Cyphoma eludens n. sp. - a Spectacular New Ovulid from the Atlantic Ocean (Gastropoda: Ovulidae)

By FELIX LORENZ, D-Buseck, Germany & JUDITH BROWN, STHL-Jamestown

With 13 figures on Plate 1

Keywords

Ovulidae, new species, transatlantic distribution, St. Helena

Abstract

Cyphoma eludens n. sp. differs from *C. aureocinctum* DALL, 1889 by a larger, more solid and heavy shell, more developed and calloused extremities, a broader and darker encircling band that runs further along the left margin basally. The animal of *C. eludens* n. sp. lacks the striking red and white pigmentation of the mantle observed in *C. aureocinctum*. Both species have a transatlantic distribution and are the only Atlantic Ovulids living on black corals.

Zusammenfassung

Cyphoma eludens n. sp. unterscheidet sich von *C. aureocinctum* DALL, 1889 durch ein größeres, schwereres Gehäuse mit stärker entwickelten Extremitäten und einem breiteren, dunkleren Band, das auf der Basis näher am linken Rand entlang läuft. Dem Mantel von *C. eludens* n. sp. fehlt die auffallend rot/weiße Musterung, die *C. aureocinctum* auszeichnet. Beide Arten haben ein transatlantisches Verbreitungsgebiet und sind die einzigen Ovuliden des Atlantiks, die auf Schwarzen Korallen vorkommen.

Introduction

The family Ovulidae has become increasingly popular among researchers in recent years. Since the publication of the revision of the family by CRAWFORD N. CATE (1973), more than 60 new taxa have been described from all over the world, and a series of publications specialized in the family (see FEHSE 2001). For example, the thin-shelled *Simnia hiscocki* from the south of England, which may serve as indicator for climate-change effects (LORENZ & MELAUN 2011). Numerous new species were discovered in moderately shallow waters of the Egyptian Red Sea, from the world's most popular dive sites around Hurghada (LORENZ 2009, 2012, LORENZ & FEHSE 2011). At the same time, researchers have become interested in the diversity of the family, which is a challenge for molecular barcoding (C. P. MEYER, pers. comm. with the first author 2013).

In their monograph of the family, LORENZ & FEHSE (2009, Pl. 120) illustrate several shells identified as *Cyphoma aureocinctum* DALL, 1889. Due to the scarcity of specimens and the lack of animal photographs, they could not realize that they were actually dealing with two different species. The recent discovery of populations of both species at diveable depth off the Canary Islands and St. Helena finally reveals that the "large variation" of *Cyphoma aureocinctum* represents an undescribed species.

Abbreviations

CLSF	CHIAPPONI LORENZ Seashell Foundation, Lecco, Italy
DFB	Collection DIRK FEHSE, Berlin, Germany
FL	Collection FELIX LORENZ, Buseck, Germany
H/L	height/length ratio in %
H/W	height/width ratio in %
L	length (mm)
mR	relative mass
MSF	Molluscan Science Foundation, Dr. M. A. MONT, Owings Mills, Maryland, USA
MNHN	Museum National d'Histoire Naturelle, Paris, France
USNM	National Museum of Natural History - Smithsonian Institution, Washington, USA
W/L	width/length ratio in %

Material and methods

Six live-collected adult specimens, three from Florida and three from St. Helena were available. As comparison material, four specimens of *Cyphoma aureocinctum* and numerous photographs of other specimens were available. Length, width, height, and weight were used to compare the shells by an abbreviated version of a formula introduced for cowry-shells (see BRIDGES & LORENZ 2012): L (W/L–H/L–H/W) [mR].

The relative mass (mR) of a shell in % is the relation between the measured weight of a shell (in g) and the hypothetical weight of a solid block of aragonite (ρ = 0,00293 g/mm^3) of the shell's dimensions (length, width and height) (see LORENZ & BEALS 2013). It is used to objectively compare "lightweight" against "heavy" shells.

Family Ovulidae FLEMING, 1822

Subfamily Simniinae F. A. SCHILDER, 1925

Genus ***Cyphoma*** RÖDING, 1798

Cyphoma eludens n. sp.

Cyphoma aureocincta – LORENZ & FEHSE 2009: pl. 120, figs. 1, 2, 4

Material

Holotype: 30.9 mm. Bennetts Point, St. Helena Island, 10-12 m. Coll. MNHN.

Paratype 1: 29.1 mm. Black Rocks S West Point, St. Helena Island, 11 m. Coll. CLSF 96076

Paratype 2: 27.8 mm. Buttermilk Point, St. Helena Island, 12-16 m. Coll. MSF ov8956

Paratype 3: 29.3 mm. Miami Beach, Florida Straits, 925 m. Coll. FL

Paratype 4: 31.6 mm. Miami Beach, Florida Straits, 925 m. Coll. FL

Paratype 5: 27.0 mm. Florida Straits, off 500-550 m. Coll. DFB

Description

The holotype is a solid and heavy shell of average size for the genus (30.9 mm). The general shape is narrow, rostrate, with greatly swollen extremities and a distinct angular mid-dorsal transverse keel. The posterior extremity is blunt and distinctly separated from the body whorl. The funiculum is a slight swelling separated from the posterior canal by a shallow groove which is visible as slight indentation on the right side of the extremity on dorsal view. The anterior extremity is calloused dorsally, broad and blunt. The labrum is calloused and separated from the dorsum by a shallow yet distinct groove. It is rounded, equally narrow along the apterure, and edentate. The aperture is constricted posteriorly, evenly widening towards the anterior. There is a prominent accumulation of basal callus along the aperture on columellar side, sloping into the aperture. A weak callus ridge forms the columellar peristome, which is enhanced in the anterior third, forming a shallow, indistinct fossula.

The ground color of the shell and the callosities are plain white. There is a 2-3 mm broad band of dark brown color encircling the shell along the margins and above the extremities, separating the basal and labral callosities from the dorsum. On basal view, this band is only visible along the outer margin of the columellar side.

In the paratypes, two weak orange transverse lines may be visible dorsally – a more distinct one in the posterior third, and a weaker one in the anterior third. The specimens we have been able to study show remarkably little variation, except for the intensity of these transverse lines.

The animal has a smooth, thin, transparent mantle with a brown line framing the margins. These lines have a diffuse darker halo, forming a longitudinal axis of symmetry where the mantle lobes meet. There are few small, irregular orange blotches encircled with darker. The surface of the pale orange foot is ornamented with wavy stripes of dark brown lines that meet with a narrow frame of the same color along the outer edge of the foot. The tentacles are purple-brown, the eye-stalks white. The sipho is fleshy, transparent, stained with pale lilac, which becomes intense along the smooth edge. The density of the darker blotches of the mantle varies individually.

The spawn consists of sphaerical, transparent egg capsules of approx. 3 mm diameter, arranged in chains attached to the branches of the host coral. Each capsule contains approximately 100 to 200 larvae.

Type locality

Bennetts Point on the western coast of St. Helena Island, Atlantic Ocean (15.962 S, 05.766 W). Here, the species was photographed in situ and collected by the second author at 10-12 m on *Plumapathes pennacea* (PALLAS, 1766).

Distribution and Habitat

At St. Helena one further specimen was collected at Buttermilk Point (12-16 m; 15.907 S, 05.707 W) and one from near Black Rocks, South West Point (11 m; 15.985 S, 05.782 W), with further sightings made by the second author at Speery Island (22 m; 16.029 S, 05.753 W), Cavalley Hole near Flagstaff Bay (14-17 m; 15.909 S, 05.694 W) and on the Bedgellett wreck (14-18 m; 15.962 S, 05.766 W). Two specimens were dredged at 925 m off Miami Beach, Florida Straits in 1959. Another typical specimen in coll. DFB was also taken in the

Florida Straits, at 500-550 m. These are the only records of the new species that we are aware of.

The black coral branches in the vicinity of the ovulids show fresh feeding traces, which implies that the ovulids are true parasites and feed directly on the polyps of their host.

Etymology

The name is derived from Latin *eludere* = to evade, to elude, and refers to the superlatives of this species in terms of depth-range, distribution and beauty, eluding all of its congeners.

Remarks

Cyphoma aureocinctum DALL, 1889 was originally described from Sombrero Island, 200 km east of Puerto Rico, at 130 m (original description). Another specimen was reported from near Havanna, Cuba, collected at 123 m with white seafans (given as type locality by CATE 1973). The holotype (USNM 87124) is a small shell, measuring 18.5 mm, illustrated in CATE (1973: 71, fig. 153) and herein (Pl. 1 Fig. 1). Based on the holotype, a group of four specimens in the collection of the first author, from Columbia, The Bermudas, and the Cape Verde Islands (see also ROLÁN 2005) can be identified as *C. aureocinctum* s. str., as well as specimens photographed from northern Jamaica. A living animal was photographed by Dr. MICHAEL J. SEALEY in the Canary Islands. He reported that the species was abundant on black corals at 15-30 m, but only during a few months, after which they disappeared again (pers. comm. 2013). Another specimen war photographed by Dr. PETER WIRTZ off the northwest of the island of São Vicente in the Cape Verde Islands in a depth of 10 m on *Antipathella wollastoni* (J. E. GRAY, 1857) (Text-Figs 1 & 2). The deepest record of *C. aureocinctum* is illustrated by ABBOTT & DANCE (1990) as coming from 1200 m off Florida.

The shell formulae derived from four specimens of *C. aureocinctum*: 25 (36 - 31 - 84)[8,4] and five specimens of *Cyphoma eludens* n. sp: 30 (42 - 34 - 83)[12,5].

On average, *C. aureocinctum* is a slightly smaller, narrower and more delicate shell of semi-transparent appearance, whereas *C. eludens* n. sp. is considerably more solid and heavy due to strong accumulations of callus on base, margins and extremities. This is obvious on comparing the mR values in the formulae. The extremities of *C. eludens* n. sp. are more projecting, more calloused and blunt, whereas those of *C. aureocinctum* are rather narrow, shorter and pointed posteriorly. The fossula of *C. aureocinctum* is shorter but more distinctly projecting than in *C. eludens* n. sp.

The dorsal area surrounded by the darker band is smaller in *C. eludens* n. sp. relative to the shell's length, due to the stronger development of callus and the longer extremities. In *C. aureocinctum*, that band is yellow to orange and moderately narrow. Above the extremites it is less distinct to absent. On basal view it is mostly situated nearly midway on columellar side, just left of the shell's axis. In *C. eludens* n. sp., the band is dark brown, broader and usually distinct throughout, also above the extremities dorsally. On basal view, the band is situated further towards the columellar (left) margin. The fine orange transverse lines can be found in both species.

Text-Figs 1 & 2: Living *Cyphoma aureocinctum* from the Cape Verde Islands. Details see text.

Photos courtesy Dr. P. WIRTZ ©

The mantle of *C. aureocinctum* from the Canary Islands is bright red with numerous minute white specks that condense to several irregular transversally oriented zones, and larger, irregular white blotches of variable size. Along its edges, there is a red line along which pale cream triangular spots are lined up. The animal of *C. eludens* n. sp. differs considerably by the transparent mantle which shows sparse, irregular darker blotches and no ornamentation along the edges of the mantle, except for a dark brown border.

The placement of the two species discussed herein in *Cyphoma* is tentative, as the host preference and the exceptional coloration of the shell are untypical for that genus. The increased mtDNA sampling conducted on the family Ovulidae will hopefully clarify their systematic status.

The discovery of *C. eludens* n. sp. in shallow waters of St. Helena raises more mystery around these striking Ovulids. Both, *Cyphoma aureocinctum* and *C. eludens* n. sp. have an exceptional depth-range, from 10 m to approximately 1,200 m, and a distribution that stretches across the Atlantic, from the Florida Straits in the Caribbean, to the Archipelagos off the West African coast. Also the range of tolerance to cold as well as warm water temperatures is exceptional: between 6-10°C in the deep water of the Florida Straits (SCHMITZ & RICHARDSON 1991) and up to 24°C on St. Helena.

An antipatharian host is rare in the family Ovulidae, less than 5 % of the species live on black corals. The two species discussed herein are the only Atlantic Ovulids known to occur on black corals. Whether they can be found sympatrically, and whether *C. eludens* n. sp. also occurs in other places, such as the southern Caribbean, Ascension, the Cape Verde and Canary Islands, is so far unknown.

Acknowledgements

We wish to thank Dr. MICHAEL J. SEALEY of the ONG Iberian Biodiversity, the DARWIN Initative, Dr.PETER WIRTZ, Madeira, and Dr. ELLEN STRONG of the USNM. For continued support we are grateful to GRAHAM SIM, CRAG YON, ANTHONY THOMAS, DIRK FEHSE, Dr. MICHAEL A. MONT, RANDALL J. BRIDGES, CHARLES FINLEY, DON PISOR, JOSE & MARCUS COLTRO, and Dr. CHRISTOPHER P. MEYER. Special thanks to JANA KRATZSCH, KLAUS GROH, ELIZABETH CLINGHAM, ANNALEA BEARD, LEEANN HENRY and Dr. CARSTEN RENKER.

References

ABBOTT, T. & DANCE, P. (1990) Compendium of seashells. – 413 pp.; Melbourne, Florida (American Conchologists, Inc.).

CATE, C. N. (1973): A systematic revision of the recent Cypraeid family Ovulidae (Mollusca: Gastropoda). – The Veliger, **15** (Supplement): I-IV, 1-116, text figs. 1-251.

DALL, W. H. (1889): Reports on the results of dredging, under the supervision of ALEXANDER AGASSIZ, in the Gulf of Mexcio (1877-78) and in the Caribbean Sea (1879-80), by the U.S. Coast Survey Steamer "Blake," Lieut.-Commander C. D. SIGSBEE, U.S.N., and Commander J. R. BARTLETT, U.S.N., commanding. Part II. Gastropoda and Scaphopoda. – Bulletin of the Museum of Comparative Zoology, **18** (29): 1-492, pls. 10-40.

FEHSE, D. (2001): Beiträge zur Kenntnis der Ovulidae (Mollusca: Cypraeoidea). VIII. Einleitung zur Familie sowie Katalog, Taxonomie und Bibliographie und Bemerkungen zu verwandten Gruppen. – Acta Conchyliorum, **5**: 3-51, text figs. 1-3, tabs 1-6. [p. 19]

LORENZ, F. (2009): A new species of *Archivolva* from the Red Sea (Gastropoda: Ovulidae). – Conchylia, **40** (1/2): 51-55.

LORENZ, F. (2012): Another new species of *Archivolva* from the Red Sea (Gastropoda: Ovulidae). – Conchylia, **42** (1-4): 65-69.

LORENZ, F. & FEHSE, D. (2009): The living Ovulidae - A Manual of the Families of Allied Cowries Ovulidae, Pediculariidae and Eocypraeidae. – 650 pp.; Hackenheim, Germany (ConchBooks).

LORENZ, F. & MELAUN, C. (2011): A new species of *Simnia* from England (Caenogastropoda: Ovulidae). – Molluscan Research, **31** (3): 167-175.

SCHMITZ, W.J. & RICHARDSON, P. L. (1991): On the sources of the Florida Current. – Deep-Sea Research, **38** (Supplement): 379-409.

ROLÁN, E. (2005): Malacological fauna from the Cape Verde Archipelago. Part 1: Polyplacophora & Gastropoda. – 455 pp., 82 pls., num. unnumb. text figs.; Hackenheim, Germany (ConchBooks).

Addresses of the authors

Dr. FELIX LORENZ
Fr.-Ebert-Str. 12
D-35418 Buseck, Germany
E-mail: felix.lorenz@t-online.de

Dr. JUDITH BROWN
Environmental Management Division
St. Helena Government
Essex House, Jamestown STHL 1ZZ
St Helena Island
E-mail: jude@dicksonandbrown.com

Plate 1 (on p. 12)

Cyphoma aureocinctum DALL, 1889

Fig. 1: Holotype: 18.5 mm. Sombrero Is. Off 130 m. Coll. USNM 87124, courtesy Dr. E. STRONG.

Fig. 2: 18.6 mm. Cabo de la Vela, Colombia. Off 360 m. Coll. FL.

Fig. 3: 26.0 mm. Jamaica. Coll. COLTRO.

Fig. 4: 28.1 mm. South Shore, Bermuda. Off 330 m. Coll. FL.

Fig. 5: 27.1 mm. South Shore, Bermuda. Off 330 m. Coll. FL.

Fig. 6: 25.1 mm. Boavista, Cape Verde Is. Off 45 m. Coll. FL.

Plate 2 (on p. 13)

Cyphoma eludens n. sp.

Fig. 1: Holotype: 30.9 mm. Bennets Point, St. Helena Island. Off 10-12 m. Coll. MNHN.

Fig. 2: Paratype 1: 29.1 mm. Black Rocks, S West Point, St. Helena Island. Off 11 m. Coll. CLSF 96076.

Fig. 3: Paratype 2: 27.8 mm. Buttermilk Point, St. Helena Island. Off 12-16 m. Coll. MSF ov8956.

Plate 3 (on p. 14)

Cyphoma eludens n. sp.

Fig. 1: Paratype 4. 31.6 mm. Miami Beach, Florida Straits. Off 925 m. Coll. FL.

Fig. 2: Paratype 3. 29.3 mm. Miami Beach, Florida Straits. Off 925 m. Coll. FL.

Fig. 3: Paratype 5. 27.0 mm. Florida Straits. Off 500-550 m. Coll. DFB.

Plate 4 (on p. 15)

Living animals

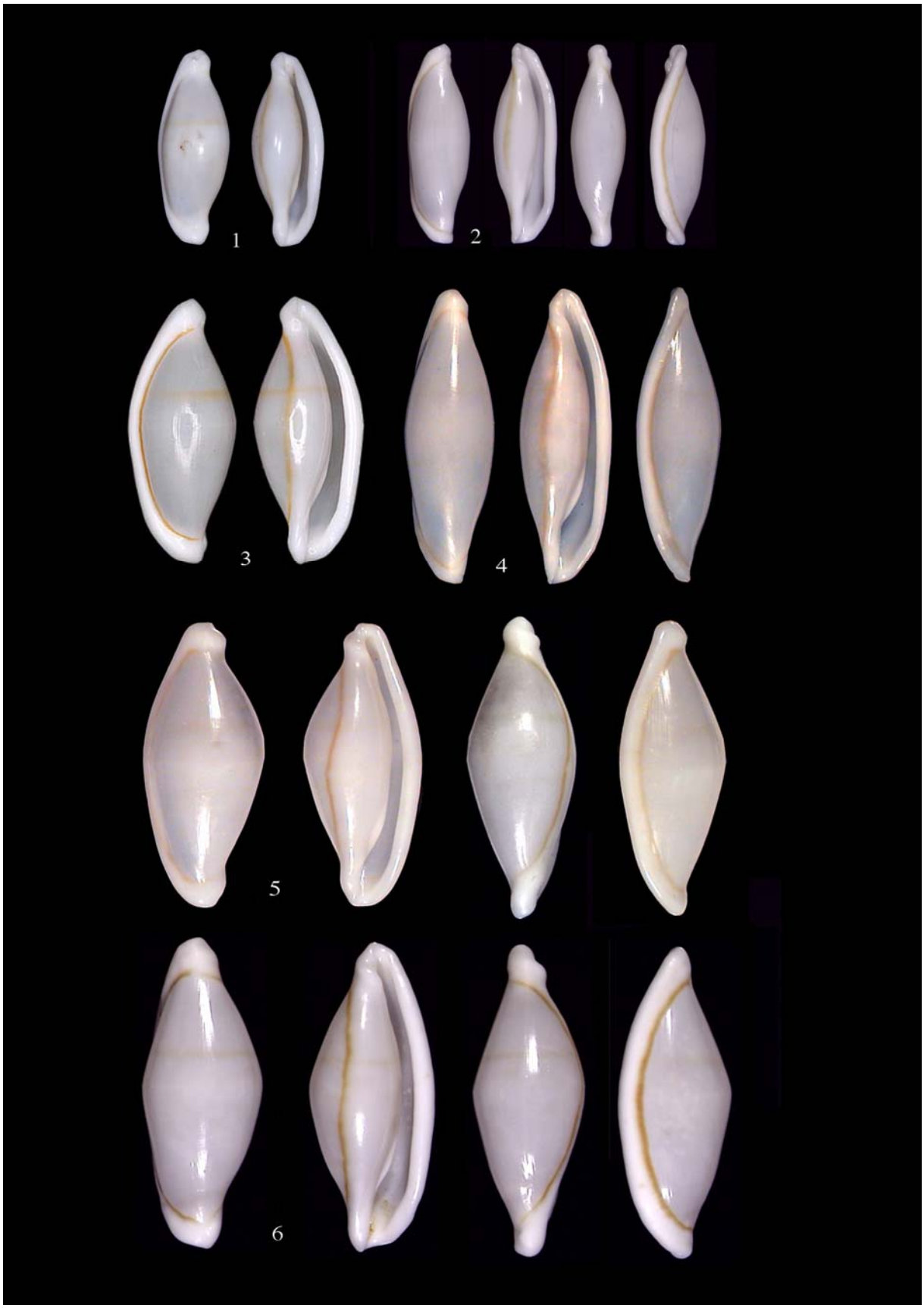
Figs 1-2: *Cyphoma aureocinctum*. With spawn. Canary Islands, at 40 m. Photo: Dr. M. J. SEALEY.

Fig. 3: *Cyphoma eludens*. Mating couple. St. Helena, at approx. 10 m. Photo: Dr. J. BROWN.

Figs 4-6: *Cyphoma eludens*. Variations of mantle coloration. Photo: Dr. J. BROWN.

Fig. 7: *Cyphoma eludens*. With spawn. Note dark longitudinal line formed by the edges of the mantle lobes. St. Helena, at approx. 10 m. Photo: Dr. J. BROWN.

Plate 1



Captions on p. 11

Plate 2

Captions on p. 11

Plate 3

Captions on p. 11

Plate 4

Captions on p. 11