

Cryptic E African and Arabian *Duplicaria* (Gastropoda: Conoidea: Terebridae), with the description of a new species

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Abstract: Excluding *Duplicaria duplicata* (s.l. = *sensu* Bratcher & Cernohorsky, 1987) and *Duplicaria veronicae* (Nicolay and Angioy, 1993), the genus *Duplicaria* was further only represented in the W Indian Ocean by 3 species, i.e. *Duplicaria mozambiquensis* Bratcher & Cernohorsky, 1982, *Duplicaria herberti* Malcolm, Terryn & Fedosov, 2020 and *Duplicaria spectabilis* (Hinds, 1844) (s.l. = *sensu* Bratcher & Cernohorsky, 1987). At present, we add a new species from Oman and discuss the status of and presence of *Duplicaria jukesi* from the Kenyan and Tanzanian coast.

Introduction: The Indian Ocean is home to a large number of shallow-water terebrid species, of which many have recently been described and many cryptic species remain to be discovered (Terryn, Rosado & Gori, herein (nassariform Terebridae)). One of the puzzling complexes comprises members of the genus *Duplicaria*. Excluding the *D. duplicata*- and *D. veronicae*-complexes, the genus only contained two widely accepted taxa in the Indian Ocean. Malcolm, Terryn & Fedosov (2020) untangled a 25-year-old mystery surrounding *D. mozambiquensis* and recently separated a new taxon, *D. herberti*. *D. spectabilis* (*sensu* Bratcher & Cernohorsky, 1987) is presumably another complex of species with separate species in the Persian Gulf, Arabian Sea, Indian Ocean and Indo-Pacific. A long-considered synonym (*Terebra gracilis*) most probably constitutes a separate valid species along the Central East African Coast.

At present, we propose a new addition to the complex of species from the Oman coast and discuss the longtime puzzling status of *D. jukesi*. A further recently discover-

ed new species from Mozambique is briefly discussed, highlighting its differences from related species and its peculiar shell morphology.

Abbreviations:

- JR:** Private collection José Rosado, Portugal.
MNHN: Muséum national d'histoire naturelle, Paris, France.
NHMUK: Natural History Museum of the United Kingdom, London, England.
NMSA: National Museum of South Africa, KwaZulu-Natal Museum, Pietermaritzburg, South Africa.
YT: Private collection Yves Terryn, Belgium.
SG: Private collection of Sandro Gori, Italy.
SH: Private collection Steve Hubrecht, Belgium.

Systematics:

The systematics for the species described and discussed in the present paper follow the systematics as proposed in Fedosov et al. (2020). For information on the types held in the NHMUK, we refer to Salvador & Pickering (2017).

Class **Gastropoda** Cuvier, 1797
 Order **Neogastropoda** Wenz, 1938
 Superfamily **Conoidea** Fleming, 1822
 Family **Terebridae** Mörch, 1852
 Subfamily **Pervicaciinae** Rudman, 1969
 Genus ***Duplicaria*** Dall, 1908

Duplicaria mozambiquensis
Bratcher & Cernohorsky, 1982

Holotype: NMSA H7843/T2541, 22.3 mm.

Type Locality: Mozambique, off Chinde Island.

Distribution: Central and N Mozambique; between 25 and 45 m.

Notes: The description as given by Bratcher & Cernohorsky (1982) is somewhat of a composite of characteristics for *D. mozambiquensis* and *D. herberti*.

For discussion on the paratypes and differences with *D. herberti*, see Fedosov et al. (2020).

Duplicaria herberti

Malcolm, Terry & Fedosov, 2020

Holotype: MNHN-IM-2013-52381, 29.7 mm.

Type Locality: Mozambique, 26°00.0'S - 32°54.4'E [INHACA 2011 Stn MR15].

Distribution: N Mozambique (Conducia Bay) to off Durban, RSA; between 0 and 55 m.

Notes: For discussion on the differences with *D. herberti*, see Fedosov et al. (2020) and here cited: "Shell colour varies: juveniles have shiny beige to fawn colour; also lighter-brown coloured mature specimens are known. This species has always been confused with *Duplicaria mozambiquensis* Bratcher & Cernohorsky, 1982, even by its authors. The holotype of *D. mozambiquensis* (NMSA H7843/T2541) is a small, slender shell of 22.3 mm. The type series of *D. mozambiquensis* shows a large discrepancy in many features between the holotype and all the paratypes, which are specimens of *D. herberti*. Subsequent authors have to our knowledge always featured specimens of *D. herberti* as *D. mozambiquensis*, which remains a rarely encountered species. The type series held at the NMSA and NHMUK is here figured in colour, to scale; next to images of *D. herberti* and additional specimens of *D. mozambiquensis* (YT). The whorls of *D. mozambiquensis* have a narrower apical angle, its convex axial ribs giving the outline an extremely rounded convex impression, the subsutural band comprises round nodes, compared to elongated nodes on *D. herberti*. The axial ribs of *D. herberti* become straight creating an angular projection posteriorly. The peripheral white band in *D. mozambiquensis* is wider and more clearly defined. Both have a subsutural furrow with minute axial growth striae, appearing as a punctate groove in *D. mozambiquensis*, while this feature is not present in *D. herberti*. We have no confirmation that *D. mozambiquensis* has ever been found in the south of Mozambique while specimens of *D. herberti* sp. nov. are found extensively in the south of Mozambique and

South Africa. Within *Duplicaria*, several species change the structure of their whorls as they grow and do so at variable rates of change. However a comparison of the early whorls of the two species highlights differences in the early whorls and protoconch of *D. mozambiquensis* and *D. herberti*. The protoconch of *D. mozambiquensis* is about 30% less wide than that of *D. herberti* and the latter has a broader inflated shape. The early whorls of *D. mozambiquensis* have distinctive round nodes compared to convex ribs on *D. herberti*."

Duplicaria jukesi (Deshayes, 1857)

Type material: Lectotype & paralectotype, NHMUK 197964/1-2, 32.8 & 35.0 mm.

Studied material: from Tanzania, Zanzibar, Unguja Island, Nungwi, 05°43'S-39°17'E, 1-2 m: MNHN-IM-2009-30342, 26.5 mm; MNHN-IM-2009-30344, 29.9 mm; MNHN-IM-2009-30345, 21.5 mm; MNHN-IM-2009-30346, 21.4 mm; MNHN-IM-2009-30347, 27.8 mm; MNHN-IM-2009-30348, 26.8 mm; YT, 18.8-34.1 mm, 20 sps. – from Tanzania, Zanzibar, Unguja Island, Nungwi, 05°43'33"S-39°17'26"E, 3 m: SG, 19.8-33.2 mm, 14 sps; JR, 24.7-30.5 mm, 2 sps. – from Tanzania, Zanzibar, dived at 20 m: SH, 29.4-29.5 mm, 2 sps.

Type Locality: Australia, Northern Territory, Port Essington.

Diagnosis: Bulbous protoconch, paucispiral, consisting of 1.0-1.5 whorls with a broad nucleus. Shell colour off-white to pink and pale brown or grey. Spiral sculpture absent. Outline of whorls convex, becoming straight and angular posteriorly after about 5 whorls. Subsutural band comprises small axially-elongated nodes with a matching number of axial ribs on the remainder of the whorl. Subsutural band bordered by a deep and sharp incision. Axial ribs about a third as wide as the interspaces, rounded and straight with an angular aspect. Aperture elongately quadrate, columella straight with a visible fold.

Habitat and bathymetric range: Retrieved in sand at depths between 0 and 3 m.

Anatomy: Unknown. Specimens preserved in alcohol are available for study (YT, MNHN).

Distribution: Reported from S Kenya, N Tanzanian mainland and Zanzibar Island.

Duplicaria sharqiya sp. nov.

Discussion: The lectotype is an orangish-pinkish specimen with an amorphous white cover, with a damaged protoconch; a defect is visible on the penultimate whorl, which is in turn most probably the cause of the widened subsutural indentation. The paralectotype is a greyish-brown specimen with an intact fawn-coloured protoconch. On the dorsum, on the border of the penultimate and body whorl, the shell sustained damage, which is the origin of the discoloured (white) spiral band just above the suture, only present on the body whorl. The latter should therefore not be regarded as a discriminative specific feature. Both specimens portray evidence of pagurisation at some point, and may even be '*ex-pisce*'. The type locality is probably erroneous: no specimens resembling the types of *D. jukesi* are known from the Northern Territories (Australia) up to now. Subsequent references in literature concern other species (f.e. Terry, 2007) It is presumed that the original label stating the locality was originally accompanying (a) different shell(s) in the Cuming-collection. Nevertheless, the type specimens fit the description seamlessly. The general collection of the NHMUK houses 3 samples currently labelled "*D. jukesi*", one of which originates from Zanzibar, conspecific with the type material. The other two samples originate from Australia, but are in fact *Duplicaria australis* s.l. (E. A. Smith, 1873)- and *Duplicaria ustulata* (Deshayes, 1857). Reeve (1860) refigured the species somewhat differently than Deshayes (1857), which in turn was adopted again in Tryon (1885), again slightly changed. Both, however, only mention the types, no additional specimens.

Specimens from the E African coast are usually shiny white, but light pinkish or light orange to light brown specimens are known. Darker coloured pinkish-orange, brown and greyish specimens are reported from off the Tanzanian and Kenyan coasts, probably crabbed *ex-pisce* in some cases. Spiral sculpture absent, although some specimens have spiral indentations between the ribs of the early teleoconch whorls. Density of axial ribs varies between specimens and between whorls on a single specimen. These specimens are conspecific with the studied types of *D. jukesi*.

Reports of an additional morpho-species within the *jukesi-mozambiquensis-herberti* group are under further investigation. They usually originate from south of the range of *D. jukesi* (area of Dar-es-Salam to the south) and north of the range of *D. mozambiquensis* and *D. herberti*. In this sense, the type material of *Terebra gracilis* Reeve, 1860 (non *Terebra gracilis* Lea, 1833 = *Terebra grayi* E. A. Smith, 1877 nom. nov.) (currently in synonymy with *D. spectabilis* (Hinds, 1844); a replacement name for it was (erroneously?) informally introduced as *D. mozambiquensis* by Bratcher & Cernohorsky, 1982) is under study, which is likely non-conspecific with each other, nor with *D. spectabilis*.

Type material: Holotype: MNHN-IM-2000-35032, 25.1 mm. **Paratype 1:** JR, 33.6 mm; **Paratype 2:** SG, 28.0 mm; **Paratype 3:** YT, 30.2 mm. All paratypes from type locality.

Type Locality: Oman, Ras-al-Ruways, 2-6 m.

Description: Protoconch paucispiral, consisting of 1.5 whorls. Shell colour dark brown, with whitish crests on the axial ribs. Spiral sculpture absent. Outline of whorls convex, becoming straighter in mature whorls. Sub-sutural band comprises small round nodes, which become axially elongated nodes, with a matching number of axial ribs on the remainder of the whorl. Subsutural band bordered by a wide angular depression with a sharp incision. Low axial ribs about half as wide as the interspaces, sharp-crested and thickened at the subsutural band. Axial growth striae visible in the interspaces, from suture to suture, arcuate between the sculpture on the subsutural band. Aperture elongate with the white band shining through, columella curved.

Habitat and bathymetric range: Found in sand at low tide, at depths between 2 and 6 m.

Distribution: Only known from the type locality.

Derivatio nominis: The species is named for the shape and outline (as seen from an aerial view) of the crests of the Sharqiya Dunes, a vast area of quasi-straight dunes (orientated more or less north-south, roughly situated inland to the north of Ras-al-Ruways, Sultanate of Oman). As with the ridges of the dunes, the species has a variable density and width of interspace of the axial ribs.

Discussion: The four known specimens portray a high variability in shell morphology. Although the characteristic features of the axial sculpture itself are stable, the intensity and number of axial ribs is not; moreover, the apical angle strongly differs between the specimens. The holotype shows the largest apical angle and the less dense setting of axial ribs, while paratype 3 is slender and has almost the double amount of axial ribs on its body whorl as in the holotype.

D. sharqiya sp. nov. is comparable to *D. herberti*, but is easily distinguished by the size of the protoconch, which is about 30% less voluminous in *D. sharqiya*.

Duplicaria species

Studied material: 1 specimen, 22.7 mm.

Locality: Mozambique, S off Bilene, 80-90 m.

Description: Protoconch paucispiral, consisting of 1.5 whorls with a protruding nucleus. Shell colour fawn, lighter coloured just above the suture. Spiral sculpture absent. Outline of whorls straight, somewhat turreted appearance because of the shallower subsutural band. Subsutural band beset with small round nodes becoming larger on mature whorls, matching the number of axial ribs on the remainder of the whorl. Subsutural band bordered by a shallow, wide and angular depression with a sharp incision. Axial ribs about a third of the width of the interspaces, faint, straight, with an angular aspect below the subsutural band. Faint axial growth striae visible all over the remainder of the whorl. Aperture elongate with the white band shining through, columella straight.

Discussion: The narrow apical angle, elongated whorls and the protoconch morphology set the specimen apart from both *D. mozambiquensis* and *D. herberti* in Mozambique. These features are also observed in a number of species in Japanese waters and the South China Sea. Awaiting further material for formal description.

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Plate 1

1-5: *Duplicaria jukesi*

Tanzania, Zanzibar, Unguja Island, Nungwi,
05°43'S-39°17'E, 1-2 m.

- 1: MNHN-IM-2009-30342, 26.5 mm.
- 2: MNHN-IM-2009-30345, 21.5 mm.
- 3: MNHN-IM-2009-30344, 29.9 mm.
- 4: MNHN-IM-2009-30347, 27.8 mm.
- 5: MNHN-IM-2009-30346, 21.4 mm.

6-9: *Duplicaria sharqiya* sp. nov.

Oman, Ras-al-Ruways, 2-6 m.

- 6: holotype, MNHN-IM-2000-35032, 25.1 mm.
- 7: paratype 1, JR, 33.6 mm.
- 8: paratype 2, SG, 28.0 mm.
- 9: paratype 3, YT, 30.2 mm.

10: *Duplicaria* species

YT, Mozambique, S off Bilene, 80-90 m, 22.7 mm.

11-13: *Duplicaria herberti* Malcolm, Terryn & Fedosov, 2020

- 11: YT, Mozambique, Inhaca, dived at 20 m, 28.8 mm.
- 12: YT, Mozambique, Maputo Bay, dived at 4-8 m, 24.8 mm.
- 13: YT, Mozambique, Inhaca, dived at 20 m, 25.2 mm.

14-15: *Duplicaria mozambiquensis* Bratcher & Chernohorsky, 1982

- 14: YT, Mozambique, N Quelimane, Pebane, dredged at 35-45 m, 19.6 mm;
- 15: Holotype, NMSA H7843/T2541, Mozambique, off Chinde, 22.3 mm.

16: *Duplicaria similis* (E. A. Smith, 1873)

Holotype, NHMUK 1979134, unknown locality, 27.4 mm.

17: *Duplicaria severa* (Melvill, 1897)

Holotype, NHMUK 1897.7.30.103, Pakistan, Mekran coast, 14.8 mm (x 1.5).

18: *Duplicaria jukesi* (Deshayes, 1857)

Paralectotype, NHMUK 197964/2, Australia, Northern Territory, Port Essington, 35.0 mm.

Plate 1

