

urn:lsid:zoobank.org:pub:61172DE1-2074-4AF0-80AA-B0237473397E

A New Species of *Darioconus* (Gastropoda: Conidae) from the Red Sea

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With 15 Figures on Plates 1-2

Keywords

Conidae, *Darioconus*, new species, Red Sea, Egypt.

Abstract

Darioconus lariniorum n. sp. from the northern Red Sea differs from the Indo-Pacific *D. aulicus* and related species by its smaller, more inflated oval shell, and a paler, more compact pattern on the body whorl and the spire.

Zusammenfassung

Darioconus lariniorum n. sp. aus dem nördlichen Roten Meer unterscheidet sich von der Indopazifischen *D. aulicus* und verwandten Arten durch ihr kleineres, ovales, etwas aufgeblähteres Gehäuse, und eine hellere, kompaktere Musterung auf dem letzten Umgang und der Spira.

Abbreviations and Acronyms

- FL Collection FELIX LORENZ
 LA Collection SILVANO LARINI
 MHNG Museum d'Histoire Naturelle, Geneva, Switzerland
 MNHN Museum national d'histoire naturelle, Paris, France
 MSF Molluscan Science Foundation, Inc., Dr. MICHAEL A. MONT, Owings Mills, MD, USA
 mR Mass ratio. The mass ratio represents the relation between the actual mass of a shell against a hypothetical block of aragonite with the shell's maximum dimensions of length, width, and height, calculated after the formula $mR = (\text{weight} / (\text{length} \times \text{width} \times \text{height} \times 0.00293)) \times 100$. This feature has been used comprehensively in cowries and is discussed in LORENZ 2017. Its use has recently been used for the characterization of the Conoidean *Thatcheria janae* LORENZ & STAHLSCHEIDT, 2019. Herein, it was proven useful for the direct comparison of the measured weight in shells of similar dimensions.
 w/l width/Length ratio in %

Introduction

The *Darioconus aulicus*-complex comprises at least six members in the Indo-Pacific, of which several are still pending to be named. The following describes a very rare species, endemic to the Red Sea, which had been known from a limited number of records for quite a long time.

Systematics

Family Conidae J. FLEMING, 1822

Genus *Darioconus* IREDALE, 1930

Darioconus lariniorum n. sp.

Pl. 1, Figs 1-8, 9a, Pl. 2, Figs 1 and 5

- 1984 *Conus aulicus* LINNAEUS, 1758 – SHARABATI: Red Sea Shells pl. 32 Fig. 1
 2008 *Conus aulicus* LINNAEUS, 1758 – RUSMORE-VILLAUME: Seashells of the Egyptian Red Sea p. 124
 2018 *Darioconus aulicus* (LINNAEUS, 1758) – MONNIER et al. [...] Living Conidae p. 935 Fig. 4

Material

Measurements listed length × width, locality, depository.

Holotype: 54.8 × 22.0 mm, Abu Ramada Is., Hurghada, Egypt, coll. MNHN-IM-2000-35266; **Paratype 1:** 53.8 × 22.5 mm, N of Jeddah, Saudi Arabia, coll. FL; **Paratype 2:** 49.9 × 19.6 mm, Giftun Is., Hurghada, Egypt, coll. FL; **Paratype 3:** 56.4 × 21.3 mm, Abu Ramada Is., Hurghada, Egypt, coll. MSF-co2003; **Paratype 4:** 64.4 × 26.1 mm, Hurghada area, Egypt, coll. MSF-co2004; **Paratype 5:** 63.0 × 24.3 mm, Giftun Is., Hurghada, Egypt, coll. MSF-co2005; **Paratype 6:** 63.3 × 22.8 mm, Hurghada area, Egypt, coll. FL.; **Paratype 7:** 57.3 × 20.0 mm, Hurghada area, Egypt, coll. LA; **Paratype 8:** 45.4 × 16.3 mm, Hurghada area, Egypt, coll. FL.; **Paratype 9:** 32.1 × 11.4 mm, Hurghada area, Egypt, coll. MSF-co2006; **Paratype 10:** 22.6 × 7.9 mm, Hurghada area, Egypt, FL; **Paratype 11:** 58.5 × 22.5 mm, Hurghada area, Egypt, FL.

Description

The shell is solid, ventricosely conical, with a rounded, smooth shoulder and a silky texture. The widest point is in the middle of the shell. The spire is moderately high, with flat sutural ramps showing indistinct longitudinal growth lines but no discernible spiral striae on the later teleoconch whorls. There are two rather deep spiral striae on the first three teleoconch whorls, whose shoulders are slightly stepped and coronated. The tip of the protoconch of the holotype is lacking. The body whorl is finely striated with variably spaced spiral threads. The aperture is slightly widened anteriorly.

The ground colour of the body whorl, the protoconch and the first four teleoconch whorls, as well as the inside of the aperture are plain white. The darker pattern is of a reddish brown colour. It covers most of the spire and the shoulder of the body whorl, with only a few isolated white tentmarks, mainly on the last sutural ramp. The body whorl is covered with angular, overlapping tentmarks with narrow outlines. There are two transverse areas of compact darker pattern: a broad one running across the mid-section, and a half as broad one in the anterior third. These zones are interrupted longitudinally by narrow areas of tentmarks. Within the darker, compact zones there are narrow stripes of darker colour with paler intermittent dashes, correlated with the transverse striae. The paratypes show very little variability in shape and in the composition of the pattern. The well-preserved protoconch of Paratype 10 is slightly inflated and glossy, consisting of two whorls of 0.6 mm diameter (Pl. 1, Fig. 9a). Subadult specimens (Paratypes 8 and 9) are slightly less inflated ($w/l = 35$) compared to adult shells. The periostracum is smooth and of a transparent tan colour. The animal characteristics are unrecorded.

Type Locality and Habitat

Darioconus lariniorum n. sp. is known from Abu Ramada Island, Hurghada, Egypt (27°09'34"N 33°58'53"E = locus typicus), Giftun Kebir Island, Hurghada, Egypt, (27°12'07" N 33°57'19" E), and Dahaban, north of Jeddah, Saudi Arabia (22°02'27" N 38°58'40" E). It has been found mainly in the general area of Hurghada. The habitat is a vital coral reef with sandy patches, where it is found under coral slabs partly buried in sand during daytime, at 1 to 15 metres.

Etymology

Named in honor of my friends VIVIANA and Dr. SILVANO LARINI of Milano, Italy.

Discussion

The diversity of the genus *Darioconus* has mainly been known from the numerous populations assignable to the “*pennaceus*-complex”, in which at least fifteen taxa and numerous undescribed species can be accommodated. MONNIER et al. (2018) thoroughly illustrated the confusing subtleness of conchological features in this group. Populations formerly assigned to a single species, *D. aulicus* (LINNAEUS, 1758), have first been recognized as distinct by DA MOTTA (1982). He re-named the “*roseus*” variation of *aulicus*, described by G. B. SOWERBY I, 1834, as a full species he called *auratinus*. Subsequently, two species have been called by that name: the “true” *auratinus* from eastern Polynesia, and *D. cathyae* MONNIER, LIMPALAER & PRUGNAUD, 2020, a spectacular species from the Western and Central Pacific (“aff. *auratinus*” in MONNIER et al. 2018: 932). In the Indian Ocean, the smaller, more solid *gracianus* DA MOTTA & BLÖCHER, 1982 from Madagascar was the first to be recognized. A larger Tanzanian population tentatively assigned to *D. gracianus* was discussed by LORENZ (1993). Such shells were also illustrated and discussed by MONNIER et al. (2018: 938, aff. *gracianus*) (Pl. 2, Fig. 3 herein) and recently described as *Darioconus michelcharlesi* MONNIER, LIMPALAER & PRUGNAUD, 2020. The distribution of this species, whose type locality is SW Madagascar, is yet to be examined, but apparently includes Tanzania. The distribution of *Darioconus lariniorum* n. sp. is confined to the northern and central Red Sea. It has been illustrated as *aulicus*, first by SHARABATI (1984), later by RUSMORE-VILLAUME (2008). MONNIER et al. (2018) show a single, well-recognizable, specimen from the type locality, also identified as *D. aulicus*. The scarcity of this species has prevented its recognition (ERIC MONNIER, pers. comm. 2018). Thanks to the effort of SVEN KAHLBROCK of Hurghada, Egypt, a series of shells has become available to confirm the consistency of the conchological differences to *D. aulicus* and related species.

Darioconus lariniorum n. sp. is quite similar to *D. gracianus* on account of the near lack of whitish tentmarks on the rather uniformly brown spire, and the larger, more compact brown areas on the body whorl. The adult *D. lariniorum* n. sp. differs by its less cylindrical, inflated body whorl,

and the wider, more defined pale transverse areas showing more numerous, densely packed tentmarks. However, subadult specimens such as Paratype 8 of *D. lariniorum* n. sp. seem barely separable from adult *D. gracianus* at first glance (see Pl. 2 figs. 4 and 5). The main difference between such shells of similar size is the spiral ribbing of the body whorl, which is coarser and denser in *D. gracianus*. The geographic isolation of the two taxa between the Red Sea and the the south of Madagascar, to where *D. gracianus* is endemic, makes a confusion of these unlikely.

In the Red Sea, *D. aulicus* is even more rare than *D. lariniorum* n. sp. In fact, in ten years of intense search, SVEN KAHLBROCK collected only a single, badly eroded *D. aulicus* in the Hurghada area. Like specimens of *D. aulicus* from Massawa, Eritrea, it has widely spaced, large tentmarks resembling the Mascarene to Arabian variation *propenudus* MELVILL, 1900. *D. michelcharlesi* does not occur in the Red Sea. On direct comparison with of two allied species with *D. lariniorum* n. sp. of similar size, the differences become apparent: *D. lariniorum* n. sp. is wider and more inflated. Although *D. lariniorum* n. sp. subjectively “feels” heavier than *D. aulicus*, the mass ratio (mR) of both species at the 50–60 mm size range is approximately 18, despite the more slender shape of *D. aulicus* at that size ($w/l = 34$, opposed to $w/l = 40$ in adult *D. lariniorum* n. sp.). Also *D. michelcharlesi* is somewhat narrower ($w/l = 38$) and differs also by a more developed spiral sculpture.

In *D. aulicus* and *D. michaelcharlesi*, the darker pattern is a rich chestnut brown instead of reddish brown as in *D. lariniorum* n. sp. The spire of *D. aulicus* ~~shown~~ shows numerous whitish to pink tentmarks, whereas, that of *D. lariniorum* n. sp. ~~shown~~ shows only small, isolated paler tents. The darker zones of *D. lariniorum* n. sp. are less interrupted by tentmarks and most distinctly compacted to two darker transverse bands: a wide mid-dorsal, and a narrow anterior band. A rather subtle feature that requires further study is the sculpturing of the early teleoconch whorls. In *D. lariniorum* n. sp., their shoulders are distinctly coronate and slightly stepped, whereas in *D. aulicus* and *D. michaelcharlesi*, the shoulders of the early teleoconch whorls are less distinctly striated, nearly smooth, and less stepped (Pl. 1 Fig. 9). Unfortunately, these species are seldom available with these features fully preserved to ascertain this observation based on the comparison of three specimens of *D. lariniorum* n. sp. and *D. aulicus* respectively, and one *D. michelcharlesi*

The *aulicus*-complex has probably evaded attention of taxonomists because of the large size and variability in shapes and pattern. However, close scrutiny reveals that many of the supposed “individual forms” have rather well-defined ranges and consistent features, when viewed in their geographical context.

Acknowledgements

Many thanks to Dr. ERIC MONNIER for continued support, and to SVEN and DORIS KAHLBROCK, SYLVIA HERBER, MICHAEL AHRNIG, KATHRIN WOHLRAB, CHRISTINA GEMMEL, MONIKA HOFBAUER, CHRISTOPHER FRIEDRICH, ULRIKE and TANJA MEINSCHÄFER, SINA GADO, BLANKA KRELLMANN-METZ, MICHAEL BUTH, VERA WITTENBERG, and MONIKA DELKE for valuable help on our expeditions to Egypt. To Dr. MARCO CHIAPPONI, EDDIE HARDY, and JANA KRATZSCH. To Dr. MICHAEL A. MONT for proofreading, and KLAUS GROH and Dr. CARSTEN RENKER for careful editing.

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Received: 19. 10. 2019
Accepted: 18. 01. 2020

Plate 1 (on opposite page)

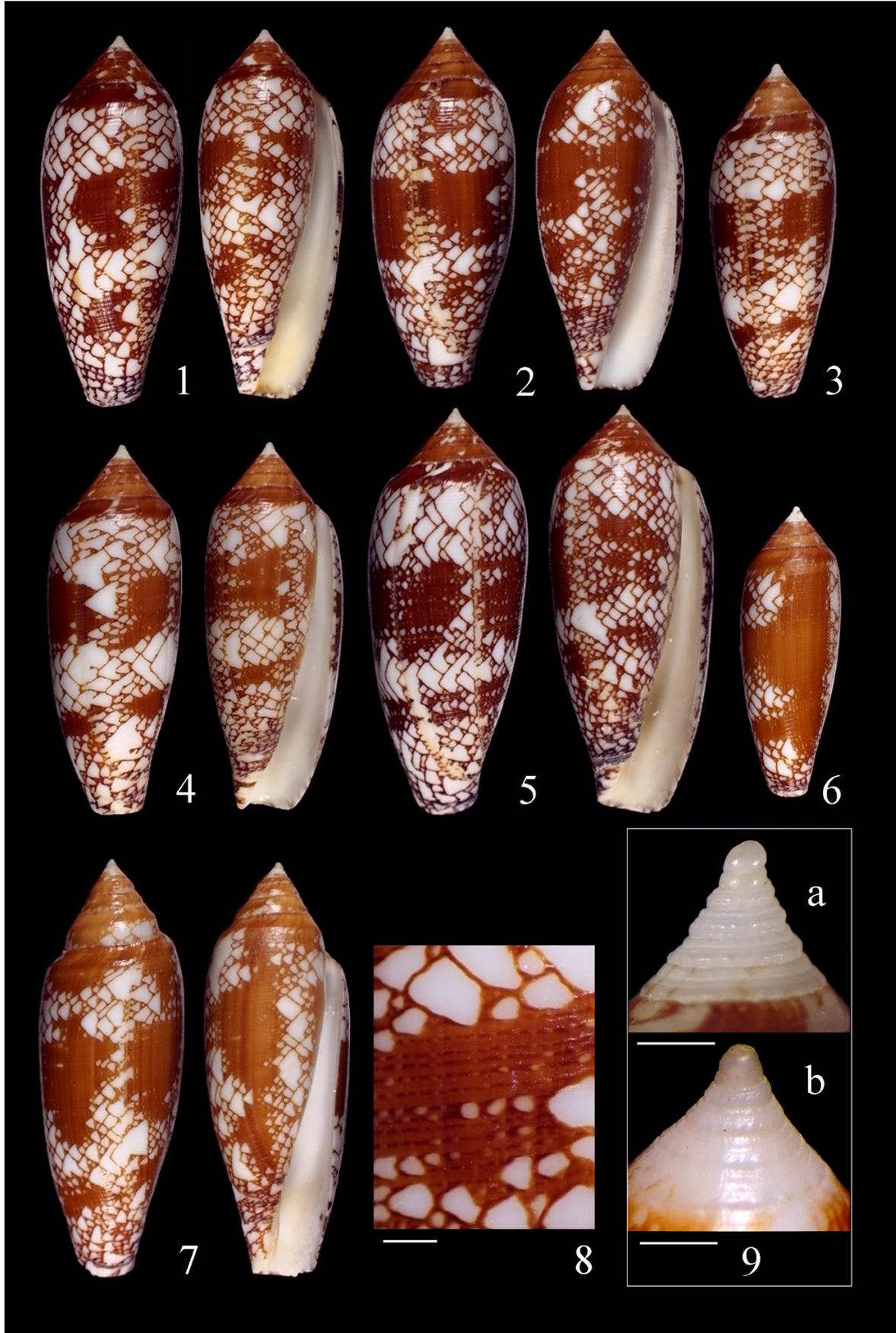
Darioconus lariniorum n. sp.

- Fig. 1:** Holotype (54.8 mm), Abu Ramada Is., Hurghada, Egypt, coll. MNHN IM 2000-35266.
Fig. 2: Paratype 1 (53.8 mm), N of Jeddah, Saudi Arabia, FL.
Fig. 3: Paratype 2 (49.9 mm), Giftun Is., Hurghada, Egypt, FL.
Fig. 4: Paratype 3 (56.4 mm), Abu Ramada Is., Hurghada, Egypt, coll. MSF-co2003.
Fig. 5: Paratype 4 (64.4 mm), Hurghada area, Egypt, coll. MSF-co2004.
Fig. 6: Paratype 8 (45.4 mm), Subadult. Hurghada area, Egypt, FL.
Fig. 7: Paratype 6 (63.3 mm), Exceptionally tall spire. Hurghada area, Egypt, FL.
Fig. 8: Holotype, detail of the pattern showing the darker lines with dark dashes. Scale = 2 mm.
Figs 9, 10: The early teleoconch whorls of *D. lariniorum* n. sp. (a) and *D. aulicus*, Massawa, Eritrea (b). Note the more stepped and coronate shoulders of *D. lariniorum* n. sp. Scale = 1 mm.

Plate 2 (on p. ##)

- Fig. 1:** *Darioconus lariniorum* n. sp. (64.4 mm), Hurghada area, Egypt.
Fig. 2: *Darioconus aulicus* (64.3 mm), Massawa, Eritrea.
Fig. 3: *Darioconus michelcharlesi* (60.5 mm), Tulear, SW Madagascar.
Fig. 4: *Darioconus gracianus* (43.4 mm), Tulear, SW Madagascar. Holotype, coll. MHNG 982/112. Photo ALAN KOHN, courtesy EDDIE HARDY@gastropods.com.
Fig. 5: *Darioconus lariniorum* n. sp. (45.4 mm), Subadult.

Plate 1



Explanation on opposite page

Plate 2



Explanation on page ##