

**A NEW SPECIES OF *CONUS* FROM THE CABO VERDE
ARCHIPELAGO, WEST AFRICA
(MOLLUSCA: GASTROPODA: CONIDAE)**

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Introduction: "There is hardly a species that does not contain several if not dozens of phenas" (Mayr, 1969), the Cabo Verde Archipelago's *Conus* populations being a flagrant example of this.

We have been needing, and using, for the Conidae studies carried out in recent years, more comprehensive collections (than the ones available in most museums and private collections all over the world) from the bottoms surrounding the islands of the Archipelago, in order to be able to assign to the above mentioned populations adequate systematic and taxonomic places. This combination of events has already been mentioned in the literature (Röckel et al., 1980; Rolán, 1985).

During our studies of west-african molluscan assemblages we came across a population of *Conus* (*Conus maioensis* sp.n.) endemic of Maio Id., Cabo Verde Archipelago, which could be an odd phenon of *Conus irregularis* Sowerby, 1857.

At least, this was how we considered that population until extensive field observations and collections were carried out at the *locus typicus* (north of Maio Id.).

In fact, one of us (E.R.) and MR. F. FERNANDES, while careful and thoroughly searching the bottoms surrounding Maio Id., made extensive observations and collections concerning among others, the populations we are dealing with here.

On the other hand during the numerous dives in the infralitoral around the northern part of Maio Id., *Conus maioensis* was found living simpatrically with a population of *Conus irregularis* Sow.

Specimens of this last population have been previously illustrated in the literature, namely in ELSEN (1983: 184, f.4) and in ROLÁN et al. (1983: 5).

The careful and detailed search, that naturally followed that finding, nevertheless failed to uncover any specimens that could be considered as an intergrade between the two mentioned populations.

Field observations and collections tended to indicate that the individuals of both populations have already developed isolating mechanisms which prevent the exchanging of genetical material between both populations.

This situation is not at all uncommon within the molluscan assemblages inhabiting the bottoms surrounding the islands of this Archipelago and, in general, see-

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mingly, those of the west african continental shelf, particularly on what concerns the Conidae (for instance, Rolán, 1985).

In fact we believe that it is already well known that biological, ecological, behavioural, zoogeographical, etc., data are of crucial importance to the study of west african species of *Conus* and Museums or private dry collections, no matter how good the *locality* data may be, provide insufficient material for such studies. Most, if not all, past confusions entrenched in literature and research habits are positively correlated with the absence of the above mentioned data.

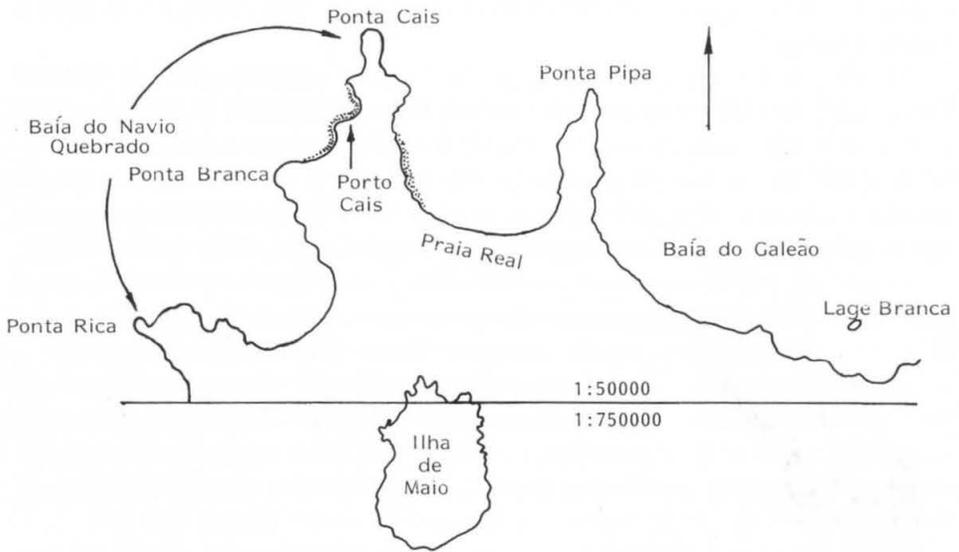


Fig. 1 — Sketch map of Maio Id., Cabo Verde Archipelago, with indication of the distribution area of *C. maioensis* n. sp.

SYSTEMATIC TREATMENT

Gastropoda Cuvier, 1797

Prosobranchia Milne-Edwards, 1848

Conidae Rafinesque, 1815

Conus Linnaeus, 1758

Conus maioensis sp. n

Diagnosis: The individuals of this population, endemic of the Cabo Verde Archipelago, have heavy shells, generally wide shouldered, with deeply excavated grooves on the spire clearly visible on the last whorl. There is a predominance of large light coloured blotches on the spire, as well as blueish shade over the entire shell. They have characteristic larval shells and egg capsules, distinct from those of related and sympatric populations.

Description: The shell is thick, pyriform, with almost straight sides, smooth with some oblique grooves on its anterior part. It has dark brown to black ground colour with a spirally arranged band of large irregular blueish white to light blue blotches, roughly at midbody, the abapical and adapical limits of this band usually being rather well defined. Some individuals present a second row of small blotches forming a similar more adapically situated narrower spiral band. Next to the suture, the body whorl occasionally presents a third band of large blotches arranged in a less orderly manner. Blotches of the same colour, irregularly shaped, sized and spaced, in a relatively smaller number, are distributed throughout the body whorl. Over the mentioned light coloured blotches there are some small more or less triangular opaque-white dashes rapidly fading towards the apertural side of the shell.

The spire has an overall coeloconoid outline. It has the same extremely dark ground colour as the body whorl, with much more numerous and more irregularly shaped light coloured blotches. The spire whorls present clearly visible spiral grooves. The suture is well marked and regular.

The aperture is narrow, wider towards its abapical side. The lip is thick, straight, almost parallel to the columella in its abapical portion. The interior of the body whorl that is visible through the aperture is blueish white, bordered on the outer side by a narrow black stripe which fades quickly and regularly towards the interior of the aperture.

The periostracum is yellowish, thin and translucent.

The radular teeth are of a type considered as belonging to worms' predators (Fig. 2).

The egg capsules and larval shells are illustrated (Fig. 3 and Fig 5) and their characteristics are discussed under "Discussion", below.

The soft parts have a yellowish ground colour with white dots and superficial small dark grey or black dashes.

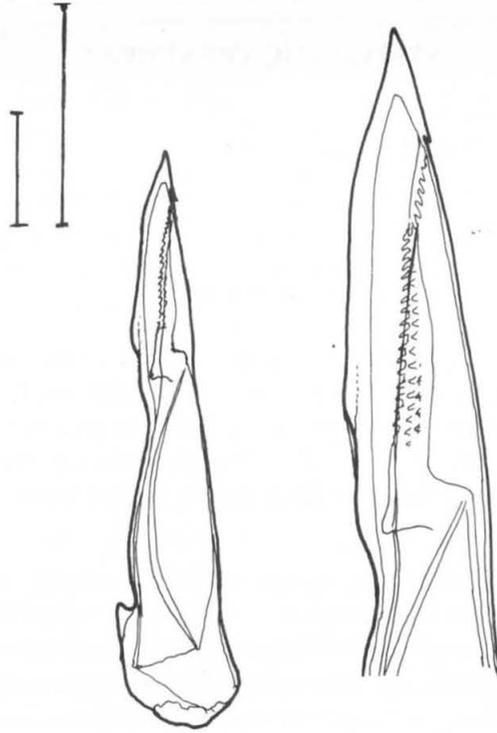


Fig. 2 — Radular tooth of *C. maioensis* n. sp. (bar: 01 mm).

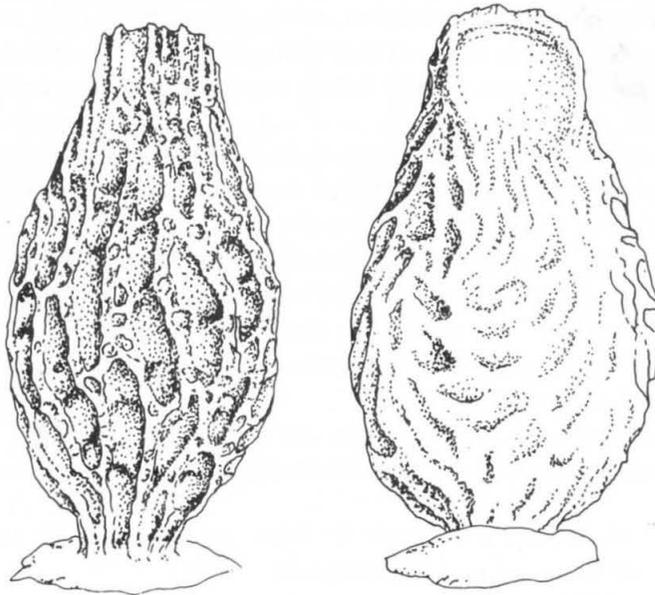


Fig. 3 — Egg capsules of *C. maioensis* n. sp. from the type locality, 8 mm, from a specimen with 32 mm max. length.

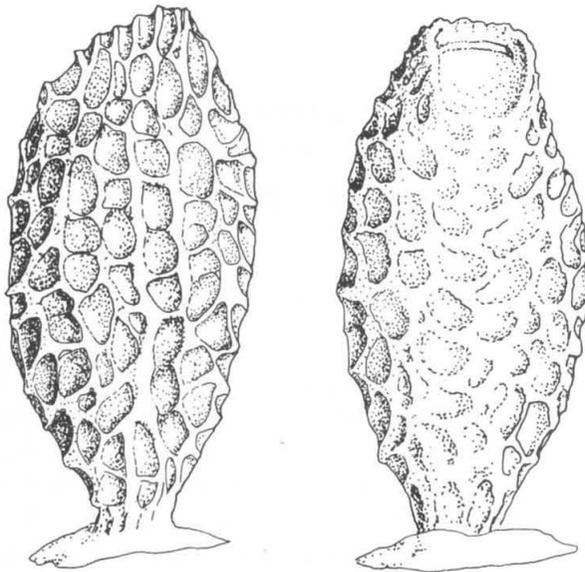


Fig. 4 — Egg capsules of *C. irregularis* collected at Gata Bay, Boavista Id., Cabo Verde Archipelago, 9 mm, from a specimen with 30 mm max. length.

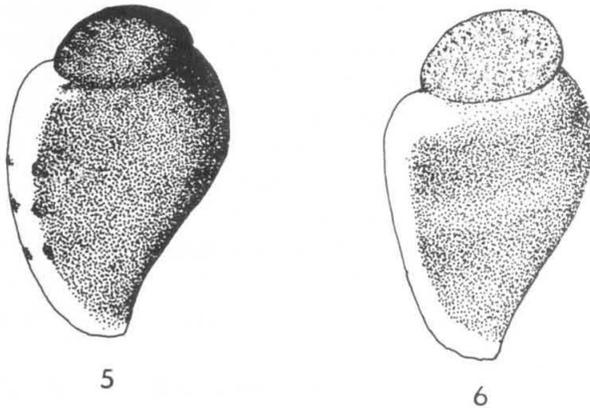


Fig. 5 — Larval shell of *C. maioensis* n. sp. collected at the type locality.

Fig. 6 — Larval shell of *C. irregularis* Sowerby, specimen collected at Gata Bay, Boavista Id., Cabo Verde Archipelago.

Etymology: This species is named after Maio Id. (Ilha de Maio), the island it is endemic from.

Type locality: Porto Cais (15° 20' N, 23° 12' W), Baía do Navio Quebrado, north of Maio Id., Cabo Verde Archipelago (Pl.I, fig. 1).

Type material: Holotype deposited in Museu Bocage, Lisboa (No. 15459). This specimen was collected in the type locality by E. Rolán (skin diving).

Dimensions of the holotype: 36.3 mm (length) 22.6 mm (width).

Paratypes: See table 1.

Distribution: Baía do Navio Quebrado and Baía do Galeão, Maio Island, Cabo Verde Archipelago.

Ecology: The specimens of this stenotopic species were found between 0,5 m and 2 m deep, among and under stones which lied on sand, always in the inner side of the bays where the waters are calmer. This population was found living simpatrially with *C.josephinae* Rolán, 1978, *C.venulatus* Hwass, 1792, *C.ermineus* Born, 1778 and *C.ambiguus* Reeve, 1843, as well as a population conspecific with *C.irregularis*, not having been found up to the present moment any intergrades between these populations.

Discussion: The more obvious morphological differences between the shells of individuals of *C.maioensis* sp.n. and those of individuals of the species it is closer to, *C.irregularis*, from Boavista Id., and *Conus irregularis* populations from Maio Id., concern their spires, which are proportionally more raised in *C.maioensis* with a preponderance of the light coloured blotches. The spires of the shells of specimens of *C.irregularis*, on the contrary, are predominately of the same colour (usually shades of brownish green) as the body whorl's ground colour and when it is very dark the spire is almost uniformly of the same dark shade.

We agree with CHANEY (1987) when he states there has been some misplaced emphasis on the characters to which primary importance should be attributed, on what concerns the separation of the species. On comparing the three populations under consideration here we have noticed that spire markings are also less variable than the body whorl's within each population.

The blueish shade over the entire shells of *C.maioensis* seems to have diagnostic value too.

The above mentioned characters may allow us to separate the two species when there are only empty shells at hand.

There are nevertheless other reasons, eventually more meaningful, for the establishment of this new taxon.

There are marked interspecific differences on what concerns egg capsules. In fact the egg capsules of *C.maioensis* (Pl.I, fig. 3 and also, Rolán (1990) Pl.7 fig. 4) are wider and more pyriform than those of *C.irregularis* (Pl.I, f. 4) which are nar-

rower and have a more ellipsoidal outline. Moreover on *C. maioensis* capsules there is a predominance of irregular cavities on the capsules' walls with smaller ones on the ribs that separate them producing an overall confused pattern while on *C. irregularis* the cavities of the capsules' walls are more regularly shaped, more oval and uniform in size with rare cavities on the ribs giving an orderly appearance to the walls' whole surface.

Larval shells also depict constant interspecific differences. The larval shells of *C. maioensis* (Pl. I, fig. 5 and also ROLÁN (1990), Pl. 8 fig F) are more pyriform, with a more voluminous body whorl and a proportionally lower nucleus than *C. irregularis* (Pl. I, f. 6). The larval shells of *C. maioensis* are, also, extremely dark with a light coloured lip on which it has two to four dark small dashes, while the larval shells of *C. irregularis* have a nucleus of a variable colour (from light to dark shades, even for specimens coming from the same egg capsule) with darker irregular dashes over it, which are never present on *C. maioensis*. Moreover the larval shells of *C. irregularis* have a narrow light coloured subsutural band which *C. maioensis*' larval shells never present.

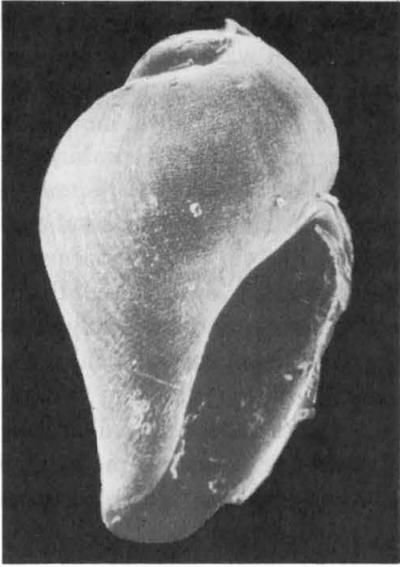
The radular tooth of *C. irregularis* was illustrated by Rolán (1990). The ratio *size of shell/size of radular tooth* for *C. maioensis* is larger than 58. For specimens of *C. irregularis* living sympatrically with *C. maioensis* the above mentioned ratio is smaller than 45.

There are specimens of *C. ermineus* with similarly patterned shells. Nevertheless they have different periostracum, different radula (of fish predator type), different egg capsules and a different type of larval development, just to mention some of the more obvious differences.

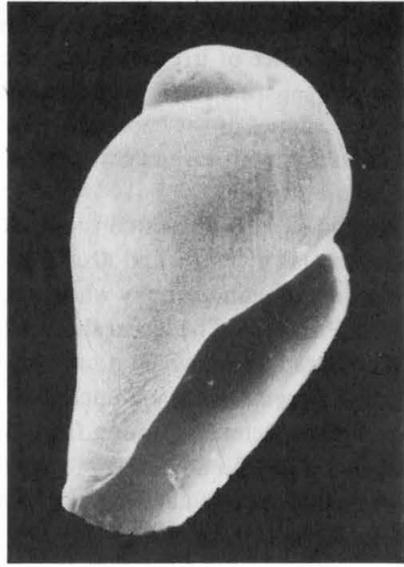
The shells of individuals of *C. maioensis* are also superficially similar to those of specimens of *C. damottai* Trovão, 1979. Nevertheless the two species are easily separable. The radulae, the egg capsules and the soft parts of the living animal are completely different.

ACKNOWLEDGEMENTS:

We thank our friend Francisco Fernandes for the loan of specimens from his collection. We are also grateful to Dr. A. Monteiro for critically reading the manuscript and suggesting innumerable corrections which allowed us to improve this paper considerably.



7



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Fig. 7 — Larval shell of *C. maioensis*, n. sp., collected at the type locality, SEM photograph, 50 x.

Fig. 8 — Larval shell of *C. irregularis* collected at Navio Quebrado, Maio Id., SEM photograph, 50 x.

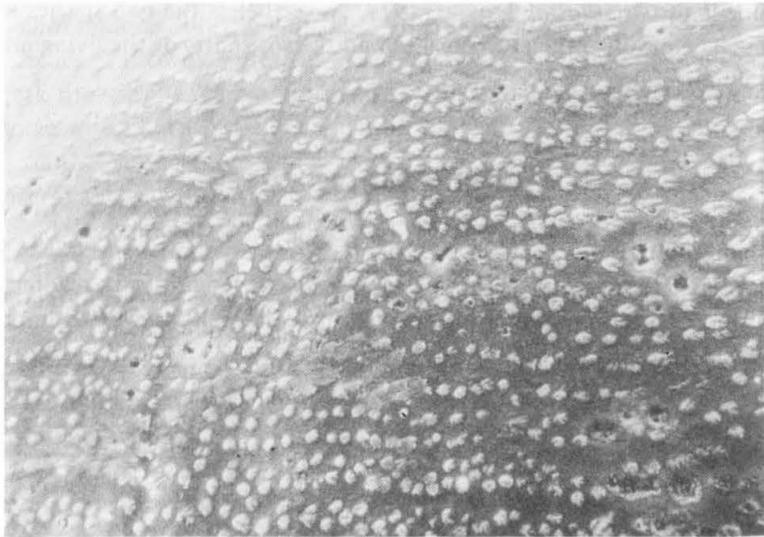


Fig. 9 — Larval shell of *C. maioensis*, same as of Fig. 7, detail, enlarged 500 x.

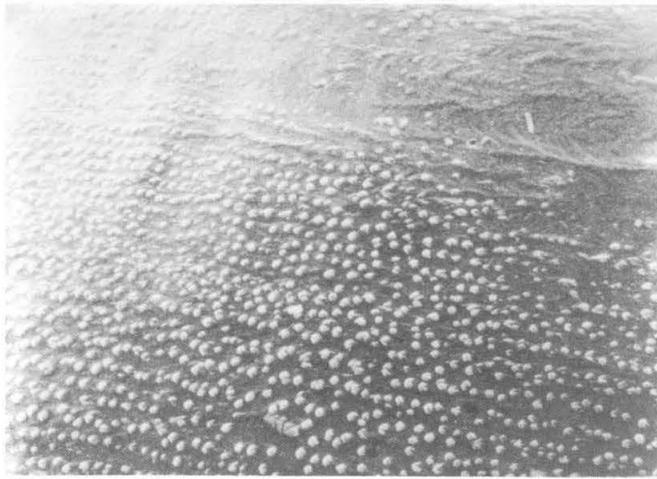


Fig. 10 — Larval shell of *C. irregularis*, same as of Fig. 8, detail, enlarged 500 x.

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TABLE 1

List of Paratypes

No.	Measurements length x width (mm)	Depository
1	23.9 x 14.1	Museo Nac. Cienc. Natur., Madrid, No. 11-19-1012
2	23.8 x 14.3	British Mus. (Nat. Hist.) London, U.K., No. 1986153
3	31.6 x 18.8	Amer. Mus. Nat. Hist., New York, U.S.A.
4	32.8 x 20.5	Dept. Malacol., Acad. Nat. Sci. Philadelphia, U.S.A.
5	27.1 x 16.3	Mus. nat. Hist. nat., Paris, France.
6	21.0 x 13.5	Coll. D. Röckel, Eberbach, Germany.
7	34.5 x 20.6	Coll. A. Monteiro, Lisboa, No. 37201
8	21.0 x 13.9	Coll. I. Navarro, Vigo.
9	27.2 x 16.2	Coll. J. Messias, Lisboa.
10	28.9 x 17.8	»
11	20.4 x 12.5	»
12	36.8 x 22.7	*Coll. F. Fernandes, Luanda, Angola.
13	33.0 x 20.6	»
14	32.0 x 19.6	»
15	36.1 x 22.8	»
16	31.8 x 20.7	»
17	30.7 x 18.5	»
18	29.6 x 18.4	»
19	29.4 x 18.2	»
20	27.5 x 16.8	»
21	27.3 x 17.1	Coll. P. Ryall, Austria.
22	25.3 x 15.2	»
23	34.5 x 20.5	Coll. I. Félix-Alves, Estoril. No. R28602
24	24.5 x 14.2	» No. R28603
25	23.1 x 12.9	» No. R28604
26	23.4 x 14.1	» No. R28605
27	26.2 x 14.5	Coll. H. Trovão No. 577
28	27.4 x 16.6	» No. 650
29	24.3 x 14.9	» No. 1648
30	25.9 x 16.2	» No. 2127
31	36.4 x 22.5	Coll. E. Rolán, Vigo. No. 16933
32	28.4 x 16.4	» No. 16934
33	32.6 x 20.7	» No. 16935
34	17.7 x 10.0	» No. 16936
35	31.5 x 18.4	» No. 16937
36	30.9 x 18.2	» No. 16938
37	25.1 x 15.3	» No. 16939
38	27.0 x 15.5	» No. 16940
39	27.0 x 16.1	» No. 16941
40	23.4 x 13.8	» No. 16942
41	24.6 x 14.2	» No. 16943
42	23.4 x 12.7	» No. 16944
43	19.2 x 11.0	» No. 16945
44	19.1 x 12.0	Coll. M. Filmer
45	28.1 x 17.7	Coll. H. Trovão
46	26.6 x 16.2	»
47	28.5 x 18.2	Coll. A. Ramalho



Fig. 11 — *C. maioensis* sp. n., holotype, Maio Id., Cabo Verde Archipelago.

