



# XENOPHORA

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# Description of two new species of cone snails from the Lesser Antilles

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## Abstract

Specimens in the *Conus (Dauciconus) daucus* (Hwass in Bruguière, 1792) complex differ by subtle differences in the colour pattern, including a yellowish to orange vs pink apex. The two forms co-occur subtidally in 5–30 m, and cluster in two distinct molecular clades. The species with yellowish to orange apex is described as *Conus (Dauciconus) quasidaucus* spec. nov. A sequenced neotype is designated for *Conus daucus*. Another cone collected in 90–95 m off Guadeloupe and resembling *C. eversoni*, with which had earlier been misidentified, is described as *Conus (Dauciconus) karubenthos* spec. nov.

## Résumé

Les spécialistes et amateurs de cônes ont depuis longtemps reconnu l'existence, chez *Conus daucus*, de deux formes se distinguant par des différences subtiles du patron de coloration et, surtout, par la présence d'un apex rosé chez certains spécimens, et d'un apex jaunâtre à orange chez d'autres. Ces deux formes co-existent de 5 à 30 m de profondeur, sans distinction particulière d'habitat. Le séquençage de huit spécimens provenant des expéditions du MNHN en Martinique et en Guadeloupe montre que ces deux formes correspondent à deux groupes moléculaires bien distincts, et donc à deux espèces différentes. L'espèce à apex rosé conserve le nom *Conus daucus* Hwass in Bruguière, 1792, pour lequel un néotype séquencé est désigné ici, le lectotype original étant perdu. La deuxième espèce avec un apex jaunâtre à orange est décrite comme nouvelle sous le nom *Conus (Dauciconus) quasidaucus* spec. nov. Trois spécimens collectés durant la mission KARUBENTHOS 2, dont deux vivants ayant été séquencés, avaient un moment été identifiés comme *Conus eversoni* Petuch, 1987, puis comme "*Dauciconus* sp."; cette espèce est ici décrite sous le nom *Conus (Dauciconus) karubenthos* spec. nov.

## Introduction

Among the cones identifiable as *Conus (Dauciconus) daucus* collected during recent MNHN expeditions in the Lesser Antilles, Clovel & Toutou (2020: 140–145) had noted that the molecular tree distinguished two groups, one with a pink apex, the other with a yellowish to orange apex. This species pair is the subject of the present paper. Beside, the identification of specimens from off Guadeloupe identified by Rabiller & Richard (2019) as *Conus eversoni* Petuch, 1987, was challenged by Clovel & Toutou (2020: 274–275), who simply referred to them as "*Dauciconus* sp.". Re-examination of these led us to conclude that they represent a new species, described

below as *C. karubenthos* spec. nov.

Deciding whether *Dauciconus* should be considered at the genus (as in Tucker & Tenorio 2013) or subgenus (as in Puillandre & al. 2015) rank would require a complete re-assessment of cone snails classification. Pending this revision, we follow Puillandre & al. (2015), and the new species are placed in the genus *Conus*, subgenus *Dauciconus*.

## Repositories

MNHN: Muséum National d'Histoire Naturelle, Paris, France.  
DT: David Toutou reference collection, Collobrières, France.  
PC: Pierre Clovel reference collection, Martinique, France.

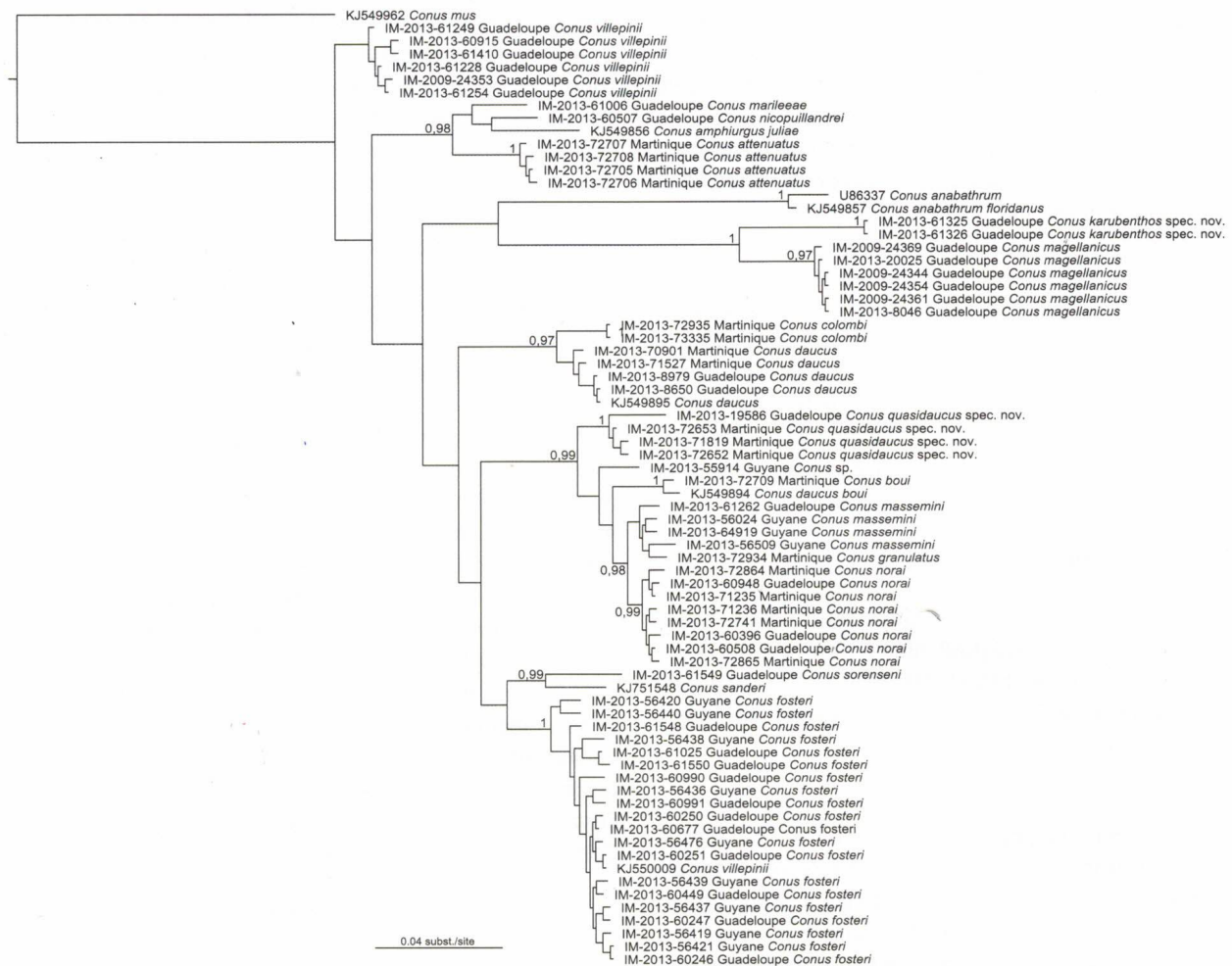
**Molecular analysis:** DNA was extracted and a fragment of the *cox1* gene sequenced following standard procedures (e.g. Puillandre & al. 2017). Newly-obtained sequences were combined with previously published sequences from Caribbean cone snails. A Bayesian phylogenetic tree was obtained using MrBayes 3.2.6 (Huelsenbeck, Ronquist & Hall, 2001), with two runs consisting of eight Markov chains and 10 000 000 generations, with four chains, three swaps at each generation, a sampling frequency of one tree each 1 000 generations and a chain temperature set at 0.02. A consensus tree was reconstructed after checking for convergence and after removal of the first 25% trees as burnin. Each of the two new species *C. quasidaucus* spec. nov. and *C. karubenthos* spec. nov. constitute well-supported clades (Posterior Probabilities = 1), well differentiated from their sister-species. In the case of *C. quasidaucus* spec. nov. the morphologically similar species, *C. daucus*, is actually not even its sister species, reinforcing the conclusion that they are not conspecific.

***Conus (Dauciconus) quasidaucus* spec. nov.**

**Type data:** Martinique: Rocher de la Caravelle, 14°48.4' N, 60°52.8' W, 13–25 m, 20 Sept. 2016 [MADIBENTHOS stn AR198], holotype (40.4 mm, MNHN-IM-2013-72653) and paratype 3 (37.5 mm, MNHN-IM-2013-72652). - Guadeloupe: Grand Cul de Sac Marin, 16°21.8' N, 61°36.4' W, 24 m, 5 May 2012 [KARUBENTHOS 2012 stn GR07], paratype 1 (49.0 mm, MNHN-IM-2013-19586). - Martinique: Anse Couleuvre, 14°50.4' N, 61°13.4' W, 10 m, 1 Oct. 2016 [MADIBENTHOS stn AR464], paratype 2 (47.7 mm, MNHN-IM-2013-71819).

**Description:** Shell medium sized, conical. The apex is yellowish to orange. The spire is low. The sutural ramp is flat, with slightly stepped whorls and shows a blurry alternation of slightly darker





**Figure1** : Bayesian phylogenetic tree obtained with the *cox1* gene. Sample names include the MNHN voucher number or the GenBank accession number, followed by the locality and the species name. Posterior probabilities are indicated for each node when  $> 0.95$ . The specimen corresponding to the GENBANK KJ550009 sequence has most probably been misidentified and is probably a specimen of *Conus fosteri* Clench & Aguayo, 1942.

orange blotches on orange background. The suture is linear and incised. Shoulder is angulate and smooth. Last whorl is smooth. Aperture is straight, with a whitish to light pinkish interior. Lip is thin, fragile, even in mature specimens. The ground color of the last whorl is orange. The pattern shows a whitish spiral band at mid-whorl (2 to 5 mm broad), bordered by two brownish spiral bands (and also has a broader, light spiral band at shoulder in paratype 1). Darker axial flammules at mid-whorl are partially covering the light band; several irregular spiral lines made of brown spots can be present on either side of the median white band. Periostracum is brown, thick and slightly hairy.

**Living animal:** The animal is completely orange.

**Etymology:** The name *quasidaucus* refers to the strong resemblance with *Conus (Dauciconus) daucus*. Used as a noun in apposition.

**Distribution and habitat:** *Conus quasidaucus* co-occurs subtidally with *C. daucus* in 5–30 m (KARUBENTHOS and MADIBENTHOS data), among rocks or algal fields with sandy areas. A specimen was dredged alive on April 15, 1976, off Dania Beach, Broward County, Florida, in 380 feet (115 m) (Bill Fenzan, pers. comm., 2020) and *C. daucus* is reported from 1–90 m (Monnier & al., 2018). Like *C. daucus*, *C. quasidaucus* seems to have a wide distribution range throughout the Caribbean area and is reported (B. Fenzan, pers. comm., 2020) from many localities

(Honduras, Netherlands Antilles, St. Kitts, Florida, British Virgin Is., Cuba, Puerto Rico, Dominican Republic, Turks & Caicos Is., Bahamas and Barbados).

**Discussion:** *Conus (Dauciconus) daucus* Hwass in Bruguière, 1792 is renowned for the variability of its shell pattern, as reflected in its long list of synonyms (Tucker & Tenorio, 2013; Kohn, 2014; Monnier & Limpalaër, 2016). A molecular analysis of the MNHN expeditions specimens actually shows two genetically distinct groups (Fig. 1; see also Clovel & Touitou, 2020) and an examination of these shells reveals that the two groups differ in the colour of their apex: pink in *C. (D.) daucus* and yellowish to orange in the newly described *C. quasidaucus* spec. nov. Specialists and amateurs alike have long noted this difference in colour and, among amateurs, the hypothesis is that the pinkish color would fade over time. However, the apex of shells collected over 50 years remains pinkish, and the four specimens from MNHN expeditions with a yellowish to orange apex were collected very recently. A review of the synonyms of *C. (D.) daucus* did not reveal any description that fits the specimens with a yellowish to orange apex (Clovel & Touitou, 2020), that are described as a new species, *C. quasidaucus* spec. nov. *Conus daucus* seems to be more variable in colour than *C. quasidaucus* spec. nov. However, for the moment, only specimens of *C. quasidaucus* spec. nov. of orange colour have been sequenced and specimens from other localities might reveal more colour variation. In addition, the brownish spiral



bands bordering the light mid-whorl one seem to be more clearly marked in *C. quasidaucus* spec. nov. (this character is strongly expressed on specimens on specimens illustrated Pl. 2 Figs 3, 4 and 5). The discovery that *Conus (D.) daucus* is a complex of two cryptic species requires to stabilize its nomenclature. Clench (1942) designated as lectotype the shell illustrated by Chemnitz (1788: pl. 144A, fig. L), which was referred to by Hwass in Bruguière (1792: 651). This specimen is lost (Kohn, 1968). We therefore designate the sequenced specimen MNHN IM-2013-71527, 26.3 mm [Martinique: Grande Anse du Diamant, 14°28.0' N, 61°00.1' W, 12 m, 26 Sept. 2016, MADIBENTHOS stn AB360] as neotype of *C. (D.) daucus*. This specimen matches well the accepted taxonomic extension of this species, with an orange body-whorl and a pink apex, alternating light blotches on the orange background of the spire, and some white blotches on the last whorl, as described by Hwass.

***Conus (Dauciconus) karubenthos* spec. nov.**

**Type data:** Guadeloupe: W of Marie-Galante, 15° 49.4' N, 61° 28.7' W, 90-95 m, 27 June 2015 [KARUBENTHOS 2 stn DW4631], 3 spms (holotype, 16.0 mm, MNHN-IM-2013-61325, paratype 1, 17.9 mm, MNHN-IM-2013-61326, paratype 2, 18.8 mm, MNHN-IM-2018-5416).

**Description:** Shell small-sized (all studied shells measure less than 20 mm), slightly bulging, elongated conical. The apex is yellowish. The protoconch is paucispiral. The spire is moderately low. The sutural ramp shows alternating white and brown blotches on an orange background. The suture is linear and incised. Shoulder is subangulate, smooth to slightly crenulated (whitish to yellowish crenulations). The ground color of the last whorl is orange. The pattern shows a spiral median band overlaid by brown and white blotches; the last whorl can be covered by numerous spiral lines composed of small brown dots. The periostracum is thin, translucent and slightly hairy.

**Distribution and habitat:** *C. karubenthos* spec. nov. is known from a single station from West of Marie-Galante (Guadeloupe) where it was dredged in 90-95 m on a bottom of coarse sand, gravel and silt.

**Etymology:** karubenthos is the acronym of the expedition that collected the material, itself derived from Karukéra, the Amerindian name of Guadeloupe, and benthos; used as a noun in apposition.

**Comparison with similar species:** *C. karubenthos* spec. nov. resembles *C. eversoni* Petuch, 1987, with which it had been identified by Rabiller & Richard (2019: 274-275), and the two share a similar adult size under 25 mm, shell colour, spiral lines made of dark dots, and smooth to slightly crenulated shoulder, but *C. eversoni*, described from Honduras in 6-20 m, has a narrower shell and higher and more stepped spire. Protoconch is "pale tan" (Petuch, 1987) and the median clear spiral band is usually lacking or very subdued and there is no visible white and brown blotches in *C. eversoni*. So far, no specimen of *C. eversoni* from Honduras have been sequenced.

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Plate 2 : *Conus (Dauciconus) daucus* Hwass in Bruguière, 1792 & *C. (Dauciconus) quasidaucus* spec. nov.



1. *C. daucus* 26.7 mm Martinique, NEOTYPE MNHN-IM-2013-71527
2. *C. daucus* NEOTYPE with periostracum
3. *C. quasidaucus* spec. nov. 50.1 mm Martinique, Coll. DT
4. *C. quasidaucus* spec. nov. 45.4 mm Martinique, Coll. DT
5. *C. quasidaucus* spec. nov. 30.4 mm Martinique, Coll. DT
6. & 6a. *C. quasidaucus* spec. nov. 39.0 mm Martinique, Live



Plate 1: *Conus (Dauciconus) quasidaucus* spec. nov.



1. *C. quasidaucus* spec. nov. 49.0 mm PARATYPE 1 MNHN-IM-2013-19586
2. *C. quasidaucus* spec. nov. 37.5 mm PARATYPE 3 MNHN-IM-2013-72652
3. *C. quasidaucus* spec. nov. 47.7 mm PARATYPE 2 MNHN-IM-2013-71815
4. *C. quasidaucus* spec. nov. 40.4 mm HOLOTYPE MNHN-IM-2013-72653

5. PARATYPE 1 with periostracum
6. PARATYPE 2 with periostracum
7. HOLOTYPE with periostracum
8. PARATYPE 3 with periostracum



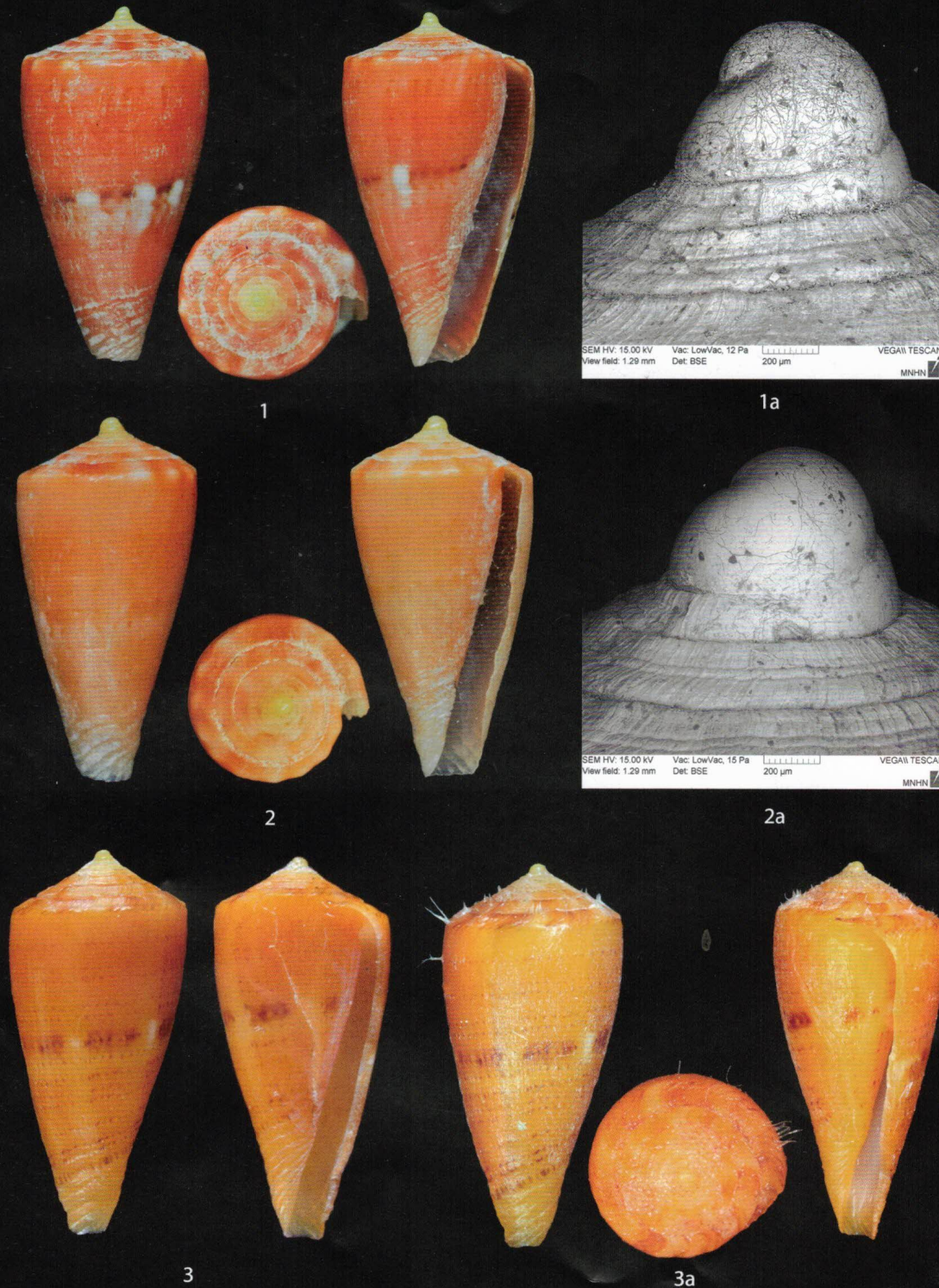
Plate 3 : *Conus (Dauciconus) daucus* Hwass in Bruguière, 1792



1. & 1a. *C. daucus* 42.6 mm Guadeloupe MNHN-IM-2013-8650
2. & 2a. *C. daucus* 42.3 mm Martinique, Coll. PC
3. & 3a. *C. daucus* 31.5 mm Martinique, Coll. PC
4. & 4a. *C. daucus* 35.6 mm Martinique, Coll. PC
5. & 5a. *C. daucus* 39.5 mm Martinique, Coll. PC
6. & 6a. *C. daucus* 34.3 mm Martinique, with periostracum, Coll. PC
7. & 7a. *C. daucus* 34.3 mm Martinique, Coll. PC
8. & 8a. *C. daucus* 14.3 mm Guadeloupe, MNHN-IM-2013-8979



Plate 4: *Conus (Dauciconus) karubenthos* spec. nov.



1. *C. karubenthos* spec. nov. 16.0 mm Marie-Galante, Guadeloupe, MNHN-IM-2013-61325 HOLOTYPE
- 1a. SEM micrograph of the protonch and early postnuclear teleoconch whorls of *C. karubenthos* spec. nov. MNHN-IM-2013-61325
2. *C. karubenthos* spec. nov. 17.9 mm Marie-Galante, Guadeloupe, MNHN-IM-2013-61326 PARATYPE 1
- 2a. SEM micrograph of the protonch and early postnuclear teleoconch whorls of *C. karubenthos* spec. nov. MNHN-IM-2013-61326
3. *C. karubenthos* spec. nov. 18.8 mm Marie-Galante, Guadeloupe, MNHN-IM-2018-5416 PARATYPE 2
- 3a. *C. karubenthos* spec. nov. PARATYPE 2 with periostracum