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Side and ventral views of *Caecum* Fleming, 1813 species from BIOMAGLO Expedition.

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The Caecidae from BIOMAGLO Expedition in the Mayotte-Glorieuses area (Mollusca, Gastropoda)

Angelo VANNOZZI
Via M.L. Longo, 8 I-00151 Rome (Italy)
ang.vannozzi@gmail.com

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KEY WORDS
Mollusca,
Caecidae,
Western Indian Ocean,
Mozambique Channel,
BIOMAGLO Expedition,
new species.

ABSTRACT
The Caecidae J. E. Gray, 1850 collected during the BIOMAGLO Expedition, carried out by the Muséum national d'Histoire naturelle, Paris, in the Mayotte-Glorieuses area in 2017 are revised. Despite the depth of the biotopes sampled, unsuitable for most members of this family, 320 specimens were collected, belonging to 11 species, two of which are new to science, *Caecum biomaglo* n. sp. and *C. iricolor* n. sp. All recorded species are illustrated, along with a further indeterminate specimen, possibly belonging to an undescribed species.

MOTS CLÉS
Mollusques,
Caecidae,
océan Indien occidental,
canal du Mozambique,
expédition BIOMAGLO,
espèces nouvelles.

RÉSUMÉ
Les Caecidae de l'expédition BIOMAGLO dans la zone Mayotte-Glorieuses (Mollusca, Gastropoda).
Les Caecidae J. E. Gray, 1850 collectés lors de l'expédition BIOMAGLO, menée par le Muséum national d'Histoire naturelle, Paris, dans la zone Mayotte-Glorieuses en 2017 sont révisés. Malgré la profondeur des biotopes échantillonnés, inadaptés à la plupart des membres de cette famille, 320 spécimens ont été collectés, appartenant à 11 espèces, dont deux nouvelles pour la science, *Caecum biomaglo* n. sp. et *C. iricolor* n. sp. Toutes les espèces signalées sont illustrées, ainsi qu'un autre spécimen indéterminé, appartenant peut-être à une espèce non décrite.

INTRODUCTION

The family Caecidae includes tiny interstitial species widely distributed in shallow-water biotopes in tropical to cold-temperate seas.

This family comprises species chiefly living in the photic zone, although indications of a deep-sea habitat preference in some species are emerging (Pizzini *et al.* 2013; unpublished data). The Caecidae are reported to feed on diatoms among sand grains (Moore 1961; Morton 1975). Their peculiar shell shape, with openly coiled teleoconch and usually truncated shells, is believed to be functional to their lifestyle.

The BIOdiversité MAyotte-GLOrieuses (BIOMAGLO, doi.org/10.17600/17004000) Expedition was carried out in 2017 in the framework of the exploration programme Tropical Deep-Sea Benthos, undertaken in the last four decades by the Muséum national d'Histoire naturelle (Paris) and was aimed at exploring marine biodiversity in the aphotic zone; PIs Laure Corbari, Sarah Samadi and Karine Olu-Le Roy. The study area includes Mayotte, Glorieuses and Comoros Islands located north of the Mozambique Channel, Indian Ocean, with 89 stations encompassing the bathymetric range 100-1000 m (Castelin *et al.* 2019); for a map and station list, see https://expeditions.mnhn.fr/campaign/biomaglo.

Despite the depth of the biotopes sampled being unsuitable for most members of the family (Bandel 1996), a small number of stations contained representative of the family Caecidae, most of them coming from the Mayotte-Glorieuses area. In total, 320 shells belonging to this family were found in 23 stations (Table 1). All material is represented by empty shells, suggesting that the sampled sites are unlikely to represent the actual habitat of living specimens. More probably, the specimens have been collected after post-mortem downslope drift from shallow-water biotopes.

Apart from a single shell of the genus *Strebloceras* Carpenter, 1859 (subfamily Streblocerat inae Bandel, 1996), all collected specimens belong to the subfamily Caecinae J. E. Gray, 1850, characterised by a tubular shell in which earlier stages are discarded from time to time during shell growth and the posterior end sealed with a calcareous septum (de Folin 1875; Draper 1985; Bandel 1996; Raines 2020). Eleven species were recognized, two of which are described as new. A further indeterminate specimen, possibly belonging to another undescribed species, is illustrated as well.

Table 1. — List of stations of BIOMAGLO Expedition containing representatives of the Caecidae J. E. Gray, 1850.

Station	Locality	Coordinates	Depth (m)	Date
DW4789	Banc du Geyser	12°22'S, 46°25'E	340-342	22.I.2017
DW4800	Glorieuses	11°27'S, 47°19'E	240-255	24.I.2017
DW4801	Glorieuses	11°27'S, 47°19'E	385-410	24.I.2017
DW4807	Glorieuses	11°30'S, 47°28'E	97-124	25.I.2017
DW4808	Glorieuses	11°30'S, 47°28'E	219-224	25.I.2017
DW4814	Glorieuses	11°30'S, 47°29'E	694-733	25.I.2017
DW4818	Glorieuses	11°37'S, 47°20'E	797-816	26.I.2017
DW4820	S Mayotte	13°05'S, 45°06'E	295-336	27.I.2017
DW4826	S Mayotte	13°05'S, 45°07'E	489-496	27.I.2017
DW4836	SE Moheli	12°25.2'S, 43°55.9'E	82-88	28.I.2017
DW4841	SW Moheli	12°23'S, 43°33'E	154-333	29.I.2017
DW4842	SW Moheli	12°23'S, 43°33'E	388-420	29.I.2017
DW4843	SE Moheli	12°28'S, 43°54'E	509-530	29.I.2017
DW4846	W Mayotte	12°41'S, 44°58'E	439-502	30.I.2017
DW4847	W Mayotte	12°41'S, 44°57'E	738-763	30.I.2017
DW4848	NW Mayotte	12°35'S, 44°55'E	399-402	30.I.2017
DW4851	SW Mayotte	13°01'S, 44°57'E	660-664	03.II.2017
DW4853	SW Mayotte	13°00'S, 44°56'E	665-669	03.II.2017
DW4854	W Mayotte	12°56'S, 44°58'E	455-465	04.II.2017
DW4860	NW Mayotte	12°31'S, 44°55'E	486-646	05.II.2017
DW4864	SE Mayotte	12°56'S, 45°15'E	455-487	07.II.2017
DW4869	SE Mayotte	12°58'S, 45°16'E	917-1070	07.II.2017
DW4871	NE Mayotte	12°44'S, 45°19'E	462-486	08.II.2017

MATERIAL AND METHODS

The examined material consisted of 26 lots sampled from 23 stations (Fig. 1; Table 1). The list of the stations is reported in Table 1. Further details on samplings can be found in Castelin *et al.* (2019). All specimens consist of empty shells without operculum and are housed in the Muséum national d'Histoire naturelle, Paris.

Relevant characters for species identification within the family Caecidae include: overall shell profile; tube twisting; protoconch and early teleoconch (when available); presence of sculpture and/or microsculpture; aperture inclination; shape of the aperture and presence of swelling or varix; shape of the septum and presence and shape of an appendix (mucro); presence and shape of a temporary septum; presence, shape and aspect of the macula (Lightfoot 1992b; Nofroni *et al.* 1997; Pizzini *et al.* 1998; Vannozzi *et al.* 2015; Vannozzi 2022). Dorsal and ventral sides refer to the convex and concave sides of the tube, respectively. Right and left sides are referred to with the apex of the shell pointing upwards and in ventral view. Truncation of earlier shell portions occurs along the cutting plane (Vannozzi 2022).

Shells were photographed from both right and ventral sides by stacking multiple images using CombineZM software. Measurements were taken using ImageJ software 1.52a, by scaling the image using a millimetre scale included in the picture. I followed Spada *et al.* (2023) to determine the number of protoconch whorls,

In the Systematics section, a standardised format for the citation of specimen data is used, as described by Chester *et al.* (2019), with the following data-fields:

Country • number of specimen (lv and/or dd); locality data (from largest to smallest); geographic coordinates; depth; date (format "16.I.1998"); other collecting data (e.g. habitat); collection repository and catalogue code.

Finally, I followed Winckworth (1941) and Rehder (1946) for the dates of publication of *Les Fonds de la Mer*.

For practical reasons, species belonging to the genus *Caecum* Fleming, 1813 are divided into two sections, without any systematic value, according to the shape of the septum.

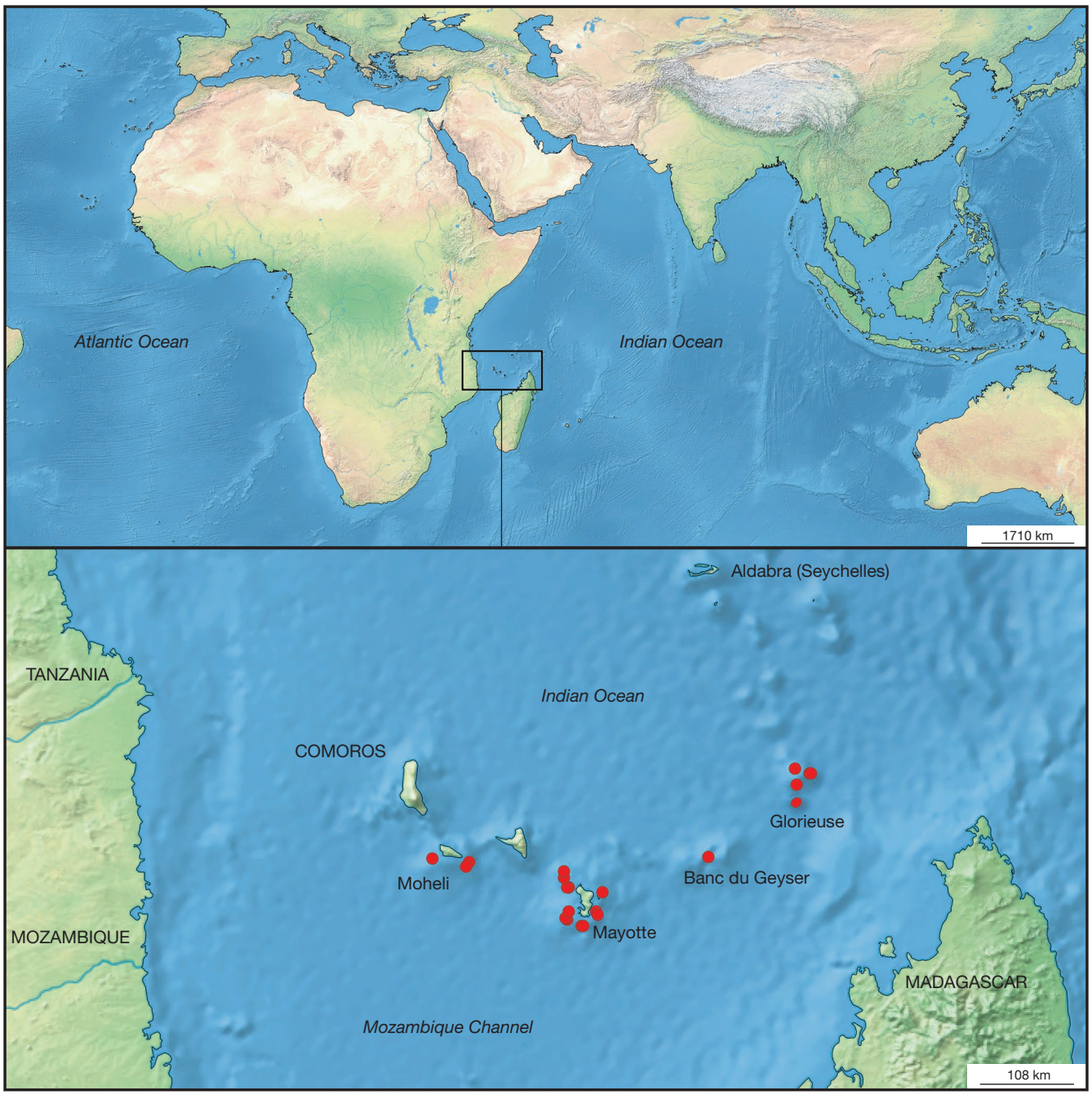

Fig. 1. — Location of the study area (box). Symbol: **red dots**, the sampled stations listed in Table 1.

Abbreviations

Repositories

BR	Bret Raines Collection, Alamogordo, NM;
LACM	Natural History Museum of Los Angeles County, Los Angeles;
MCZR	Museo Civico di Zoologia, Rome;
MNHN	Muséum National d'Histoire Naturelle, Paris;
MZUB	Museo di Zoologia dell'Università di Bologna;
NHMUK	Natural History Museum, London;
NMNS	National Museum of Nature and Science, Tokyo.

Other abbreviations

diam	diameter;
fragm	fragmentary specimen;
juv	juvenile specimen;
lv	live-collected specimen;
max	maximum;
min	minimum;
dd	empty shell without soft parts;
stn	station.

SYSTEMATICS

Class GASTROPODA Cuvier, 1797
Superfamily TRUNCATELLOIDEA J. E. Gray, 1840
Family CAECIDAE J. E. Gray, 1850
Subfamily CAECINAE J. E. Gray, 1850

Genus *Caecum* Fleming, 1813

TYPE SPECIES. — *Dentalium trachea* Montagu, 1803 by subsequent designation (J. E. Gray 1847: 203).

Section A. — Species with simple, dome-shaped septum without mucro

Caecum sepimentum de Folin, 1868 (Fig. 2A-C)

Caecum sepimentum de Folin, 1868: 84, pl. 6, fig. 7. — Vannozzi 2019b: 73, fig. 7E and synonymy therein.

† *Caecum afrum* Selli, 1974: 308, pl. 16, figs 11-13.

TYPE MATERIAL. — **Lectotype. Mauritius** • dd; Mauritius; MNHN-IM-2000-24907 selected by Pizzini *et al.* (2013: 5, fig. 8D).
Paralectotypes. Mauritius • 20 dd; same data as for lectotype; MNHN-IM-2000-24908.

TYPE LOCALITY. — Indian Ocean, Mauritius.

MATERIAL EXAMINED — **Îles Éparses** • 5 Dd; Mozambique Channel, Banc Du Geyser, Biomaglo Stn Dw4789; 12°22'S, 46°25'E; 340-342 m depth; 22.I.2017; MNHN • 5 dd worn; Mozambique Channel, Glorieuses, BIOMAGLO Stn DW4800; 11°27'S, 47°19'E; 240-255 m depth; 24.I.2017; MNHN • 14 dd (1 juv) worn; Mozambique Channel, Glorieuses, BIOMAGLO Stn DW4801; 11°27'S, 47°19'E; 385-410 m depth; 24.I.2017; MNHN • 32 dd (9 juv, 1 growth stage, 2 fragm) mostly worn; Mozambique Channel, Glorieuses, BIOMAGLO Stn DW4807; 11°30'S, 47°28'E; 97-124 m depth; 25.I.2017; MNHN • 62 dd (9 juv); Mozambique Channel, Glorieuses, BIOMAGLO Stn DW4808; 11°30'S, 47°28'E; 219-224 m depth; 25.I.2017; MNHN • 1 dd; Mozambique Channel, Glorieuses, BIOMAGLO Stn DW4814; 11°30'S, 47°29'E; 694-733 m depth; 25.I.2017; MNHN • 3 dd worn; Mozambique Channel, Glorieuses, BIOMAGLO Stn DW4818; 11°37'S, 47°20'E; 797-816 m depth; 26.I.2017; MNHN.
Mayotte • 42 dd (1 juv); Mozambique Channel, S Mayotte, BIOMAGLO Stn DW4820; 13°05'S, 45°06'E; 295-336 m depth; 27.I.2017; MNHN • 10 dd; Mozambique Channel, S Mayotte, BIOMAGLO Stn DW4826; 13°05'S, 45°07'E; 489-496 m depth; 27.I.2017; MNHN• 4 dd; Mozambique Channel, W Mayotte, BIOMAGLO Stn DW4846; 12°41'S, 44°58'E; 439-502 m depth; 30.I.2017; MNHN • 11 dd (1 juv); Mozambique Channel, W Mayotte, BIOMAGLO Stn DW4847; 12°41'S, 44°57'E; 738-763 m depth; 30.I.2017; MNHN • 16 dd (1 juv); Mozambique Channel, NW Mayotte, BIOMAGLO Stn DW4848; 12°35'S, 44°55'E; 399-402 m depth; 30.I.2017; MNHN • 5 dd mostly worn; Mozambique Channel, SW Mayotte, BIOMAGLO Stn DW4851; 13°01'S, 44°57'E; 660-664 m depth; 03.II.2017; MNHN • 5 dd; Mozambique Channel, SW Mayotte, BIOMAGLO Stn DW4853; 13°00'S, 44°56'E; 665-669 m depth; 03.II.2017; MNHN • 18 dd (6 juv); Mozambique Channel, W Mayotte, BIOMAGLO Stn DW4854; 12°56'S, 44°58'E; 455-465 m depth; 04.II.2017; MNHN • 11 dd (2 juv, 1 growth stage) worn; Mozambique Channel, NW Mayotte, BIOMAGLO Stn DW4860; 12°31'S, 44°55'E; 486-646 m depth; 05.II.2017; MNHN • 7 dd worn; Mozambique Channel, SE Mayotte, BIOMAGLO Stn DW4864; 12°56'S, 45°15'E; 455-487 m depth; 07.II.2017; MNHN • 20 dd (1 juv) worn; Mozambique Channel, NE Mayotte, BIOMAGLO Stn DW4871; 12°44'S, 45°19'E; 462-486 m depth; 08.II.2017; MNHN.
Comoros • 11 dd (3 juv, 3 fragm); Mozambique Channel, SE Moheli, BIOMAGLO Stn DW4836; 12°25.2'S, 43°55.9'E; 82-88 m depth; 28.I.2017; MNHN • 1 dd (juv); Mozambique Channel, SW Moheli, BIOMAGLO Stn DW4841; 12°23'S, 43°33'E; 154-333 m depth; 29.I.2017; MNHN • 1 dd (fragm) worn; Mozambique Channel, SW Moheli, BIOMAGLO Stn DW4842; 12°23'S, 43°33'E; 388-420 m depth; 29.I.2017; MNHN • 1 dd; Mozambique Channel, SE Moheli, BIOMAGLO Stn DW4843; 12°28'S, 43°54'E; 509-530 m depth; 29.I.2017; MNHN.

DISTRIBUTION. — Whole Indo-West Pacific. From the east coast of Africa (Red Sea to eastern South Africa) to Maldives, Papua New Guinea, Philippines, Japan, Australia, New Caledonia, French Polynesia, Hawaii (Hedley 1903; Kay 1979; Lightfoot 1992a; Hasegawa 2000; Albano & Pizzini 2011; Pizzini & Raines 2011; Pizzini *et al.* 2013; Vannozzi *et al.* 2015; Vannozzi 2017, 2019b; Blatterer 2019; unpublished data). Allochthonous to the Mediterranean Sea (Pagli 2009; Ovalis & Mifsud 2014).

DIAGNOSIS. — Shell of average size for the genus. Tube subcylindrical, evenly arched. Sculpture of about 21 strong rings with a somewhat subtriangular profile. Aperture preceded by a swelling, ending with several concentric small rings. Microsculpture of fine longitudinal threads. Septum almost flat without mucro, lying below the cutting plane. Periostracum brownish. Colourless or creamy, often with darker blotches. Juveniles showing a conical and more curved tube. Transition to the adult stage smooth. Protoconch multispiral with about 1.9 whorls. Operculum circular, terraced. Length 2.5 mm.

REMARKS

Caecum sepimentum is by far the commonest caecid in the entire Indo-West Pacific, and represents the vast majority of the caecids collected during the BIOMAGLO Expedition, occurring in almost all stations.

Caecum succineum de Folin, 1880 (Fig. 2D)

Caecum succineum de Folin, 1880: 810. — Vannozzi 2019b: 86 and synonymy therein.

TYPE MATERIAL. — **Lectotype. Australia** • dd; Queensland, Cape York, Flinders Passage, 12.5 m depth; NHMUK 1887.2.9.2344 selected by Pizzini *et al.* (2013: fig. 11R).
Paralectotypes. Australia • several dd; same data as for holotype; NHMUK.

TYPE LOCALITY. — Pacific Ocean, NE Australia, Queensland, Cape York, Flinders Passage, 12.5 m depth.

MATERIAL EXAMINED. — **Îles Éparses** • 1 dd; Mozambique Channel, Glorieuses, BIOMAGLO Stn DW4807; 11°30'S, 47°28'E; 97-124 m depth; 25.I.2017; MNHN.
Mayotte • 1 dd; Mozambique Channel, W Mayotte, BIOMAGLO Stn DW4854; 12°56'S, 44°58'E; 455-465 m depth; 04.II.2017; MNHN • 1 dd cf; Mozambique Channel, SE Mayotte, BIOMAGLO Stn DW4864; 12°56'S, 45°15'E; 455-487 m depth; 07.II.2017; MNHN.
Comoros • 1 dd; Mozambique Channel, SE Moheli, BIOMAGLO Stn DW4836; 12°25.2'S, 43°55.9'E; 82-88 m depth; 28.I.2017; MNHN.

Fig. 2. — Side and ventral views of *Caecum* Fleming, 1813 species from BIOMAGLO Expedition: **A**-**C**, *C. sepimentum* de Folin, 1868 from Stn DW4848; **A**, **B**, specimens with preserved colour pattern; **C**, juv.; **D**, *C. succineum* de Folin, 1880 from Stn DW4854; **E**-**H**, *C. iricolor* n. sp.; **E**, **F**, holotype MNHN-IM-2000-38696, length 2.33 mm; **G**, **H**, paratype MNHN-IM-2000-38697 from type locality; **I**-**M**, *C. biomaglo* n. sp.; **I**, **J**, holotype MNHN-IM-2000-38700, length 2.46 mm; **K**, **L**, paratype MNHN-IM-2000-38701 from type locality; **M**, paratype from Stn DW4854 MNHN-IM-2000-38702; **N**, *Caecum* sp. from Stn DW4847, length 2.4 mm. Scale bar: 1 mm.

Distribution. — Indo-West Pacific, from the east coast of Africa (Red Sea to eastern South Africa) to Papua New Guinea, Philippines, New Caledonia (Pizzini *et al.* 2013; Vannozzi *et al.* 2015; Vannozzi 2017, 2019b; Blatterer 2019).

Diagnosis. — Shell small for the genus. Tube subcylindrical, smooth, showing some rings toward the aperture. Macula absent. Aperture preceded by a slight swelling. Septum very low dome shaped without mucro, sometimes encrusted. Length 1.5 mm.

Remarks

This small species shows a very constant morphology, including a very low septum without mucro and a small swelling before the aperture preceded by some distinct rings.

Caecum biomaglo n. sp.
(Figs 2I-M; 4C-D; 5C-D)

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Type material. — **Holotype. Mayotte** • dd (length 2.46 mm, Figs 2I-J, 4C and 5C); Mozambique Channel, S Mayotte, BIOMAGLO Stn DW4820; 13°05'S, 45°06'E; 295-336 m depth; 27.I.2017; MNHN-IM-2000-38700.
Paratypes. Mayotte • 1 dd; same data as for holotype; MNHN-IM-2000-38701 • 1 dd; Mozambique Channel, W Mayotte, BIOMAGLO Stn DW4854; 12°56'S, 44°58'E; 455-465 m depth; 4.II.2017; MNHN-IM-2000-38702.

Type locality. — Indian Ocean, Mozambique Channel, S Mayotte, 13°05'S, 45°06'E, 295-336 m depth.

Other material examined. — **Îles Éparses** • 1 dd cf; Mozambique Channel, Glorieuses, BIOMAGLO Stn DW4808; 11°30'S, 47°28'E; 219-224 m depth; 25.I.2017; MNHN.

Distribution. — Known only from Mayotte. The record from Glorieuses needs confirmation.

Etymology. — Derived from the BIOMAGLO Expedition, used as a noun in apposition.

Description

Shell of average size for the genus, tubular, substantially smooth, colourless, semitransparent, somewhat iridescent. Tube cylindrical, tapering near the apex, straight in ventral view. Surface covered by fine growth lines, crossed by a pronounced longitudinal wavy sculpture of fine threads mostly visible in the adapical part. Microsculpture of very fine and regular longitudinal grooves. Macula absent. Aperture somewhat inclined, preceded by a strong varix-like swelling crossed by distinct growth lines, then contracting and ending with a fine reflected lip. Septum low dome shaped without mucro, slightly recessed below the cutting plane. Traces of temporary septum visible at the boundary of the septum with the tube. No traces of periostracum detected. Young stages, protoconch, operculum and soft parts unknown. Holotype: length 2.46 mm, max diam 0.57 mm, min diam 0.41 mm.

Remarks

At first sight, *Caecum biomaglo* n. sp. resembles *C. succineum* due to the smooth shell and the simple low dome shaped septum without mucro. However, the new species is much larger, without distinct annular sculpture and shows a strong swelling before the aperture. The new species recalls *Caecum folini* Kisch, 1959 and *C. bathus* Pizzini, Raines & Vannozzi, 2013 from New Caledonia. However, the former shows a slightly more protruding septum, a more conspicuous longitudinal microsculpture and a different shape of the aperture, asymmetric and prolonged after the swelling (Vannozzi 2019d); the latter is more slender, with a subcylindrical tube gradually expanding toward the bell-shaped aperture (Pizzini *et al.* 2013).

The paratype in Fig. 2K-L is relatively small and shows no longitudinal sculpture, but all other characters are consistent and it certainly belongs to the new species.

Caecum iricolor n. sp.
(Figs 2E-H; 4A, B; 5A, B)

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Type material. — **Holotype. Mayotte** • dd (length 2.33 mm, Figs 2E-F, 4A and 5A); Mozambique Channel, W Mayotte, BIOMAGLO Stn DW4854; 12°56'S, 44°58'E; 455-465 m depth; 4.II.2017; MNHN-IM-2000-38696.
Paratypes. Mayotte • 1 dd; same data as for holotype; MNHN-IM-2000-38697 • 3 dd; Mozambique Channel, NW Mayotte, BIOMAGLO Stn DW4860; 12°31'S, 44°55'E; 486-646 m depth; 5.II.2017; MNHN-IM-2000-38699.

Type locality. — Indian Ocean, Mozambique Channel, W Mayotte, 12°56'S, 44°58'E, 455-465 m depth.

Other material examined. — **Îles Éparses** • 1 dd; Mozambique Channel, Banc du Geyser, BIOMAGLO Stn DW4789; 12°22'S, 46°25'E; 340-342 m depth; 22.I.2017; MNHN.
Mayotte • 1 dd (fragm); Mozambique Channel, NW Mayotte, BIOMAGLO Stn DW4860; 12°31'S, 44°55'E; 486-646 m depth; 5.II.2017; MNHN • 2 dd; Mozambique Channel, S Mayotte, BIOMAGLO Stn DW4826; 13°05'S, 45°07'E; 489-496 m depth; 27.I.2017; MNHN • 1 dd (fragm); Mozambique Channel, NE Mayotte, BIOMAGLO Stn DW4871; 12°44'S, 45°19'E; 462-486 m depth; 8.II.2017; MNHN.

Distribution. — Known only from Mayotte and Banc du Geyser.

Etymology. — Derived from Latin adjective *iricolor* due to the iridescent appearance of the surface.

Description

Shell of average size for the genus, tubular, smooth, colourless, semitransparent, iridescent. Tube cylindrical, gradually tapering toward the apex. In ventral view, tube appearing slightly dextrally twisted. Surface covered by fine growth lines, sometimes showing shallow wavy longitudinal grooves. Macula absent. Aperture somewhat inclined, preceded by a distinct swelling forming a rounded varix crossed by growth lines, then contracting and ending with a clearly reflected lip. Septum dome shaped without mucro, lying on the cutting plane. Traces of temporary septum visible at the boundary of the septum with the tube. No traces of periostracum detected. Young stages, protoconch, operculum and soft parts unknown. Holotype: length 2.33 mm, max diam 0.44 mm, min diam 0.33 mm.

Remarks

Caecum iricolor n. sp. is very similar to *C. biomaglo* n. sp. and may at first sight be confused with it. However, *C. iricolor* n. sp. is more fragile and is easily distinguished due to the more slender shape of the tube, slightly twisted and more gradually tapering toward the apex, the smaller and more protruding septum and the more gently rounded swelling and more clearly reflected lip. Furthermore, *C. biomaglo* n. sp. shows

Fig. 3. — Side and ventral views of *Caecum* Fleming, 1813 and *Mauroceras* Vannozzi, 2019 species from BIOMAGLO expedition.: **A**, *C. hyalinum* Vannozzi, 2022 from Stn DW4847; **B**, *C. egenum* Vannozzi, 2017 from Stn DW4854; **C**, *C.* cf. *mauritianum* de Folin, 1868 from Stn DW4820; **D**, **E**, *C. mauritianum*; **D**, holotype MNHN-IM-2000-24911; **E**, paratype MNHN-IM-2000-24912; **F**-**L**, *C. cooki* Pizzini & Raines, 2011; **F**, specimen from Stn DW4847; **G**, **H**, specimens from Stn DW4854 (**H**, juv.); **I**-**L**, specimens from Stn DW4820; **M**, *M. kajiyamai* (Habe, 1963) from Stn DW4847; **N**, *M. sandwichense* (de Folin, 1881) juv. from Stn DW4854. Scale bar: 1 mm. Images D, E, courtesy of Ph. Maestrati (MNHN).

a fine longitudinal microsculpture (Fig. 4), while *C. iricolor* n. sp. has no true microsculpture apart from growth lines and only longitudinal shallow wavy grooves occasionally occur.

Caecum iricolor n. sp. is also similar to *C. succineum*, which however is much smaller and shows several distinct rings in the abapical portion of the tube.

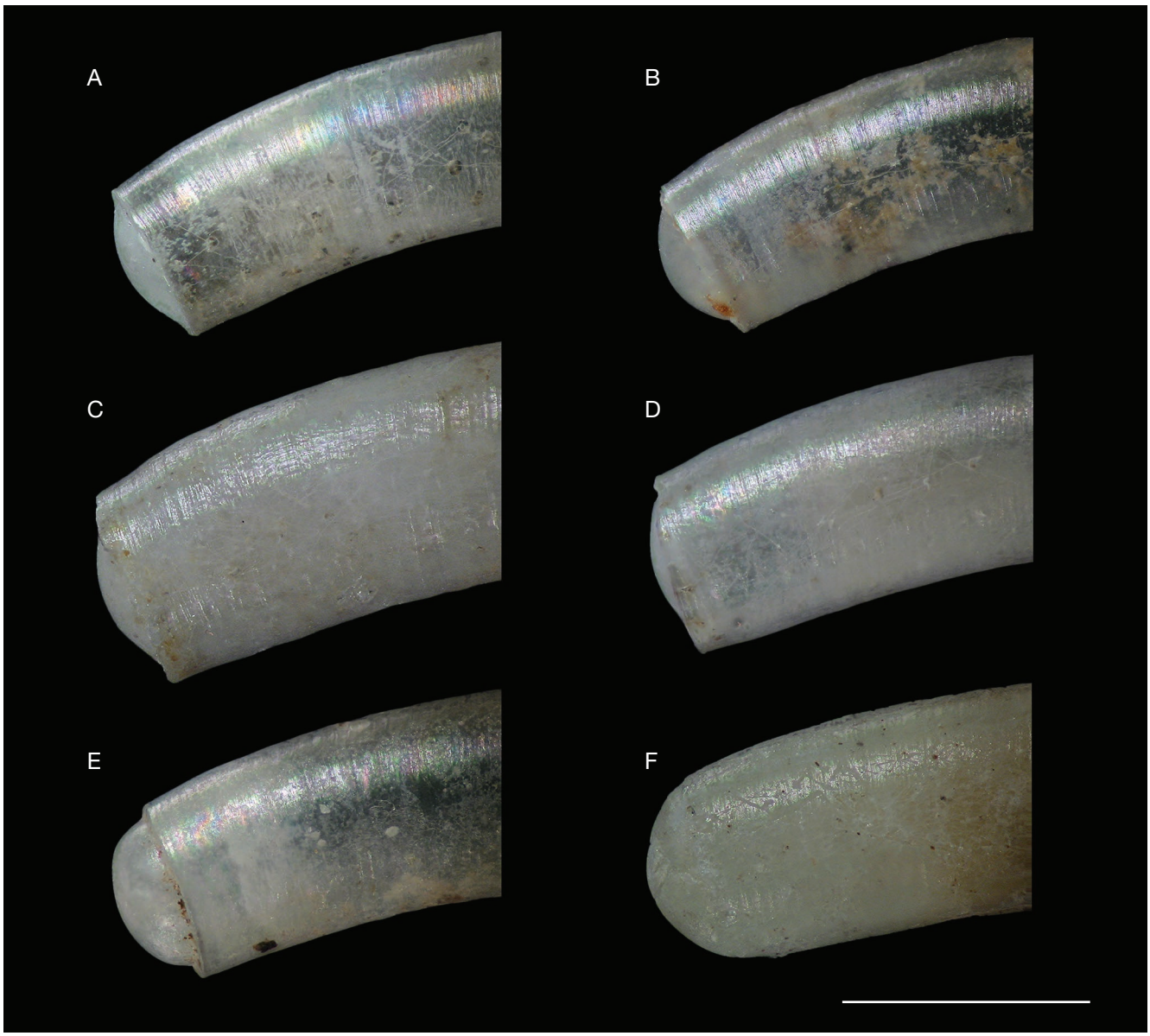

Fig. 4. — Detail of the septum (right side) of *Caecum* Fleming, 1813 species: **A**, **B**, *C. iricolor* n. sp.; **A**, holotype MNHN-IM-2000-38696; **B**, paratype MNHN-IM-2000-38697; **C**, **D**, *C. biomaglo* n. sp.; **C**, holotype MNHN-IM-2000-38700; **D**, paratype MNHN-IM-2000-38701; **E**, *C.* sp. from Stn DW4847; **F**, *C. hyalinum* Vannozzi, 2022 from Stn DW4847. Scale bar: 100 µm.

Iridescence of the tube is not unique to *C. iricolor* n. sp. and occurs in several other species of *Caecum*, all sharing a smooth and colourless tube, e.g., *C. glabrum* (Montagu, 1803), *C. subannulatum* de Folin, 1870, *C. subcylindratum* Pizzini, Raines & Vannozzi, 2013, *C. maraisi* Vannozzi, Pizzini & Raines, 2015 and *C. biomaglo* n. sp.

Caecum sp.
(Figs 2N; 4E; 5D)

Material examined. — **Mayotte** • 1 dd; Mozambique Channel, W Mayotte, BIOMAGLO Stn DW4847; 12°41'S, 44°57'E; 738-763 m depth; 30.I.2017; MNHN.

Description
Shell of average size for the genus, smooth, colourless, semi-transparent, iridescent. Tube cylindrical, not twisted and gradually tapering toward the apex. Surface smooth crossed by fine growth lines only. Macula absent. Aperture preceded by a strong varix-like swelling, somewhat inclined toward the left side. Septum narrow, dome shaped, slightly asymmetrical in dorso-ventral direction but without any visible mucro. Length 2.4 mm.

Remarks
This single specimen recalls both *Caecum biomaglo* n. sp. and *C. iricolor* n. sp. due to the smooth, iridescent tube with similar size. However, it is clearly distinguished by the more

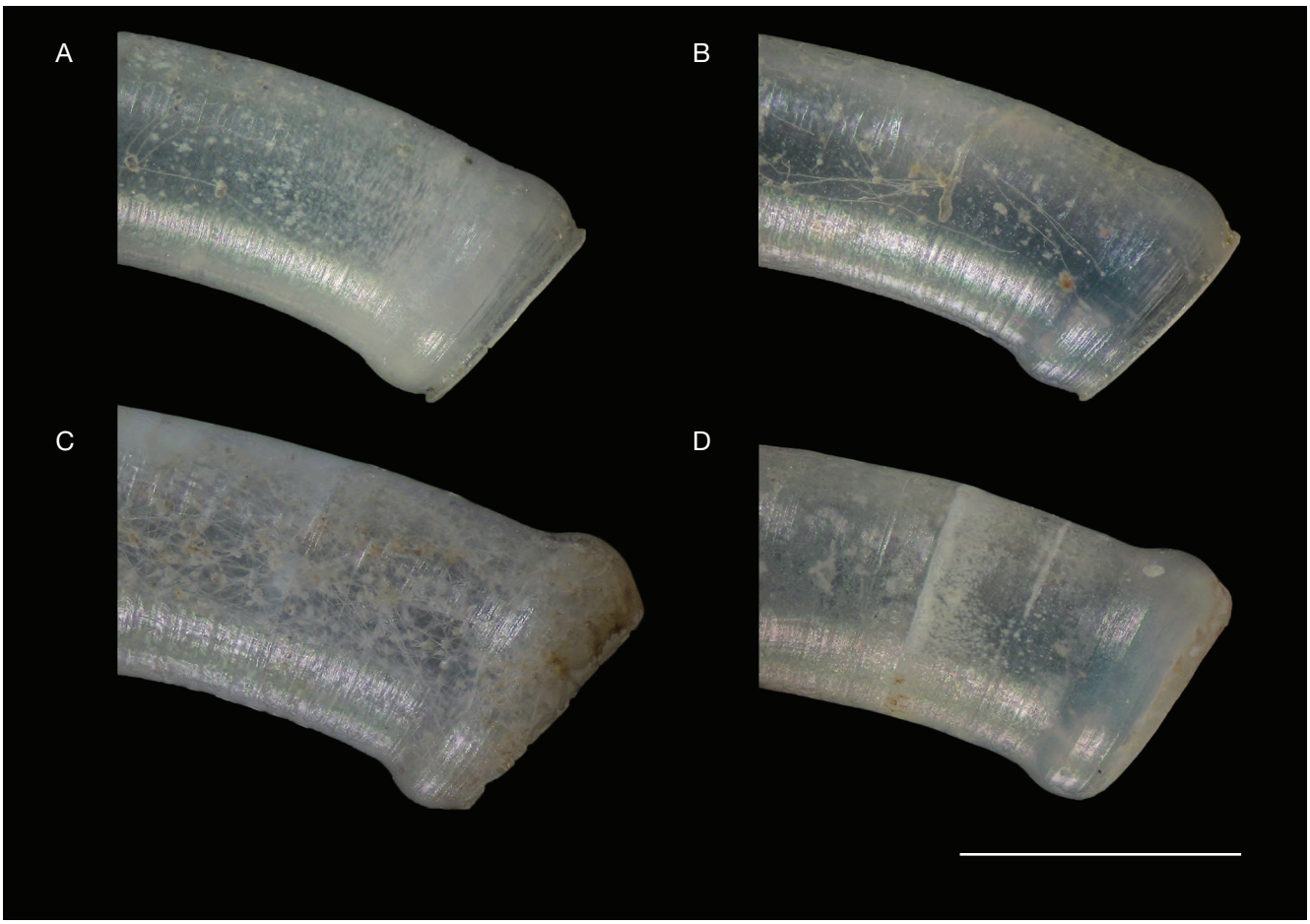

Fig. 5. — Detail of the aperture (right side) of *Caecum* Fleming, 1813 species: **A**, **B**, *C. iricolor* n. sp.; **A**, holotype MNHN-IM-2000-38696; **B**, paratype MNHN-IM-2000-38697; **C**, *C. biomaglo* n. sp., holotype MNHN-IM-2000-38700; **D**, *Caecum* sp. from Stn DW4847. Scale bar: 100 µm.

protruding septum, the stronger varix-like swelling and the smooth surface without longitudinal microsculpture. Additional material is necessary to clarify the identity of this specimen.

A loose operculum was found in the capsule containing this sample, possibly belonging to this specimen. In fact, this operculum is corneous, circular, thin, flat on both sides and with compatible size, whereas the specimens of other species found in the same station are very worn, as *C. hyalinum* Vannozzi, 2022, or much larger, as *Mauroceras kajiyamai*, or are known to have a differently shaped operculum, i.e., thick with stepped profile in *C. sepimentum* or hat-shaped in *C. cooki* (Pizzini *et al.* 2013: fig. 19).

Section B. — Species with mucronated septum

Caecum hyalinum Vannozzi, 2022
(Figs 3A; 4F)

Caecum hyalinum Vannozzi, 2022: 89, fig. 3A-R.

Caecum cf. *gulosum* Hedley, 1899 — Vannozzi *et al.* 2015: 115, fig. 25F.

Caecum arabicum Issel, 1869 — Blatterer 2019: 251, pl. 123, fig. 1a, b.

Type Material. — **Holotype. Tanzania** • dd; Zanzibar, Uroa Bay; 25-30 m depth; MCZR-M-TYPE-00110.

Type locality. — Indian Ocean, Tanzania, Zanzibar, Uroa Bay, 25-30 m depth.

Material examined. — **Mayotte** • 1 dd worn; Mozambique Channel, W Mayotte, BIOMAGLO Stn DW4847; 12°41'S, 44°57'E; 738-763 m depth; 30.I.2017; MNHN.

Distribution. — Whole eastern coast of Africa, from northern Red Sea to northeastern South Africa (Vannozzi *et al.* 2015; Blatterer 2019; Vannozzi 2022).

Diagnosis. — Shell of average size for the genus, colourless, semi-transparent. Tube cylindrical, tapering toward the apex, smooth or with minute rounded rings. No macula. Aperture with a slight but clear swelling. Septum hemispherical, dome shaped with a broad and low nail-like mucro, oriented between the dorsal and the right side. Length 2.47 mm.

Remarks

A single, worn shell was found in the examined material. Although the specimen is slightly larger compared to the holotype and despite the poor condition of this specimen

and the incomplete aperture, the shape the septum and the presence of minute rounded rings support its identification as *Caecum hyalinum*.

This elusive species is known from few specimens so far. It can be compared with *C. inflatum* de Folin, 1869 and *C. armoricum* de Folin, 1869, both sharing a hemispherical protruding septum with nail-like mucro. *Caecum inflatum* from the southwest Pacific is smaller, shows a stouter tube, a narrower and more protruding septum and a simple aperture without swelling. *Caecum armoricum* from the eastern Atlantic and the Mediterranean Sea has a septum of very similar shape, but possesses a smooth tube without rings and never has a swelling before the aperture.

Caecum egenum Vannozzi, 2017
(Fig. 3B)

Caecum egenum Vannozzi, 2017: 127, fig. 2G-J, N.; 2019b: 78.

Type material. — **Holotype. Philippines** • lv; Balicasag; depth 10-15 m; MNHN-IM-2000-33078.

Type locality. — Pacific Ocean, Philippines, Balicasag, depth 10-15 m.

Material examined. — **Mayotte** • 1 dd; Mozambique Channel, W Mayotte, BIOMAGLO Stn DW4854; 12°56'S, 44°58'E; 455-465 m depth; 4.II.2017; MNHN.

Distribution. — Known from Mayotte, Papua New Guinea and Philippines (Vannozzi 2017; 2019b). This is the first record for Indian Ocean.

Diagnosis. — Shell small for the genus, colourless, smooth. Tube subcylindrical adapically, cylindrical in the middle and contracted toward the aperture, with a slight swelling in the ventral side. Aperture simple ending with a reflected lip. Septum dome shaped with an ear-like mucro rotated toward the right side. Length 1.5 mm.

Remarks
A single shell was found in the material from BIOMAGLO Expedition. No differences could be observed with respect to the holotype.

Caecum cf. ***mauritianum*** de Folin, 1868
(Fig. 3C-E)

Caecum mauritianum de Folin, 1868: 84, pl. 9, figs 8, 9.

Type material. — **Holotype. Mauritius** • dd; Mauritius; MNHN-IM-2000-24911. **Paratype. Mauritius** • 1 dd worn; same data as for holotype; MNHN-IM-2000-24912.

Type locality. — Indian Ocean, Mauritius.

Material examined. — **Mayotte** • 1 dd worn; Mozambique Channel, S Mayotte, BIOMAGLO Stn DW4820; 13°05'S, 45°06'E; 295-336 m depth; 27.I.2017; MNHN.

Distribution. — Described from Mauritius, it was reported from New Caledonia (Pizzini *et al.* 2013).

Diagnosis. — Shell of average size for the genus. Tube subcylindrical, smooth or with ill-defined very small rings. Aperture slightly inclined, preceded by a narrow varix-like swelling. Septum narrow, dome-shaped with a dorsal nail-like mucro slightly rotated towards the right. Length 2.5 mm.

Remarks
A single, rather worn shell was found in the available material, on the whole in agreement with de Folin's description and drawing, but not very well fitting the type specimens. In fact, the holotype and the paratype of *C. mauritianum*, shown in Figure 3D, E, are smaller and less curved with more pointed mucro. For this reason, its identification of the specimen from Mayotte is tentative. The relationship between this species and *C. sericeum* de Folin, 1873, described from Mayotte, needs to be re-evaluated based on additional material.

Caecum cooki Pizzini & Raines, 2011
(Fig. 3F-L)

Caecum cooki Pizzini & Raines, 2011: 29, fig. 4A, B. — Pizzini *et al.* 2013: 35, fig. 14H-J.

Type material. — **Holotype. French Polynesia** • dd;, Tuamotu Islands, Makemo, Arikitamiro Passage; MNHN-IM-2000-23124. **Paratypes. French Polynesia** • 1 dd; same data as for holotype; MNHN-IM-2000-23125 • 1 dd; Society Islands, Tahiti, Tiarei; fringing reef, shell grit; MNHN-IM-2000-23126 • 4 dd; Society Islands, W Moorea; 17°30'S, 149°46'W; 2-3 m depth; LACM 3131. **Norhtern Mariana Islands** • 6 dd; Saipan, Laolao Bay; 6-9 m depth; BR.
Indonesia • 1 dd; NW side of Lombok, off Ajer & Meno Islets; 8°22'S, 116°04'E; 5-20 m depth; rubble of steep coral slope; LACM 3130.

Type locality. — Pacific Ocean, French Polynesia, Tuamotu, Makemo, Arikitamiro Passage.

Material examined. — **Îles Éparses** • 1 dd; Mozambique Channel, Banc du Geyser, BIOMAGLO Stn DW4789; 12°22'S, 46°25'E; 340-342 m depth; 22.I.2017; MNHN.
Mayotte • 2 dd; Mozambique Channel, S Mayotte, BIOMAGLO Stn DW4820; 13°05'S, 45°06'E; 295-336 m depth; 27.I.2017; MNHN • 1 dd; Mozambique Channel, S Mayotte, BIOMAGLO Stn DW4826; 13°05'S, 45°07'E; 489-496 m depth; 27.I.2017; MNHN • 1 dd; Mozambique Channel, W Mayotte, BIOMAGLO Stn DW4847; 12°41'S, 44°57'E; 738-763 m depth; 30.I.2017; MNHN • 1 dd; Mozambique Channel, NW Mayotte, BIOMAGLO Stn DW4848; 12°35'S, 44°55'E; 399-402 m depth; 30.I.2017; MNHN • 1 dd; Mozambique Channel, SW Mayotte, BIOMAGLO Stn DW4853; 13°00'S, 44°56'E; 665-669 m depth; 3.II.2017; MNHN • 2 dd (1 juv); Mozambique Channel, W Mayotte, BIOMAGLO Stn DW4854; 12°56'S, 44°58'E; 455-465 m depth; 4.II.2017; MNHN • 1 dd; Mozambique Channel, SE Mayotte, BIOMAGLO Stn DW4869; 12°58'S, 45°16'E; 917-1070 m depth; 07.II.2017; MNHN • 1 dd (growth stage); Mozambique Channel, NE Mayotte, BIOMAGLO Stn DW4871; 12°44'S, 45°19'E; 462-486 m depth; 8.II.2017; MNHN.

Distribution. — Indo-West Pacific, from the eastern coast of Africa (Kenya and Mayotte) to Maldives, Papua New Guinea, Philippines, New Caledonia and French Polynesia (Pizzini & Raines 2011; Pizzini *et al.* 2013; Vannozzi 2017; 2019b; unpublished data).

Diagnosis. — Shell of average size for the genus. Tube smooth, tapering toward the apex. Aperture simple, inclined, preceded by a slight but distinct swelling on the ventral side. Microsculpture of

fine longitudinal striae interrupted by growth lines. Macula small, white, heart-shaped. Septum protruding, with a strong, ear-like mucro rotated toward the right side. Juveniles thin, conical and curved, Transition to the adult stage rapid. Length about 2 mm.

Remarks

This species shows a very wide distribution in the tropical Indo-West Pacific but is never abundant. A small heart-shaped white macula observed in the ventral side of the tube in adult shells is characteristic of this species.

Genus *Mauroceras* Vannozzi, 2019

Type species. — *Meioceras kajiyamai* Habe, 1963 by original designation.

Mauroceras kajiyamai (Habe, 1963) (Fig. 3M)

Meioceras kajiyamai Habe, 1963: 231, fig. 5. — Vannozzi 2019a: 91 (and synonymy therein).

†*Parastrophia christinae* Selli, 1974: 305, pl. 16, figs 5, 6.

†*Meioceras mateldae* Selli, 1974: 306, pl. 16, figs 8, 9.

Type material. — **Holotype. Japan** • dd; Amami-Oshima, Ankyaba, Kakeroma Jima; NMNS figured by Pizzini *et al.* (2013: fig. 15M).

Type locality. — Pacific Ocean, Japan, Amami-Oshima, Ankyaba, Kakeroma Jima.

Material examined. — **Mayotte** • 1 dd; Mozambique Channel, W Mayotte, BIOMAGLO Stn DW4847; 12°41'S, 44°57'E; 738-763 m depth; 30.I.2017; MNHN.

Distribution. — Indo-West Pacific, from the eastern coast of Africa to Maldives, Papua New Guinea, Philippines, Japan, New Caledonia (Habe 1963; Hasegawa 2000; Pizzini *et al.* 2013; Vannozzi 2017; 2019a; 2019b; unpublished data).

Diagnosis. — Shell of average size for the genus, semitransparent whitish, glossy. Tube subcylindrical, tapering toward both the apex and the aperture. Maximum width located at about one quarter of the length close to the aperture. Sculpture of fine, regular rings. Septum on the cutting plane, with a strong mucro, showing a straight dorsal side and a sloping, slightly convex ventral side. Young stage showing a rapid growth and a cow-horn shape. Protoconch planispiral of about 1.75 whorls with a shallow sinusigera. Adult shell length 2.8 mm.

Remarks

A single, slightly worn specimen was found in the studied material. No differences can be seen with respect to specimens coming from other Indo-West Pacific localities.

Mauroceras sandwichense (de Folin, 1881) (Fig. 3N)

Meioceras sandwichensis [sic] de Folin, 1881: 18, pl. 1, figs 10, 11.

Mauroceras sandwichense —Vannozzi 2019a: 60 and synonymy therein.

Type material. — **Holotype. Hawaii** • dd; Hawaii; MNHN-IM-2000-24904 figured by Pizzini *et al.* 2013: fig. 15G.

Type locality. — Pacific Ocean, Hawaii.

Material examined. — **Mayotte** • 1 dd juv; Mozambique Channel, W Mayotte, BIOMAGLO Stn DW4854; 12°56'S, 44°58'E; 455-465 m depth; 4.II.2017; MNHN.

Distribution. — Indo-West Pacific, recorded from Red Sea, Mayotte and Hawaii (Kay 1979; Blatterer 2019; Vannozzi 2019a).

Diagnosis. — Shell small for the genus. Shell tubular, arched, slightly but clearly twisted in ventral view. Dorsal and ventral sides of the tube evenly arched. Septum slightly protruding, with a sharp dorsal mucro, slightly rotated toward the right side. Aperture simple, oblique. Early teleoconch coiled, trochospiral, widely umbilicated, starting to uncoil after about 1 whorl. Sculpture of slightly wavy collabral ribs in the early teleoconch, fading with teleoconch growth and disappearing in the adult stage. Transition to the adult stage rapid. Protoconch planorbid of 1. 5 whorls. Adult shell length 2 mm.

Remarks

A single, rather worn juvenile stage was found in the examined material. This species shows a characteristically tightly-coiled early teleoconch that readily distinguishes it from the congeners (Blatterer 2019; Vannozzi 2019a).

Subfamily Strebloceratinae Bandel, 1996

Genus *Strebloceras* Carpenter, 1859

Type species. — †*Strebloceras cornuoides* Carpenter, 1859 by subsequent designation, Finlay (1931: 20).

Strebloceras oliverioi Vannozzi, 2019 (Fig. 6A-D)

Strebloceras oliverioi Vannozzi, 2019c: 148, fig. 1a-d.

Strebloceras sp. A Vannozzi, 2016: 118, fig. 3G-M.

Type material. — **Holotype. Yemen** • dd; offshore Yemen; 14°47'12"N, 42°33'22"E; 76 m depth; MZUB 60080.
Paratype. Sudan • 1 dd; Sha'ab Rumi; 60 m depth; SCUBA, 3.II.1992; MCZR.

Type locality. — Southern Red Sea, offshore Yemen, 14°47'12"N, 42°33'22"E, 76 m depth.

Material examined. — **Mayotte** • 1 dd; Mozambique Channel, NW Mayotte, BIOMAGLO Stn DW4848; 12°35'S, 44°55'E; 399-402 m depth; 30.I.2017; MNHN-IM-2022-17519.

Distribution. — Known from southern Red Sea and Mayotte (Vannozzi 2019c).

Diagnosis. — Shell of average size for the genus. Protoconch low trochospiral, broad, of about 2.25 whorls. Sinusigera notch very shallow. Teleoconch tubular, twisted, with circular cross section. Teleoconch initially tapering, then slowly growing until the aperture. Sculpture of irregular collabral ribs. Aperture simple. Length 2 mm.

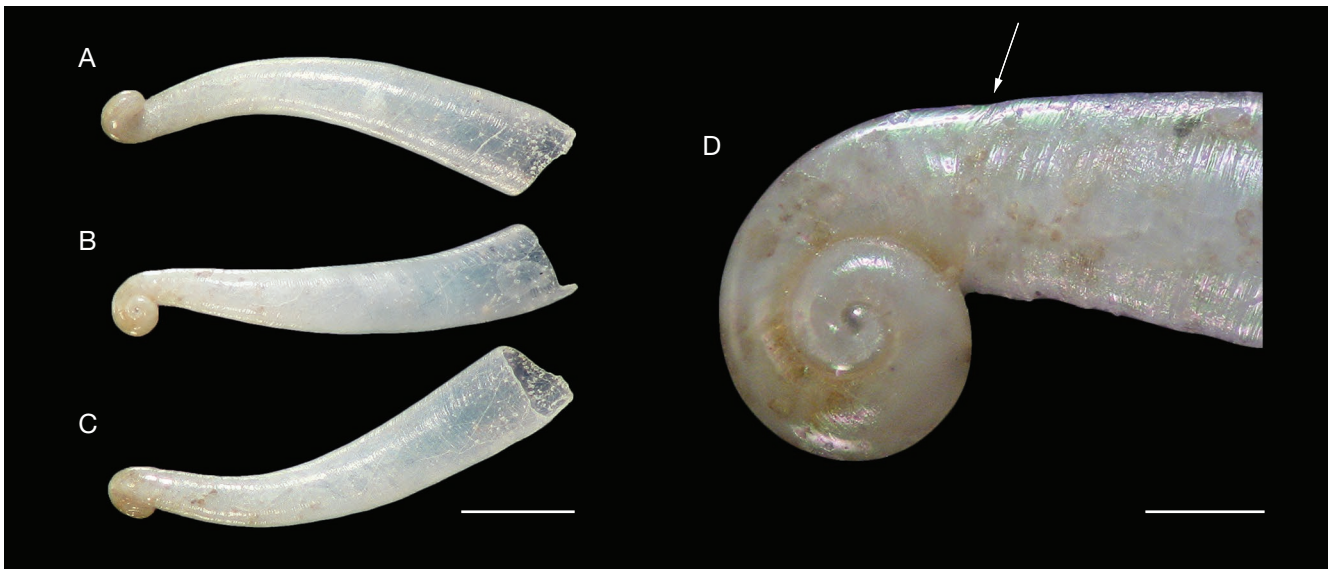

Fig. 6. — *Strebloceras oliverioi* Vannozzi, 2019 from Stn DW4848, MNHN-IM-2022-17519: **A-C**, different views of the specimen; **D**, protoconch. **Arrow** marks protoconch/teleoconch transition. Scale bar: A-C, 1 mm; D, 100 µm.

Table 2. — List of Caecidae from BIOMAGLO Exp. divided by sampling site. Numbers refer to station code as DW+number, as referred in Table 1.

Station DW	4789	4800	4801	4807	4808	4814	4818	4820	4826	4836	4841	4842	4843	4846	4847	4848	4851	4853	4854	4860	4864	4869	4871
C. biomaglo n. sp.					•			•											•				
C. cooki Pizzini & Raines, 2011	•							•	•						•	•		•	•			•	•
C. egenum Vannozzi, 2017																			•				
C. hyalinum Vannozzi, 2022															•								
C. iricolor n. sp.	•								•										•	•			•
C. cf. *mauritianum* de Folin, 1868								•															
C. sepimentum de Folin, 1868	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•
C. succineum de Folin, 1880				•						•									•		•		
Caecum sp.															•								
M. kajiyamai (Habe, 1963)															•								
M. sandwichense (de Folin, 1881)																			•				
S. oliverioi Vannozzi, 2019																•							

Remarks

A single specimen was found in the examined material. Apart from the chipped aperture, the shell is otherwise perfect and agrees well with the type material, although the tube is slightly broader. This is the third known specimen of this species and this finding extends its distribution beyond the Red Sea.

DISCUSSION

Considering the relatively small number of available specimens, likely due to depth of the biotopes sampled, and the limited extent of the area investigated, the Caecidae collected during the BioMaGlo Exp. exhibited considerable diversity, with 11 recognized species (Table 2). All specimens were empty shells without operculum and in several cases they were more or less worn, suggesting that the habitats of living specimens occur at shallower depths. The most abundant species in the examined material is *Caecum sepimentum*, accounting for more than 88% of all specimens. In contrast, five species were represented by a single specimen. Two species, *Caecum biomaglo* n. sp. and *C. iricolor* n. sp., possibly endemic to the Mayotte-Glorieuses area, are described as new. A further single specimen remained so far undetermined. All other species, apart from *Strebloceras oliverioi*, known from the Red Sea and whose distribution is here extended to Mozambique Channel and perhaps *Caecum mauritianum*, which requires further study, show a wide Indo-West Pacific distribution. Significant range extension for *Caecum egenum* is reported. Species occurrence in each station is reported in Table 2.

CONCLUSION

The Caecidae from BIOMAGLO Expedition (2017) carried out by the MNHN in the Mayotte-Glorieuses area are presented. Only 23 stations out of 89 contained repre-

sentatives of this family, with 320 collected specimens. All specimens were empty shells. Eleven species were recorded, two of which described as new: *Caecum biomaglo* n. sp. and *C. iricolor* n. sp. Considering the limited sampled area and the deep sampled biotopes, the family Caecidae revealed a significant biodiversity.

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REFERENCES

Albano P. G. & Pizzini M. 2011. — Notes on Caecidae (Mollusca: Gastropoda) from southern Mozambique, with the description of a new species. *African Invertebrates* 52 (1): 1-10. https://doi.org/10.5733/afin.052.0101

Bandel K. 1996. — Phylogeny of the Caecidae (Caenogastropoda). *Mitteilungen aus dem Geologisch-Paläontologischen Institut der Universität Hamburg* 79: 53-115.

Blatterer H. 2019. — Mollusca of the Dahab region (Gulf of Aqaba, Red Sea). *Denisia* 43: 1-480. https://www.zobodat.at/pdf/DENISIA_0043_0001-0480.pdf

Castelin M., Delavenne J., Brisset J., Chambart C., Corbari L., Keszler L., Lozouet P., Olu K., Poncet L., Puillandre N. & Samadi S. 2019. — Exploration et étude de la biodiversité benthonique profonde de Mayotte et des Îles ésparses. Rapport technique MNHN 2019 mnhn-03335768. https://hal-mnhn.archives-ouvertes.fr/mnhn-03335768

Chester C., Agosti D., Sautter G., Catapano T., Martens K., Gérard I. & Bénichou L. 2019. — EJT editorial standard for the semantic enhancement of specimen data in taxonomy literature. *European Journal of Taxonomy* 586: 1-22. https://doi.org/10.5852/ejt.2019.586

Draper C. B. 1985. — Mollusks which truncate their shells and how they plug the openings. *The Festivus* 17 (1): 3-9. https://www.biodiversitylibrary.org/item/196075

Finlay H. J. 1931. — On the occurrence of *Strebloceras* in New Zealand. *Transactions and Proceedings of New Zealand Institute* 62 (1): 20-22. https://paperspast.natlib.govt.nz/periodicals/TPRSNZ1931-62.2.5.3

Folin L. de 1868. — Les rivages de l'Île Maurice, *in* de Folin L. & Périer L. (eds), *Les Fonds de la Mer* 1: chap. 17, 82-88, pls 6, 9-11. https://www.biodiversitylibrary.org/item/108784

Folin L. de 1875. — Monographie de la Famille des Caecidae. *Bulletin de la Société de Sciences, Lettres et Arts* 1: 103-131. https://gallica.bnf.fr/ark:/12148/bpt6k834938

Folin L. de 1880. — On the Mollusca of the H.M.S. Challenger Expedition. The Caecidae, comprising the genera *Parastrophia*, *Watsonia*, and *Caecum*. *Proceedings of the Zoological Society of London* 52: 806-812. https://www.biodiversitylibrary.org/item/90455

Folin L. de 1881. — Un *Meioceras* des Îles Sandwich, *in* de Folin L. & Périer L. (eds), *Les Fonds de la Mer* 4: chap. 8, 18, pl. 1. https://www.biodiversitylibrary.org/item/51439

Gray J. E. 1847. — *List of the genera of recent Mollusca, their synonyma and types*. Richard & John E. Taylor, London: 129-219. https://www.biodiversitylibrary.org/part/244293

Habe T. 1963. — Eight minute species of shells from Amami Islands far south of Kyushu, Japan, including six new species. *Venus* 22 (3): 229-237. https://doi.org/10.18941/venusjjm.22.3_229

Hasegawa K. 2000. — Caecidae, *in* Okutani T. (ed.), Marine Mollusks in Japan. Tokai University Press, Tokyo: 170-173.

Hedley C. 1903. — Studies on Australian Mollusca. Part 7. *Proceedings of the Linnean Society of New South Wales* 27: 596-619. https://www.biodiversitylibrary.org/item/29995

Kay E. A. 1979. — Hawaiian Marine Shells. Reef and shore fauna of Hawaii. Section 4: Mollusca. Bernice P. *Bishop Museum Special Publication* 64 (4), 653 p. http://hbs.bishopmuseum.org/pubs-online/pdf/sp64-4.pdf

Lightfoot J. 1992a. — Hawaiian Caecidae. *Hawaiian Shell News* 40 (7): 1, 4-5. Reprinted in Of Sea & Shore 15 (3): 171-173.

Lightfoot J. 1992b. — Caecidae of the western Atlantic. *Of Sea and Shore* 14 (4): 171-185.

Moore D. R. 1961. — The marine and brackish water Mollusca of the State of Mississippi. *Gulf Research Reports* 1 (1): 1-58. https://doi.org/10.18785/grr.0101.01

Morton J. 1975. — Form and habit in some small gastropods of New Zealand boulder beaches. *The Veliger* 18 (1): 1-15. https://www.biodiversitylibrary.org/item/137755

Nofroni I., Pizzini M. & Oliverio M. 1997. — Contribution to the knowledge of the family Caecidae. 3. Revision of the Caecidae of the Canary Islands (Caenogastropoda: Rissooidea). *Argonauta* 10 (7-12): 3-32.

Ovalis P. & Mifsud C. 2014. — On the presence of *Caecum sepimentum* de Folin, 1868 (Gastropoda: Caecidae) in the Mediterranean Sea. *Triton* 29: 3, 4.

Pagli A. 2009. — Untitled, *in* Forum Natura Mediterraneo. Accessed through: http://www.naturamediterraneo.com/forum/topic.asp?TOPIC_ID=95634 on 2023-02-26.

Pizzini M. & Raines B. 2011. — The Caecidae from French Polynesia with description of eight new species (Caenogastropoda: Rissooidea). *Bollettino Malacologico* 47 (1): 23-46. https://www.biodiversitylibrary.org/part/190468

Pizzini M., Nofroni I. & Oliverio M. 1998. — Contribution to the knowledge of the family Caecidae. 4. The temporary septum formation of some caecid species (Caenogastropoda: Rissooidea). *Iberus* 16 (1): 133-140. https://www.biodiversitylibrary.org/part/98386

Pizzini M., Raines B. & Vannozzi A. 2013. — The family Caecidae in the South-West Pacific (Gastropoda: Rissooidea). *Bollettino Malacologico* 49 (suppl. 10): 1-78. https://www.biodiversitylibrary.org/part/291987

Raines B. K. 2020. — A Rosetta Stone for eastern Pacific Caecidae (Gastropoda: Caenogastropoda). *Zootaxa* 4827: 1-146. https://doi.org/10.11646/zootaxa.4827.1.1

Rehder H. A. 1946. — Additional notes on the dates of publication of *Les fonds de la mer*. *Proceedings of the Malacological Society of London* 27 (2): 74-75. https://doi.org/10.1093/oxfordjournals.mollus.a064505

Selli R. 1974. — Molluschi quaternari di Massaua e di Gibuti, *in* Missione geologica dell'Azienda Generale Italiana Petroli (A.G.I.P.) nella Dancalia meridionale e sugli altipiani hararini (1936-1938). *Documentazione Paleontologica, Accademia Nazionale dei Lincei* 4 (2): 151-444, pls 1-30.

Spada G., Sabelli B. & Giannuzzi-Savelli R. 2023. — *Mangelia* Risso, 1826 and allied genera in the Mediterranean with the description of a new genus and three new species (Gastropoda: Mangeliidae). *Bollettino Malacologico* 59 (1): 1-53. https://doi.org/10.53559/BollMalacol.2022.06

Vannozzi A., Pizzini M. & Raines B. 2015. — Revision of South African Caecidae (Mollusca: Gastropoda). *African Invertebrates* 56 (1): 99-136. https://doi.org/10.5733/afin.056.0109
Vannozzi A. 2016. — Revision of the genus *Strebloceras* Carpenter, 1859 (Gastropoda: Caecidae). *Bollettino Malacologico* 52 (2): 110-121. https://www.biodiversitylibrary.org/item/278584
Vannozzi A. 2017. — The family Caecidae (Mollusca: Gastropoda) from the Central Philippines. *Bollettino Malacologico* 53 (2): 121-149. https://www.biodiversitylibrary.org/item/278548
Vannozzi A. 2019a. — *Mauroceras*, a new genus for Indo-West Pacific species hitherto assigned to *Meioceras* (Gastropoda: Caecidae). *Bollettino Malacologico* 55 (1): 55-61.
Vannozzi A. 2019b. — The family Caecidae (Mollusca: Gastropoda) from northern Papua-New Guinea. *Bollettino Malacologico* 55 (1): 72-104.
Vannozzi A. 2019c. — *Strebloceras oliverioi* spec. nov., a new species from the southern Red Sea (Gastropoda: Caecidae). *Basteria* 83 (4-6): 147-150. https://natuurtijdschriften.nl/pub/1018543/BAST2019083004007.pdf
Vannozzi A. 2019d. — Rediscovery of *Caecum folini* Kisch, 1959 (Gastropoda: Caecidae). *Basteria* 83 (4-6): 166-168. https://natuurtijdschriften.nl/pub/1001511/BAST2019083004010.pdf
Vannozzi A. 2022. — The identity of *Caecum arabicum* (Issel, 1869), with the description of a new species from eastern Africa and the synonymization of caecid taxa introduced by Selli (Gastropoda: Caecidae). *Archiv für Molluskenkunde* 151 (2): 85-92. https://doi.org/10.1127/arch.moll/151/085-092
Winckworth R. 1941. — *Les fonds de la mer*. *Proceedings of the Malacological Society of London* 24: 149-151.

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