New muricid species (Mollusca, Gastropoda) from French Guiana

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ABSTRACT
Two new muricid species (Mollusca Gastropoda) are described from the continental shelf of French Guiana. The first one, *Siratus lamyi* n. sp., belongs to the subfamily Muricinae and is compared to two close Caribbean and Brazilian species. The second one, *Favartia massemini* n. sp., belongs to the subfamily Muricopsinae and is compared to six close Caribbean and Brazilian species. For each species, the characters of the spiral sculpture are described using precise structural homologies. This study of the shell characters shows that *Siratus* Jousseaume, 1880, which is often regarded as a subgenus of *Chicoreus* Montfort, 1810, seems more related to *Vokesimurex* Petuch, 1994 than to *Chicoreus*. Then, *Siratus* is here excluded from *Chicoreus* and elevated at the genus level.

KEY WORDS
Mollusca,
Gastropoda,
Muricidae,
Siratus,
Favartia,
French Guiana,
new species.

RÉSUMÉ
Nouvelles espèces de Muricidae (*Mollusca, Gastropoda*) *de Guyane française.*
Deux espèces nouvelles de Muricidae (Mollusca Gastropoda) sont décrites du plateau continental de la Guyane française. La première, *Siratus lamyi* n. sp., appartient à la sous-famille des Muricinae et est comparée à deux espèces des Caraïbes et du Brésil. La seconde, *Favartia massemini* n. sp., appartient à la sous-famille des Muricopsinae et est comparée à six espèces proches des Caraïbes et du Brésil. Pour chaque espèce, les caractères de la sculpture spirale sont décrits en utilisant des homologies structurales précises. Cette étude des caractères de la coquille montre que *Siratus* Jousseaume, 1880, qui est souvent considéré comme un sous-genre de *Chicoreus* Montfort, 1810, semble plus proche de *Vokesimurex* Petuch, 1994 que de *Chicoreus*. En conséquence, *Siratus* est exclu ici de *Chicoreus* et élevé au rang de genre.

MOTS CLÉS
Mollusca,
Gastropoda,
Muricidae,
Siratus,
Favartia,
Guyane française,
espèces nouvelles.

INTRODUCTION

After the description of *Siratus guionneti* (Merle, Garrigues & Pointier, 2001) in the French West Indies (Merle *et al.* 2001), new malacological researches made by Dominique Lamy and David Massemin on the continental shelf of French Guiana had led to the discovery of two new muricid species belonging to the genera *Siratus* Jousseaume, 1880 and *Favartia* Jousseaume, 1880. These species will be presented in a book showing the malacological biodiversity of French Guiana (Massemin *et al.* in press).

MATERIAL AND METHODS

The descriptive methodology was already used in Merle (2001, 2005) and Merle *et al.* (2001). It refers to a precise terminology of the sculptural characters (see Abbreviations).

Abbreviations

Text conventions used to describe the spiral sculpture and the internal denticles of the apertural lip (Merle 2001, 2005; Merle *et al.* 2001):

P	primary cord (cord appearing in first order);
IP	infrasutural primary cord;
P1	shoulder cord;
P2-P6	primary cords of the convex part of the teleoconch whorl;
ADP	adapical siphonal primary cord;
MP	median siphonal primary cord;
ABP	abapical siphonal primary cord;
EAB1	extreme abapical siphonal primary cord;
s	secondary cord (cord appearing in second order);
adis	adapical infrasutural secondary cord;
abis	abapical infrasutural secondary cord;
s1-s6	secondary cords of the convex part of the teleoconch whorl;
ads	adapical siphonal secondary cord;
ms	median siphonal secondary cord;
abs	abapical siphonal secondary cord;
t	tertiary cord (cord appearing in third order);
ID	infrasutural apertural denticle;
D1-D6	abapical apertural denticles.

Shell measurements:

NIR	number of intervarical ribs only;
TAR	total number of axial ridges (including protovarices, varices and intervarical ribs).

Repository:

MNHN	Muséum national d'Histoire naturelle, Paris.

SYSTEMATICS

Family Muricidae Rafinesque, 1815
Subfamily Muricinae Rafinesque, 1815

Genus *Siratus* Jousseaume, 1880

Type species. — *Purpura sirat* Jousseaume, 1880 by original designation (= *Murex senegalensis* Gmelin, 1791).

Siratus lamyi n. sp.
(Figs 1A-C, E-G; 2A; 4A, B)

Type material. — **French Guiana.** Continental shelf, Holotype (Figs 1A-C; 4B), length: 40.2 mm (MNHN); 1 paratype (Figs 1E-G; 2A; 4A), length: 25.1 mm (MNHN).

Type locality. — N French Guiana (70-80 m).

Etymology. — Named in honour of Dominique Lamy.

Other material examined. — **N French Guiana.** VI.2003, 7 specimens (coll. Lamy). — VI.2003, 2 specimens (coll. B. Garrigues).
Surinam. X.2003, 2 specimens (coll. Lamy).

Description of the holotype

Paucispiral protoconch: 1.25 whorls and high of 0.75 mm (Fig. 2A). Surface covered by numerous granules. Subfusiform teleoconch of 40.2 mm in length, of 16.4 mm in width. Spire slightly elongated, high, with 7 subcarinate whorls. Last whorl (7th whorl) of 73.1% of total length of teleoconch. Apical angle of 55°. Spiral sculpture with fine primary cords in the intervarical spaces becoming larger on the varices. First and 2nd whorls: presence of primary cords P1, P2 and P3. Third whorl: appearance of primary cord IP and secondary cord adis on the sutural ramp. Fourth whorl: appearance of secondary cords abis, s1 and s3. Fifth and 6th whorls: appearance of secondary cords s2 and occasionally P4. Seventh and last whorl showing the primary cords IP (sutural ramp), P1 to P6 (convex part of the whorl), and ADP, MP, ABP, EAB1 (siphonal canal); secondary cords (adis, abis, s1-s6, ads and ms). P2 slightly atrophied. P6 and s6 more strongly developed

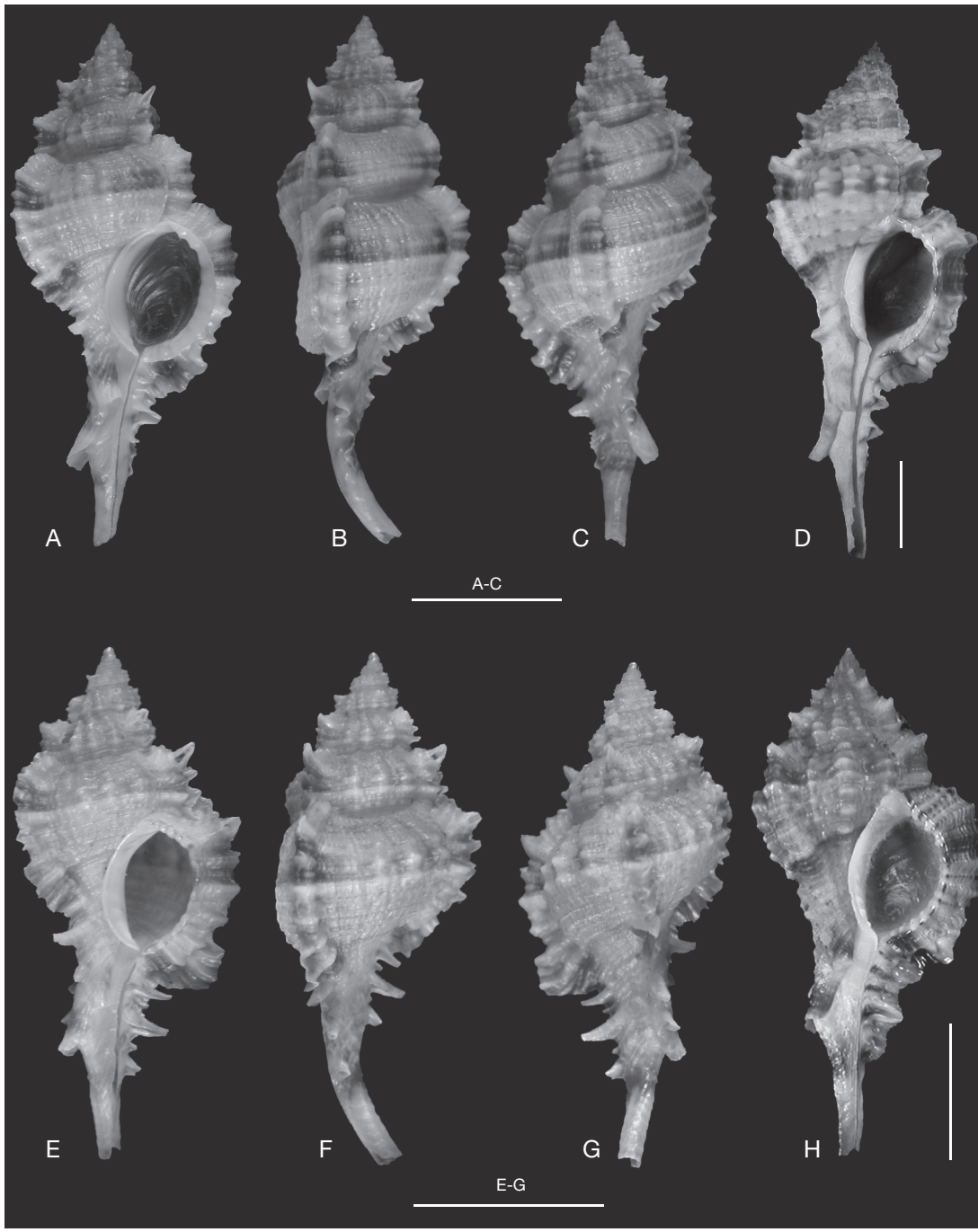

FIG. 1. — Teleoconchs: **A**-**C**, *Siratus lamyi* n. sp., French Guiana, holotype (MHNH); **D**, *S. coltrorum* (Vokes, 1990), Brazil (Garrigues coll.); **E**-**G**, *S. lamyi* n. sp., French Guiana, paratype (MNHN); **H**, *S. consuela* (Verrill, 1950), Brazil (Garrigues coll.). Scale bar: 10 mm.

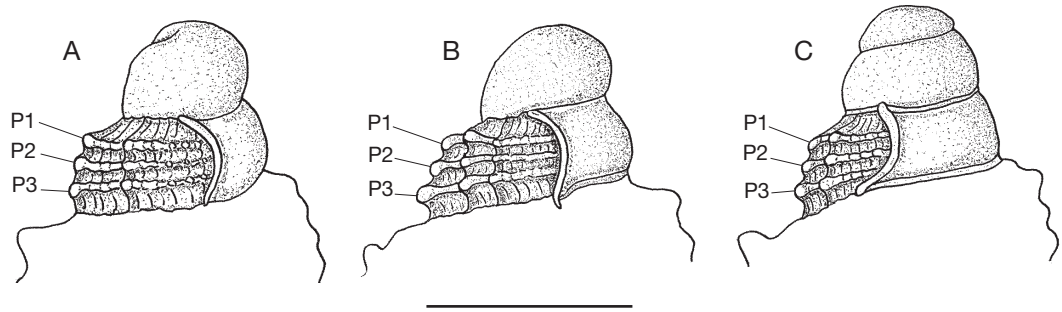

FIG. 2. — Protoconchs: **A**, *Siratus lamyi* n. sp., N French Guiana, paratype (MNHN); **B**, *S. coltrorum* (Vokes, 1990), Brazil (Garrigues coll.); **C**, *S. consuela* (Verrill, 1950), Guadeloupe (Garrigues coll.). Scale bar: 1 mm.

than P5 and ADP. MP more strongly developed than ADP and ABP. Axial sculpture with 9 protovarices on 1st whorl and 11 on the 2nd whorl. On 3rd whorl, appearance of 3 major varices and 8 intervarical ribs (2 to 3 between each major varix). On 4th whorl, 9 intervarical ribs (3 between each major varix). On the 5th, 12 intervarical ribs (4 between each major varix). On the 6th whorls, 20 intervarical ribs (5 to 10 between each major varix). On the 7th whorl, 22 intervarical ribs (6 to 10 between each major varix). Intervarical ribs decreasing in height after the 6th whorl. P1 spine short, occurring between the 2nd and the 5th whorls. P6 and s6 spines, short, open and joined by short foliation of the varices. MP spines short, open. Other spines not developed on the last whorl. Intervarical nodules more developed on P2 and P3 on the 1st whorls, but with similar development in height on the last whorls. Microsculpture with fine growth laminae, always erected and particularly expressed on the last 2 whorls. Oval and large aperture of 37% of the diameter and of 87.3% of length of the body whorl (including the siphonal canal). Columellar lip with 2 weak, low knobs abapically. Rim partially erect, adherent adapically. Small and poorly defined anal notch. Parietal callus poorly developed. Inner denticles not visible on outer lip (covered by shelly material). Denticles at the edge of the outer lip (= crenulations) present between the major cords (primary and dominant secondary cords). Siphonal canal up to 69.3% of the aperture length and slightly dorsally recurved. Shell rosy-brown with dark brown lines between P1 and P3 and P6 and s6. Operculum with apical nucleus. Animal and radula unknown.

INTRASPECIFIC VARIATION

The number of protovarices (axial ridges occurring before the distinction between true varices and intervarical ribs) varies from 9 to 16 on the 1st whorl and from 11 to 14 on the 2nd whorl (Fig. 3). The varices appear between the 2nd and the 11113rd whorls. They are marked by short spines on P1. The number of intervarical ribs (NIR) varies from 6 to 8 on the 3rd whorl, from 7 to 11 on the 4th whorl, from 8 to 19 on the 5th whorl, from 9 to 20 on the 6th whorl and from 16 to 27 on the 7th. Then, an increase of the number of intervarical ribs is observed from the 5th whorl on (Fig. 3). Following this increase, the relief of the intervarical ribs decreases. Another decrease of the sculptural expression during the growth corresponds to the progressive disappearance of the P1 spine on the last 2 whorls of the oldest specimens. Then, the paratype, which seems younger (length: 25.1 mm) than the holotype (length: 40.2 mm), does not bear a total disappearance of P1 spine on its last whorl. This progressive disappearance corresponds to the recording of other disappearances of spines during the ontogeny. Indeed, the studied series of

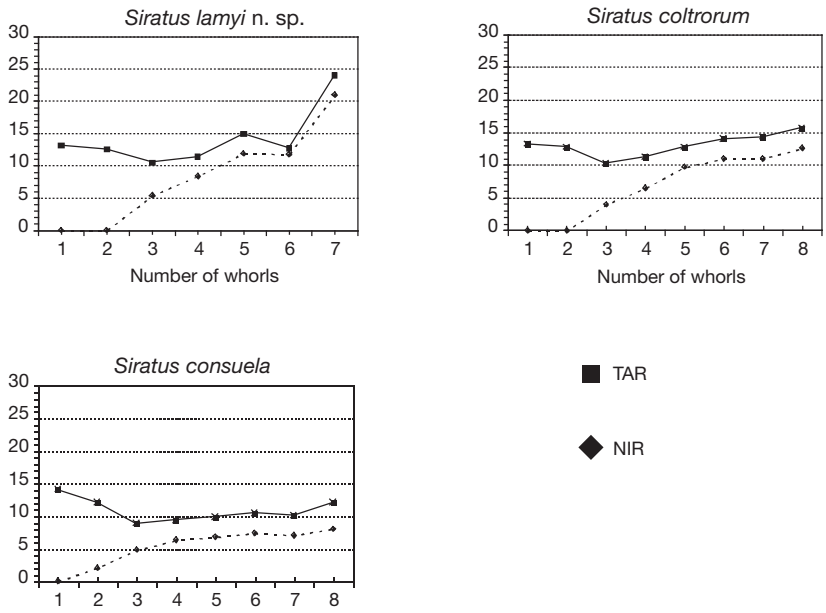

FIG. 3. — Evolution of the TAR and the NIR during the ontogeny of *Siratus lamyi* n. sp., *S. coltrorum* (Vokes, 1990) and *S. consuela* (Verrill, 1950). For each species, the mean is used.

growth shows the disappearance of the spines of P3, P4 and P5, present in some young specimens, but lacking in the adults.

INTERSPECIFIC COMPARISONS

Siratus lamyi n. sp. may be compared to two recent species, *S. consuela* (Verrill, 1950) and *S. coltrorum* (Vokes, 1990) reported from the northern part of Brazil (Vokes 1990a, b).

Siratus consuela

Siratus consuela is distinguishable by its protoconch of 2.5 whorls and a well-marked sinusigeral lamella and a small basal cord (Fig. 2C). Regarding the axial sculpture, the total number of intervarical ribs (NIR) on the last 4 whorls of *S. consuela* (5th, 6th, 7th and 8th whorls) stabilizes between 5 and 9 per whorl (5th: 5-9; 6th: 6-9; 7th: 6-9; 8th: 8), but increases in the oldest specimens of *S. lamyi* n. sp. (Fig. 3). This stabilization had earlier been observed in *S. consuela* (Merle *et al.* 2001), but was based on a smaller number of specimens. The stabilized number of intervarical ribs in *S. consuela* is probably due to their type of growth, because they remain well-developed during ontogeny. Intervarical ribs are reduced in thickness and more numerous in *S. lamyi* n. sp. *Siratus lamyi* n. sp. and *S. consuela* tend to lose their cord spines (P1 to P5) on the last whorls. However, the cords P6 and s6 of *S. lamyi* n. sp. (Fig. 4A, B) are hypermorphic and connected by a beginning of foliation, while s6 remains poorly developed in *S. consuela* (Fig. 5C, D). *Siratus lamyi* n. sp. is also characterized by its axial microsculpture, formed of a dense network of small and erected growth laminae that are lacking in *S. consuela*. Other characters, such as columellar ornamentation with more tubercles and a greater size in *S. consuela*, distinguish the species, even though they may have a great intraspecific variability.

Siratus coltrorum

Siratus coltrorum (Fig. 2B) has a protoconch of 1.25 whorls, which is very similar to that of *S. lamyi* n. sp. Regarding the axial sculpture, the total NIR on the last 4 whorls of *S. coltrorum* (5th, 6th, 7th and 8th whorls) varies from 9 to 14 (5th: 9-11; 6th: 10-13; 7th: 10-12; 8th: 12-14), while it varies

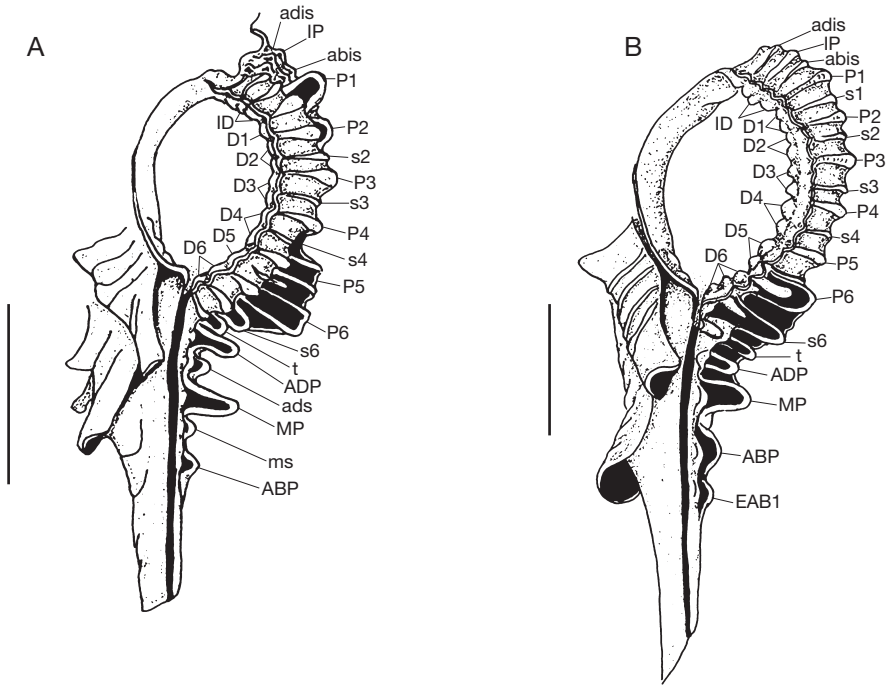

FIG. 4. — Spiral sculpture (apertural view) of *Siratus lamyi* n. sp., French Guiana: **A**, paratype (MNHN); **B**, holotype (MNHN). Scale bars: 5 mm.

from 8 to 27 (5th: 8-19; 6th: 9-20; 7th: 16-27) in *S. lamyi* n. sp. (Fig. 3). Then, *Siratus lamyi* n. sp. differs by a higher number of intervarices at the end of its growth. *Siratus coltrorum* and *S. lamyi* n. sp. share a well-developed P6 (Fig. 5A, B), but the secondary cord s6 of *S. coltrorum* is not hypermorphic as in *S. lamyi* n. sp. *Siratus lamyi* n. sp. is also characterized by its axial microsculpture, formed of a dense network of small and erected growth laminae, lacking in *S. coltrorum*. In conclusion three characters distinguish *S. lamyi* n. sp. from *S. coltrorum*:

– higher number of intervarical ribs on the last 2 whorls;
– hypermorphic cord s6;
– dense and erected growth laminae.

The geographic range of *S. lamyi* n. sp. extends from Surinam to French Guiana, while that of *S. coltrorum* extends from Rio Grande del Norte to Salvador de Bahia (Fig. 6).

GENERIC DISCUSSION

Vokes (1965, 1990a, b), Houart (1999, 2000) and Merle *et al.* (2001) previously regarded *Siratus* to be a subgenus of *Chicoreus* Montfort, 1810 (type species: *Murex ramosus* Linnaeus, 1758, by original designation), while *Vokesimurex* Petuch, 1994 (type species: *Haustellum* (*Vokesimurex*) *messorius* (Sowerby, 1841)) was accorded generic status. However, the sculptural patterns of *Siratus* and *Vokesimurex* are closely related. They share the atrophy of P2 and P4 when the cord spines are developed, narrow spines without secondary ornamentation, poorly developed tertiary cords, columellar tubercles, internal denticules on the apertural lip, crenulations forming secondary denticles on the posterior part of the apertural lip, a narrow and elongated siphonal canal and they lack labral spine. These characters easily distinguish *Vokesimurex* and *Siratus* from the type species of *Chicoreus* (see Merle 2001, 2004;

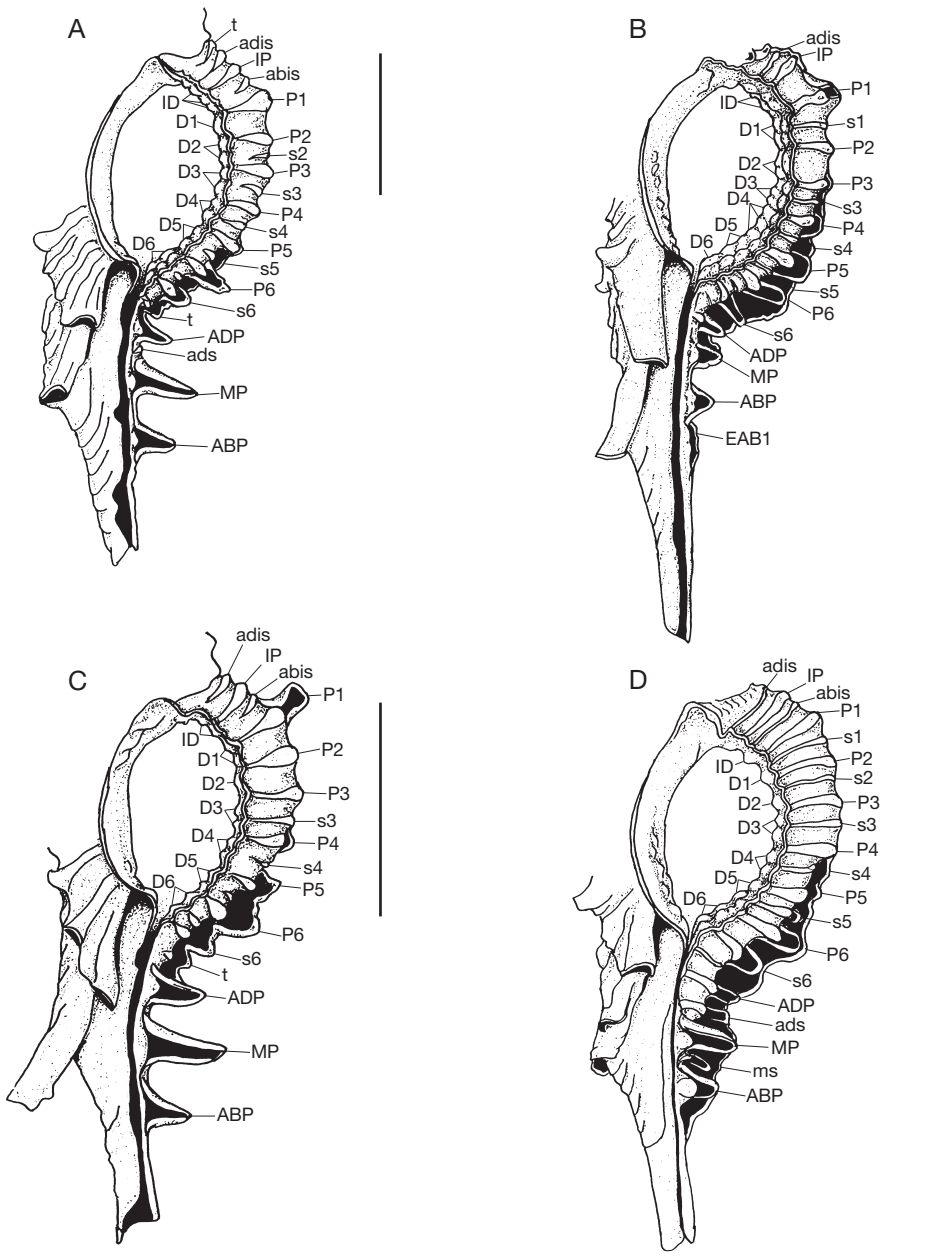

FIG. 5. — Spiral sculpture: **A**, **B**, *Siratus coltrorum* (Vokes, 1990); **A**, young specimen, Brazil (Garrigues coll.); **B**, adult specimen, Brazil (Garrigues coll.); **C**, **D**, *S. consuela* (Verrill, 1950); **C**, Guadeloupe (Garrigues coll.); **D**, adult specimen, Brazil (Garrigues coll.). Scale bars: 5 mm.

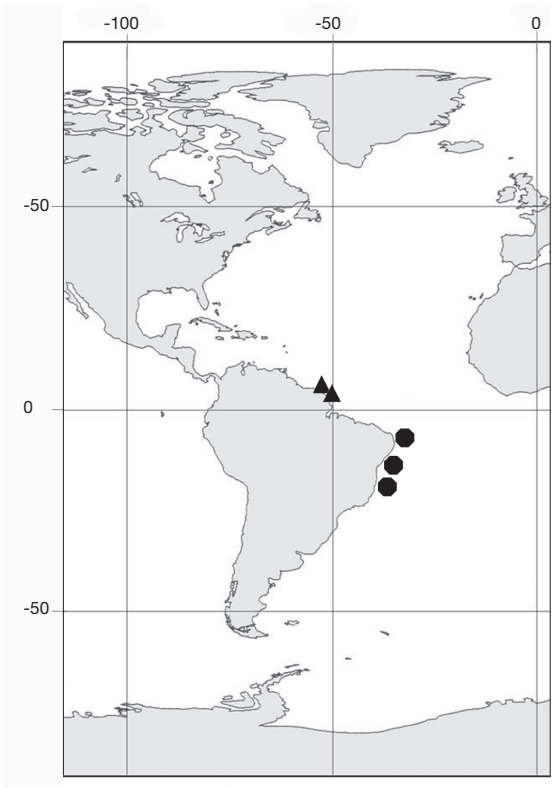

FIG. 6. — Geographic range of *Siratus lamyi* n. sp. (▲) and *S. coltrorum* (Volkes, 1990) (●).

Merle *et al*. 2001) and are sufficient to exclude *Siratus* species from the genus *Chicoreus*.

Subfamily MURICOPSINAE
Radwin & D'Attilio, 1971

Genus *Favartia* Jousseaume, 1880

TYPE SPECIES. — *Murex breviculus* Sowerby, 1841 by original designation.

Favartia massemini n. sp.
(Fig. 7)

TYPE MATERIAL. — **N French Guiana**. Continental shelf, holotype (Fig. 7), length: 18.5 mm, diameter: 12 mm, (MNHN).

TYPE LOCALITY. — N French Guiana.

ETYMOLOGY. — Named in honour of David Massemin.

DESCRIPTION
Protoconch unknown. Biconic shell high of 5 subcarinate whorls (height: 18.5 mm; width: 12 mm). Last whorl (5th whorl) 72% of total length of the teleoconch. Spiral sculpture with thick primary cords. First and 2nd whorls: presence of primary cords P1 and P2. Third whorl: appearance of primary cord IP. Fourth whorl: appearance of secondary cord s2. Fifth whorl: developed IP (sutural ramp), P1 to P5 (convex part of the whorl) atrophied P6, ADP and MP (siphonal canal); secondary cords: s2 more developed than s3 and poorly developed s6. Axial sculpture of imbricate varices. Primary cords spines IP, P1 to P5, ADP and MP slightly developed. Nine varices on 2nd and 3rd whorls, 8 on 4th and 5th whorls. Microsculpture with erected growth laminae, appearing on 4th whorl. Suborbicular aperture 25% of the diameter. Outer lip orthocline, thickened by 8 to 10 growth laminae. Six simple, internal denticles (ID, D1 to D5) which are poorly expressed and slightly extended in the internal part of apertural lip. D6 missing. Shoulder sinus closed by the growth laminae. Parietal lip poorly erected. Columellar lip erected and drawing an inductura. Siphonal canal of 54% of aperture length. Pseudombilicus large. Shell rosy with brown varices. Animal and radula unknown.

INTERSPECIFIC COMPARISONS
Favartia massemini n. sp. may be compared to other close species as *F. cellusosa* (Conrad, 1846) (Florida, North Caribbean), *F. nucea* (Mörch, 1850) (Florida, South Caribbean), *F. coltrorum* Houart, 2005 (Brazil, Guadeloupe), *F. lindae* Petuch, 1987 (Florida) and *F. pacei* Petuch, 1988 (Florida) (Rios 1985; Petuch 1987; Vokes 1994; Houart 2005). *Favartia massemini* n. sp. differs from these species in having a shell with more spiny varices, by a more marked shoulder and by a longer siphonal canal. *Favartia cellulosa*, *F. nucea* and *F. lindae* have a more developed s2 (almost of the same thickness as the primary cords). Their growth laminae are more numerous, particularly in the intervarical

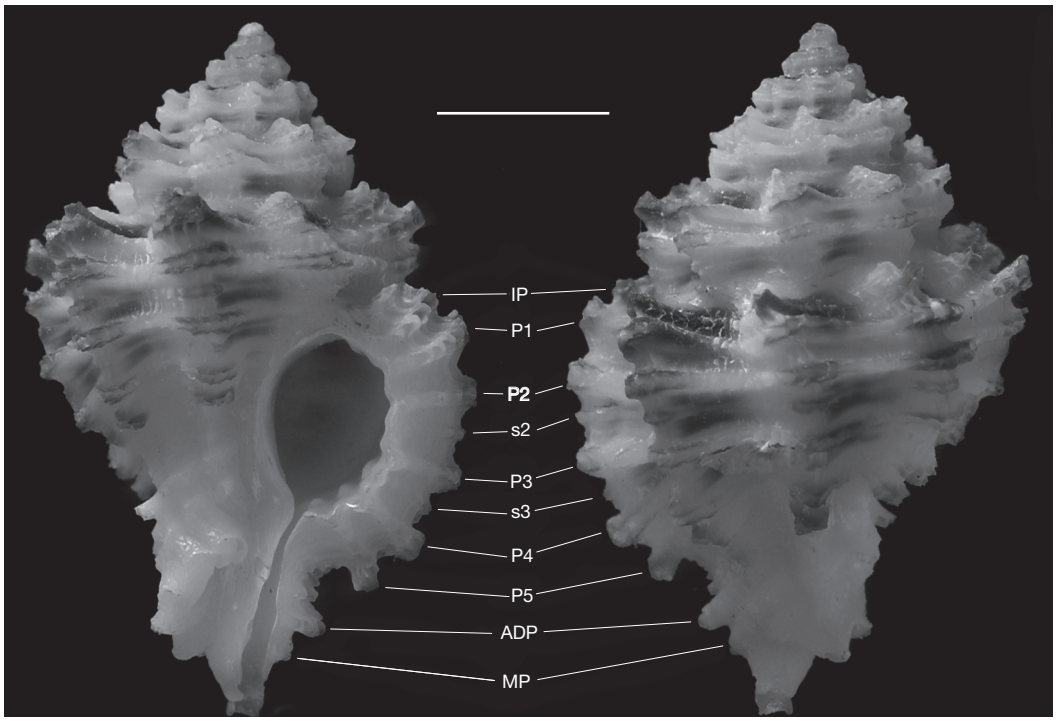

FIG. 7. — Spiral sculpture (apertural and dorsal views) of *Favartia massemini* n. sp., holotype (MNHN). Scale bar: 5 mm.

spaces. The teleoconch whorls of *F. pacei* are slightly more carinate than in the other species, because of a spiny P1. It differs from *F. massemini* n. sp. by the lack of other developed cord spines. *Favartia coltrorum* lacks secondary cords. *Favartia massemini* n. sp. may be also compared to *Murexiella glypa* (Smith, 1938) from Brazil (= *F. iemanja* Petuch, 1979) and from the Plio-Pleistocene of Florida (Vokes 1994). The spire of *M. glypta* is, however, longer and its cords are always more marked in the intervarical spaces. These last observations show that it is difficult to practically distinguish the genera *Favartia* and *Murexiella* Clench & Pérez Farfante, 1945 (type species *Murex hidalgoi* Crosse, 1869 by original designation), which are very closely related (Merle 2002).

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