Zoila alabaster n. sp. from NW Australia (Gastropoda: Cypraeidae)

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With 1 Table and 4 Plate1

Keywords

Western Australia, *Cypraeidae*, *alabaster, decipiens, mariellae, Zoila,* new species

Abstract

Zoila alabaster n. sp. is described from the Broome area off Western Australia and compared with *Z. decipiens* (E. A. SMITH 1880) and *Z. mariellae* RAYBAUDI 1983. The shell is white, with lemon-yellow basal patches. Although referred to as an albino, the animal is black. The projecting, produced, anterior terminal ridge, the convex base with rounded margins, and the short, rounded, posterior extremity distinguish this species from its relatives, in addition to its unusual, pale coloration. A dorsal groove and dorsal tubercles of mature *Z. alabaster* n. sp. are not found in any other species of the genus.

Zusammenfassung

Zoila alabaster n. sp. wird aus der Gegend vor Broome, Westaustralien beschrieben und mit *Z. decipiens* (E. A. SMITH 1880) und *Z. mariellae* RAYBAUDI 1983 verglichen. Das Gehäuse ist weiß, mit zitronengelben Basalflecken. Obgleich zunächst für eine Albinoform gehalten, ist das Tier schwarz gefärbt. Die hervorstehende, verdickte Terminalrippe, eine konvexe Basis mit abgerundeten Seiten und die kurze, abgerundete linke Hinterextremität unterscheiden die neue Art von ihren Verwandten, abgesehen von der ungewöhnlichen, hellen Färbung. Eine Dorsalfurche und dorsale Warzen voll ausgewachsener *Z. alabaster* n. sp. findet man bei keiner anderen Art der Gattung.

Introduction

Recently, pearl divers operating out of Broome, NW Australia, collected a large number of *Zoila decipiens decipiens* (E. A. SMITH 1880), offshore from the Eighty Miles Beach area. Among these shells, there were a couple of golden ("rufinistic") specimens, two specimens that resembled *Zoila mariellae* RAYBAUDI 1983 in coloration, and also several specimens identified as "albinos." These shells had a black-colored animal and yellow-colored patches on the base, denoting that they were not merely off-color *Z. decipiens*. Because we also observed multiple morphological differences between these specimens and typical *Z. decipiens* in addition to their color, we are describing this new species in the following report.

Abbreviations

AK	Collection ANDREY KOSTIN †, Moscow, Russia
CLSF	CHIAPPONI LORENZ Seashell Foundation, Lecco, Italy
MAM	Collection of Dr. MICHAEL A. MONT, Owings Mills, Maryland, USA
FL	Collection of Dr. FELIX LORENZ, Buseck-Beuern, Germany
H	height
L	length
LTct	labral teeth counted, CTct= columellar teeth counted
LTnl	labral teeth normalized, CTnl = columellar teeth normalized
mD	measured weight, mR = relative mass
W	width

Materials and Methods

For further characterization, we morphometrically compared this new species to typical specimens of *Z. decipiens* obtained during the same month as the holotype and paratype 1 from the same location, by the same diving team. At least five live-collected specimens of this new species are known to exist, three of which are designated as types. Dimensions enumerated are: L×W×H in mm (counted labral : columellar teeth) weight in grams. The formula contains these elements: **(L(W/L - H/L - H/W) LTnl : CTnl [mR]**. For details about this revised formula to characterize cowry shells, please refer to BRIDGES & LORENZ 2013, this issue on pp. 27-39.

For photographs of the two additional specimens, see Plate 2, Figures 1 and 2, from PASSAMONTI & HISCOCK (2012) p. 14, courtesy Beautiful Cowries magazine and Dr. MARCO PASSAMONTI, and WILSON & CLARKSON (2004), p. 292, courtesy JOHN JACKSON† and HUGH MORRISON.

For comparison with the closest relatives, 150 specimens of live-collected *Zoila d. decipiens* collected by divers during the same time period (February, 2012) and from the same habitat and location were utilized, including one of two known off-color specimens of *decipiens* that have recently been discussed as variety "*kimbacki*" by HISCOCK (2012), in the collection CLSF 14914. Formulae of *Z. decipiens* 52(67-60-89) 16:13 [10.8] and *Z. mariellae* 58(72-64-90)16:14 [9,5] were taken by measuring 10 specimens each, from the collections of AK, CLSF, and MAM.

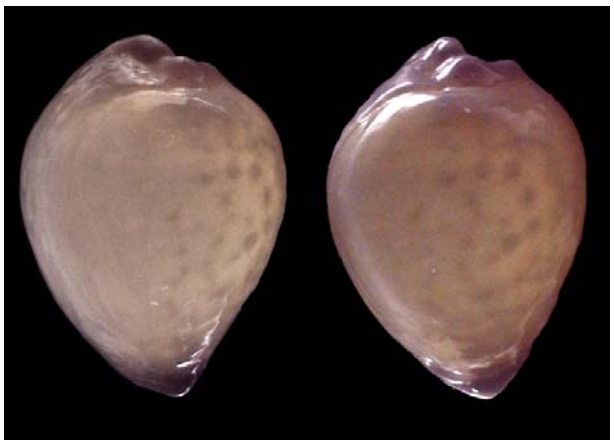
Zoila alabaster n. sp.
Plates 1 and 2

Holotype: 47.5×31.7×28.4 (18 : 15) 15.0; coll. CLSF (14913)
Formula: 48 (67 - 60 - 90) 15 : 13 [12] Plate 1, Figure 1

Paratype 1: 49.9×35.4×30.2 (20 : 14) 19.62; coll. MAM (4511)
Formula: 50 (71 - 61 - 85) 16 : 12 [12.6] Plate 2, Figure 2

Paratype 2: 53.3×38.0×32.0 (20:15) 27.0; coll. FL
Formula: 53 (71 - 60 - 84) 16 : 12 [14.2] Plate 2, Figure 3

Average formula: 50 (70 - 60 - 86) 16 : 12 [12.9]



Text-Fig. 1: Paratype 2 ((??)) of *Zoila alabaster* n. sp., length 53.3 mm

Description

The shell is medium-sized, solid, and rather heavy (mR= 12.9). The outline is slightly rhomboidal, the dorsum is humped in the posterior third, and the posterior extremity is blunt. The columellar posterior tip is short and rounded, and hidden below the callused, distinctly projecting spire on the dorsal view. The protoconch is thinly covered with callus, through which its orange color is well-discernible. The labral posterior tip is rounded and slightly curved to the left. The anterior extremity is strongly callused and only slightly separated from the evenly tapered dorsum. The terminal ridge is swollen and projecting so that on dorsal views, the right side of the anterior extremity far exceeds the labral side. The aperture is equally wide throughout, slightly declivous, and widened in the anterior fourth. Here, the strongly-developed terminal ridge partly obscures the canal, giving the aperture a final turn to the right. Posteriorly, the aperture is slightly curved to the left. The fossula is smooth and projecting along the anterior third of the columella. The teeth are thick and dense, barely extending towards the labrum, but restricted to the edge of the aperture on the columellar side, where they become indistinct midways. The margins are callused and evenly rounded, the base is convex, and there is no indication of a callus ridge bordering the margins basally. The callosities along the margins and the base are slightly irregular.

The ground color is yellow-white and the callosities are porcelain-white. The interior of the shell is pale-cream. The base shows pale lemon-yellow patches of irregular shape.

From what is discernible in photographs of the withdrawn animal, the foot is black and the mantle is semi-transparent, with numerous and discrete black spots. (See Plate 2, 4th row)

Paratype 2 is the most mature shell (mR= 14.2). The callosities are well developed, an the dorsum is covered with faint tubercles that seem loosely arranged in transverse rows (Text-Fig. 1). There is a distinct, longitudinal groove dorsally in the position of the dorsal line. It forms deep depressions above either extremity. Also the specimen illustrated in Wilson & Clarkson (2004) shows indications of these features (see Pl. 2, 3rd row herein).

Habitat and distribution

As far as we were able to learn, all known specimens of *Zoila alabaster* n. sp. were live-collected by pearl divers, at depths ranging from 15 to 25 meters, offshore Eighty Mile Beach, NorthWest Australia (Type locality), in an area densely inhabited by *Zoila decipiens decipiens*.

Etymology

The name *alabaster* is due to the characteristic color of white alabaster which has entered the vernacular as a metonym for white things. This has been often used to describe “alabaster skin”. The origin of the word is Middle English which

originated from the Greeks, who used this term to identify vases made of alabaster (LIDDELL & SCOTT 1940). Another possible derivation is from Ancient Egypt, where the word "*a-labaste*" referred to a vessel of the Egyptian Goddess Bast. She was personified as a lioness and often depicted in figures placed on top of alabaster vessels (HARRELL, 1990).

Discussion

With the discovery of *Zoila alabaster*, the *decipiens*-complex of conchologically- and genetically-close relatives comprises five species. Its members inhabit the northern limit of the *Zoila*'s distribution today (the fossil record of *Zoila* reaches as far north as Java, Indonesia). The species of the *decipiens*-complex differ from each other only in the distribution of color and callus on the adult shell. Conchological elements important in the distinction of other *Zoila* species (dentition and general shape) are less relevant in the *decipiens*-complex. This has led some authors to lump all of its species with *decipiens* (BURGESS, 1985). The confusion connected with the taxonomy of the group is reflected in WILSON & CLARKSON's approach (2004). These authors lumped all other species-complexes of *Zoila* to subspecies or synonyms, while in the *decipiens*-complex, even debated taxa got listed as valid species or subspecies (with the exception of *d. suprasinum* LORENZ 2002). In addition, HISCOCK (2012) recently questioned the validity of *Z. mariellae* (see below).

The "systematic rank" assigned to the various taxa of the genus *Zoila* by future authors will probably retain great ambivalence in interpretation. The true biological nature of the various taxa will most likely remain a mystery.

1. *Zoila decipiens* (E. A. SMITH 1880) is the most widespread species from NW Australia. Its range stretches from the Buccaneer Archipelago, north of Cape Leveque, to the Exmouth Gulf. The depth at which typical *Z. decipiens* have been found ranges from 5 to over 70 m. *Zoila decipiens* is characterized by a moderately small, humped shell with steep margins that form a callused angle framing the somewhat concave base. The callosities are dark-brown to black and the dorsum is densely covered with black spots of variable size. Southern populations of the subspecies *Z. d. suprasinum* LORENZ 2002 tend to be larger and callused basally, with more distinct, marginal spotting. An important aspect for the distinction of northern and southern populations is the difference in their mtDNA (CHRISTOPHER P. MEYER, personal communication with the second author in 2001). Various authors have vacillated on interpreting the differences between mt-DNA. Further study and characterization may clarify these issues in the future.

2. *Zoila eludens* RAYBAUDI 1991 lives around 15 to 50 m depth, in a quite restricted area, in close vicinity to *Z. d. suprasinum*, mainly around the offshore islands of the Exmouth Gulf (Murion and Peak). At the northern tip of its distribution, the smaller *Z. e. delicatura,* CHANDLER & DUROSS 1997, is found. *Z. eludens* has expanded margins of paler color and dense, black spotting. The dorsum is densely mottled with black spotting, separated from the paler margins by a zone of whitish-blue. The base is convex and usually stained darker in the middle.

3. *Zoila perlae* LOPEZ & CHIANG 1975 is an offshore species trawled off 100 to 150 m. Its exact range is unknown, but is supposedly just offshore of that of *Z. eludens*. The shell is small and lightweight, with its spire exposed and projecting. The base is convex and as in *Z. decipiens*, framed with a callus ridge along the margins. Shells of *Z. perlae* are sparsely-spotted and darker dorsally with a base that is usually cream, however, exceptions with darker areas on the middle are known.

4. *Zoila mariellae* RAYBAUDI 1983 is suspected to come from deep water at 150 to 200 m from further offshore, possibly close to the northern distribution limit of *Z. decipiens*. The shells of *Z. mariellae* are inflated, their aperture curved, and their posterior columellar tip of the extremity pointed and bent to the left. The base is of cream color, flat, and more narrow than in *Z. decipiens*, while somewhat sloping to the aperture. The margins form an angular frame around it. The spire is usually exposed. The shell does not have darker dorsal pigmentation, but only pale-brown tinting of the extremities and indications of pale-orange lateral spots.

5. *Zoila alabaster* n. sp. at first was identified as an "albino" form of *Z. decipiens*, as it was collected in shallow water, alongside numerous typical shells of that species. However, despite the complete lack of darker pigmentation dorsally, and lemon-yellow patches basally, the new species has a black animal indicating that the shell color is not the result of albinism in a strict sense. Apart from the differences in color, a set of consistent morphological differences exist, which become most apparent when the columellar lateral side and the

basal aspects are directly compared with *Z. decipiens* from the same locality where *Z. alabaster* n. sp. has been collected. For the conchological characterization and differentiation of the new species, *Z. decipiens* and *Z. mariellae* have to be considered. Table 1 compares the most important conchological features between the three taxa.

Z. alabaster n. sp. is less humped and somewhat wider than *Z. decipiens* and *Z. mariellae*, and the dorsum is slightly more symmetrical. The marginal callus-ridge bordering the base in *Z. decipiens* and *Z. mariellae* is absent in *Z. alabaster* n. sp. The margins are callused, but evenly rounded, and also the base and labrum are convex, and not concave and sloping towards the aperture as in *Z. decipiens* and *Z. mariellae*. The anterior terminal ridge of *Z. alabaster* n. sp. is consistently projecting, blunt, and swollen when compared to Z. *decipiens,* where it is shorter, pointed, and narrow. In *Z. mariellae,* that structure is slightly more developed than in *Z. decipiens*, but not as swollen and conspicuous as in *Z. alabaster*. The posterior tip on the columellar side is short and rounded in *Z. alabaster* n. sp., and when viewed from the side, it does not exceed the spire in length. In all adult *Z. decipiens* we studied, this region was more or less produced and pointed, exceeding the spire and covering its basal half. The same is true for *Z. mariellae*, but the extremity is less pronounced than in *Z. decipiens*. In both species, the margin of the posterior columellar extremity is bordered with a callus flange, which is absent in *Z. alabaster* n. sp. The shell formulae of *Z. alabaster* n. sp.: 50 (70-60-86) 16:12 [12.9] and *Z. decipiens* from the same area: 52(67-60-89) 16:13 [10.8] reveal that *Z. alabaster* n. sp. is a heavier shell, despite the lack of a callus ridge along the margin. The distribution of callus differs from that of *Z. decipiens*. Paratype 2 has callus deposited even dorsally. The dorsal surfaces of *Z. decipiens* and *Z. mariellae* are not callused and display a characteristic malleated surface which in *Z. decipiens* is enhanced optically by fine, paler lines framing the rectangular sculpture.

Table 1: Comparison of Zoila *decipiens, Z. alabaster* n. sp., and *Z. mariellae.*

	Zoila decipiens	***Zoila alabaster* n. sp.**	***Zoila mariellae***
Dorsal color	Densely spotted and mottled with dark-brown to black	White with pale orange-yellow tint, no spotting	White, often with olive tint, unspotted
Base and margins	Uniform dark-brown to black, margins often faintly spotted	Plain white, base with irregular yellow patches	Base pale cream, margins faintly spotted, tips stained darker
Anterior terminal ridge	Short, narrow, pointed	Projecting, swollen, rounded	Somewhat produced, not swollen
Base shape	broad, flat to concave, sloping towards aperture	broad, convexly rounded	less wide, flat, concave, sloping towards aperture
Labrum on base	flat	rounded	flat
Margins	forming angular callus ridge framing base	evenly rounded, callused	forming angular callus ridge framing base
Posterior columellar tip	projecting, flanged	shortest, rounded, not flanged	shorter, distinctly flanged
Dorsal surface in mature shells	distinctly malleated, with rectangular sculpture, no groove	smooth or tuberculose, with dorsal groove	malleated, with fine longitudinal striae, no groove
Protoconch	mostly obscured by callus, brown	covered with callus, yet visible, orange	mostly exposed, white
Width to length (%)	67	70	72
Height to length (%)	89	86	90
Relative mass	10.8	12.9	9.5

The similarity in coloration of *Z. alabaster* n. sp. and *Z. mariellae* 58(72-64-90)16:14 [9.5] makes the structural differences described above and in Table 1 even more obvious. Interestingly, all three species have a similar amount of teeth. Recently, two very pale shells of *Z. decipiens* have been found among typical dark shells and were given the taxonomically invalid, yet useful forma name *kimbacki* HISCOCK 2012. One of these shells resembles *Z. mariellae* in lacking a darker pattern, with the other having faint brown, but dense, dorsal spotting. Both shells have a broad, orange base, dark marginal spots, dark-tinted tips, and a typical *decipiens*-shape (Plate 3:2). HISCOCK

postulated that these shells would form a conchological continuum between *Z. mariellae* and *Z. decipiens*, abrogating the distinction of *Z. mariellae* as a valid species. In our opinion, the opposite is the case: though superficially similar to *Z. mariellae* in lacking a dark pattern dorsally, the structural differences that exist between *Z. decipiens* and *Z. mariellae* become even more apparent in the two "*kimbacki*" shells: the wider base that has its maximum expansion in the posterior fourth and not in the middle of the shell as in *Z. mariellae*; the callused spire and the broad, produced posterior columellar tip, the relatively smaller size and less inflated dorsum are all typical of *Z. decipiens* and not at all intermediate or continuous with *Z. mariellae*. To us, the "*kimbacki*" shells may represent an extreme, possibly atavistic, color variant of *Z. decipiens* that allows assumptions about a common ancestry with *Z. mariellae*. Genetically, *Z. mariellae* is distinct from *Z. decipiens*, which supports the systematic level of a species, or at least, a bathymetric subspecies (CHRISTOPHER P. MEYER, personal communication with the second author, 2001).

It was interesting that for morphometric evaluation using the new Cowry Formula, for this group of cowries, that after five specimens were tabulated, adding specimens 6 to 10 did not appreciably change the formula. This formula stability occurred despite the fact that many of the specimens were of different sizes. Thus, this formula allows for objective morphometric characterization of a species from only a limited number of specimens for certain species. It remains to be determined how universally this new formula can be used for the differentiation and characterization of other cowry species.

The structural, not intermediate, differences from *Z. decipiens* and *Z. mariellae* support the status of *Z. alabaster* n. sp. as a distinct species rather than as a mere "off-color form." Being from moderately shallow water, we suspect that the few shells that have been collected represent strays from a yet to be discovered population-center, somewhere offshore in the immensely large area off Broome in NW Australia.

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Plate 1 on opposite p. 131

***Zoila alabaster* n. sp.**

Top: Holotype, 47,5 mm. Collection CLSF 14913

Bottom: Paratype 1, 49,9 mm. Collection MAM 4511

Plate 2 on p. 132

***Zoila alabaster* n. sp.**

1st row: Paratype 2, 53,3 mm. Collection FL

2nd row: Dimensions unknown. Specimen from Beautiful Cowries magazine No. 1 (2012), courtesy MARCO PASSAMONTI.

3rd row: Dimensions unknown. Specimen from Wilson & Clarkson (2004) courtesy JOHN JACKSON and HUGH MORRISON.

4th row: Two specimens shortly after collecting, showing the black animal.

Plate 3 on p. 133

Top: *Zoila decipiens decipiens*, 54,7 mm.

Bottom: *Zoila decipiens decipiens* var. "*kimbacki*", 51,5 mm. Collection CLSF 14914

Plate 4 on p. 134

Zoila mariellae, 58 to 61 mm. Typical specimens. Collection AK

Plate 1

Explanation on p. 130

Plate 2

Explanation on p. 130

Plate 3

Explanation on p. 130

Plate 4

Explanation on p. 130