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Conus circumcissus brazieri - Philippines, Hadsan. 18 m. - May 2005

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Two new deep water species of **Columbellidae** (Gastropoda: Neogastropoda) from the Caribbean

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Key words: GASTROPODA, NEOGASTROPODA, COLUMBELLIDAE, *Anachis*, *Costoanachis*, *Mitrella*, Guadeloupe, Martinique.

Abstract: Two new species of **Columbellidae**: *Mitrella tosatoi* sp. nov. and *Anachis* (*Costoanachis*) *roberti* sp. nov. are introduced as new to science. The first one, originating from Martinique, can easily be distinguished from all other congeners by its size, the presence of columellar denticles and by its denticles extending into the aperture along the inner side of the lip. The latter, originating from Guadeloupe, is compared with *A. (C.) translirata* (Ravenel, 1861), *A. (C.) sparsa* (Reeve, 1859) and *A. (C.) catenata* (Sowerby, 1844), its closest congeners.

Introduction: The genus *Mitrella* Risso, 1826 has only got a limited number of representatives in the Caribbean, all of very small size and usually from shallow water. Yet, among the many deep water specimens of **Columbellidae** sent to us by Mr. D. Lamy (Guadeloupe), three species lots were of particular interest. On closer examination, one lot was later identified as *Cotonopsis* (*Cotonopsis*) *lafresnayi* (Fischer & Bernardi, 1856), subject of a former paper (Monsecour & Monsecour, 2005). One other lot consisted of a yet undescribed species of *Mitrella*. It is hereby introduced as new to science. The other lot was immediately assigned to *Anachis* (*Costoanachis*), a genus with several representatives in the Caribbean, all from shallow water. Studying type material of *Costoanachis* species and hundreds of specimens in private collections, revealed that the species lot offered by D. Lamy was also to be introduced to science.

Abbreviations:

MNHN: Muséum National d'Histoire Naturelle, Paris, France.

DL: Personal collection Dominique Lamy (Guadeloupe).

DM: Personal collection David Monsecour.

KM: Personal collection Kevin Monsecour.

Systematics:

Family **COLUMBELLIDAE** Swainson, 1840

Subfamily *Atiliinae* Cossmann, 1901

Genus *Mitrella* Risso, 1826

Type species by subsequent designation (Cox, 1927): *Mitrella flaminea* Risso, 1826. Recent, Mediterranean.

***Mitrella tosatoi* sp. nov.**

(Figs 1-4)

Type material: Holotype, MNHN, length 26.3 mm, width 11.2 mm.

No further material available at this time.

Type locality: Martinique. 300-400m deep (actual depth to be confirmed).

Description: Shell of moderate size for the genus, fusiform. Teleoconch consisting of 8 slightly convex whorls; protoconch paucispiral, indicating direct development. Protoconch with microscopic crenulations. The first two teleoconch whorls with numerous clearly visible, close-set axial ribs; further teleoconch whorls virtually smooth, but with microscopic axial and spiral lines. Suture straight, shallow. Body whorl about 60% of total shell length, adorned with basal cords, exact number unknown due to natural repairs of the shell. Outer lip slightly thickened, smooth outside, with 10 denticles on apertural side, the adapical 5 extending inside as apertural lirations. Columellar callus restricted. Columella with 2 adapical denticles close to the canal constriction and one central denticle.

Shell colour pale pinkish brown, with a pattern of brown and white dots, leaving the central part of the body whorl in the pale pinkish brown shell colour. Protoconch off-white with a pale purplish overcast on the uppermost part. Aperture and columella purple, denticles paler.

Animal, operculum and periostracum unknown.

Comparison: *Mitrella tosatoi* stands out from all other members of the genus from the Caribbean by its size, the presence of denticles on the columella and more importantly by the denticles extending into the aperture, a feature only present in one other Caribbean columbellid species, *Cotonopsis (Cotonopsis) lindae* (Petuch, 1988).

Remarks: As the division into subgenera is not complete for the genus *Mitrella* and no available subgeneric name fits this species, we do not wish to place it in any known subgenus, nor establish a new subgenus to accommodate this species. Anatomic and radular studies are needed to further survey the subgeneric level for the entire genus.

Etymology: *Mitrella tosatoi* is named in honour of Mr. Mikael Tosato (Martinique) as he collected the only shell available at this time.

Genus *Anachis* H. & A. Adams, 1853.

Subgenus *Costoanachis* Sacco, 1890.

Type species by subsequent designation (Pace, 1902): *Columbella (Anachis) turrita* Sacco, 1890. Fossil, Miocene, Italy.

Anachis (Costoanachis) roberti sp. nov.

(Figs 5-11)

Type material: Holotype, MNHN, length 11.6 mm, width 5.2 mm.

Paratypes 1-4, DL; 5-7, KM; 8-10, DM; 11-14, MNHN.

Type locality: Guadeloupe, off Basse Terre. On muddy sand at 350m deep (actual depth to be confirmed).

Description: Shell of moderate size for the genus, fusiform. Teleoconch consisting of 6 slightly convex whorls; protoconch paucispiral, indicating direct development. Protoconch smooth. All teleoconch whorls with numerous strong, close-set axial ribs. Whorls shouldered. Body whorl with 15-17 axial ribs and 12-14 very fine spiral threads. Body whorl about 65% of total shell length, adorned with 8-10 basal cords. Outer lip with fine crenulations, not thickened. Inner lip with 5-7 denticles, the most adapical and most abapical ones significantly smaller than the central three. Columellar callus restricted. Columella with 5 nodules, the abapical three minute, the adapical two larger.

Shell colour off-white to beige, with a pattern of darker brown dots on the axial ribs. Protoconch purple, becoming paler towards the transition with the teleoconch. Aperture, columella and denticles white to off-white.

Operculum smooth, apart from the terminal nucleus; yellow.

Periostracum smooth, thin, brown.

Animal unknown.

Comparison: *A. (C.) roberti* can easily be distinguished from its closest Caribbean congeners:

It differs from *A. (C.) translirata* (Ravenel, 1861) by its more shouldered whorls and its paucispiral protoconch (multispiral in *A. (C.) translirata*). For a detailed discussion on the status of *A. (C.) translirata*, we refer to Monsecour & Monsecour (2005).

A second related species, likewise distinguishable by its multispiral protoconch, is *A. (C.) sparsa* (Reeve, 1859). Other distinctive features are *A. (C.) sparsa*'s less shouldered whorls, its smaller size (about 7-9mm) and its typical colour pattern consisting of minute brown dots.

A final species, closely related to *A. (C.) sparsa*, but with a paucispiral protoconch, is *A. (C.) catenata* (Sowerby, 1844). It differs from *A. (C.) roberti* by its smaller size (about 7-8mm), the colour pattern consisting of small brown dots, more or less like in *A. (C.) sparsa*, the less pronounced spiral threads and the smaller number of teleoconch whorls (about 5).

Etymology: *Anachis (Costoanachis) roberti* is named in honour of Mr. Francis Robert (Guadeloupe) because he collected all the type material.

Acknowledgements: We would like to thank Mr. D. Lamy for making Caribbean columbellid specimens available for study, and Mr. P. Bouchet (MNHN) for access to the type collection of the MNHN and perusing the manuscript.

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Plate:

1-4: *Mitrella tosatoi* sp. nov. Holotype. Martinique. 26.3mm.

1: ventral view

2: detail of aperture

3: dorsal view

4: detail of protoconch and upper teleoconch whorls

5-11: *Anachis (Costoanachis) roberti* sp. nov.

5-7: Holotype. Basse Terre, Guadeloupe. 11.6mm.

5: ventral view

6: dorsal view

7: detail of protoconch and upper teleoconch whorls.

8-9: Paratype. Coll. D. Lamy. Basse Terre, Guadeloupe. 11.7mm.

10-11: Paratype. Coll. K. Monsecour. Basse Terre, Guadeloupe. 12.2mm.

12-13: *Anachis (Costoanachis) translirata* (Ravenel, 1861). New York, USA.

Coll. K. Monsecour. 14.4mm.

14-15: *Anachis (Costoanachis) mitrula* (Dunker in Philippi, 1849). Brasil.

Coll. K. Monsecour. 7.8mm.

16-17: *Anachis (Costoanachis) catenata* (Sowerby, 1844). Dominican Republic.

Coll. K. Monsecour. 8.3mm.



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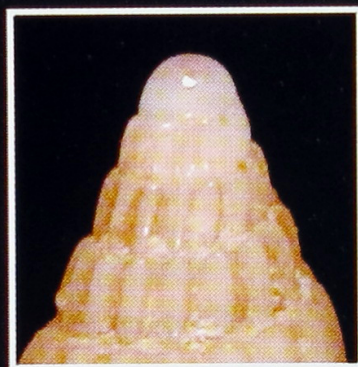
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Two new *Cosmioconcha* (Gastropoda: Neogastropoda: Columbellidae) from the Caribbean

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Key words: GASTROPODA, NEOGASTROPODA, COLUMBELLIDAE, *Cosmioconcha*, Panama, new species.

Abstract: Two new Caribbean species of **Columbellidae**, both belonging to the genus *Cosmioconcha* Dall, 1913 are described: *C. dedonderi* and *C. rika*. The first one stands out from all other Caribbean members of the genus by its cancellate sculpture. It is also compared with its closest congener *C. calliglypta* (Dall & Simpson, 1901). *C. rika* is compared with *C. calliglypta* and *C. nitens* (C.B. Adams, 1850), both from the Caribbean. It is likewise compared with *C. rehderi* (Hertlein & Strong, 1951), its closest congener, yet originating from western America.

Introduction: The Caribbean region, subject to numerous recent publications, harbours a very rich malacological fauna. However, the family **Columbellidae** has often been neglected, apart from Radwin (1977, 1978), De Jong & Coomans (1988), Faber (2004) and Monsecour & Monsecour (2005, 2006). These publications also often added new species for this region thanks to new collecting methods.

Among the many deep water Caribbean specimens of **Columbellidae** yearly offered by Fernand & Rika De Donder-Goethaels, three species lots were of particular interest. On closer examination, one lot was later identified as *Cosmioconcha calliglypta* (Dall, 1901). The two other above-mentioned species are hereby introduced as new to science.

Abbreviations:

MNHN: Muséum national d'Histoire naturelle, Paris, France.
 DG: collection Fernand & Rika De Donder-Goethaels, Belgium.
 DM: collection David Monsecour, Belgium.
 KM: collection Kevin Monsecour, Belgium.

Systematics:

Family **COLUMBELLIDAE** Swainson, 1840

Subfamily *Atiliinae* Cossmann, 1901

Genus *Cosmioconcha* Dall, 1913

Type species by original designation: *Buccinum modestum* Powys, 1835.
 Recent, Tropical West America.

***Cosmioconcha dedonderi* sp. nov.**
 (Figs 1-4)

Type material:

Holotype, MNHN, length 9.0mm, width 4.1mm.

Paratype 1 (from type locality) DG; Paratype 2-3 (Colombia) KM; Paratype 4-5 (Colombia) DM; Paratype 6-7 (Colombia) DG; Paratype 8 (Panama, off Bocas del Toro) KM.

Type locality: Panama. Off Punta San Blas. On muddy sand at about 280m deep.

Range: Until now only known from eastern Panama and Colombia.

Description: Shell small for the genus, shape fusiform. Teleoconch consisting of $5\frac{1}{4}$ - $5\frac{3}{4}$ slightly convex whorls; protoconch multispiral, consisting of $2\frac{1}{2}$ glossy whorls, virtually smooth, but with microscopic crenulations. The first teleoconch whorls with 31 clearly visible, close-set axial ribs, diminishing in size towards the last whorl. Last whorl with about 40 indistinct axial ribs. Spiral sculpture appearing from second teleoconch whorl onwards, increasing in strength towards the last whorl, rendering a cancellate effect. Number of spiral ribs increasing from 5 or 6 on second teleoconch whorl to 22-25 on the last whorl, including the basal cords as there is no clear transition between spiral cords and basal cords. Whorls slightly shouldered. Last whorl about $\frac{2}{3}$ of total shell length. Outer lip thickened, showing the spiral ribs. Inner side of lip

with 9-12 denticles. Columellar callus restricted. Columella smooth, yet revealing the sculpture of the basal cords.

Shell colour uniformly off-white, with a very faint pattern of one pale brown spiral line on the earlier teleoconch whorls and two on the last whorl. Protoconch glassy white. Aperture and columella white to off-white.

Animal, operculum and periostracum unknown.

Comparison: *Cosmioconcha dedonderi* stands out from all other Caribbean members of the genus by its cancellate sculpture.

Its closest relative is *C. calliglypta* (Dall & Simpson, 1901), which differs by its stouter appearance, paucispiral protoconch, smooth upper whorls, more strongly shouldered whorls and the smaller number of stronger axial ribs on the last whorl.

Remarks: The genus *Cosmioconcha* is characterized by a deep subsutural spiral groove. However, *C. dedonderi* only shows a shallow subsutural spiral groove due to the strongly developed spiral and axial sculpture. The placement within this genus was based on the relative deeper incision of the subsutural groove compared to the interspaces between the spiral cords.

Etymology: *Cosmioconcha dedonderi* is named in honour of Mr. Fernand De Donder (Peutie, Belgium) for his kind donation of the holotype and his regular supply of interesting material.

Cosmioconcha rikae sp. nov.
(Figs 5-8)

Type material: Holotype, MNHN, length 7.9mm, width 3.5mm.

Paratype 1 (from type locality) KM; Paratype 2 (Panama. Escudo de Veraguas) KM; Paratype 3 (same locality) DM; Paratypes 4-10 (same locality) DG; Paratypes 11-16 (Panama. San Blas) DG; Paratypes 17-18 (same locality) KM; Paratype 19 (same locality) DM.

Type locality: Eastern Panama. Bocas del Toro. In sand at about 180-250m deep.

Range: Known from eastern Panama to Trinidad & Tobago. Also known from the Gulf of Mexico (Radwin, 1978): only exact locality confirmed is off Mustang Island, Texas (figured specimen in Radwin, 1978).

Description: Shell small for the genus, shape fusiform. Teleoconch consisting of 5 - 5 $\frac{1}{4}$ slightly convex whorls; protoconch multispiral, consisting of 2 $\frac{3}{4}$ - 3 $\frac{1}{4}$ virtually smooth whorls. Early teleoconch whorls with about 19 axial ribs, diminishing in strength and number towards the last whorl. Last whorl with faint or without axial ribs. Spiral sculpture virtually absent, yet consisting of very fine, microscopic threads. Suture slightly shouldered, shallow. Subsutural rim slightly thickened, forming small beads at the intersections with the axial ribs. Subsutural spiral groove rather shallow. Last whorl about $\frac{3}{5}$ of total shell length, adorned with about 16 ventral basal cords, the uppermost one almost at the constriction of the aperture. Dorsally about 12 basal cords visible, ending at about midwhorl. Outer lip thickened, showing the basal cords. Inner lip with 7-9 denticles. Columellar callus restricted, smooth, abapically revealing the sculpture of the basal cords.

Shell colour pale brown, with a white subsutural band and a second, sometimes hardly visible white band at about midwhorl of the last whorl. Protoconch off-white. Aperture and denticles off-white, columella with a pale brown tinge.

Operculum, periostracum and animal unknown.

Comparison: *Cosmioconcha rika* is closest to the western American *C. rehderi* (Hertlein & Strong, 1951), which differs by the more bulbous protoconch consisting of 3 $\frac{3}{4}$ whorls, the straighter suture, the less pronounced subsutural rim and the higher number of axial ribs (22-23) on the early teleoconch whorls not diminishing in strength until the final $\frac{1}{4}$ of the last whorl.

The closest Caribbean congener is *C. calliglypta* (Dall & Simpson, 1901), which differs by its much stouter appearance, the paucispiral protoconch, the –apart from the subsutural groove- smooth upper whorls, more strongly shouldered suture and the stronger sculpture.

The only other remaining Caribbean member of the genus, *C. nitens* (C.B. Adams, 1850) can easily be distinguished by its much larger size (about twice the size of *C. rika*) and the completely smooth shell apart from the basal cords.

Remarks: This species is in fact widely known among collectors, yet often misidentified as *C. cf. calliglypta*. This misunderstanding is partly based on Radwin (1978), who

misidentified the species described here as *C. calliglypta*.

Etymology: *Cosmioconcha rika* is named in honour of Ms. Rika Goethaels (Peutie, Belgium) for her kind donation of the holotype and her regular supply of interesting material.

Acknowledgements: We would like to thank Fernand & Rika De Donder-Goethaels for bringing their Caribbean columbellid species to our attention, Koen Fraussen (Aarschot, Belgium) for perusing the manuscript and Sarah Vertongen & Natalie Bruynseels for support.

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Plate:**1-4: *Cosmioconcha dedonderi* sp. nov.**

1-2: Holotype. Panama. Off Punta San Blas. 9.0mm.

3-4: Paratype 2. Colombia. 11.2mm.

5-8: *Cosmioconcha rikae* sp. nov.

5-6: Holotype. Eastern Panama. Bocas del Toro. 7.9mm.

7-8: Paratype 11. Panama. San Blas. 8.2mm.

9-10: *C. calliglypta* (Dall & Simpson, 1901). Panama. San Blas. 7.3mm. Coll. DG.

11-12: *C. rehderi* (Hertlein & Strong, 1951). Panama. Chiriqui Bay. 7.3mm. Coll. KM.

13-14: *C. nitens* (C.B. Adams, 1850). Panama. Atlantic side. 11.6 mm. Coll. KM.



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**New data on East-African *Mericella* species, and description
of a new species of *Scalptia* (Neogastropoda:
Cancellarioidea: Cancellariidae)**

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Abstract: New material from Mozambique allowed redescription of the poorly known *Mericella paschalis* (Thiele, 1925). The genera *Mericella* Thiele, 1929, and *Gerdiella* Olsson & Bayer, 1973, were found to be synonymous. A new species of *Scalptia* is introduced, based on shells from southern Madagascar.

Introduction: The knowledge of East-African **Cancellariidae** has been rather poor for a long time, but has expanded considerably during the last two decades (Beu & Maxwell, 1987; Beu & Verhecken, 2000; Petit & Harasewych 1991, 1993, 2000a, b, 2002; Verhecken 1991, 1997). The present paper studies material of two taxa: a poorly known *Mericella* species described on only one broken shell by Thiele (1925) and for which no further data have been recorded since; and a new *Scalptia* species from southern Madagascar.

Species studied

A. *Mericella paschalis* (Thiele, 1925)

The Mollusca collected off East-Africa by the "Valdivia" during the *Deutsche Tiefsee Expedition* 1898-99 were published by Thiele (1925). He described five new

cancellariid species: *Cancellaria plebeja* from Stn 104, 155 m, Agulhas Bank, South Africa; *C. patricia* from Stn 244 in the Zanzibar Channel, 463 m; *C. (Merica) jucunda*, 2 shells (15.2 x 7.3 mm, 12.4 x 5.6 mm) from Stn 242, off Dar es Salam (depth not mentioned), 6° 34' 8" S, 39° 35' 5" E, Tanzania; *C. (Merica) paschalis* (based on a single broken shell) from Stn 245, 5° 27' 9" S, 39° 18' 8" E, Zanzibar Channel, depth not mentioned, Tanzania and *Admete aethiopica* from Stn 251 and 256, off the African coast, at about 1°45'N and S of the Equator, depths 693 and 1134 m respectively. These species are rather distinct from most cancellariids known at that time; their type material is in the Institut für systematische Zoologie, Malakologie, Museum für Naturkunde in Berlin (ZMB).

This was the only information on these species until the identification of *C. patricia* in southeastern Australian material (Verhecken, 1991) and of *Admete aethiopica* in material taken in Indonesian waters by the Karubar expedition (Verhecken, 1997: 316).

Thiele placed *C. jucunda* and *C. paschalis* in the subgenus *Merica*. Later (1929: 352) he introduced the genus *Mericella* as a section of *Narona*, with *C. (Merica) jucunda* as monotype. He gave the following short distinctive characteristics (transl.): "shell rather finely cancellated, whorls inflated, outer lip expanded, smooth inside". Only *M. bozzettii* Petit & Harasewych, 1993, from off Cape Ras Hafun, Somalia, and *Cancellaria (Merica) paschalis* were also placed in *Mericella* by Petit & Harasewych (1993: 221).

Shells of *Mericella paschalis* have now been identified in material from Bazaruto, Mozambique, kindly made available for study by Mr J. Rosado (Maputo, Mozambique). This is the first material of this species found since 1925, and contains the first undamaged shells collected. A redescription of this species is given here, based on the fragmentary holotype and the shells from Mozambique here studied.

***Mericella paschalis* (Thiele, 1925)**

(Figs. 1-5)

Material studied:

Holotype, by monotypy: a broken shell, 8.9 x 5.0 mm, ZMB 109368 (Fig. 1), 'Valdivia' Stn. 245, Zanzibar channel, 5° 27' 9" S, 39° 18' 8" E, off Tanzania.

New material: five shells, trawled at a depth of 375-450 m off Zavora, Bazaruto, Mozambique.

Description: Shell elongate, white; no traces of a periostracum. Top angle 45-49°. Shell height 12.4-17.2 mm, shell width 6.5-8.1 mm. Sculpture consisting of fine axial and spiral riblets. Protoconch bulbous, smooth and shiny, paucispiral with $1\frac{3}{4}$ - $1\frac{7}{8}$ whorl, visible height 1.3-1.8 mm, maximum diameter 1.5-1.9 mm. Protoconch rim neatly indicated, forming an opisthocyrt line. Teleoconch with up to $4\frac{1}{2}$ whorls. Axial sculpture consisting of low narrow riblets: 13-15, 14-16, 17-25 and 21-28 respectively on first to fourth teleoconch whorl; the last whorl has 19-28 axial riblets. There can be 2-3 low varices, spaced 180-240° along the whorl. Spiral sculpture consisting of 3, 3-4, 4-6, 5-7 thin cords on first to fourth whorl respectively; the last whorl has 18-22 cords. The area between the suture and the first spiral ridge on the younger whorl is flat and steeply inclined; it is much wider than the normal spacing between the spiral lines. Height of the last whorl 8.2-11.3 mm (65-67% of total shell height). The whorls are rounded, but near the posterior suture there is a flat sloping area, wider than the other areas between the spiral ridges, one thin spiral line can be present in that area. Aperture oblong; height: 6.5-8.7 mm (49-53% of total shell height); width 3.0-3.5 mm. Columella straight, slightly inclined towards shell axis anteriorly, with two well-defined rounded folds placed near half height of the aperture; the posterior fold may be slightly broader than the other one. Aperture smooth inside, without lirae nor teeth. Hardly any siphonal canal, no siphonal fasciole. A thin colourless callus covers part of the parietal side; it can be thicker on the columellar side, where it completely covers the umbilical area. Aperture rim thickened and reflected outwards, forming a sigmoid line.

The new material originates from about 15° south of the type locality, but completely agrees with the holotype characters. The depth range of this species was unknown, but off Mozambique the bathymetrical distribution seems to be 375-450 m.

Discussion: Differences between *Mericella paschalis* and *Mericella jucunda*:

The new material has the same rather coarse sculpture as the holotype of *M. paschalis*. The figures given by Thiele (1925: pl. 34 fig. 21; 1929: fig. 424) for *M. jucunda* suggest a rather fine and smoothish sculpture, but its syntypes [ZMB 109369: 2 complete shells 12.4 x 5.6 mm (68), 15.2 x 7.3 mm (Figs. 7-8); 2 juveniles 5.9 x 3.3 mm (2 teleoconch whorls); 5.3 x 3.1 mm (1.75 teleoconch whorls); and an apertural part] show a fine, yet rather crisp sculpture with fine rounded knobs (mentioned by Thiele) at the crossings of the sculpture lines (Figs. 7-9). This sculptural difference between *M. jucunda* and *M. paschalis* is less evident in Thiele's figures, therefore it is shown here (Figs. 1-9). It is unlikely that these two types of sculpture would be the extremes of the sculpture variability in one and the same species. Moreover, *M. jucunda* also differs from *M. paschalis* in having the columellar folds narrower and placed much more obliquely, and in its outer lip which is more expanded anteriorly than in *M. paschalis*. Between the axial ribs, *M. jucunda* has fine axial intritacalx riblets (as proposed by d'Attilio &

Radwin, 1971), absent in *M. paschalis*. The only quantitative differences reside in the sculpture: the higher number of axials starting from the 2nd teleoconch whorl onwards (*M. paschalis*: 2nd whorl: 14-16, 3d whorl: 17-25, last whorl: 19-27; *M. jucunda*: 2nd whorl: 24-25, 3d whorl: 34-35, last whorl: 45-46), and the slightly higher number of spirals on the 2nd and 3d whorl. (*M. paschalis*: 2nd whorl: 3-4, 3d whorl: 4-6; *M. jucunda*: 2nd whorl: 5-6, 3d whorl: 8, on the fourth whorl this difference has disappeared).

Genera *Mericella* Thiele, 1929 and *Gardiella* Olsson & Bayer, 1972

Olsson & Bayer (1972: 876) introduced the new genus *Gardiella* for three new Caribbean deep water species. In their discussion they state "... *Mericella* is perhaps the more likely possibility with which *Gardiella* may be congeneric. However, definite reference of our Caribbean shells to *Mericella*, as first considered, would be premature since it would imply a direct relationship between our Caribbean species and an imperfectly known species from the Indian Ocean, an expression of a degree of knowledge on our part that we do not possess".

Cancellaria corbicula Dall, 1908, from 650-1980 m, off Southern California, was placed in *Mericella* by Abbott (1974: 247) and in *Gardiella* by Kaicher (1978: card 1952). Thiele (1925: 201), while describing *M. jucunda*, mentioned its closeness to *Merica bifasciata* (Deshayes, 1830) (*Merica oblonga* Sowerby, 1825) and especially to *C. corbicula*, but stated, without providing the differences, that both species are clearly different.

Characteristics of *Mericella* and *Gardiella* are compared in table 1

Discussion: table 1 shows that the genera *Mericella* and *Gardiella* are very much alike conchologically, the main differences being the relative spire height and the suture form. The shell size of the largest *Mericella*, *M. bozzettii* (up to 37 mm), is in the same range as for the three *Gardiella* species (30.1 to 31.5 mm). In species of *Mericella*, the relative aperture height (*M. jucunda*: 0.488-0.493; *M. paschalis*: 0.494-0.527; *M. bozzettii*: 0.553) is larger than in *Gardiella* (0.388-0.396). This agrees with Petit & Harasewych (1993: 223), who consider a value > 0.5 a diagnostic feature for *Mericella*. However, in general, there are no important differences in shell characteristics that would justify a separation between *Mericella* and *Gardiella*. Therefore, *Gardiella* must be considered a junior synonym of *Mericella*, or at most as an Atlantic subgenus of it.

Comparison of the genera *Mericella* and *Gardiella*. (a): Text in **Bold**: Thiele's (1929) diagnosis (translated); in *italics*: own observations on *M. jucunda* syntypes; underlined: *M. bozzettii*. (b): Olsson & Bayer, 1973: 876.

	<i>Mericella</i> ^a	<i>Gardiella</i> ^b
Form	<i>elongated</i>	stout, broadly elongated
Umbilicus	<i>imperforate</i>	imperforate
Columellar folds	2, <i>rounded, posterior one the strongest</i>	2, sharply keeled, upper one the largest
Axis	<i>straight</i>	short, pillar straight
Apex	<i>blunt</i>	blunt
Protoconch	<i>large, 1 ¾ whorls, smooth</i>	large, pupoid; 2.5 whorls, 1 st : smooth, 2 nd : axial riblets
Postnuclear whorls	inflated rather finely cancellated	rounded or strongly shouldered fine spirals & axials or strong plain spiral cords
Sutures	<i>very narrow</i>	deeply recessed
Varices	<i>weak, spaced 180-225 °</i>	spaced 150°
Aperture	outer lip expanded	widely expanded, semioval parietal side only weakly arched labial side regularly curved
Callus	<i>thin, spreading on the parietal side.</i>	spreading pad on parietal side thickens the outer lip
Outer lip sinus	<i>sigmoid profile</i>	wide, shallow, in upper half (sigmoid profile)
Inside aperture	smooth <u>or with weak denticles</u>	smooth or lirated
Outer colour	<i>whitish</i>	white or light brown

B. A new *Scalptia* species from Madagascar

Scalptia foveolata (Sowerby, 1849) is a well-known, rather common eastern South African species, occurring from Jeffreys Bay to Natal, it has a pale buff to chestnut-brown shell of up to 24 mm (Barnard, 1959: 19). Steyn & Lussi (1998: 148) give about the same distribution (Port Elisabeth to Port Shepstone) but add "violet colour"; a question to M. Lussi on this remained unanswered. No finds have been reported from outside the cited area, except for the general statement in a palaeontological paper (King, 1953: 83) that the species occurs in Natal and Mozambique, but the latter locality has never been confirmed. Barnard (1959: 19) stated that this species is only known from beach material; according to recent information it lives in sand in very shallow water, and at low tide is sometimes washed out by strong waves (B. de Bruin, pers. comm.).

The protoconch of *S. foveolata* is paucispiral, indicating a direct development of the larvae, without a floating veliger stage. The surface currents off southern East-Africa are dominated by the NE to SW Agulhas current, opposing to a passive transport from

South Africa to Madagascar. These two factors explain why *S. foveolata* has never been found in Madagascar.

Recently, shells superficially resembling *S. foveolata* have been reported from southern Madagascar; 22 shells in different condition, from Lavanono, WNW of Cap Sainte-Marie, were seen by the present authors. All these shells have a vivid red-violet colour. Apparently all shells were beach-collected, as evidenced by slight to heavy surface erosion on most, and breaks and holes in several of them. This material was obtained from the local population on at least four occasions over a time span of three years. The village is very far from Fort Dauphin and only consists of huts and a small store; therefore the possibility of tampering with the shells to artificially change the colour can be excluded.

Thirteen of these Madagascar shells in fine to reasonable condition were studied, they are here described as a new species, because of their geographical isolation from *S. foveolata* and several constant differentiating characters.

***Scalptia androyensis* sp. nov.**
(Figs. 10-14)

Type material:

Holotype: RBINS IG30517, type n° 537, 17.0 x 11.2 mm. Lavanono, Madagascar, beach. (Figs. 10-11)

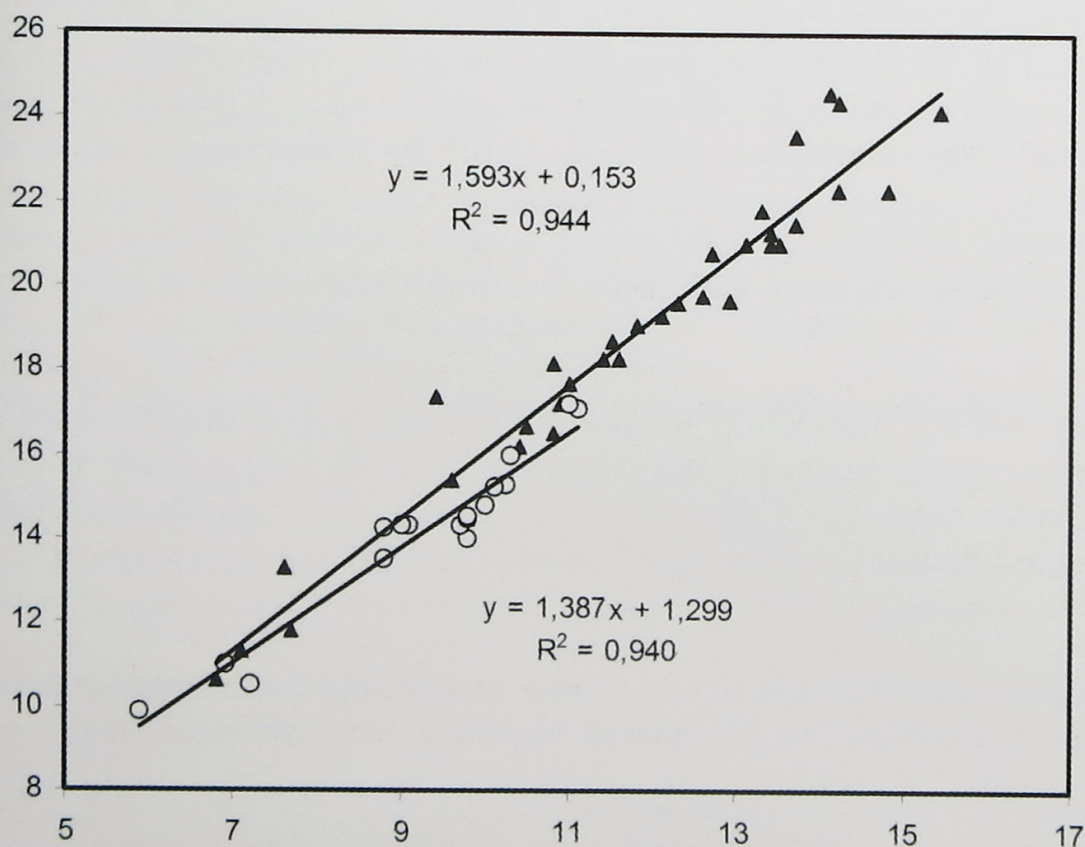
Paratypes: all from type locality: 1, 14.3 x 9.0 mm, MNHN; 2-3, 14.3 x 8.8 mm and 14.8 x 10.0 mm, coll. Bozzetti; 4-5, 14.5 x 9.9 mm, AV1199 (Fig. 12) and 14.3 x 9.6 mm, AV1212 (Fig. 13). The other shells seen are not included in the type series because of their poorer condition.

Type locality: Lavanono, Androy province, Madagascar.

Description: Shell up to 17.2 x 11.0 mm; colour reddish purple in all shells seen, but protoconch, umbilicus, columella and outer lip white, yet the latter may show some reddish patches. Protoconch rather large, smooth, paucispiral with 1.25 whorl, diameter 1.1-1.3 mm, height 0.9-1.1 mm; end of protoconch marked only by start of teleoconch sculpture. Teleoconch with up to 4 $\frac{3}{8}$ strongly shouldered whorls. Sutural plane flat and almost perpendicular to shell axis, the prolongations of the axial ribs cross over obliquely as raised rounded ribs; there are brownish blotches near the shoulder in that area. Axial sculpture consisting of 10-11 low rounded ribs. Spiral

sculpture of very fine close-set striae (about 9 per mm; Fig. 14) all over the teleoconch outer surface, except for the inner part of the umbilicus. Last whorl large, 73-75% of total shell height. Aperture rounded triangular, columella slightly inclined abaxially, with two rather strong folds and a clearly marked tooth at its anterior end. Outer lip thickened, truncated part perpendicular to the shell axis and bearing a small tooth. There are 14-18 (mean: 15.25, $n = 7$) rather strong lirae inside the outer lip. Umbilicus deep but rather narrow.

Discussion: The new species best resembles *S. foveolata* from eastern South Africa (Fig. 15), whose protoconch is of the same type and form, but may reach a height of 1.7 mm and a maximum diameter of 1.7 mm. Shells of the new species are smaller and have a neat tendency to be less elongated (see graph 1).



Graph 1. Shell dimensions of *Scalptia* species discussed here. X-axis: shell width, Y-axis: shell height. Circles: *Scalptia androyensis* sp. nov.; black triangles: *S. foveolata*.

Furthermore, *S. androyensis* can easily be distinguished from *S. foveolata* by the following characteristics:

(a) The presence of fine spiral grooves all over the whorls (Fig. 14); this is absent in all 34 studied shells of *S. foveolata*, which may have coloured spiral lines but no grooves.

(b) The sutural area is almost flat and perpendicular to the shell axis, and crossed by the raised axial ribs prolongations; whereas in *S. foveolata* it is excavated, resulting in a sharp-angled shoulder, and the prolongations of the axial ribs are none or very faint.

(c) The number and intensity of the lirae in the aperture: 14-18 (mean: 15.25, $n = 7$) rather strong lirae; in *S. foveolata*, lirae are present in 22 out of 34 shells, but in lower number (9-13, mean: 10.6), and in most cases only very softly indicated.

(d) The columellar folds of *S. androyensis* have about the same strength; they are clearly stronger than in *S. foveolata*, in which the posterior fold is the strongest. Moreover, *S. androyensis* has a marked tooth at the anterior end of the columella.

(e) The umbilicus, although rather narrow, is clearly wider than in *S. foveolata*. The angle formed by the straight lines from the centre of the protoconch to the left inner umbilicus curvature, and to the point where the anterior point of the columella meets the endpoint of the columellar callus is about 10° for *S. androyensis* and 7° for *S. foveolata*.

(f) The vivid red-violet colour of all shells seen from Madagascar.

Variability: Mr R.E. Petit kindly informed us of a single shell from the same area, with the same spiral striation, yet of a pale brownish colour. That shell may have been bleached on the beach; but if this were not the case, it could indicate that the violet colour may not be an absolute specific character.

Etymology: The new species is named after Madagascar's southernmost province Androy (here treated as a non-latin name), where this material was collected.

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Plate 1 : (Right)

1-6: *Mericella paschalis*

1: Holotype, 8.9 x 5.0 mm, ZMB 109368, 'Valdivia' Stn. 245, Zanzibar channel, 5° 27' 9" S, 39° 18' 8" E, off Tanzania.

2-6: off Zavora, Bazaruto, Mozambique, 375-450 m.

2: 16.5 x 8.0 mm.

3: 12.4 x 6.5 mm.

4-5: 17.2 x 7.7 mm.

6: 16.9 x 7.7 mm.

7-9: *Mericella jucunda* Syntypes from Stn 242, off Dar es Salam (depth not mentioned) Tanzania, Stn. 242: 6° 34' 8" S, 39° 35' 5" E.

7: ZMB109369, 12.4 x 5.6 mm;

8-9: ZMB 109369, 15.2 x 7.3 mm.

8: side view of syntype of Fig. 9, showing the sigmoid outer lip.

Plate 2: (over)

10-14: *Scalptia androyensis* sp. nov. Lavanono, Madagascar.

10-1: Holotype, RBINS IG 30517 type n° 537, 17.0 x 11.2 mm.

12: Paratype 4, AV1199, 14.5 x 9.9 mm.

13: Paratype 5, AV1212, 14.3 x 9.6 mm.

14: Fine spiral sculpture of holotype shell, 20 x.

15: *Scalptia foveolata* South Africa, Jeffreys Bay, AV0230, 24.6 x 14.2 mm.



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2



3



4



5



6



7



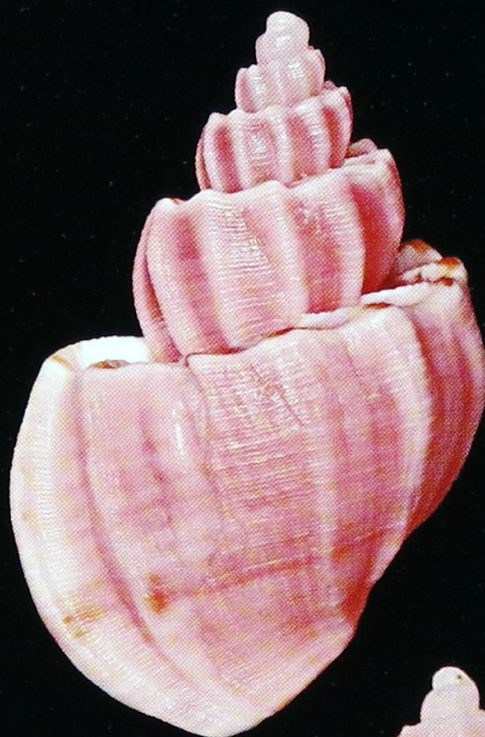
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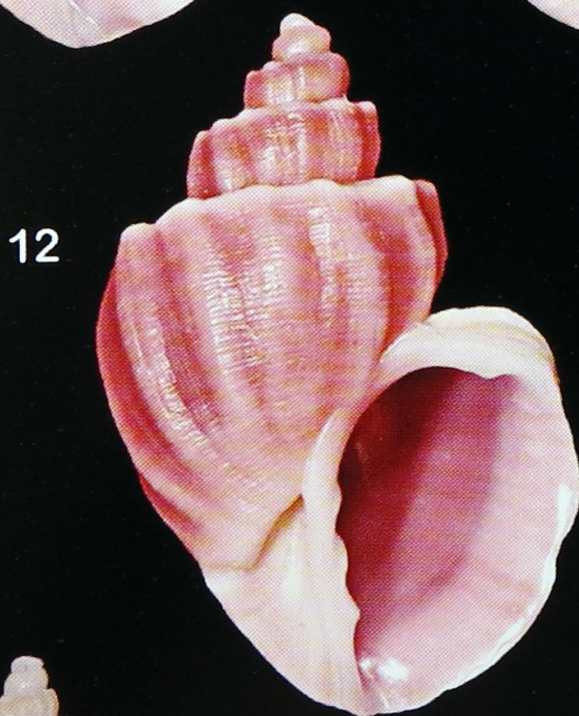
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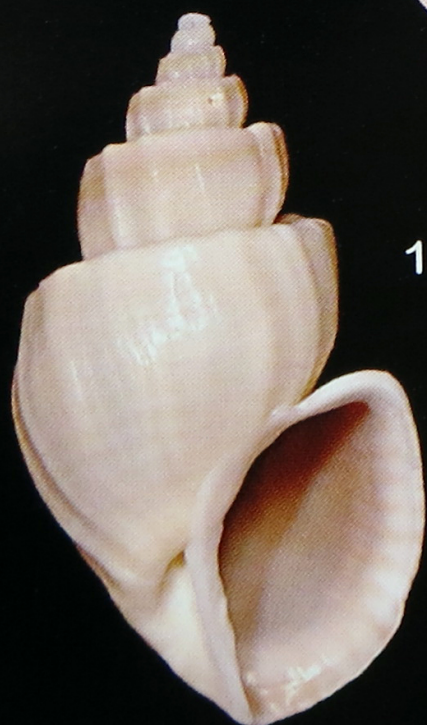
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14

Gloria Maris	45 (1-2)	26-29	Antwerpen, april 2006
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***Eudolium aulacodes* Tomlin, 1927,
a junior synonym of *Oocorys weberi* Schepman, 1909**

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Keywords: MOLLUSCA, GASTROPODA, TONNIDAE, CASSIDAE, taxonomy.

Abstract: *Eudolium aulacodes* Tomlin, 1927 is shown to be a junior synonym of *Oocorys weberi* Schepman, 1909 through a study of the type specimens.

Introduction: During their work on 'A Conchological Iconography: **Tonnidae**', Chris Vos, Yves Terryn and Marcel Verhaeghe came across the name *Eudolium aulacodes*. In order to find out about the true identity of this species, photographs of the type were asked from the Iziko Museum (South Africa), which were kindly passed on to them. These immediately revealed that they were dealing with an *Oocorys* Fischer, 1883. They passed it on to the second present author, a very enthusiastic **Cassidae**-collector, who could easily identify the species as *Oocorys weberi* Schepman, 1909.

Discussion: *Oocorys weberi* (Figs 3-6) was described by Schepman (1909) and accommodated in the family **Oocorythidae** Fischer, 1883. However, most authors always considered this 'family' a subfamily of the **Tonnidae** Suter, 1913. Nevertheless, Dall (1909) already argued that the **Oocorythidae** are closer related to **Cassidae** Latreille, 1825. This discussion lasted until Warén & Bouchet (1990), who

included **Oocorythidae** within the family **Cassidae**, based on anatomical and radular evidence.

The type of *O. weberi* (type locality: Siboga Station 175, Ceram Sea, 2°37'S, 130°33'E) is in the Zoölogisch Museum, Amsterdam, the Netherlands (ZMA) and the species is very distinct from all other known *Oocorys* species, especially because of the typical sculpture that mainly consists of strong spiral ribs (about 22 on the body whorl) on all whorls. The other characteristics are less useful to distinguish it at once from other *Oocorys* as they are usually present in at least one other *Oocorys* species: the solid shell with convex whorls, a rather strong suture, a rather strong parietal callus which still reveals the spiral ribs and the flaring outer lip with interior grooves.

Eudolium aulacodes (Figs 1-2) was described by Tomlin (1927) and accommodated in the family **Tonnidae**. The type (type locality: Cape Point) is in the Iziko Museum. The photographs at our disposal show a shell with exactly the same characteristics mentioned above. We can therefore only conclude that Tomlin's *E. aulacodes* in fact belongs to the genus *Oocorys* and is a junior synonym of *O. weberi*: ***E. aulacodes* Tomlin, 1927 syn. nov.**

Note: As the genus *Oocorys* was classified within the family **Tonnidae** until Dall (1909) (see above), it is not very surprising to find a species described within the genus *Eudolium* Dall, 1889 to actually belong to the genus *Oocorys*, something already presupposed by Turner (1948), who stated that "From the published description and figures *aulacodes* Tomlin and *solidior* Dautzenberg appear to be very close in their relationship to each other and they may both eventually prove to be in the genus *Oocorys*".

Acknowledgements: We would like to thank Yves Terryn, Marcel Verhaeghe and Chris Vos (all Belgium) for bringing *Eudolium aulacodes* to our attention, Robert M. Moolenbeek (ZMA, Amsterdam, The Netherlands) for access to the type collection of the ZMA, Delphine Brabant (MNHN, Paris, France) & Kevin Monsecour (Rillaar, Belgium) for digital images of *O. weberi* and Kurt Kreipl (Öhringen, Germany) for confirming the thesis discussed in the present article.

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Summarizing translation into Dutch/ Samenvattende Nederlandse vertaling

Tijdens hun werk aan 'A conchological Iconography: **Tonnidae**' kwamen Chris Vos, Yves Terryn en Marcel Verhaeghe de naam *Eudolium aulacodes* Tomlin, 1927 tegen. Om de juiste identiteit van deze soort te achterhalen werden foto's van het typemateriaal gevraagd. Deze tonen aan dat *E. aulacodes* in werkelijkheid tot het genus *Oocorys* (**Cassidae**) behoort en reeds bekend was onder de naam *O. weberi* Schepman, 1909. *O. weberi* onderscheidt zich van alle andere gekende recente *Oocorys*-soorten door de zeer typische sculptuur die bestaat uit stevige axiale ribbels (22 op de laatste omgang) op alle omgangen. De andere kenmerken zoals een vrij stevige schelp met convexe omgangen, sterke suture, sterk pariëtaal schild dat de sculptuur nog doorlaat en een uitdraaiende, gegroefde buitenlip komen ook voor bij andere *Oocorys*-soorten. Daar Tomlin's *E. aulacodes* volledig beantwoordt aan de hier opgegeven beschrijving, kunnen we alleen maar concluderen dat *E. aulacodes* tot het genus *Oocorys* behoort en in feite een junior synoniem van *O. weberi* is.

Plate:

1-2: *Eudolium aulacodes* Tomlin, 1927 **syn. nov.** Ventral and dorsal view.

Cape point. 42mm.

Type specimen. Coll. Iziko Museums.

3-4: *Oocorys weberi* Schepman, 1909. Venral and dorsal view.

Siboga Station 175, Ceram Sea, 2°37'S, 130°33'E. 38,5mm.

Holotype. Coll. ZMA.

5-6: *Oocorys weberi* Schepman, 1909. Ventral and dorsal view.

Ceram Sea. 41mm. Coll. L. Segers.



1



2



3



4



5



6

Gloria Maris	45 (1-2)	30-45	Antwerpen, april 2006
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Marine Mollusca collected during a journey to the Great Bitter Lake (Suez Canal) and Nile Delta, Egypt

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Key words: MOLLUSCA, exotic species, Lessepsian migrants, anti-Lessepsian migrants, Egypt, Great Bitter Lake, Mediterranean Sea, new records.

Abstract: This article provides a record of gastropod and bivalve species gathered during a trip to Egypt, the Great Bitter Lake along the Suez Canal and the greater Nile delta, by the first two authors. 38 gastropod species and 32 bivalve species were collected during this trip. Whilst the collection is a modest representation of the mollusc population of the region, it will add to the knowledge of the distribution of molluscan species. Both the Great Bitter Lake and the Nile delta have proven to be a fertile environment for settling of Lessepsian migrants. Living specimens of the species *Diodora funiculata* are for the first time reported from the Great Bitter Lake. The bio-fouling brackish water species *Mytilopsis sallei* is also found in the Nile Delta, it was reported earlier as an introduced species from widely scattered localities in the tropical Indo- West-Pacific.

Objective of the journey: A journey to the Suez Canal and Nile Delta region was undertaken by both senior authors in October 2002 to collect and study predominantly marine molluscan migrants from the Red Sea into the Mediterranean, also known as Lessepsian species. By-products of the collected species were migrants from the Mediterranean into the Red Sea (anti-Lessepsian species) and indigenous species from the Mediterranean.

A historic perspective: Since the Red Sea was connected to the Mediterranean Sea by the opening of the Suez Canal in 1869, migration of molluscs and other animals has started between Suez near the Red Sea and Port Said on the Mediterranean coast, and in the reversed direction. The main current through the Canal is from the Red Sea towards the Mediterranean Sea. This causes many more molluscs migrating from the Red Sea into the Mediterranean Sea than from the Mediterranean Sea into the Red Sea.

The first record of an anti-Lessepsian migrant is *Cerastoderma glaucum* by Fischer (1870). First records of Lessepsian migrants in the Suez Canal system by Fuchs (1877), who mentions *Brachidontes pharaonis* as an early Lessepsian migrant from Port Said. *Cerithium scabridum* was reported by Keller (1883). More detailed malacological records are given by Tillier & Bavay (1906) who discuss the arrival of for example *Cellana rota*, *Fusinus* sp., *Murex forskoehlII* and *Siphonaria crenata*. Tomlin (1927) reports the common distribution of *Thais lacera* and *Trochus erithreus* in the Canal. Gruvel and Moazzo (1933) reported on the larger shells found in the Great Bitter Lake. The most extensive study of the Suez Canal is from Moazzo (1939). More recent advances on (anti-)Lessepsian migration of species were reported by Ryland (1951), Ghisotti (1974), Barash & Danin (1973, 1977, 1987). A recent update of Lessepsian migrants in the Mediterranean Sea was published in an "exotic" species list by CIESM (Zenetos et al., 2004). Additional species from Israel were mentioned by Mienis (2004).

Collecting activities: Collecting in the NE Egyptian region is severely hampered by many strategic considerations imposed by local authorities. Large parts of the Suez Canal, Nile Delta and northern Sinai coast and nearly all harbours are inaccessible to foreigners. Our collecting efforts were limited to the eastern shore of the Great Bitter Lake, the Suez Canal ferry crossings, along the beaches of northern Sinai towns (Romani, El Arish), the northern Sinai Bardawil Lagoon, near large ports in the eastern Nile Delta (Port Said, Dumyat) and more freely along the beaches between Alexandria and El Alamain. Most collecting activities in the Great Bitter Lake were done by snorkelling in shallow water. All other collecting was conducted on beaches or on artificial rocky shorelines.

Nomenclature: Identification and recent nomenclature was based on a combination of Red Sea and Mediterranean literature. The Red Sea literature was combined in the Check-list of Red Sea Mollusca by Dekker and Orlin (2000). The Mediterranean species and associated literature are comprehended in CLEMAM. Some taxonomic notes on certain species are added.

The Great Bitter Lake: The Great Bitter Lake is a natural "lake" located along the southern trajectory of the Suez Canal. It was connected through the Small Bitter Lake to the Red Sea before the opening of the Suez Canal, until the times when the Pharaoh's ruled Egypt. The nearly totally dried out Bitterlakes were filled with Mediterranean water with the construction of the Suez Canal system. Towards the North of the Great Bitter Lake, Lake Timsah was dry before the opening of the Suez Canal.

At present the sea water of the Great Bitter Lake is hypersaline and mostly turbid, its flora and fauna are rather poor compared to the proper Red Sea. The water temperature is near 30 °C. The bottom soil of the lake is mainly composed of sand and mud of a mostly carbonate nature. Current and tide influences are nearly negligible. The bottom soil is locally fouled, particularly in the deeper parts of the lake (Beets, 1953). Cause of fouling is probably related to the nearly stagnant water conditions and the pollution by naval traffic in the Canal. During Beets's dredgings only very few molluscs were found in the deeper parts of the lake (maximum depth 12m). We concentrated our collecting activities down to 3m depth along the eastern side of the lake where some growth of sea weed on or around rocks formed a fruitful biotope. Often, the visibility of the water in the lake is very poor, i.e. less than 0.3m, which restricts collecting to near-shore activities. Occasionally, after several days of minor wind or surf activity, the water clears up and snorkelling is feasible up to some 1000m away from the shoreline.

Hoenselaar and Dekker (1998) studied the material collected in the Great Bitter Lake by Beets (1953) in 1950, which was stored unsorted in the Nationaal Natuurhistorisch Museum, Leiden, the Netherlands. They reported 44 gastropods and 47 bivalve species of which only 3 gastropods and 5 bivalve species were of Mediterranean origin, 1 was common to both regions. A few gastropod species collected by Beets were mentioned by Schaeffer (1971), a report not known to Hoenselaar & Dekker in 1998.

A total of 31 gastropod (Table 1) and 19 bivalve (Table 2) species were found in the Great Bitter Lake during our journey. Only 2 gastropod (*Pusulina radiata*, *Cyclope neritea*) and 2 bivalve (*Cerastoderma glauca*, *Tapes decussatus*) species are anti-Lessepsian migrants, of Mediterranean origin, leaving the large majority as species from the Red Sea. The proximity of the Red Sea, the high water temperature, and the main direction of the current from Red Sea to Mediterranean Sea have influenced this imbalance. Of the species collected during the journey, 12 gastropod and 3 bivalve

species do not occur in the list by Hoenselaar & Dekker. Obviously, manual collecting in shallow water yields different species in contrast to dredging. In addition, in a time lapse of 52 years between 1950 and 2002, the exposure time for migration of species since the opening of the Canal in 1869 has increased by 40% and consequently a different molluscan population can be expected.

Table 1: Great Bitter Lake gastropods (HD list refers to Hoenselaar & Dekker study, numbered items refer to notes at the end of the article)

Family	Genus	Species	Author	Location	Origin/ Remarks
Nacellidae	Cellana	rota	(Gmelin, 1791)	Alive on rocks intertidal, Abu Sultan	Red Sea
Fissurellidae	Diodora	funiculata	(Reeve, 1850)	Alive on rocks, depth 1m, Abu Sultan	introduced / 1 addition to HD list
Trochidae	Trochus	erithreus	Brocchi, 1821	Alive abundant on rocks, depth 1m, Abu Sultan	Red Sea
	Clanculus	pharaonius	(Linnaeus, 1758)	Alive on rocks, depth 1m, Abu Sultan	Red Sea
	Pagodatrochus	variabilis	(H.Adams, 1873)	Alive on rocks, depth 1m, Abu Sultan	Red Sea
	Ethminolia	hemprichi	(Issel, 1869)	Alive on rocks, depth 1m, Abu Sultan	Red Sea
	Pseudominolia	nedyma	Melville, 1897	Alive on rocks, depth 1m, Abu Sultan	Red Sea
Cerithiidae	Cerithium	scabridum	Philippi, 1848	Alive abundant on mud, intertidal, Abu Sultan	Red Sea
Dialidae	Diala	varia	Adams A., 1861	Dead on mud, depth 1m, Abu Sultan	Red Sea / 2
Litiopidae	Styliferina	goniochila	A. Adams, 1860	Dead on mud, depth 1m, Abu Sultan	Red Sea addition to HD list
	Gibborissoa	virgata	(Philippi, 1849)	Dead on mud, depth 1m, Abu Sultan	Red Sea / 3 addition to HD list
Obtortionidae	Finella	pupoides	Adams A., 1860	Dead on mud, depth 1m, Abu Sultan	Red Sea
Planaxidae	Planaxis	griseus	(Brocchii, 1821)	Dead on mud, depth 1m, Abu Sultan	Red Sea addition to HD list
Potamididae	Potamides	conicus	(de Blainville, 1829)	Alive abundant on mud, intertidal, Abu Sultan	both in Red Sea & Mediterranean / 4
Rissoidae	Pusillina	radiata	(Philippi, 1836)	Dead on mud, depth 1m, Abu Sultan	Mediterranean
Strombidae	Tricornis	tricornis	(Lightfoot, 1786)	Alive on mud near rocks, depth 2m, Abu Sultan	Red Sea addition to HD list
Muricidae	Murex	forskoehlii	Röding, 1798	Alive, many specimen, in nets, Al Fayed	Red Sea
	Chicoreus	virgineus	(Röding, 1798)	Dead, one specimen, in nets, Al Fayed	Red Sea
Fasciolaridae	Fusinus	verrucosus	(Gmelin, 1791)	Alive, abundant on rocks, depth 2m, Abu Sultan	Red Sea / 5

	Nassarius	erythraeus	(Issel, 1869)	Alive on mud near rocks, depth 2m, Abu Sultan	Red Sea / 6
Nassariidae	Cyclope	neritea	(Linnaeus, 1758)	Dead on mud, depth 1m, Abu Sultan	Mediterranean addition to HD list
Olividae	Ancilla	lineolata	(A. Adams, 1853)	Dead on mud, depth 1m, Abu Sultan	Red Sea
Pyramidellidae	Tiberia	fasciata	(Jickeli, 1882)	Dead on mud, depth 1m, Abu Sultan	Red Sea addition to HD list
	Chrysallida	maiae	(Hornung & Mermod, 1924)	Dead on mud, depth 1m, Abu Sultan	Red Sea addition to HD list
	Syrnola	arabica	(Issel, 1869)	Dead on mud, depth 1m, Abu Sultan	Red Sea addition to HD list
	Turbonilla	species		Dead on mud, depth 1m, Abu Sultan	Red Sea
Bullidae	Bulla	ampulla	Linnaeus, 1758	Dead on mud, intertidal, Abu Sultan	Red Sea addition to HD list
	Diniatys	dentiferus	(A. Adams, 1850)	Dead on mud, depth 1m, Abu Sultan	Red Sea
Haminoeidae	Liloa	curta	(A. Adams, 1850)	Dead on mud, depth 1m, Abu Sultan	Red Sea
Siphonariidae	Siphonaria	crenata	de Blainville, 1827	Alive on rocks, intertidal, Abu Sultan	Red Sea / 7 addition to HD list
Ellobiidae	Laemodonta	monilifera	(H. & A. Adams, 1854)	Dead on mud, depth 1m, Abu Sultan	Red Sea addition to HD list

Table 2: Great Bitter Lake bivalves (HD list refers to Hoenselaar & Dekker study, numbered items refer to notes at the end of the article)

Family	Genus	Species	Author	Location	Origin/ Remarks
Noetiidae	Striarca	erytraea	(Issel, 1869)	Alive on rocks, depth 1m, Abu Sultan	Red Sea
Mytilidae	Brachidontes	pharaonis	(Fischer P., 1870)	Alive on rocks, depth 1m, Abu Sultan	Red Sea
	Musculista	senhousia	(Benson in Cantor, 1842)	Dead abundant on mud, intertidal, Abu Sultan	Red Sea
Lucinidae	Pillucina	angela	(Melvill, 1899)	Dead on mud, depth 1m, Abu Sultan	Red Sea / 8 addition to HD list
	Pillucina	vietnamica	Zorina, 1970	Dead on mud, depth 1m, Abu Sultan	Red Sea / 9
	Cardiolucina	semperiana	(Issel, 1869)	Dead on mud, depth 1m, Abu Sultan	Red Sea addition to HD list
Ungulinidae	Diplodonta	subrotunda	(Issel, 1869)	Dead on mud, depth 1m, Abu Sultan	Red Sea
Chamidae	Chama	asperella	Lamarck, 1819	Dead on mud, depth 1m, Abu Sultan	Red Sea
Cardiidae	Cerastoderma	glaucum	(Poiret, 1789)	Dead on mud, depth 1m, Abu Sultan	Mediterranean / 4
Tellinidae	Fulvia	fragilis	(Forskål, 1775)	Dead on mud, depth 1m, Abu Sultan	Red Sea
	Psammotreta	turgida	(Deshayes, 1854)	Dead on mud, depth 1m, Abu Sultan	Red Sea / 10
	Tellina	species		Dead on mud, depth 1m, Abu Sultan	Red Sea / 11
Psammobiidae	Soletellina	ruppeliana	(Reeve, 1857)	Dead on mud, depth 1m, Abu Sultan	Red Sea
Veneridae	Timoclea	roemeriana	(Issel, 1869)	Dead on mud, depth 1m, Abu Sultan	Red Sea
	Gafrarium	pectinatum	(Linnaeus, 1758)	Alive on mud, depth 1m, Abu Sultan	Red Sea
	Callista	florida	(Lamarck, 1818)	Alive on mud, depth 1m, Abu Sultan	Red Sea
	Tapes	decussatus	(Linnaeus, 1758)	Alive on mud, depth 1m, Abu Sultan	Mediterranean addition to HD list
Petricolidae	Choristodon	hemprichii	(Issel, 1869)	Dead on mud, depth 1m, Abu Sultan	Red Sea
Laternulidae	Laternula	subrostrata	(Lamarck, 1818)	One specimen alive on mud, depth 1m, Abu Sultan	Red Sea

The Nile Delta and northern Sinai: The estuary of the Nile Delta stretches from Alexandria in the West to Port Said in the East, where the Suez Canal reaches the Mediterranean. The prevailing Mediterranean current is from West to East along the coast. To the West of the Nile delta, the sea is light blue, clear, but relatively few molluscs are found. In the Nile delta, large amounts of sediment and organic debris and pollutants are washed into the Mediterranean. Hence, in and to the East of the Nile delta the sea water is brown, with large amounts of sediment and debris in suspension. However, the mix of nutrients from the Nile with oxygen-rich water from the West creates a bloom of life in and to the East of the Nile Delta. Species introduced by the Suez Canal appear to benefit from these fertile circumstances and have firmly settled along the northeastern Egyptian coastline. Following the sea currents from Egypt, species have spread to the shores of Israel (Barash and Danin, 1982), Lebanon (Bogi and Khairallah, 1987), Turkey (Engl, 1995; Buzzurro & Greppi, 1996), Cyprus, Greece (Vardala-Theodorou, 1999), southern Italy (Gianuzzi-Savelli et al., 1994-2003) and Tunisia. Many Lessepsian migrants might not sustain in the western Mediterranean Sea where the water is clearly colder.

One exception in the general distribution movements is *Thais lacera*, a species imported from the Arabian Gulf or the Indian Ocean to the Suez Canal where it migrated North into the Mediterranean (Mienis, 1994; Engl, 1995) and South into the Red Sea (Mienis, 1994).

In total 10 gastropod (Table 3) and 15 bivalve (Table 4) species have been found in the Nile delta and northern Sinai. Of these, 2 gastropod and 4 bivalve species are Lessepsian migrants, one gastropod (*Thais lacera*) and two bivalve (*Anadara inaequalis*, *Mytilopsis sallei* [Fig. 7]) species were introduced. One anti-Lessepsian species (*Neverita josephina*) was found in the Suez Canal. Again, this list represents a small part of the mollusc species population along the Egyptian North coast. However, it is clear that Lessepsian species are well established and abundant across the Nile delta and the adjacent coast line of northern Sinai.

Table 3: Nile delta and northern Sinai coast gastropods, (numbered items refer to notes at the end of the article)

Family	Genus	Species	Author	Location	Origin/ Remarks
Patellidea	Patella	ulyssiponensis	Gmelin, 1791	Alive on rocks, Ras El Barr, Dumyat	Mediterranean
Cerithiidae	Cerithium	scabridum	Philippi, 1848	Alive on mud, Zaranik reserve, Bardawil, N Sinai	Red Sea
Potamididae	Potamides	conicus	(de Blainville, 1829)	Alive on mud, Zaranik reserve, Bardawil, N Sinai	both in Red Sea & Mediterranean / 4
Littorinidae	Melaraphe	punctata	(Gmelin, 1791)	Alive on rocks, Ras El Barr, Dumyat	Mediterranean
Naticidae	Neverita	josephinia	Risso, 1826	Beached dead, Romani, NW Sinai	Mediterranean
	Neverita	josephinia	Risso, 1826	Beached dead, Ras El Barr, Dumyat	Mediterranean
	Neverita	josephinia	Risso, 1826	Beached dead, Suez Canal, eastbank, 5 km S of Port Said	Mediterranean
	Neverita	josephinia	Risso, 1826	Beached alive, 5 km W of Port Said	Mediterranean
Tonnidae	Tonna	galea	(Linnaeus, 1758)	Beached dead, Romani, NW Sinai	Mediterranean
Muricidae	Murex	forskoehlii	Röding, 1798	Beached dead, abundant, Romani, NW Sinai	Red Sea
	Murex	forskoehlii	Röding, 1798	Dead on mud, Zaranik reserve, Bardawil	Red Sea
	Hexaplex	pecchiolianus	(d'Ancona, 1871)	One dead specimen, Romani, NW Sinai	Mediterranean / 12
	Thais	lacera	(von Born, 1778)	Beached dead, abundant, Romani, NW. Sinai	introduced
	Thais	lacera	(von Born, 1778)	Beached dead, abundant, 5 km W of Port Said	introduced
Nassariidae	Nassarius	mutabilis	(Linnaeus, 1758)	Beached dead, Ras El Barr, Dumyat	Mediterranean

Table 4: Nile delta and northern Sinai coast bivalves, (numbered items refer to notes at the end of the article)

Family	Genus	Species	Author	Location	Origin / Remark
Arcidae	Anadara	inaequivalvis	(Bruguière, 1789)	Ras Al Barr, Dumyat,	introduced / 13
	Anadara	natalensis	(Krauss, 1848)	Beached valves, abundant, El Arish, N Sinai	Red Sea
	Anadara	natalensis	(Krauss, 1848)	Beached dead, abundant, Romani, NW Sinai	Red Sea
	Anadara	natalensis	(Krauss, 1848)	Beached alive, abundant, 5km W of Port Said	Red Sea
Mytilidae	Brachidontes	pharaonis	(Fischer P., 1870)	Alive on rocks, abundant, 5 km W of Port Said	Red Sea
	Brachidontes	pharaonis	(Fischer P., 1870)	Dead on mud, Zaranik reserve, Bardawil, N Sinai	Red Sea
	Modiolus	adriaticus	(Lamarck, 1819)	Beached dead, abundant, 5 km. W. of Port Said	Mediterranean
	Modiolus	auriculatus	Krauss, 1848	Beached dead, abundant, Ras al Barr, Dumyat	Red Sea
Dreissenidae	Mytilopsis	sallei	(Récluz, 1849)	Alive on rocks, Mouth of river Nile, intertidal, Ras al Barr, Dumyat	introduced / 14
Ostreidae	Ostreola	stentina	(Payraudeau, 1826)	Dead on mud, Zaranik reserve, Bardawil, N Sinai	Mediterranean
Cardiidae	Cerastoderma	glaucum	(Poiret, 1789)	Dead on mud, Zaranik reserve, Bardawil, N Sinai	Mediterranean
Mactridae	Mactra	olorina	Philippi, 1846	Dead on mud, Zaranik reserve, Bardawil, N Sinai	Red Sea
	Mactra	stultorum	(Linnaeus, 1758)	Beached dead, abundant, Romani, N. Sinai,	Mediterranean
	Mactra	stultorum	(Linnaeus, 1758)	Dead on mud, Zaranik reserve, Bardawil, N Sinai	Mediterranean
Solenidae	Solen	marginatus	Pulteney, 1799	Dead on mud, Zaranik reserve, Bardawil, N Sinai	Mediterranean
Tellinidae	Tellina	planata	Linnaeus, 1758	Dead on mud, Zaranik reserve, Bardawil, N Sinai	Mediterranean
	Macoma	cumana	(Costa O.G., 1829)	Beached dead, abundant, 5 km W of Port Said	Mediterranean
Donacidae	Donax	trunculus	Linnaeus, 1758	Dead on mud, Zaranik reserve, Bardawil, N Sinai	Mediterranean
Semelidae	Abra	segmentum	(Récluz, 1843)	Dead on mud, Zaranik reserve, Bardawil, N Sinai	Mediterranean

Observations on migration rates: Rate of progressive migration into the Mediterranean clearly is a function of a species' ability to migrate biotically; resettling normally controlled by currents depends on reaching the right biotope in time. Abiotic "migration" is also common for some species, by means of ships in ballast water or attached to the hull (*Diodora funiculata* [Fig. 1], *Thais lacera*, *Mytilopsis sallei* [Fig. 7]), or by intentional or accidental attempts to introduce species locally (e.g. *Musculista senhousia* in southern France Etanges).

Early settlement of the first Lessepsian migrants in the Mediterranean occurred around the 1880s, some 10 years after opening the Suez Canal. In the late 1930s there were records of species reaching Syria, after a 70 years' time lapse. In the 1970s the first Lessepsian migrants reached the east coast of Sicily, a time lapse of some 100 years. In 2003, 134 years after the event some 120 Lessepsian molluscan species had been added to the Mediterranean fauna (Zenetos et al., 2004). Some 70 of these species are established, leaving the remainder as temporary migrants only surviving if the surrounding conditions (e.g. temperature) are favourable, but likely to disappear if for example a cold winter hits the Mediterranean. The 70 established Lessepsian species represent some 2% of the European molluscan fauna. Undoubtedly, this number will further increase with continued global shipping traffic crossing the Suez Canal. Notably, species additions from sub-tropic regions around the world are to be expected.

Acknowledgements: Henk K. Mienis is thanked for his remarks and additions.

Notes on the species.

1. *Diodora funiculata* (Reeve, 1850) (Fig. 1). This species is here for the first time recorded alive from the Suez Canal - Mediterranean Sea region. This species originally lived from Southern Arabia towards western India, including the Persian Gulf. It has only recently been recorded by dead shells from Israel by Singer (2002) and Mienis (2002a). A specimen from the material collected was earlier published by Nolf (2004).
2. *Diala varia* Adams A., 1861. A well known older name for this species is *Diala semistriata* (Philippi, 1849), originally described as *Rissoa semistriata*, but this name is a primary homonym of *Rissoa semistriata* Deshayes, 1833 (CLEMAM).
3. *Gibborissoa virgata* (Philippi, 1849). Also known as *Alaba virgata*, but it was shown that this species should be placed in the genus *Gibborissoa* by Van Aartsen (2002).
4. *Potamides conicus* (de Blainville, 1829). This species was both in the Red Sea and the Mediterranean Sea living before the opening of the Suez Canal. Hoenselaar & Dekker argued that this species might have entered the Mediterranean Sea through a

connection between the Bitter Lakes and the Mediterranean Sea in earlier geological times. This is probably not the case and this species can be transported by birds, as pointed out by Faber (1999). Similarly, *Cerastoderma glauca* can also be transported by birds, which accounts for its distribution in a number of inland brackish lakes in northern Africa and elsewhere.

5. *Fusinus verrucosus* (Gmelin, 1791) (Figs 4-5). The taxonomy of Red Sea *Fusinus* species is not well established. A name frequently encountered in Red Sea literature is *Fusinus marmoratus* (Philippi, 1846), but the identity of this species described from unknown locality is not clear. Specimens with rounded whorls were encountered in the Bitter Lakes and are here identified as *F. verrucosus*, a species described from the Red Sea, following Hadorn (1996). This species was recently figured by Giannuzzi-Savelli et al., 2003: figs 372a-c. A morph with a more angular shoulder (Fig. 6) is commonly encountered in the proper Red Sea and can be referred to as *F. polygonoides* (Lamarck, 1822) (as figured by Sharabati, 1984). However, studying many more specimens from the Bitter Lakes, Gulf of Suez (Mary Lyn Villaume collection) and Egypt shows that many intergrades exist and that only one variable species can be recognized. Delsaerdt (1989) recorded this species as *Fusinus acuticostatus* (Sowerby, 1838) [sic, date is 1880], but the holotype in the Natural History Museum (courtesy of Martin A. Snyder) shows that this name is a synonym of the American *Fusinus hartvigii* (Shuttleworth, 1856).

6. *Nassarius erythraeus* (Issel, 1869). The species known as *Nassarius pauper* (Gould, 1849) (Cernohorsky, 1984) from the Indo-West-Pacific are currently being reviewed by Hugo H. Kool & H. Dekker (submitted). This shows that the small species from the Red Sea is a species different from *N. pauper* and should be called *N. erythraeus*.

7. *Siphonaria crenata* de Blainville, 1827. This species is better known by one of its synonyms, *S. savignyi* Krauss, 1848 or *S. kurracheensis* Reeve, 1856. Both *S. crenata* & *S. savignyi* were based on figures in the work of Savigny (1817). The types of *S. kurracheensis* were studied in The Natural History Museum and were found to be conspecific with *S. crenata* (H. Dekker, unpublished).

8. *Pillucina angela* (Melvill, 1899). Reported as *P. cypselis* (Melvill, 1918) by Dekker & Orlin, 2000, but see the revision by Glover and Taylor (2001).

9. *Pillucina vietnamica* Zorina, 1970. Reported as *P. fischeriana* (Issel, 1869) by Dekker and Orlin (2000) and by Hoenselaar and Dekker (1998), but see the revision by Glover and Taylor (2001).

10. *Psammotreta turgida* (Deshayes, 1854). The names for thin shelled large macomid shells are in need of revision. The present species is well illustrated by Oliver (1995) as *P. praerupta* (Salisbury, 1934), but this is a different species.

11. *Tellina* species. The same unidentified species as reported by Hoenselaar and Dekker (1998).
12. *Callista florida* (Lamarck, 1818). Our results confirmed the presence of this species in the Great Bitter Lake, but no specimens were collected along the Mediterranean coast, and the old records from the Egyptian Mediterranean coast (Mienis, 2005) cannot be confirmed here.
13. *Hexaplex pecchiolianus* (d'Ancona, 1871) (Fig. 3). An interesting location for this species, which was only recently for the first time reported from northern Egypt, the Bardawil Lagoon area by Mienis (2002b).
14. *Anadara inaequalis* (Bruguière, 1789). We follow CLEMAM in using this name for the introduced species, which is well-known from the Adriatic Sea.
15. *Mytilopsis sallei* (Récluz, 1849) (Fig. 7). This species is known from brackish waters. Its origin is America (Marelli & Gray, 1985), but nowadays it can be found widespread in many places, especially in SE Asia (India, Thailand, Hong Kong, Singapore, Taiwan, Japan) (Swennen et al., 2001), Fiji (Marelli & Gray) and Australia (CSIRO, 1999). It is a species that lives attached to hard substrata by a byssus and is apparently easily transported by ships. Locally it is very common and is a bio-fouling species, which forms a threat for water inlets, aquaculture, ship hulls, etc. It is certainly a species different from the other American species *Mytilopsis leucophaeata* (Conrad, 1831), as can be found e.g. introduced in the Netherlands, Belgium, etc. The specimens from Egypt agree very well with specimens from Thailand and are the first recorded of this species along the Mediterranean Sea. We follow Marelli and Gray in using the name *M. sallei* for this species.

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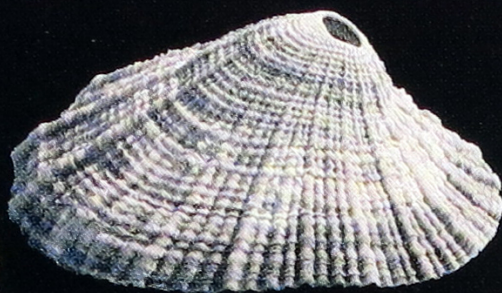
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1a



1b



1c



2



3



4a



4b



5a



5b



6a



6b

Figures:

1: *Diodora funiculata* (Reeve, 1850). Egypt, Great Bitter lake, Abu Sultan, live collected on muddy rocks, 1 m depth. Length 27, width 19, height 11 mm, Henk Dekker coll. nr. 11597.

Fig. 2: *Murex forskoehlüi* Röding, 1798. Egypt, Great Bitter Lake, off Al Fayed, dredged by fishermen. Leon Hoffman coll.

Fig. 3: *Hexaplex pecchiolianus* (d'Ancona, 1871). Egypt, Mediterranean Sea, Eastern Nile Delta, Romani, beached. Leon Hoffman coll.

Figs 4-5: *Fusinus verrucosus* (Gmelin, 1791). Egypt, Great Bitter lake, Abu Sultan, live collected on muddy rocks, 1 m depth. Fig. 4: Leon Hoffman coll. Fig. 5: Length 100 mm, Henk Dekker coll. nr. 11596.

Fig. 6: *Fusinus verrucosus* (Gmelin, 1791). Egypt, Red Sea, Abu Minqâr Island [4 km ESE off Hurghada]. Length 64 mm, Henk Dekker coll. nr. 12705.

Fig. 7: *Mytilopsis sallei* (Récluz, 1849). Egypt, Mouth of river Nile, Ras al Barr, Dumyat, intertidal, live collected. Length 22 or 20 mm, Henk Dekker coll. nr. 11599.



Gloria Maris	45 (1-2)	46-59	Antwerpen, april 2006
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Conidae in the Maldives

Report on species collected during the Int. Sc. Maldives Exp. 2003

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Key words: MOLLUSCA, GASTROPODA, CONIDAE, Maldives, species list.

Abstract: This report is restricted to the survey of the **Conidae**. Results of earlier expeditions are compared to the list of species collected during the expedition 2003.

Introduction: J. Stanley Gardiner (Cambridge University) organized the first important scientific expedition on the fauna and geography of the Maldivian Archipelago from 23 October 1899 to 25 April 1900. The results were published in two volumes (1903, 1906). Herein Edgar Albert Smith reported on the collected land- and fresh water mollusca (1903) and extensively on the marine mollusca (1906). Half a century later, two (American) expeditions, yet for marine research only, crossed the Maldives again: the Yale Seychelles Expedition (1957) and the International Indian Ocean Expedition (1964). More recent researches were mostly more limited in time and/or localities. However, the results of the Bailey & Ehrlich's Expedition (2000) are interesting and complementary; their report will be cited as far as dealing with **Conidae**.

One century after Stanley Gardiner's expedition, dr. W. Backhuys thought a new project in the Maldives meaningful enough. He met dr. A. de Voogt (University of Leiden) and they started to organize a Maldives Expedition, in cooperation with dr. Abdullah Saeed (University of Melbourne), who is a Maldivian. The committee of the Treub

Society wanted to support a large-scale project of research in the tropics. The Maldives Expedition 2003 intended a multidisciplinary overview of unexplored areas.

International Scientific Maldives Expedition 2003

Participants:

Abdullah Saeed
(Islamic studies: Modernisation in the Maldives)
Alex de Voogt
(Material culture and DNA-research)
Luc Reurich
(Ethnomusicology)
Willem Backhuys
(Malacology: land- and fresh water mollusca)
André Delsaerd
(Malacology: marine mollusca)

Length of the expedition: 5 January – 3 February 2003

A volume of reports by all participants will be published soon. For that purpose the present author has prepared an annotated list of all marine species collected during the expedition (with the exception of micro species).

1. J. Stanley Gardiner's Expedition (1899-1900).

E.A. Smith (1906) identified 381 species of marine mollusca, collected in the Maldives during Stanley Gardiner's Expedition. Although the extensive collecting activities - 237 dredgings in no less than 13 atolls and to -44 fathoms- all in all the number of species seems rather limited. Concerning the family **Conidae**, only 23 species could be collected. Striking: in 5 atolls not a single *Conus*-specimen was collected, while at least 4 species could only be found in 3 stations. Even the absence of scuba diving one century ago does not explain these disappointing results – disappointing as the Maldives are quite famous for their richness of underwater fauna, aren't they?

Table 1: The list of stations during Gardiner's expedition as given by Smith (1906: 599). For each station the number of *Conus*-species as summarized from Smith's report has been added.

STATIONS		fms.	species of Conidae
I	Addu Atoll	5-40	2
II	Suvadiva Atoll	5-44	1
III	Haddumati Atoll	3-40	0
IV	Kolumadulu Atoll	1-40	1
V	S. Nilandu Atoll	1-36	1
VI	Mulaku Atoll	1-40	0
VII	Felidu Atoll	1-35	0
VIII	S. Male Atoll	1-30	1
IX	Hulhule Island*	1-6	18
X	N. Male Atoll	1-35	0
XI	Goidu Atoll	on reef	5
XII	Mahlos Atoll	4-24	2
XIII	Fadifolu Atoll	2-23	0
XIV	Miladumadulu Atoll	3-28	3

*Hulhule: now the island of the international airport.

The atolls were listed from South to North by Smith. *Suvadiva Atoll* (= Huvadhu Atoll), *Haddumatu* (= Haddhunmathee Atoll), *Mahlos* (= Maalhosmadulu Atoll), *Fadifolu* (Faadhippolhu Atoll), *Miladumadulu* (Miladhunmadulu Atoll) – modern spelling based on Malways, Maldives Island Directory (references, see “Malways”).

Smith mentioned Minikoi as Gardiner's XVth locality, but that is a southern atoll in the Laccadives, the archipelago North of the Maldives.

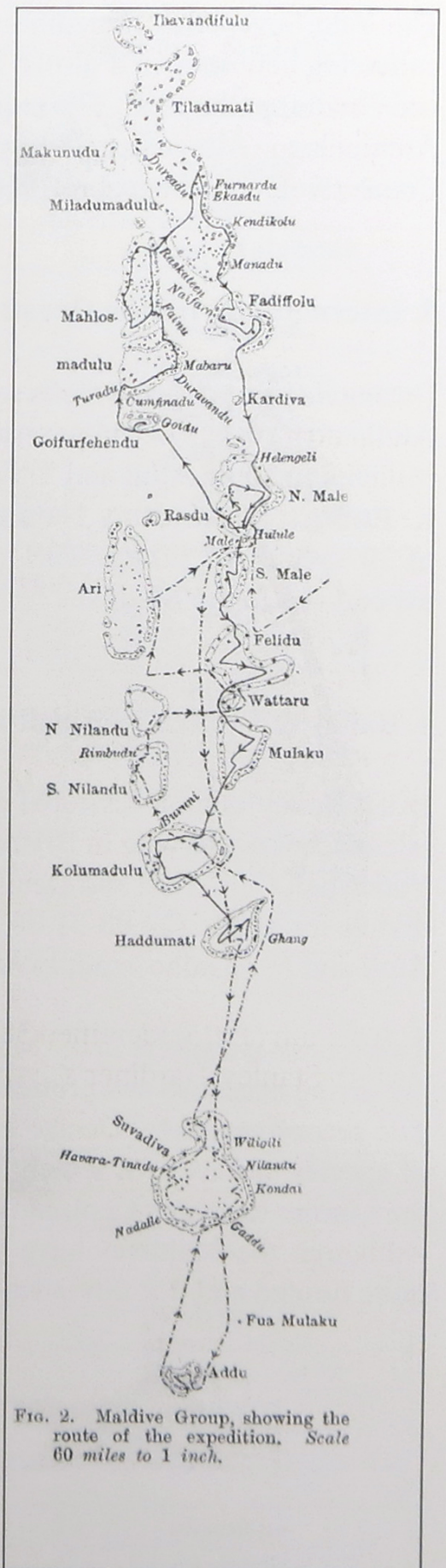


FIG. 2. Maldives Group, showing the route of the expedition. Scale 60 miles to 1 inch.

The route of Gardiner's expedition: Gardiner, 1903, Introduction, p.4 - copied.

2. Yale Seychelles Expedition (1957).

The Yale Seychelles Expedition, led by A.J. Kohn (University of Washington), had collecting activities in 4 atolls: Addoo Atoll, N. Male Atoll, S. Maalhosmadulu Atoll and Faadhippolhu atoll. The expedition also visited Peros Banhos Atoll in the Chagos Archipelago. Altogether 754 specimens were collected, belonging to 30 species of *Conus* (Kohn & Robertson, 1966: 273).

3. International Indian Ocean Expedition (1964).

During this expedition 8 atolls of the Maldives were visited: Addoo Atoll, S. Nilandhoo Atoll, Ari Atoll, N. Male Atoll, Faadhippolhu Atoll, N. Maalhosmadulu Atoll, Miladhunmadulu Atoll and Thiladhunmathee Atoll.

R. Robertson (Academy Natural Sciences of Philadelphia) collected 300 specimens of 30 species of *Conus*. The total number of *Conus* species, collected during both expeditions in the Maldives reached 39 (Kohn & Robertson, 1966: 273).

4. Bailey & Ehrlich's Expedition (2000).

Brian Bailey is a professional diver, well-known for shell-collecting in the Solomon Islands, but now living in Brisbane, Australia. Carl Ehrlich is the president of the New York Shell Club. Carl and Denise Ehrlich are experienced scuba divers. All three were diving for shells (20.08-31.08.2000) in 3 atolls: N. Male Atoll, S. Maalhosmadulu Atoll and N. Maalhosmadulu Atoll; all sites within the tourist zone.

Two reports were kept in the Marine Research Centre in Male: one with the schedule of the diving activities and provisional identification of species by Bailey and C. Ehrlich. The second report by Denise Ehrlich-Lute (mailed 20.02.2001) is their complete list of species and data, of which 25 belong to **Conidae**. A copy of these reports was in the Marine Research Centre given to the present author. Bailey's report mentions that –although the Maldives have good habitats for mollusca- the number of species is quite limited and it is obviously difficult to collect specimens.

Conidae: list of species collected in the Maldives

Gardiner's Exp.	Yale Seych. Exp.	Int. Indian Oc. Exp.	Bailey & Ehrlich
-	-	acutangulus	-
<i>aristophanes</i> *	<i>aristophanes</i> **	-	-
arenatus	arenatus	arenatus	arenatus
-	aulicus	-	aulicus
-	-	-	aureus paulucciae
-	balteatus	-	-
-	bandanus	bandanus	bandanus
-	-	barthelemyi	barthelemyi
betulinus	-	-	betulinus
-	canonicus	-	canonicus
-	capitaneus	-	-
catus	catus	-	-
-	chaldaeus	chaldaeus	-
consors	-	-	-
-	coronatus	coronatus	-
distans	distans	distans	distans
ebraeus	ebraeus	ebraeus	-
eburneus	-	eburneus	-
-	emaciatus	emaciatus	-
-	-	-	eximius
flavidus	flavidus	-	-
-	frigidus	frigidus	-
generalis	-	-	-
glans	-	glans	-
-	-	-	imperialis
-	-	-	leehmani
-	leopardus	leopardus	leopardus
litoglyphus	-	litoglyphus	-
-	litteratus	litteratus	-
lividus	lividus	lividus	-
-	-	<i>longurionis</i> ***	-
miles	miles	miles	-
-	miliaris	miliaris	-
-	moreleti	-	moreleti
musicus*	musicus	musicus	musicus
nussatella	-	-	-
-	-	-	obscurus
pennaceus	pennaceus	pennaceus	ganensis
-	-	pertusus	pertusus

quercinus	-	quercinus	quercinus
-	rattus	rattus	rattus
-	-	-	retifer
-	sponsalis	-	-
-	-	-	striatellus
tessulatus	tessulatus	tessulatus	tessulatus
textile*	-	-	-
tulipa	tulipa	tulipa	-
-	varius	varius	-
violaceus*	-	violaceus	violaceus
-	virgo	virgo	virgo
zonatus	zonatus	zonatus	zonatus

* Many specific names as given by Smith (1906) have in the meantime become synonyms. In the list above, some have been corrected: specimens of the species *coronatus*, *musicus* and *violaceus* were originally identified as “*minimus*”, “*ceylonensis*” and “*tendineus*” by Smith [Discussion is going on concerning the taxonomic status of *C. ceylonensis*.]. Specimen(s) identified as “*C. textile*” by Smith, possibly belong to *C. canonicus*.

** In the list by Kohn & Robertson (1968: 275), “*C. aristophanes*” is given for Smith’s “*C. minimus* Linn.” and therefore both are cited here in the actual list, but in italics. *C. minimus* Linné, 1758 is a rejected name (Opinion 753). However, *C. aristophanes* Sowerby II, 1875 is now generally accepted as a form of *C. coronatus* Gmelin, 1791 (also by Röckel, Korn & Kohn, 1995). It means that *C. minimus* = *C. aristophanes* = *C. coronatus* and only one taxon.

*** Kohn & Robertson (1968: 276) mentioned one dredge haul made during the Expedition 1964 containing 3 specimens of a species “tentatively identified as *C. longurionis* Kiener” – in their list of species reported as “*C. longurionis* Kiener (= *C. aculeiformis* Reeve?)”.

The records of the expedition by B. Bailey, C. & D. Ehrlich (as given here) are based on the report by Denise Ehrlich-Lute (2001). The latter briefly commented two (sub)-specific names, wrongly degraded to forms by Röckel, Korn & Kohn (1995):

-*C. leehmani* da Motta & Röckel, 1979: “*gubernator* form, but not true!” [as considered by Röckel et al. (p. 221)].

Specimens of *C. leehmani* have the general form and spire more in common with *C. barthelemyi* than with *C. gubernator*. It is important that *C. barthelemyi* also occurs in the Maldives Archipelago and no transitional specimens are found. Anyway, the degradation of the *leehmani* population from the Maldives to nothing but a form is hard to understand.

-*C. ganensis* Delsaerdt, 1988: “form of *C. pennaceus* Born, 1778 (I disagree)” [as written by Röckel et al. (p. 299: “local form”)].

The *ganensis* population from the Maldives was described by the present author as *C. pennaceus ganensis*. By some advanced **Conidae** collectors, *C. ganensis* is upgraded to a valid species. Anyway, the degradation by Röckel et al. is again hard to understand.

5. International Scientific Maldives Expedition (2003)

Six atolls were visited: Addoo Atoll (7-9 and 12-13 January), Foammulah Atoll (10-11 Jan.), North Nilandhoo Atoll (30 Jan. – 2 Feb.), North Male Atoll, Huraa (20 Jan.), Hulhumale (27-28 Jan.), North Maalhosmadulu Atoll (21-25 Jan.), Ihavandhippolhu Atoll (14-18 Jan.). Compared to the earlier expeditions named above research in three atolls was new: Foammulah (NE of the southern Addoo Atoll), North Nilandhoo (somewhat central in the western chain of atolls) and Ihavandhippolhu Atoll (the most northern). The expedition members travelled to the atolls by airplanes, seaplanes, speedboats and dhonis (traditional boats); the latter were mostly used for trips to the islands. Specimens of marine mollusca were collected by W. Backhuys as well as the present author – concerning the family **Conidae** 43 species.

List of stations.

Of all stations, only those where species of **Conidae** were collected are given here.

	ATOLL	ISLAND	species of CONIDAE
I.	Addoo Atoll	1. Feydhoo	3
		2. Gan	2
II.	Foammulah Atoll	Foammulah	1
III.	N. Nilandhoo Atoll	Nilandhoo	2
IV.	N. Male Atoll	1. Huraa	7
		2. Hulhumale (reclaimed island)	16
V.	N. Maalhosmadulu Atoll	1. Kandholhudhoo	33
		2. Vaffushi	3
		3. Iguraidhoo	17
		4. (reclaimed land) off Kandholhudhoo	5
		5. small island off Kandholhudhoo	3
VI.	Ihavandhippolhu Atoll	Huvarafushi	8

The number of species is relevant to the collected material only, not at all to the real number of species occurring in the atolls. The latter should need a large scale project during several years.

IHAVANDHIPPOLHU VI

THILADHUNMATHEE N.

THILADHUNMATHEE S.

MILADHUNMADULU N.

MILADHUNMADULU S.

MAALHOSMADULU N V.

FAADHIPPOLHU

MAALHOSMADULU S.

ARI

MALE IV

NILANDHOO N III.

FELIDHOO

NILANDHOO S.

MULAKU

KOLHUMADULU

HADHUNMATHEE

HUVADHOO N.

HUVADHOO S.

FOAMMULAH II

ADDOO I

In the following list of species the localities have been indicated by a Roman numeral for the atoll, followed by the Arabic between brackets for the island (if the species was collected in more than one locality of the atoll).

Conidae: list of species collected during the Int. Sc. Maldives Exp. 2003

arenatus	Hwass, 1792	I(2); III; IV(1-2); V(1,3); VI
aulicus	Linné, 1758	V(1)*
aureus paulucciae	Sowerby III, 1877	V(1)
auricomus	Hwass, 1792	V(1)
balteatus	Sowerby I, 1833	V(1)
bandanus	Hwass, 1792	V(1)*
betulinus	Linné, 1758	I(1)*
canonicus	Hwass, 1792	V(1-3)
capitaneus	Linné, 1758	IV(2); V(1, 3)
catus	Hwass, 1792	IV(2)
chaldaeus	(Röding, 1798)	I(1)
coffeae	Gmelin, 1791	V(1, 3, 4)
coronatus	Gmelin, 1791	IV(2); V(1, 3)
distans	Hwass, 1792	III; V(2)
ebraeus	Linné, 1758	I(1); IV(2); V(1*, 3, 5); VI
eburneus	Hwass, 1792	I(2); IV(1,2); V(1)*
emaciatius	Reeve, 1849	V(3)
episcopatus	da Motta, 1982	V(1, 3); VI
flavidus	Lamarck, 1810	V(3); VI
generalis	Linné, 1758	V(1)*; VI
glans	Hwass, 1792	V(1, 3)
leehmani	da Motta & Röckel, 1979	IV(1, 2); V(1)*
leopardus	(Röding, 1798)	IV(2); V(1)
litoglyphus	Hwass, 1792	V(1, 3)
litteratus	Linné, 1758	V(2)
lividus	Hwass, 1792	IV(2); V(1*, 3, 4); VI
miles	Linné, 1758	V(1)
miliaris	Hwass, 1792	II
mustelinus	Hwass, 1792	IV(2); V(1); VI
nussatella	Linné, 1758	IV(1); V(1, 3)
parvatus	Walls, 1979	V(1)
pennaceus ganensis	Delsaerdt, 1988	V(1, 2)
pertusus	Hwass, 1792	IV(2)
quercinus	Lightfoot, 1786	IV(2)
rattus	Hwass, 1792	IV(1); V(1*, 5)
retifer	Menke, 1829	V(1, 3)
striatellus	Link, 1807	IV(2); V(1*, 4)
tenuistriatus	Sowerby II, 1858	V(1, 4)

terebra	Born, 1778	IV(2)
tessulatus	Born, 1778	IV(1, 2)
varius	Linné, 1758	V(1)
vexillum	Gmelin, 1791	IV(2); V(1, 4)
violaceus	Gmelin, 1791	V(1*, 3)
virgo	Linné, 1758	IV(2); V(1*, 3, 5); VI
zonatus	Hwass, 1792	V(1*, 3)

*= specimens from these localities are only kept in the collection W. Backhuys.

C. auricomus: one juvenile in coll. author; one adult in coll. Backhuys.

C. balteatus: colour pale ochreous. Identification confirmed by J. de Visser and Ed. Wils.

C. (pennaceus) ganensis: two specimens in coll. A. Shafeeg (Male), collected in Thoddu (Ari Atoll). Mr. Shafeeg donated one to the present author. The specimen collected off Vaffushi (V, 2) is kept in the Marine Research Centre.

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Samenvattende Nederlandse Vertaling/ Summarizing translation into Dutch

Inleiding: De eerste belangrijke expeditie om de fauna en aardrijkskunde van de Malediven te onderzoeken, werd geleid door J. Stanley Gardiner (Cambridge University) van 23.10.1899 tot 25.04.1900. De resultaten werden gepubliceerd in twee volumes (1903, 1906). Hierin een artikel door Edgar Albert Smith over de verzamelde land- en zoetwater mollusca (1903) en een uitgebreid artikel over de mariene mollusca (1906).

Een halve eeuw later werden de Malediven opnieuw doorkruist door 2 expedities voor marien onderzoek, ditmaal Amerikaanse initiatieven: de Yale Seychelles Expedition (1957) en de International Indian Ocean Expedition (1964). Jongere onderzoekingen waren meestal van korte duur en/of vonden plaats in een beperkt gebied. Toch zijn de resultaten van de expeditie door Bailey en de Ehrlichs (2000) interessant en aanvullend; voor zover hun resultaten de Conidae betreffen, worden ze mee opgenomen in dit artikel.

W. Backhuys vond het zinvol om een eeuw na Gardiner's expeditie een nieuw onderzoeksproject op de Malediven uit te voeren. Hij ontmoette hierover A. de Voogt (Universiteit Leiden), beiden commissieleden van de Treub Maatschappij, en ze begonnen de expeditie te organiseren, in samenwerking met de Malediviër Abdullah Saeed (Universiteit Melbourne). De Treub Maatschappij beoogt de realisatie van multi- disciplinair onderzoek in tropische gebieden en geeft daartoe financiële steun. Zo werd de "International Scientific Maldives Expedition 2003" mogelijk.

International Scientific Maldives Expedition 2003

Deelnemers: Abdullah Saeed (veranderingen in de islamitische beleving) - Alex de Voogt (cultuur en DNA-onderzoek) - Luc Reurich (etnische muziek) - Willem Backhuys (malacologie: land- en zoetwater mollusca) - André Delsaert (Malacologie: mariene mollusca)

Duur van de expeditie: 5 januari tot 3 februari 2003.

Dit artikel beperkt zich tot het overzicht van de Conidae. De resultaten van de vroegere expedities worden vergeleken met de lijst van soorten verzameld tijdens onze expeditie.

Alle deelnemers stelden rapporten op die zullen gepubliceerd worden in een boek. De auteur van dit artikel heeft daartoe een lijst met aantekeningen klaar van alle mariene soorten verzameld tijdens deze expeditie (met uitzondering van de micro-soorten).

1. Expeditie van J. Stanley Gardiner (1899 - 1900)

E.A. Smith (1906) determineerde 381 soorten mariene mollusca op de Malediven verzameld tijdens deze expeditie. Ondanks intensief verzamelen (o.a. 237 dreggingen in 13 atollen tot een diepte van zo'n 80m) bleek het aantal soorten beperkt. Wat de Conidae betreft, konden slechts 23 soorten verzameld worden. Opvallend: in 5 atollen werd niet één *Conus* gevonden en minstens 4 soorten werden slechts in 3 atollen aangetroffen. Dat Gardiner natuurlijk niet beschikte over moderne duikapparatuur is geen uitleg voor de teleurstellende resultaten.

In de Engelse tekst wordt de lijst gegeven van plaatsen waar Gardiner verzamelde, zoals Smith (1906: 599) die in zijn rapport optekende. Het aantal *Conus* soorten overeenkomstig dit rapport werd hieraan toegevoegd. Volledigheidshalve moet opgemerkt worden dat er nog een station XV vermeld werd, Minokoi, maar dat is een zuidelijk atol van de Laccadiven, die zelf boven de Malediven liggen.

We hebben hier ook de route afgedrukt die door Gardiner gevolgd werd.

2. Yale Seychelles Expedition (1957)

Deze werd geleid door A.J. Kohn (Universiteit van Washington). Er werd verzameld in 4 atollen.

De expeditie bezocht ook de Peros Bahnos Atol in de Chagos Archipel. Alles bij elkaar werden er van de Conidae 754 exemplaren verzameld die behoren tot 30 soorten (Kohn & Robertson, 1966: 273)

3. International Indian Ocean Expedition (1964)

Hier werden 8 atollen bezocht. R. Robertson (Academie voor Natuurwetenschappen in Philadelphia) verzamelde 300 *Conus* exemplaren die ook konden ondergebracht worden in 30 soorten.

De twee expedities samen geven voor de Malediven een totaal van 39 *Conus* soorten (Kohn & Robertson, 1966: 273).

4. Expeditie door Bailey en de Ehrlichs (2000)

Er werd tussen 20 en 31 augustus 2000 voor schelpdieren gedoken in 3 atollen. Alle duikplaatsen lagen binnen de "toeristische zone".

Het Marine Research Centre in Male kreeg 2 rapporten: één met het schema van de duikactiviteiten en de voorlopige determinaties door Bailey en Carl Ehrlich. Een tweede rapport, vanwege Denise Lute, geeft de volledige lijst van de verzamelde soorten en hun vindplaatsen. Van de familie Conidae worden 23 soorten genoemd.

Bailey's rapport besluit dat, hoewel de Malediven goede levensomstandigheden bieden voor mollusca, het aantal soorten toch vrij beperkt is en dat verzamelen moeilijk is.

In de Engelse tekst wordt dan de lijst van soorten gegeven van elk van de 4 expedities. Hierbij moeten wel enkele bemerkingen gemaakt worden.

Smith (1906) gebruikte heel wat soortnamen die ondertussen synoniem geworden zijn. Voor de Conidae werden in de lijst 3 synoniemen gecorrigeerd. Exemplaren van *aristophanes*, *musicus* en *violaceus* waren oorspronkelijk door Smith gedetermineerd als '*minimus* Linn.', '*ceylonensis*' en '*tendineus*'. De discussie loop nog m.b.t. de taxonomische status van *C. ceylonensis*. Het is ook mogelijk dat het materiaal door Smith als *C. textile* gedetermineerd, in feite behoort tot *C. canonicus*.

Kohn & Robertson (1968: 275) vermeldde *C. aristophanes* i.p.v. "*C. minimus* Linn." (bij Smith). "*C. minimus* Linné, 1758" is een verworpen naam (Opinion 753). Ondertussen wordt ook algemeen aanvaard dat *C. aristophanes* Sowerby II, 1857 een forma is van *C. coronatus* Gmelin, 1791 (ook door Röckel, Korn & Kohn, 1995).

Kohn & Robertson (1968: 276) vermeldde een dreg tijdens de expeditie van 1964 waarin 3 exemplaren zaten van een soort "voorlopig geïdentificeerd als *C. longurionis* Kiener" en in hun soortenlijst gerapporteerd als "*C. longurionis* Kiener (= *C. aculeiformis* Reeve?)".

In dit artikel is de soortenlijst van de expeditie door Bailey en de Ehrlichs gebaseerd op het rapport van Denise Lute (2001). Deze schreef commentaar bij 2 (onder)soorten, die in het boek van Röckel, Korn & Kohn (1995) gedegradeerd werden tot slechts een vorm (en dus synoniem):

-*C. leehmani* da Motta & Röckel, 1979: '*gubernator* form, but not true!' [wat door Röckel et al. (p.221) beweerd werd.]. Schelpen van *C. leehmani* lijken door hun algemene vorm en spira meer op *C. barthelemyi* dan op *C. gubernator*. Het is belangrijk dat ook *C. barthelemyi* voorkomt in de Malediven en dat er geen overgangsvormen worden aangetroffen. Wat er ook van zij, de ontwaarding van de *leehmani* populatie in de Malediven tot een vorm valt moeilijk te begrijpen.

-*C. ganensis* Delsaerdt, 1998: 'form of *C. pennaceus* Born, 1778 (I disagree)' [Röckel et al (p.299) noemden het een 'local form']. De *ganensis* populatie in de Malediven werd beschreven als *C. pennaceus ganensis*. Sommige vergevorderde Conidae verzamelaars hebben *C. ganensis* omwille van constante kenmerken ondertussen opgewaardeerd tot een volwaardige soort. Ook hier weer een moeilijk te begrijpen degradatie door Röckel et al.

5. International Scientific Maldives Expedition (2003)

6 atollen werden aangedaan en vergeleken met de hoger genoemde expedities was het onderzoek nieuwe in 3 atollen (Foammulah, N. Nilandhoo en Ihavandhippolhu). Er werden 43 soorten Conidae verzameld.

In de Engelse tekst wordt de lijst van verzamelgebieden gegeven waar Conidae gevonden werden: het romeins cijfer met atol, gevolgd door het eiland; daarna het aantal *Conus* soorten. Als er Conidae gevonden werden aan meerdere eilanden van eenzelfde atol, gaan arabische cijfers de eilandnamen vooraf.

Het is vanzelfsprekend dat deze soortenaantallen alleen relevant zijn voor het verzamelde materiaal en absoluut niet voor wat er in een atol leeft. Dat laatste zou een grootschalig project veronderstellen van meerdere jaren.

Tenslotte volgt dan de lijst van soorten die tijdens de expeditie verzameld werden, telkens gevolgd door een vindplaatsaanduiding (romeins cijfer: atol; arabisch cijfer: eiland). Een sterretje betekent dat exemplaren van deze vindplaats zich alleen bevinden in de collectie Backhuys.

Plate:

Identification.

Conus tenuistriatus Sowerby II, 1858 (figs. 1-4). - ***C. balteatus*** Sowerby I, 1833 (fig. 5). - ***C. varius*** Linné, 1758 (fig.6). - ***C. auricomus*** Hwas, 1792 (fig. 7). - ***C. bandanus*** Hwas, 1792 (fig.8). - ***C. aulicus*** Linné, 1758 (fig.9). - ***C. aureus paulucciae*** Sowerby III, 1877 (fig.10)

Photos: D. Monsecour

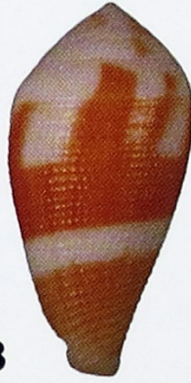
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