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A much needed new name for a Brazilian Cone (Gastropoda: Conidae)

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ABSTRACT A new species of *Jaspidiconus* is described from the southern area of the Cabo Frio region, Rio de Janeiro State, Brazil, in the northernmost part of the Janeiran Subprovince of the Paulinian Molluscan Province. This new cone shell, here named *Jaspidiconus carnaval* new species, was previously referred to as "*Conus pusio*" by most Conidae workers. That taxon is now known to refer to a West Indian species from the Caribbean Molluscan Province and not the southern Brazilian cone. *Jaspidiconus carnaval* represents the farthest-south range of the genus *Jaspidiconus*.

KEY WORDS *Jaspidiconus*, *Jaspidiconus carnaval*, Conidae, Brazil, Cabo Frio, Janeiran Subprovince, Paulinian Molluscan Province

INTRODUCTION

In 1792, Christian Hee Hwass published the description of a small cone shell that he named *Conus pusio* (Figure 1). The description appeared on page 710 (no. 103) of volume 1 of Jean-Guillaume Bruguière's *Encyclopédie méthodique ou par ordre de matières. Histoire naturelle des vers* (Pancoucke, Paris). As usual in those days, the description was rather short, the diagnosis for the species being: "*Conus, testa conica flavescente, fusco alboque cingulata, variegata, spira acuminata, fauce violacea*." Hwass then proceeds to describe two varieties (as A and B) in further detail.

Unfortunately, no holotype exists. Kohn (1992), explains that "no specimens are present in the Hwass collection" for "*Conus pusio*", and for that reason, in 1968, Kohn designated as lectotype the figure in the *Tableau encyclopédique et méthodique des trois règnes de la nature*, pl. 334, fig. 4 (19 x 9 mm, in the original description given as 18 x 9 mm). Kohn (1968) also selected Santo Domingo (Dominican Republic) as the type locality, since it was the first of three given localities, the other two being Martinique and Guadeloupe. However, Vink (1989) pointed out that that was erroneous (see Kohn (1992)), as the species does not appear in Santo Domingo, and he designated Guadeloupe (Leeward Islands) as the type locality. The same views and a thorough examination of related species can be found in Kohn (2014).

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Figure 1. "*Conus pusio*" from Hwass, 1792.

Regardless of whether there is enough information to identify Hwass' *Conus pusio* with some concrete Caribbean population, there is no doubt about the fact that any such population would be restricted to the Caribbean Molluscan Province. This proves that the occasional use of the name "*Conus pusio*" to identify specimens collected in southern Brazil is clearly erroneous. That area belongs within the Paulinian Molluscan Province, and the two provinces and their faunas are separated by both the entire Brazilian Molluscan Province and the Amazon River Mouth ecological barrier (Petuch and Berschauer, 2021). This faunal bifurcation has been confirmed by other conid experts, in particular Loic Limpalaer (personal communication). The *Jaspidiconus* from the southern coast of Brazil, previously referred to as "*J. pusio*" by shell dealers and collectors, was found to be without any referable taxon and is here given a new name. This all means that the population from the Brazilian coast occasionally identified as *pusio* needs to be properly classified and a new name for it is needed, which is what we propose in this paper.

SYSTEMATICS

Class Gastropoda	Cuvier, 1795
Subclass Prosobranchia	Milne-Edwards, 1848
Order Neogastropoda	Wenz, 1938
Superfamily Conoidea	Fleming, 1822
Family Conidae	Fleming, 1822
Subfamily Conolithinae	Tucker & Tenorio, 2009
Genus *Jaspidiconus*	Petuch, 2003

Jaspidiconus carnaval Crabos, Petuch, Monteiro & Monteiro, n.sp.
(Plate 1, Figures A-D; Plate 2, Figures A-E)

Description. Average size 15 mm, but can vary from 13 to 19 mm (most shells recorded range from 14 to 16 mm), exceptionally reaching 22 mm; biconical shell with varied colour, from pale cream to dark orange and brown purple with around 20 incised spiral channeled lines on last whorl, showing dark spots regularly arranged along those lines; interior of aperture is yellowish in light coloured specimens, to light purple in darker ones; spire shows dark spots all over, has straight line without marked steps and is topped by characteristic protuberant hemispherical protoconch, feature that actually separates it readily from vaguely similar species; ratio of spire/whole shell is approximately one-third.

Type Material. The holotype, measuring 15.1 in length by 7.9 mm in width, is deposited in Museu Nacional do Rio de Janeiro MNRJ, Brazil, under the registration number MNRJ 37351. The holotype was donated by the first author, from his private collection. Paratypes: No. 1 - 20 x 10 mm – Arraial do Cabo, Rio de Janeiro State, Brazil, in the collection of Olivier Crabos (photo Gonçalo Rosa); No. 2 - 17 x 9 mm - Arraial do Cabo, Rio de Janeiro

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State, Brazil, in the collection of Olivier Crabos (photo Gonçalo Rosa); No. 3 - 15.5 x 8.2 mm - Arraial do Cabo, Rio de Janeiro State, Brazil, in the collection of André Poremski (photo André Poremski); No. 4 - 20 x 8.5 mm - off Farol de São Tomé, Rio Janeiro, Brazil, in the collection of Pascal Wink (photo Pascal Wink); No. 5 - 16 x 8 mm - Arraial do Cabo, Rio de Janeiro State, Brazil, in the collection of Olivier Crabos (photo Gonçalo Rosa).

Type Locality. Off Arraial do Cabo, Rio de Janeiro State, Brazil. Most of the specimens recently collected at this locality were found by diver Paulo César Gonçalves.

Geographic distribution. Very limited between Cabo Frio and Arraial do Cabo, Rio de Janeiro State, exceptionally reaching Saquarema at the south west end of its range (Figure 2). It should be noticed that some shells from Rio Grande do Norte State (Natal and Rio do Fogo) have also been called *pusio*. However we believe they belong to another species (with a convergent shell aspect) or may even be *J. serafimi*.

Etymology. The name of the new species actually refers to its type location and is derived from the Latin *carne levare* ("remove meat"), referring to the approaching fast of the Christian celebration of Lent. The term "carnival" became more or less synonym with a popular yearly festival that reaches it bigger proportions at Rio de Janeiro, where it is held since the early 18th Century.

Figure 2. Locality map of south east Brazil. This geographic range makes *Jaspidiconus carnaval* one the southernmost species of *Jaspidiconus*, together with *J. ericmonnieri* (Petuch & Myers, 2014).

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Habitat. In coral sand, at depths of 10-30 m, in relatively cold waters for Tropic latitude, 22 to 23 ºC at sea level, and probably 17ºC at these depths, due to the northward-flowing cold Falkland Current.

Discussion. Among Conidae species, the genus *Lamniconus* is quite common around Cabo Frio and Arraial do Cabo, but the only *Jaspidiconus* found there are *J. ericmonnieri, J. simonei* and *J. ildae,* all mistaken and previously grouped in *J. mindanus. Jaspidiconus ericmonnieri* is a very large species for the genus with a clearly more robust shell predominantly over 35 mm. It also shows a lower ratio spire/whole shell than *J. carnaval. Jaspidiconus simonei,* a medium sized *Jaspidiconus* (averagely over 20 mm), has its centre of distribution in Guarapari (Espirito Santo State), 300 kms north of Arraial do Cabo, even if its holotype is declared to come from Arraial do Cabo. Its pattern is darker and more greyish than *J. carnaval.* It also has a stepped spire as opposed to *J. carnaval. Jaspidiconus ildae* has an average size of 18.5 mm and occupies the same area as *J. simonei* but is has brown blotches on the spire, shows a stepped spire and does not present the protuberant protoconch of *J. carnaval*.

Biogeography of Brazilian *Jaspidiconus*

The conid genus *Jaspidiconus* Petuch, 2004 in Brazil is presently undergoing the largest single species radiation in the western Atlantic, with many more taxa being present there than are seen in the Carolinian and Caribbean Provinces to the north. This anomalously-large number of species within a single Brazilian genus was considered problematic until recently, when it was discovered (using quantitative methodologies; see Petuch, 2013; Petuch & Berschauer, 2021) that the Brazilian coastline actually encompasses two separate biogeographic provinces and four separate subprovinces, each with their own clusters of endemic species. These include: the **Brazilian Province** in the north (extending from the Amazon River Delta to Cabo Frio, Rio de Janeiro State) and its two subdivisions, the **Cearaian Subprovince** in the north and the **Bahian Subprovince** in the south; and the **Paulinian Province** in the south (extending from Cabo Frio south to the Mar del Plata, Argentina) and its two subdivisions, the **Janeiran Subprovince** in the north and the **Uruguayan Subprovince** in the south. These provinces and subprovinces are shown here on Figures 3 and 4.

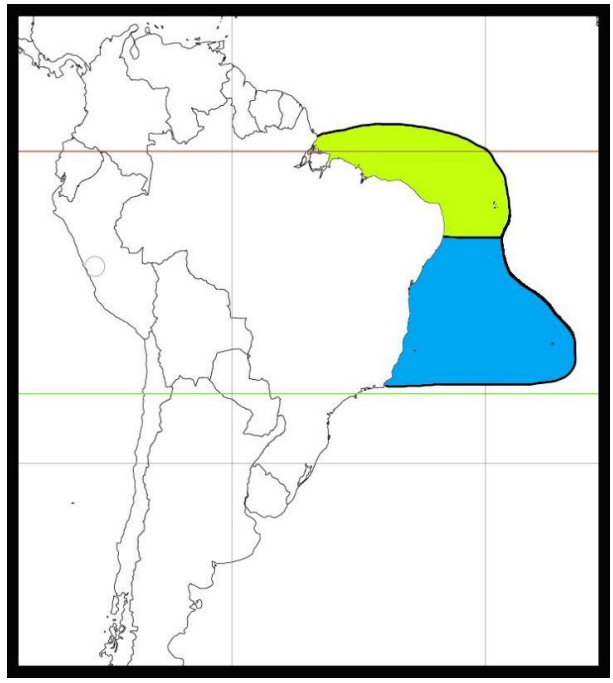

Figure 3. Brazilian Province. The areal extent of the Brazilian Molluscan Province. Light Green= the extent of the Cearaian Subprovince; Blue= the extent of the Bahian Subprovince. Each subprovince contains its own suite of endemic species of *Jaspidiconus*. Map taken from Petuch and Berschauer, 2021.

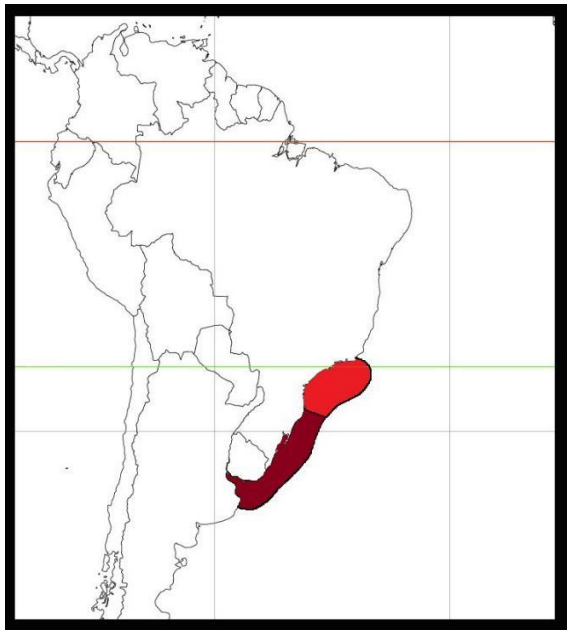

Figure 4. Paulinian Province. The areal extent of the Paulinian Molluscan Province. Red= the extent of the Janeiran Subprovince; Burgundy= the extent of the Uruguayan Subprovince. Only the northernmost edge of the Janeiran Subprovince is the type locality of *Jaspidiconus carnaval* n.sp., the only member of its genus to occur within the Paulinian Province. Map taken from Petuch and Berschauer, 2021.

The Brazilian Province is a high-tropical region that contains a large cone shell fauna, all of which, except for two species (*Stephanoconus regius* and *Kohniconus centurio*), are endemic to that coastline. The northernmost subprovince, the Cearaian, is typified by coastlines that are dominated by coralline algal bioherms (crustose rhodoliths) and wide areas of clean carbonate sand. At least eight different *Jaspidiconus* species are now known from this area, with new ones being discovered regularly. The Bahian subprovince is typified as containing long stretches of open beaches, composed of a mixture of quartz and carbonate sand. These prominent beaches are separated from each other by extensive coastal lagoons that are bordered by forests of Red Mangroves and large areas of organic-rich sediments and brackish water conditions. The most prominent geomorphologic feature within the Bahian Subprovince is the immense, shallow water Abrolhos Platform, which encompasses a group of volcanic islands, numerous small low coral islands, and large coral reef complexes, as well as adjacent isolated seamounts. The Abrolhos Platform environments are now known to house the largest number of endemic *Jaspidiconus* species, comprising at least 12 species (Petuch, Coltro & Berschauer, 2020).

Within the Brazilian Province (Figure 3), the Bahian Subprovince is seen to contain the largest and most biodiverse *Jaspidiconus* fauna, the richest known from any one area of the entire Tropical Western Atlantic Region. The tiny, heavily-coronated species of the subgenus *Coltroconus* are known only from the Abrolhos Platform and reefs and appear to represent an endemic species radiation that is restricted to southern Bahia State. The known Bahian Subprovince *Jaspidiconus* species include:

J. barragrandensis Crabos, Oliveira, Queiroz & Almeida, 2022
J. carlagrezziae Petuch, Coltro & Berschauer, 2020
J. crabosi Petuch & Berscahuer, 2018
J. elenae Queiroz, Crabos, Passos & Pomponet, 2023
J. gregorioi Crabos & Oliveira, 2021
J. henckesi (Coltro, 2004)
J. itapua Petuch & Berschauer, 2018
J. josei Petuch & Berschauer, 2016
J. kasieae Cossignani, Allary & Stimpson, 2022
J. keppensi Petuch & Berschauer, 2018
J. laudelinoi Crabos & Oliveira, 2021
J. marinae Petuch & Myers, 2014
J. ogum Petuch & Myers, 2014

J. pomponeti Petuch & Myers, 2014
J. poremskii Petuch & Myers, 2014
J. ramosorum Petuch & Berschauer, 2019
J. tinharensis Crabos, Oliveira, Almeida & Queiroz, 2021
J. vanini Crabos, Oliveira, Almeida & Queiroz, 2021
J. (Coltroconus) bianchii Petuch & Berschauer, 2018
J. (C.) bodarti (Coltro, 2004)
J. (C.) delucai (Coltro, 2004)
J. (C.) henriquei Petuch & Myers, 2014
J. (C.) iansa (Petuch, 1979)
J. (C.) schirrmeisteri (Coltro, 2004)
J. (C.) valianti Petuch, Coltro & Berschauer, 2020

The Cearaian Subprovince of the Brazilian Province, in contrast to the Bahian Subprovince, has a much smaller *Jaspidiconus* fauna, with only a few known species. This diminished species-richness may be an artifact of collecting, as much of the Cearaian Subprovince area is still unexplored oceanographically and most of the endemic cones have highly localized distributions. The known Cearaian Subprovince *Jaspidiconus* species include:

J. anacarolinae Cossignani, 2019
J. damasoi (Cossignani, 2007)
J. damasomonteiroi Petuch & Myers, 2014
J. icapui Petuch & Berschauer, 2018
J. joanae Petuch & Berschauer, 2018
J. serafimi Petuch & Berschauer, 2019
J. tibauensis Crabos, Pomponet, Queiroz & Passos, 2022
J. toincabrali Petuch & Berschauer, 2019

The Paulinian Province (Figure 4) is a temperate area that lacks coral reef development and has a much less species-rich marine molluscan fauna. The Brazilian Province typically contains classic widespread index species such as the turbinellids *Aristovasum cassiforme* and *Turbinella laevigata*, the stombid *Titanostrombus goliath*, the fasciolariid *Aurantilaria aurantiaca*, the ovulid *Cyphoma macumba*, and the cypraeid *Macrocypraea dissimilis*. These widespread tropical species disappear abruptly at Cabo Frio, demonstrating that the cold-water upwelling conditions act as the boundary between the Bahian Subprovince of the Brazilian Province and the Janeiran Subprovince of the Paulinian Province. The extreme southernmost area of Espirito Santo State, just north of the Cabo Frio region, also houses three endemic *Jaspidiconus* taxa: *Jaspidiconus simonei* Petuch & Myers, 2014; the large *J. ericmonnieri* Petuch & Myers, 2014; and, *J. ildae* Monteiro & Monteiro, 2024 which lives at the limit between the Bahian and the Paulinian Provinces. Previously, these were thought to be the southernmost species of their genus. The discovery of *Jaspidiconus carnaval* n.sp. demonstrates that the genus *Jaspidiconus* does extend south of the Cabo Frio area, and is now known to be a component of the Janeiran Subprovince of the Paulinian Province. South of Rio de Janeiro, the genus *Jaspidiconus* disappears, and the family Conidae is represented only by species of the genera *Lamniconus*, *Dalliconus*, and *Conasprelloides* (see Petuch and Berschauer, 2021: 90-92).

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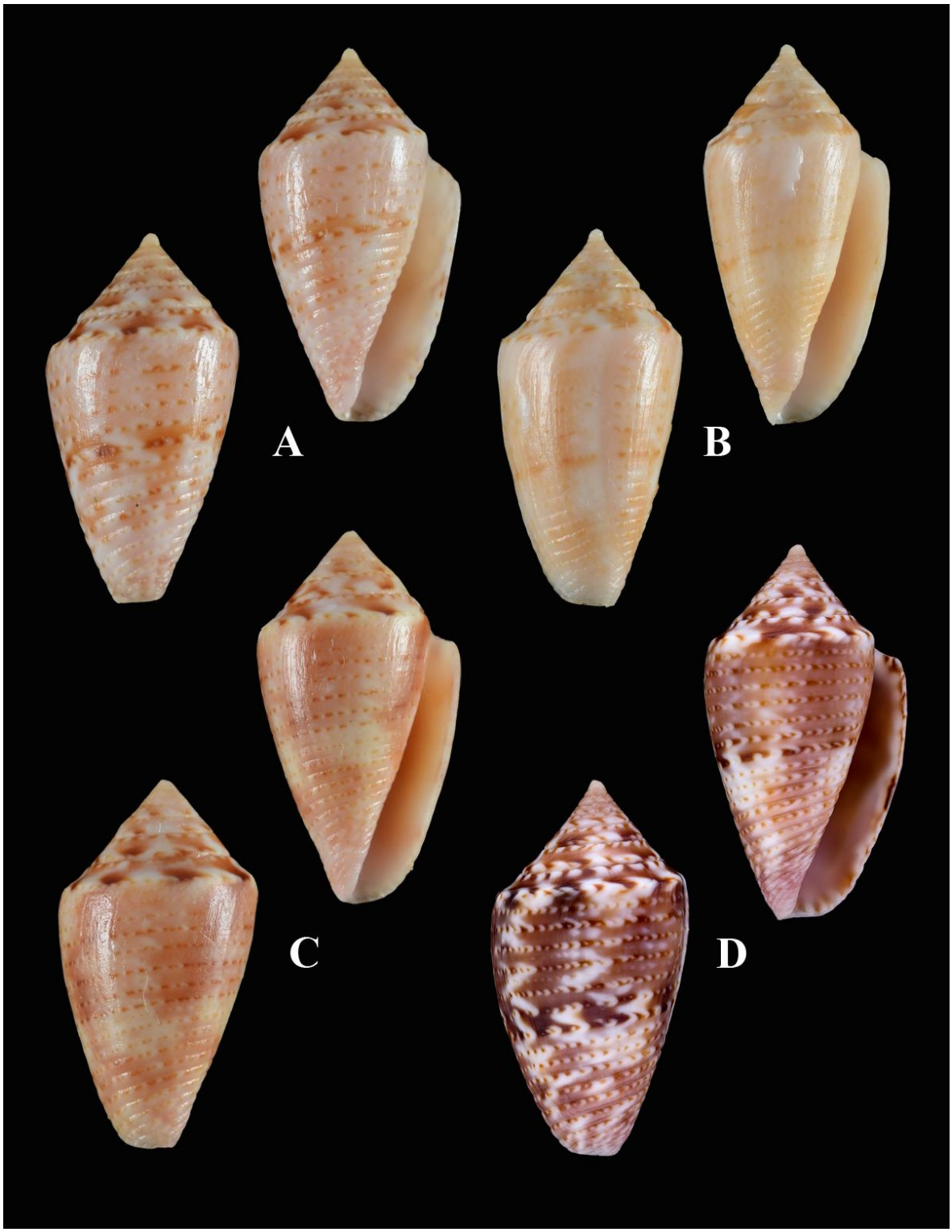

Plate 1. A= *Jaspidiconus carnaval* n. sp. – Holotype, MNRJ 37351, measuring 15.1 mm in length (Photo : Gonçalo Rosa); **B=** *J. carnaval* n. sp. – Paratype 1, 20.0 mm (photo Gonçalo Rosa); **C=** *J. carnaval* n. sp. – Paratype 2, 17.0 mm (photo Gonçalo Rosa); **D=** *J. carnaval* n. sp. – Paratype 3, 15.5 mm (photo André Poremski).

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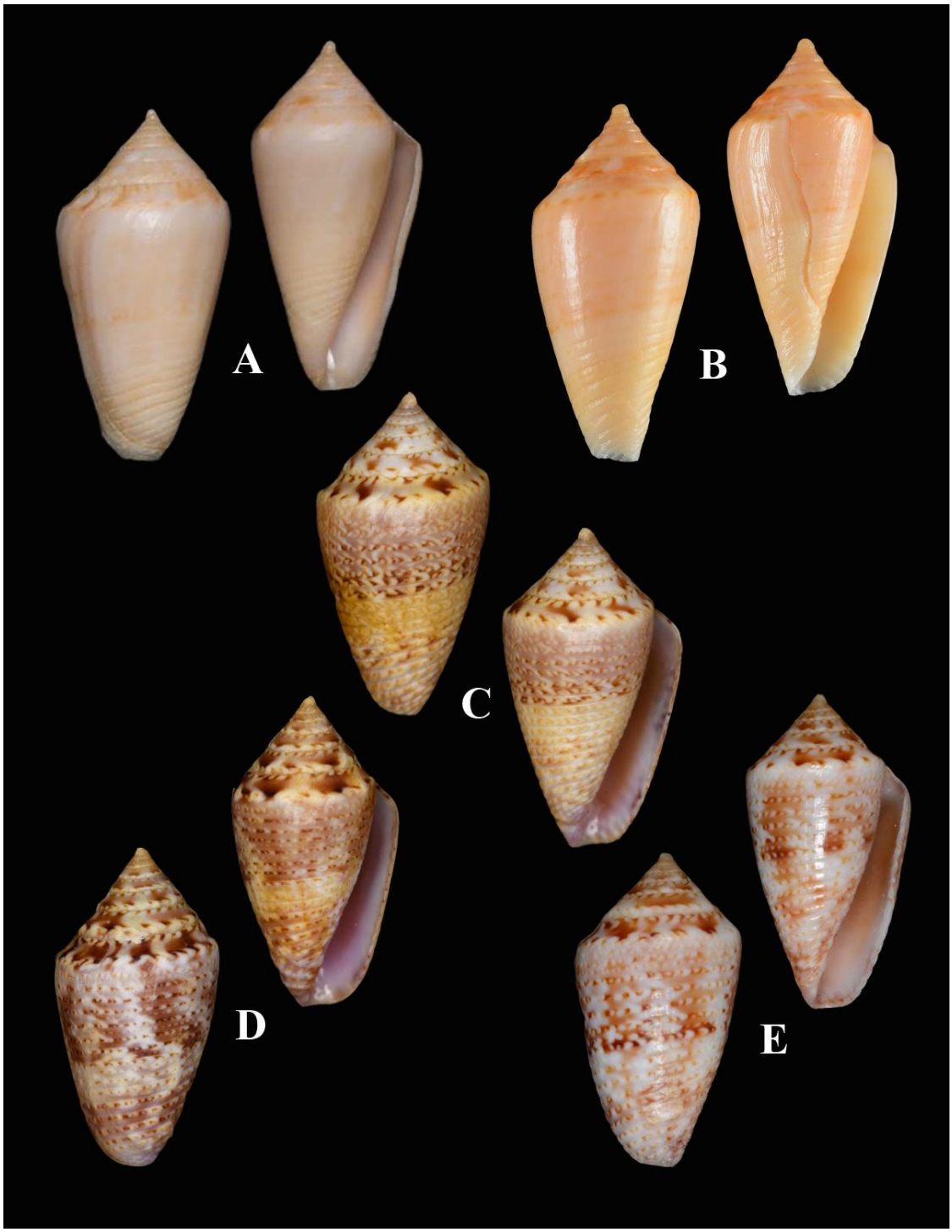

Plate 2. A= *Jaspidiconus carnaval* n. sp. – Paratype 4, 20.0 mm (photo Pascal Wink); **B=** *J. carnaval* n. sp. – Paratype 5 , 16.0 mm (photo Gonçalo Rosa); **C=** J. carnaval, 15.0 mm, Arraial do Cadbo, Rio de Janeiro, Brazil, on rocks 10-15 m (photo Marcus Coltro, Femorale); **D=** *J. carnaval*, 15.0 mm, Arraial do Cabo, Rio de Janeiro, Brazil. On rocks, 10-15 m, (photo Marcus Coltro, Femorale); **E=** *J. carnaval*, 17.2 mm, Arraial do Cabo, Rio de Janeiro, Brazil, On rocks, 10-15 m, (photo Marcus Coltro, Femorale); **F=** *J. carnaval*, 14.3 mm, Arraial do Cabo, Rio de Janeiro, Brazil, On rocks, 10-15 m, (photo Marcus Coltro, Femorale).