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A new species of *Chicomurex* (Gastropoda, Muricidae) from the Saya de Malha Bank, Western Indian Ocean

I.P. BONDAREV [1,2]

[1] *A.O. Kovalevsky Institute of Biology of the Southern Seas of RAS, Sevastopol, 299011, Nakhimov Avenue 2, Sevastopol, RUSSIAN FEDERATION;*
[2] *Sevastopol State University, 33 Universitetskaya str., Sevastopol, 299033, RUSSIAN FEDERATION. E-mail:igor.p.bondarev@gmail.com*

ABSTRACT. *Chicomurex* ***kozlovi*** sp. nov., collected from the Saya de Malha Bank in the Mascarene Plateau, Western Indian Ocean, is described and illustrated. The holotype was sampled at a depth of 200 m during the expedition of R/V *Gordy* in 1989, while paratypes 1 and 2 were trawled from a depth of 100-200 m by research-fishery boats during the 1980s. *Chicomurex* ***kozlovi*** sp. nov. is compared with morphologically similar congeneric species.

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Новый вид рода *Chicomurex* (Gastropoda, Muricidae) с банки Сайя де Малья, западная часть Индийского океана

И.П. БОНДАРЕВ [1,2]

[1] *ФИЦ Институт биологии южных морей имени А.О. Ковалевского РАН, 299011, Проспект Нахимова,2, Севастополь, РОССИЙСКАЯ ФЕДЕРАЦИЯ,*
[2] *ФГАОУ ВО «Севастопольский государственный университет», 299033, ул. Университетская, 33, Севастополь, РОССИЙСКАЯ ФЕДЕРАЦИЯ, E-mail:igor.p.bondarev@gmail.com*

РЕЗЮМЕ. Описан и иллюстрирован *Chicomurex* ***kozlovi*** sp. nov., обнаруженный на банке Сайя де Малья, расположенной на Маскаренском хребте в западной части Индийского океана. Голотип поднят с глубины 200 м в экспедиции НИС *Гордый* в 1989 г., паратипы 1 и 2 добыты тралом исследовательско-промыслового судна в 1980-х гг. с глубин 100–200 м. *Chicomurex* ***kozlovi*** sp. nov. сравнивается с морфологически схожими родственными видами.

Introduction

The Saya de Malha Bank, located between 8°30'–12°S and 59°30'–62°30'E, is the largest of the banks of the Mascarene Plateau with an area of approximately 40,000 km². It lies northeast of Madagascar, southeast of the Seychelles, and north of Nazareth Bank, the Cargados Carajos Shoals (Saint Brandon), and the island of Mauritius (Fig. 1).

Saya de Malha, with its remote location from the mainland, deep ocean depths exceeding 4,000 meters, and prolonged isolation, is renowned for its high level of endemism [Bondarev, Roeckel, 1992; Bouchet, Bail, 1991; Houart, 2013b]. More than a dozen gastropod species with a paucispiral protoconch indicating non-planctotrophic larval development have been discovered only in Saya de Malha [Bouchet, Bail, 1991; Houart, 2013b], suggesting an additional factor contributing to their endemism. In terms of muricids, Saya de Malha has yielded *Murex surinamensis* Okutani, 1992, *Vokesimurex danilai* (Houart, 1992), *Haustellum bondarevi* Houart, 1999 [Houart, 2013b], and now, *Chicomurex* ***kozlovi*** sp. nov.

In the past 10 years, significant progress has been made in the study of the genus *Chicomurex* Arakawa, 1964. Houart [2013a] and Houart *et al.* [2014, 2015, 2017] have added six new species to *Chicomurex*, while also reviewing the synonymy and validity of some names, resulting in a total of 14 valid Recent Indo-West Pacific species. The recent description of a new species from Mauritius by Houart and Lorenz [2020] brought the total number of *Chicomurex* species to 15. In their publication Houart *et al*. [2021] provided a detailed description and images of the species and their variability. These works provide a qualified basis for comparing *Chicomurex kozlovi* sp. nov. with closely related species in the genus.

Material and methods

The type material, including the holotype and two paratypes, was collected from the Saya de Malha Bank in the Mascarene Plateau of the Western Indian Ocean during expeditions conducted by research organizations of the Ministry of Fisheries of the USSR.

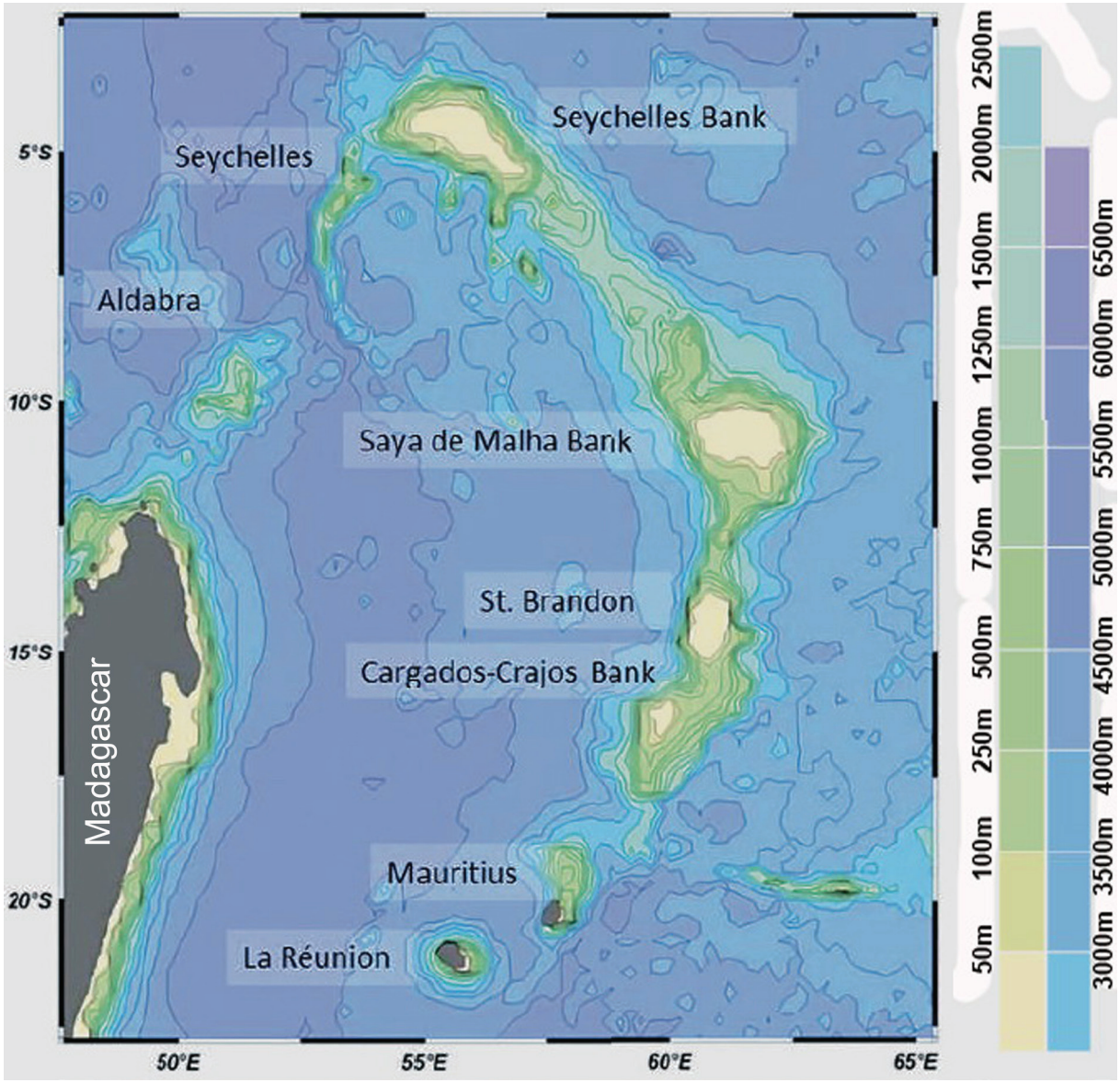

FIG. 1. Map showing the location of the Saya de Malha bank on the Mascarene Plateau. A color bar highlights isobaths readings (after *Baseline Study - Indian Ocean Expedition*. Monaco Explorations – www.monacoexplorations.org).

РИС. 1. Карта показывающая местоположение банки Сая де Малья на Маскаренском плато. На цветовой планке дана градация значений изобат (по *Baseline Study. Indian Ocean Expedition*. Monaco Explorations – www.monacoexplorations.org).

The holotype, which was fresh-dead, was obtained at a depth of 200 m during the 1989 expedition of R/V *Gordy*, Gydronavt Base, Sevastopol. Paratypes 1 and 2 were trawled in the 100-200 m depth range during the 1980s by research-fishery boats belonging to the Production-Search Association of Fish Searching and Research Fleet for the Southern Basin, Kerch.

The characters used in this study to describe the shell morphology include size, general shape, base color, color patterns, details of axial and spiral sculptures, aperture, and siphonal canal. The terminology used to describe the spiral cords is based on Merle [2001, 2005].

The biogeographic background of the distribution of the new species and other species of *Chicomurex* is given according to Houart *et al*. [2021].

Abbreviations: Shell structure and terminology, in parentheses: (variable feature).

Convex part of the whorl and siphonal canal

P: primary cord; s: secondary cord; t: tertiary cord; ad: adapical (or adapertural); ab: abapical (or abapertural); IP: infrasutural primary cord (primary cord on shoulder); adis: adapical infrasutural secondary cord (shoulder); abis: abapical infrasutural secondary cord (shoulder); P1: shoulder cord; P2–P6:

primary cords of the convex part of the teleoconch whorl; s1–s6: secondary cords of the convex part of the teleoconch whorl (example: s1 – secondary cord between P1 and P2; s2 – secondary cord between P2 and P3, etc.); ADP: adapertural primary cord on the siphonal canal; MP: median primary cord on the siphonal canal; ABP: abapertural primary cord on the siphonal canal; abs: abapertural secondary cord on the siphonal canal (example: abs – secondary cord just after ABP).

SL: shell length, w/o: with operculum.

Repositories:

IBSS: A.O. Kovalevsky Institute of Biology of the Southern Seas of RAS, Sevastopol, Russia,

CKE: collection of Eugene Kozlov, Kaliningrad, Russia,

ZMMU, Zoological Museum of Moscow State University, Russia.

Taxonomy

Class Gastropoda Cuvier, 1795
Subclass Caenogastropoda Cox, 1960
Order Neogastropoda Wenz, 1938
Family Muricidae Rafinesque, 1815
Subfamily Muricinae Rafinesque, 1815

Genus *Chicomurex* Arakawa, 1964

Type species *Murex superbus* Sowerby, 1889, by original designation.

Description [from Houart *et al*., 2021]. Shell broadly ovate, medium or large sized, from 35 to 90 mm in length, spire high with 3 rounded varices on last whorl with short, usually webbed spines; protoconch rounded or conical, with 1.5–3.5 whorls; Spiral sculpture elaborate, consisting of primary and secondary squamous cords, and usually additional tertiary cords between P6 or s6 and ADP. Aperture broadly-ovate; columellar lip smooth or with weak folds with fairly strong, elongate parietal tooth at adapical extremity; outer lip denticulate, with elongate, narrow, split ID, D1–D6 denticles within. Siphonal canal medium sized or long with 2 or 3 short or moderately long, broadly open spines. Operculum ovate or broadly ovate with apical nucleus.

*Chicomurex **kozlovi*** sp. nov.
(Figs 2 A–O, 3 A–C)

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Type material: holotype ZMMU Lc-41717, SL 41.5 mm, (Figs 2 A–E); paratype 1 IBSS collection, ibss.bent.2.Mol. p., SL 33.1 mm, w/o (Figs 2 F–J); paratype 2 CKE, SL 37.9 mm, (Figs 2 K–O).

Type locality: Saya de Malha Bank, Mascarene Plateau, Western Indian Ocean, 11°35.2'S, 61°35.2'E, 200 m depth.

Etymology: The species is named after Mr. Eugene Kozlov (Kaliningrad, Russia) well known all over the world muricid collector, who donated the paratype 1 to IBSS collection, and provided an opportunity to study and photograph the paratype 2.

Diagnosis. Shell biconical, heavy, small to medium size for the genus. Spire rather high with up to 7 convex, moderately shouldered teleoconch whorls, suture adpressed. Axial sculpture of third to seventh whorls with 3 rounded, high varices and high intervarical ribs. Spiral sculpture of subsutural ramp of last whorl consists of primary, secondary and few tertiary cords. Aperture broadly ovate, white, light lavender inside. Siphonal canal relatively short, broad, more or less dorsally bent at tip, narrowly open, with 3 long spines more or less strongly dorsally bent. Four first teleoconch whorls pink crimson or dull light crimson. Other teleoconch whorls white, cream-white or light tan with pinkish and light brown tenting between varices. Three chestnut spiral interrupted bands: traced by spots on suture under intervarical ridges, also apparent on varices. Operculum reddish-brown, ovate, with terminal nucleus.

Description. Shell biconical, heavy, squamous, nodose, small to medium sized for the genus: from 33.1 mm (paratype 1) up to 41.5 mm in length (holotype) at maturity. Spire rather high with up to 7 convex, moderately shouldered teleoconch whorls (paratype 2), suture adpressed. First whorl of teleoconch damaged in the holotype and absent in paratype 1. Protoconch unknown.

Axial sculpture of two first teleoconch whorls consisting of high, narrow, nodose ribs, third to seventh whorls with 3 rounded, high varices with short, open spines increasing in length, more webbed abapically, and high intervarical ribs: 3 or 4 on third and fourth whorls, 2 or 3 on fifth and sixth, 1 or 2 on last whorl, highest axial knobbed ridge between penultimate and apertural varix.

Spiral sculpture of subsutural ramp of last whorl consists of primary, secondary and few tertiary with adis, IP, abis cords, followed by P1, s1, P2, s2, P3, s3, P4, s4, P5, s5, P6, s6, t on convex part of whorl, separated with smooth interspace from ADP. Primary cords extending on varices as short, broad, squamous, weakly adapically recurved open spines, increasing in strength and length abapically. Apertural varix broad, ventrally strongly squamous.

Aperture broadly ovate, columellar lip narrow, smooth, weakly broader abapically, rim adherent, weakly erect abapically. Outer lip weakly erect, crenulated, lirate within.

Siphonal canal relatively short, broad, more or less dorsally bent at tip, narrowly open, with 3 long ADP, MP, ABP spines and abs (Fig. 3 B, C); ADP

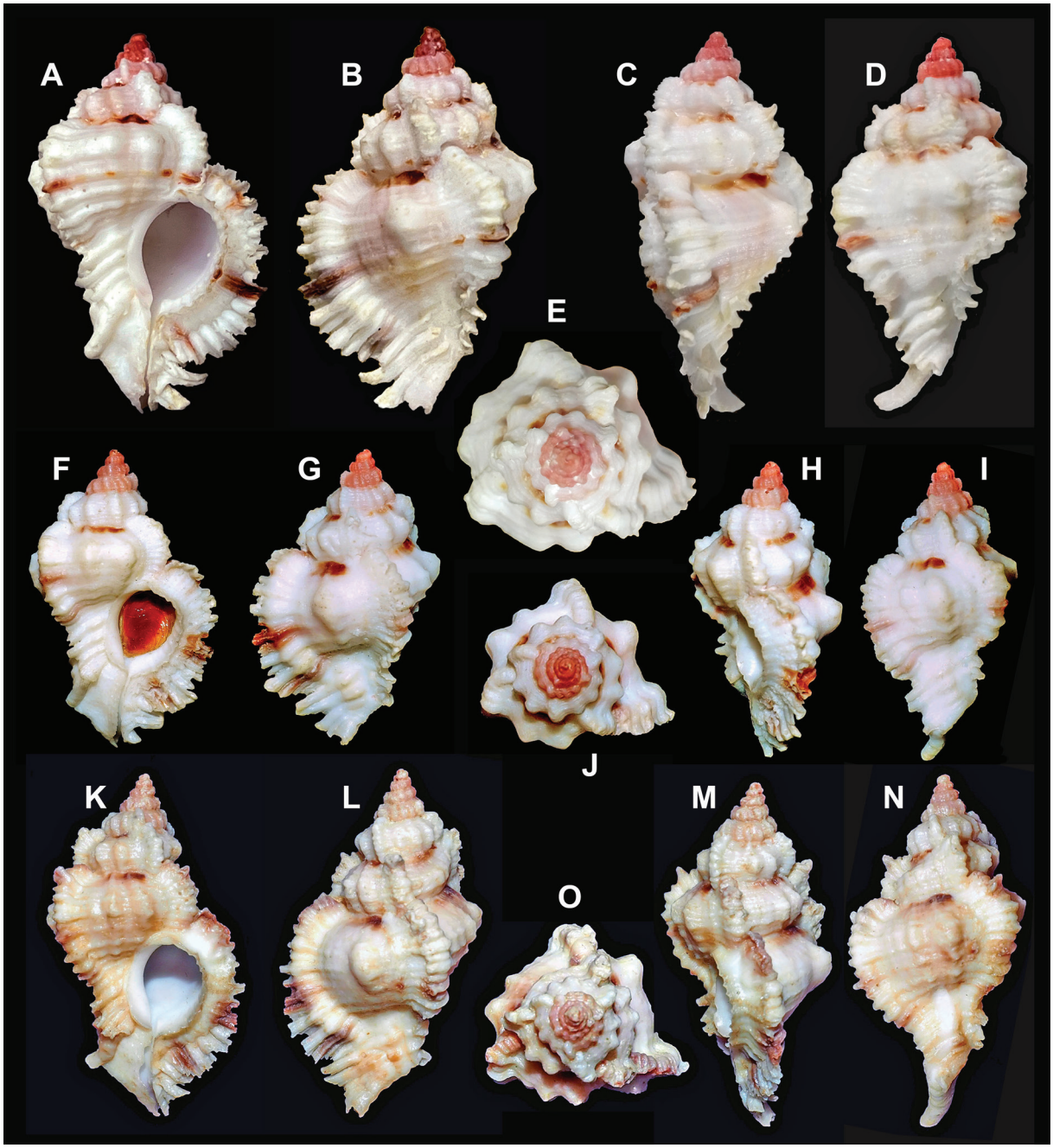

FIG. 2. *Chicomurex* ***kozlovi*** sp. nov.: **A–E**. Holotype ZMMU, 41.5 mm: ventral (A) dorsal (B), right (C), left (D) and apical (E) views; **F–J**. Paratype 1 IBSS, 33.1 mm: ventral (F) dorsal (G), right (H), left (I) and apical (J) views; **K–O**. Paratype 2 CKE, 37.9 mm: ventral (K) dorsal (L), right (M), left (N) and apical (O) views.

РИС. 2. *Chicomurex* ***kozlovi*** sp. nov.: **A–E**. Голотип ZMMU, 41,5 мм, ракурсы: вентральный (A) дорсальный (B), справа (C), слева (D), апикальный (E); **F–J**. Паратип 1 IBSS, 33,1 мм, ракурсы: вентральный (F) дорсальный (G), справа (H), слева (I), апикальный (J); **K–O**. Паратип 2 CKE, 37,9 mm: ракурсы: вентральный (K) дорсальный (L), справа (M), слева (N), апикальный (O).

more strongly and MP less strongly dorsally bent, ABP widest and trilobate in holotype (Fig. 3B).

Four first teleoconch whorls crimson-pink (holotype and paratype 1) or dull light crimson (paratype 2). Other teleoconch whorls white, creamy white (holotype and paratype 1) or light tan (paratype 2) with pinkish and light brown tenting between varices. Three chestnut spiral interrupted bands: traced by spots on suture under intervarical ridges, also apparent on varices on (adis), IP, (abis), P1, on (s3), P4, (s4) and s6, t6. Aperture white, light lavender inside.

Operculum reddish-brown, ovate, with terminal nucleus. Radula unknown.

Distribution. Saya de Malha Bank, Mascarene Plateau, Western Indian Ocean, in 100–200 m.

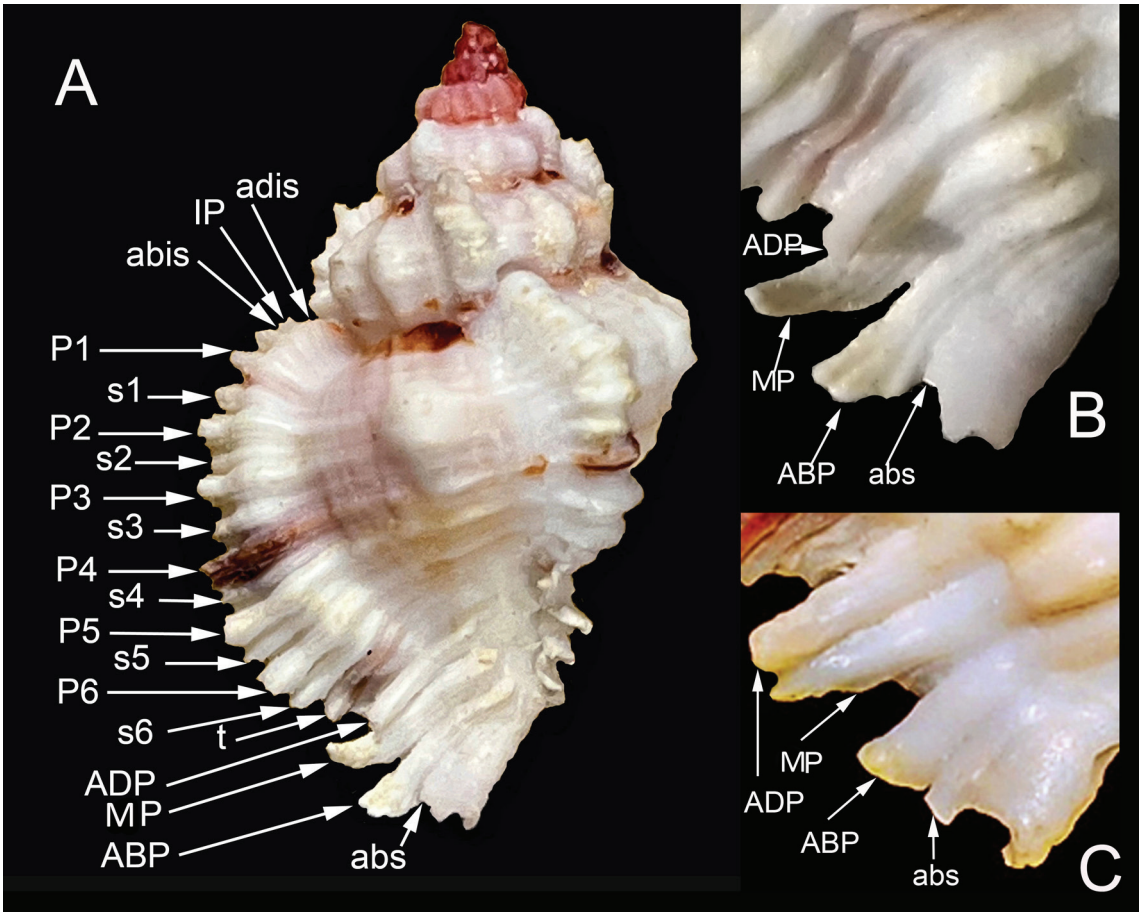

FIG. 3. *Chicomurex* ***kozlovi*** sp. nov., dorsal view with arrows indicating the details of the spiral sculpture: **A.** Holotype, 41.5 mm, **B–C**. siphonal canal, enlarged without scale: **B –** holotype, **C –** paratype 1.

РИС. 3. *Chicomurex* ***kozlovi*** sp. nov., дорсальный вид с указанием стрелками деталей спиральной скульптуры: **A**. Голотип, 41,5 мм, **B–C**. сифональный канал, увеличен без масштаба: **B –** голотип, **C** – паратип 1.

Remarks. Many *Chicomurex* species have a paucispiral protoconch [Houart *et al*., 2021], which indicates the absence of a planktonic stage in development and, consequently, results in provincialism and endemism. Since *Chicomurex* ***kozlovi*** sp. nov. has not been found outside the Saya de Malha Bank, it is possible that its protoconch is paucispiral. The brightly colored crimson-pink apical whorls make it distinguishable from other *Chicomurex* species, and the shell morphology features provide additional evidence.

Five additional species of *Chicomurex* live in the western Indian Ocean: *C. gloriosus* (Shikama, 1977), *C. laciniatus* (Sowerby II, 1841), *C. rosadoi* Houart, 1999, *C. vaulberti* Houart & Lorenz, 2020 and probably *C. turschi* (Houart, 1981) [Houart *et al.*, 2021] (Fig. 4).

Chicomurex gloriosus from Madagascar, Reunion and Mauritius and Nazareth Bank in the Indian Ocean and several records in the Pacific Ocean is larger, exceeding 60 mm in length *vs.* up to 41.5 mm in *C.* ***kozlovi*** sp. nov., with a distinctly longer siphonal canal but without abs cord. The columellar lip in *C. gloriosus* has weak folds on its entire length while it is smooth in *C. kozlovi* sp. nov. *Chicomurex gloriosus* is pink or light orange, occasionally with a darker spiral band, usually between s2 and s4 or P5 [Houart *et al.*, 2021, Fig. 9 F–S].

Chicomurex laciniatus distributed from Southern Africa, throughout the Indo-West Pacific, to the Fiji Islands is a highly distinctive species because of its light brown, occasionally orange or pale brown color, with darker colored varices, and violet or pink columellar lip [Houart *et al.*, 2021, Fig. 10 A–N]. It has a larger adult size (up to 77 mm), and lower axial nodes. The spiral sculpture has occasionally an additional tertiary cord (t) above adis, IP on the subsutural ramp and another occasional tertiary cord below P6 and s6 on the convex part of the last whorl. The short or moderately long siphonal canal lacks the abs cord.

Chicomurex rosadoi from South Mozambique also has a whitish colored form with pink spire whorls [Houart *et al.*, 2021, Fig. 14 M, N], being mostly light tan to tan with darker colored blotches

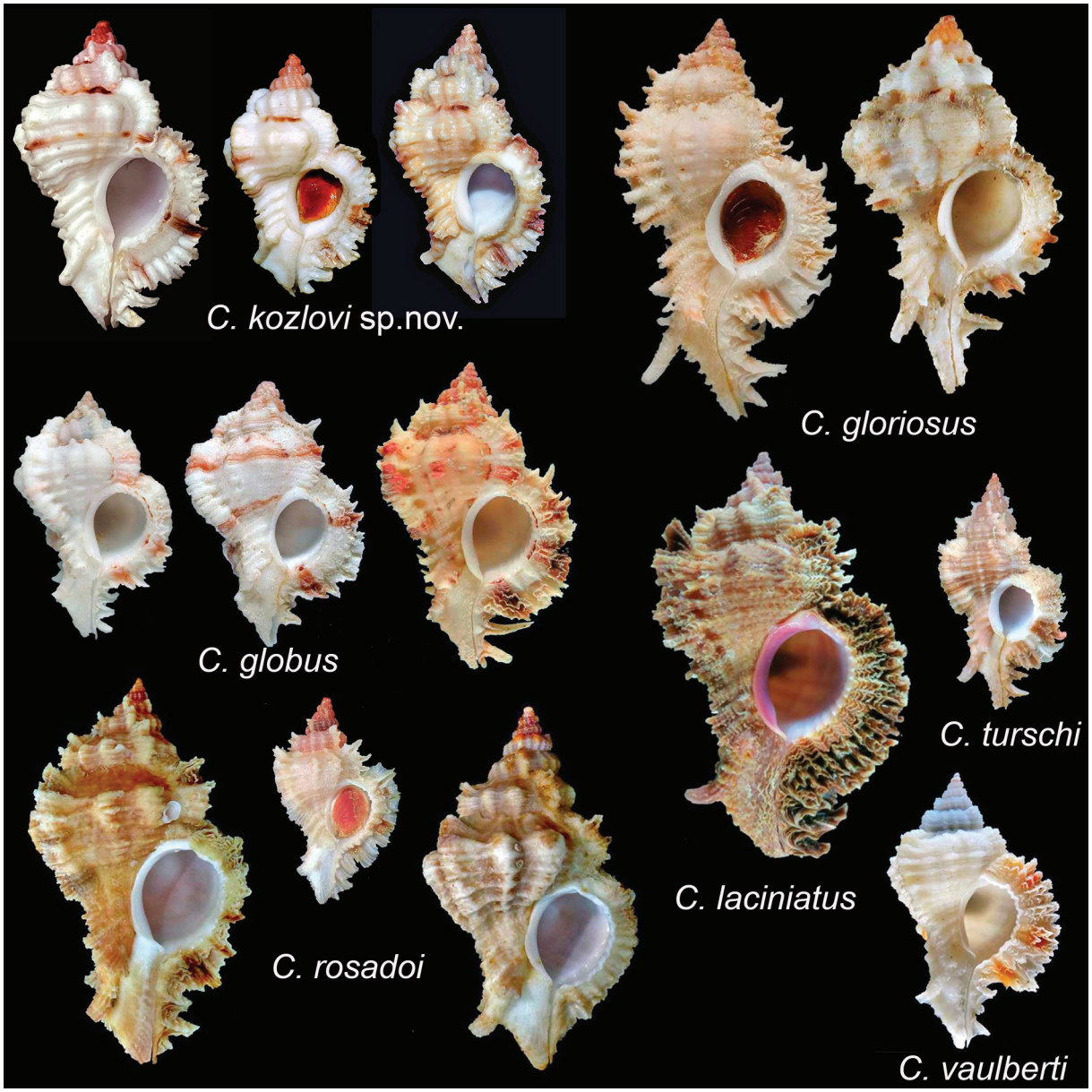

FIG. 4. *Chicomurex* species in the same scale, comparative specimen pictures extracted from [Houart *et al.,* 2021].

РИС. 4. Виды *Chicomurex* в одном масштабе, изображения сравниваемых экземпляров заимствованы из [Houart *et al.,* 2021]..

on the varices [Houart, 1999; Houart *et al.*, 2021, fig. 14. J, K, O, P]. *Chicomurex rosadoi* differs by the longer siphonal canal and a less developed spiral sculpture: (s1)… (s6), few tertiary cords on convex part of whorl, and ADP, MP, ABP extending as small, open spines *vs.* distinct s1 … s6 followed by rather strong t, and ADP, MP, ABP extending as long dorsally bent spines.

Chicomurex turschi is doubtfully reported from Zululand, South Africa, Madagascar and the Philippines, but occurs in Papua New Guinea, south of New Caledonia, Fiji and Tonga, in 45–79 m [Houart *et al.*, 2021]. It differs by the more slender fusiform shell with less squamous and narrower axial varices, with a longer siphonal canal, lower and more numerous axial ridges: 3 or 4 *vs.* 2 or 3 on penultimate whorl, 2 or 3 *vs.* 1 or 2 on the last whorl. *Chicomurex turschi* spiral sculpture with occasional s5 *vs.* distinct s5 in *C.* ***kozlovi*** sp. nov., and 2 or 3 tertiary cords between s6 and ADP *vs.* one very prominent tertiary cord followed by smooth space (Fig. 3A). *Chicomurex turschi* is more uniformly clored: cream or light brown, occasionally entirely white or orange, never with distinctly crimson-pink spire whorls.

Chicomurex vaulberti, known only from Northern Mauritius, differs in having a lower spire, a broadly convex, less shouldered body whorl and a longer siphonal canal. The spiral sculpture has no abis cord,

but two threads on convex part of whorl below s6 *vs* strong tertiary cord**.** The spire whorls are whitish *vs.* crimson-pink or dull pale crimson in *C.* ***kozlovi*** sp. nov.

Chicomurex globus Houart, Moe et Chen, 2015, particularly the West Pacific creamy-white color form (Fig. 4), is most similar to *C.* ***kozlovi*** sp. nov. It differs by the globose, broader and lightly built shell, the narrower siphonal canal, two additional tertiary cords below s6 *vs.* one strong tertiary cord on the convex part of whorl; the ABP spine is short and narrow *vs.* long and broad.

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