

Sponges from the 2010-2014 Paamiut Multispecies Trawl Surveys, Eastern Arctic and Subarctic: Class Demospongiae, Subclass Heteroscleromorpha, Order Poecilosclerida, Families Dendoricellidae and Tedaniidae

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Class Demospongiae, Subclass Heteroscleromorpha, Order Poecilosclerida, Families
Dendoricellidae and Tedaniidae

by

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ABSTRACT

Baker, E., Odenthal, B., Walkusz, W., Siferd, T., Ríos, P., Tompkins, G. and Kenchington, E. 2018. Sponges from the 2010-2014 Paamiut Multispecies Trawl Surveys, Eastern Arctic and Subarctic: Class Demospongiae, Subclass Heteroscleromorpha, Order Poecilosclerida, Families Dendoricellidae and Tedaniidae. Can. Tech. Rep. Fish. Aquat. Sci. 3282: v + 46 p.

Sponges (phylum Porifera) are benthic filter-feeding animals that play an important role in nutrient cycling and habitat provision in the deep sea. Sponges collected between 2010 and 2014 during annual multispecies trawl surveys conducted by Fisheries and Oceans Canada (DFO) in Baffin Bay, Davis Strait and portions of Hudson Strait were taxonomically examined. In total ~2500 specimens were identified, comprising over 100 sponge taxa. Sponges from the order Poecilosclerida comprised nearly half the identified species. This report summarizes sponges from the family Dendoricellidae (class Demospongiae, subclass Heteroscleromorpha, order Poecilosclerida) and family Tedaniidae (class Demospongiae, subclass Heteroscleromorpha, order Poecilosclerida). A total of six species are described, from genera *Dendoricella* (Dendoricellidae) and *Tedania* (Tedaniidae). These species are: *Dendoricella flabelliformis*, *Dendoricella* cf. *flabelliformis*, *Dendoricella* aff. *flabelliformis*, *Dendoricella* sp. 1, *Tedania* (*Tedania*) *suctoria*, and *Tedania* sp. 1. Descriptions include morphological and spicule descriptions, spicule dimensions, and taxonomic discussion.

RÉSUMÉ

Baker, E., Odenthal, B., Walkusz, W., Siferd, T., Rios, P., Tompkins, G. et Kenchington, E. 2018. Éponges provenant des relevés plurispécifiques au chalut effectués par le navire scientifique *Paamiut* entre 2010 et 2014 dans l'est de l'Arctique et la région subarctique : classe Demospongiae, sous-classe Heteroscleromorpha, ordre Poecilosclerida, familles Dendoricellidae et Tedaniidae. Rapp. tech. can. sci. halieut. aquat. 3282: v + 46 p.

Les éponges (phylum Porifera) sont des animaux filtreurs benthiques qui jouent un rôle important dans le cycle des éléments nutritifs et la production d'habitats dans les profondeurs de la mer. Les éponges recueillies au cours des relevés plurispécifiques annuels au chalut entre 2010 et 2014 effectués par Pêches et Océans Canada (MPO) dans la baie de Baffin, le détroit de Davis et certaines parties du détroit d'Hudson ont été examinées sur le plan taxonomique. Au total, 2 500 spécimens ont été identifiés, et ceux-ci représentaient plus de 100 taxons d'éponges. Presque la moitié des espèces recensées étaient de l'ordre Poecilosclerida. Le présent rapport fait état des éponges appartenant à la famille Dendoricellidae (classe Demospongiae, sous-classe Heteroscleromorpha, ordre Poecilosclerida) et à la famille Tedaniidae (classe Demospongiae, sous-classe Heteroscleromorpha, ordre Poecilosclerida). En tout, six espèces des genres *Dendoricella* (Dendoricellidae) et *Tedania* (Tedaniidae) sont décrites. Il s'agit des suivantes : *Dendoricella flabelliformis*, *Dendoricella* cf. *flabelliformis*, *Dendoricella* aff. *flabelliformis*, *Dendoricella* sp. 1, *Tedania* (*Tedania*) *suctoria* et *Tedania* sp. 1. Les descriptions portent sur les éléments morphologiques et comprennent des détails descriptifs et dimensionnels sur les spicules ainsi que des observations sur les aspects taxinomiques.

INTRODUCTION

Two previous reports presented the morphological and spicule descriptions of poecilosclerid sponge species from the eastern Arctic, along with their DNA barcodes in certain instances. Tompkins et al. (2017) documents sixteen species from genera *Forcepia* and *Lissodendoryx* (class Demospongiae, subclass Heteroscleromorpha, order Poecilosclerida, family Coelosphaeridae) with applicable barcodes, while Baker et al. (2018) details six species from genus *Crella* (class Demospongiae, subclass Heteroscleromorpha, order Poecilosclerida, family Crellidae) and genera *Melonanchora* and *Myxilla* (class Demospongiae, subclass Heteroscleromorpha, order Poecilosclerida, family Myxillidae). Between 2010 and 2014, 479 trawl sets were conducted in the eastern Arctic, and sponges from the order Poecilosclerida comprised nearly half of the ~100 species identified from them (Figure 1). In this report, we provide a similar description of species from two more families within Poecilosclerida: four species from the family Dendoricellidae, and two from the family Tedaniidae. They are, as follows: *Dendoricella flabelliformis*, *Dendoricella* cf. *flabelliformis*, *Dendoricella* aff. *flabelliformis*, *Dendoricella* sp. 1, *Tedania (Tedania) suctoria*, and *Tedania* sp. 1. As in the previous reports, our intent is to provide a resource to facilitate accurate, consistent and efficient identification of eastern Canadian Arctic sponges for the purpose of monitoring and mapping species distributions. DNA barcodes were not attempted for these taxa in this report, but sample material has been kept from which barcodes could be obtained in the future.

Taxonomic Background on Families Dendoricellidae and Tedaniidae

The order Poecilosclerida is the largest order of sponges with over 2209 described species (World Porifera Database, accessed 17th October, 2014 by Morrow and Cárdenas 2015) from 20 families: Acarnidae, Chondropsidae, Cladorhizidae, Crambeidae, Crellidae, Coelosphaeridae, Dendoricellidae, Desmacididae, Esperipsidae, Guitarridae, Hymedesmiidae, Iotrochotidae, Isodictyidae, Latrunculiidae, Microcionidae, Mycalidae, Myxillidae, Phellodermidae, Podospongiidae, and Tedaniidae (Morrow and Cárdenas 2015). Spicule composition may include chelae, sigmas and sigmancistra derivatives, and sometimes toxas, raphides, microoxeas, dicorhabds or spinorhabds within the microscleres. Skeletons of poecilosclerids are also known to show differentiation between the outer ectosome and inner choanosome.

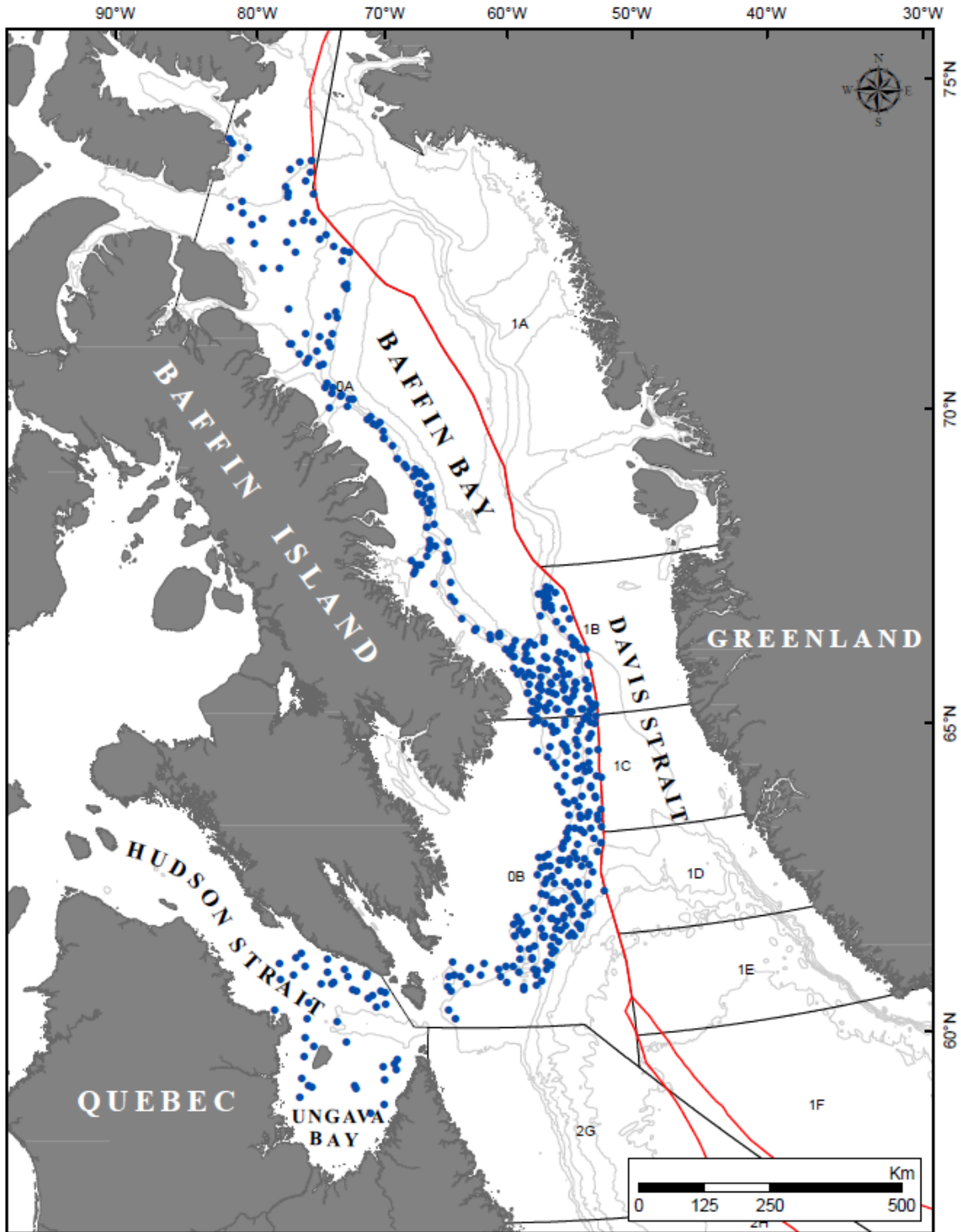


Figure 1. Location of *Paamiut* 2010-2014 trawl sets (N=479) with sponge catch, spanning Baffin Bay, Davis Strait, Ungava Bay and Hudson Strait. Northwest Atlantic Fisheries Organization (NAFO) Divisions are indicated in black. The exclusive economic zones of Canada and Greenland are indicated in red. Depth contours at 500m intervals (500 to 3000 m) are in light gray. Note that the species listed in this report were found in a subset of these locations.

Family Dendoricellidae (Hentschel, 1923)

The family Dendoricellidae consists of massive sponges that can be arborescent, flabellate, or fistulose in form, and they are typically found in colder and deeper waters (Hooper and Van Soest 2002). The family, as conceived by Hentschel (1923), originally contained a different set of genera but now refers to species that were once part of Desmacididae. The current dendoricellids were separated due to their plumose skeleton (by contrast, sponges belonging to Desmacididae have reticulate skeletons) and their distinct spicule complement: Their megascleres consist of oxeas and/or oxea-like tornotes, and their microscleres of arcuate isochelae and occasionally sigmas. Differentiation between the ectosome and choanosome exists in some fistulose forms, with an ectosomal crust of tangentially-arranged oxeas. The spicule complement for Dendoricellidae sponges is as follows: 1) megascleres consist of oxeas that fall into one or two size classes; 2) microscleres, when present, include arcuate isochelae scattered within the skeleton, and occasionally sigmas. The current classification for Dendoricellidae is: Phylum Porifera > Class Demospongiae > Subclass Heteroscleromorpha > Order Poecilosclerida > Family Dendoricellidae.

Six genera originally belonged to Dendoricellidae, three of which are currently considered valid. These are: *Dendoricella*, *Fibulia*, and *Pyloclerma* (Hooper and Van Soest 2002). The family contains eighteen valid species, four of which belong to *Dendoricella*, ten to *Fibulia*, and another four to *Pyloclerma* (World Porifera Database, Accessed 10 September 2018). Only specimens from *Dendoricella*, including *Dendoricella flabelliformis*, have been identified within our collections (*Paamiut* 2010-2014). However, we cannot say with certainty that species belonging to other genera within Dendoricellidae are not present in the area surveyed, as the *Paamiut* sponge surveys are on-going and sampling methodology may bias our collections toward the identification of larger and/or more robust taxa. Therefore, a list of the defining characteristics of each genus, as given by Hooper and Van Soest (2002), is provided here.

Dendoricellidae with one size class of oxeas

Fibulia: ectosomal skeleton reticulate, choanosomal skeleton confused or plumose; megascleres include oxeas of one size class, some of which are thinner and more oxeote-like; microscleres include arcuate or unguiferate isochelae, as well as sigmas

Dendoricellidae with two size classes of oxeas

Dendoricella: external morphology flabellate or lobe shaped; megascleres include smaller ectosomal oxeas and larger choanosomal oxeas; microscleres include arcuate isochelae and occasionally sigmas

Pyloclerma: external morphology fistular; megascleres include small and large oxeas; microscleres consist of arcuate isochelae

***Dendoricella* (Lundbeck, 1905)**

Dendoricella is a small genus, consisting of four valid species (World Porifera Database, Accessed 12 September 2018). The sponges belonging to *Dendoricella* were originally placed within genus *Damiria* by Topsent on the basis of their skeletons consisting of diactinal spicules (Lundbeck 1905). Upon examining this genus, Lundbeck (1905) found that the name had been applied too broadly, and erected *Dendoricella* for those *Damiria* sponges in which all skeletal spicules were ‘plainly and really diactinal’ (oxeas or in some instances strongyles). *Dendoricella* sponges are massive in form, and can be flabellate, lobate, or clavate in shape. The spicule complement is therefore a more useful means of identifying a specimen as a *Dendoricella*, as the genus is defined by its possession of two size classes of oxeas and arcuate isochelae. Lundbeck noted in his description that the smaller oxeas are found in standing bundles within the ectosome, while the larger ones are found in bundles within the choanosome, where they form a dendritic-plumose skeleton (Lundbeck 1905; Hooper and Van Soest 2002). The microscleres consist of arcuate isochelae, but sigmas may also be present alongside the isochelae in some species. In this report, four species of *Dendoricella* are examined: *Dendoricella flabelliformis*, *Dendoricella* cf. *flabelliformis*, *Dendoricella* aff. *flabelliformis*, and an unidentified *Dendoricella* species that we have classed as *Dendoricella* sp. 1.

Family Tedaniidae (Ridley and Dendy, 1886)

The family Tedaniidae was described briefly by Ridley and Dendy (1886) as subfamily Tedaniina, and subsequently (Ridley and Dendy 1887) in more detail as subfamily Tedaniinae. Both were part of the now-invalid family Heterorrhaphidae that was characterised by the absence of chelae and included sponges from genera *Desmacella* and *Gellius* (now *Haliclona*). In later years, Tedaniinae was raised to the family level by some authors, while others continued to classify it as a subfamily, but within Myxillidae rather than Heterorrhaphidae. Ultimately, Tedaniidae was defined as a family of sponges in possession of onychaete microscleres (Bergquist and Fromont 1988, in Hooper and Van Soest 2002). Physically, they tend to be slimy and irregular in form, appearing massive, encrusting, or digitate. Their distribution is cosmopolitan, and they prefer sediment-covered habitats. They are placed within Poecilosclerida, even though they lack chelae (considered a primary synapomorphy of the order), due to the presence of tornotes (Hooper and Van Soest 2002). The choanosomal skeleton is plumo-reticulate, formed from monactinal or diactinal spicules, while the ectosome is composed of diactinal spicules that lie perpendicular to, parallel with, or at an angle with the choanosome, forming a crust. The spicule complement is as follows: 1) ectosomal diactinal spicules that are either tylotes, tornotes, or strongyles; 2) choanosomal monactinal or diactinal megascleres (styles, tornotes or tylotes), either smooth or acanthose; 3) microscleres consist of thin, raphide-like structures called onychaetes. The following is the updated classification for the Tedaniidae:

Phylum Porifera > Class Demospongiae > Subclass Heteroscleromorpha > Order Poecilosclerida > Family Tedaniidae.

There are eight genera associated with Tedaniidae, but out of these only four are now considered valid. These are: *Hemitedania*, *Strongylamma*, *Tedania*, and *Trachytodania*. Of these genera, *Tedania* is the most speciose, with approximately eighty species (World Porifera Database accessed 21 August 2018). Sixty of these belong to the subgenus *Tedania*, and the remaining twenty to the subgenus *Tedaniopsis*.

The Tedaniidae species identified in our collections (*Paamiut* 2010-2014) belong to genus *Tedania*. However, sponge surveys in the area of study are on-going, and it is possible that other genera from Tedaniidae will be found as we continue to find new specimens and refine our identifications. We therefore provide a brief list of the characteristics of each genus, as detailed in Systema Porifera.

Tedaniidae displaying differentiation between the ectosomal and choanosomal megascleres

Tedania: megascleres include tylotes or tornotes, styles that can grade to anisostrongyles and/or strongylote styles, onychaetes are present; the tylotes or tornotes are found in the ectosome and the styles in the choanosome, these can be smooth or slightly spined at the endpoints

Trachytodania: formerly a subgenus of *Tedania*; megascleres include smooth ectosomal tornotes with mucronate or oxete ends, choanosomal styles that are smooth or slightly spined, and numerous onychaetes

Tedaniidae lacking differentiation between the ectosomal and choanosomal megascleres

Hemitedania: megascleres consist of oxeas, and the microscleres of onychaetes (sometimes belonging to multiple size classes); the ectosomal skeleton is reticulate and the choanosomal skeleton is plumoreticulate, but no spicule differentiation exists between the two; choanosome can contain sand particles as structural elements

Strongylamma: megascleres are smooth strongyles, and the microscleres consist of one or two size classes of onychaetes; skeleton plumose and occasionally contains sand particles as structural elements

***Tedania* (Gray, 1867)**

Originally described by Gray (1867), the genus *Tedania* is the largest genus within Tedaniidae, consisting of sponges that are massive and/or lobate in structure, and with a cosmopolitan distribution (Hooper and Van Soest 2002). Gray (1867) noted that there were three types of spicules present within the genus: ‘clavate, needle-shaped’, ‘fusiform, very slender, elongate, sometimes flexuous’, and ‘cylindrical, with rather thicker, blunt ends’. These descriptions correspond to tylotes/tornotes, onychaetes, and styles that can grade into strongyles, respectively. The styles/strongyles and tylotes/tornotes may be smooth or microspined toward the bases. The chief characteristic separating *Tedania* from the other genera of Tedaniidae is the differentiation of their ectosomal and choanosomal megascleres. In *Tedania*, the styles are found in the choanosome, while tylotes or tornotes are located on the surface where they form tangential or paratangential tracts (Hooper and Van Soest 2002). Though we do not present thick sections of the sponges in this report, it should be noted that the choanosomal skeleton can be reticulate, plumose, plumoreticulate, or dendritic (Hooper and Van Soest 2002). The genus *Tedania* consists of two subgenera: *Tedania* and *Tedaniopsis*. The former possesses microspined tylotes in their ectosome, while the latter has ectosomal tornotes or smooth tylotes instead. In this report, two species from genus *Tedania* are examined: *Tedania (Tedania) suctoria*, and an unidentified *Tedania* specimen classified here as *Tedania* sp. 1.

Using this Report

For each of the six species included in this report we provide morphological and spicule descriptions and dimensions, macro photos and spicule figures, and taxonomic discussion. A taxonomic key based on spicule characteristics is provided to allow end users of this report to more efficiently key out sponges for identification. The key should be used with caution, as our spicule characteristics are chosen to distinguish amongst only the 6 species in this report and may not be applicable when considering a broader group of species. The full descriptions should be consulted and spicule measurements or morphological characteristics compared prior to confirming any identification. We note that sponge taxonomy, including taxonomy of the Dendoricellidae and Tedaniidae, is subject to change and that naming schemes for the sponges in this report may differ in the future from those detailed here. We recommend consulting the World Porifera Database at the time of identification to determine whether the taxa names included here are still accepted or have been replaced by alternate names.

METHODOLOGY

Sponge Collection

Sponges described in this report series were collected during five annual multispecies surveys (2010-2014) with the Greenland Institute of Natural Resources (GINR) research vessel *Paamiut*. The missions examined were coded as PA2010-9, PA2011-7, PA2012-7, PA2013-8 and PA2014-7 using a vessel code (PA), year (XXXX) and cruise number (X) syntax. These surveys were conducted to provide fisheries-independent data on the status of Greenland Halibut for stock assessments in NAFO Subdivisions 0A and 0B (Baffin Bay/Davis Strait) and with depth coverage 200-1500 m. In 2010 and 2012, a small area of the NAFO 0A referred to as the Shrimp Fishing Area 1 (SFA1) was surveyed in order to assess the stock of Northern Shrimp. Also, in 2011 and 2013 samples were collected during the DFO Central and Arctic survey of Northern and Striped Shrimp in the Shrimp Fishing Area 3 (SFA3) (Hudson Strait/Ungava Bay) with depth coverage of 100-1000 m. The Greenland Halibut survey was performed with an Alfredo trawl towed at 3 knots for 30 minutes at each location. The Shrimp survey was performed with the Cosmos 2000 shrimp trawl towed at 2.6 knots for 15 minutes. A buffered random sampling approach designed by Kingsley et al. (2004) was employed and the areas were divided into the depth strata, i.e. 100-200 m, 200-300 m, 300-400 m, 400-500 m, 500-750 m and > 750 m.

Documentation of Sponge Catches at Sea

For each trawl catch, sponges were separated from other taxa at sea and then further separated by morphology. Each sponge morphotype was photographed with a label containing mission and set number and a tentative sponge name, then weighed and recorded in a database along with geospatial data. If sponge catches were very large, the weight of a subsample was extrapolated to the whole catch. A sample of each sponge was placed into a plastic bag with the original label. These samples were frozen at sea and shipped to the Bedford Institute of Oceanography, Dartmouth, Nova Scotia, for further identification to species level.

Sponge Identification by Spicule Analysis

Sponge species were identified by analysis of gross morphology and spicule arrangement, and microscopic analysis of the sponge spicules. Taxonomic resources consulted include Ackers et al. (2007), Boury-Esnault and Rützler (1997), Koltun (1959 and 1966), Van Soest (Marine Species Identification Portal, Sponges of the NE Atlantic <http://species->

[identification.org/species.php?species_group=sponges&menuentry=inleiding](http://www.marinespecies.org/species.php?species_group=sponges&menuentry=inleiding), accessed 9 October 2018), Systema Porifera (Hooper and Van Soest 2002), and World Porifera Database (<http://www.marinespecies.org/porifera>). Full details of procedures used for spicule preparations, terminology and identification are provided in Tompkins et al. (2017).

Descriptions

The remainder of this report is comprised of descriptions for 6 species collected in the Paamiut surveys: 4 from the family Dendoricellidae (genus *Dendoricella*), and the remaining 2 from the family Tedaniidae (genus *Tedania*). Our descriptions are based primarily on spicule characteristics.

Each of the sponge descriptions in this report includes the following:

- ITIS and WORMS reference numbers when available
- Specimen macro photo
- Morphological description
- Habitat information including depth and geographic area
- Map of *Paamiut* 2010-2014 collection locations
- Descriptions of spicule morphology and sizes
- Spicule figure with light micrographs of each spicule type
- Discussion of taxonomic literature
- Distinguishing characteristics
- Table with spicule measurements

RESULTS

Species from the Family Dendoricellidae

Four species from family Dendoricellidae were collected, from genus *Dendoricella*: *Dendoricella flabelliformis* (with five associated specimens), *Dendoricella* cf. *flabelliformis* (one specimen), *Dendoricella* aff. *flabelliformis* (one specimen), and *Dendoricella* sp. 1 (six specimens). All four of our Dendoricellidae species possess two size classes of diactinal megascleres, the largest of which are found in the choansomal spicule tracts, while the smaller ones are found toward the ectosome. This renders them part of genus *Dendoricella*, as does their fan-like shape (Hooper and Van Soest 2002) which was discernible on the larger specimens.

Dendoricella currently consists of four species: *Dendoricella abyssi*, *Dendoricella flabelliformis*, *Dendoricella obesichela*, and *Dendoricella rhopalum* (World Porifera Database, accessed 11 October, 2018). All four of our species possess the bent arcuate isochelae with the long/overlapping alae associated with *D. flabelliformis*, and their spicule measurements do not conform with any of the other species. While it is possible that all of our species belong to *D. flabelliformis*, it is also quite possible that more species exist; hence the designations *cf.* and *aff.* are employed for two specimens that do not completely conform to descriptions of *D. flabelliformis*. We hope that future collections will provide more *Dendoricella* specimens to bolster or refute these categorisations.

Species from the Family Tedaniidae

A total of two species from Tedaniidae were collected, both from genus *Tedania*: *Tedania (Tedania) suctoria* (six specimens), and another species referred to here as *Tedania* sp. 1 (one specimen). Sponges belonging to family Tedaniidae have a spicule complement composed of monactinal (styles) and/or diactinal spicules (strongyles, oxeas), as well as thin, hair-like onychaetes unique to the family (Ridley and Dendy 1886; Hooper and Van Soest 2002). Our specimens possessed these spicules. The onychaetes of *Tedania* sp. 1 appeared somewhat tylostyle-like, however this specimen was included with the Tedaniidae on the basis of its other spicules and its skeletal structure.

As most of our specimens were small and/or fragmented, we identified them primarily by their spicule complement. This was particularly true of *T. (T.) suctoria*, a species for which observations of the spicule complement proved sufficient for identifications. A brief examination of the skeletal structures of both *T. (T.) suctoria* and *Tedania* sp. 1, however, indicated that there was differentiation between the choanosomal and ectosomal skeletons, as the tylotes were found in bundles along the outer surface, while the choanosome contained numerous polyspicular fibres composed of styles. This differentiation is indicative of the *Tedania*, and was useful in assigning *Tedania* sp. 1 to that genus.

Spicule Key for Species of the Families Dendoricellidae and Tedaniidae

- (1) Choanosomal megascleres are oxeas.....2 (Dendoricellidae)
 Choanosomal megascleres are styles.....5 (Tedaniidae)
- (2) Large size class of oxeas are $> 800 \mu\text{m}$ *Dendoricella* aff. *flabelliformis*
 Large size class of oxeas are $< 800 \mu\text{m}$ 3
- (3) Two types of isochelae (palmate and arcuate) are present*Dendoricella* sp. 1
 Only arcuate isochelae are present.....4
- (4) Sigmas or sigma-like structures are present.....*Dendoricella* cf. *flabelliformis*
 Sigmas or sigma-like structures are absent.....*Dendoricella flabelliformis*
- (5) Onychaetes possess a tylostyle-like head.....*Tedania* sp. 1
 Onychaetes are acanthoses with a blunt, pointed head.....*Tedania (Tedania) suctoria*

Descriptions of Species of the Family Dendoricellidae

Dendoricella

ITIS TSN 659410 (genus)

Dendoricella flabelliformis (Hansen, 1885)

WORMS AphiaID 133518

Species description

The sponge is massive and somewhat flabellate in form, with a holdfast site present on the reference specimen (Figure 2). The sponge is beige in colour, with a fairly compressible consistency and irregular margins. Small, isolated patches of dermal membrane are present on the reference specimen; these have a velvet-like texture. The remainder of the sponge's surface appears somewhat shaggy, is lined with spicule tracts, and possesses numerous openings that may be ostia or oscula. Five specimens were examined, the largest of them is ~5.75 cm long and ~6.25 cm wide at its widest point.

Habitat information

Baffin Bay, north of Davis Strait, and Hudson Strait at 244-1279 m depth (Figure 3).

Spicules (Table 1, Figure 4)

Megascleres: Oxeas I are 442-600 x 15-29 μm and smooth, some are straight while others display a slight bend toward the middle of the shaft. Oxeas II are smooth and straight, 228-367 x 8-17 μm .

Microscleres: Arcuate isochelae (25-38 x 3-7 μm) with highly bent shafts and opposing alae (teeth) that meet and/or overlap one another.

Distinguishing characteristics

Based on the specimens in our collections, this species appears easily fragmented, and easily detached from its dermal membrane (none of our specimens possess an intact one). Therefore, an examination of its spicule complement is most useful in distinguishing it from other poecilosclerid species. The spicule complement is rather distinctive, as the megascleres consist exclusively of oxeas, and the microscleres of arcuate isochelae. These isochelae are fairly peculiar in shape, as their shafts display a pronounced curve, and the alae at opposite ends of the chelae are quite long, often meeting or overlapping each other (Figure 4C).

Taxonomic remarks

Dendoricella flabelliformis was originally described by Hansen (1885) as *Myxilla flabelliformis*. Hansen's description is brief, but in it he describes a sponge that is leaf-like or fan-shaped and grey in colour. Based on his drawings, the spicules consist of oxeas and arcuate isochelae with opposite alae that meet or nearly meet each other. Later, Lundbeck (1905) provided further detail based on four specimens (two large, two smaller). He describes an erect sponge, leaf-like in adult form, club-shaped as a juvenile, anchored to hard substrate with a stalk. In addition, he notes the presence of a dermal membrane that contains small oxeas and numerous chelae, but surmises that it must be quite thin. Given that Hansen (1885) did not describe a membrane at all, and that Lundbeck (1905) only found isolated patches of it on the specimens he examined, it seems likely that the membrane is easily lost during collection efforts. The skeleton is composed of polyspicular tracts that originate at the stalk and are connected by spicules placed transversely (Lundbeck 1905). This description fits the skeleton illustrations provided by Hansen (1885), in which single oxeas are placed perpendicularly to polyspicular bundles of oxeas. The spicule complement described by Lundbeck (1905) includes two size classes of oxeas (410-550 x 17-25 μm and 268-350 x 13-18 μm) and strongly-curved arcuate chelae (30-40 x 3.3-4 μm).

Our specimens' external and spicule morphologies conform well with Hansen's and Lundbeck's descriptions. Like Lundbeck (1905), we have found that our specimens lack dermal membranes, save for some small patches, although in our specimens these patches appear more clump-like than sheet-like. The spicule complement of our reference specimen is composed of larger and smaller oxeas, and arcuate isochelae of the distinct appearance noted above. Lundbeck (1905) observed that the choanosomal spicule tracts consist of larger oxeas, while the smaller oxeas are found toward the surface of the specimens and within the dermal membrane. This distinction is true of our specimens as well. The isochelae are found throughout the sponge, and display the characteristic strong bend in the shaft. Lundbeck (1905) noted that in these chelae "the tooth forms such an angle with the shaft, that a straight line drawn from one end of the shaft to the other will pass through or along the teeth". This description applies to the chelae found in our specimens. Given these similarities, and the fact that our spicule measurements overlap fairly well with those of Lundbeck (1905), we have called this species *Dendoricella flabelliformis*.



Figure 2. *Dendoricella flabelliformis* specimen PA2013-8 Set 128 showing opposite sides.

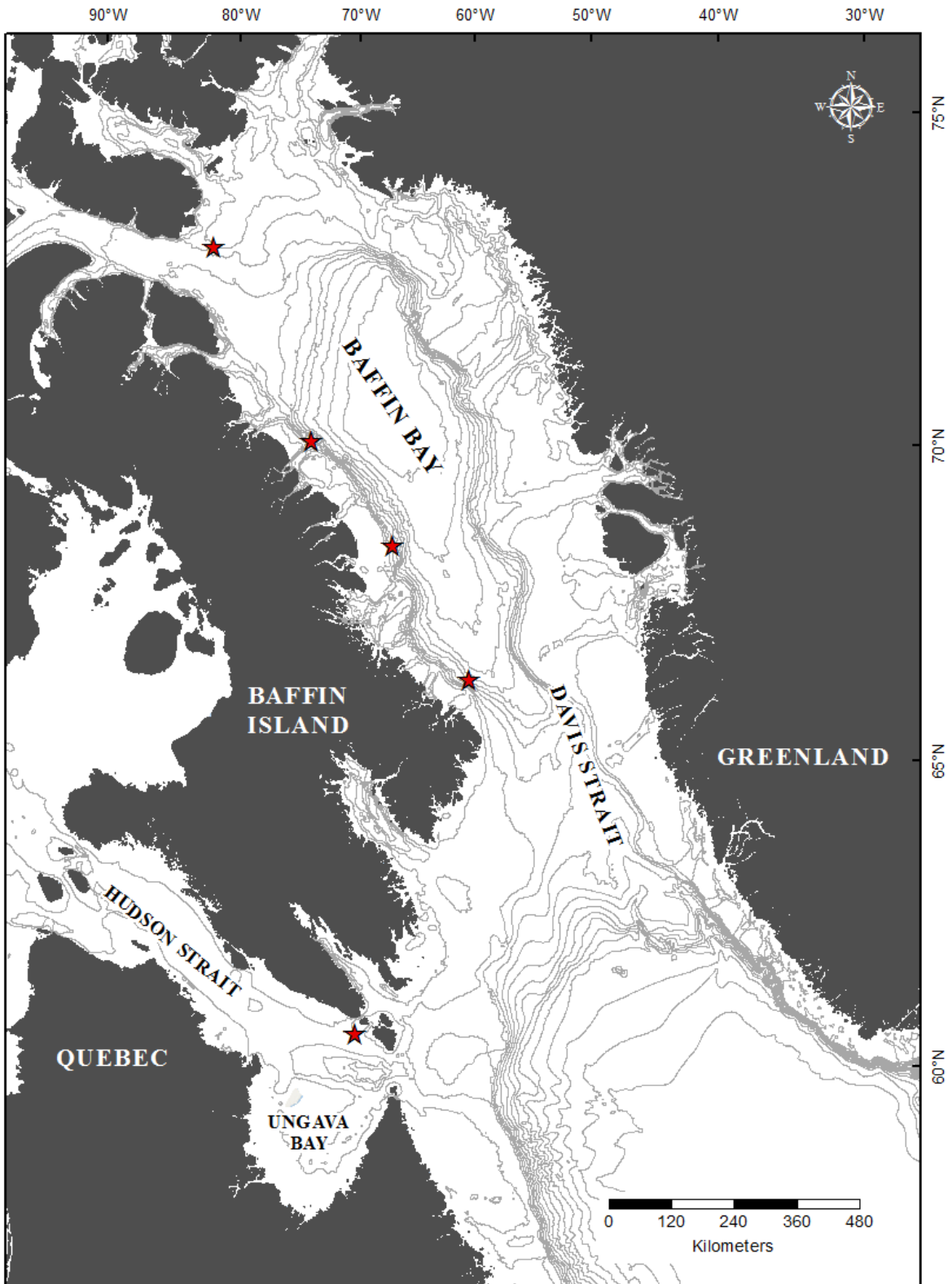


Figure 3. *Dendoricella flabelliformis* collection locations.

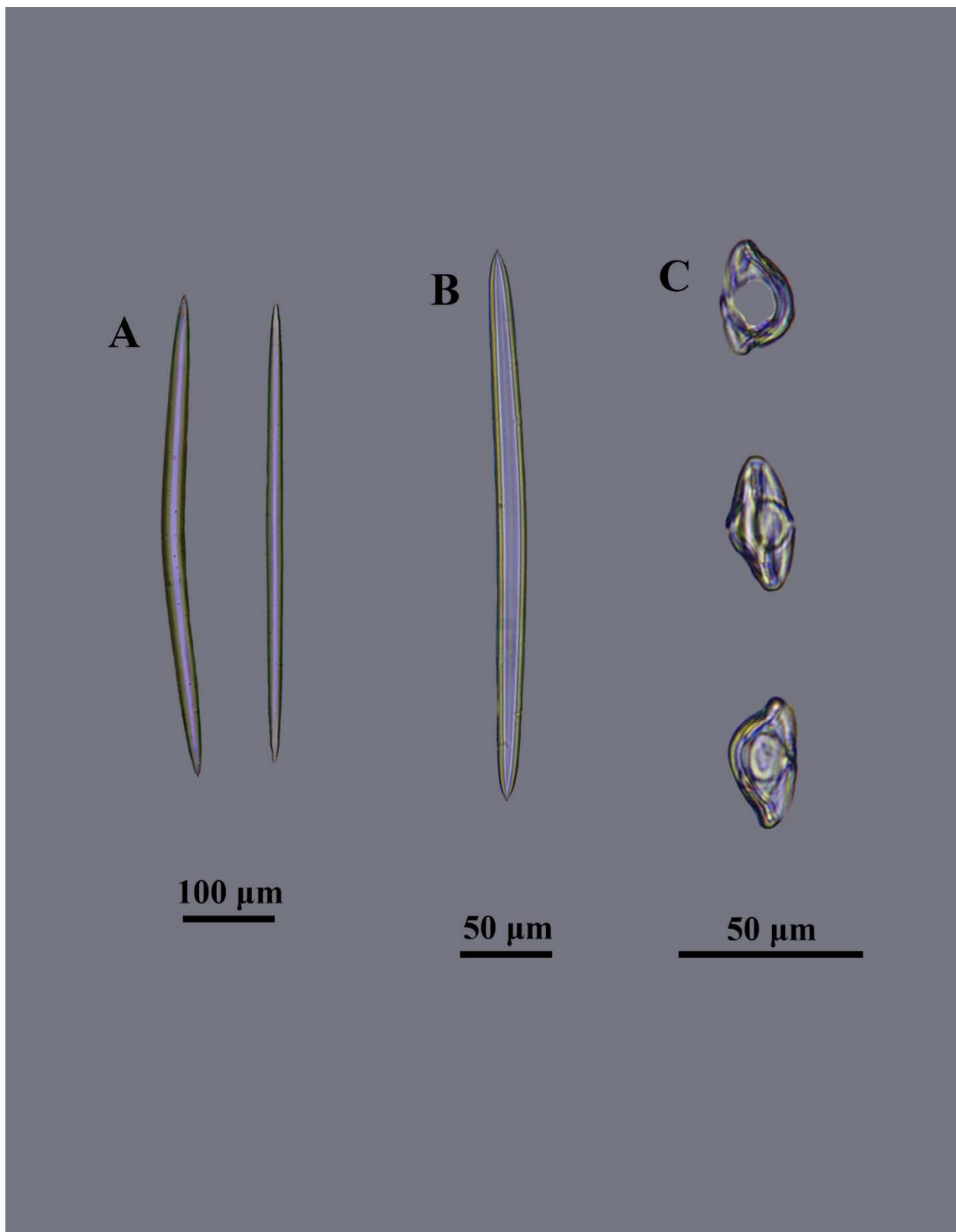


Figure 4. *Dendoricella flabelliformis* spicules from PA2013-8 Set 128. Oxeas I (A), Oxeas II (B), and Isochelae (C) with characteristically bent shafts.

Table 1. Measurements of spicules from specimens of *Dendoricella flabelliformis* all reported as minimum-(average)-maximum for length (top line) x width (bottom line). N indicates the number of spicule measurements in each specimen.

Collection	N	Oxeas I	Oxeas II	Isochelae
PA2013-8 Set 128	30	501.5-(533.3)-568.2 x 16.4-(19.9)-23.6	282.1-(322.0)-367.0 x 8.0-(12.5)-16.9	29.3-(33.1)-35.6 x 3.6-(4.8)-6.0
PA2010-9 Set 68	10	503.8-(563.6)-592.8 x 18.0-(21.2)-24.4	300.0-(319.2)-333.2 x 12.5-(14.1)-17.0	25.9-(31.1)-36.5 x 3.8-(4.7)-5.2
PA2010-9 Set 98	10	503.3-(531.5)-564.8 x 15.6-(18.2)-23.5	231.7-(276.5)-307.3 x 8.6-(11.9)-15.3	32.4-(35.3)-36.9 x 4.2-(5.0)-5.9
PA2012-7 Set 37	10	442.4-(472.9)-504.6 x 17.2-(21.3)-28.1	228.4-(255.8)-284.1 x 12.6-(13.9)-15.4	30.4-(33.7)-37.4 x 3.2-(4.5)-5.5
PA2012-7 Set 96	10	513.0-(558.5)-599.6 x 19.8-(22.1)-25.2	297.5-(324.3)-348.7 x 10.2-(13.5)-15.8	29.1-(33.3)-38.0 x 4.2-(5.4)-6.3

Dendoricella* cf. *flabelliformis* (Hansen, 1885)*Species description**

The sponge fragment is massive and somewhat flabellate in form, with uneven edges (Figure 5). The surface is covered with numerous pores and lined with spicule tracts that run parallel to the holdfast area. Some of the pores have a fine mesh-like covering. The sponge is beige, and has a compressible consistency. One specimen, ~14 cm long, was examined.

Habitat information

Found in Hudson Strait, at 307 m depth (Figure 6).

Spicules (Table 2, Figure 7)

Megascleres: Oxeas are smooth and slightly bent toward the middle of the shaft, with tapering endpoints, 454-568 x 18-29 μm . The tornotes are somewhat oxeote in appearance, 264-324 x 10-21 μm .

Microscleres: Arcuate isochelae with strongly-bent shafts, 25-38 x 4-7 μm . Sigmas are 24-31 x 2-3 μm .

Distinguishing characteristics

This species is best diagnosed by its spicule complement, as its external morphology is not particularly distinctive. The megascleres consist of oxeas, found primarily in the choanosomal spicule tracts, and oxea-like tornotes that tend to occur in bundles at the surface. The microscleres include arcuate isochelae with a pronounced bend in their shafts and elongated alae that can overlap, and sigmas. The presence of sigmas makes this specimen unusual within our collections.

Taxonomic remarks

This species has been placed within *Dendoricella* due to its spicule complement, which includes the diactinal megascleres and arcuate isochelae typical of this genus. The spicule types and measurements conform well with *Dendoricella flabelliformis*, with the exception of the sigmas, which are not present in *D. flabelliformis*. *Dendoricella obesichela* (Lundbeck 1905) does possess sigmas within the size range noted here. However, *D. obesichela* has larger oxeas and tornotes than those of this specimen. Furthermore, the isochelae of this specimen align more closely with those of *D. flabelliformis* in their appearance than they do with *D. obesichela*. This suggests a close affinity with *D. flabelliformis*. Lundbeck (1905) notes in his writings that some of his specimens of *D. flabelliformis* include developmental forms of isochelae that 'are fine and

have rather short recurved ends; at this stage they may to some degree remind of sigmata'. It is therefore possible that the sigmas are in fact developmental forms of isochelae. Their presence near the chelae at the surface of the sponge would corroborate this idea, for they are too widespread within the specimen to be contaminants. However, the sigmas do appear quite distinct from the isochelae, and as no microscleres intermediate between the two forms were found, nor any additional sponges possessing these sigmas, we have chosen to name this specimen *Dendoricella* cf. *flabelliformis*.



Figure 5. *Dendoricella cf. flabelliformis* specimen PA2011-7 Set 69 showing opposite sides.

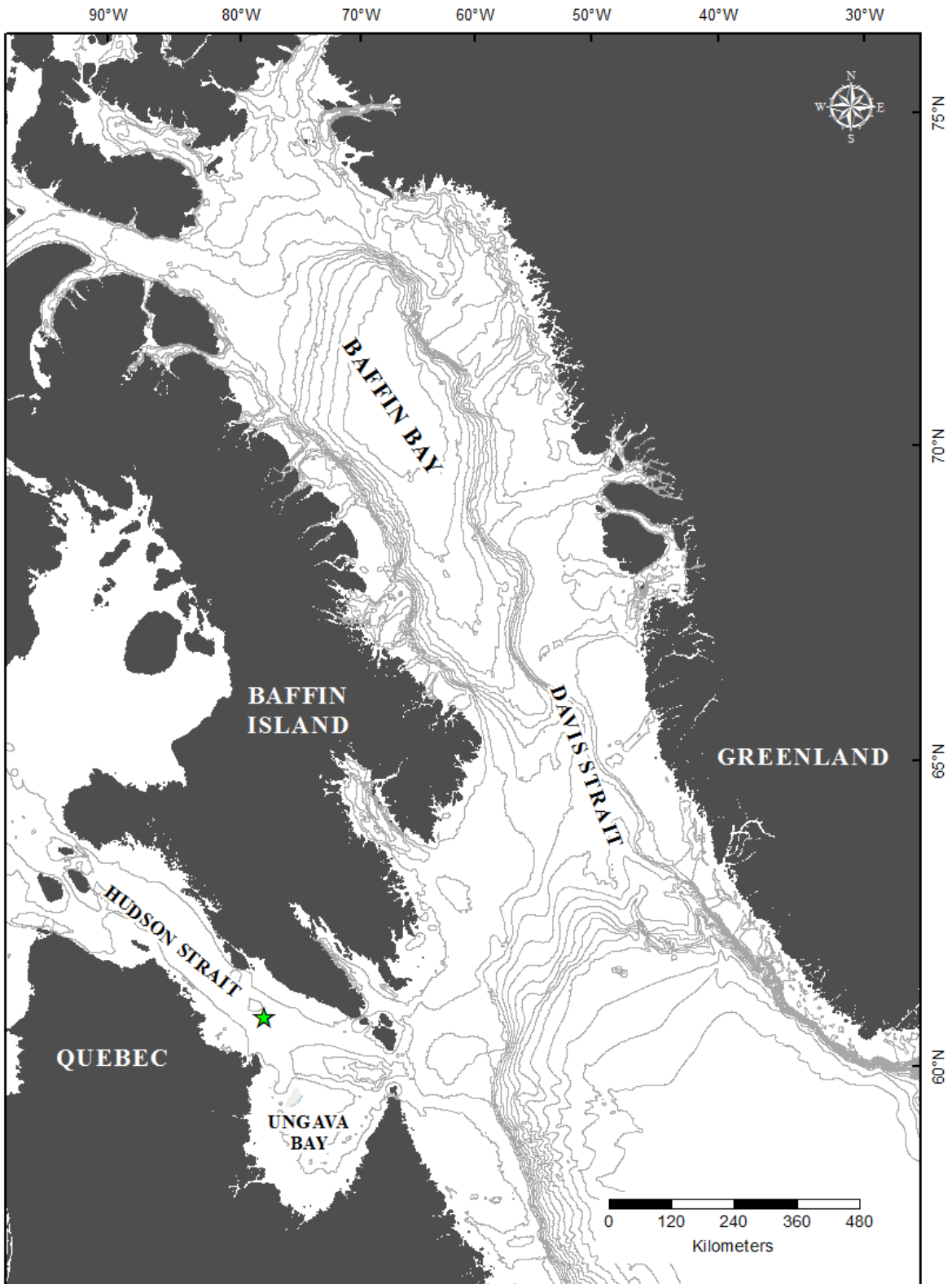


Figure 6. *Dendoricella cf. flabelliformis* collection location.

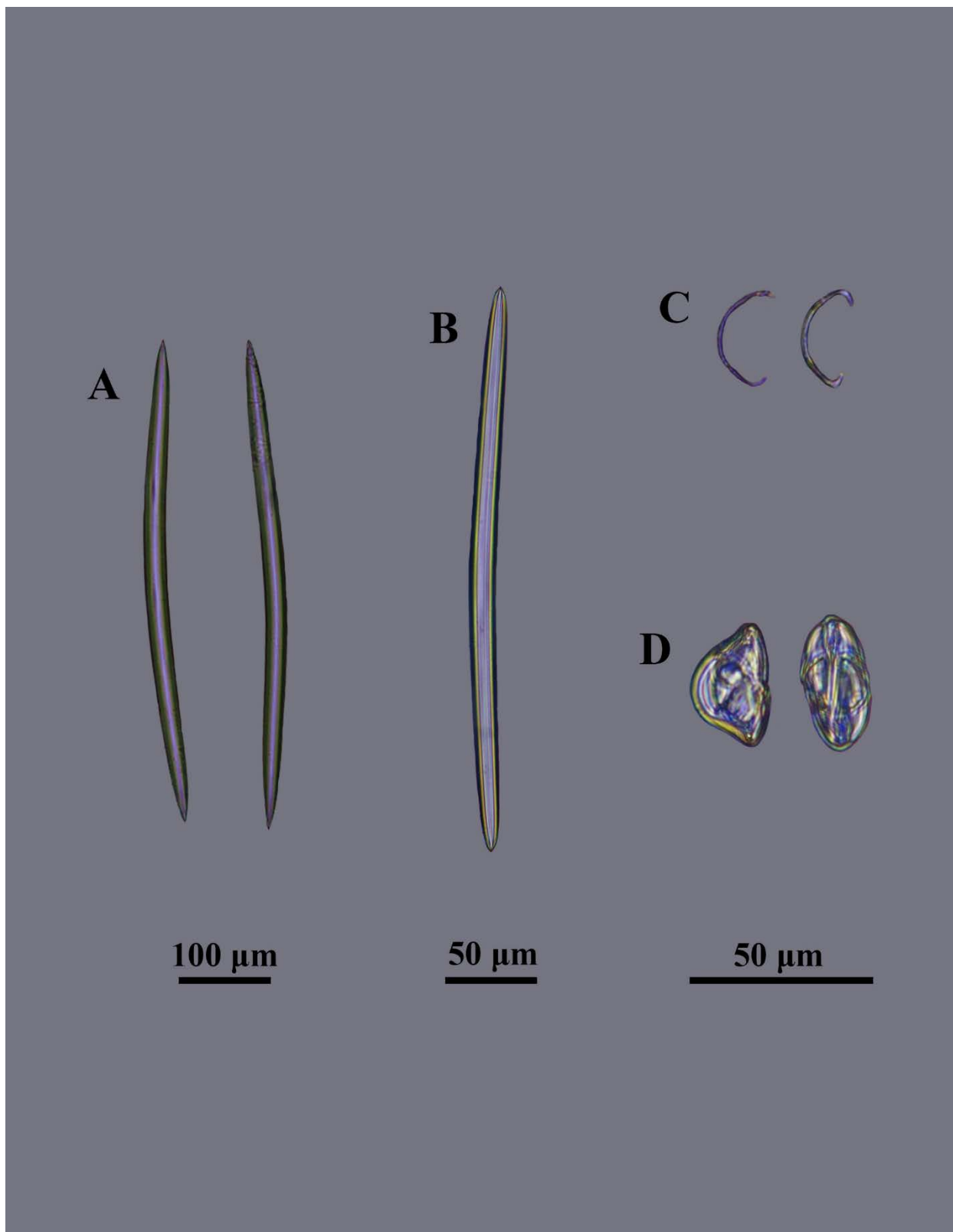


Figure 7. *Dendoricella cf. flabelliformis* spicules from PA2011-7 Set 69. Oxeas (A), Tornotes (B), Sigmas (C), and Isochelae (D). Note that C and D have the same scale.

Table 2. Measurements of spicules from the single specimen of *Dendoricella cf. flabelliformis* all reported as minimum-(average)-maximum for length (top line) x width (bottom line). N indicates the number of spicule measurements in the specimen.

Collection	N	Oxeas	Tornotes	Isochelae	Sigmas
PA2011-7 Set 69	30	454.4-(506.8)-567.3 x 18.3-(22.9)-28.7	264.7-(296.2)-323.1 x 10.2-(13.9)-20.3	25.8-(32.5)-37.7 x 3.9-(5.5)-6.9	24.3-(27.8)-30.6 x 2.0-(2.4)-3.0

Dendoricella* aff. *flabelliformis* (Hansen, 1885)*Species description**

The material examined consists of a small fragment that is somewhat irregular in shape (Figure 8). The sponge is beige in colour, and is fairly compressible. Numerous fine spicule tracts are visible, lending a feathered aspect to the sponge's surface. Faint pores are visible as well. One specimen, ~2.25 cm in length, was examined.

Habitat information

Found in Davis Strait at 963 m depth (Figure 9).

Spicules (Table 3, Figure 10)

Megascleres: Oxeas I are 719-1091 x 22-35 μm , with long, tapering points. Oxeas II are much shorter and have blunt ends, 265-579 x 10-24 μm .

Microscleres: Arcuate isochelae with strongly-bent shafts: 26-37 x 3-7 μm .

Distinguishing characteristics

Given that only a fragment exists within our collections, this species is best diagnosed by its spicule complement. This consists of two size classes of oxeas, one small, the other quite large, and one size class of highly-bent arcuate isochelae. The size of the oxeas, in particular the large oxeas, distinguishes this species from *Dendoricella flabelliformis*, in which these spicules are smaller. There are also differences in the shape of the larger oxeas, as those of *Dendoricella* aff. *flabelliformis* are straighter and have longer more tapering points than those of *D. flabelliformis*.

Taxonomic remarks

This specimen's spicule complement is very similar to that of *Dendoricella flabelliformis*. It includes two size classes of oxeas and a single size class of arcuate isochelae with the distinctive shaft bend and long alae noted by Hansen (1885) and Lundbeck (1905) in their descriptions of *D. flabelliformis*, as well as in our own specimens. The primary difference between the two species is the size of the oxeas. In *D. flabelliformis*, the size range for the large oxeas noted by Lundbeck (1905) is 410-550 x 17-25, and that of the smaller oxeas is 268-350 x 13-18 μm . By contrast, the oxeas in *Dendoricella* aff. *flabelliformis* are 719-1091 x 22-35 μm and 265-579 x 10-24 μm . It is possible that this size difference is the result of variation within *D. flabelliformis* individuals, or that it stems from local environmental conditions (Lundbeck [1905] also noted larger spicule sizes for a specimen of *Myxilla brunnea* found in the Arctic; it is possible that individuals from other species could display a similar characteristic). However, our lack of *D. flabelliformis*

specimens renders it difficult to determine if this specimen merits its own species name due to the discrepancies in oxea measurements and appearance, or whether these differences merely represent one end of a broader continuum of what *D. flabelliformis* may look like. For this reason, we have decided to call this sponge *Dendoricella* aff. *flabelliformis*.

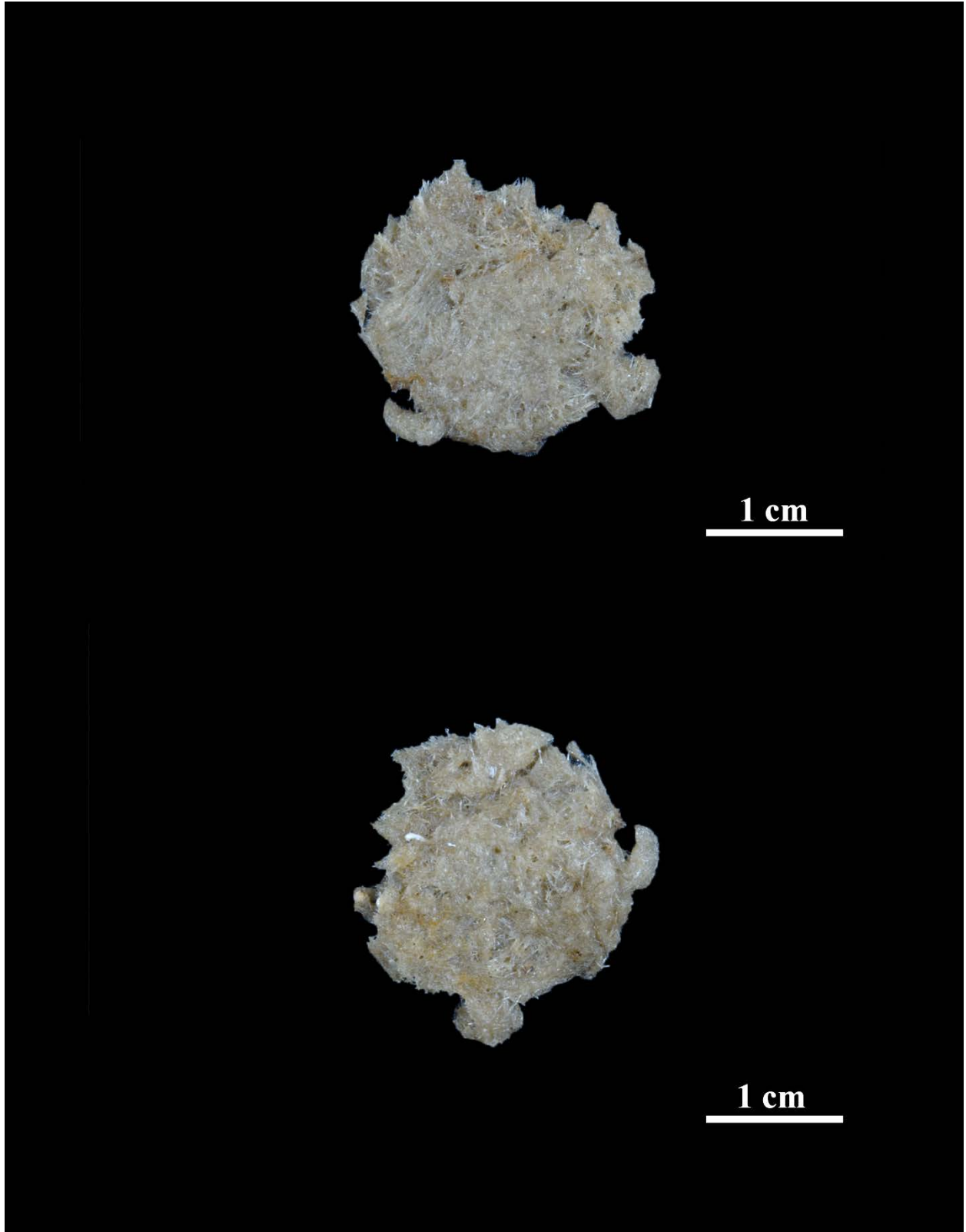


Figure 8. *Dendoricella* aff. *flabelliformis* specimen PA2010-9 Set 146 showing opposite sides.

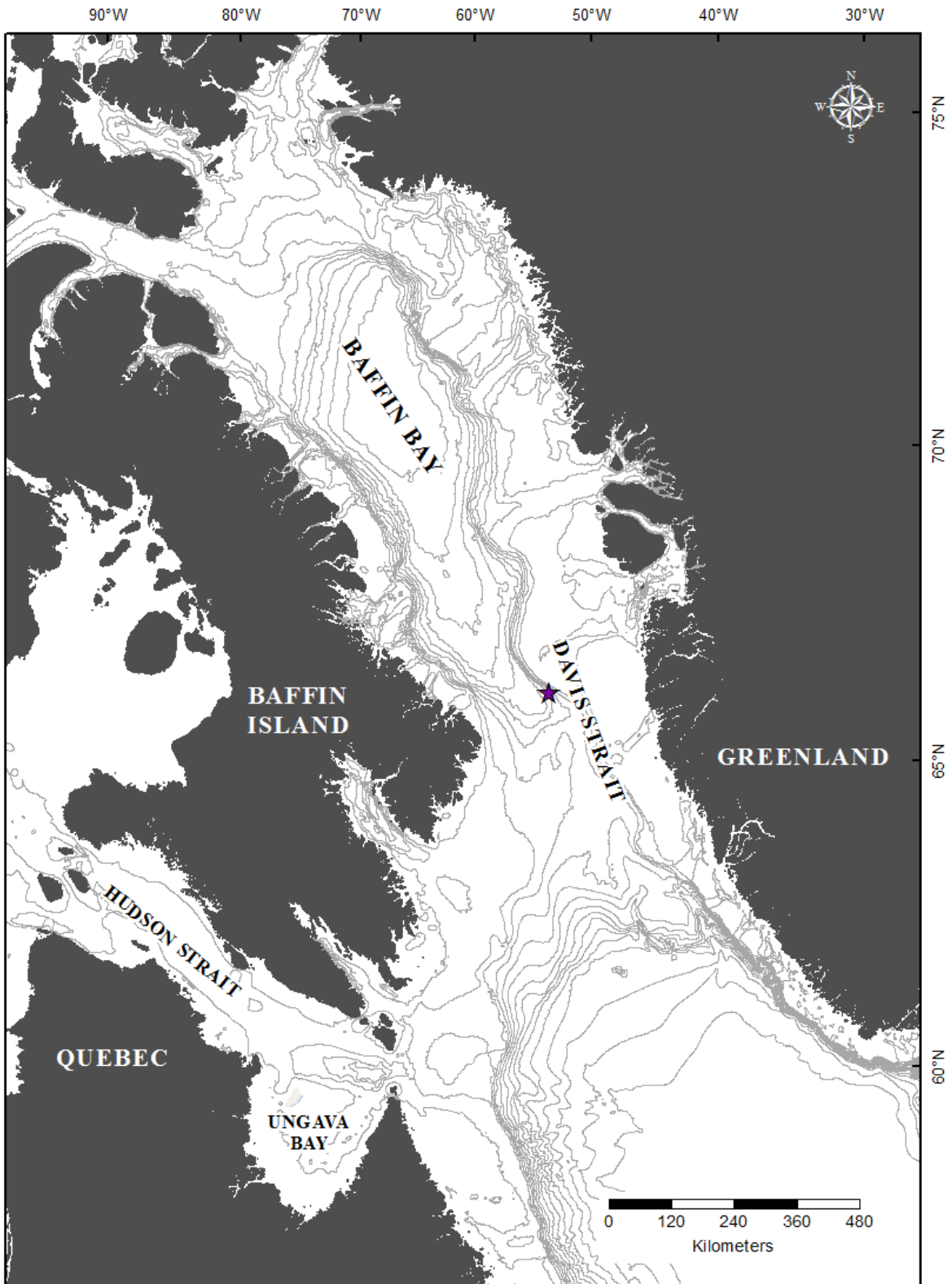


Figure 9. *Dendoricella* aff. *flabelliformis* collection location.

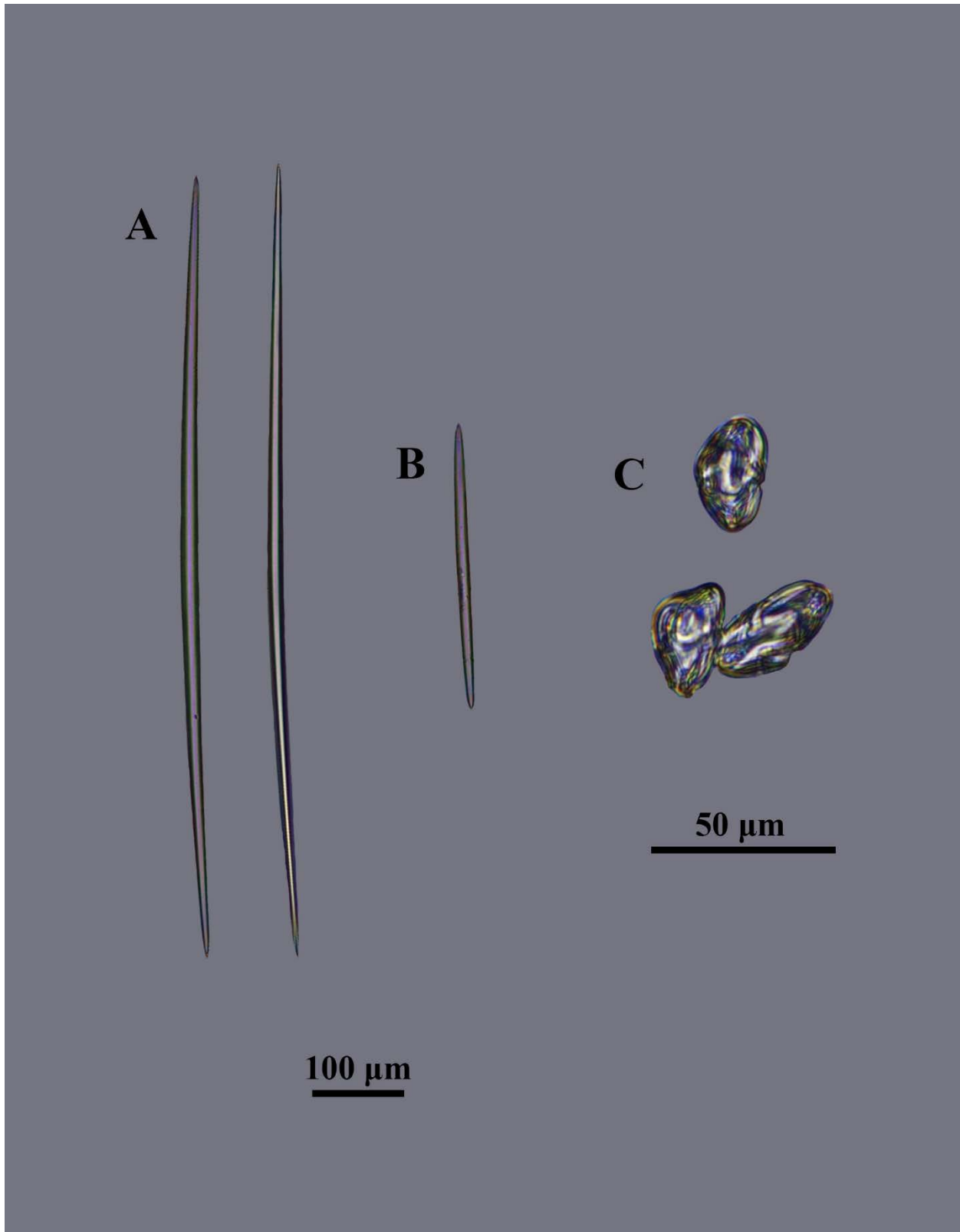


Figure 10. *Dendoricella* aff. *flabelliformis* spicules from PA2010-9 Set 146. Oxeas I (A), Oxeas II (B), and Isochelae (C).

Table 3. Measurements of spicules from the single specimen of *Dendoricella* aff. *flabelliformis* all reported as minimum-(average)-maximum for length (top line) x width (bottom line). N indicates the number of spicule measurements in the specimen.

Collection	N	Oxeas I	Oxeas II	Isochelae
PA2010-9 Set 146	30	719.3-(896.7)-1090.2 x 22.3-(25.8)-34.9	265.9-(384.6)-578.5 x 10.3-(13.4)-23.9 n = 8	26.7-(32.9)-36.2 x 3.3-(5.2)-6.8

***Dendoricella* sp. 1**

Species description

Our reference specimen consists of a ~6.5 cm fragment from a larger sponge (Figure 11). The sponge is light beige in colour, has irregular margins, and has a fairly compressible consistency. It appears to fragment easily. Numerous pores cover the surface, and these vary in size; the smaller ones may be ostia, while the larger ones may be oscula. Six specimens were examined.

Habitat information

Found in Baffin Bay and Davis Strait at 496-1315 m depth (Figure 12).

Spicules (Table 4, Figure 13)

Megascleres: Oxeas are 504-766 x 13-27 μm , some straight, others with a slight curve. Tornotes are 281-490 x 3-23 μm .

Microscleres: Two types of isochelae are present: Isochelae I, 39-53 x 3-8 μm , are not bent and appear palmate. Isochelae II are arcuate and highly bent, 34-56 x 4-12 μm .

Distinguishing characteristics

Due to its easily-fragmented nature, an examination of the spicule complement is the most effective means of identifying this sponge. The megascleres are composed of oxeas and tornotes, while the microscleres consist of two types of isochelae: arcuate isochelae that display the bent shaft and long alae characteristic of *Dendoricella flabelliformis*, and unbent isochelae that appear palmate. Possession of these two types of isochelae renders this specimen different from other species of *Dendoricella*, and unique in our collections.

Taxonomic remarks

These specimens have been placed within genus *Dendoricella* on the basis of their spicule complement, as the megascleres consist of diactinal spicules, and the microscleres of isochelae. However, the presence of palmate isochelae with recurved alae alongside the bent arcuate isochelae distinguishes these specimens from *D. flabelliformis* and the other three species within *Dendoricella*. The palmate chelae occur too frequently within the sponges to be considered contaminating spicules. Lundbeck (1905) did note that not all arcuate isochelae in his specimens were of the highly-bent variety, and Arndt's (1935) entry on *Isodictya flabelliformis* contains spicule drawings of arcuate isochelae with and without overlapping teeth. However, neither Arndt's drawings nor Lundbeck's descriptions make mention of palmate isochelae with recurved alae being present. Therefore, we have named these specimens *Dendoricella* sp. 1.

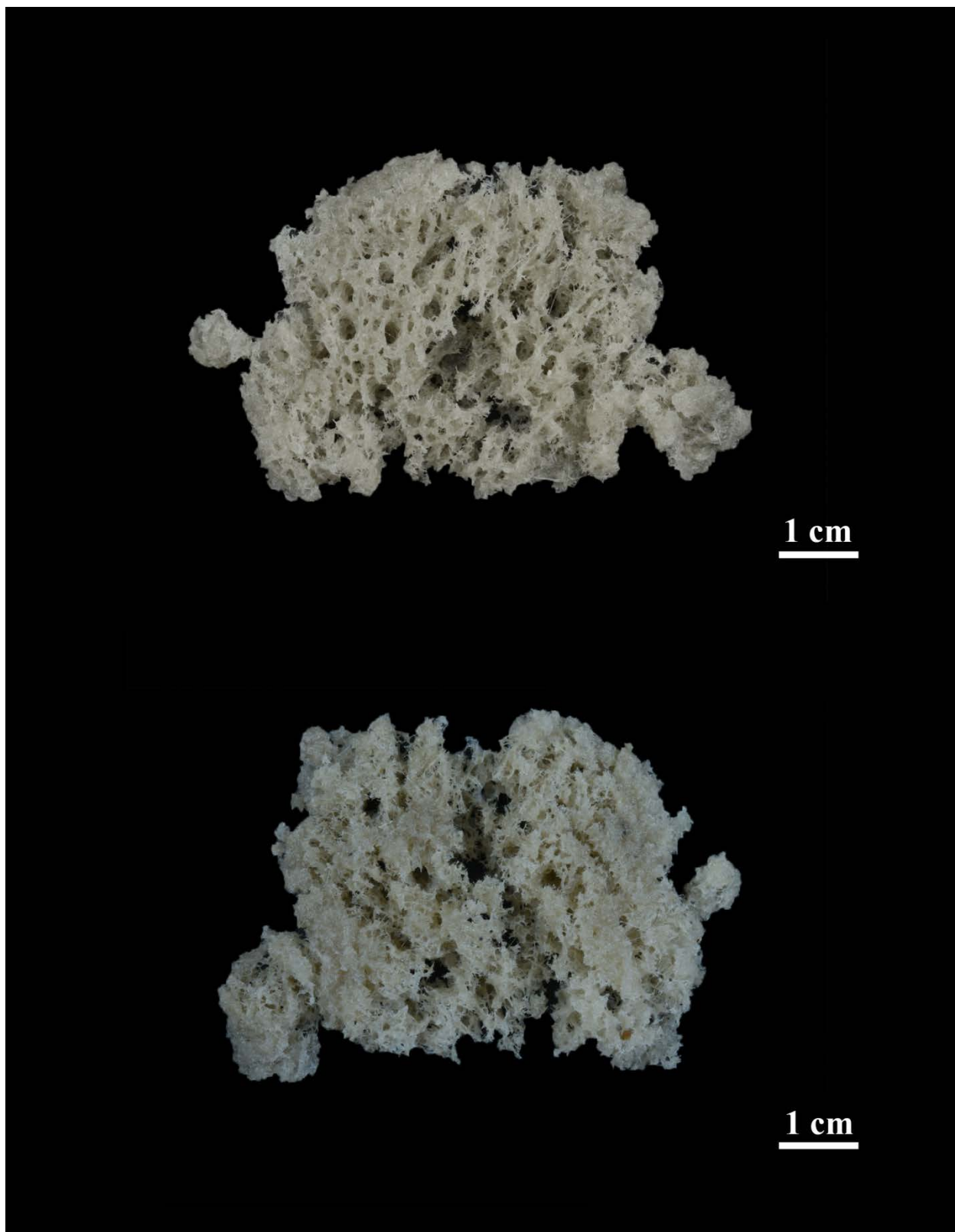


Figure 11. *Dendoricella* sp. 1 specimen PA2011-7 Set 154 showing opposite sides.

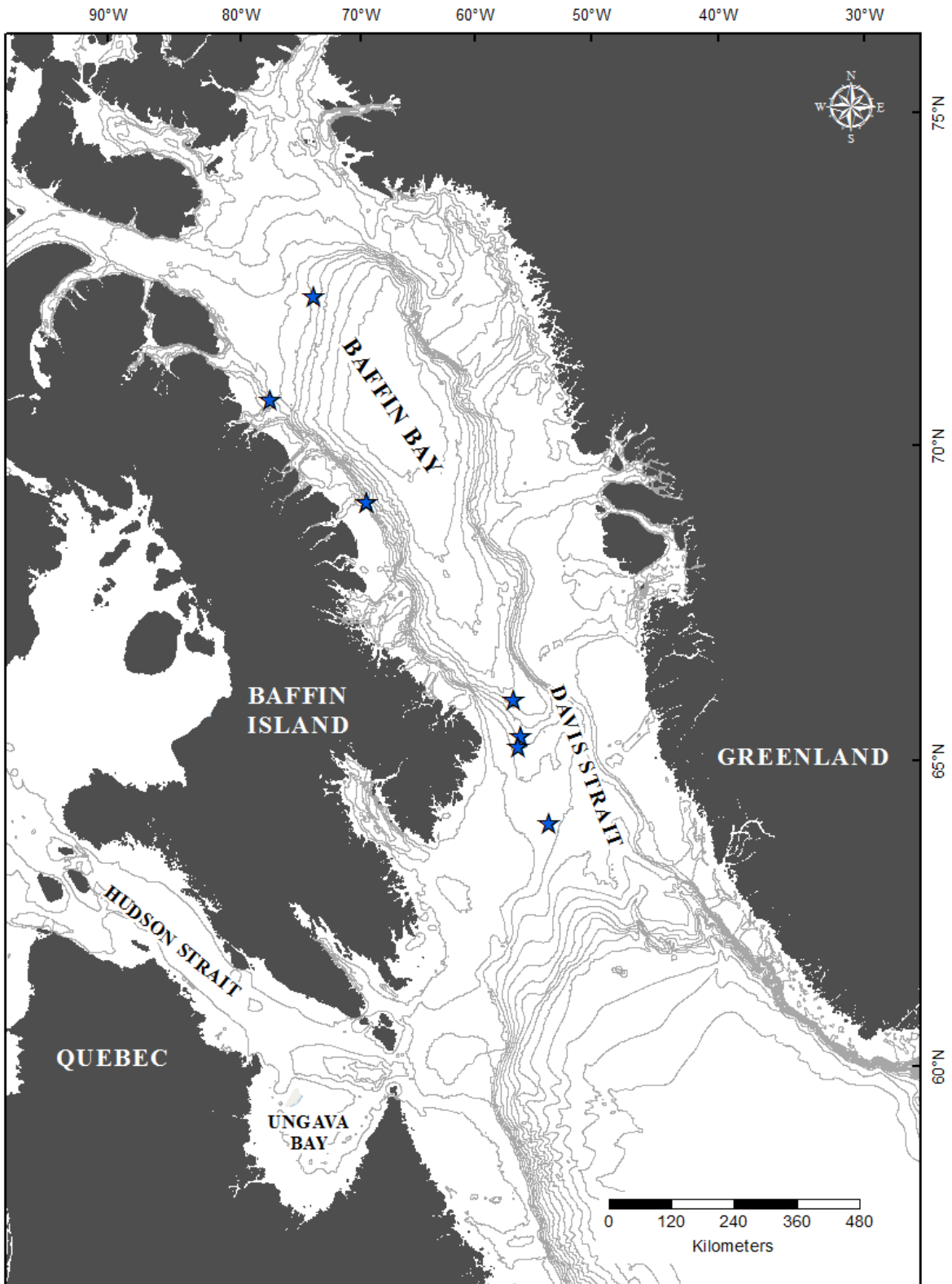


Figure 12. *Dendoricella* sp. 1 collection locations.

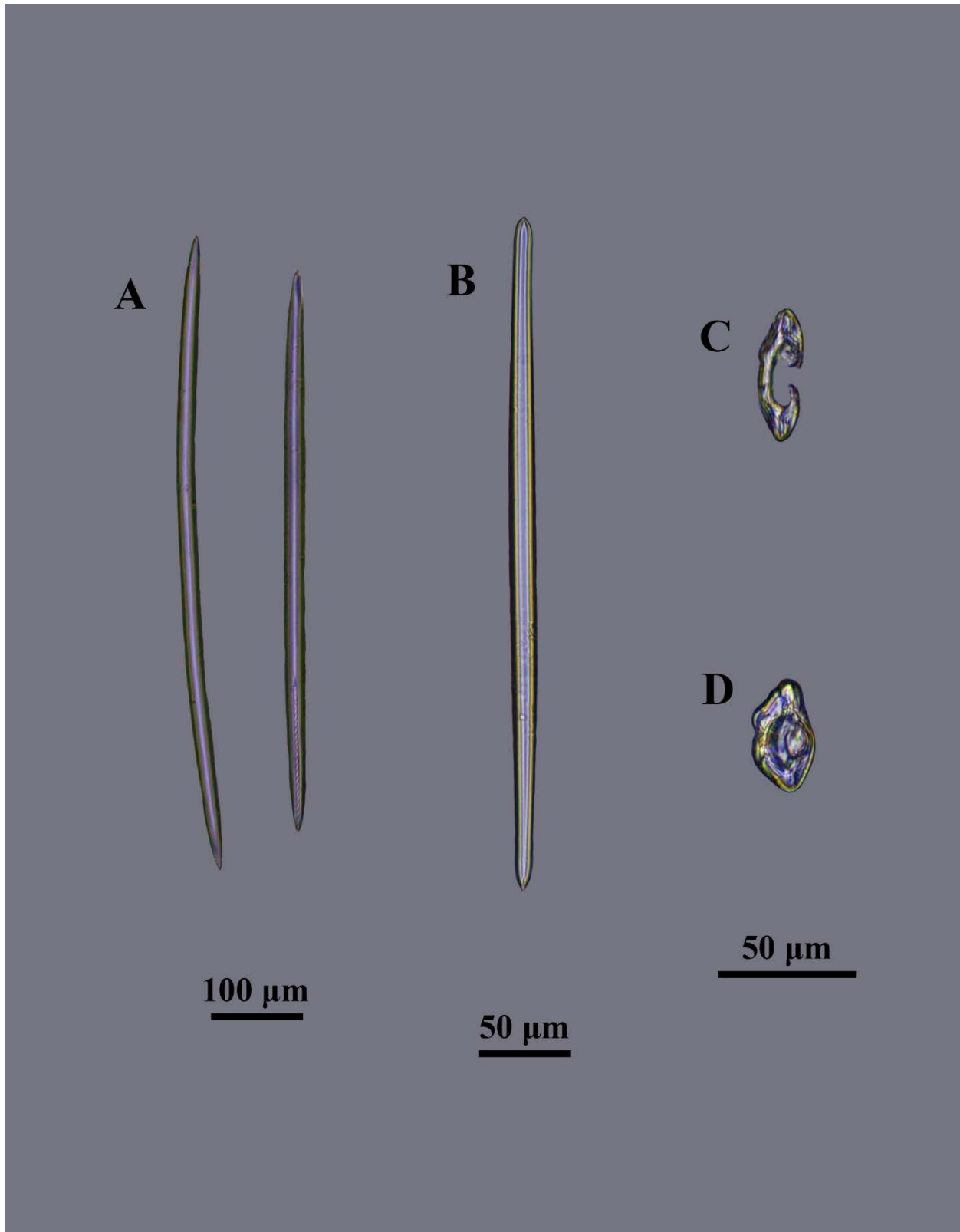


Figure 13. *Dendoricella* sp. 1 spicules from PA2011-7 Set 154. Oxeas (A), Tornotes (B), Isochelae I (C), and Isochelae II (D).

Table 4. Measurements of spicules from specimens of *Dendoricella* sp. 1 all reported as minimum-(average)-maximum for length (top line) x width (bottom line). N indicates the number of spicule measurements in each specimen.

Collection	N	Oxeas	Tornotes	Isochelae I	Isochelae II
PA2011-7 Set 154	30	504.3-(635.3)-725.7 x 13.2-(18.7)-21.9	300.8-(357.0)-420.1 x 9.9-(12.1)-14.5	42.2-(47.7)-52.5 x 3.6-(5.0)-6.7	34.4-(45.0)-50.7 x 4.2-(6.5)-9.0
PA2010-9 Set 61	10	565.7-(661.9)-731.2 x 18.9-(21.9)-25.0	354.4-(396.3)-437.3 x 11.3-(14.0)-15.6	44.2-(46.7)-49.0 x 4.2-(5.4)-7.4	45.8-(49.1)-51.8 x 5.5-(7.3)-10.4
PA2010-9 Set 111	10	569.7-(609.5)-683.4 x 18.6-(20.1)-22.8	357.0-(386.2)-414.6 x 6.2-(11.8)-14.9	39.7-(45.8)-52.8 x 3.6-(5.3)-6.4	45.6-(48.4)-51.3 x 5.1-(7.7)-9.4
PA2010-9 Set 112	10	585.2-(669.0)-765.7 x 20.1-(22.9)-25.9	341.1-(368.7)-404.2 x 5.8-(10.6)-13.8	42.7-(46.8)-50.9 x 4.3-(6.1)-7.6	36.5-(46.2)-48.4 x 5.7-(7.8)-11.3
PA2012-7 Set 3	10	592.0-(661.4)-736.8 x 18.4-(21.3)-26.1	281.5-(388.6)-427.1 x 3.6-(13.8)-18.8	43.5-(48.1)-51.2 x 4.4-(5.0)-6.2	39.0-(46.5)-50.4 x 4.2-(6.3)-9.1
PA2012-7 Set 190	10	570.9-(619.9)-671.5 x 19.6-(22.5)-26.4	350.3-(405.4)-489.7 x 9.4-(14.0)-22.2	44.5-(47.9)-52.5 x 4.6-(5.7)-6.9	35.5-(47.6)-56.0 x 5.4-(6.8)-8.2

Descriptions of Species of the Family Tedaniidae

Tedania

ITIS TSN 48117

Tedania (Tedania) suctoria (Schmidt, 1870)

 WORMS AphiaID 169587

Species description

The sponge is massive and irregular in shape, light tan in colour, and has a fairly compressible consistency (Figure 14). The surface is smooth and slightly reflective due to mucous secretions, and a few closed, conical papillae can be seen. Six specimens were examined, the largest measuring ~3.5 cm in length.

Habitat information

Baffin Bay, Davis Strait and south of Davis Strait, Hudson Strait, and near Ungava Bay at 173-540 m depth (Figure 15).

Spicules (Table 5, Figure 16)

Megascleres: Styles (416-578 x 6-14 µm) are smooth and somewhat curved along the shaft. Tyloles are 328-459 x 3-10 µm, with slight terminal swellings.

Microscleres: Onychaetes are long and thin with one pointed and one feathered endpoint; these range in size from 73-360 x 2-4 µm.

Distinguishing characteristics

There are several distinctive morphological features found on this species, in particular the smooth mucous-coated surface and the presence of papillae. Depending on the specimen, these can be prominent or reduced (Lundbeck 1910); in our specimen they are more reduced. However, neither of the characteristics named above are unique to *Tedania (Tedania) suctoria*, and this species is therefore best distinguished by its spicule complement. This includes smooth styles, tyloles, and hair-like onychaetes, or raphides that range widely in size. They are covered with numerous fine spines, particularly toward one end, which lends them a feather-like appearance. The other end of the onychaete is pointed.

Taxonomic remarks

Tedania (Tedania) suctoria was first described by Schmidt (1870) as *Tedania suctoria*, as the subgenus *Tedania* was formally recognised in 1996 by Desqueyroux-Faúndez and Van Soest (Hooper and Van Soest 2002). Schmidt (1870) described the sponge as ‘an unassuming tuber’, smooth and with small papillae on the surface. He went on to describe the papillae, within which

the ostia and oscula may be found, and his specimen's spicule complement, which consists of fine, needle-like spicules (onchaetes), styles within the choanosome, and tylotes within the ectosome. Schmidt (1870) noted that the styles are the largest of the spicules (460 μm), and that they are arranged in a reticular fashion. Topsent (1904) also examined *T. suctoria*, and observed smooth choanosomal styles, smooth ectosomal tylotes, and onchaetes (he referred to them as microoxeas). Lundbeck's description expanded upon Schmidt's; he notes that the external morphology of the species varies greatly and includes massive and encrusting forms (Lundbeck 1910). Both Lundbeck (1910) and Schmidt (1870) observed a dermal membrane; the former found it easily separable from the choanosome and noted that it seemed to have adhesive properties, which may have stemmed from its mucous layer. The dermal skeleton of *T. suctoria* described by Lundbeck (1910) and later Koltun (1959) is composed of tylotes lying in bundles positioned in variable angles, while the choanosomal skeleton is made of irregular, reticulating fibres composed of styles.

Our specimens conform well with the species descriptions given by Schmidt (1870) and Lundbeck (1910). The habit is cushion-like, and there are papillae present, although they are somewhat reduced in form. The membrane is quite thin but appears distinct from the choanosome, and is composed of bundles of tylotes oriented in a horizontal fashion. The internal skeleton is reticulate and consists of styles, and the onchaetes are found throughout. Our spicule sizes match the ranges given by Topsent (1904) (styles up to 600 x 12 μm , tylotes 450-480 x 5 μm , onchaetes 380-400 x 2.5-3 μm), Lundbeck (1910) (styles 300-680 x 7-14 μm , tylotes 250-470 x 3-6 μm , onchaetes 53-500 x 1-2.8 μm) and Koltun (1959) (styles 300-680 x 7-15 μm , tylotes 250-470 x 3-6 μm , onchaetes 53-500 μm). We have therefore named our specimens *Tedania (Tedania) suctoria*.



Figure 14. *Tedania (Tedania) suctoria* specimen PA2011-7 Set 79 with opposite surfaces shown.

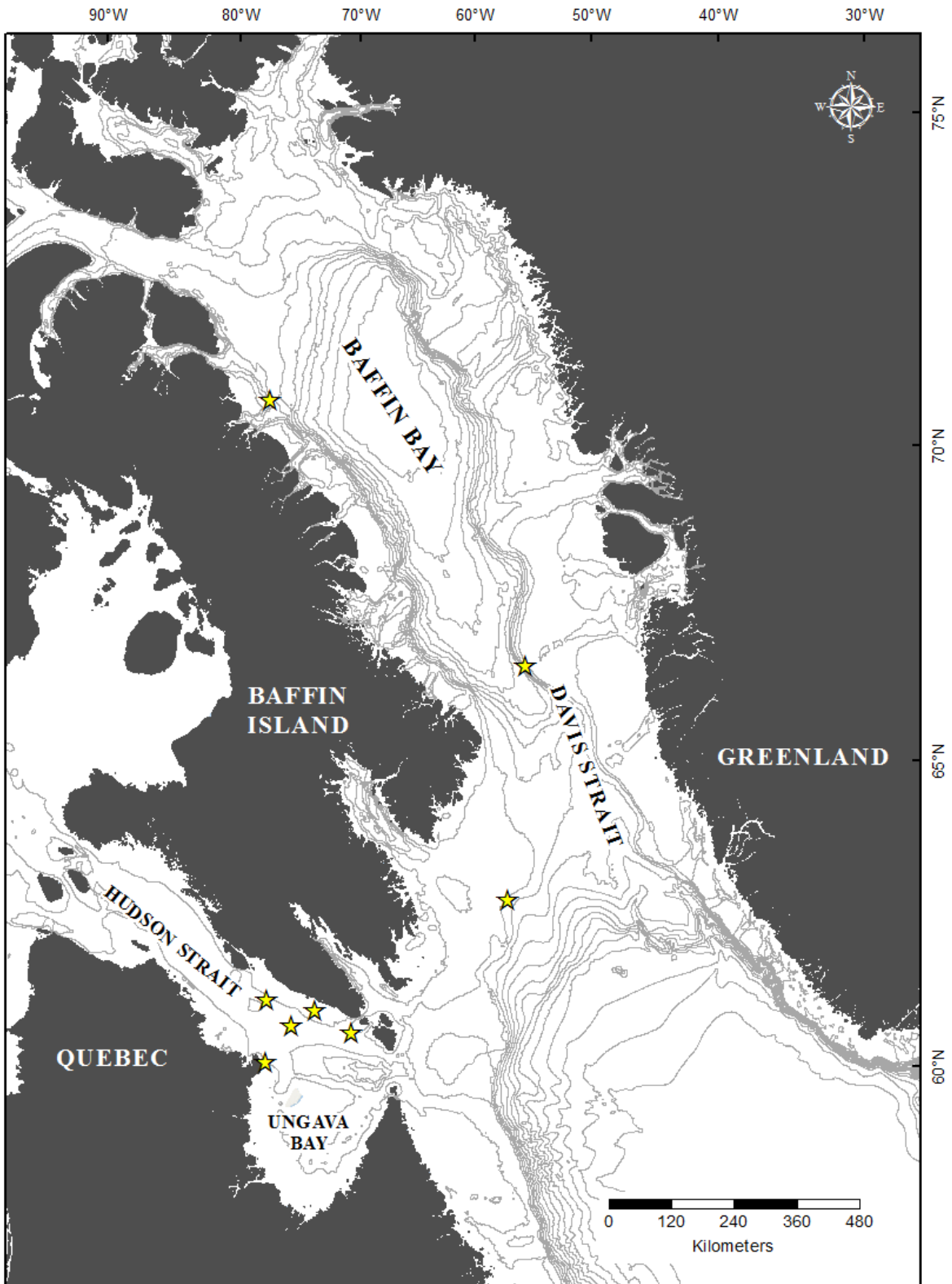


Figure 15. *Tedania (Tedania) suctoria* collection locations.

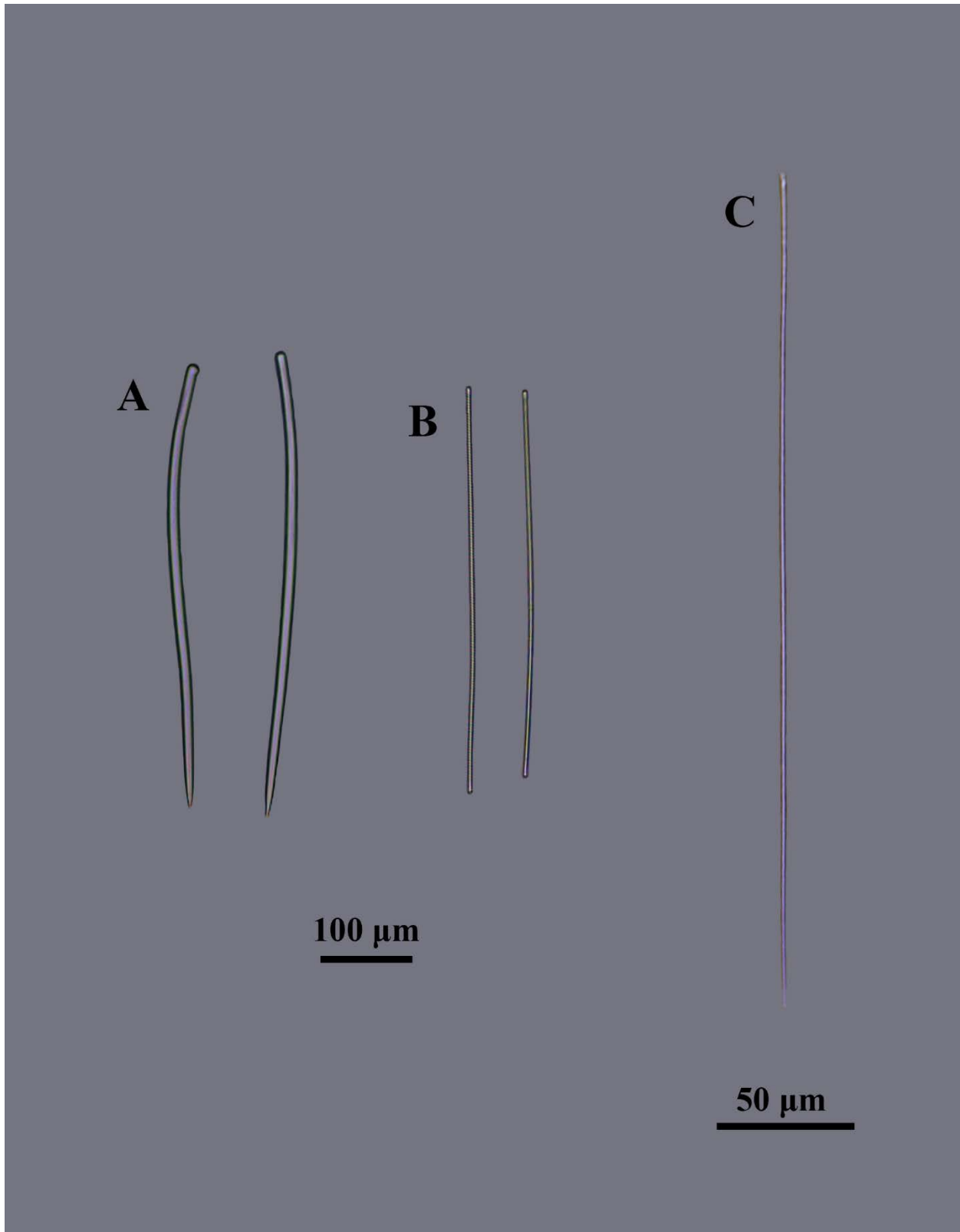


Figure 16. *Tedania (Tedania) suctoria* spicules from specimen Pa2011-7 Set 79. Styles (A), Tylotes (B), Onychaetes (C). Note that A and B are the same scale.

Table 5. Measurements of spicules from specimens of *Tedania (Tedania) suctoria* all reported as minimum-(average)-maximum for length (top line) x width (bottom line). N indicates the number of spicule measurements in each specimen.

Collection	N	Styles	Tylotes	Onychaetes
PA2011-7 Set 79	30	416.8-(492.8)-545.5 x 6.1-(10.7)-13.5	328.0-(404.7)-447.2 x 4.1-(6.0)-9.1	73.7-(260.2)-318.3 x 2.1-(2.6)- 3.1
PA2011-7 Set 45	10	468.4-(490.9)-519.4 x 7.2-(9.6)-11.4	365.7-(409.6)-443.4 x 4.5-(5.3)-6.3	83.4-(259.5)-324.7 x 2.1-(2.5)-3.3
PA2011-7 Set 59	10	483.0-(514.9)-557.0 x 8.5-(10.3)-12.3	376.7-(405.9)-459.0 x 3.6-(4.4)-5.2	235.1-(269.9)-304.2 x 2.5-(2.8)-3.3
PA2011-7 Set 63	10	478.7-(504.1)-541.3 x 9.1-(10.6)-12.9	345.6-(380.3)-407.4 x 4.3-(4.9)-6.2	127.0-(215.4)-316.1 x 2.1-(2.5)-2.8
PA2012-7 Set 3	10	446.4-(516.4)-577.9 x 9.8-(11.1)-12.7	374.7-(399.4)-437.4 x 4.1-(6.3)-7.9	254.0-(308.7)-359.8 x 2.1-(3.1)-3.9
PA2012-7 Set 186	10	492.5-(511.3)-532.1 x 8.5-(11.5)-13.6	402.4-(424.8)-444.4 x 4.8-(6.1)-7.6	249.6-(264.6)-297.3 x 2.1-(2.8)-3.4

***Tedania* sp. 1**

Species description

The sponge is compact, massive, and oval in form (Figure 17). It is reddish brown in colour, and the margins are relatively smooth. The consistency is compressible, and the fibres composing the sponge are easily separated from one another. The surface is velvet-like and covered with numerous fine pores and channels. One specimen, ~4 cm long, was examined.

Habitat information

Hudson Strait, at 183 m depth (Figure 18).

Spicules (Table 6, Figure 19)

Megascleres: Styles are 346-456 x 8-15 μm , smooth, slightly curved, and can have faintly tylotic heads. Tyloles are 153-279 x 2-7 μm .

Microscleres: Small, thin onychaetes are present (132-342 x 2-4 μm). These appear somewhat similar to thin tylostyles but are classed as onychaetes due to the lack of intermediate forms between these and larger styles or tyloles.

Distinguishing characteristics

This species can be distinguished by its spicule complement, specifically the presence of thin, tylostyle-like onychaetes rather than those found in *Tedania* (*Tedania*) *suctorica*. The tyloles are also significantly smaller than those seen in *T. (T.) suctorica*.

Taxonomic remarks

This species has been placed within family Tedaniidae due to its spicule complement of smooth styles, smooth tyloles, and a third spicule category that appears to consist of either thin tylostyles or onychaetes with a tylostyle-like head. The species has been placed in genus *Tedania* due to the differentiation of the megascleres (Hooper and Van Soest 2002): the tyloles are found primarily in the ectosome (although they may also be found throughout the sponge) and the styles compose the choanosome. Classification to the subgenus level based on the key in Hooper and Van Soest (2002) has not been attempted, as the tyloles appear smooth and the styles are not definitively less than or greater than 350 μm in length. For these reasons, we have named this species *Tedania* sp. 1.



Figure 17. *Tedania* sp. 1 specimen PA2013-8 Set 130 showing opposite surfaces.

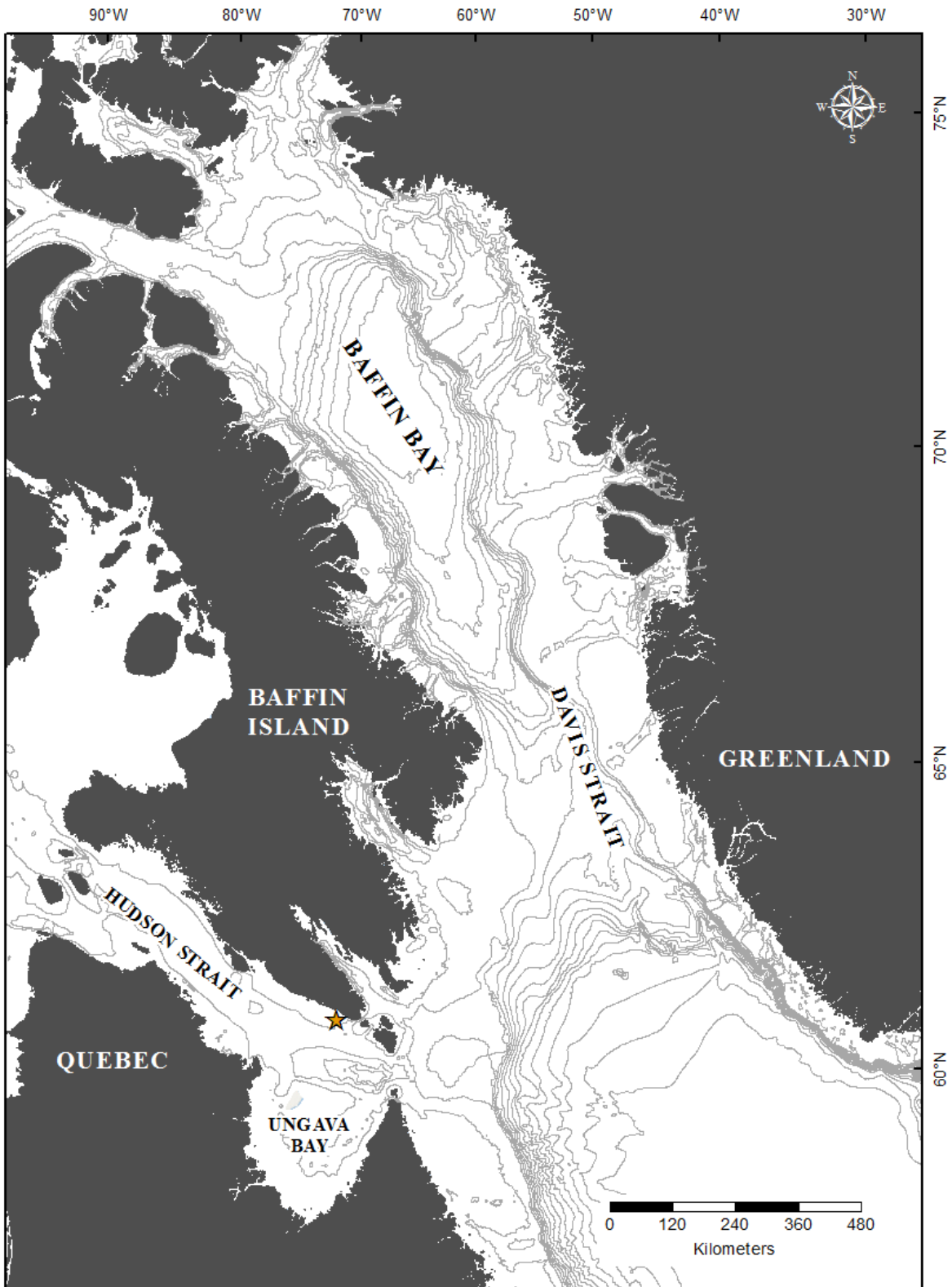


Figure 18. *Tedania* sp. 1 collection location.

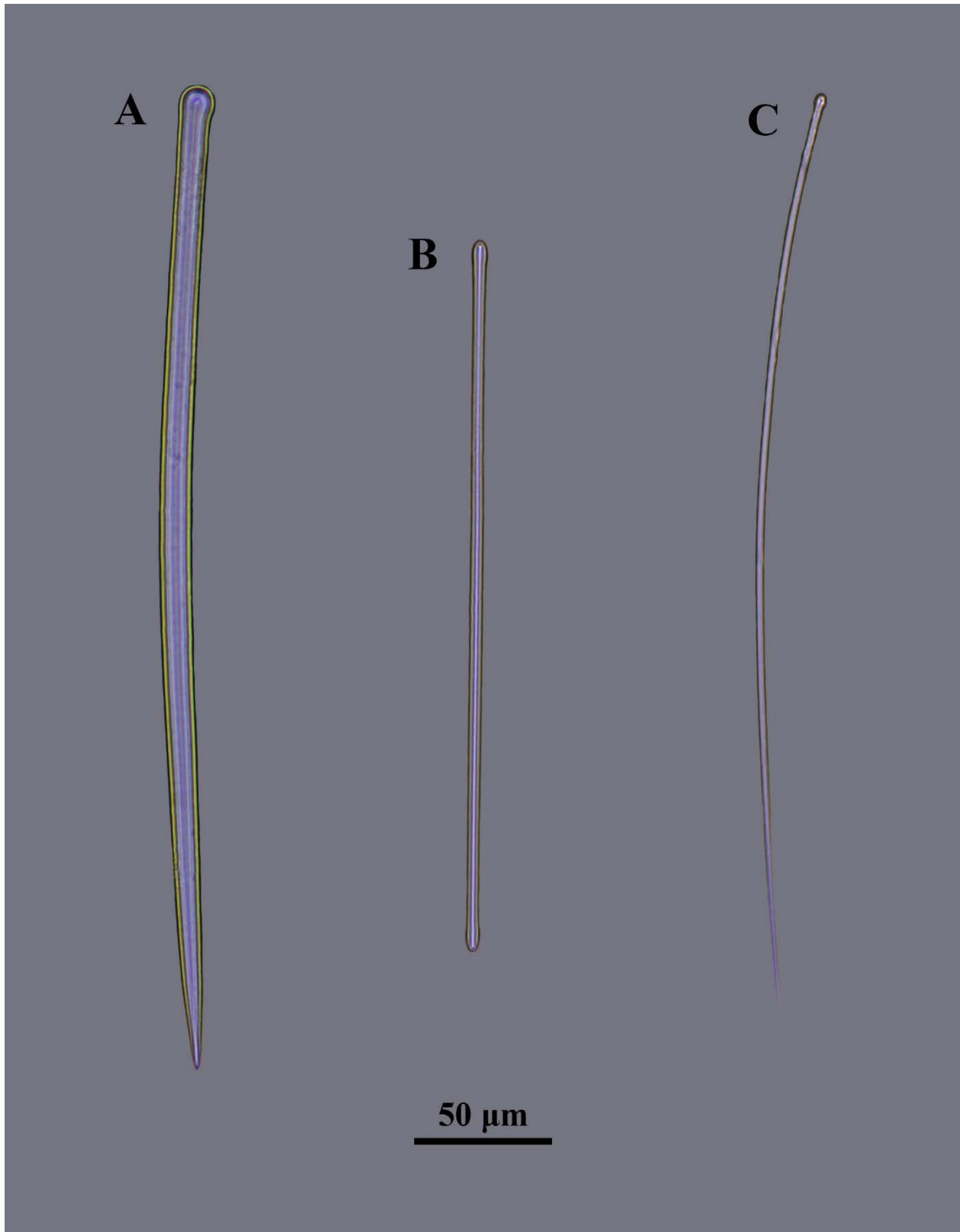


Figure 19. *Tedania* sp. 1 spicules from PA2013-8 Set 130. Styles (A), Tylotes (B), Onychaetes (C).

Table 6. Measurements of spicules from the single specimen of *Tedania* sp. 1 all reported as minimum-(average)-maximum for length (top line) x width (bottom line). N indicates the number of spicule measurements in the specimen.

Collection	N	Styles	Tylotes	Onychaetes
PA2013-8 Set130	30	346.0-(404.2)-455.3 x 8.6-(10.2)-14.5	153.1-(230.9)-278.6 x 2.8-(4.5)-6.1	132.2-(264.9)-341.2 x 2.3-(2.9)-4.0

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