

A new subspecies of *Cribrarula fallax* E. A. SMITH, 1881 (Gastropoda: Cypraeidae)

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With 9 Text-Figs

Keywords

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Abstract

Cribrarula fallax antonellae n. ssp. is described from the Cape Naturaliste to Cape Leeuwin area, far west of the distribution of the nominate subspecies, from which it differs mainly by a more steep fossula, a more inflated shell and a distinctly pustulose labrum.

Zusammenfassung

Cribrarula fallax antonellae n. ssp. aus der Gegend zwischen Cape Naturaliste und Cape Leeuwin, weit westlich des Verbreitungsgebietes der Nominatform, wird beschrieben. Sie unterscheidet sich vor allem durch eine steilere Fossula, eine bauchigere Form und ein deutlich pustulöses Labrum.

Introduction

For a long time, the elusive Australian endemic *Cribrarula fallax* E. A. SMITH 1881 was only known from beached shells from the area between Walpole and Albany, on the southern coast of Western Australia. In the 1990s, a population was discovered at Canal Rocks on the southwestern tip of the continent. These shells were found by divers at approximately 20 meters. Recently, a considerable number of specimens were taken nearby, at an undisclosed spot in the Cape Leeuwin area, again by divers at 30 to 40 meters. The western shells differ from the classic *fallax* by a number of conchological details, and are therefore described as a new subspecies.

Abbreviations

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Cribrarula fallax antonellae n. ssp.

Material

The material studied comprises eighteen diver-collected specimens of the new subspecies as well as the same amount of freshly dead collected *fallax fallax* from Denmark, Western Australia. Measurements listed as length × width × height (labral: columellar toothcount) [weight in grams] locality; depository. The formula is calculated according to BRIDGES & LORENZ 2013.

Holotype: 33.2 × 20.6 × 16.5 (20:22) [3.39] Cape Leeuwin; Coll. WAM

Paratype 1: 29.8 × 17.8 × 14.4 (16:20) [2.63] Cape Leeuwin; Coll. FL

Paratype 2: 34.1 × 19.7 × 16.4 (23:23) [3.20] Cape Leeuwin; Coll. CLSF15001

Paratype 3: 34.9 × 19.9 × 17.1 (21:23) [3.51] Geographe Bay; Coll. CLSF4711

Paratype 4: 36.2 × 22.1 × 19.0 (24:28) [4.58] Cape Leeuwin; Coll. MAM

Paratype 5: 34.7 × 20.1 × 16.8 (20:24) [4.56] Canal Rocks; Coll. CLSF7770

Paratype 6: 36.2 × 20.5 × 17.2 (23:24) [3.61] Cape Leeuwin; Coll. JDD

Paratype 7: 35.5 × 20.3 × 17.4 (21:21) [3.60] Cape Leeuwin; Coll. FL

Paratype 8: 34.8 × 20.9 × 17.1 (23:24) [3.59] Cape Leeuwin; Coll. FL

Paratype 9: 30.6 × 17.4 × 14.8 (22:24) [3.29] Cape Leeuwin; Coll. FL

Paratype 10: 34.0 × 19.2 × 16.7 (20:23) [3.36] Cape Leeuwin; Coll. FL

Paratype 11: 31.3 × 17.2 × 15.3 (20:23) [3.35] Cape Leeuwin; Coll. FL

Paratype 12: 33.6 × 18.7 × 16.6 (22:24) [3.64] Cape Leeuwin; Coll. FL

Paratype 13: 34.2 × 19.7 × 16.9 (22:23) [3.22] Cape Leeuwin; Coll. MAM

Paratype 14 is a fragment of a juvenile bulla shell displaying the protoconch; Coll. FL

Paratype 15: 30.5 × 16.1 × 15.0 (22:12) [3.00] Canal Hamelyn; Coll. MB

Paratype 16: 30.5 × 16.1 × 15.0 (20:21) [2.80] Canal Rocks; Coll. MB

Paratype 17: 32.0 × 20.3 × 15.7 (19:20) [2.80] Augusta; Coll. MB

Paratype 18: 35.7 × 16.1 × 17.9 (23:24) [3.90] Margaret River; Coll. MB

Formula

33 (57 - 49 - 86) 19 : 20 [11,2] – based on Paratypes (no. 14 excluded) and Holotype

Description

The holotype shell is live taken and by all means typical specimen of the new taxon. As there is no variability in any of the important structural features, the following description also applies to all of the paratypes.

The shell is medium-sized (30 to 36 mm) with pyriform outline, slightly inflated body, and rostrated extremities. The spire is umbilicate. The juvenile paratype 14 shows a large (1.3 mm diameter) smooth, paucispiral protoconch of 1.8 mm diameter. The posterior extremity shows a pointed, long labral tip, and a shorter one on the columellar side. The anterior extremity shows a spiny prolongation of the terminal ridge and the labrum, visible on the dorsal view. The labral margin is narrow and rather angular, forming a groove that borders the dorsum. Towards the extremities, there are several distinct tubercles that give the margin a corrugated outline. The aperture is narrow throughout, curved to the left in the posterior third. The labral teeth are thick and quite dense, extending well across the lip, the interstices between them are narrow. The columellar teeth are short, and restricted to the angular columellar border. They extend far into the shell, enhanced by a calloused peristome that runs longitudinally all along the columella, parallel to the apertural edge. In the anterior third, that ridge-like structure is thicker, forming a steep, distinctly denticulate fossula. The terminal ridge is broad and shallow, separated from the last anterior tooth by a narrow incision.

The shell's ground color is pale yellow-orange, the callosities are plain white. There is a thin coat of orange-brown dorsally, with evenly distributed circular lacunae of variable size. A narrow dorsal line extends longitudinally just above the labral

margin. The lacunae and the line are not enhanced with a darker frame, but their outline is well-defined.

The entire animal is of a uniform orange-red color. The mantle is thick, showing numerous prominent lacunae of class 1d (after LORENZ & HUBERT 1993) and minute white specks. Few of the lacunae are of paler color (Fig. 8)

Habitat and distribution

Cribrarula fallax antonellae n. sp. is known from Canal Rocks, Yallingup and an undisclosed spot off Cape Leeuwin (Type locality). It has been washed up on the Augusta lighthouse beach. Records from the Busselton area in Geographe Bay require confirmation. The distribution stretches from Cape Naturaliste to Augusta, Western Australia (Fig. 1). Living specimens have been found at 18 to 40 m, under rocks in association with red and orange sponges.

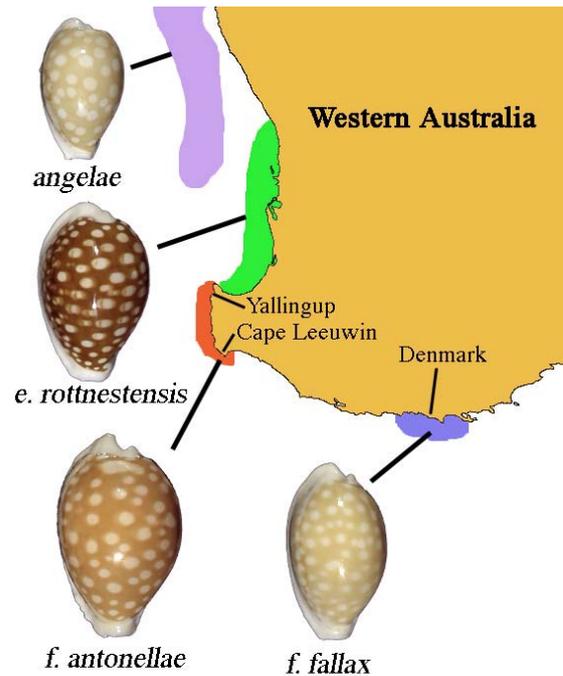


Fig. 1: Distributions of *Cribrarula angelae*, *exmouthensis rotnestensis*, *f. fallax* and *f. antonellae*.

Etymology

The new subspecies is named in honor of our friend and collaborator ANTONELLA CRIPPA of Lecco.

Discussion

Until the year 1986 the name *fallax* E. A. SMITH,

1881 was used for a subspecies or variety of *Cribrarula cribraria* (LINNAEUS, 1758) from Western Australia (SCHILDER & SCHILDER 1952, ALLAN 1956, BURGESS 1970). In 1985 LORENZ studied the holotype of *fallax* in the British Museum of Natural History and concluded that it was identical with a species until then known as *haddnighatae* TRENBERTH 1973 (e.g. in TAYLOR & WALLS 1975). He published a short report which described the outlook on the taxonomical consequences of this discovery (LORENZ 1986). RAYBAUDI reviewed this subject and produced a series of illustrated reports and listings (1986, 1987, see also BIRAGHI 1987). He introduced *cribraria occidentalis*, alas in a taxonomically invalid manner.

In the same context, RAYBAUDI also revised the name *exmouthensis* and illustrated MELVILL's holotype. He assigned the shell to a population from the Broome area, today known as *exmouthensis magnifica* LORENZ 2002. The nominate *exmouthensis* from the Exmouth Gulf area was rediscovered a few years after RAYBAUDI's revisions. In addition, he also introduced the name *cribraria occidentalis* f. *rotnnestensis* in a sales list of The Connoisseur No. 12 and again in TC No. 13 p. 43. The procedure of naming this population was also invalid, according to the International Code of Zoological Nomenclature (ICZN). However, as LORENZ (2002) already pointed out, it was RAYBAUDI who first recognized the diversity of the genus *Cribrarula* along the Western Australian coast. It took more than a decade and the molecular revolution to ascertain that all of the "forms" mentioned in RAYBAUDI's revisions actually represented valid species and subspecies.

LORENZ (2002) discussed the genus *Cribrarula* of Western Australia, considering RAYBAUDI's revisions and the DNA analysis conducted by Dr. CHRISTOPHER MEYER. He validated the name *rotnnestensis*, replaced *occidentalis* with *australiensis*, and described *abrolhensis* and *magnifica* as subspecies of *exmouthensis*. Another specialized study on the genus followed a year later (MORETZSOHN 2003).

Cribrarula angelae MORETZSOHN & BEALS, 2009 was added to the account of Western Australian *Cribrarulae*. It is an interesting taxon, mainly from deeper water. It's DNA has not yet been analyzed and the systematic status is under study.

The following taxa of *Cribrarula* are found along the coast of Western Australia:

Cribrarula "cribraria" australiensis LORENZ, 2002

Cribrarula exmouthensis exmouthensis MELVILL, 1888

Cribrarula exmouthensis abrolhensis LORENZ, 2002

Cribrarula exmouthensis rotnnestensis LORENZ, 2002

Cribrarula angelae MORETZSOHN & BEALS, 2009

Cribrarula fallax fallax E. A. SMITH 1881

Cribrarula fallax antonellae n. ssp.

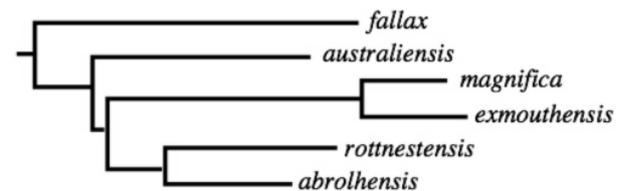


Fig. 2: Simplified cladogram derived from molecular data, showing the relative relationships between the Western Australian *Cribrarula* (after MEYER, personal communication with FELIX LORENZ, 2005)

The molecular data reveal that the Western Australian coast is inhabited by six separate, genetically distinct units, of which the conchologically similar *exmouthensis*, *magnifica*, *abrolhensis*, and *rotnnestensis* are currently regarded as subspecies of a widespread species *exmouthensis* (Fig. 2). The name *australiensis* was originally proposed as a subspecies of *cribraria* LINNAEUS, 1758. However, the molecular data places *australiensis* in the proximity of several distinct Indian Ocean look-alike members of the genus (including *abaliena* LORENZ, 1989 and *ganteri* LORENZ, 1998), whereas, the true *cribraria* is closest to *abrolhensis*. The genus *Cribrarula* is more diverse than the shells suggest, and yet another comprehensive revision is urgently needed.

Although remarkably similar conchologically, *Cribrarula fallax* is not directly attached to the *Cribrarula exmouthensis*-complex. *C. exmouthensis rotnnestensis*, whose distribution overlaps that of *fallax*, is also the closest in shape and general appearance. Many authors have confused *fallax* and instead illustrated specimens of *rotnnestensis*, *abrolhensis*, or *angelae* (BURGESS 1985: 255, BIRAGHI 1986, RAYBAUDI 1986: 27: fig. 3: 1st row, 1st specimen on the left is *abrolhensis*; 2nd row: 4th specimen from the left is *rotnnestensis*, the 5th specimen is *angelae*).

The most obvious difference, the paler color of the dorsal coat of *fallax*, as well as the less distinct lacunae, are also found in occasional specimens of *rotnnestensis* and *abrolhensis* (e.g. the specimen in

Fig. 5: 2).

Cribrarula angelae has a pale yellow dorsal color quite similar to *fallax*. The dentition of *angelae* places it in the proximity of *exmouthensis*, and it is likely that it belongs to this complex (Fig. 5: 3, 4). The main feature that safely distinguishes *fallax* from all other species of the genus is the structure of the columellar dentition. The terminal ridge is rounded and broad, whereas, in the other species it is narrow and pointed. It is separated from the first anterior columellar tooth by a narrow slit in *fallax*, and not by a distinct gap as in the other species. The fossula of *fallax* is a ridge with many rather indistinct denticles and there is a distinct, ribbed peristome along the columella. The fossula region in the other species is steep, with few prolongations of the anterior columellar teeth, but there is no callused ridge as in *fallax*. The peristome of *exmouthensis* and *angelae* is reduced and does not form a prominent callus-ridge as in *fallax* (Fig. 7).

The protoconch of *C. exmouthensis rotnestensis* measures 0.8 mm in diameter, whereas, that of *fallax* measures 1.4 mm (Fig. 3). Both protoconchs show only two whorls indicating non-planktotrophic larvae, with the limiting effects on dispersal and a higher rate of speciation (STRATHMANN 1990, MEYER 2003).

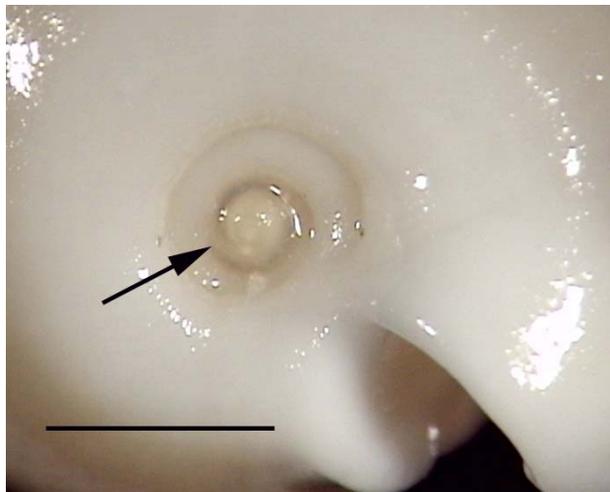


Fig. 3: The protoconch of paratype 14 of *C. fallax antonellae* (arrow). Scale: 5 mm.

The holotype of *Cribrarula fallax fallax* SMITH, 1881 is a well-preserved specimen that can be assigned to the eastern (Denmark) population. The distribution of the *fallax antonellae* n. ssp. is confined to the Cape Naturaliste to Augusta area

on the southwestern tip of Australia, whereas, the nominate subspecies is found on beaches between Walpole and Albany. There is a considerable gap between the known distributions, which is likely to be extended with increasing searches at in between sites. The morphometric analysis of the available shells shows that the typical *f. fallax* is somewhat smaller, equally wide, but quite obviously flatter and less inflated than the new subspecies. The number of teeth is remarkably constant, and the difference in weight is negligible (Fig. 4).

<i>fallax fallax</i>	<i>fallax antonellae</i>
31 (58 - 47 - 81) 19 : 20 [12,3]	34 (58 - 49 - 85) 19 : 21 [11,1]

Fig. 4: The shell-formulae of *f. fallax* and *f. antonellae* n. ssp. There is an obvious difference in the width to length and the height to width ratios, whereas, the reduced number of teeth are identical and the relative masses are quite similar.

The reduced number of teeth in the two subspecies is identical, but the structure of the columellar teeth differs: in *f. fallax*, the columellar teeth extend slightly onto the base and the border of the columellar callus along the aperture is less angular, but slightly sloping. In *f. antonellae*, this border is more angular and steep, especially above the fossula, which is separated by a longitudinal indentation (Fig. 6). The labral margin of *f. fallax* is more even than in *f. antonellae*, where it shows distinct corrugations, or small tubercles towards the extremities. The lacunae of *f. antonellae* are slightly more defined than in *f. fallax*. The dorsal coat of the new subspecies appears to be darker and more saturated, but this is an effect caused by the fresh state of the diver-collected shells against the faded, beached specimens of *f. fallax*. A specimen of *f. antonellae* collected at Canal Rocks in 2001 (paratype 5, Fig. 9: 3) has faded to the same pale color as shells of *f. fallax* from Denmark, Western Australia.

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Fig. 5: 1: *C. e. rotnnestensis* (31.5 mm) Rottnest Is. SW Austr.; 2: *C. e. abrolhensis* (27.6 mm) Dorre Is., W Austr. CLSF4712; 3: *C. angelae* (27.1 mm) Geraldton area, offshore W. Austr. by Taiwanese fishermen, deep water; 4: *C. angelae* (22.9 mm) offshore Dorre Is., W. Austr. MAM163. **((Zahlen 1-4 in TNR 12 pt. fett fehlen noch!))**

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Fig. 6: Fossula area of *C. fallax fallax* (left) and *C. f. antonellae* (right). Note the more distinct step in *f. antonellae* separating the fossula from the columellar margin.

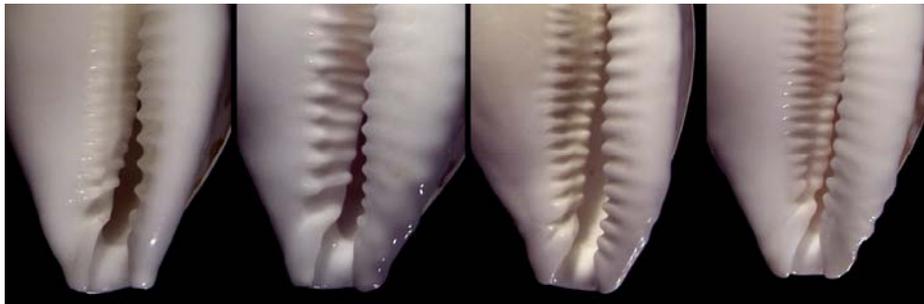


Fig. 7: Fossula region of *C. angelae*, *C. e. rotnestensis*, *C. f. fallax* and *C. f. antonellae* (from left to right). Note the distinct gap between the sharply cut terminal ridge and the first pronounced anterior columellar tooth in *angelae* and *e. rotnestensis*, in contrast to the narrow cut with intermitted denticle between the flat terminal ridge and the first barely pronounced anterior tooth in *f. fallax* and *f. antonellae*.



Fig. 8: *C. fallax antonellae*, living animals.

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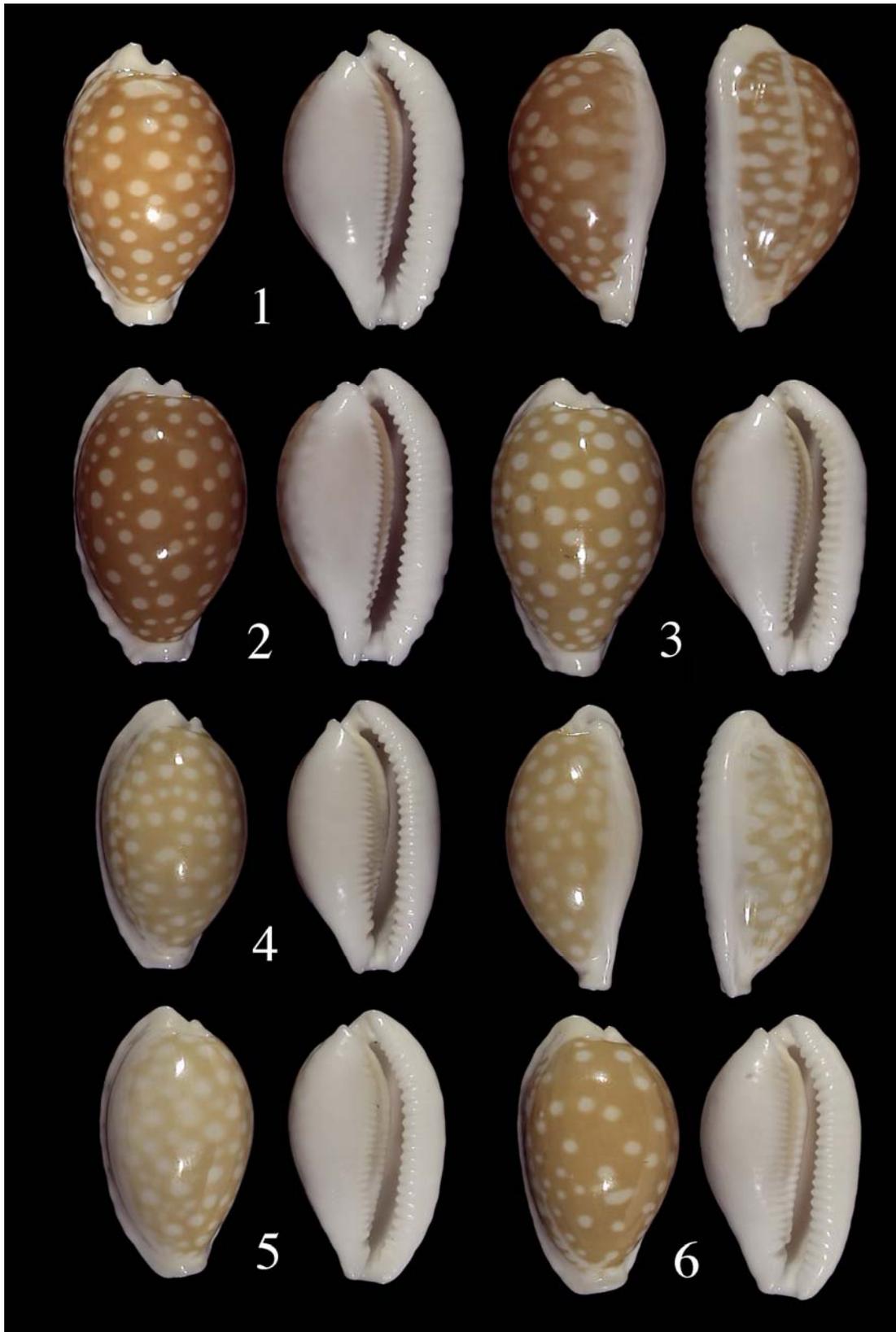


Fig. 9: 1: *C. fallax antonellae* Holotype (33.2 mm) Cape Leeuwin, W Austr. WAM; 2: *C. fallax antonellae* Paratype 2 (34.1 mm) Cape Leeuwin, W Austr. CLSF15001; 3: *C. fallax antonellae* Paratype 5 (34.7 mm) Canal Rocks, Yallingup, W Austr. CLSF7770; 4-6: *C. fallax fallax* (27.8-30.1 mm) all from Parry's Beach, Denmark, SW Austr. CLSF13733,7772. **(Zahlen müssen auf 12 pt. fett reduziert werden!)**