

Marine Record

Cite this article: Moura CJ, Wirtz P, Nhanquê FT, Barbosa C, Serrão E, Van Syoc R (2024). Range extension for *Conopea saotomensis* (Crustacea; Cirripedia: Archaeobalanidae) in the tropical eastern Atlantic. *Journal of the Marine Biological Association of the United Kingdom* **104**, e81, 1–4. <https://doi.org/10.1017/S0025315424000729>

Received: 5 April 2024

Revised: 7 June 2024

Accepted: 7 June 2024

Keywords:

Africa; Arthropoda; barnacles; DNA barcoding; gorgonians; marine biodiversity; symbiosis


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Range extension for *Conopea saotomensis* (Crustacea; Cirripedia: Archaeobalanidae) in the tropical eastern Atlantic

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Abstract

Barnacles of the genus *Conopea* are obligate epibionts of gorgonians and antipatharians. The species *Conopea saotomensis* Carrison-Stone *et al.* 2013, previously only known from the islands of São Tomé and Príncipe and the coast of Gabon, is reported from the Bijagós archipelago, Guinea-Bissau, based on morphological examination and DNA barcoding of specimens. The new record extends the known range of the species about 3000 km to the northwest.

Introduction

Species of the archaeobalanid genus *Conopea* Say, 1822 are obligate symbionts of cnidarians of the orders Malalcyonacea and Antipatharia and are almost completely covered by host tissue, with only the opercular opening exposed (Figure 1); *Conopea* currently encompasses 20 valid species in temperate and tropical oceans around the world (Kolbasov *et al.*, 2016; WORMS, 2024).

Only two species of *Conopea* were known from the Atlantic Ocean when Carrison-Stone *et al.* (2013) described *Conopea saotomensis* and *Conopea fidelis* from gorgonians (*Leptogorgia* and *Eunicella*) at São Tomé and Príncipe. Subsequently, Wirtz *et al.* (2020) reported *C. saotomensis* from *Eunicella* sp. at the coast of Gabon (based on examination of specimens by R. Van Syoc). Here we report the first record of *C. saotomensis* from three islands in the Bijagós archipelago, Guinea-Bissau, extending the known range of the species about 3000 km to the northwest (measured as a straight line from northern Gabon to the Bijagós archipelago) (Figure 2).

Materials and methods

Four gorgonian fragments with *Conopea* were collected during an expedition to the Bijagós archipelago, Guinea Bissau, 27.4.-11.5.2023. While scuba diving in a depth range of 3–12 m, we sampled *Conopea* attached to two unidentified gorgonian species tentatively classified as *Leptogorgia* spp., and preserved them in 96% ethanol. One specimen from Poilão Island was morphologically examined by RVS and deposited as a voucher specimen at the California Academy of Sciences (collection number CASIZ 422435). A fragment of tissue was isolated from three other specimens – collected near João Vieira and Unhocomo Islands – for DNA barcoding analyses. The cytochrome c oxidase I (COI) sequences of these specimens, available in GenBank (accession numbers PP496555–7), were determined in a single run with a MinIon nanopore sequencer (©Oxford Nanopore Technologies), using a flow cell R10.4, adopting the methodology described by Moura *et al.* (2022), and demultiplexing sequence reads and assembling DNA barcodes with the ONTbarcoder v2.2 (Srivathsan *et al.*, 2021). We retrieved all the COI barcodes of *Conopea* available in GenBank, and aligned these with two sequences of *Balanus* to serve as outgroup and with the new DNA barcodes of *Conopea* from Guinea-Bissau. Finally, we generated a maximum-likelihood phylogenetic tree through the PHYML server (<http://atgc.lirmm.fr/phyml/>; Guindon *et al.*, 2010), selecting a standard bootstrap analysis for 1000 repeats and the remaining default settings.

Results

Morphological examination of the specimen and comparison with other specimens in the collection of the California Academy of Sciences Department of Invertebrate Zoology and Geology showed that this specimen was similar to *C. saotomensis*.

DNA barcoding showed the following results: a COI barcode of one specimen collected at João Vieira Island is 100% similar to the barcode of the *Conopea saotomensis* specimen from

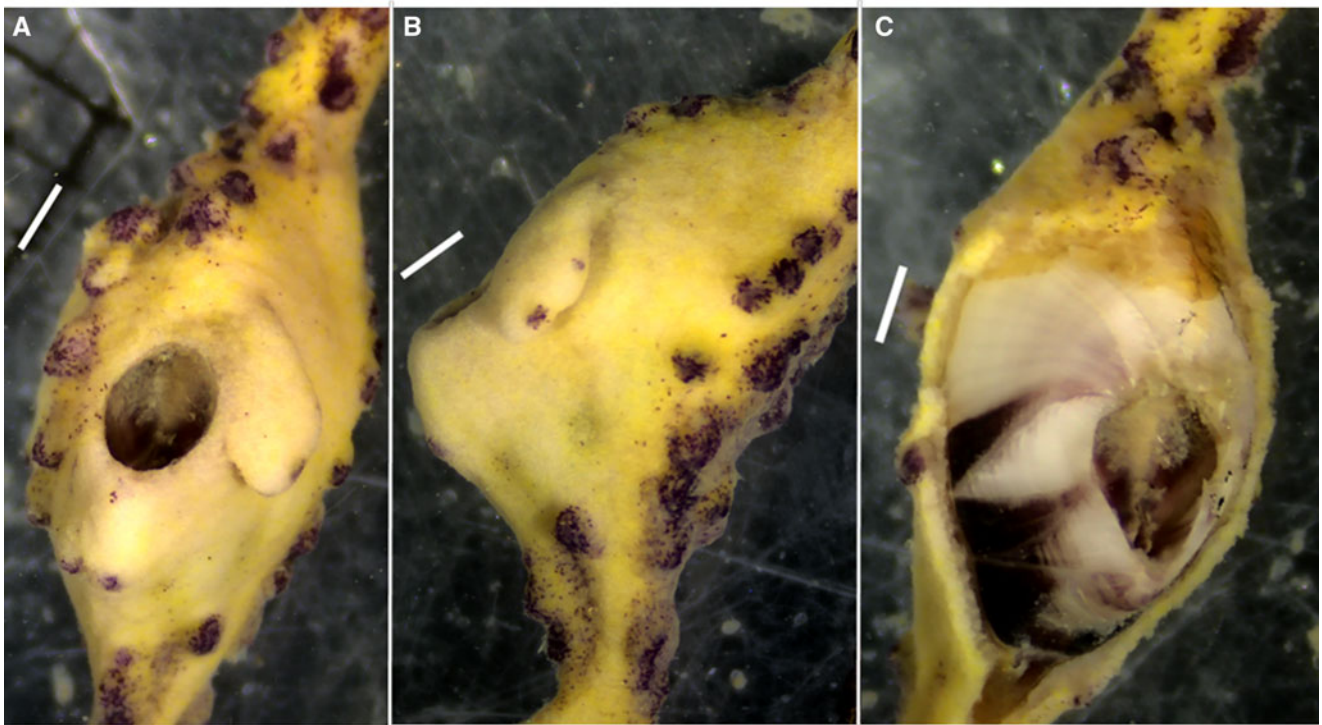


Figure 1. *Conopea* (Guinea-Bissau sample with GenBank number PP496555) on *Leptogorgia* sp. in frontal (A) and lateral (B) views and with host tissue partly removed (C). Scale bar is 1 mm.

São Tomé with GenBank accession number KC349916. The two other specimens, collected at João Vieira and Unhocomo Islands, had equal COI sequences, representing a distinct haplotype never

previously recorded and 99.3% similar to the haplotype of *C. saotomensis* samples from São Tomé and Príncipe (GenBank numbers HQ290136, KC349925, and KC349925) (Figure 3).

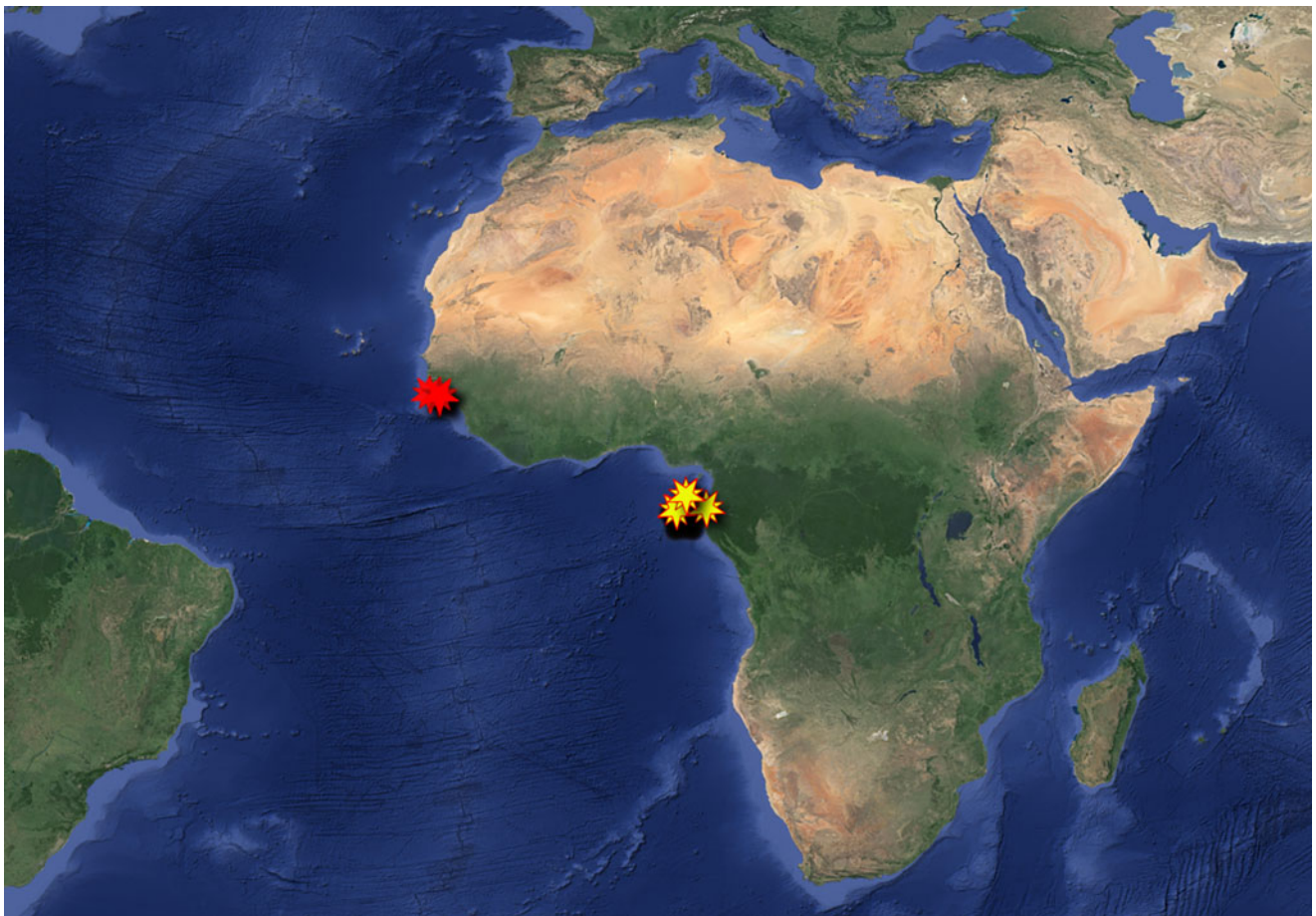


Figure 2. Locations where *C. saotomensis* has been found, namely the Bijagós archipelago (Guinea-Bissau), São Tomé and Príncipe, and the coast of Gabon.

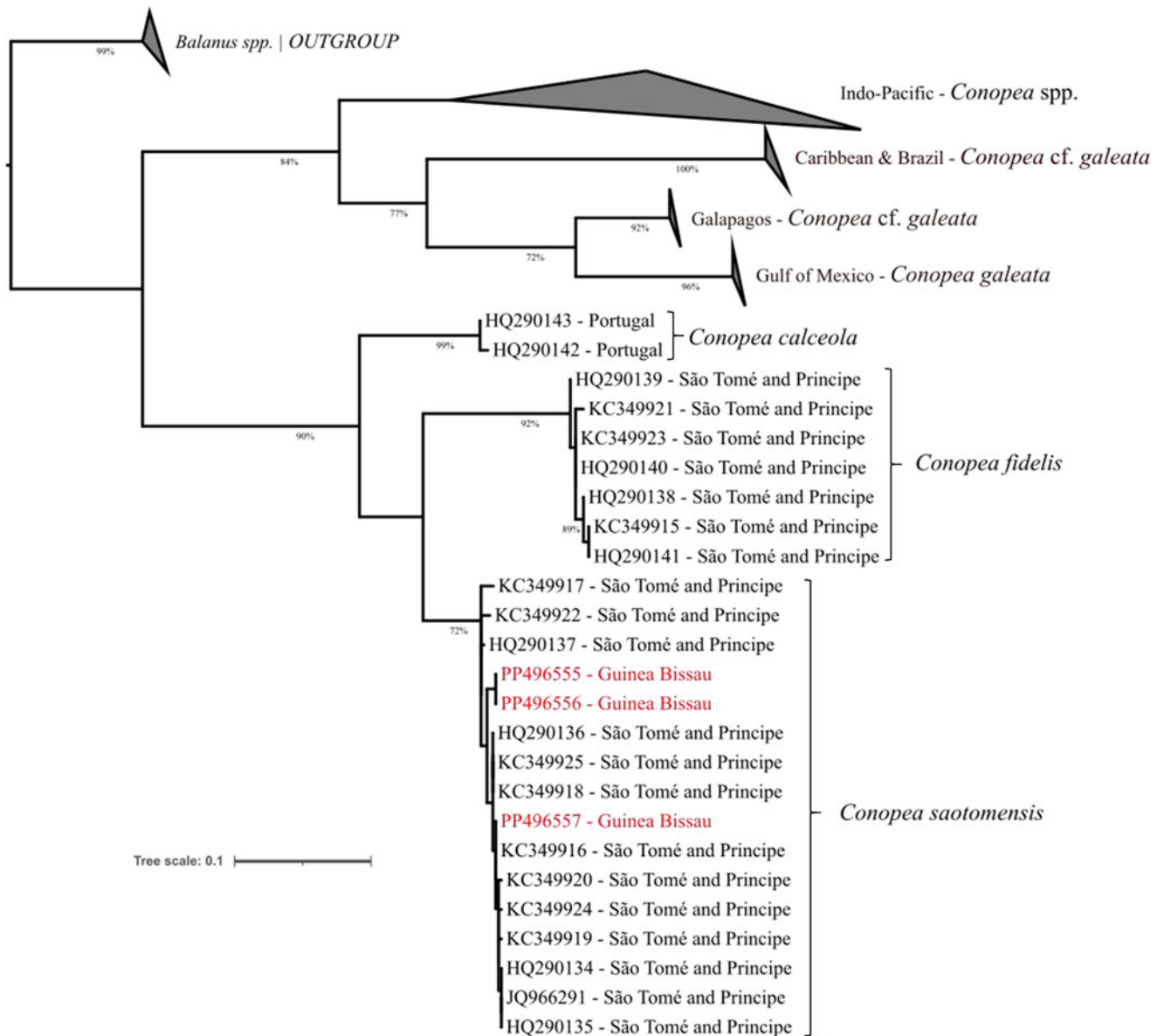


Figure 3. Maximum-likelihood phylogenetic tree (COI marker) of eastern Atlantic *Conopea* species.

Thus, both morphology and the COI sequences of the *Conopea* specimens collected in the Bijagós archipelago agree and indicate that these specimens belong to *C. saotomensis*, a species hitherto only recorded from São Tomé and Príncipe Islands and the coast of Gabon.

Discussion

The discovery that the same COI sequence is shared between two *C. saotomensis* samples from places more than 2600 km apart suggests that the species might also be common at other localities, between these two places, along the shores of tropical NW-Africa.

Acknowledgements. The authors thank Sylvie Dias (photography and filming), Nuno Fernandes (diving, health, security), and the IBAP and INIPO (Guinea-Bissau) staff for their help during the expedition. For helpful comments, we are grateful to G. Kolbasov. Study permit: IBAP and INIPO declarations emitted May 2023.

Author contributions. Participation and organization in the Bijagós expedition: C. J. M., P. W., F. T. N., C. B., and E. S. Sample collection: C. J. M. and P. W. DNA barcoding: C. J. M. Morphological analyses: R. V. S.

Article writing: C. J. M., P. W., and R. V. S. Funding acquisition: E. S. Article revision and approval: all authors.

Financial support. C. J. M. and the expedition to the Bijagós archipelago were funded by FCT – Foundation for Science and Technology and Aga-Khan Foundation through project MARAFRICA (AGA-KHAN/540316524/2019). The expedition to the Bijagós was also funded by UIDB/04326/2020, UIDP/04326/2020, LA/P/0101/2020, and EU-H20202 854248 (Tropibio).

Competing interests. None.

Data availability. The COI barcodes of *C. saotomensis* generated are available in GenBank (accession numbers PP496555–7). Other data can be shared on request.

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