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Deep Reef Benthos of Bermuda: Field Identification Guide

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NEKTON
DEEP OCEAN EXPLORATION



Deep Reef Benthos of Bermuda: Field Identification Guide

Paris V. Stefanoudis, Struan R. Smith, Craig Schneider,
Daniel Wagner, Gretchen Goodbody-Gringley, Joana
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Credits

Photography: All photographs were taken by one of the authors of this guide. All underwater images were acquired from video data, hence, special thanks to the team of technical SCUBA divers (Global Underwater Explorers) and the team of pilots (Brownies Global Logistics) operating the two Triton 1000-2 class submersibles, *Nemo* and *Nomad* (Triton submersibles, Vero Beach, Florida, USA), for gathering underwater footage from shallow and mesophotic reef locations (~15–90 m depth), and deeper reef locations (~150–300 m), respectively.

Design: **Daniel Metson**

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Bermuda from the International Space Station, © NASA
This image was taken after a hurricane in 2015 and shows extensive re-suspended sediment plumes to the east and south of the island.



Bermuda Research Area

Bermuda is an isolated group of subtropical islands located in the Sargasso Sea, western central Atlantic. The Bermuda platform lies on top of the eroded stump of an ancient volcano, the largest of four volcanoes which run in a line trending north east and which include the Plantagenet and Challenger Banks and Bowditch Seamount. Despite its temperate latitude, Bermuda has a subtropical climate and sea surface temperatures, and thus distinctive biological communities reside here.

Bermuda is home to the northernmost reef systems in the Atlantic, which makes studying their communities particularly interesting and important in understanding

how the region functions. In fact, Bermuda has been a centre for shallow water research for over a century due to the central lagoon and surrounding coral reefs of the islands. More recently exploration of deeper waters has started to reveal the uniqueness of the islands' marine ecosystems. However, knowledge of mesophotic (30–150 m) and deeper, rariphotic (~150–300 m) habitats remain poorly known.

Nekton Mission - XL Catlin Deep Ocean Survey

In summer 2016, Nekton undertook the XL Catlin Deep Ocean Survey - a major multidisciplinary scientific research Mission in the NW Atlantic, largely focused on Bermuda.

Nekton deployed the latest underwater technology including technical divers with closed-circuit rebreathers, submersibles and a remotely operated vehicle. The Mission explored reef habitats in four locations (North Northeast, Plantagenet Bank, Spittal and Tiger) around Bermuda (Fig. 1) extending from the shallows to the rariphotic zone (15–305 m). At each visited depth (divided into eight depth categories: 15, 30, 60, 90, 150, 200, 250 and 300 m), replicate transect surveys were made to fully characterise biological communities. A fifth location (Challenger Bank), was briefly visited as part of the same Mission but is not presented here due to lack of replication, except where we present images or refer to specimens collected from that location specifically.

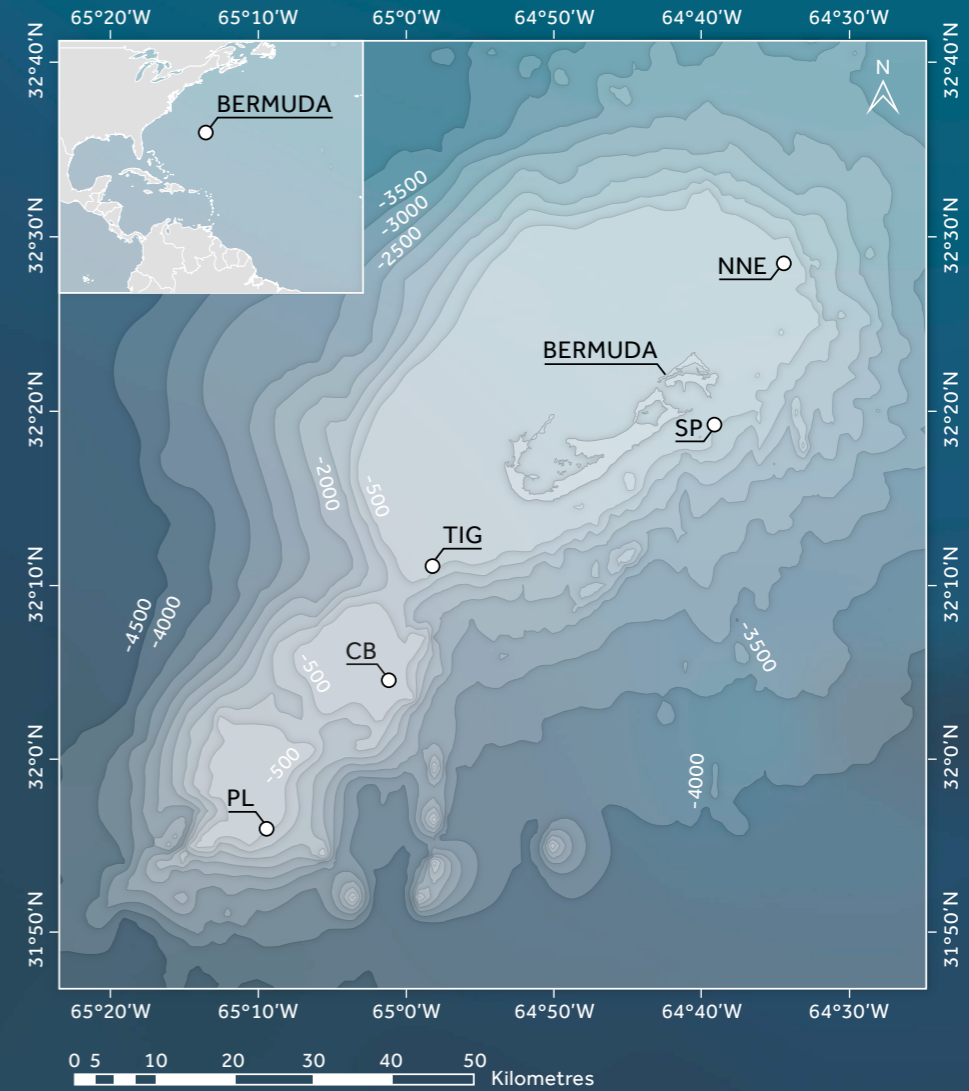
All collected specimens from the Mission are retained in Bermuda and curated in the Bermuda Aquarium, Museum & Zoo.

Further Details

- Mission Overview: <https://nektonmission.org/mission-i>
- Research Programme & Cruise Report: <https://nektonmission.org/mission-i/research-programme>
- Research Protocol: General Ocean Survey & Sampling Protocol [GOSSIP]: <https://nektonmission.org/science/gossip>
- Scientific Publications: <https://nektonmission.org/science/publications>

Fig 1. Map of the four surveyed sites around Bermuda along with Challenger Bank that was briefly visited during the Mission. Data overlay GEBCO_2014 Grid which provides 30 arc-second global grid of elevations. CB = Challenger Bank, NNE = North Northeast, PL = Plantagenet Bank, SP = Spittal, TIG = Tiger.

Fig. 1.



Authors' Note

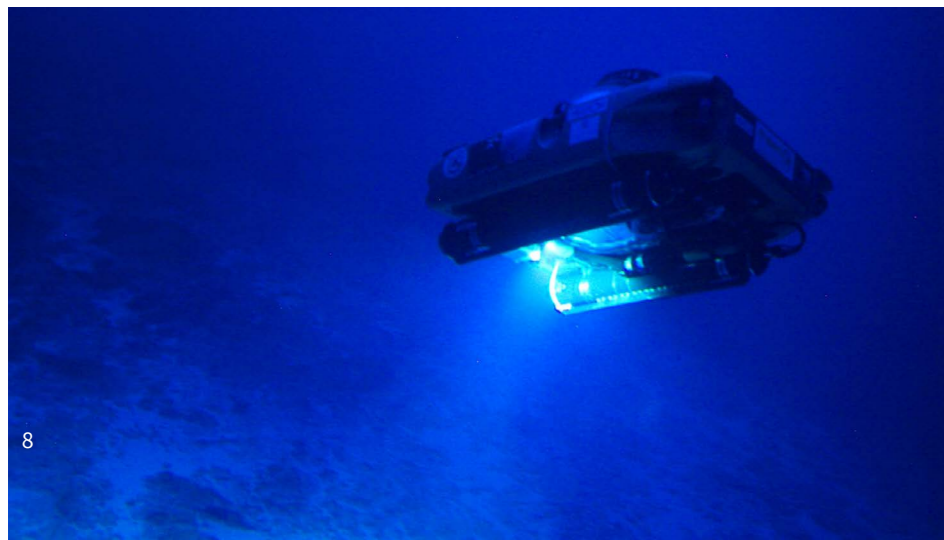
Deep Reef Benthos of Bermuda builds on the video and imagery data collected during Nekton's Mission – the XL Catlin Deep Ocean Survey – and provides a photographic guide for the visual identification of the corals, marine plants and other common invertebrates that inhabit Bermuda's outer deep reefs. For each entry we provide information on the distribution and observed depth range based on our work only, accompanied by a short morphological description and some representative images. A more comprehensive guide to shallow water species and their distributions is Sterrer (1986) Marine Flora and Fauna of Bermuda.

Inevitably, the use of images to collect faunal data brings with it the challenge of identifying taxa. When identifying taxa from images, well-trained researchers use a combination of traditional taxonomic features and ecological information (e.g. depth, location, knowledge of the local species pool) to arrive at decisions on a taxon ID. The taxonomic level of each ID

will vary depending on the type of organism in question but in general rarely reaches species level, since some groups have enormous morphological plasticity (e.g. sponges), or their unique characters are too small to distinguish without the use of high-power microscopes (e.g. corals, algae).

Therefore we have placed each taxon into visually distinct morphotypes (i.e. aggregation of morphologically similar individuals) that correspond to species or a higher taxonomic level (genus, family etc.) accordingly.

Currently, there are very few formalised training materials available to new marine researchers working in mesophotic and deeper reef habitats and any 'field identification skills' are often acquired orally, by working with more experienced researchers. With this in mind, the present guide is designed to aid marine biologists, divers and naturalists with the identification of organisms as seen in underwater footage or live in the field.



How to Use the Guide

All observed morphotypes are divided into 14 major classification groupings ranging from class to phylum, with the exception of the informal term algae, which is widely used to describe this large and diverse group of photosynthetic organisms.

The choice of different taxonomic levels for each major group is to correspond with commonly recognised groups by the public and scientists alike, such as hard corals (Order: Scleractinia) or sponges (Phylum: Porifera). Members of each major group are then further classified into family and given a two-part scientific name. The first word is always capitalised and refers to the genus, while the second one is never capitalised and corresponds to the species. Both are always italicised. Where available, a common name is also given for each entry.

If species-level identification is not possible, classification stops at a higher level (genus, family, class) or alternatively only an informal/common name is given. In cases where morphotypes are suspected to be part of a species, but for which no formal assignment is possible the term 'sp.' (not italicised) has been used instead (e.g. *Galaxaura* sp.). For each entry, a short morphological description and information on its observed distribution and depth range is also given.

Finally, each member is accompanied by one or two representative images *in situ* (i.e. in their natural environment, underwater), the first from a distance and the second from close-up. Where available an additional *ex situ* (off-site) image of preserved specimens that were collected during the mission is provided.

Species Accessions

For some of the specimens already accessioned into the collections of the Bermuda Natural History Museum at the Bermuda Aquarium, Museum and Zoo (BAMZ), their accession number (BAMZ followed by year of sampling and unique number) is also given. For the rest, the unique sample number used during the survey is given instead (BEX followed by year and unique number).

Mission Partners

Title Partner

XL Catlin

Strategic Partners

Kensington Tours & Traveledge

Mission Partners

- XL Catlin
- Garfield Weston Foundation

Government Partners

Canada, Bermuda

Bermuda Partners

- Department of the Environment & Natural Resources
 - Department of Education
 - Bermuda Aquarium, Museum & Zoo
 - Bermuda Institute of Ocean Sciences (BIOS)
 - Bermuda Tourism Authority
 - Bermuda Underwater Exploration Institute (BUEI)
 - CITV (Bermuda National Broadcaster)
 - The Royal Gazette
-

Participating Scientists & Institutions

University of Oxford, University of Florida, University of Puerto Rico, Trinity College (Hartford), Stanford University, Geological Survey of Ireland, Bedford Institute of Ocean Sciences, Bermuda Aquarium, Museum & Zoo, Bermuda Institute of Ocean Sciences (BIOS), Natural History Museum (London, UK)

Consortium Partner

Atlas are a consortium of 25 multi-stakeholder, multidisciplinary partners from leading organisations from Europe, the USA and Canada undertaking research of deep-sea habitats (200-2000 m) in the Atlantic Ocean. <https://www.eu-atlas.org>

Communications Partners

Google Expeditions, YouTube, CellOne, Digital Explorer, Bermuda Underwater Exploration Institute, Sirius XM

Ocean Policy & Stewardship

Sargasso Sea Commission, Ocean Elders, IUCN, UNESCO, Global Ocean Trust, Deep Sea Conservation Coalition

Technology Partners

Triton Submarines, Bowtech, Teledyne Marine, GUE, Canon, VRTUL

Technical Dive Partners

Project Baseline



About Nekton

Nekton undertakes multidisciplinary scientific research into the state of the deep ocean, the planet's most critical yet least explored ecosystem. Nekton's discoveries inform global decision makers and ignite public interest to catalyse change. The Nekton Deep Ocean Oxford Research Institute is a charity, established in the UK, with headquarters in Oxford.

Order: Scleractinia (Hard Corals)

FAMILY:

Agariciidae

SPECIES:

Agaricia fragilis Dana, 1848

COMMON NAME:

Fragile saucer coral

VISUAL ID:

Colonies form small, thin, saucer-shaped plates, with corallites in long, concentric, closely-spaced valleys. Colour varies from brown to green-yellow and white.

OBSERVED DEPTH RANGE:

15-31 m.

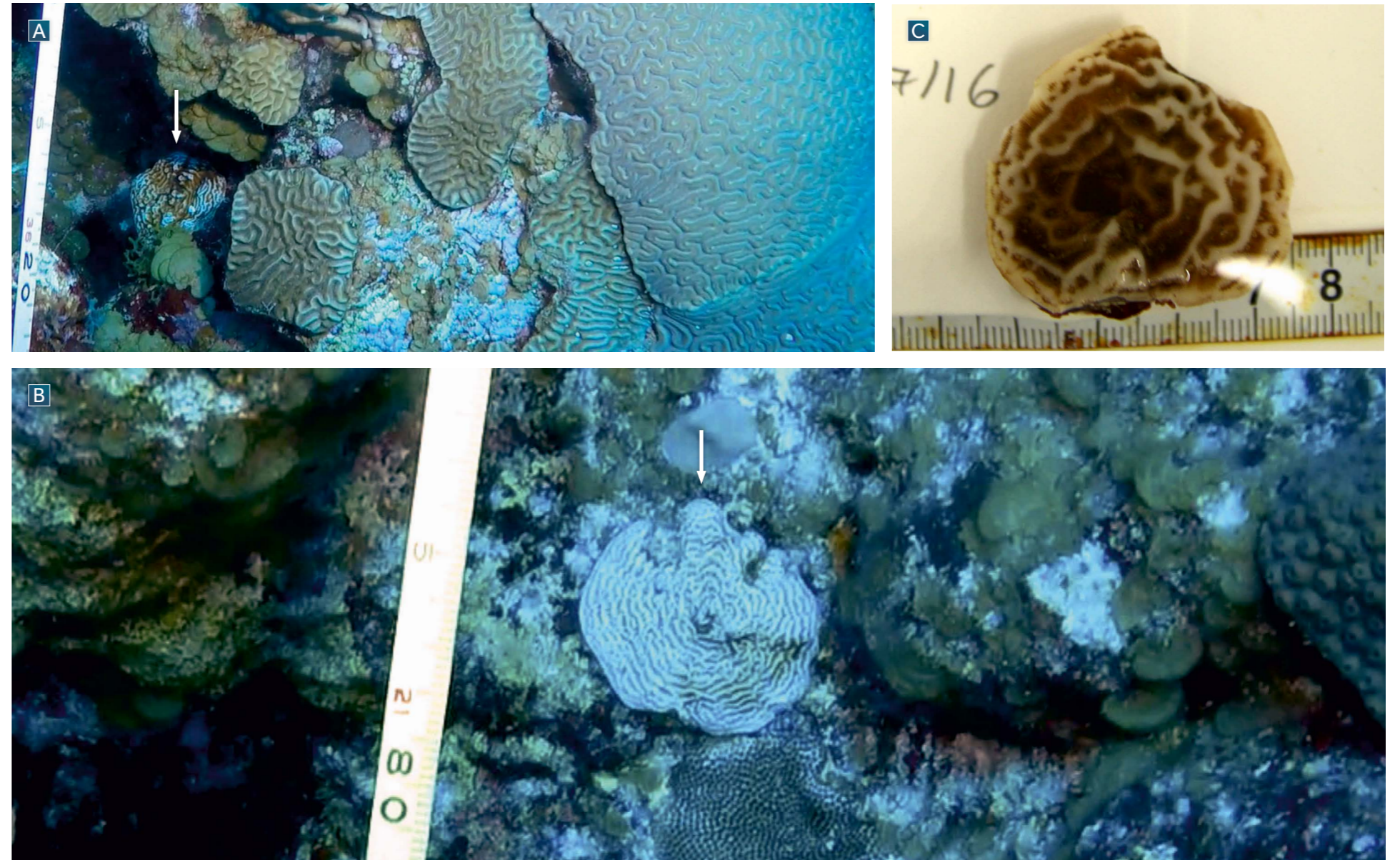
DISTRIBUTION:

North Northeast, Spittal, Tiger.

Fig. 2. *Agaricia fragilis*.

A) North Northeast, 29-30 m. B) Spittal, 29-30 m.

C) North Northeast, 20-30 m, preserved specimen (BEX2016-0099).



Order: Scleractinia (Hard Corals)

FAMILY:

Astrocoeniidae

SPECIES:

Madracis myriaster
(Milne Edwards & Haime, 1850)

COMMON NAME:

Striate finger coral

VISUAL ID:

White, bush-like colonies commonly found on elevated topography. Colonies of this genus superficially resemble *Lophelia*, although branches are thinner and very delicate. Occasionally forming dense patches.

OBSERVED DEPTH RANGE:

90–303 m.

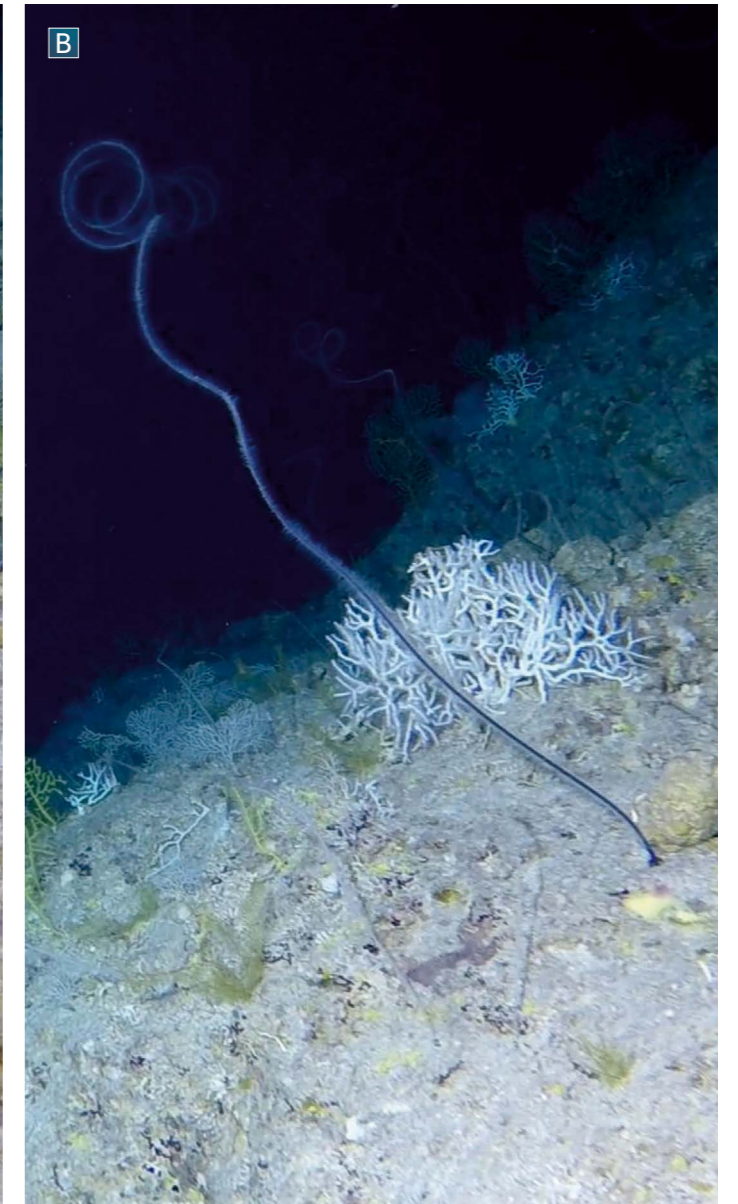
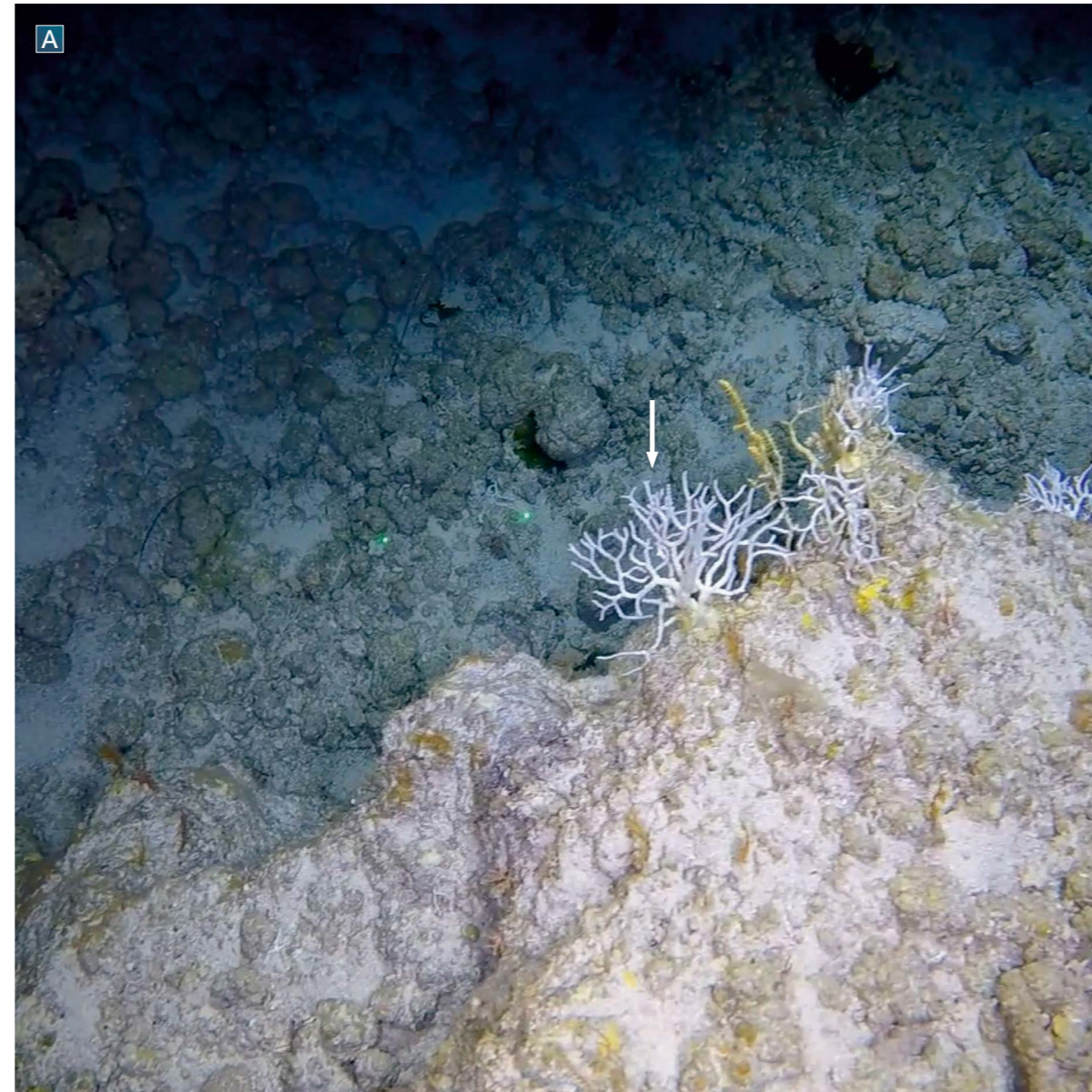
DISTRIBUTION:

North Northeast, Plantagenet Bank,
Spittal, Tiger.

Fig. 3. *Madracis myriaster*.

A) North Northeast, 200 m. B) North Northeast,
300 m, solitary colony behind wire coral.

Fig. 3.



Order: Scleractinia (Hard Corals)

FAMILY:

Astrocoeniidae

SPECIES:

***Madracis* spp.**

VISUAL ID:

There are three species found in Bermuda that are difficult to separate using underwater footage. *Madracis decactis* (Lyman, 1859) colonies comprise small clumps (~10–15 cm long) of short, flattened branches or blunt, rounded lobes giving them a nodular or knobby appearance, respectively. Usually green to yellow-brown colour. *Madracis formosa* Wells, 1973 colonies are thicker and more densely packed compared to *M. decactis*, and occasionally have double-lobed tips. *Madracis auretenra* Locke, Weil & Coates, 2007 forms dense clumps, comprising pencil-sized, bluntly-tipped branches. Colonies can be up to 1 m long and have a bright yellow colour. Several of the *Madracis* specimens encountered in this survey looked damaged, possibly a result of bleaching.

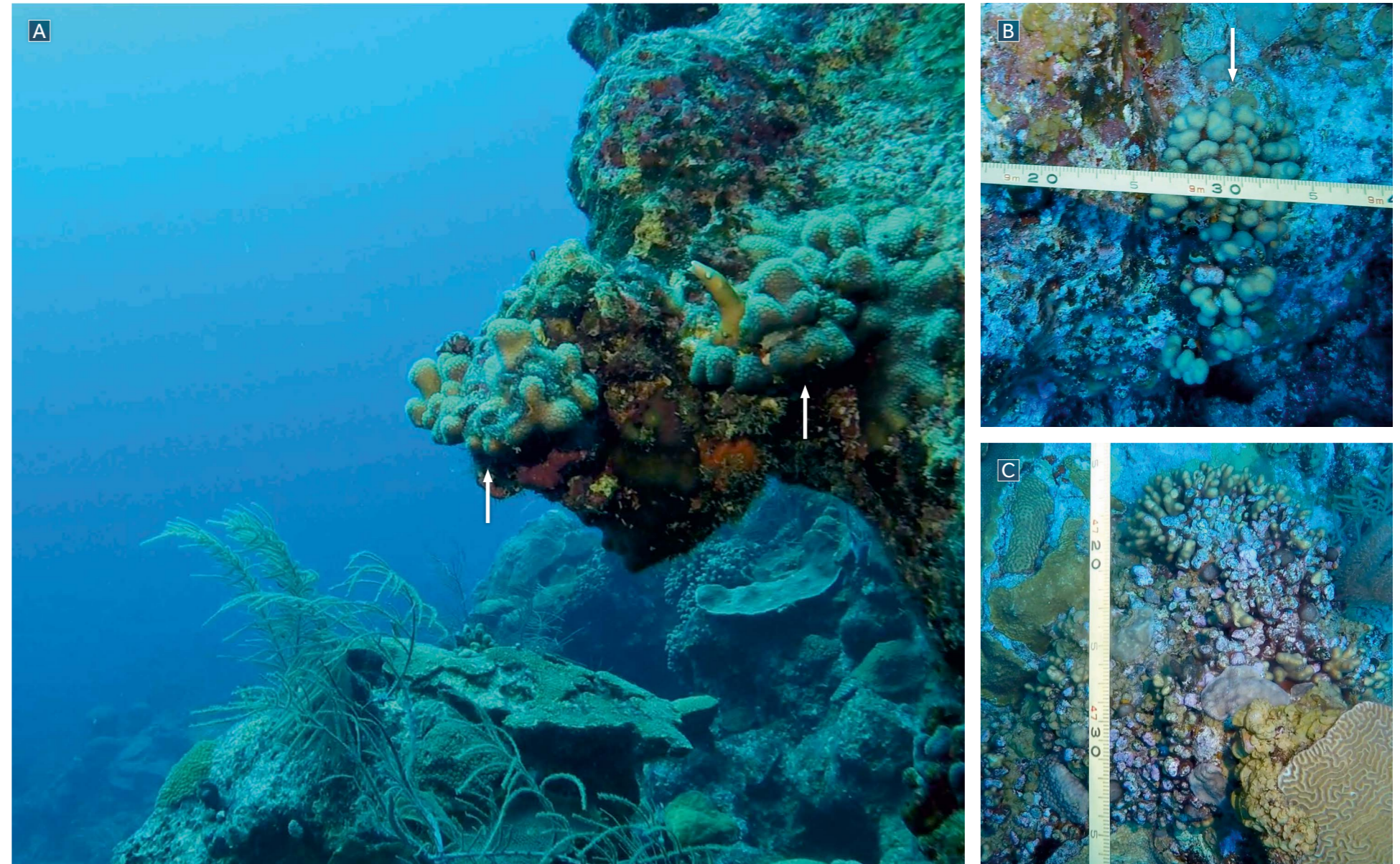
OBSERVED DEPTH RANGE:
15–31 m.

DISTRIBUTION:
North Northeast, Spittal, Tiger.

Fig. 4. *Madracis* spp.

A) Spittal, 28–31 m, *M. decactis*. B) North Northeast, 30 m, *M. decactis*. C) Spittal, 28–29 m, *Madracis* cf. *formosa* with coralline algae overgrowth.

Fig. 4.



Order: Scleractinia (Hard Corals)

FAMILY:

Caryophyllidae

COMMON NAME:

Cup corals

VISUAL ID:

Small, solitary corals of circular, cup-like appearance. Colour creamy-white.

OBSERVED DEPTH RANGE:

148–303 m.

DISTRIBUTION:

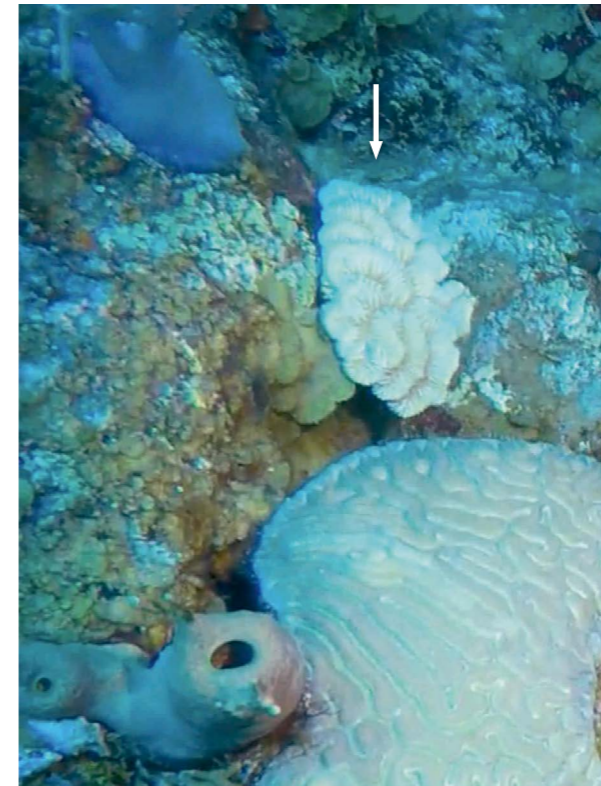
North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 5. Solitary cup coral.
North Northeast, 200 m.

Fig. 5.



Fig. 6.



Order: Scleractinia (Hard Corals)

FAMILY:

Meandrinidae

SPECIES:

Meandrina meandrites
(Linnaeus, 1758)

COMMON NAME:

Maze coral

VISUAL ID:

Colonies in Bermuda are generally small (≤ 10 cm), elliptical to oval in shape. Colour typically dark to golden brown. Large, thick septa protrude, with tentacles occasionally visible in the day.

OBSERVED DEPTH RANGE:

15–31 m.

DISTRIBUTION:

North Northeast, Spittal, Tiger.

Fig. 6. *Meandrina meandrites*.
Spittal, 29–30 m, bleached colony.

Order: Scleractinia (Hard Corals)

FAMILY:

Merulinidae

SPECIES:

Orbicella franksi
(Gregory, 1895)

COMMON NAME:

Boulder star coral

VISUAL ID:

Colonies can be massive, encrusting or flat; at mesophotic depths in Bermuda they are predominantly the latter, forming thick plates or encrustations with uneven surfaces. Occasionally scattered with small lumps. Colour ranges from grey to green-brown and yellow-brown.

OBSERVED DEPTH RANGE:

15-31 m.

DISTRIBUTION:

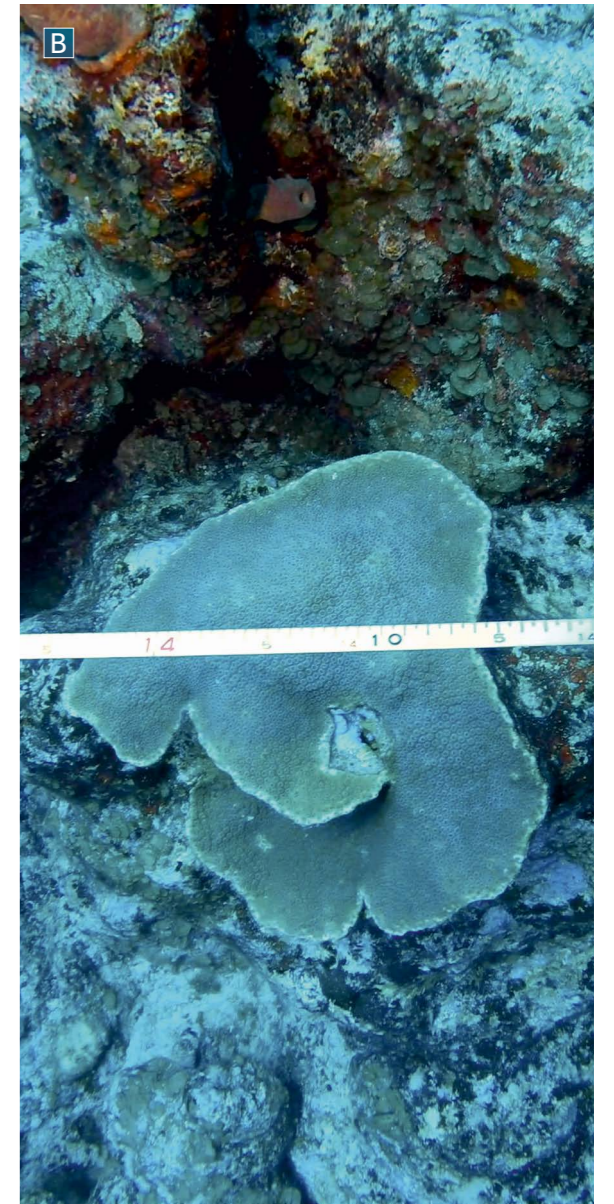
North Northeast, Spittal, Tiger.

Fig. 7. *Orbicella franksi*.

A) Spittal, 29–30 m, encrusting colony with scattered lumps.

B) Spittal, 31 m, plate-like colony.

Fig. 7.



FAMILY:

Montastraeidae

SPECIES:

Montastraea cavernosa (Linnaeus, 1766)

COMMON NAME:

Great star coral

VISUAL ID:

Colonies typically massive to sub-massive formations or domes, although encrusting forms also occur, with plate-like formations common at increased depth. Colour shades of grey, green, yellow, brown and orange.

OBSERVED DEPTH RANGE:

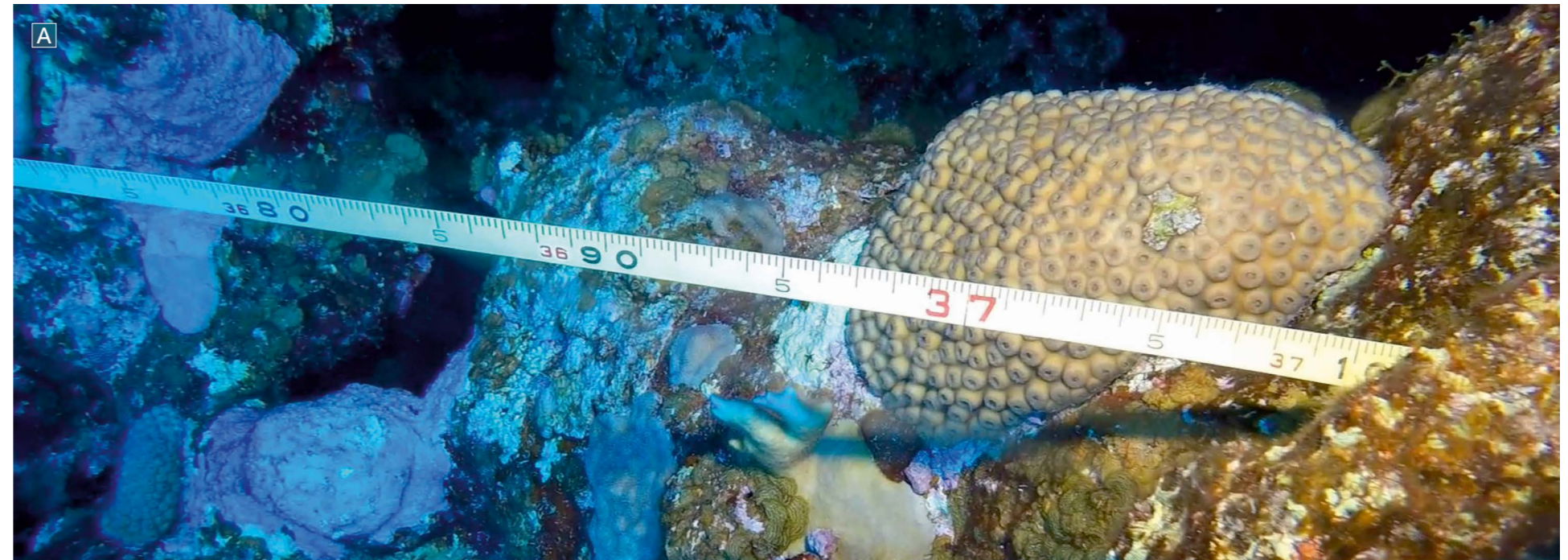
15–62 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank,
Spittal, Tiger.

Fig. 8. *Montastraea cavernosa*.

A) Spittal, 31 m, dome-like colony. B) Tiger, 31 m,
encrusting colony. C) North Northeast, 15–20 m,
preserved specimen (BEX2016-0125).



Order: Scleractinia (Hard Corals)

FAMILY:

Mussidae

SPECIES:

Diploria labyrinthiformis
(Linnaeus, 1758)

COMMON NAME:

Grooved brain coral

VISUAL ID:

Colonies massive, often forming hemispherical domes. Deep meandering valleys are separated by ridges with clear grooves on top creating a zipper-like appearance. Colour ranges from yellow-green to brownish-grey.

OBSERVED DEPTH RANGE:

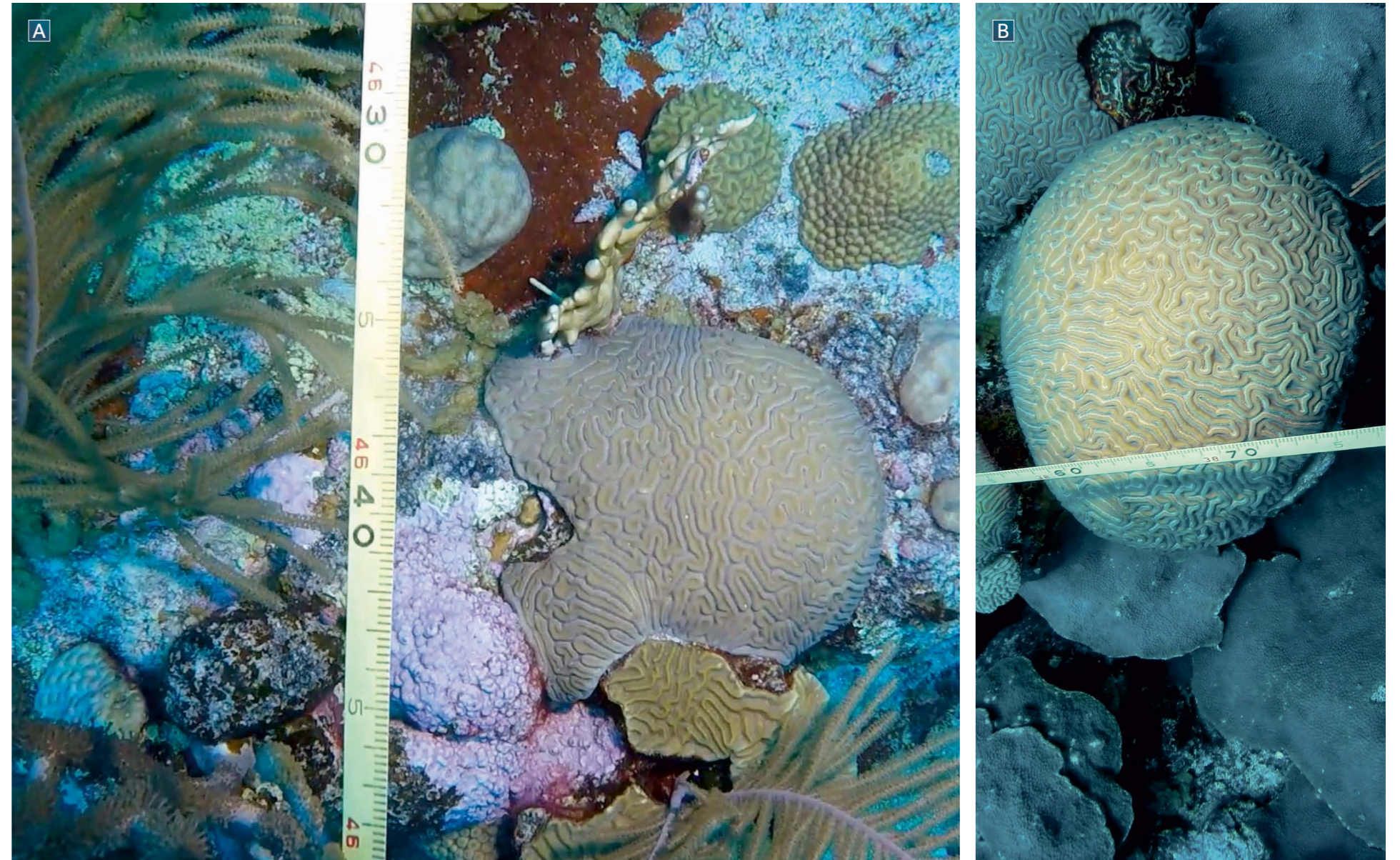
15–31 m.

DISTRIBUTION:

North Northeast, Spittal, Tiger.

Fig. 9. *Diploria labyrinthiformis*.

A) Spittal, 28–29 m, massive colony. B) North Northeast, 30 m, massive, hemispherical colony.



FAMILY:

Mussidae

SPECIES:

Pseudodiploria strigosa
(Dana, 1846)

COMMON NAME:

Symmetrical brain coral

VISUAL ID:

Colonies form thick encrusting plates or sheets, occasionally massive. Meandering valleys separated by ridges with no grooves, although fine grooves are discernible in some colonies. Colour ranges from yellow-green to brownish-grey.

OBSERVED DEPTH RANGE:

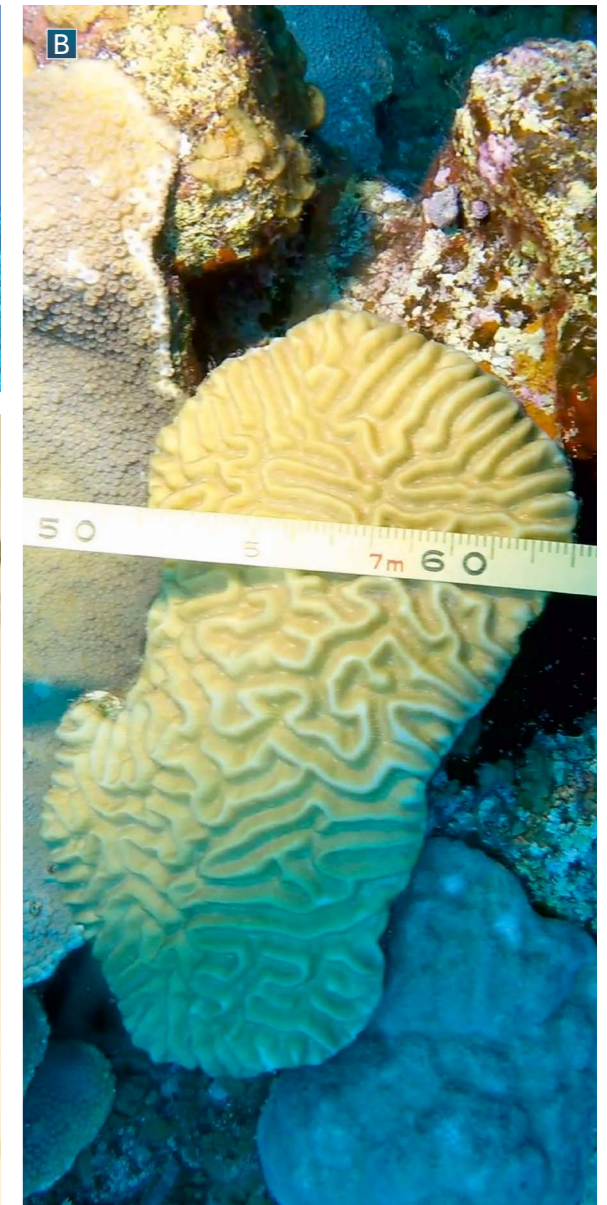
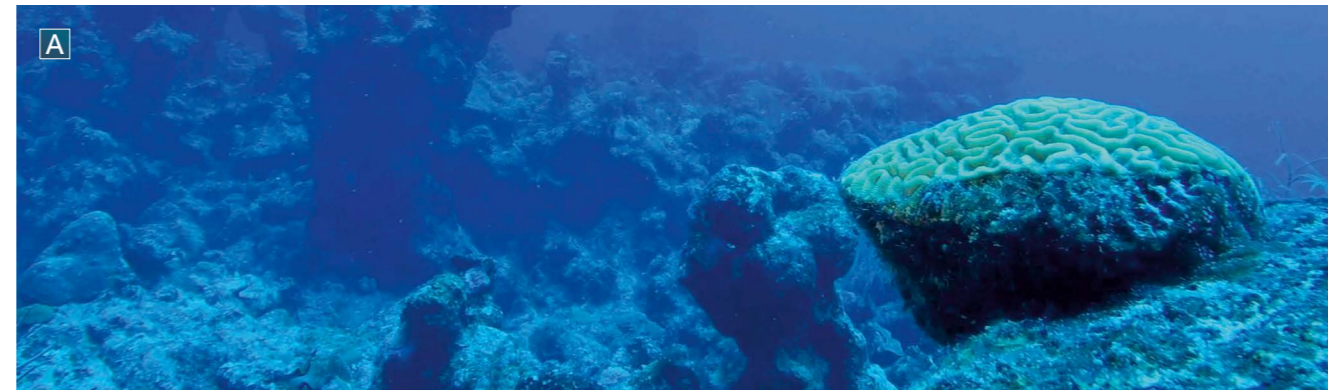
15–31 m.

DISTRIBUTION:

North Northeast, Spittal, Tiger.

Fig. 10. *Pseudodiploria strigosa*.

A-B) Spittal, 29–31 m, encrusting, sheet-like colonies. C) North Northeast, 20–30 m, preserved specimen (BAMZ-2016-337-063).



Order: Scleractinia (Hard Corals)

FAMILY:

Mussidae

SPECIES:

Scolymia cubensis
(Milne Edwards
& Haime, 1849)

COMMON NAME:

Artichoke coral

VISUAL ID:

Colony consists of a single, large, fleshy, circular to oval polyp. Colour shades of dark grey and green.

OBSERVED DEPTH RANGE:

30–31 m.

DISTRIBUTION:

North Northeast, Spittal, Tiger.

Fig. 11. *Scolymia cubensis*.
Spittal, 31 m.

Fig. 11.

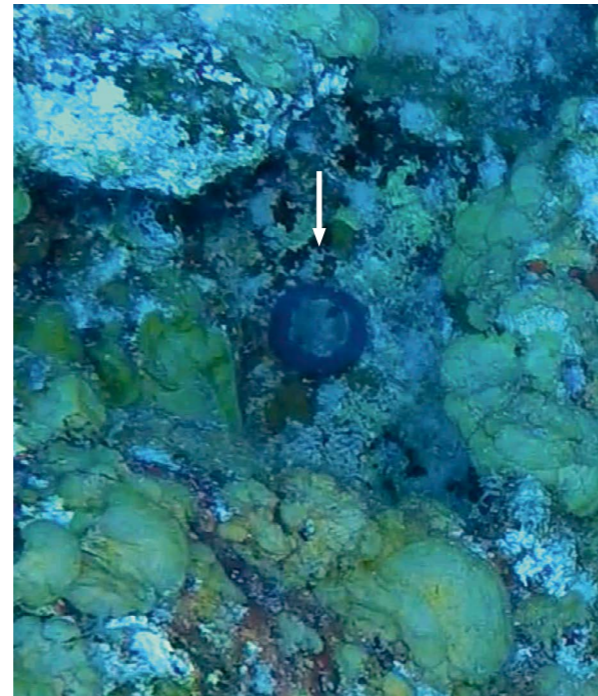
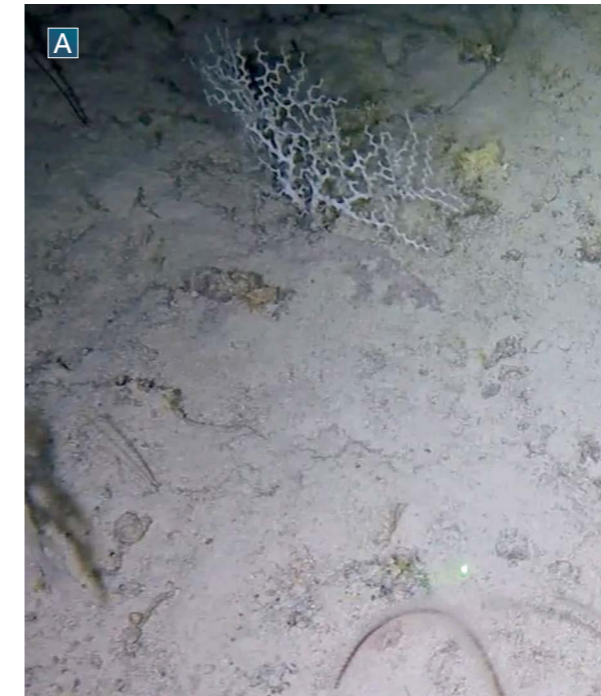


Fig. 12.



Order: Scleractinia (Hard Corals)

FAMILY:

Oculinidae

SPECIES:

Madrepora carolina
(Pourtalès, 1871)

COMMON NAME:

Zigzag coral

VISUAL ID:

Bushy, branching colony with branches growing in one plane giving it a fan-like appearance. Alternate arrangement of polyps gives branches its characteristic zigzag shape. Skeleton white.

OBSERVED DEPTH RANGE:

195–301 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank,
Spittal, Tiger.

Fig. 12. *Madrepora carolina*.
A) Tiger, 241 m. B) Spittal, 301 m.

Order: Scleractinia (Hard Corals)

FAMILY:

Poritidae

SPECIES:

Porites astreoides

Milne Lamarck, 1816

COMMON NAME:

Mustard hill coral

VISUAL ID:

Colonies typically massive or encrusting with rough surface containing small lumps (caused by commensal barnacles), although smooth colonies also occur. A typical feature of this species is the tiny corallites that cannot be distinguished with the naked eye, much less so when using underwater footage. Most observed colonies were fairly small with a maximum length of 10–15 cm. Colour grey to yellow-brown.

OBSERVED DEPTH RANGE:

15–31 m.

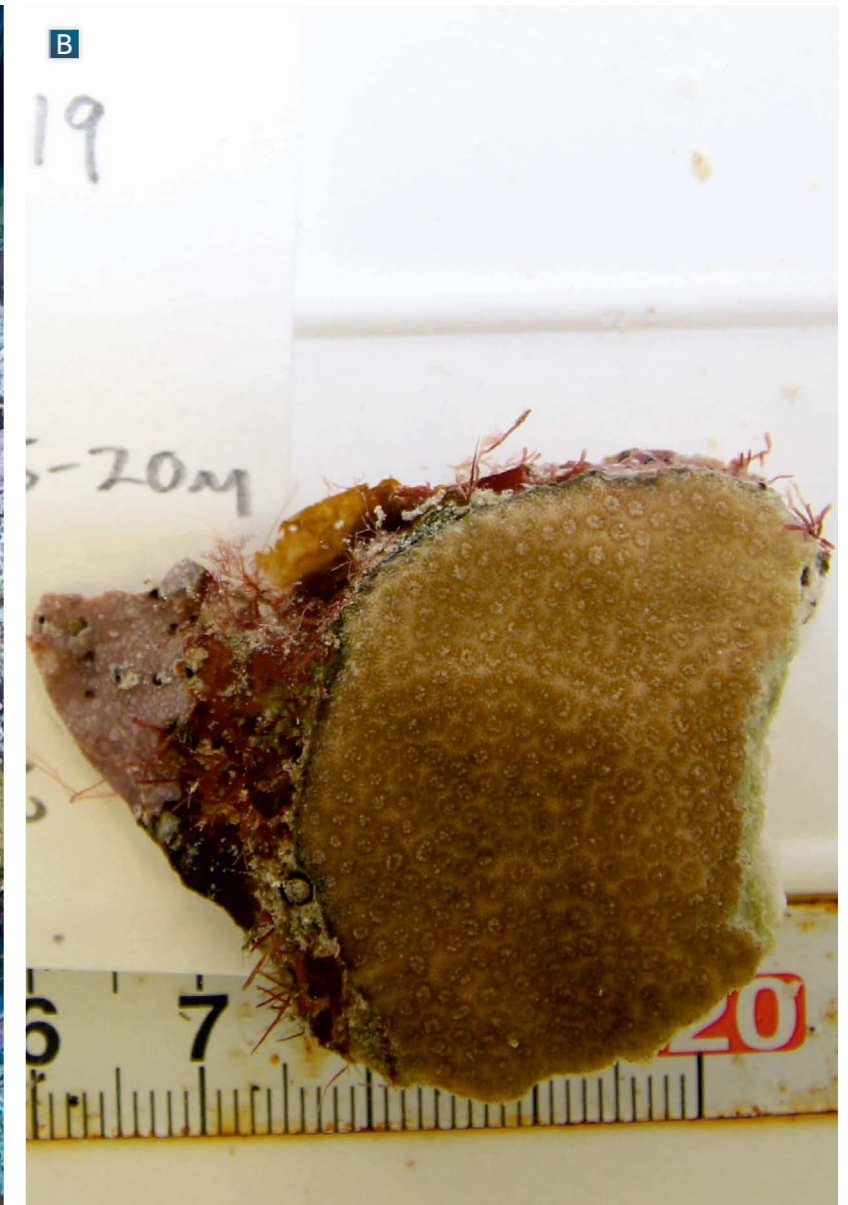
DISTRIBUTION:

North Northeast, Spittal, Tiger.

Fig. 13. *Porites astreoides*.

A) Tiger, 31 m, massive colony with lumpy surface.

B) North Northeast, 15–20 m, preserved specimen (BEX2016-0119).



FAMILY:

Siderastreidae / *Astrocoeniidae*

SPECIES:

Siderastrea radians
(Pallas, 1766) / *Stephanocoenia
intersepta* (Lamarck, 1836)

COMMON NAME:

Lesser starlet coral /
Blushing star coral

VISUAL ID:

Colonies encountered were small (typically <20 cm), commonly encrusting or occasionally massive. Surface of colonies was covered with numerous, closely-spaced corallites. Usually whitish to light brown colour. Positive identification of either species requires closer inspection of the corallites.

OBSERVED DEPTH RANGE:

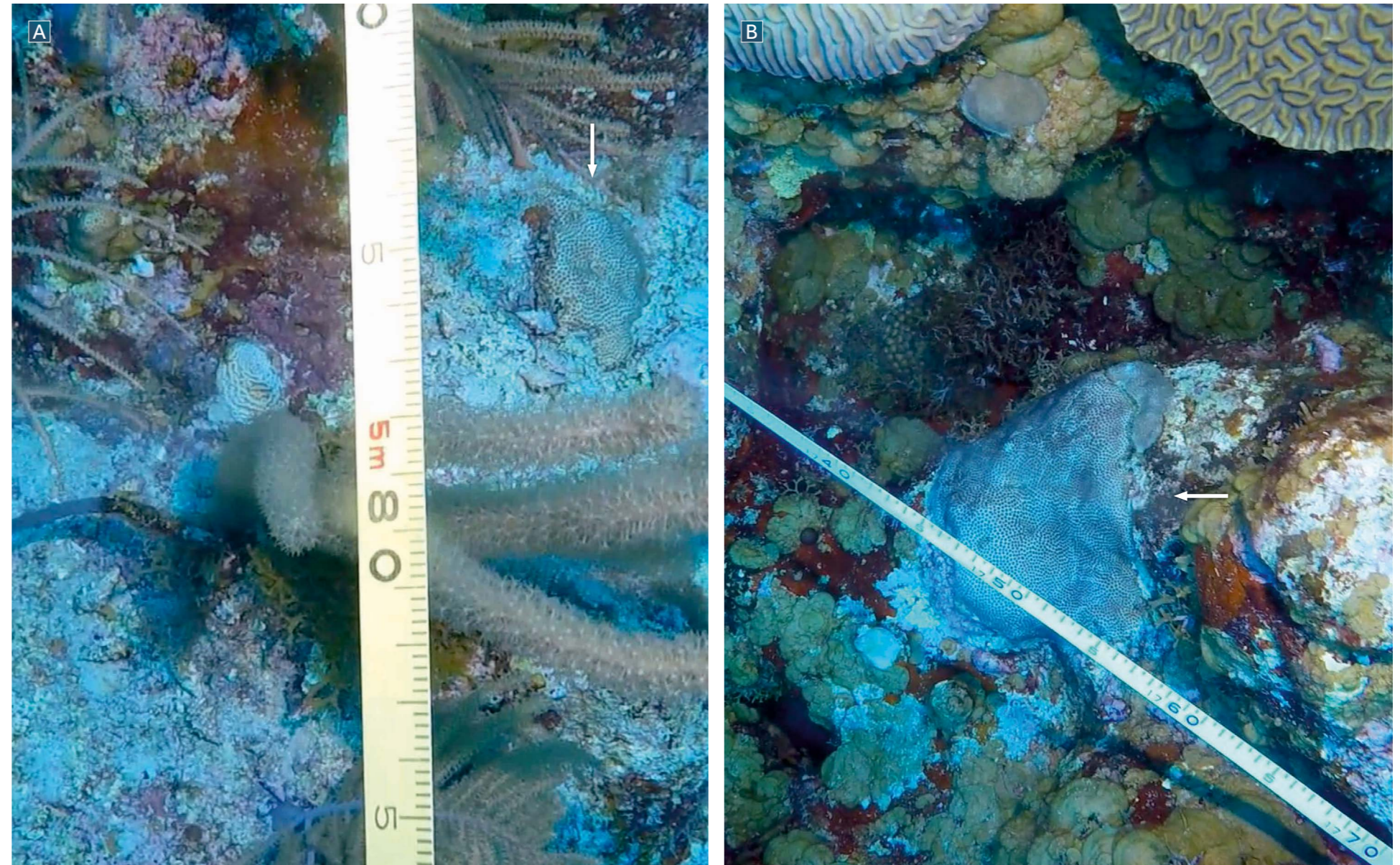
15–31 m.

DISTRIBUTION:

North Northeast, Spittal, Tiger.

Fig. 14. *Siderastrea radians* / *Stephanocoenia intersepta*.

A) Spittal, 29–30 m, dome-like colony. B) Tiger, 30 m, encrusting colony.



Order: Antipatharia (Black Corals)

FAMILY:

Antipathidae

SPECIES:

***Antipathes atlantica* Gray, 1857**

COMMON NAME:

Grey sea fan black coral

VISUAL ID:

Colonies of this species form dense networks of fine, often interconnected branches, extending in a single plane, thus appearing as a net-like fan. Colour shades of grey to greenish-grey.

OBSERVED DEPTH RANGE:

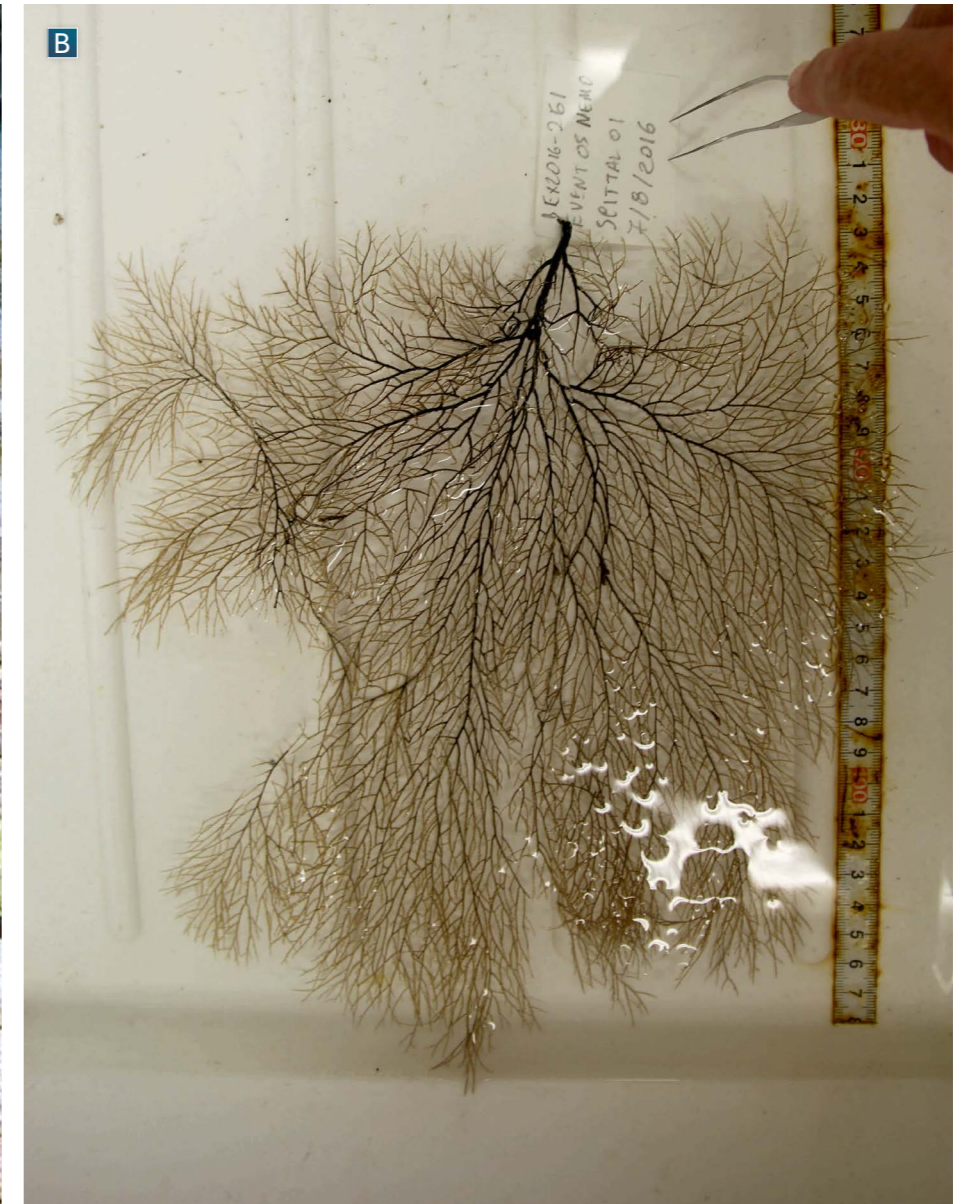
55–303 m.

DISTRIBUTION:

Challenger Bank, North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 15. *Antipathes atlantica*.

A) Spittal, 147–153 m. B) Tiger, 107 m, preserved colony (BAMZ-2016-337-010).



Order: Antipatharia (Black Corals)

FAMILY:

Antipathidae

SPECIES:

Antipathes furcata Gray, 1857

VISUAL ID:

Fan-shaped colonies, with branches that grow in narrow angles, and terminal branches reaching lengths of 5 cm or more without becoming sub-branched. Colour greyish brown to white. This species can be distinguished from *A. atlantica* by generally being less densely branched, as well as having much longer terminal branches.

OBSERVED DEPTH RANGE:

90–200 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 16. *Antipathes furcata*.

A) Plantagenet Bank, 146–151 m. B) Spittal, 104 m, preserved colony attached to a rhodolith (BAMZ-2016-337-012).

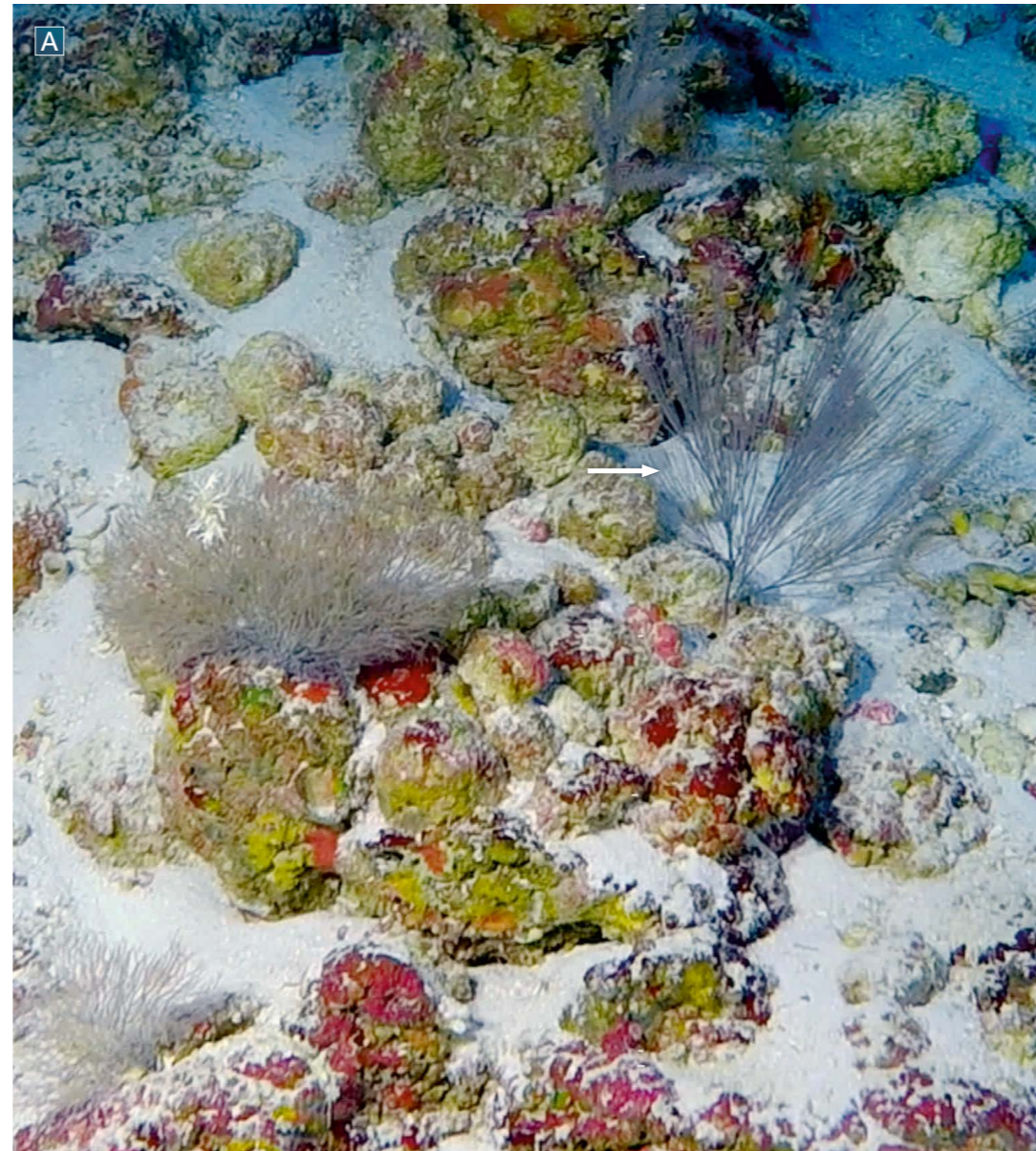


Fig. 16.

Order: Antipatharia (Black Corals)

FAMILY:

Antipathidae

GENUS:

Stichopathes spp.

COMMON NAME:

Wire coral

VISUAL ID:

Several species of black wire corals are known from Bermuda (*Stichopathes* sp., *S. pourtalesi* Brook, 1889, and *S. luetkeni* Brook, 1889), but these are nearly indistinguishable in the field, and require microscopic examination for species-level identifications. Therefore, these wire-coral species are grouped here. Colonies consist of a single, unbranched, wire-like stalk that can reach lengths of several meters, and are often coiled. Colony holdfast appears like a narrow black ring and is commonly visible in underwater footage. Colonies can range in coloration from light brown, grey, white, green to yellow, and can occasionally include commensals like ophiuroids, sponges, shrimps and gobies.

OBSERVED DEPTH RANGE:

61–303 m.

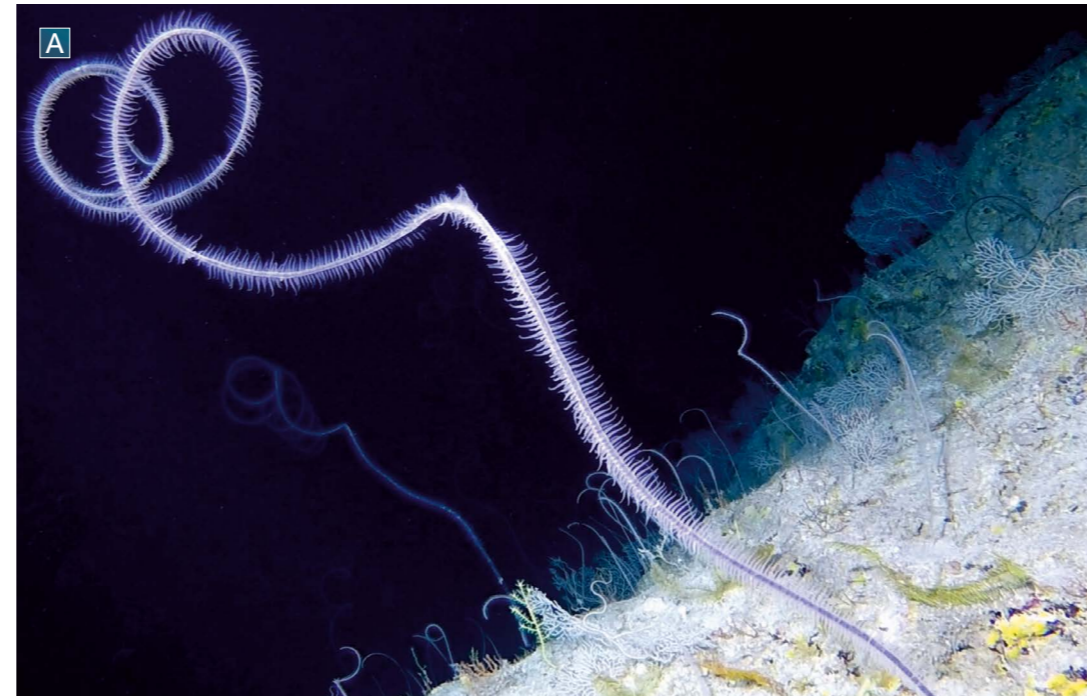
DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 17. *Stichopathes* spp.

A) North Northeast, 299–303 m. B) Plantagenet Bank, 249 m. C) North Northeast, 159 m, preserved colony of *Stichopathes pourtalesi* attached to a rhodolith (BAMZ-2016-337-001).

Fig. 17.



Order: Antipatharia (Black Corals)

FAMILY:

Aphanipathidae

SPECIES:

Distichopathes filix
(Pourtalès, 1867)

VISUAL ID:

Sparsely branched colonies, branching in a single plane like a fan. Stem and branches are pinnulate, with bilateral and alternate pinnule arrangement. Size of colonies typically small, <25 cm. Colour shades of green-yellow.

OBSERVED DEPTH RANGE:

137–304 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank,
Spittal, Tiger.

Fig. 18. *Distichopathes filix*.

A) North Northeast, 300–301 m. B) Tiger, 304 m
(BAMZ-2016-337-025).

Fig. 18.



Order: Antipatharia (Black Corals)

FAMILY:

Myriopathidae

SPECIES:

Tanacetipathes hirta
(Gray, 1857)

COMMON NAME:

Bottle-brush bush coral

VISUAL ID:

Colonies are upright, rigid, moderately to sparsely branched, typically in a single plane like a fan. Individual branches consist of multiple pinnules that resemble a bottle brush. Colour shades of grey-brown.

OBSERVED DEPTH RANGE:

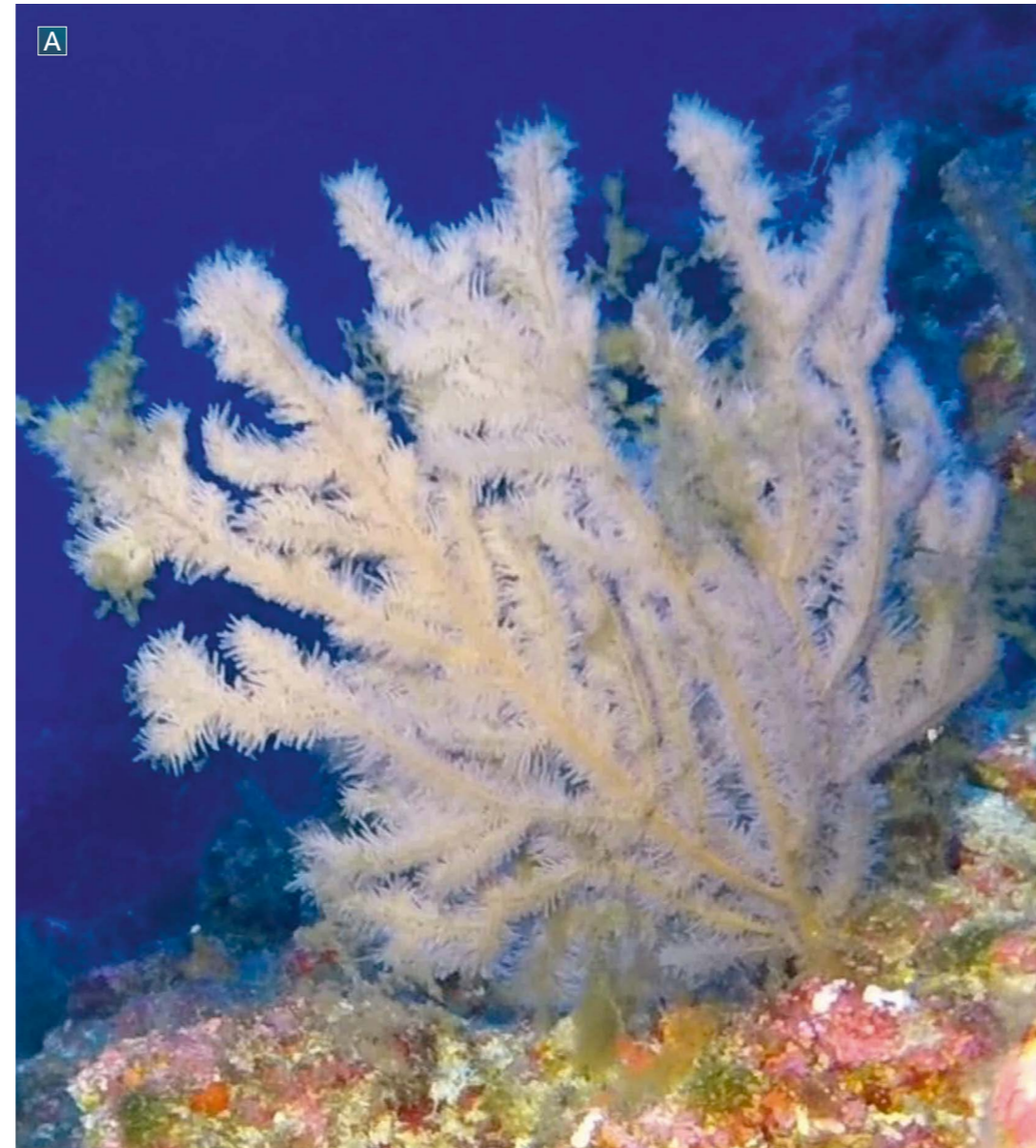
90–200 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank,
Spittal, Tiger.

Fig. 19. *Tanacetipathes hirta*.

A) Plantagenet Bank, 90 m. B) Spittal, 122 m,
preserved colony (BAMZ-2016-337-007).



Order: Antipatharia (Black Corals)

FAMILY:

Myriopathidae

SPECIES:

Tanacetipathes tanacetum (Pourtalès, 1880)

COMMON NAME:

Bottle-brush black coral

VISUAL ID:

Single, unbranched, flexible, stalk equipped with numerous, radially-arranged pinnules, which have the appearance of a bottle-brush. Colonies can very occasionally also be branched. Shades of grey, brown and orange.

OBSERVED DEPTH RANGE:

55–301 m.

DISTRIBUTION:

Challenger Bank, North Northeast,
Plantagenet Bank, Spittal, Tiger.

Fig. 20. *Tanacetipathes tanacetum*.

A-B) Spittal, 147–153 m. C) Challenger Bank, 55–90 m,
preserved specimens (BAMZ-2016-337-005).

Fig. 20.



FAMILY:

Anthothelidae

SPECIES:

Iciligorgia sp.

VISUAL ID:

Short (<0.5 m), rigid, loosely branched fan; branching dichotomous and usually in a single plane. Colour bright red to light brown. This species resembles *Iciligorgia schrammi* Duchassaing, 1870 that is known to occur in the Caribbean and the Gulf of Mexico at similar depths, however, due to the small size of the colonies observed from the present survey (typically ~10–20 cm in height) we refrained from grouping it together with *I. schrammi* (colonies up to 1 m in height).

OBSERVED DEPTH RANGE:

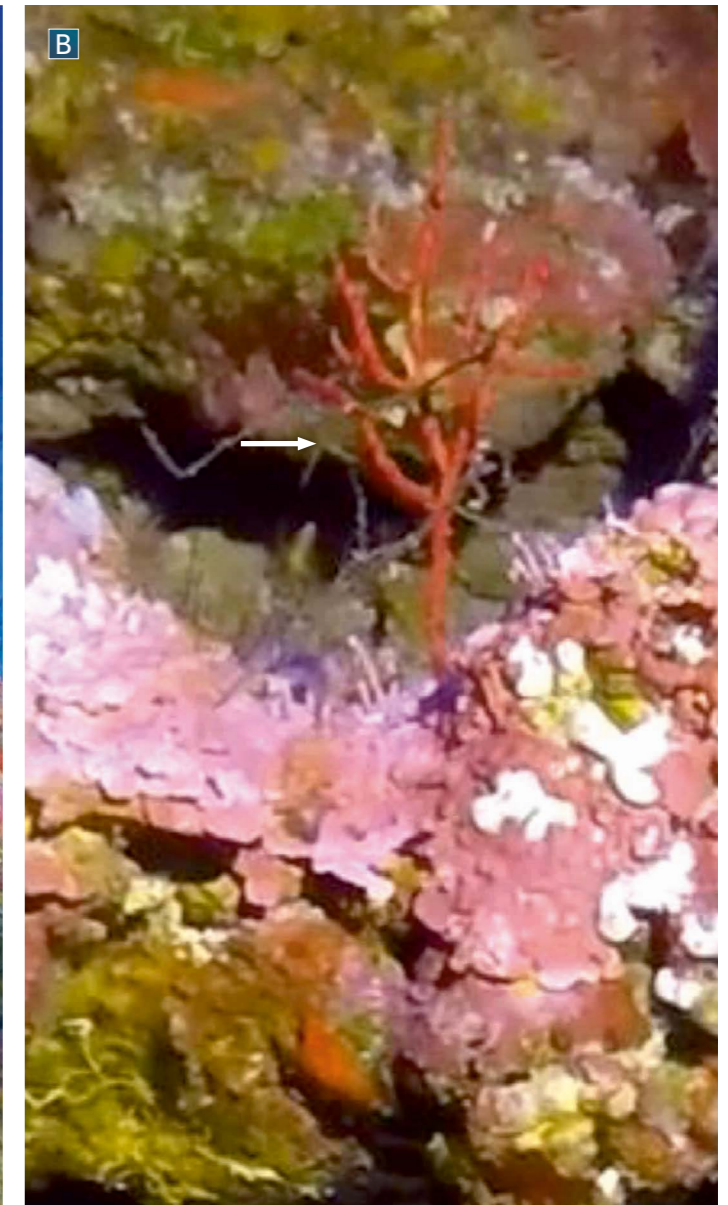
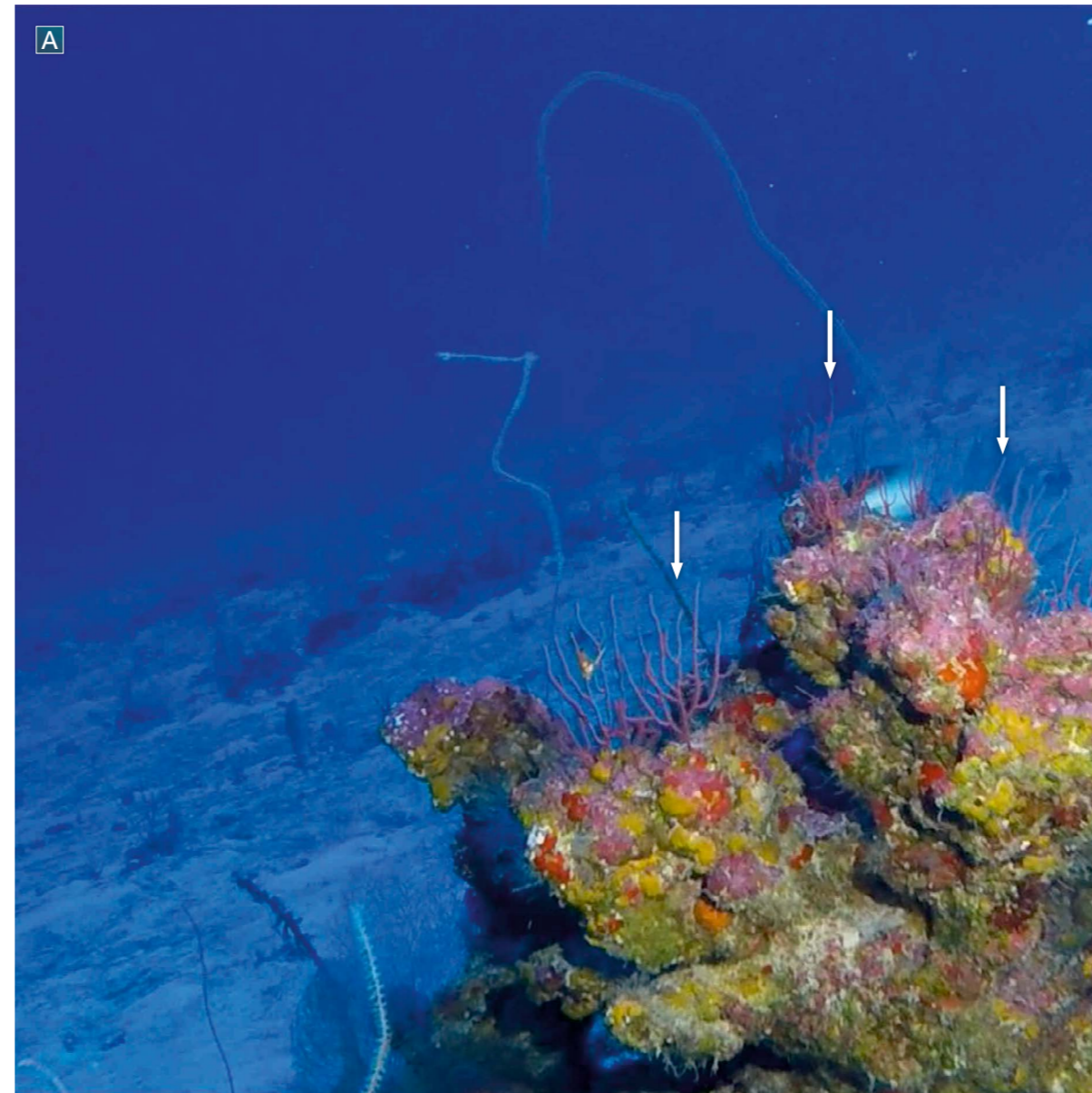
90–93 m.

DISTRIBUTION:

Spittal, Tiger.

Fig. 21. *Iciligorgia* sp.

A-B) Spittal, 90 m.



Subclass: Octocorallia

FAMILY:

Chrysogorgiidae

SPECIES:

Chrysogorgia sp.

VISUAL ID:

Colonies are long (~25–30 cm in height), narrow (<10 cm wide) and sparsely branched, with a slight bottle-brush shape. Main stalk with gold, black or green metallic lustre. With conspicuous whitish polyps that are large compared to the size of the branches that support them. This morphotype could belong to *Chrysogorgia fewkesii* Verrill, 1883 that is reported from Bermuda, however, positive assignment to this species would require microscopic examination.

OBSERVED DEPTH RANGE:

200–305 m.

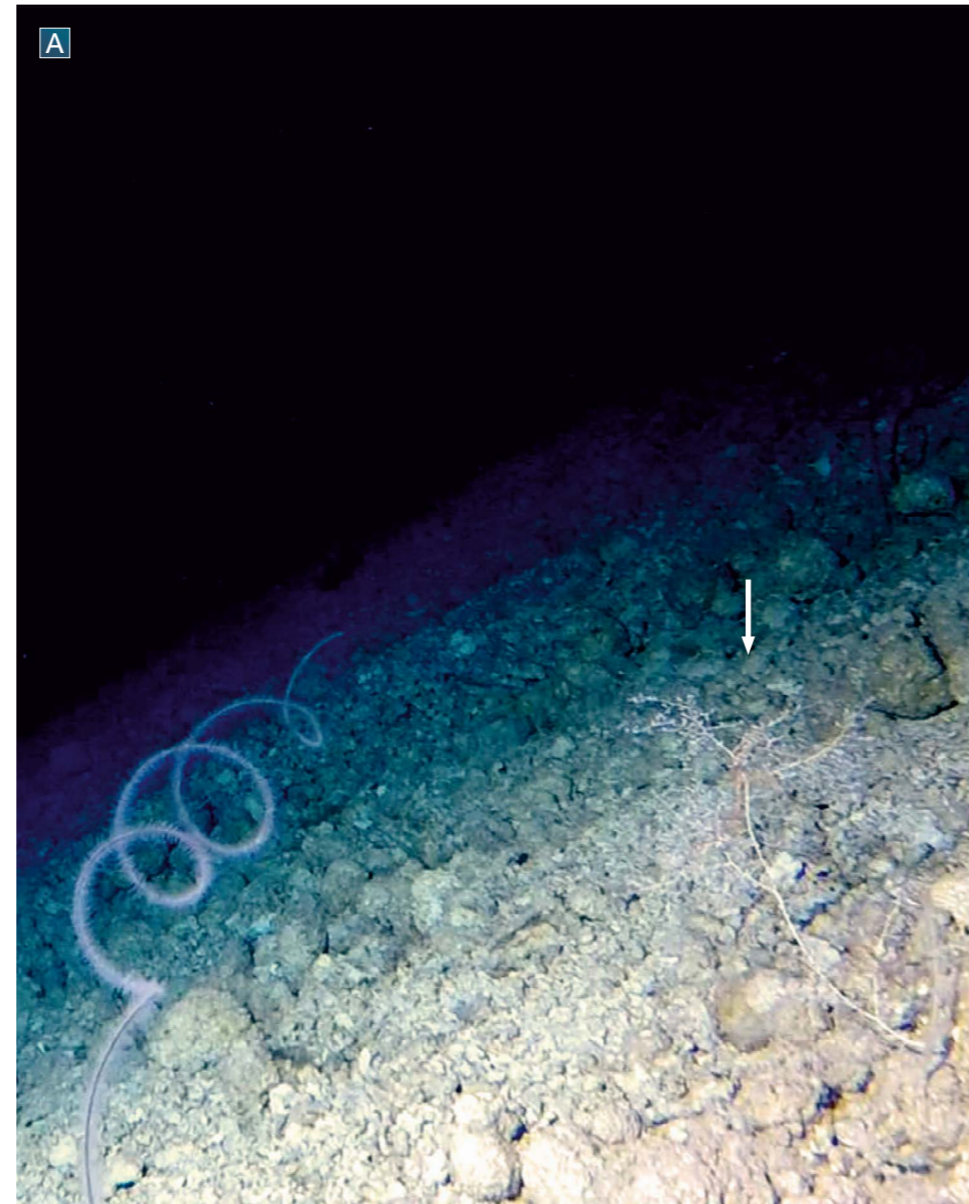
DISTRIBUTION:

North Northeast, Tiger.

Fig. 22. *Chrysogorgia* sp.

A) Tiger, 304–305 m. B) North Northeast, 300–301 m.

Fig. 22.



FAMILY:

Clavulariidae

GENUS:

Carijoa sp.

VISUAL ID:

Colonies are small (<0.25 m), with fleshy stalks and branches. Polyps conspicuously large compared to the size of branches they sit on. Species of this genus are difficult to be distinguished in the field. Pale white to light purple.

OBSERVED DEPTH RANGE:

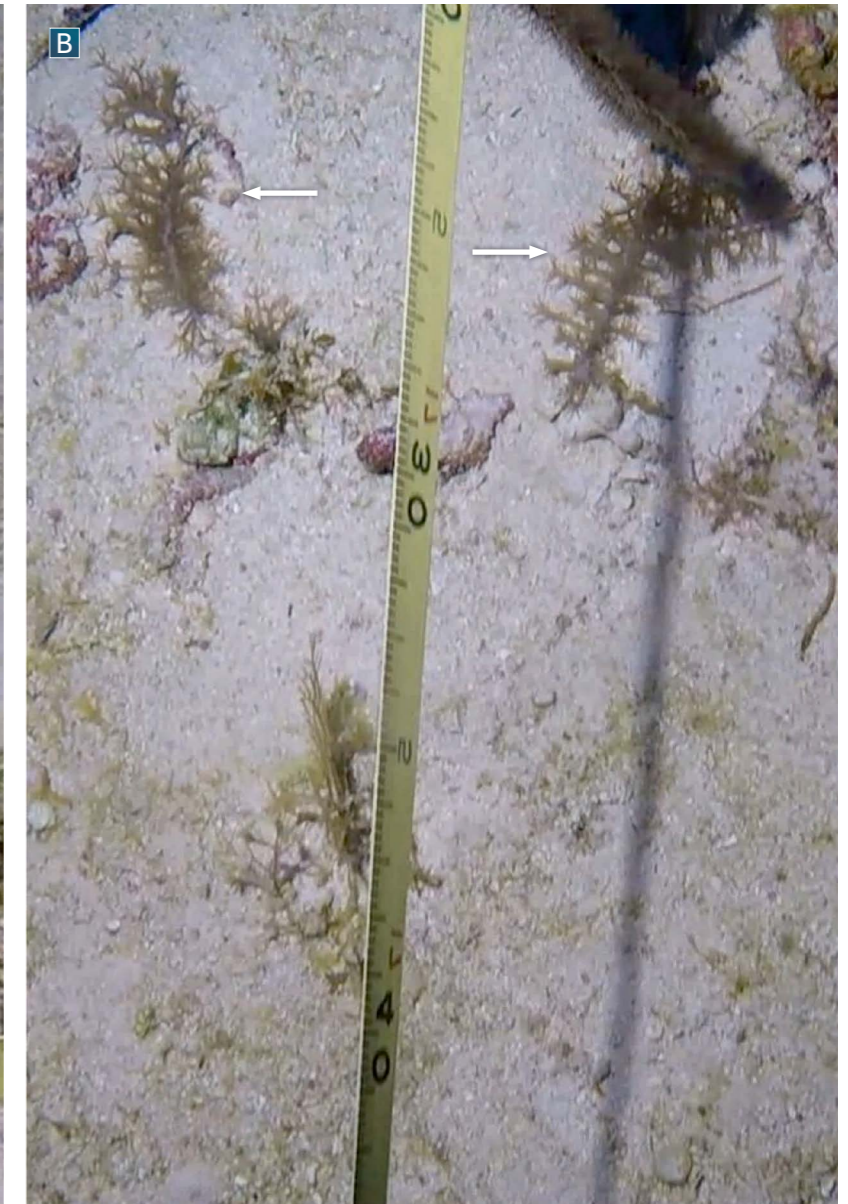
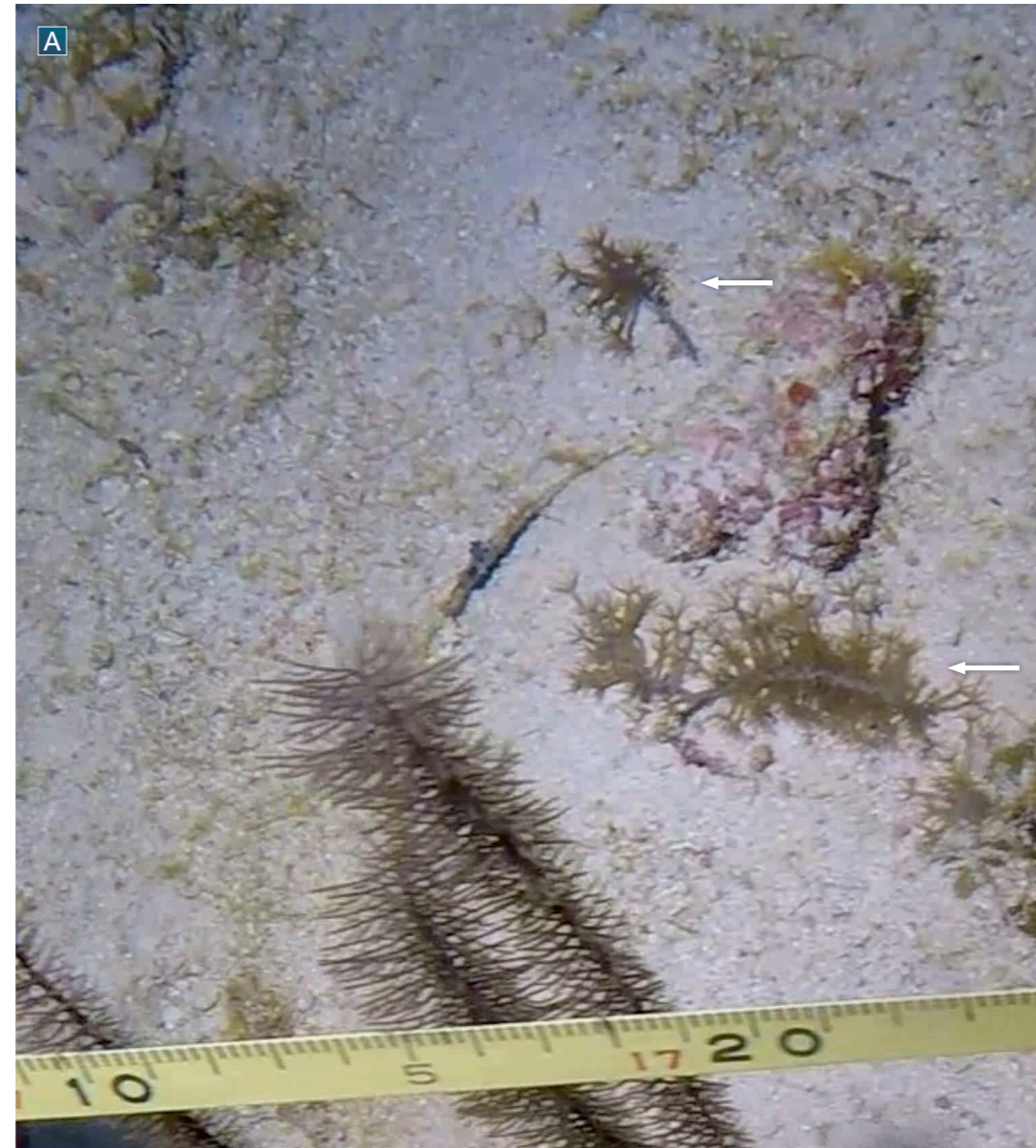
90 m.

DISTRIBUTION:

Spittal.

Fig. 23. *Carijoa* sp.

A-B) Spittal, 90 m.



FAMILY:

Ellisellidae

SPECIES:

Ellisella atlantica (Toeplitz, 1910) /
Ellisella elongata (Pallas, 1766)

COMMON NAME:

Long sea whip /
Devil's sea whip

VISUAL ID:

Colonies form single, long (often >1 m), unbranched stalks that are slightly tapered from base to tip. Occasionally, distal part is heavily bent giving colonies a 'reversed hook'-like appearance. Polyps white; when extracted may appear fuzzy. Two similar species are known to occur in Bermuda, *E. atlantica* and *E. elongata* however, separation between the two is not possible from underwater footage. From a distance, this morphotype could also be confused with young colonies of *Stichopathes* that have not yet attained their characteristic coiled morphology. Colour bright yellow to mustard. This morphotype was frequently found towards the drop off from the Bermuda platform attached on rhodoliths or on outcropping limestone rock.

OBSERVED DEPTH RANGE:

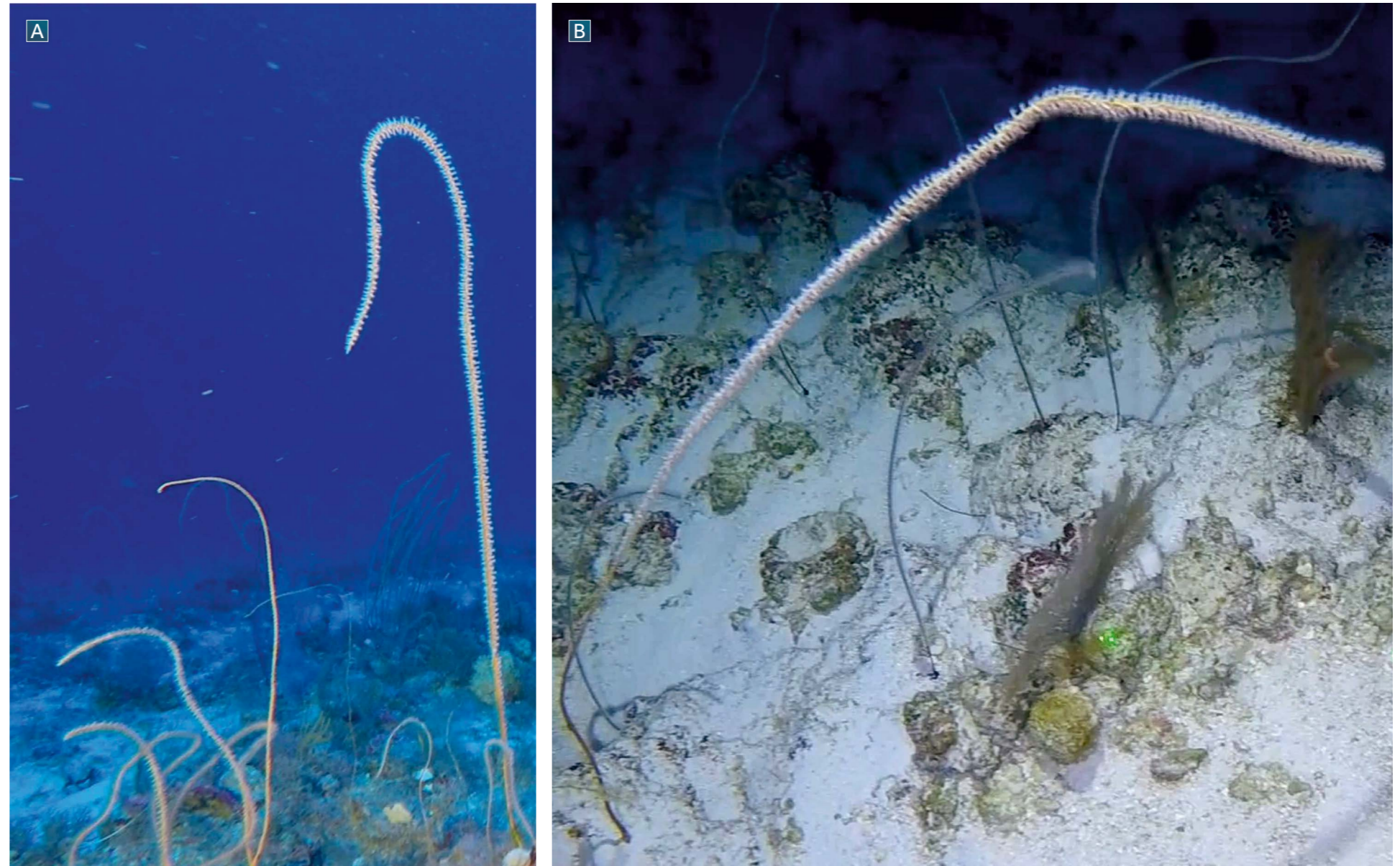
90–250 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 24. *Ellisella atlantica/elongata*.

A) Spittal, 89–90 m. B) Plantagenet Bank, 146–151 m.



FAMILY:

Ellisellidae

SPECIES:

Ellisella grandis (Verrill, 1901)

COMMON NAME:

Grand sea whip

VISUAL ID:

Colonies are typically tall (>1 m) with sparse to moderate dichotomous branching from short stalks. Branches are long, rigid and grow at narrow angles. Colour bright yellow to mustard. Typically encountered towards the drop off from the Bermuda platform, attached on rhodoliths or on outcropping limestone rock.

OBSERVED DEPTH RANGE:

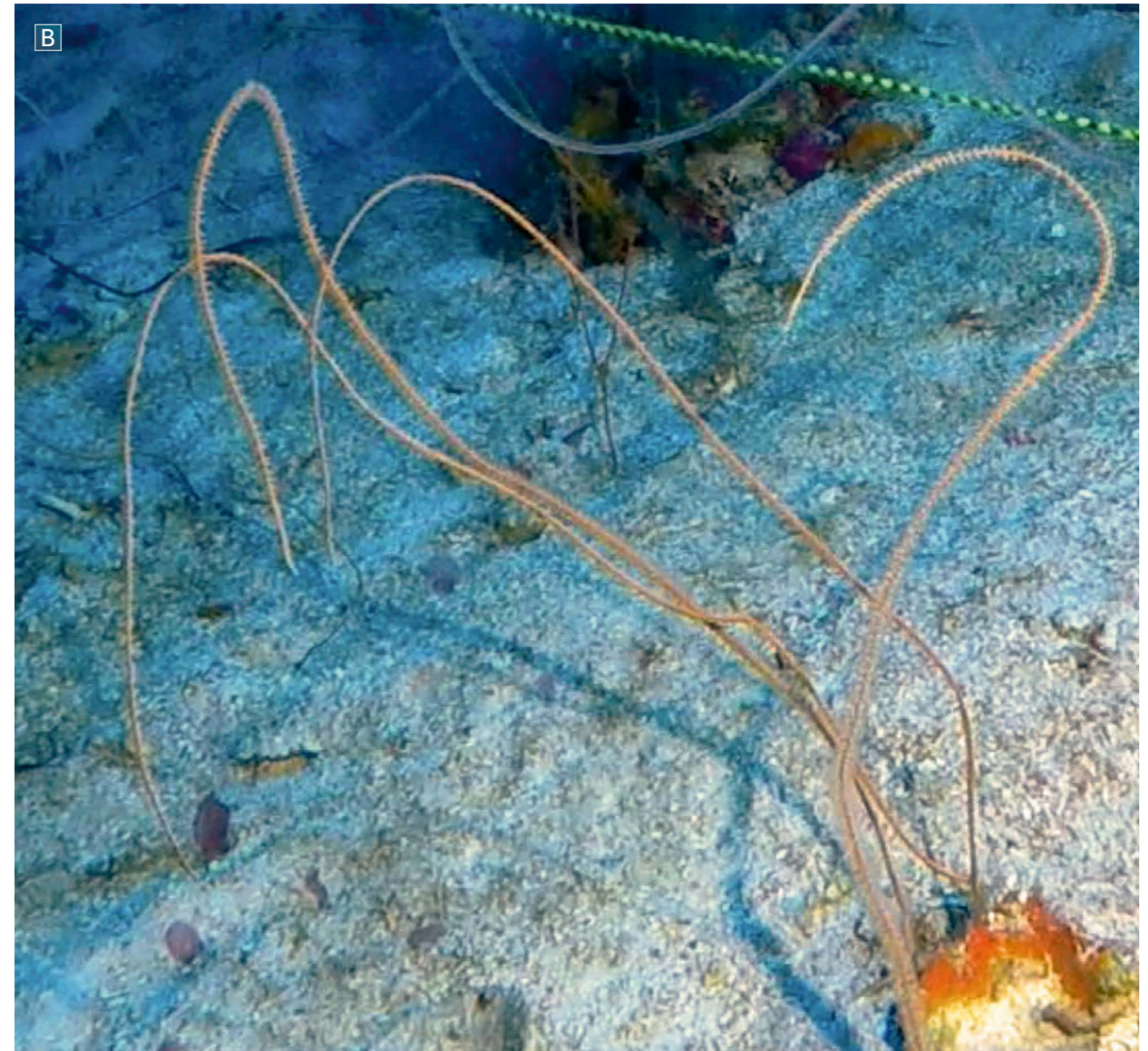
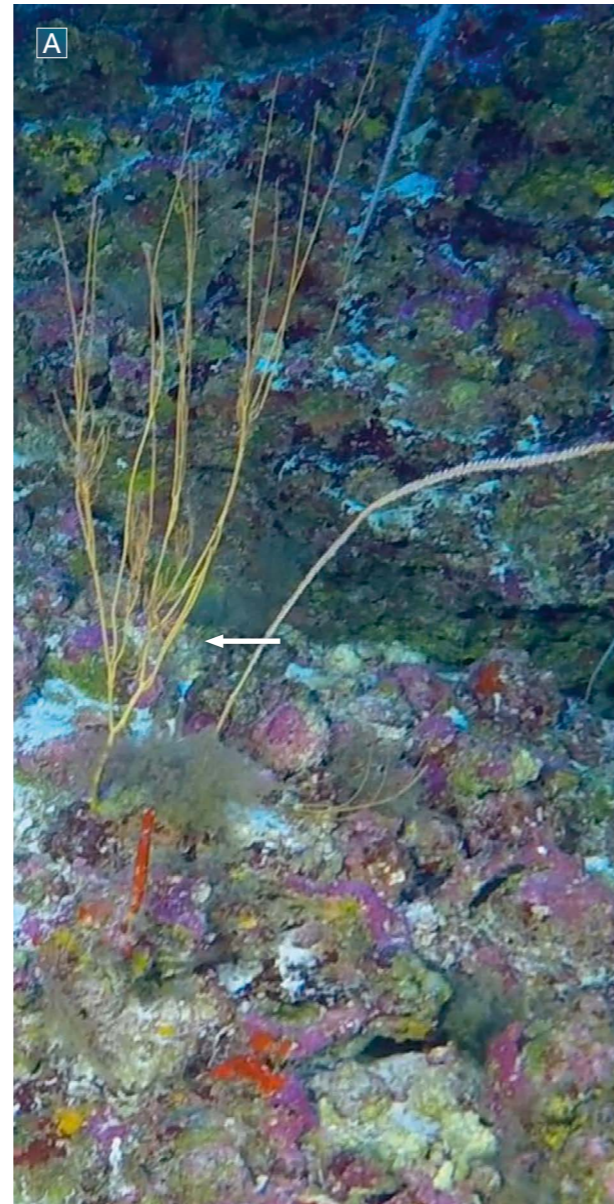
90–93 m.

DISTRIBUTION:

North Northeast, Spittal, Tiger.

Fig. 25. *Ellisella grandis*.

A) Tiger, 92 m. B) Spittal, 90 m.



FAMILY:

Ellisellidae

SPECIES:

Nicella sp.

VISUAL ID:

Colonies short (typically <25 cm), stiff, flabellate, with dichotomous branching. Large, alternate polyps give it a slight zigzag appearance. Colour orange-red to red-brown. Previous reports of *Nicella* from Bermuda include *Nicella gracilis* Cairns, 2007, however, since the colonies of that species are typically white, it is unlikely to be the same as the one observed from the present survey.

OBSERVED DEPTH RANGE:

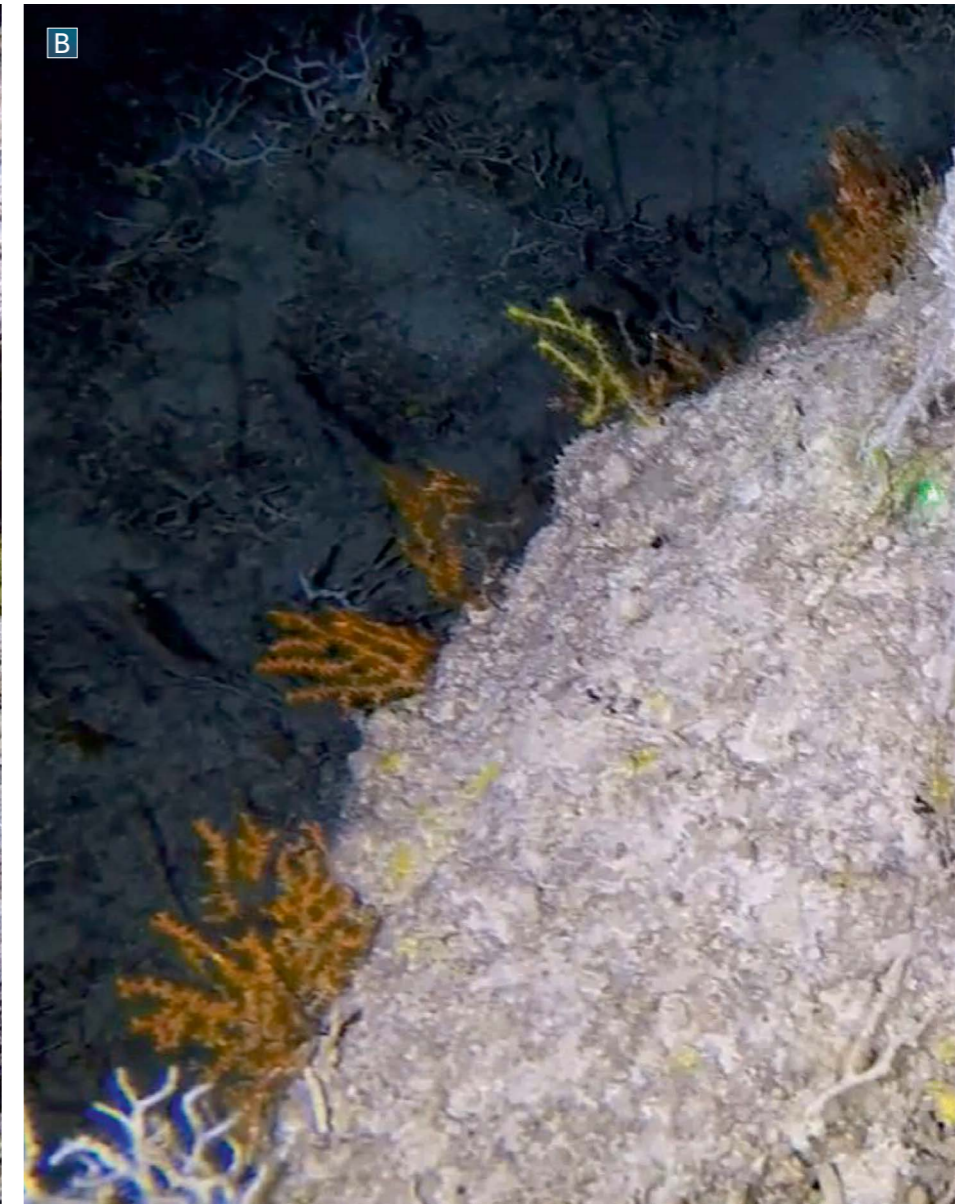
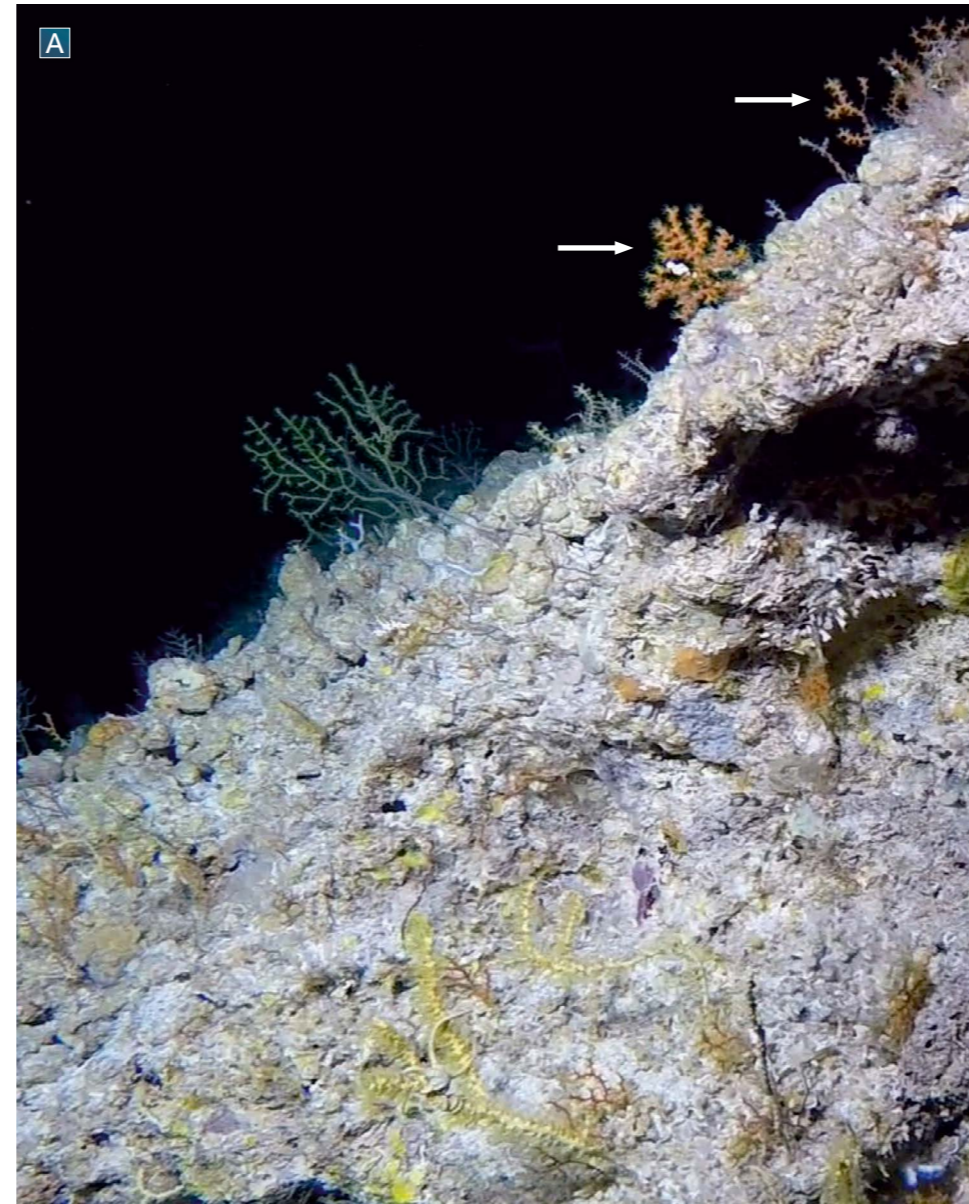
146–303 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 26. *Nicella* sp.

A) North Northeast, 200 m. B) North Northeast, 300–301 m.



FAMILY:

Ellisellidae

GENUS:

Viminella sp.

VISUAL ID:

Single, unbranched stalk, typically <1 m tapering slightly from base to the tip. Colour whitish-yellow. From a distance, *Viminella* colonies resemble young, uncoiled colonies of *Stichopathes*, or young colonies of *Ellisella elongata*, although *Viminella* has much thinner, delicate-looking stalks.

OBSERVED DEPTH RANGE:

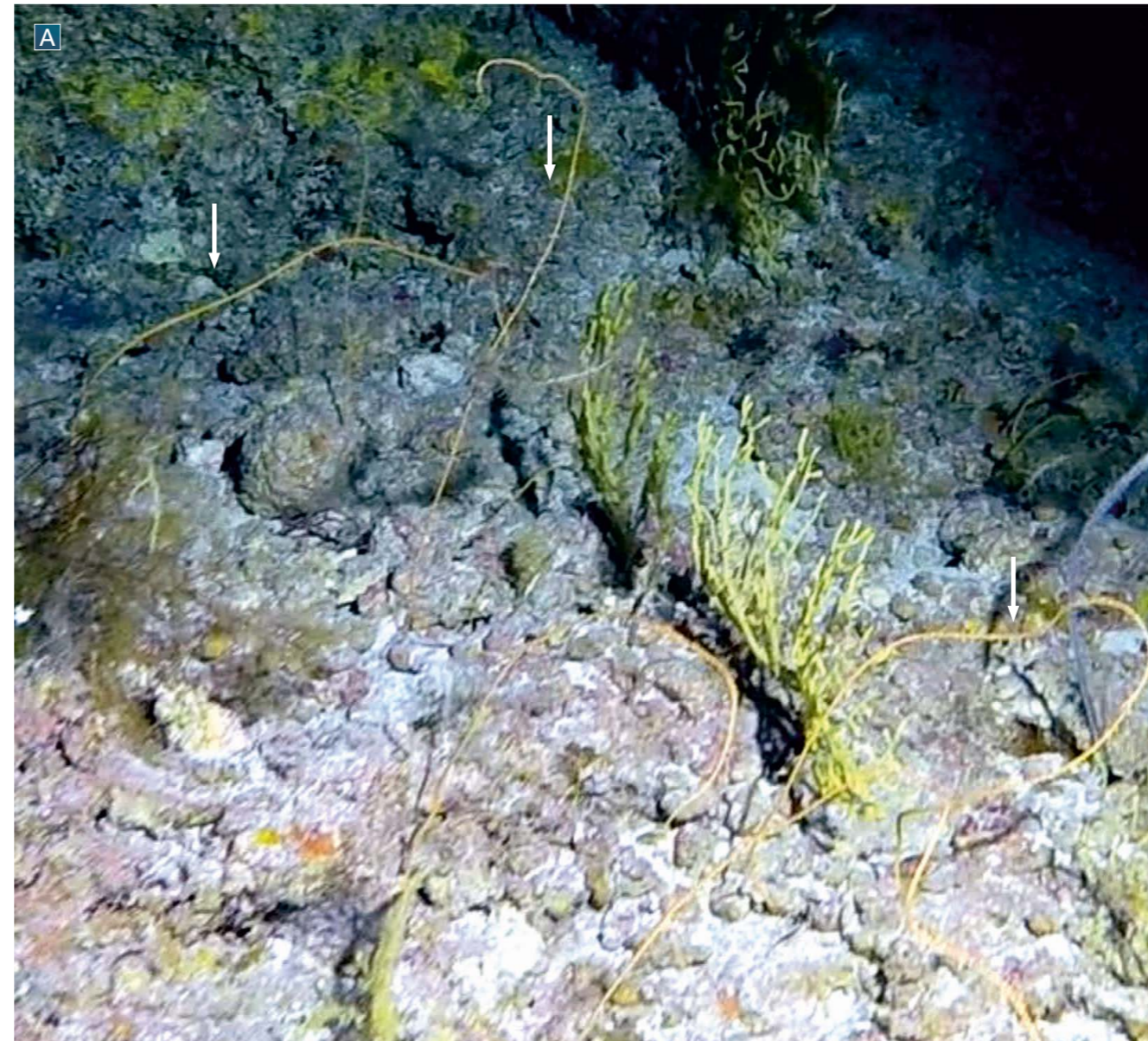
137–301 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank,
Spittal, Tiger.

Fig. 27. *Viminella* sp.

A) Tiger, 200 m. B) Spittal, 148–150 m.



FAMILY:

Gorgoniidae

GENUS:

Antillogorgia spp.

COMMON NAME:

Sea plumes

VISUAL ID:

Bushy clusters of feather-like plumes with pinnate branching in a single [*Antillogorgia bipinnata* (Verrill, 1864)] or multiple plane(s) [*A. americana* (Gmelin, 1791)]. Main branches have a distinct purple colour; pinnules long and commonly arranged in pairs opposite main branch. Polyps green to yellow.

Positive species identification requires further microscopic examination.

OBSERVED DEPTH RANGE:

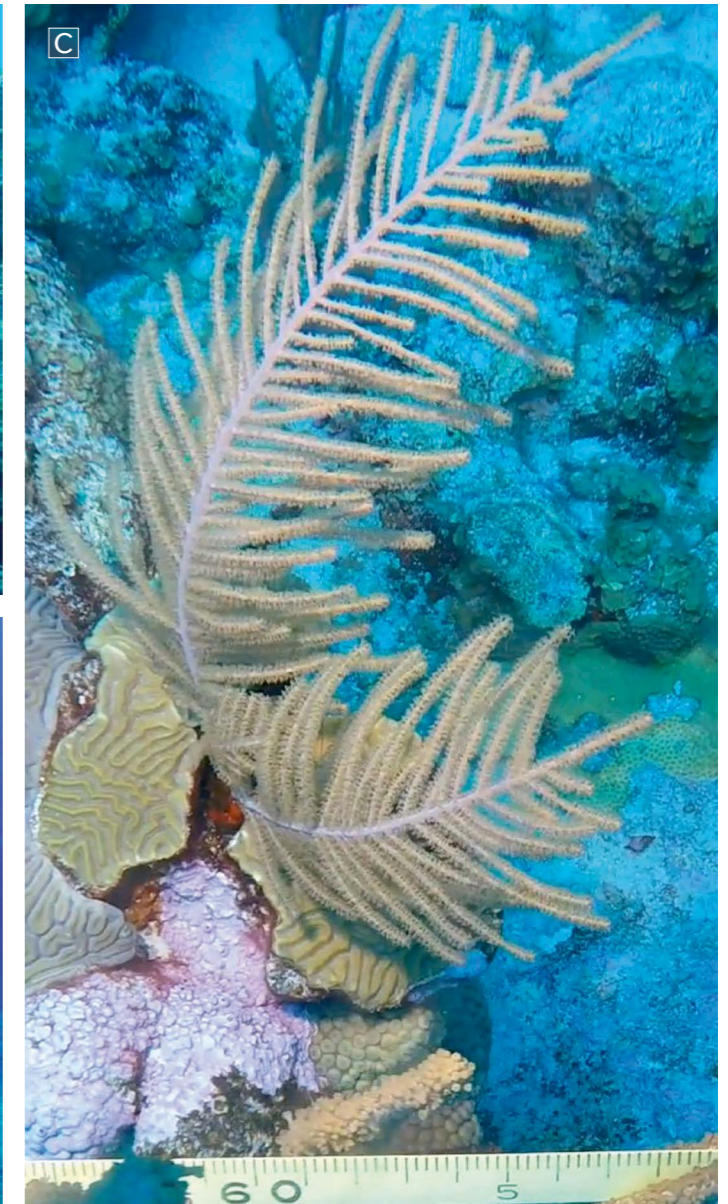
15–31 m.

DISTRIBUTION:

North Northeast, Spittal, Tiger.

Fig. 28. *Antillogorgia* spp.

A-C) Spittal, 29–30 m.



FAMILY:

Gorgoniidae

SPECIES:

Gorgonia ventalina
Linnaeus, 1758

COMMON NAME:

Common sea fan

VISUAL ID:

Colonies form large (up to 2 m tall), flat fans comprising tightly meshed networks of branches. The smaller branches appear shades of green-yellow while the main branches have a distinct purple colour resembling leaf veins.

OBSERVED DEPTH RANGE:

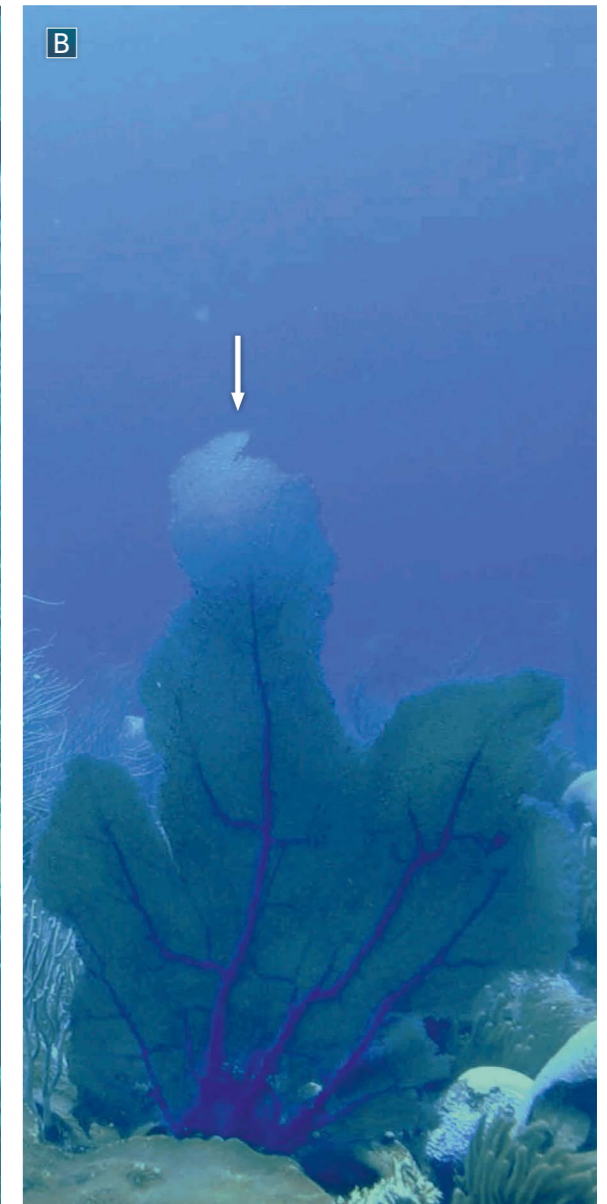
15–20 m.

DISTRIBUTION:

North Northeast, Spittal.

Fig. 29. *Gorgonia ventalina*.

A-B) Spittal, 16 m.



FAMILY:

Nephtheidae

SPECIES:

Gersemia sp.

VISUAL ID:

Colonies in general small (often <0.25 cm) with, thick, fleshy trunk and branches. With large, conspicuous polyps. Pale to creamy white. It somewhat resembles *Gersemia fruticosa* Sars, 1860 but that species is known to have a boreal distribution and typically occurs in deep-water (>200 m) environments.

OBSERVED DEPTH RANGE:

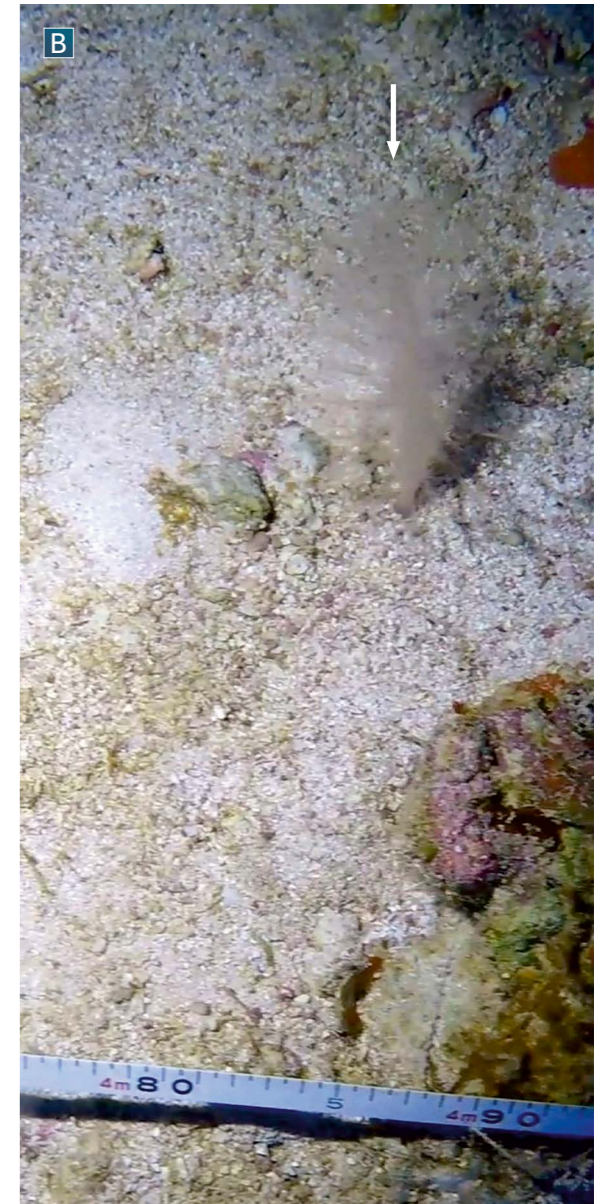
58–90 m.

DISTRIBUTION:

Spittal, Tiger.

Fig. 30. *Gersemia* sp.

A-B) Spittal, 90 m.



FAMILY:

Nidaliidae

GENUS:

Chironephthya sp.

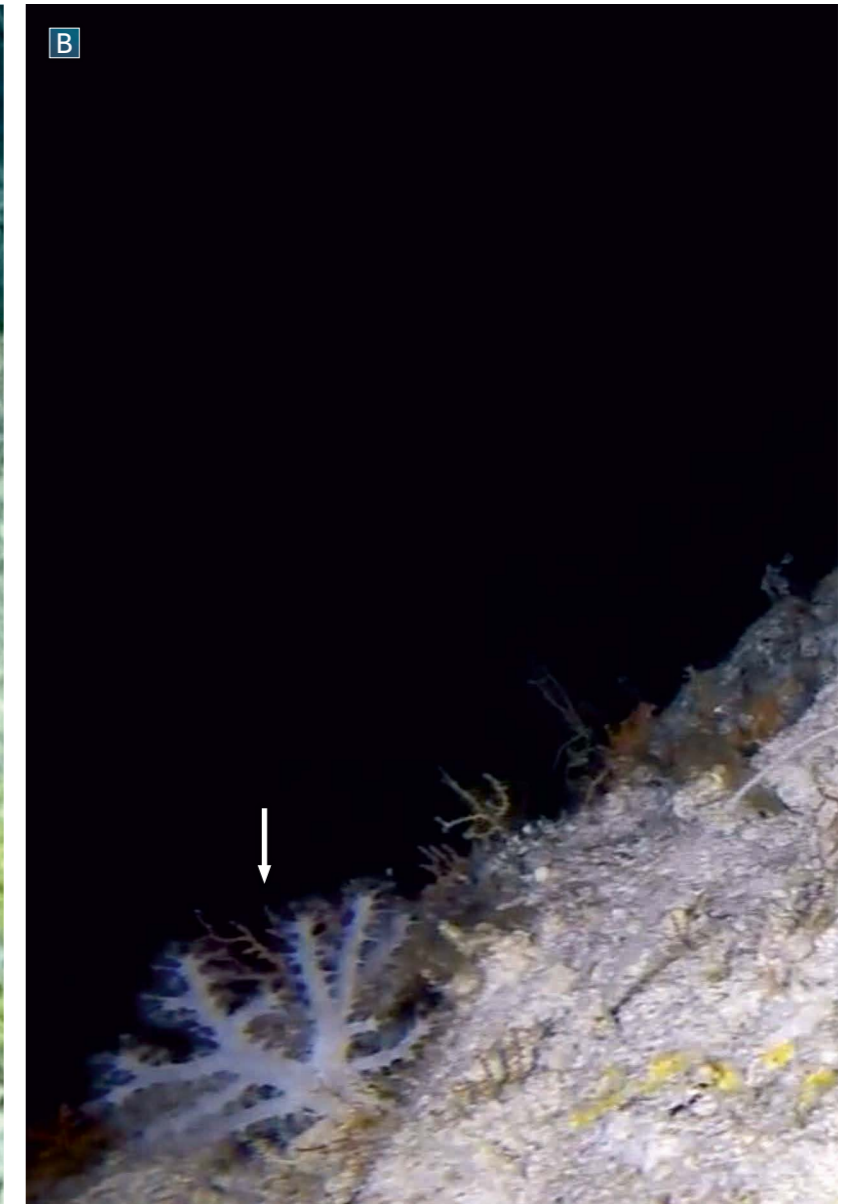
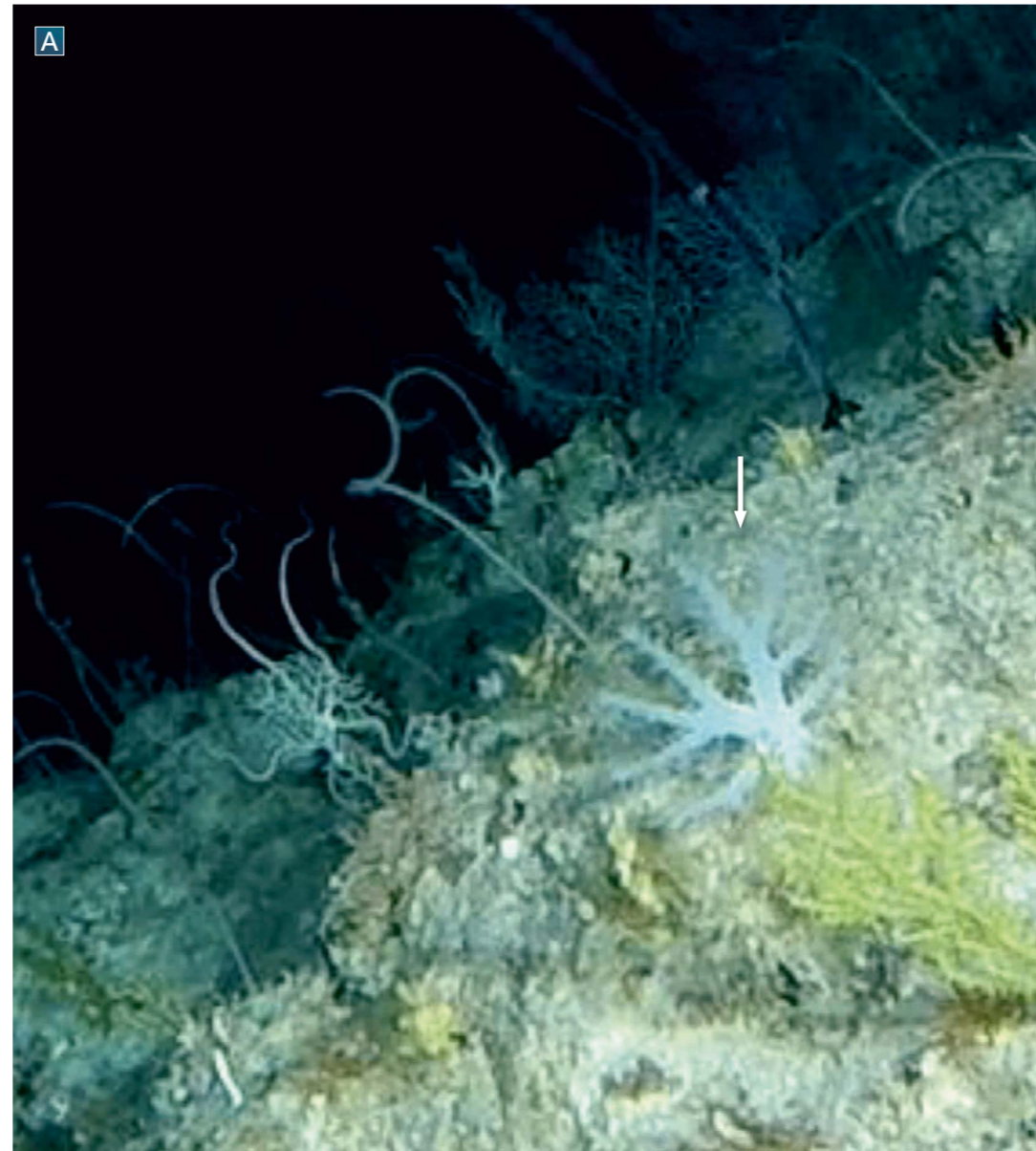
VISUAL ID:

Colonies small (typically <25 cm), branched, tree-like, and erect; with thick, fleshy main stem. Polyps throughout the main stem and branches; with large, conspicuous calycular teeth. Colour shades of white to transparent. Positive identification of species requires microscopic examination of the calyces and sclerites, however, it bears a resemblance to *Chironephthya caribaea* (Deichmann, 1936) whose white to yellowish colonies are reported from the Caribbean, as well as resembles the whitish *C. mediterranea* López-González, Grinyó & Gili, 2014 reported from the Mediterranean.

OBSERVED DEPTH RANGE:
200–301 m.

DISTRIBUTION:
North Northeast, Spittal.

Fig. 31. *Chironephthya* sp.
A-B) North Northeast, 300–301 m.



FAMILY:

Plexauridae

GENUS:

Eunicea spp.

COMMON NAME:

Knobby sea rods

VISUAL ID:

Multiple species are known to occur in Bermuda, however, it is not possible to distinguish individual taxa without prior microscopic examination. Colonies of this genus are branched, forming bushy or candelebrum-like structures, and <1 m tall. When polyps are retracted, calyces are prominently extracted forming knobby protuberances (e.g. in *Eunicea tourneforti* Milne Edwards & Haime, 1857). Colour shades of brown/grey, occasionally purple.

OBSERVED DEPTH RANGE:

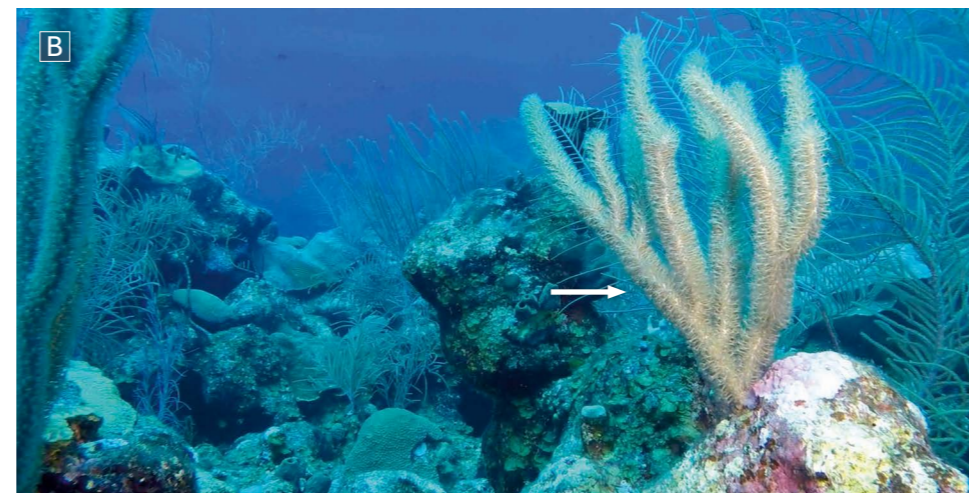
15–63 m.

DISTRIBUTION:

North Northeast, Spittal, Tiger.

Fig. 32. *Eunicea* spp.

A-B) Spittal, 30 m. C) Spittal, 15 m, *Eunicea tourneforti*.



Subclass: Octocorallia

FAMILY:

Plexauridae

SPECIES:

Hypnogorgia sp.

VISUAL ID:

Flat, fan-shaped colonies, with dense branching. Peripheral outline is slightly sinuous. Colour shades of white. Resembles *Hypnogorgia pendula* Duchassaing & Michelotti, 1864 reported from deep-water locations across the Caribbean and the Gulf of Mexico, however, positive species identification requires microscopic examination.

OBSERVED DEPTH RANGE:

146–303 m.

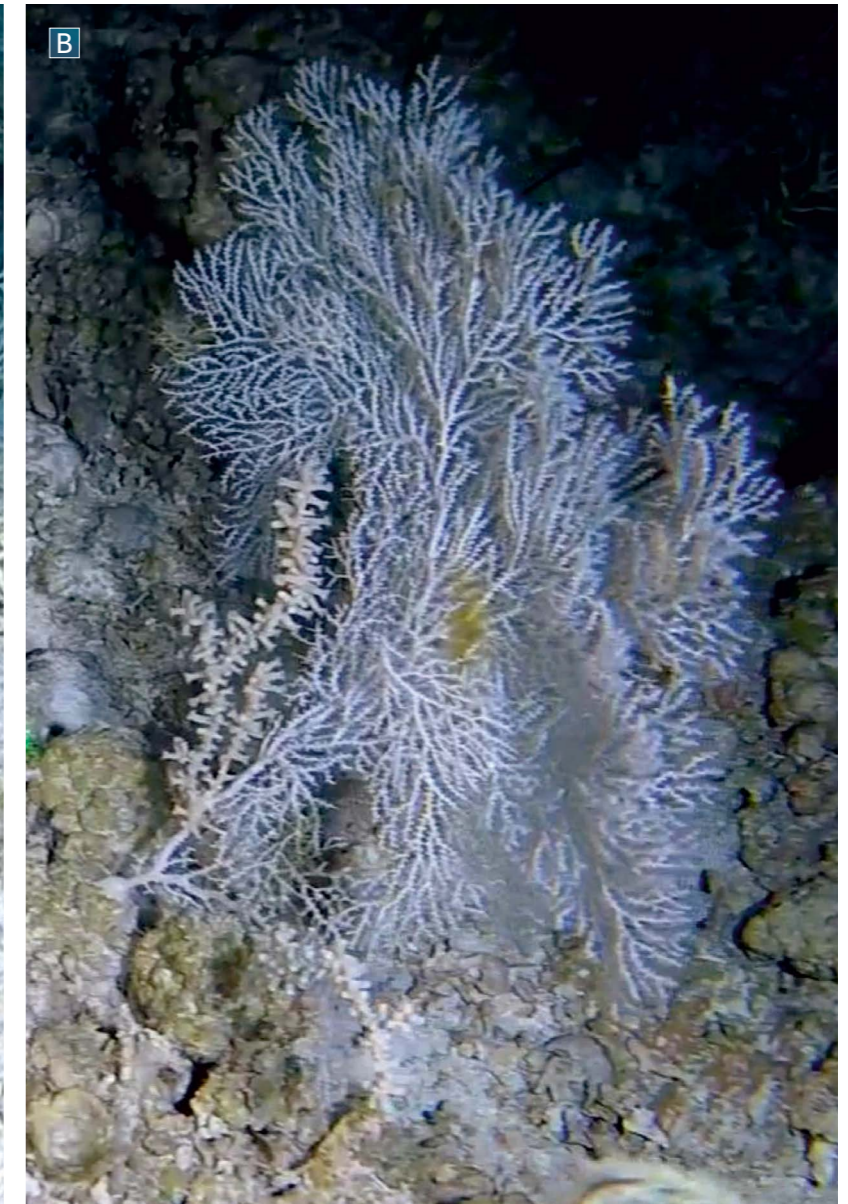
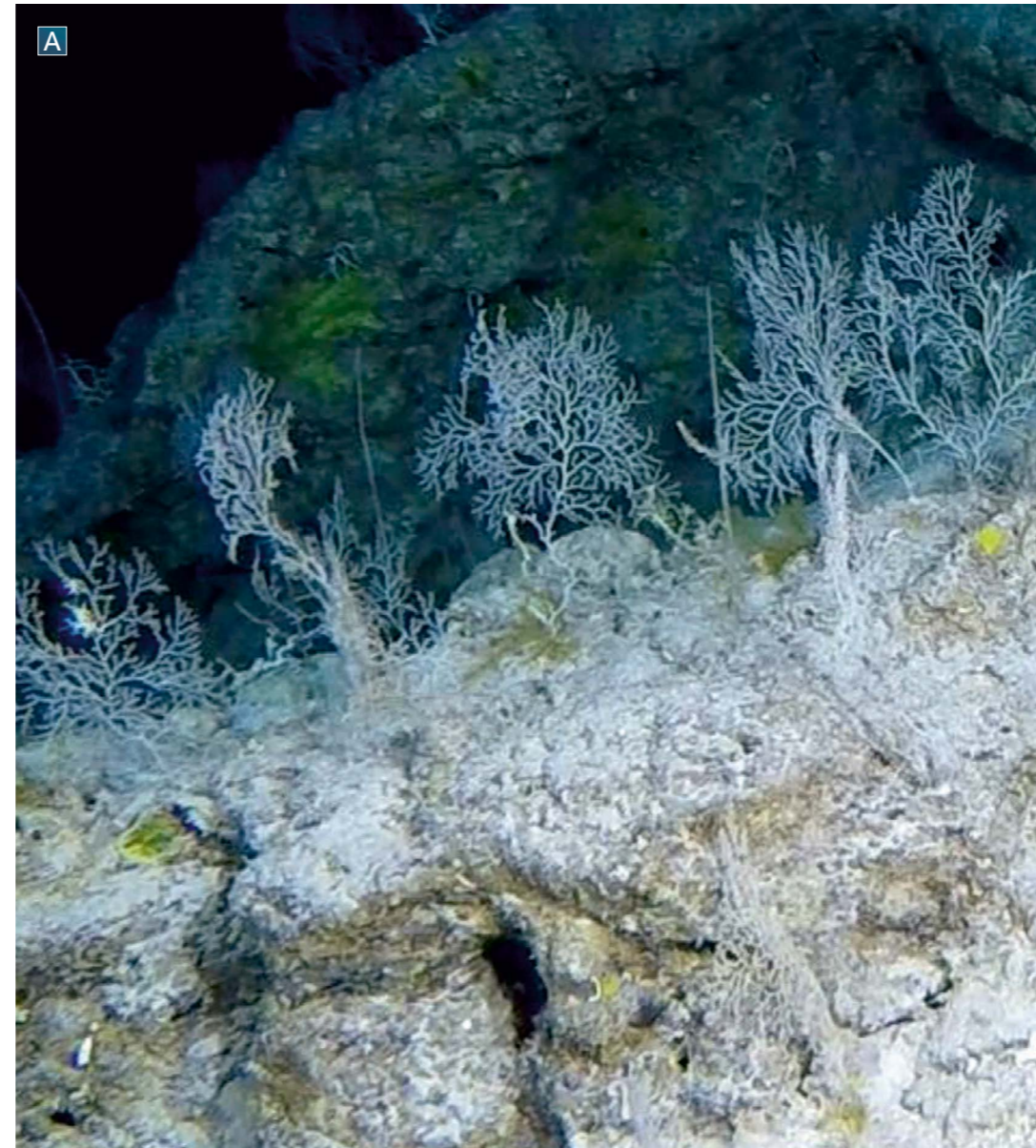
DISTRIBUTION:

North Northeast, Plantagenet Bank,
Spittal, Tiger.

Fig. 33. *Hypnogorgia* sp.

A) Tiger, 243 m. B) Tiger, 200 m.

Fig. 33.



FAMILY:

Plexauridae

GENUS:

Placogorgia spp.

VISUAL ID:

Two species are known to occur in Bermuda, *Placogorgia* cf. *intermedia* (Thomson, 1927) and *Placogorgia tenuis* (Verrill, 1883), however, it is not possible to distinguish individual taxa without prior microscopic examination. Colonies fan-shaped and growing mostly in one plane; with thick, main stem and several thinner branches; overall, there is a strong tree-like resemblance. Colour bright green to yellow. Often with ophiuroid commensals.

Note: The gross morphology of this genus is very similar to that of *Paramuricea* Kölliker, 1865, which has not been reported from Bermuda before. Positive separation requires microscopic examination of sclerites, hence, it is impossible to reliably set these genera apart from video and still images.

OBSERVED DEPTH RANGE:

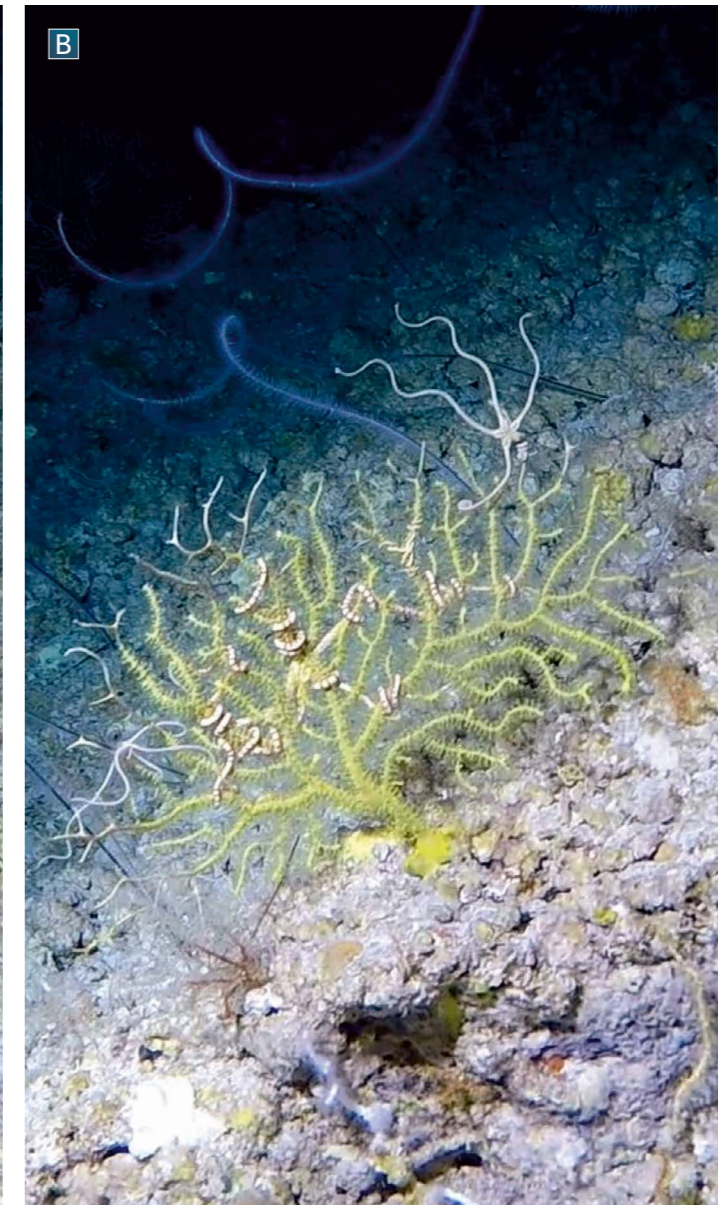
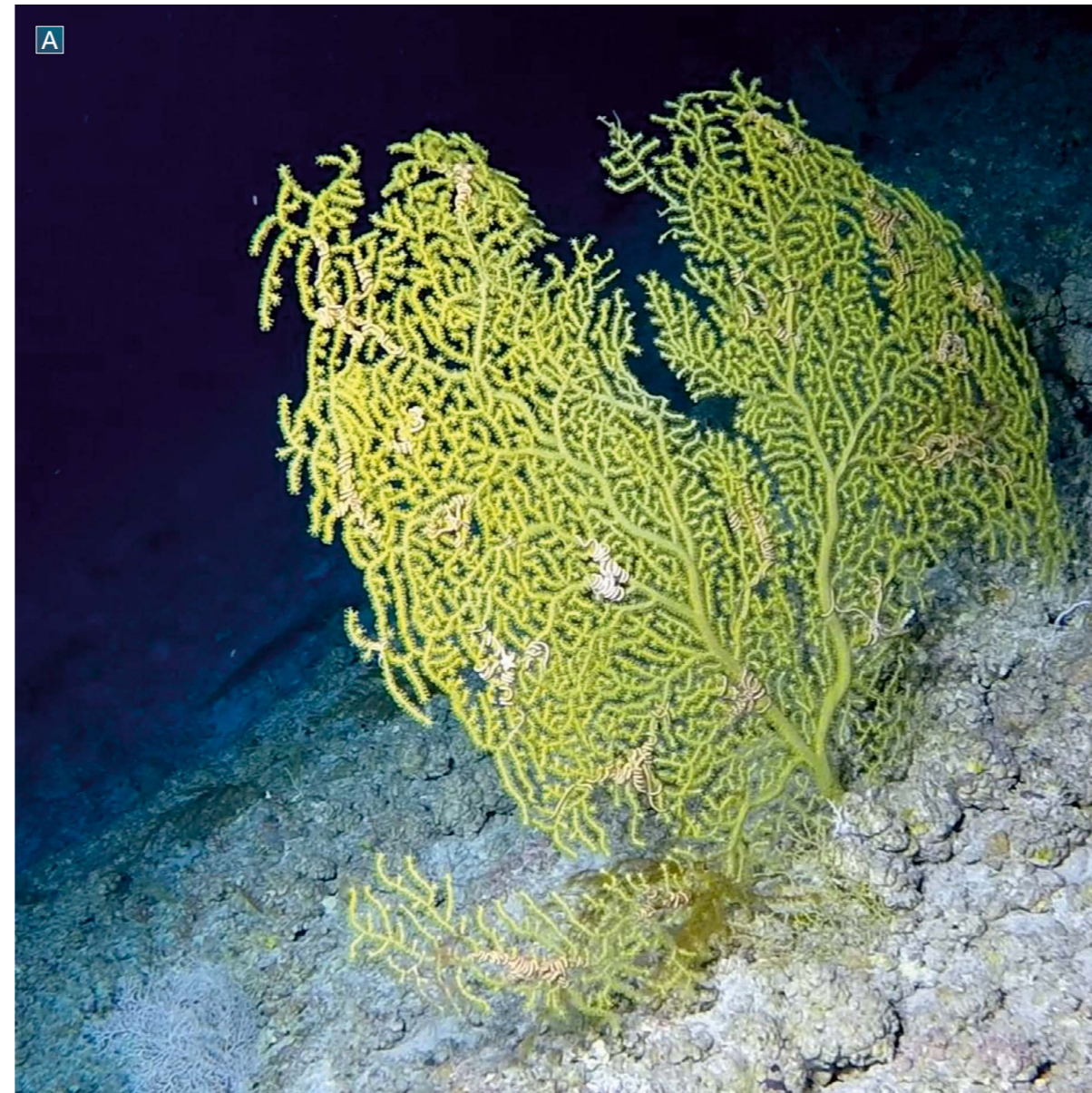
136–303 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank,
Spittal, Tiger.

Fig. 34. *Placogorgia* spp.

A-B) North Northeast, 198–200 m.



FAMILY:

Plexauridae

SPECIES:

Plexaura homomalla (Esper, 1794)

COMMON NAME:

Black sea rod

VISUAL ID:

Bushy colonies growing in flat, single planes. Primarily lateral branching, although dichotomous branching also occurs. Distinct black stalk with bright yellow/brown polyps.

OBSERVED DEPTH RANGE:

15–31 m.

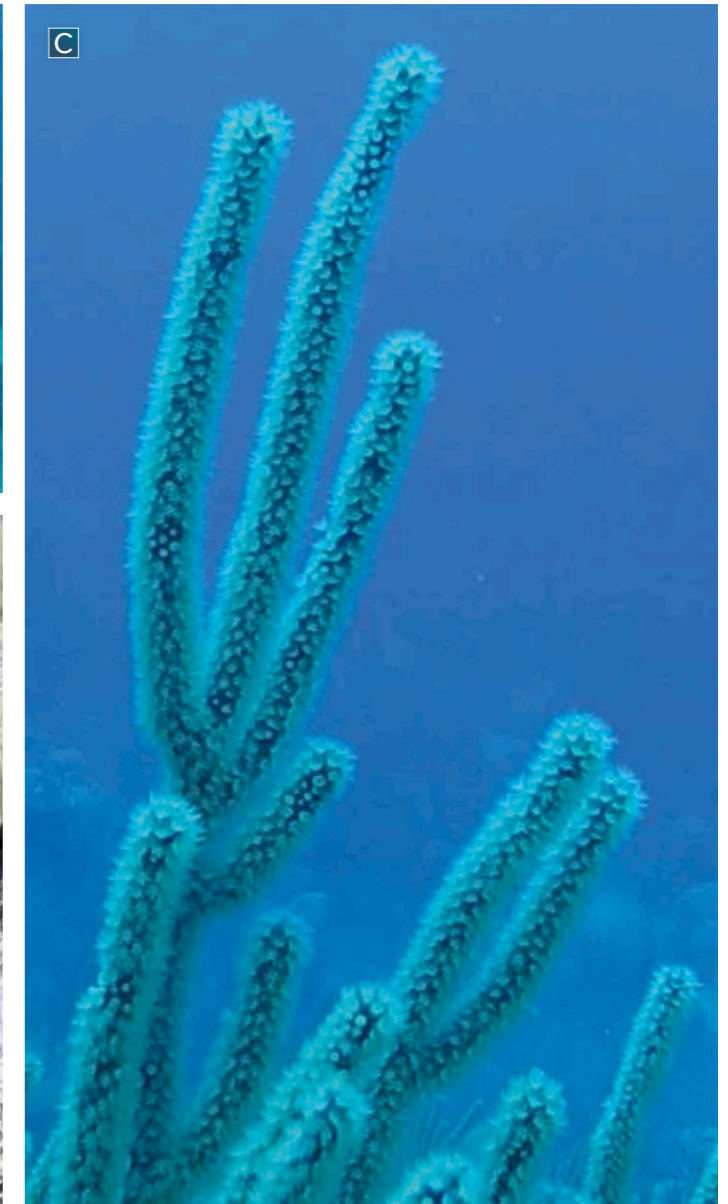
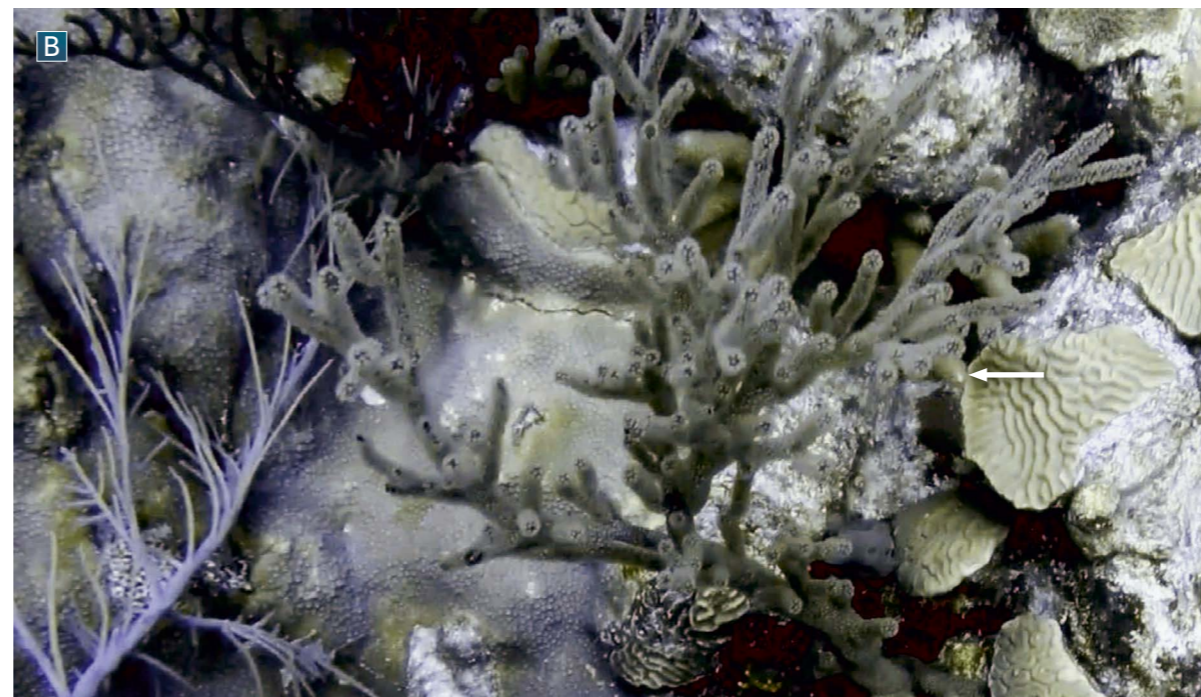
DISTRIBUTION:

North Northeast, Spittal, Tiger.

Fig. 35. *Plexaura homomalla*.

A) Spittal, 16 m. B) Tiger, 17 m, top-down view.

C) Spittal, 16 m, close-up.



FAMILY:

Plexauridae

SPECIES:

Plexaurella spp.

COMMON NAME:

Slit-pore rods

VISUAL ID:

Bushy sea rod colonies, typically branching dichotomously; with thick stalks and branches. Polyps typically white to yellow; when retracted, slit-like to elliptical apertures are visible. Three species are known to occur in Bermuda [*P. dichotoma* (Esper, 1971), *P. grisea* Kunze, 1916 and *P. nutans* (Duchassaing and Michelotti, 1860)], however, positive identification requires closer inspection under the microscope. An exception to that is *P. nutans* (Giant slit pore rod) that forms tall (typically >1 m), loosely branched colonies with thick stalks.

Note: In the field, small colonies of this genus with extended polyps may be difficult to separate from *Eunicea*. Similarly, colonies of *P. dichotoma* with extended polyps are often indistinguishable from colonies of *Pseudoplexaura porosa* due to their similar stature and branching habit.

OBSERVED DEPTH RANGE:

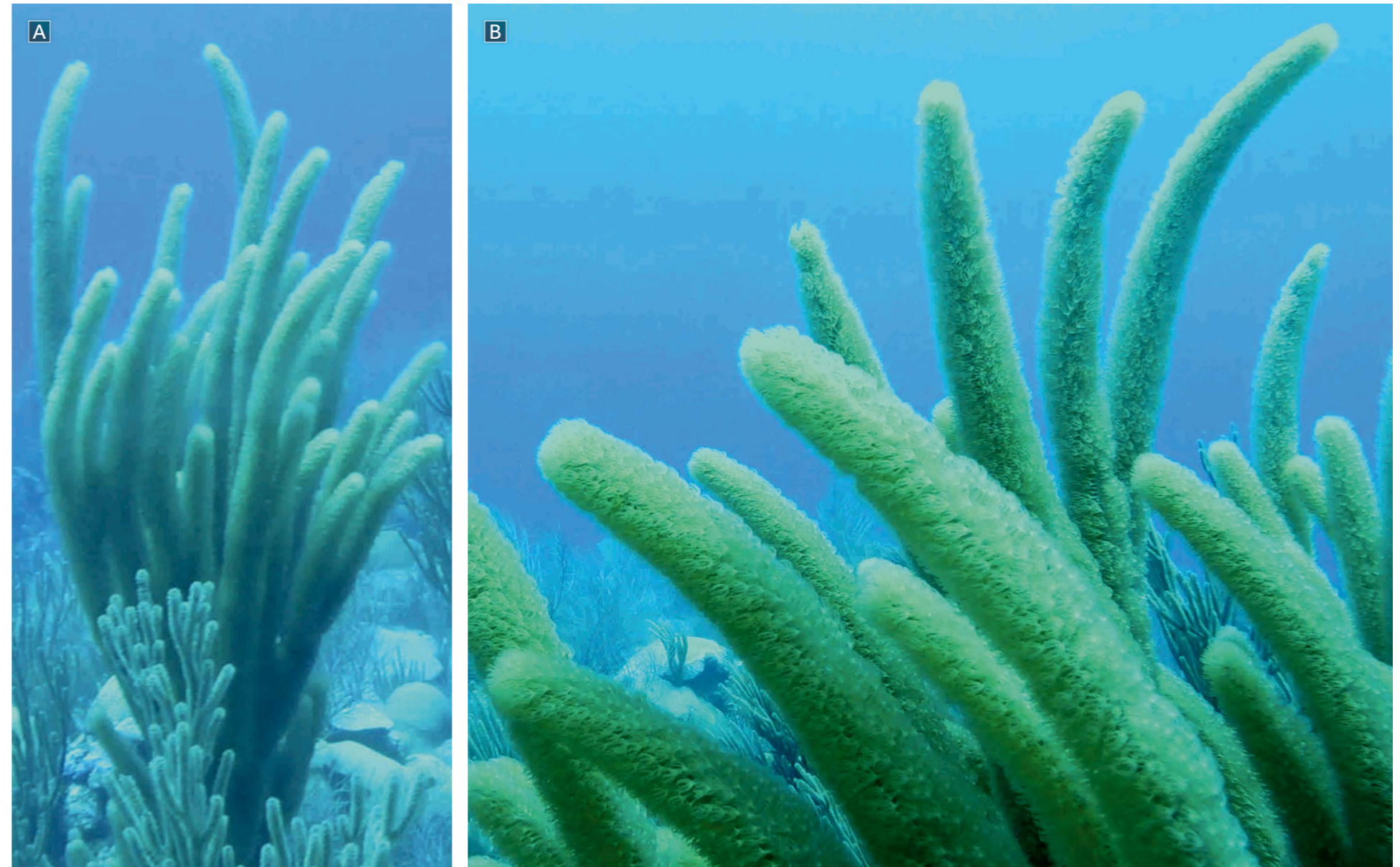
15–31 m.

DISTRIBUTION:

North Northeast, Spittal, Tiger.

Fig. 36. *Plexaurella* spp.

A) Spittal, 15 m, *Plexaurella nutans*. B) View of same colony from close proximity.



FAMILY:

Plexauridae

SPECIES:

Pseudoplexaura spp.

COMMON NAME:

Porous sea rods

VISUAL ID:

Bushy sea rods with dichotomous branching in single or multiple planes. Apertures appear as round to oval pores and can be particularly conspicuous and densely packed in some species [e.g. in *P. porosa* (Houttuyn, 1772)]. So far, three species have been reported from Bermuda [*P. flagellosa* (Houttuyn, 1772), *P. porosa*, *P. wagnaari* (Stiansy, 1941)], however, they cannot easily be distinguished in the field, and are thus grouped together. Colour ranges between olive-grey to brown.

OBSERVED DEPTH RANGE:
15–20 m.

DISTRIBUTION:
North Northeast, Spittal, Tiger.

Fig. 37. *Pseudoplexaura* spp.
A) Spittal, 15 m. B) Spittal, 30 m. C) North Northeast, 15 m, *Pseudoplexaura porosa*.



FAMILY:

Primnoidae

GENUS:

Callogorgia spp.

VISUAL ID:

Colonies are typically tall (>1 m), uniplanar, with dichotomous (usually earlier branches) and/or pinnate branching. Colour light brown to orange. Two species have been previously reported from Bermuda, *Callogorgia gracilis* (Milne Edwards & Haime, 1857) and *C. verticillata* (Pallas, 1766), however, species identification requires microscopic examination. Typically, with multiple ophiuroid commensals.

OBSERVED DEPTH RANGE:

195–250 m.

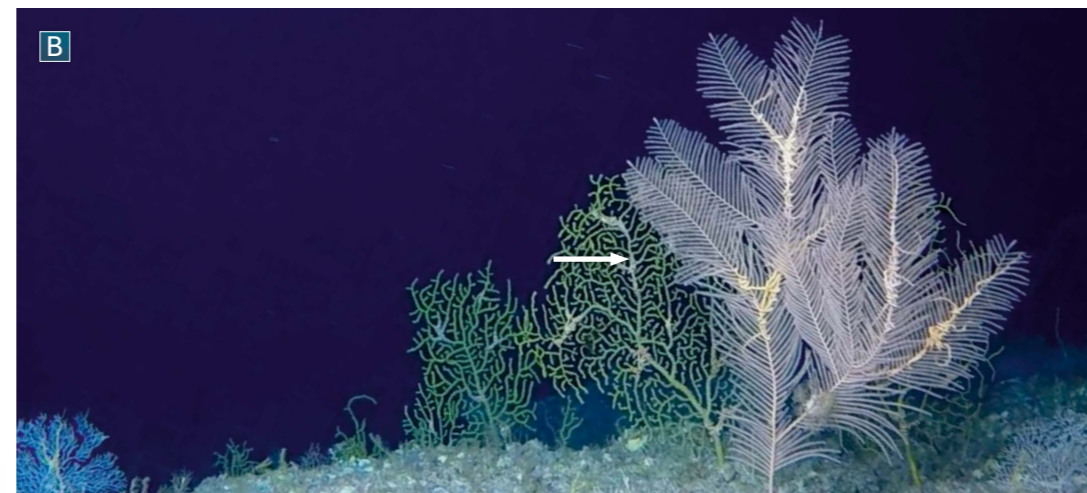
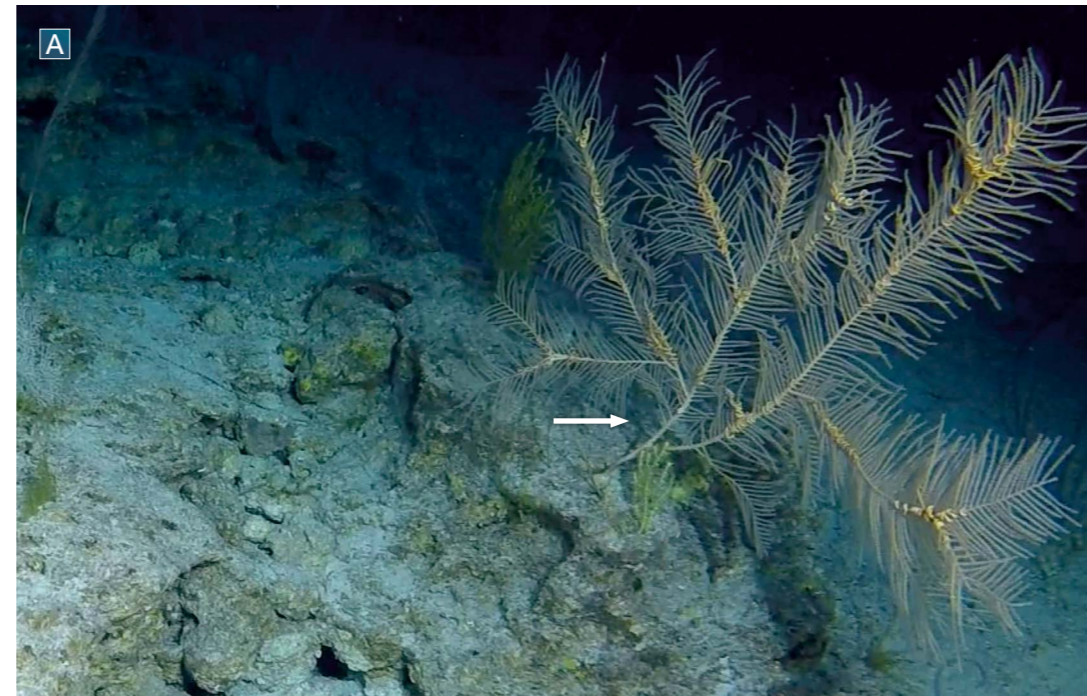
DISTRIBUTION:

North Northeast, Tiger.

Fig. 38. *Callogorgia* spp.

A) Tiger, 242 m. B) North Northeast, 195–200 m.

C) Spittal, 299 m, preserved colony of *C. gracilis* (BAMZ-2016-337-040).



Order: Actiniaria (Sea anemones)

FAMILY:

Actiniidae

SPECIES:

Condylactis gigantea
(Weinland, 1860)

COMMON NAME:

**Giant Caribbean sea
anemone**

VISUAL ID:

Wide oral disc (~15 cm in diameter) with numerous, long (8–10 cm) and thick (up to 1 cm) tentacles; colour brown to grey.

OBSERVED DEPTH RANGE:

12–18 m.

DISTRIBUTION:

Tiger.

Fig. 39. *Condylactis gigantea*.
Tiger, 12–18 m.

Fig. 39.

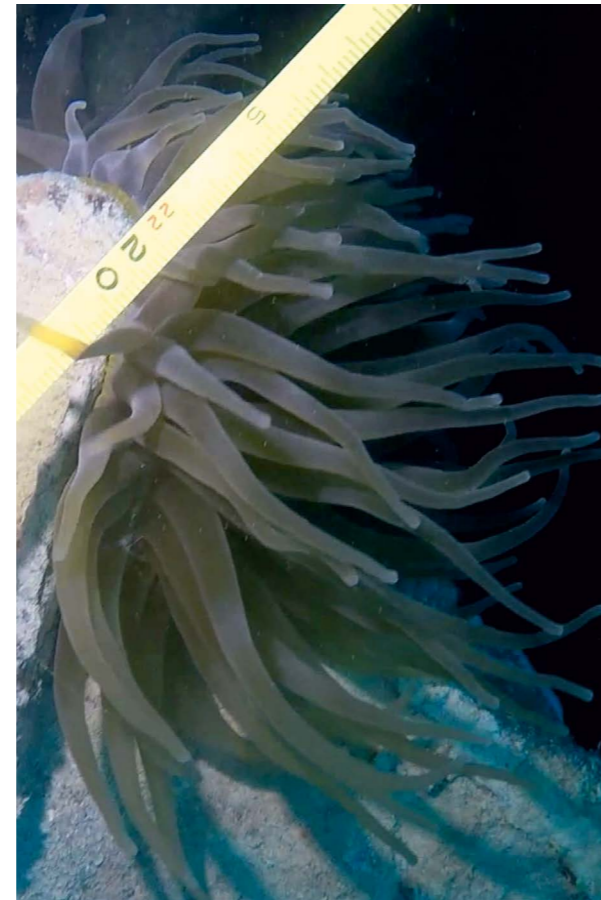


Fig. 40.



Order: Actiniaria (Sea anemones)

FAMILY:

Aiptasiidae

SPECIES:

Bartholomea annulata
(Le Sueur, 1817)

COMMON NAME:

Corkscrew anemone

VISUAL ID:

Oral disc (~5 cm in diameter), with numerous tentacles (~2 cm long). Colour brown to grey.

OBSERVED DEPTH RANGE:

30 m.

DISTRIBUTION:

North Northeast.

Fig. 40. *Bartholomea annulata*.
North Northeast, 30 m.

Order: Actiniaria (Sea anemones)

COMMON NAME:

Deep-water anemones

VISUAL ID:

Solitary polyps lacking any hard skeletal parts. 2–3 cm wide oral disc equipped with large tentacles compared to their body size; colour soft pink to near transparent. Further microscopic examination is necessary for positive taxonomic identification.

OBSERVED DEPTH RANGE:

303 m.

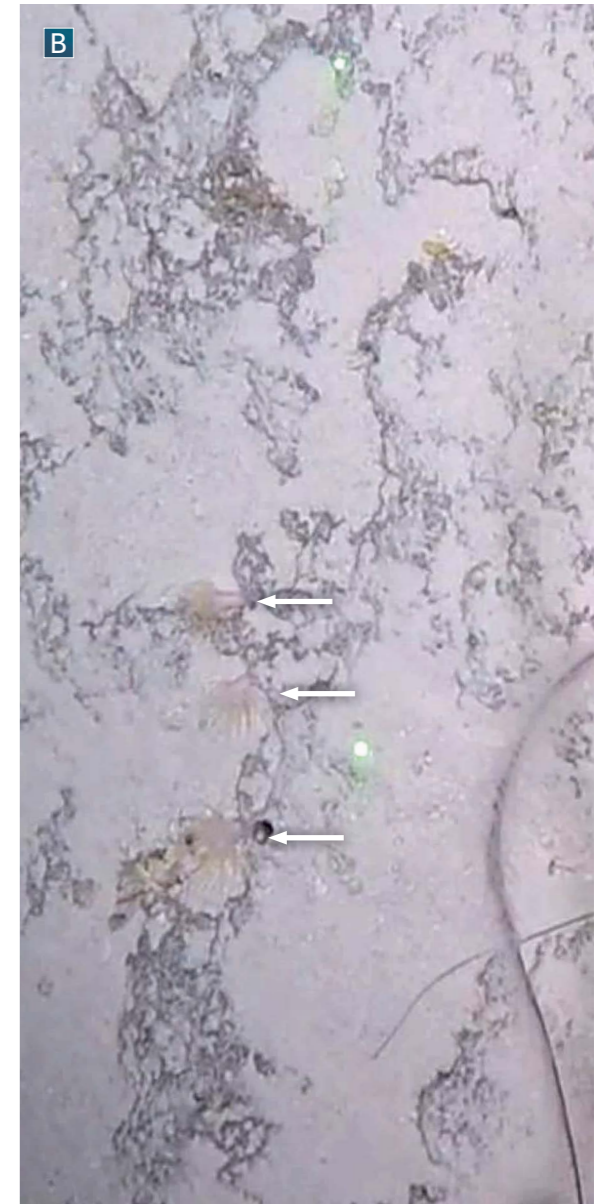
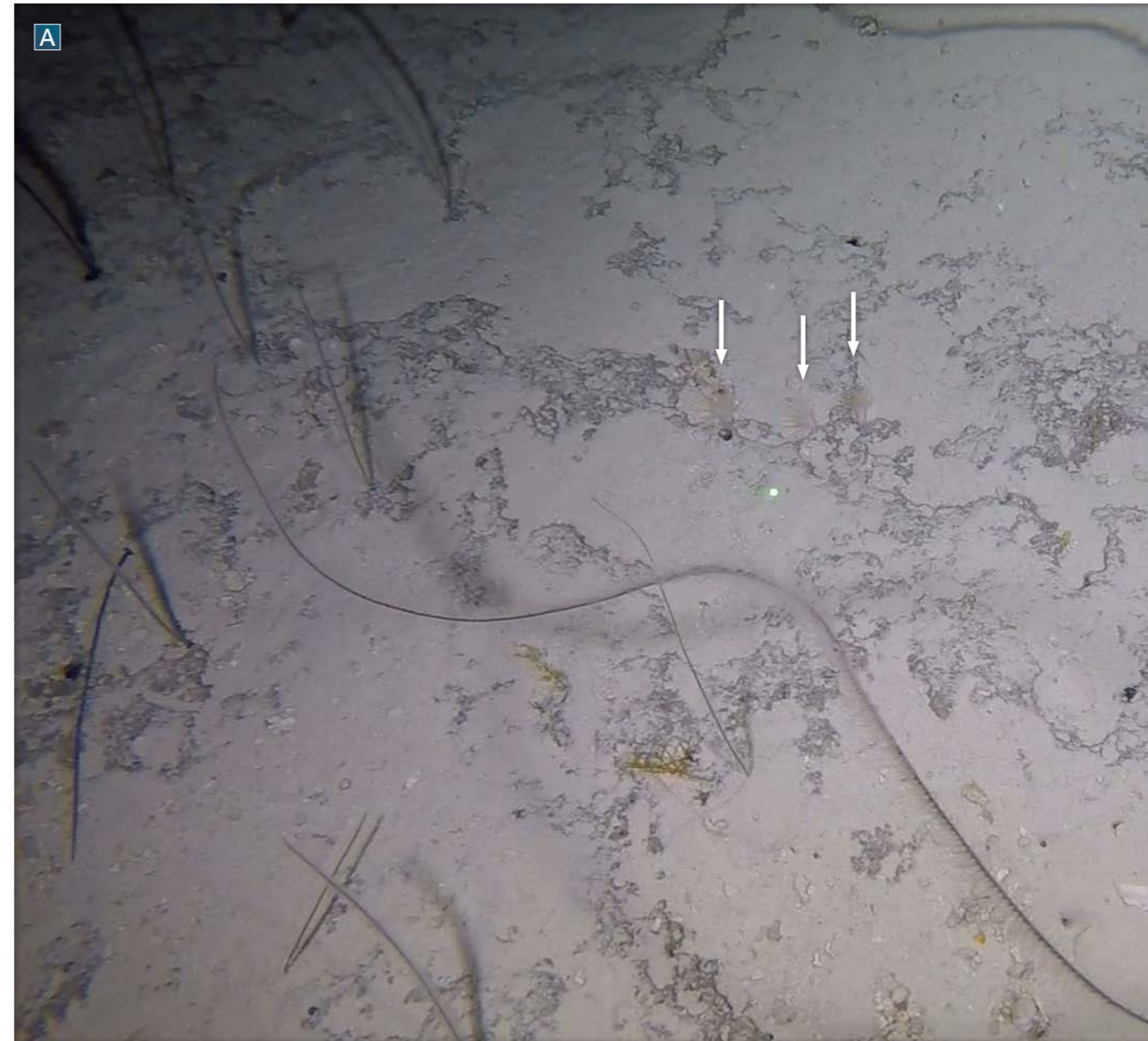
DISTRIBUTION:

Plantagenet Bank.

Fig. 41. Deep-water anemones.

A-B) Plantagenet Bank, 303 m.

Fig. 41.



FAMILY:

Parazoanthidae

COMMON NAME:

Commensal zoanthids

VISUAL ID:

Superficially resembling sea anemones due to their long tentacles. However, zoanthids are typically colonial and much smaller in size. In Bermuda, they are often found attached on stalks of corals, such as those of the black wire coral *Stichopathes*. Colour typically light brown to yellow-green.

OBSERVED DEPTH RANGE:

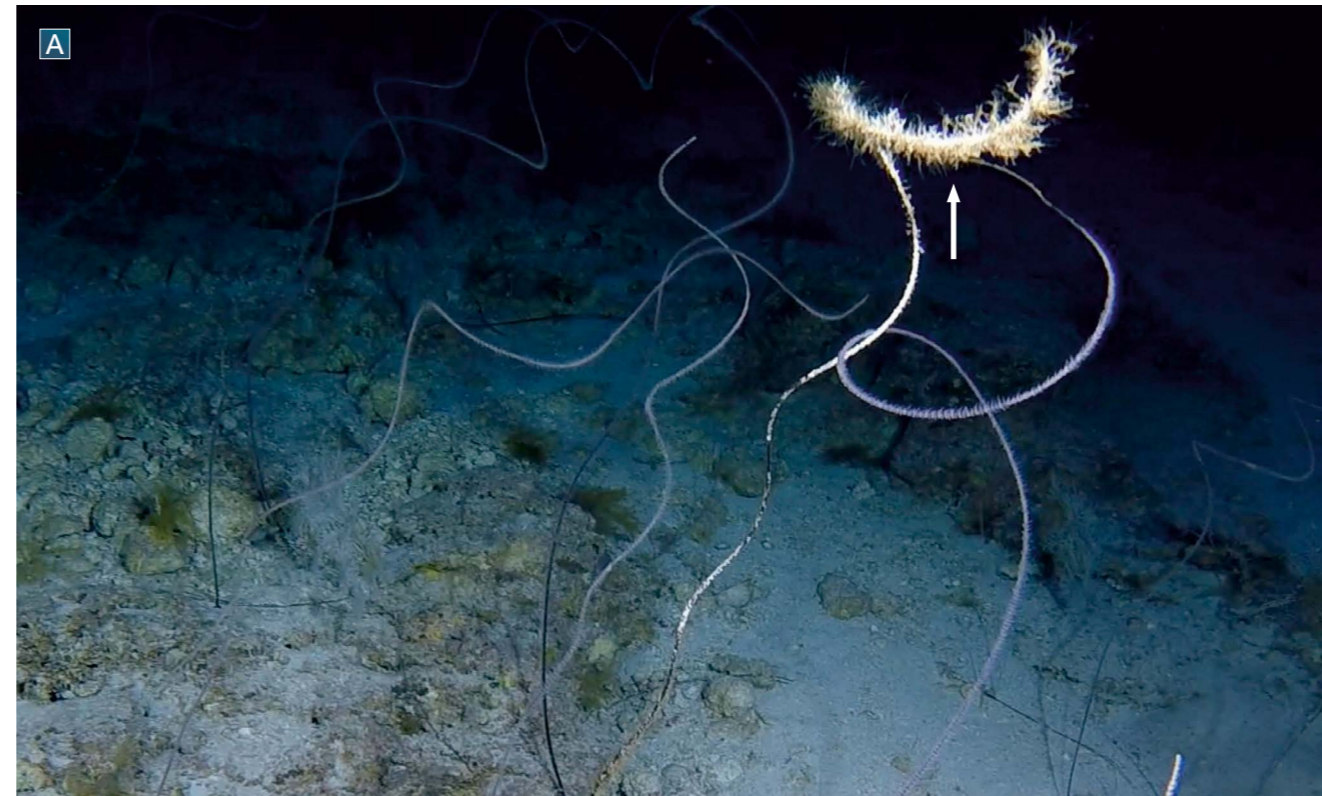
90–301 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 42. *Parazoanthidae* zoanthids attached on black wire corals of *Stichopathes*.

A) Tiger, 242 m. B) Tiger, 243 m. C) Plantagenet Bank, 200–202 m.



Order: Zoantharia

FAMILY:

Sphenopidae

SPECIES:

Palythoa caribaeorum

Duchassaing and Michelotti, 1860

COMMON NAME:

White encrusting zoanthid

VISUAL ID:

Colonies are thick encrustations forming large mats. Polyps can be elliptical or circular. Typical colour is white to yellow-brown.

OBSERVED DEPTH RANGE:

15–31 m.

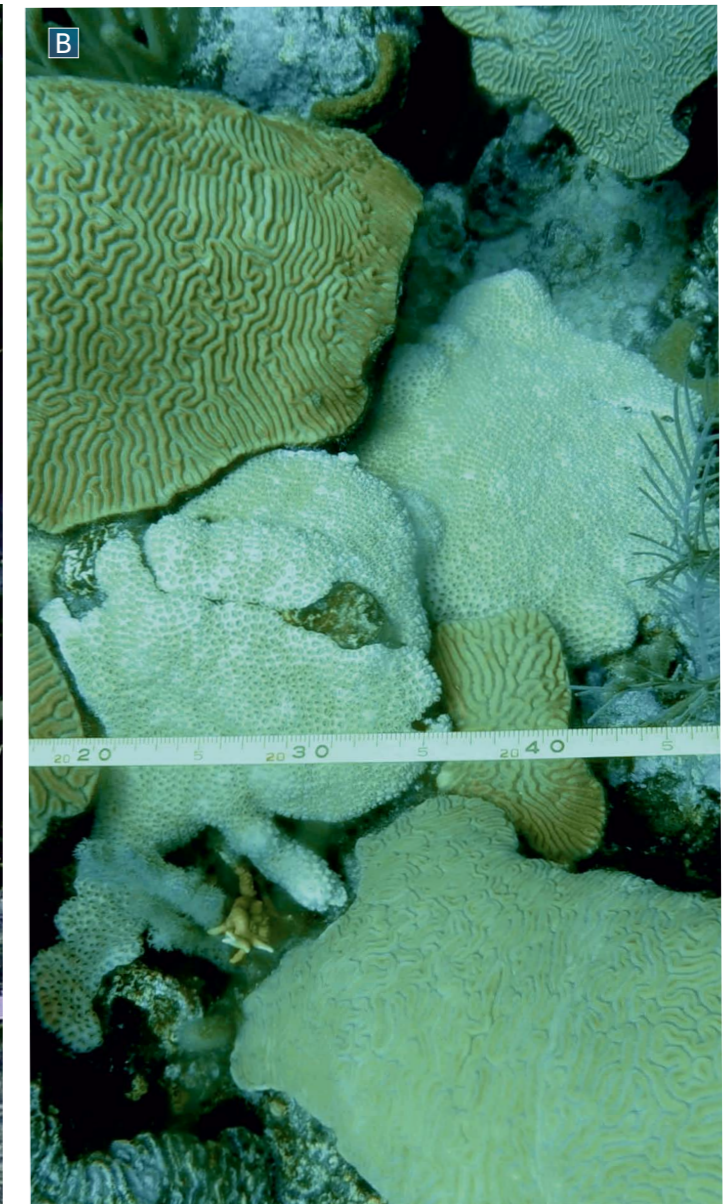
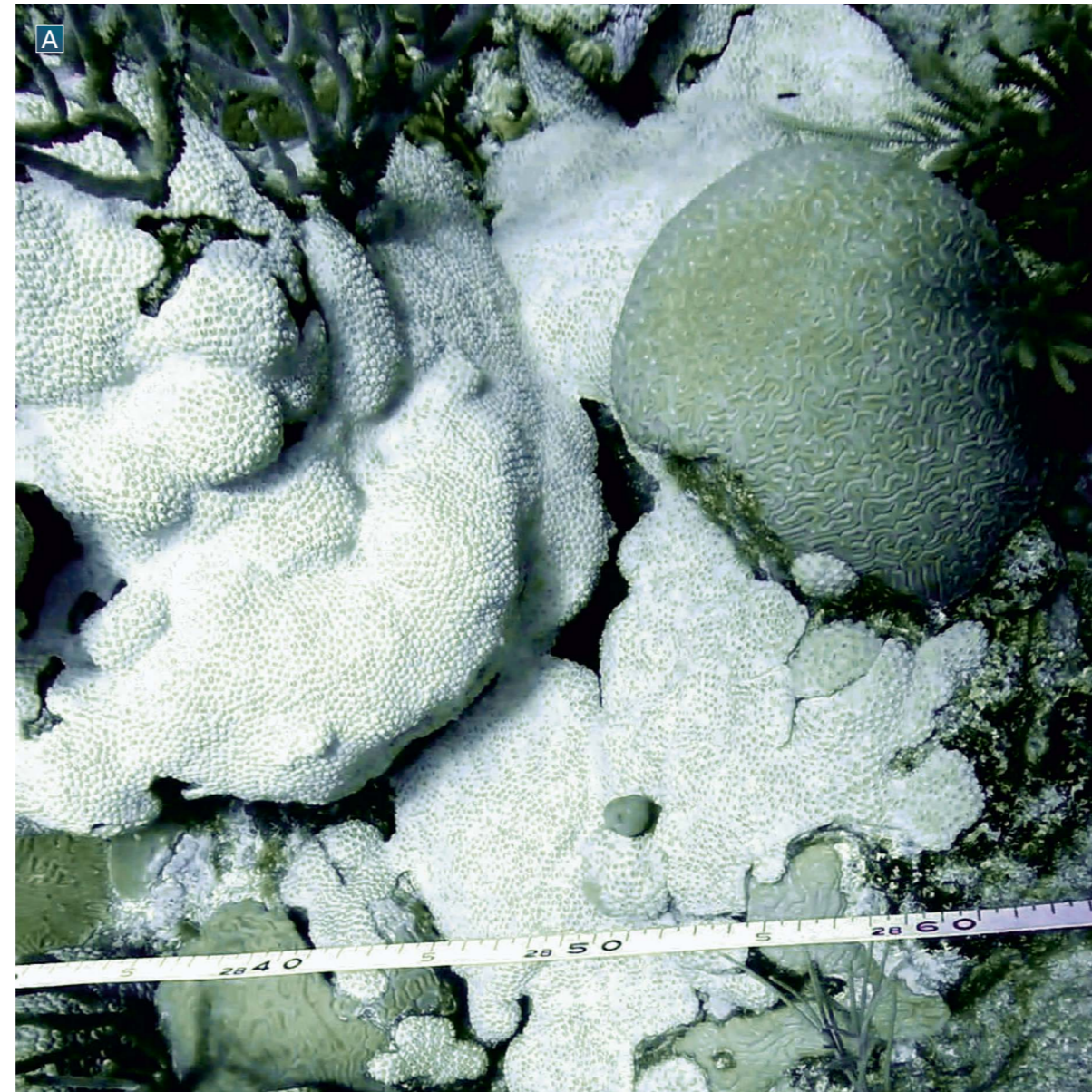
DISTRIBUTION:

Spittal, Tiger.

Fig. 43. *Palythoa caribaeorum*.

A) North Northeast, 18–20 m. B) Spittal, 16 m.

Fig. 43.



Order: Anthoanthecata (Hydrocorals)

FAMILY:

Milleporidae

SPECIES:

Millepora alcicornis
Linnaeus, 1758

COMMON NAME:

Fire coral

VISUAL ID:

Colonies form branched structures arising from encrusting basal plates. Yellow to brown, with white edged tips/outer rims.

OBSERVED DEPTH RANGE:

15–31 m.

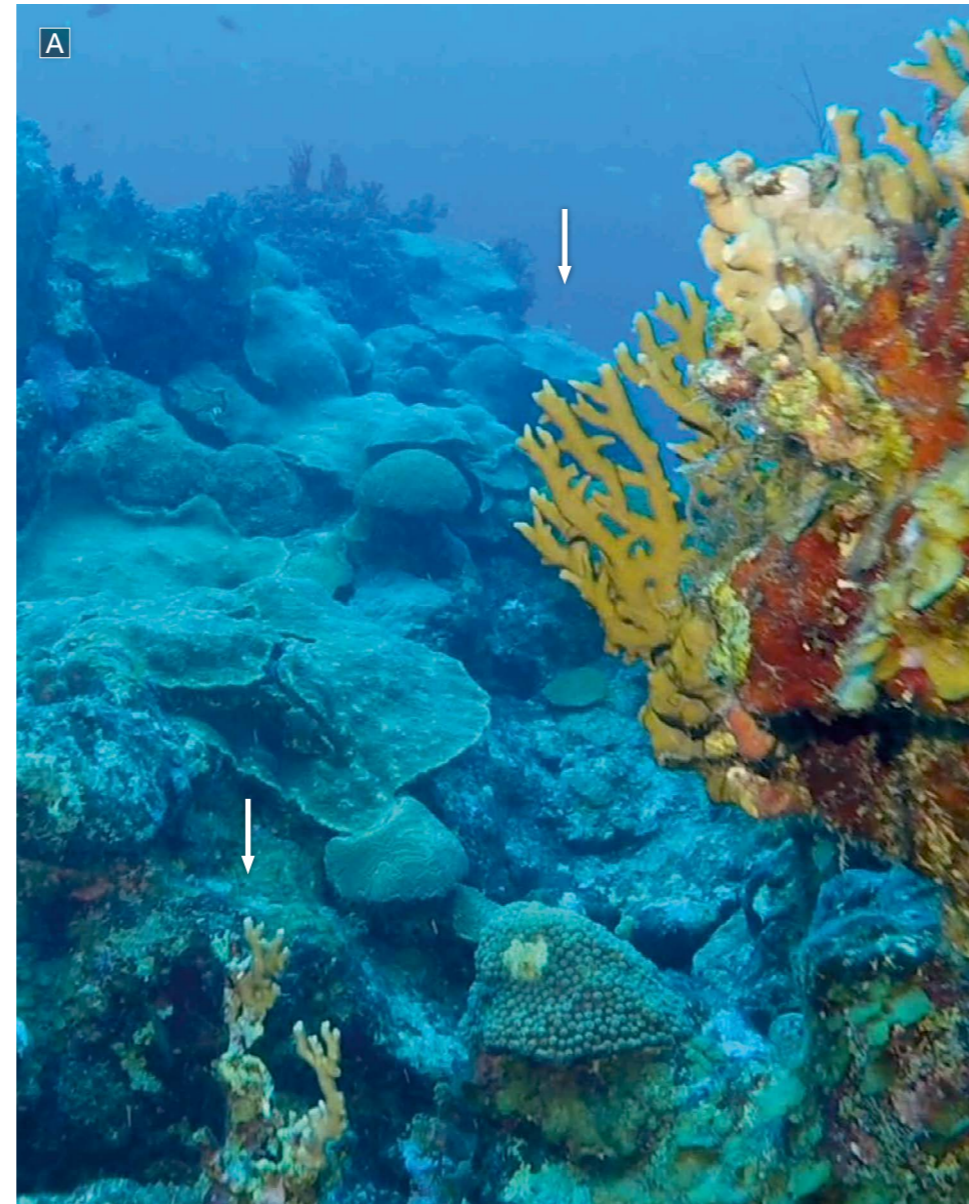
DISTRIBUTION:

North Northeast, Spittal, Tiger.

Fig. 44. *Millepora alcicornis*.

A) Spittal, 31m, branching colonies. B) Spittal, 30 m, branching colony with basal plate.

Fig. 44.



FAMILY:

Bonnemaisoniaceae

SPECIES:

Asparagopsis taxiformis (Delile) Trevisan de Saint-Léon, 1845

VISUAL ID:

Extensive network of cylindrical runners giving rise to small branchlets each one equipped with numerous very fine filaments; as a result, each branchlet has an unopened asparagus-like appearance.

OBSERVED DEPTH RANGE:

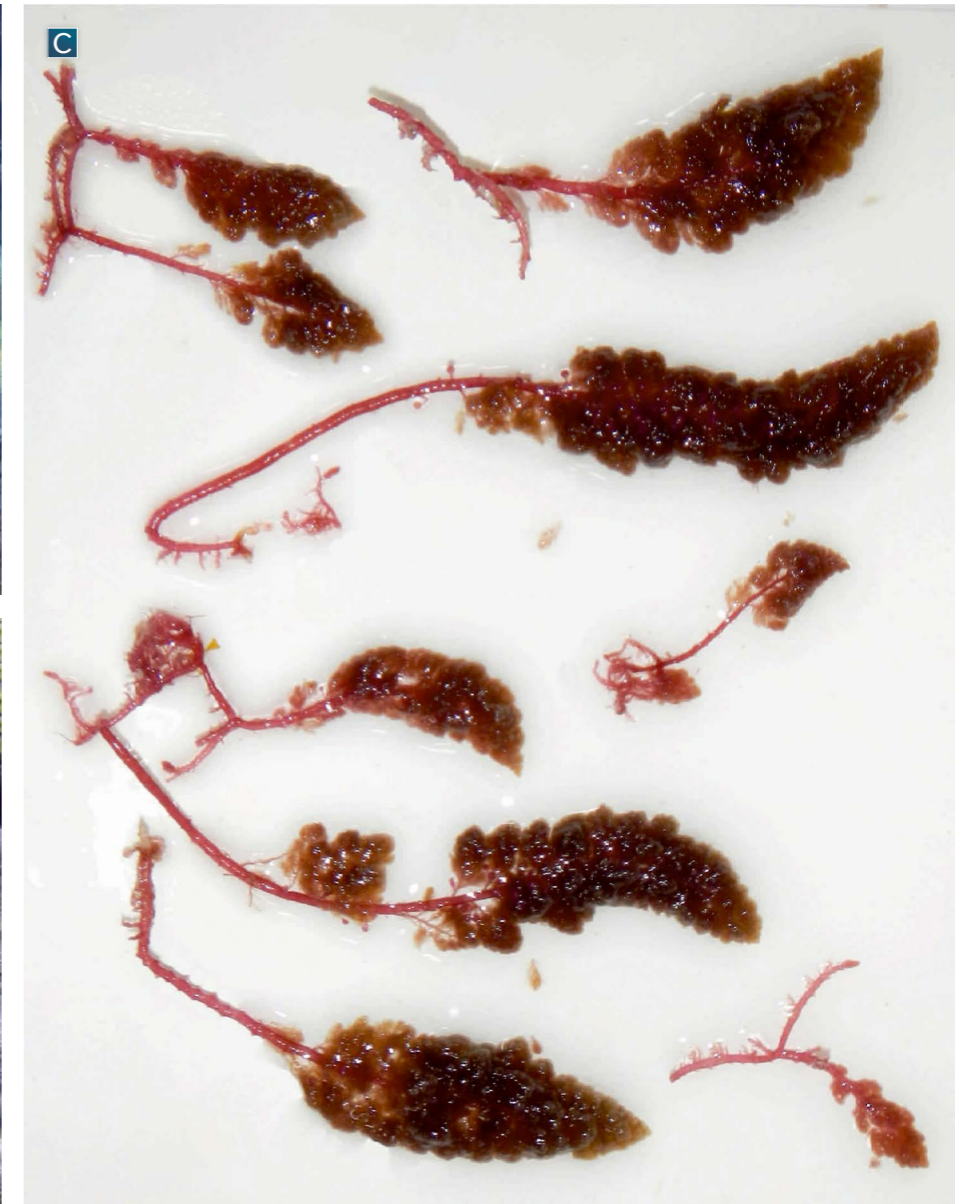
10–16 m.

DISTRIBUTION:

Spittal.

Fig. 45. *Asparagopsis taxiformis*.

A) Spittal, 16 m. B) Spittal, 15 m. C) Spittal, 15 m,
preserved specimens (BEX2016-0400).



FAMILY:

Boodleaceae

SPECIES:

Cladophoropsis macromeres W.R. Taylor, 1928

VISUAL ID:

Dark green mats comprising easily-distinguishable cells, giving it a strong grass-like appearance.

OBSERVED DEPTH RANGE:

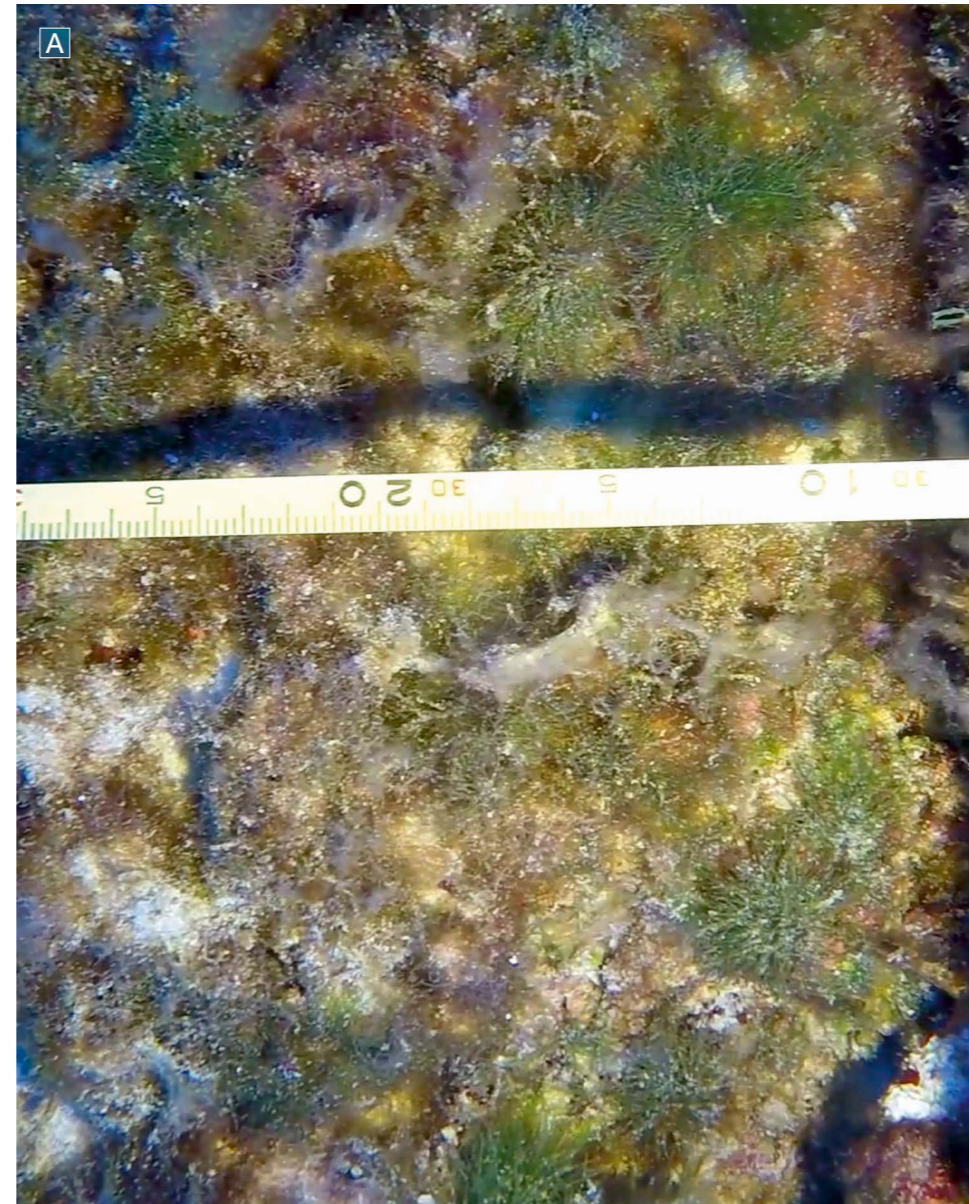
15–93 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal.

Fig. 46. *Cladophoropsis macromeres*.

A) Plantagenet Bank, 55 m. B) Plantagenet Bank, 56 m, preserved specimen (BEX2016-0453).



FAMILY:

Boodleaceae

SPECIES:

Phyllodictyon pulcherrimum
J.E. Gray, 1866

COMMON NAME:

Stalked green net alga

VISUAL ID:

Leaf-like structure comprising short stalk that gives rise to a very fine, tight network of filaments. Light green to yellow.

OBSERVED DEPTH RANGE:

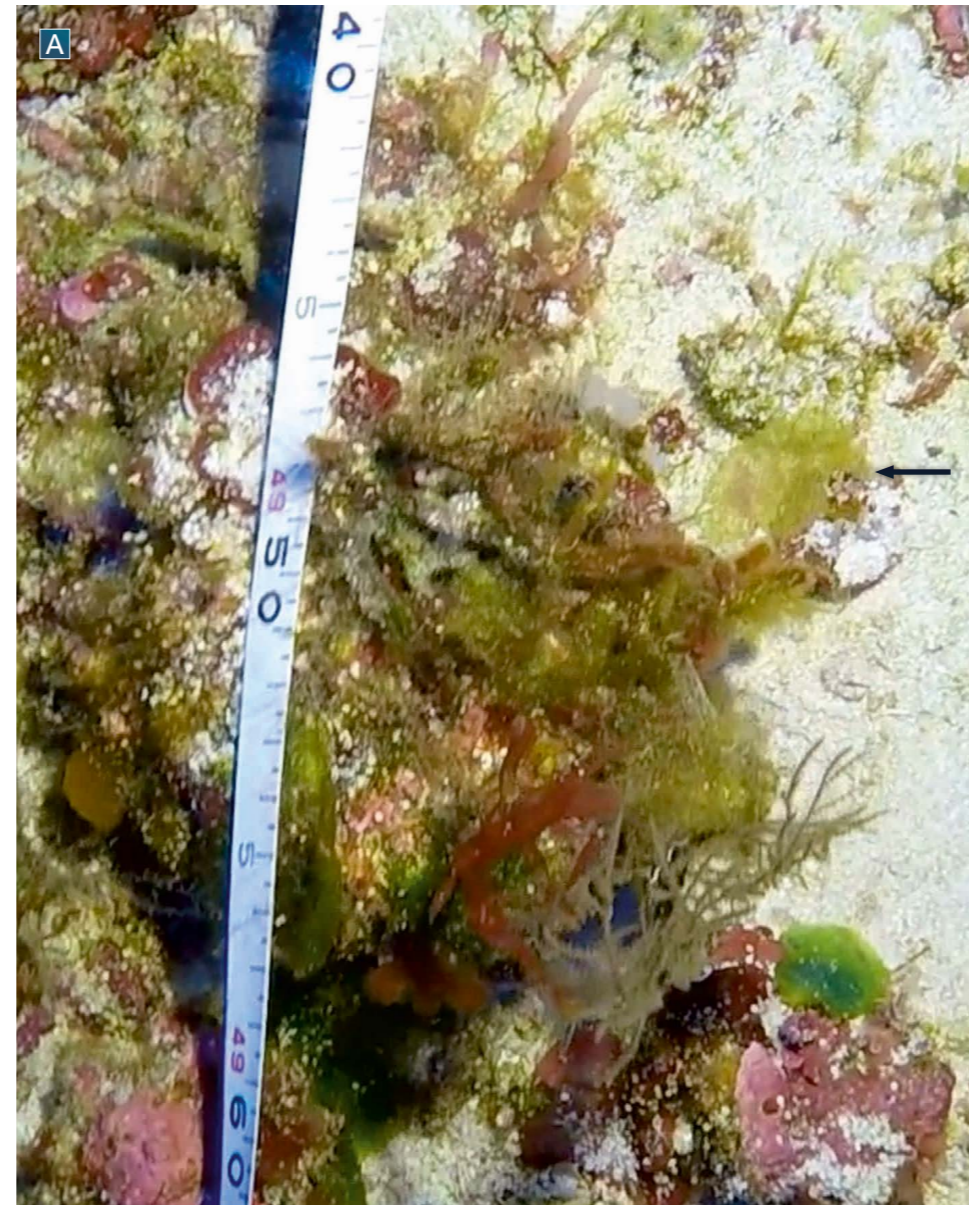
55–93 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank,
Spittal, Tiger.

Fig. 47. *Phyllodictyon pulcherrimum*.

A) North Northeast, 92–93 m. B) North Northeast,
92–93 m, preserved specimen (BEX2016-0157).



FAMILY:

Caulerpaceae

SPECIES:

Caulerpa chemnitzia
(Esper) J.V. Lamouroux, 1809

COMMON NAME:

Green grape alga

VISUAL ID:

This species forms extensive networks of branching, cylindrical runners, which give rise to numerous, smaller branchlets, each equipped with clusters of grape-like spheres. Shades of light to medium grassy-green.

OBSERVED DEPTH RANGE:

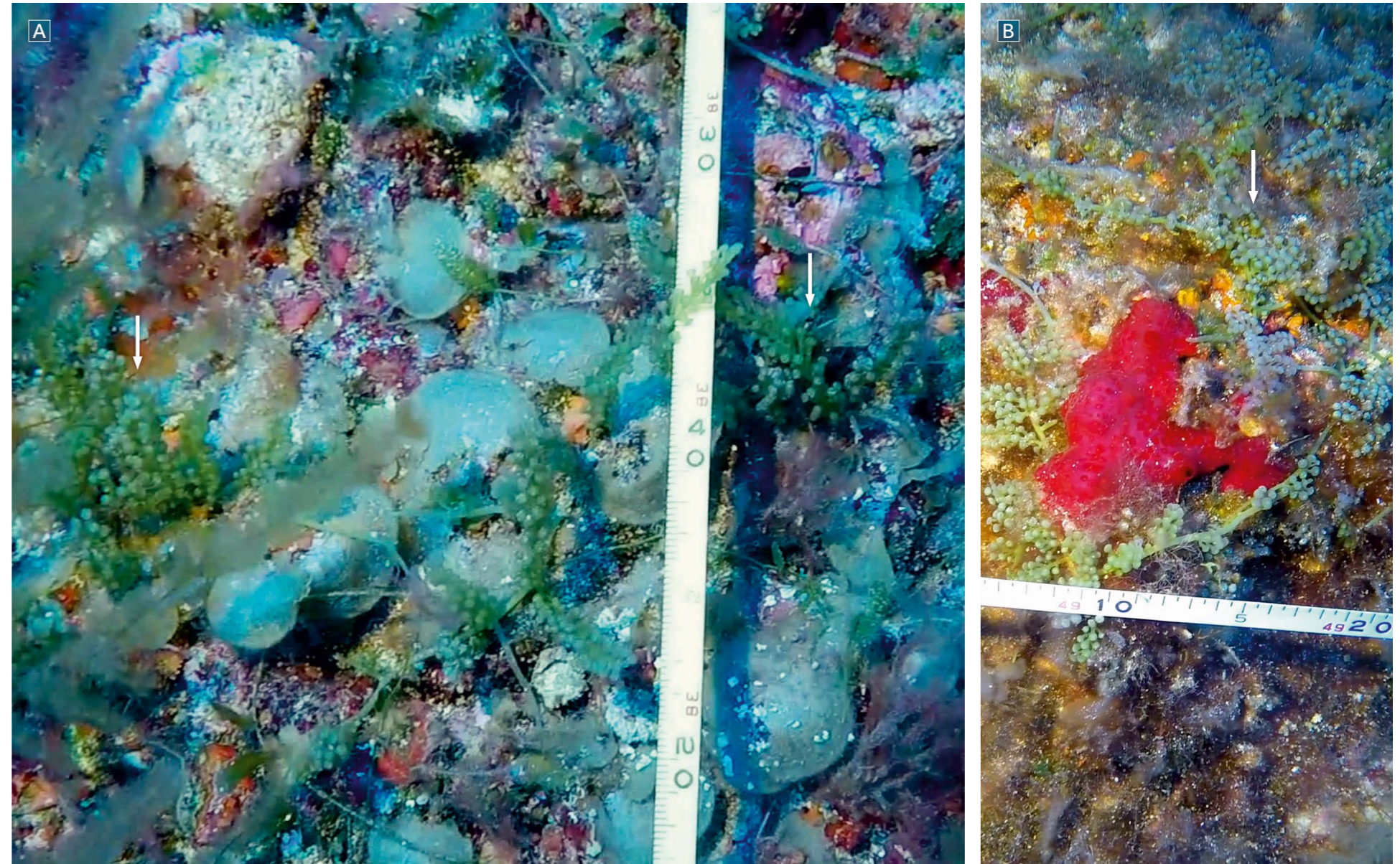
55–93 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank,
Spittal, Tiger.

Fig. 48. *Caulerpa chemnitzia*.

A) North Northeast, 60 m. B) Plantagenet Bank, 56 m.



FAMILY:

Caulerpaceae

SPECIES:

Caulerpa mexicana Sonder ex Kützing, 1849

COMMON NAME:

Flat green feather alga

VISUAL ID:

Flat, feather-like structures growing from a network of cylindrical runners. Yellow green to green.

OBSERVED DEPTH RANGE:

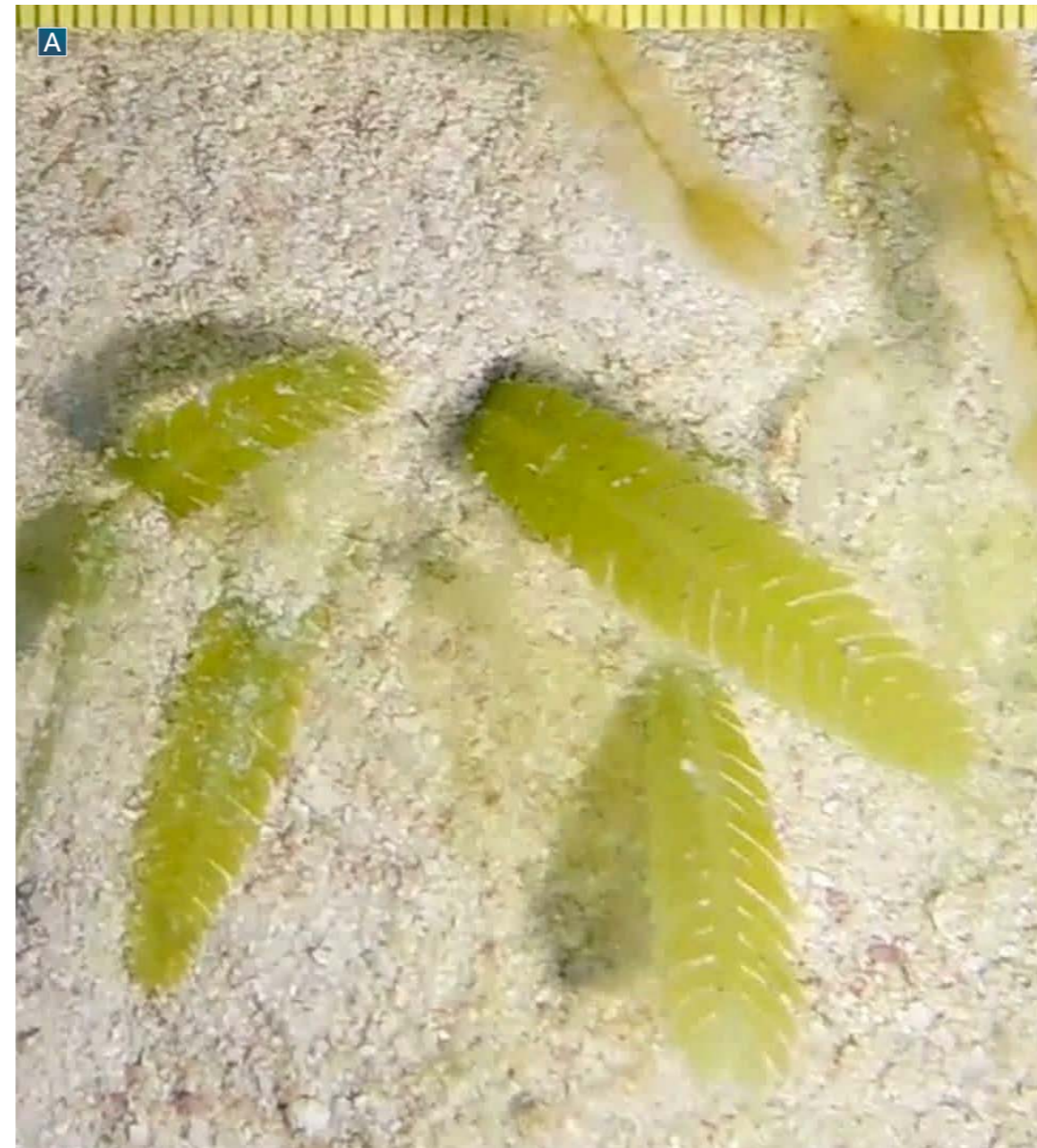
58–63 m.

DISTRIBUTION:

North Northeast, Spittal.

Fig. 49. *Caulerpa mexicana*.

A) Spittal, 58 m. B) North Northeast, 60 m, preserved specimen (BEX2016-0010).



FAMILY:

Caulerpaceae

SPECIES:

Caulerpa prolifera (Forsskål) J.V.Lamouroux, 1809

COMMON NAME:

Oval-blade alga

VISUAL ID:

Flat, slightly tapered, oval blades arising from a network of cylindrical runners. Shades of green and yellow.

OBSERVED DEPTH RANGE:

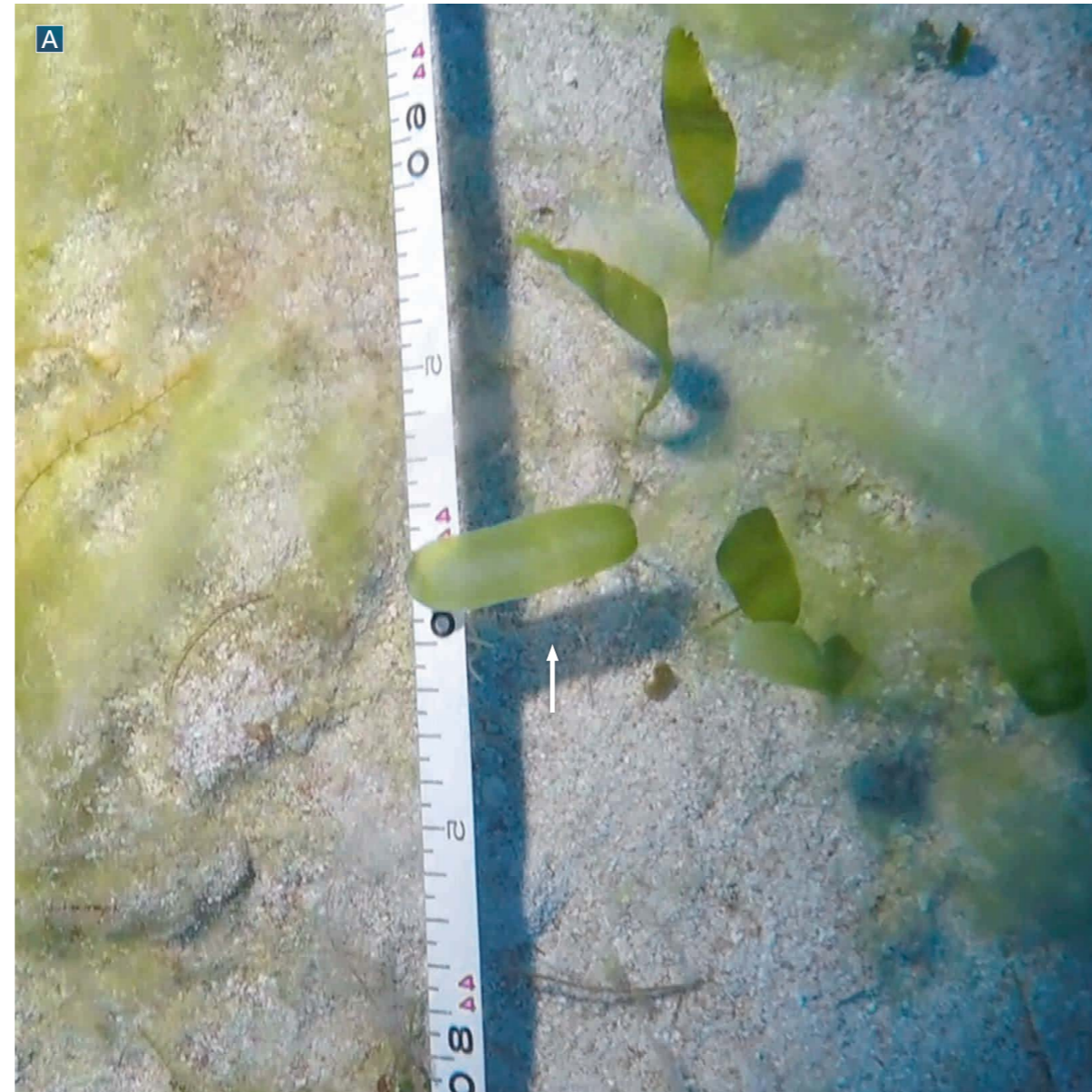
58–63 m.

DISTRIBUTION:

North Northeast, Spittal.

Fig. 50. *Caulerpa prolifera*.

A) Spittal, 58 m. B) North Northeast, 60 m, preserved specimen (BEX2016-0092).



FAMILY:

Cladophoraceae

SPECIES:

Cladophora sp.

VISUAL ID:

Dark green mats with grass-like appearance comprised of fine filaments. Positive identification requires microscopic examination.

OBSERVED DEPTH RANGE:

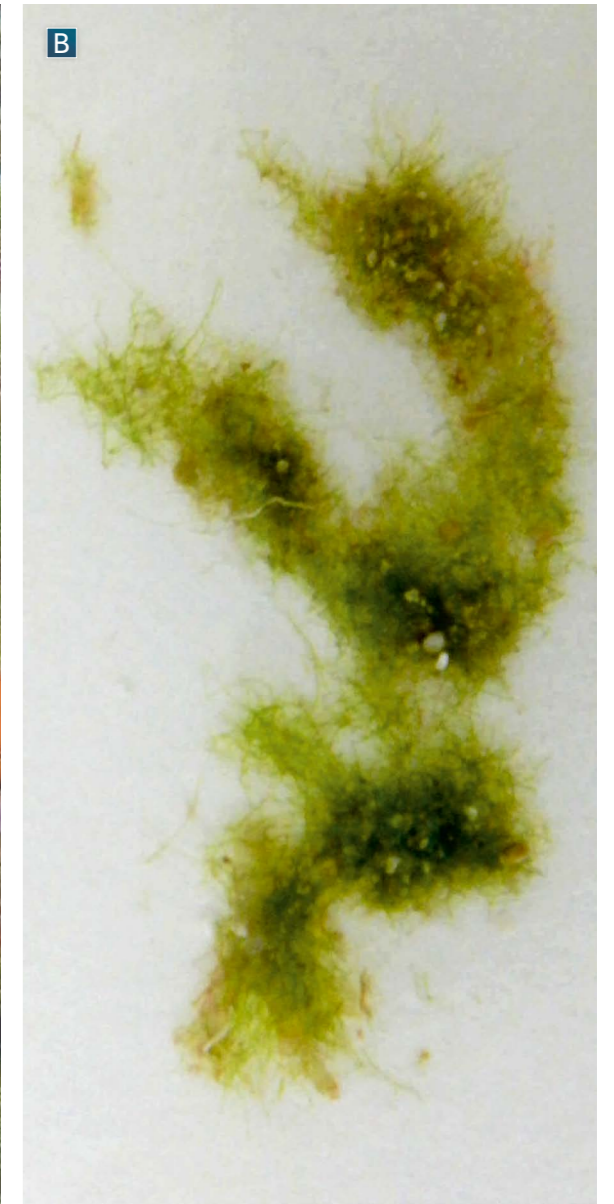
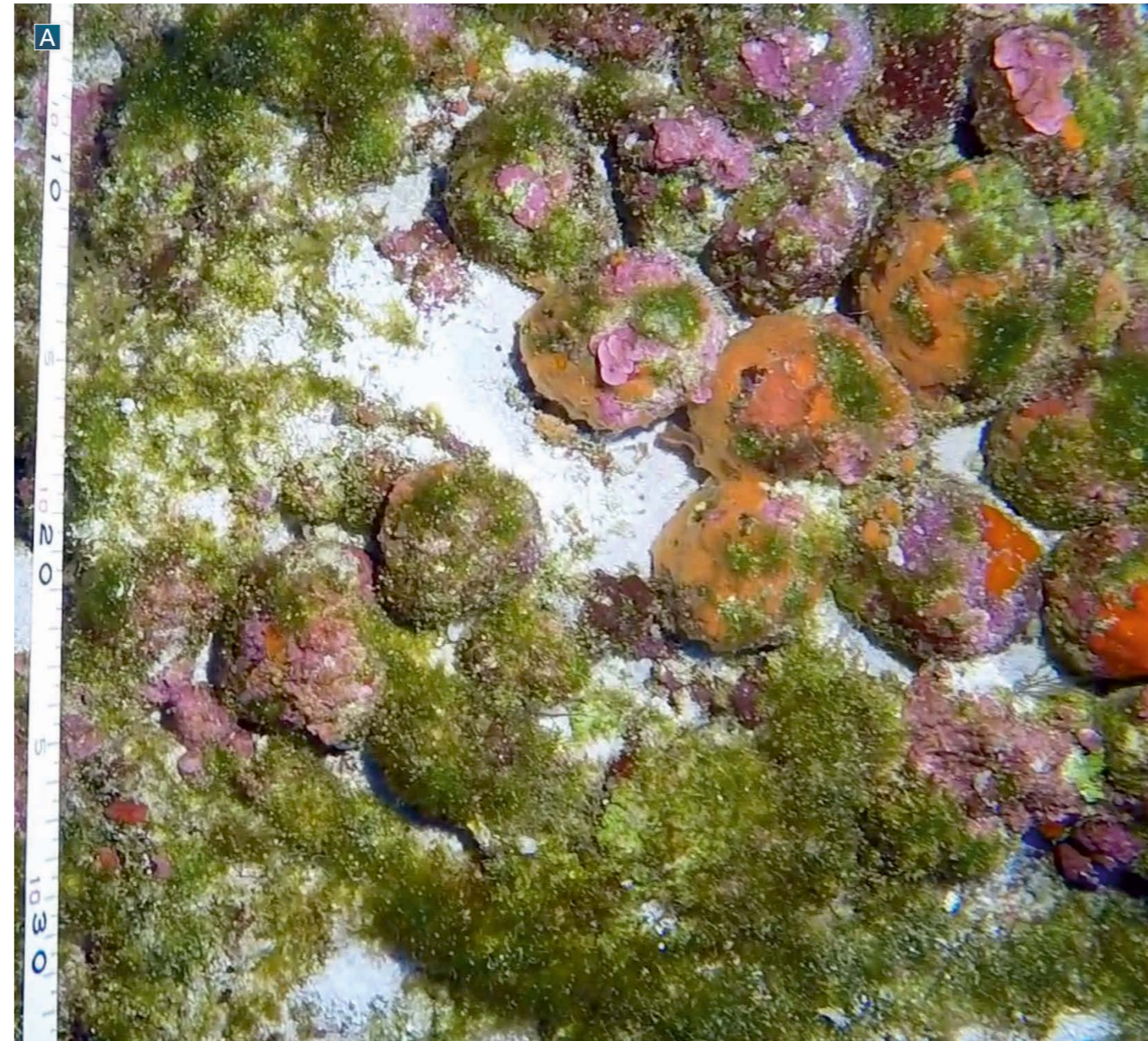
55–94 m.

DISTRIBUTION:

Challenger Bank, North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 51. *Cladophora* sp.

A) Plantagenet Bank, 90–91 m. B) Challenger Bank, 90 m, preserved material (BEX2016-0351).



FAMILY:

Codiaceae

GENUS:

Codium spp.

COMMON NAME:

Dead man's fingers

VISUAL ID:

Tubular, dichotomously branched algae with fleshy appearance. Green to dark green. Likely to contain several species, however, positive species identification requires microscopic examination.

OBSERVED DEPTH RANGE:

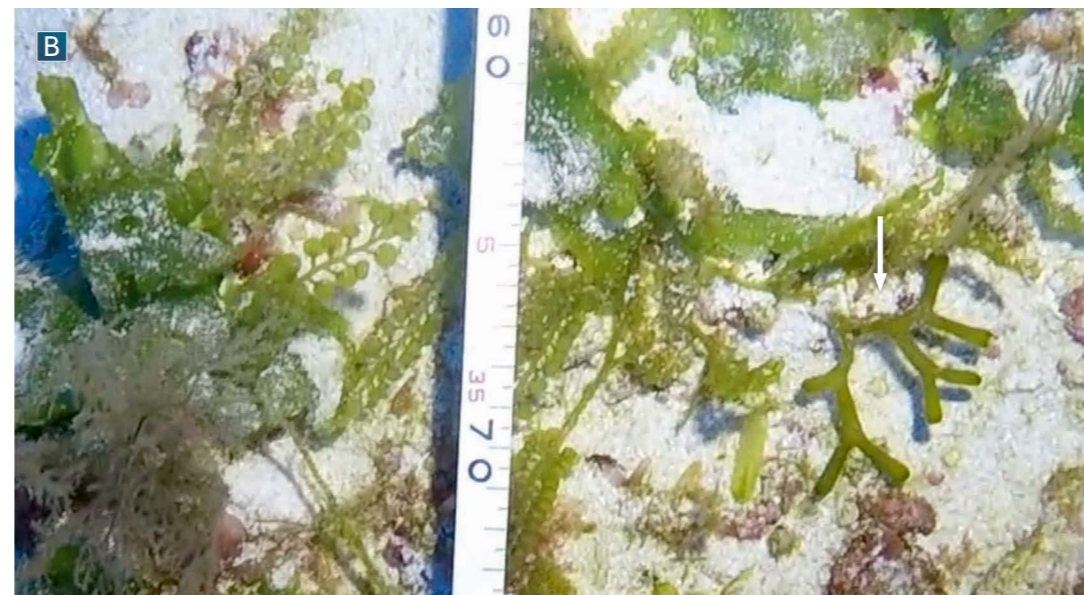
60–93 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank.

Fig. 52. *Codium* spp.

A) North Northeast, 60 m. B) North Northeast, 93 m. C) North Northeast, 60 m, preserved specimen (BEX2016-0093).



FAMILY:

Dasyaceae

GENUS:

Dasya spp.

COMMON NAME:

Red chenille weeds

VISUAL ID:

Densely-branched algae forming small, bushy clumps. Shades of pink, purple and red. Likely to contain several species, however, positive species identification requires microscopic examination.

OBSERVED DEPTH RANGE:

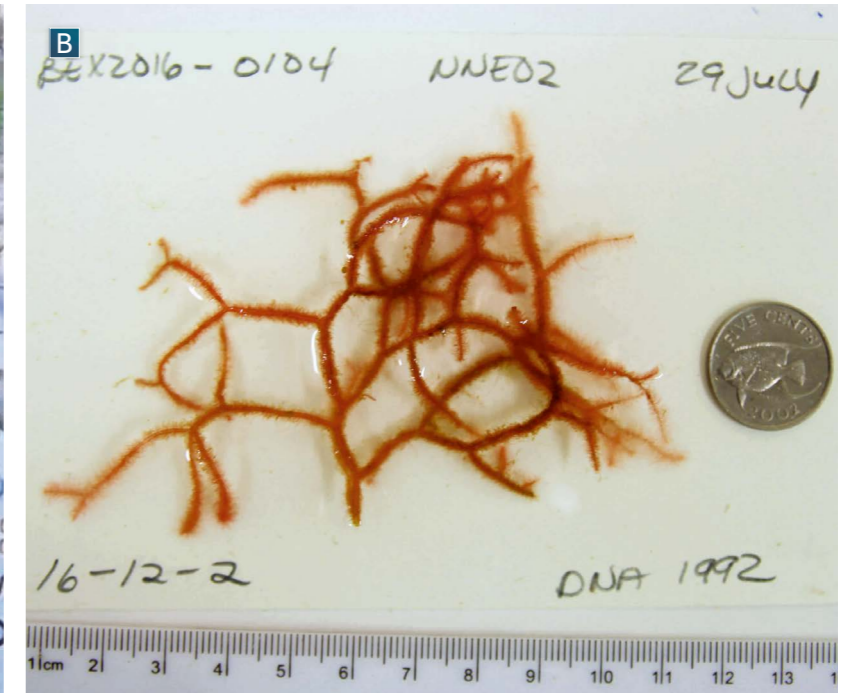
55–93 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 53. *Dasya* spp.

A) Spittal, 63 m. B) North Northeast, 90 m, preserved specimen, *Dasya spinuligera* Collins & Hervey, 1917 (BEX2016-0104). C) Spittal, 60 m, preserved specimen, *Dasya* sp. (BEX2016-0304).



FAMILY:

Dictyotaceae

GENUS:

Dictyopteris spp. / *Dictyota* spp.

VISUAL ID:

Flattened, dichotomous thin light brown to dark brown blades with or without midribs. Likely to contain several species, however, positive species identification requires microscopic examination.

OBSERVED DEPTH RANGE:

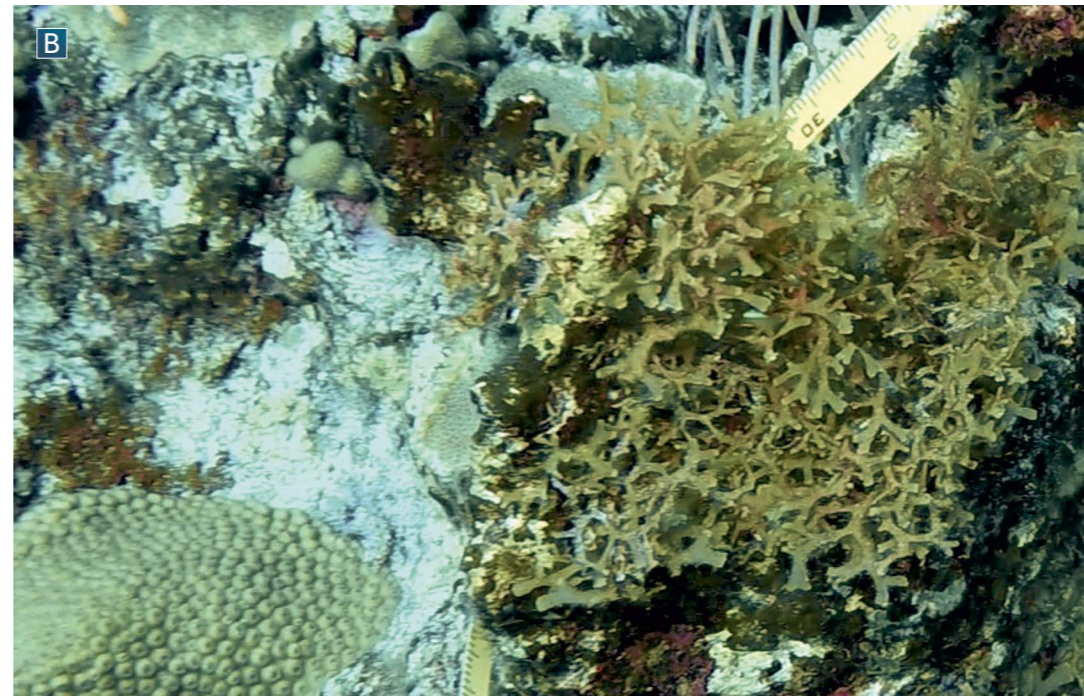
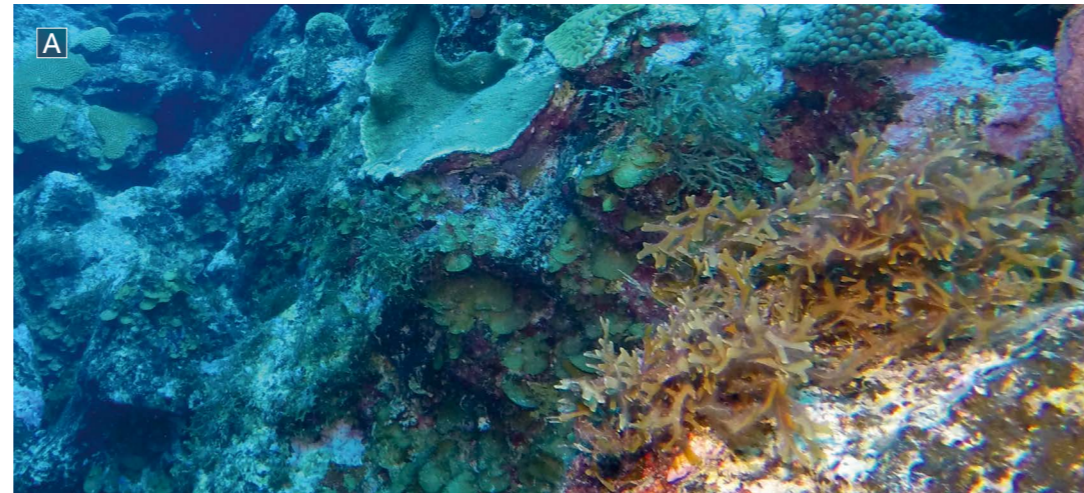
15–94 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 54. *Dictyopteris* spp./*Dictyota* spp.

A-B) Spittal, 28–31 m. C) North Northeast, 30 m, preserved specimen, *Dictyopteris delicatula* J.V. Lamouroux, 1809 (BEX2016-161). D) North Northeast, 30 m, preserved specimen, *Dictyota pulchella* Hörnig & Schnetter, 1988 (BEX2016-0162).



FAMILY:

Dictyotaceae

SPECIES:

Lobophora canariensis (Sauvageau) C.W. Vieira, De Clerck & Payri, 2016

COMMON NAME:

Encrusting brown fan-leaf alga

VISUAL ID:

Encrusting, fan-shaped, blades, commonly overlapping;
outer margin is loosely attached. Yellow to light brown.

OBSERVED DEPTH RANGE:

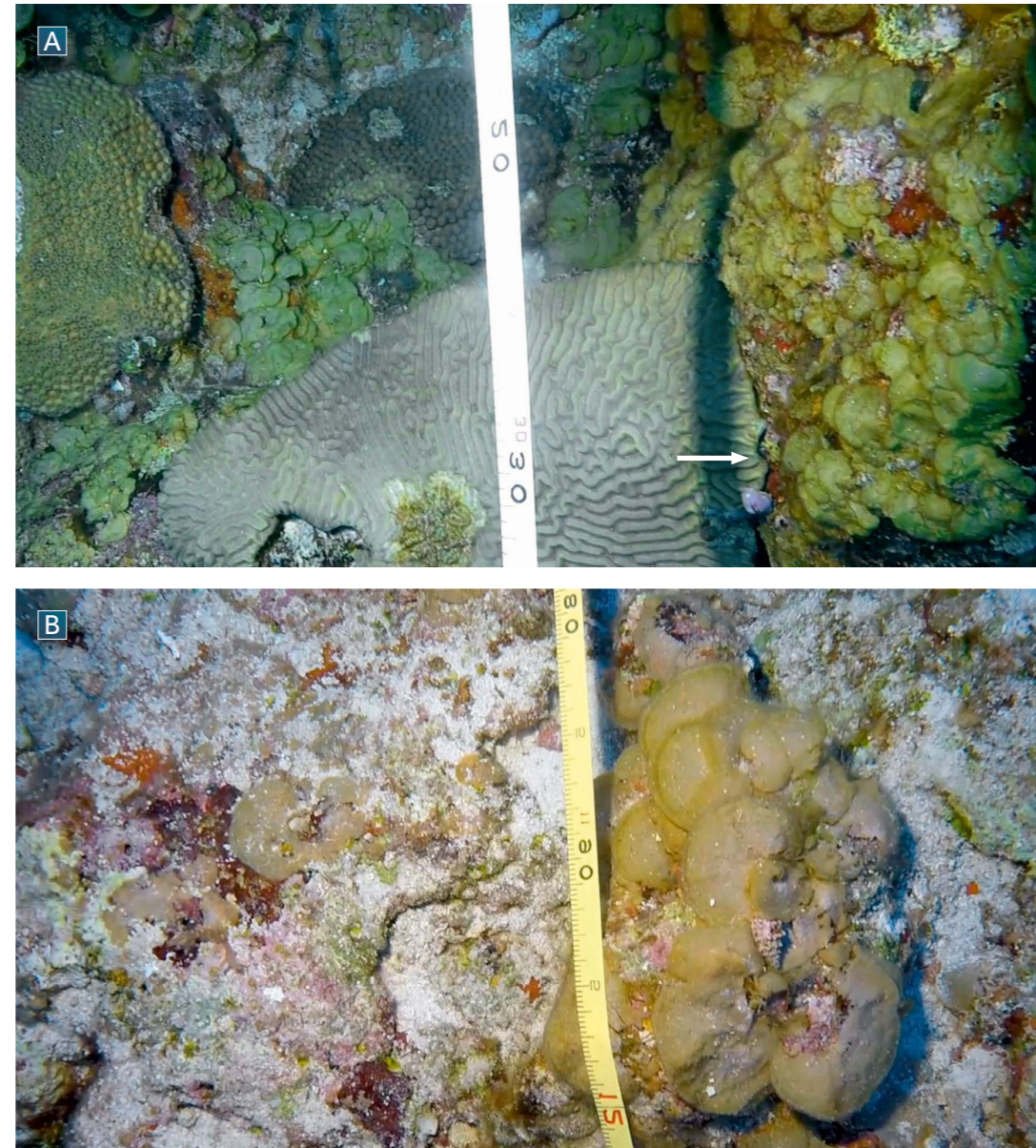
15–93 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank,
Spittal, Tiger.

Fig. 55. *Lobophora canariensis*.

A) Spittal, 29–30 m. B) Tiger, 61–63 m. C) North Northeast,
60 m, preserved specimen (BEX2016-0008).



FAMILY:

Galaxauraceae

SPECIES:

Galaxaura sp.

COMMON NAME:

Tubeweeds

VISUAL ID:

Generally erect, tubular algae with dichotomous branching. Shades of dark red to brown.

OBSERVED DEPTH RANGE:

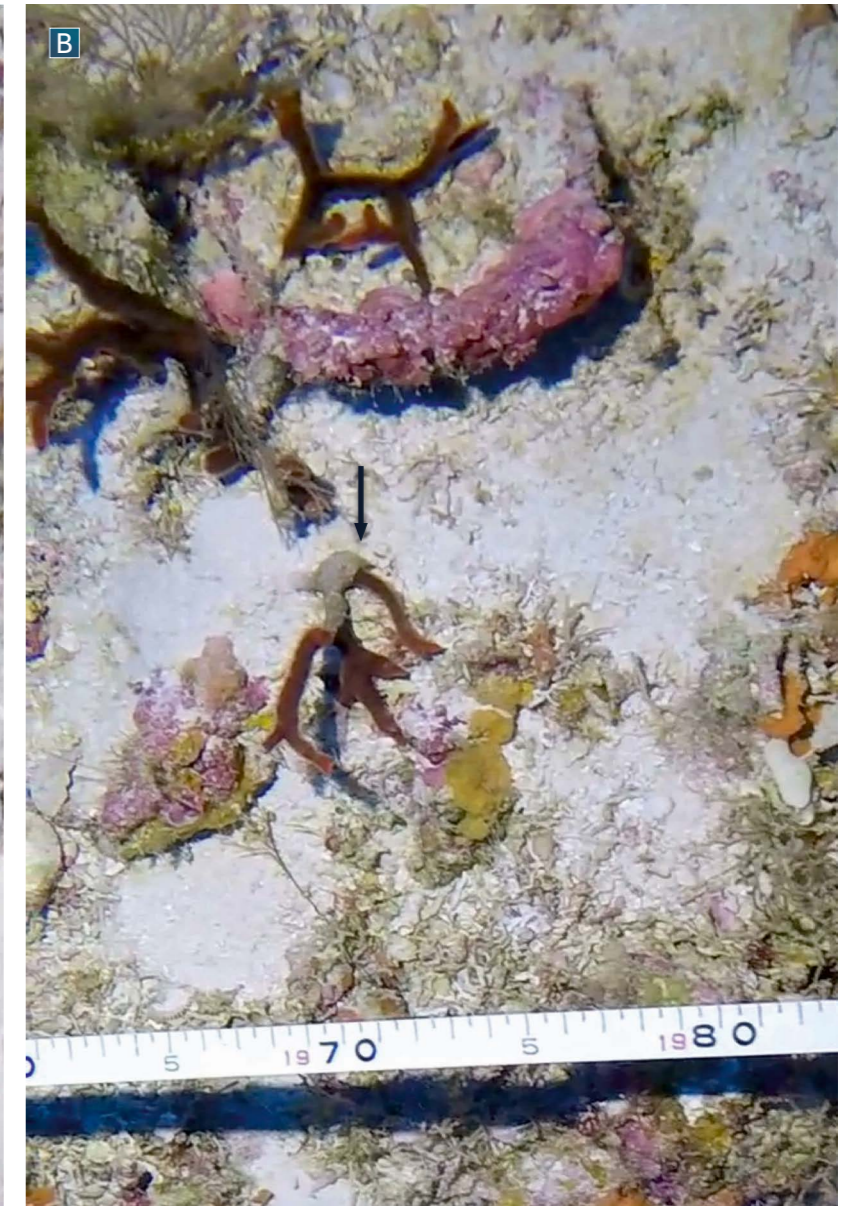
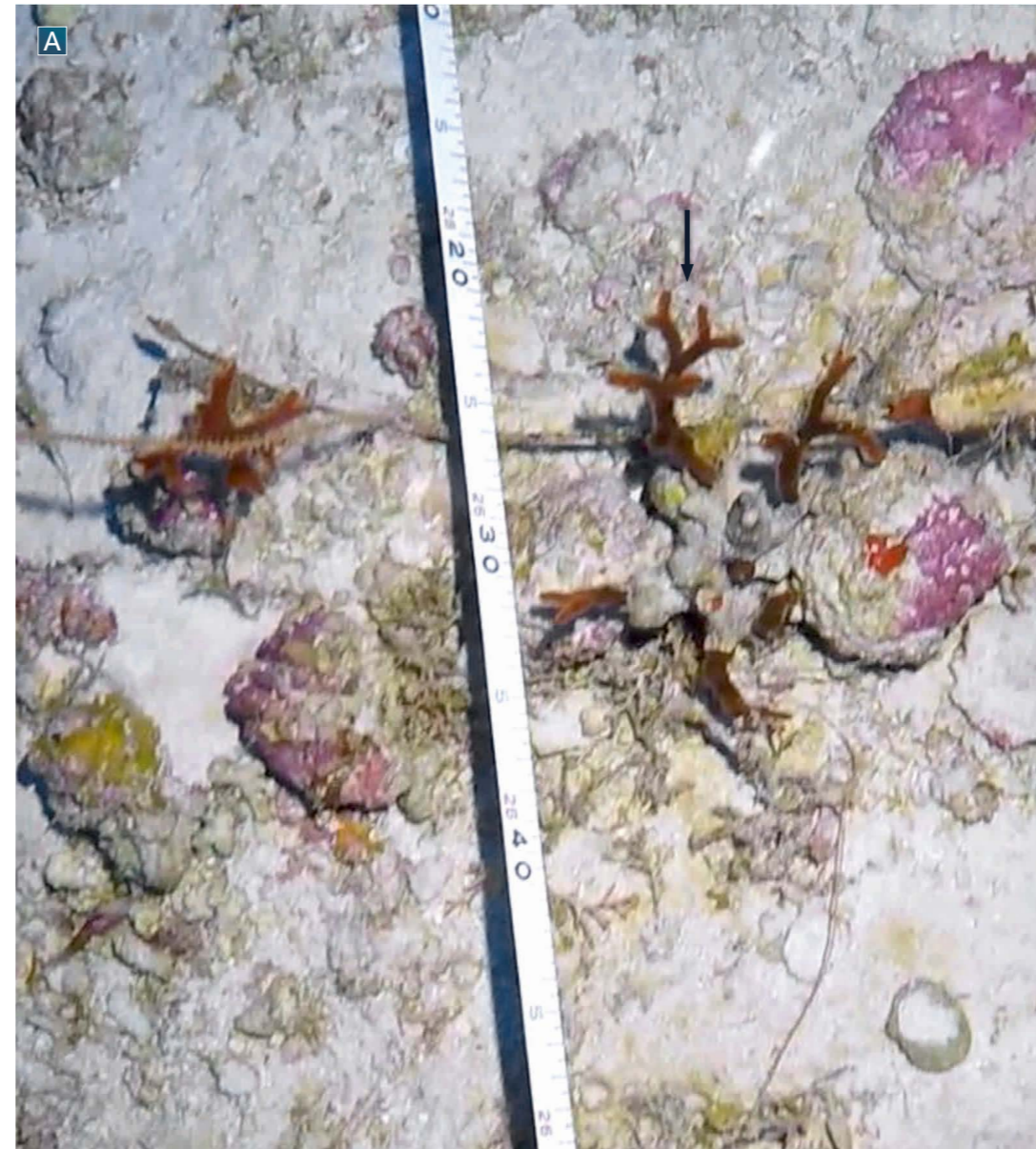
90–93 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal.

Fig. 56. *Galaxaura* sp.

A-B) Spittal, 90–93 m.



FAMILY:

Palmophyllaceae

SPECIES:

Verdigellas peltata

D.L. Ballantine & J.N. Norris, 1994

COMMON NAME:

Goopy green crust

VISUAL ID:

Thick spreading prostrate blades. Green to dark green.

OBSERVED DEPTH RANGE:

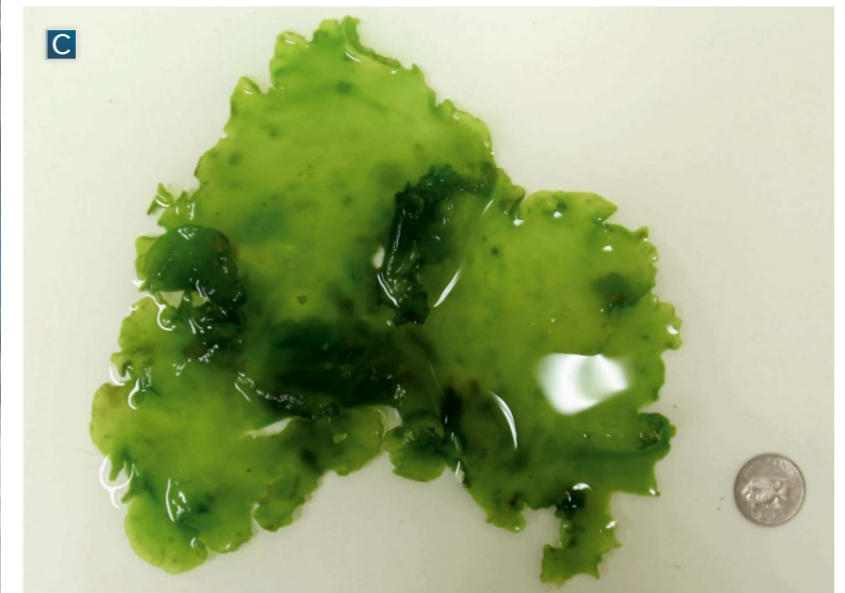
31–93 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank,
Spittal, Tiger.

Fig. 57. *Verdigellas peltata*.

A-B) North Northeast, 91 m. C) North Northeast, 90 m,
preserved specimen from (BEX2016-0155).



FAMILY:

Peyssonneliaceae

GENUS:

Peyssonnelia spp.

COMMON NAME:

Burgundy plate algae

VISUAL ID:

Dark red to purple and burgundy. Likely to contain several species, however, positive species identification requires microscopic examination.

OBSERVED DEPTH RANGE:

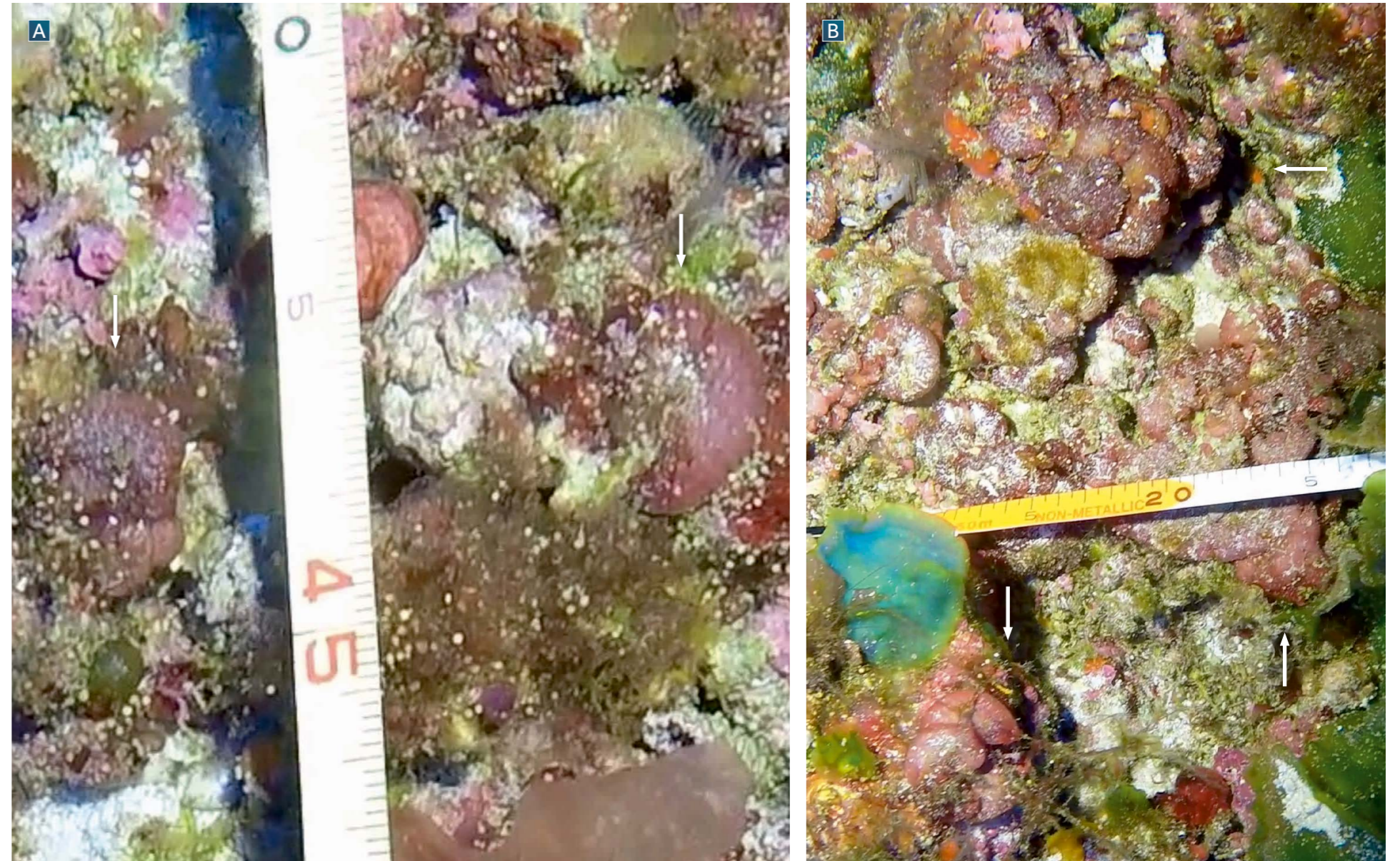
28–93 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 58. *Peyssonnelia* spp.

A-B) North Northeast, 92–93 m.



FAMILY:

Sporochnaceae

SPECIES:

Sporochnus bolleanus Montagne, 1856

VISUAL ID:

Brown, bushy algae with alternate branching. Individual plants can often exceed 0.5 m in height. This species has been found to form extensive meadows between 60–90 m such as on the summit of Plantagenet Bank or in North Northeast. Scattered detached and dying fragments were commonly observed occupying the seafloor in deeper-water habitats (150–300 m). Shades of yellow-brown and brown.

OBSERVED DEPTH RANGE:

55–94 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal, Tiger.

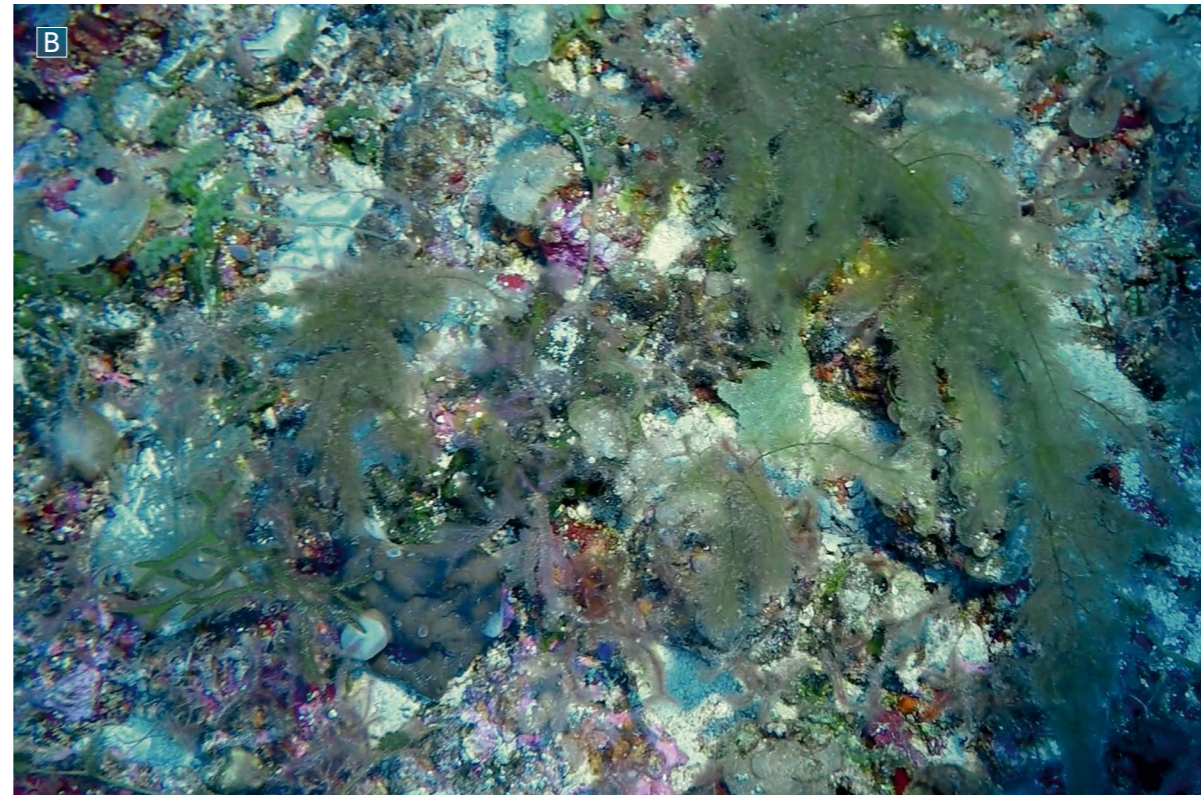
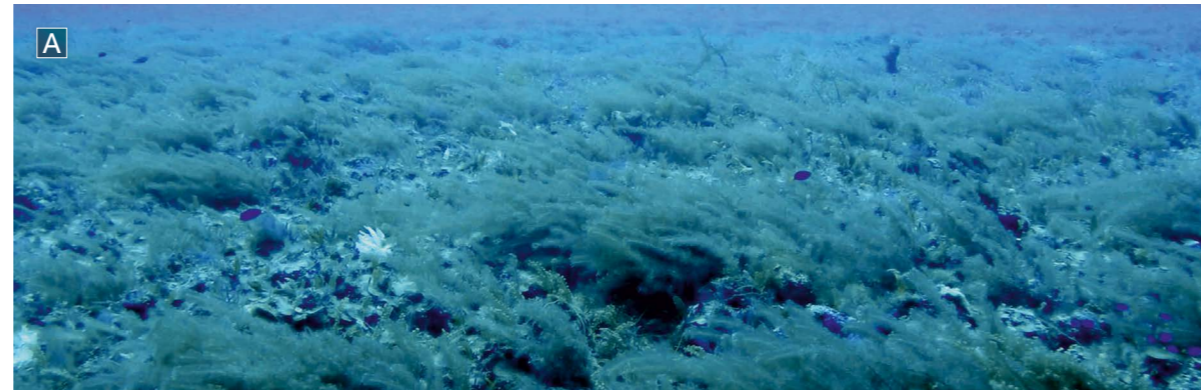
Fig. 59. *Sporochnus bolleanus*.

A) North Northeast, 60 m, meadows.

B) North Northeast, 60 m, close-up of

individuals. C) North Northeast, 60 m,

preserved specimen (BEX2016-0094).



Algae

FAMILY:

Udoteaceae

SPECIES:

Udotea cyathiformis Decaisne, 1842

COMMON NAME:

Mermaid's fan

VISUAL ID:

Broad funnel-shaped blades often torn at maturity into fan-shaped blades attached to single stalks. Whitish-green to yellow-green.

OBSERVED DEPTH RANGE:

55–60 m.

DISTRIBUTION:

North Northeast.

Fig. 60. *Udotea cyanthiformis*.
Plantagenet Bank, 55 m.

Fig. 60.

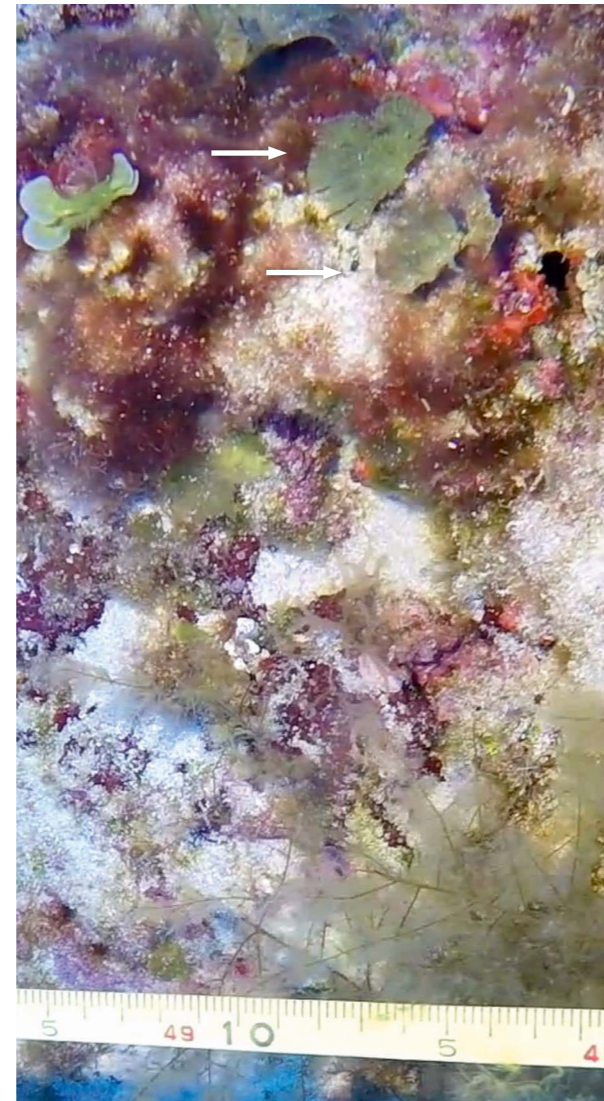
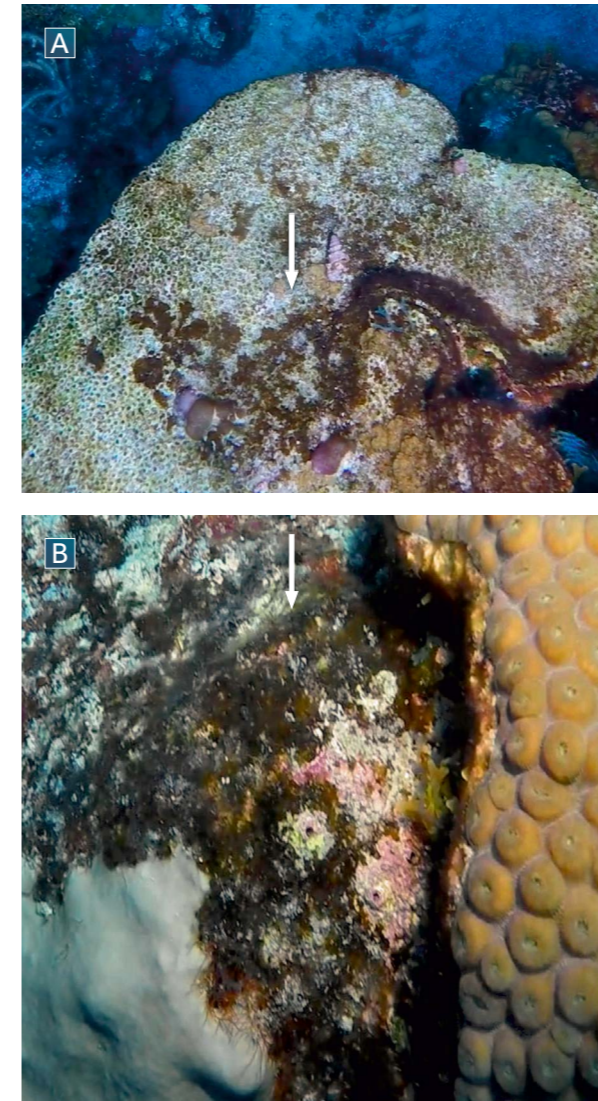


Fig. 61.



Algae

COMMON NAME:

Brown fleshy crust

VISUAL ID:

Flat, brown to dark brown encrustations on rock and coral.

OBSERVED DEPTH RANGE:

15–63 m.

DISTRIBUTION:

North Northeast.

Fig. 61. Brown fleshy crust.

A) Spittal, 28–29 m. B) North
Northeast, 30 m.

COMMON NAME:

Crustose coralline algae

VISUAL ID:

Thick, heavily calcified encrustations or plate-like formations with variable colorations ranging from pink and lavender to dark red and burgundy. This group contains a variety of species that are impossible to distinguish in the field.

OBSERVED DEPTH RANGE:

15–301 m.

DISTRIBUTION:

Challenger Bank, North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 62. Crustose coralline algae.

A) Tiger, 93 m. B) Challenger Bank, 94 m.



COMMON NAME:

Green filamentous algae

VISUAL ID:

Green, fluffy clumps consisting of very fine filaments.

OBSERVED DEPTH RANGE:

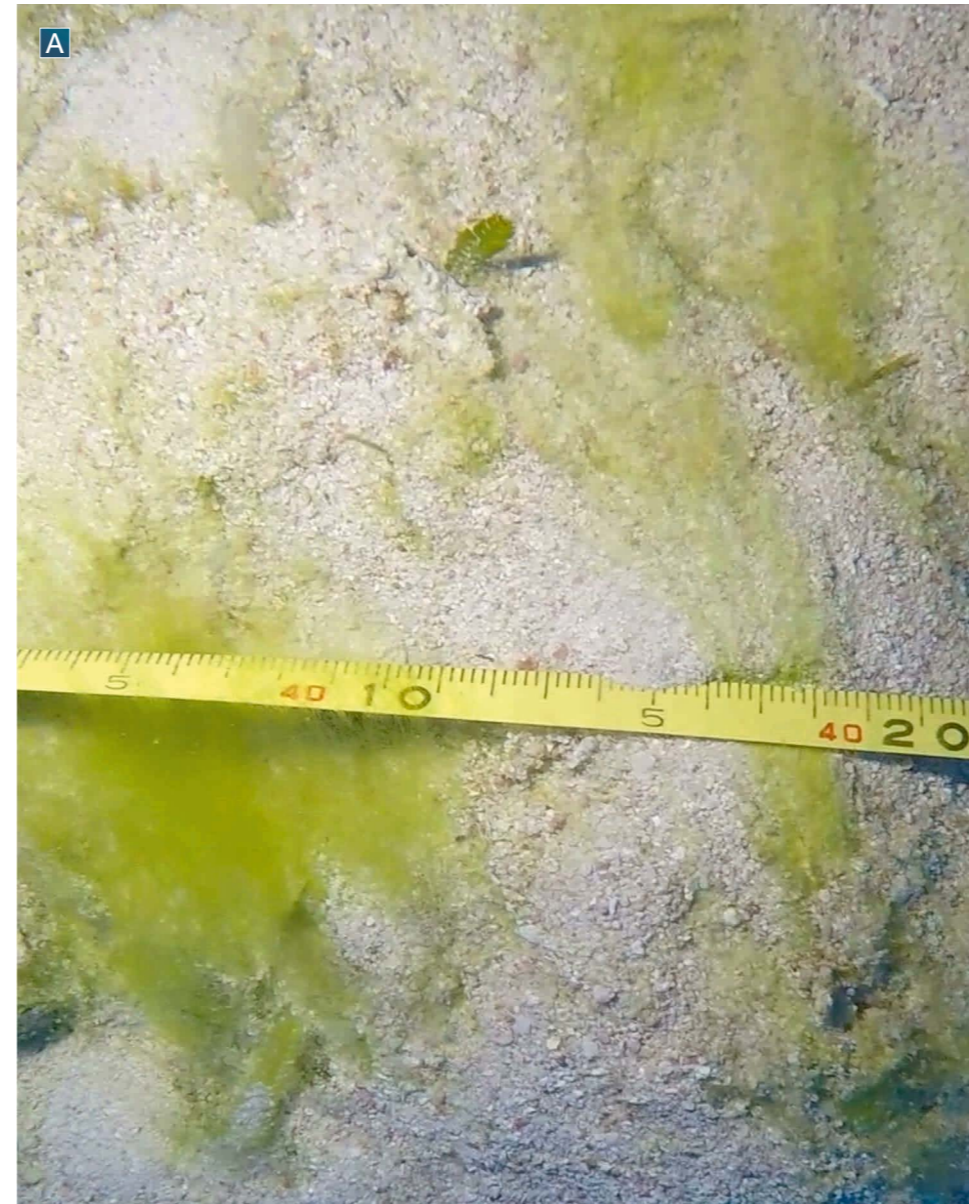
55–93 m.

DISTRIBUTION:

Plantagenet Bank, Spittal, Tiger.

Fig. 63. Green filamentous algae.

A-B) Spittal, 58 m.



COMMON NAME:

Membranous red blades

VISUAL ID:

Thin to medium-thin blades with red, pink and purple colour variations. This morphotype encompasses several genera including *Austokallymenia*, *Galene*, *Halarachnion*, *Halymenia* and *Nothokallymenia*. Positive identification requires microscopic examination.

OBSERVED DEPTH RANGE:

55–93 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 64. Membranous red blades.

A) North Northeast, 92–93 m. B) North Northeast, 91 m, *Austokallymenia* sp. C) North Northeast, 90 m, preserved specimen, *Galene* sp. (BEX2016-0151). D) Spittal, 77 m, preserved specimen, *Halarachnion louisianense* N. Arakaki & Fredericq, 2014 (BEX2016-0366). E) North Northeast, 90 m, preserved specimen, *Austokallymenia* sp. (BEX2016-103).

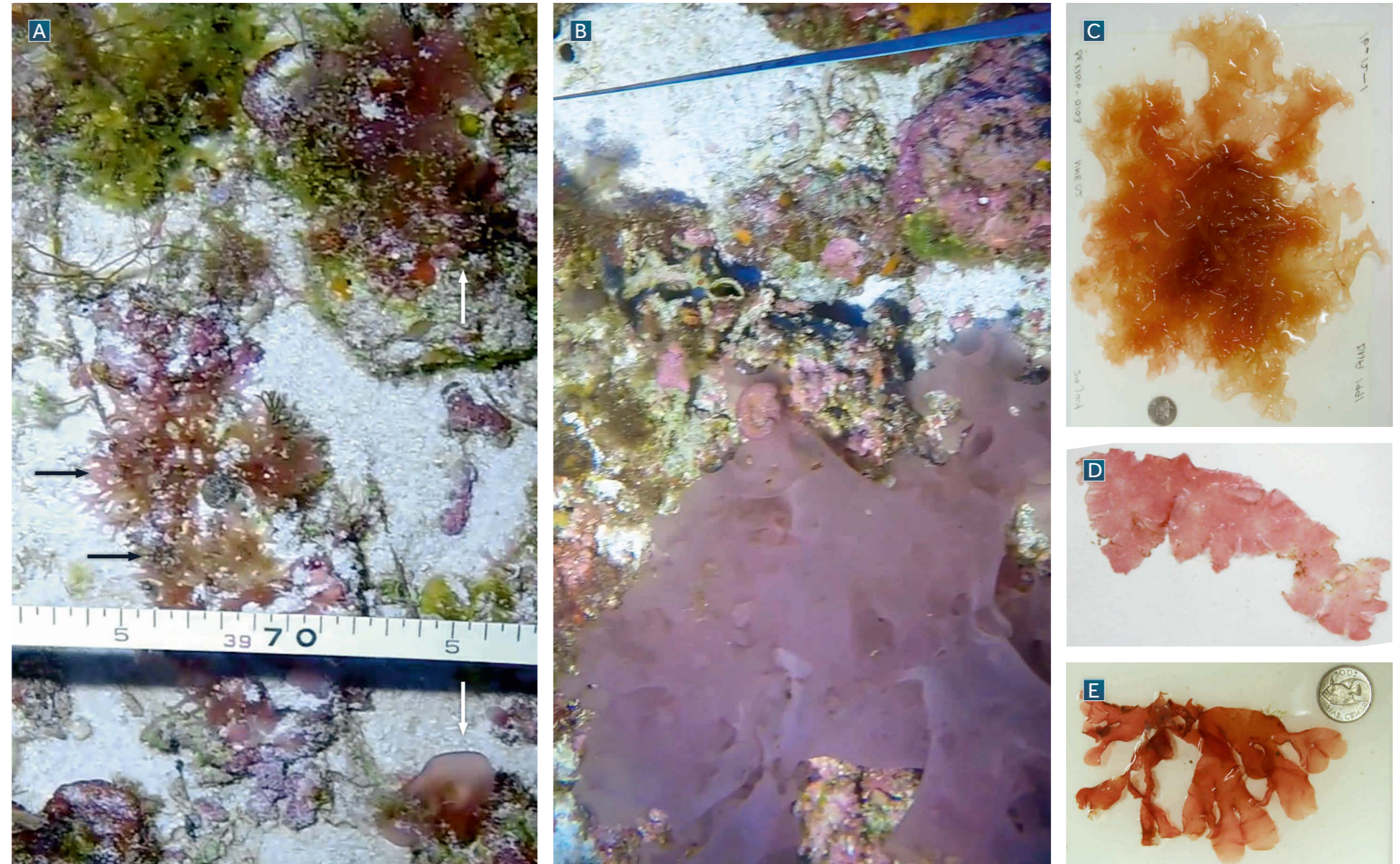


Fig. 64.

COMMON NAME:

Red filamentous algae

VISUAL ID:

Dark orange to red mats comprising very fine filaments giving it a rather fuzzy appearance.

OBSERVED DEPTH RANGE:

55–60 m.

DISTRIBUTION:

Plantagenet Bank.

Fig. 65. Red filamentous algae.

A) Plantagenet Bank, 56 m. B) Plantagenet Bank, 56 m, preserved specimen (BEX2016-0409).



FAMILY:

Aplysinidae

SPECIES:

Aplysina cauliformis
(Carter, 1882)

COMMON NAME:

Row pore rope sponge

VISUAL ID:

Rope-like, branching sponge with large, conspicuous pores, typically forming rows, covering the entire surface area. Purple to lilac.

OBSERVED DEPTH RANGE:

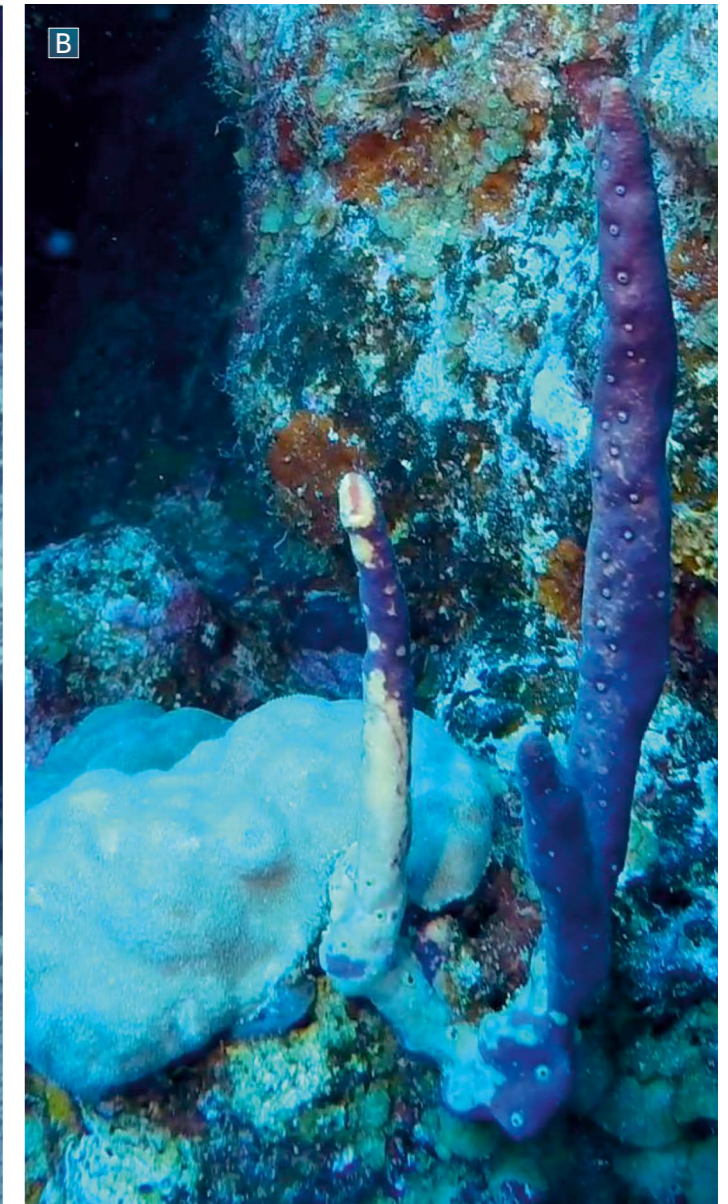
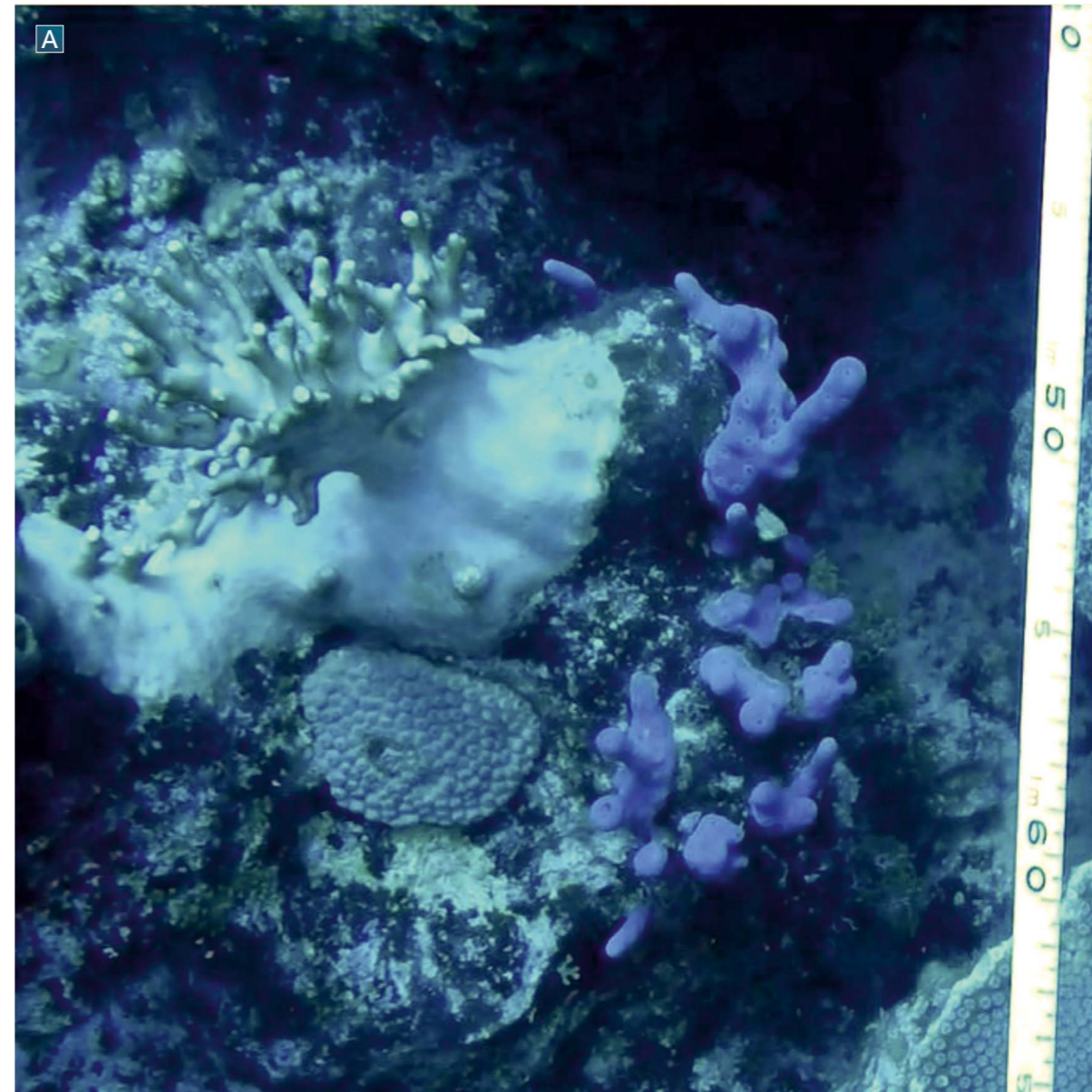
15–31 m.

DISTRIBUTION:

North Northeast, Spittal, Tiger.

Fig. 66. *Aplysina cauliformis*.

A) Spittal, 30 m. B) North Northeast, 30 m.



FAMILY:

Aplysinidae

SPECIES:

Aplysina fistularis (Pallas, 1766)

COMMON NAME:

Yellow tube sponge

VISUAL ID:

Yellow-brown to greyish-green tubes with smooth surface and compact outline. Tubes typically grow in clusters joined at the base.

OBSERVED DEPTH RANGE:

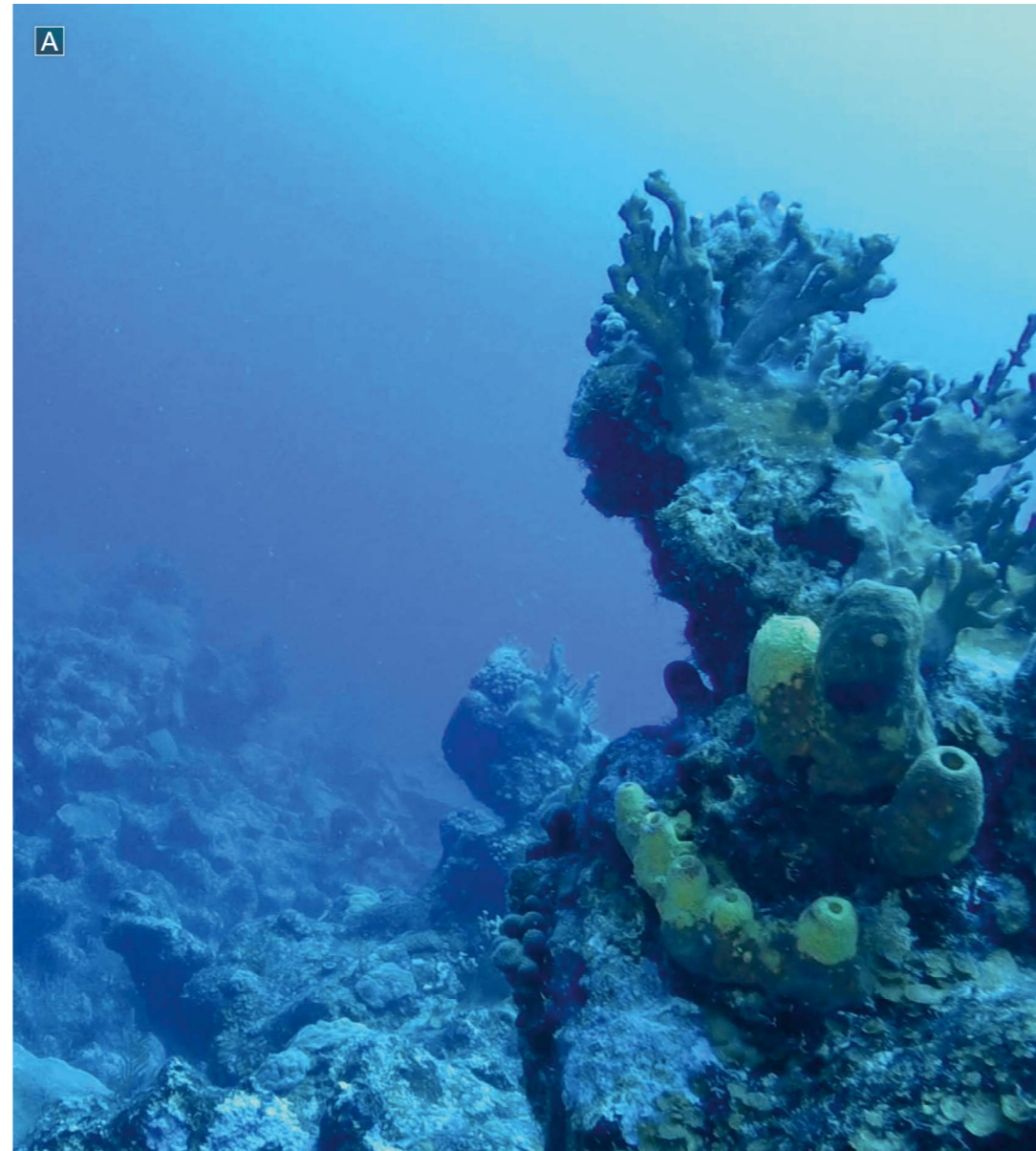
15–31 m.

DISTRIBUTION:

North Northeast, Spittal, Tiger.

Fig. 67. *Aplysina fistularis*.

A) Spittal, 30 m. B) Tiger, 30 m. C) Tiger, 40–90 m, preserved specimen (BEX2016-285).



Phylum: Porifera (Sponges)

FAMILY:

Aplysinidae

SPECIES:

***Aplysina* sp.**

COMMON NAME:

Stove-pipe sponge

VISUAL ID:

Thick-walled barrels or tubes with slightly convoluted exterior. Can be solitary or in groups. Olive green to grey. Resembles *Aplysina archeri* (Higgin, 1875) known to occur in the Caribbean although closer microscopic examination is required to confirm a new record of this species from Bermuda.

OBSERVED DEPTH RANGE:

15–31 m.

DISTRIBUTION:

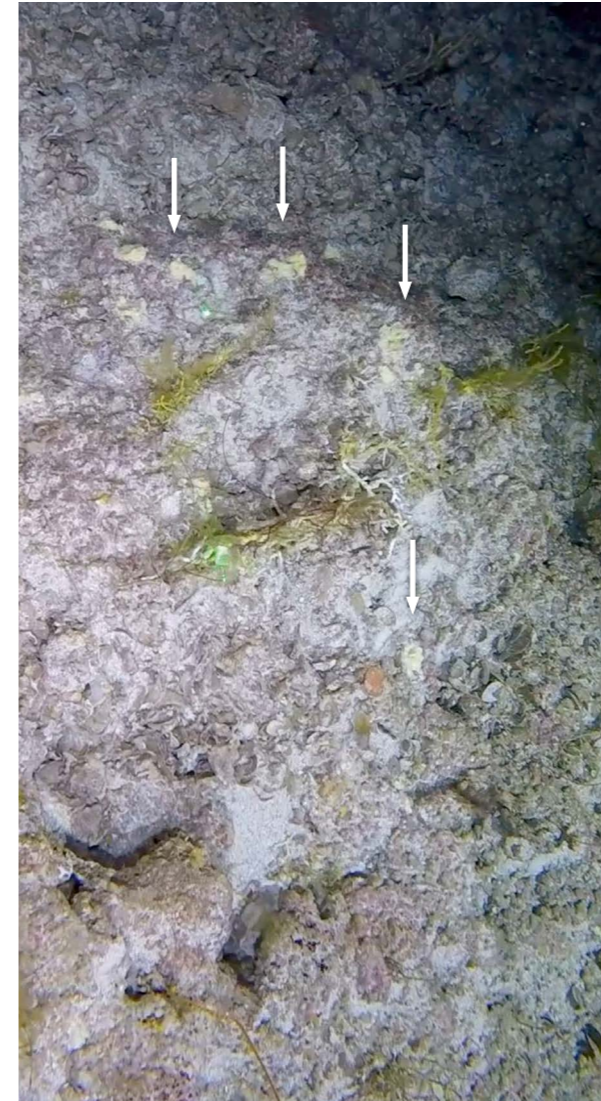
North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 68. *Aplysina* sp.
Spittal, 30 m.

Fig. 68.



Fig. 69.



Phylum: Porifera (Sponges)

COMMON NAME:

**Creamy-white
encrusting sponge**

VISUAL ID:

Small, encrusting sponge with colour that ranges from shades of white to pale yellow.

OBSERVED DEPTH RANGE:

147–301 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 69. Creamy-white encrusting sponge.
Tiger, 200 m.

Phylum: Porifera (Sponges)

COMMON NAME:

Green rope sponge

VISUAL ID:

Thick, finger-like branches creeping on the seafloor.
Shades of green.

OBSERVED DEPTH RANGE:

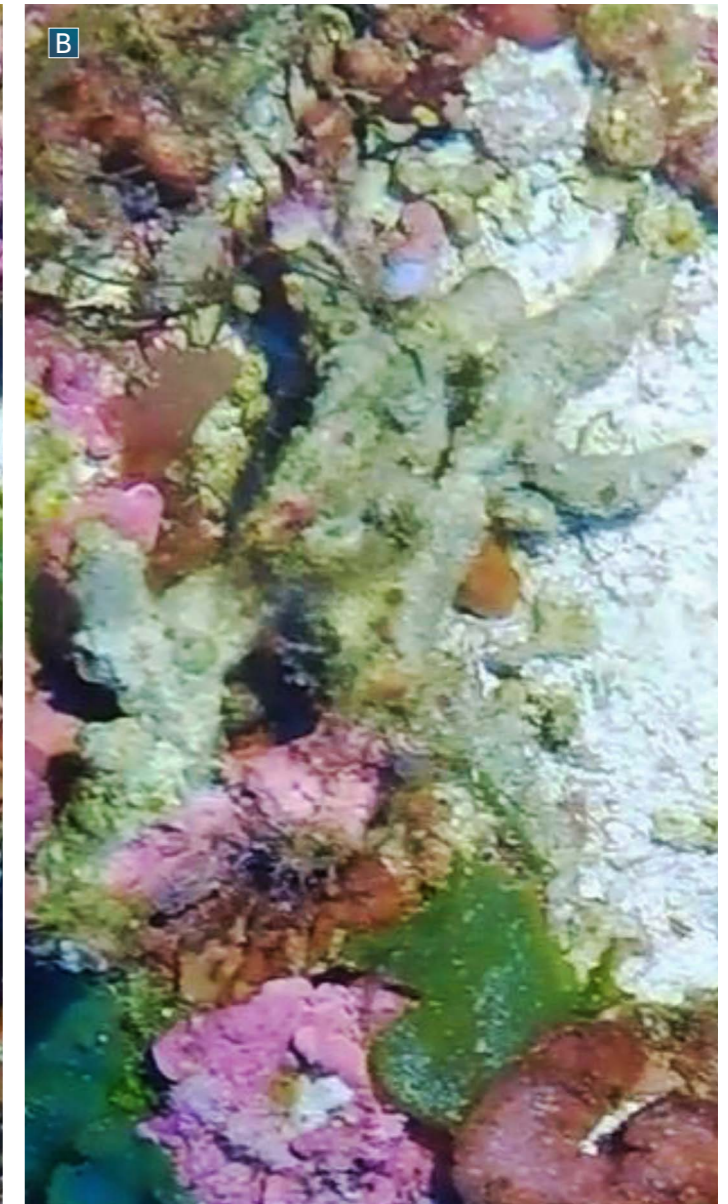
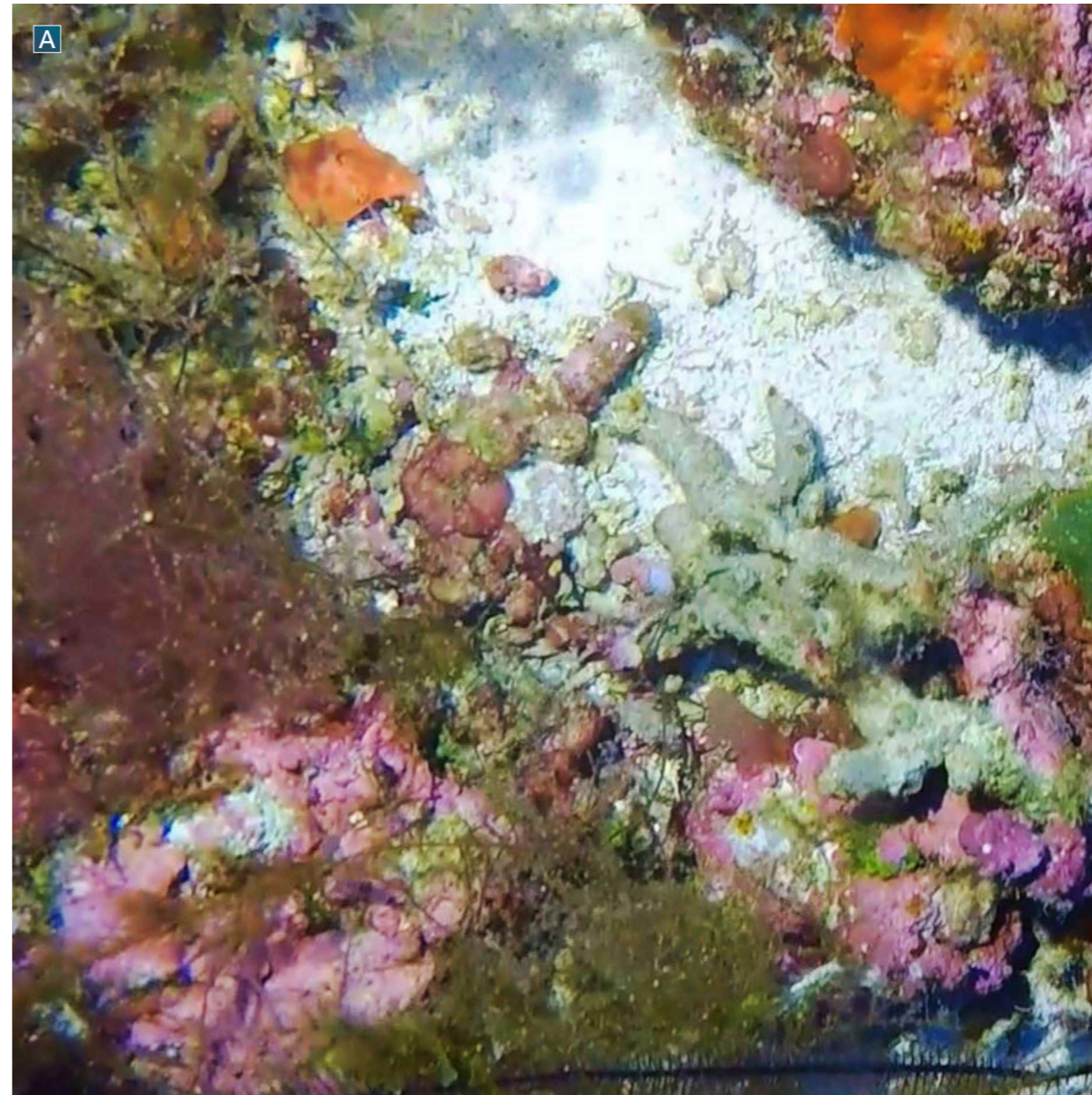
90–93 m.

DISTRIBUTION:

North Northeast, Tiger.

Fig. 70. Green rope sponge.
A-B) North Northeast, 90 m.

Fig. 70.



COMMON NAME:

Orange-red encrusting sponge

VISUAL ID:

Thick encrustations with variable colorations ranging from yellow-orange to orange-red. This group likely contains a variety of species belonging to different families, however, positive identification requires microscopic examination.

OBSERVED DEPTH RANGE:

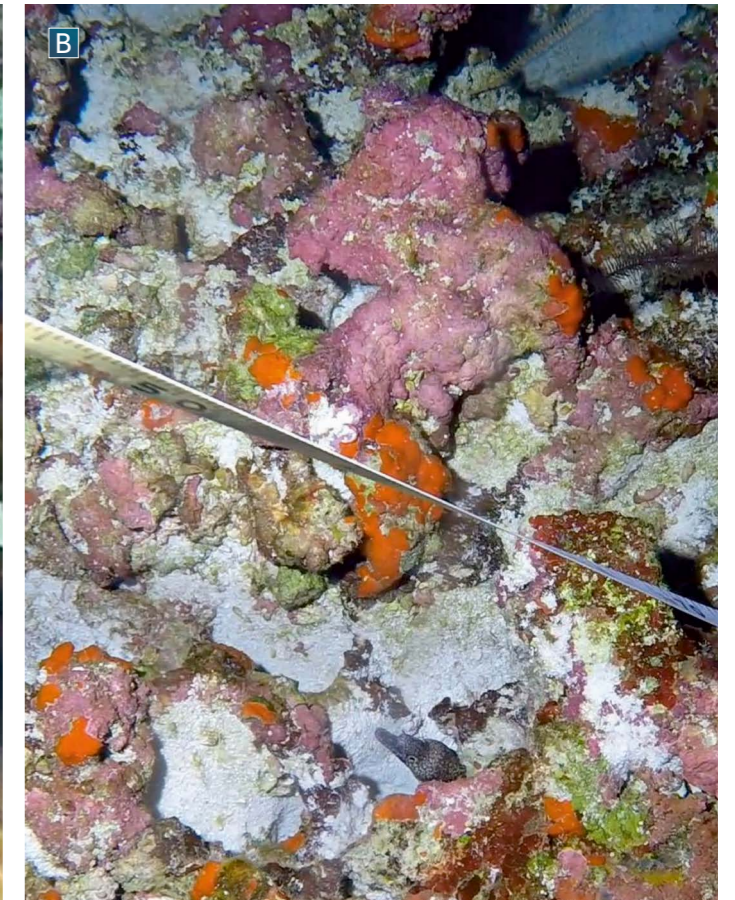
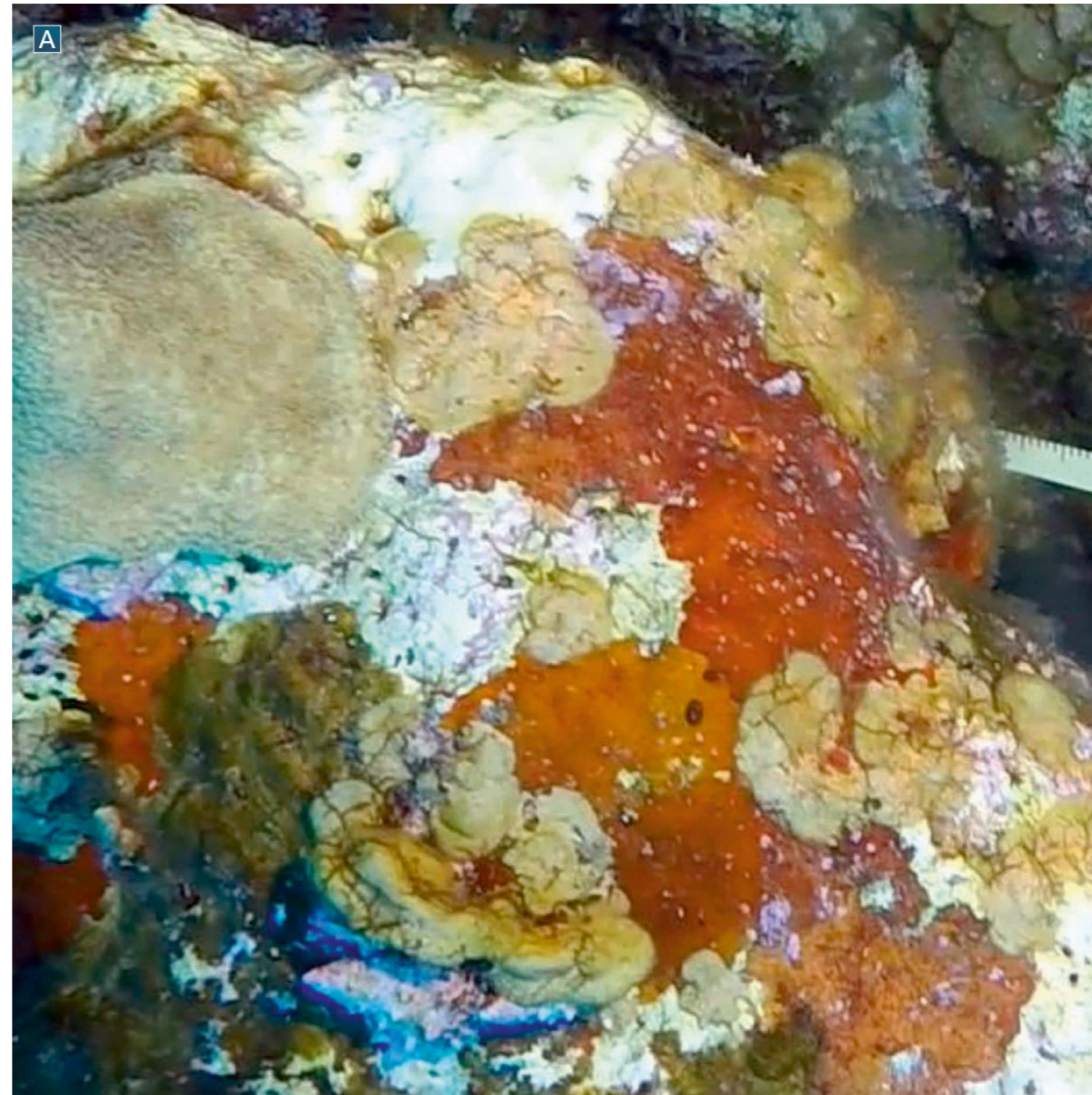
15–303 m.

DISTRIBUTION:

North Northeast, Tiger.

Fig. 71. Orange-red encrusting sponges.

A) Tiger, 30 m. B) Tiger, 90 m. C) North Northeast, 200 m.



Phylum: Porifera (Sponges)

COMMON NAME:

Red sieve encrusting sponge, cf. *Phorbos amaranthus*
Duchassaing & Michelotti, 1864

VISUAL ID:

Bright red encrusting sponge with numerous pores scattered across the surface, giving it a sieve-like appearance. This morphotype is likely conspecific with *Phorbos amaranthus* although microscopic examination would be needed for positive identification.

OBSERVED DEPTH RANGE:

55–63 m.

DISTRIBUTION:

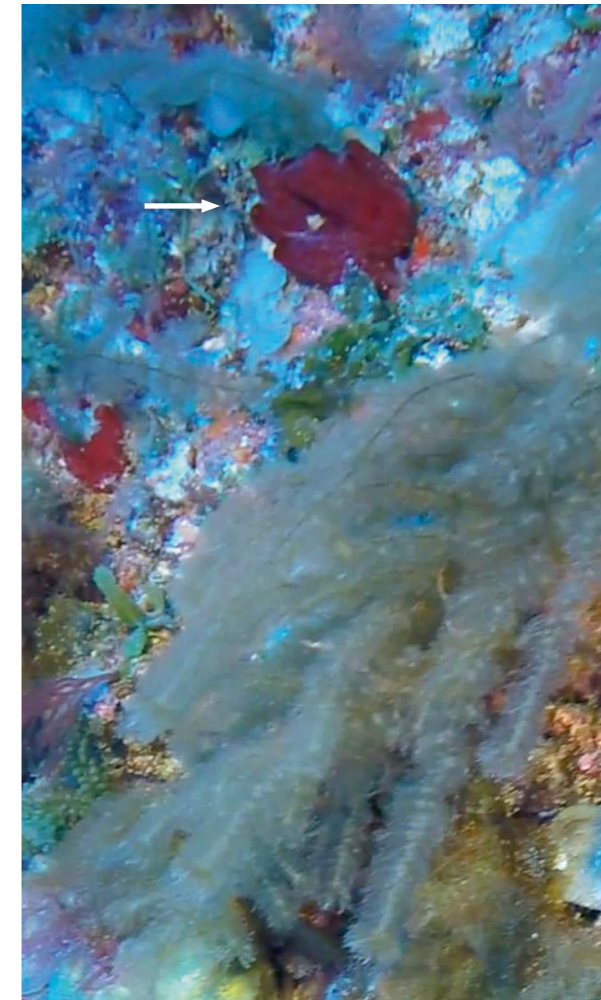
North Northeast, Plantagenet Bank, Tiger.

Fig. 72. Red sieve encrusting sponge, cf. *Phorbos amaranthus*.
Plantagenet Bank, 60 m.

Fig. 72.



Fig. 73.



Phylum: Porifera (Sponges)

COMMON NAME:

Red tube sponge

VISUAL ID:

Branching, tubular-shaped sponge of red colour; tubes are usually in clusters joined at the base.

OBSERVED DEPTH RANGE:

60–91 m.

DISTRIBUTION:

North Northeast.

Fig. 73. Red branching tube sponge.
North Northeast, 60 m.

Phylum: Porifera (Sponges)

COMMON NAME:

Yellow encrusting sponge

VISUAL ID:

Bright yellow encrusting sponge forming low mounds.

OBSERVED DEPTH RANGE:

137–303 m.

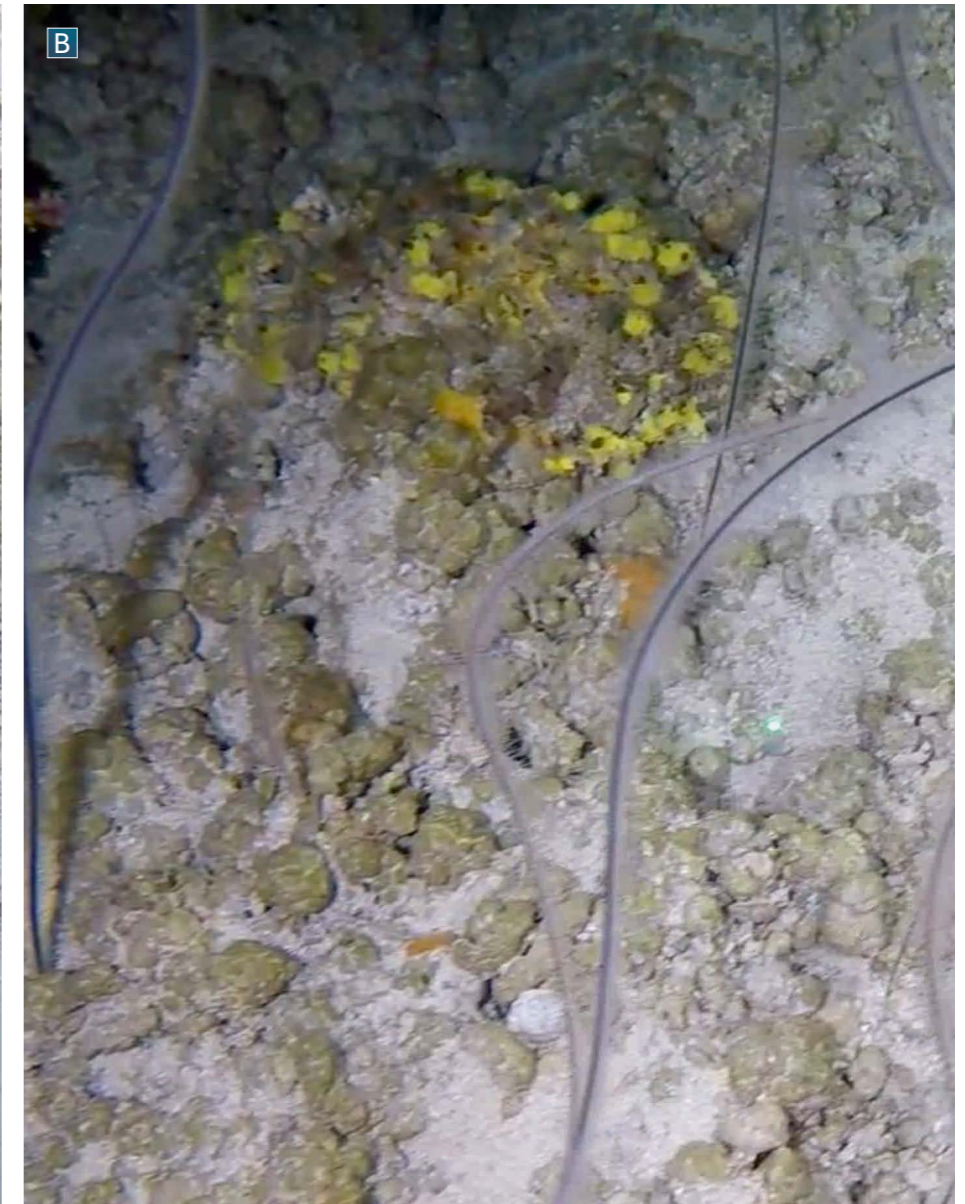
DISTRIBUTION:

North Northeast, Plantagenet Bank,
Spittal, Tiger.

Fig. 74. Yellow encrusting sponge.

A) Plantagenet Bank, 250 m. B) North Northeast, 200 m.

Fig. 74.



COMMON NAME:

Yellow-green encrusting sponge

VISUAL ID:

Thick encrustations with variable colorations ranging from yellow-green to dark green. This morphotype likely contains a variety of species belonging to different families, however, positive identification requires microscopic examination.

OBSERVED DEPTH RANGE:

15–303 m.

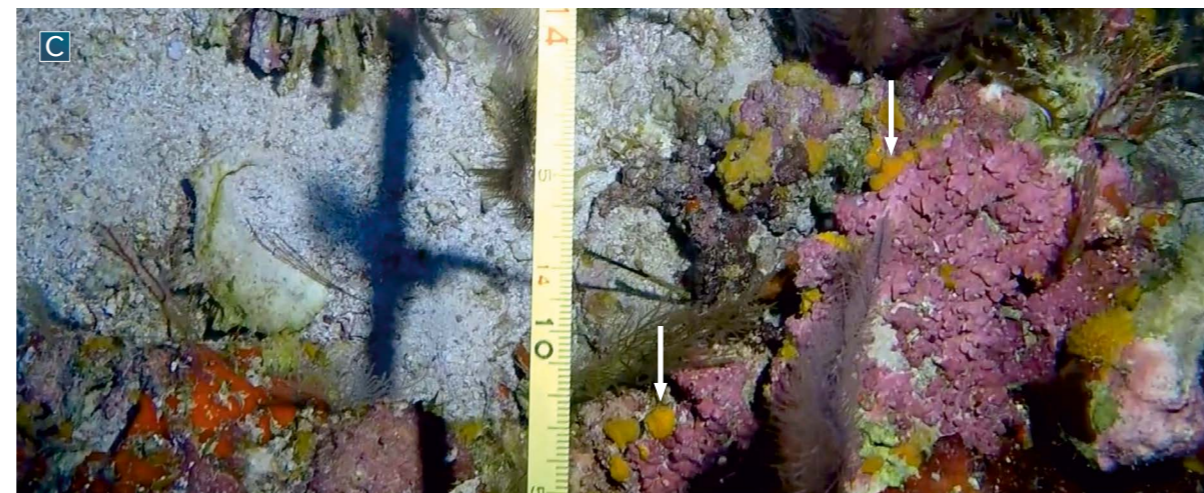
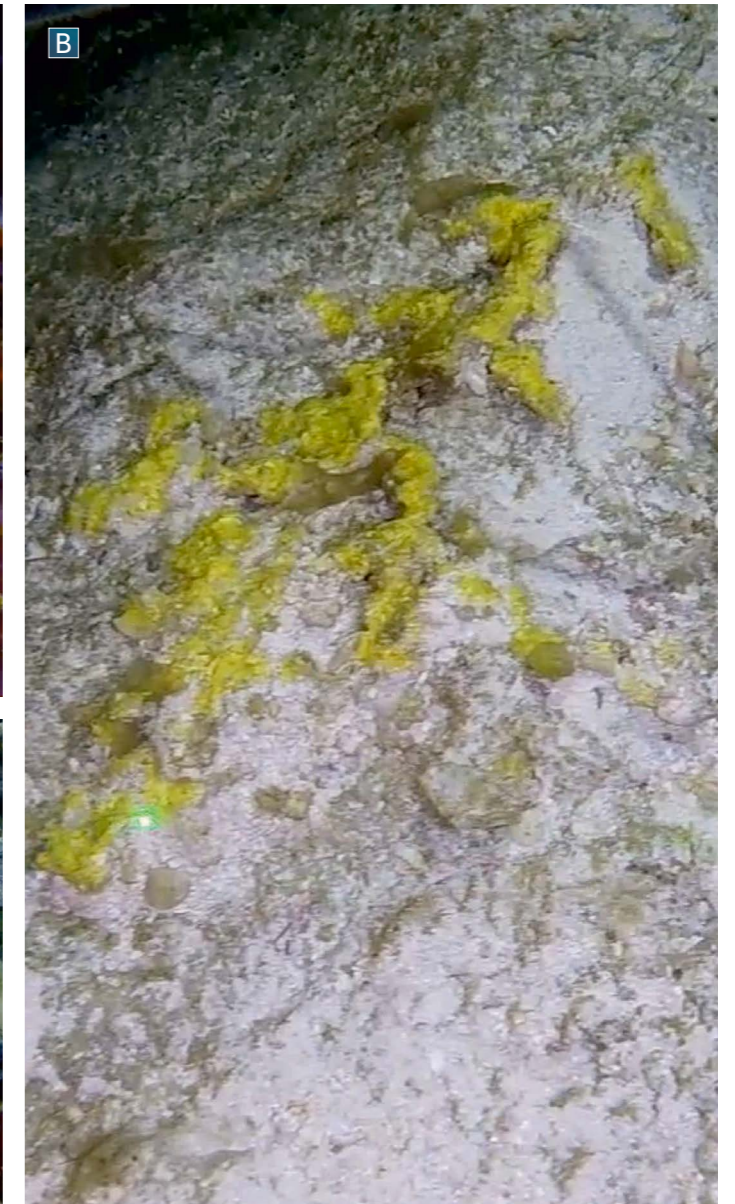
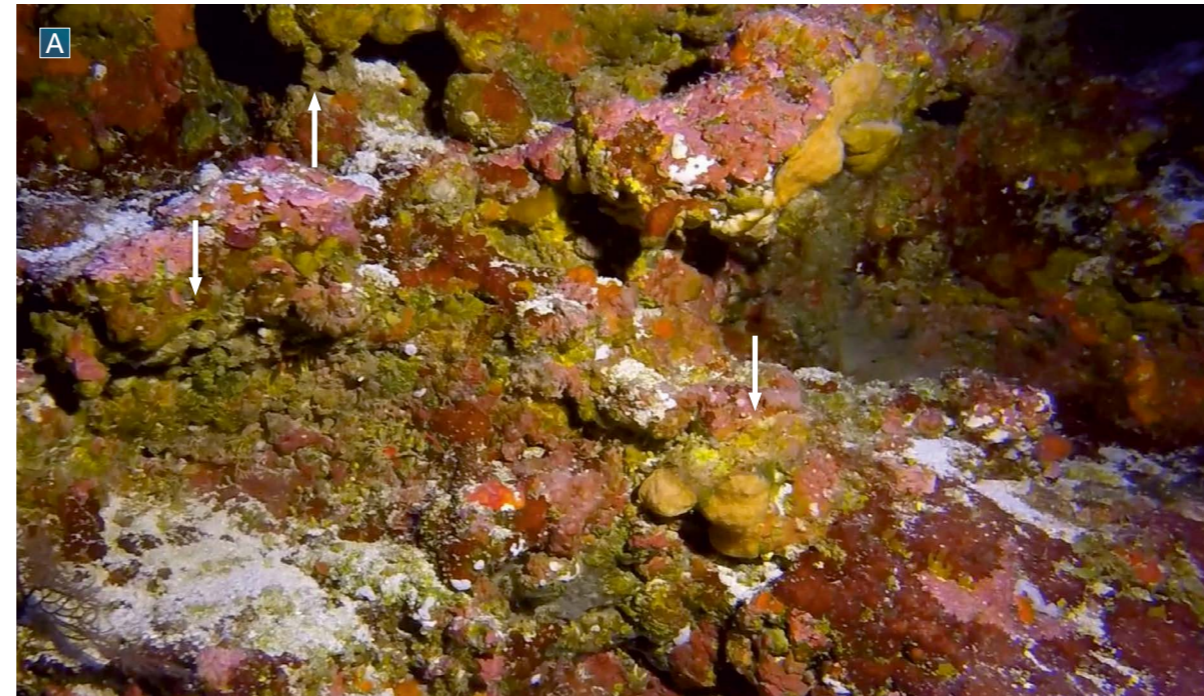
DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 75. Yellow-green encrusting sponge.

A) Challenger, 90 m. B) Plantagenet Bank, 200 m.

C) Spittal, 90 m.



Phylum: Porifera (Sponges)

COMMON NAME:

White-brown
encrusting sponge

VISUAL ID:

White to creamy-brown encrusting sponge with some excurrent openings scattered on its surface.

OBSERVED DEPTH RANGE:

55–93 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank,
Spittal, Tiger.

Fig. 76. White-brown sponge.
Spittal, 90 m.

Fig. 76.

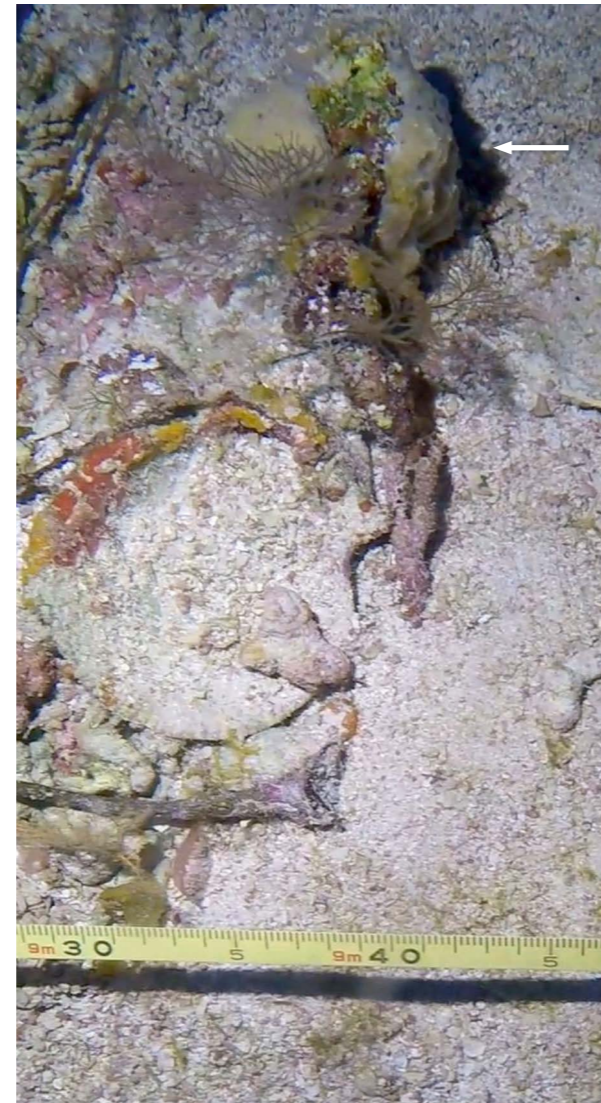
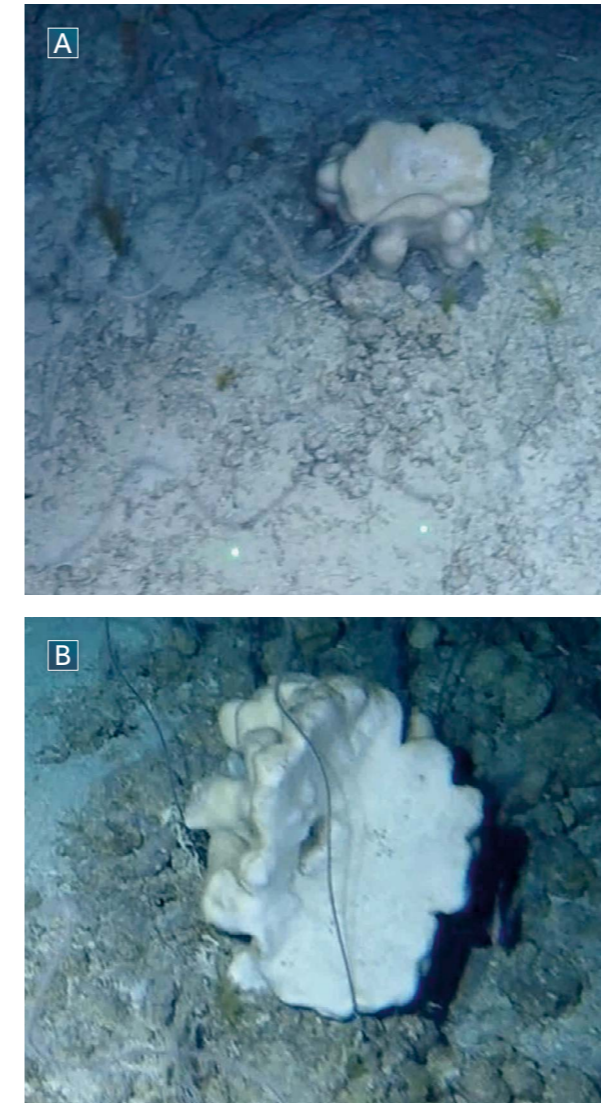


Fig. 77.



Phylum: Porifera (Sponges)

COMMON NAME:

White boulder-shaped
sponge

VISUAL ID:

Large (>20 cm), massive sponge with several
irregular, lobe-shaped protuberances. White to
creamy-brown.

OBSERVED DEPTH RANGE:

200–300 m.

DISTRIBUTION:

Tiger.

Fig. 77. White boulder-shaped sponges.
A) Tiger, 200 m. B) Tiger, 300 m.

Class: Asteroidea (Sea Stars)

FAMILY:

Ophidiasteridae

SPECIES:

Copidaster schismochilus
(H.L. Clark, 1922)

VISUAL ID:

Large sea stars (often >25 cm) with small central disc, and five to six, long, tubular arms. Light brown to orange with dark brown mottling or irregular banding. This species is endemic to Bermuda.

OBSERVED DEPTH RANGE:

148–303 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank.

Fig. 78. *Copidaster schismochilus*.

A) Plantagenet, 249 m. B) North Northeast, 200 m.

C) North Northeast, 250 m, preserved specimen (BAMZ-2016-337-059).



Class: Asteroidea (Sea Stars)

SPECIES:

Asteroidea sp. 1

VISUAL ID:

Light brown to pale yellow, with five slightly tapered arms. Relatively small interradial areas result in a compact appearance. Tip of arms can be occasionally blunt. Based on these features it is likely a member of Ophidiasteridae.

OBSERVED DEPTH RANGE:

149–303 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal.

Fig. 79. *Asteroidea* sp. 1.
Plantagenet Bank, 303 m.

Fig. 79.



Fig. 80.

Class: Asteroidea (Sea Stars)

SPECIES:

Asteroidea sp. 2

VISUAL ID:

Small sea star (~10 cm in diameter) with slightly raised central disc and five equally long, tapered arms. Bright orange to red, although arm tips have a lighter orange to yellow colour.

OBSERVED DEPTH RANGE:

148–252 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 80. *Asteroidea* sp. 2.
Spittal, 250 m.



Class: Asteroidea (Sea Stars)

SPECIES:

Asteroidea sp. 3

VISUAL ID:

Small (~2–3 cm in diameter), creamy-white, with five equally long and narrow arms, tapering towards the tip. Its appearance hints at Benthoplectinidae, which contains similar-looking deep-sea dwelling sea stars with flexible, tapered arms.

OBSERVED DEPTH RANGE:

200 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 81. *Asteroidea* sp. 3.
North Northeast, 200 m.

Fig. 81.

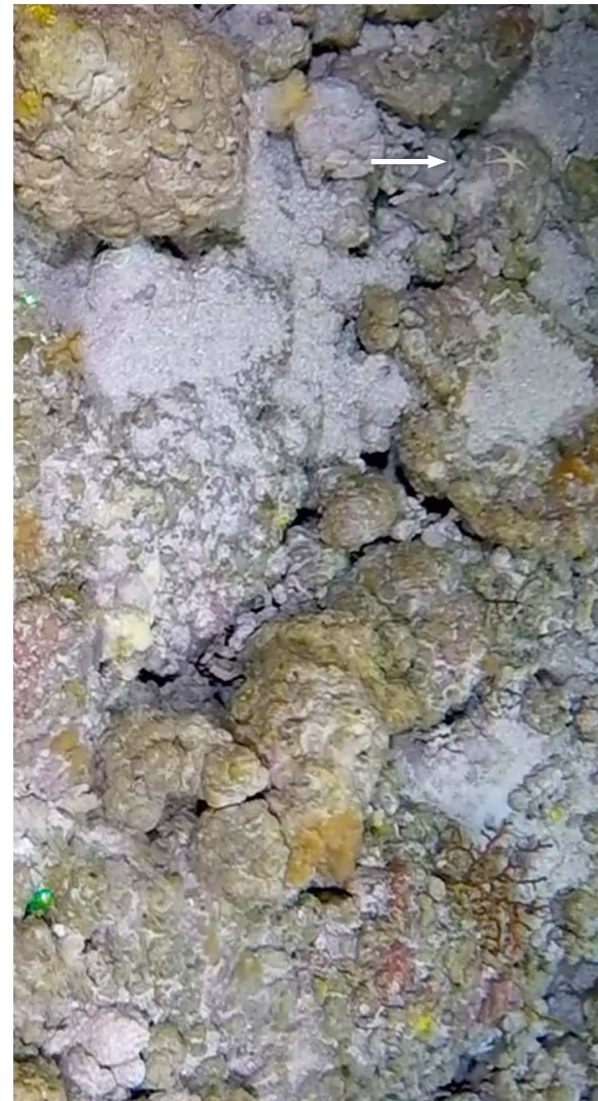
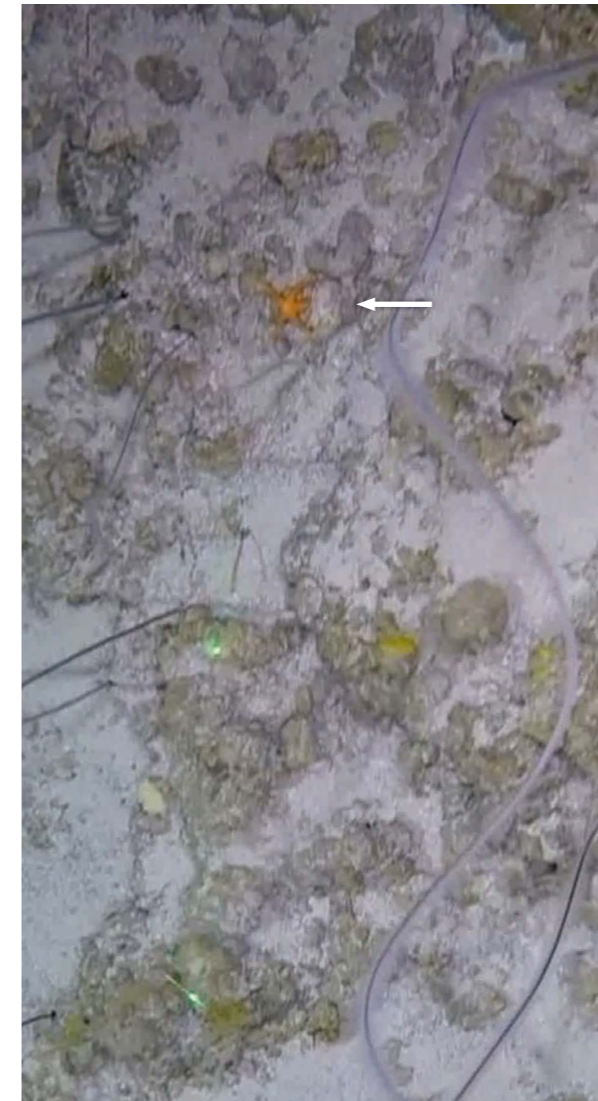


Fig. 82.



Class: Asteroidea (Sea Stars)

SPECIES:

Asteroidea sp. 4

VISUAL ID:

Small (~4–5 cm in diameter), with five equally long, tapered arms. Colour shades of orange.

OBSERVED DEPTH RANGE:

195–301 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 82. *Asteroidea* sp. 4.
North Northeast, 200 m.

Class: Ophiuroidea (Brittle Stars)

VISUAL ID:

Small central disc sharply demarcated from its five arms. Arms slender, very long and narrow. We found two species in Bermuda *Asteroschema oligactes* (Pallas, 1788) and *Ophiothrix suensonii* Lütken, 1856 although they cannot be distinguished using underwater footage, especially since they are typically found coiled around coral branches. Both species have arms equipped with spines throughout, although these are much longer and pronounced in *O. suensonii*. In addition, *A. oligactes* has dark central lines running through the arms, while *O. suensonii* has multiple dark rings instead. Colour for both species is light brown to pale pink; rings or central lines dark brown-red.

OBSERVED DEPTH RANGE:

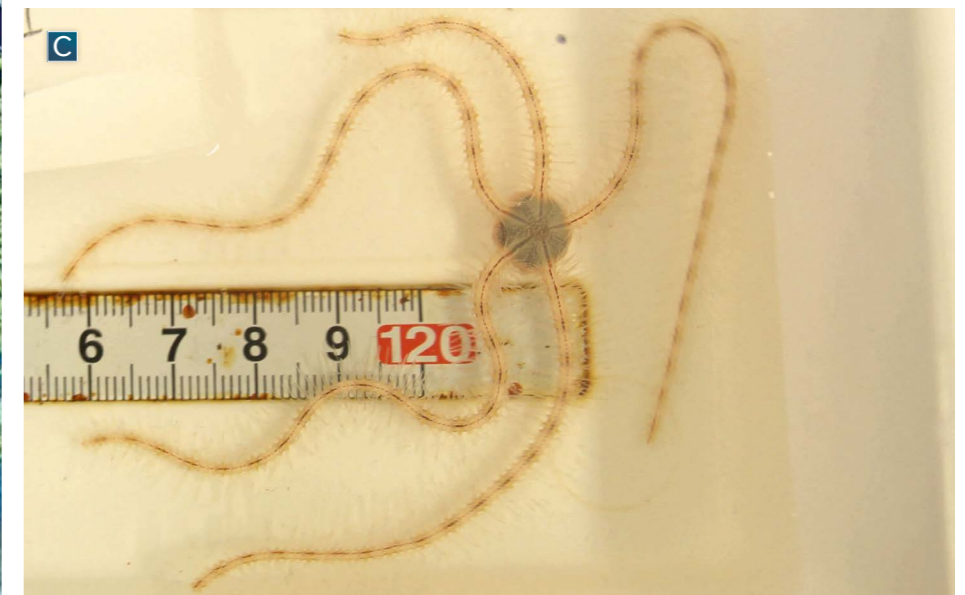
186–303 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 83. Ophiuroidea.

A) North Northeast, 198–200 m. B) Spittal, 299 m, preserved *A. oligactes* specimens (BAMZ2016-337-041). C) Spittal, 299 m, preserved *O. suensonii* specimens (BAMZ2016-337-043).



FAMILY:

Arbaciidae

SPECIES:

Coelopleurus floridanus A. Agassiz, 1872

VISUAL ID:

'Test' (skeleton) circular to sub-circular divided into regions that give rise to spines (dark red to brown) and regions that are naked (creamy white). Primary spines are long and curved white secondary spines are comparatively shorter and pointed.

OBSERVED DEPTH RANGE:

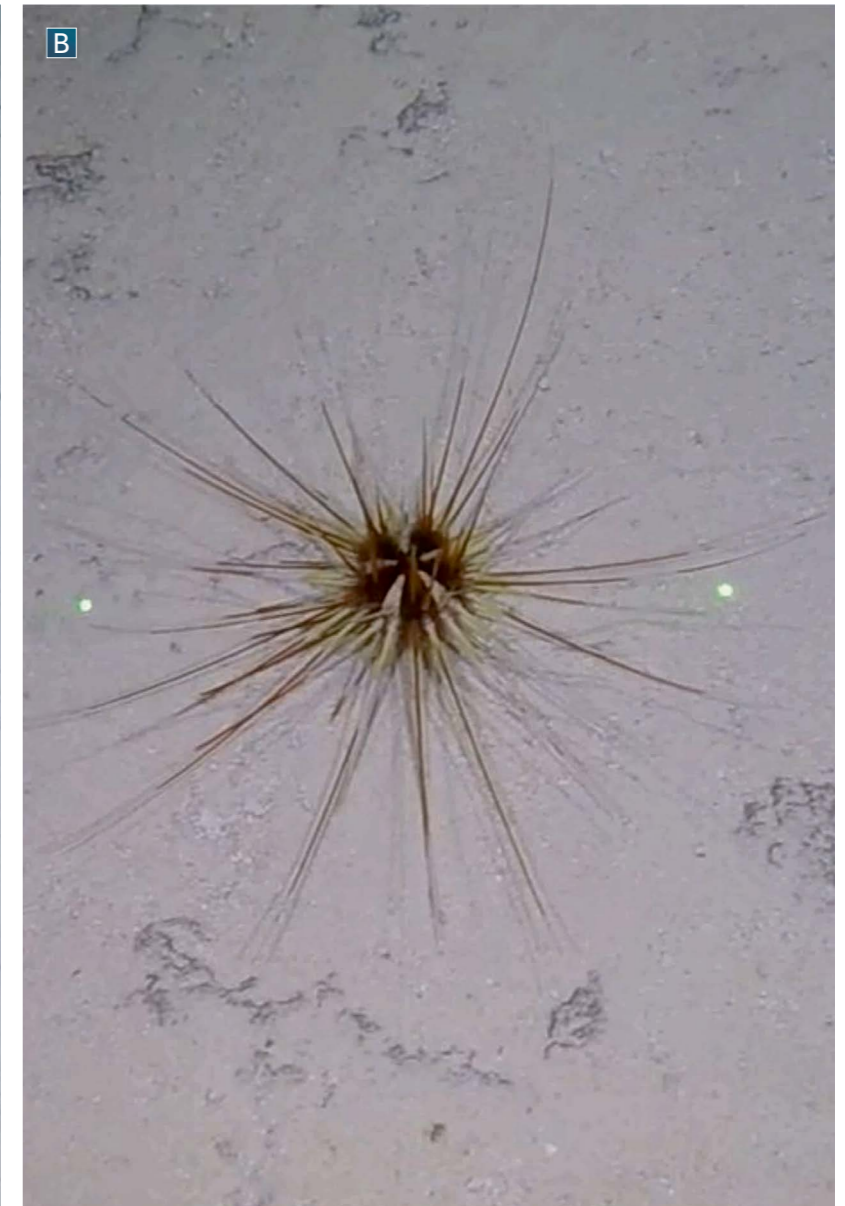
249–303 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal.

Fig. 84. *Coelopleurus floridanus*.

A-B) Plantagenet Bank, 303 m.



Class: Holothuroidea (Sea Cucumbers)

FAMILY:

Stichopodidae

SPECIES:

Isostichopus badionotus (Selenka, 1867)

VISUAL ID:

This species of sea cucumber can be distinguished by the three rows of podia on its back, which have a darker, brown colour compared to the rest of the back which is light pink/brown.

OBSERVED DEPTH RANGE:

146–301 m.

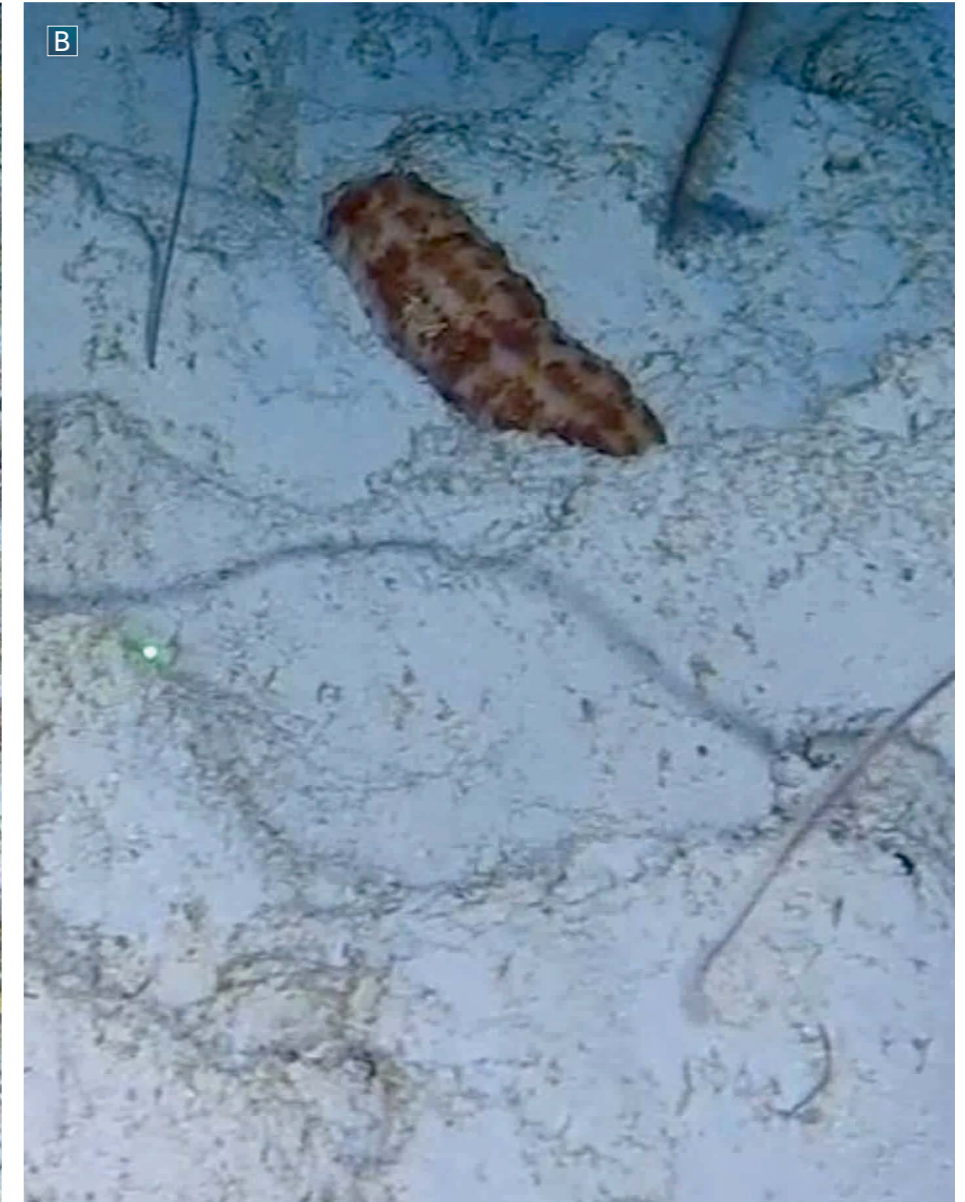
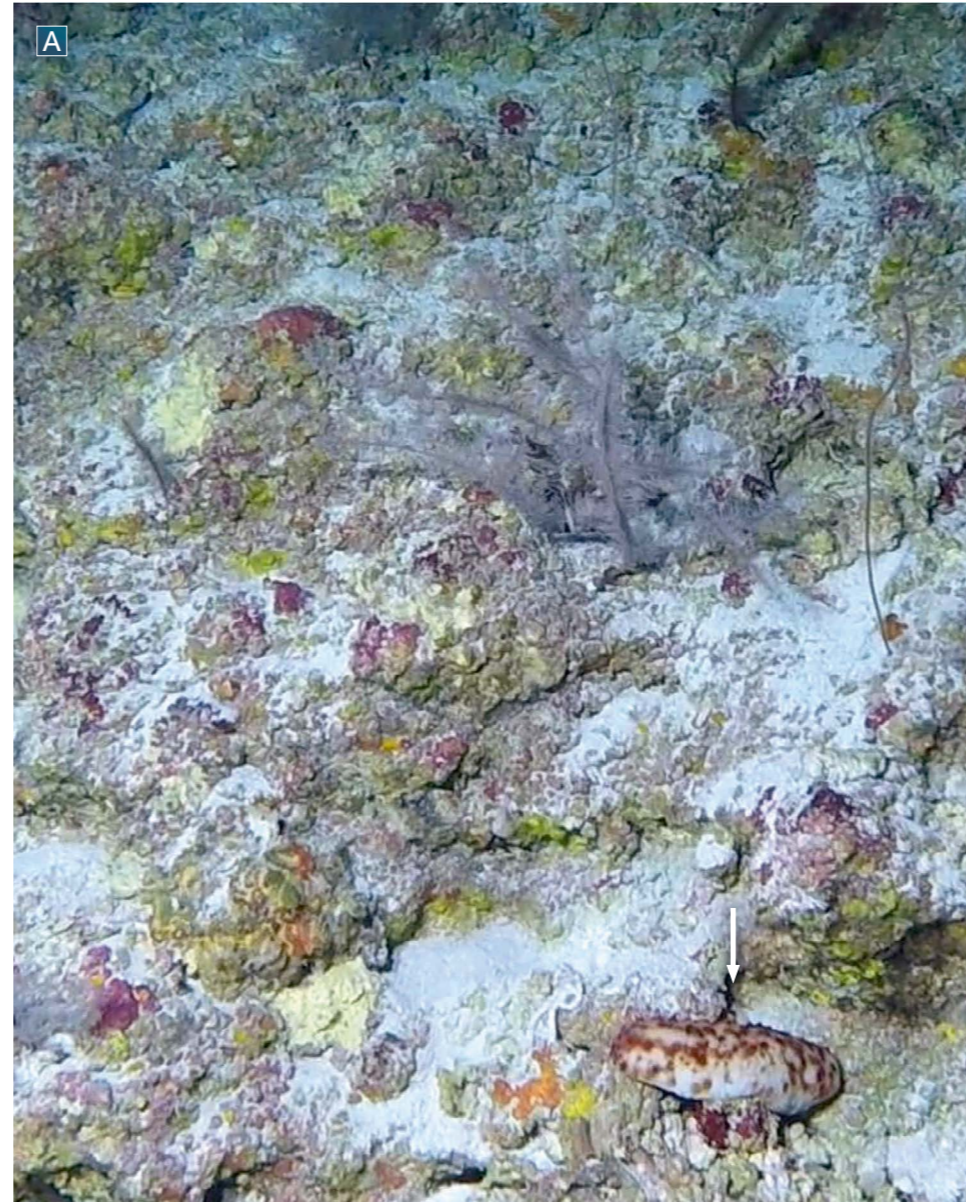
DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal.

Fig. 85. *Isostichopus badionotus*.

A) Spittal, 150 m. B) Plantagenet Bank, 146–151 m.

Fig. 85.



Class: Gastropoda

FAMILY:

Calliostomatidae

GENUS:

***Calliostoma* sp.**

VISUAL ID:

Fist-sized sea snails with acute, conical-shaped, spiral shells. Brown to dark brown colour.

OBSERVED DEPTH RANGE:

146–250 m.

DISTRIBUTION:

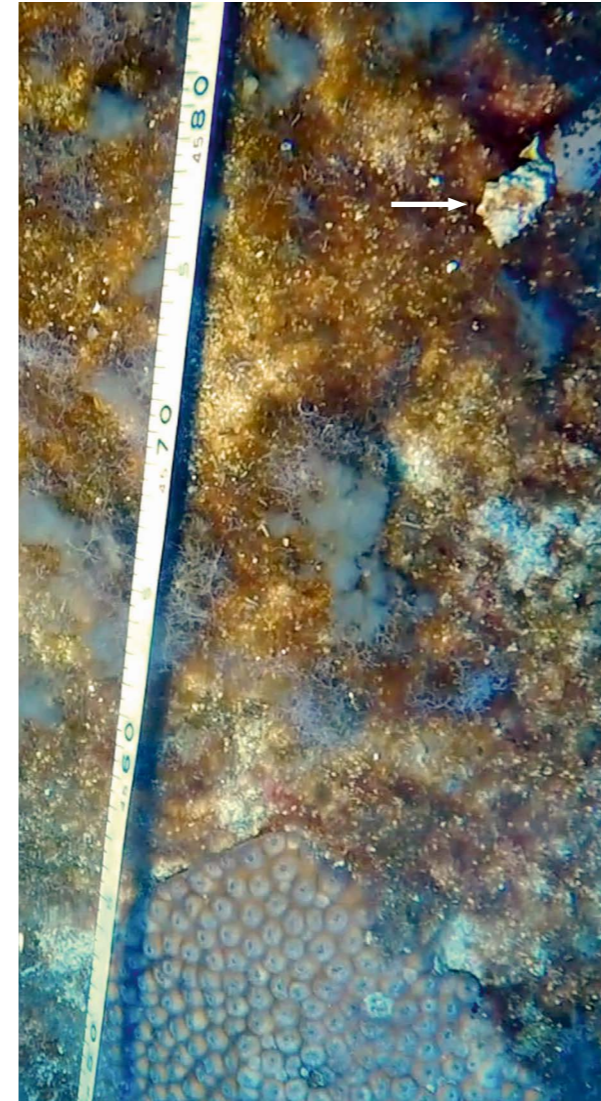
Plantagenet Bank, Tiger.

Fig. 86. *Calliostoma* sp.
Plantagenet Bank, 146-151 m.

Fig. 86.



Fig. 87.



Class: Gastropoda

FAMILY:

Cerithiidae

GENUS:

***Cerithium* sp.**

VISUAL ID:

Small (<5 cm long), spiral shell, slightly arched. Shades of white. Potentially *Cerithium litteratum* (Born, 1778) that has been previously been reported in shallow-water reefs around Bermuda.

OBSERVED DEPTH RANGE:

17–63 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 87. *Cerithium* sp.
Plantagenet Bank, 56 m.

Class: Ascidiacea (Tunicates)

VISUAL ID:

Colonial tunicates, with transparent to pale white/purple bodies. Positive identification requires microscopic examination of internal body parts.

OBSERVED DEPTH RANGE:

12–56 m.

DISTRIBUTION:

Plantagenet Bank, Tiger.

Fig. 88. Tunicate.

Tiger, 12–18 m, *Clavelina* sp. attached on a rock.

Fig. 88.



Fig. 89.



Unknown encrusters

COMMON NAME:

Dark green encruster

VISUAL ID:

Small, flat encrustations of dark green colour. They could be sponges, although dark green is not common for this group, or possibly algae, although typically red algae are known to occur at such great depths.

OBSERVED DEPTH RANGE:

136–303 m.

DISTRIBUTION:

North Northeast, Plantagenet Bank, Spittal, Tiger.

Fig. 89. Dark green encrusters.

North Northeast, 145–146 m.

Unknown encrusters

COMMON NAME:

Turquoise encrusting plate

VISUAL ID:

Flat, plate-like encrustations; outer rim maybe less firmly attached. Turquoise to bright blue-green.

OBSERVED DEPTH RANGE:

91–93 m.

DISTRIBUTION:

North Northeast.

Fig. 90. Turquoise encrusting plate.
North Northeast, 92–93 m.

Fig. 90.



Others

ORDER: Antipatharia (Black corals)
FAMILY: Leiopathidae
GENUS: *Leiopathes* sp.
VISUAL ID: Loosely branched, bushy or planar. Branches appear crooked with irregular or uniserial branchlet arrangement. Colour orange-brown.
OBSERVED DEPTH: 200 m.
DISTRIBUTION: Tiger.

FAMILY: Schizopathidae
GENUS: *Dendrobathypathes* sp.
VISUAL ID: Fan-shaped, densely branched colonies of tree-like appearance. Branches are pinnulate. Colour shades of grey-brown.
OBSERVED DEPTH: 200 m.
DISTRIBUTION: North Northeast.

SUBCLASS: Octocorallia
FAMILY: Clavulariidae
GENUS: *Telesto* sp.
VISUAL ID: Fan-shaped, densely branched colonies of tree-like appearance. Branches are pinnulate. Colour shades of grey-brown.
OBSERVED DEPTH: 90–93 m.
DISTRIBUTION: North Northeast, Spittal, Tiger.

FAMILY: Gorgoniidae
GENUS: *Leptogorgia* sp.
VISUAL ID: Colonies form short (<0.5 m), moderately-branched, whip-like stalks. Colour bright yellow to mustard.
OBSERVED DEPTH: 90–94 m.
DISTRIBUTION: North Northeast, Plantagenet Bank, Spittal.

ORDER: Leptothecata (Hydroids)
COMMON NAME: Hydroid sp. 1
VISUAL ID: Numerous thin, whitish branches extending from a dark brown central stalk; has a feather-like appearance.
OBSERVED DEPTH: 58–93 m
DISTRIBUTION: North Northeast, Spittal, Tiger.

COMMON NAME: Hydroid sp. 2
VISUAL ID: Tiny (~5 cm long), sparsely-branched hydroid with visible polyps; colour shades yellow and brown.
OBSERVED DEPTH: 90–93 m.
DISTRIBUTION: North Northeast, Spittal.

PHYLUM: Porifera (Sponges)
COMMON NAME: Light green encrusting sponge
VISUAL ID: Thick encrustations of light green colour with a few scattered pores.
OBSERVED DEPTH: 60–93 m.
DISTRIBUTION: North Northeast, Tiger.

COMMON NAME: White fluffy sponge
VISUAL ID: White, hemispherical, fleshy sponge.
OBSERVED DEPTH: 148–301 m.
DISTRIBUTION: Spittal.

UNKNOWN: Unknown encrusters
COMMON NAME: Purple encruster
VISUAL ID: Small, thick purple encrustations with seemingly a few scattered pores.
OBSERVED DEPTH: 195–252 m.
DISTRIBUTION: North Northeast, Plantagenet Bank, Tiger.

Deep Reef Benthos of Bermuda builds on the video and imagery data collected during Nekton's Mission – the XL Catlin Deep Ocean Survey - and provides a photographic guide for the visual identification of many of the corals, marine plants and other common invertebrates that inhabit Bermuda's outer deep reefs.

This guide is designed to aid marine biologists, divers and naturalists with the identification of organisms as seen in underwater footage or live in the field.

