.

Remarks: The lectotype (Fig. 16A) is in accordance with the original description and it seems to be the shell figured in DALL (1889: pl. 20, fig. 12) (herein Fig. 36I), having the same number of whorls and almost the same dimensions. A paralectotype in the same lot as the lectotype (Fig. 16B) seems to be a different species, because this shell has three spirals instead of two. The paralectotype in MCZ (Fig. 16C) is a little different from the lectotype, but it has the typical distribution of the cords (Fig. 16D) and is probably the same species. Some shells from the Gulf of Mexico (Figs. 16E and 16F) have been included in this taxon but they could rep-



Figure 14. A, B. *Inella* aff. *harryleei*, shell, 28.8 mm and protoconch (FLMNH). C-E. *Inella triserialis* (Dall, 1881). C: lectotype, 6.4 mm (USNM); D: paralectotype, 5.6 mm (USNM); E: protoconch of the paralectotype. F. *Triphora aspera*, lectotype, 13.0 mm (BMNH) (= *Strobiliger brychia*). G-J. *Inella intermedia* (Dall, 1881). G: lectotype, 7.9 mm, off Cuba, Yucatan Strait and Cape San Antonio, 1171 m (syntype of *T. triserialis*, MCZ 7384). H: paralectotype, 7.2 mm, (Havana, off Morro Light, 1473 m (syntype of *T. triserialis*, MZS 7382); I: detail of the sculpture of the paralectotype. J: shell photographed by Kaicher (ANSP, unknown size and other data). K-M. *Inella ibex* (Dall, 1881). K: lectotype, 10.4 mm, off Cuba, Yucatan Strait and Cape San Antonio, 1171 m (MCZ 7391); L: paralectotype, 9.2 mm (USNM 87313); M: detail of the spire of the lectotype.

Figura 14. A, B. *Inella* aff. *harryleei*, concha, 28,8 mm y protoconcha (FLMNH). C-E. *Inella triserialis* (Dall, 1881). C: lectotipo, 6,4 mm (USNM); D: paralectotipo, 5,6 mm (USNM); E: protoconcha del paralectotipo. F. *Triphora aspera*, lectotipo, 13,0 mm (BMNH) (= *Strobiliger brychia*). G-J. *Inella intermedia* (Dall, 1881). G: lectotipo, 7,9 mm, fuera de Cuba, Estrecho de Yucatán y Cabo de San Antonio, 1171 m (sintipo de *T. triserialis*, MCZ 7384). H: paralectotipo, 7,2 mm, (La Habana, fuera de Morro Light, 1473 m (sintipo de *T. triserialis*, MZS 7382); I: detalle de la escultura del paralectotipo. J: concha fotografiada por Kaicher (ANSP, tamaño desconocido así como otros datos). K-M. *Inella ibex* (Dall, 1881). K: lectotipo, 10,4 mm, fuera de Cuba, Estrecho de Yucatán y Cabo de San Antonio, 1171 m (MCZ 7391); L: paralectotipo, 9,2 mm (USNM 87313); M: detalle de la espira del lectotipo.

resent a different species, because the spirals are more prominent and are more widely separated than on the lectotype. However, the lack of protoconch and the differences of the sculpture are not very important, and so provisionally they have been kept in this species awaiting more material in the future.

DALL (1881) referred to the differences between *I. ibex* and *I. colon*, probably because he considered both species very similar. Unfortunately at present their protoconchs are not known, but Dall was of the opinion that the protoconch of *I. ibex* was twice as large as that of *I. colon*. In the teleoconch characters, *I. ibex* has more rapidly expanding whorls,

the nodules are larger and are cut at the middle, and fewer whorls occupy the same space.

The other Caribbean species may have two spirals at the beginning of the teleoconch, but finally have three or more spirals. This includes *I. pompona* and *I. meteora*, although spiral 1 is very small and sometimes difficult to see.

Inella unicornium Simone, 2006, from Brazil, has a larger shell (up to 50 mm, the biggest known species of Triphoridae), which according to the original description may be differentiated from *I. colon* not only by its larger size, but also by its proportionally longer whorls, taller spiral cords and projecting outer lip.

Inella undebermuda spec. nov. Rolán and Lee (Figs. 17A-E)

Type material: Holotype (Fig. 17A) in FLMNH; a paratype (Fig. 17B), 12.3 mm, in USNM. Both from type locality (J.R.H. Lightbourn and A.T. Guest, 1988; *ex* J.R.H. Lightbourn 9/8/93; *ex* CHL).

Type locality: S. of Castle Roads, Bermuda, 90 m.

Etymology: The specific name derives from the Latin word *unde* "origin" and the name of the archipelago where the species was collected.

Description: Shell (Figs. 17A, 17B) elongate, whitish and solid. Protoconch (Fig. 17C) white, without a clear separation from the teleoconch, with about two whorls, the nucleus smooth, one spiral cord appearing in the middle of the first whorl and becoming two on the second; the diameter of about 380 μ m. The first whorls of the teleoconch have two spiral beaded cords (spirals 1 and 3), and a very small smooth and narrow thread very close to the suture; between the 6-7th whorls, spiral 2, which is also narrow and smooth, appears between the other two, closer to spiral 1. On the subsequent whorls, spiral 2 increases slowly in size, becoming slightly undulating and with nodules appearing at the end of the spire (Fig. 17D), but always remaining nearer to spiral 1. The nodules of spirals 1 and 3 are larger and cut at the middle. Aperture (Fig. 17E) rhomboid, columella almost straight, siphonal canal very short and curved.

Dimensions: The holotype measures 7.8 mm, and the paratype 12.3 mm.

Distribution: Only known from the type locality.

Remarks: The holotype is the smallest shell, but has a protoconch in good condition. The paratype lacks the first protoconch whorl. The most important differential character is the smaller size of spiral 2 and its location closer to spiral 1.

This species must be compared with and separated from the following:

Inella longissima is more elongate and cylindrical and has the three spirals similar in size and distribution. In juveniles assumed to belong to this species, the protoconch has three whorls, and when spiral 2 appears on the first whorls of the teleoconch, it is in the middle between spirals 1 and 3 and not closer to the upper one.

Inella pseudolongissima spec. nov. has a protoconch with four whorls and the spirals of the teleoconch are different, spiral 3 being larger and more prominent than the others. Spiral 2 is only the smaller one at the beginning.

Inella harryleei spec. nov. has three whorls in the protoconch, and in the teleoconch spiral 2 becomes nodulous very early (between whorls 5-6) and is not closer to spiral 1, and the suture is

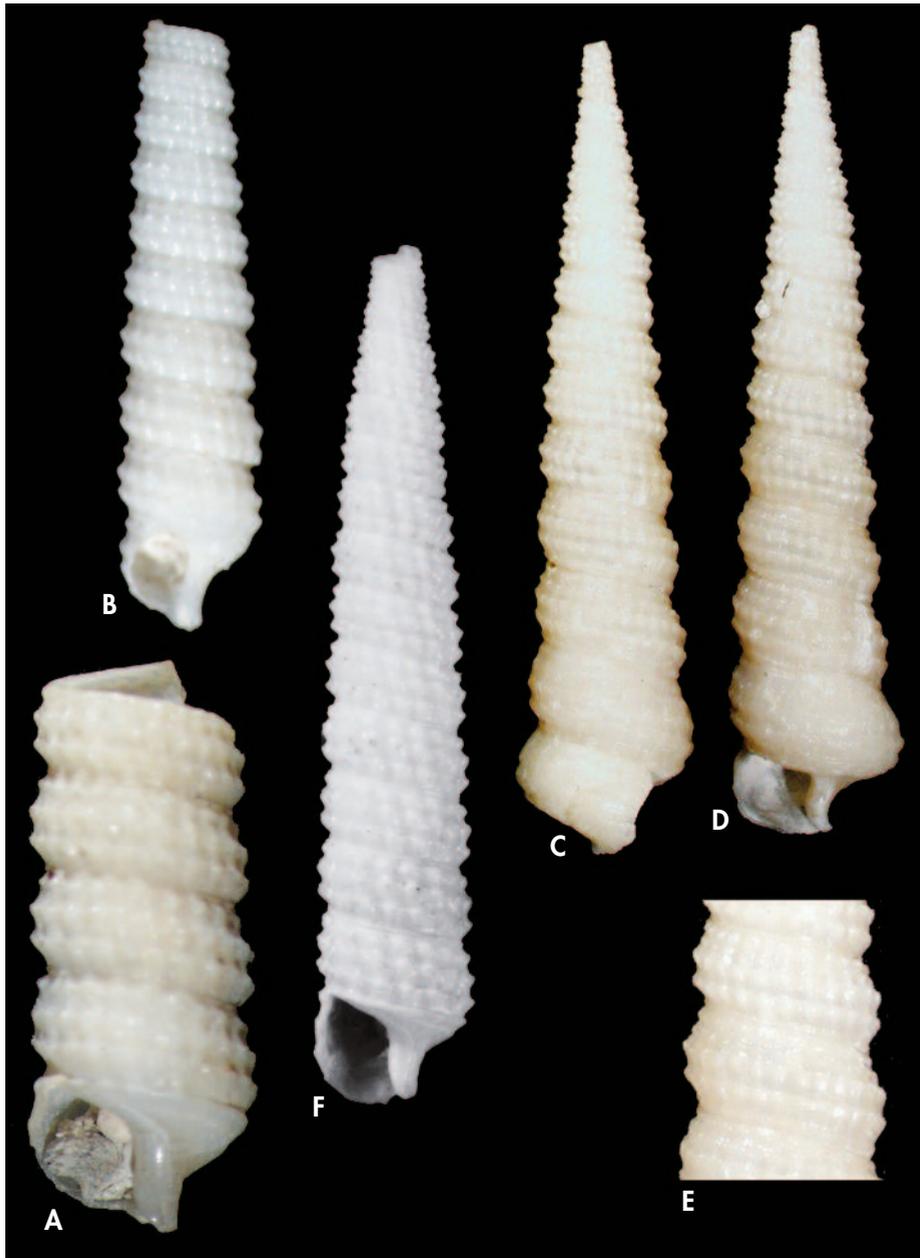


Figure 15. *Inella torticula* (Dall, 1881). A: lectotype, 6.7 mm (MCZ 7390); B: shell, (labeled as *T. bigemma*), 9.7 mm, 9 whorls, Yucatan Strait, 1171 m (MCZ 7388); C, D: shell, 25.0 mm, Straits of Florida, 1000-1200 m (CHL); E: detail of sculpture. F: shell photographed by Kaicher (ANSP, lacking size and data).

Figura 15. *Inella torticula* (Dall, 1881). A: lectotipo, 6,7 mm (MCZ 7390); B: concha, (etiquetada como *T. bigemma*), 9,7 mm, 9 vueltas, Estrecho de Yucatán, 1171 m (MCZ 7388); C, D: concha, 25,0 mm, Estrechos de Florida, 1000-1200 m (CHL); E: detalle de la escultura. F: concha fotografiada por Kaicher (ANSP, careciendo de información sobre su tamaño y otros datos).

more evident. Furthermore, the colour consists of axial brown flammules and brown siphonal canal, more elongate.

Inella intermedia has a shorter shell and spiral 2 is strongly nodulous on the early whorls, being almost the same size

as the other two and located at a similar distance between them.

Inella ibex and *I. colon* have only two main spirals.

Inella torticula can have up to five spirals on the final whorls.

Inella sarissa (Dall, 1889)

Triforis (Inella) sarissa Dall, 1889. *Bull. Mus. Comp. Zool.*, 18: 247. [Type locality: near Barbados, 13° 11.54' N, 59° 38.45' W, 134 m].

Type material: The lot in USNM labeled as "87314 Holotype" of this species is empty (E. Strong, pers. comm.).

Description: See DALL (1889). The following characters must be pointed out from the original description: three rows of strong tubercles, the uppermost being the largest and spiral 3 the next in size; spiral 2 is the smallest and is close to spiral 1. It is also mentioned that one specimen had 24 whorls, thus being an elongate shell.

Dimensions: 15.5 mm is mentioned in the original description.

Distribution: Only known from its type locality.

Remarks: Apparently only *I. triserialis* has the uppermost spiral with larger nodules, but the other two spirals have the nodules rather similar in size; none of the other species here described have these characters. Anyway *I. triserialis* has a shorter shell.

Inella compsa (Dall, 1927) (Figs. 17F, G)

Triphora (Strobiligera) compsa Dall, 1927. *Proc. U. S. N. M.*, 70: 96. [Type locality: Off Georgia].

Type material: Lectotype, here designated (Fig. 17F) 12.0 mm, and one paralectotype (Fig. 17G) 9.4 mm (USNM 333518).

Description: See DALL (1927).

Distribution: Only known from the type locality.

Remarks: The description of the species seems to have been based on the characters of both lectotype and paralectotype, in spite of the fact that they may be different species. The lectotype (Fig. 17F) is in accordance with the description with the exception that it has not two but three prominent beaded cords with almost orthocline ribs, but the dimensions are those indicated in the

original description. However it is a fragment of a shell with a broken aperture and lacking a protoconch, and it is therefore difficult to define exactly. The paralectotype (Fig. 17G) has only two spirals, with a third appearing on the final whorls close to the undulating thread near the suture, and it could be a different species. Due to the lack of additional material apart from these mentioned types, it is preferable to wait for more suitable material to study in the future.

Inella pseudotorticula spec. nov. Rolán and Lee (Figs. 17H-L)

Type material: Holotype (Fig. 17H) in FLMNH; a paratype (Fig. 17I) in USNM (both ex J.R.H. Lightbourn, 9/8/93; ex CHL).

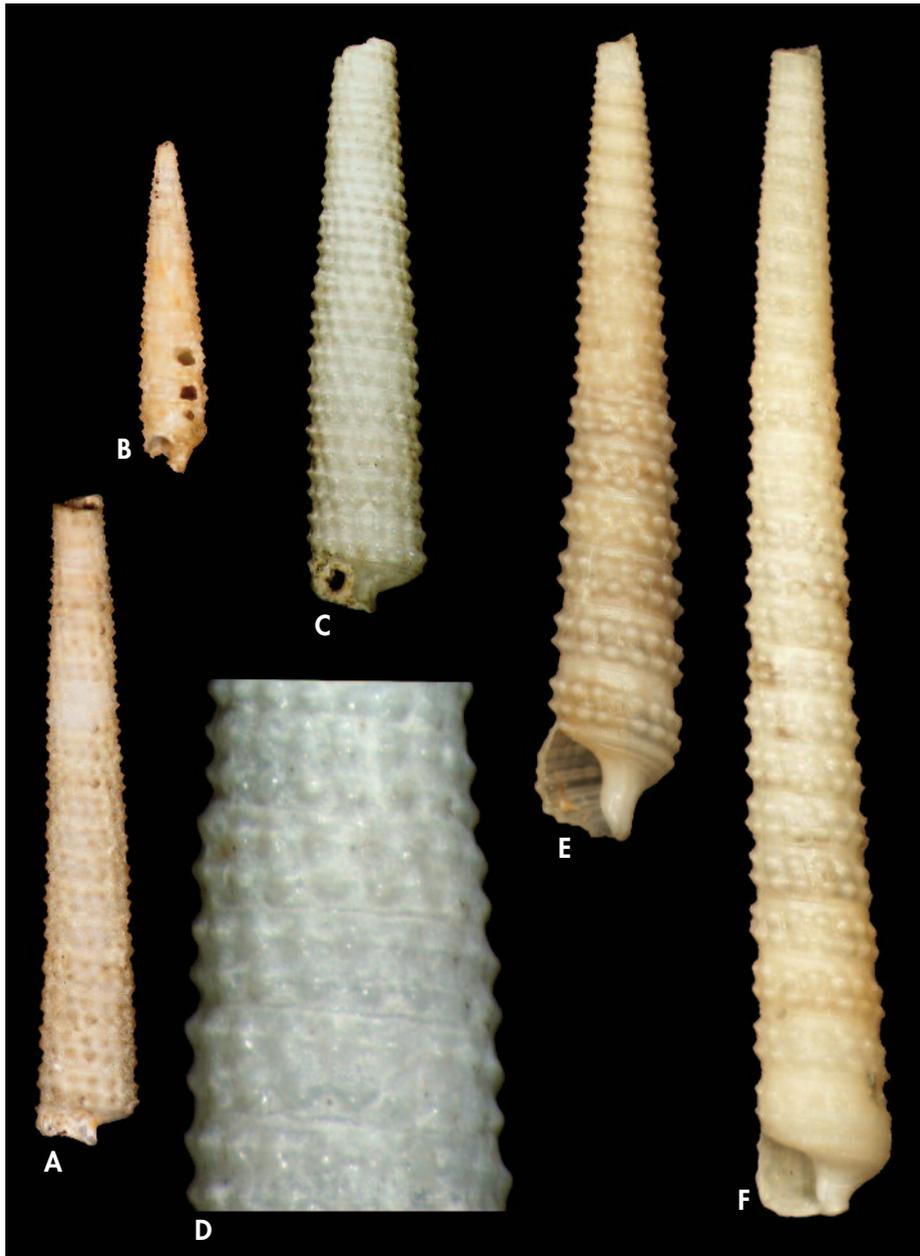


Figure 16. *Inella colon* (Dall, 1881). A: lectotype, 12.7 mm, off Havana, 823 m (USNM); B: paralectotype, 7.8 mm, off Havana, 823 m (USNM); C: paralectotype, 8.6 mm, Cape San Antonio, 1171-1834 m (MCZ 7387); D: detail of the sculpture; E: shell, 20.3 mm, Yucatan (FLMNH); F: shell, 29.4 mm, straits of Florida (FLMNH).

Figura 16. *Inella colon* (Dall, 1881). A: lectotipo, 12,7 mm, fuera de La Habana, 823 m (USNM); B: paralectotipo, 7,8 mm, fuera de La Habana, 823 m (USNM); C: paralectotipo, 8,6 mm, Cabo de San Antonio, 1171-1834 m (MCZ 7387); D: detalle de la escultura; E: concha, 20,3 mm, Yucatán (FLMNH); F: concha, 29,4 mm, estrechos de Florida (FLMNH).

Type locality: South of Castle Roads, SE Bermuda, (J.R.H. Lightbourn and A.T. Guest, 1988) 100 m.
Etymology: The specific name alludes to the similarity with *I. torticula*.

Description: Shell (Figs. 17H, 17I) very elongate, pointed, with blunt apex, not straight in profile, solid. Protoconch (Fig. 17J) with about 2 ¹/₂ whorls, with a wide nucleus and two spiral cords, of which the upper one is smaller and less prominent; diameter of about 400 μ m. The teleoconch has about 23 whorls (on the holotype) with spirals 2 and 3 present from the beginning, very similar in size, and with the nodules cut in the middle. On the early whorls spiral 1 is very small and is located close to the upper suture, with spiral 4 appearing like a fine thread near the lower suture; on about the ninth whorl, spiral 1 is more clearly defined on the upper part of the whorl, below the suture, but is smaller and less prominent than the other two, while spiral 2 is the most prominent and slightly larger; on about the seventeenth whorl, spiral 1 continues to be closer to spiral 2 (Fig. 17K). On about the twenty-first whorl, the three spirals are almost similar in size. Aperture (Fig. 17L) ovoid with a short siphonal canal.

The shell has some white whorls alternating with entirely light brown whorls. The cords are often light brown between the nodules.

Dimensions: The holotype measures 16.8 mm.

Distribution: Only known from the type locality.

Remarks: This species must be compared with the following ones that have elongate shells:

Inella longissima has spirals 1 and 3 from the beginning, with spiral 2 appearing below; at the end of the spire the spirals are of almost equal strength, but spiral 2 is slightly smaller and spiral 3 a little more prominent on most of the shell.

I. pseudolongissima spec. nov. has spirals 1 and 3 from the beginning, with spiral 2 smaller; on the final whorls spiral 3 is noticeably larger than the others; the colour is whitish. The protoconch has four whorls.

I. harryleei spec. nov. has spirals 1 and 3 from the beginning; spiral 2 appears after the first few whorls but remains smaller throughout the shell; at the end, spiral 3 is very large in comparison with the others; the colour is white or light brown with brown axial flammules.

I. triserialis (Dall, 1881) has a shorter shell with three spirals, spiral 1 being larger with more inflated nodules. The apex is more depressed.

I. intermedia (Dall, 1881) has a shorter shell with spirals 1 and 3 present at the beginning; spiral 2 is smaller and appears later.

I. ibex (Dall, 1881) and *I. colon* have only two prominent beaded cords.

I. torticula (Dall, 1881) has spiral 1 less prominent on the early whorls; subsequently the final whorls are wider and have up to 5 spirals.

I. undebermuda spec. nov. has spirals 1 and 3 at the beginning of the teleoconch, with spiral 2 appearing between the other two, always remaining smaller and closer to spiral 1.

I. unicornium, described by Simone, 2006 from Brazil, has some general similarity with *I. pseudotorticula*, but the holotype is a shell with 40 whorls that measures almost 50 mm in height; also it is mentioned in the original description that the protoconch has only one whorl and the teleoconch whorls have only two beaded spiral cords, with an additional smooth cord appearing on the final whorl.

Inella enopla (Dall, 1927) (Figs. 18A-E)

Triphora enopla Dall, 1927. *Proc. U. S. N. M.*, 70: 95. [Type locality: Off Fernandina, Florida, 294 fms (538 m)].

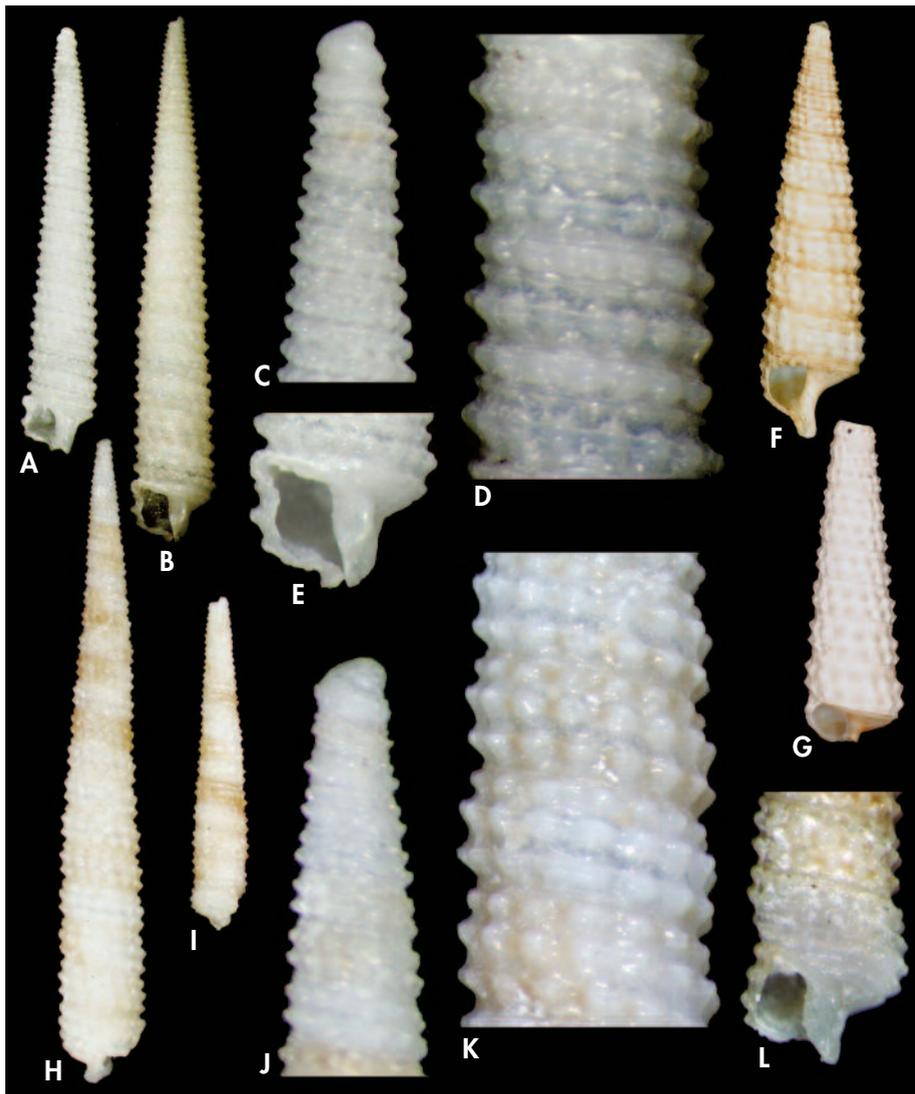


Figure 17. A-E. *Inella undebermuda* spec. nov. A: holotipo, 7,8 mm, S. of Castle Roads, Bermuda, 90 m (FLMNH); B: paratipo, 12,3 mm, same locality (USNM); C: protoconcha of the holotipo; D: detalle de la escultura, holotipo; E: detalle de la abertura, holotipo. F, G. *Inella compsa* (Dall, 1927). F: lectotipo, 12,0 mm, off Georgia, 805 m; (USNM); G: paralectotipo, 9,4 mm, off Georgia, 805 m (USNM). H-L. *Inella pseudotortricula* spec. nov. H: holotipo, 16,8 mm, SE Bermuda (FLMNH); I: paratipo, 8,5 mm, S. of Castle Roads, Bermuda (USNM); J: protoconcha, holotipo; K: detalle de la escultura, holotipo; L: detalle de la abertura.

Figura 17. A-E. Inella undebermuda spec. nov. A: holotipo, 7,8 mm, S. de Castle Roads, Bermuda, 90 m (FLMNH); B: paratipo, 12,3 mm, la misma localidad (USNM); C: protoconcha del holotipo; D: detalle de la escultura, holotipo; E: detalle de la abertura, holotipo. F, G. *Inella compsa* (Dall, 1927). F: lectotipo, 12,0 mm, fuera de Georgia, 805 m; (USNM); G: paralectotipo, 9,4 mm, fuera de Georgia, 805 m (USNM). H-L. *Inella pseudotortricula* spec. nov. H: holotipo, 16,8 mm, SE Bermuda (FLMNH); I: paratipo, 8,5 mm, S. de Castle Roads, Bermuda (USNM); J: protoconcha, holotipo; K: detalle de la escultura, holotipo; L: detalle de la abertura.

Type material: Lectotype (2 f, labeled as "type"), here designated (Figs. 18A, 18B) and 5 paralectotypes (3 j, 2 f) (USNM 108074).

Other material examined: 2 f (with the label "*Triforis colon*"), off Havana, Cuba 823 m (Blake Expedition, Sta. 243) (BMNH acc. n° 2283).

Description: DALL (1927). Protoconch (Figs. 18C, 18D) with the apex smooth, pupoid, wide (about 500 μ m), followed by about 2 whorls with three very close cords, the uppermost smaller and the lowest one the largest and most prominent. Teleoconch whorls with two spiral nodulous cords and another two very fine cords that are separated by the suture (Fig. 18E); the subsutural one is very small and has elongate nodules, while the one just above the suture is smooth. The nodules on the main spirals are pointed and cut at the middle.

Dimensions: The lectotype consists of fragments measuring 7.2 and 6.6 mm.

Distribution: Only known from Florida and Cuba.

Remarks: The original description mentions 15 whorls and dimensions of 11.5 x 2 mm. The glass tube labeled "type" contained two fragments (7.2 and 6.6 mm respectively), but there were no apparent indication that they were previously united; therefore it is doubtful, although possible, that they came from the same shell. However, they give a good representation of the specific characters, and as it is not certain whether or not they are from the same broken shell, it is better to keep both fragments together and consider both as parts of the lectotype.

The large pupoid protoconch is the most important differential character. The most similar species are:

I. inflata has the protoconch whorls with two scarcely visible spiral cords, the nodules of the teleoconch smaller and sharply pointed, the shell with rapidly enlarging whorls.

Inella bigemma has the shell with more rapidly enlarging whorls, spiral 1 more developed and more clearly nodulous.

I. ibex is not so cylindrical and has more pointed nodules, with only one small thread near the suture, lacking the small upper spiral on the final whorls.

I. harryleei, *I. compsa*, *I. pseudotortricula* spec. nov. and *I. intermedia* have three spiral cords.

I. colon has a more cylindrical shell, with spiral cords less prominent, the nodules very small, and the small cords at both sides of the suture almost imperceptible.

I. undebermuda has three main spirals, spiral 2 being small and close to spiral 1; only one small thread near the suture.

I. pompona has a much larger space between spiral 2 and spiral 3, the nodules are smaller and the protoconch is wider and more prominent at the apex, and has two spiral cords.

Inella meteora (Dall, 1927) (Figs. 18F-H)

"Triphora" meteora Dall, 1927. *Proc. U. S. N. M.*, 70: 95. [Type locality: Off Fernandina, Florida].

Type material: Lectotype (labeled as "type", in three fragments), here designated (Figs. 18F, 18G) (USNM 108081) and 3 paralectotypes.

Description: DALL (1927). The protoconch (Fig. 18G) is pupoid with about 2 whorls and a diameter of about 600 μ m; below the nucleus there are two main smooth spiral cords and another smaller subsutural one.

The whorls of the teleoconch have three spiral cords from the beginning

(Fig. 18H), the lower two more similar in prominence, the nodules slightly larger on spiral 2; the uppermost is smaller from the beginning of the teleoconch and also is less prominent on the final whorls. The nodules are uniformly rounded on spiral 1 and larger and cut at the middle on the other two. Above

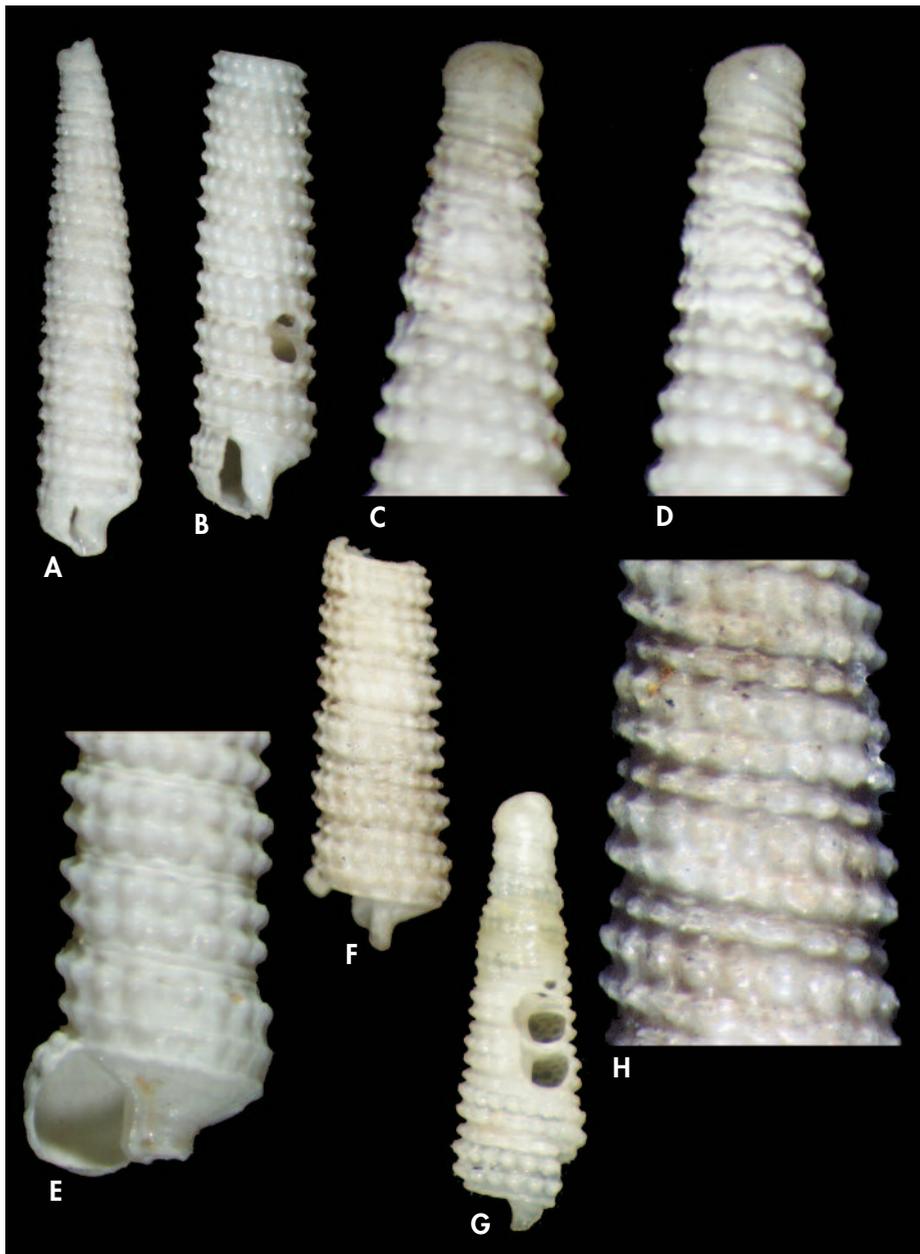


Figure 18. A-E. *Inella enopla* (Dall, 1927). A, B: two fragments labeled as “type”, 7.2, 6.6 mm, 538 m (USNM); C, D: protoconch of a paralectotype; E: detail of the sculpture of a paralectotype. F-H. *Inella meteora* (Dall, 1927). F, G: two fragments labeled as “type” 4.0 and 5.1 mm, off Fernandina, 538 m (USNM); H: detail of the sculpture.

Figura 18. A-E. *Inella enopla* (Dall, 1927). A, B: dos fragmentos etiquetados como “tipo”, 7,2, 6,6 mm, 538 m (USNM); C, D: protoconcha de un paralectotipo; E: detalle de la escultura de un paralectotipo. F-H. *Inella meteora* (Dall, 1927). F, G: dos fragmentos etiquetados como “tipo” 4,0 y 5,1 mm, fuera de Fernandina, 538 m (USNM); H: detalle de la escultura.

the suture there is a small undulating thread.

Dimensions: See below.

Distribution: Only known from its type locality.

Remarks: The original description gives dimensions of 9 x 2 mm; the fragments in the tube labeled "type" measure 6.2, 5.1 and 4.0 mm; they are of the same species but probably not from the same shell.

The 3 paralectotypes in the other tube appear to be a different species.

The differences with the closest species are:

I. bigemma has two spirals at the beginning of the teleoconch.

I. pompona and *I. inflata* have two spirals at the beginning of the teleoconch and a wider, pupoid protoconch.

I. longissima has two spirals at the beginning, subsequently three regular spirals of similar size, with spherical nodules, and the protoconch has three whorls.

I. pseudolongissima spec. nov. has a protoconch with 4 whorls, and spirals 2

and 3 are more evident at the beginning of the teleoconch.

I. harryleei has a more depressed apex on the protoconch; on the teleoconch the lower spiral is larger, with spiral 2 smaller.

I. ibex and *I. enopla* have only two spirals on the protoconch.

I. torticula can have up to 5 spirals at the end.

I. colon is more cylindrical and has only two main spirals on the teleoconch with small nodules.

I. undebermuda spec. nov. has two main spirals at the beginning of the teleoconch and one smaller spiral 2 in-between, located closer to spiral 1.

I. compsa is more conical, having more rapidly enlarging whorls; the nodules are less prominent and spherical.

I. pseudotorticula spec. nov. has a protoconch with a smaller diameter and with 2 well defined cords; only spirals 2 and 3 are present at the beginning of the teleoconch, spiral 1 appearing later.

Inella pompona (Dall, 1927) (Figs. 19A-C)

Triphora (Strobiligera) pompona Dall, 1927. *Proc. U. S. N. M.*, 70: 94. [Type locality: Off Georgia].

Type material: In the material under this name from USNM (Figs. 19A-19C) there is a label mentioning "type", but in the three glass tubes there is no other indication. The shell measuring almost 20 mm with 21 whorls is here designated as lectotype (Fig. 19A); it is referred to in the original description as the "larger but imperfect specimen" because the apex is missing. Numerous paralectotypes (USNM 108339), most of them fragments (6 in one tube and 48 in another); the largest fragment measures 23.5 mm.

Description: DALL (1927). The protoconch (Fig. 19B) is pupoid and wide, the nucleus and the first whorl wider than the subsequent ones, with the diameter of the first whorl between 650 and 750 μm ; in the original description it is described as having 1 1/2 whorls, but it can have more than 2 whorls, the second one with two spiral cords. Teleoconch with two main spirals (spirals 2 and 3); spirals 1 and 4 are very close to the suture, which separates them (Fig. 19C). Spiral 1 has very small nodules, while spiral 4 is smooth. The nodules on the main spirals are not very prominent

and only a little higher than the cords, and they are slightly cut at the middle.

Dimensions: The lectotype measures almost 20 mm, and some shells are somewhat larger.

Distribution: Only known from the type locality.

Remarks: The species with a pupoid and wide protoconch are:

I. enopla has a slightly narrower protoconch of three whorls, with three scarcely visible spiral cords.

I. ibex and *I. colon* each have information on the protoconch in the original description, but shells with a complete

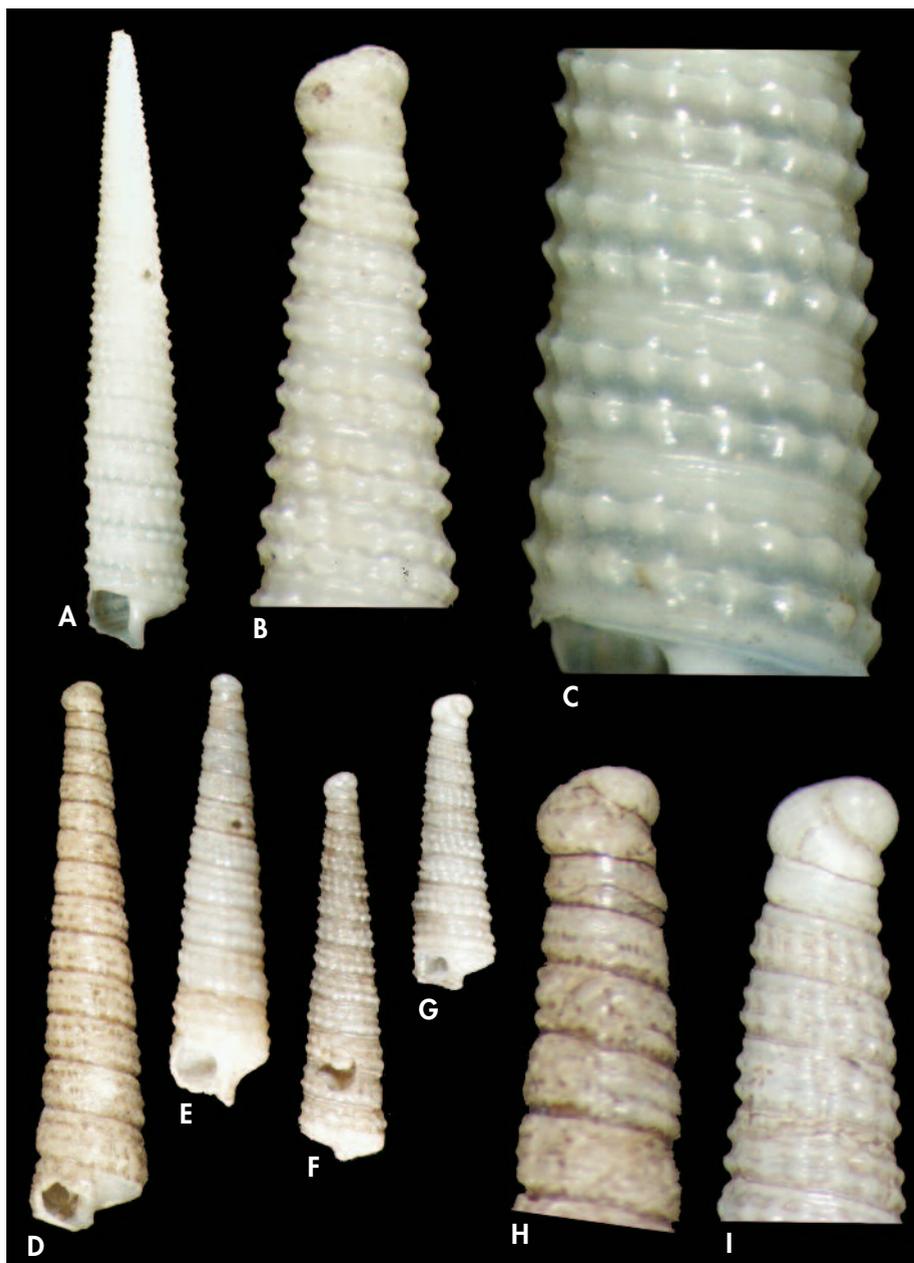


Figure 19. A-C. *Inella pompona* (Dall, 1927). A: lectotype, 19.5 mm, 804 m (USNM); B: protoconch of a paralectotype; C: detail of the sculpture of lectotype. D-I. *Inella dinea* (Dall, 1927). D: lectotype, 7.9 mm, 804 m (USNM); E-G: paralectotypes, 6.6, 6.0, 4.7 mm, same locality; H, I: protoconchs, lectotype and paralectotype.

Figura 19. A-C. *Inella pompona* (Dall, 1927). A: lectotipo, 19,5 mm, 804 m (USNM); B: protoconcha de un paralectotipo; C: detalle de la escultura del lectotipo. D-I. *Inella dinea* (Dall, 1927). D: lectotipo, 7,9 mm, 804 m (USNM); E-G: paralectotipos, 6,6, 6,0, 4,7 mm, la misma localidad; H, I: protoconchas, lectotipo y paralectotipo.

apex are not known; on the teleoconch there are similarly two spiral beaded cords, but on *I. colon* the sutural area is narrower and the nodules are smaller; *I. ibex* has smooth spirals at the beginning of the teleoconch.

I. inflata has a similar protoconch, but clearly narrower; there is a greater increase in the width of the whorls and the suture is more prominent.

I. undebermuda spec. nov. has a narrower protoconch; in the teleoconch,

between the main spirals 1 and 3, there is a small spiral 2 closer to spiral 1.

I. dinea (see below).

The species with unknown protoconch:

I. compsa has rapidly enlarging whorls and three almost similar spirals.

I. sarissa has spiral 1 larger, with spiral 2 very small and close to spiral 1.

I. bigemma has small nodules on spiral 1 and fewer whorls, never elongated.

Inella dinea (Dall, 1927) (Figs. 19D-I)

"*Triphora*" *pompona dinea* Dall, 1927. *Proc. U. S. N. M.*, 70: 94. [Type locality: Off Georgia, 440 fms (805 m)].

Type material: Lectotype (Fig. 19D), here designated, and 11 paralectotypes (Figs. 19E-19G) (USNM 333517).

Description: DALL (1927), comparing shells to typical *I. pompona*, only mentioned that the beading is less prominent and the shells are more slender and compact, measuring 10 mm for 15 whorls, with a maximum diameter of 1.75 mm. Now it can be added that the protoconch (Figs. 19H, 19I) has between $2^{1/4}$ - $2^{1/2}$ smooth whorls and is a little variable in size, but it can reach up to 700 μ m and is pupoid at the apex, with a large nucleus and with two or three depressed smooth cords on the second whorl. On the teleoconch, the suture has a smooth fine cord on each side. The axial sculpture is formed by small ribs on some shells; on others the ribs are almost absent; there are small orthocline growth lines. There are three spirals, equal in size on the lectotype but with spiral 1 less prominent on other shells.

Dimensions: The lectotype measures 7.9 mm.

Distribution: ROSENBERG (2005) gives coordinates of 30.73° N, 79.43° W, with a depth of 805 m.

Remarks: In the material studied there was no shell measuring 10 mm, but the designated lectotype has 14 whorls including the protoconch, and is almost 8 mm. This shell was chosen because the number of whorls is closest

to the number given in the description. Also because it has three similar cords on each whorl, very different from *T. pompona*. Not all the paralectotypes seem to be the same species.

Although the present taxon was published as a variety of *T. pompona*, comparison of the types of both species allowed us to confirm that they are different species. *T. pompona* has two nodulous cords per whorl and a very small cord, lacking nodules, on either side of the suture. *T. dinea* has a similar pupoid protoconch but the shell is variable, with some shells having three cords of similar size; other shells have only two spiral nodulous cords and the third, near the suture, is depressed. These could represent characters of two different species but, as the studied material did not include enough complete shells, it is better to keep these two morphs within *T. dinea*.

I. sentoma has a flat profile, lacks nodules and is also a larger shell.

I. gaesona has depressed spirals almost without nodules and the protoconch is narrower, with a depressed apex.

I. inflata has a narrower protoconch, with 2 poorly defined cords. The teleoconch has more prominent spirals and nodules.



Figure 20. A, B. *Inella sentoma* (Dall, 1927). A: lectotype, 28 mm, off Fernandina, 538 m (USNM); B: paralectotype, 4.4 mm, same locality (USNM). C. *Inella gaesona* (Dall, 1927), lectotype, 9 mm, off Georgia, 805 m (USNM). D-H. *Inella differens* spec. nov. D: holotype, 7.6 mm, off Egmont Key, Hillsborough Co., Florida (FLMNH); E: paratype, 6.2 mm; F, G: protoconchs of holotype and paratype; H: detail of the sculpture.

Figura 20. A, B. *Inella sentoma* (Dall, 1927). A: lectotipo, 28 mm, fuera de Fernandina, 538 m (USNM); B: paralectotipo, 4,4 mm, la misma localidad (USNM). C. *Inella gaesona* (Dall, 1927), lectotipo, 9 mm, fuera de Georgia, 805 m (USNM). D-H. *Inella differens* spec. nov. D: holotipo, 7,6 mm, fuera de Egmont Key, Hillsborough Co., Florida (FLMNH); E: paratipo, 6,2 mm; F, G: protoconchas del holotipo y paratipo; H: detalle de la escultura.

Inella sentoma (Dall, 1927) (Figs. 20A-B)

Triphora sentoma Dall, 1927. *Proc. U. S. N. M.*, 70: 96. [Type locality: Off Fernandina, Florida, 805 m].

Type material: Lectotype, here designated (Fig. 20A), 28 mm and a paralectotype (Fig. 20B), 4.4 mm (USNM 108072).

Description: See DALL (1927). The protoconch is unknown. Both the lectotype and paralectotype are in very poor condition, so the most important characters from the original description are mentioned here: two low flattened spiral cords, faintly undulated, one at the periphery of the whorl, the other in front of it; the suture linear with a minute threadlet on each side of it, the interspaces shallow.

In reality it can be said that there are grooves and orthocline growth lines, but no prominent sculpture.

Dimensions: The lectotype measures 28 mm.

Distribution: Only known from its type locality.

Remarks: This species is very elongate and with depressed sculpture. There is no information about the protoconch or aperture, but in the original description it is mentioned that one of the fragments had a protoconch of a whorl and a half. For this reason and the almost cylindrical shell form it is included in the genus *Inella*.

The paralectotype (Fig. 20B) is more similar to the lectotype of *I. gaesona* (see below).

No other *Inella* species in the studied area has such depressed sculpture.

Inella gaesona (Dall, 1927) (Figs. 20C)

Triphora (Strobiliger) gaesona Dall, 1927. *Proc. U. S. N. M.*, 70: 95. [Type locality: Off Georgia, 805 m].

Type material: Lectotype, here designated (Fig. 20C) with 16 whorls, 9 mm (USNM 1088341). Paralectotypes: 15 s and f (not examined) (USNM).

Description: See DALL (1927). Protoconch paucispiral, pupoid and depressed, with the first whorl wider than the following one. The spiral sculpture is formed more by grooves which separate the whorls into three parts than by prominent spirals. The axial sculpture consists only of orthocline growth lines.

Dimensions: The lectotype measures 9 mm.

Distribution: Only known from its type locality.

Remarks: Species very different from any other due to the pupoid and depressed protoconch and the flat spiral cords without nodules. It only has some similarity to *I. sentoma*, but a complete comparison could not be made because of the poor condition of the lectotype of this species and the lack of sufficient material. For this reason they are kept as different valid taxa, awaiting more material for study.

Inella differens spec. nov. Rolán and Lee (Figs. 20D-H)

Type material: Holotype (Fig. 20D) in FLMNH. Paratype (Fig. 20E) in BMSM (both ex CHL).

Other material examined: Off Louisiana: 3 f without protoconch, 28° 05.61' N, 91° 02.245' W by 28° 05.524' N, 91° 02.036' W, 58 m (E. F. Garcia/Pelican 06/09/00) (CHL).

Type locality: Off Egmont Key, Hillsborough Co., Florida, USA, (J. Moore/Cavalier, 1962), 135 m.

Etymology: The specific name alludes to the shell having different characters from others in the area.

Description: Shell subcylindrical (Figs. 20D, 20E) solid, light brown. Pro-

toconch (Figs. 20F, 20G) pupoid with 1³/₄ -2 whorls and a diameter of about

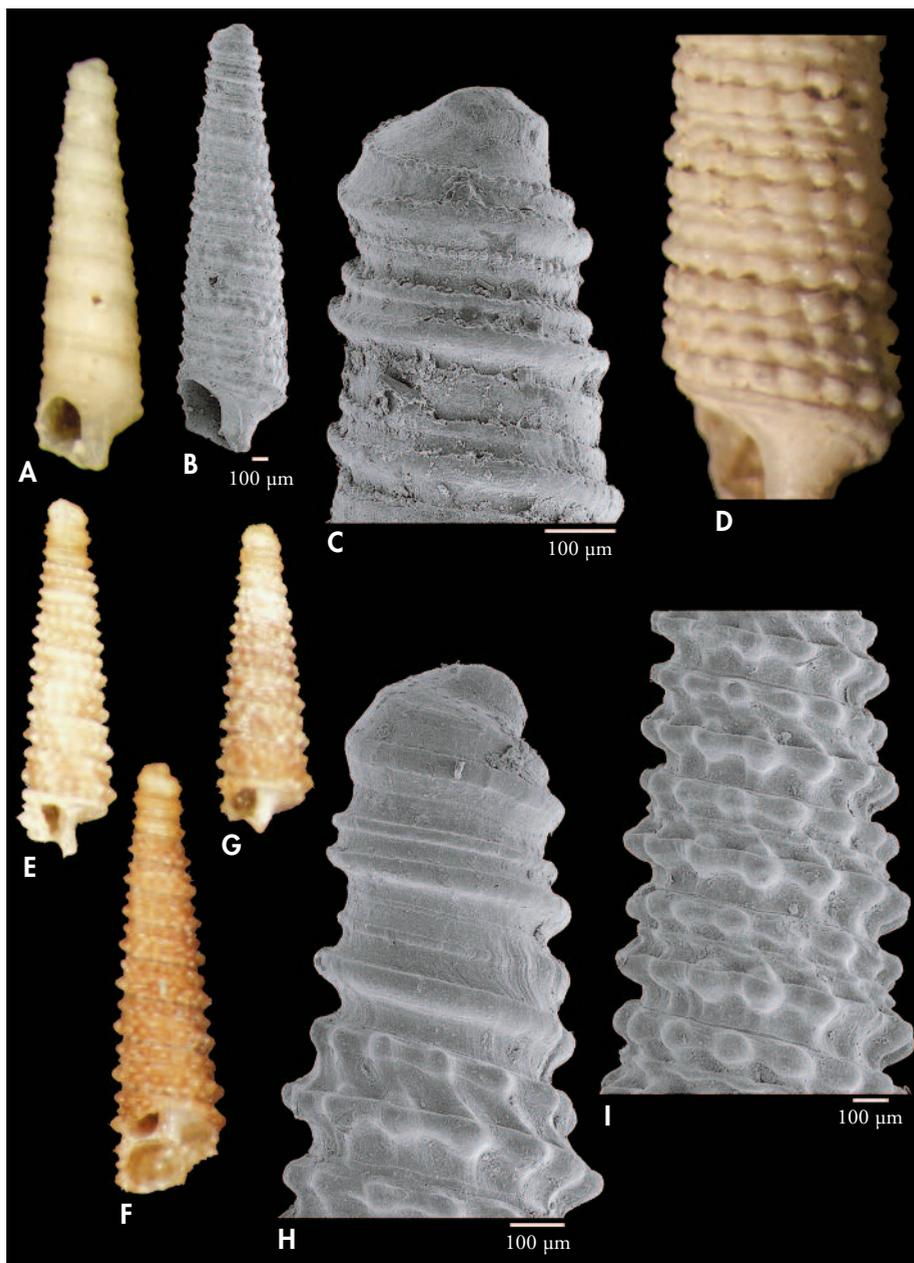


Figure 21. A-D. *Inella slapcinskyi* spec. nov. A, B: holotype, 2.6 mm (FLMNH); C: protoconch of the holotype; D: detail of the fragment (ANSP). E-I. 1: *Inella faberi* spec. nov. E: holotype, 3.7 mm; F, G: paratypes, 4.4 and 3.0 mm. Louisiana (FLMNH); H, I: protoconch and detail of teleconch sculpture, paratype in figure F.

Figura 21. A-D. *Inella slapcinskyi* spec. nov. A, B: holotipo, 2,6 mm (FLMNH); C: protoconcha del holotipo; D: detalle del fragmento (ANSP). E-I. 1: *Inella faberi* spec. nov. E: holotipo, 3,7 mm; F, G: paratipos, 4,4 y 3,0 mm. Louisiana (FLMNH); H, I: protoconcha y detalle de la escultura de la telococha, paratipo de la figura F.

600 μm , the nucleus smooth and the whorls with two smooth spiral cords. The teleoconch begins when the two spiral cords become nodulous; these beaded spirals are equal in size and both are closer to the suture and more widely separated in the middle of the whorl. About the fourth or fifth whorl, spiral 2 appears below and very close to spiral 1, beginning as a fine thread undulating beneath the nodules (Fig. 20H). Immediately it becomes nodulous but with a smaller nodular size. About the eleventh whorl the nodules reach almost the size of those on spirals 1 and 3. There are three additional smooth cords on the base. Aperture ovoid elongate; siphonal canal short and open.

Dimensions: The holotype measures 7.6 mm.

Distribution: Only known from its type locality.

Remarks: This species is kept in the genus *Inella* due to the characteristic protoconch.

It may be differentiated from most of the other closely similar species by its short protoconch with only $1\frac{3}{4}$ - 2 whorls and its brown colour:

I. dinea has more weakly sculptured whorls and the protoconch has a wider pupoid form.

I. meteora, *I. undebermuda* spec. nov., *I. enopla* and *I. pompona* have a similar number of protoconch whorls but the apex is more inflated and pupoid, and the shells are larger and white; furthermore, *I. meteora* has three spiral cords on the teleoconch, spiral 1 being smaller; *I. undebermuda* has spiral 2 beginning on about the tenth whorl (instead of on the fourth in *I. differens*), and it is very small and closer to spiral 1; *I. enopla* and *I. pompona* have two main spiral cords on the teleoconch with an additional cord on each side of the suture, the protoconch being very much wider.

I. triserialis has a rather similar shell but the protoconch has 3 whorls, the apex is more depressed, the nodules of spiral 1 are larger and cut at the middle.

I. sarissa is white, spiral 2 is smaller and very close to spiral 1.

I. compsa has rapidly enlarging whorls, and spiral 2 is not smaller.

I. intermedia has a larger shell that is lighter, whitish and more conical, the spirals almost equal in size.

See also *I. faberi* below.

Inella slapcinskyi spec. nov. Rolán and Fernández-Garcés (Figs. 21A-D)

Type material: Holotype (juvenile, Figs. 21A, 21B) (FLMNH UF350382).

Other material studied: 1 f (ANSP).

Type locality: Cayman Islands, Little Cayman, Jackson's Bight (P. Watson, Dec/1992), 35 m.

Etymology: The species is named after John Slapcinsky, Curator of Molluscs of the FLMNH, for his help in the examination of the material housed in this museum.

Description: Shell (Figs. 21A, 21B) small, almost cylindrical, whitish. Protoconch paucispiral (Fig. 21C) with a diameter of about 400 μm and almost three whorls, with two narrow spiral cords on the first whorl, three on the following, well defined, the lower one more prominent; each spiral cord bears a row of small tubercles on its upper surface. The nucleus of the protoconch is very small. The teleoconch has four spirals; spiral 1 has more prominent nodules; spiral 4 is the next in size and spirals 2 and 3 have smaller, elongated nodules (Fig. 21D). The axial ribs are

wide and strongly prosocline. On the base there are two more smooth spirals. Aperture rounded with a strong columellar callus; siphonal canal short and open.

Dimensions: The holotype measures 2.6 mm.

Distribution: Only known from its type locality.

Remarks: This species has been named in spite of the scarcity of available material because the shell and the protoconch have characters that are absolutely different from any other species of this group in the study

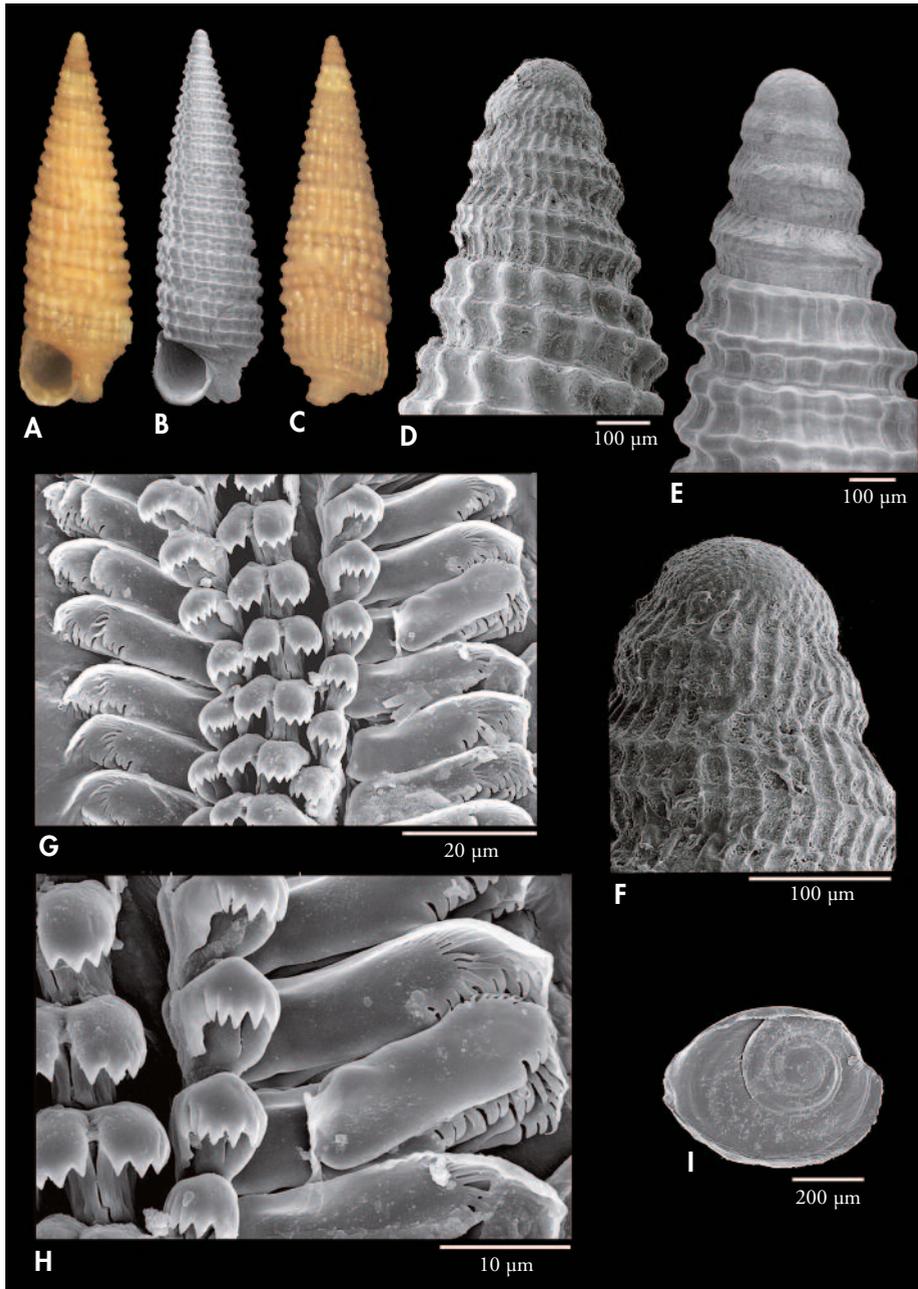


Figure 22. *Sagenotriphora osclausum* (Rolán and Fernández-Garcés, 1995). A-C: shells, 4.9, 4.9 and 4.8 mm, E Palm Beach, Florida (CHL); D-F: protoconchs; G-H: radula, specimen from off Palm Beach, Florida (CHL); I: operculum.

Figura 22. *Sagenotriphora osclausum* (Rolán y Fernández-Garcés, 1995). A-C: conchas, 4,9, 4,9 y 4,8 mm, E Palm Beach, Florida (CHL); D-F: protoconchas; G-H: rádula, de un ejemplar de fuera de Palm Beach, Florida (CHL); I: opérculo.

area. Only *I. torticula* has 4 beaded spirals, and no species in the study

area has a row of tubercles on the protoconch.

Inella faberi spec. nov. Rolán and Fernández-Garcés (Figs. 21E-I)

Type material: Holotype (Fig. 21E) and 2 paratypes (Figs. 21F, 21G) in FLMNH (UF 291343).

Type locality: Louisiana, 28.05731° N, 92.44963° W, 71-74 m.

Etymology: The species is named after the Dutch malacologist Marien Faber, who studied many of the species of Caribbean Triphoridae and helped us in some aspects of this work.

Description: Shell (Figs. 21E-21G) subcylindrical, solid, brownish in colour. Protoconch (Fig. 21H) with almost three whorls which have two narrow well defined spirals, the lower of which is a little more prominent; its diameter is about 450 μ m. The teleoconch begins with two nodulous spirals 1 and 3, quite close together; spiral 1 is slightly smaller and less prominent than spiral 3. Subsequently spiral 2 appears between them and remains smaller (Fig. 21I). The axial ribs which connect the nodules are strongly prosocline. The nodules are different on the three spirals: on spiral 1 they are spherical and a little ovoid, on spiral 2 they are very elongate and narrow, and on spiral 3 the nodules are larger and cut by the spiral which crosses them. Aperture rounded but in poor condition on all the type material.

Dimensions: The holotype measures 3.7 mm. One paratype reaches 4.4 mm.

Distribution: Only known from the type locality.

Remarks: The most similar species are:

I. differens spec. nov. has a wider protoconch, apically more depressed and with only 2 whorls, the nodules of the teleoconch are all spherical and the axial ribs almost orthocline.

I. undebermuda spec. nov. has a protoconch with only 2 whorls, the nucleus more elevated; spiral 2 on the teleoconch is closer to spiral 1 and the axial ribs are slightly prosocline.

I. apexbilitrata spec. nov. has cords of similar size on the protoconch, the shell is whitish, and on the teleoconch spiral 1 has very small nodules, spirals 2 and 3 have larger nodules which are cut at the middle, and the axial ribs are almost orthocline.

I. harryleei spec. nov. has a very elongate shell, a protoconch with cords of similar size, and the teleoconch has spiral 3 with much larger and more prominent nodules.

Genus *Sagenotriphora* Marshall, 1983

Type species (by original designation): *Triphora ampulla* Hedley, 1903. Recent, southern Australia and northern New Zealand.

Description: Protoconch multispiral with reticulate sculpture on the first whorl; radula with a rachidian tooth

which is separated into two parts, and only one lateral and one marginal.

Sagenotriphora osclausum (Rolán and Fernández-Garcés, 1995) (Figs. 22A-I)

"*Triphora*" *osclausum* Rolán and Fernández-Garcés, 1995. *Apex*, 10(1): 21.

Type material: Holotype and paratypes (see ROLÁN AND FERNÁNDEZ-GARCÉS, 1995)

Other material examined: Florida: 3 s, beach drift, Little Torch Key, Monroe Co., (M. Teskey, 5/76) (CHL); 2 sp, 32 miles E St. Augustine, St. Johns Co. (T. Yocius 6/81; ex J. Dawley 12/2/90), 30 m

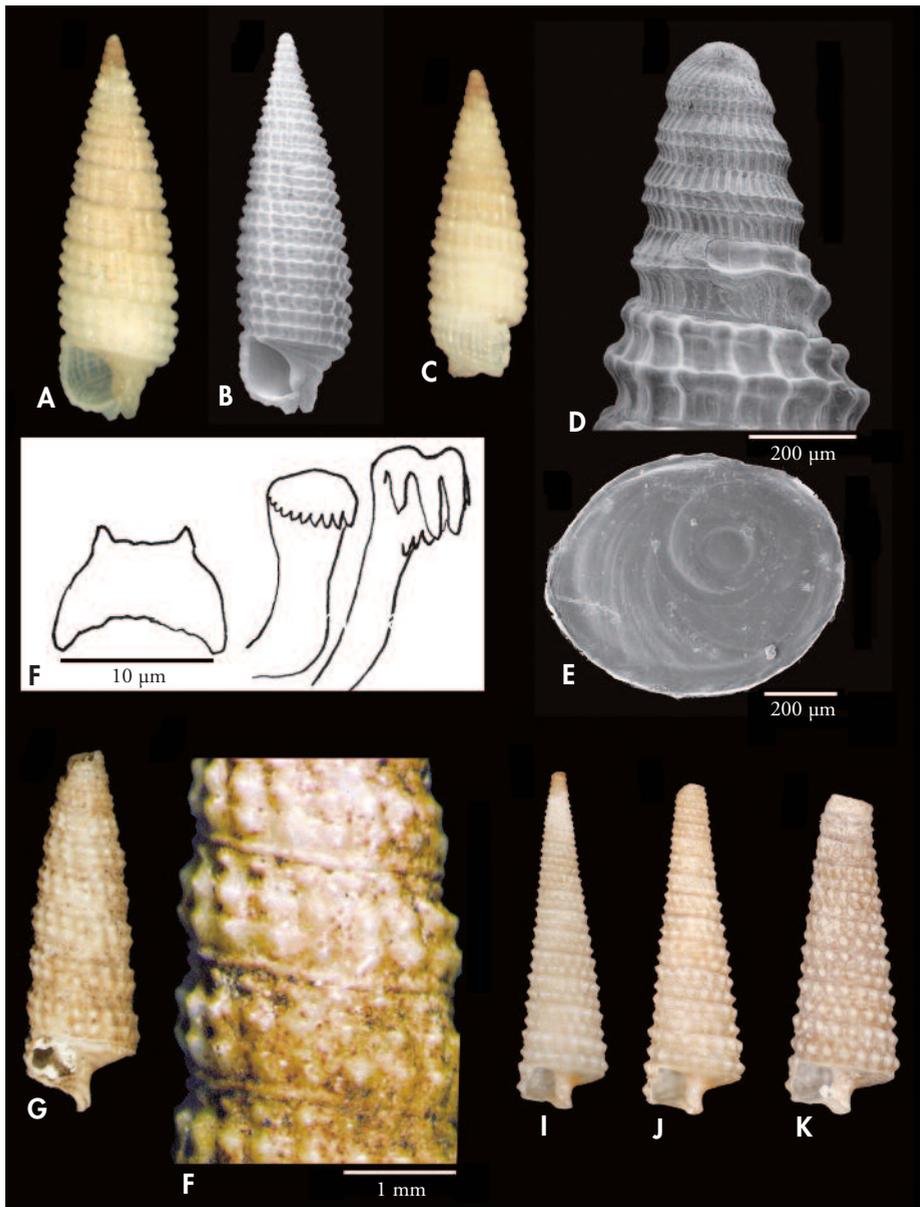


Figure 23. A-F. *Sagenotriphora candidula* spec. nov. A, B: holotype, 5.0 mm (FLMNH); C: paratype 3.9 mm, from type locality (BMSM); D: protoconch of the holotype; E: operculum; F: drawing of the radula. G, H. “*Triphora*” *abrupta* (Dall, 1881); G: lectotype, 7.9 mm (MCZ 7389); H: Detail of the spire. I-K. “*Triphora*” *caracca* Dall, 1927. I: lectotype, 7.1 mm, off Georgia, 805 m (USNM); J, K: paralectotypes, 6.9, 6.7 mm, same locality (USNM).

Figura 23. A-F. *Sagenotriphora candidula* spec. nov. A, B: holotipo, 5,0 mm (FLMNH); C: paratipo 3,9 mm, de la localidad tipo (BMSM); D: protoconcha del holotipo; E: opérculo; F: dibujo de la rádula. G, H. “*Triphora*” *abrupta* (Dall, 1881); G: lectotipo, 7,9 mm (MCZ 7389); H: Detalle de la espira. I-K. “*Triphora*” *caracca* Dall, 1927. I: lectotipo, 7,1 mm, fuera de Georgia, 805 m (USNM); J, K: paralectotipos, 6,9, 6,7 mm, la misma localidad (USNM).

(CHL); 5 sp (Figs. 22A-22C)(one destroyed by radular study), E Palm Beach (J. Root; *ex* K. Sunderland 1991) 30 m (CHL); 5 s, SW Egmont Key, 73-92 m (Steger, 1966) (ANSP 306356); 2 s, Monroe Co. Dry Tortugas area, 25 30' N, 59 m (FLMNH 154901); 3 s, Palm Beach Co., off Singer Id. (McGinty/Jun 1940) 183-274 m (FLMNH 257141); 2 s, Palm Beach Co., off Palm Beach (McGinty/Jun 1950) 92 m (FLMNH 205145); 8 s, Palm Beach Co., reefs (D. Akers/1970-1971) 30 m (FLMNH 127829); 15 sp, Palm Beach Co., off Delray Beach, Manalapan Wreck (McGinty), 10 m (FLMNH 249896); 1 s, Palm Beach Co., off Yamato Rocks (F. B. Lyman/ Apr 1939) 11 m (FLMNH 10242). Bahamas: 2 s, Indian Cay, Grand Bahama Island 26° 42' 45"N, 78° 39' 15"W (Worsfold) (ANSP 366953).

Description: ROLÁN AND FERNÁNDEZ-GARCÉS (1995). Shell (Figs. 22A-22C) light brown with the protoconch darker.

Radula (Figs. 22G, 22H): With the formula 4-1-1-1-4. Central tooth divided in two parts by a deep separation. Each of these two prominences finishes in four short sharp pointed cusps. Lateral teeth elongate and with the form of a half tube, the end curved with 6-7 pointed and short cusps. Four marginal teeth in each side, flat, elongate, and at their ends are about 15-17 very fine and elongate cusps, which are shorter on one side and more elongate on the other.

Dimensions: The holotype measures 4.5 mm. Some shells can reach up to 5.0 mm.

Distribution: Known from Florida, Bahamas and Cuba.

Remarks: This species was described without a generic assignment, as no soft parts were studied. With the present

material it was possible to study the radula from dried animals retracted into the shell. This radula proved to be very different from all those previously known, and for this reason the creation of a new genus was considered, but it seemed preferable to place the species provisionally in a known genus that had the most similar radula. In this case we found that the genus *Sagenotriphora* is almost the only one in which the rachidian tooth is divided into two parts, although it has only one wide lateral and one marginal, contrary to the four that are found in the present species.

Sagenotriphora osclausum had been considered by some malacologists (the label of most of the studied material) to be *Triphora dupliniana* Olsson, 1916. This taxon is a fossil species and it may be differentiated by the shorter shell and the open siphonal canal.

Sagenotriphora candidula spec. nov. Rolán and Lee (Figs. 23A-F)

Type material: Holotype (Figs. 23A, 23B) in FLMNH. Paratypes: 1 s (Fig. 23C) in BMSM; 1 s, in USNM; all from the type locality and *ex* CHL. Other paratypes: 3 s, off Anna Maria Island, Manatee Co., Florida (J. Moore / *Cavalier*, 1962), 15-30 m (CHL); 4 s, SW of Egmont Key, Florida (Steger, 1996) 40-50 m (ANSP 306346); 10 s, East Tampa Bay, Florida (C. L. Richardson) (ANSP 335494); 5 s, Palm Beach Co., Florida (McGinty, Jul/1941) 55-73 m (FLMNH 249739); 2 s, Hillsborough Co., W of Egmont Key, Florida (J. Moore, 1962) 183 m (FLMNH 249838); 1 s, Palm Beach Co., reefs, Florida (D. Akers, 1970-1971) 30 m (FLMNH 127829); 13 sp, Palm Beach Co., off Delray Beach, Manalapan Wreck, Florida (McGinty), 10 m (FLMNH 249896); 1 s, Palm Beach Co., off Singer Island, Florida (McGinty, Jun/1940) 30 m (FLMNH 178388); 1 s, Palm Beach Co., Breakers Hotel, (McGinty, Jun/1940) 30 m (FLMNH 154860).

Other material studied: Florida: 7 s and f, SW of Egmont Key (Steger, 1996) 40-50 m (ANSP); 2 sp (destroyed for radular studies), type locality (CHL); 11 s, in poor condition, East Tampa Bay (C. L. Richardson) (ANSP 335494); 2 s, in poor condition, St. Augustine (FLMNH 286017).

Type locality: beach drift, Captiva Island, Florida.

Etymology: The specific name is the Latin word *candidula* which means "shining white" (diminutive) and alludes to the colour of the shell.

Description: Shell (Figs. 23A-23C) elongate, solid. Protoconch (Fig. 23D) of almost 4 whorls, apex with rounded tubercles and

the whorls with two spiral threads crossed by small undulating axial ribs. The beginning of the teleoconch has two spirals, spi-



Figure 24. A-E. "*Triphora*" *georgiana* Dall, 1927. A: lectotype, 7.5 mm, off Georgia, 805 m (USNM); B-E: paralectotypes, 6.0, 4.9, 5.0, 4.1 mm, same locality (USNM). F, G. "*Triphora*" *indigena* Dall, 1927. F: lectotype, 6.6 mm, off Georgia, 805 m (USNM); G: paralectotype, 3.3 mm, same locality (USNM). H. "*Triphora*" *lilacina*, lectotype, 8.5 mm, Turtle Harbor, Florida, 11 m (USNM 83087). I-O. "*Triphora*" *cf. lilacina* (Dall, 1889). I: shell, 7.5 mm, Pinellas Co., Florida (FLMNH); J: shell, 9.0 mm, Monroe Co., Florida (FLMNH); K: shell, 8.0 mm, Palm Beach Co., Florida (FLMNH); L: shell, SEM photo, 4.1 mm, Pickles Reef, off Key Largo, 5 m (CHL); M: apical part with protoconch, shell in figure J; N: protoconch of shell in Figure L; O: detail of the last whorl from shell in Figure I.

Figura 24. A-E. "*Triphora*" *georgiana* Dall, 1927. A: lectotipo, 7,5 mm, fuera de Georgia, 805 m (USNM); B-E: paralectotipos, 6,0, 4,9, 5,0, 4,1 mm, de la misma localidad (USNM). F, G. "*Triphora*" *indigena* Dall, 1927. F: lectotipo, 6,6 mm, fuera de Georgia, 805 m (USNM); G: paralectotipo, 3,3 mm, la misma localidad (USNM). H. "*Triphora*" *lilacina*, lectotipo, 8,5 mm, Turtle Harbor, Florida, 11 m (USNM 83087). I-O. "*Triphora*" *cf. lilacina* (Dall, 1889). I: concha, 7,5 mm, Pinellas Co., Florida (FLMNH); J: concha, 9,0 mm, Monroe Co., Florida (FLMNH); K: concha, 8,0 mm, Palm Beach Co., Florida (FLMNH); L: concha, SEM photo, 4,1 mm, Pickles Reef, fuera de Cayo Largo, 5 m (CHL); M: parte apical con protoconcha, concha de la Figura J; N: protoconcha de la concha de la Figura L; O: detalle de la última vuelta de la concha de la Figura I.

ral 1 very close to the suture and spiral 3 in the middle of the whorl. About the fourth-fifth whorl spiral 2 appears in the middle of the space between the other two, enlarging quickly and becoming equal to spirals 1 and 3 on the subsequent two whorls. A very fine spiral thread appears at the suture. Aperture oval elongate. Siphonal canal very short, closed by the continuation of the outer lip. Colour: protoconch brown and the teleoconch uniformly creamy-white; small areas of cream or light brown may be visible on the base and inside the aperture. Operculum multispiral (Fig. 23E) ovoid, yellowish, translucent.

Dimensions: The holotype measures 5.0 mm.

Distribution: Known from Florida coasts.

Due to the scarcity of available material, our radular study was limited to only two specimens. Unfortunately, only a little information could be obtained and the radula could not be photographed (see Fig. 23F). The radula (formula 3-1-1-3) has a central tooth with two upward cusps and two more externally and in the

opposite direction. The lateral teeth have a sharp border with many small cusps. The marginal has only a few cusps.

Remarks: This species had been considered by collectors to be conspecific with the previous one (*S. osclausum*), which is similar but light brown in colour. However, the difference in the radula indicated that they were different species.

S. candidula spec. nov. must be differentiated from the white *Cosmotriphora melanura* (C. B. Adams, 1850) which is larger, with more whorls. Spiral 2 appears earlier (3-4 whorls), the colour of the teleoconch is milk white and not creamy-white, and the base is white; the apex of the protoconch is narrower; also the protoconch is consistently dark brown and not light brown, has only one spiral on the first and second whorls and is also a little larger.

Marshallora ostenta spec. nov. is not totally cream, and some spiral cords (at least the suture) may be brown or light brown; the siphonal canal is short and open and the protoconch is somewhat larger, and has one spiral cord on the first protoconch whorl.

Genus *Triphora* Blainville, 1828

Type species (by monotypy): *Triphora gemmatum* Blainville, 1828; Recent, Mauritius.

Remarks: This genus name has formerly been employed as the nominal for the family. Consequently, it

is commonly used when generic assignment is not possible, as "*Triphora*" *sensu lato*.

"*Triphora*" *hircus* (Dall, 1881) (Fig. 36J)

Triforis hircus Dall, 1881. *Bull. Mus. Comp. Zool.*, 9: 83. [Type locality: Yucatan Strait, 640 fms (1171 m)].
Triforis (bigemma var.?) *hircus* Dall, 1889. *Bull. Mus. Comp. Zool.*, 18: 249, pl. 20, fig. 11.

Type material: No type in USNM (E. Strong, pers. comm.); neither in other American museums. Figured in DALL (1889: pl. 20, fig. 11) (Fig. 36J) measuring 12.5 mm.

Description: See DALL (1881). With 14 or more inflated whitish whorls. The most important characters in the original description and in the figure are the two prominent spirals, the upper one more widely separated from the suture.

Dimensions: The original description gives a dimension of 12.5 mm.

Distribution: Only known from the type material.

Remarks: DALL (1881) described this species as new; later (DALL, 1889) he revised his taxonomic opinion and he considered it to be probably a variety of *T. bigemma* Watson, 1880; but that species has only two spirals on the upper part of

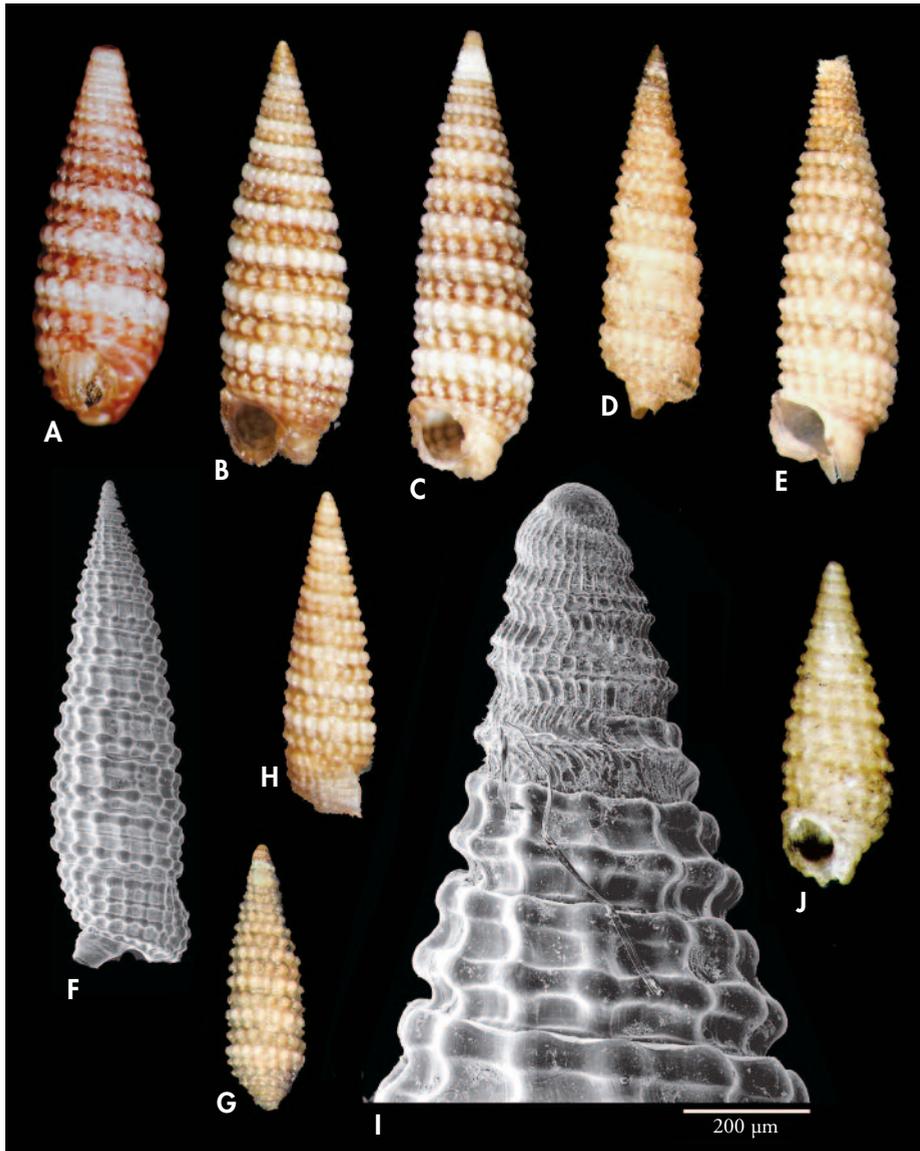


Figure 25. A. *Triforis atlantica* E. A. Smith, 1890, lectotype, 6 mm, St. Helena. B-I. “*Triphora*” *atlantica*. B: shell, 6.3 mm, W Egmont Key, Hillsborough Co., Florida (CHL); C, D: shells, 7.1, 4.9 mm off Guarapari, Espiritu Santo State, Brazil, 15-20 m (CHL); E, G, H: shells, 6.7, 5.3, 4.2 mm, 42 miles E St. Augustine, St. Johns Co., Florida, 85 m (CHL); F: shell, 4.8 mm, SEM photo, Florida (FLMNH); I: protoconch of the shell in previous figure). J. “*Triphora*” *pyrrha* Henderson and Bartsch, 1914, syntype, 2.7 mm, Chincoteague (USNM).

Figura 25. A. *Triforis atlantica* E. A. Smith, 1890, lectotipo, 6 mm, St. Helena. B-I. “*Triphora*” *atlantica*. B: concha, 6,3 mm, O Cayo Egmont, Hillsborough Co., Florida (CHL); C, D: conchas, 7,1, 4,9 mm fuera de Guarapari, Estado de Espiritu Santo, Brasil, 15-20 m (CHL); E, G, H: conchas, 6,7, 5,3, 4,2 mm, 42 miles E St. Augustine, St. Johns Co., Florida, 85 m (CHL); F: concha, 4,8 mm, SEM photo, Florida (FLMNH); I: protoconcha de la concha de la figura anterior). J. “*Triphora*” *pyrrha* Henderson y Bartsch, 1914, syntype, 2,7 mm, Chincoteague (USNM).

the teleoconch, subsequently with three spirals of which spiral 1 is smaller (WATSON, 1886, pl. 43, fig. 6). For these reasons both taxa have been considered here to be valid and different species.

This species has been kept here in "*Triphora*" instead of in *Inella* due to several characters found in the original description: acutely tapered apex probably rather pointed, crowded transverse sculpture (twenty-one slightly oblique

ribs, etc.), and also due to the figured shape of the species.

Comparison must be made with the species having 2 main spirals, basing the differences on the teleoconch characters:

I. enopla and *I. pompona* are more cylindrical and have two small spirals besides the two main ones.

I. colon and *I. ibex* have more cylindrical shells, and the two spirals are located equidistant between the sutures.

"Triphora" cylindrella (Dall, 1881) (Fig. 36K)

Triforis cylindrella Dall, 1881. *Bull. Mus. Comp. Zool.*, 9: 83. [Type locality: Cape San Antonio, 640 fms (1171 m)].

Triforis (Sychar) cylindrella Dall, 1881. In DALL, 1889. *Bull. Mus. Comp. Zool.*, 18: 250, pl. 20, fig. 6.

Type material: No type in USNM (E. Strong, pers. comm.), AMNH (M. Sidall, pers. comm.), or ANSP. The lectotype, here designated, (Fig. 36K) is the specimen figured by DALL (1889, plate 20, fig. 6).

Description: See DALL (1881). Shell with 12-14 white whorls. The most important characters are the presence of three similar spirals and convex whorls, the lowest with more elongate nodules.

Dimensions: The original description gives a dimension of 6.5 mm.

Distribution: Only known from Cape San Antonio.

Remarks: The placement of this species in the genus "*Triphora*" s. l. is tentative and based on the original description and figure. As the type was not found, the comparison was made from the characters in the original description with the species which had three equal spirals, as follows:

I. intermedia has whorls with a flat profile, only 2 spirals at the beginning, and spiral 2 is smaller on most of the shell.

I. torticula has convex whorls, but the nodules are larger on spirals 2 and 3, and the shell is more elongate and cylindrical.

I. compsa has an unknown protoconch, so comparison is difficult; however, spiral 1 is smaller and the nodules are more prominent.

Cosmotriphora melanura is more elongate and the profile of the whorls is flat.

Sagenotriphora candidula has only two spirals at the beginning of the teleoconch and the whorls are rather flat.

"Triphora" rushii (Dall, 1889)

Triforis rushii Dall, 1889. *Bull. Mus. Comp. Zool.*, 18: 246. [Type locality: west of North Bimini Island, Bahamas, 200 fms (366 m)].

Type material: Holotype (USNM 61227) missing (Ellen Strong pers. comm.).

Description: See DALL (1889: 246). Shell with 12-14 whorls. Four spirals, of which only the lowermost is prominent, with a row of large pointed nodules. Above this are three much finer, lower and undulating threads of equal size. No ribs exist. Shell milky-white in colour.

Dimensions: 2.6 mm according to the original description.

Remarks: No other species in the studied area shows this kind of sculpture with four spirals, the lowermost the most prominent and with the largest nodules.

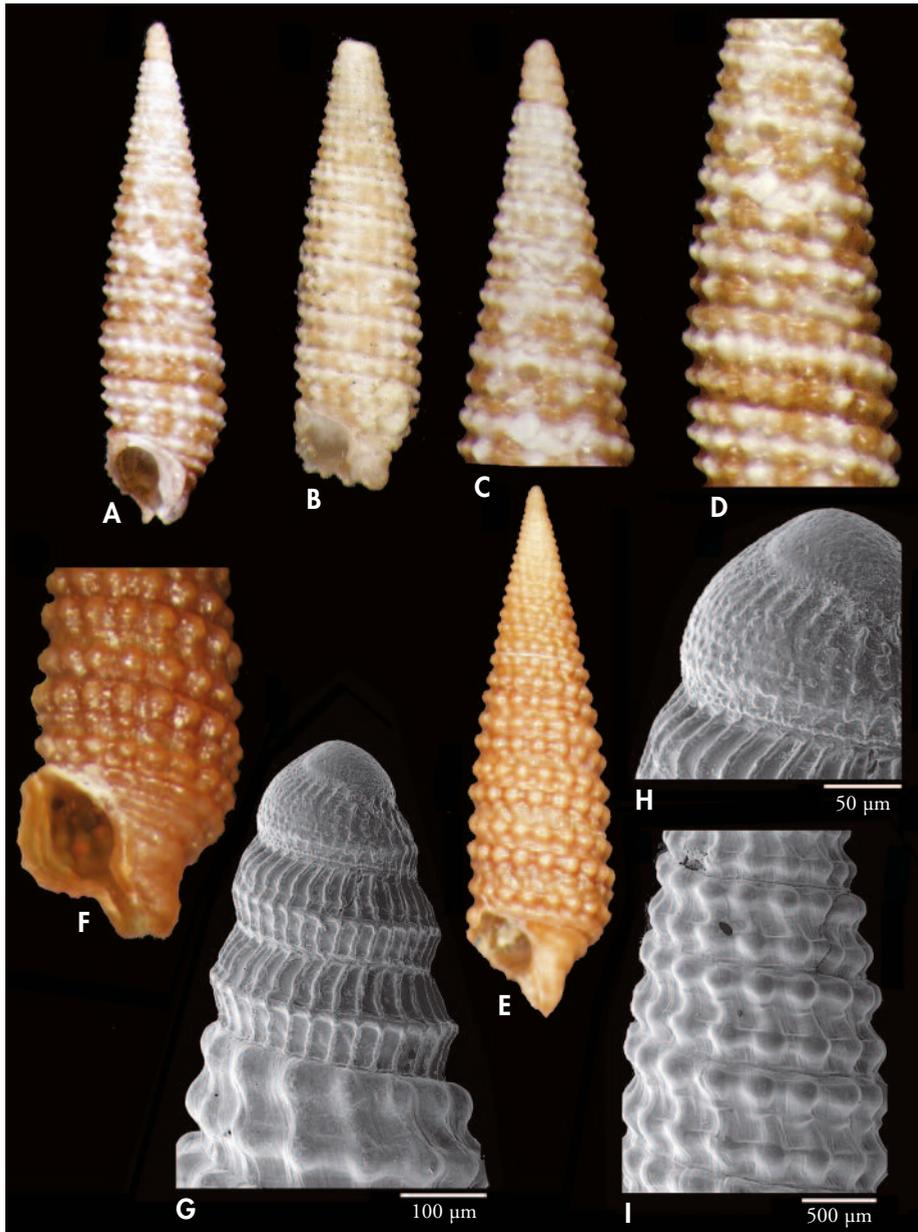


Figure 26. A-D. “*Triphora*” *inaudita* spec. nov. A: holotipo, 5.4 mm, SW of Dry Tortugas (FLMNH). B: paratipo, 4.4 mm (BMSM). C: detalles de la protoconcha del holotipo; D: detalle de la escultura. E-I. “*Triphora*” *pseudonovem* spec. nov. E: holotipo, 7.3 mm (FLMNH); F: detalle de la abertura de un paratipo (FLMNH); G: protoconcha; H: detalle de la protoconcha; I: detalle de la espira del holotipo.

Figura 26. A-D. “*Triphora*” *inaudita* spec. nov. A: holotipo, 5,4 mm, SO de Dry Tortugas (FLMNH). B: paratipo, 4,4 mm (BMSM). C: detalle de la protoconcha del holotipo; D: detalle de la escultura. E-I. “*Triphora*” *pseudonovem* spec. nov. E: holotipo, 7,3 mm (FLMNH); F: detalle de la abertura de un paratipo (FLMNH); G: protoconcha; H: detalle de la protoconcha; I: detalle de la espira del holotipo.

“Triphora” abrupta (Dall, 1881) (Figs. 23G-H, 36M)

Triforis (*bigenma* Watson var.) *abruptus* Dall, 1881. *Bull. Mus. Comp. Zool.*, 18: 84. [Type locality: Yucatan Strait, 640 fms (1171 m)].

Triforis (*Sychar*) *abrupta* Dall, 1881. In DALL, 1889. *Bull. Mus. Comp. Zool.*, 18: 249, pl. 20, fig. 12b.

Type material: A syntype, here designated as lectotype (Figs. 23G, 23H) (MCZ 7389). The types in USNM are lost (E. Strong, pers. comm.).

Description: See DALL (1881). The lectotype is a shell without protoconch and aperture. The most important characters are that spiral 1 is formed by small, less prominent nodules; spirals 2 and 3 are more prominent and almost equal, with larger nodules. Below there is a small, smooth spiral 4.

Dimensions: according to DALL (1881) the shell measures 7.5 mm. The lectotype measures 7.9 mm.

Distribution: Only known from the type material.

Remarks: The lectotype is probably the same shell studied by Dall with the loss of the external lip, with the same size and sculpture. For this reason it is

considered as lectotype. No information on protoconch and aperture are available, which makes any kind of comparison difficult. The placement in *“Triphora”* and not in *Inella* is tentative, based on the rapidly enlarging whorls.

There are only a few species with spiral 1 smaller, spirals 2 and 3 larger and similar, and spiral 4 smooth:

Inella pompona and *I. enopla* have shells lighter in colour, more elongated, lacking spiral 1 on the first teleoconch whorls, and with the space between the main spirals more depressed.

Inella apexbilitrata spec. nov. has a smaller shell, narrower and almost cylindrical in profile.

“Triphora” caracca Dall, 1927 (Figs. 23I-K)

Triphora caracca Dall, 1927. *Proc. U. S. N. M.*, 70: 93. [Type locality: Off Georgia, 440 fms (805 m)].

Type material: Lectotype, here designated (Fig. 23I) and paralectotypes (Fig. 23J, 23K) (USNM 108343).

Description: See DALL (1927). Dark brown paucispiral protoconch with at least three whorls with two spiral cords. No more details can be known because of erosion. The most important differential character is that the axial ribs are very fine and strongly prosocline. Spirals 1 and 3 larger and prominent from the beginning of the teleoconch, with spiral 2 appearing about the tenth whorl and remaining very small on the final whorls.

Dimensions: The original description gives a dimension of 7.1 mm.

Distribution: Only known from the type material.

Remarks: The shell mentioned by DALL (1927) measured 8 mm, but the lectotype examined from USNM only reached 7.1 mm, which could be due to the loss of one whorl. No other triphorid in the Caribbean has spiral 2 beginning on the tenth whorl and remaining small and close to spiral 1 down to the end of the spire.

“Triphora” georgiana Dall, 1927 (Figs. 24A-E)

Triphora (*Biforina*) *georgiana*, Dall, 1927. *Proc. U. S. N. M.*, 70: 93 [Type locality: Off Georgia].

Type material: Lectotype, here designated (Fig. 24A) with 15 whorls and 5 paralectotypes (Figs. 24B-24E) (USNM 333516).

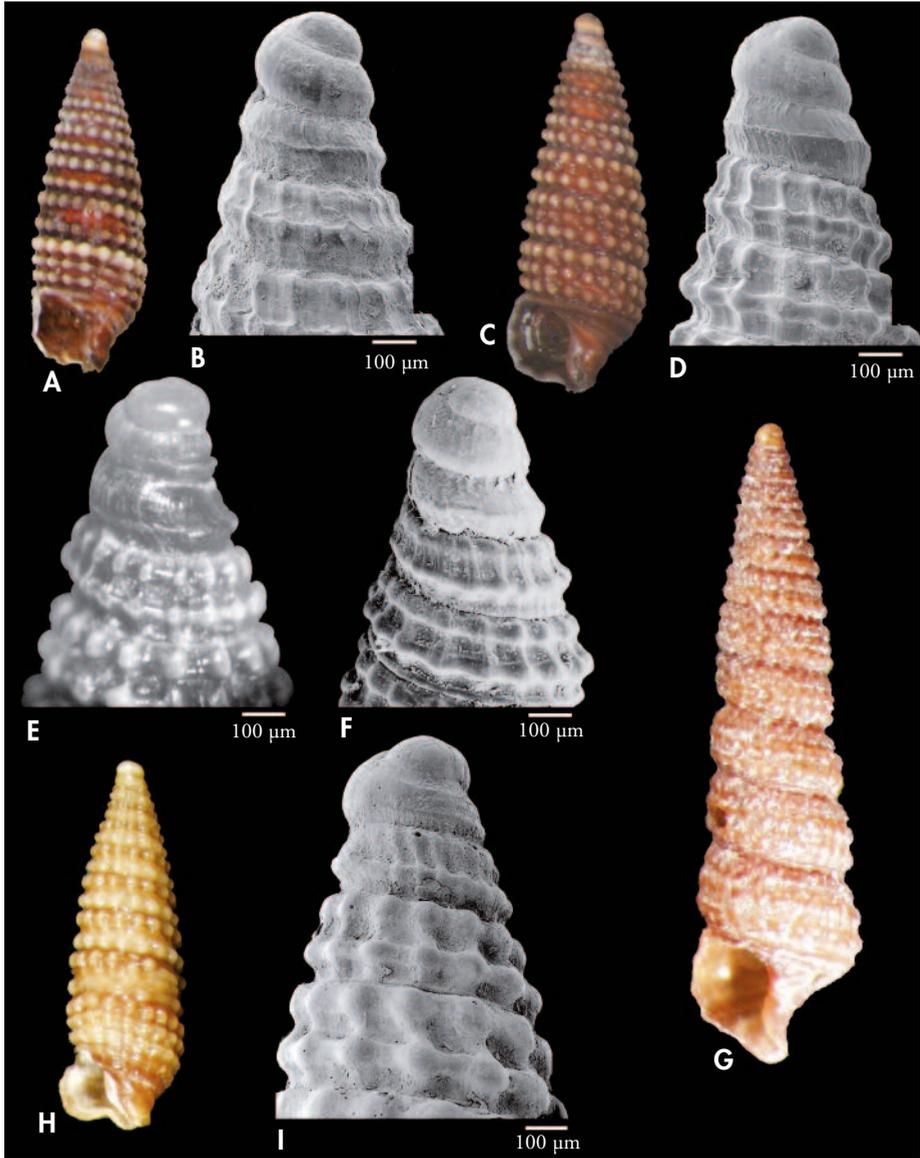


Figure 27. A-F. “*Triphora*” *calva* (Faber and Moolenbeek, 1991). A: shell, 3.7 mm, Key Largo, Florida (CMK); B: protoconch of the previous shell; C: shell, 3.7 mm, Key Matias, Cuba (MHNS); D: protoconch, Cienfuegos, Cuba (CFG); E: protoconch, Santa Lucia, Pinar del Río, Cuba (CFG); F: protoconch, Abaco, Bahamas (CCR); G: “*Triphora*” cf. *calva*, shell, 6.8 mm, Grand Bahama Island (ANSP). H, I. “*Triphora*” *yociusi* spec. nov. H: holotype, 3.9 mm, off St. Augustine, St. Johns Co., Florida (FMNH); I: protoconch of the paratype.

Figura 27. A-F “*Triphora*” *calva* (Faber and Moolenbeek, 1991). A: concha, 3,7 mm, Cayo Largo, Florida (CMK); B: protoconcha de la concha anterior; C: concha, 3,7 mm, Cayo Matías, Cuba (MHNS); D: protoconcha, Cienfuegos, Cuba (CFG); E: protoconcha, Santa Lucía, Pinar del Río, Cuba (CFG); F: protoconcha, Abaco, Bahamas (CCR); G: “*Triphora*” cf. *calva*, concha, 6,8 mm, Grand Bahama (ANSP). H, I. “*Triphora*” *yociusi* spec. nov. H: holotipo, 3,9 mm, fuera de St. Augustine, St. Johns Co., Florida (FMNH); I: protoconcha del paratipo.

Description: See DALL (1927). It is relevant that the protoconch was described as having a smooth nucleus and 2 more whorls sculptured with two spiral threads and numerous "flexuous axial threadlets". Probably all the protoconchs are eroded, so the exact form and sculpture could only be known after the examination of fresh shells. The teleoconch has spirals 2 and 3 from the beginning; later a very weak spiral 1 appears below the suture, and remains the smallest one up to the end. Spiral 2 is the largest and most prominent.

Dimensions: The lectotype measures 7.5 mm.

Distribution: Only known from the type material.

Remarks: MARSHALL (1983) considered the genus *Biforina* to be a synonym

of *Monophorus* Granata-Grillo, 1877. As there is no information on the radula, it seems better to keep it in "*Triphora*" in *sensu lato*.

The shell designated as lectotype had been separated from the rest of the lot in a different capsule with the indication "type". This shell has the dimensions and number of whorls given by the author. Because no holotype was mentioned in the original description, this shell must be designated as lectotype.

This species shows some resemblance to *Strobiligera brychia* (Bouchet and Guillemot, 1978) (Fig. 14F) in its teleoconch whorls, but apparently the protoconch of the latter species is more pointed and has more whorls.

"Triphora" indigena Dall, 1927 (Figs. 24F-G)

Triphora indigena Dall, 1927. *Proc. U. S. N. M.*, 70: 93. [Type locality: Off Georgia, 805 m].

Type material: Lectotype, here designated (Fig. 24F) with 13 whorls, and a paralectotype (Fig. 24G) (USNM 108079).

Description: See DALL (1927). Protoconch multispiral, a little eroded on the paralectotype but apparently brown with two spiral cords. The teleoconch begins with three almost similar spirals, with spiral 1 becoming smaller on subsequent whorls, appearing as a small thread very close to the suture. The cords and ribs are rather elevated, and cross to form rectangular interspaces.

Dimensions: The lectotype measures 6.6 mm.

Distribution: Georgia and Fernandina (mentioned in the original description).

Remarks: Its most important character is the formation of rectangular spaces between cords and ribs. Spiral 1 is smaller throughout the spire, the other two being similar to each other.

There are no similar species in the study area.

"Triphora" lilacina (Dall, 1889) (Fig. 24H)

Triforis lilacina Dall, 1889. *Bull. M. C. Z.*, 18: 243. [Type locality: Turtle Harbor, Florida, USA].

Type material: One syntype (Fig. 24H) here designated as lectotype (USNM 83087).

Description: See DALL (1889). The protoconch is unknown. The most important character is the uniform lilac colour; also, the two spirals, with an additional very narrow spiral only appearing between them on the eleventh whorl. The nodules are spherical and relatively small.

Dimensions: The lectotype measures 8.5 mm.

Remarks: The lectotype does not have exactly the characters mentioned in the original description (it measures 8.5 mm instead of 9.0 and has 15 whorls instead of 18), but these differences may be the

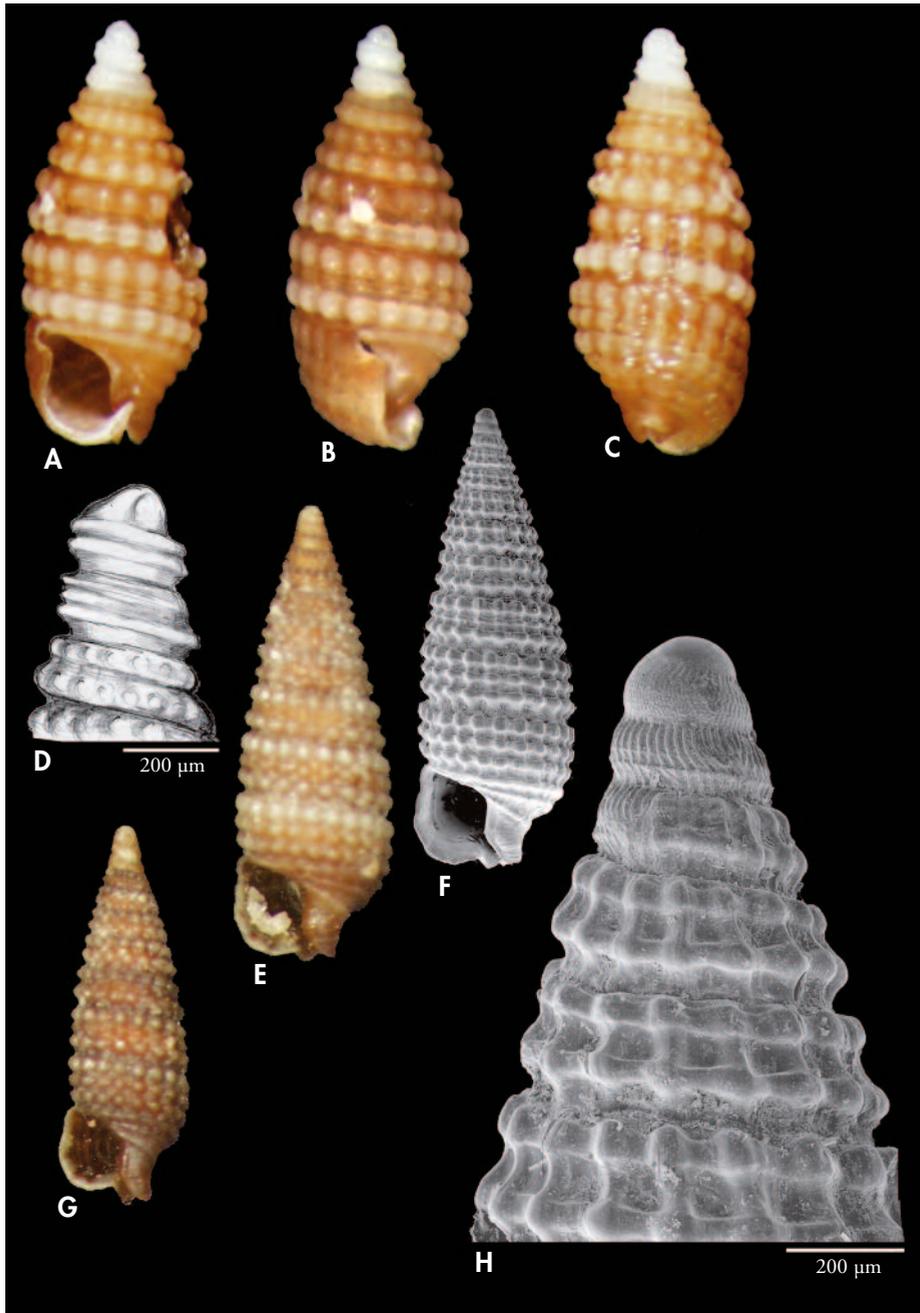


Figure 28. A-D. "*Triphora*" *guadaloupensis* spec. nov. A-C: holotipo, 2,3 mm, Guadalupe (ANSP); D: dibujo de la protoconcha. E-H. "*Triphora*" *amicorum* spec. nov. E, F: holotipo, 4,4 mm, Florida (FLMNH); G: paratipo, 3,8 mm, Florida (FLMNH); H: protoconcha del holotipo.
 Figura 28. A-D. "*Triphora*" *guadaloupensis* spec. nov. A-C: holotipo, 2,3 mm, Guadalupe (ANSP); D: dibujo de la protoconcha. E-H. "*Triphora*" *amicorum* spec. nov. E, F: holotipo, 4,4 mm, Florida (FLMNH); G: paratipo, 3,8 mm, Florida (FLMNH); H: protoconcha del holotipo.

result of a quick examination or due the loss of a small part of the shell (the loss of the first whorls of the protoconch was already mentioned in the original description). In spite of this, the colour is very characteristic and there is no doubt that it is the type mentioned in the original description. Besides, it is necessary to point out that the shell has a defect on the penultimate whorl, which may cause a slight deformation.

The shells illustrated by some authors under this name (VOKES AND VOKES, 1983) seem to be very different.

Distribution: Only known from the type locality.

Mesophora novem (Nowell-Usticke, 1969) seems to be the closest species, but has a different colour, larger and lighter nodules, and a darker suture; spiral 2 does not appear until the final whorls

and is always smaller than the other two, but it has larger nodules than those on spiral 2 of "*T.*" *lilacina*.

No shells resembling the type of this taxon have been collected by any other author in spite of the fact that it comes from shallow water (11 m). Hence, some malacologists (pers. comm.) have considered that this type could be an abnormal individual from a population which is usually differently coloured (which we will mention below as "*Triphora*" *atlantica*).

Another possibility is the one suggested by several persons (pers. comm.): if the lectotype is an abnormal shell with an uncommon colour for the species, it may be conspecific with shells from other populations having different morphological form and colour. One candidate for this is presented below as "*T.*" cf. *lilacina*.

"Triphora" cf. lilacina (Figs. 24I-O)

Material examined: Florida: 1 s (Fig. 24J), 24° 50' N, Monroe Co., West Coast of Florida (Jun 1961) (McGinty coll.) 61 m (FLMNH 259042); 6 s (Fig. 24I) Pinellas Co., SSW John's Pass (Dan Steger) 55 m (FLMNH 238675); 1 s (Fig. 24L), Pickles Reef, off Key Largo, Monroe Co. (L. Hill, May/76), 7-10 m (CHL); 1 s, Palm Beach Co., Breakers Hotel to Biltmore Hotel (R/V Triton, Apr 1951) (McGinty coll.) 36-55 m (FLMNH 177402); 1 s, Monroe Co., off Dry Tortugas (R. Black, dec. 1990) 960 m (FLMNH 279375); 1 s, Palm Beach Co., Boynton Beach, off Briny Breezes (R/V Triton, Feb 1951) (McGinty coll.) 50-60 fms (FLMNH 219907); 2 s, Collier Co., SW of John's Pass (Powlus and Steger, May 1958) (McGinty coll.) 55 m (FLMNH 154900); 2 s, Collier Co., 150 miles W (J. Moore, Jun. 1962) (M. Hunter coll.) Cape Romano, 450 m (FLMNH 129846); 1 s (Fig. 24K), Palm Beach Co., Bath and Tennis Club to Palm Beach Pier (R/V Triton, Apr. 1951) (McGinty coll.) 36-55 m (FLMNH 176649); 1 s, Palm Beach Co. (R/V Triton, Apr. 1950) 40-50 m (FLMNH 204877).

Description: Shell (Figs. 24I-24L) solid, elongated, light brown. Protoconch (Fig. 24N) multispiral, with about 4 whorls, the apex surface with small tubercles and the subsequent whorls with two spiral cordlets crossed by numerous fine axial ribs that are slightly S-shaped, especially on the last whorl. Teleoconch with about 11-12 whorls, beginning with spirals 1 and 3, crossed by prosocline small axial ribs which form nodules at the intersection points. These two spirals continue on the subsequent whorls, the upper one with slightly larger nodules; on about the sixth-eighth whorl, a very small spiral 2 appears close to spiral 1; on the subse-

quent whorls, this spiral 2 enlarges slightly until it is almost similar in size to spiral 3, spiral 1 is always slightly larger with larger nodules. On about the tenth whorl an additional spiral cord appears; this cord is smooth, always smaller, and located just below the lower suture, but on the final whorl it is more obvious and beaded. Below it there are two more spiral cords, the upper one slightly nodulous and the lower one smooth, located on the base of the siphonal canal. Aperture rounded-ovoid, columella curved, siphonal canal elongate and recurved, closed at its base by an extension of the aperture.

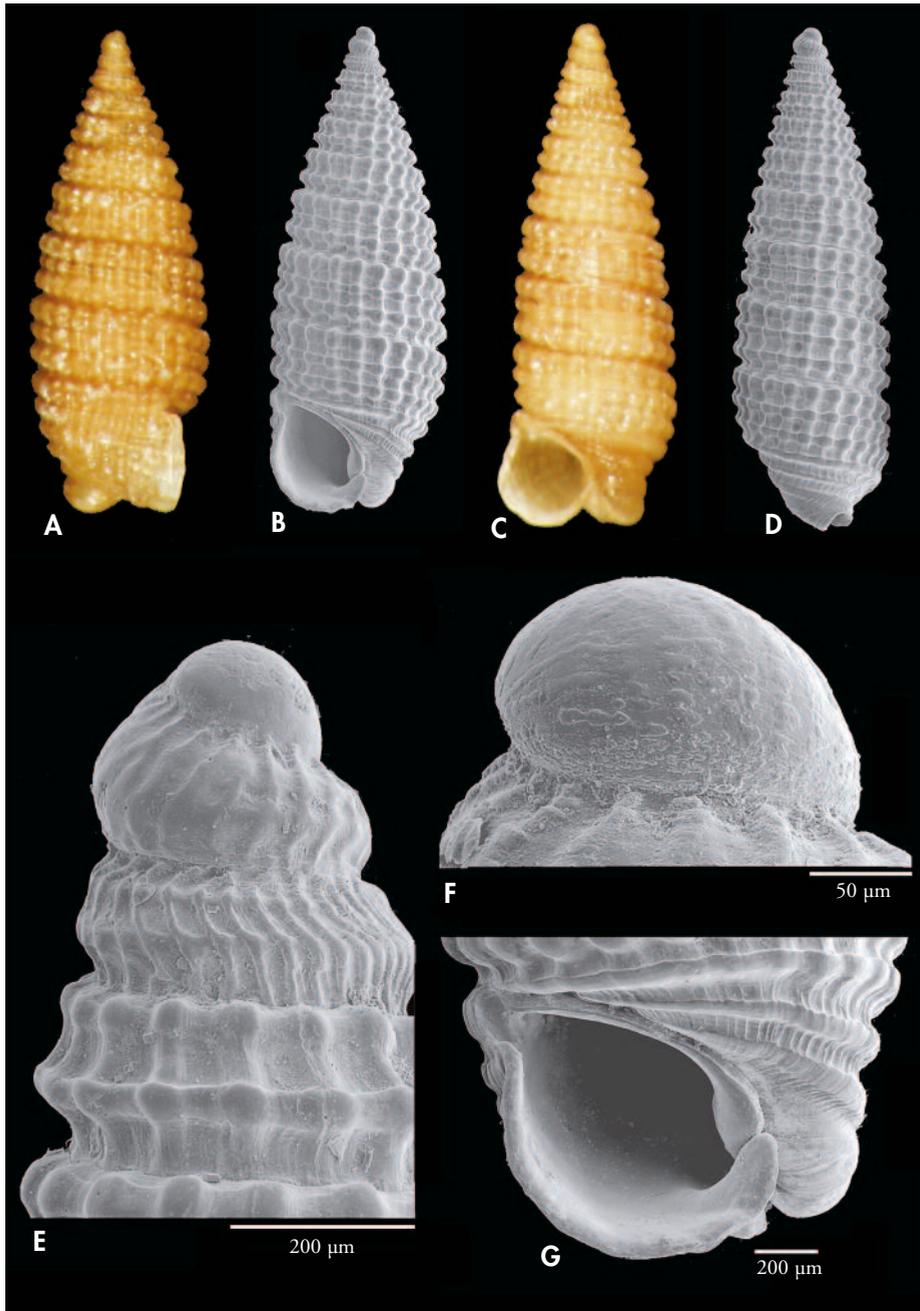


Figure 29. “*Triphora*” *turtlebayensis* spec. nov. A, B: holotype, 4.1 mm, Bermuda (FLMNH); C, D: paratype, 4.2 mm (BMSM); E: protoconch of the holotype; F: detail of the protoconch of the paratype; G: detail of the aperture and base.

Figura 29. “*Triphora*” *turtlebayensis* spec. nov. A, B: holotipo, 4,1 mm, Bermudas (FLMNH); C, D: paratipo, 4,2 mm (BMSM); E: protoconcha del holotipo; F: detalle de la protoconcha del paratipo; G: detalle de la abertura y de la base.

The colour is brown on the protoconch; light brown on the shell, spiral 1 having lighter nodules, more evident on the last whorls.

Dimensions: The shells studied measure between 4.0 and 9.0 mm.

Distribution: Only known from Florida.

Remarks: The shells figured by ABBOTT (1974) as *T. lilacina* may belong to this taxon. If the present well defined species is "*T.*" *lilacina*, the only explana-

tion would be that the lectotype of that taxon is an abnormally coloured shell, in which case the synonymy would only be acceptable if intergrades were found. On the other hand, if additional examples of the typical lilac shells of "*Triphora*" *lilacina* were collected in the future, showing consistent differences with the shells described here, then the shells referred here as "*Triphora*" cf. *lilacina* could be named as a different species.

"*Triphora*" *atlantica* (E. A. Smith, 1890) (Figs. 25A-I)

Triforis atlantica E. A. Smith, 1890. *Proc. Zool. Soc. Lond.*, 18: 292, pl. 21, fig. 16.

Triphora lilacina Dall, 1889. In Abbott, 1974: 112.

Type material: Lectotype, here designated, of *Triforis atlantica* (Fig. 25A) and several paralectotypes (BMNH 89.10.1.1874-93).

Other material examined: **USA: Florida:** 1 s (Fig. 25B), W Egmont Key, Hillsborough Co. (Gulf of Mexico) (Jim Moore/*Cavalier*, 1962), 76 m (CHL); 2 s, off Palm Beach (M. Glickstein, 1980) 82-105 m (CHL); 3 s (Figs. 25E-25G), 42 miles E St. Augustine, St. Johns Co. (T. Yocius, 1979), 85 m (CHL); 2 s (Fig. 25E, G), 42 miles E St. Augustine, St. Johns Co. (T. Yocius, Jul/1980), 36 m (CHL); 1 s, 50 miles S Carrabelle, Franklin Co. (J. Keeler, Feb/1986), 60 m (CHL); 2 s, W Marco, Collier Co. (J. Moore/*Cavalier*, 1972) 55 m (CHL); 1 s, Monroe Co., West coast, 24° 50' N, 33 fms (FLMNH 259042); 3 s, Palm Beach Co. (D. Akers, 1970-1971) 30 m (FLMNH 127891); 1 s, Palm Beach Co., off Boynton Inlet (D. and H. Akers, Sep. 1970) 36 m (FLMNH 228682). **Louisiana:** 2 s, off Louisiana, 26° 06.8' 66N 91° 02.418W (E.F. Garcia/*Pelican*, Jun/2001 57-65 m (CHL); 1 s, off extreme W Louisiana, 29° 45.9' N 13° 02.8' W, (E.F. Garcia/*Pelican*, Sept/98) 55-65 m (CHL); 1 s, off Louisiana, 28° 05.61N 91° 02.206' W (E.F. Garcia/*Pelican*, Jun/2000), 58 m (CHL); **Puerto Rico:** 2 s, Rincon (L. Germaine, Apr/1961) 30 m (FLMNH 163833). **Brazil:** 3 sp. (Figs. 25C, 25D) off Guarapari, Espiritu Santo State (R. Bodart, 1994) 15-20 m (CHL).

Description: Shell (Figs. 25A-25H) sharp-pointed, elongate, solid, with bands of brown and white. Protoconch multispiral (Fig. 25I) with the apex reticulated and 4 whorls with narrow axial ribs that cross a single thread on the first whorl and 2 elsewhere, except at the end where there is only one. Teleoconch with about 12-13 whorls, sometimes more on large shells, beginning with spirals 1 and 3, crossed by prosocline axial ribs which form nodules at the intersection points. These two spirals continue on the subsequent whorls, the upper one white and with slightly larger nodules; on about the eighth-ninth whorl, a very small spiral 2 appears close to spiral 1; on the subsequent whorls, this spiral 2 enlarges slightly until it is almost similar in size to spiral

3, spiral 1 continuing to have larger, more prominent white nodules. On about the tenth-twelfth whorl an additional spiral cord appears; this cord is only slightly nodulous, always smaller, and located just below the lower suture, but on the final whorl it is more obvious, is located near the periphery and has larger nodules. Below it there are two more spiral cords, the upper one slightly nodulous and the lower one smooth, located on the base of the siphonal canal. Aperture rounded-ovoid, columella curved, siphonal canal elongate and recurved, closed at its base by an extension of the aperture.

The colour is dark brown on the protoconch; white on the first two teleoconch whorls, subsequently with white nodules on spiral 1 and light brown in

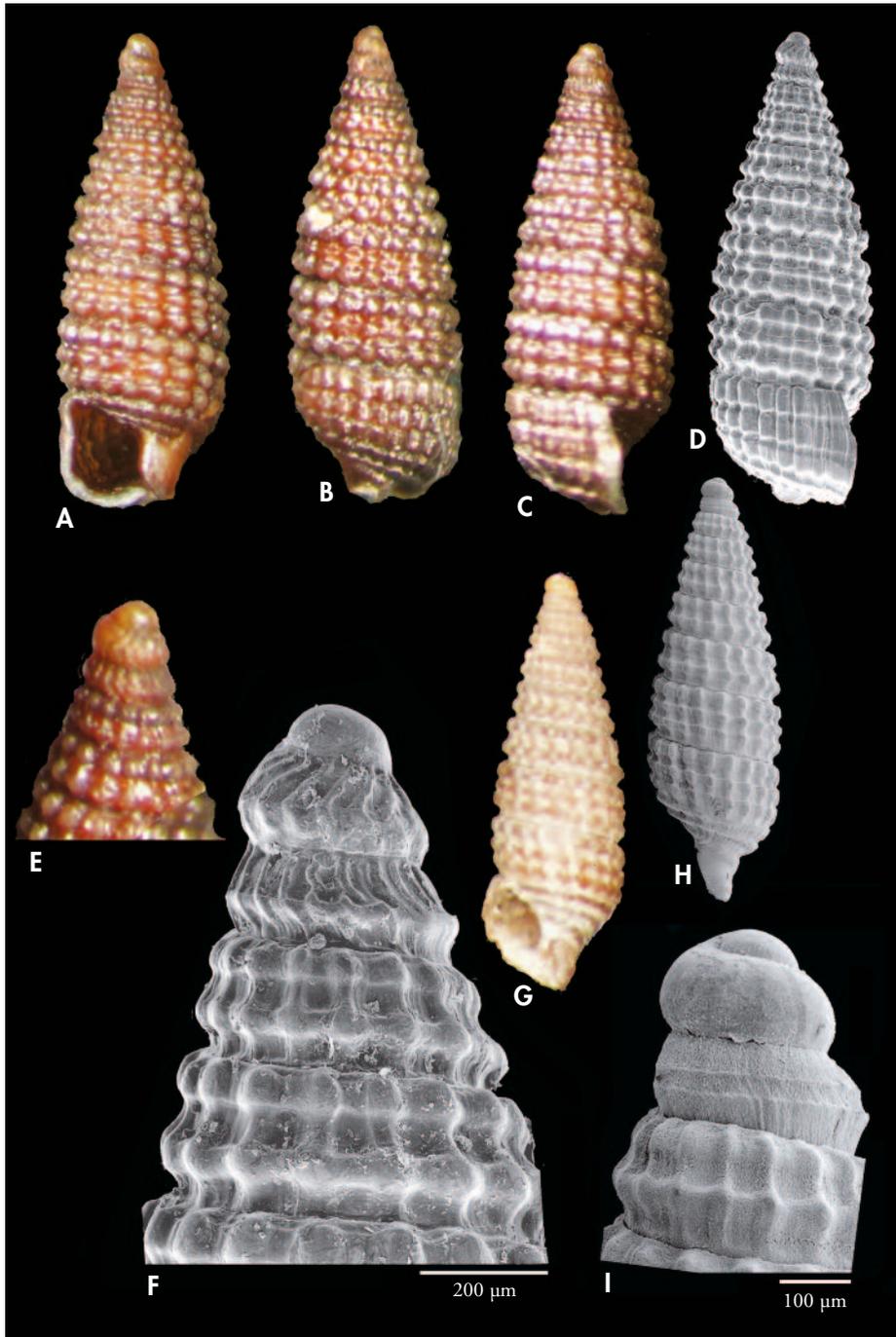


Figure 30. A-F. *Triphora* *grenadensis* spec. nov. A-D: holotype, 3.2 mm, Grenada (ANSP); E, F: protoconch of the holotype. G-I. *Triphora* sp. 1, 3.5 mm, British Honduras (Belize) (ANSP).
 Figura 30. A-F *Triphora* *grenadensis* spec. nov. A-D: holotipo, 3,2 mm, Granada (ANSP); E, F: protoconcha del holotipo. G-I. *Triphora* sp. 1, 3,5 mm, British Honduras (Belize) (ANSP).

the interspaces; the background colour of spiral 2 is brownish, with the nodules somewhat lighter. On some shells the colour is similar but lighter throughout.

Dimensions: The lectotype measures 6.0 mm. Some shells from the Caribbean can reach up to 9.0 mm.

Distribution: It is known from Florida to Brazil (not collected in Cuba). Otherwise, St. Helena, in the middle of the Atlantic is the type locality of *T. atlantica*.

Remarks: This taxon is very confused, and for many years it was considered by some authors and collectors to be *T. lilacina*. Yet the lectotype of *T. lilacina* is uniform pink-lilac, spirals 1 and 3 are well developed and spiral 2 never reaches the size of the other two. The nodules are the same colour as the shell and are not lighter, and there are no differences between the colour of spiral 1 and spiral 3. No intergrades between these two morphs were found. Furthermore, the nodules are smaller and the protoconch more sharply pointed with tubercles on the apex. However, a definitive conclusion can not be reached until enough material of true "*T.*" *lilacina* becomes available for examination, allowing a proper comparison and a study of the animal and radula.

On the other hand, the taxon "*T.*" *atlantica* described by Smith from St. Helena is a shell with constant brown and white colouration and distribution of the bands, and with nodules of similar size. The location of the type locality in the middle of the Atlantic is not a problem for a species which has a multispiral protoconch. The only problem is that the protoconch of the holotype is not known, but the eroded protoconch of a paralectotype showed 2 spiral threads, which is compatible with that of the present population. Therefore we suggest that the shells studied from the Caribbean belong to this taxon, the only doubts being due to the lack of a good protoconch from the St. Helena material. Provisionally this species must therefore be kept under this name, awaiting the information that new material will provide in the future.

It may be confused with *Monophorus ateralbus* Rolán and Fernández-Garcés, 1994, but the latter species is smaller and has a totally different colour pattern, with the lower band white in contrast to that of "*T.*" *atlantica*, on which the white spiral is always the upper one. *Triphora ellyae* De Jong and Coomans, 1988 is smaller and does not reach 4 mm.

"Triphora" pyrrrha Henderson and Bartsch, 1914 (Fig. 25J)

Triphoris pyrrrha Henderson and Bartsch, 1914. Proc. U.S.N.M. 47: 413, pl. 2, f. 4 [Type locality: Chincoteague, Virginia, USA].

Type material: A syntype (Fig. 25J) here designated as lectotype (USNM 252571).

Description: HENDERSON AND BARTSCH (1914). The lectotype is a shell in poor condition, white or cream in colour, or possibly faded brown. The protoconch is multispiral and has about 4 whorls but is very eroded, and further details are impossible to discern. The next 3 whorls have 2 spirals close together; on the following whorls, these cords 1-3 are more separate; subsequently a narrow spiral 2 appears in the middle of the whorls; on the final whorl spiral 2 is similar in size to the other

two. The siphonal canal is short and open.

Dimensions: The lectotype measures 2.7 mm.

Distribution: Only known from its type locality.

Remarks: Due to the lack of information on the protoconch, the validity of this species must be confirmed by the examination of more material from the type locality. It is somewhat similar to *Marshallora modesta* or *M. nigrocincta*, but is probably a valid species.

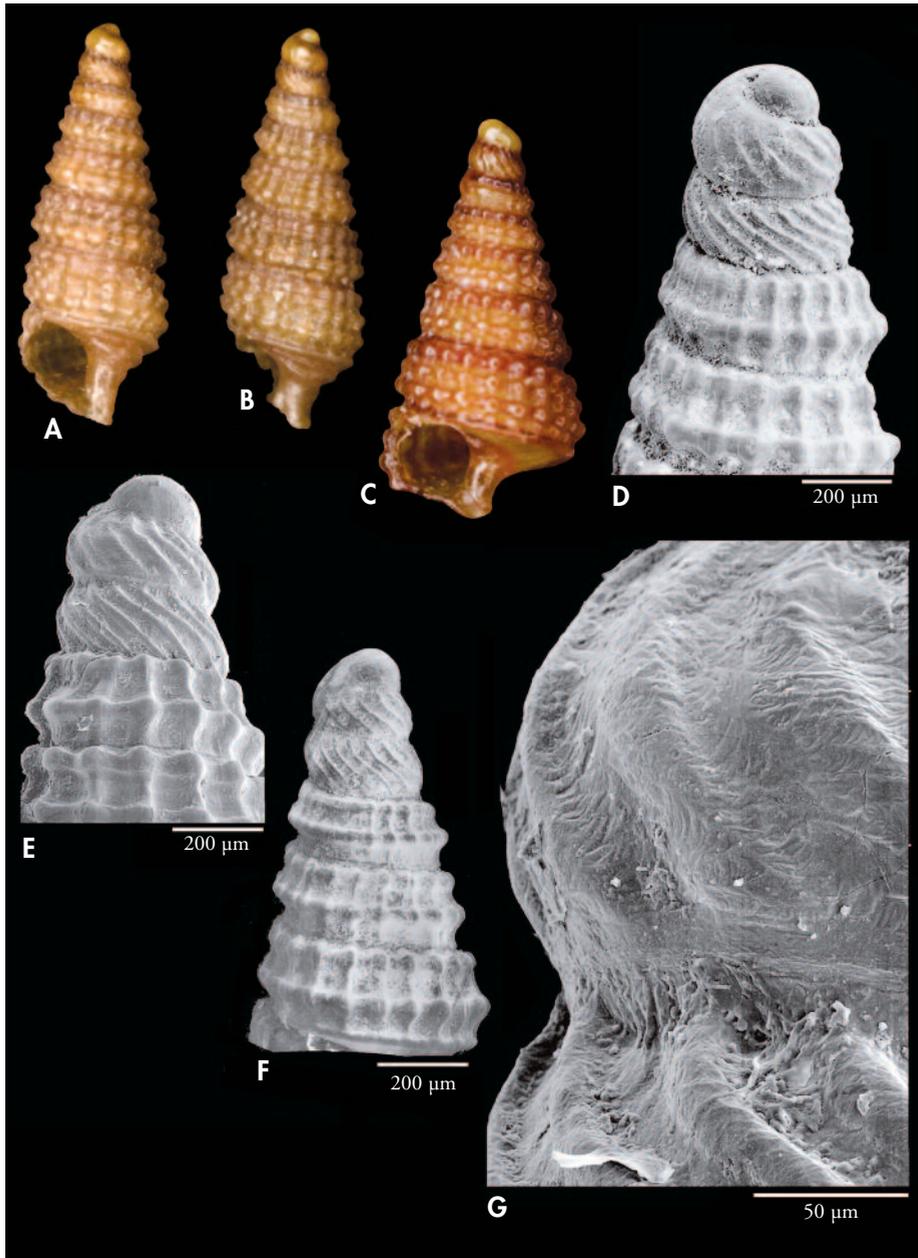


Figure 31. "*Triphora*" *abacoensis* spec. nov. A, B: holotype, 2.5 mm, Abaco, Bahamas (BMSM); C: paratype, 2.25 mm, Abaco, Bahamas (CCR); D: protoconch of paratype, Abaco, Bahamas (MHNS); E: protoconch of paratype, Abaco, Bahamas (CCR); F: protoconch, Cienfuegos, Cuba (MHNS); G: detail of the microsculpture of Figure E.

Figura 31. "*Triphora*" *abacoensis* spec. nov. A, B: holotipo, 2,5 mm, Abaco, Bahamas (BMSM); C: paratipo, 2,25 mm, Abaco, Bahamas (CCR); D: protoconcha de un paratipo, Abaco, Bahamas (MHNS); E: protoconcha de un paratipo, Abaco, Bahamas (CCR); F: protoconcha, Cienfuegos, Cuba (MHNS); G: detalle de la microescultura de la Figura E.

"Triphora" inaudita spec. nov. Rolán and Lee (Figs. 26A-D)

Type material: Holotype (Fig. 26A) in FLMNH; paratype (Fig. 26B) in BMSM from 28° 05.61' N, 91° 02.205' W to 29° 05.524' N, 91° 02.086' W (E.F. Garcia/*Pelican* 5/27/00) 58 m (both *ex* CHL).

Type locality: SW Dry Tortugas, Florida, USA 26° 42.9' N, 83° 43.20' W, 73.3-78.5 m.

Etymology: The specific name derives from the Latin word *inauditus*, which means "uncommon, unheard-of", referring to some curious characters of the shell.

Description: Shell (Figs. 26A, 26B)) very distinctive, solid, elongate. Protoconch (Fig. 26C) with 3 and 1/2 whorls with two spiral cords crossed by axial ribs. Teleoconch (Fig. 26D) with three spirals from the beginning, crossed by slightly prosocline axial ribs and forming nodules at the intersections. Spiral 1 is very small on the first whorls and is located very near to spiral 2; spirals 2 and 3 are similar in size. On the subsequent whorls, spiral 1 increases in size until it reaches a size similar to spiral 2 on about the tenth whorl, but is still less prominent. Throughout the shell spirals 1 and 2 are closer than spirals 2 and 3. On the last whorl three additional spirals appear towards the base. Aperture ovoid, almost rhomboid, with a short and open siphonal canal. The colour is very characteristic: spiral 1 is mainly brown, with 1-2 white nodules alternating with 1-3 brown ones; spiral 2 is mainly white, with only a small area of brown on the lower part of some nodules; on spiral 3 the brown colour predominates, but white nodules appear between two or more brown ones.

Dimensions: The holotype measures 5.4 mm and the paratype 4.4 mm.

Distribution: Only known from the type locality.

Remarks: Some of the characters of "*T.*" *inaudita* are totally different from any other species from the study area and therefore it has been named in spite of the scarcity of available material. The colour pattern, the smaller spiral 1 and the proximity of spirals 1 and 2 are the most important differential characters. The most similar species are:

"Triphora" cf. *atlantica* has two spirals on the first whorls, the nodules of the upper spiral are white and larger, while the rest are brown.

Cosmotriphora arnoldoi Faber and Moolenbeek, 1991 has uniform blotches of brown on a white background, spiral 2 does not exist on the first whorls and is smaller on the final ones.

Monophorus olivaceus has the lowermost spiral totally white; this spiral is larger on the first whorls, while spiral 2 is the smallest when it appears. Spirals 1 and 2 have only a few white nodules.

Nototriphora decorata (C. B. Adams, 1850) has three spirals similar and equidistant throughout the shell, the brown blotches are isolated on the whorls against a white background.

"Triphora" pseudonovem spec. nov. Rolán and Fernández-Garcés (Figs. 26E-I)

Type material: Holotype (Fig. 26E) and 2 paratypes in FLMNH (193355).

Type locality: Barnegat Bay, Massachusetts, USA.

Etymology: The specific name alludes to the similarity with *Mesophora novem*.

Description: Shell (Fig. 26E) subconical elongate, solid. Protoconch (Figs. 26G, 16H) with 3 1/2 whorls and a diameter of about 300 μ m. The nucleus is tuberculated and is followed by one spiral thread crossed by numerous slightly opisthocline axial ribs. Teleoconch with about 14 whorls, spirals 1

and 3 appearing beaded at the beginning, with the ribs clearly prosocline; on the subsequent whorls the spirals slowly become more widely separated. The nodules are large and spherical, of similar size on both spirals, the upper nodules connected to the lower ones by well defined and slightly curved proso-

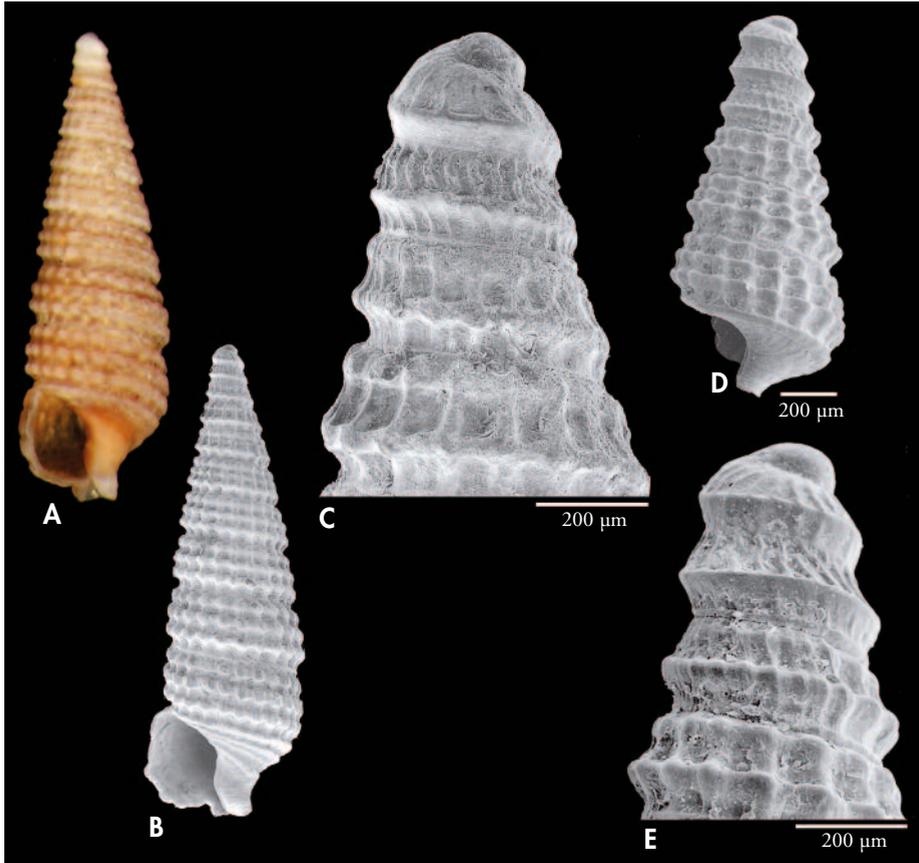


Figure 32. “*Triphora*” *portoricensis* spec. nov. A, B: holotype, 4.4 mm, Puerto Rico (FLMNH); C: protoconch of the holotype; D: paratype, 1.8 mm, Abaco, Bahamas (CCR); E: protoconch of the paratype.

Figura 32. “*Triphora*” *portoricensis* spec. nov. A, B: holotipo, 4,4 mm, Puerto Rico (FLMNH); C: protoconcha del holotipo; D: paratipo, 1,8 mm, Abaco, Bahamas (CCR); E: protoconcha del paratipo.

cline axial ribs (Fig. 26I). Spiral 2 appears between the other two spirals on the final two or three whorls; it is very fine and is located very close to spiral 1, not increasing immediately in size and remaining clearly smaller than the other two on the final whorl. Towards the base there are three more nodulous spirals. Aperture rounded, small, opened to the siphonal canal, which is curved and a little smaller in size than the height of the aperture (Fig. 26F).

The entire shell is brown, with the nodules a little lighter.

Dimensions: The holotype measures 7.3 mm.

Distribution: Only known from the type locality.

Remarks: This species has some of the characters of *Mesophora novem*, such as spirals 1 and 3 separated throughout most of the shell, but this new species is brownish, whereas *M. novem* is tinged with violet and has the first teleoconch whorls white; another difference is the slowly increasing size of spiral 2. The protoconch has only one spiral thread and it is shorter than that of *M. novem*.

“Triphora” calva Faber and Moolenbeek, 1991 (Figs. 27A-G)

Triphora calva Faber and Moolenbeek, 1991. *Apex*, 6(3/4): 82, figs. 3, 4. [Type locality: Key Biscayne, Florida, USA].

Type material: Holotype not examined (ZMA 391003). Represented in the original description.

Material examined: Bahamas: 1 j (Fig. 27F), Treasure Cay, Abaco 26 40.12N 77 18.19W (CCR); 5 j, North Sound, Bimini, mangrove (R. Robertson, 1957) (ANSP 329747); 3 s, Grand Bahama Island, 26° 31' 00"N, 78° 46' 30"W (J. Worsfold) (ANSP 373944); 1 s (Fig. 27G) Bootle Bay, Grand Bahama Island, 26° 39' 30"N, 078° 57' 00" (J. Worsfold) (ANSP 371845); 6 sp, North Hawksbill Creek, Grand Bahama Island 26° 32' 00"N, 78° 45' 00"W (J. Worsfold) (ANSP 370520); 1 sp, 7 s, Hotel, West End, Grand Bahama Island 26° 42' 15"N, 78° 59' 50"W (J. Worsfold, Dec. 1981) (ANSP 368674); 1 s, McLeans Town, Grand Bahama Island, 26° 38' 45"N, 77° 57' 30"W (J. Worsfold) (ANSP 368484); 1 s, Hope Town Harbour, Abaco (R. Robertson, Jun. 1953) (ANSP 299409). Grand Cayman Island: 1 s, W of Prospect, SW Sound (A. J. Ostheiner) (ANSP 198925). Florida: 1 s, 1 f (Fig. 27A), Key Largo (CMK); 1 sp, 1 s, Bonefish Key (Aug. 1957) (FLMNH UF368198). Cuba: 3 s, Caibarién, (FLMNH UF365100); 1 f (Fig. 27D), Cienfuegos (CFG); 1 f, Jibacoa (MHNS); 1 f (Fig. 27E) Santa Lucia, Pinar del Rio (CFG); 3 s, Batabanó (CFG); 1 s, Cabo Matias, Canarreos (MHNS).

Description: FABER AND MOOLENBEEK (1991). The most important diagnostic characters are the following: the shell is dark brown; the brown colour may be uniform, sometimes with the nodules lighter (Fig. 27C) and even with spiral 1 on the last whorl with white nodules (Fig. 27A). The protoconch (Figs. 27B, 27D, 27E, 27F) is described as having only one smooth whorl, but if the protoconch whorls are counted by the VERDUIN (1977) method, and the end of the protoconch is at the point where the teleoconch begins with two spirals, it actually has 2 whorls (sometimes a little less); the first whorl is smooth and there is a spiral cord at the middle of the second one. In the original description there is no information on the diameter of the protoconch. Based on the photograph of the holotype it could be deduced that the protoconch is about 275 μm in width; in the material examined the diameter is variable between 250 and 380 μm . This and the brown colour are important characters for differentiation from other species.

Teleoconch sculpture begins with spiral 3; spiral 1 and axial ribs appear on the third whorl (the second whorl of the teleoconch). Spiral 2 emerges on the sixth whorl (the fifth of the teleoconch). Also another smooth sutural spiral commences on the 3th-4th whorl.

Dimensions: The holotype measures 5.0 mm. Some shells attributed to this species can reach 9 mm.

Distribution: Known from several areas of the Caribbean: Florida, Bahamas, Cuba.

Remarks: In some works (e.g. ROLÁN AND FERNÁNDEZ-GARCÉS, 2007) this species is assigned to the genus *Marshallora*. In fact there is no information on the radula and it is therefore better to keep it in *“Triphora” s. l.*

Shells from Quintana Roo were referred to in the original description under *“Other material studied”* to be this species; these shells were later described as *Marshallora nichupte* by ROLÁN AND CRÚZ-ÁBREGO (1996). This species can be differentiated from *“T.” calva* by its more variable colour, ranging from dark brown to white, larger shell and wider protoconch, with only 1 to 1 1/2 whorls.

Below, several species are shown to be different from *“T.” calva* although having a short protoconch as a common feature.

The protoconch of this species has been studied in shells from the Bahamas, Florida and Cuba (Figs. 27B, 27D, 27E, 27F), all of which have a first whorl with a similar diameter: 250, 270 μm and 260 μm respectively. Other similar characters include a smooth apex and one spiral cord on the second whorl.

One shell from the Bahamas (Fig. 27G) resembles "*T. calva*" but is larger (6.8 mm) and elongated (11 whorls), and

the protoconch has only one spiral whorl instead of two. It may be a different species or an abnormal individual.

"Triphora" yociusi spec. nov. Rolán and Lee (Figs. 27H, I)

Type material: Holotype (Fig. 27H) deposited in FLMNH (*ex* CHL). Paratype (Fig. 27I) in BMSM from 67 miles E St. Augustine, St. Johns Co., Florida (T. Yocius 1979) 54 m; both *ex* CHL.

Other material studied: 1 s (eroded), Bermuda (C. Abbott Davis) (ANSP 88722).

Type locality: 32 miles E St. Augustine, St. Johns Co., Florida (J. Dawley / *Scallop* 1982), 30 m.

Etymology: The species is named after Ted Yocius, the St. Augustine fisherman who dredged so many of the triphorids from off northeast Florida, including the present species.

Description: Shell (Fig. 27H) subconical elongate, solid. Protoconch (Fig. 27I) paucispiral with $1\frac{3}{4}$ whorls and a diameter of about 370 μ m. The nucleus and most of the first whorl are smooth; near the end of this whorl two spiral cords appear. Teleoconch with about 8 whorls, with spirals 1 and 3 nodulous at the beginning. The nodules are large and rounded, of similar size on both spirals, the upper ones connected to the lower by fine prosocline axial ribs. On about the fifth whorl of the teleoconch spiral 2 appears between the other two, but closer to spiral 1; it is very narrow, subsequently increasing in size until the three spirals are similar on the final whorl. Aperture rounded, small and open to the siphonal canal, which is half the size of the aperture.

The entire shell is brown, but a darker band covers spiral 1 and reaches to the suture, the nodules on this spiral being lighter than the background colour; the nodules and the background colour of spiral 3 are cream coloured, as is spiral 2 on the last whorl.

Dimensions: The holotype measures 3.9 mm.

Distribution: Only known from type locality and area close by.

Remarks: "*Triphora yociusi*" spec. nov. has a wider protoconch than "*T. calva*", with $1\frac{3}{4}$ whorls, and at the end of the first protoconch whorl there are two spirals, while in "*T. calva*" there is only one. The teleoconch colour is lighter and spiral 3 is cream colored, the shell is narrower, the aperture relatively smaller and the siphonal canal larger.

"Triphora" guadaloupensis spec. nov. Rolán and Fernández-Garcés (Figs. 28A-D)

Type material: Holotype (Figs. 28A-28D) ANSP (313817). Two paratypes in the same lot (ANSP). All from the type locality.

Type locality: Guadaloupe, NW of Pointe de Chateaux (Maes, Feb. 1962) 6-11 m.

Etymology: The species is named after the island where it was collected.

Description: Shell (Figs. 28A-D) very small, ovoid, short, solid. Protoconch (Fig. 28D) paucispiral, white, with 2 whorls and a diameter of about 280 μ m. The nucleus is smooth and almost vertical, followed by a whorl with two spiral cords; on the second whorl an additional smaller spiral cord appears between the other two. The white colour extends no further than the protoconch, the beginning of the teleo-

conch being brown with two beaded cords. Teleoconch with about $4\frac{1}{2}$ whorls, with spirals 1 and 3 nodulous at the beginning. The nodules are large and rounded, of similar size on both spirals, the upper ones connected to the lower ones by wide orthocline ribs. On the 3rd-4th whorls, spiral 2 appears between the other two and subsequently increases in size, with the three spirals only becoming

similar on the final whorl at the end of the spire. The base has three more spiral cords, only the upper one being nodulous. Aperture ovoid, closing the siphonal canal by an extension of the outer lip; an anal notch is visible at the top of the lip.

The shell colour is brown, but the nodules on spiral 3 are always whitish-cream; the background of the spiral as well as the nodules are of this color on the final whorl, but the nodules are lighter.

***“Triphora” amicorum* spec. nov.** Rolán and Fernández-Garcés (Figs. 28E-H)

Type material: Holotype (Figs. 28E, 28F) and one paratype (Fig. 28G) in FLMNH (249812).

Type locality: Palm Beach Co., Lake Worth, North Inlet, Peanut Id., Florida, USA.

Etymology: The species is named after the several friends who contributed to this work with material, information and advice, and those who also helped in other ways.

Description: Shell (Figs. 28E-28F) elongate, solid. Protoconch (Fig. 28H) with $2\frac{3}{4}$ whorls, the apex (nucleus and first whorl) with numerous microscopic tubercles, followed by crowded axial ribs which begin below the suture; on the next whorl, the tubercles are aligned to form two threads, the upper one in the middle of the whorl and the second, a little larger and more prominent, between the first one and the suture. The axial ribs number about 40 per whorl, narrow and very close, undulating in the shape of an open S. The teleoconch begins with spirals 1 and 3, with spherical nodules that are larger on spiral 1, and with slightly orthocone axial ribs. Spiral 2 appears on the seventh whorl and is narrower, equidistant between the other two; it increases in size on the following whorls. Three more spirals on the base, the lowest one close to the siphonal canal. The colour of the shell is brown, with white nodules

Dimensions: The holotype measures 2.3 mm. Paratypes of similar size.

Distribution: Only known from Guadalupe, and probably endemic to that island.

Remarks: This species, with two protoconch whorls bearing 2 and 3 spiral cords respectively, a very short shell with lighter beads on spiral 1 and a cream-colored spiral 3, is different from any other in the study area.

on spiral 1. Aperture ovoid, opened to a short siphonal canal.

Dimensions: The holotype measures 4.4 mm. The paratype is smaller.

Distribution: Only known from the type locality.

Remarks: This species is different from other Caribbean species of Triphoridae because of its planktotrophic but short protoconch. The shell may have some similarity with the following:

Marshallora modesta and *M. nigrocincta* have larger shells, and both protoconchs are different (see Figs. 8G, 8H), with more whorls and with the upper spiral thread located above the middle of the whorl.

Marshallora nichupte and *“Triphora” calva* both have protoconchs that lack axial sculpture.

Cheirodonta apexcrassum (Rolán and Fernández-Garcés, 1994) has a protoconch with spiral cords but no axial ribs (Fig. 34J).

***“Triphora” turtlebayensis* spec. nov.** Rolán and Lee (Figs. 29A-G)

Type material: Holotype (Figs. 29A, 29B) in FLMNH ex CHL. Paratypes: in BMSM (1 s, Figs. 29C, 29D), USNM (1 s) and CHL (3 s). All from the type locality. Other paratypes: 4 s, Bermuda (A. Haycock) (ANSP 105606).

Other material examined: 4 s eroded, Shelly Bay, Bermuda (ANSP 145963); 1 s eroded (labeled as *T. modesta*), (A. J. Peile) Bermuda (BMNH 1911.17.21.641-50).

Type locality: Off Turtle Bay, Bermuda.

Etymology: The specific name alludes to the name of the type locality.

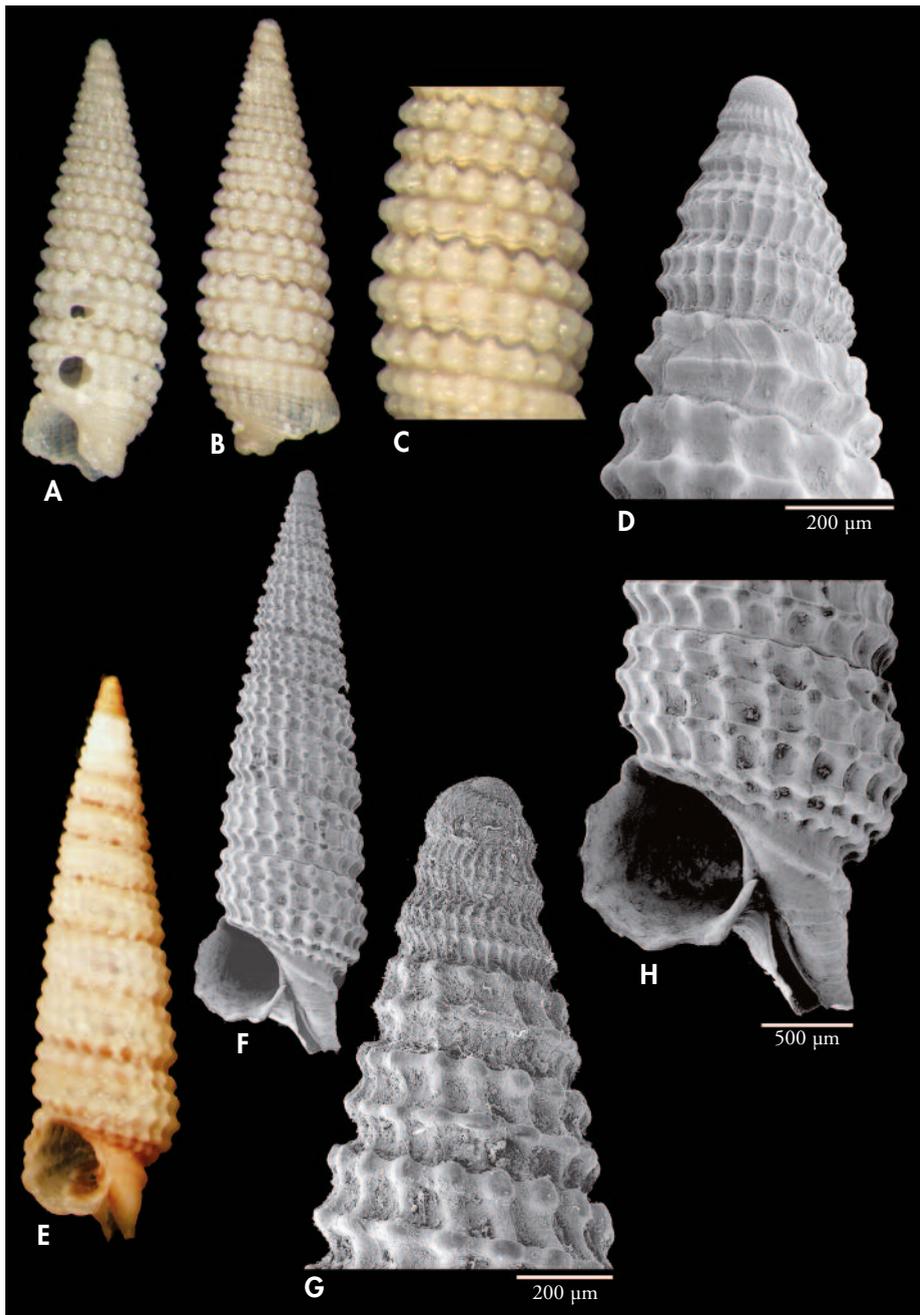


Figure 33. A-D. “*Triphora*” sp. 2. A, B: shell, 4.6 mm, La Herradura, N of Cuba (MHNS); C: detail of the spire; D: protoconch. E-H. “*Triphora*” sp. 3. E, F: shell, 5.8 mm, Miami, Florida (FLMNH); G: protoconch; H: detail of the aperture.

Figura 33. A-D. “*Triphora*” sp. 2. A, B: concha, 4,6 mm, La Herradura, N de Cuba (MHNS); C: detalle de la espira; D: protoconcha. E-H. “*Triphora*” sp. 3. E, F: concha, 5,8 mm, Miami, Florida (FLMNH); G: protoconcha; H: detalle de la abertura.

Description: Shell (Figs. 29A-29D) ovoid elongate, solid. Protoconch (Figs. 29E, 29F) paucispiral, with two whorls and a diameter of 300 μm on the first whorl and 380 on the second. The nucleus is smooth, the first whorl with prominent opisthocline axial ribs crossed at its end by 2 transient spiral cords; on the second whorl these two cords are well defined and the axial ribs change, becoming prosocline and more dense at the end. Spirals 1 and 3 are present at the beginning of the teleoconch, with the lower spiral more prominent. On the subsequent whorls they become more widely separated, and on about the fifth whorl spiral 2 appears between them. This smaller spiral increases in size on the two final whorls, but spiral 1 continues to have slightly larger nodules. Suture deep. Towards the base of the final whorl there are three additional spirals that are separated by numerous axial threads.

Aperture ovoid (Fig. 29G), columella thickened at the base and outer lip extended, closing off the opening of the short, curved siphonal canal. The colour is uniformly light brown.

Dimensions: The holotype measures 4.1 mm. Paratypes of similar or smaller size.

Distribution: Only known from the type locality.

Remarks: The differences of this species with "*T.*" *calva* are the following: "*T.*" *turtlebayensis* has a wider shell, the protoconch is wider and has 2 whorls with prominent axial and spiral sculpture beginning on the first whorl, the siphonal canal is closed and there are numerous axial threads between the basal cords.

There are other Caribbean species with a similar shell but all of them have different protoconchs: *Cheirodonta apex-crassum* (Fig. 34J), *Sagenotriphora osclausum* (Fig. 22D-22F) and *Marshallora modesta* (Fig. 8G).

"*Triphora*" *grenadensis* spec. nov. Rolán and Lee (Figs. 30A-F)

Type material: Holotype (Figs. 30A-30D) in ANSP (313668).

Type locality: Levera Beach, N end of Grenada (R.A. and V.O. Maes, 1966), on *Caulerpa*, 1-3 m.

Description: Shell (Figs. 30A-30D) dark brown, somewhat darker on the suture, relatively solid, pointed. Protoconch (Figs. 30E, 30F) paucispiral, with a little more than 2 whorls and a diameter of about 300 μm , the apex smooth, the first protoconch whorl with a poorly defined wide spiral cord just below the periphery, crossed by rather well separated axial ribs, opisthocline above the spiral and prosocline below, forming an angle in the middle. On the subsequent whorl the spiral cord is well defined and above it the axial ribs are almost orthocline. Teleoconch with seven whorls with two spiral beaded cords (spiral 1 and 3) on the first four whorls; on the fifth, spiral 2 appears between the other two but is smaller, the three spirals being similar in size on the final whorls. The aperture is rectangular, the siphonal canal short and open; the border of the outer lip is white.

Dimensions: The holotype measures 3.2 mm.

Distribution: Only known from the type locality.

Remarks: This species is described and named in spite of the scarcity of the study material, due to the fact that it has very distinct differences with all other Caribbean species, probably being endemic to Grenada.

Comparison must be made with the species that have a similar shell and protoconch:

"*T.*" *calva* has a similar shell, but the protoconch is always smooth, lacking any axial sculpture except for a spiral elevation on the second whorl.

"*T.*" *turtlebayensis* has a similar protoconch but it is light brown in colour, with two spiral cords located on the upper middle of the whorl. Furthermore the shell is a little more slender, of a uniform light brown

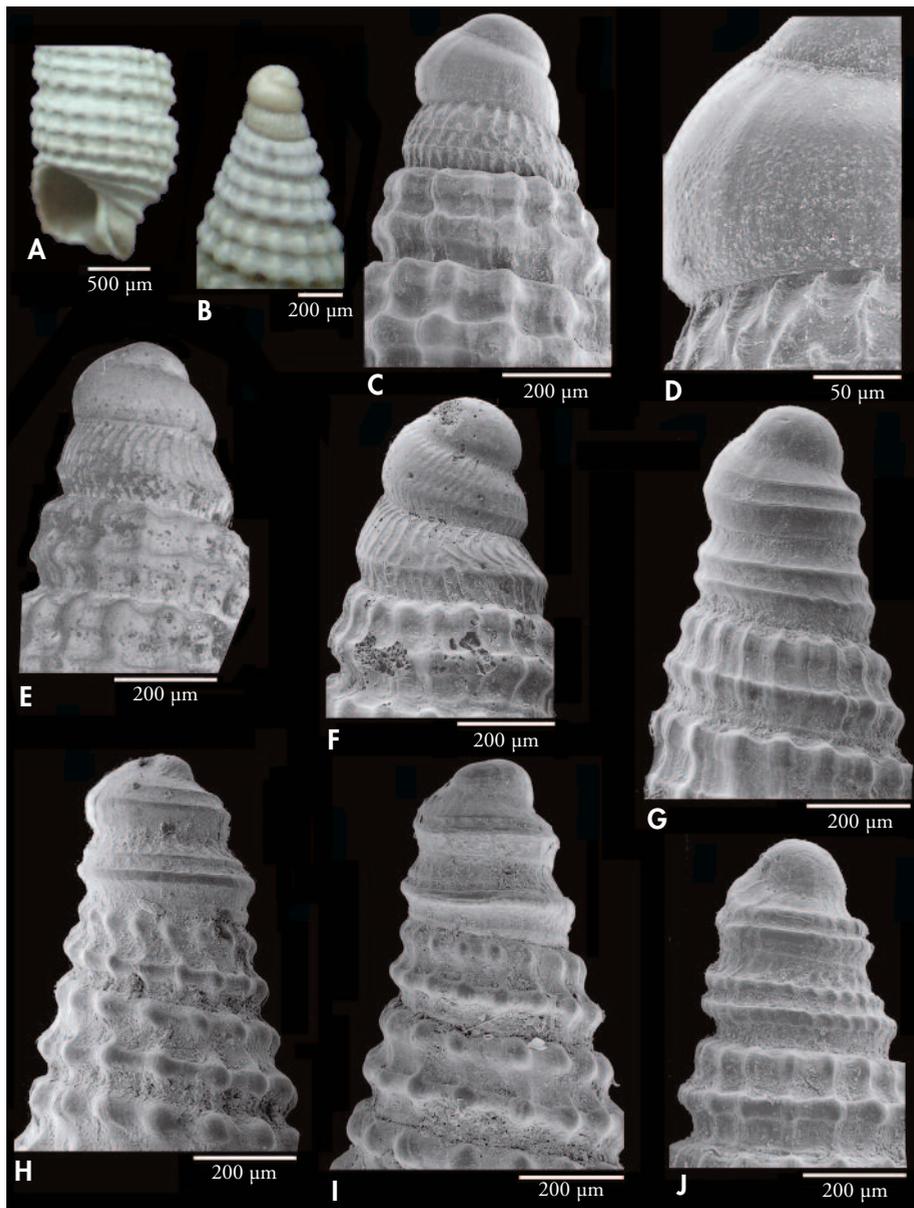


Figure 34. A-D. "*Triphora*" sp. 4. Batabano, Cuba (MHNS); A: fragment; B: protoconch; C: protoconch, SEM photograph; D: detail of the sculpture of the protoconch. E, F. "*Triphora*" sp. 5. Protoconchs, Cienfuegos, Cuba (MHNS). G. "*Triphora*" sp. 6. Protoconch, Cienfuegos, Cuba (MHNS). H. "*Triphora*" sp. 7. Protoconch, Miskito Archipelago, Nicaragua (MHNS). I. "*Triphora*" sp. 8. Witties Cape, Nicaragua (MHNS). J. *Cheirodonta apexcrassum*, Cuba (MHNS).
 Figura 34. A-D. "*Triphora*" sp. 4. Batabanó, Cuba (MHNS); A: fragmento; B: protoconcha; C: protoconcha, fotografía al MEB; D: detalle de la escultura de la protoconcha. E, F. "*Triphora*" sp. 5. Protoconchas, Cienfuegos, Cuba (MHNS). G. "*Triphora*" sp. 6. Protoconcha, Cienfuegos, Cuba (MHNS). H. "*Triphora*" sp. 7. Protoconcha, Archipiélago Miskito, Nicaragua (MHNS). I. "*Triphora*" sp. 8. Cabo Witties, Nicaragua (MHNS). J. *Cheirodonta apexcrassum*, Cuba (MHNS).

colour, the aperture is rounded with an occlusion of the base of the siphonal canal and lacks white colour on the outer lip.

Other species with a similar shell but different protoconch are mentioned in the *Remarks* for "*T. turtlebayensis*". The comparison is valid for this species.

"Triphora" abacoensis spec. nov. Rolán and Redfern (Figs. 31A-G)

"Triphora" sp. A. Redfern, 2001. *Bahamian Seashells*, p. 69, figs. 289A, 289B.

Type material: Holotype (Figs. 31A, 31B) in BMSM (15499); paratypes; 1 j (Fig. 31C) beach drift, Treasure Cove 26° 42' 00"N, 77° 18' 30"W, (CCR); 1 j (Figs 31E, 31G) Chub Rocks 26° 43' 55"N, 77° 13' 05"W 10 m (CCR), 1 j (Fig. 31D) from the type locality (MHNS); 1 s, 3 j from the type locality (CCR); all of the above from Abaco, Bahamas. 1 paratype, Lucayan Waterway, off South End, Grand Bahama Island, Bahamas 26° 31' 45"N, 78° 32' 45"W (J. Worsfold) (ANSP 369222).

Other material studied: 2 j, Cienfuegos, Cuba 30 m (CFG and MHNS).

Type locality: East of Chub Rocks, Abaco, Bahamas in 52 m, 26° 44' 00"N 77° 09' 00"W.

Etymology: The specific name refers to Abaco, the island in the Bahamas from which the holotype was collected.

Description: See REDFERN (2001). Shell (Figs. 31A-31C) ovoid elongate, brownish, solid. Protoconch (Figs. 31D-31F) very distinctive, brown with a darker suture, the nucleus almost vertical and about 125 µm high, with a diameter of 250 µm; in total, the protoconch has a little more than 2 whorls; the surface of the tip is irregularly roughened but without tubercles; very strong prosocline axial ribs appear immediately below the nucleus and extend between the sutures to cover the entire whorl; minute, irregular spiral lines are visible under high magnification (Fig. 31G). Spirals 1 and 3 are present at the beginning of the teleoconch, their nodules connected by axial ribs; spiral 2 appears on the third whorl, with all spirals being of similar size. The colour

is brown, with spiral 1 darker. The aperture is not known, as the shells studied are juveniles. Siphonal canal short.

Dimensions: The holotype, which is juvenile, measures 2.5 mm.

Distribution: Known from the Bahama Islands. One of the protoconchs collected in Cuba (Fig. 31F), in spite of being narrower, is probably of the same species.

Remarks: The type material consists of immature shells, but the protoconch is so characteristic that it was finally decided to describe the species and to give it a name, as there is none similar in the studied area.

There are no species in the Caribbean having this kind of protoconch with strongly prosocline axial ribs.

"Triphora" portoricensis spec. nov. Rolán and Redfern (Figs. 32A-E)

Iniforis sp. Redfern, 2001. *Bahamian Seashells*, p. 66, figs. 278A, 278B.

Type material: Holotype (Figs. 32A, 32B) (FLMNH UF363895). One paratype (Fig. 32D), f, east of Chub Rocks, Abaco, Bahamas, 26° 44' 00"N, 77° 09' 00"W 52 m (CCR).

Type locality: Puerto Rico.

Etymology: The name derives from Puerto Rico, the island on which the holotype was found.

Description: Shell (Figs. 32A, 32B) conical elongate, light brown, with the apex white. The protoconch (Fig. 32C)

has about 2 ³/₄ whorls and has a prominent keel a little below the middle of the whorl. Above and below this keel there

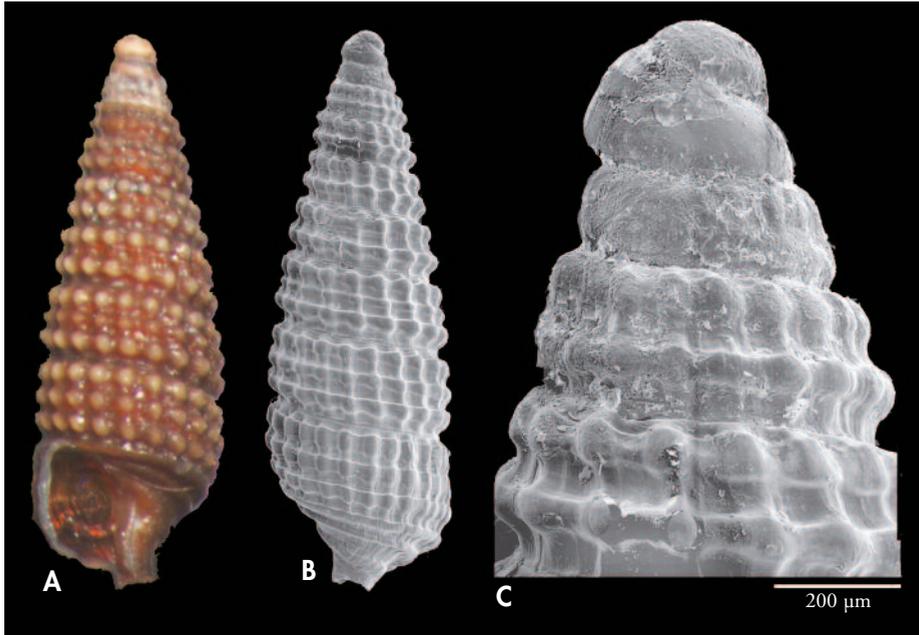


Figure 35. "*Triphora*" sp. 9. Key Matias, Los Canarreos Archipelago. S Cuba (MHNS).

Figura 35. "*Triphora*" sp. 9. Cayo Matias, Archipiélago de Los Canarreos. S Cuba (MHNS).

are narrow axial ribs, orthocline at the beginning and slightly prosocline below. The teleoconch has about 8 whorls, with spirals 1 and 3 present at the beginning and spiral 2 appearing on the third whorl, smaller initially but immediately enlarging until it is the same size as the other two. On the last whorls, the three spirals are similar but the lowermost is more prominent, and a very small, smooth spiral appears just on the suture. On the base this spiral 4 is wider, and three more smooth spiral cords appear below. The aperture is ovoid, the outer lip sharp, the columella curved, the siphonal canal short and open.

Dimensions: The holotype measures 4.4 mm. The paratype is a juvenile.

Distribution: Only known from Puerto Rico and the Bahamas.

Remarks: The paratype from the Bahamas (Figs. 32D, 32E) differs slightly from the holotype; for example the spiral cord on the protoconch is more prominent and, on the teleoconch, spiral

2 appears a little earlier, but these are small differences, while the others characters are similar. For this reason both are considered to be the same species.

The protoconch of this species is somewhat similar to those of some species in the genus *Iniforis*, such as *Iniforis immaculata* Rolán and Fernández-Garcés, 1993 and *I. carmelae* Rolán and Fernández-Garcés, 1993, but those two species are white and always have only two spirals throughout the teleoconch, with large nodules; that is very different from the three spirals and small nodules on most of the teleoconch of "*T.*" *portoricensis*.

No other Caribbean species has this kind of protoconch. The most similar are those with a short protoconch that has one spiral: "*T.*" *turtlebayensis* spec. nov. and "*T.*" *grenadensis* spec. nov., but they have differences on the teleoconch and also on the protoconch, where the axial sculpture is present from the beginning and crosses the spiral cord.

"Triphora" sp. 1 (Figs. 30G-I)

Material studied: British Honduras (now Belize): 2 s (Figs. 30G, 30H), Cangrejo Bay, 17° 51' 35"N, 88° 02' 55"W (R. Robertson, July 1961) (ANSP 282402).

Description: Shell (Figs. 30G, 30H) elongate, narrow, solid and brown in colour. Protoconch (Fig. 30I) paucispiral, with only two whorls, the upper one apparently smooth, followed by another whorl on which there are two very fine spiral threads. The teleoconch begins with spirals 1 and 3, which both have nodules connected by orthocline axial ribs. About the fifth whorl, spiral 2 appears between spirals 1 and 3, starting very narrow but increasing in size on the following whorls; on the body whorl the size of the three spirals is similar. On the lower part of the whorls, very close to the suture, a very small, smooth spiral can be seen. On the base, this spiral is wider and below it there are two more, the lowermost close to the siphonal canal.

Dimensions: The studied shells measure 3.5 mm.

Remarks: "*T.*" *calva* has a wider shell, the protoconch with only one cord on the second whorl.

"*T.*" *turtlebayensis* spec. nov. and "*T.*" *grenadensis* spec. nov. have axial ribs on the protoconch.

"*T.*" *yociusi* spec. nov. has a shell with bands of colour; the protoconch is wider and has only 1^{3/4} whorls.

This species is undoubtedly a valid endemic from Belize, but only two shells have been studied, one of them with the protoconch somewhat eroded, the other decollated and in not very good condition. It is therefore preferable to keep this species without a name, waiting for more material in the future.

"Triphora" sp. 2 (Figs. 33A-D)

Material examined: 1 s and 1 protoconch. La Herradura, N of Cuba (MHNS).

Description: Shell (Figs. 33A, 33B) cream, solid, ovoid elongate.

The apex of the protoconch is broken, with the remaining three whorls showing only one spiral cord. The protoconch (Fig. 33D) of a juvenile presumed to be the same species has 4 whorls, the apex with microscopic tubercles and the following whorls with one thread crossed by slightly opisthocline axial ribs; on the subsequent whorls there are two spiral threads. However, the protoconch of the complete shell, although slightly eroded, differs by having only one spiral cord.

Teleoconch with nine whorls beginning with two nodulous cords, the nodules being large and spherical; on about the seventh whorl a narrow spiral thread appears between the other two, located very close to spiral 1 and there-

fore very undulating (Fig. 33C); it enlarges very slowly and only becomes nodulous on the final whorl, the nodules being smaller than those on spiral 1; the nodules on spiral 3 decrease in size on the final whorl; on the base there are 4 more smooth cords. Aperture rounded. Siphonal canal short and open.

The colour is very characteristic: uniform cream with only a small brown spot between each nodule.

Dimensions: The shell studied measures 4.6 mm.

Remarks: The characters are very typical and different from any other species in the Caribbean. But only one shell was found, and there is not even any certainty that the protoconch is from the same species, so the species will not be named until more material has been obtained.

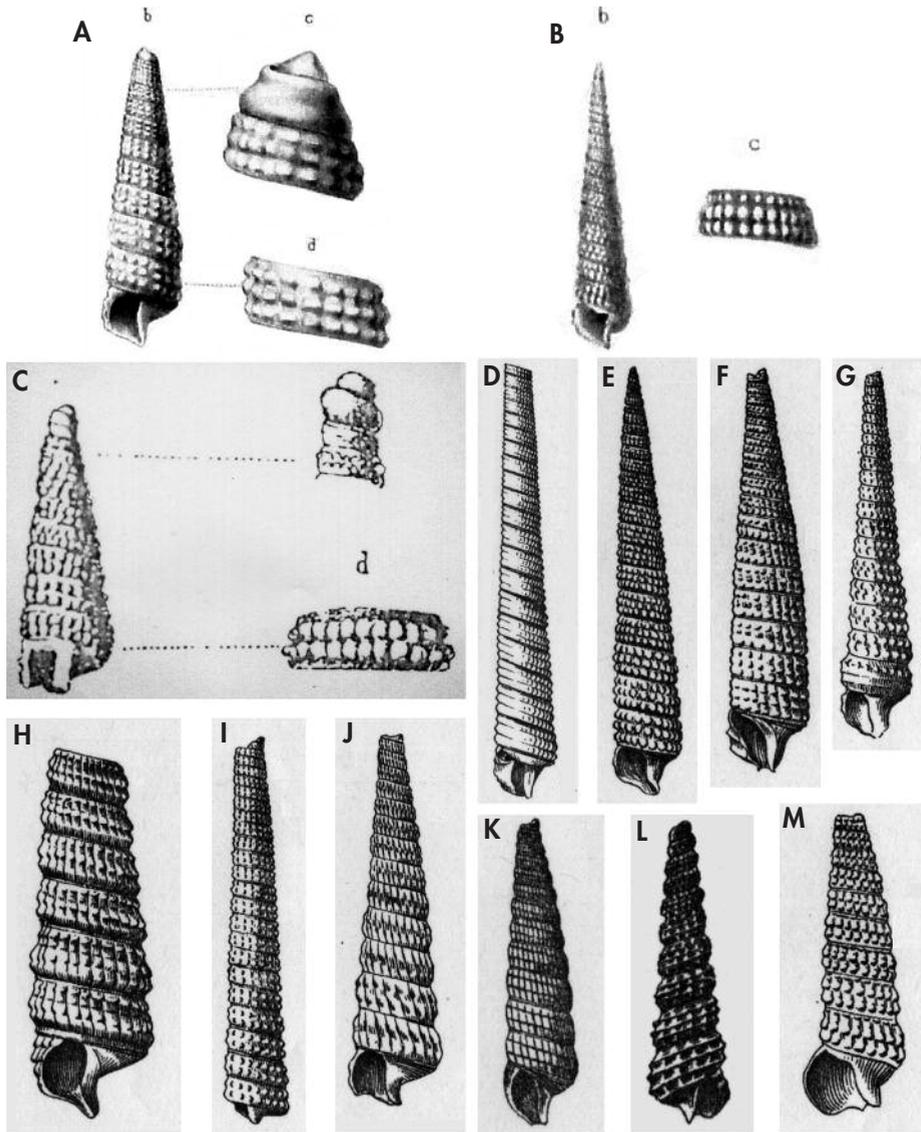


Figure 36. Original drawings of some triphorids. A: *Triforis hebes* (from WATSON, 1886); B: *Triforis bigemma* (from WATSON, 1886); C: *Triforis inflata* (from WATSON, 1886); D: *Triforis longissima* (from DALL, 1889); E: *Triforis triserialis* (from DALL, 1889); F: *Triforis intermedia* (from DALL, 1889); G: *Triforis inflata* Watson var. *ibex* (from DALL, 1889); H: *Triforis torticula* (from DALL, 1889); I: *Triforis colon* (from DALL, 1889); J: *Triforis bigemma* var. *hircus* (from DALL, 1889); K: *Triforis cylindrella* (from DALL, 1889); L: *Cerithiopsis abrupta* (in DALL, 1889 not Watson); M: *Triforis abrupta* (from DALL, 1889).

Figura 36. Dibujos original de algunos trifóridos. A: Triforis hebes (en WATSON, 1886); B: Triforis bigemma (en WATSON, 1886); C: Triforis inflata (en WATSON, 1886); D: Triforis longissima (en DALL, 1889); E: Triforis triserialis (en DALL, 1889); F: Triforis intermedia (en DALL, 1889); G: Triforis inflata Watson var. ibex (en DALL, 1889); H: Triforis torticula (en DALL, 1889); I: Triforis colon (en DALL, 1889); J: Triforis bigemma var. hircus (en DALL, 1889); K: Triforis cylindrella (en DALL, 1889); L: Cerithiopsis abrupta (en DALL, 1889 non Watson); M: Triforis abrupta (en DALL, 1889).

"Triphora" sp. 3 (Figs. 33E-H)

Material examined: 1 s, 5.8 mm Miami, Florida (FLMNH UF363887).

Description: Shell (Figs. 33E, 33F) large, cream coloured, darker at the suture and on the base. Protoconch (Fig. 33G) with three whorls, apex tuberculated, subsequently with 2 spiral threads crossed by numerous axial ribs. Teleoconch with spirals 1 and 3 at the beginning, spiral 2 appearing on about the fourth whorl; the spiral cords and the axial ribs are relatively narrow, forming prominent nodules at the points of intersection. Two beaded cords appear on the base, with another smooth one below on the dorsum of the siphonal canal. Aperture (Fig. 33H) rounded, the outer lip a little everted and sharp; an extension of the lip crosses the columella, closing the beginning of the siphonal canal. The siphon is relatively larger than

in most of the Caribbean species and is initially wider.

Remarks: The present shell is very different from any other studied from the Caribbean. With three protoconch whorls it is assumed to have planktotrophic development, and therefore it is strange that no other example of this species has appeared in the large quantity of material studied. This suggests that the shell may have incorrect collection data, and hence it has not received a name and awaits more information in the future.

Some similarity may be observed with *"T. auffenbergi*, but the shell of that species is larger, has more whorls and a more uniform color, the protoconch is narrower at the apex and the siphonal canal is larger.

"Triphora" sp. 4 (Figs. 34A-D)

Material studied: Cuba: 10 f (Figs 34A-34D), Cienfuegos, Jibacoa and Batabanó (CFG).

Description: Shell whitish, elongate, pupoid. Protoconch (Fig. 34C) with two whorls, light brown in colour, with a diameter of 235 μ m and with a microsculpture of small irregular tubercles (Fig. 34D) on the first whorl, while on the second there are two spiral threads crossed by poorly defined axial ribs. The teleoconch begins immediately with two spiral cords crossed by orthocone axial ribs; on the subsequent whorls spiral 2 appears, on the last whorl becoming of similar size to the other spirals.

Distribution: The material studied consists only of fragments from several localities from the south of Cuba, and as the material is not fresh, it is possible that it could be from Quaternary deposits.

Remarks: No material good enough for a correct description of this species was collected.

Several characters differentiate this species from most of the Caribbean triphorids, such as having a short protoconch with small tubercles, and only fine sculpture on the rest of the protoconch.

"T. calva has a protoconch wider than the present species, lacking any microsculpture of tubercles or axial threads.

"T. grenadensis spec. nov. and *"T. turtlebayensis* spec. nov. have protoconchs with stronger axial sculpture that begins at the apex.

"T. amicornum spec. nov. has a protoconch with more than 2 whorls and stronger spiral sculpture.

Triphora sp. 5 (Figs. 34E, F)

Material studied: 2 j, Cienfuegos, Cuba.

Description: The protoconchs (Figs. 34E, 34F) of the two shells of this species

have between 2 and 2 ¹/₂ whorls, the first one with a diameter of about 222

μm and the second about 250 μm ; the nucleus is smooth (if not eroded), and there are numerous opisthocline axial ribs on the first whorl, crossed by two weak spiral cords that combine into one on the second whorl.

Remarks: This kind of protoconch suggests a planktotrophic development, but with a shorter period of planktotrophy than the other species. It can be differentiated from the previous species (*Triphora* sp. 4) which has no thread on

the first whorl and two small ones on the second protoconch whorl.

The most similar protoconchs are:

"*T.*" *calva* has a protoconch that lacks any axial sculpture.

"*T.*" *grenadensis* spec. nov. and "*T.*" *turtlebayensis* spec. nov. have protoconchs with stronger but less crowded axial sculpture.

"*T.*" *amicorum* spec. nov. has a protoconch with more than 2 whorls, less crowded axial sculpture and only one spiral cord.

"*Triphora*" sp. 6 (Fig. 34G)

Material examined: 1 f, Cienfuegos, Cuba.

Remarks: This protoconch (Fig. 34G) is slightly similar to that of *Cheirodonta apexcrassum* Rolán and Fernández-

Garcés, 1994, but the latter has a protoconch with beaded cords (Fig. 36J), unlike those on this fragment.

"*Triphora*" sp. 7 (Fig. 34H)

Material studied: 1 fragment, Miskito Archipelago, Nicaragua (MHNS).

Remarks: This protoconch with only two whorls has two cords as on the previous

one, but in this shell the whorls appear scratched, and the apex is more depressed.

"*Triphora*" sp. 8 (Fig. 34I)

Material studied: 1 f, Cabo Witties, Nicaragua (MHNS).

Remarks: This protoconch with only two whorls has two cords as on the previous one, but in this case the whorls

have two very different spirals cords, the upper one being very weak and the lower one stronger.

"*Triphora*" sp. 9 (Figs. 35A-C)

Material studied: 1 s, Canarreos, Cuba (MHNS).

Remarks: This shell is dark brown, has spirals 1 and 3 at the beginning of the teleoconch; spiral 2 appears

between whorls 4 and 5. Protoconch short with only 1 $1/2$ whorls, apparently smooth.

II. ERRONEOUS RECORDS, INVALID SPECIES OR SPECIES NOT INCLUDED IN THE STUDY

"*Triphora*" *hebes* Watson, 1880 (Fig. 36A)

Triphora hebes Watson, 1880. *Moll. of the Challenger expedition*, 1886, p. 103; 1886, pl. 43, figs. 7a-d. [Type locality: Tristan de Cunha, 230 m].

Description: WATSON (1880).

Remarks: This species was recorded in the Caribbean by PILSBRY AND AGUAYO (1933), but the original description and figure of WATSON (1886) show a shell with an unusual, short protoconch of only one whorl and a pointed apex,

which is different from any other species known in the area. Furthermore, the type locality is an island in the south Atlantic Ocean. This record must therefore be considered an error, confused with another species with paucispiral protoconch.

“Triphora” filata Dall, 1889

Triforis (Sychar) inflata var. *filata* Dall, 1889. *Bull. M. C. Z.*, 18: 249. [Type locality: Station 136, near Santa Cruz, 929 m].

Type material: No types in USNM (E. Strong, pers. comm.); it was not present in the material examined from other museums (ANSP, MCZ, etc.).

Remarks: This must be considered a *nomen nudum* because there is no description (DALL, 1889: 249) and it

was only mentioned as a variety, without any explanation of the differences.

Triforis barbadosis Coomans and Faber, 1984

Triforis barbadosis Coomans and Faber, 1984. *Bulletin Zoologisch Museum. Studies on West Indian Marine Molluscs*, 2.

Remarks: The genus *Triforis* Deshayes, 1834, in spite of having been used for many of the shells described and discussed above, does not belong to the family

Triphoridae, but to Cerithiopsidae. For this reason this species, although being valid and present in the study area, is not included in the family studied here.

CONCLUSIONS

Species in this work

From the 68 taxa studied in the present work, 30 were previously known, 26 are described as new and 12 were not named or received a tentative name due to the scarcity of study material or the existence of doubts about their determination. More than 3000 specimens and shells have been examined for the present work, of which more than 600 are included in the material examined for the species here included.

New species in the Caribbean

FABER AND MOOLENBEEK (1991), in their Remarks in the original description of *Triphora calva*, pointed out that “It is quite a surprise to find an undescribed species with such a characteristic shell

in Florida”. In the following years more than 10 species were described as new from the Caribbean, sometimes proving to be abundant in areas such as the Nichupté Lagoon in Quintana Roo, Yucatán; also to be considered are the numerous species described in the present work, as well as those awaiting more material before they can be fully described and named.

Total number of Caribbean species

The previous work (ROLÁN AND FERNÁNDEZ-GARCÉS, 2007) constituted a summary of several papers written in recent years concerning the species known from Cuba, with 33 species of Triphoridae figured in colour. The present work, complementary to that

paper, includes the study of 68 species, as well as 3 which are invalid taxa for the area or are not included in Triphoridae. Of those 68 species, only 2 (*Monophorus olivaceus* and *Sagenotriphora osclausum*) had been mentioned in previous works by these authors, and are now referred to with the addition of new information. Therefore the total number of species of this family in the study area (Caribbean and adjacent regions) exceeds one hundred, some of them unnamed due to the scarcity of available material and/or doubts about their determination.

State of the art of the study of this group in the Caribbean

In the last 30 years (1977 to the present work) 21 new species of triphorids have been described as new; 26 more are described and named in this work, and 12 more species await description in the future; a total of 59 species, which represents more than half of the estimated one hundred species in the area. All of which supports the observation already made in ROLÁN AND FERNÁNDEZ-GARCÉS (2007) that this group has not yet been completely studied, in spite of the fact that more than half of the valid species listed here were only described in the last 30 years.

Distribution range

An important number of the studied species are from deep water, and this makes it difficult to know exactly their distribution range, due to the limited number of samplings made and the shortage of available information in other studies. Undoubtedly some species do not have an extended range and are probably endemic to individual islands, due to their non-planktotrophic development.

Endemic species

Out of approximately a hundred species of Triphoridae known from the Caribbean and adjacent areas, about half have a protoconch of 3 whorls or less, which represents for many of these a short planktotrophic or non-planktotrophic larval development, and prob-

ably most of these are endemic to a small area. This suggests that more new species can probably be found in the future after some of the islands have been sampled in detail for the first time, thus increasing the total number of species.

Generic assignment

A significant part of the studied material consisted of dry shells collected by old expeditions, therefore no information on soft parts was available. Only in a few cases could the radula be studied from this dry material. For this reason many of the studied species were placed in *Inella* or in "*Triphora*" *sensu lato*, because the radula is very important for generic assignment. Future collecting expeditions will probably result in a complete revision of these species, at which time their correct generic assignment will be made.

Apart of "*Triphora sensu lato*", at least 15 genera are considered to be present in the Caribbean area: *Inella* (25 species, some of them without a definitive assignment), *Metaxia* (7), *Marshallora* (6), *Iniforis* (5), *Cheirodonta* (4), *Isotriphora* (3), *Cosmotriphora* (2), *Monophorus* (2), *Sagenotriphora* (2), *Aclophora* (1), *Eutriphora* (1), *Latitriphora* (1), *Mesophora* (1), *Nototriphora* (1), and *Similiphora* (1).

List of names for species of Triphoridae recorded from the Caribbean and adjacent areas

A list of taxa referred to the study area was presented in ROLÁN AND FERNÁNDEZ-GARCÉS (2007). Some changes were made in the present work and for this reason it is necessary to revise it. Hence, a new list is provided in Table I, including information on distribution, habitat, protoconch whorls and shell colour.

The list includes 128 specific names, some of which are not currently considered to be triphorids; 94 are considered here as valid species (which with the addition of the 11 mentioned without name in the present work, raises the number of specific taxa mentioned to 105); 27 are probably synonyms or errors, and 8 are only known as fossils.

Table I. List of taxa employed for the Caribbean and adjacent areas, with taxonomic status, synonymy, and other information on the protoconch, range of distribution, depth and colour. Abbreviations, B: shell more or less uniformly brown; BB: shell with brown bands of different intensity; BW: shell brown with isolated white dots; BWB: shell brown and white, but without bands; V: shell of variable colour; W: shell white; WBB: shell white with brown bands; DW: deep water (more than 100 m); SW: shallow water; M: protoconch multispiral (3 whorls or more); P: protoconch paucispiral (less than 3 whorls); R: reduced distribution (few records from small area); U: poorly known because it is a deep water species; WI: wide distribution (several records).

Tabla I. Listado de taxones empleados para el Caribe en áreas adyacente, con su status taxonómico, sinónimas e información sobre su protoconcha, distribución, profundidad y color. Abreviaturas, B: concha casi toda marrón; BB: concha con bandas marrones de distinta intensidad; BW: concha marrón con puntos blancos aislados; BWB: concha marrón y blanca, pero sin bandas; V: concha de color variable; W: concha blanca; WBB: concha blanca con bandas marrones; DW: aguas profundas (más de 100 m); SW: aguas someras; M: protoconcha multiespiral (3 ó más vueltas); P: protoconcha pauciespiral (menos de 3 vueltas); R: distribución restringida (pocas citas en un área pequeña); U: escasamente conocida por ser especie de aguas profundas; WI: amplia distribución (varias citas).

Name of taxon	colour	depth	protoconch	range
<i>abacoensis</i> Rolán and Redfern spec. nov. " <i>Triphora</i> "	B	SW	P	R?
<i>abrupta</i> (Watson, 1880), <i>Metaxia</i> (error, not Caribbean)				
<i>abrupta</i> (Dall, 1881), " <i>Triphora</i> "	W	DW	?	U
<i>affinis</i> (Hinds, 1843), " <i>Triphora</i> " (nomen dubium)				
<i>albida</i> (A. Adams, 1854), <i>Latitriphora</i>	BWB	SW	M	WI
<i>amicorum</i> Rolán and Fernández-Garcés spec. nov. " <i>Triphora</i> "	BW	SW	P	?
<i>angasi</i> (Crosse and Fischer, 1865) " <i>Triphora</i> " (error)				
<i>apexbilitata</i> Rolán and Fernández-Garcés spec. nov. <i>Inella</i>	W	DW	M	R?
<i>apexdiversus</i> Rolán and Lee spec. nov. <i>Marshallora</i>	BWB	SW	M	?
<i>apexcrassum</i> Rolán and Fernández-Garcés, 1994, <i>Cheirodonta</i>	B	SW	P	R?
<i>arnoldoi</i> Faber and Moolenbeek, 1991, <i>Cosmotriphora</i>	BWB	SW	M	WI
<i>aspera</i> Jeffreys, 1885, <i>Strobiliger</i> (=brychia)				
<i>ateralbus</i> Rolán and Fernández-Garcés, 1994, <i>Monophorus</i>	BW	SW	M	R
<i>auffenbergi</i> Rolán and Lee spec. nov. " <i>Triphora</i> "	B	SW	M	?
<i>barbadensis</i> Coomans and Faber, 1984 <i>Triforis</i> (not Triphoridae)	B	DW	P	R
<i>bartschi</i> Olsson, 1916, " <i>Triphora</i> "	fossil	fossil	P	fossil
<i>bermudensis</i> (Bartsch, 1911), <i>Eutriphora</i>	WBB	SW	M	WI
<i>bermudensis</i> (Verrill and Bush, 1900) <i>Metaxia</i> (=rugulosa?)				
<i>bigemma</i> (Watson, 1880), <i>Inella</i>	W	DW	?	U
<i>bolax</i> Olsson and Harbison, 1953, " <i>Triphora</i> "	fossil	fossil	?	fossil
<i>brychia</i> (Bouchet and Guillemot), 1978, <i>Strobiliger</i>	W	DW	M	WI
<i>calva</i> Faber and Moolenbeek, 1991, " <i>Triphora</i> "	B	SW	P	WI?
<i>candidula</i> Rolán and Lee spec. nov. <i>Sagenotriphora</i>	W	SW	M	?
<i>caracca</i> Dall, 1927, " <i>Triphora</i> "	W	DW	?	U
<i>caribbeana</i> Treece, 1980, " <i>Triphora</i> " (nomen nudum)				
<i>carmelae</i> Rolán and Fernández-Garcés, 1993, <i>Iniforis</i>	BWB	SW	P	S
<i>casta</i> (Hinds, 1843), <i>Iniforis</i>	WBB	SW	P	WI
<i>clenchi</i> Aguayo, 1935, " <i>Triphora</i> " (unnecessary new name)				
<i>colon</i> (Dall, 1881), " <i>Inella</i> "	W	DW	?	U
<i>compsa</i> Dall, 1927, " <i>Inella</i> "	W	DW	?	U
<i>cylindrella</i> (Dall, 1881), " <i>Triphora</i> "	W	DW	?	U
<i>dealbata</i> (C. B. Adams, 1850), " <i>Triphora</i> " (=melanura?)				
<i>decollata</i> Rolán and Fernández-Garcés, 1994, <i>Cheirodonta</i>	BW	SW	M	S
<i>decorata</i> (C. B. Adams, 1850), <i>Nototriphora</i>	BWB	SW	M	WI

Table I. Continuación.

Tabla I. Continuación.

Name of taxon	colour	depth	protoconch	range
<i>differens</i> Rolán and Lee spec. nov. <i>Inella</i>	B	DW	P	U
<i>dinea</i> Dall, 1927, " <i>Inella</i> "	W	DW	P	U
<i>distincta</i> (Meyer, 1886), " <i>Triphora</i> "	fossil	fossil	?	fossil
<i>dupliniana</i> (Olsson, 1916), " <i>Triphora</i> "	fossil	fossil	?	fossil
<i>ellyae</i> De Jong and Coomans, 1988, " <i>Triphora</i> "	WBB	SW	M	WI
<i>elvira</i> De Jong and Coomans, 1988, " <i>Triphora</i> "	WBB	SW	M	WI
<i>enopla</i> Dall, 1927, " <i>Inella</i> "	W	DW	P	U
<i>espinosai</i> Rolán and Fernández-Garcés, 1993, <i>Metaxia</i>	W	SW	P	S
<i>excelsa</i> Faber and Moolenbeek, 1991, <i>Metaxia</i>	B	SW	M	WI
<i>exiguum</i> (C. B. Adams, 1850), <i>Triphora</i> ? (nomen dubium)				
<i>exile</i> C. B. Adams, 1850 non Eichholtz, 1829 (= <i>excelsa</i>)				
<i>faberi</i> Rolán and Fernández-Garcés spec. nov. <i>Inella</i>	B	SW	P	?
<i>filata</i> (Dall, 1889), <i>Strobiligera</i> (= <i>inflata</i>) nom. nudum				
<i>gaesona</i> Dall, 1927, " <i>Inella</i> "	W	DW	P	U
<i>georgiana</i> Dall, 1927, " <i>Triphora</i> "	W	DW	P	U
<i>grenadensis</i> Rolán and Lee spec. nov. " <i>Triphora</i> "	B	SW	P	R
<i>guadalupensis</i> Rolán and Fernández-Garcés spec. nov. " <i>Triphora</i> "	BB	SW	P	R
<i>guanahacabibes</i> Rolán and Fernández-Garcés spec. nov. <i>Isotriphora</i>	W	DW	P	R
<i>guttata</i> (Guppy, 1874), " <i>Triphora</i> "	fossil	fossil	?	fossil
<i>harryleei</i> Rolán and Fernández-Garcés n. sp. <i>Inella</i>	BWB	DW	P	U
<i>hebes</i> Watson, 1881 in Pilsbry and Aguayo, 1933 <i>Triphora</i> ? (error, not Caribbean)				
<i>hemphilli</i> Bartsch, 1907, " <i>Triphora</i> " (error, not Caribbean)				
<i>hircus</i> (Dall, 1881), " <i>Triphora</i> "	W	DW	?	U
<i>lbex</i> (Dall, 1881), " <i>Inella</i> "	W	DW	?	U
<i>immaculata</i> Rolán and Fernández-Garcés, 1993, <i>Iniforis</i>	W	SW	P	S
<i>inaudita</i> Rolán and Lee spec. nov. " <i>Triphora</i> "	WBB	DW?	M	?
<i>indigena</i> Dall, 1927, " <i>Triphora</i> "	W	DW	M	U
<i>inflata</i> (Watson, 1880), <i>Inella</i>	W	DW	P	U
<i>intermedia</i> (C. B. Adams, 1850), <i>Similiphora</i>	WBB	SW	M	WI
<i>intermedia</i> (Dall, 1881), " <i>Inella</i> "	W	DW	?	U
<i>intermedius</i> Tryon, 1887 non Adams <i>Triforis</i> (= <i>turrithomae</i>)				
<i>lilacina</i> Dall, 1889, " <i>Triphora</i> "	lilac	SW	?	?
cf. <i>lilacina</i> , " <i>Triphora</i> "	WBB	DW	M	U
<i>longissima</i> (Dall, 1881), <i>Inella</i>	W	DW	?	U
<i>marmorata</i> (Hinds, 1843), " <i>Triphora</i> " nomen dubium				
<i>martii</i> Rolán and Fernández-Garcés, 1995, " <i>Triphora</i> "	WBB	SW	M	S
<i>medinae</i> Parodiz, 1955 " <i>Triphora</i> " (error)				
<i>melanura</i> (C. B. Adams, 1850), <i>Cosmotriphora</i>	W	SW	M	WI
<i>metaxa</i> (delle Chiaje, 1828), <i>Metaxia</i> (error; not Caribbean)				
<i>meteora</i> Dall, 1927, " <i>Inella</i> "	W	DW	P	U
<i>mirabile</i> (C. B. Adams, 1850), <i>Iniforis</i> (= <i>turrithomae</i>)				
<i>mitella</i> Dall, 1892, " <i>Triphora</i> "	fossil	fossil	?	fossil
<i>miskitorum</i> Rolán and Luque, 1999, <i>Cheirodonta</i>	W	SW	P	S
<i>modesta</i> (C. B. Adams, 1850), <i>Marshallora</i>	B	SW	M	WI
<i>Nana</i> (C. B. Adams, 1850) " <i>Triphora</i> " nomen dubium				
<i>nicaraguensis</i> Rolán and Luque, 1999, <i>Marshallora</i>	B	SW	P	S
<i>nichupte</i> Rolán and Cruz-Ábrego, 1996, <i>Marshallora</i>	V	SW	P	S
<i>nigrocincta</i> (C. B. Adams, 1839), <i>Marshallora</i>	B	SW	M	WI

Table I. Continuación.
Tabla I. Continuación.

Name of taxon	colour	depth	protoconch	range
<i>noduloides</i> Rolán and Fernández-Garcés spec. nov. <i>Inella novem</i> (Nowell-Usticke, 1969), <i>Mesophora</i>	W	DW	P	R
<i>olivaceus</i> (Dall, 1889), <i>Monophorus</i>	BB	SW	M	WI
<i>oreodoxa</i> Olsson and Harbison, 1953, " <i>Triphora</i> "	BWB	SW	M	WI
<i>ornata</i> (Deshayes, 1832), " <i>Triphora</i> " (error; not Caribbean)	fossil	fossil	?	fossil
<i>ornatus</i> auct. non Deshayes, 1832, <i>Monophorus</i> (= <i>olivaceus</i>)				
<i>orteai</i> Espinosa, 2001 " <i>Triphora</i> " (= <i>ellyae</i>)				
<i>osclausum</i> (Rolán and Fernández-Garcés, 1995) <i>Sagenotriphora</i>	B	SW	M	WI
<i>ostenta</i> Rolán and Fernández-Garcés spec. nov. <i>Marshallora</i>	WBB	SW	M	WI
<i>peetersae</i> (Moolenbeek and Faber, 1989), <i>Isotriphora</i>	BB	SW	P	WI
<i>perversa</i> Linné in Dall, 1889 (error, not Caribbean)				
<i>pfeifferi</i> (Crosse and Fischer, 1865) " <i>Triphora</i> " (error)				
<i>pinarena</i> Espinosa, Ortea and Fernández-Garcés, 2007, <i>Inella</i>	BWB	SW	M	R?
<i>portoricensis</i> Rolán and Redfern spec. nov. " <i>Triphora</i> "	B	SW	P	R
<i>pompona</i> Dall, 1927, " <i>Inella</i> "	W	DW	P	U
<i>prompta</i> Rolán and Fernández-Garcés spec. nov. <i>Metaxia</i>	V	?	P	?
<i>propria</i> Rolán and Fernández-Garcés spec. nov. <i>Metaxia</i>	W	DW	P	U
<i>propinqua</i> Rolán and Fernández-Garcés spec. nov. <i>Metaxia</i>	V	SW	P	U
<i>pseudolongissima</i> Rolán and Fernández-Garcés spec. nov., <i>Inella</i>	W	DW	M	U
<i>pseudonovem</i> Rolán and Fernández-Garcés spec. nov. " <i>Triphora</i> "	B	?	M	?
<i>pseudothomae</i> Rolán and Fernández-Garcés, 1993, <i>Iniforis</i>	WBB	SW	M	WI
<i>pseudotortricula</i> Rolán and Lee spec. nov. <i>Inella</i>	BWB	DW	P	U
<i>pulchellum</i> C. B. Adams, 1850 " <i>Triphora</i> " (= <i>intermedia</i>)				
<i>pusilla</i> (Pfeiffer, 1840), " <i>Triphora</i> " nomen dubium				
<i>pyrrha</i> (Henderson and Bartsch, 1914), " <i>Triphora</i> "	B?	?	M	?
<i>rugulosa</i> (C. B. Adams, 1850), <i>Metaxia</i>	W	SW	M	WI
<i>rushii</i> Dall, 1881, " <i>Triphora</i> "	W	DW	?	U
<i>sagei</i> Rolán and Fernández-Garcés, 1995, <i>Aclophora</i>	BB	SW	M	WI
<i>samanae</i> (Dall, 1889), <i>Latitriphora</i> (= <i>albida</i>)				
<i>sarissa</i> Dall, 1889, " <i>Inella</i> "	W	DW	?	U
<i>sentoma</i> Dall, 1927, " <i>Inella</i> "	W	DW	?	U
<i>slapcinskii</i> Rolán and Fernández-Garcés spec. nov. <i>Inella</i>	W	SW	P	?
<i>somersi</i> Peile, 1926 " <i>Triphora</i> " nomen dubium				
<i>somersi</i> Pilsbry and Aguayo, 1933 " <i>Triphora</i> " nomen nudum				
<i>taenialba</i> Rolán and Espinosa, 1994, <i>Isotriphora</i>	BB	SW	P	R
<i>taeniolata</i> (Dall, 1889), <i>Metaxia</i>	WBB	SW	M	WI
<i>tebrata</i> (Heilprin, 1889) " <i>Triphora</i> "	fossil	fossil	?	fossil
<i>Tortricula</i> (Dall, 1881), " <i>Inella</i> "	W	DW	?	U
<i>triserialis</i> (Dall, 1881), " <i>Inella</i> "	W	DW	P	U
<i>turrissimilis</i> (Nowell-Usticke, 1969), <i>Iniforis</i> (= <i>bermudensis</i>)				
<i>turristhomae</i> (Holten, 1802), <i>Iniforis</i>	WBB	SW	M	WI
<i>turtlebayensis</i> Rolán and Lee spec. nov. " <i>Triphora</i> "	B	?	P	R
<i>undebermuda</i> Rolán and Lee spec. nov. <i>Inella</i>	W	DW	P	U
<i>variegata</i> (A. Adams, 1854), " <i>Triphora</i> " (= <i>decorata</i>)				
<i>vestalis</i> (A. Adams, 1854) 1851? <i>Tripharis</i> (error: it is a <i>Cerithiopsis</i>)				
<i>verbernei</i> (Moolenbeek and Faber, 1989), <i>Cheiradonta</i>	BW	SW	M	WI
<i>vicina</i> (C. B. Adams, 1850), <i>Metaxia</i> (= <i>rugulosa</i>)				
<i>yociusi</i> Rolán and Lee spec. nov. " <i>Triphora</i> "	B	DW	P	R

ACKNOWLEDGEMENTS

The authors thank those persons who facilitated the loan of material, photographs and information from Museums: Gonzalo Giribet and Adam Baldinger, Kenneth J. Boss from MCZ; Jerry Harasewych and Ellen Strong, from the USNM; Kathie Way and Roberto Portela Miguez, for their help during our time with the SYNTHESYS PROJECT in BMNH; Paula Mikkelsen, James R. "Jay" Cordeiro from AMNH; Gary Rosenberg and Daniel L. Graf from ANSP; John Slapcinsky, Kurt Auffenberg, Chelsey Campbell, Gustav Paulay from FLMNH; Marien Faber for his information on

some material studied by him. We also thank Angel Valdés of The Natural History Museum of Los Angeles County.

Jesús S. Troncoso from the Universidad de Vigo, Department of Ecology, for his authorization to use the photographic equipment; Jesús Méndez and Inés Pazos for the SEM photographs made in the Centro de Apoyo Científico y Tecnológico a la Investigación (CACTI) of the University of Vigo.

Harry G. Lee and Colin Redfern shared with us some very valuable material from their collections, and also helped by reading the manuscript and making many interesting observations and comments.

BIBLIOGRAPHY

- ADAMS, C. B., 1850a. Description of supposed new species of marine shells which inhabit Jamaica. *Contributions to Conchology*, 1 (4): 56-68.
- ADAMS, C. B., 1850b. Description of supposed new species of marine shells which inhabit Jamaica. *Contributions to Conchology*, 1 (7): 109-123.
- BOUCHET, P., 1985. Les Triphoridae de Méditerranée et du proche Atlantique (Mollusca, Gastropoda). *Lavori S.I.M.*, 21: 5-58.
- BOUCHET, P., 1997. Nouvelles observations sur la systématique des Triphoridae de Méditerranée et du proche Atlantique. *Bollettino Malacologico*, 31 (9-12): 205-220.
- BOUCHET, P. AND GUILLEMOT, H., 1978. The *Triphora perversa*-complex in Western Europe. *Journal of Molluscan Studies*, 44: 344-356.
- BOUCHET, P. AND WARÉN, A., 1993. Revision of the Northeast Atlantic bathyal and abyssal Mesogastropoda. *Bollettino Malacologico*, suplemento 3: 579-840.
- CLENCH, W. J. AND TURNER, R. D., 1950. The Western Atlantic marine mollusks described by C. B. Adams. *Occasional Papers on Mollusks*, 1 (15): 233-403.
- DALL, W. H., 1881. Reports on the results of dredging, under the supervision of Alexander Agassiz, in the Gulf of Mexico, and in the Caribbean Sea, 1877-79, by the United States Coast Survey steamer "Blake", Lieutenant-Commander C. D. Sigsbee, U. S. N., and Commander J. R. Bartlett, U. S. N., commanding. XV. Preliminary report on the Mollusca. *Bulletin of the Museum of Comparative Zoology*, 9 (2): 33-144.
- DALL, W. H., 1889. Reports on the results of dredging, under the supervision of Alexander Agassiz, in the Gulf of Mexico (1877-78), and in the Caribbean Sea, (1879-80), by the United States Coast Survey steamer "Blake", Lieutenant-Commander C. D. Sigsbee, U. S. N., and Commander J. R. Bartlett, U. S. N., commanding. XXIX. Report on the Mollusca. Part 2. Gastropoda and Scaphopoda. *Bulletin of the Museum of Comparative Zoology*, 18: 1-492, pls. 10-40.
- DALL, W. H., 1927. Small shells from dredgings off the southeast coast of the United States by the United States Fisheries Steamer "Albatross" in 1885 and 1886. *Proceedings of the United States National Museum*, 70: 1-134.
- DE JONG, K. M. AND COOMANS, H. E., 1988. *Marine gastropods from Curaçao, Aruba and Bonaire*. E. J. Brill, Leiden, 261 pp.
- DÍAZ MERLANO, J. M. AND PUYANA HEGEDUS, M., 1994. *Moluscos del Caribe Colombiano, un catálogo ilustrado*. Fundación Natura/ Ciencias/ Invenmar, Bogotá. 291 pp, 74 pls.
- ESPINOSA, J., ORTEA, J. A., FERNÁNDEZ-GARCÉS, R. AND MORO, L., 2007. Adiciones a la fauna de moluscos marinos de la península de Guahacabibes (I), con la descripción de nuevas especies. *Avicennia*, 19: 63-88.
- FABER, M. J. AND MOOLENBEEK, R. G., 1991. Two new shallow water triphorids and a new name in *Metaxia* from Florida and the West Indies. *Apex*, 6 (3-4): 81-85.
- FERNANDES, F. AND ROLÁN, E., 1988. A familia Triphoridae (Mollusca: Gastropoda) no arquipélago de Cabo Verde. *Publicações Ocasionalis da Sociedade Portuguesa de Malacologia*, 11: 17-32.

- HENDERSON, J. B. AND BARTSCH, P., 1914. Littoral marine mollusks of Chincoteague Island, Virginia. *Proceedings of the United States National Museum*, 47: 411-421, pls. 13-14.
- LASERON, C. F., 1958. The family Triphoridae (Mollusca) from Northern Australia; also Triphoridae from Christmas Islands (Indian Ocean). *Australia Journal of Marine and Freshwater Research*, 9 (4): 569-658.
- LEAL, J. H., 1991. *Marine Prosobranch Gastropods from Oceanic Islands off Brazil*. Universal Book Services, Oegstgeest, 418 pp.
- LINDEN, J. VAN DER, 1998. The Metaxiinae dredged by the CANCAP Expeditions, with the new species *Metaxia carinaplex* and *M. haplax* from the Cape Verde Islands (Gastropoda, Heteropoda, Triphoridae). *Basteria*, 61 (4-6): 115-122.
- MARSHALL, B. A., 1983. A revision of the Recent Triphoridae of Southern Australia (Mollusca: Gastropoda). *Records of the Australian Museum*, Supplement 2: 1-119 pp.
- MOOLENBEEK, R. G. AND FABER, M. J., 1989. Two new *Triphora* species from the West Indies (Gastropoda; Triphoridae). *Basteria*, 53 (4-6): 77-80.
- MORRIS, P. A., 1973. *A field guide to shells of the Atlantic and Gulf coasts and the West Indies*. Houghton Mifflin Company, Boston. 330, 76 pls.
- NOWELL-USTICKE, G. W., 1959. *A check list of the marine shells of S. Croix U.S. Virgin Islands with random annotations*. Lane Press, Burlington. 90 pp.
- NOWELL-USTICKE, G. W., 1971. *A supplementary listing of new shells (illustrated)*. Nowell-Usticke. U.S.A. 31 pp.
- OLSSON, A. A. AND HARBISON, A., 1953. Pliocene Mollusca of Southern Florida, with special reference to those from North Saint Petersburg. *Monographs of the Academy of Natural Sciences of Philadelphia*, 8: 1-457, 65 pls.
- REDFERN, C., 2001 *Bahamian seashells, a thousand species from Abaco, Bahamas*. Bahamianseashells.com, Inc., Boca Raton, 280 pp, 124 pls.
- RIOS, E., 1994. *Seashells of Brazil*. Editora de Furg, Rio Grande. 368 pp, 113 pls.
- ROLÁN, E. AND CRÚZ-ÁBREGO, F. M., 1996 "1995". A new triphorid species (Gastropoda, Triphoridae) from Nichupté lagoon, Yucatan peninsula, Mexico. *Iberus*, 13 (2): 87-92.
- ROLÁN, E. AND ESPINOSA, J., 1994. The family Triphoridae (Mollusca, Gastropoda, Prosobranchia) in Cuba 3. The genus *Isotriphora*, with description of a new species. *Basteria*, 58 (1-2): 63-68.
- ROLÁN, E. AND FERNÁNDEZ-GARCÉS, R., 1993a "1992". La familia Triphoridae (Mollusca: Gastropoda) en la isla de Cuba, 1. El género *Metaxia* Monterosato, 1884. *Bollettino Malacologico*, 28 (5-12): 169-176.
- ROLÁN, E. AND FERNÁNDEZ-GARCÉS, R., 1993b. The family Triphoridae (Mollusca, Gastropoda) in Cuba. 2. The genus *Iniforis* Jousseaume, 1884. *Apex*, 8 (3): 95-106.
- ROLÁN, E. AND FERNÁNDEZ-GARCÉS, R., 1994. The family Triphoridae (Mollusca, Gastropoda) in Cuba. 4. The genera *Monophorus*, *Nototriphora*, *Cosmotriphora* and *Cheirodonta*, with the description of three new species. *Apex*, 9 (1): 17-27.
- ROLÁN, E. AND FERNÁNDEZ-GARCÉS, R., 1995. The family Triphoridae (Mollusca, Gastropoda) in Cuba. 5. The genera *Marshallora*, *Mesophora*, *Similiphora*, *Eutriphora*, *Latitriphora*, *Aclophora* and other species without generic affiliation. *Apex*, 10 (1): 9-24.
- ROLÁN, E. AND FERNÁNDEZ-GARCÉS, R., 2007. Caribbean Triphoridae (Gastropoda, Triphoroidea): list and colour illustrations. *Neptunea*, 6 (3): 13-24.
- ROLÁN, E. AND LUQUE, A. A. 1999. Two new species of triphorids (Gastropoda, Triphoridae) from the Miskitos Archipelago, Nicaragua. *Iberus*, 17 (1): 107-113.
- ROLÁN, E. AND PEÑAS, A., 2001. Two new species of the genus *Monophorus* (Gastropoda, Triphoridae) in the east Atlantic and Mediterranean Sea. *Iberus*, 19 (2): 31-40.
- ROLÁN, E. AND REDFERN, C., 1996. Variabilidad de la protoconcha de *Metaxia rugulosa* (C. B. Adams, 1850) (Gastropoda; Triphoridae). *Noticiario SEM*, 26: 27-29.
- ROSENBERG, G., 2005. Malacolog 4.1: A database of Western Atlantic marine Mollusca. [WWW database (version 4.1.0)] URL <http://www.malacolog.org>.
- SIMONE, L. R. L., 2006. A new Triphoridae from Canopus Bank, N. E. Brazil (Caenogastropoda). *Strombus*, 13 (1): 6-8.
- VERDUIN, A., 1976. On the systematics of recent Rissoa of the subgenus *Turboella* Gray, 1847, from the Mediterranean and European Atlantic coasts. *Basteria*, 40: 21-73.
- VOKES, H. E. AND VOKES, E. H., 1983. Distribution of shallow-water marine Mollusca, Yucatan Peninsula, Mexico. *Mesoamerican Ecology Institute, Monograph 1. Middle American Research Institute, publ.* 54. 183 pp.
- WARMKE, G. L. AND ABBOTT, R. T., 1961. *Caribbean seashells*. Livingston Publishing Co. Wynnewood, Pennsylvania. 348 pp., 43 pls.
- WATSON, R. B., 1980. Mollusca of H. M. S. Challenger Expedition. *Journal of the Linnean Society of London*, 15: 87-126.
- WATSON R. B., 1886. Report on the Scaphopoda and Gasteropoda collected by HMS Challenger during the years 1873-1876. *Reports of the scientific results of the voyage of H.M.S. "Challenger"*, Zoology, 15 (part 42): 1-756.
- WELLS, 1998. Superfamily Triphoroidea. Pp. 808-811 In Beesley, P.L., Ross, G.J.B. and Wells, A. (eds). *Mollusca: The Southern Synthesis. Fauna of Australia vol. 5*. CSIRO Publications: Melbourne, Part B viii 565-1234 pp.