

New record of the soft coral *Lobophytum* cf. *cristatum* Tixier-Durivault, 1970 from Indian waters

(Anthozoa, Malacalcyonacea, Sarcophytidae)

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Soft corals (Cnidaria, Anthozoa, Octocorallia) are a group of marine invertebrates, that contribute significantly to the complexity and functionality of coral reef ecosystems. This study reports the occurrence of *Lobophytum* cf. *cristatum* Tixier-Durivault, 1970 in Indian waters. *Lobophytum* cf. *cristatum* was collected from the coral reef region of the Andaman and Nicobar Islands. This species was originally described from New Caledonia in 1970 and there have been no subsequent records until now. The current report represents the second documented instance of this species in the Andaman and Nicobar Islands, India. *Lobophytum* cf. *cristatum* is distinguished from its congeners by the spindles, irregularly shaped sclerites within the lobe and base, and the distinctive sclerite structures on the surface layer of the lobe and base. A detailed account of description of colony, sclerites and locality is provided herein.

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Introduction

Octocorals, commonly known as alcyonarians, belonging to the class Octocorallia within the subphylum Anthozoa, are a diverse and intriguing group of marine invertebrates (WoRMS 2024). Unlike their stony coral counterparts, soft corals are supported by calcium carbonate skeletal elements called sclerites and flexible, proteinaceous structures, contributing to their distinctive and often complex morphology (Fabricius & Alderslade 2001, McFadden et al. 2022). They are characterized by their eight-fold symmetry, possessing eight tentacles and eight internal mesenteries, distinguishing them from hexacorallians, or scleractinian corals, which exhibit six-fold symmetry (Fabricius & Alderslade 2001). Soft corals are documented across a broad

spectrum of marine environments, ranging from cold temperate regions to warm tropical oceans, and from shallow coral reefs to the deep sea (Alderslade 1984). Approximately 3600 species of octocorals are documented worldwide (WoRMS 2024). The family Sarcophytidae, order Malacalcyonacea, is a significant component of reef ecosystems due to its structural contributions and ecological interactions (Fabricius & Alderslade 2001, McFadden et al. 2022). Species within the family Sarcophytidae are characterized by the absence of a skeletal axis. They typically form colonies that are lobate, plate-like, or capitata, often with a prominent stalk. These colonies are generally not highly branched. Polyps may be monomorphic or dimorphic, and fully retractile into thick coenenchyme (Gray 1869, McFadden et al. 2022). Soft corals and sea fans are major faunal

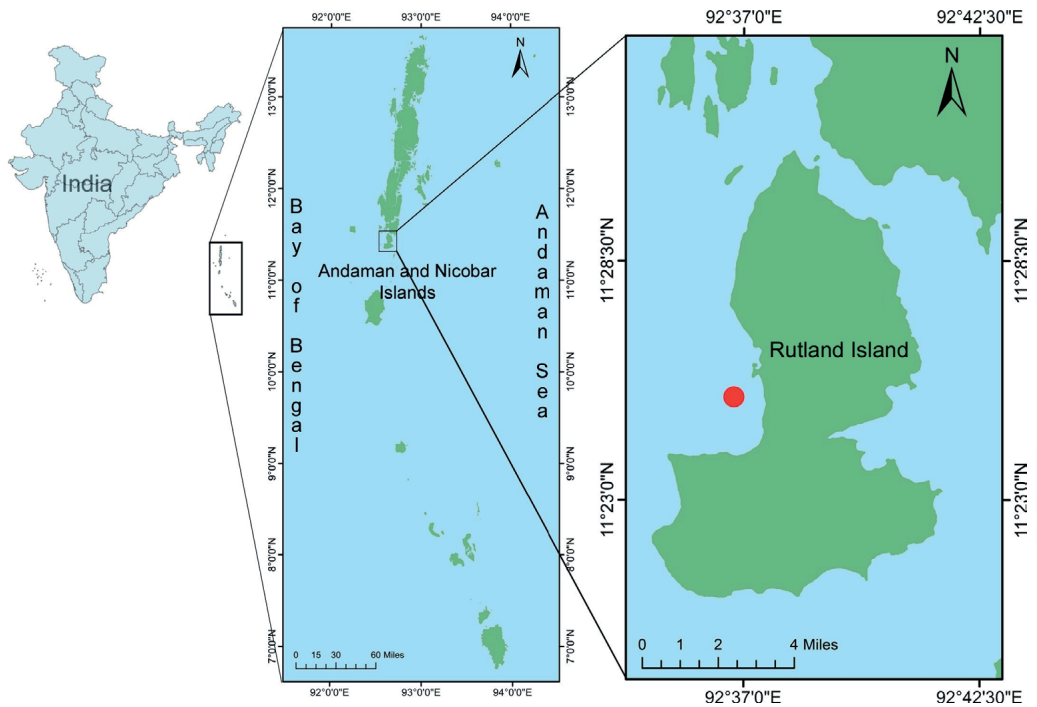


Fig. 1. Map of Rutland Island, Andaman and Nicobar Islands (● showing sampling station).

components of coral reef ecosystems, long recognized for their important roles due to their large size (up to 2–2.5 m tall and across) and their ability to form a substratum for numerous organisms, including bacteria, hydrozoans, sponges, bryozoans, crustaceans, echinoderms, fish, molluscs, polychaetes, ascidians and other cnidarians (Goh et al. 1999, Dautova & Kiyashko 2017, personal observation).

Species of the genus *Lobophytum* are commonly referred to as devil's hand corals or devil's hand leather corals due to their colony morphology. *Lobophytum* species are characterized by their leathery texture and encrusting growth form, exhibiting a distinctive morphology that includes numerous finger-like lobes extending from a robust, often sprawling base. These lobes are densely covered with polyps that extend into the water column for feeding, contributing to the coral's overall surface area and enhancing its capacity to engage in symbiotic relationships with photosynthetic zooxanthellae (Verseveldt 1983, Fabricius & Alderslade 2001, McFadden et al. 2022, Rajendra & Raghunathan 2024a,b). This genus contains 61 species described from shallow waters across a wide area of the tropical Indo-Pacific region, with 22 species recorded in Indian waters (WoRMS 2024, Rajendra & Raghunathan 2024b). The skeletal elements of soft corals are spiny microscopic struc-

tures called sclerites, which include club-shaped, spindle-shaped, and capstan or oblong spindles characteristic of this genus (Verseveldt 1983, Rajendra et al. 2023). Verseveldt (1983) revised the genus *Lobophytum* and provided a valid list of 46 species. Since then, additional species have been described by Verseveldt & Benayahu (1983), Li (1984), Alderslade & Shirwaiker (1991), Ofwegen (1999), Benayahu & Ofwegen (2009), and Rajendra & Raghunathan (2024b) from various marine regions. The present study reveals the presence of *Lobophytum* cf. *crisatum* Tixier-Durivault, 1970 from Rutland Island, South Andaman, which is reported here as a new distributional record to Indian waters.

Material and methods

Sampling was conducted at a depth of 15 to 20 meters in the reefs of Rutland Island, South Andaman, Andaman and Nicobar Islands in 2016 (Fig. 1). A small colony of soft coral was collected by hand using a Self-Contained Underwater Breathing Apparatus (SCUBA) and preserved in 70% ethanol. Measurements of the colonies were taken in the laboratory using a Vernier caliper (Model: Aerospace 074 15376). The sclerites were extracted from the lobe exterior, interior and base exterior, interior by dissolving a piece of tissue in 5% so-

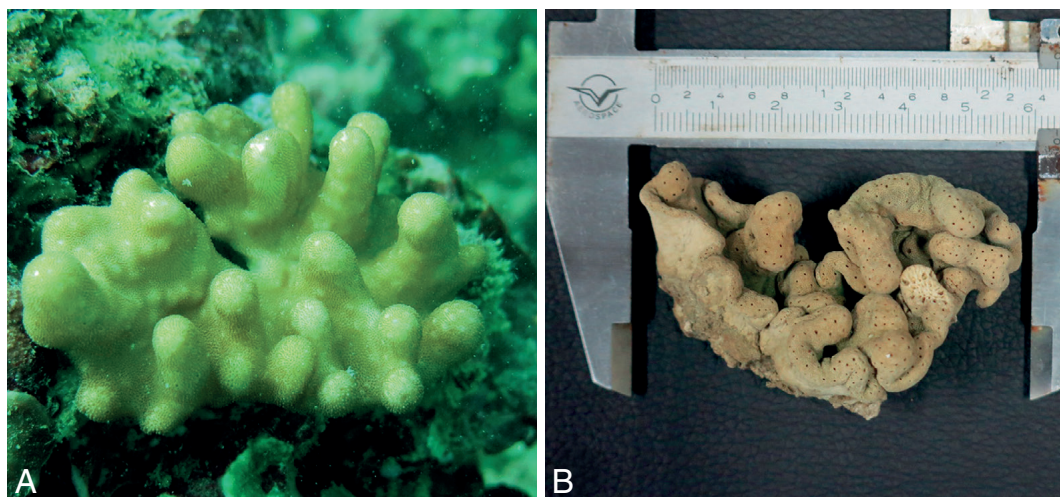


Fig. 2. *Lobophytum* cf. *cristatum* Tixier-Durivault, 1970: **A.** underwater photograph of the colony; **B.** in-situ photograph of the colony.

dium hypochlorite. Preliminarily sclerites were examined under a stereo-zoom microscope (LEICA M 205A) for taxonomic identification. Later, sclerites were sputter-coated with gold for 120 seconds using a Neo Coater MP-19020NCTR, and examined with a scanning electron microscope (JEOL JCM 5000) with associated software for image acquisition. Specimen was identified based on morphological analysis in conjunction with Tixier-Durivault (1970) and Verseveldt (1983). The identified specimen was registered and deposited at the National Zoological Collections, Zoological Survey of India, Andaman and Nicobar Regional Centre, Port Blair.

Results

Systematic account

Phylum Cnidaria Hatschek, 1888
 Subphylum Anthozoa Ehrenberg, 1834
 Class Octocorallia Haeckel, 1866
 Order Malacalcyonacea McFadden,
 van Ofwegen & Quattrini, 2022
 Family Sarcophytidae Gray, 1869
 Genus *Lobophytum* von Marenzeller, 1886

Lobophytum cf. *cristatum* Tixier-Durivault 1970 Figs 2–4

Lobophytum cristatum Tixier-Durivault, 1970: 209,
 figs 35–37.

Lobophytum cristatum Verseveldt, 1983: 37, fig. 12;
 pl. 6, fig. 2.

Material examined. ZSI/ANRC-16541: India, Rutland Island, South Andaman Island, Lat. 11°25.112' N; Long. 92°36.535' E, coral reef habitat, depth 17 m, 16th December, 2016.

Diagnostic characters

Colony morphology. The colony is low encrusting, with a less distinct stalk (base of the colony) and the capitulum is rather flat with digitiform lobes are erect, compactly arranged (Fig. 2). The total height of the colony is 36 mm, height of the base is 6 mm and width of the polyparium region is 63 mm, with average length of the lobes on polyparium of about 14 mm.

Polyps. The capitulum contains dimorphic polyps, including both autozooids and siphonozooids. Autozooids are very distinct and fully retracted. The distance between autozooids at the summits of the lobes is approximately 1.3 to 3.2 mm; on the sides about 2.0 to 4.0 mm. The distance between autozooids and siphonozooids ranges from 0.33 to 0.44 mm, while the distance between siphonozooids is 0.31 to 0.37 mm. The number of siphonozooids varies among the lobes: there are 2 to 3 on the summits, and 2 to 6 on the sides.

Sclerites. The surface layer of the lobe contains shuttle-shaped sclerites (Fig. 3A) and club-shaped sclerites, which measure approximately 0.11 to 0.28 mm. Smaller clubs measure 0.11 to 0.20 mm and have less distinct heads and wart zones. Medium-sized clubs feature irregular wart zones with cone-shaped prominences (Fig. 3B). Longer sclerites, measuring up to 0.28 mm, appear to be intermediate between the

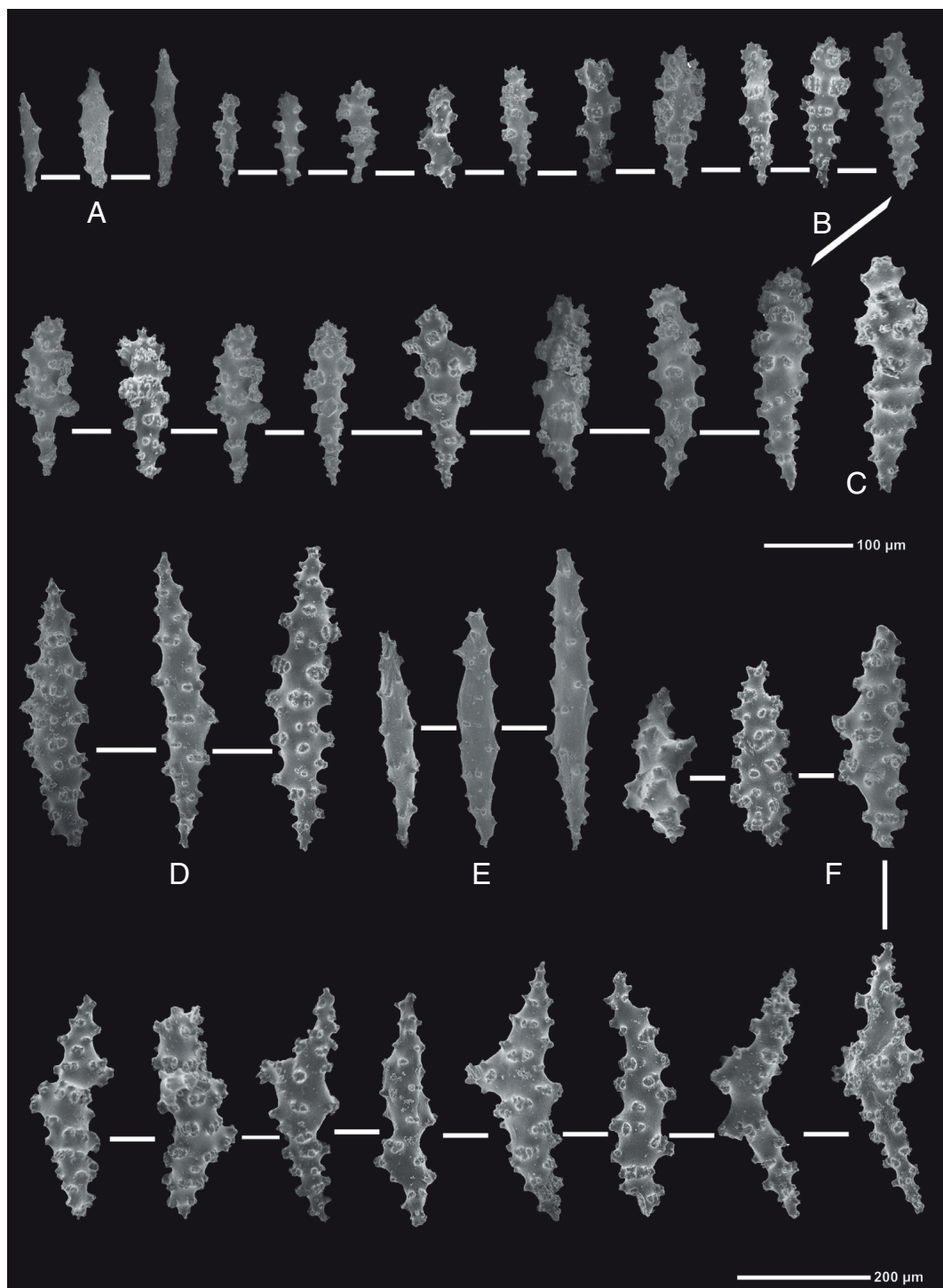


Fig. 3. Sclerites of *Lobophytum cf. cristatum* Tixier-Durivault, 1970: A-C. sclerites from exterior of the lobe; D-F. sclerites from interior of the capitulum.

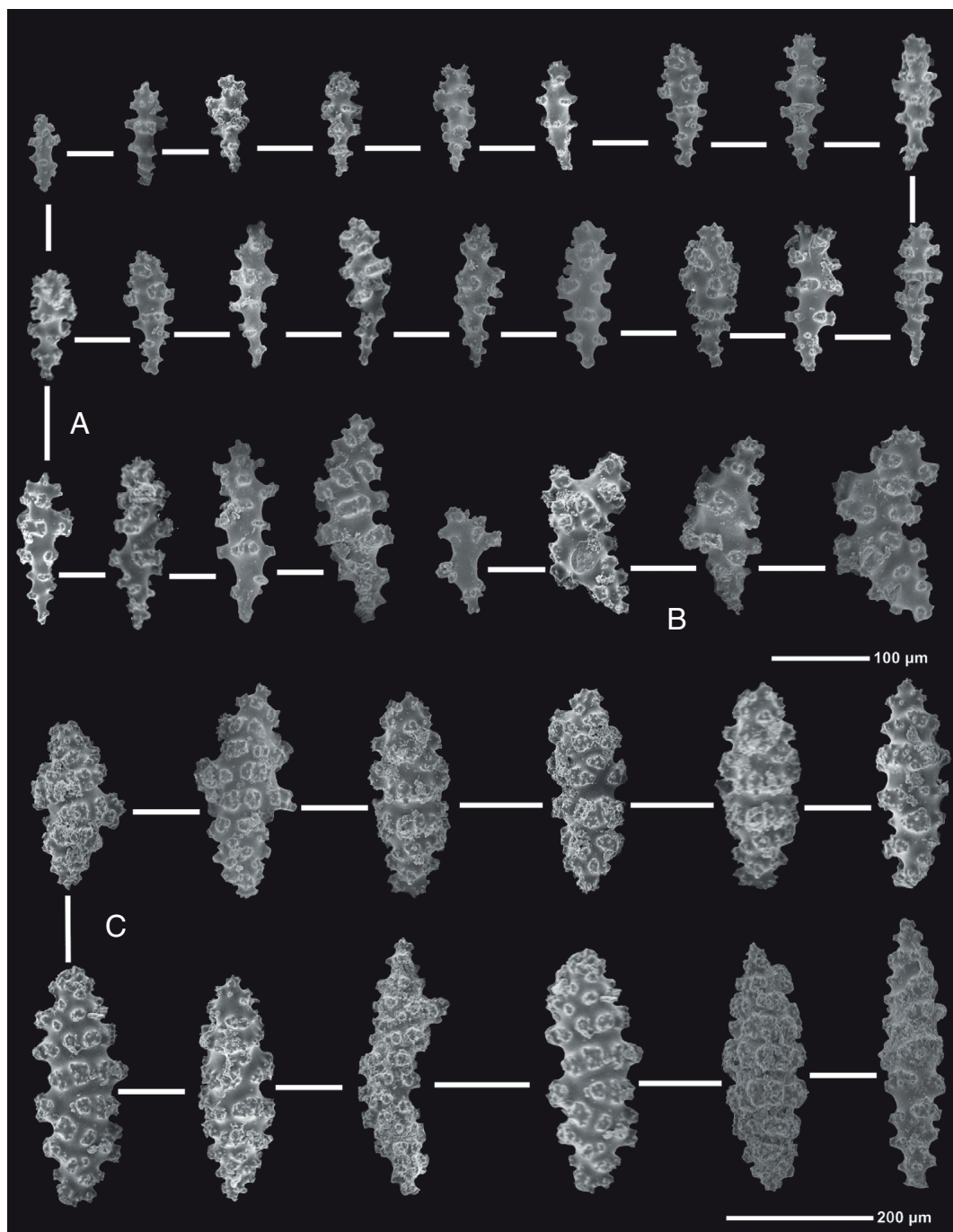


Fig. 4. Sclerites of *Lobophytum cf. cristatum* Tixier-Durivault, 1970: A, B. sclerites of base exterior; C. sclerites from interior of the base.

surface layer and the interior of the lobes (Fig. 3C). The interior of the lobes contains elongated spindles (Fig. 3D), shuttles shaped (Fig. 3E) and irregularly shaped bodies (Fig. 3F) which measure up to 0.47 mm and rarely up to 0.51 mm. The prominences on spindles are warts, which are irregularly distributed or placed on distinct girdles. Irregularly shaped sclerites contain high, distinctly stalked warts. The surface layer of the base has club-shaped sclerites ranging in length of 0.10 mm to 0.21 mm (Fig. 4A) and small irregular shaped sclerites with large warts, measuring up to 0.26 mm (Fig. 4B). The shorter ones are often rod shaped with less distinct heads with zones of warts. The interior of the base has spindles and few irregular or branched-shaped sclerites. Spindles are pointed and curved, with larger warts distributed irregularly with or without distinct girdles, measuring about 0.48 mm. Irregularly shaped bodies are wider, with some cross-shaped sclerites having larger warts present on the surface (Fig. 4C).

Colour. Greyish white underwater. After preservation colour changes to light green to creamy white.

Geographical distribution. India: Andaman Islands (present report); elsewhere: New Caledonia (Tixier-Durivault 1970).

Remarks. New record to Indian waters from the Andaman Islands. This species has irregularly shaped sclerites in interior of the both, the lobe and base, with wide distinct big warts on the surface of sclerites. The colony shape remarkably resembles that of *Lobophytum pauciflorum* (Ehrenberg, 1834), *L. pusillum* Tixier-Durivault, 1970, *L. varium* Tixier-Durivault, 1970 and *L. schoeide* Moser, 1919. The characters such as low encrusting colonies with finger like lobes, and with distance between two autozooids are common characters shared by these species. The structures of sclerites in both *L. pauciflorum* and *L. pusillum* Tixier-Durivault, 1970 show variations to those of *L. cf. cristatum*. The sclerites in lobe interior of *L. pauciflorum* contain pointed spindle measures of 0.25 to 0.40 mm and the base contains capstans and cylindrical shaped sclerites of 0.18 to 0.26 mm with four girdles of compound warts. The sclerites in interior of the lobe of *L. pusillum* have cylindrical spindles 0.18 to 0.37 mm long, sculptured with high simple warts, with or without distinct waist, and the interior of the base contains dumbbell shaped capstans with a few cylindrical-shaped sclerites with length of 0.18 to 0.26 mm. In the interior of the lobes, *L. varium* has cylindrical or spindle and sometimes irregular shaped sclerites which measure up to 0.18 to 0.29 mm, and in the interior of the base cylindrical and slender capstans which measure 0.20 to 0.29 mm. *L. schoeide*

lobe interior contains 0.40 mm long spindles, and base interior contains only spindle-shaped sclerites up to 0.44 mm long. The above characters of four congeneric species vary from those of *L. cf. cristatum*, containing spindle-shaped, shuttle-shaped and irregular bodies up to 0.51 mm in lobe interior region and, pointed or curved spindles of 0.48 mm in length in base interior.

Discussion

The species *Lobophytum cristatum*, initially described by Tixier-Durivault in 1970, was later revised by Verseveldt in 1983. Verseveldt's revision included a detailed discussion of the morphological characteristics of the genus and its skeletal sclerites. The present report provides a detailed account of the morphometric characters, distance between autozooids and siphonozooids, and the distance between siphonozooids at the summit and the lower regions of the lobes. According to Tixier-Durivault (1970), interior of the base contains mostly 'four whorl barrels composed of prominent tubercles' but no such sclerites were observed in the present specimen. And in Verseveldt (1983), irregular shaped sclerites were present in both lobe interior and base interior with size up to 0.42 and 0.30 mm respectively. However, in the present study, the sclerites in interior of the both, lobe and base, measured up to 0.44 and 0.48 mm respectively. While there was no mention about the pointed curved and elongated spindles in the previous reports, it is important to note that pointed curved and elongated spindles were also observed in the present specimen.

Identifying soft corals based on morphological features alone is challenging due to their high intraspecific variation, and the absence of rigid skeletal structures that provide clear diagnostic characters (Rajendra & Raghunathan 2023). Many species exhibit morphological plasticity influenced by environmental factors, while others belong to cryptic species complexes that are indistinguishable without genetic analysis (Quattrini et al. 2019). The specimen described in this report from the Andaman Islands exhibits morphological features similar to those originally described from New Caledonia. It matches its morphological description more closely than any other known species of *Lobophytum*. However, given the challenges of species delimitation within this group and the absence of molecular data for *L. cristatum*, this specimen was identified as *Lobophytum cf. cristatum* from Andaman Islands. Furthermore, molecular analysis will be helpful to confirm its species identity, delineate species boundaries, and assess its biogeographic distribution.

Andaman and Nicobar Islands are known as the ecologically significant region in the Indo-Pacific province and harbour rich coastal and marine biodiversity (Chandra & Raghunathan 2018). The marine ecosystems of Andaman and Nicobar Islands have remarkable biodiversity and endemic fauna and flora (Dorairaj et al. 1997). The coral reef ecosystems are primarily present as fringing reefs along the coastlines of these islands, with a barrier reef also reported over a century ago in the western coastal areas of the Bay of Bengal (Tikader et al. 1986, Venkataraman et al. 2003). The distribution of zooxanthellate soft corals is primarily confined to the shallow reef habitats within this archipelago. Despite the significant diversity of soft corals in the coral reef regions of the Andaman and Nicobar Islands, the available literature in this area is limited. The genus *Lobophytum* is represented by 22 species in India of which 21 species are known so far from the Andaman and Nicobar Islands (Rajendra & Raghunathan 2016, Rajendra et al. 2023, Rajendra & Raghunathan 2024a,b). The present report provides the second documentation of *Lobophytum cristatum* Tixier-Durivault, 1970, from the Andaman Islands, India, after its original description from New Caledonia and adds to the diversity of Sarcophytidae.

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