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Cerithiopsidae (Gastropoda) from the Cape Verde archipelago collected during the CANCAP expeditions

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Key words: Gastropoda, Caenogastropoda, *Cerithiopsis*, *Dizoniopsis*, Atlantic Ocean, West Africa, Cape Verde, CANCAP.

Species in the family Cerithiopsidae are spongivores that live in all oceans from the littoral to the upper bathyal zone. This paper discusses the cerithiopsid species that were collected during the Dutch expeditions CANCAP-VI (1982) and CANCAP-VII (1986) to the Cape Verde archipelago. Fourteen species were identified in the CANCAP samples. Six new species of *Cerithiopsis* are proposed: *C. sal* spec. nov., *C. luzia* spec. nov., *C. vicente* spec. nov., *C. cima* spec. nov., *C. boavista* spec. nov. and *C. saotiago* spec. nov. Five existing species of the genus *Cerithiopsis* Forbes & Hanley, 1850 were redescribed and illustrated: *Cerithiopsis laurauae*, *C. albae*, *C. carmelae*, *C. chechoi* and *C. eolo*. The identification of one species was uncertain: *Cerithiopsis* cf. *diadema*. In addition, a new species is described in the genus *Dizoniopsis* Sacco, 1895: *D. razo* spec. nov. *Cerithiopsis leopoldoi* Espinosa & Ortea, 2021 is placed in the genus *Dizoniopsis*. The cerithiopsid species in our material are distributed throughout the archipelago; the oceanic gaps between the islands (10 – 100 km) have not been a barrier in the distribution of the species. None of the cerithiopsid species known from the Cape Verde archipelago have been found on the NW African coast, the Canary Islands, Madeira, the Azores or Ascension. A high degree of endemism is likely for the cerithiopsids from the Cape Verde archipelago.

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INTRODUCTION

The Dutch CANCAP expeditions explored the marine fauna of the subtropical areas of the NE Atlantic Ocean between 1976 and 1986 (van der Land, 1987). The CANCAP-VI (1982) and CANCAP-VII (1986) expeditions to the Cape Verde archipelago were carried out using the R/V Tydeman. The mollusks collected during these expeditions are stored in the collection of the Naturalis Biodiversity Center in Leiden, The Netherlands. Hoffman et al. (2023) and references therein have reported on reviews of molluscan groups collected by the CANCAP expeditions to the Cape Verde archipelago. The species in Cerithiopsidae H. Adams & A. Adams, 1853 are reviewed here.

The Cape Verde archipelago is located approximately 600 km west of Cape Verde in Senegal, West Africa, and its islands are of volcanic origin. A hot spot in the earth's mantle caused eruptions that created the volcanic islands and its surrounding seamounts. The origin of the archipelago has been dated to about 180 MaBP (Mitchell-Thomé, 1972). The highest mountain is the active volcano of Fogo (2829 m), which erupted last in 2014. The bases of the islands are about 2000 m above the surrounding seabed. The seabed in the vicinity of the islands consists of volcanic rocks and mostly volcanic sediments. In particular, the hard bottoms on the slopes of the islands and seamounts provide substrate for many species of sponges, which in turn, provide the food and shelter for the cerithiopsid commensals.

The archipelago lies in the southern water mass of the North Atlantic Gyre and throughout the year the sea currents flow westward from the African coast across the Atlantic, down to depths of about 200 m (Stramma & Siedler, 1988).

Cerithiopsidae is a large family of gastropods with currently 40 genera and well over 1000 described species; the type genus *Cerithiopsis* Forbes & Hanley, 1850 currently has

218 described species and the genus *Dizoniopsis* Sacco, 1895 has nine species (MolluscaBase, 2024). The species in Cerithiopsidae live in all oceans, from the littoral to bathyal depths. Most species are commensals with sponges (Fretter, 1951; Graham, 1988: 167). There have been no recent comprehensive reviews of Cerithiopsidae species from the NE Atlantic or the Mediterranean Sea, but the results of many smaller studies have been published.

Major reviews were carried out in the Pacific and the Caribbean Sea. Marshall (1978) conducted a large regional review of Cerithiopsidae from New Zealand; he introduced many new species and several new genera and subfamilies. Cecalupo & Perugia (2012, 2013, 2014, 2017, 2020) reported on the systematics and diversity of cerithiopsids in many publications including those on (1) the Philippine and Samoan Sea (Cecalupo & Perugia, 2012) with over 180 new species, (2) the southern Pacific, including Vanuatu (Cecalupo & Perugia, 2013) with over 90 new species, (3) French Polynesia (Cecalupo & Perugia, 2014) with the reporting of 17 new species, (4) New Caledonia (Cecalupo & Perugia, 2017) with over 70 new species and (5) the eastern Caribbean Sea with 32 new cerithiopsid species (Cecalupo & Perugia, 2020). Rolán & Espinosa (1996), Rolán & Fernández-Garcés (1996), Rolán et al. (2007), Rolán & Krisberg (2014) reviewed species of *Cerithiopsis* from the eastern Gulf of Mexico and the Caribbean Sea and they described several new species.

In their inventory of western African mollusks, Ardovini & Cossignani (2004) reported four species in *Cerithiopsis* and six species in the genus *Seila* A. Adams, 1861. Rolán (2005: 109) gives an overview of historical reports of *Cerithiopsis tubercularis*, *C. barleei* Jeffreys, 1867, and *C. minima* (Brusina, 1865) from the Cape Verde archipelago, but does not mention any own finds of these species. Rolán (2005) also reported *Seila inchoata* Rolán & Fernandes, 1990, *Cerithiopsis paucispiralis* Rolán & Fernandes, 1989, and illustrated ten species in the open nomenclature. Rolán (2007) introduced a new species of *Dizoniopsis* from the Gulf of Guinea. Bouchet et al. (2010) discussed the species of *Dizoniopsis* from the Mediterranean Sea and introduced two new species. Cossignani & Ardovini (2011) illustrated 35 cerithiopsids from the Mediterranean Sea among them are 18 of *Cerithiopsis* and four of *Dizoniopsis*. Hernandez et al. (2011) reported twelve cerithiopsids (plus four in open nomenclature) from the Canary Islands; among them were eight species in *Cerithiopsis* (plus three in open nomenclature). Rolán & Gori (2013) introduced two new species of *Cerithiopsis* from São Tomé Island. Espinosa & Ortea (2021) described six species of Cerithiopsidae from the Cape Verde Archipelago, five of the genus *Cerithiopsis* and one of *Dizoniopsis* Sacco, 1895. Swinnen & Nappo (2022) introduced four species of *Cerithiopsis* from Ascension Island, about

2400 km South of the Cape Verde archipelago. Gofas et al. (2023) recently completed a study on Cerithiopsidae and Newtoniellidae from the Azorean seamounts. This chain of seamounts is located about 1700 km NW of the Cape Verde archipelago. Their review identified twenty species from the seamount chain, ten were new to science.

Landau et al. (2006) studied the Pliocene Mediterranean cerithiopsid species in an outcrop near Estepona (Spain) and Landau et al. (2018) made a review of the Upper Miocene NE Atlantic cerithiopsids of NW France; they reported several extant species like for example *Cerithiopsis minima* (Brusina, 1865) and *C. barleei* (Jeffreys, 1867), and they introduced several extinct species like for example *C. cerithiopsoides* Landau, Ceulemans & Van Dingenen, 2018, *C. esterae* Landau, Ceulemans & Van Dingenen, 2018 and *C. mira* Landau, Ceulemans & Van Dingenen, 2018.

Modica et al. (2013) performed DNA barcoding of sympatric species of the genus *Cerithiopsis* from Croatia. They found a remarkable differentiation of species using only the *coi* (mitochondrial) sequence and they pointed out a cryptic complex related to the type species *C. tubercularis* (Montagu, 1803). We are not aware of any other major molecular review in the Cerithiopsidae.

MATERIAL AND METHODS

The present study concentrated on empty shells of thanatocoenoses that were sampled during the CANCAP expeditions to the Cape Verde archipelago. From these expeditions, 319 bottom samples were collected during the CANCAP-VI (1982) and CANCAP-VII (1986) expeditions. Most of the samples were collected using van Veen grabs, dredges, and Agassiz trawls. Additional material from shore visits and scuba dives was not available for study. Live fauna were preserved on board but we are not aware of any cerithiopsids collected live during the expeditions.

The sediment fractions were rinsed in fresh water to remove salt, sieved and the shells were sorted using a low magnification binocular microscope. The shell material was sorted to species level without naming the species. The shells were originally stored in the Mollusca Collection of the Rijksmuseum voor Natuurlijke Historie (RMNH) in Leiden, The Netherlands. Currently, the entire mollusc collection is stored at the Naturalis Biodiversity Center, Leiden, The Netherlands.

The cerithiopsid shells were originally sorted by the late Mr H.J. Hoenselaar and later examined and re-sorted by the late Mr L. van der Linden. However, all species remained in the open nomenclature; not a single species was identified as a described species. The present study included a final sorting to species level and the description of new species. A total of 84 bottom sediment samples contained species of

Cerithiopsidae.

Van der Land (1987) published the metadata of the sampling sites. We copy his full data for all type species reported here: nearby island, coordinates, depth, sampling date, station number, sampling gear, bottom conditions. For the other material studied we give only the nearby island, depth and station number. If necessary, additional data should be obtained from van der Land (1987).

All shells reported here are stored in Naturalis Biodiversity Center (Leiden).

Colour photographs were taken using a Keyence confocal microscope; the internal calibration of the microscope was used for size determinations. Detailed images were obtained using a Vega3-Tescan scanning electron microscope (SEM) at the Senckenberg am Meer Institute in Wilhelmshaven. The incident electron energy was 10 keV and both secondary electron imaging and back-scatter imaging were used. The SEM specimens were coated with gold to improve image quality. The internal software of the SEM was used to obtain calibrated size measurements.

Espinosa & Ortea (2021) provided little information on the cerithiopsids studied, e.g. paratypes were not discussed, their images were limited to one or two specimens for each species and descriptions lacked some important details, such as the protoconch sculpture. Therefore, we decided to extensively illustrate and redescribe their species in the genus *Cerithiopsis*.

Abbreviations: H = height of shell; Ha = height of aperture; EXEMS = Royal Albert Memorial Museum & Art Gallery, Exeter, UK; RMNH.MOL = Rijksmuseum voor Natuurlijke Historie, Mollusca collection, currently in Naturalis Biodiversity Center, Leiden, The Netherlands; W = width of shell.

SYSTEMATICS

Class Gastropoda Cuvier, 1795

Subclass Caenogastropoda L. R. Cox, 1960

Superfamily Triphoroidea J. E. Gray, 1847

Family Cerithiopsidae H. Adams & A. Adams, 1853

Genus *Cerithiopsis* Forbes & Hanley, 1850

Type species (by monotypy): *Murex tubercularis* Montagu, 1803.

Cerithiopsis sal spec. nov.

Figs 1-5, 18

urn:lsid:zoobank.org:act:76B55A4B-6055-456A-B1DF-B32CDFC2E42A

Type locality. — Cape Verde archipelago, S of Sal, Santa Maria Bay, 16°34'N-22°55'W, depth 145-160 m.

Type material. — Holotype: Cape Verde archipelago, S of Sal, Santa Maria Bay; 16°34'N, 22°55'W; 145-160 m; 29.viii.1986; CANCAP Sta. 7.096; van Veen grab; sandy mud with some shells; RMNH.MOL.87561, Figs 1a-c. Paratypes: 3 shells, same location data as holotype; RMNH.MOL.351824; Figs 2-3.

Other material examined (Cape Verde archipelago, 13 shells). — 1 shell; Boa Vista; 185-190 m; Sta. 6.078; RMNH.MOL.35080 • 1 shell; Cima; 225 m; Sta. 7.028; RMNH.MOL.35081 • 1 shell; Sal; 18-28 m; Sta. 7.090; RMNH.MOL.351583 • 1 shell; Sal; 354 m; Sta. 7.100; RMNH.MOL.35082 • 1 shell; Sal; 165 m; Sta. 7.102; RMNH.MOL.35083 • 1 shell; Sal; 123-142 m; Sta. 7.105; RMNH.MOL.35084 • 1 shell; Razo; 208 m; Sta. 7.120; RMNH.MOL.35085 • 3 shells; Razo; 200-230 m; Sta. 7.121; RMNH.MOL.35086 • 3 shells (Figs 4-5); São Nicolao; 400 m; Sta. 7.128; RMNH.MOL.35087.

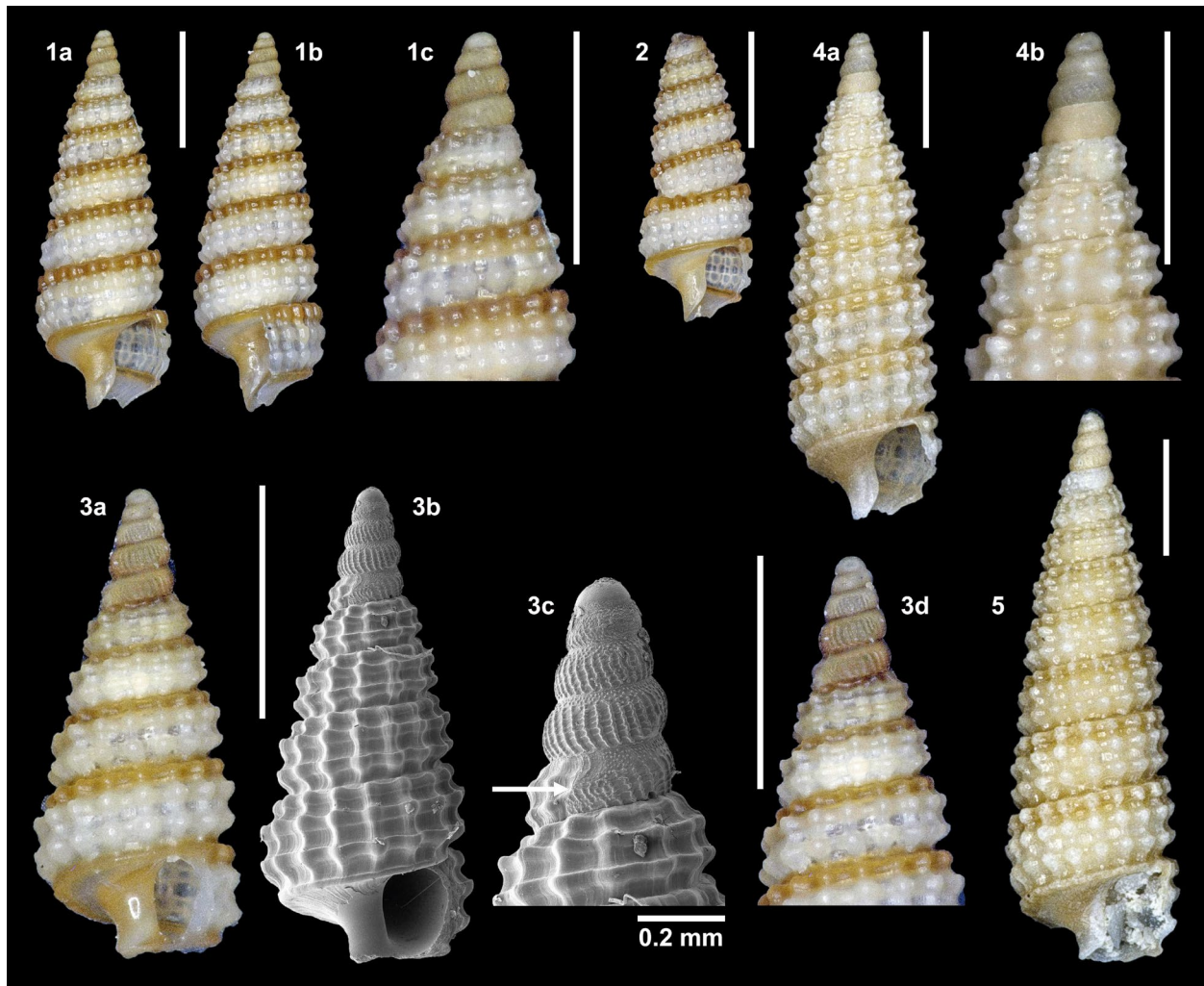
Etymology. — The name (noun) refers to Sal Island, the type locality in the Cape Verde archipelago.

Diagnosis. — Elevated, cyrtoconoidal-conical shell with beaded spiral cords and ribs, colour white with brown columellar, and supra and subsutural spiral bands; maximum height 5 mm, width 1.6 mm (width/height ratio 0.33). Elevated multispiral protoconch with rounded nucleus.

Description. — Protoconch: 4½ conical, elevated, convex whorls with dome-shaped nucleus, apical angle 25°, translucent white. Sculpture nucleus with random beads; below suture fine beads; on penultimate whorl about 28 flexuous, prosocline, axial ribs; 7 spiral cordlets. Distinct lip with deep indentation adapically, flexuous below. Exposed height 540 µm, diameter 300 µm. Colour translucent light tan with orange-brown sutural band. Transition to teleoconch clear by change in sculpture and demarcated lip.

Teleoconch: maximum 7½ whorls with cyrtoconoidal outline, apical angle initially 35°, decreasing to 15° near penultimate whorl. Suture deep, impressed. First two whorls angular outline with two beaded spiral cords on shell face and one undulating cord on shoulder, about 15 ribs; subsequent whorls with three beaded spiral cords with up to 19 regular ribs, two lower cords of equal strength, upper cord weaker; ribs slightly prosocline; weak prosocline growth lines, at 10° to spire axis. Last whorl with strong, smooth sutural cord; base smooth with fine growth lines. Aperture 34% of height, oblique-pyriform, outer lip sharp, slightly prosocline, corrugated edge following external sculpture; adapically pointed at suture, abapically with oblique open siphonal canal, columella S-curved with thin demarcated callus; parietal callus absent; internally smooth, glossy, with imprint of external sculpture, base widely concave.

Variability. — Some specimens lack the brown colour pattern on the protoconch and on the initial whorls; this may be due to bleaching in worn shells.



Figs 1-5. *Cerithiopsis sal* spec. nov. 1-3. Sal, sta. 7.096. 1a-c. Holotype; a. ventral view, height 3.3 mm, width 1.1 mm; b. side view; c. apex. 2. Paratype, ventral view, height 2.5 mm, width 1.0 mm. 3a-d. Paratype; a-b. ventral view, shell with broken lip, height 2.0 mm, width 0.9 mm; c. protoconch, exposed height 0.54 mm, width 0.30 mm, arrow indicating lip; d. apex. 4-5. São Nicolao, sta. 7.128; 4a-b. a. ventral view, height 4.2 mm, width 1.3 mm; b. apex; 5. ventral view, height 4.7 mm, width 1.5 mm. Vertical scale bars 1 mm; horizontal scale bars 0.2 mm.

Differential diagnosis. — The new species is similar to *Cerithiopsis fayalensis* R. B. Watson, 1880 from the Azores and the NE Atlantic; it has a similar size multi-spiralled protoconch with axial and spiral sculpture and teleoconch sculpture but it has a conical outline, it is more elevated and it has a uniform cream colour. The present species is cyrtconoidal, with a broader outline and with brown colour bands (Gofas et al., 2023). *Krachia trauseli* Gofas, Freiwald & Hoffman, 2023 from the Azorean Seamounts has a similar colour pattern and outline but it has an extra subsutural cord; the present species has a different protoconch sculpture with regular oblique riblets and it lacks the second subsutural spiral cord. The NE Atlantic type species *C. tubercularis* has a similar outline and sculpture of the teleoconch and an elevated multispiral protoconch but it has

a uniform colour, only weak axial sculpture on the protoconch and a weak subsutural cord (Graham, 1988: 466-467, fig. 196; Prkić & Mariottini, 2010); the present species has brown bands, a more pronounced protoconch sculpture, a strongly beaded teleoconch sculpture and a strong subsutural cord. The NE Atlantic species *C. barleei* Jeffreys, 1867 has a similar sculpture of the teleoconch and an elevated multispiral protoconch but it has a conical outline, uniform colour, only weak axial sculpture on the protoconch (Graham, 1988: 468-469, fig. 197). The present species has a cyrtconoidal outline, brown spiral bands and a more pronounced protoconch sculpture. *Cerithiopsis tarruellasi* Peñas & Rolán, 2006, from the Alboran Sea, has a similar colour pattern, size and protoconch sculpture but its outline is more cyrtconoidal and the protoconch has a height

of about 420 μm (Peñas et al., 2006: 80, figs 77, 106-108, 112-117). The present species is more conical and its protoconch has a height of 540 μm .

Distribution. — Only empty shells off the Cape Verde archipelago Sal, Boa Vista, Cima, Razo, São Nicolao in 18 – 400 m. Most shells were found below 100 m. It is probably distributed over the full Cape Verde archipelago on the lower shelf and upper bathyal depth zone.

Remarks. — The species it is not yet known from the W African coast.

***Cerithiopsis luzia* spec. nov.**

Figs 6-9, 18

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Type locality. — Cape Verde archipelago; SW of Santa Luzia; 16°45'N-24°46'W; 20 m.

Type material. — Holotype: 1 shell; Cape Verde archipel-

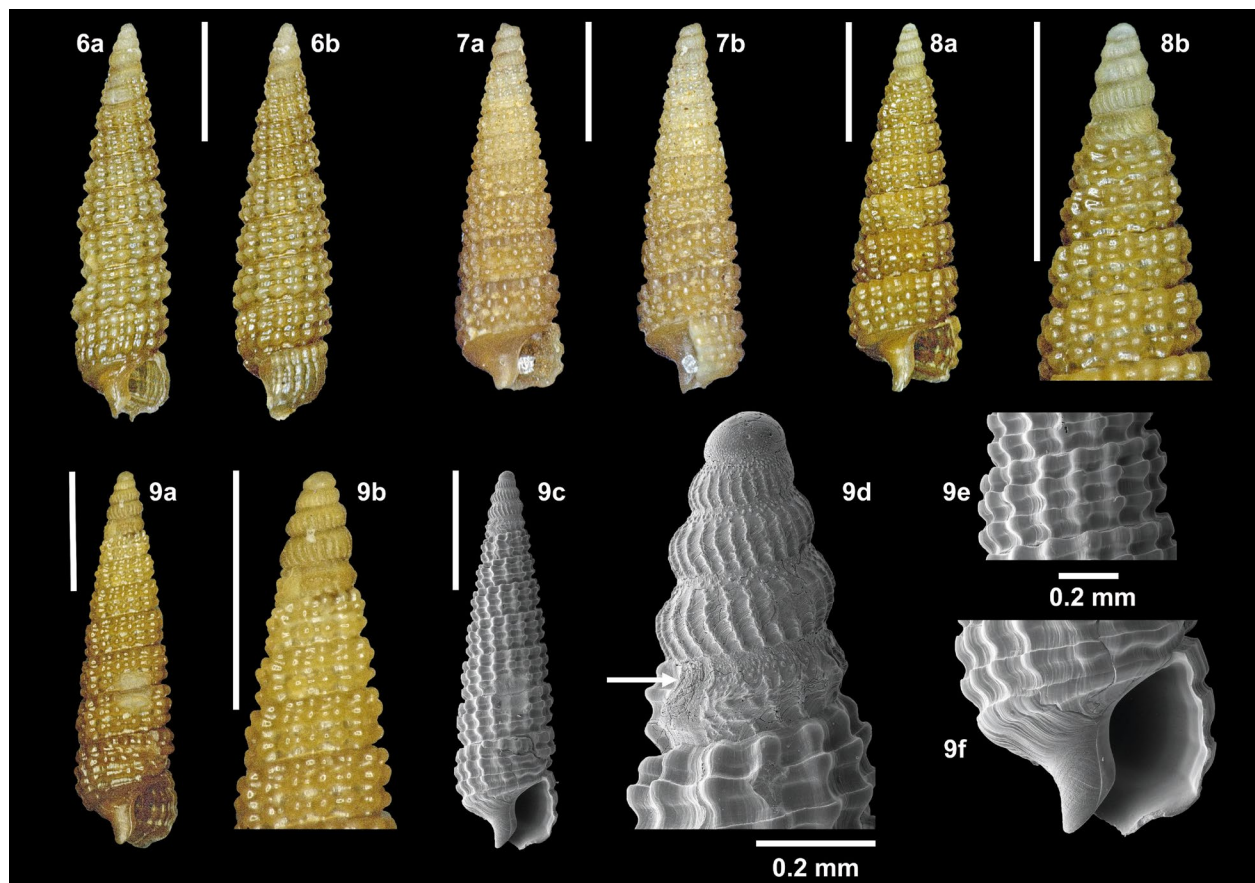
ago, SW of Santa Luzia; 16°45'N-24°46'W; 20 m; 16.vi.1982; CANCAP Sta. 6.101: van Veen grab; coarse sand, calcareous algae and corals; RMNH.MOL.351558; Figs 6a-b. Paratypes: 2 shells, same location data as holotype; RMNH.MOL.351823.

Other material examined (Cape Verde archipelago, 27 empty shells). — 10 shells; São Tiago; 150 m; Sta. 6.015; RMNH.MOL.194324; Figs 7a-b • 3 shells; Boa Vista; 53 m; Sta. 6.066; RMNH.MOL.194356 • 3 shells; São Vicente; 99 m; Sta. 6.147; RMNH.MOL.194441 • 4 shells; São Vicente; 38-45 m; Sta. 6.162; RMNH.MOL.30951 • 8 shells; Cima; 65 m; Sta. 7.032; RMNH.MOL.194373; Figs 8-9 • 1 shell; Sal; 145-160 m; Sta. 7.096 • 1 shell; Sal; 165 m; Sta. 7.102; RMNH.MOL.351574.

Etymology. — The name (noun) refers to Santa Luzia Island, the type locality in the Cape Verde archipelago.

Diagnosis. — Elevated, conical, weakly cyrtocoisoidal shell with beaded spiral cords and ribs, colour brown smooth base; maximum height 3.3 mm, width 0.8 mm (width/height ratio 0.25). Rounded elevated multispiral protoconch with axial sculpture.

Description. — Protoconch: 4½ conically elevated con-



Figs 6-9. *Cerithiopsis luzia* spec. nov. **6a-b.** Holotype, Santa Luzia, 20 m, sta. 6.101, height 3.3 mm, width 0.8 mm; **a.** ventral view; **b.** side view. **7a-b.** São Tiago, 150 m, sta. 6.015, height 3.1 mm, width 0.9 mm; **a.** ventral view; **b.** side view. **8a-b.** Cima, 65 m, sta. 7.032, height 3.1 mm, width 1.0 mm; **a.** ventral view; **b.** apical view. **9a-f.** Same location, height 3.1 mm, width 0.85 mm; **a.** ventral view; **b.** apical view; **c.** ventral view SEM image; **d.** protoconch, arrow indicates lip, exposed height 0.56 mm, width 0.31 mm; **e.** sculpture whorl 4; **f.** base and aperture. Vertical scale bars 1 mm; horizontal scale bars 0.2 mm.

vex whorls with dome-shaped nucleus, apical angle 30°; sculpture nucleus with random beads, whorls beaded below suture, below with about 20 strong, flexuous, prosocline, axial ribs crossed by seven spiral cordlets on ultimate whorl; lip deeply indented adapically, flexuous below. Exposed height 560 µm, diameter approximately 310 µm. Colour translucent tan. Transition to teleoconch demarcated by lip and change in sculpture.

Teleoconch: maximum 8½ whorls with conical or slightly cyrtconoidal outline, apical angle 20° decreasing to 10° near penultimate whorl. Suture deep, impressed. First whorl with two lower strongly beaded spiral cords and one weak cord above, approximately 13 ribs; from third whorls with three beaded spiral cords of equal strength with up to 16 regular ribs, slightly curved and nearly orthocline. Interspaces between axial ribs decreases towards terminal lip. Weak prosocline growth stages, at 10° to spire axis. Last whorl with smooth sutural cord; base smooth with fine growth lines or with one smooth cord. Aperture 16% of height, trapezoidal, outer lip sharp, nearly orthocline, corrugated margin following external sculpture; adapically pointed at suture, abapically with oblique open siphonal canal, columella S-curved with thick demarcated callus; parietal callus distinct; internally smooth, glossy, with imprint of external sculpture, base widely concave. Colour is tan, lighter at terminal lip.

Variability. — Some variation in W/H aspect ratio is observed. Some shells are conical, others are more cyrtconoidal. The abapical spiral cord on the body whorl may be strong, weak, or absent. The colour varies between light and dark tan; this may be a result of bleaching of older specimens.

Differential diagnosis. — The new species is similar to *Cerithiopsis fayalensis* Watson, 1880 from the Azores and the NE Atlantic; it has a similar size multi-spiralled protoconch with axial and spiral sculpture and teleoconch sculpture and outline; in contrast it has a more conical outline and it has a uniform cream colour whereas the present species is more cyrtconoidal, with a uniform tan colour and the protoconch has a stronger axial sculpture (Gofas et al., 2023). *C. annaleabeardae* Swinnen & Nappo, 2022, from Ascension Island, has a similar colour, sculpture and size but its outline is cyrtconoidal and the protoconch has three whorls (Swinnen & Nappo, 2022: 77-78 pl. 2). The present species has a more conical outline and its protoconch has four whorls.

Distribution. — Only empty shells off the Cape Verde archipelago Santa Luzia, Sal, Boa Vista, Cima, San Vicente, São Tiago in 20 – 165 m. It is probably distributed over the full Cape Verde archipelago on the upper shelf.

Remarks. — The species it is not yet known from the W African margin. It possibly is an endemic to the Cape Verde area.

Cerithiopsis vicente spec. nov.

Figs 10-15, 18

urn:lsid:zoobank.org:act:A83D5364-6C4E-4E7A-B627-F753506161DF

Type locality. — Cape Verde archipelago, NE of São Vicente, Baía das Gatas; 16°54'N-24°54'W; 52 m.

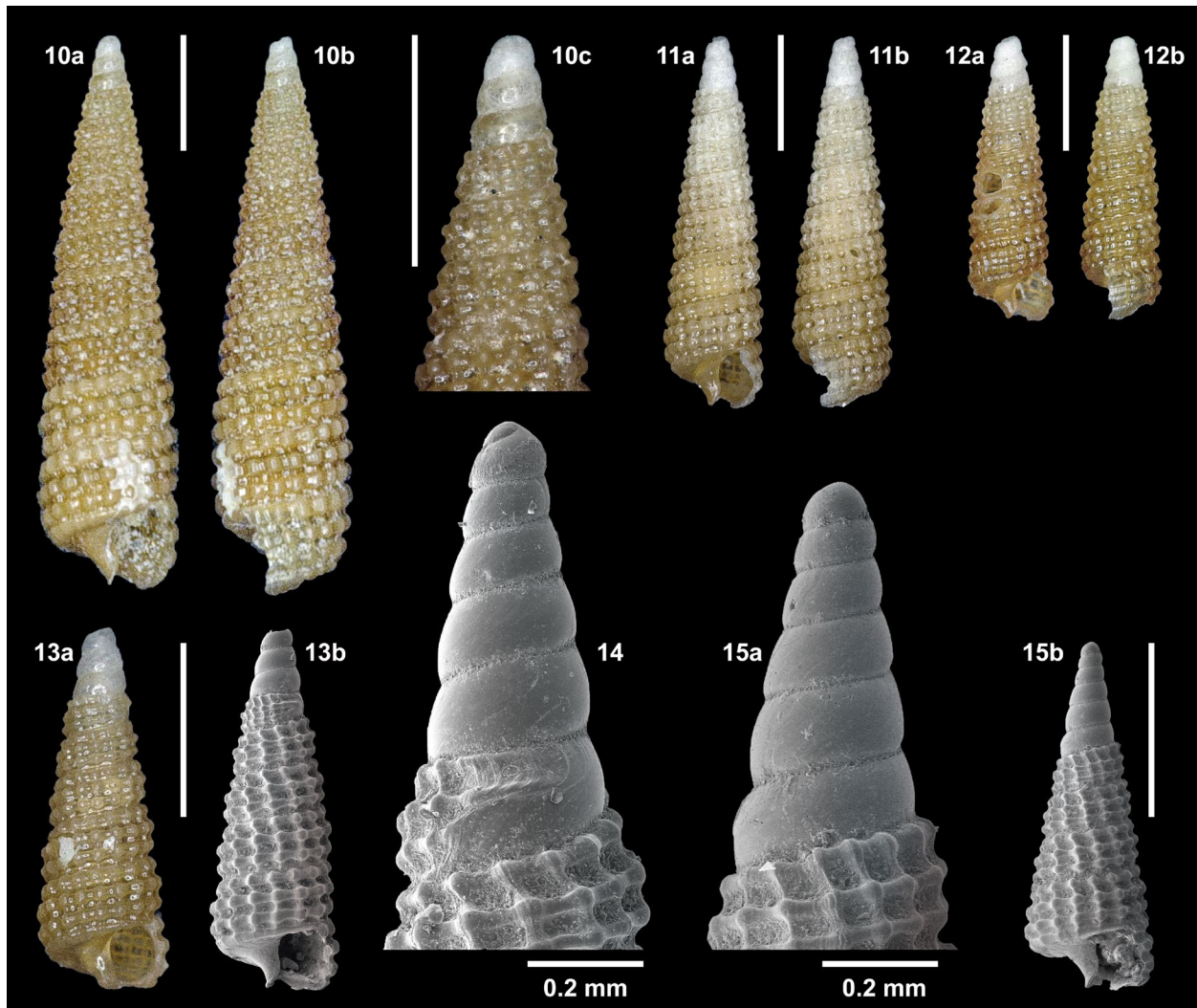
Type material. — Holotype: Cape Verde archipelago, NE of São Vicente, Baía das Gatas; 16°54'N 24°54'W; 52 m; 6.ix.1986; CANCAP Sta. 7.159; van Veen grab; somewhat muddy, grey-yellow calcareous sand and gravel; RMNH.MOL.30925; Figs 10a-c. Paratypes: 5 shells; same location data as holotype; RMNH.MOL.351825; Figs 11-15.

Other material examined (Cape Verde archipelago, 127 empty shells). — 1 shell; São Tiago; 75-68 m; Sta. 6.005; RMNH.MOL.30905 • 6 shells; São Tiago; 540 m; Sta. 6.024; RMNH.MOL.194170 • 31 shells; Boa Vista; 25 m; Sta. 6.056; RMNH.MOL.30906 • 7 shells; Boa Vista; 36 m; Sta. 6.057; RMNH.MOL.30907 • 19 shells; Boa Vista; 50 m; Sta. 6.059 foto; RMNH.MOL.30908 • 1 shell; Boa Vista; 80 m; Sta. 6.061; RMNH.MOL.30909 • 1 shell; Boa Vista; 185-190 m; Sta. 6.078; RMNH.MOL.194357 • 1 shell; Santa Luzia; 20 m; Sta. 6.101; RMNH.MOL.30911 • 1 shell; Santa Luzia; 204 m; Sta. 6.105; RMNH.MOL.30912 • 1 shell; Santa Luzia; 204 m; Sta. 6.105; RMNH.MOL.194124 • 1 shell; Santa Luzia; 50 m; Sta. 6.107; RMNH.MOL.30949 • 10 shells; São Vicente; 50 m; Sta. 6.130; RMNH.MOL.30950 • 5 shells; São Vicente; 24 m; Sta. 6.159; RMNH.MOL.30915 • 2 shells; São Vicente; 50 m; Sta. 6.130; RMNH.MOL.351461 • 6 shells; São Vicente; 30 m; Sta. 6.160; RMNH.MOL.30916 • 1 shell; São Vicente; 38-45 m; Sta. 6.162; RMNH.MOL.351564 • 1 shell; Maio; 30 m; Sta. 7.043; RMNH.MOL.30917 • 11 shells; Boa Vista; 39 m; Sta. 7.065; RMNH.MOL.30918 • 1 shell; Boa Vista; 42 m; Sta. 7.067; RMNH.MOL.30919 • 14 shells; Boa Vista; 60 m; Sta. 7.079; RMNH.MOL.30920 • 1 shell; Sal; 18-28 m; Sta. 7.090; RMNH.MOL.194438 • 1 shell; Sal; 30-50 m; Sta. 7.095; RMNH.MOL.194237 • 2 shells; Sal; 30-50 m; Sta. 7.095; RMNH.MOL.194429 • 1 shell; São Nicolau; 400 m; Sta. 7.128; RMNH.MOL.30921 • 1 shell; Branco; 35 m; Sta. 7.141; RMNH.MOL.30955 • 1 shell; Branco; 56 m; Sta. 7.142; RMNH.MOL.30923 • 1 shell; Branco; 102 m; Sta. 7.143; RMNH.MOL.30924.

Etymology. — The name (noun) refers to São Vicente Island, the type locality in the Cape Verde archipelago.

Diagnosis. — Elevated, conical, shell with beaded spiral cords and ribs, colour brown with columellar cord; observed maximum height 5 mm, width 1.3 mm (width/height ratio 0.26). Highly elevated multispiral smooth protoconch, colour grayish-white.

Description. — Protoconch: six conically elevated convex whorls with dome-shaped nucleus, apical angle 25°. Suture shallow, impressed with many tiny vertical notches. Lip deeply indented adapically, flexuous below. Colour translucent white, smooth, glossy. Maximum exposed height 500



Figs 10-15. *Cerithiopsis vicente* spec. nov., São Vicente, sta. 7.159. **10a-c.** Holotype, height 4.8 mm, width 1.3 mm; **a.** ventral view; **b.** side view with broken lip; **c.** apex with broken protoconch. **11a-b.** Paratype ventral and side view, height 3.2 mm, width 0.9 mm. **12a-b.** Paratype, ventral and side view, height 2.5 mm, width 0.9 mm. **13a-b.** Paratype, ventral view; height 2.1 mm, width 0.7 mm. **14.** Paratype protoconch, exposed height 0.79 mm, width 0.33 mm. **15a-b.** Paratype; **a.** protoconch exposed height 0.67 mm (part), width 0.32 mm; **b.** ventral view, height 2.0 mm, width 0.7 mm. Vertical scale bars 1 mm; horizontal scale bars 0.2 mm.

μm , diameter approximately $380 \mu\text{m}$. Transition to teleoconch clear by demarcated lip and change in sculpture.

Teleoconch: maximum 10 whorls with conical outline, apical angle 18° . Suture deep. All whorls with three dominating beaded cords; first whorl about 11 ribs; later whorl with up to 20 ribs. Beads dominate sculpture, interspaces between ribs minor. Sculpture weakens towards terminal lip. Weak regular growth stages, at $5\text{--}10^\circ$ prosocline to spire axis. Last whorl with broad smooth sutural cord; base smooth, fine growth lines. Aperture 16% of height, rounded-pyriform, outer lip sharp, slightly prosocline, corrugated edge following external sculpture; apically pointed at suture, abapically with oblique open siphon, columella S-curved with thick callus; parietal callus declining; internally smooth, glossy, with imprint of external sculpture,

base widely concave. Colour is tan, white at apex, lighter at terminal lip.

Variability. — Most shells are conical, few are slightly cyrtococonoidal. The colour varies between light and dark tan; this may be a result of bleaching of older specimens. Rolán (2005: 328, figs 451-452 as sp. 2 and sp. 3) indicates shell heights of up to 11 mm.

Differential diagnosis. — The type species *Cerithiopsis tubercularis* has a protoconch with an oblique sculpture (Oliver et al., 2017) whereas the present species has a smooth protoconch. *Cerithiopsis petanii* Prkić & Mariottini, 2010 from the Mediterranean Sea (Prkić & Mariottini, 2010; Cossignani & Ardovini, 2011: 166) has a similar size, and teleoconch sculpture; in contrast it has a cyrtococonoidal outline, strong columella cords and is dark brown. The

present species is lighter brown or dark tan, its outline is more conical and the aperture is smaller.

Distribution. — Only empty shells off the Cape Verde archipelago Santa Luzia, Sal, Boa Vista, Branco, São Vicente, São Tiago in 25 – 400 m. It is probably distributed over the entire Cape Verde archipelago on the shelf and upper bathyal depth range.

Remarks. — The species was illustrated by Rolán (2005: 328–329, figs 451–452) and it is not yet known from the W African margin. It possibly is an endemic to the Cape Verde area.

***Cerithiopsis cima* spec. nov.**

Figs 16–18

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Type locality. — Cape Verde archipelago, SE of Cima; 14°57'N–24°39'W; 225 m.

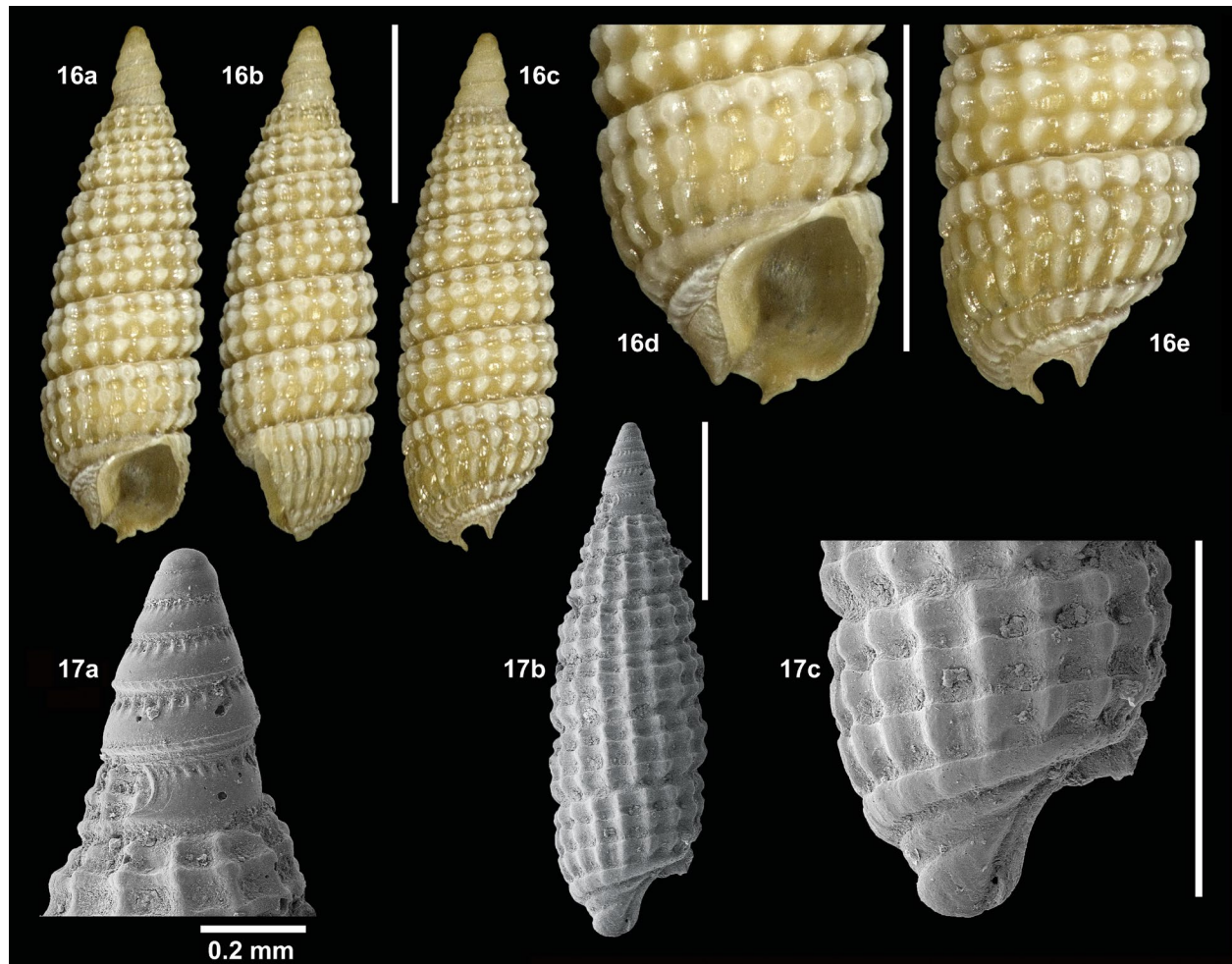
Type material. — Holotype: Cape Verde archipelago, SE

of Cima; 14°57'N–24°39'W; depth 225 m; 23.viii.1986; CAN-CAP Sta. 7.028; van Veen grab; yellow sand with shell gravel; RMNH.MOL.35107; Figs 16a–e. Paratypes: 1 shell; same location data as holotype; RMNH.MOL.351826 • 1 shell; S of São Tiago; 380 m; Sta. 6.017; RMNH.MOL.35094; Figs 17a–c.

Etymology. — The name (noun) refers to Cima Island, the type locality in the Cape Verde archipelago.

Diagnosis. — Elevated, strong, cyrticonoidal shell; beaded spiral cords and ribs, beaded columellar cords, dorsally beaded abapically towards siphonal channel; colour cream white; observed maximum height 2.8 mm, width 0.9 mm (width/height ratio 0.33). Large elevated multispiral protoconch with flattened whorls, colour opaque light tan.

Description. — Protoconch: five elevated whorls, convex smooth nucleus and first whorl, four subsequent sloping whorls, apical angle 35°, suture shallow, sculpture with subsutural axial riblets, keel near periphery with two cordlets, suture to penultimate whorl well below periphery, lip with broad adapical indentation, flexuous below. Maximum exposed height 550 µm, diameter approximately 320



Figs 16–17. *Cerithiopsis cima* spec. nov. **16a–e.** Holotype, Cima, 225 m, sta. 7.028, height 2.8 mm, width 0.9 mm. **17a–c.** Paratype São Tiago, sta. 6.017; **a.** protoconch, exposed height 0.55 mm, width 0.32 mm; **b–c.** ventral view, height 2.8 mm, width 0.9 mm. Scale bars 1 mm.

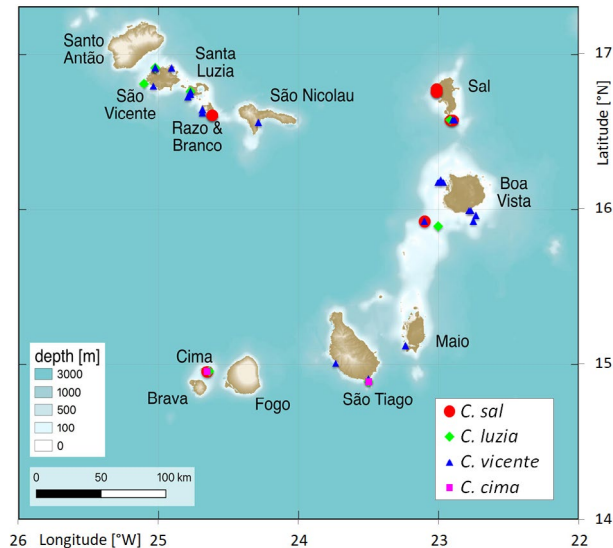


Fig. 18. Species distribution from CANCAP stations in Cape Verde archipelago in the genus *Cerithiopsis*. Red dot = *Cerithiopsis sal* spec. nov.; green diamond = *C. luzia* spec. nov.; blue triangle = *C. vicente* spec. nov.; lilac square = *C. cima* spec. nov. Bathymetry from GEBCO.

µm. Transition to teleoconch clear by demarcated lip and change in sculpture.

Teleoconch: Six whorls with cyrtconoidal outline, apical angle 35°. Suture deep. All whorls with three beaded cords and orthogonal ribs, first whorl approximately 13 ribs; later whorl with up to 19 axial ribs. Beads dominate sculpture, interspaces between ribs about 30% of diameters of beads. Ribs closely spaced towards terminal lip; beads oblong near margin. Last whorl with broad beaded subsutural cord; columellar cord with incised line below, pointed base; outer lip well within periphery of penultimate whorl. Aperture 16% of height, rounded-trapezoidal, outer lip broken, ortho-cline; adapically pointed at suture, abapically with oblique open siphon, columella S-curved with demarcated thick callus; demarcated parietal callus; internally smooth, widely concave. Colour is cream white, tan at apex.

Variability. — Little variability was observed within our small shell set.

Differential diagnosis. — The new species is unique with its combination of strong cyrtconoidal outline and large smoothly pointed protoconch. We are not aware of a similar cerithiopsid in the eastern Atlantic. The sinistral *Cheirodonta pallescens* (Jeffreys, 1867) in Triphoridae has a similar sculpture and cyrtconoidal outline (Cossignani & Ardovalini, 2011: 163) but our species is dextral and it has a different cerithiopsid protoconch. *Cerithiopsis petanii* Prkić & Mariottini, 2010 from the Mediterranean Sea (Prkić & Mariottini, 2010; Cossignani & Ardovalini, 2011: 166) has a

similar size, cyrtconoidal outline and teleoconch sculpture but is brown and has an elevated multispiral protoconch with smooth convex whorls. The present species is cream white and has a different protoconch.

Distribution. — Only empty shells off Cima and São Tiago in 68–75 m.

Remarks. — The species is not yet known from the W African margin. It possibly is an endemic to the Cape Verde area.

Cerithiopsis laurauae Espinosa & Ortea, 2021

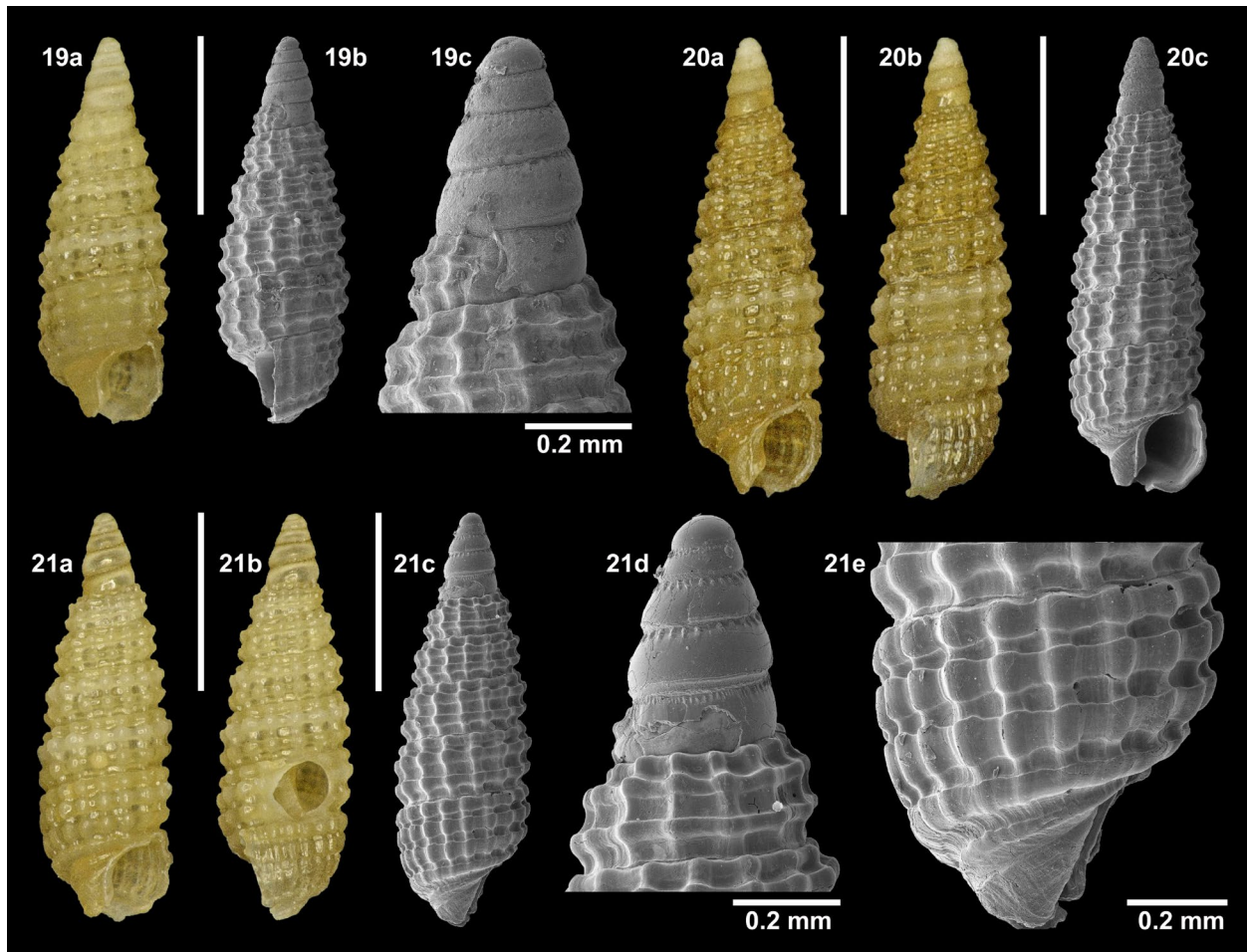
Figs 19–21, 31

Cerithiopsis sp5 — Rolán, 2005: 110, fig. 455.

Cerithiopsis laurauae Espinosa & Ortea, 2021: 86–87, fig. 2B.

Type locality. — Cape Verde archipelago, Palmeira harbour, Sal; 1.5–2 m.

Material examined (Cape Verde archipelago, 264 empty shells). — 1 shell; São Tiago; 75–68 m; Sta. 6.005; RMNH.MOL.35088 • 1 shell; São Tiago; 120 m; Sta. 6.008; RMNH.MOL.194421 • 1 shell; São Tiago; 310 m; Sta. 6.010; RMNH.MOL.35090 • 2 shells; São Tiago; 150 m; Sta. 6.015; RMNH.MOL.35092 • 2 shells; Fogo; 60 m; Sta. 6.041; RMNH.MOL.351616 • 1 shell; Fogo; 60 m; Sta. 6.047; RMNH.MOL.35096 • 2 shells; São Tiago; 29–33 m; Sta. 6.054; RMNH.MOL.194277 • 1 shell; Boa Vista; 25 m; Sta. 6.056; RMNH.MOL.35097 • 1 shell; Boa Vista; 25 m; Sta. 6.056; RMNH.MOL.194419 • 31 shells; Boa Vista; 50 m; Sta. 6.059; RMNH.MOL.351619 • 30 shells; Boa Vista; 50 m; Sta. 6.059; RMNH.MOL.351539 • 31 shells; Boa Vista; 50 m; Sta. 6.059; RMNH.MOL.351619 • 3 shells; Boa Vista; 80 m; Sta. 6.061; RMNH.MOL.35098 • 7 shells; Boa Vista; 80 m; Sta. 6.061; RMNH.MOL.194209 • 5 shells; São Nicolau; 79 m; Sta. 6.083; RMNH.MOL.30946 • 1 shell; São Nicolau; 100 m; Sta. 6.085; RMNH.MOL.35099 • 1 shell; Razo; 400–430 m; Sta. 6.093; RMNH.MOL.194134 • 1 shell; Santa Luzia; 102 m; Sta. 6.103; RMNH.MOL.30948 • 2 shells; Santa Luzia; 102 m; Sta. 6.103; RMNH.MOL.35101 • 1 shell; Santa Luzia; 50 m; Sta. 6.107; RMNH.MOL.194452 • 30 shells; São Vicente; 50 m; Sta. 6.130; RMNH.MOL.194420; Figs 19–21 • 2 shells; São Vicente; 99 m; Sta. 6.147; RMNH.MOL.35102 • 3 shells; São Vicente; 99 m; Sta. 6.147; RMNH.MOL.194155 • 20 shells; São Vicente; 30 m; Sta. 6.160; RMNH.MOL.351618 • 3 shells; São Vicente; 38–45 m; Sta. 6.162; RMNH.MOL.351563 • 7 shells; São Vicente; 38–45 m; Sta. 6.162; RMNH.MOL.30951 • 7 shells; São Vicente; 67 m; Sta. 6.164; RMNH.MOL.30952 • 10 shells; São Vicente; 67 m; Sta. 6.164; RMNH.MOL.35104 • 3 shells; São Vicente; 35 m; Sta. 6.171; RMNH.MOL.30953 • 3 shells; São Vicente; 50 m; Sta. 6.175; RMNH.MOL.351545 • 1 shell; São Tiago; 320 m; Sta. 7.004; RMNH.MOL.35105 • 2 shells; Cima; 380–470 m; Sta. 7.029; RMNH.MOL.35107 • 2 shells; Cima; 75 m; Sta. 7.031; RMNH.MOL.35108



Figs 19–21. *Cerithiopsis laurauae* Espinosa & Ortea, 2021, São Vicente, sta 6.130. **19a–c.** Shell; **a–b.** ventral and side view, height 2.1 mm, width 0.7 mm; **c.** protoconch, exposed height 0.49 mm, width 0.28 mm. **20a–c.** Shell, ventral and side view, height 2.6 mm, width 0.8 mm. **21a–e.** Shell; **a–c.** ventral, side and dorsal view, height 2.1 mm, width 0.7 mm; **d.** protoconch, exposed height 0.46 mm, width 0.30 mm; **e.** dorsal base view.

• 2 shells; Maio; 380 m; Sta. 7.050; RMNH.MOL.35112 • 1 shell; Maio; 380 m; Sta. 7.050; RMNH.MOL.351457 • 25 shells; Boa Vista; 60 m; Sta. 7.079; RMNH.MOL.194221 • 1 shell; Sal; 41 m; Sta. 7.091; RMNH.MOL.351560 • 2 shells; Sal; 165 m; Sta. 7.102; RMNH.MOL.194422 • 2 shells; Razo; 80 m; Sta. 7.115; RMNH.MOL.35117 • 1 shell; Razo; 208 m; Sta. 7.120; RMNH.MOL.35120 • 8 shells; São Vicente; 52 m; Sta. 7.159; RMNH.MOL.30956 • 2 shells; São Vicente; 52 m; Sta. 7.159; RMNH.MOL.351516 • 2 shells; São Vicente; 72 m; Sta. 7.160; RMNH.MOL.30957.

Diagnosis. — small, elevated, cyrtoconoidal, translucent shell; beaded spiral cords and ribs, subsutural and columellar cords; colour tan; observed maximum height 2.6 mm, width 0.75 mm (width/height ratio 0.30). Large cyrtoconoidal, elevated, multispiral protoconch with convex whorls, colour translucent light tan.

Description. — Protoconch: $4\frac{1}{2}$ elevated whorls. Suture shallow with vertical riblets. Convex smooth nucleus and flattened first whorl, three subsequent whorls convex, api-

cal angle 35° , smooth with keel periphery, peripheral cordlet with rough cordlet below. Suture to penultimate whorl well below periphery. Maximum exposed height 460 μm , diameter 300 μm . Transition to teleoconch clear by change in sculpture.

Teleoconch: Six whorls with cyrtoconoidal / pupoidal outline, apical angle 30° . Suture deep, impressed. First four whorls with two beaded cords and orthogonal ribs, last two whorl with three beaded cords; first whorl approximately 9 ribs, penultimate whorl with 17 axial ribs. Beads dominate sculpture, interspaces between ribs approximately equals diameters of beads. Ribs closely spaced towards terminal lip; beads oblong near margin. Last whorl with broad subsutural cord, weakly beaded; smooth columellar cordlet with incised line below, pointed base; outer lip at periphery of penultimate whorl. Aperture 20% of height, rounded-trapezoidal, outer lip blunt, orthocline; adapically weakly pointed at suture, abapically with oblique open

sipho, columella S-curved with thick columellar and parietal callus, strongly demarcated; internally smooth with weak imprint of external sculpture, widely concave. Colour is tan, lighter at apex, outer lip and on the middle spiral cord.

Variability. — Height range of adult specimens is 2.1 – 2.7 mm. The strength of the columellar cordlet is variable.

Differential diagnosis. — The species is most similar to the three species *Cerithiopsis albae* Espinosa & Ortea, 2021, *C. carmelae* Espinosa & Ortea, 2021 and *C. cima* spec. nov.. *Cerithiopsis albae* has a similar outline and beaded sculpture but its protoconch shows flattened whorls, stronger columellar cords and a darker sub/supra-sutural band. The present species has a protoconch with convex whorls, weaker columellar cords and a different spiral colour pattern. *Cerithiopsis carmelae* has a similar outline and protoconch but it has a uniform brown colour, strong columellar cords and a finer beads sculpture. The present species has weaker columellar cords, a tan colour with a light spiral band and coarser beads. *C. cima* has flattened protoconch whorls and a more closely spaced and even bead sculpture. The present species has convex protoconch whorls and widely spaced beads on the cords. The present species has lighter colour bands on its teleoconch and its beads are more widely spaced. *Cerithiopsis rhyshobbsi* Swinnen & Nappo, 2022, from Ascension Island has a similar outline, size, sculpture and colour but its protoconch has three whorls and a suprasutural sculpture (Swinnen & Nappo, 2022: 77 pl. 1). The protoconch of the present species has four smooth whorls.

Distribution. — Only empty shells off Cima, Maio, São Tiago, Fogo, Boa Vista, Sal, Santa Luzia, Razo and São

Vicente in 1-430 m.

Remarks. — The species was described from a single live taken specimen (Espinosa & Ortea, 2021: 86-87, fig. 2B). The species was illustrated by Rolán (2005: 110, fig. 455) off Sal and it is not yet known from the W African margin. It possibly is an endemic to the Cape Verde area.

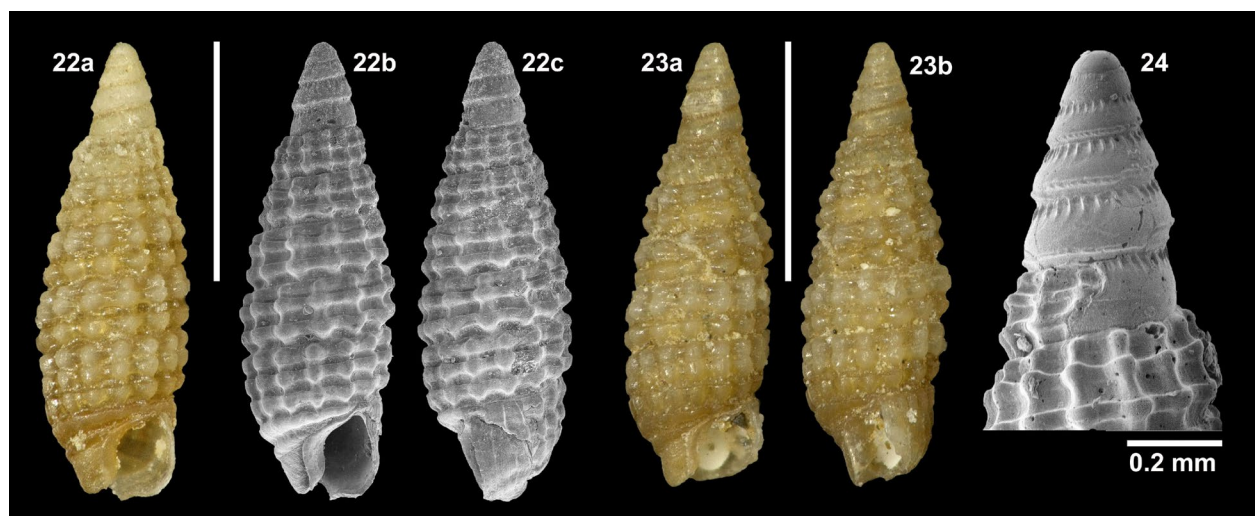
Cerithiopsis albae Espinosa & Ortea, 2021

Figs 22-24, 31

Cerithiopsis albae Espinosa & Ortea, 2021: 88-89, fig. 3.

Type locality. — Cape Verde archipelago, cave entrance near Palmeira harbour, Sal; 12-18 m.

Material examined (Cape Verde archipelago, 54 empty shells). — 3 shells; SãoTiago; 110-100 m; Sta. 6.006; RMNH. MOL.351617 • 2 shells; SãoTiago; 120 m; Sta. 6.008; RMNH. MOL.35089 • 1 shell; SãoTiago; 310 m; Sta. 6.010; RMNH. MOL.35090 • 2 shells; São Tiago; 18 m; Sta. 6.014; RMNH. MOL.35091; Figs 22-23. • 3 shells; SãoTiago; 150 m; Sta. 6.015; RMNH.MOL.41210 • 1 shell; SãoTiago; 340 m; Sta. 6.016; RMNH.MOL.35093 • 3 shells; Fogo; 55m & 38 m; Sta. 6.040; RMNH.MOL.35095 • 2 shells; Razo; 400-430 m; Sta. 6.093; RMNH.MOL.35100 • 1 shell; Santa Luzia; 60-80 m; Sta. 6.110; RMNH.MOL.194177 • 1 shell; São Vicente; 110-120 m; Sta. 6.134; RMNH.MOL.194219 • 2 shells; São Vicente; 99 m; Sta. 6.147; RMNH.MOL.35102 • 1 shell; São Tiago; 320 m; Sta. 7.004; RMNH.MOL.35113 • 1 shell; São Tiago; 420 m; Sta. 7.007; RMNH.MOL.35106 • 2 shells; Cima; 410-460 m; Sta. 7.038; RMNH.MOL.35109 • 1 shell; Maio; 76 m; Sta. 7.042; RMNH. MOL.35110 • 1 shell; Maio; 273 m; Sta. 7.049; RMNH.MOL.35111



Figs 22-24. *Cerithiopsis albae* Espinosa & Ortea, 2021. **22-23.** São Tiago, sta 6.014. **22a-c.** Ventral and side view, height 1.8 mm, width 0.6 mm. **23a-b.** Ventral and side view, height 1.9 mm, width 0.6 mm. **24.** Razo, sta. 7.121, protoconch, exposed height 0.61 mm, width 0.33 mm. Vertical scale bars 1 mm, horizontal scale bars 0.2 mm.

• 3 shells; Sal; 262–280 m; Sta. 7.101; RMNH.MOL.35114 • 7 shells; Sal; 85 m; Sta. 7.110; RMNH.MOL.35116 • 2 shells; Razo; 75 m; Sta. 7.116; RMNH.MOL.35118 • 4 shells; Razo; 140–160 m; Sta. 7.119; RMNH.MOL.35119 • 7 shells; Razo; 200–230 m; Sta. 7.121; RMNH.MOL.35121; Fig. 24 • 3 shells; Razo; 85 m; Sta. 7.129; RMNH.MOL.35116 • 2 shells; Razo; 405 m; Sta. 7.129; RMNH.MOL.35122 • 1 shell; São Vicente; 72 m; Sta. 7.160; RMNH.MOL.35123.

Diagnosis. — Small, elevated, cyrtconoidal, translucent shell; beaded spiral cords and ribs, subsutural and columellar cords; colour tan; observed maximum height 1.9 mm, width 0.62 mm (width/height ratio 0.34). Large cyrtconoidal, elevated, multispiral protoconch with flattened whorls, colour translucent light tan.

Description. — Protoconch: five elevated whorls, smooth convex nucleus and first whorl, three subsequent flattened smooth whorls with peripheral keel / cordlet, apical angle 40°. Suture shallow with subsutural vertical riblets. Suture of ultimate whorl well below periphery penultimate whorl. Lip with broad adapical indent, flexuous below. Maximum exposed height 610 µm, diameter approximately 330 µm. Transition to teleoconch demarcated by lip and change in sculpture.

Teleoconch: Five whorls with cyrtconoidal / pupoidal outline, apical angle 30°. Suture deep. First whorl with orthogonal reticulated sculpture of 11 ribs crossed by 3 cords of equal strength. Second whorl with dominating beaded cords. Third whorl with two beaded cords and fourth and ultimate whorls with three beaded cords; penultimate whorl with 13 axial ribs. Beads dominate sculpture, interspaces between ribs approximately 60% of beads. Ribs and cords disappear towards terminal lip. Last whorl with broad smooth subsutural cord; smooth columellar cord, weakly pointed base; outer lip well within periphery of penultimate whorl. Aperture 17% of height, rounded-trapezoidal, outer lip sharp, slightly prosocline; adapically pointed at suture, abapically with oblique open siphonal canal, columella S-curved with thick demarcated columellar and parietal callus; internally smooth with weak imprint of external sculpture. Colour is tan, lighter at apex, outer lip and on the middle spiral cord; darker columellar band.

Variability. — Little variability observed.

Differential diagnosis. — *Cerithiopsis albae* is most similar to the two species *C. laurauae* and *C. carmelae*. *Cerithiopsis albae* has a similar outline and beaded sculpture but its protoconch shows flattened whorls, stronger columellar cords and a darker sub/supra-sutural band. For differentiation with other species refer to the differential diagnosis of *C. laurauae*. *Cerithiopsis pellegrinii* Swinnen & Nappo, 2022 from Ascension Island has a similar outline, size, (teleoconch and protoconch) sculpture and colour but the protoconch has three whorls (Swinnen & Nappo, 2022:

79–80 pl. 3). The protoconch of the present species has five whorls.

Distribution. — Only empty shells off Cima, Maio, São Tiago, Fogo, Sal, São Nicolau, Santa Luzia, Razo and São Vicente in 12–460 m.

Remarks. — The species was originally described from multiple shells (Espinosa & Ortea, 2021: 88–89, fig. 3). The species was not illustrated by Rolán (2005) and it is not yet known from the W African margin. It possibly is an endemic in the Cape Verde archipelago.

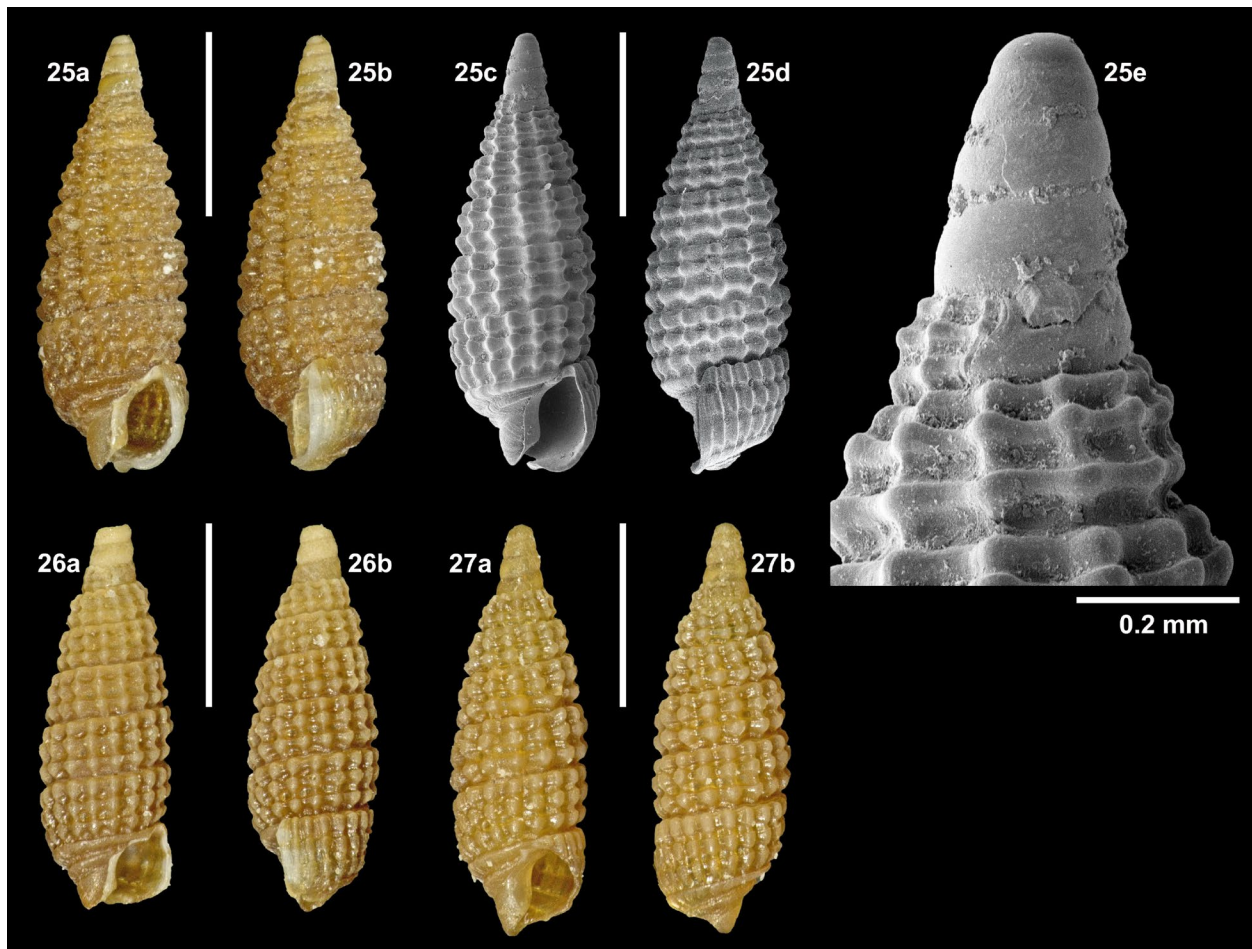
Cerithiopsis carmelae Espinosa & Ortea, 2021

Figs 25–27, 31

Cerithiopsis carmelae Espinosa & Ortea, 2021: 86, fig. 2A.

Type locality. — Cape Verde archipelago, Palmeira harbour, Sal, 1.5–2 m.

Material examined (Cape Verde archipelago, 171 empty shells). — 3 shells; SãoTiago; 15–20 m; Sta. 6.001; RMNH.MOL.30926 • 6 shells; SãoTiago; 68–75 m; Sta. 6.005; RMNH.MOL.194205 • 3 shells; SãoTiago; 110–100 m; Sta. 6.006; RMNH.MOL.194160 • 8 shells; SãoTiago; 110–100 m; Sta. 6.006; RMNH.MOL.194181 • 4 shells; SãoTiago; 70–88 m; Sta. 6.007; RMNH.MOL.194164; Figs 25a–e • 6 shells; SãoTiago; 120 m; Sta. 6.008; RMNH.MOL.194117 • 11 shells; SãoTiago; 150 m; Sta. 6.015; RMNH.MOL.351621 • 2 shells; Fogo; 60 m; Sta. 6.041; RMNH.MOL.194169 • 1 shell; Fogo; 60 m; Sta. 6.041; RMNH.MOL.351454 • 1 shell; Fogo; 60 m; Sta. 6.041; RMNH.MOL.351452 • 5 shells; São Nicolau; 35 m; Sta. 6.082; RMNH.MOL.194149 • 1 shell; Razo; 400–430 m; Sta. 6.093; RMNH.MOL.351459 • 1 shell; Santa Luzia; 20 m; Sta. 6.101; RMNH.MOL.194154 • 14 shells; Santa Luzia; 102 m; Sta. 6.103; RMNH.MOL.194266 • 2 shells; Santa Luzia; 204 m; Sta. 6.105; RMNH.MOL.194267 • 2 shells; Santa Luzia; 50 m; Sta. 6.107; RMNH.MOL.194161 • 15 shells; São Vicente; 30 m; Sta. 6.160; RMNH.MOL.194255 • 1 shell; São Vicente; 67 m; Sta. 6.164; RMNH.MOL.30934 • 1 shell; São Vicente; 30–37 m; Sta. 6.171; RMNH.MOL.30935 • 5 shells; Cima; 30 m; Sta. 7.031; RMNH.MOL.194434 • 3 shells; Cima; 65 m; Sta. 7.032; RMNH.MOL.194158 • 4 shells; Maio; 76 m; Sta. 7.042; RMNH.MOL.194139 • 1 shell; Maio; 30 m; Sta. 7.043; RMNH.MOL.30937 • 5 shells; Maio; 166 m; Sta. 7.048; RMNH.MOL.194264 • 3 shells; Sal; 76 m; Sta. 7.088; RMNH.MOL.194434 • 4 shells; Sal; 24 m; Sta. 7.094; RMNH.MOL.194250 • 3 shells; Sal; 262–280 m; Sta. 7.101; RMNH.MOL.194189 • 3 shells; Sal; 165 m; Sta. 7.102; RMNH.MOL.351542; Figs 26–27 • 8 shells; Sal; 165 m; Sta. 7.102; RMNH.MOL.35115 • 10 shells; Sal; 60 m; Sta. 7.106; RMNH.MOL.194241 • 12 shells; Sal; 31 m; Sta. 7.109; RMNH.MOL.194218 • 1 shell; Sal; 31 m; Sta. 7.109; RMNH.MOL.351543 • 16 shells; Sal; 85 m; Sta. 7.110; RMNH.MOL.194157 • 1 shell; Razo; 75 m; Sta. 7.116; RMNH.MOL.194153 • 1 shell; São Nico-



Figs 25–27. *Cerithiopsis carmelae* Espinosa & Ortea, 2021. **25.** São Tiago, sta 6.007; **a–d.** ventral and side view, height 2.4 mm, width 0.8 mm; **e.** protoconch, exposed height 0.43 mm, width 0.25 mm. **26–27.** Sal, sta. 7.102. **26a–b.** Shell, ventral and side view, height 2.1 mm, width 0.8 mm. **27a–b.** Shell, ventral and side view, height 2.2 mm, width 0.8 mm. Vertical scale bars 1 mm, horizontal scale bar 0.2 mm.

lau; 400 m; Sta. 7.129; RMNH.MOL.194196 • 2 shells; Branco; 102 m; Sta. 7.143; RMNH.MOL.194245 • 1 shell; São Vicente; 52 m; Sta. 7.159; RMNH.MOL.87662 • 1 shell; São Vicente; 72 m; Sta. 7.160; RMNH.MOL.194228.

Diagnosis. — Small, elevated, cyrtokonoidal, opaque shell; beaded spiral cords and ribs, subsutural and columellar cords; colour uniform brown; observed maximum height 2.4 mm, width 0.8 mm (width/height ratio 0.33). Large cyrtokonoidal, elevated, multispiral protoconch with convex whorls, colour translucent light tan with thin sub-sutural darker band.

Description. — Protoconch: $4\frac{1}{2}$ elevated weakly convex whorls, apical angle 30° . Suture shallow with tiny axial notches. Predominantly smooth and glossy, tiny subsutural beads. Lip with broad adapical indentation, flexuous below. Maximum exposed height 430 μ m, diameter approximately 250 μ m. Transition to teleoconch clear by demarcated lip and change in sculpture.

Teleoconch: $5\frac{1}{2}$ whorls with cyrtokonoidal outline, apical

angle 40° . Whorls with three beaded cords and ribs; penultimate whorl with 17 axial ribs. Beads dominate sculpture, interspaces between ribs approximately 40% of beads. Ribs are closely spaced towards terminal lip; beads are oblong-shaped with minute interspaces; external lip smooth. Suture deep. Last whorl with broad smooth subsutural cord; smooth columellar cord with incised line below, weakly pointed base; outer lip at periphery of penultimate whorl. Aperture 20% of height, rounded-trapezoidal, outer lip blunt, orthocline; adapically pointed at suture, abapically with oblique open siphonal canal, columella S-curved with demarcated thick columellar and parietal callus; internally smooth with weak imprint of external sculpture. Colour is light to dark brown, tan at apex, very light at outer lip and inner callus.

Variability. — Adult specimens have a height range of 2.1–2.4 mm.

Differential diagnosis. — This species is most similar to the two other species *Cerithiopsis laurauae* and *C. albae*.

Cerithiopsis carmelae has a similar outline and beaded sculpture but its protoconch has convex whorls, its teleoconch has a basal cord and a uniform brown colour. For differentiation with other species we refer to the differential diagnosis of *C. laurauae*. *Cerithiopsis cima* has flattened protoconch whorls and a light cream colour. The present species has convex protoconch whorls and is brown. *Cerithiopsis minima* from the NE Atlantic and Mediterranean Sea has a similar outline and uniform brown colour but its protoconch has three smooth whorls. The present species has a basal cord and its protoconch has four whorls. *Cerithiopsis fusiformis* (C. B. Adams, 1850) from the Caribbean Sea has a similar outline, sculpture but its teleoconch is dark brown and the protoconch is white (Figuera & Pimenta, 2008: 73 figs 1-5, holotype). The present species is lighter brown with a tan protoconch. *Cerithiopsis aimen* Rolán & Espinosa, 1995 from Cuba is similar but its protoconch whorls are more convex than those of the present species (Figuera & Pimenta, 2008: 73 figs 6-11, holotype). *Cerithiopsis inespazosae* Rolán & Gori, 2013 from São Tomé Island in the Gulf of Guinea has a similar outline, size, sculpture and colour but its protoconch has two whorls with a spiral keel and sculpture (Rolán & Gori, 2013: 135-136 figs 2A-F). The protoconch of the present species has four whorls and lacks the sculpture. *Cerithiopsis annaleabeardae* Swinnen & Nappo, 2022, from Ascension Island, has a similar outline, sculpture and size but the colour is tan, its protoconch is sculptured and has three whorls (Swinnen & Nappo, 2022: 77-78 pl. 2). The present species has a brown colour and the protoconch has four smooth whorls.

Distribution. — The species was found off the islands São Tiago, Fogo, São Nicolao, Razo, Branco, Santa Luzia, São Vicente, Sal, Cima, and Maio; it lives over the full Cape Verde archipelago in 1–430 m.

Remarks. — The species was described from a single live taken specimen (Espinosa & Ortea, 2021: 88-89, fig. 3). It was not mentioned in Rolán (2005) and it is not yet known from the W African margin. The cerithiopsid may be endemic to the Cape Verde area.

Cerithiopsis boavista spec. nov.

Figs 27-31

urn:lsid:zoobank.org:act:03B69354-41A0-4AD7-B302-561C4DFD2C35

Type locality. — Cape Verde archipelago, SE of Boa Vista; 15°57'N-22°44'W; 50 m.

Type material. — Holotype: Cape Verde archipelago, SE of Boa Vista; 15°57'N-22°44'W; 50 m; 12.vi.1982; CANCAP Sta. 6.059; van Veen grab; sand, calcareous algae and shell gravel; RMNH.MOL.194121; Figs 28a-b. Paratypes: 4 shells; same location data as in holotype; RMNH.MOL.315822; Figs 29a-b.

Other material examined (Cape Verde archipelago, 4 empty shells). — 1 shell; São Tiago; 29-33 m; Sta. 6.054; RMNH.MOL.351556 • 1 shell; SW of Santa Luzia; 25-33 m; Sta. 6.102; RMNH.MOL.351451 • 1 shell; Sal; 41 m; Sta. 7.091; RMNH.MOL.194439; Figs 30a-d • 1 shell; São Vicente; 52 m; Sta. 7.159; RMNH.MOL.351549.

Etymology. — The name (noun) refers to Boa Vista Island, type locality in the northern Cape Verde archipelago.

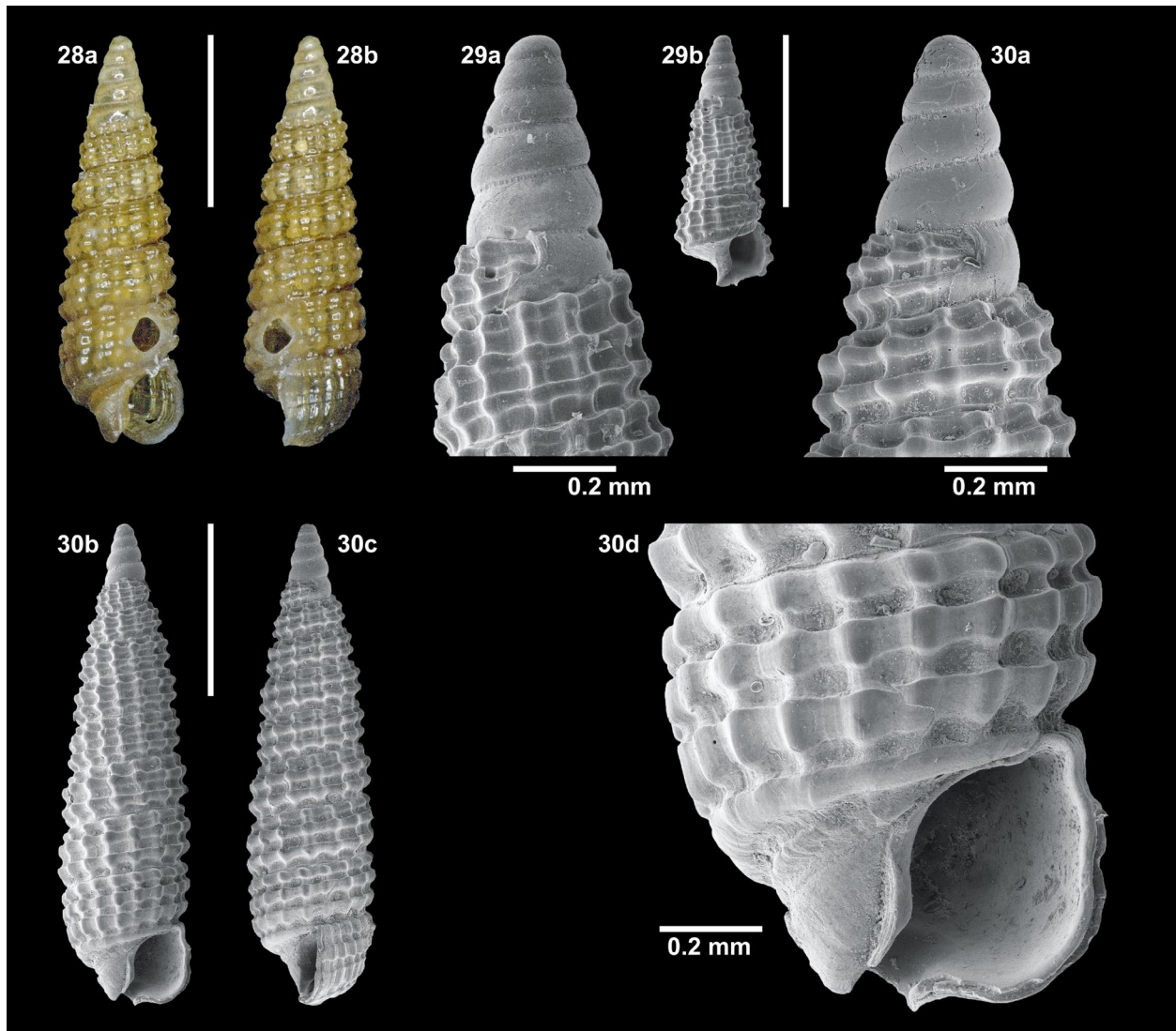
Diagnosis. — Highly elevated, nearly conical shell with beaded spiral cords and orthocline ribs, one smooth sub-sutural cord; colour tan, translucent, glossy; maximum height 3.2 mm, width 0.9 mm (width/height ratio 0.28).

Description. — Protoconch: highly elevated, 5 convex whorls, apical angle 30°. Suture shallow with tiny axial notches. Lip with broad adapical indentation, flexuous below. Translucent, smooth, glossy, colour tan. Exposed height 600 µm, diameter 330 µm. Transition to teleoconch demarcated by lip and change in sculpture and colour.

Teleoconch: maximum 8 whorls with nearly conical outline, apical angle approximately 20°. First whorl with two spiral cords and approximately 11 beaded ribs; subsequent two whorls with two beaded spirals of equal strength, subsequent whorls with three beaded cords; 11 to 15 orthocline ribs per whorl. Suture deep. Last whorl with one strong, smooth subsutural cord; one weak columellar cord with channel below; smooth base with blunt tip. Ribs closely spaced towards outer lip. Aperture 22% of height, pyriform, outer lip orthocline, weak corrugations following external sculpture; adapically pointed near suture; abapically with oblique open siphon; columella S-curved with demarcated callus; demarcated parietal callus; internally smooth with weak imprint of external sculpture. The colour is lighter at apertural callus and outer lip.

Variability. — The observed height of the protoconch varies between 0.53 and 0.60 mm. The observed width to height ratio ranges between 0.55 and 0.70.

Differential diagnosis. — The type species *Cerithiopsis tubercularis* has a similar teleoconch sculpture but its broken protoconch has a diameter that is about 0.27 mm and an oblique axial sculpture (Oliver et al., 2017: 405 fig. 87, Lectotype EXEMS Moll4235/1). Prkić & Mariottini (2010) figured Adriatic shells of *C. tubercularis* that have a protoconch with similar sculpture to the new species, different to that of the type species, and with a diameter of 0.26–0.28 mm and an exposed height of 0.50 mm. The present species has a larger protoconch with a diameter of 0.33 mm and an exposed height of 0.60 mm. *C. luzia spec. nov.* has a similar outline and size but its protoconch has an axial sculpture and its teleoconch sculpture is finer with more ribs. The present species has a smooth protoconch and it has a coarser sculpture. *C. vicente spec. nov.* has a similar conical outline and smooth protoconch but its protoconch is



Figs 28-30. *Cerithiopsis boavista* spec. nov. **28a-b.** Holotype, Boa Vista, sta. 6.059, ventral and side view, height 2.7 mm, width 0.9 mm. **29a-b.** Paratype, juvenile, same location; **a.** protoconch, exposed height 0.60 mm; width 0.33 mm; **b.** ventral view, height 1.7 mm, width 0.7 mm. **30a-d.** Sal, sta. 7.091; **a.** protoconch, exposed height 0.53 mm; width 0.39 mm; **b-c.** ventral and side view, height 3.2 mm, width 0.9 mm; **d.** aperture. Vertical scale bars 1 mm, horizontal scale bars 0.2 mm.

whitish and the beads of the teleoconch sculpture are larger and more closely set with interspaces between beads of less than 50% of the bead diameter. The protoconch of the present species is tan coloured and the beads are loosely set with interspaces between beads more than 70% of the bead diameters. *C. laurauae* has a similar height and protoconch but its outline is more cyrtconoidal. The present species is more conical and elevated. *C. albae* also has a cyrtconoidal outline and its protoconch has flattened whorls. The present species has convex protoconch whorls. The present species is conical, with widely-spaced beads and it is tan coloured. *Cerithiopsis rhyshobbsi* Swinnen & Nappo, 2022, from Ascension Island, has a similar sculpture, colour and size but its outline is cyrtconoidal and the protoconch is

sculptured and has three whorls (Swinnen & Nappo, 2022: 77 pl. 1). The outline of the present species is more conical and the protoconch has four smooth whorls. *Cerithiopsis fusiformis* (C. B. Adams, 1850), from the Caribbean Sea and the Gulf of Mexico has a similar outline, size and protoconch but its colour is dark brown and protoconch is white. The present species has a more dense sculpture and its colour is lighter brown with a tan protoconch.

Distribution. — Only empty shells from Boa Vista, São Tiago, Sal, and São Vicente in 29-52 m. It is probably distributed over the full Cape Verde archipelago.

Remarks. — The species is not yet known from the W African margin. It possibly is an endemic to the Cape Verde area.

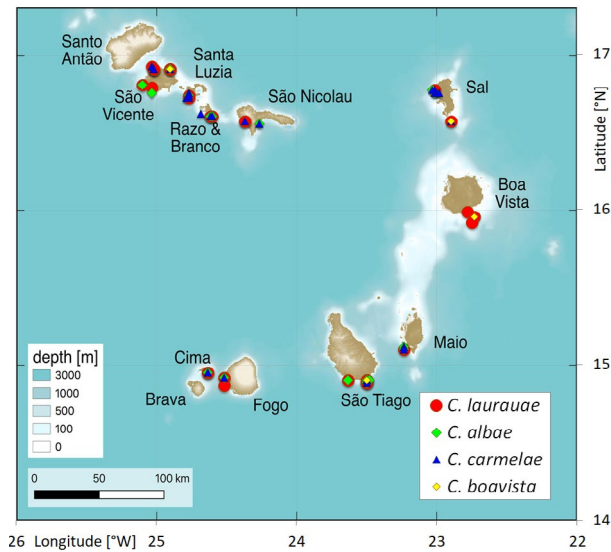


Fig. 31. Species distribution from CANCEP stations in Cape Verde archipelago in the genus *Cerithiopsis*. Red dot = *Cerithiopsis laurauae* Espinosa & Ortea, 2021; green diamond = *C. albae* Espinosa & Ortea, 2021; blue triangle = *C. carmelae* Espinosa & Ortea, 2021; yellow diamond = *C. boavista* spec. nov. Bathymetry from GEBCO.

***Cerithiopsis chechoi* Espinosa & Ortea, 2021**

Figs 32–35, 41

Cerithiopsis sp10 — Rolán, 2005: 110, fig. 462.

Cerithiopsis chechoi Espinosa & Ortea, 2021: 90–91, fig. 5.

Type locality. — Cape Verde archipelago, cave entrance near Palmeira harbour, Sal; 12–18 m.

Material examined (Cape Verde archipelago, 12 empty shells). — 1 shell; São Tiago; 120 m; sta. 6.008; RMNH. MOL.351818 • 2 shells; São Tiago; 120 m; sta. 6.009; RMNH. MOL.30928 • 1 shell; Fogo; 55–38 m; sta. 6.040; RMNH. MOL.351463 • 1 shell; Santa Luzia; 20 m; sta. 6.101; RMNH. MOL.351559; Fig. 35 • 2 shells; São Vicente; 50 m; sta. 6.130; RMNH. MOL.194204; Figs 34a–b • 1 shell; São Vicente; 30 m; sta. 6.160; RMNH. MOL.351819 • 1 shell; Sal; 24 m; sta. 7.094; RMNH. MOL.351820 • 1 shell; Sal; 31 m; sta. 7.109; RMNH. MOL.351620; Figs 33a–b • 2 shells; São Nicolau; 400 m; sta. 7.128; RMNH. MOL.351562; Figs 32a–b.

Diagnosis. — Small, elevated, pupoidal and cyrtococonoidal, opaque shell; beaded spiral cords and ribs, subsutural cords; colour brown with white peripheral band; observed maximum height 2.1 mm, width 0.9 mm (width/height ratio 0.46). Large, elevated, multispiral protoconch with convex whorls, translucent white.

Description. — Protoconch: four elevated translucent convex whorls, apical angle 20°, smooth, glossy. Maximum exposed height 440 µm, diameter approximately 250 µm.

Transition to teleoconch clear by change in sculpture.

Teleoconch: 5 whorls with cyrtococonoidal outline, apical angle approximately 35–50°. First whorl with two beaded cords, lowest cord strongest. Subsequent whorls with three beaded cords; penultimate whorl 15 ribs. Beads dominate sculpture, interspaces between ribs and cords approximately 30% of bead diameters. Ribs are closely spaced towards terminal lip; beads are oblong-shaped with minute interspaces; external lip smooth. Suture deep. Last whorl with broad coarsely beaded subsutural cord; outer lip near periphery of penultimate whorl. Aperture 25% of height, rounded-trapezoidal, outer lip blunt, orthocline; adapically pointed at suture, abapically with oblique open siphonal canal, columella S-curved with thick columellar and reclining parietal callus, strongly demarcated; internally smooth. Colour is light to dark brown, white at apex, the peripheral band, at the edge of the outer lip and inner callus.

Variability. — Adult specimens have a height range of 2.1–2.7 mm. Rolán (2005) displayed a specimen of 2.7 mm and indicated in the text a size of up to 4 mm. The holotype has a height of 2.4 mm. The initial two whorls may lack the brown band.

Differential diagnosis. — *Cerithiopsis chechoi* is similar to *Cerithiopsis saotiago* spec. nov., which has a similar outline and size but has a uniform tan colour and a larger apical angle (50°). The current species has a white peripheral band and a smaller apical angle (40°).

Distribution. — Only empty shells off the Cape Verde archipelago São Tiago, Fogo, Sal, São Nicolau, Santa Luzia and São Vicente, in 12–400 m.

Remarks. — Rolán (2005: 110, fig. 462) displayed a shell from Porto Ancião, Brava Island. The species is not yet known from the W African margin. It might be an endemic to the Cape Verde area.

***Cerithiopsis saotiago* spec. nov.**

Figs 36–37, 41

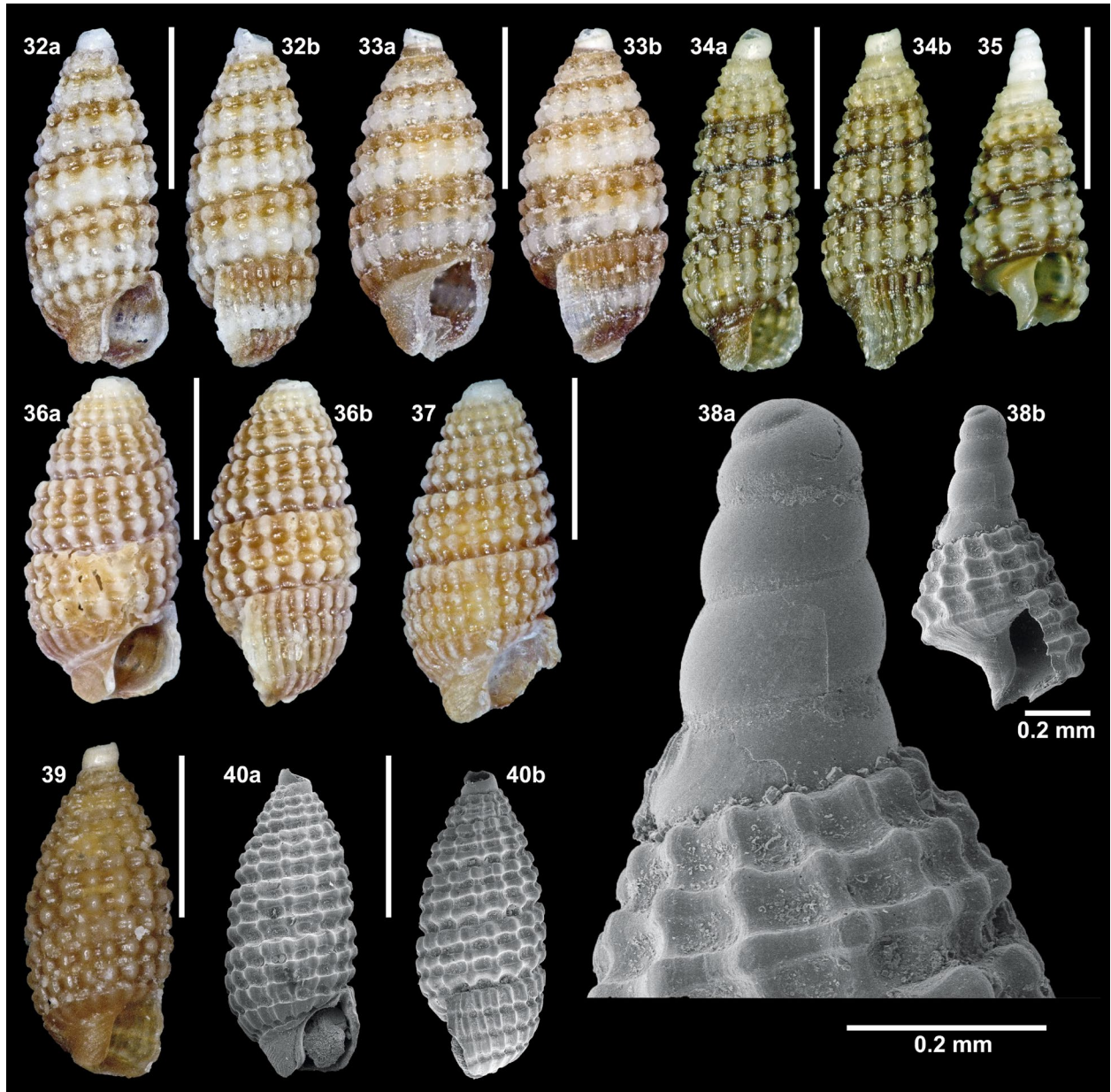
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Type locality. — Cape Verde archipelago, bay on W coast of São Tiago; 15°00'N–23°44'W; 540 m.

Type material. — Holotype: bay on W coast of São Tiago; 15°00'N–23°44'W; 540 m; 7.vi.1982; Sta. 6.024; van Veen grab; muddy volcanic sand; RMNH. MOL.30929; Figs 36a–b. Paratypes: 2 shells; same location data as in holotype; RMNH. MOL.351821; Fig. 37.

Etymology. — The name (noun) refers to São Tiago Island, type locality in the northern Cape Verde archipelago.

Diagnosis. — Obese, cyrtococonoidal shell with beaded



Figs 32-40. *Cerithiopsis* spp. **32-35.** *Cerithiopsis chechoi* Espinosa & Ortea, 2021. **32a-b.** São Nicolao, sta. 7.128, ventral and side view, height 2.1 mm, width 0.9 mm. **33a-b.** Sal, sta. 7.094, ventral and side view, height 2.0 mm, width 0.9 mm. **34a-b.** São Vicente, sta. 6.130, height 2.1 mm, width 0.8 mm. **35.** Santa Lucia, sta. 6.101, height 1.9 mm, width 0.8 mm. **36-37.** *Cerithiopsis saotiago* spec. nov., São Tiago, sta. 6.024; **36a-b.** ventral and side view, height 2.0 mm, width 1.0 mm. **37.** ventral view, height 2.1 mm, width 1.0 mm. **38-40.** *Cerithiopsis eolo* Espinosa & Ortea, 2021. **38a-b.** São Vicente, sta. 6.160; **a.** protoconch, exposed height 0.43 mm, width 0.26 mm; **b.** ventral view juvenile, height 0.9 mm, width 0.6 mm. **39.** Sal, sta 7.090, height 2.1 mm, width 0.9 mm. **40a-b.** Sal, sta. 7.102, ventral and side view, height 1.9 mm, width 0.8 mm. Vertical scale bars 1 mm; horizontal scale bars 0.2 mm.

spiral cords and oblique ribs, one broad subtural and one columellar cord; straw-yellow with darker supra sutural band and white beads; maximum height 2.0 mm, width 1.0 mm (width/height ratio 0.50).

Description. — Protoconch: largely unknown, broken, diameter approximately 290 µm; colour basis white, smooth. Transition to teleoconch clear by change in sculp-

ture and colour. Teleoconch: maximum 4½ whorls with cyrtconoidal outline, apical angle approximately 50°. First whorl with two spiral cords and approximately 13 beaded ribs; subsequent whorls with three beaded spirals of equal strength, 15 to 19 ribs per whorl; ribs slightly prosocline. Suture deep. Last whorl with one strong, beaded subsutural cord with oblong beads; one smooth columellar cord and

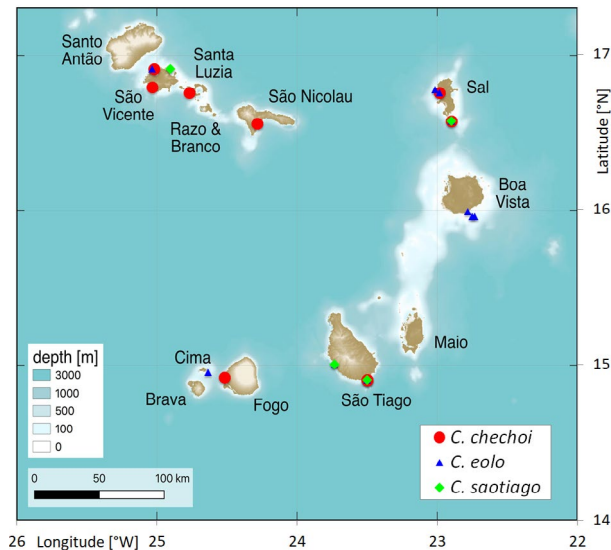


Fig. 41. Species distribution from CANCEP stations in Cape Verde archipelago in the genus *Cerithiopsis*. Red dot = *Cerithiopsis chechoi* Espinosa & Ortea, 2021; green diamond = *C. saotiago* spec. nov.; blue triangle = *C. eolo* Espinosa & Ortea, 2021. Bathymetry from GEBCO.

multiple fine cordlets near the base; base with blunt tip. Ribs closely spaced towards outer lip. Aperture 25% of height, trapezoidal, outer lip broken, orthocline (from external riblets), adapically with anal channel, abapically with oblique open siphonal canal, columella S-curved with thin callus; parietal callus reclining; internally smooth with weak imprint of external sculpture. The colour is lighter at apertural callus and outer lip.

Variability. — No variability observed in small shell set.

Differential diagnosis. — The species is similar to *Cerithiopsis chechoi* Espinosa & Ortea, 2021 and *C. eolo* Espinosa & Ortea, 2021. For differences with these and other Atlantic or Mediterranean species, we refer to the differential diagnoses of these species.

Distribution. — Only empty shells from São Tiago Island, 540 m.

Remarks. — The species is not yet known from the W African margin. It possibly is an endemic to the Cape Verde area.

Cerithiopsis eolo Espinosa & Ortea, 2021

Figs 38–41

Cerithiopsis sp10 — Rolán 2005: 110, fig 462

Cerithiopsis eolo Espinosa & Ortea, 2021: 89–90, fig. 4.

Type locality. — Cape Verde archipelago, Sal, cave entrance near Palmeira harbour, depth 12 – 18 m.

Material examined (Cape Verde archipelago, 11 empty shells). — 1 shell; São Tiago; 120 m; Sta. 6.008; RMNH. MOL.30941 • 1 shell; São Tiago; 29–33 m; Sta. 6.054; RMNH. MOL.30930 • 3 shells; Boa Vista; 25 m; Sta. 6.056; RMNH. MOL.30945 • 2 shells; Boa Vista; 50 m; Sta. 6.059; RMNH. MOL.30932 • 4 shells; São Vicente; 30 m; Sta. 6.160; RMNH. MOL.30933; Figs 38a–b • 1 shell; São Vicente; 50 m; Sta. 6.175; RMNH. MOL.30936 • 1 shell; Cima; 65 m; Sta. 7.032; RMNH. MOL.194227 • 8 shells; Sal; 18–28 m; Sta. 7.090; RMNH. MOL.194432; Fig. 39 • 2 shells; Sal; 24 m; Sta. 7.094; RMNH. MOL.30938 • 1 shell; Sal; 165 m; Sta. 7.102; RMNH. MOL.30954; Figs 40a–b • 2 shells; Sal; 31 m; Sta. 7.109; RMNH. MOL.30940.

Diagnosis. — Small, elevated, pupoidal and cyrtococonoidal, opaque shell; beaded spiral cords and ribs, subsutural cord and fine columellar cordlets; colour brown with lighter beards; observed maximum height 2.3 mm, width 1.0 mm (width/height ratio 0.43). Small, elevated, multispiral protoconch, white.

Description. — Protoconch: four highly elevated translucent weakly convex whorls, apical angle 20°, smooth, glossy. Suture shallow, smooth. Demarcated flexuous lip with thin terminal rim. Maximum exposed height 350 µm, diameter approximately 200 µm. Transition to teleoconch clear by demarcated lip, change in colour and sculpture.

Teleoconch: 5 whorls with cyrtococonoidal / pupoidal outline, apical angle 40°. Suture deep. Whorls with three beaded cords; penultimate whorl 17 ribs. Beads dominate sculpture, interspaces between ribs and cords approximately 30% of bead diameters. Ribs closely spaced towards terminal lip with oblong-shaped beads and narrow interspaces; external lip smooth and lighter. Last whorl with broad coarsely beaded subsutural cord; one smooth columellar cord near interface with parietal area, base columellar areas with fine cordlets, base rounded; outer lip near periphery of penultimate whorl. Aperture 30% of height, rounded-trapezoidal, outer lip blunt, orthocline; adapically pointed at suture, abapically with oblique open siphonal canal, columella S-curved with thick demarcated columellar and parietal callus; internally smooth.

Variability. — Adult specimens have a height range of 2.1–2.7 mm and a width to height ratio of 0.38–0.45. Rolán (2005: 110, fig. 457) displayed a specimen of 1.2 mm. The holotype has a height of 2.4 mm.

Differential diagnosis. — *Cerithiopsis eolo* is most similar to *C. chechoi* and *C. saotiago* spec. nov. For differentiation with these species, we refer to the earlier descriptions and remarks. *C. minima* from the NE Atlantic and Mediterranean Sea has a similar outline and uniform brown colour but its protoconch has three whorls and it lacks basal cordlets (Cossignani & Ardovini, 2011: 165). *Cerithiopsis ladae* Prkić & Buzzurro, 2007 from the Mediterranean Sea, Atlantic Iberian and Moroccan coast, Madeira and the Azores, has a uniform dark brown colour, cyrtococonoidal

dal-pupoidal outline and a protoconch with three white whorls (Cossignani & Ardovini, 2011: 165). The present species has a light brown colour, fine basal cordlets and its protoconch has four whorls.

Distribution. — Only empty shells off the Cape Verde archipelago São Vicente, Sal, Boa Vista, São Tiago and Cima in 12–540 m.

Remarks. — Rolán (2005: 110, fig. 462) displayed a shell from Porto Anciã, Brava Island. The species is not yet known from the W African margin. It might be an endemic to the Cape Verde area.

***Cerithiopsis* cf. *diadema* Monterosato, 1874**

Figs 42–43

Cerithiopsis diadema — Monterosato, 1874: 273–274; Apolloni et al., 2018: 39, 101, fig. 11K.

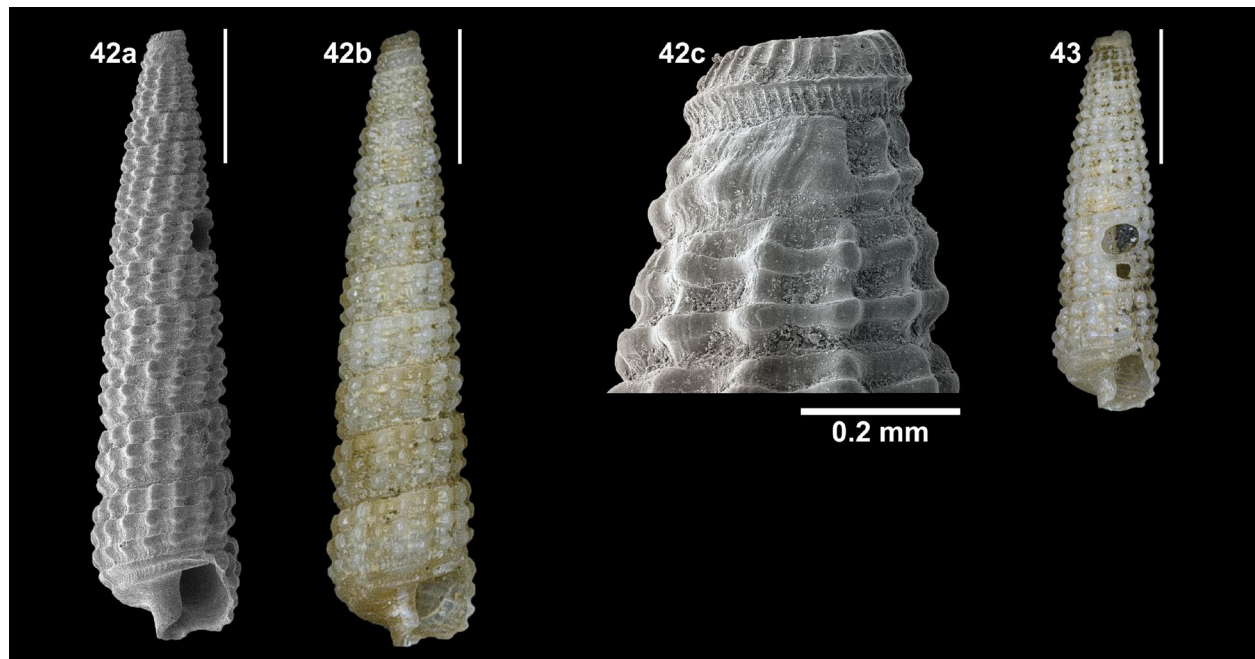
Material investigated. — 3 shells; Cape Verde archipelago, SW of Brava; 14°50'N 24°45'W; depth 530 m; 8.vi.1982; Sta. 6.031; van Veen grab; coarse volcanic sand and gravel; RMNH.MOL.30575 (Figs 42–43).

Diagnosis. — Highly elevated, cyrtoconical shell with beaded spiral cords and oblique ribs, double subsutural cords; maximum height 4.5 mm (part), width 1.1 mm (width/height ratio 0.25); colour uniform yellowish white.

Description. — Protoconch broken off, base whorl with about 23 supra-peripheral axial riblets, strong peripheral

keel, about 45 sub-peripheral riblets, colour light brown, maximum diameter approximately 280 µm. Transition to teleoconch demarcated by change in sculpture. Teleoconch with maximum 12½ whorls, conical outline, apical angle about 25°, at penultimate whorl decreased to 10°. Suture deep. First four whorls with two beaded spiral cords with about 11 ribs; subsequent whorls with three beaded cords of equal strength, 13 to 17 opisthocline ribs per whorl. Last whorl with two distinct, smooth subsutural cords and one weak basal cordlet; base, concave, smooth. Aperture 11% of height, trapezoidal, slightly opisthocline, straight, corrugated edge following external sculpture; adapically pointed at suture, abapically with straight open siphonal canal, columella concave with weakly distinct callus; internally smooth.

Remarks. — The species is only known from three old and predated specimens; all without protoconch and fragmentary lip. It is named *Cerithiopsis* cf. *diadema* Monterosato, 1874 based on the double subsutural cords and the sculptured protoconch. Monterosato's type specimen from Madeira, figured by Apolloni et al. (2018: fig. 11K) shows a height of 3.7 mm, cords of irregular strength, a highly elevated eroded protoconch and a weak columellar cord. The present species has a similar outline and teleoconch sculpture, a maximum height of 4.5 mm, but regularly beaded cords and a smooth columellar area. Placement in a different species may be feasible once material of better quality is found.



Figs 42–43. *Cerithiopsis* cf. *diadema* Monterosato, 1874, Brava, sta. 6.031. **42a–c.** Shell; **a–b.** ventral view, height 4.2 mm, width 1.0 mm; **c.** apex with broken protoconch, exposed width 0.28 mm. **43.** Same locality, ventral view, height 2.8 mm, width 0.8 mm. Vertical scale bars 1 mm, horizontal scale bar 0.2 mm.

Genus *Dizoniopsis* Sacco, 1895

Type species (by original designation): *Cerithium bilineatum* M. Hörnes, 1848 †.

Species of *Dizoniopsis* from the Cape Verde archipelago can be differentiated from those in *Cerithiopsis* by the morphology of the protoconch and the subsutural sculpture. Their protoconchs show a large nucleus and a near cylindrical elevated outline with sculptured convex whorls. Adult specimens have multiple, broad subsutural cords without intermediate channels. Species of *Cerithiopsis* have conical

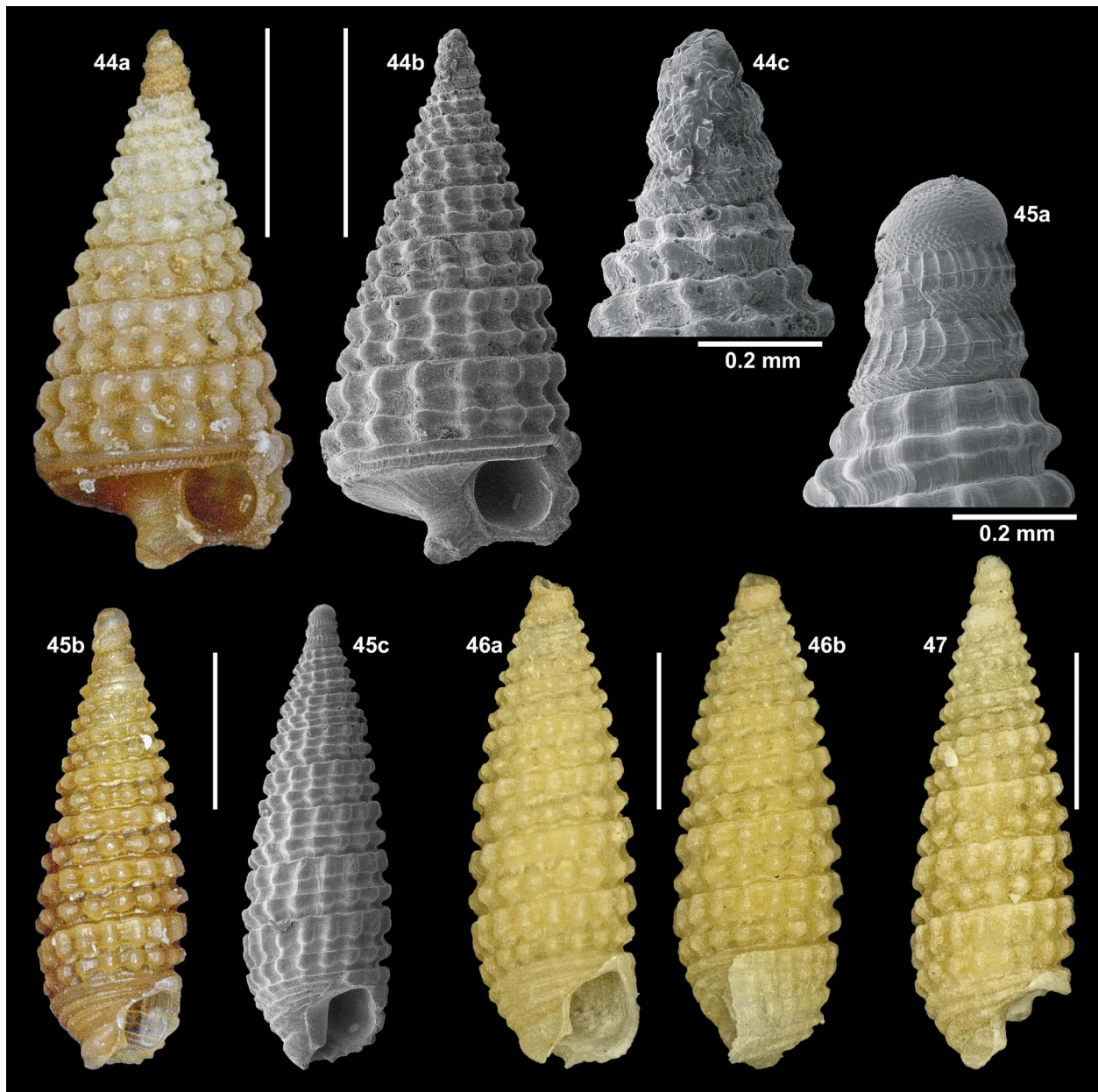
protoconchs and show a single subsutural cord, often with an isolated columellar cord. Species of *Krachia* show exactly two subsutural cords.

***Dizoniopsis razo* spec. nov.**

Figs 45–48

urn:lsid:zoobank.org:act:805BEB63-C7C2-44BC-9DB9-32457E253A27

Type locality. — Cape Verde archipelago, S of Razo;



Figs 44–47. *Dizoniopsis* spp. 44a–c. *Dizoniopsis leopoldoi* (Espinosa & Ortea, 2021), São Tiago, sta. 6.007; a–b. ventral view juvenile with broken lip, height 2.5 mm, width 1.2 mm; c. protoconch, exposed height 0.31 mm, width 0.23 mm. 45–47. *Dizoniopsis razo* spec. nov. 45a–c. Holotype, Razo, sta. 7.121; a. protoconch, exposed height 0.37 mm, width 0.29 mm; b–c. ventral view, height 3.5 mm, width 1.1 mm. 46a–b. Cima, sta. 7.030. 47. Cima, sta. 7.028. Vertical scale bars 1 mm, horizontal scale bars 0.2 mm.

16°36'N-24°37'W; 200-230 m.

Type material. — Holotype: S of Razo; 16°36'N-24°37'W; 200-230 m; 1.ix.1986; Sta. 7.121; van Veen grab; muddy calcareous sand; RMNH.MOL.30535; 45a-c. Paratypes: 3 shells; SE of Cima; 14°57'N-24°39'W; 225 m; 23.viii.1986; Sta. 7.028; van Veen grab; yellow sand with shell gravel; RMNH.MOL.30533; Fig. 47 • 1 shell; SE of Cima; 14°57'N-24°39'W; 165 m; 23.viii.1986; Sta. 7.030; van Veen grab; hard bottom with some yellow calcareous sand; RMNH.MOL.30534; Figs 46a-b • 1 shell; S of São Nicolau, S. Jorge Bay; 16°33'N-24°17'W; 400 m; 2.ix.1986; Sta. 7.128; van Veen grab; muddy Foraminifera sand, some shell gravel and some volcanic gravel; RMNH.MOL.30536 • 1 shell; SE of Boa Vista; 15°55'N-22°45'W; 80 m, 12.vi.1982; Sta. 6.061; van Veen grab; coarse sand, calcareous algae and shells; RMNH.MOL.30532.

Etymology. — The name (noun) refers to the type locality of Razo Island in the northern Cape Verde archipelago.

Diagnosis. — Elevated, cyrtconoidal shell with beaded spiral cords and oblique ribs, and multiple subturnal cords; apical angle 30°; colour uniform straw-yellow or tan; maximum height 3.2 mm, width 1.1 mm (width/height ratio 0.32). Rounded elevated multispiral protoconch.

Description. — Protoconch: three conically elevated whorls with smooth dome-shaped nucleus and first whorl; lower two whorls convex. Sculpture nucleus beaded; lower whorls with approximately 20 curved subturnal riblets, angular at shoulder, peripheral keel with fine complex axial sculpture below. Exposed height 370 µm, diameter approximately 290 µm; colour translucent light tan. Transition to teleoconch clear by change in sculpture. Teleoconch: maximum 7½ whorls with cyrtconoidal outline, apical angle approximately 30°. Suture deep. First whorl with one beaded spiral cord on periphery; subsequent whorls with two beaded spirals, 15 to 17 ribs per whorl; lower cord dominant in upper three whorls; upper cord dominates in subsequent whorls with large oblong beads; ribs slightly ophiotocline. Last whorl with three strong, smooth subturnal cords; demarcated smooth base with pointed tip. Ribs weaker and closely spaced towards outer lip. Aperture 22% of height, trapezoidal, outer lip blunt, orthocline, flexuous, corrugated edge following external sculpture; adapically pointed at suture, abapically with oblique open siphonal canal, columella S-curved with thick demarcated callus; demarcated parietal callus; internally smooth. The colour is tan to straw-yellow, lighter apertural callus and outer lip.

Variability. — Little variation observed in type set.

Differential diagnosis. — The Middle Miocene type species *Dizoniopsis bilineata* is similar (Landau et al., 2018: 237-238, pl. 62 figs 1-2; Miocene-Pliocene) to the present species but its outline is more cylindrical and its protoconch has strong spiral cords. The present species has a more convex outline and the protoconch has weak spiral cordlets. *Dizoniopsis concatenata* (Conti, 1864) from the Mediterra-

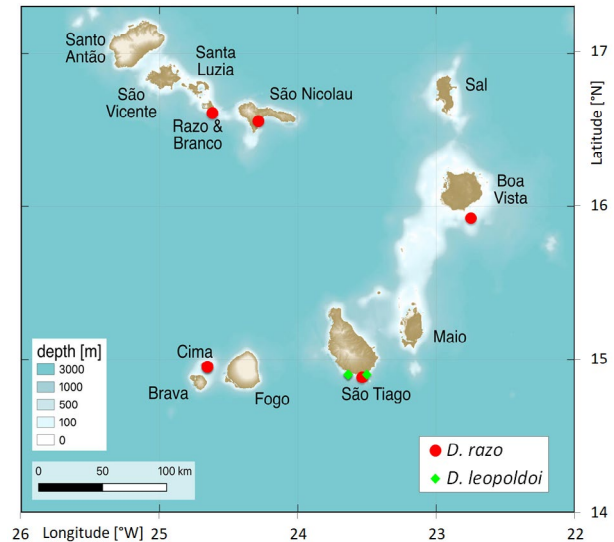


Fig. 48. *Dizoniopsis* spp. distribution from CANCAP stations in Cape Verde archipelago. Red dot = *Dizoniopsis razo* spec. nov.; green diamond = *D. leopoldoi* (Espinosa & Ortea, 2021). Note that the type locality of *D. leopoldoi* is on Sal. Bathymetry from GEBCO.

nean Sea is uniform cream coloured but its protoconch has a different sculpture (Bouchet et al., 2010: 55-56 figs 5-12). *Dizoniopsis coppolae* (Aradas, 1870) from the Mediterranean Sea is uniform cream coloured but its protoconch has a weaker axial sculpture and the spiral cords on the teleoconch have an equal strength (Bouchet et al., 2010: 53-54 figs 1-4). *Dizoniopsis aspicienda* from the Alboran Sea is uniform white and its protoconch has a strong keel on its lower whorl (Bouchet et al., 2010: 59-60 figs 13-17). *Dizoniopsis abylenis* from the Alboran Sea has a more cylindrical outline, uniform cream colour, two protoconch whorls with a spiral cords on the lower whorl (Bouchet et al., 2010: 61 figs 18-19). The present species is darker, with a more convex outline and its protoconch has three whorls with a different axial sculpture. *Dizoniopsis leopoldoi* (Espinosa & Ortea, 2021: 90-91, fig. 5) comb. nov., which described from 12-18 m depth on Sal in the genus *Cerithiopsis*. *Dizoniopsis leopoldoi* has a cyrtconoidal outline and a similar sculpture but it has a broader outline, more dense rib sculpture and a colour pattern with a white top of the teleoconch and a light spiral band on the lower peripheral cord. The present species is narrower with coarser bead sculpture and has a uniform tan colour.

Distribution. — Only empty shells from Cima, São Tiago, Boa Vista, São Nicolau and Razo in 80-400 m. It is probably distributed over the full Cape Verde archipelago on the lower shelf.

Remarks. — The species is not yet known from the W African margin. It possibly is an endemic to the Cape Verde area.

Key to Cerithiopsidae from the Cape Verde archipelago

- A. Appearance of spiral cords
 - spiral cords smooth *Seila inchoata*
 - spiral cords beaded B
- B. Number of sutural cords
 - Two spiral cords prolonging the suture on last whorl *C. cf. diadema*
 - One cord prolonging the suture on last whorl C
- C. More than one cord on the abapical part of the shell
 - Three strong abapical cords, club-shaped protoconch *N. Dizoniopsis*
 - Single or no abapical cord, conoidal protoconch *D. Cerithiopsis*
- D. *Cerithiopsis*, number protoconch whorls
 - Protoconch < 2 whorls *C. paucispiralis*
 - Protoconch > 3 whorls E
- E. Sculpture on multispiral protoconchs
 - protoconch sculptured with riblets and cordlets F
 - protoconch predominantly smooth G
- F. Sculpture protoconchs, width to height (W/H) ratio
 - W/H ratio < 0.3, tan coloured *C. luzia* spec. nov.
 - W/H ratio > 0.3, banded colour *C. sal* spec. nov.
- G. *Cerithiopsis*, smooth protoconchs, fat or elevated outline
 - Fat, W/H ratio > 0.35 H
 - Elevated, W/H ratio < 0.35 I
- H. Small pupoid *Cerithiopsis* with white protoconchs
 - Spirally banded brown and white, $0.37 < W/H < 0.46$ *C. chechoi*
 - Uniform dark brown, $0.37 < W/H < 0.46$ *C. eoloi*
 - Fat, uniform light brown with light beads, $W/H > 0.48$ *C. saotiago* spec. nov.
- I. Degree of elevation
 - Elevated, $W/H < 0.28$ J
 - Pupoidal / cyrtoconoidal, $0.35 > W/H > 0.30$ K
- J. Elevated shell, protoconch colour
 - protoconch with six white whorls *C. vicente* spec. nov.
 - protoconch tan coloured whorls *C. boavista* spec. nov.
- K. Cyrtoconoidal / pupoidal shell, protoconch smooth
 - protoconch with smooth convex whorls, teleoconch brown *C. carmelae*
 - protoconch with keeled periphery L
- L. Protoconchs with keel, whorl shape
 - protoconch with convex upper whorls *C. laurauae*
 - protoconch with flattened sloping whorls M
- M. Protoconchs with flattened whorls, sculpture on subsutural cords
 - subsutural cords with coarse beaded sculpture *C. cima* spec. nov.
 - subsutural cord smooth *C. albae*
- N. *Dizoniopsis*, apical angle
 - Apical angle 40°, white apex *D. leopoldoi*
 - Apical angle 30°, tan coloured *D. razo* spec. nov.

***Dizoniopsis leopoldoi* (Espinosa & Ortea, 2021) comb. nov.**

Figs 44, 48

Cerithiopsis leopoldoi Espinosa & Ortea, 2021: 84–86, fig. 1.

Type locality. — Cape Verde archipelago, Sal, cave entrance near Palmeira harbour, depth 12–18 m.

Material examined (Cape Verde archipelago, 3 empty shells). — 1 shell; S of São Tiago; 70–88 m; Sta. 6.007; RMNH.MOL.35042; Figs 44a–c • 1 shell; SW of São Tiago; 420 m; Sta. 7.007; RMNH.MOL.35043 • 1 shell; S of São Tiago; 700 m; Sta. 7.008; RMNH.MOL.35044.

Distribution. — Only empty shells from Sal (type material) and São Tiago in 12–700 m.

Remarks. — The type material consists of three empty shells (Espinosa & Ortea, 2021: 84, fig. 1). We hereby place *Cerithiopsis leopoldoi* Espinosa & Ortea, 2021 in the genus *Dizoniopsis*; this is based on the characteristic sculpture on the teleoconch and club-like protoconch, which are also present in the type species *D. bilineata* (M. Hörnes, 1848) † (Landau et al., 2018: 237–238, pl. 62 figs 1–2; Miocene–Pliocene). Our material only contained three subadult shells with broken outer lips. A redescription was therefore not done for this species.

The apical angle of *D. leopoldoi* is 40° and the colour of the teleoconch is white apically and darker near the penultimate whorl. *Dizoniopsis razo* spec. nov. has an apical angle of 30° and a uniform tan colour.

DISCUSSION

This study examined the occurrence of cerithiopsids in 85 bottom samples from the CANCAP expeditions. These 85 samples represent about 26% of all bottom samples. We found fourteen species in the CANCAP material. Two additional species were reported by Rolán & Fernandes (1989, 1990), bringing the total to sixteen confirmed species in the archipelago. It is likely that more cerithiopsid species are yet to be discovered in the archipelago.

Historical studies on molluscs from the Cape Verde archipelago reported species that are known from the upper slopes of Europe, Morocco, the Azores and the Canary Islands such as *Cerithiopsis tubercularis*, *C. barleei* and *C. minima*. We presume that these reports are based on misidentifications, considering their absence in our large sample set targeting an upper bathyal and shelf depth range typical for these species. Specifically, *Cerithiopsis sal* spec. nov. could be mistaken for *C. barleei*, *C. boavista* spec. nov. for *C. tubercularis* and *C. carmelae* for *C. minima*.

The inventory by Cossignani & Ardovalini (2004: 27–28) reported only ten cerithiopsid species in the genera *Cerithiopsis* and *Seila* from western Africa; we believe this to

be an underestimate based on our unpublished material from Morocco to Mauritania. Segers et al. (2009) reported eleven species (plus two in the open nomenclature) from Madeira and Gofas et al. (2017) reported eleven species from the Canary Islands, which are approximately 1700 km northeast of the Cape Verde archipelago. A recent review by Gofas et al. (2023) of upper bathyal species from the Azorean seamounts, which are located approximately 1700 km to the NW, gave twelve cerithiopsid species (plus two in the open nomenclature). We therefore conclude that the sixteen cerithiopsid species in the Cape Verde archipelago are comparable to those in the archipelagos further north.

None of the species identified species in the archipelago are currently known from the Azores, the Canary Islands, Madeira, Ascension or from the West African coast. The cerithiopsids of the archipelago show a high degree of endemism, which is surprising since all of them have planktotrophic larvae.

Most of the species examined in this study are found throughout the archipelago. Apparently, the oceanic gaps between the islands are too small to form a distribution barrier for veliger larvae; the largest gap between Sal and São Nicolau is only about 100 km.

The prevailing westward current would allow veligers from the mainland to reach the archipelago, but not vice versa. We assume that most veligers either do not survive the journey across the 600 km gap, or they cannot find their obligate host and / or they are unable to find a mate to reproduce with.

Many species of sponges (Porifera) from the Cape Verde archipelago have been studied but a comprehensive overview of their species diversity is not yet available. There is currently insufficient information available to construct a commensal network showing the relationships between cerithiopsid species and their host species.

The fact that we only collected empty shells is a weakness of our study. Morphological and genetic studies should be carried out when suitable soft parts are available with the aim of determining the phylogeny of the Cape Verdean species and their relationship with other Northeast Atlantic species.

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