Food and Agriculture Organization of the United Nations

# Marine biodiversity of the Saya de Malha Bank shallows: A photographic catalogue








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# PREPARATION OF THIS DOCUMENT

The EAF-Nansen Programme "*Supporting the Application of the Ecosystem Approach to Fisheries Management considering Climate and Pollution Impacts*" of the Fisheries and Aquaculture Division of the Food and Agriculture Organization of the United Nations is an initiative to promote sustainable utilization of marine living resources and improved protection of the marine environment. To fulfill its objectives, the programme prioritizes the generation of scientific knowledge, with scientific surveys conducted aboard the research vessel (R/V) *Dr. Fridtjof Nansen*. Data are collected according to a science plan comprising 11 themes, with Theme 7 focusing on mapping critical and vulnerable habitats.

In May 2018, the programme conducted a survey on the Saya de Malha and Nazareth Banks with the objective of characterizing their marine ecosystems and morphology. Remotely Operated Vehicle dives were conducted in both shallow and deep waters of the area and subsequently, local scientists who had participated in the survey attended two workshops aimed at enhancing the identification of the benthic flora and fauna observed.

Following these workshops, a compilation of snapshots featuring key organisms observed during the dives and identified at the lowest taxonomic level possible was assembled. To optimize the use of these materials, it was suggested to compile these snapshots into a guide that would assist researchers in conducting future surveys in the region.

The EAF-Nansen Programme provided technical and financial support for the production of this catalogue. Moreover, the Joint Management Area, the mechanism of joint jurisdiction between Mauritius and Seychelles over the Saya de Malha Bank in the Mascarene Plateau region, endorsed the production of this catalogue to promote the sustainable management and understanding of the region's marine life and biodiversity.

# ABSTRACT

This photographic catalogue presents an overview of the flora and fauna observed in the shallow waters (less than 100 m depth) of the Saya de Malha Bank in the Mascarene Plateau. While not a comprehensive representation, as some taxa were excluded due to poor-quality photos that could result in misleading or unreliable depictions, it encompasses a total of 113 taxa identified at the family, genus, or species level. These taxa span key groups, including seaweeds, seagrasses, sponges, corals, echinoderms, crustaceans, molluscs, and fish.

The images are snapshots derived from video observations captured during the 2018 R/V *Dr. Fridtjof Nansen* ecosystem survey, which aimed to characterize the marine ecosystem and morphology of the Saya de Malha Bank. This area is notable for its rich marine biodiversity, supporting a diverse array of species and habitats that contribute to the overall health of oceanic environments.

This catalogue serves as a valuable resource for scientists conducting further explorations in the Mascarene Plateau region, providing a basic tool for taxonomic identification. By raising awareness of the significance of the Saya de Malha Bank, we aim to foster a greater appreciation for its unique marine life and promote the conservation of these critical habitats.

# ACKNOWLEDGEMENTS

This work was made possible with the support of the EAF-Nansen Programme "*Supporting the Application of the Ecosystem Approach to Fisheries Management considering Climate Change and Pollution Impacts*" executed by Food and Agriculture Organization of the United Nations (FAO), with the scientific support of the Norwegian Institute of Marine Research (IMR), and funded by the Norwegian Agency for Development Cooperation (Norad). The authors are thankful to the FAO for funding and supporting Leg 2.1 of the regional resources and ecosystem surveys in the Indian Ocean (NORAD-FAO PROGRAMME GCP/GLO/690/NOR) on the Saya de Malha Bank on board the R/V *Dr Fridtjof Nansen* in 2018. The survey was carried out within the project framework entitled "*Characterising the marine ecosystem and morphology of the Saya de Malha Bank*" between the FAO and the Designated Authority (DA) of the Extended Continental Shelf, Mascarene Plateau region.

The authors are indebted to the Department for Continental Shelf, Maritime Zones Administration & Exploration (Prime Minister's Office, Republic of Mauritius) for coordinating and co-leading the expedition and for their continuous support towards the publication of this photographic catalogue on the Marine Biodiversity of the Saya de Malha Bank Shallows, and the Mauritius-Seychelles Joint Commission of the Extended Continental Shelf for their support and assistance and granting the necessary authorisations.

During the R/V *Dr. Fridtjof Nansen* survey and two subsequent workshops, the authors of this photographic catalogue conducted identifications to the lowest taxonomic level possible within their areas of expertise across various groups. Subsequently, several experts were consulted and generously agreed to review the photographic material to enhance the accuracy of these preliminary identifications.

The authors of this catalogue extend their sincere gratitude to all these reviewers, whose assistance was crucial in validating or correcting the identifications. Their expertise greatly enhanced the presentation of a more accurate taxonomy in this catalogue.

Below, we list these experts by taxonomic group:

### Sponges

**Dr Michelle Kelly**, National Institute of Water & Atmospheric Research, Auckland, New Zealand, and **Dr Toufiek Samaai**, Department of Forestry, Fisheries and the Environment, Cape Town, South Africa, emphasized that, as no specimens were examined, an element of doubt remains regarding the identity of these species based solely on images, particularly when they lack obvious diagnostic morphological characters that facilitate identification at the species level.The identifications provided here are the most accurate possible, based upon their personal understanding of the species in this and surrounding regions.

## Corals

Scleractinian coral identifications were performed or verified by **Prof Francesca Benzoni**, King Abdullah University of Science and Technology, Saudi Arabia. In addition, other taxonomists provided their identifications, such as **Dr Lyndon Devantier**, Coral Reef Research, Townsville, Australia; **Dr David Obura**, CORDIO East Africa, Kenya; and **Dr Parisa Alidoost Salimi**, Department of Marine Biology, Science and Research Branch, Azad University, Tehran, Iran.

The authors compared the different identifications and, when they differed, decided to use the most conservative classification to ensure accuracy.

## Echinoderms

Sea cucumber identifications were verified by **Prof Steve Purcell**, Marine Science and Management, National Marine Science Centre, Southern Cross University, Australia.

Starfish identifications were performed, improved, or verified by **Dr Christopher Mah**, Research Associate at the Smithsonian Museum of Natural History, USA.

Sea urchin identifications were performed or verified by **Dr Rich Mooi**, Curator of Echinoderms, Department of Invertebrate Zoology & Geology, California Academy of Sciences, USA.

## Crustaceans

**Prof Shane T. Ahyong**, Senior Principal Research Scientist & Manager, Marine Invertebrates, Australian Museum Research Institute, Australia, identified the two species of stomatopods featured in this catalogue.

## Bony fishes

**Prof Kent Carpenter**, Old Dominion University, USA, confirmed the identification of the two species of Lethrinids.

**Dr Jeff Johnson**, Manager of Ichthyology at the Queensland Museum, Australia, identified the sweetlip *Diagramma centurio*.

**Dr Helen K. Larson**, Curator Emeritus of Fishes at the Museum and Art Gallery of the Northern Territory, Australia, confirmed the identifications of the Gobiids.

**Dr J. Howard Choat**, James Cook University, Australia, confirmed the identification of the *Chlorurus* species.

**Dr Benjamin Victor**, Nova Southeastern University, USA, identified *Oxycheilinus bimaculatus*.

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# ABOUT THE AUTHORS

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**Gilberte Gendron** is a marine biologist with extensive expertise in marine biodiversity and ecosystem conservation. She holds an MSc in Oceanography from the Université du Quebéc à Rimouski, Canada. She is the Director of Bee Ecological Consulting and a core member of the Island Biodiversity & Conservation (IBC) Center at the University of Seychelles. With a strong background in marine research and applied environmental consulting, she has contributed significantly to strategic conservation initiatives across in Seychelles and the Western Indian Ocean region.

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**Dr Edoardo Mostarda** is a fisheries and fish biodiversity expert at the Food and Agriculture Organization of the United Nations (FAO) in Rome, Italy. After a decade of work as a fish ecologist, he joined the FAO FishFinder Programme (formerly the Species Identification and Data Programme) in 2011. Since then, he has contributed to the development of over 25 species identification tools, serving as an author, technical editor, or scientific editor in various FAO projects, including the EAF-Nansen Programme.

# INTRODUCTION

## The EAF-Nansen Programme

The EAF-Nansen Programme is a longstanding partnership between the Food and Agriculture Organization of the United Nations (FAO) and Norway, in close collaboration with the Norwegian Institute of Marine Research (IMR). Working with 32 countries across Africa and the Bay of Bengal, the programme aims to enhance food and nutrition security by strengthening fisheries policies and management practices in line with the ecosystem approach to fisheries (EAF).

The programme is structured around three interconnected areas that contribute to sustainable fisheries and improved food and nutrition security for people in partner countries: scientific advice, fisheries management, and capacity development. Scientific knowledge is generated through surveys conducted aboard the research vessel *Dr. Fridtjof Nansen*, the primary tool for collecting fisheries-independent data. The vessel's work, through the collection of unique data, contributes to monitoring and assessing fisheries resources while addressing pressing global concerns such as biodiversity conservation, and the impacts of climate change, pollution, and human activities on marine ecosystems. The programme's science plan guides the efficient collection and use of data to support research and decision-making.

Theme 7 of the science plan aims to provide comprehensive information on bottom habitats, particularly focusing on the vulnerable ones. These habitats, which are at risk from fisheries and other human activities, often include biodiversity hotspots that recover slowly from disturbances and thus qualify as vulnerable marine ecosystems (VMEs). Understanding their characteristics and distribution is crucial for providing science-based advice for targeted and effective protective measures. The programme's bottom habitat studies are primarily focused on the deep-sea areas beyond national jurisdiction (ABNJ), where there is still limited knowledge about species and habitat diversity. Studies within national waters are also conducted, especially in relation to oil and gas activities, to provide baseline data for environmental impact assessments of such projects.

This photographic catalogue was developed to support the work of Theme 7 and scientists conducting further explorations in the Mascarene Plateau region, providing a tool for accurate taxonomic identification and enhancing future research and conservation efforts.

## The Mauritius and Seychelles Joint Management Area

In March 2011, the United Nations Commission on the Limits of the Continental Shelf (CLCS) adopted recommendations confirming the entitlement of the Republic of Mauritius and the Republic of Seychelles to an area of extended continental shelf in the

Mascarene Plateau region, as detailed in a joint submission by the two states. In March 2012, Mauritius and Seychelles signed two treaties. The first treaty established the outer limits of the extended continental shelf and outlined their joint sovereign rights for exploration and resource exploitation, in accordance with the 1982 United Nations Convention on the Law of the Sea (UNCLOS). The second treaty, effective for 30 years, created the Joint Management Area (JMA), which spans approximately 396 000 km$^2$ and is jointly managed by both countries (Figure 1).

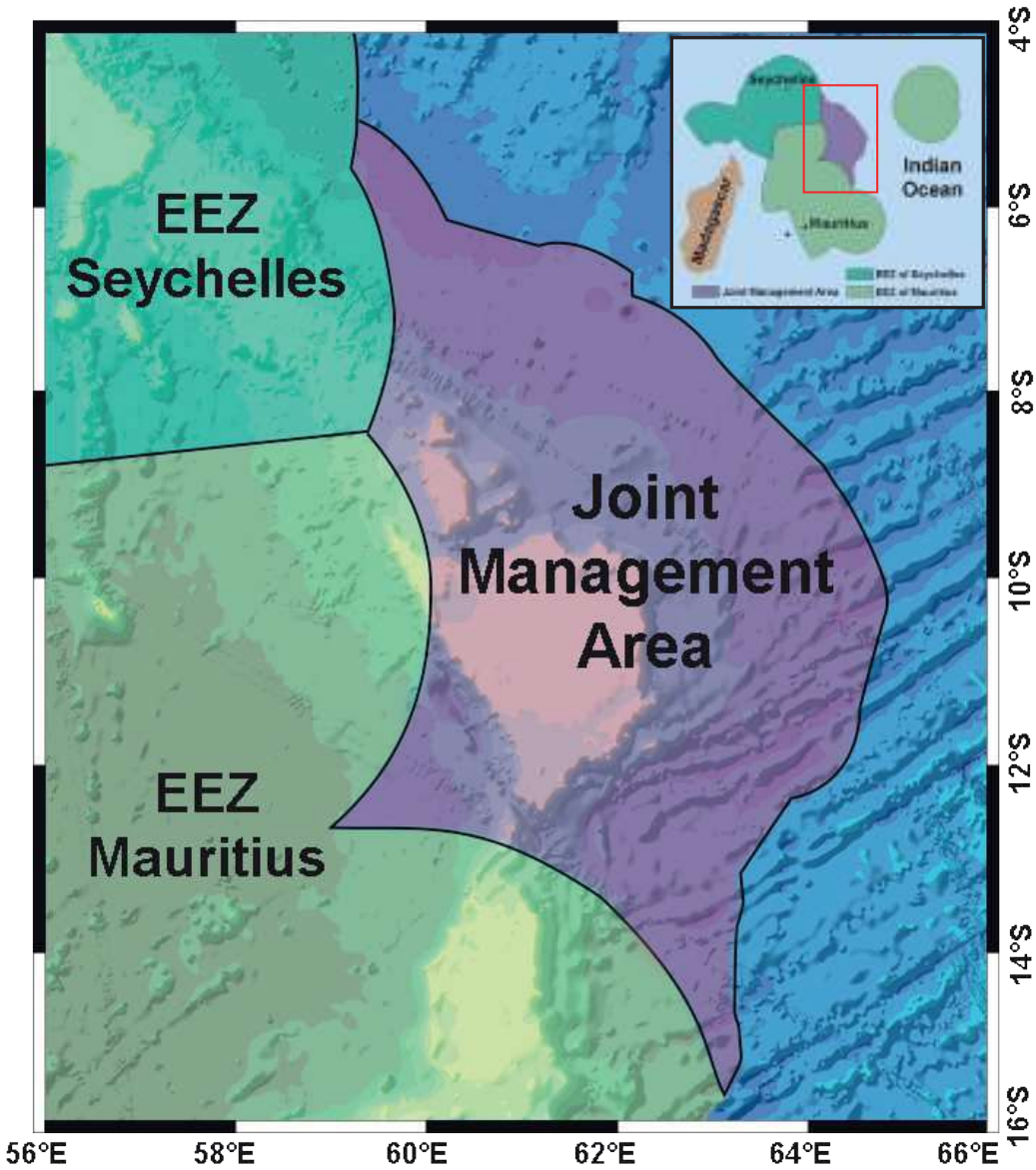



**Figure 1** Map of the Joint Management Area (JMA) over the Continental Shelf in the Mascarene Plateau. **Source:** Author's elaboration on background grid: GEBCO Compilation Group (2024) GEBCO 2024 Grid (doi:10.5285/1c44ce99-0a0d-5f4f-e063-7086abc0ea0f). Conforms to UN Map of the World, 2024.

This treaty is particularly significant as it represents the first instance of joint management over such a large maritime area and establishes an institutional and regulatory framework for the sustainable management and exploitation of its natural resources. Both Mauritius and Seychelles are committed to the 2030 Agenda for Sustainable Development and the Paris Agreement on climate change, with a strong emphasis on Sustainable Development Goal (SDG) 14, which focuses on marine life. They reaffirm their dedication to sustainably managing the JMA's natural resources, prioritising the precautionary principle and the protection of the marine environment and biodiversity.

## The Saya de Malha Bank

A notable feature within the JMA is the Saya de Malha Bank, a vast submerged feature extending between Mauritius and Seychelles, spanning roughly from 9° to 13° S and 59° to 63° E (Figure 2).

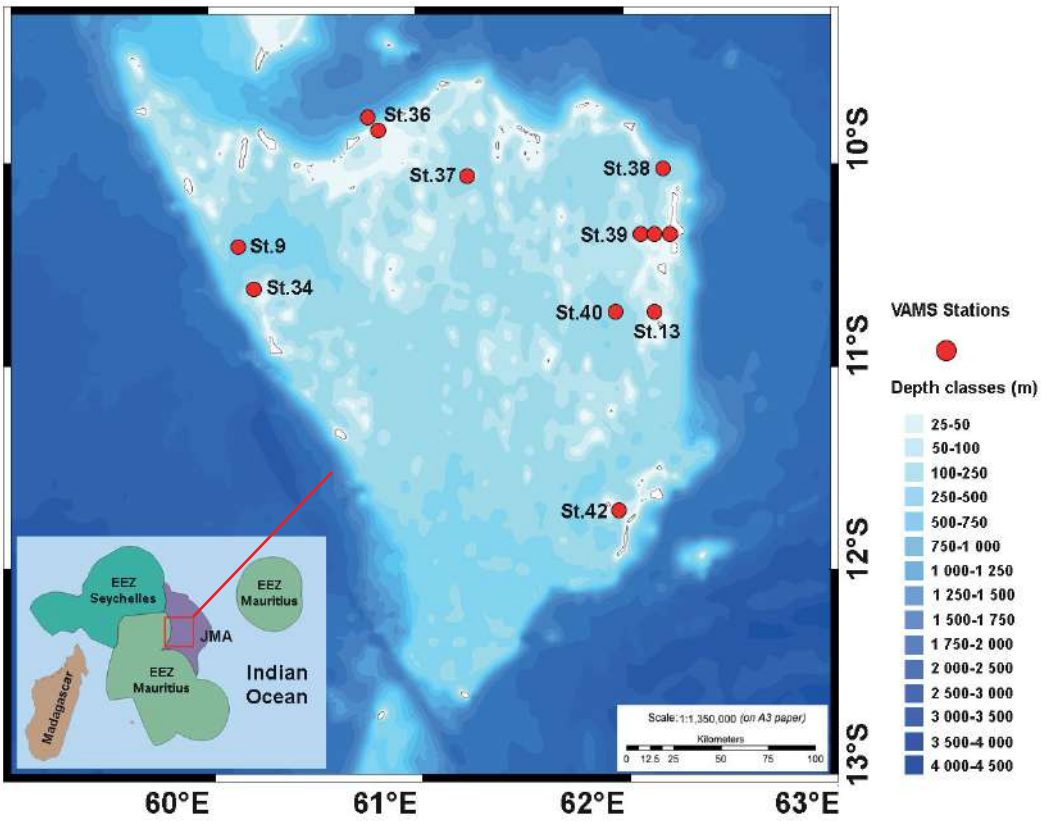



**Figure 2** Map of the Saya de Malha Bank. The red dots are the stations where the VAMS was deployed. **Source:** Author's elaboration on background grid: GEBCO Compilation Group (2024) GEBCO 2024 Grid (doi:10.5285/1c44ce99-0a0d-5f4f-e063-7086abc0ea0f). Conforms to UN Map of the World, 2024

It is among the most remote and least explored shallow water ecosystems globally with the closest land, Agalega, approximately 300 km to the west. It is also among the world's largest underwater Banks; the smaller North Bank, also known as the Ritchie Bank, and the significantly larger and more southerly Saya de Malha Bank together cover an area of 40 808 km$^2$, largely within international waters. The depths on these Banks vary from 8 to 150 m, separated by a 1 000 m deep channel. The Banks gradually slope downwards on all sides into the deep open ocean. Ridges and pinnacles are scattered on the Bank's relatively flat, plateau-like topography, creating a complex underwater landscape. The Saya de Malha Bank is influenced by the South Equatorial Current (SEC) which enhances oceanic productivity in the region. The seabed of Saya de Malha Bank is jointly managed by the Republics of Mauritius and Seychelles, while the water column remains in the high seas.

*Importance and uniqueness of the region*

Scientific research on the underlying seafloor of the Saya de Malha Bank has become primordial to help both the Republic of Mauritius and the Republic of Seychelles in the future development, management, and effective conservation strategies within the JMA using science-based evidence. The Saya de Malha Bank has been identified as globally important in two independent processes (Obura *et al*., 2012):

- the technical process supporting the Convention on Biological Diversity used the Bank as an illustration of a likely Ecologically or Biologically Significant Area (EBSA), satisfying four of seven criteria: 1. Uniqueness or rarity; 2. Special importance for life history stages of species; 3. Importance for threatened, endangered, or declining species and/or habitats; and 5. Biological productivity; and
- s separate analysis by World Wildlife Foundation, as part of the Western Indian Ocean Marine Ecoregion (WIOMER) and 'Réseau des Aires Marines Protégés' project of the Indian Ocean Commission (RAMP-COI) scored Saya de Malha as high as the other 3 EBSA criteria, namely: 4. Vulnerability, Fragility, Sensitivity, or Slow recovery; 6. Biological diversity; and 7. Naturalness; and has selected it as a priority seascape of global significance for its eco-regional conservation strategy.

*Biodiversity*

The Saya de Malha Bank is a biodiversity hotspot thanks to oceanic productivity, enhanced by the interaction of its topography and the SEC. In addition to seagrasses, the Bank hosts extensive coral communities and encrusting red coralline algae, while more than 150 species of invertebrates and 100 species of gastropods (a diverse class of molluscs) have been identified (Hilbertz *et al*., 2002). Among the array of fauna are parrotfish, surgeonfish, rabbitfish, green sea turtles, wedge-tailed shearwaters, white-

tailed tropicbirds, spotted dolphins, pygmy blue whales, and pilot whales. The coral reefs of Saya de Malha are a critical stepping stone for the migration of shallow-water species across the Indian Ocean, and sailors crossing the Banks have reported that they are also a major breeding ground for sperm whales and blue whales (Webber *et al*. 2023).

Current knowledge holds that Saya de Malha Bank hosts the most abundant green calcareous algae (*Halimeda* spp.) field and probably constitutes the main source of unstable substrate (sand) dominating the stations surveyed. Thirteen genera of corals have previously been recorded from the shallow areas of the SMB (Rosen, 1971). At the north Bank, however, an entirely different coral ecosystem was found, dominated by large stands of a single species of branching *Acropora* corals (Hagan and Robinson, 2001). *Acropora*, *Pocillopora*, *Montipora*, *Porites*, *Heliopora*, *Danafungia*, *Favites*, *Dipsastraea*, *Seriatopora* and the possibility of *Stylophora* were the most common genera amongst others.

## The 2018 R/V *Dr Fridtjof Nansen* survey

### *Overview and objectives*

The cruise entitled "Characterizing the Marine Ecosystem and Morphology of the Saya de Malha Bank" started on 3 May 2018 when the Research Vessel *Dr Fridtjof Nansen* left Port Victoria, Seychelles, and ended on 4 June 2018 when the vessel docked in Port Louis, Mauritius.

The overriding general aim of the cruise was to characterize the marine ecosystem and morphology of the Saya de Malha Bank. Sampling using the full complement of technologies of the vessel facilitated investigations of the following aspects:

- geomorphology, benthic habitats, and benthos (Multibeam sounder mapping in subareas and along pre-determined transects, habitat and benthos studies emphasising sandy subareas and subareas with macroalgae, seagrass, and coral);
- fish and crustacean resources (density mapping with acoustic and optical technologies, emphasising commercial and toxic species); and
- physical and chemical oceanography, including current measurements (onboard measurements).

In addition, sampling in support of studies with a wider geographical scope undertaken on other surveys under the EAF-Nansen Programme were conducted, e.g. tissue sampling for genetics, contaminants, mammal observations, recording of microplastics and litter.

One key question the cruise aimed at addressing is in regard to geomorphology, benthic habitats, and benthos. Coarse maps of the bathymetry and substrates were generated from previous surveys. The technologies available on the research vessel

facilitate more detailed and accurate mapping that will be useful as baselines for further scientific studies and assessments related to industrial developments. This was done using single- and multibeam acoustics and the sub-bottom profiler to map geomorphology in selected subareas and along pre-determined transects, and use the video-assisted multisampler (VAMS) to collect grab samples and HD videos for benthos studies. Benthos studies were focused on soft-bottom substrates and along upper slopes where coral cover is expected. Data gathered from the VAMS videos recorded in shallow areas of Saya de Mahla were used to develop this catalogue.

*Video transects data collection*

In-situ visual data collection was carried out using the HD camera of a tethered Remotely Operated Vehicle (ROV), able to operate between 20 and 1000 m depth, attached to a Video-assisted Multi-sampler (VAMS), a tubular cage hosting the ROV (Serigstad *et al*., 2015).

The ROV attached to the VAMS was used to carry out the video transect survey in two modes: 1) as a point sampler where the VAMS was deployed on the seabed allowing the ROV to explore the immediate 15 m vicinity in four directions (north, east, south and west) and 2) in a towed mode whereby the vessel towed the VAMS at 5 m above the seabed along pre-determined transects perpendicular to isobaths at 0.1–0.4 knots while the ROV explored the underlying seabed. The distance between the ROV camera and the seabed was kept at 2 m, lens' swarth width of 15 m, during the steady passage, depending on the environment and sea condition.

As a first exploratory survey, several stops were made along the transects in order to have close-up videos for record and identification of certain benthic organisms. The video records were logged with data on GPS position, to calculate the distance covered by the ROV along the transect, dive time and depth in the CAMPOD Logger software, a camera-based data collection software designed by the Institute of Marine Research of Norway (IMR) used with the ROV.

The CAMPOD Logger uses the same principle as the Coral Point Count with Excel extension (CPCe) Software (Kohler and Gill, 2006). The data was further analysed after the cruise.

*Summary of key findings from the survey*

For the benthos, the shallow water flats (depth 20–70 m) were dominated by organisms such as seagrass (*Thalassodendron ciliatum*), calcareous red algae (*Lithothamnion* sp.), and green algae (*Halimeda* sp.). In various locations where *Halimeda* species were dominant, the upper 5 cm layer of sediment consisted mainly of its dead calcareous leaves. Shallow waters also provided a range of degraded coral colonies, including branching *Porites*, *Acropora* sp., *Heliopora* sp., *Tubastrea* sp., *Cyphastrea* sp., *Turbinaria* sp., *Fungia* sp., *Favites* sp., *Favia* sp., and *Galaxea* sp., which were more dominant than others. These calcified algae and corals, together with foraminiferans, are likely to be important in forming reef construction and constitute a notable portion of the bottom sediments—sand and gravel—in the investigated area. An additional source of bottom sediments and reefal boulders comes from remnants of fossil gastropods and bivalves.

The areas predominantly occupied by the organisms listed above were well recognized during visual observations: *Thalassodendron ciliatum*, *Halimeda* sp., and corals (with *Lithothamnion*) or only *Lithothamnion*. Occasionally, sands with no epibenthic domination were observed. These five communities likely represent different stages of succession.

The deeper locations were divided into two zones: 40–100 m and 100–1000 m. The first zone was characterized by very poor fauna, with flat, sandy rocky slopes observed. In the 100–1000 m depth zone, a more diverse fauna was observed on different substrates, which were mainly dominated by sand or rocks.

Additional findings related to physical oceanography, geomorphology and benthic substrates, chemical oceanography and phytoplankton, zooplankton, pelagic and demersal fish, mammals, birds, and turtles, as well as other observations (including litter and microplastics), can be viewed in the outputs described below.

*Outputs*

This photographic catalogue is among one of the outputs of the 2018 Nansen Research Cruise. The details of the cruise, including activities and planned outcomes and outputs, have been documented mainly in the NORAD–FAO project GCP/INT/730/NOR cruise reports "*Dr. Fridtjof Nansen* – Regional Resources and Ecosystem Survey in the Indian Ocean, Leg 2.1. Characterizing ecosystems and morphology of the Saya de Malha Bank and Nazareth Bank, Survey no 2018406, 3 May–4 June, 2018, by Bergstad *et al*. (2018).

The scientific papers emanating from the surveys and follow-up analyses during the post-cruise workshops have been published in a Special Issue edition of the Western Indian Ocean Journal of Marine Science (WIOJMS) (https://www.wiomsa.org/publications-2/wio-journal-of-marine-science/) hosted by the Western Indian Ocean Marine Science Association (WIOMSA)(https://www.wiomsa.org/). The special edition was entitled "Studies on the Mascarene Plateau" and the main findings were presented under topics like ocean circulation patterns; inorganic nutrient distribution; chlorophyll a and microphytoplankton density and diversity distribution; shallow-water benthic habitat diversity and distribution; sediment grain size and organic matter contents; photosynthetic functioning of macroalgae, seagrass, healthy and bleached scleractinian corals; marine molluscs diversity; macro- and mega-fauna of the Bank slopes; pelagic and demersal fish diversity; field observations on *Halimeda*, Rhodoliths and *Thalassodendron* beds, the coral-eating Crown-of-Thorn and other starfish, and endemic giant clam sightings; and coral disease.

The full text articles are accessible at https://www.ajol.info/index.php/wiojms/issue/view/20888

**Purpose of the photographic catalogue and how to use it**

This photographic catalogue is designed to assist in identifying a selection of taxa observed during the video surveys of the 2018 R/V *Dr Fridtjof Nansen* survey.

It is not meant to be a comprehensive representation of the fauna and flora of the

shallow-water habitats of the Saya de Malha Bank. Several taxa were observed and tentatively identified; however, they were excluded from this catalogue due to the poor quality of the photos, which would have resulted in a misleading or unreliable representation. The photos and descriptions provided are based on the author's expertise and that of numerous reviewers. However, identifying marine species can be complex, and while every effort has been made to ensure accuracy, there are inherent limitations to this catalogue.

Many marine organisms exhibit variations in colour, size, and behaviour that can make identification challenging. The taxa included here have been identified to the best of the authors' and reviewers' knowledge, but they may not account for all variations or look-alikes. We recommend consulting additional resources or seeking expert advice when precise identification is critical.

The taxa included in this catalogue are organized by major taxonomic groups: seagrasses and seaweeds, sponges, corals, echinoderms, other invertebrates, and bony and cartilaginous fishes. Within each group, taxa are arranged alphabetically by class, order, and family.

For each taxon, the scientific name is provided, including authorship. If the species could not be identified, the genus name is followed by "sp. indet." If both genus and species are undetermined, the family name is followed by "gen. et sp. indet.".

A brief description highlights key characteristics used for identification, along with the habitat where the taxon was observed. Each photograph is labeled with the station where it was captured and the depth in metres. The locations of the stations are shown in Figure 2.

# SEAGRASSES AND SEAWEEDS

## *Thalassodendron ciliatum* (Forsskål) Hartog, 1970


St. 13. Depth: 31 m


St. 36. Depth: 28 m

A common seagrass species, forming dense meadows. It has long, ribbon-like, dark-green leaves that are linear and often have serrated edges, resembling blades or straps. The plant's overall shape can be described as bushy or tufted, with leaves radiating from a central point or growing in clusters along rhizomes.
**Habitat:** sandy or muddy substrates.

Family **Hydrocharitaceae** | Class Magnoliopsida
Order Alismatales

## *Halophila decipiens* Ostenfeld, 1902



A small seagrass species, with elongated, paddle-shaped leaves arranged in pairs along the stem. The smooth leaves range from bright green to olive-green. **Habitat:** shallow waters, on sandy or muddy substrates with clear water and moderate wave action.

## *Caulerpa cupressoides* (Vahl) C.Agardh, 1817


A distinctive seaweed with upright branches resembling miniature trees or cacti. The branches are arranged in a dense, bushy manner, giving the alga a compact and sculptural form. **Habitat:** rocky substrates or coral reefs.

## *Caulerpa taxifolia* (Vahl) C.Agardh, 1817


A fast-growing seaweed with upright, feather-like branches, standing 3 to 10 cm tall. Each leafy branch is flat, slightly curved upwards, and tapers at both ends. Colour varies from dark to light green. **Habitat:** sandy bottoms, rocky outcroppings, mud, and natural meadows.

## *Halimeda* sp. indet.


A frequently encountered seaweed species characterized by distinctive connected calcified segments, reminiscent of a chain of coins. In this species, the segments are round and arranged in flat, fan-like structures. **Habitat:** shallow coral reefs.

## *Halimeda* sp. indet. 1


A different species of *Halimeda* characterized by a branched structure and oval segments, and found in isolated patches or scattered individuals. **Habitat:** sandy bottoms, attached to dead corals.

## *Udotea* sp. indet.


A seaweed species with a fan-shaped thallus with flattened, branching blades with calcified segments. It is anchored to the bottom by uncalcified tufts of rhizoids, which vary in shape depending on the substrate. **Habitat:** *Udotea* species grow isolated or in groups and prefer shallow, well-lit habitats such as coral reefs, where they contribute to the benthic ecosystem's structure and function.

# SPONGES

## Family Agelasidae

Class Demospongiae
Order Agelasida

### *Agelas oxeata* Lévi, 1961


A lobed-shaped sponge with a velvety surface texture that contributes to its distinctive appearance. The sponge is characterized by a brownish-red hue, which is a key diagnostic feature for identifying the species in its natural habitat. **Habitat:** coral reefs and rocky habitats.

## Family Axinellidae

Order Axinellida

### *Axinella weltnerii* (Lendenfeld, 1897)


An erect, flabellate or fan-shaped sponge with a rough, twisted, and wrinkled surface with shallow ridges. Colour is a dark red. **Habitat:** rocky or sand rubble substrates.

## Family Axinellidae

Class Demospongiae
Order Axinellida

### *Dragmacidon coccineum* (Keller, 1891)


This sponge has an irregularly encrusting form with a smooth surface that ranges from faintly domed to undulating. Oscules are regularly spaced and slightly elevated. It is brilliant red in color, with a whitish sheen caused by surface sand granules. **Habitat:** found on coral reefs.

## Family Stelligeridae

### *Higginsia pulcherrima* Pulitzer-Finali, 1993


This sponge features an irregularly contoured structure with multiple blades extending from a common base. Externally, it displays a dull orange coloration with ridged-shaped blades. **Habitat:** found on coral rubble.

## Family Bubaridae

Class Demospongiae
Order Bubarida

### *Phakellia* sp. indet.


An undetermined species of *Phakellia*, which includes 36 species worldwide. *Phakellia* species are generally fan-shaped with thin plates. Its fans are reinforced by thick spicule tracts, resembling veins or stout lines. **Habitat:** rocky flats and seagrass/seaweed beds.

## Family Scopalinidae

Order Scopalinida

### *Stylissa carteri* (Dendy, 1889)


An erected, lamellar sponge, usually fan-shaped, with short, stout projections covering both surfaces, forming extensive ridges that diverge towards the edges. Bright orange in colour. **Habitat:** rocky substrates.

## *Spheciospongia inconstans* (Dendy, 1887)

St. 34. Depth: 44 m

St. 40. Depth: 45 m

A massive sponge exhibiting an irregularly sub-spherical shape, with a shallow, slightly raised depression at its summit housing numerous oscules. Its surface presents a uniform appearance, devoid of protruding structures, yet adorned with numerous distinctive circular or meandering openings seamlessly integrated with the surface. Colour brownish to golden. **Habitat:** reef flats and seagrass beds.

## Family Spongiidae

Class Demospongiae
Order Dictyoceratida

### *Spongia* sp. indet.


An undetermined species of *Spongia*, which includes 78 valid species worldwide. Members of this genus are soft to firm and compressible, with a skeletal structure that includes primary fibers with foreign inclusions, and a meshwork of interconnecting secondary fibers providing flexibility and water retention. **Habitat:** sandy bottoms.

## Family Thorectidae

### *Hyrtios erectus* (Keller, 1889)


A characteristic sponge forming a club-shaped lobe that extends vertically from the substrate and features a rounded apex with the oscules, located at the apex. Its overall coloration is brown-black. **Habitat:** reefs and rocky substrates.

## *Haliclona* sp. indet.


This species belongs to the Chalinid sponges and is assigned to the genus *Haliclona*. The genus *Haliclona* comprises approximately 480 valid species globally, exhibiting a wide range of sponge forms, from erect and tube-shaped to branching structures. The textures of these sponges can vary significantly, from soft and fragile to firm and elastic. **Habitat:** *Haliclona* sponges are found across various depths but are more commonly observed in relatively shallow environments.

## Chalinidae gen. et sp. indet.


A Chalinid sponge which could not be assigned to one of the five genera in the family. Taxonomic research within this family presents challenges due to the scarcity, simplicity, and occasional variability in distinguishing characteristics among its species.

## *Xestospongia testudinaria* (Lamarck, 1815)

St. 36. Depth: 42 m

St. 36. Depth: 42 m

Commonly referred to as the giant barrel sponge, this species is morphologically unique with its large, barrel-shaped form and tough, rigid exterior. It displays a maroon to pink coloration, with a pale white opening at the top. These sponges can grow to notable sizes, reaching up to 1.5 m in height and 1 m in diameter. **Habitat:** this species primarily inhabits shallow tropical waters, especially within coral reef environments. It is commonly found in areas with hard substrates that allow it to anchor securely. It can also be found in deeper waters, extending to depths of up to 55 m. In the Saya de Malha Bank, most specimens were observed in *Halimeda* meadows.

## *Hemiasterella vasiformis* (Kirkpatrick, 1903)


A large, typically cup-shaped sponge, characterized by a slightly thickened base, firm and rubbery texture, and pinkish-purple coloration. **Habitat:** found on rocky or sand rubble substrates.

## *Liosina paradoxa* Thiele, 1899


A sponge that grows in a massive, lobose form, rising vertically from a broad base. It features branches extending upward, with oscules located at the apex. The surface appears tuberculated, with a muted, muddy grey coloration. **Habitat:** typically found on rocky substrates.

## *Aciculites tulearensis* Vacelet & Vasseur, 1965


This species is a relatively large sponge with an irregularly contoured, thick blade shape. Its inhalant side features visible subdermal canals, while the exhalant side is marked by small conical protrusions with oscules. Externally, the sponge appears dull dark brown, while internally it is a paler brown. **Habitat:** initially reported from dark tunnels and cavities within barrier reefs. It predominantly inhabits rocky substrates and is commonly associated with coral reefs.

# CORALS

## *Acropora* sp. indet.

St. 39. Depth: 45 m

St. 39. Depth: 35 m

Colonies exhibit an arborescent growth pattern, characterized by cylindrical branches that intertwine to form thickets. The axial corallites (the stony cups in which the polyps sit) are prominently exserted. These colonies typically display a cream to brown coloration, with pale branch ends. **Habitat:** commonly found inhabiting both the reef slopes and flats.

# Family Acroporidae

Class Hexacorallia
Order Scleractinia

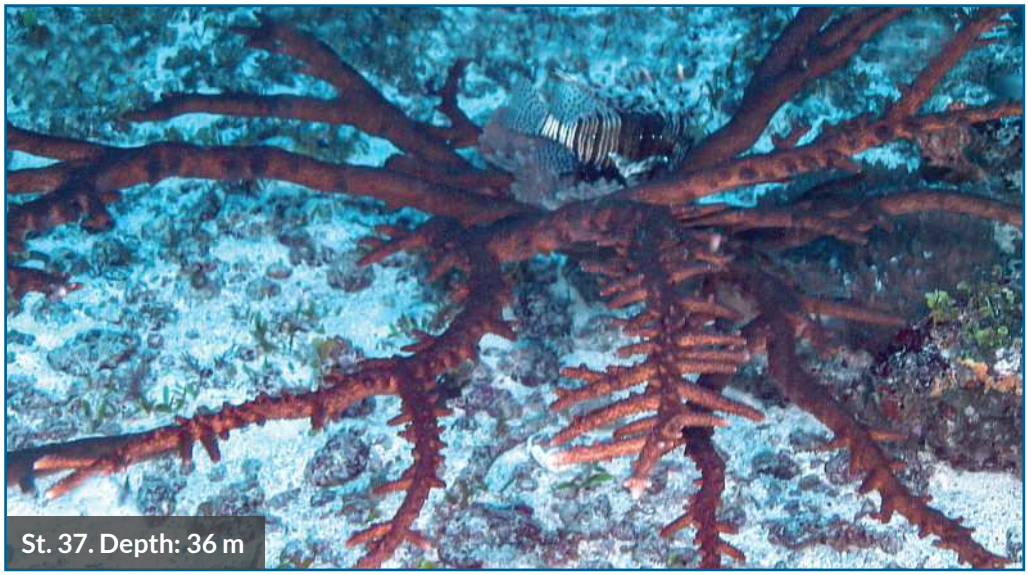
## *Acropora* sp. indet. 1


Colonies consist of open thickets of sturdy, tapered branches. Axial corallites are moderately large and tubular to dome-shaped. Radial corallites are of mixed sizes, widely spaced, and vary in length. The colonies are brown with pale tips. **Habitat:** observed in shallow reef environments.

## *Acropora* sp. indet. 2


Colonies exhibit a digitate morphology, characterized by finger-like branches arising from an encrusting, plate-like base. Branches are thick, gradually tapering to large, dome-shaped axial corallites. The colonies are brown with cream tips. **Habitat:** observed on exposed upper reef slopes and reef flats.

## *Acropora* sp. indet. 3



St. 37. Depth: 36 m

St. 37. Depth: 36 m

Colonies are arborescent with cylindrical branches and horizontally fused basal branches that have upturned ends. Radial corallites are of mixed sizes. The colonies are pale to dark brown with paler tips. **Habitat:** restricted to shallow back-reef margins.

## *Anacropora* sp. indet.


St. 39. Depth: 43 m

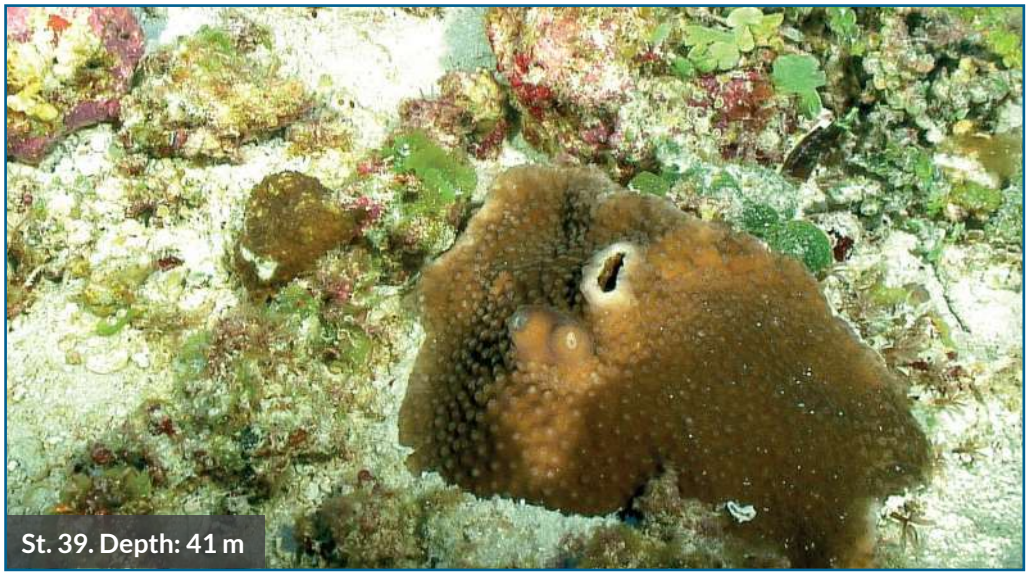

St. 39. Depth: 43 m

A species of *Anacropora* with evenly spaced branches, thick and tapered, with blunt tips. The coenosteum, the skeletal material lying between the corallites, is smooth. Colonies are pale brown with white branch tips. **Habitat:** observed in reef environments.

## *Astreopora* sp. indet.


Colonies are hemispherical, with an even surface. Corallites are evenly spaced and conical with rounded, upright or outwardly directed openings. The coenosteum has outwardly directed papillae. They are brownish in colour. **Habitat:** observed in reef environments.

## *Astreopora* sp. indet. 1

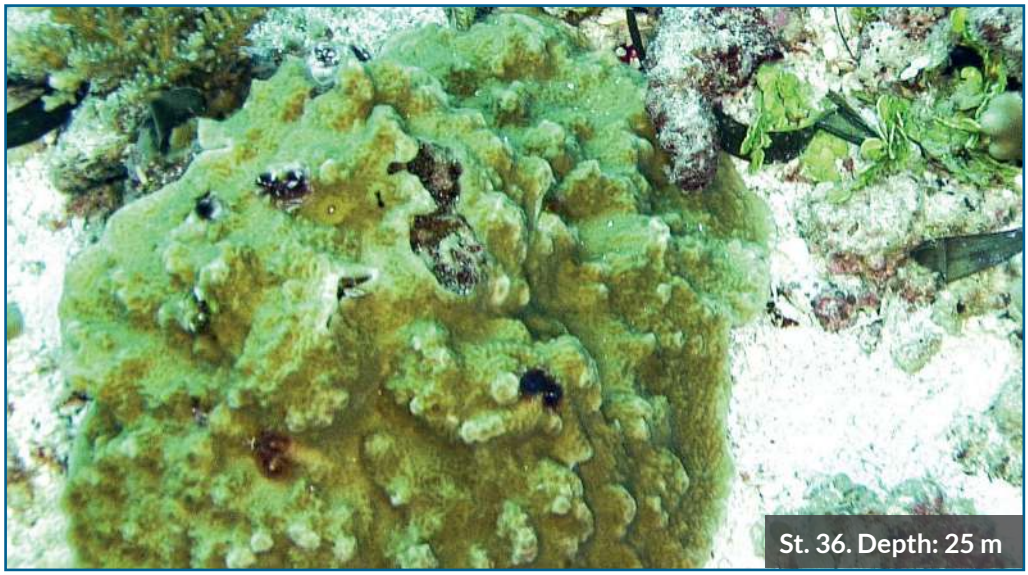



Colonies take on an encrusting form, with thick-walled and conical corallites. The coenosteum between the corallites presents a darker brown hue compared to the corallite walls. **Habitat:** observed in reef environments.

# Family Acroporidae

Class Hexacorallia
Order Scleractinia

## *Montipora* cf. *undata* Bernard, 1897




A colony characterized by its encrusting growth, featuring small, immersed, and indistinct corallites. The coenosteum exhibits tuberculae fused into ridges. Typically brown with pale growing margins. **Habitat:** observed on upper reef slopes.

## Acroporidae gen. et sp. indet.


An Acroporid species with colonies forming clusters of thin, irregularly fused branches. The corallites are small and immersed, while the coenosteum is smooth. The coloration is pale brown with white tipped branches. **Habitat:** reef environments.

## *Leptoseris* sp. indet.

St. 39. Depth: 43 m

St. 39. Depth: 41 m

Coral colonies may be horizontal to vertical with unifacial and irregular fronds, which form upright cylindrical tubes. **Habitat:** observed in reef environments. **Note:** *Leptoseris* species in Indian Ocean waters typically exhibit horizontal to vertical unifacial fronds, whorls of broad fronds, or take on encrusting forms, rather than tubular structures. The species observed here could potentially represent the initial documentation of the tubular species, *Leptoseris tubulifera*, which has yet to be documented in this area.

## Fungiidae sp. indet.

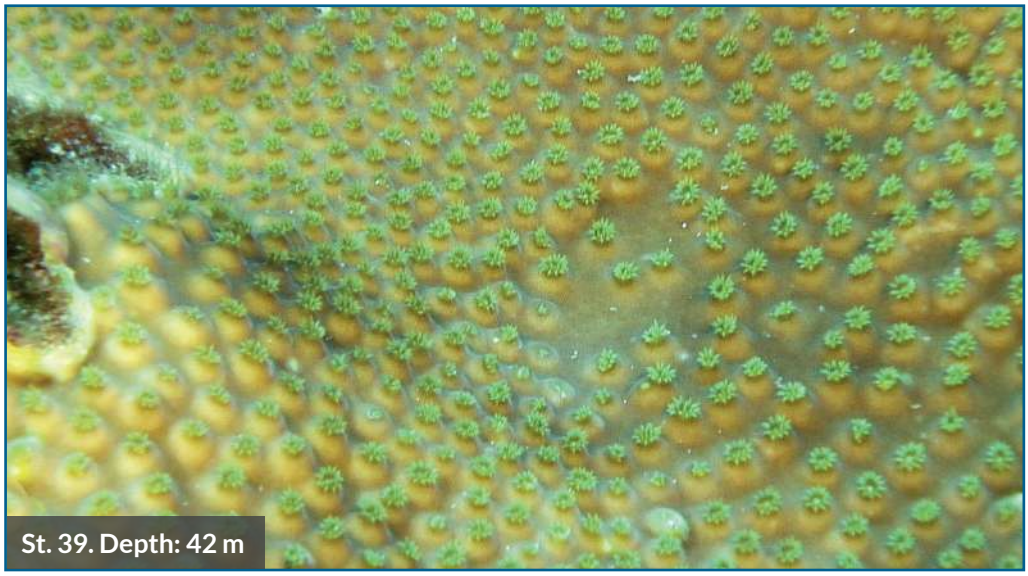

A solitary, free-living coral with circular and arched polyps. Tentacles are often extended during the day. **Habitat:** reef slopes or flat shallow substrates.

## Fungiidae sp. indet. 1


A solitary, free-living coral with distinctly non-circular polyps. **Habitat:** reef slopes and shallow reef environments.

## *Turbinaria* cf. *mesenterina* (Lamarck, 1816)


St. 39. Depth: 42 m


St. 39. Depth: 42 m

Colonies of this coral species feature unifacial laminae, which can be contorted and fuse together in subtidal environments, grow upright on upper reef slopes, or spread horizontally in deeper waters, as shown here. These growth patterns are influenced by the availability of light. Typically, colonies are less than 1 m in size but can be substantially larger in fringing reef areas. Corallites are densely packed, slightly protruding, Colour is usually grey-green or grey-brown. **Habitat:** diverse, especially in turbid waters and around reef bases.

## Family **Lobophylliidae**

Class Hexacorallia
Order Scleractinia

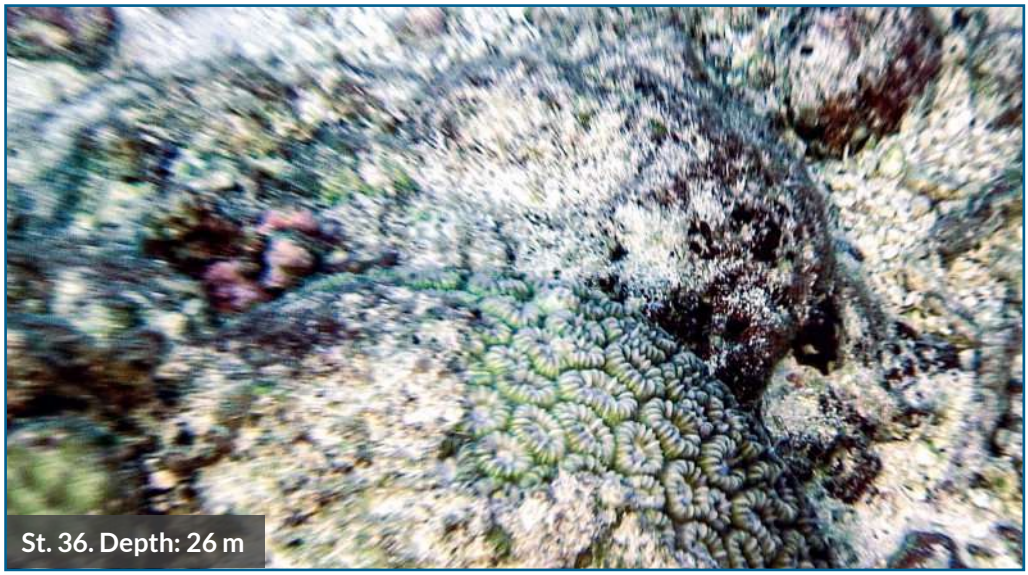
### *Lobophyllia* cf. *hemprichii* (Ehrenberg, 1834)

St. 39. Depth: 42 m

St. 39. Depth: 42 m

Colonies exhibit a flat to hemispherical morphology and can span more than 5 m in diameter. Their growth forms range from phaceloid to flabello-meandroid, with the corallites arranged in irregularly winding or maze-like patterns. Septa gradually taper in thickness from the coral wall towards the columella, featuring tall, sharp teeth. When retracted, polyps appear thick and fleshy, presenting either smooth or rough mantles. **Habitat:** reef slopes.

## *Astrea* sp. indet.




Colonies are irregularly sub-massive or encrusting. Corallites are circular. **Habitat:** shallow environments, especially reef flats.

## *Dipsastraea* cf. *rotumana* (Gardiner, 1899)



Often flat and subplocoid. Corallites are clearly subplocoid on convex surfaces; crowded on flat surfaces, becoming cerioid and irregularly shaped. **Habitat:** reef associated in shallow waters.
**Note:** the genus *Dipsastraea* was previously known as *Favia*.

## Family Merulinidae

Class Hexacorallia
Order Scleractinia

### *Dipsastraea* sp. indet.


Colonies are dome-shaped or flat. Corallites are thick walled and circular, ranging within and among colonies from fully plocoid to cerioid. **Habitat:** reef slopes and lagoons.
**Note:** the genus *Dipsastraea* was previously known as *Favia*.

### *Favites* cf. *abdita* (Ellis & Solander, 1786)


Colonies are massive, either rounded or hillocky and sometimes over 1 m across. Corallites are rounded, with thick walls. **Habitat:** reef environments.

## *Favites* cf. *vasta* (Klunzinger, 1879)


Colonies are massive and are commonly over 1 m across. Corallites are deep and angular and have very thick walls. **Habitat:** most reef environments.

## *Oulophyllia crispa* Lamarck, 1816


Colonies are sub-massive or hemispherical and are frequently over 1 m across. Valleys are short, broad, V-shaped and have sharp upper margins. **Habitat:** shallow reef environments.

## *Paramontastraea peresi* (Faure & Pichon, 1978)


Colonies are encrusting and helmet-shaped. **Habitat:** shallow reef environment.

## *Platygyra* cf. *acuta* Veron, 2000


Colonies are massive and meandroid, with walls forming an acute or sharp edge. Septa are uniformly exsert and have ragged margins. **Habitat:** most reef environments, especially shallow fringing reefs.

## Family Merulinidae

### *Platygyra* cf. *daedalea* (Ellis & Solander, 1786)


Colonies are generally massive, and meandroid or submeandroid, with thick walls. Septa are exsert and have a characteristically ragged appearance. **Habitat:** Most reef environments, especially back reef margins.

## Family Pocilloporidae

### *Pocillopora* sp. indet.


Colonies are cespitose, i.e., growing in small dense clumps, with main branches often rounded at the base. **Habitat:** shallow reef environments.

## *Pocillopora* sp. indet. 1


Colonies are cespitose, i.e., growing in small dense clumps, with main branches often rounded at the base. **Habitat:** shallow reef environments.
**Note:** the photo shows a colony of *Pocillopora* sp. on the right side and a colony of *Stylophora* on the left side, identified as *S. madagascarensis* by F. Benzoni.

## *Stylophora* sp. indet.


Colonies are ramose, i.e., with many branches which can be slender, digitiform or palmate. **Habitat:** shallow reef environments.

## *Goniopora* sp. indet.

St. 32. Depth: 46 m

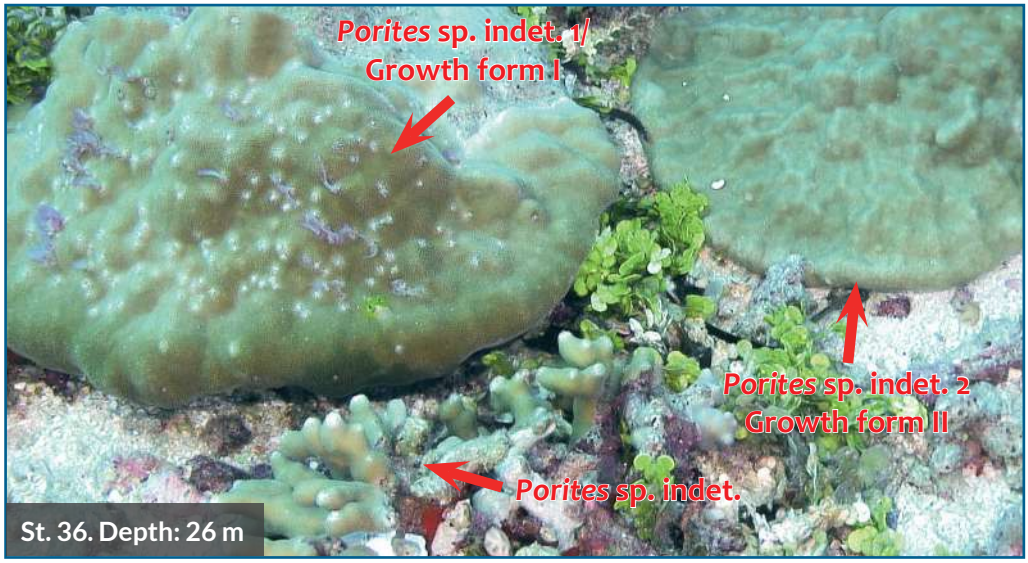
St. 32. Depth: 46 m

Colonies are submassive. Living colonies are usually brown, either pale or dark. They are readily distinguished by having numerous daisy-like polyps that extend outward from the base, each tipped with 24 stinging tentacles which surround a mouth. **Habitat:** many reef environments including turbid waters.

# Family Poritidae

Class Hexacorallia
Order Scleractinia

At least three growth forms of ***Porites*** were observed in the area. Here, we distinguish between branched and massive colonies, considering the branched colonies as a separate species from the massive ones. It remains unclear whether these two growth forms represent morphological plasticity or signify distinct species.

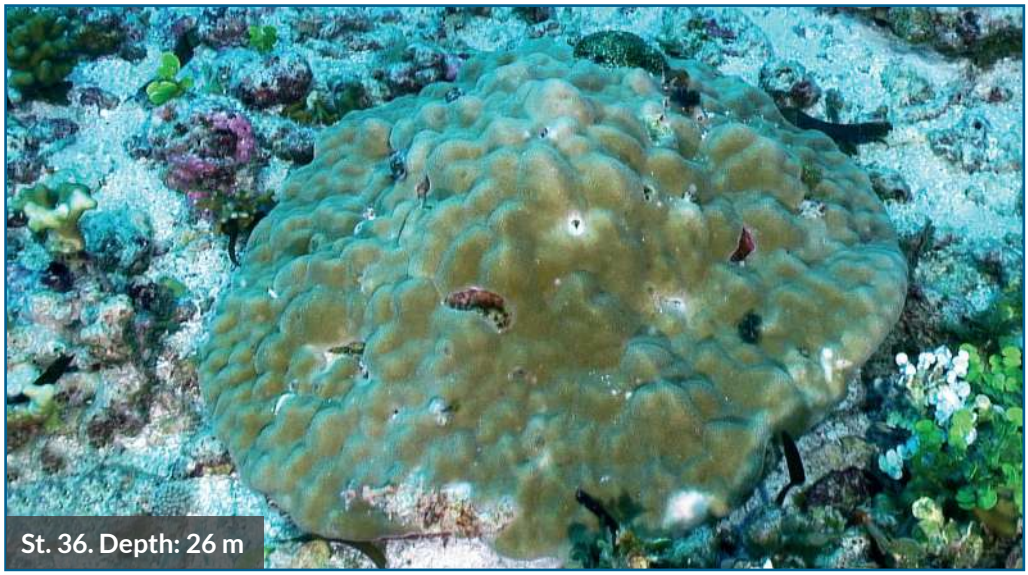



## *Porites* sp. indet.


Colonies of this species or morphotype exhibit knobbly growth forms with short, stumpy branches. **Habitat:** reef flats.

**Note:** several colonies with a knobbly growth form were observed at station 36. They were identified as *Porites* cf. *fontanesii* by L. De Vantier, a species that was described by Benzoni and Stefani in 2012 from the southern Red Sea and the Gulf of Aden. Here we designate it as *Porites* sp. indet. as F. Benzoni did not confirm its status as this specific species.

## *Porites* sp. indet. 1 (Growth form I)

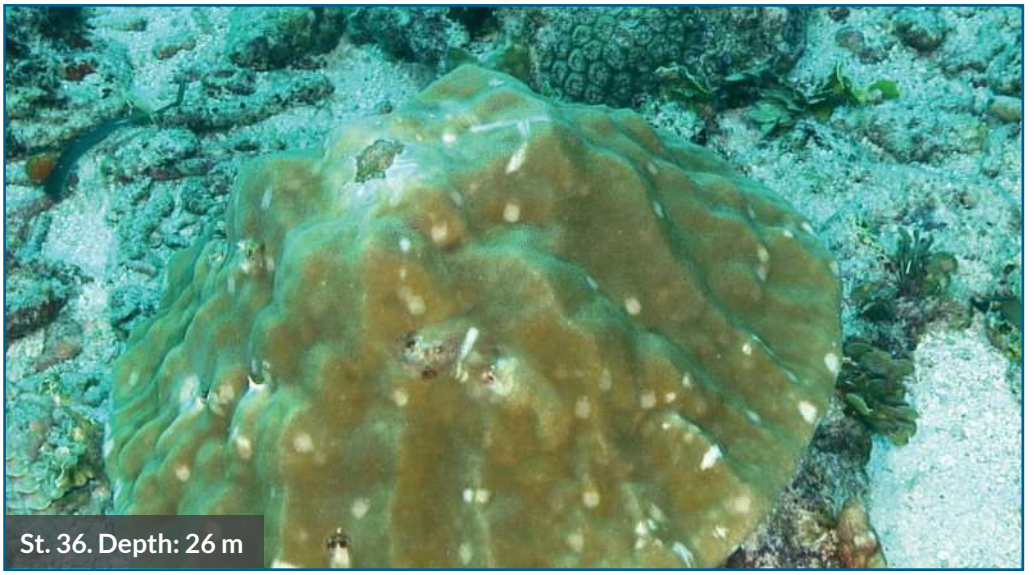


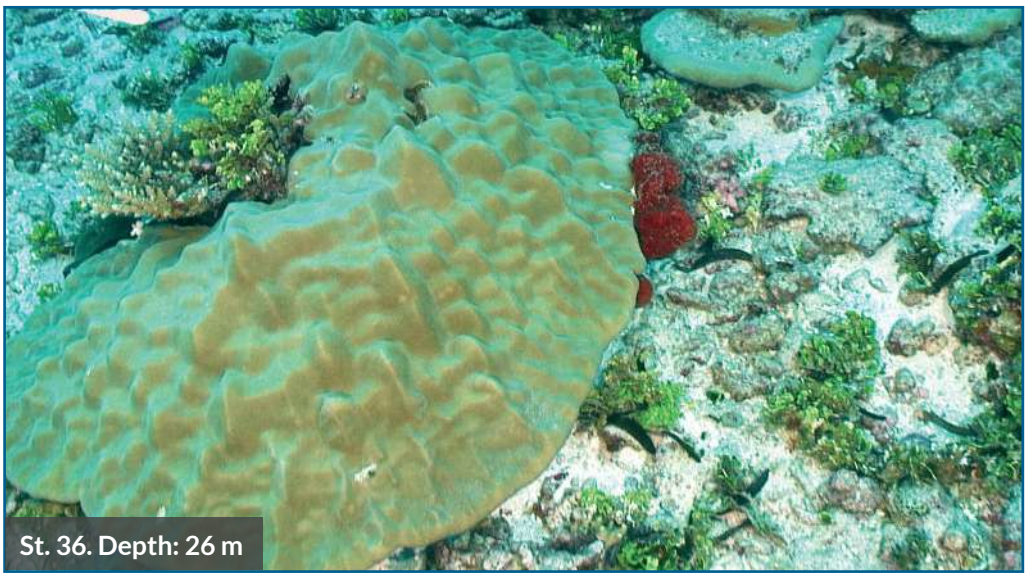
St. 36. Depth: 26 m

St. 36. Depth: 25 m

Colonies of this species or morphotype are cream or brown in colour, massive, reaching sizes exceeding 1 m in diameter, and exhibit a bumpy growth surface with rounded knobs. **Habitat:** reef flats.

## *Porites* sp. indet. 2 (Growth form II)




Colonies of this species or morphotype resemble *Porites* sp. indet. 1 in their massive structure and cream or brown coloring. However, their knobs displayed distinct sharp corners. **Habitat:** reef flats.

## *Heliopora* cf. *coerulea* (Pallas, 1766)


St. 36. Depth: 26 m


St. 36. Depth: 26 m

Commonly known as the blue coral due to the presence of iron salts in its skeleton. Colonies consist of thin, vertical brown branches with eight-tentacled polyps, giving the surface a hairy appearance. It has three main growth forms: columnar, lobate, and encrusting, exhibiting high morphological plasticity and continuous variation among these forms. It can form very large colonies, especially in reef lagoons. The International Union for Conservation of Nature (IUCN) classifies it as a threatened species. **Habitat:** reported from a wide range of environments, including intertidal reef flats, wave-exposed reefs, reef fronts, reef slopes (from less than 1 m to over 60 m deep), and marginal habitats.

## *Heliopora* sp. indet.

St. 36. Depth: 39 m

St. 39. Depth: 32 m

Until 2018, *Heliopora* was known to consist of only a single valid species, *H. coerulea*, and all descriptions available actually refer to this species. However, in 2018, Richards *et al.* described a new species, *H. hiberniana*, which has a white skeleton instead of blue and is currently known only from offshore areas in northern Western Australia. The morphological descriptions of both species are very similar, except for the colour of the skeleton when broken. **Habitat:** observed on reef flats.

## Family Ellisellidae

Class Octocorallia
Order Scleralcyonacea

### Ellisellidae gen. et sp. indet.


Colonies observed are attached to a hard surface by a holdfast. They are bushy with dense branches protruding from a narrow, hollow, cross-chambered central core. The spicules are calcareous and less than 0.3 mm in length while the polyps are retractable. **Habitat:** shallow reef to mesophotic environments.

## Family Isididae

| Order Malacalcyonacea

### Isididae gen. et sp. indet.


This colony was tentatively identified as a member of the Isididae (Benayahu, pers. comm.). **Habitat:** observed on reef flats.

## *Rumphella* sp. indet.


St. 36. Depth: 39 m


St. 39. Depth: 25 m

Possibly a species of *Rumphella* with colonies typically bushy, with either sparse, whip-like branches or dense shrub-like branches that have a smooth surface and blunt tips. Light brown to greyish colour. **Habitat:** observed on reef flats.

## *Lobophytum* sp. indet.


Colonies have a thick encrusting morphology and a raised surface. They have two types of polyps: large autozooids that extend from the crown (capitulum) and small siphonozooids embedded in it. They exhibit a distinct "hairy" appearance when the autozooids are extended. *Lobophythum* possess thick-fleshed, digitate outgrowths on short stalks at the edges of the capitulum, whereas *Sarcophyton* do not. **Habitat:** shallow reef waters, but also on hard substrates in deeper waters.

## *Sarcophyton* sp. indet.


Colonies have a prominent bare stalk and a large, smooth upper surface with distinct convoluted edges. As *Lobophyton*, *Sarcophyton* species have two types of polyps: large autozooids and small siphonozooids. The underside of the coral is visible where the edges are folded upwards. **Habitat:** usually found in sheltered back reef and lagoonal habitats, but in the area on hard substrates in deeper waters.

## *Millepora* sp. indet.


Colonies have a calcareous skeleton with diverse growth-forms, from fine branching domes, encrusting sheet-like, to laminar. Colonies are brownish with a pale yellow hue. **Habitat:** observed on shallow reefs.

**Note:** at least three species have been reported in the Western Indian Ocean, differing in pore size and arrangement, colony branching, shape and colour. Individuals also differ depending on local conditions.

Sting is painful, burning, hence the common name, Fire Coral but not a true coral.

# ECHINODERMS

## *Holothuria atra* Jaeger, 1833

St. 39. Depth: 32 m

A sea cucumber with a uniformly black body, commonly covered with medium-grain sand, with characteristic bare circles in two rows along the dorsal surface. Podia on the dorsal surface small and sparse. Tentacles black. **Habitat:** inner and outer reef flats, and seagrass beds, 0–30 m deep. Found in Mauritius and the Saya de Malha Bank, often near *Halimeda* sp.

## *Holoturia coronopertusa* Cherbonnier, 1980

St. 34. Depth: 46 m

A sea cucumber typically orange-brown dorsally and light-peach ventrally, with light to dark brown dorsal papillae spread over the entire surface, larger near the mouth and anus. **Habitat:** reported to forage on coralline sand, both during the day and during the night, in relatively deep waters 20–100 m deep.

## Family Stichopodidae

Class Holothuroidea
Order Holothuriida

### *Stichopus* cf. *pseudohorrens* Cherbonnier, 1967

St. 37. Depth: 34 m

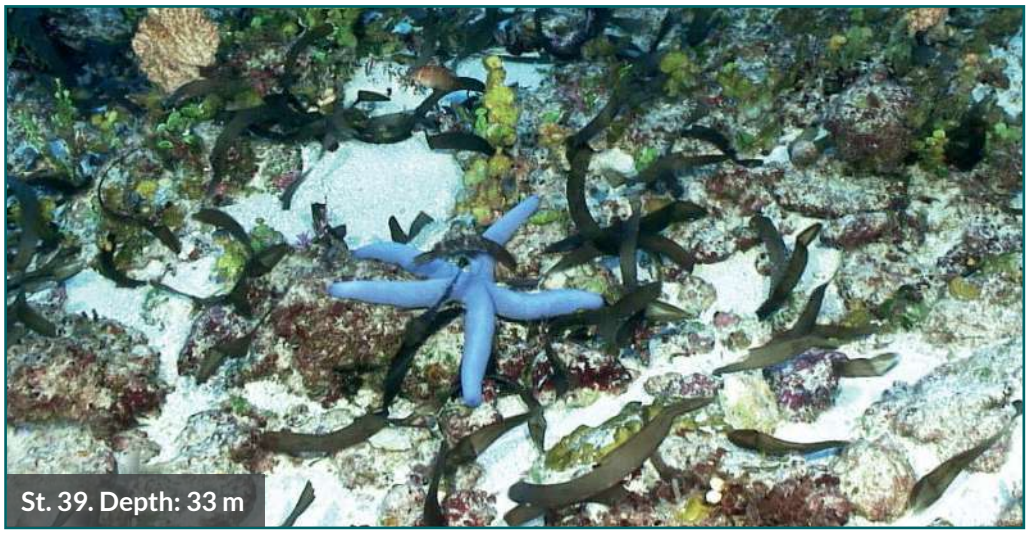
A large sea-cucumber, brownish-yellow to rosy red or brown with darker mottling. Body arched dorsally and flattened ventrally. Very long, large conical papillae dorsally. Long papillae also occur along the lateral margins of the ventral surface. The mouth is ventral, with 20 long dark brown tentacles. **Habitat:** hard bottoms with coral rubble and sand.

### *Thelenota ananas* (Jaeger, 1833)

St. 39. Depth: 33 m

A characteristic sea cucumber with large papillae covering the dorsal surface, appearing conical, star-shaped, or somewhat branched. The colour dorsally varies from reddish-orange to brown, ventrally light pink, with podia ranging from brown to pink. Body firm, arched dorsally, flattened ventrally. Mouth ventral with 20 large, brown tentacles. **Habitat:** hard bottoms with large coral rubble, and coral patches.

## *Linckia* cf. *laevigata* (Linnaeus, 1758)




A starfish with five cylindrical arms and a bright blue or light blue body, though other colors have been observed. It can grow up to 30–40 cm across. Identification is tentative and based on coloration; confirmation would require a close-up view of the underside. **Habitat:** shallow reef areas exposed to the sunlight, among sponges, macroalgae and seagrasses and on rocks, dead coral or rubble at depths of 0 to 60 m.

## *Linckia* sp. indet.


A starfish of the genus *Linckia*, with long conical arms that are yellowish mottled with brown near the center and dark brown towards the tips. Dr. Mah tentatively identified it as *Linckia profunda*, the mesophotic species of *Linckia* described from the Pacific Ocean. **Habitat:** observed on a sand and rubble bottom at 58 m depth.

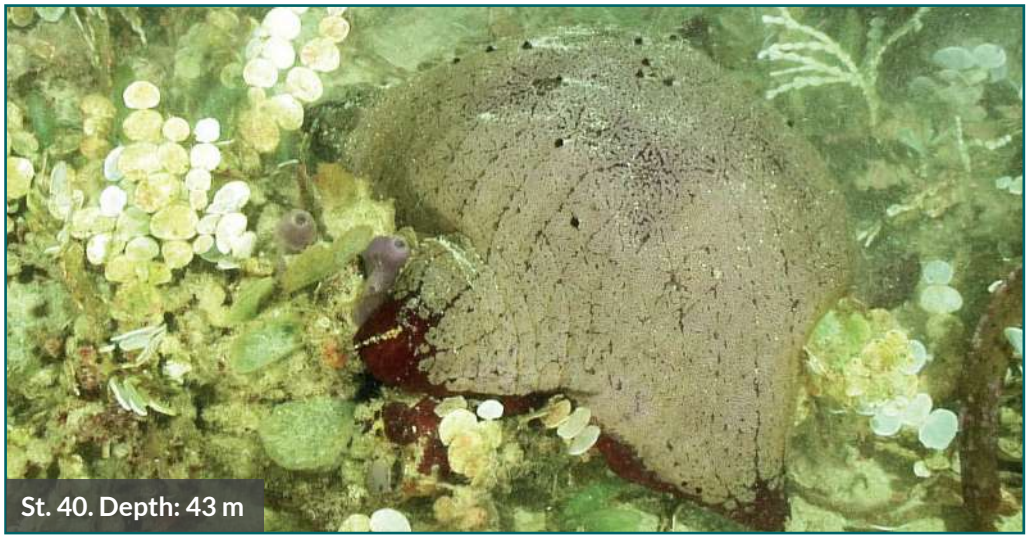
## *Culcita* cf. *novaeguineae* Müller & Troschel, 1842


A cushion star, morphologically very similar to *C. schmideliana*, predominantly found in the eastern Indian and Pacific Oceans. Provisionally identified as *C. novaeguineae* due to the absence of large, dark granules or nodules on its body surface. **Habitat:** lagoon areas and on inner reef flats with seagrasses and among algae at depths down to about 90 m depth.

## *Culcita schmideliana* (Retzius, 1805)


A peculiar cushion star with a leathery, puffed-up appearance, featuring a convex upper surface and a flat underside. Coloration varies, but large dark granules are present, with variation in their abundance. **Habitat:** lagoon areas and on inner reef flats with seagrasses and among algae at depths down to about 90 m depth.

## *Pentaceraster* sp. indet.




Members of the genus *Pentaceraster* differ from those belonging to *Protoreaster*, by having spines on the marginal plates between the arms. Dr. Mah identified this specimen as possibly *P. alveolatus*, an Indo-West Pacific species commonly known as the Cushion sea star, which occurs in sandy-rocky intertidal regions and on reef platforms at depths between 1 and 60 m.

## *Protoreaster lincki* (Blainville, 1830)


A large starfish, 25–30 cm, with a rigid body, white to light gray dorsally, but traversed by a vivid red network connecting large, blunt tubercles, which can be slightly sharper and denser at the ends of the arms; their shape, size, and number vary considerably. *Protoreaster* species lack spines on the marginal plates between the arms. **Habitat:** sandy bottoms and seagrass meadows from shallow waters, down to 100 m depth.

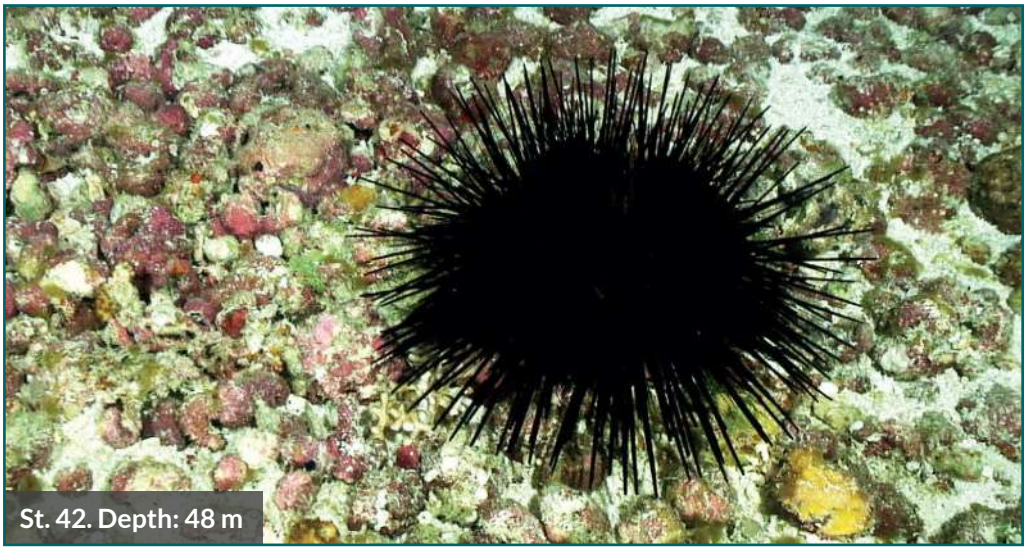
## Family Diadematidae

Class Echinoidea
Order Diadematoida

### *Echinothrix calamaris* (Pallas, 1774)


Commonly known as the Black banded sea urchin, this species has two sets of spines: short, slender, yellow-to-dark spines, and longer, thicker spines, often banded. A translucent large anal sac surrounded by visual receptors for rudimentary vision is visible on the aboral side. **Habitat:** lagoons, external reef slopes and channels down to 70 m depth.

### *Echinothrix diadema* (Linnaeus, 1758)




A sea urchin with long, slender spines generally black or blue-black in colour (the spines show a blue sheen in the light). Anal sac is small and dark. Their round body, or test, features five star-patterned naked zones called iridophores, which can be brightly colored. **Habitat:** coral reefs, rocky substrates, and seagrass beds, often in shallow waters but can also be found at greater depths.

## Family Cidaridae

Class Echinoidea
Order Cidaroida

### Cidaridae gen. and sp. indet.


A sea urchin belonging to the family Cidaridae. Members of this family have robust, thick spines and their body, or test, is typically covered in secondary spines and tubercles, giving them a rough appearance. **Habitat:** shallow coastal habitats to the deep ocean floor.

## Family Toxopneustidae | Order Camarodonta

### *Toxopneustes pileosus* (Lamarck, 1816)


Commonly known as the Flower urchin, it is notable for its colorful, petal-like pedicellariae which can resemble flowers. It has short, blunt spines that are often hidden by these pedicellariae. This species is venomous and can deliver painful stings. **Habitat:** shallow coastal habitats.

# OTHER INVERTEBRATES

## Family Conidae

Class Mollusca
Order Gastropoda

### *Conus* cf. *tessulatus* Born, 1778


A sea snail species, robust and conical in shape, with a highly variable coloration that generally features a pattern of tessellated or checkered markings. The base color can range from white to yellowish or pale brown, with darker brown, orange or reddish tessellated patches. The base of the shell is sometimes dark colored. **Habitat:** shallow waters, commonly found on sandy or rocky substrates, coral reefs, inner reef platforms, and deeper areas.

## Family Strombidae

### *Lambis* cf. *lambis* (Linnaeus, 1758)


A sea snail species with a thick and heavy shell, variable in colour, often displaying a combination of brown, cream, orange, and pink hues. The exterior of the shell may be mottled or patterned. The aperture is wide and flaring. The outer lip is flared, thickened and expanded, with six distinctive finger-like projections or spines of the shell (that resemble spider legs) radiating outward. **Habitat:** mangrove areas, seagrass beds, reef flats and coral-rubble bottoms in shallow to deeper waters.

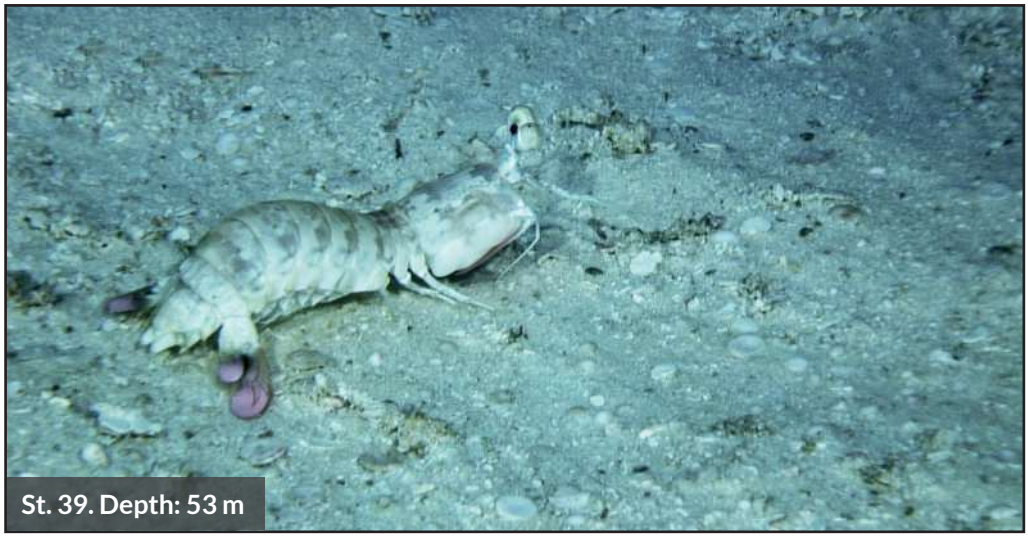
## *Phyllidiopsis quadrilineata* (Bergh, 1905)


A nudibranch species with a very light background colour and a distinct pattern of longitudinal black lines on the dorsum. The rhinophores (a pair of external chemosensory structures on the head) and rhinotubercles (tubercles on the mantle) are yellow. There are three to five, longitudinal, blue grey to pale grey ridges (broken or continuous) joining the tubercles. A central ridge is always present. Towards the margins of the dorsal surface or notum, there are usually short, transverse ridges. **Habitat:** frequently found on the fore reef zone and the reef flat zone. Some are also found in moderately deep to shallow waters.

## *Odontodactylus japonicus* (De Haan, 1844)


A Mantis shrimp species overall salmon in colour. Uropod yellow; exopod with outer movable spines yellow orange with blue posterior margin; endopod and distal segment of exopod with red setae. **Habitat:** sandy and shelly bottoms.

## *Odontodactylus latirostris* Borradaile, 1907




A Mantis shrimp species overall mottled light brown on white-cream, with darker brown mid-dorsal surface. Uropod with black band across proximal segment of exopod, adjacent protopod and endopod; exopod distal segment pink. **Habitat:** sandy and shelly bottoms.

# BONY AND CARTILAGINOUS FISHES

## Family Muraenidae

Class Actinopterygii
Order Anguilliformes

### *Gymnothorax favagineus* Bloch & Schneider, 1801

St. 36. Depth: 38 m

A moray eel with moderately sized teeth, bold coloration of narrow yellow reticulations enclosing dark brown to black polygons (dark honey-comb-like pattern); colour of uniform intensity on head, body and fins, and continuing into mouth. **Habitat:** rocks and crevices of reef flats and outer reef slopes of continental reefs. **Note:** the cardinal fish *Ostorhinchus nigrofasciatus* at the bottom right.

## Family Holocentridae | Order Beryciformes

### *Myripristis botche* Cuvier, 1829

St. 39. Depth: 41 m

A soldierfish with head red anteriorly; postorbital head and body silvery white, edges of scales dark; opercular membrane black from about ½ distance from opercular spine to pectoral-fin base; spinous dorsal fin whitish basally; other median fins red with white leading edges, and lobe tips with large black spots; paired fins whitish. **Habitat:** reef-associated.

## *Myripristis* sp. indet.


A soldierfish with red body, large scales with darker edges; black on opercular membrane; fins with white leading edge (except for pectoral fins). **Habitat:** reef-associated.

## *Sargocentron* cf. *seychellense* (Smith & Smith 1963)


A squirrelfish with alternating stripes of brownish red (darker dorsally) on body; 2 pairs of brownish red stripes on sides of body converging on peduncle; head red dorsally, yellowish ventrally; opercle silvery with 2 brownish red bars, and an oblique reddish brown band from eye to corner of preopercle; pectoral-fin base red, axils dark brown; spinous dorsal fin with pale red spines, other fins mainly yellowish; upper and lower margins of caudal fin red. **Habitat:** shallow waters, coral reefs and rocky shores.

## Family Holocentridae

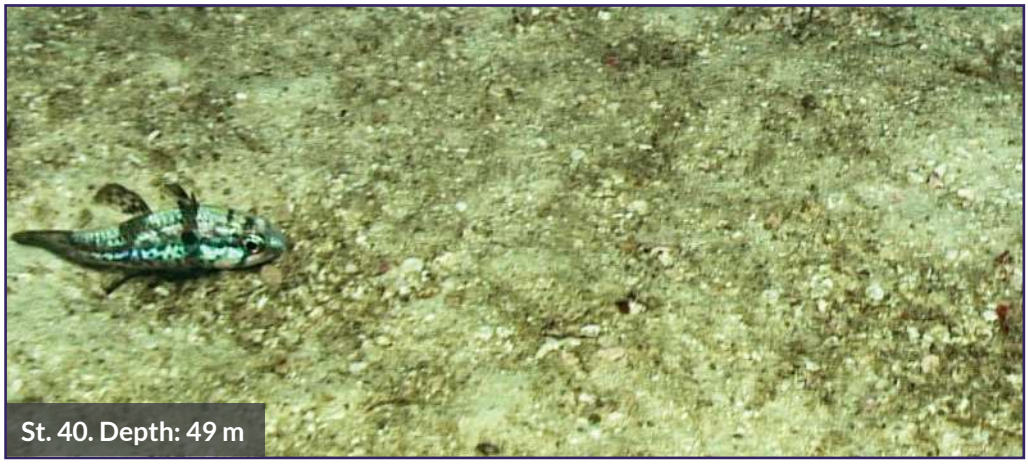
Class Actinopterygii
Order Beryciformes

### *Sargocentron* cf. *diadema* (Lacepède 1801)


A squirrelfish with alternating stripes of red and silvery white on body, red stripes much broader than white ones; spinous dorsal fin deep red to reddish black, membrane tips white, usually with curving longitudinal white band along lower third of fin. **Habitat:** coral reefs, between 2 and 42 m depth.

## Family Apogonidae | Order Gobiiformes

### *Apogonichthyoides pharaonis* (Bellotti, 1874)




Cardinal fish with body generally bronzy dorsally and silvery ventrally, with 3 dark brown to black bars, 1st bar joining dark leading edge of 1st dorsal fin and extends downwards through large ocellated dark spot and fading near ventrum; 2nd bar extending from middle of 2nd dorsal fin to middle of anal fin; 3rd bar across rear of peduncle; cheeks with narrow dark mark from eye to preoperple ridge. **Habitat:** silty reefs, mangroves, seagrass beds..

## *Amblyeleotris periophthalma* (Bleeker, 1853)

St. 36. Depth: 38 m

St. 9. Depth: 57 m

A shrimpgoby with head and body whitish to pale yellowish, 5 orange to reddish brown blotchy bands; pale interspaces on body with brownish to orange mottling and spots; similarly coloured round spots on head; 2 red spots or 1 blotch at corners of mouth; caudal-fin base with a curved brownish bar. **Habitat:** sandy and coral-rubble substrates, between 10 and 25 m depth.

## Family Gobiidae

### *Valenciennea* cf. *wardii* (Playfair, 1867)

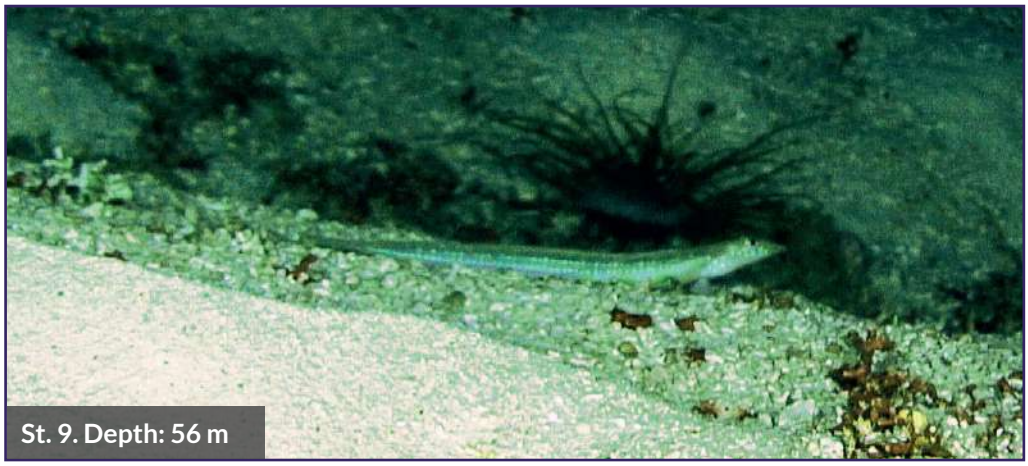

St. 9. Depth: 57 m


St. 39. Depth: 53 m

A glidergoby with 1st dorsal fin rounded; head and body pale grey to pearly white; 3 brown dark-margined bars on body and similar bar across distal half of caudal fin; oblique iridescent blue-white stripes below eyes, on sides of head; rear of 1st dorsal fin with large black spot, and 2 black bars on lower part of 2nd dorsal fin. **Habitat:** silty sand, observed between 16 to 60 m depth.

## Family Trichonotidae

### *Trichonotus* cf. *marleyi* (Smith, 1936)


St. 9. Depth: 56 m

A sand-diver with a yellowish body dorsally, pale reddish ventrally with translucent bluish green and red spots; iris flap golden. Males with up to 14 indistinct dark markings and 3 longitudinal rows of small brilliant bluish white spots on upper half of body; fins transparent; dorsal- and anal-fin rays with small yellowish dots. Females with indistinct narrow dark stripe above lateral line; dorsal and caudal fins with small yellow to dark brown spots. **Habitat:** sandy bottoms.

## Family Callionymidae

Class Actinopterygii
Order Sygnathiformes

### *Synchiropus* cf. *sechellensis* Regan, 1908


A species of dragonets with snout shorter than eye diameter, head and body rose-pink or red-orange, white ventrally, with irregular broad red bars and narrower white blotches; 1st dorsal fin of males with small brown ocelli, fin of females alternatively spotted with black and white; caudal fin with 2 red-orange bars. **Habitat:** soft bottoms, 37 to 68 m depth.

## Family Fistulariidae

### *Fistularia* cf. *commersonii* Rüppell, 1838


A flutemouth species with a body uniformly olive-green or brownish dorsally, with pair of blue or green lines and/or rows of blue spots; silvery white ventrally; median fins pinkish distally; caudal filament white. **Habitat:** coral reefs and seagrass beds, to at least 120 m depth.

# Family Carangidae

Class Actinopterygii
Order Carangiformes

## Carangidae gen. et sp. indet.

St. 37. Depth: 36 m

A trevally or scad with fusiform body, compressed laterally. Dorsal fin usually divided into separate spinous and soft-rayed fins; caudal fin strong, widely forked, with slender peduncle; scales in posterior (straight) part of lateral line often modified as scutes. **Habitat:** pelagic, usually in schools.

# Family Echeneidae

## *Echeneis naucrates* Linnaeus, 1758

St. 34. Depth: 46 m

A remora with robust, elongated body; sucking disc large, with 21–28 laminae; caudal fins convex to almost truncate in adults, and lanceolate in juveniles. Body brown to black, with pale bands. **Habitat:** near and far from the coast, often free-swimming in shallow inshore areas and around coral reefs. Temporarily attaches to hosts like sharks, rays, large fish, sea turtles, whales, dolphins, and ships.

## Family Epinephelidae

Class Actinopterygii
Order Perciformes

### *Variola louti* (Forsskål, 1775)


A lyretail with variable colour: head, body, and median fins range from yellowish-brown to orange-red, covered with small blue, lavender, or pink spots. Median-fin margins are yellow, pectoral fins red to brown with yellow tips. **Habitat:** offshore coral reefs, usually > 15 m depth, in clear waters.
**Remarks:** in Mauritius, a specimen caught from oceanic banks weighing more than 3 kg when ungutted or more than 2.6 kg when gutted is considered toxic. If caught in Mauritius's territorial waters, it is considered toxic if it weighs more than 1.5 kg when ungutted or more than 1.3 kg when gutted.

## Family Scorpaenidae

### *Dendrochirus hemprichi* Matsunuma, Motomura & Bogorodsky, 2017


A species of lionfish with dark reddish brown to scarlet red body, with 5 or 6 broad darker saddles, sometimes with pale areas between them; 3 indistinct dark red bars below eyes; dorsal fin spines red or reddish brown, with small dark spots; pectoral fins with 4–10 dark brown to reddish bars, alternating with pale whitish to yellowish area. **Habitat:** reef-associated, to about 70 m depth.

## Family Scorpaenidae

### *Pterois miles* (Bennett, 1828)


St. 39. Depth: 47 m

A firefish with numerous dark red or brown vertical bars, of irregular width; 4 or 5 stripes radiate from the eyes; supraocular cirrus usually dark brown or black; dorsal-fin spines with dark brown, dark grey or dark red areas alternating with nearly white areas; dorsal, anal and caudal fin rays with numerous black spots, membranes translucent. **Habitat:** reef-associated.

## Family Zanclidae

### *Zanclus cornutus* (Linnaeus, 1758)


St. 39. Depth: 30 m

Known as the Moorish idol, it has compressed disc-like body, with 2 broad vertical black bars (one bar from dorsal fin origin, across head and covering anterior body and pectoral and pelvic fins, the 2nd bar on rear of body; caudal fin black with white margin; dorsal fin extending into a long filament. **Habitat:** coral and rocky reefs.

## *Naso brevirostris* (Cuvier, 1829)


A unicorn fish with a broad, tapering horn extending up to one head length forward of the mouth in adults, appearing as a bump in fish under 10 cm total length; moderately developed keels on each side of the peduncle; caudal fin truncate to slightly rounded. Body pale bluish-grey to olive-brown with fine vertical dark grey lines on midsides, ending as rows of spots ventrally; head with small dark spots or reticular lines, and horn with oblique dark lines. **Habitat:** reef-associated.

## *Naso hexacanthus* (Bleeker 1855)


A brownish to bluish-grey surgeonfish becoming yellowish below, with a black margin on the cheek and gill cover. Capable of rapidly changing to pale greyish blue overall, as when at a wrasse cleaning station. **Habitat:** inshore reefs and coral-rich areas.

## Family Haemulidae

### *Diagramma centurio* Cuvier, 1830


A species of rubberlip with dusky greyish body, with numerous small brownish yellow spots on head, back, sides, upper part of caudal fin, and sometimes over entire caudal fins. **Habitat:** reef-associated.

## Family Lutjanidae

### *Lutjanus sebae* (Cuvier, 1816)


A snapper with reddish body, becoming paler ventrally. Juveniles and subadults silvery white, with 3 broad reddish brown bands (1st from snout tip to dorsal-fin origin, 2nd vertical through spinous dorsal fin to pelvic fins, 3rd from beneath anterior dorsal-fin rays to lower leading edge of caudal fin); bars fade with growth and body become redder. **Habitat:** coral or rocky reefs, to about 180 m depth.

## *Lethrinus enigmaticus* Smith, 1959



A greyish or tan emperor, with grey or brownish head. Dark purplish spots around front and lower rim of eyes; pale yellowish streak radiating forward from eyes to nostrils, and yellowish cross-stripes on upper head; upper sides often with about 7 dark bars, sometimes 3 bronze stripes ventrally. **Habitat:** seagrass beds, coral reefs and adjacent sandy areas, usually to about 50 m depth.

# Family Lethrinidae

## *Lethrinus variegatus* Valenciennes, 1830




A slender grey or brown emperor, sometimes with scattered irregular dark blotches on sides; often 2 dark bands below eyes; inner surface of pectoral fins never red in life. **Habitat:** sandy areas near coral reefs, to about 150 m depth.

# Family Nemipteridae

## *Scolopsis frenata* (Cuvier, 1830)


A species of monocle bream with body blue or olive-green on dorsum, white below; snout dusky; narrow blue stripe from snout tip to anteroventral part edge of eye, yellow stripe from top of snout, through upper part of eyes, arching on back to upper part of peduncle; stripe edged dark green above from behind eyes to beneath dorsal fin. **Habitat:** sandy bottoms near coral reefs.

## *Pomacanthus imperator* Bloch, 1784


A characteristic angel fish with alternating yellow and blue stripes on body extending onto dorsal and anal fins; dark mask edged with blue over eyes; nape yellowish or greenish grey; snout and cheek bluish white; caudal fin yellow. **Habitat:** lagoons and outer-reef slopes, in 1 to 60 m depth.

## *Pomacanthus semicirculatus* (Cuvier 1831)


An angel fish with head free of spots, body yellowish grey that transitions to a dusky brown towards the distal areas, adorned with small, dark blue oval spots. This pattern continues onto the median fins, where the spots become rounder; fin margins are bright blue. **Habitat:** inshore reefs and coral-rich areas.

## *Oxycheilinus bimaculatus* (Valenciennes, 1840)


A wrasse with colour variations, females reddish-orange to orangish-brown hues, marked with whitish blotches and yellow ventrally, and a prominent blackish blotch between the pectoral-fin tips and lateral line. Males orangish-brown and pale green, featuring a conspicuous blackish blotch on the sides. Head is predominantly green with radiating pink to orange-red lines from the eyes. **Habitat:** areas with heavy growth of algae or seagrass, to 100 m depth.

## *Chlorurus* sp. indet.


A parrotfish with moderately deep body; teeth in jaws fully fuse to form dental plates which are fully exposed, outer surface smooth and cutting edge irregular. **Habitat:** reef-associated.

## Family Balistidae

Class Actinopterygii
Order Tetraodontiformes

### *Sufflamen chrysopterum* (Bloch & Schneider, 1801)


A dark brown triggerfish with bluish purple throat and belly; short transverse white band on chin; vertical band varying in colour from yellow to pale brown, extending from back edge of eye to lower pectoral-fin base; caudal fin dark brown with broad white rear margin and narrow upper and lower white margins. **Habitat:** shallow lagoons and sheltered back reefs, to about 20 m depth.

## Family Ostraciidae

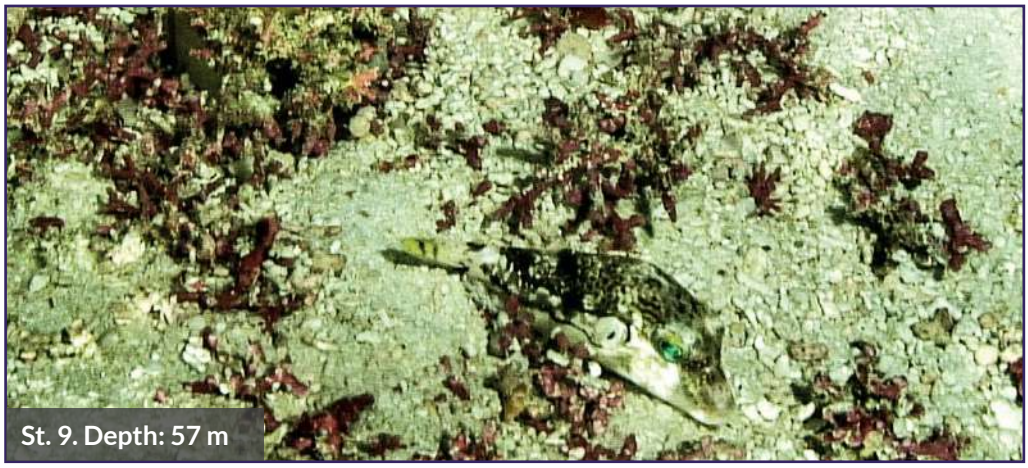
### *Lactoria fornasini* (Bianconi, 1846)


A cowfish with distinct mid-dorsal ridge and stout retrorse spine. Body enclosed in hard armoured-like carapace with 5 ridges, cross-section pentagonal in adults. Carapace comprises pale brown or yellowish scale plates, with central blue or magenta spot that can change colour within seconds. Spines ('horns') present in front of eyes. **Habitat:** coral reefs and weedy areas, at 5 to 80 m depth.

## *Arothron hispidus* (Linnaeus 1758)


A pufferfish with head and body greenish brown dorsally, with many small white spots, becoming white ventrally, with curved dark stripes; wide dark vertical bars on sides of head and body; pectoral-fin bases and gill opening encircled with alternating white or yellow and black lines. **Habitat:** coral reefs, to about 59 m depth. Juveniles usually occur in weedy areas of estuaries.

## *Canthigaster rivulata* (Temminck & Schlegel, 1850)




Head and body brownish grey dorsally, with many short, wavy, dark blue lines creating vermiculate pattern; lower half of body white; sides with 2 parallel dark bands, joined by vertical section curving around front of gill opening; dark blotch at dorsal-fin base; dorsal, anal and pectoral fins pale; caudal fin with yellowish brown rays and dark mark at base of lower rays. Attains 20 cm total length. **Habitat:** rocky and coral reefs.

## *Taeniurops meyeni* (Müller & Henle 1841)


A stingray with a nearly circular disc, slightly wider than long, all outer margins evenly rounded, relatively short tail, less than disc width, with usually 1 stinging spine, and small pelvic fins small. Dorsal surface of disc usually dark purplish, bluish or brownish grey dorsally, or pale with scattered irregular dark spots or mottling and dusky specks or streaks; disc whitish ventrally. **Habitat:** bottom-dwelling in lagoons, estuaries and on reefs.

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# FURTHER READINGS


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# INDEX

## U



## V



## W



## X



## Z

This photographic catalogue presents an overview of the flora and fauna observed in the shallow waters (less than 100 m depth) of the Saya de Malha Bank in the Mascarene Plateau. While not a comprehensive representation, as some taxa were excluded due to poor-quality photos that could result in misleading or unreliable depictions, it encompasses a total of 113 taxa identified at the family, genus, or species level. These taxa span key groups, including seaweeds, seagrasses, sponges, corals, echinoderms, crustaceans, molluscs, and fish.

The images are snapshots derived from video observations captured during the 2018 R/V *Dr. Fridtjof Nansen* ecosystem survey, which aimed to characterize the marine ecosystem and morphology of the Saya de Malha Bank. This area is notable for its rich marine biodiversity, supporting a diverse array of species and habitats that contribute to the overall health of oceanic environments.

This catalogue serves as a valuable resource for scientists conducting further explorations in the Mascarene Plateau region, providing a basic tool for taxonomic identification. By raising awareness of the significance of the Saya de Malha Bank, we aim to foster a greater appreciation for its unique marine life and promote the conservation of these critical habitats.

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