

GREAT AUSTRALIAN BIGHT RESEARCH PROGRAM

RESEARCH REPORT SERIES

Deepwater sponges (Porifera) of the Great Australian Bight

Project 3.1 - Great Australian Bight benthic biodiversity characterisation

S.J. Sorokin, A. Williams, F. Althaus and J.E. Tanner

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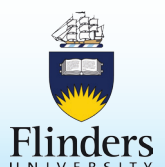
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GREAT AUSTRALIAN BIGHT RESEARCH PROGRAM

The Great Australian Bight Research Program is a collaboration between BP, CSIRO, the South Australian Research and Development Institute (SARDI), the University of Adelaide, and Flinders University. The Program aims to provide a whole-of-system understanding of the environmental, economic and social values of the region; providing an information source for all to use.

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EDITOR/AUTHOR AFFILIATIONS AND CONTRIBUTIONS

SS – SARDI Aquatic Sciences; collection of sponges, spicule preparations, sponge identifications wrote report.

FA – CSIRO; expedition planning, mapping, analysis.

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JT – SARDI Aquatic Sciences; expedition planning, collection of sponges.

LG – Sponge consultant, Victoria; collection of sponges, spicule preparations, sponge identifications (Calcarea, Demospongiae, Hexactinellida).

AC – South Australian Museum; sponge identifications (Calcarea), accession of all sponges into South Australian Museum.

MK – Universidade Federal do Rio de Janeiro; workshop presenter, sponge identifications and confirmation of identifications (Calcarea).

JF – Western Australian Museum; sponge identifications (Calcarea).

AG – Queensland Museum; sponge identifications (Calcarea).

SM – University of Waikato; sponge identifications (Calcarea).

MAW – Australian Institute of Marine Science; sponge identifications (Calcarea).

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EXECUTIVE SUMMARY

The Great Australian Bight Research Program (GABRP) was developed to improve the understanding of the environmental, economic and social values of the Great Australian Bight (GAB).

This report catalogues the sponge species collected as part of the GABRP, specifically from the expedition on the RV *Investigator* (voyage number IN2015_C02) during December 2015.

Benthos was sampled at 30 depth-stratified stations as part of the first characterisation of deep benthic communities in the GAB.

Sponges were found at 25 out of 30 sampling stations. A total of 191 sponge species from three Classes were collected: Calcarea (18%), Demospongiae (73%) and Hexactinellida (9%).

Demospongiae made up 96% of the total sponge biomass. Two demosponge species dominated the sponge biomass; the haplosclerid fan sponge *Callyspongia* (*Callyspongia*) sp. made up 27% of the total sponge biomass and dominated the shelf edge (200 m). The tetractinellid *Thenia* sp. made up 42% of the total sponge biomass that dominated the slope.

Thenia sp. was the most widespread species, being found at all depths between 400 m and 3000 m, with the highest concentration at 1000 m.

Seven Calcarea species are new to science: *Ascoleucetta* (four spp.), *Ute* n. sp. (one sp.), *Ernstia* n. sp. (one sp.) and *Leucettusa* n. sp. (one sp.). Two demosponge species are possibly new, Placospongiid sp. and Tetillid sp. and warrant further investigation from specialist taxonomists.

A comparison of these sponges with sponges in the western GAB and Bass Strait are needed to ascertain the degree of endemism in the central and eastern GAB and whether these sponges are representative of southern slope fauna.

INTRODUCTION

There are over 8,500 valid sponge species worldwide; of these ~83% are in the class Demospongiae, with the remainder distributed amongst the classes Calcarea (8%), Hexactinellida (8%) and Homoscleromorpha (1%) (van Soest et al., 2012). Hexactinellida in particular have predominantly bathyal and abyssal distributions (van Soest et al., 2012), although the other three classes are also found in deep-water (van Soest, 2009, Rapp et al., 2011, Domingos et al. 2015).

There are two lists of Australian sponge species, the most up-to-date being the online register of Codes of Australian Aquatic Biota (CAAB) (Rees et al. 1999 onwards). This lists 1,710 named sponge species in Australia, ~20% of the worldwide count. The Australian Biological Resources Study (ABRS) database lists 1,476 accepted species in Australia, of which just over half are endemic (ABRS database, based on last update in 2009). A total of 110 species from 33 families are listed in the Integrated Marine and Coastal Regionalisation of Australia (IMCRA) areas that take in the Great Australian Bight (GAB) shelf (Southern Province, GAB Transition and Spencer Gulf Shelf Province). Only one sponge is listed from the IMCRA Southern Province, which includes the GAB slope and highlights the lack of database compilation between museums/scientific institutes and the official ABRS 'count'.

Knowledge of the benthic invertebrate epifauna of the GAB is sparse. Two studies on the effectiveness of the Benthic Protection Zone Marine Park (Ward et al., 2006; Currie et al., 2008) have investigated the eastern GAB continental shelf from 40 m to 200 m depth, where benthic assemblages were diverse and dominated by sessile suspension feeders, such as sponges, sea squirts and bryozoans. Sponges on the shelf were diverse, with 351 species collected and the highest diversity inshore (Sorokin et al., 2007).

The deepwater regions of the central and eastern GAB are currently the focus of oil and gas exploration, and there is a need to improve the understanding of the structure and function of the benthic ecosystem (Ward et al., 2014). There are almost no existing benthic biological data for the areas beyond continental shelf depths (>200 m). A preliminary survey of the slope benthos at three depths: 500, 1000 and 2000 m found communities that were different from those on the shelf, distinct at each depth, and dominated by motile organisms (Currie and Sorokin, 2011). The sponges in this study were collected as part of the first characterisation of deep benthic communities in the GAB by the Great Australian Bight Research Program (GABRP), which was established as an integrated approach to examine the ecology of the GAB (Ward et al., 2014). Findings will inform future integrated and sustainable ocean management, and assessment/mitigation of potential future anthropogenic impacts.

The aim of this report is to catalogue the sponges collected from the expedition on the RV *Investigator* (voyage number IN2015_C02; voyage report - Kloser, 2016). Detailed analysis of all benthos collected in this project is presented in another report (Williams et al., 2017).

METHODS

Field sampling

Thirty depth-stratified stations (200, 400, 1000, 1500, 2000 and 3000 m) along five longitudinal transects (T1-T5) across the GAB were sampled for benthos as part of the RV *Investigator* IN2015_C02 survey (Figure 1, Table 1; Williams 2017). Transect 4 (200 m) was sampled twice. Time constraints prevented replicate sampling at other stations.

Epifauna were collected using a beam trawl that was lowered to the seafloor and towed for ~30 minutes at a speed of 1-1.5 knots. The beam trawl mouth was 4 m wide with a mouth depth of 0.5 m and 10 mm mesh size. The net is held open by the beam to retain a constant opening aperture of 2 m². Sponges were separated from other benthos onboard and sorted into groups of putative species/Operational Taxonomic Units (OTU lots) for each site. Samples from each site were weighed and subsampled into voucher specimens and preserved in 70% ethanol.

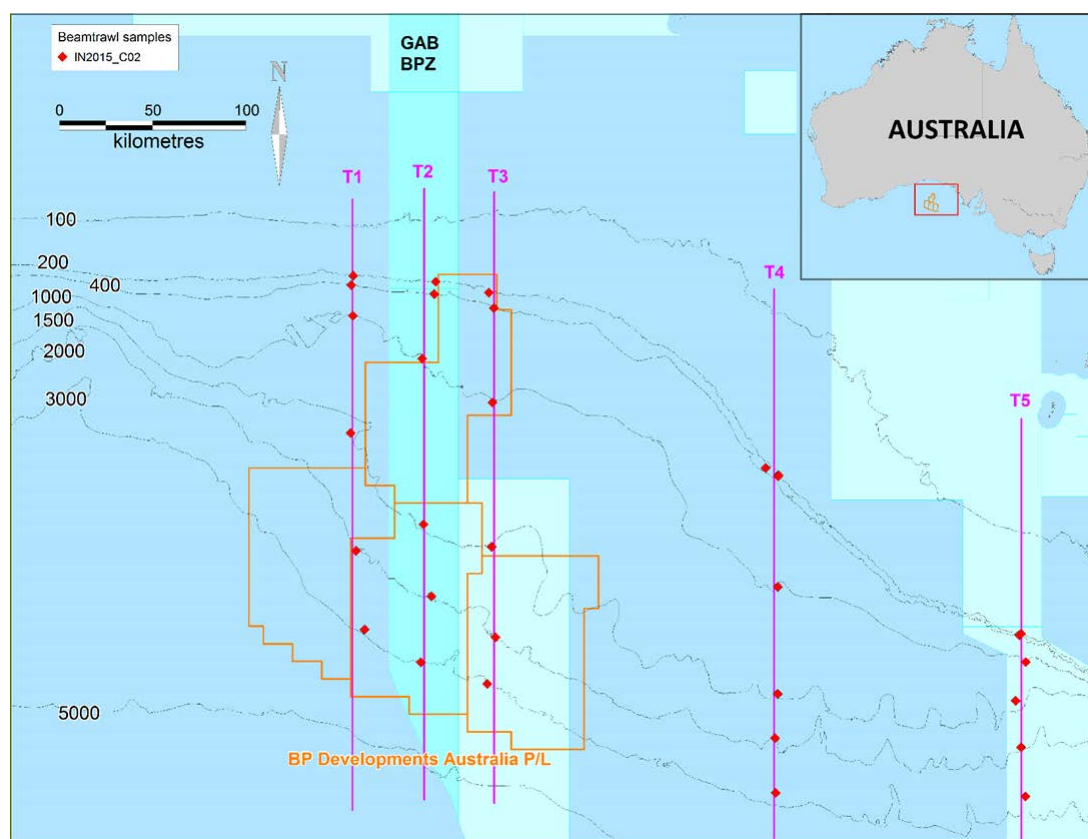


Figure 1. Beam trawl sampling operation sites (red diamonds) are shown for six depth strata (200, 400, 1000, 1500, 2000, 3000 m) along five longitudinal transects in the Great Australian Bight. Transect 2 runs through the centre of the Great Australian Bight Benthic Protection Zone Marine Park (GABBPZ) a Commonwealth Marine Reserve (CMR). Paler polygons are proposed extensions of, or new CMRs. Orange polygons are BP exploration lease areas.

Table 1. Position of beam trawl casts with target and average depth of trawl.

Beam trawl cast operation number	Transect	Target depth (m)	Average depth of trawl (m)	Long. (start)	Lat. (start)
IN2015_C02_395	T1	200	189	130.257	-33.3366
IN2015_C02_389	T1	400	426	130.256	-33.3811
IN2015_C02_382	T1	1000	996	130.265	-33.5161
IN2015_C02_435	T1	1500	1553	130.26	-34.0723
IN2015_C02_449	T1	2000	2037	130.28	-34.625
IN2015_C02_227	T1	3000	2840	130.317	-35.0094
IN2015_C02_398	T2	200	199	130.742	-33.366
IN2015_C02_330	T2	400	412	130.735	-33.4234
IN2015_C02_292	T2	1000	1005	130.666	-33.7187
IN2015_C02_281	T2	1500	1478	130.669	-34.5304
IN2015_C02_276	T2	2000	2004	130.697	-34.8532
IN2015_C02_274	T2	3000	3002	130.665	-35.1652
IN2015_C02_191	T3	200	218	131.046	-33.417
IN2015_C02_186	T3	400	383	131.074	-33.4881
IN2015_C02_196	T3	1000	1027	131.061	-33.9283
IN2015_C02_202	T3	1500	1492	131.056	-34.6091
IN2015_C02_207	T3	2000	2014	131.077	-35.0352
IN2015_C02_216	T3	3000	3021	131.042	-35.2617
IN2015_C02_179*	T4	200	209	132.693	-34.2778
IN2015_C02_181	T4	200	283	132.689	-34.2903
IN2015_C02_174	T4	400	410	132.623	-34.2536
IN2015_C02_167	T4	1000	1006	132.692	-34.8227
IN2015_C02_159	T4	1500	1468	132.689	-35.3362
IN2015_C02_155	T4	2000	1934	132.676	-35.5399
IN2015_C02_151	T4	3000	2725	132.693	-35.7975
IN2015_C02_128	T5	200	221	134.087	-35.0348
IN2015_C02_126	T5	400	388	134.079	-35.0428
IN2015_C02_131	T5	1000	1021	134.109	-35.1527
IN2015_C02_134	T5	1500	1527	134.045	-35.3445
IN2015_C02_137	T5	2000	1961	134.083	-35.5582
IN2015_C02_141	T5	3000	2826	134.109	-35.8183

There were two 200 m casts in Transect 4. *Cast 179 resulted in a broken beam and was not a full tow. Sponges collected on both operations are included in the taxonomic descriptions.

Laboratory processing

The identification of the sponge collection was undertaken at SARDI Aquatic Sciences. The collection was sorted into classes (Calcarea, Demospongiae and Hexactinellida) and workable OTUs. Sponges in the class Calcarea were identified in a taxonomic training workshop involving seven sponge workers and a specialist. All sponges were identified using standard morphological methods – external appearance (shape, colour and texture), skeletal structure and spicule types. Preparation of skeletal and spicule microscope slides for the different sponge classes is described below.

Skeletal sections of Calcarea were made for histological examination by cutting a small cube of one of each putative species, and processing the pieces as follows: acid fuchsin 20 min, 93% ethanol 10 min, xylene 30 min, repeat xylene 30 min, before placing in melted paraffin for 1 hour and cooling into blocks. Paraffin blocks were prepared so that when cut the sponge sections were at right angles to the surface of the sponge. Blocks were cut by hand to ensure that the sections were thick enough (~500 µm) to see the three dimensional arrangement of the spicules. Wax was removed with xylene and the sections were then mounted with Durcupan™. Spicule slides were prepared by putting a small piece of sponge tissue into a test tube with household bleach (3.9% sodium hypochlorite). Once the sponge was completely dissolved the supernatant was poured off and replaced with distilled water, and the sample left to settle. This washing was repeated three times, followed by

two washes with 95% ethanol. Spicules were then transferred onto microscope slides, dried and mounted in DPX Mountant. There were 100 specimen-lots of calcareous sponges assigned to 36 putative species. Following the workshop, sponges in the 64 specimen lots that were not examined were examined under a dissecting microscope with the identified vouchers to check that they still aligned with the putative (now identified) species. In cases where this was not 100% certain, the sample was reassigned to a new putative species to be reexamined in the future.

Skeletal slides for Demospongiae were prepared by hand-cutting fine sections from the sponge. Two or three sections from each sponge were cut perpendicular to the surface with a sharp blade. Sections were laid onto a slide, covered with a coverslip with a small weight on top, and dried on a hot plate. Slides were removed from the heat, the coverslips removed, and the sections covered with mounting media (Durcupan™) and dried overnight in an oven at 50 degrees. Spicules slides were prepared as for Class Calcarea.

Skeletal slides for Hexactinellida were prepared by gently pulling apart a small piece of the sponge and treating it as for the demosponge specimens. If necessary, spicule slides were prepared as for Class Calcarea.

Photographs of each sponge and details of morphological characters that were used to determine the species examined can be found in the mudmaps in Appendix 1. Where identifications are made to species level, the link to the World Porifera Database (WPD) page is given as well as the known distribution.

RESULTS

Sponges were collected in 25 of the 31 beam trawl samples, with a total biomass of 48.4 kg. The diversity at 200 and 400 m depth was generally high, with a median of 27 species; the maximum of 46 species occurred at T1-200. The deeper samples yielded much lower diversity, with a median of 3 species, and a maximum of 13 at T5-1000. Only Transect 1 (T1) yielded sponges at all depths. Overall, there was little overlap of species between depths, with 93% of species only occurring at one depth.

The sponge fauna is poorly described, thus the majority of OTUs could not be determined to species level, instead they were assigned alpha-numeric codes, each of which has a detailed sponge 'mudmap' description (following Hooper et al., 2013) for future reference (see appendix). In total, 191 taxa were identified from the 384 lots that were examined. These include 3 multi-species complexes (Demosponge Darwinellid/Suberitid spp., and *Calcarea Grantiid* spp. and *Ascoleucetta* spp.) that were not further separated, and 188 species-level identifications. Demosponges (138 taxa) were the most common, followed by *Calcarea* (34 taxa: 13 *Calcaronea* and 21 *Calcinea*) and glass sponges (Hexactinellida, 18 taxa). No sponges of the class Homoscleromorpha were collected. Of the 188 species-level taxa, only eight were identified to known species. Seven of the *Calcarea* and two Demospongiae were recognised as species possibly new to science. Of the remaining 171 putative species, 132 were identified to known genera, 34 to known families and 5 to orders. In total, 79 genera and 47 families were determined.

A total of 131 taxa (68%) were only sampled once and another 34 (18%) sampled twice. Between 4 and 7 taxa were collected in 3 to 6 samples, while 1 taxon each was collected in 7 operations (*Leucettusa lancifera*), 9 operations (*Suberites* sp. 1), and 14 operations (*Thenea* sp. 1). Figure 2 shows the total biomass of sponges by order across the transects. Table 2 shows the taxonomic distribution of the sponges collected. The order Haplosclerida had the highest number of species (Figure 3).

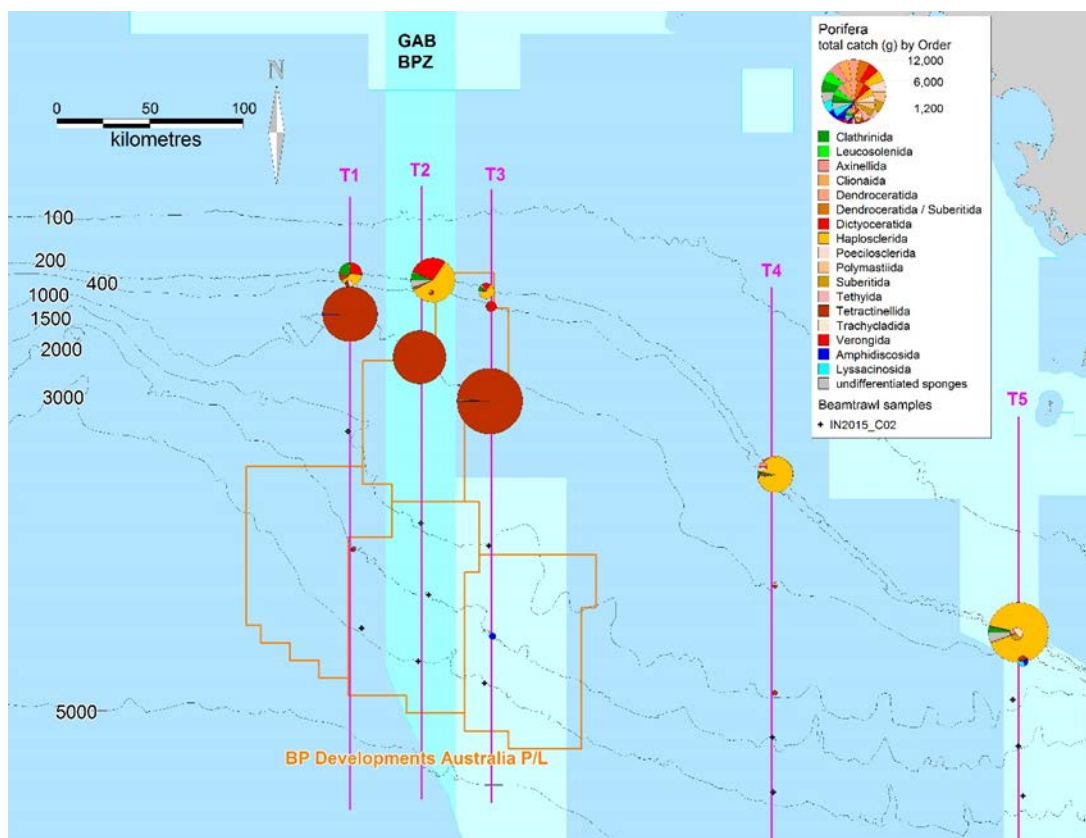


Figure 2. Bubble chart of total sponge catch by taxonomic order across all five transects and six depths in the Great Australian Bight.

Table 2. Taxonomic distribution of sponges collected.

Class	Order	No. families	No. genera	No. species*
Calcarea	Clathrinida	4	8	21
	Leucosolenida	6	11	14
Demospongiae (12 orders)	Axinellida	3	12	28
	Clionaida	1	1	1
	Dendroceratida	1	1	2
	Dendroceratida/Suberitida mix	1	1	1
	Dictyoceratida	4	5	25
	Haplosclerida	5	9	34
	Poecilosclerida	7	11	15
	Polymastiida	1	1	1
	Suberitida	2	7	15
	Tethyida	1	2	2
	Tetractinellida	4	5	11
	Trachycladida	1	1	1
	Verongida	2	2	2
Hexactinellida (2 orders)	Amphidiscosida	1	2	10
	Lyssacosida	3	2	8

*Includes species not determined to genera/families

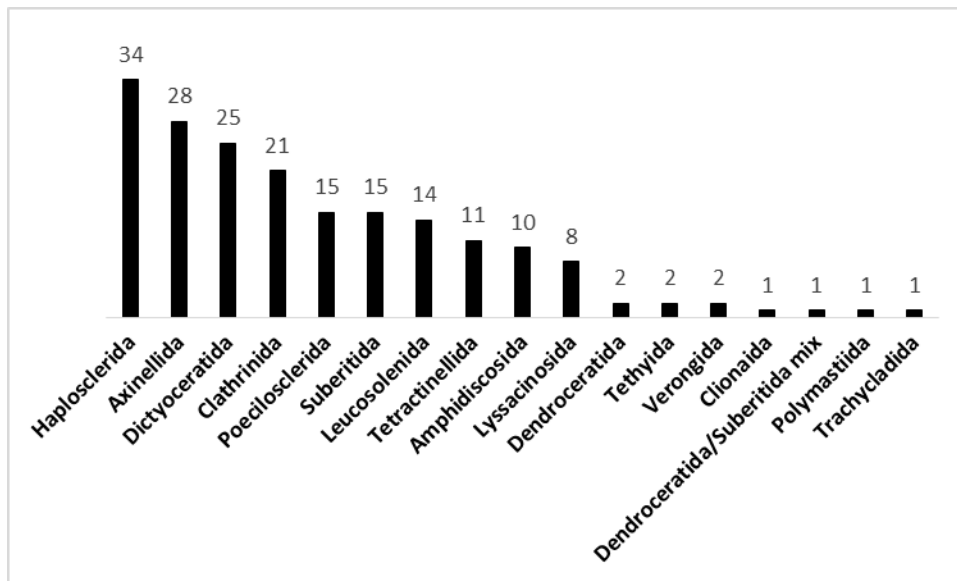


Figure 3. Number of sponge species collected from the GAB, ranked by taxonomic order.

Calcarea identifications

Of the sponge species collected, 18% were Calcarea, making up 3% of the sponge biomass. Apart from *Leucetta* sp., all the specimens were small (< 5 cm in length). Calcarea were found on all transects at the 200 m stations (Figure 4).

Twenty-nine species of Calcarea were identified, 12 of the subclass Calcaronea (all order Leucosolenida) and 17 of the subclass Calcinea (all order Clathrinida) (Table 3). Six other sponge lots were assigned OTUs with identification at the level of family or above. The most diverse genus was *Ascoleucetta* and the most widespread species was *Leucettusa lancifera*. Seven species are new to science: *Ascoleucetta* (four species), *Ute* n. sp. (one species), *Ernstia* n. sp. (one species) and *Leucettusa* n. sp. (one species). Descriptions of the new species will be made at a later date following further examination of their spicule characteristics by scanning electron microscope.

Two species were found to have gravid specimens, *Leucettusa lancifera* (IN2015_C02_181_N133-b, IN2015_C02_398_N135, IN2015_C02_128_N122), and *Leucettusa* n. sp. (IN2015_C02_128_N118). The internal characteristics in the gravid specimens were masked by the sponge body being thick and cushioned.

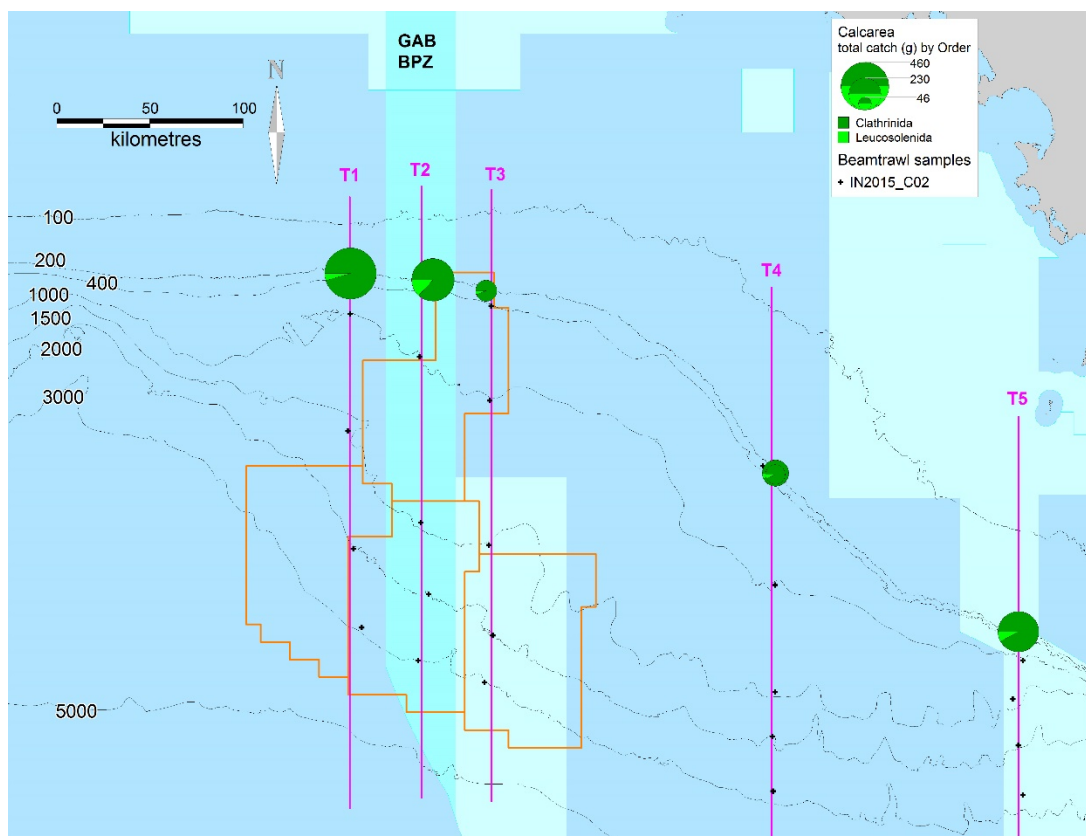


Figure 4. Bubble chart of total catch by Order of Class Calcareous, which were only found in the 200 m trawls.

Table 3. Taxonomic distribution of the class Calcareous identified from the voyage IN2015_C02.

Subclass, Order	Family	No. genera	No. species	Total catch (g)
Calcaronea, Leucosolenida	Amphoriscidae	1	1	1
	Grantiidae	4	5	60
	Jenkinidae	1	1	3.5
	Lelapiidae	1	1	8
	Sycettidae	1	2	6.5
	Heteropiidae	2	2	24.5
	Not determined	1	1	21.5
Calcinea, Clathrinida	Clathrinidae	3	3	16.5
	Leucaltidae	1	2	322.5
	Leucascidae	2	9+	564.5
	Leucettidae	1	2	413
	Not determined	-	4	21.5

Demospongiae identifications

Of the sponges collected, 73% (139 spp.) were Demospongiae making up 96% of the total sponge biomass. Two demosponge species dominated the sponge biomass (Table 4, Figure 5). The haplosclerid fan sponge *Callyspongia* (*Callyspongia*) sp. made up 27% of the total sponge biomass and dominated the shelf edge (200 m). The tetractinellid *Thenia* sp. made up 42% of the total sponge biomass and dominated the slope and was the most widespread species, being found at all depths between 400 and 3000 m, with the highest concentration at 1000 m. Both sponges were found on all longitudinal transects. *Thenia* sp. is likely one of two species: *Thenia grayi* Sollas 1886, which is listed as occurring in Southern Australia (off Sydney), or *Thenia novaezealandiae* Bergquist 1961 reported from New Zealand. The latter has spicule dimensions similar to those of the GAB specimens, however, detailed examination of the type specimen would be necessary to confirm identification.

The most diverse genus was *Oceanapia*, although separation of these species was difficult and expert re-examination may find that some of these species could be combined. Two demosponge species are possibly new genera: Placospongiid sp. 1 and Tetillid sp. These are currently under further examination at the South Australian Museum.

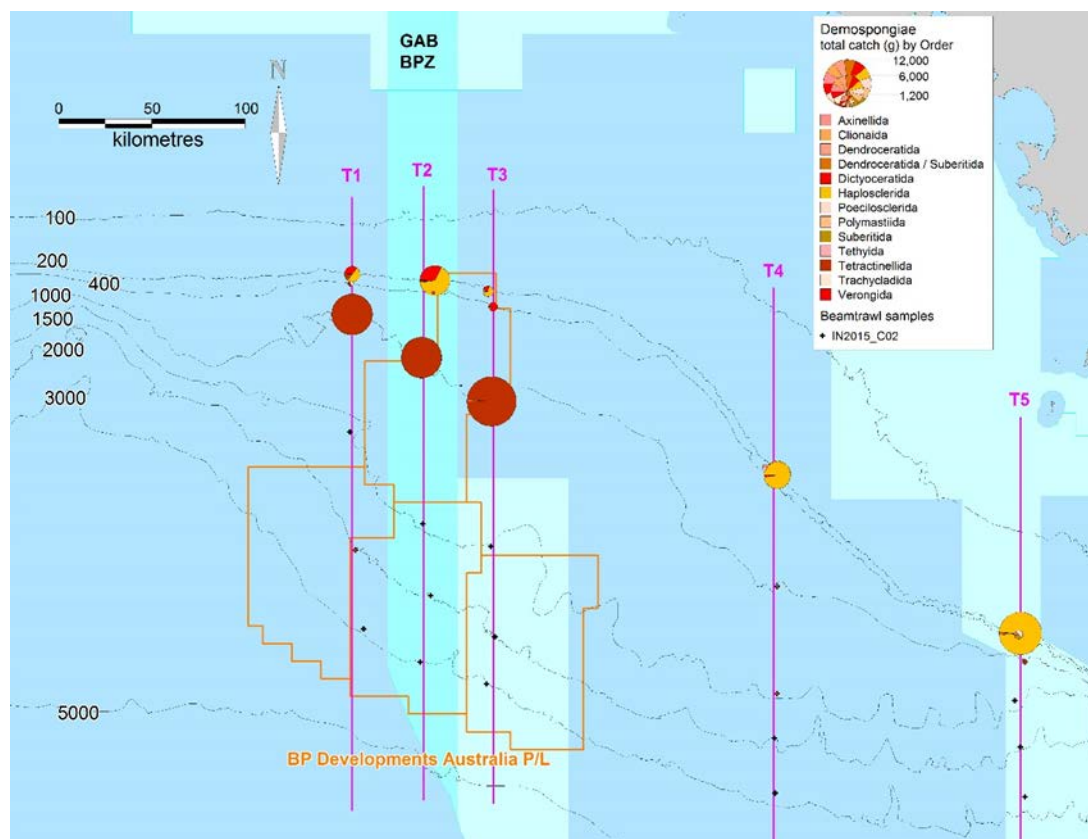


Figure 5. Bubble chart of total catch (g) of the class Demospongiae, by taxonomic order across 5 transects and 6 depths in the Great Australian Bight.

Table 4. Taxonomic distribution and biomass of sponges from the class Demospongiae identified from the voyage IN2015_C02.

Subclass	Order	Family	No. genera	No. species	Tot catch (g)
Heteroscleromorpha	Axinellida	Axinellidae	5	18	243
		Dictyonellidae	2	2	136
		Raspailiidae	4	8	3
	Clionaida	Placospongiidae	1	1	127
	Haplosclerida	Callyspongiidae	2	4	13019
		Chalinidae	2	3	840
		Niphatidae	3	9	1280
		Petrosiidae	1	2	417
		Phloeodictyidae	2	14	3443
	Poecilosclerida	Chondropsidae	2	4	180
		Coelosphaeridae	4	4	303
		Crellidae	1	1	82
		Dendoricellidae	1	2	44
		Microcionidae	1	1	3
		Mycalidae	1	1	130
		Myxillidae	1	2	20
	Polymastiida	Polymastiidae	1	1	15
	Suberitida	Halichondriidae	2	6	69
		Suberitidae	3	9	372
		Stylocordylidae	1	1	1
	Tethyida	Tethyiidae	2	2	8
	Tetractinellida	Ancorinidae	4	8	329
		Theneidae	1	1	20381
		Theonellidae	1	1	4
		Tetillidae	1	1	23
	Trachycladida	Trachycladidae	1	1	2
Keratosa	Dictyoceratida	Dysideidae	1	2	14
		Irciniidae	2	2	117
		Spongiidae	3	13	1674
		Thorectidae	5	8	1747
	Dendroceratida	Dictyodendrillidae	1	1	2
		Darwinellidae	1	1	2
Veron-giida	Verongida	Aplysinellidae	1	1	57
		Aplysinidae	1	1	1100
		Fam. undetermined	1	1	4
Mix	Dendroceratida/Suberitida	Darwinellidae/Suberitidae	1	1	2

Hexactinellida identifications

Of the sponges collected, 9% of the species and 1% of the biomass were Hexactinellida. Hexactinellid sponges were found in the deeper sites from 1000 to 3000 m (Figure 6). Many of the sponges were fragmented and difficult to identify; identifications provided here are tenuous /unconfirmed.

Sponges were separated into 18 putative species from two orders (Table 5). Only three genera and one species were named (*Hyalonema* spp. *Aphorme* sp. and *Walteria flemmingi*).

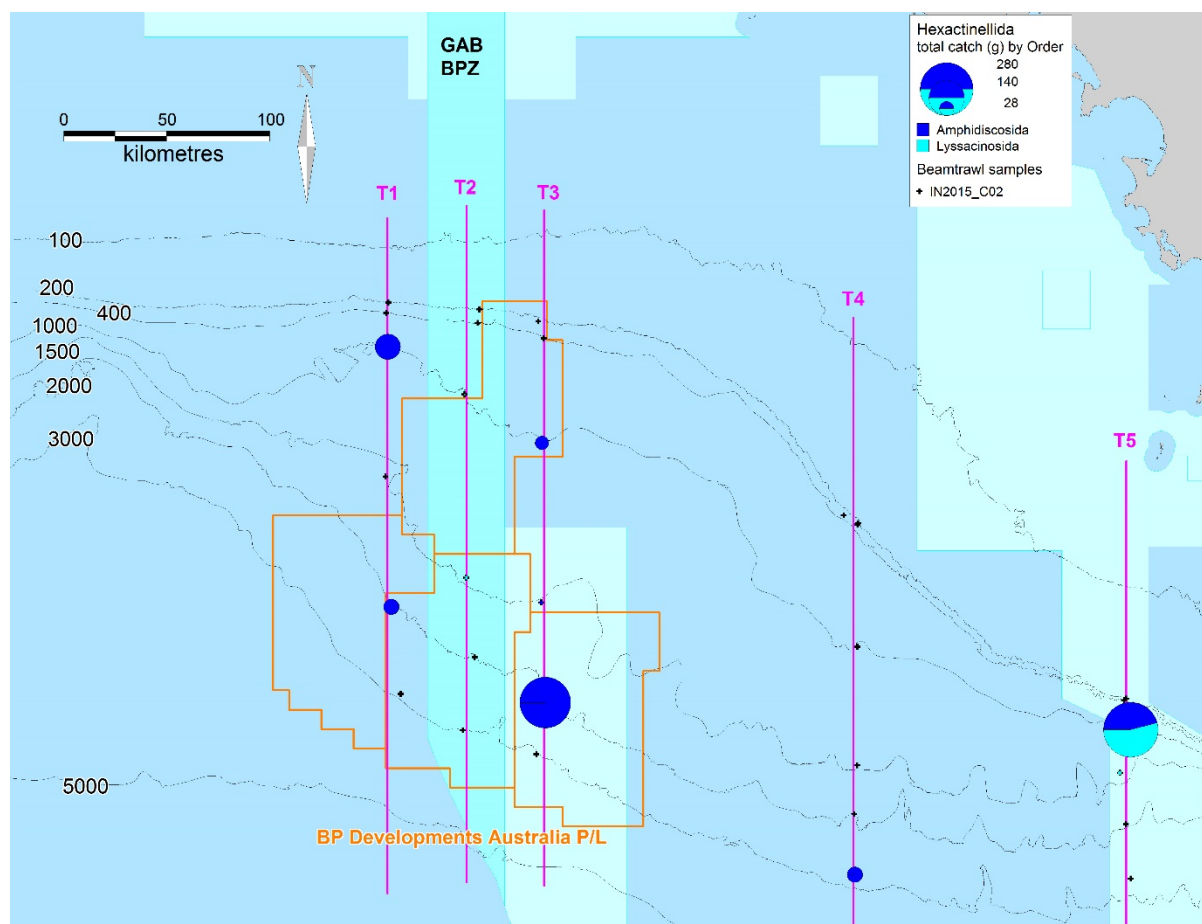


Figure 6. Bubble chart of total catch (g) of the class Hexactinellida, by taxonomic order across 5 transects and 6 depths in the Great Australian Bight.

Table 5. Taxonomic distribution and biomass of sponges from the class Hexactinellida identified from voyage IN2015_C02

Order	Family	No. genera	No. species	Tot catch (g)
Amphidiscosida	Hyalonematidae	5	10	534
	Euplectellidae	2	2	79
Lyssacinosa	Leucopsacidae	1	1	2
	Rosellidae	1	4	68.5
	Family not determined	1	1	3

DISCUSSION

Taxonomy

The most speciose taxonomic order on the GAB slope was Haplosclerida (18% of total sponges), although this included 13 species of the genus *Oceanapia* (Phloeodictyidae): some of these may be combined when further examined by specialists. Poecilosclerida was previously found to be the most speciose order on the GAB shelf making up 30% of species (Sorokin et al., 2007). Similarly, this was the most speciose order in Western Australian deep water collections (sled and beam trawl, 100 to 1500 m), making up 25% of the collection (McEnnulty et al., 2011).

All genera named are already recognised as occurring in Australia, however, as only 7 sponges were identified to species it is difficult to comment on biogeography. Seven *Calcarea* species were recognised as new to science, and morphological and molecular examination is continuing to assign names to these sponges. We have not been able to confirm the species of the two dominant demosponges, *Callyspongia* (*Callyspongia*) sp. and *Thenaea* sp. The genus *Thenaea* was found in great numbers in this collection and has also been found in aggregations in other deep-sea sites around the world e.g. off Norway and Greenland (Witte et al., 1997), their long spicules suited to living on deep sea mud (Schonberg, 2016). *Callyspongia* (*C*) sp. was previously collected on the shelf edge in the GAB and has also been collected off Albany in Western Australia at 212 m (McEnnulty et al., 2011).

Two Demospongiae in this collection warrant further investigation as being possibly new genera. It is likely that there are several new species of Demospongiae that may be revealed by further taxonomic work. In a deep water collection from waters of Western Australia (100-1100 m), almost a third (28% of 372) of the Demospongiae were new to science (McEnnulty et al., 2011). Hexactinellid or glass sponges were the dominant class of sponges collected from the deeper sites of the survey. Only one was identified to species level, *Walteria flemmingi*, previously recorded from the Western Pacific region at depths between 350 and 5000 m (van Soest, 2008), and is also noted as being present in Australia in the CAAB list (Rees et al., 1999 onwards).

The literature on sponges commonly cites the number of species per taxonomic 'order' to compare similar collections. Molecular systematics has recently influenced major changes in the classification of Demospongiae (Morrow and Cardenas, 2015), making 'order' level comparisons with previous collections difficult. Despite this, it is notable that the most speciose order of the Demospongiae, Poecilosclerida (Hooper and van Soest, 2002) only made up 11% of the sponges on the GAB slope.

Depth limitation of *Calcarea*

Although we only found *Calcarea* in the 200 m (shelf break) trawls and not in any of the deeper trawls, the calcite compensation depth in the GAB occurs deeper than 1000 m (James et al., 2005), and so the apparent depth limitation of *Calcarea* is probably not due to spicule solubility but to other factors. *Calcarea* have been thought to be limited to shallow water (Bergquist, 1978), but the hypothesis that their depth restriction may be due to the calcium carbonate compensation depth has been questioned (Duplessis and Reisswig, 2000) as they have been found in deep water, including bathyal and abyssal zones (eg Vacelet, 1989, Duplessis and Reisswig, 2000, Rapp et al., 2011). Previous studies of GAB benthos on the shelf also found small *Calcarea* principally on the deeper shelf sites 150-190 m (Sorokin et al., 2007).

In this study we checked our preserved samples of hard corals (Scleractinia) from deep trawls to see if there were any attached Calcareia that we may not have accounted for, without success, although some supported small Demospongiae. One possible physical difference between the 200 m sites and the deeper sites that may influence the occurrence of Calcareia is the coarser sediments at the former (Williams et al., 2017). Depth restrictions on sponge distribution have also been attributed to the influence of depth-related conditions (eg temperature) on larval survival and settlement (Maldonado et al., 1998), and nutrition (Rapp et al., 2011).

Comparison with GAB Shelf

Differences in collection methods (gear, and time and speed on the seafloor) made accurate comparisons with previous collections from the GAB shelf problematic. Previously, on the GAB shelf (40-200 m), 351 sponge species were collected in sled (1.8 m wide mouth) tows (~5 min at 3.5 knots) from 65 sites on the central and eastern GAB shelf (Ward et al., 2003). The GAB slope sites (200-3000 m) in this study were located in the central and eastern GAB, where 191 species were collected from 31 beam-trawls (4 m wide mouth; ~30 min at 1-1.5 knots). Excluding considerations of gear-type/size, but taking into consideration distance travelled, the number of sites and sponges collected, the ratio between sponges collected on the shelf and on the slope is 1:0.44.

Contribution to Australian fauna data

There are several large collections of sponges (including the GAB shelf and slope sponges) that are identified to genera but not to species in the South Australian Museum. Further work is required to compare these collections and assign proper OTU or species names so that they could be confidently added to the official list of Australian sponges. Some effort to align species OTUs is being made especially at the Western Australian Museum (Fromont and Gomez mudmaps) and the Queensland Museum with the launch of the on-line tool SpongeMaps (Hooper et al., 2013).

Conclusions and recommendations for future research

This is the first comprehensive assessment of deep-water sponge communities in the central and eastern GAB, and gives us much needed data about the biodiversity of sponges on the GAB slope (200-3000 m). It is unknown whether the area studied is representative of the entire GAB and the Bass Strait. These data would be useful if there is to be anthropogenic disturbance to the benthic communities in central GAB. Consideration of the characteristics of the entire benthic fauna in the light of future monitoring needs are the subject of a further report (Williams et al., 2017).

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APPENDICES

CLASS: CALCAREA

Notes on identification and mudmaps of Calcarea

Calcarea were identified during a dedicated workshop held at SARDI Aquatic Sciences, Adelaide, supervised by Calcarea expert Prof. Michelle Klautau. Identification sheets “Mudmaps” for these sponges are presented here. Sponges are arranged alphabetically by order, family and genus. Microscope photos in these mudmaps do not have scales. Average depth of trawl is given with target depth in brackets. Vouchers along with skeletal and spicule preparations are lodged at the South Australian Museum, South Australia. Average depth of trawl is given with target depth in brackets. In addition to the sponges documented below, the following calcareous sponges occurring at ≥ 200 m in the Great Australian Bight and already lodged in the South Australian Museum were databased as part of the GABRP. Spicule and skeletal slides have been prepared for these sponges for future identification and are lodged at the South Australian Museum. All these sponges were collected on the FV *Comet* 12 – 16th January, 1989 from the Great Australian Bight SW of Eucla between 220 and 260 m depth. SAMA reg. numbers S1192-S1221; S1226-S1233; and S1236-1239. SAMA reg. numbers S2040-S2059 are sponges split from the above jars during examination as they were different species.

Table 6. List of all sponges of class Calcarea, collected on IN2015_C02 with museum and field numbers

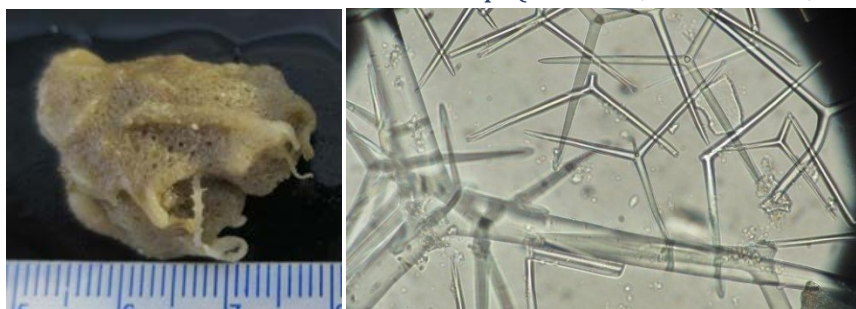
Family	Genus and Species	SAMA Number	Field Identifier
ORDER CLATHRINIDA			
Clathrinidae	<i>Arthuria</i> sp.	S1878	IN2015_C02_179_N122-d
Clathrinidae	<i>Clathrina</i> sp.	S1885	IN2015_C02_181_N115
Clathrinidae	<i>Ernstia</i> n. sp.	S1879	IN2015_C02_179_N122-e
Leucaltidae	<i>Leucettusa lancifera</i>	S1855	IN2015_C02_128_N112
Leucaltidae	<i>Leucettusa lancifera</i>	S1858	IN2015_C02_128_N112-b
Leucaltidae	<i>Leucettusa lancifera</i>	S1862	IN2015_C02_128_N157
Leucaltidae	<i>Leucettusa lancifera</i>	S1866	IN2015_C02_131_N148
Leucaltidae	<i>Leucettusa lancifera</i>	S1867	IN2015_C02_179_N121
Leucaltidae	<i>Leucettusa lancifera</i>	S1870	IN2015_C02_179_N121-c
Leucaltidae	<i>Leucettusa lancifera</i>	S1883	IN2015_C02_181_N107
Leucaltidae	<i>Leucettusa lancifera</i>	S1890	IN2015_C02_181_N133-b
Leucaltidae	<i>Leucettusa lancifera</i>	S1892	IN2015_C02_181_N133-d
Leucaltidae	<i>Leucettusa lancifera</i>	S1901	IN2015_C02_191_N145
Leucaltidae	<i>Leucettusa lancifera</i>	S1903	IN2015_C02_191_N147
Leucaltidae	<i>Leucettusa lancifera</i>	S1918	IN2015_C02_395_N192
Leucaltidae	<i>Leucettusa lancifera</i>	S1923	IN2015_C02_395_N201
Leucaltidae	<i>Leucettusa lancifera</i>	S1928	IN2015_C02_395_N202-e
Leucaltidae	<i>Leucettusa lancifera</i>	S1929	IN2015_C02_395_N202-f
Leucaltidae	<i>Leucettusa lancifera</i>	S1940	IN2015_C02_398_N135
Leucaltidae	<i>Leucettusa lancifera</i>	S1943	IN2015_C02_398_N135-c
Leucaltidae	<i>Leucettusa</i> n. sp. 1	S1859	IN2015_C02_128_N118
Leucaltidae	<i>Leucettusa</i> n. sp. 1	S1881	IN2015_C02_179_N124

Leucaltidae	<i>Leucettusa</i> n. sp. 1	S1899	IN2015_C02_181_N166
Leucaltidae	<i>Leucettusa</i> n. sp. 1	S1906	IN2015_C02_191_N156
Leucaltidae	<i>Leucettusa</i> n. sp. 1	S1911	IN2015_C02_395_N157
Leucaltidae	<i>Leucettusa</i> n. sp. 1	S1939	IN2015_C02_398_N132
Leucascidae	<i>Ascaltis</i> sp. 1	S1905	IN2015_C02_191_N148
Leucascidae	<i>Ascaltis</i> sp. 2	S1934	IN2015_C02_398_N125
Leucascidae	<i>Ascaltis</i> sp. 3	S1907	IN2015_C02_191_N157
Leucascidae	<i>Ascoleucetta compressa</i>	S1874	IN2015_C02_179_N122
Leucascidae	<i>Ascoleucetta compressa</i>	S1898	IN2015_C02_181_N160
Leucascidae	<i>Ascoleucetta compressa</i>	S1914	IN2015_C02_395_N188
Leucascidae	<i>Ascoleucetta compressa</i>	S1922	IN2015_C02_395_N198-b
Leucascidae	<i>Ascoleucetta compressa</i>	S1935	IN2015_C02_398_N125-a
Leucascidae	<i>Ascoleucetta</i> n. sp. 1	S1875	IN2015_C02_179_N122-a
Leucascidae	<i>Ascoleucetta</i> n. sp. 1	S1880	IN2015_C02_179_N122-f
Leucascidae	<i>Ascoleucetta</i> n. sp. 1	S1893	IN2015_C02_181_N133-e
Leucascidae	<i>Ascoleucetta</i> n. sp. 1	S1910	IN2015_C02_191_N157-c
Leucascidae	<i>Ascoleucetta</i> n. sp. 1	S1915	IN2015_C02_395_N188-a
Leucascidae	<i>Ascoleucetta</i> n. sp. 2	S1917	IN2015_C02_395_N188-c
Leucascidae	<i>Ascoleucetta</i> n. sp. 3	S1896	IN2015_C02_181_N156
Leucascidae	<i>Ascoleucetta</i> n. sp. 4	S1895	IN2015_C02_181_N155
Leucascidae	<i>Ascoleucetta</i> n. sp. 4	S1909	IN2015_C02_191_N157-b
Leucascidae	<i>Ascoleucetta</i> spp.	S1861	IN2015_C02_128_N156
Leucascidae	<i>Ascoleucetta</i> spp.	S1876	IN2015_C02_179_N122-b
Leucascidae	<i>Ascoleucetta</i> spp.	S1877	IN2015_C02_179_N122-c
Leucascidae	<i>Ascoleucetta</i> spp.	S1887	IN2015_C02_181_N127
Leucascidae	<i>Ascoleucetta</i> spp.	S1897	IN2015_C02_181_N160
Leucascidae	<i>Ascoleucetta</i> spp.	S1921	IN2015_C02_395_N198-a
Leucascidae	<i>Ascoleucetta</i> spp.	S1936	IN2015_C02_398_N125-c
Leucascidae	<i>Ascoleucetta</i> spp.	S1938	IN2015_C02_398_N125-f
Leucascidae	cf. <i>Ascaltis</i> sp. 3	S1953	IN2015_C02_398_N180
Leucettidae	<i>Leucetta</i> sp. 1	S1854	IN2015_C02_128_N105
Leucettidae	<i>Leucetta</i> sp. 1	S1859	IN2015_C02_128_N128
Leucettidae	<i>Leucetta</i> sp. 2	S1894	IN2015_C02_181_N142
Leucettidae	<i>Leucetta</i> sp. 2	S1908	IN2015_C02_191_N157-a
Leucettidae	<i>Leucetta</i> sp. 2	S1916	IN2015_C02_395_N188-b
Leucettidae	<i>Leucetta</i> sp. 2	S1920	IN2015_C02_395_N198
Leucettidae	<i>Leucetta</i> sp. 2	S1937	IN2015_C02_398_N125-e
	Clathrinid. sp. 1	S1891	IN2015_C02_181_N133-c
	Clathrinid. sp. 2	S1912	IN2015_C02_395_N158
	Clathrinid. sp. 2	S1951	IN2015_C02_398_N167
	Clathrinid. sp. 3	S1886	IN2015_C02_181_N116
	Clathrinid. sp. 4	S1930	IN2015_C02_395_N203-b
ORDER LEUCOSOLENIDA			
Amphoriscidae	<i>Leucilla</i> sp.	S1884	IN2015_C02_181_N114
cf. Jenkinidae	cf. Jenkinid. sp. 1	S1865	IN2015_C02_128_N157-d
cf. Jenkinidae	cf. Jenkinid. sp. 1	S1949	IN2015_C02_398_N146-c

Grantiidae	Grantiid spp.	S1863	IN2015_C02_128_N157-a
Grantiidae	Grantiid spp.	S1868	IN2015_C02_179_N121-a
Grantiidae	Grantiid spp.	S1889	IN2015_C02_181_N133
Grantiidae	Grantiid spp.	S1904	IN2015_C02_191_N147-a
Grantiidae	Grantiid spp.	S1925	IN2015_C02_395_N202-b
Grantiidae	Grantiid spp.	S1941	IN2015_C02_398_N135-a
Grantiidae	Grantiid spp.	S1946	IN2015_C02_398_N146
Grantiidae	<i>Aphroceras</i> sp.	S1856	IN2015_C02_128_N112_a(i)
Grantiidae	<i>Leucandra</i> sp.	S1927	IN2015_C02_395_N202-d
Grantiidae	<i>Ute</i> cf. <i>syconoides</i>	S1869	IN2015_C02_179_N121-b
Grantiidae	<i>Ute</i> cf. <i>syconoides</i>	S1882	IN2015_C02_181_N106
Grantiidae	<i>Ute</i> cf. <i>syconoides</i>	S1888	IN2015_C02_181_N132
Grantiidae	<i>Ute</i> cf. <i>syconoides</i>	S1900	IN2015_C02_191_N122
Grantiidae	<i>Ute</i> cf. <i>syconoides</i>	S1933	IN2015_C02_395_N204-b
Grantiidae	<i>Ute</i> cf. <i>syconoides</i>	S1952	IN2015_C02_398_N178
Grantiidae	<i>Ute</i> n. sp.	S1857	IN2015_C02_128_N112_a(ii)
Heteropiidae	<i>Grantessa</i> sp. 1	S1864	IN2015_C02_128_N157-c
Heteropiidae	<i>Grantessa</i> sp. 1	S1871	IN2015_C02_179_N121-d
Heteropiidae	<i>Grantessa</i> sp. 1	S1932	IN2015_C02_395_N204-a
Heteropiidae	<i>Grantessa</i> sp. 1	S1950	IN2015_C02_398_N146-d
Heteropiidae	<i>Sycettusa</i> cf. <i>tenuis</i>	S1873	IN2015_C02_179_N121-f
Heteropiidae	<i>Sycettusa</i> cf. <i>tenuis</i>	S1902	IN2015_C02_191_N146
Heteropiidae	<i>Sycettusa</i> cf. <i>tenuis</i>	S1919	IN2015_C02_395_N195
Heteropiidae	<i>Sycettusa</i> cf. <i>tenuis</i>	S1945	IN2015_C02_398_N136
Lelapiidae	<i>Lelapia australis</i>	S1926	IN2015_C02_395_N202-c
Lelapiidae	<i>Lelapia australis</i>	S1942	IN2015_C02_398_N135-b
Sycettidae	<i>Sycon</i> sp. 1	S1931	IN2015_C02_395_N204
Sycettidae	<i>Sycon</i> sp. 1	S1947	IN2015_C02_398_N146-a
Sycettidae	<i>Sycon</i> sp. 1	S1948	IN2015_C02_398_N146-b
Sycettidae	<i>Sycon</i> sp. 2	S1913	IN2015_C02_395_N181
	Leucosolenid. sp. 1	S1872	IN2015_C02_179_N121-e
	Leucosolenid. sp. 1	S1924	IN2015_C02_395_N202-a
	Leucosolenid. sp. 1	S1944	IN2015_C02_398_N135-e

SUBCLASS CALCINEA, ORDER: CLATHRINIDA

IN2015_C02_179_N122d *Arthuria* sp. (Calcinea, Clathrinida, Clathrinidae)



Depth: 209 (200) m.

Growth form: Clathroid with tight and regular anastomosed tubes (pseudopores).

Size: 2x2 cm.

Colour: Brownish cream (in ethanol).

Location of oscule: Osculum not found nor water collecting tubes.

Sponge surface: Uneven.

Aquiferous system: Asconoid.

Cortex: No cortex.

Atrium: Not present.

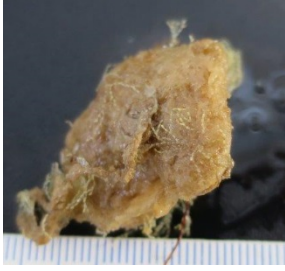
Spicule forms: Regular triactines. Tetractines are rare. Two size categories of triactines and tetractines; the bigger ones are on the external tubes and the smaller ones are scattered all over.

Actines of the smaller spicules are cylindrical, blunt or rounded, while the actines of the large spicules are conical and sharp, sometimes the basal actines are not equiradiate (unequal basal actines). Some sagittal triactines and tetactines. The apical actine of the tetractines is cylindrical, thin and smooth and undulating.

Reg triactines large	320x25, 380x30, 390x30
Reg triactines small	140x12, 125x10, 120x8, 150x15, 90x5
Tetractines	130x8, 140x8, 160x15, 145x7, 145x12, (apical actine 95)
Sagittal triactines	u:170x15 p:170x15; u:210x10 p:210x10; u:130x8 130x8
Sagittal tetractines	u:54x6 p:50x6

Remarks: New genus. Based on the molecular phylogeny, this species is assigned to *Arthuria* sp. (Klautau et al., 2013).

IN2015_C02_181_N115 *Clathrina* sp. (Calcinea, Clathrinida, Clathrinidae)



Depth: 283 m (200).

Growth form: Amorphous blob - Clathrinida – tightly irregular, anastomosing, tubes on surface, incorporating sand.

Size: 2x1 cm.

Colour: Beige, some slightly darker, sandy in ethanol.

Substrate attachment: Base of sponge spreads over surface.

Location of oscule: None.

Size of atrium: None.

Sponge surface: Porous; Covered in bryozoan.

Aquiferous system: Asconoid.

Organisation of skeleton: Disorganized.

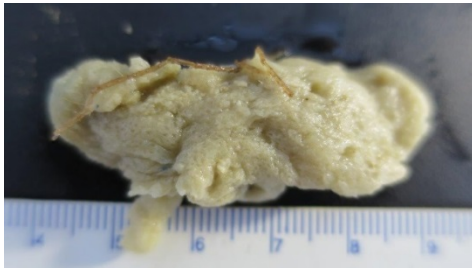
Cortex: None (sand encrusted).

Tubar/Choanosome: Tracts folded walls consist of overlying triactines; external tube peel – with two slizes of triactines, tangentially arranged.

Spicule forms: Dominant triactines, various sizes, but all very similar shaper. Most regular equiradiate, equiangular, conical sharp point. Rare diactines. Trichoxea.

Remarks/ notes: No cortex, no atrium = *Clathrina*. not *C. adusta* as this has tetractines. To confirm if new species, need to measure spicules and compare with *C. antofagastensis*, *C. laminoclathrata* (Victoria), *C. clara*, *C. sororcula* (probably not).

IN2015_C02_179_N122-e *Ernstia* n. sp. (Calcinea, Clathrinida, Clathrinidae)



Depth: 209 (200) m.

Growth form: Amorphous, wrinkled not stalked.

Size: 4.7x1.6 cm.

Colour: Grey white.

Body shape: Cormus with folds, formed by tightly and irregular anastomosed tubes.

Substrate attachment: No stalk, may have been lightly attached.

Location of oscule: Not obvious, no water collecting tubes seen.

Size of atrium: No atrium.

Sponge surface: Soft, wrinkled, anastomosed tubes/clathroid.

Aquiferous system: Asconoid?

Organisation of skeleton: Disorganized.

Cortex: Yes, sand inclusions, tangential tetractines with apical actines poking out (?) also tangential triactines. Large spicules on the external tubes (triactines – variable sizes) – small triactines and tetractines inside.

Tubar/Choanosome: “Tracts” with sand, tetractines with apical actines pointing into gaps. Channels lined by 2 types of tetractines with apical actines protruding into channel. One with long, sharp, very fine, slightly curved apical actine. Other thick, short, rounded.

Spicule forms: Same proportion of triactines and tetractines.

regular, equiradial, equiangular, conical actines.

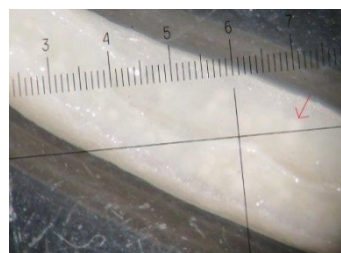
Dominated by large thick or large fine triactines, huge have conical and sharp on surface tubes, variable size. Smaller cylindrical and sharp – apical very thin, cylindrical, sharp and smooth.

Tetractines with smooth apical sharp spine straight.

Diatines (foreign siliceous) small with sharp ends and large with rounded ends.

Remarks: 1 specimen in jar. Many *Ernstia* spp are in the Clathrinidae paper as *Clathrina*, these were changed in 2013.

IN2015_C02_128_N112 *Leucettusa lancifera* Dendy 1924 (Calcinea, Clathrinida, Leucaltidae)



Depth: 221 m (200).

Growth form: Small flasks on stalks.

Size: 4x0.7 cm.

Colour: Beige to grey (live), beige (in ethanol).

Substrate attachment: Stalk.

Location of oscule: Single, apical, without a crown.

Size of atrium: 3 cm length.

Presence of membrane (in atrium): Yes.

Hispid atrium?: No. Canals into atrium: Yes, occasional.

Thickness of wall: Sponge wall is very thin. 1 mm.

Sponge surface: Smooth, tangential triactines.

Aquiferous system: Leuconoid.

Organisation of skeleton: Disorganised.

Cortex: Large armour of triactines. Continuous cortex, below it seems to have anastomosed tubes and then a continuous region. Cortical triactines are large, slightly conical/ sharp. Large tetractine.

Tubar/Choanosome: Collagenous, with small scattered regular triactines and tetractines

Atrium: collagenous. Very few tetractines projecting thin apical actines (big more cylindrical but very thick, sharp.).

Other: The sponge is full of embryos or larvae (some individuals in jar do not have reproductive material). Reproductive specimens are thicker with smaller oscules, and the gelatinous material around the reproductive material masks skeletal characteristics.

Spicule forms: The tiny triactines have frequently actines thicker near the centre tips are blunt.

Regular triactines:	675x40 μ m (largest), 540x36, 480x30, 450x35, 420x25
Tiny regular triactines:	24x6 μ m, 36x6 μ m
Tiny tetractine:	24x6 μ m

Remarks: The specimen fits *L. lancifera*, although the spicules in this specimen are slightly smaller than the description of *L. lancifera*. Gravid specimens are thick/gelatinous and the atrium is markedly reduced in size. NB: Photo of spicules from IN2015_C02_195_N202-e, photo of reproductive material from IN2015_C02_181_N133-b (scale not accurate – eyepiece micrometre)

Other specimens: Examined: (photos L to R) IN2015_C02 collection: 181_N133-b, 398_N135 (gravid); 395_N202-e (not gravid).



Not examined in detail: 128_N112-b, 128_N157, 131_N148, 179_N121, 179_N121-c, 181_N107, 181_N133-c, 181_N133-d, 191_N145, 191_N147, 395_N192, 395_N201, 395_N202-e, 395_N202-f, 398_N135, 398_N135-c

Distribution: Ross Sea, Antarctica; Three Kings-North Cape, New Zealand.

WPD link: <http://www.marinespecies.org/porifera/porifera.php?p=taxdetails&id=164724>

IN2015_C02_128_N118 *Leucettusa* n. sp. (Calcinea, Clathrinida, Leucaltidae)



Depth: 221 m (200).

Growth form: Single, thin tubes. The tubes are thinner at the base.

Size: 3.0x.5 cm.

Colour: Blue/green (live), brownish (in ethanol).

Location of oscule: Apical (as wide as tube), without a crown.

Size of atrium: Length of sponge.

Presence of membrane (in atrium): No.

Hispid atrium? Yes, the cortex has huge tetractines, with apical actines, which run through body wall and protrude into atrium Slight curve on apical actine.

Canals into atrium: No.

Thickness of wall: Very thin.

Sponge surface: Smooth.

Aquiferous system: Syconoid – but not a regular syconoid system. There are spherical chambers of leuconoid aquiferous system.

Organisation of skeleton: Inarticulate.

Cortex: Yes with huge tetractines with apical actines which run through body wall and protrude into atrium. Longitudinal triactines. The apical actine of the large teracines are sometimes undulated.

These actines frequently curved and penetrate the atrium – the undulation is at the end.

Tubar/Choanosome: Absent.

Subatrium: No subatrial skeleton.

Atrium: Very large, and wall is very thin – no atrial skeleton.

Special cell types: No.

Other: Maybe gravid _ inside the atrium are several black 'balls' (? Larvae) (in photo above).

Spicule forms:

Tetractines, regular, the apical actine is the longest one and the thickest. Actines are slightly conical and blunt.	Apical actine lengths eg. 825x24, 750x22, 780x24, 675x24, 750x25. Eg of two other spicules apical and basal lengths: ap. 780x30 bas. 360x20 ; ap 825x30 bas. 400x25
Triactines, regular, actines are cylindrical and blunt.	300x18, 420x15, 270x15, 275x12, 190x18

Notes/Remarks: Not a classical looking *Leucettusa*, but this is the best fit genus for this sponge in this family. Possibly a new genus - Closest species that lacks subatrial skeleton in Calcinea.

Other specimens: IN2015_C02 collection: 179_N124; 181_N166; 395_N157; 191_N156; 398_N132

IN2015_C02_191_N148 *Asclatis* sp. 1 (Calcinea, Clathrinida, Leucascidae)



Depth: 218 m (200).

Growth form: Small urn-like.

Size: 2.5x 0.5 cm.

Colour: White in ethanol.

Substrate attachment: Stalk, attached to gastropod shell.

Location of oscule: Apical.

Size of atrium: Small close to opening 5 mm long x 2 mm.

Hispid atrium: No.

Canals into atrium: Not obvious.

Thickness of wall: 3 mm.

Sponge surface: Smooth.

Aquiferous system: Asconoid.

Organisation of skeleton: Not distinct.

Atrium: No membrane (because the tubes seen in the wall are seen in the atrium)

Other: Sand incorporated, holothurian spicules, plus branching dendritic inclusions (relic).

Spicule forms:

Regular sagittal triactines	u: 190 μ m p: 115 μ m
Regular triactine	90 μ m
Regular tetractine	150 μ m
apical actine smooth (not measured)	
Regular parasagittal triactine	P: 95 μ m, u:215 μ m

Remarks: Surface not clathrinid. It is translucent.

IN2015_C02_398_N125 *Asclatis* sp. 2 (Calcinea, Clathrinida, Leucascidae)



Depth: 199 (200) m.

Growth form: Anastomosing = cormus.

Size: 2.5 cm. Small.

Colour: Beige in ethanol.

Location of oscule: Apical. 2-3 mm.

Size of atrium: Wide 2.5 mm.

Presence of membrane (in atrium): No.

Hispid atrium?: Yes.

Sponge surface: Porous/clathrinid.

Aquiferous system: Asconoid because no membrane in the atrium.

Organisation of skeleton: disorganized.

Cortical skel: Yes, narrow, composed of many small triactines, large triactines of surface are also visible throughout choanosome.

Tubar/Choanosomal: Large triactines, and small tetractines.

Atrial: Tetractine apical actine extend into atrium.

Spicule forms: Large tetractines very rare, microdiactines rare, small tetractine apical actine long and thin with small hook at apex.

IN2015_C02_191_N157 *Asclatis* sp. 3 (Calcinea, Clathrinida, Leucascidae)



Depth: 218 m (200).

Growth form: Small, soft solid.

Size: 1x0.8 cm.

Colour: White in ethanol.

Location of oscule: Not clear, apical.

Size of atrium: short apically, <1 mm wide.

Presence of membrane (in atrium): No.

Hispid atrium?: Yes

Sponge surface: Smooth.

Aquiferous system: Asconoid.

Organisation of skeleton: Disorganized.

Cortical skel: Large triactines, contains foreign material including holothurian spicules

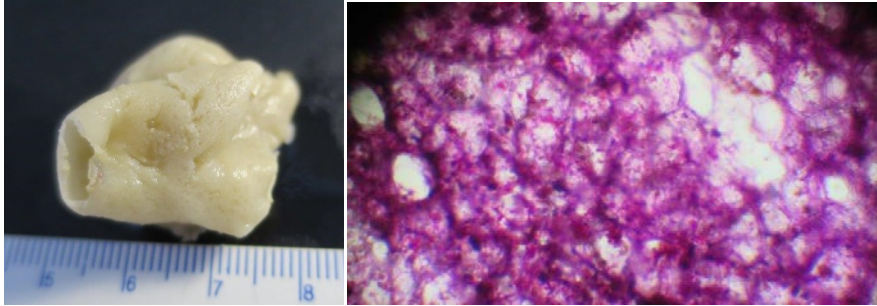
Tubar/Choanosomal: Large triactines, small triactines disorganized, tetractines around pores, accreted material in choanosome, perhaps mainly around canals.

Spicule forms: Triactines (regular and parasagittal) and tetractines (similar size to small triactines).

Apical actine of the tetractine is conical, short and blunt.

Remarks: Compared with IN2015_C02_191_N148 similar surface and spicules except that 191_N157 has larger triactines, and no stalk. Also has foreign material including holothurian spicules seen in 191_N148. Both species have a conical, short, blunt apical actine on the small tetractines. 191_N157 different from 398_N125 as latter has very visible pseudopores. In 191_N157 pseudopores are masked by thicker membrane externally in cortex. Both 191_N148 and 191_N157 are unusually soft for *Asclatis*.

IN2015_C02_398_N180 cf. *Asclatis* sp. 3 (Calcinea, Clathrinida, Leucascidae)



Depth: 199 (200) m.

Growth form: Wide tube, anastomosing = cormus with pseudopores.

Size: 3 cm.

Colour: White in ethanol.

Location of oscule: apical, wide.

Size of atrium: Large.

Presence of membrane (in atrium): Yes.

Hispid atrium? No.

Canals into atrium: Yes.

Thickness of wall: Thick 3 mm.

Sponge surface: Smooth; spicules not visible.

Aquiferous system: Solenoid with membrane.

Organisation of skeleton: Disorganised

Cortex: Yes, thin, with triactines, blends into choanosomal skeleton.

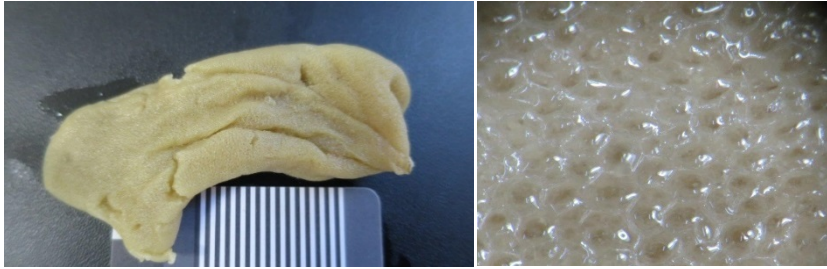
Tubar/Choanosome: Disorganized with small triactines and tetractines.

Atrium: tetractines. Tetractine short apical actine, tapering and conical.

Spicule forms: No large triactines, mainly small triactines, tetractines same size as small triactines.

Remarks: Similar to WAM Z97201 *Leucetta* sp, in external surface characters, but in the skeletal prep *Leucetta* sp has large triactines not seen in 398_180. Also 398_180 has a large central atrium apparently on in *Leucetta* sp. But not *Leucetta*. Needs molecular work. Problem is can't see choanocyte chambers or anastomosing tubes.

IN2015_C02_179_N122 *Ascoleucetta compressa* Dendy & Frederick, 1924 (Calcinea, Clathrinida, Leucasidae)



Depth: 209 (200) m.

Colour: Cream (live), Beige (ethanol).

Size: 4x3 cm.

Body shape: Tube to larger vase like. Tightly and regularly anastomosed tubes with regular pseudopores.

Substrate attachment: Unknown.

Location of oscule: One at top of sponges. Large in large sample (pictured)

Size of atrium: Large.

Presence of membrane (in atrium): Yes.

Sponge surface: Hexagonal mesh of spicules.

Special cell types: No

Spicule forms:

Regular, Triactines	350x30 μ m actines are conical
Triactine small	85x15 μ m
Regular tetractines. Apical actine smooth	
Trichoxeas	

Other specimens: IN2015_C02 collection: 181_N160-a, 395_N188

395_N198-b, 398_N125-a. WAM Z31501, Z49223.

Distribution: Houtman (West Central Australian Shelf)

Link to WPD: <http://www.marinespecies.org/porifera/porifera.php?p=taxdetails&id=164732>

IN2015_C02_179_N122a *Ascoleucetta* n. sp. 1 (Calcinea, Clathrinida, Leucascidae)



Depth: 209 (200) m.

Growth form: Clathroid cormus covered by a cortex and with atrial membrane. Tightly anastomosed tubes.

Size: 4 x1 cm.

Colour: Beige.

Substrate attachment: Side of sponge attached to bryozoan.

Location of oscule: One apical osculum.

Presence of membrane (in atrium): Yes.

Sponge surface: Tightly anastomosing tubes. Pseudopores without ornamentation.

Aquiferous system: Solenoid.

Cortex: Present. Large cortical triactines.

Tubar/Choanosome: small choanosomal triactines and tetractines (very thin, and long apical).

Spicule forms: Triactines and fewer tetractines (140-160 μ m). The apical actines are very thin, cylindrical, sharp and smooth (240 μ m); No trichoxeas or micro diactines.

Remarks: Leucascidae has three genera: *Asclatis*, *Leucascus* and *Ascoleucetta*. *Asclatis* has asconoid aquiferous system while *Leucascus* and *Ascoleucetta* have solenoid aquiferous system. So since this specimen has solenoid system, we need to search for the apical actine of the tetractines to see if it has spines or not. If apical actines have spines, then it is *Leucascus* and if not, *Ascoleucetta*.

Therefore, the present species is *Ascoleucetta*.

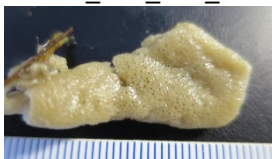
Other specimens:

IN2015_C02_395_188a Identical to 179_122a but with more large cortical triactines. There are also



big triactines and tetractines – conical and sharp. Small triactines and tetractines (cylindrical blunt – very thin and long apical actine) Small, with protrusions; remark other specimens in jar different, only refer to specimen in small vial with yellow lid);

IN2015_C02_179_122f



Micro? diactines present but uncommon (not trichoxeas)? blunt on one end and sharp on the other); Large regular triactines; Small regular triactines; Very small regular triactines; Large and small tetractines; Large tetractine has short, straight, conical, smooth and blunt apical actin. Small tetractine has thin, long and slight bent (closer to the apex) apical actine,

many are straight like *A. ventricosa*. Some small tetractines have a very wavy apical actine.

Notes: 2 specimens in jar, very small tetractines and triactines may be developmental.

Remarks: much softer texture than 395_188a. Similarly, much softer texture than 395_188c, and 179_122f does not have the large triactines of *Ascoleucetta* n.sp.2. Comparison to 181_156 shows the softness is similar, but 181_156 has thin, long, curved conical apical actines, with curve closer to apex than base, also 179_122f has very small and small triactines not seen n.sp.3. Compared to *A. compressa* (179_122) 179_122f does not have large triactines. Compared to *A. ventricosa* does not have very small tetractines and triactines and *A. ventricosa* has smaller diactines. No ornamentation around the pseudopores.

Also in IN2015_C02 collection: 181_N133e, 191_N157c.

IN2015_C02_395_N188-c *Ascoleucetta* n. sp. 2 (Calcinea, Clathrinida, Leucascidae)



Depth: 189 m (200).

Growth form: Anastomosing = cormus. Tubes very tight.

Colour: Cream in ethanol.

Location of oscule: Apical, Raised pinprick.

Size of atrium: ~ 1 mm.

Presence of membrane (in atrium): Yes.

Hispid atrium?: No.

Sponge surface: No ornamentation on pseudopores

Aquiferous system: Solenoid.

Organisation of skeleton: Disorganised

Cortex: Cortical skeleton present, large triactines – 2 size categories.

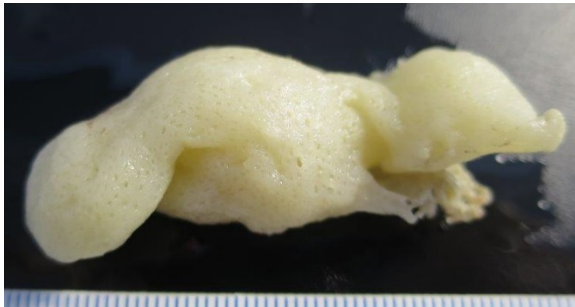
Tubar/Choanosome: Large triactines in choanoderm perpendicular to atrium and cortex, small triactines conical with blunt tips.

Atrium: No chactines protruding into atrium, mostly triactines.

Spicule forms: Few tetractines with thin, smooth apical actine. Small triactines and tetractines slightly conical, blunt to rounded apical actine very thin, cylindrical.

Remarks: Not like new sp. 1 because does not have tetractine (chiactine) with long actine extending into choanoderm. New sp. 2 does not have trichoxea or microdiactines.

IN2015_C02_181_N156 *Ascoleucetta* n. sp. 3 (Calcinea, Clathrinida, Leucascidae)



Depth: 283 m (200).

Growth form: Anastomosing = cormus.

Size: 6 cm long.

Colour: White in ethanol.

Oscules: 3 oscules apically.

Location of oscule: Large ~3mm, apical.

Size of atrium: ~4 mm.

Presence of membrane (in atrium): Yes.

Hispid atrium?: No.

Sponge surface: Fine hispid, pseudopores, no ornamentation.

Aquiferous system: Solenoid.

Organisation of skeleton: Disorganized.

Cortex: Thin cortex, sagittal triactines, large (not huge) triactines and small triactines.

Tubar/Choanosome: Small triactines and tetractines.

Spicule forms: Small and larger tetractine present, conical sharp; Large tetractines uncommon;

Tetractines apical actine long, thin and smooth (slightly curved apically).

Remarks: No microdiactines or trichoxeas.

IN2015_C02_181_N155 *Ascoleucetta* n. sp. 4 (Calcinea, Clathrinida, Leucascidae)



Depth: 283 m (200).

Growth form: Small, subspherical, 'upside down teardrop', narrow at base near attachment.

Size: 3x1 cm.

Colour: Pale apricot pink (live) cream in ethanol.

Substrate attachment: Narrow at base where attached.

Location of oscule: Apical. Apical area has appearance of being pinched in.

Size of atrium: One third size of sponge.

Presence of membrane (in atrium): Yes.

Hispid atrium?: Yes.

Canals into atrium: Yes.

Thickness of wall: Very wide between atrium and cortex. Looser deeper into sponge compared to surface, full of anastomosing tubes.

Sponge surface: Porous, sponge has a wrinkled pinched look at one end. Hispid, large triactines projecting. Tightly packed anastomosing tubes.

Aquiferous system: Solenoid.

Cortex: Layer of triactines.

Spicule forms

Regular triactines of various sizes	eg (3 spicules actine lengths) 45, 110, 280 μ m
Tetractines, appear to be only in membrane of atrium. Apical actines are smooth, undulating, long, sharp 90 μ m length.	eg (2 spicules actine lengths) 120, 150 μ m
Trichoxeas in pseudopores	

Remarks: Apical actine of the tetractines project into the lumen of the choanocytic tubes.

Other specimens: IN2015_C02_191_N157-b and WAM Z31503 (Albany 179 m).

IN2015_C02_128_N105 *Leucetta* sp. 1 (Calcinea, Clathrinida, Leucettidae)



Depth: 221 m (200).

Growth form: Massive, angular.

Size: 9 x 5 cm.

Colour: Pastel aqua and white (live), khaki (in ethanol).

Location of oscule: Sponge broken up, hard to tell.

Size of atrium: Large.

Canals into atrium: Yes.

Thickness of wall: Thick.

Sponge surface: Very large triactines penetrate surface.

Aquiferous system: Leuconoid.

Organisation of skeleton: Disorganized.

Cortex: Yes, layer of triactines, cells with inclusions.

Subcortex: No lacunae in subcortex.

Atrium: Smooth, large triactines in skeleton.

Lacunae: Not subcortical.

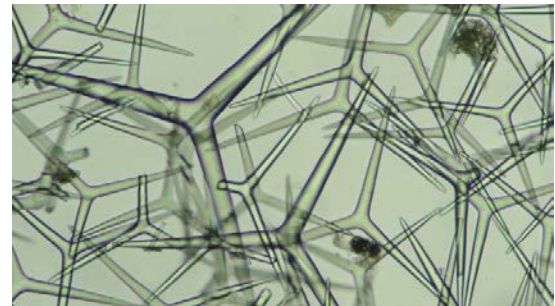
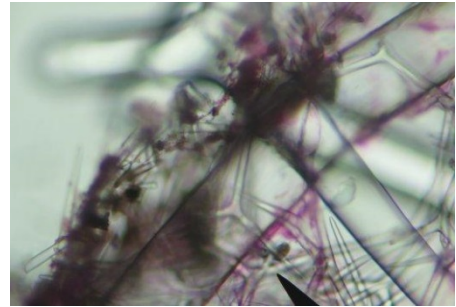
Special cell types: Cells with inclusions in cortex?

Spicule forms: Regular triactines of various sizes, smooth, straight, largest ones, conical, smooth, sharp ends. Rare tetractines in choanosomal skeleton, apical actine smooth, short, slightly curved at end. Apical actine poking into lacunae in choanosomal skeleton. Surface peel section (unstained) saw tetractines, stubby smooth, rounded, apical actine.

Notes/Remarks: There are two spp. of *Leucetta* listed on WPD for Australia *L. inginis*, and *L. villosa* (probably tropical shallow reef).

Other specimens: IN2015_C02 collection: 128_N128; 395_N158; 398_N167
WAM Z31504, Z35330.

IN2015_C02_181_N142 *Leucetta* sp. 2 (Calcinea, Clathrinida, Leucettidae)



Depth: 283 m (200).

Growth form: Flask like on short stalk.

Size: 2.2 cm high x 1.44 cm wide.

Colour: Beige (in ethanol).

Substrate attachment: Short stalk attached to dead coral/rock.

Location of oscule: Apical, sand encrusted around rim.

Size of atrium: 1/3 length of sponge.

Hispid atrium?: Yes.

Thickness of wall: thick, 4-6 mm.

Sponge surface: Very hispid, large triactines.

Aquiferous system: Leuconoid.

Organisation of skeleton: Disorganised.

Cortex: Yes, huge tangential triactines, other sized triactines also tangential. Some tetractines, apical spine sticking out.

Tubar/Choanosome: Triactines dominant.

Subatrium: Tetractines and diactines (?) protruding back into subatrium.

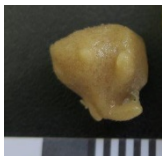
Atrium: Tangential dense layer of diactines, triactines.

Lacunae: Canals surrounded by triactines, make a border around lacunae (gaps).

Special cell types: Some cells with inclusions.

Spicule forms: Regular triactines. 180 μ m, 2-3 size classes, pointed ends. Tetractines, 180 μ m, apical is straight, sharp, smooth.

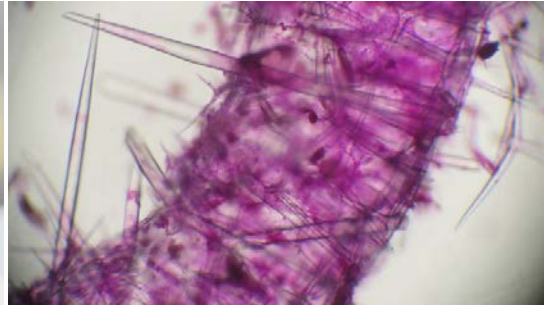
Other specimens: SAM S1463 (ID L. Goudie) and IN2015_C02 collection: 191_N157-a, 395_N198 398_N125-e, 395_N188-b (description and photo below).



Amorphous urn like, Beige in ethanol. Single at top of sponge. Spiculose, firm to hard. Porous/clathrinid, spicular, Atrium only small. Disorganized skeleton, cortex contains tangential triactines, include sagittal triactine. Some tetractines, apical protrudes out of cortex.

SUBCLASS CALCARONEA, ORDER LEUCOSOLINIDA

IN2015_C02_181_N114 *Leucilla* sp. (Calcaronea, Leucosolenida, Amphoriscidae)



Depth: 283 m (200).

Growth form: Tube.

Size: 3x0.5 cm.

Colour: Whitish cream.

Location of oscule: Single apical, wide.

Sponge surface: Hispid.

Aquiferous system: Leuconoid.

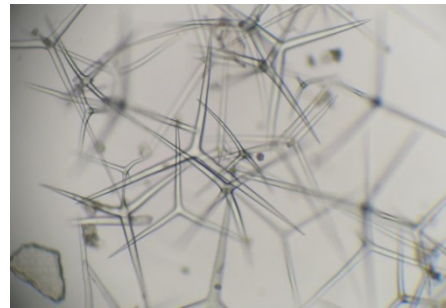
Hispid atrium?: Yes.

Organisation of skeleton: Inarticulated.

Cortex: Present with diactines.

Subcortex: Yes.

Spicules: Sagittal triactines, diactines, subatrial triactines and tetractines in the atrial skeleton; diactines penetrate up to subatrium. Outer side of the diactine is thicker than the inside ones.



Remarks: In young sponges, we may miss the subatrial layer between the atrial skeleton and subatrial free spicules while the matured ones has a distinct cortex and free subatrial pseudosagittal triactines.

IN2015_C02_128_N112a(i) *Aphroceras* sp. (Calcaronea, Leucosolenida, Grantiidae)



Depth: 221 m (200).

Growth form: Solitary tubes.

Size: 3 cm length, 3-5 mm diam.

Colour: Cream - lighter white at ends (in ethanol).

Substrate attachment: Yes by peduncle.

Location of oscule: Single, apical with trichox crown.

Location and size of atrium: Single central atrium, 2-4 mm.

Presence of membrane (in atrium): No.

Hispid atrium? Yes.

Canals into atrium: Occasional (leuconoid), irregular shape and arrangement.

Thickness of wall: Up to 1 mm thick.

Sponge surface: Very hispid, huge longitudinal diactines at surface.

Aquiferous system: Leuconoid.

Organisation of skeleton: Disorganised.

Cortex: Longitudinal diactines (just below, but probably still part of cortex). Dense tangential small triactines, cortical small diactines, perpendicular in bundles (organized and regular).

Tubar/Choanosome: mostly disorganized, some slight "tracts". Canals with tetractines (actines conical, sharp, longer unpaired, very short actine).

Atrium: Dense tangential layer of triactines, and rare tetractines.

Other: Chambers surrounded by tetractines, apical actine poking into chamber.

Spicule forms: Irregular; very large diactines (900µm x 50µm) ; sagittal triactines (u: 75µm p:75 µm, u:525 µm p:300 µm); tetractines with long apical actine; pseudosagittal triactines?

Remarks: Probably a new species. *Aphroceras* because these specimens have huge diactines only on the surface (longitudinal) as part of the cortex. It is not *A. cataphracta* or *A. alcornis*.

IN2015_C02_395_N202-d *Leucandra* sp. (Calcaronea, Leucosolenida, Grantiidae)



Depth: 189 m (200).

Growth form: Small urn like.

Size: 30 mm long and 5 mm width.

Colour: Cream in ethanol.

Substrate attachment: Stalked.

Location of oscule: Single apical, oscular crown hashed (criss-crossed regularly shown in micro photo).

Size of atrium: Length of sponge.

Presence of membrane (in atrium): Yes.

Hispid atrium: Yes but not regularly, the spicules protruding maybe so large that they just point in, and this is not the apical actines of tetractines.

Canals into atrium: Yes, occasional.

Thickness of wall: 1 mm.

Sponge surface: Smooth, but can see tangential irregular triactines.

Aquiferous system: Leuconoid.

Organisation of skeleton: Condensed articulated directly below crown, otherwise disorganised.

Cortex: Yes, tangential triactines.

Atrium: Same as choanosome.

Lacunae: No.

Special cell types: No.

Spicule forms:

Common _ Irregular triactines	(almost t_shaped) paired 495x30 μm , unpaired 480 μm
Regular triactines	700x75 μm
Crown:	diactines, and tetractines
Microdiactines	serrated (from an atrial membrane peel)

Remarks: no subatrial skeleton, but still best fit in *Leucandra*. But this is not a monophyletic genus.

IN2015_C02_181_N106 *Ute cf. syconoides* (Carter, 1886) (Calcaronea, Leucosolenida, Grantiidae)



Depth: 283 m (200).

Colour: Beige (live).

Size: 4x2 cm.

Body shape: Fused tubes, digitate.

Location of oscule: Apical on each tube.

Canals into atrium?: Yes.

Sponge surface: Diactinal spicules can be seen running longitudinally on surface. When cut there are regular pores on atrium surface. Crown of trichox.

Aquiferous system: Syconoid.

Organisation of skeleton: Articulated, inarticulated, disorganized) Articulated.

Tubar/Choanosome: tubar, triactines.

Subatrium: Triactines, tetractines.

Atrium: Tetractines, apical actine protruding into atrium.

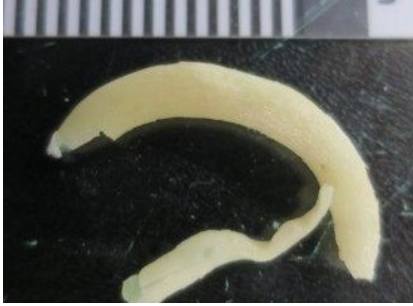
Spicule forms: Sagittal triactines, tetractines.

Other specimens: IN2015_C02 collection: 179_N121-b, 181_N132, 191_N122, 395_N204-b, 398_N178.

Distribution of species: Australia and New Zealand.

WPD link: <http://www.marinespecies.org/porifera/porifera.php?p=taxdetails&id=164422>

IN2015_C02_128_N112a(ii) *Ute* n. sp. (Calcaronea, Leucosolenida, Grantiidae)



Depth: 221 m (200).

Growth form: Solitary tubes

Size: 2x0.3 cm.

Colour: Cream (in ethanol).

Substrate attachment: Narrow end of sponge forms peduncle.

Location of oscule: Single, apical with crown.

Location and size of atrium: Length of sponge.

Presence of membrane (in atrium): No.

Hispid atrium? Yes

Canals into atrium: Regular size and arrangement.

Thickness of wall: Up to 1 mm thick.

Sponge surface: Hispid, large diactines protruding, can see syconoid arrangement of chambers clearly.

Aquiferous system: Syconoid.

Organisation of skeleton: Articulated.

Cortex: Giant diactines in longitudinal tracts, tangential diactines, cortical triactines (small) – thin layer of triactines.

Tubar/Choanosome: Articulated, very sagittal triactines, unpaired actines longer than paired. Apical actine pointed toward cortex surface.

Atrium: Tangential layer of tetractines – sagittal, apical actine conical, sharp, smooth, bent – protrude into atrium. Tetractines have very long apical actines, quite robust, paired and unpaired actines very long. Bundles seen in atrial peel, composed of tetractines, the unpaired actine.

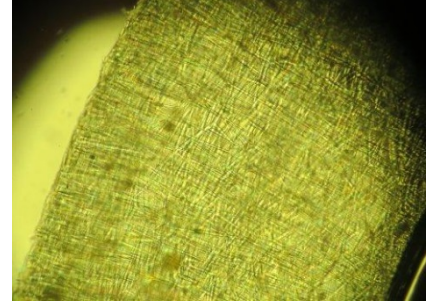
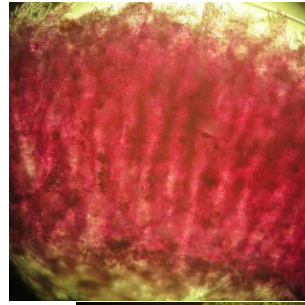
Triactines very long unpaired actines.

Other: oscular crown: Some trichoxea tangential.

Spicule forms: Paired actines of choanosomal triactines some curved slightly, some straight.

Remarks: New species.

IN2015_C02_395_N204-a *Grantessa* sp. (Calcaronea, Leucosolinida, Heteropiidae)



Depth: 189 m (200).

Growth form: Tube

Size: 2.5x0.3 cm.

Colour: Cream in ethanol, oscule crown is white.

Substrate attachment: Small stalk attached to hard substrate
Location of oscule: Single, apical. In the oscular 'crown' the horizontal spicules are most obvious, but at the top there is a dominance of vertical spicules which form a defined rim (micro photo).

Size of atrium: 20 x 1 cm

Presence of membrane (in atrium): No

Hispid atrium?: Yes.

Canals into atrium: Yes close together.

Thickness of wall: 1 mm.

Sponge surface: Tufts of spicules at the end of apical cones, makes the surface look microconulose.

Aquiferous system: Syconoid (shown in photo of stained skeleton).

Organisation of skeleton: Articulated.

Cortex: Yes.

Subcortex: Radial tubes fully coalescent.

Subatrium: Condensed skeleton of irregular triactines with unpaired actine towards atrium.

Lacunae: No.

Special cell types: No.

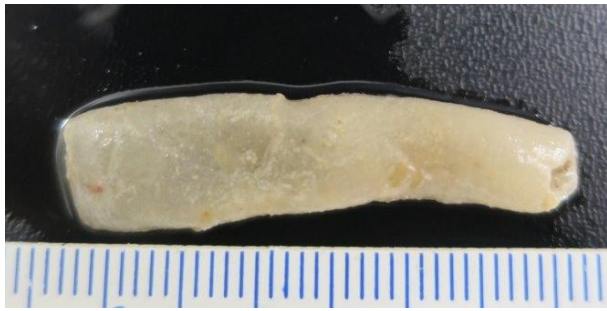
Spicule forms:

Irregular sagittal triactines	p: 90x8 u: 96x10 µm
Irregular sagittal triactines	p1:132x10 p2: 120x10 u:260x10
Oxeas	210x(6-12) µm foreign!

Remarks: Cannot see diactines in cone tufts.

Other specimens: not examined in detail: IN2015_C02_128_N157-c, IN2015_C02_179_N121-d, IN2015_C02_398_N146-d.

IN2015_C02_191_N146 *Sycettusa cf. tenuis* Borojevic and Klautau, 2000 (Calcaronea, Leucosolinida, Heteropiidae)



Depth: 218 m (200).

Growth form: Tubular with apical osculum surrounded by tufts of trichoxeas

Size: 3.5 x 0.5 cm.

Colour: White in ethanol.

Oscules: Single apical, almost as wide as tube. Small crown.

Substrate attachment: Sponge is broken, no attachment point seen.

Location of oscule: Apical

Size of atrium: Length of sponge, large, central.

Thickness of wall: Thin.

Sponge surface: Smooth.

Aquiferous system: Syconoid.

Organisation of skeleton: Inarticulated. Cortical and subatrial skeleton formed by sagittal triactines and tetractines.

Cortex: Yes. Tangential triactines.

Subcortex: Composed of pseudosagittal triactines.

Subatrium: Sagittal triactines and tetractines. The unpaired actine points centrifugally. The unpaired actine is longer and a little thicker. Actines are slightly conical and sharp, sometimes one of the paired actines is shorter. The apical actine of the tetractine is shorter than the basal ones, conical, sharp and smoother.

Atrium: Atrial skeleton composed of triactines. They are sagittal but curved. Actines are slightly conical and sharp. Rare tetractines. The atrial triactines seem larger than the cortical triactines.

Spicule forms: Cortical pseudosagittal triactines; subatrial sagittal triactines and tetractines.

Tetractines	Apical: 480x18 µm, basal: 180x15 µm
Pseudosagittal triactines (3 spicules measured)	p1: 115x15, p2: 415x15 u: 80x15 µm; p1: 95x12 µm p2: 330x12 u: 100x12 µm; p1: 115x12 p2:390x12 µm u: 66x12 µm
Sagittal triactines (3 spicules measured)	p: 240x15 u: 290x12 µm; p: 235x18 µm u: 330x18 µm; p: 170x12 u: 450x18 µm
Small triactines (3 spicules measured)	p: 60x6 u: 90x6 µm; p: 60x6 u: 100x6 µm; p: 50x6 u: 100x6 µm

Remarks: The skeleton is very similar to *Sycettusa simplex* from Africa, but our specimen is tubular, seems to be solitary, while *S. simplex* has anastomosed tubes.

Other specimens: IN2015_C02_395_N195 shares the same skeletal structure and spicule organization.



Not examined in detail: IN2015_C02_179_N121-f, IN2015_C02_398_N136.

Distribution: New Caledonia.

IN2015_C02_398_N146-c cf. Jenkinid sp. (Calcaronea, Leucosolenida, Jenkinidae)



Depth: 199 (200) m.

Growth form: Tube.

Colour: White (in ethanol).

Size: 2.5x0.1 cm.

Substrate attachment: Small stalk.

Location of oscule: Apical, tetractines at base of oscule crown, small crown.

Size of atrium: 20 mm.

Presence of membrane (in atrium): Yes.

Hispid atrium? No, but in oscular region, tetractines apical actine projecting in lumen.

Canals into atrium: not obvious.

Thickness of wall: 1 mm.

Sponge surface: Smooth.

Aquiferous system: Leuconoid.

Organisation of skeleton: Tangential spicules layered throughout.

Cortex: Triactine actines tangential on surface; scattered spined microdiactines

Tubar/Choanosome: Larger triactines.

Subatrium: Not present.

Atrium: Microdiactines.

Lacunae: No.

Special cell types: No.

Spicule forms:

Common: irregular sagittal triactines	p: 495 μ m u: 495 μ m; u: 435 p:390; p:460x30
Rare (choanosomal): regular triactines	480x60 μ m;
Base of crown: tetractine apical actine	570 μ m
Microdiactines – in atrium, cortex, choanosome.	spined

Remarks: This may be a new family, or a new genus within Jenkinidae (or Ampramorphidae) not exactly in either of these families but best fit because microdiactines in cortex, possibility of no subatrial skeleton. This specimen does not have chactines typical of the family Ampramorphidae, and has tangential spicules, like Jenkinidae.

Other specimens: Not examined in detail: IN2015_C02_128_N157-d.

IN2015_C02_395_N202-c *Lelapia australis* Gray 1867 (Calcaronea, Leucosolenida, Lelapiidae)



Depth: 189 m (200).

Growth form: Long thin tube.

Colour: Beige in ethanol.

Size: 9.0x0.4 cm.

Substrate attachment: Unknown.

Location of oscule: Apical, no crown.

Atrium: 90 mm long, 1 mm wide, sagittal triactines, and diactines.

Atrial membrane: No

Hispid atrium?: No.

Thickness of wall: 0.5 mm.

Sponge surface: Large diactinal spicules can be seen running longitudinally.

Aquiferous system: Leuconoid.

Organisation of skeleton: Articulated

Cortex: Long diactines, closely side by side.

Subcortex: Thin layer of triactines over large diactines.

Tubar/Choanosome: bundles of diapasons, these were seen in the spicule prep, and a fresh cut of the choanosome, they were not visible in the stained skeletal preparation.

Atrium: lined with thin layer of triactines, but can see the diactines throughout.

Spicule forms

large diactines	900x50 µm
small diactine	525x20 µm
Diapasons – cortical (in micro photo above)	total length 300 µm
irregular sagittal triactines	u: 460x5-10 µm p:190
irregular sagittal tetractine	ap:300x8 µm ba:150x16 µm

Remarks: Usually in the Pacific. This genus is quite rare. Similar to one from Japan (*L. nipponica*)

Species identified using Burton 1963.

Other specimens: Not examined in detail: IN2015_C02_398_N135-b

Distribution: South East Australian Shelf.

WPD link: <http://www.marinespecies.org/porifera/porifera.php?p=taxdetails&id=164502>

IN2015_C02_398_N146-a *Sycon* sp. 1 (Calcaronea, Leucosolenida, Sycettidae)



Depth: 199 (200) m.

Growth form: Tube.

Size: 2.5x0.3 cm.

Colour: Beige in ethanol.

Location of oscule: Apical, Conical oscular crown. White ring on top of sponge before oscular crown.

Hispid atrium?: Yes.

Canals into atrium: Packed together.

Sponge surface: Smooth.

Aquiferous system: Syconoid (see photo of stained slide taken of additional specimen 398_146-b).

Organisation of skeleton: Articulated tubar.

Cortex: No cortex , distal cones, bouquet of diactines on top of distal cones.

Tubar/Choanosome: Articulated.

Atrium: Tetractines apical actines protruding.

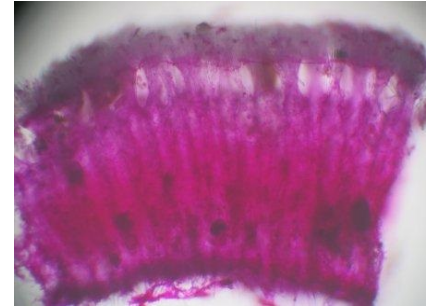
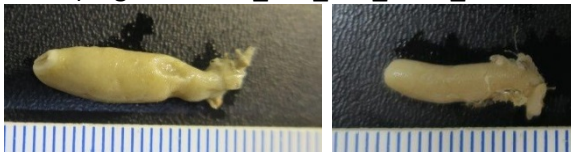
Lacunae: No.

Special cell types: No.

Spicule forms:

Diactines	central or terminal swelling, slightly bent 75-270µm
Saggital triactines	U:225x15 µm, p: actines 120 µm; u: 60um, p: 120x7 µm;
Pseudosagittal triactine	90 µm/165 µm/225 µm;
Tetractines	basal actines u: 300 µm p:210 µm

Other specimens: examined: photos Left: IN2015_C02_395_N204 (grey green in colour with slanted oscule) Right: IN2015_C02_398_N146_b.



IN2015_C02_395_N181 *Sycon* sp 2 (Calcaronea, Leucosolenida, Sycettidae)



Depth: 189 m (200).

Growth form: Small urn/tube.

Size: 1.5x0.4 cm.

Colour: Ruddy brown/pinkish (in ethanol).

Substrate attachment: Short stalk, peduncle.

Location of oscule: Apical, ring of spicules.

Size of atrium: Length of sponge.

Presence of membrane (in atrium): No.

Hispid atrium? Yes slightly.

Canals into atrium: Yes, many enter atrium.

Thickness of wall: 2 mm.

Sponge surface: Porous/clathrinid. Under the microscope the layout looks brick_like regular. (hispid, large spicules protruding).

Aquiferous system: Syconoid.

Organisation of skeleton: Articulated.

Cortex: No, absent.

Subcortex: Distal cone – large diactine, triactines, unpaired actine forming cone with diactines.

Tubar/Choanosome: Triactines + tetractines (thicker than distal cone ones).

Subatrium: Triactines only large unpaired actines.

Atrium: Chunky tetractines tangential in atrium short stubby apical actines, protrude into atrium.

Lacunae: No.

Special cell types: No.

Spicule forms: Very large diactines: conical fusiform shape; Triactines, diff types in distal cone, tubar and atrial.

CLASS: DEMOSPONGIAE

Notes on the identification and mudmaps of Demospongiae

Determinations are by authors unless otherwise noted. The keys in Hooper and van Soest (2002) were used to identify sponges to genus where possible. Orders and families for Demospongiae are given following the revised classification (Morrow and Cardenas, 2015). Sponges are arranged alphabetically by Subclass, Order, Family and Genus. Distribution data is provided for sponges that were identified to species. Sponges are arranged below by subclass, then alphabetically by order, family, genus and species/OTU. Vouchers along with skeletal and spicule preparations are lodged at the South Australian Museum, South Australia. Average depth of trawl is given with target depth in brackets.

Table 7. List of all sponges of class Demospongiae, collected on IN2015_C02 with museum and field numbers

Family	Genus and Species	SAMA Number	Field Identifier
ORDER AXINELLIDA			
Axinellidae	Axinellid. sp. 1	S2347	IN2015_C02_128_N137
Axinellidae	Axinellid. sp. 2	S2351	IN2015_C02_128_N141
Axinellidae	Axinellid. sp. 3	S2319	IN2015_C02_126_N177
Axinellidae	Axinellid. sp. 3	S2398	IN2015_C02_174_N132
Axinellidae	<i>Auletta</i> sp.	S2397	IN2015_C02_174_N131
Axinellidae	<i>Axinella</i> sp. 1	S2316	IN2015_C02_126_N175
Axinellidae	<i>Axinella</i> sp. 1	S2394	IN2015_C02_174_N128
Axinellidae	<i>Axinella</i> sp. 1	S2399	IN2015_C02_174_N136
Axinellidae	<i>Axinella</i> sp. 2	S2317	IN2015_C02_126_N175_a
Axinellidae	<i>Axinella</i> sp. 3	S2321	IN2015_C02_126_N179
Axinellidae	<i>Axinella</i> sp. 3	S2395	IN2015_C02_174_N129
Axinellidae	<i>Axinella</i> sp. 4	S2355	IN2015_C02_128_N144
Axinellidae	<i>Axinella</i> sp. 5	S2520	IN2015_C02_395_N176
Axinellidae	<i>Axinella</i> sp. 6	S2388	IN2015_C02_174_N117
Axinellidae	<i>Axinella</i> sp. 7	S2471	IN2015_C02_191_N158
Axinellidae	<i>Axinella</i> sp. 8	S2343	IN2015_C02_128_N123
Axinellidae	<i>Axinella</i> sp. 8	S2556	IN2015_C02_398_N172
Axinellidae	<i>Cymbastela</i> ? sp.	S2411	IN2015_C02_179_N119
Axinellidae	<i>Pararhaphoxya</i> sp. 1	S2328	IN2015_C02_126_N186
Axinellidae	<i>Pararhaphoxya</i> sp. 1	S2455	IN2015_C02_186_N134
Axinellidae	<i>Pararhaphoxya</i> sp. 2	S2426	IN2015_C02_181_N112
Axinellidae	<i>Pararhaphoxya</i> sp. 2	S2432	IN2015_C02_181_N129
Axinellidae	<i>Phakellia</i> sp. 1	S2410	IN2015_C02_179_N118
Axinellidae	<i>Phakellia</i> sp. 2	S2392	IN2015_C02_174_N124
Axinellidae	<i>Phakellia</i> sp. 3	S2382	IN2015_C02_174_N114
Dictyonellidae	<i>Acanthella</i> sp. 1	S2408	IN2015_C02_179_N111
Dictyonellidae	<i>Acanthella</i> sp. 1	S2464	IN2015_C02_191_N149
Dictyonellidae	<i>Acanthella</i> sp. 1	S2479	IN2015_C02_227_N132
Dictyonellidae	<i>Stylissa carteria</i>	S2406	IN2015_C02_179_N106
Raspailiidae	<i>Aulospongos</i> sp.	S2401	IN2015_C02_174_N145
Raspailiidae	<i>Raspailia</i> (<i>Clathriodendron</i>) sp. 1	S2322	IN2015_C02_126_N180

Raspailiidae	<i>Raspailia (Clathriodendron)</i> sp. 1	S2379	IN2015_C02_174_N110
Raspailiidae	<i>Raspailia (Parasyringella)</i> sp. 1	S2310	IN2015_C02_126_N170
Raspailiidae	<i>Raspailia (Parasyringella)</i> sp. 2	S2352	IN2015_C02_128_N141_a
Raspailiidae	<i>Raspailia (Raspailia)</i> sp. 1	S2309	IN2015_C02_126_N169
Raspailiidae	<i>Raspailia (Raspailia)</i> sp. 2	S2468	IN2015_C02_191_N153
Raspailiidae	<i>Raspailia (Raspailia)</i> sp. 2	S2555	IN2015_C02_398_N165
Raspailiidae	<i>Raspailia (Raspailia)</i> sp. 3	S2311	IN2015_C02_126_N170_a
Raspailiidae	<i>Raspailia (Raspaxilla)</i> sp. 1	S2314	IN2015_C02_126_N173
Raspailiidae	<i>Raspailia (Raspaxilla)</i> sp. 1	S2345	IN2015_C02_128_N134
Raspailiidae	<i>Raspailia (Raspaxilla)</i> sp. 1	S2470	IN2015_C02_191_N155
Raspailiidae	<i>Raspailia (Raspaxilla)</i> sp. 1	S2519	IN2015_C02_395_N175
Raspailiidae	<i>Raspailia (Raspaxilla)</i> sp. 1	S2548	IN2015_C02_398_N140
ORDER CLIONAIDA			
Placospongiidae	Placospongiid. sp. 1	S2371	IN2015_C02_131_N147
Placospongiidae	Placospongiid. sp. 1	S2376	IN2015_C02_167_N104
Placospongiidae	Placospongiid. sp. 1	S2072	IN2015_C02_196_N134
Placospongiidae	Placospongiid. sp. 1	S2482	IN2015_C02_292_N142
ORDER DENDROCERATIDA			
Dictyodendrillida	<i>Dictyodendrilla</i> sp.	S2312	IN2015_C02_126_N171
	Dendroceratid. sp.	S2452	IN2015_C02_186_N126_a
Darwinellidae/Suberitidae	Darwinellid./Suberitid. spp.	S2324	IN2015_C02_126_N182
Darwinellidae/Suberitidae	Darwinellid./Suberitid. spp.	S2381	IN2015_C02_174_N113
ORDER DICTYOCERATIDA			
Dysideidae	cf. <i>Euryspongia</i> sp. 1	S2431	IN2015_C02_181_N126
Dysideidae	cf. <i>Euryspongia</i> sp. 2	S2350	IN2015_C02_128_N140
Dysideidae	cf. <i>Euryspongia</i> sp. 2	S2503	IN2015_C02_395_N131
Dysideidae	cf. <i>Euryspongia</i> sp. 2	S2504	IN2015_C02_395_N132
Irciniidae	<i>Psammocinia</i> sp. 1	S2430	IN2015_C02_181_N119
Irciniidae	<i>Psammocinia</i> sp. 1	S2514	IN2015_C02_395_N155
Irciniidae (?)	Irciniid sp. (?)	S2501	IN2015_C02_389_N141
Spongiidae	Spongiid. sp. 1	S2413	IN2015_C02_179_N127
Spongiidae	Spongiid. sp. 2	S2393	IN2015_C02_174_N127
Spongiidae	Spongiid. sp. 3	S2315	IN2015_C02_126_N174
Spongiidae	Spongiid. sp. 4	S2349	IN2015_C02_128_N139
Spongiidae	Spongiid. sp. 5	S2493	IN2015_C02_382_N123
Spongiidae	<i>Hyatella</i> sp. 1	S2348	IN2015_C02_128_N138
Spongiidae	<i>Leiosella</i> sp. 1	S2353	IN2015_C02_128_N142
Spongiidae	<i>Leiosella</i> sp. 2	S2383	IN2015_C02_174_N115
Spongiidae	<i>Leiosella</i> sp. 2	S2415	IN2015_C02_179_N130
Spongiidae	<i>Leiosella</i> sp. 2	S2467	IN2015_C02_191_N152
Spongiidae	<i>Leiosella</i> sp. 2	S2518	IN2015_C02_395_N165
Spongiidae	<i>Leiosella</i> sp. 2	S2527	IN2015_C02_395_N200
Spongiidae	<i>Leiosella</i> sp. 2	S2538	IN2015_C02_398_N123
Spongiidae	<i>Leiosella</i> sp. 3	S2428	IN2015_C02_181_N117
Spongiidae	<i>Leiosella</i> sp. 3	S2451	IN2015_C02_186_N126
Spongiidae	<i>Leiosella</i> sp. 3	S2453	IN2015_C02_186_N128

Spongiidae	<i>Leiosella</i> sp. 4	S2507	IN2015_C02_395_N145
Spongiidae	<i>Leiosella</i> sp. 4	S2537	IN2015_C02_398_N119
Spongiidae	<i>Spongia</i> sp. 1	S2465	IN2015_C02_191_N150
Spongiidae	<i>Spongia</i> sp. 2	S2524	IN2015_C02_395_N189
Spongiidae	<i>Spongia</i> sp. 3	S2466	IN2015_C02_191_N151
Spongiidae	<i>Spongia</i> sp. 3	S2542	IN2015_C02_398_N128
Thorectidae	<i>Aplysinoopsis</i> sp. 1	S2340	IN2015_C02_128_N120
Thorectidae	<i>Aplysinoopsis</i> sp. 1	S2535	IN2015_C02_398_N111
Thorectidae	<i>Fascaplysinoopsis</i> sp. 1	S2510	IN2015_C02_395_N149
Thorectidae	<i>Fascaplysinoopsis</i> sp. 1	S2536	IN2015_C02_398_N113
Thorectidae	<i>Hyrtios</i> sp. 1	S2423	IN2015_C02_179_N153
Thorectidae	<i>Hyrtios</i> sp. 1	S2547	IN2015_C02_398_N139
Thorectidae	<i>Hyrtios</i> sp. 2	S2469	IN2015_C02_191_N154
Thorectidae	<i>Hyrtios</i> sp. 3	S2506	IN2015_C02_395_N144
Thorectidae	<i>Hyrtios?</i> sp.	S2541	IN2015_C02_398_N127
Thorectidae	<i>Thorecta</i> sp. 1	S2505	IN2015_C02_395_N133
Thorectidae	<i>Thorectandra</i> sp. 2	S2446	IN2015_C02_186_N113
ORDER HAPLOSCLERIDA			
Callyspongiidae	<i>Callyspongia (Callyspongia)</i> sp. 1	S2331	IN2015_C02_128_N101
Callyspongiidae	<i>Callyspongia (Callyspongia)</i> sp. 1	-	IN2015_C02_128_N102
Callyspongiidae	<i>Callyspongia (Callyspongia)</i> sp. 1	-	IN2015_C02_128_N127
Callyspongiidae	<i>Callyspongia (Callyspongia)</i> sp. 1	-	IN2015_C02_179_N125
Callyspongiidae	<i>Callyspongia (Callyspongia)</i> sp. 1	-	IN2015_C02_181_N147
Callyspongiidae	<i>Callyspongia (Callyspongia)</i> sp. 1	S2456	IN2015_C02_191_N137
Callyspongiidae	<i>Callyspongia (Callyspongia)</i> sp. 1	S2463	IN2015_C02_191_N144_a
Callyspongiidae	<i>Callyspongia (Callyspongia)</i> sp. 1	S2512	IN2015_C02_395_N151
Callyspongiidae	<i>Callyspongia (Callyspongia)</i> sp. 1	S2525	IN2015_C02_395_N191
Callyspongiidae	<i>Callyspongia (Callyspongia)</i> sp. 1	-	IN2015_C02_398_N112
Callyspongiidae	<i>Callyspongia (Callyspongia)</i> sp. 2	S2409	IN2015_C02_179_N114
Callyspongiidae	<i>Callyspongia</i> sp. 3	S2360	IN2015_C02_128_N153
Callyspongiidae	<i>Callyspongia</i> sp. 3	S2362	IN2015_C02_128_N157-b
Callyspongiidae	<i>Callyspongia</i> sp. 3	S2433	IN2015_C02_181_N133-a
Callyspongiidae	<i>Callyspongia</i> sp. 3	S2462	IN2015_C02_191_N144
Callyspongiidae	<i>Callyspongia</i> sp. 3	S2531	IN2015_C02_395_N205
Callyspongiidae	<i>Callyspongia</i> sp. 3	S2546	IN2015_C02_398_N135-d
Callyspongiidae	<i>Callyspongia</i> sp. 4	S2416	IN2015_C02_179_N146
Chalinidae	<i>Chalinula</i> sp. 1	S2346	IN2015_C02_128_N135
Chalinidae	<i>Chalinula</i> sp. 1	S2363	IN2015_C02_128_N167
Chalinidae	<i>Chalinula</i> sp. 1	S2364	IN2015_C02_128_N169
Chalinidae	<i>Chalinula</i> sp. 1	S2366	IN2015_C02_128_N171
Chalinidae	<i>Chalinula</i> sp. 1	S2521	IN2015_C02_395_N179
Chalinidae	<i>Chalinula</i> sp. 1	S2545	IN2015_C02_398_N134
Chalinidae	<i>Haliclona (Haliclona)</i> sp. 1	S2405	IN2015_C02_179_N104
Chalinidae	<i>Haliclona (Haliclona)</i> sp. 2	S2441	IN2015_C02_181_N161
Chalinidae	<i>Haliclona</i> sp.	S2434	IN2015_C02_181_N143
Niphatidae	<i>Niphatid</i> sp. 1	S2420	IN2015_C02_179_N150

Niphatidae	Niphatid. sp. 1	S2517	IN2015_C02_395_N162
Niphatidae	Niphatid. sp. 2	S2526	IN2015_C02_395_N194
Niphatidae	Niphatid. sp. 3	S2543	IN2015_C02_398_N129
Niphatidae	Niphatid. sp. 4	S2540	IN2015_C02_398_N125-d
Niphatidae	<i>Amphimedon</i> sp. 1	S2384	IN2015_C02_174_N116
Niphatidae	<i>Hemigellius?</i> sp. 1	S2354	IN2015_C02_128_N143
Niphatidae	<i>Niphat</i> sp. 1	S2418	IN2015_C02_179_N148
Niphatidae	<i>Niphat</i> sp. 1	S2421	IN2015_C02_179_N151
Niphatidae	<i>Niphat</i> sp. 2	S2459	IN2015_C02_191_N141
Niphatidae	<i>Niphat</i> sp. 2	S2523	IN2015_C02_395_N182
Niphatidae	<i>Niphat</i> sp. 3	S2361	IN2015_C02_128_N155
Petrosiidae	<i>Neopetrosia</i> sp. 1	S2356	IN2015_C02_128_N147
Petrosiidae	<i>Neopetrosia</i> sp. 1	S2414	IN2015_C02_179_N128
Petrosiidae	<i>Neopetrosia</i> sp. 1	S2417	IN2015_C02_179_N147
Petrosiidae	<i>Neopetrosia</i> sp. 2	S2516	IN2015_C02_395_N160
Phloeodictyidae	<i>Oceanapia</i> sp. 1	S2336	IN2015_C02_128_N111
Phloeodictyidae	<i>Oceanapia</i> sp. 10	S2334	IN2015_C02_128_N109
Phloeodictyidae	<i>Oceanapia</i> sp. 10	S2508	IN2015_C02_395_N147
Phloeodictyidae	<i>Oceanapia</i> sp. 11	S2337	IN2015_C02_128_N113
Phloeodictyidae	<i>Oceanapia</i> sp. 12	S2445	IN2015_C02_181_N167
Phloeodictyidae	<i>Oceanapia</i> sp. 13	S2515	IN2015_C02_395_N159
Phloeodictyidae	<i>Oceanapia</i> sp. 2	S2333	IN2015_C02_128_N108
Phloeodictyidae	<i>Oceanapia</i> sp. 3	S2338	IN2015_C02_128_N117
Phloeodictyidae	<i>Oceanapia</i> sp. 3	S2435	IN2015_C02_181_N148
Phloeodictyidae	<i>Oceanapia</i> sp. 3	S2439	IN2015_C02_181_N158
Phloeodictyidae	<i>Oceanapia</i> sp. 4	S2365	IN2015_C02_128_N170
Phloeodictyidae	<i>Oceanapia</i> sp. 4	S2442	IN2015_C02_181_N162
Phloeodictyidae	<i>Oceanapia</i> sp. 5	S2339	IN2015_C02_128_N119
Phloeodictyidae	<i>Oceanapia</i> sp. 5	S2367	IN2015_C02_128_N174
Phloeodictyidae	<i>Oceanapia</i> sp. 5	S2440	IN2015_C02_181_N159
Phloeodictyidae	<i>Oceanapia</i> sp. 6	S2341	IN2015_C02_128_N121
Phloeodictyidae	<i>Oceanapia</i> sp. 7	S2407	IN2015_C02_179_N107
Phloeodictyidae	<i>Oceanapia</i> sp. 7	S2443	IN2015_C02_181_N164
Phloeodictyidae	<i>Oceanapia</i> sp. 7	S2509	IN2015_C02_395_N147_a
Phloeodictyidae	<i>Oceanapia</i> sp. 7	S2539	IN2015_C02_398_N124
Phloeodictyidae	<i>Oceanapia</i> sp. 8	S2438	IN2015_C02_181_N157
Phloeodictyidae	<i>Oceanapia</i> sp. 9	S2335	IN2015_C02_128_N110
Phloeodictyidae	<i>Oceanapia?</i> sp.	S2342	IN2015_C02_128_N122
ORDER POECILOSCLERIDA			
Chondropsidae	<i>Chondropsis</i> sp. 1	S2419	IN2015_C02_179_N149
Chondropsidae	<i>Chondropsis</i> sp. 1	S2425	IN2015_C02_179_N162
Chondropsidae	<i>Chondropsis</i> sp. 1	S2461	IN2015_C02_191_N143
Chondropsidae	<i>Chondropsis</i> sp. 2	S2424	IN2015_C02_179_N154
Chondropsidae	<i>Chondropsis</i> sp. 3	S2358	IN2015_C02_128_N149
Chondropsidae	<i>Chondropsis</i> sp. 3	S2437	IN2015_C02_181_N153
Chondropsidae	<i>Phoriospongia</i> sp.	S2330	IN2015_C02_126_N188

Coelosphaeridae	<i>Coelosphaera (Coelosphaera) sp. 1</i>	S2326	IN2015_C02_126_N184
Coelosphaeridae	<i>Forcepia (Forcepia) sp.</i>	S2305	IN2015_C02_126_N168
Coelosphaeridae	<i>Lissodendoryx (Anomodoryx) cf. dendyi</i>	S2404	IN2015_C02_174_N188
Coelosphaeridae	<i>Lissodendoryx (Lissodendoryx) sp. 2</i>	S2306	IN2015_C02_126_N168-a
Coelosphaeridae	<i>Lissodendoryx (Lissodendoryx) sp. 2</i>	S2488	IN2015_C02_330_N175_a
Coelosphaeridae	<i>Lissodendoryx (Lissodendoryx) sp. 2</i>	S2499	IN2015_C02_389_N128_a
Crellidae	<i>Crella sp.</i>	S2403	IN2015_C02_174_N187
Dendoricellidae	<i>Dendoricellid. sp.</i>	S2429	IN2015_C02_181_N117_a
Dendoricellidae	<i>Fibulia sp.</i>	S2412	IN2015_C02_179_N123
Microcionidae	<i>Clathria (Axosuberites) sp.</i>	S2473	IN2015_C02_191_N162
Mycalidae	<i>Mycale (Mycale) sp. 1</i>	S2396	IN2015_C02_174_N130
Mycalidae	<i>Mycale (Mycale) sp. 1</i>	S2447	IN2015_C02_186_N117
Mycalidae	<i>Mycale (Mycale) sp. 1</i>	S2498	IN2015_C02_389_N128
Myxillidae	<i>Myxilla sp. 1</i>	S2450	IN2015_C02_186_N125
	<i>Myxillinid. sp. 1</i>	S2472	IN2015_C02_191_N161
	<i>Myxillinid. sp. 1</i>	S2549	IN2015_C02_398_N141
ORDER POLYMASTIIDA			
Polymastiidae	<i>Polymastia sp. 1</i>	S2502	IN2015_C02_395_N130
Polymastiidae	<i>Polymastia sp. 1</i>	S2551	IN2015_C02_398_N148
ORDER SUBERITIDA			
Halichondriidae	<i>Halichondrid. sp. 1</i>	S2359	IN2015_C02_128_N152
Halichondriidae	<i>Halichondrid. sp. 2</i>	S2357	IN2015_C02_128_N148
Halichondriidae	<i>Ciocalypta sp. 1</i>	S2427	IN2015_C02_181_N113
Halichondriidae	<i>Ciocalypta sp. 2</i>	S2460	IN2015_C02_191_N142
Halichondriidae	<i>Ciocalypta sp. 2</i>	S2528	IN2015_C02_395_N202
Halichondriidae	<i>Ciocalypta sp. 2</i>	S2533	IN2015_C02_395_N207
Halichondriidae	<i>Ciocalypta sp. 2</i>	S2553	IN2015_C02_398_N163
Halichondriidae	<i>Halichondria (?) sp.</i>	S2400	IN2015_C02_174_N141
Halichondriidae	<i>Halichondria sp.</i>	S2454	IN2015_C02_186_N130
Suberitidae	<i>Pseudosuberites sp. 1</i>	S2344	IN2015_C02_128_N130
Suberitidae	<i>Pseudosuberites sp. 2</i>	S2422	IN2015_C02_179_N152
Suberitidae	<i>Rhizaxinella sp. 1</i>	S2332	IN2015_C02_128_N103
Suberitidae	<i>Rhizaxinella sp. 1</i>	S2457	IN2015_C02_191_N139
Suberitidae	<i>Rhizaxinella sp. 1</i>	S2475	IN2015_C02_196_N129
Suberitidae	<i>Rhizaxinella sp. 1</i>	S2513	IN2015_C02_395_N152
Suberitidae	<i>Rhizaxinella sp. 1</i>	S2544	IN2015_C02_398_N131
Suberitidae	<i>Rhizaxinella sp. 1</i>	S2557	IN2015_C02_435_N104
Suberitidae	<i>Stylocordyla sp. 1</i>	S2402	IN2015_C02_174_N183
Suberitidae	<i>Stylocordyla sp. 1</i>	S2495	IN2015_C02_389_N103
Suberitidae	<i>Stylocordyla sp. 1</i>	S2532	IN2015_C02_395_N206
Suberitidae	<i>Stylocordyla sp. 1</i>	S2552	IN2015_C02_398_N149
Suberitidae	<i>Suberites sp. 1</i>	S2313	IN2015_C02_126_N172
Suberitidae	<i>Suberites sp. 1</i>	S2323	IN2015_C02_126_N181
Suberitidae	<i>Suberites sp. 1</i>	S2378	IN2015_C02_167_N108
Suberitidae	<i>Suberites sp. 1</i>	S2448	IN2015_C02_186_N121
Suberitidae	<i>Suberites sp. 1</i>	S2449	IN2015_C02_186_N122

Suberitidae	<i>Suberites</i> sp. 1	S2476	IN2015_C02_196_N133
Suberitidae	<i>Suberites</i> sp. 1	S2481	IN2015_C02_292_N141
Suberitidae	<i>Suberites</i> sp. 1	S2486	IN2015_C02_330_N172
Suberitidae	<i>Suberites</i> sp. 1	S2492	IN2015_C02_382_N122
Suberitidae	<i>Suberites</i> sp. 1	S2496	IN2015_C02_389_N113
Suberitidae	<i>Suberites</i> sp. 1	S2558	IN2015_C02_449_N133
Suberitidae	<i>Suberites</i> sp. 2	S2325	IN2015_C02_126_N183
Suberitidae	<i>Suberites</i> sp. 3	S2308	IN2015_C02_126_N168-c
Suberitidae	<i>Suberites</i> sp. 3	S2320	IN2015_C02_126_N178
Suberitidae	<i>Suberites</i> sp. 4	S2387	IN2015_C02_174_N116_c
Suberitidae	<i>Suberites</i> sp. 5	S2389	IN2015_C02_174_N120
ORDER TETHYIDA			
Tethyiidae	<i>Tethya</i> sp. 1	S2534	IN2015_C02_398_N103
Tethyiidae	<i>Tethycometes</i> sp. 1	S2307	IN2015_C02_126_N168-b
Tethyiidae	<i>Tethycometes</i> sp. 1	S2458	IN2015_C02_191_N140
Tethyiidae	<i>Tethycometes</i> sp. 1	S2485	IN2015_C02_330_N109
ORDER TETRACTINELLIDA			
Ancorinidae	<i>Ancorinid.</i> sp.	S2391	IN2015_C02_174_N123
Ancorinidae	<i>Asteropus</i> sp. 1	S2554	IN2015_C02_398_N164
Ancorinidae	<i>Psammastra?</i> sp.	S2385	IN2015_C02_174_N116_a
Ancorinidae	<i>Stelletta</i> sp. 1	S2329	IN2015_C02_126_N187
Ancorinidae	<i>Stelletta</i> sp. 2	S2386	IN2015_C02_174_N116_b
Ancorinidae	<i>Stelletta</i> sp. 2	S2494	IN2015_C02_389_N102
Ancorinidae	<i>Stelletta</i> sp. 2	S2522	IN2015_C02_395_N180
Ancorinidae	<i>Stelletta</i> sp. 2	S2529	IN2015_C02_395_N203
Ancorinidae	<i>Stelletta</i> sp. 2	S2550	IN2015_C02_398_N147
Ancorinidae	<i>Stelletta</i> sp. 3	S2380	IN2015_C02_174_N111
Ancorinidae	<i>Stelletta</i> sp. 3	S2444	IN2015_C02_186_N109
Ancorinidae	<i>Stelletta</i> sp. 4	S2530	IN2015_C02_395_N203-c
Ancorinidae	<i>Stryphnus</i> sp.	S2511	IN2015_C02_395_N150
Tetillidae	<i>Tetillid.</i> sp.	S2327	IN2015_C02_126_N185
Theneidae	<i>Thenea</i> sp. 1	S2368	IN2015_C02_131_N143
Theneidae	<i>Thenea</i> sp. 1	S2369	IN2015_C02_131_N145
Theneidae	<i>Thenea</i> sp. 1	S2370	IN2015_C02_131_N146
Theneidae	<i>Thenea</i> sp. 1	S2372	IN2015_C02_134_N113
Theneidae	<i>Thenea</i> sp. 1	S2373	IN2015_C02_151_N118
Theneidae	<i>Thenea</i> sp. 1	S2374	IN2015_C02_159_N124
Theneidae	<i>Thenea</i> sp. 1	S2375	IN2015_C02_167_N103
Theneidae	<i>Thenea</i> sp. 1	S2377	IN2015_C02_167_N107
Theneidae	<i>Thenea</i> sp. 1	S2474	IN2015_C02_196_N105
Theneidae	<i>Thenea</i> sp. 1	-	IN2015_C02_196_N106
Theneidae	<i>Thenea</i> sp. 1	S2474	IN2015_C02_207_N102
Theneidae	<i>Thenea</i> sp. 1	none	IN2015_C02_227_N123
Theneidae	<i>Thenea</i> sp. 1	S2480	IN2015_C02_281_N110
Theneidae	<i>Thenea</i> sp. 1	S2483	IN2015_C02_292_N147
Theneidae	<i>Thenea</i> sp. 1	S2484	IN2015_C02_292_N148

Theneidae	<i>Thenea</i> sp. 1	-	IN2015_C02_292_N150
Theneidae	<i>Thenea</i> sp. 1	S2487	IN2015_C02_330_N175
Theneidae	<i>Thenea</i> sp. 1	S2489	IN2015_C02_382_N115
Theneidae	<i>Thenea</i> sp. 1	S2490	IN2015_C02_382_N116
Theneidae	<i>Thenea</i> sp. 1	S2491	IN2015_C02_382_N117
Theneidae	<i>Thenea</i> sp. 1	S2497	IN2015_C02_389_N127
Theneidae	<i>Thenea</i> sp. 1	S2500	IN2015_C02_389_N128_b
Theneidae	<i>Thenea</i> sp. 1	S2560	IN2015_C02_449_N135
Theneidae	<i>Thenea</i> sp. 1	S2559	IN2015_C02_449_N136
Theonellidae	Theonellid. sp.	S2318	IN2015_C02_126_N176
Trachycladidae	<i>Trachycladus</i> sp.	S2390	IN2015_C02_174_N121
ORDER VERONGIDA			
Aplysinnellidae	<i>Suberea</i> sp. 1	S2436	IN2015_C02_181_N152
Aplysiniidae	<i>Aplysina</i> sp. 1	S2561	IN2015_C02_179_N105

SUBCLASS: HETEROSCLEROMORPHA

ORDER: AXINELLIDA

IN2015_C02_174_N131 *Auletta* sp. (Axinellida, Axinellidae)



Depth: 410 (400) m.

Growth form: Small, upright, hollow. Base of sponge spreads over dead coral to which it is attached.

Colour: White (in ethanol).

Oscules: Not seen.

Texture: Compressible.

Surface: Hispid.

Ectosomal skel: Strongyles tangential to surface. Towards the top of sponge are bunches of spicules, with one centrally longer spicule.

Choanosomal skel: No axial tracts.

Megascleres: Sinuous strongyles, styles, emergent in groups.

Microscleres: None.

Associated fauna: Base encrusting on dead coral.

Remarks: Some parts of the ectosome look raspailiid in arrangement but the sinuous strongyles and hollow sponge fit more into *Auletta*.

IN2015_C02_126_N175 *Axinella* sp. 1 (Axinellida, Axinellidae)



Depth: 388 (400) m.

Growth form: Small, erect flabelliform.

Colour: Sandy white (live); Sandy white (in ethanol).

Oscules: Not obvious.

Texture: Firm, flexible.

Surface: Translucent, very hispid, porous.

Ectosomal skel: Single large styles protruding as palisade.

Choanosomal skel: Axial core of interwoven styles and oxeas, little collagen.

Megascleres: Oxeas bent (225 μ m), Styles bent (550-750 μ m).

Microscleres: None.

Other specimens: IN2015_C02_174_N136, IN2015_C02_174_N128.

IN2015_C02_126_N175a *Axinella* sp. 2 (Axinellida, Axinellidae)



Depth: 388 (400) m.

Growth form: Flabelliform, frondose.

Colour: Sandy white (live); Sandy white (in ethanol).

Oscules: Not obvious.

Texture: Firm, flexible.

Surface: Translucent, very hispid, porous.

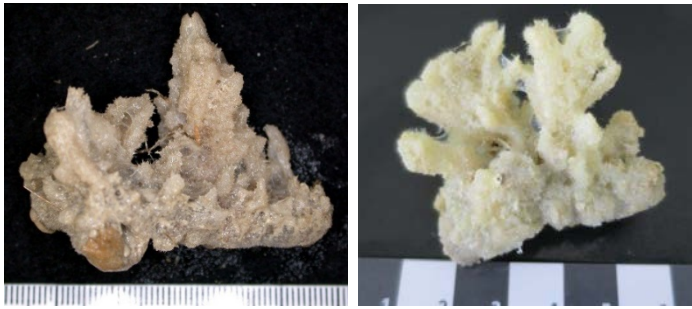
Ectosomal skel: Single large styles protruding as palisade.

Choanosomal skel: Axial core of interwoven styles and oxeas, little collagen.

Megascleres: Sinuous styles and oxeas.

Microscleres: None.

IN2015_C02_126_N179 *Axinella* sp. 3 (Axinellida, Axinellidae)



Depth: 388 (400) m.

Growth form: Erect frilly frondose-flabelliform.

Colour: White (live); Beige (in ethanol).

Oscules: Not obvious.

Texture: Firm, harsh.

Surface: Translucent, very hispid.

Ectosomal skel: Plumose palisade of styles.

Choanosomal skel: Plumose arrangement of styles, dense interwoven axially, collagen.

Megascleres: Styles straight to curved or slightly rhabdo (e.g. 645x14, 690x18, 885x30, 1050x30 μm).

Microscleres: None.

Other specimens: IN2015_C02_174_N129 (400 m; RHS photo).

IN2015_C02_128_N144 *Axinella* sp. 4 (Axinellida, Axinellidae)



Depth: 221 (200) m.

Growth form: Small, erect lobe.

Colour: Cream (in ethanol).

Oscules: 1-1.5 mm diam., difficult to see due to rugose surface.

Texture: Firm.

Surface: Rugose, hispid.

Ectosomal skel: Not defined.

Choanosomal skel: Some longitudinal pauci – multi spicular in centre, otherwise isodictyal mesh one spicule long.

Megascleres: Styles, some pointed some blunt (e.g. 360x15, 405x10, 585x14, 720x8 μm). Oxeas occasional (195x7 μm); Strongyles occasional (not sinuous) (360x10 μm).

Microscleres: None.

IN2015_C02_395_N176 *Axinella* sp. 5 (Axinellida, Axinellidae)



Depth: 189 (200) m.

Growth form: Small, 20-30 mm, projections arising from body (only part of a sponge).

Colour: Cream (in ethanol).

Oscules: Not obvious.

Texture: Compressible, spiculose.

Surface: Bushy-conulose and coarsely ridged.

Ectosomal skel: Plumose subectosomal spicules protrude the surface.

Choanosomal skel: Plumoreticulate, axis a dense confusion of spicules becoming plumose extra-axially.

Megascleres: Oxeas centrangulate with pointed but not sharp ends, sometimes stepped, (390x10 μm); Styles occasional (450x7 μm).

Microscleres: None.

IN2015_C02_174_N117 *Axinella* sp. 6 (Axinellida, Axinellidae)



Depth: 410 (400) m.

Growth form: Stalked, thickly flabelliform-lamellate.

Colour: Pale pink (live and in ethanol).

Oscules: Sunken, marginal, 5 mm diam.

Texture: Firm, harsh, compressible.

Surface: Translucent, porous, hispid.

Ectosomal skel: Styles protrude surface collagen.

Choanosomal skel: Axial reticulation of fibres cored by bundles of styles, becoming plumose extra-axially, collagen abundant.

Megascleres: Styles curved (500-1100 μm).

Microscleres: None.

IN2015_C02_191_N158 *Axinella* sp. 7 (Axinellida, Axinellidae)



Depth: 218 (200) m.

Growth form: Erect whip-like, branching dichotomously.

Colour: Cream (in ethanol).

Oscules: Not seen.

Texture: Firm, cartilaginous.

Surface: Hispid, microconulose.

Ectosomal skel: Collagenous with plumose brushes protruding, trichodragmata visible in collagen

Choanosomal skel: Dense axial core of interwoven spicules becoming plumose extra-axially

Megascleres: Styles curved/rhabdose/sinuuous (600-1500 μm); Oxeas much less common, curved (400 μm).

Microscleres: Trichodragmata; raphides.

Remarks: See Hooper and Van Soest (2002) p. 731 whip-like Axinella

IN2015_C02_128_N123 *Axinella* sp. 8 (Axinellida, Axinellidae)



Depth: 221 (200) m.

Growth form: Erect, whip-like (up to 6 mm thick in middle of whip), tapering to point. Rootlets at attachment point.

Colour: Orangey - beige (in ethanol); yellow live.

Oscules: Not seen.

Texture: Firm, flexible.

Surface: Translucent, hispid.

Ectosomal skel: Arenaceous in some areas, bouquets of oxeas (more obvious in IN2015_C02_398_N172 skeletal preparation).

Choanosomal skel: Thick fibres. Multispicular (but never filling the fibre) or paucispicular.

Plumoreticulate.

Megascleres: Oxeas (e.g. 300x7, 335x3 μm).

Microscleres: None.

Other specimens: IN2015_C02_398_N172

IN2015_C02_179_N119 *Cymbastela?* sp. (Axinellida, Axinellidae)



Depth: 209 (200) m.

Growth form: Stalked flabelliform, branching-digitate.

Colour: Yellow beige (live); Light beige (in ethanol.)

Oscules: Not obvious.

Texture: Firm, cartilaginous.

Surface: Translucent, conulose, microscopically hispid, drainage pattern visible.

Ectosomal skel: Collagenous, subectosomal spicules barely protrude surface.

Choanosomal skel: Dense reticulation of large bundles coring spongin fibres axially, becoming plumose-radial subectosomally.

Megascleres: Oxeas uniform straight (400 μ m).

Microscleres: None.

Remarks: Exclusively oxeas/barely hispid.

IN2015_C02_126_N186 *Pararhaphoxya* sp. 1 (Axinellida, Axinellidae)



Depth: 388 (400) m.

Growth form: Small whip 5 mm diam.

Colour: Beige-white (live and in ethanol).

Oscules: Not obvious.

Texture: Firm, flexible.

Surface: Very hispid under light microscope.

Ectosomal skel: Paratangential styles.

Choanosomal skel: Axial core of interwoven strongyles.

Megascleres: Sinuous vermiform strongyles long (>1000 μ m), styles thick some rhabdose (500-1000 μ m), oxeas small centrangulate many junk spicules.

Microscleres: None.

Other specimens: IN2015_C02_186_N134.

IN2015_C02_181_N112 *Pararhaphoxya* sp. 2 (Axinellida, Axinellidae)



Depth: 283 (200) m.

Growth form: Erect, whip-like.

Colour: Cream (in ethanol).

Oscules: None obvious.

Texture: Firm.

Surface: Hispid, microconulose.

Ectosomal skel: Multispicular bundles of spicules (oxeas) emerging as processes (pointed to the top of sponge).

Choanosomal skel: Dense axial core of interwoven sinuous spicules becoming plumose in the subectosomal region. Spongin is more obvious in the subectosome as the core axis is very dense with spicules.

Megascleres: Thin long sinuous spicules: strongyles (675x3, 1370x3 μm); oxeas (e.g. 375x5 μm .)

Microscleres: None.

Other specimens: IN2015_C02_181_N129.

IN2015_C02_179_N118 *Phakellia* sp. 1 (Axinellida, Axinellidae)



Depth: 209 (200) m.

Growth form: Stalked, digitate, branching.

Colour: Light beige (live and in ethanol).

Oscules: Not obvious.

Texture: Firm, flexible.

Surface: Translucent, conulose.

Ectosomal skel: Collagenous with long plumose extra-axial bundles of styles protruding as conules.

Choanosomal skel: Dense interwoven axial bundles of styles and strongyles.

Megascleres: Styles curved, strongyles thinner flexuous.

Microscleres: None.

Remarks: More like *Pararhaphoxya* but styles not oxeas.

IN2015_C02_174_N124 *Phakellia* sp. 2 (Axinellida, Axinellidae)



Depth: 410 (400) m.

Growth form: Dichotomously branched whip 2-3 mm diam.

Colour: White (live and in ethanol).

Oscules: Not seen.

Texture: Compressible, flexible, very tough to cut.

Surface: Translucent, microscopically hispid.

Ectosomal skel: Single styles protrude surface layer of tufts of axial fibres.

Choanosomal skel: Dense axial core of reticulated sinuous strongyles (coring fibres?).

Megascleres: Strongyles long thin sinuous vermiform (up to 1000x3 μm), styles slightly curved (600x10 μm).

Microscleres: None.

IN2015_C02_174_N114 *Phakellia* sp. 3 (Axinellida, Axinellidae)



Depth: 410 (400) m.

Growth form: Stalked, lamellate-frondose, bushy.

Colour: Pale beige (in ethanol).

Oscules: Not seen.

Texture: Cartilaginous, tough to cut.

Surface: Opaque, very hispid.

Ectosomal skel: Palisade of single spicules, short thick styles protrude the surface with occasional long styles projecting well beyond surface.

Choanosomal skel: Axial core of interwoven sinuous megascleres, collagen present.

Megascleres: Styles curved thick (450-600 μm); Styles thinner (650-1275 μm); Strongyles sinuous (1000-1250 μm).

Microscleres: None.

N2015_C02_128_N137 Axinellid sp. 1 (Axinellida, Axinellidae)



Depth: 221 (200) m.

Growth form: Small, thick stipitate, growing on shell fragment.

Colour: Cream (in ethanol).

Oscules: Not seen.

Texture: Firm, compressible.

Surface: Slightly rugose.

Ectosomal skel: Ectosome is like a skin that can be pulled away from the choanosome.

Choanosomal skel: Oxeas in thick tracts running parallel to the sponge surface, and sometimes fanning out to the surface, but sometime the tracts are horizontal at the surface. Spongin thick around longitudinal tracts and weaker around looser spicules, between and perpendicular to and joining the tracts. Section includes the tip of the sponge, which has a wall of oxeas (? surrounding an oscule).

Megascleres: Oxeas with sharp ends, sometimes mucronate (e.g. 380x5, 435x6 μm).

Microscleres: None.

Associated fauna: Growing on dead shell.

IN2015_C02_128_N141 Axinellid sp. 2 (Axinellida, Axinellidae)



Depth: 221 (200) m.

Growth form: Small, erect, occasional branch.

Colour: Beige (in ethanol).

Oscules: None obvious.

Texture: Firm to hard (like a piece of wire).

Surface: Avenaceous, hispid, occasional filamentous processes (visible under microscope).

Ectosomal skel: Not specialized.

Choanosomal skel: Thick spongin around multi-spicular reticulated tracts.

Megascleres: Oxeas blunt and sharp ends, and different sizes (e.g. 140x7, 210x3, 480x5 μm).

Microscleres: None.

IN2015_C02_126_N177 Axinellid sp. 3 (Axinellida, Axinellidae)



Depth: 388 (400) m.

Growth form: Tuberoso with long (20-30 mm) branching papillae.

Colour: Beige (live and in ethanol).

Oscules: Not obvious.

Texture: Firm, spiculose.

Surface: Very hispid under light microscope.

Ectosomal skel: Ectosomal short styles barely protrude surface layer of collagen, large styles protrude occasionally. Long papillae protrude consisting of a single tract of styles, not echinated but terminate in radial profusion of styles.

Choanosomal skel: Dense axial mass of interwoven sinuous oxeas.

Megascleres: Sinuous/vermiform/deformed oxeas (300-1050x30 μ m), styles (300-700x40 μ m).

Microscleres: None.

Other specimens: IN2015_C02_174_N132.

IN2015_C02_179_N111 *Acanthella* sp. 1 (Axinellida, Dictyonellidae)



Depth: 209 (200) m.

Growth form: Stalked flabelliform frilly.

Colour: Pink-cream (live) Beige (in pale orange ethanol).

Oscules: Not seen.

Texture: Cartilaginous, harsh, barely compressible.

Surface: Opaque, optically smooth, glossy, conulose with bifurcate fibre tips.

Ectosomal skel: Collagenous with occasional style protruding.

Choanosomal skel: Dense axial core of interwoven styles, branching off to become scopiform processes, collagen filled with pigment granules.

Megascleres: Styles curved-flexuous (500-750x7.5 μ m).

Microscleres: None.

Other specimens: IN2015_C02_191_N149 and IN2015_C02_227_N132 (the latter believed to be net contamination as Site 227 at 3000 m).

IN2015_C02_179_N106 *Stylissa carteri* (Axinellida, Dictyonellidae)



Depth: 209 (200) m.

Growth form: Stalked flabelliform, large, rugose fan, very thick stem (4 cm thick).

Colour: Orange (live) Beige (in orange ethanol).

Oscules: Sunken scattered 3-4 mm diam.

Texture: Firm but spongy, cartilaginous, difficult to cut.

Surface: Rugose, bushy, clathrate, translucent, porous, drainage canals, like veins.

Ectosomal skel: Collagenous with fibres cored by multispicular tracts of styles protruding as tufts.

Choanosomal skel: Undifferentiated axially/extra-axially, open spongin fibre skeleton dominant, cored by tracts of single styles.

Megascleres: Styles rhabdose thick, telescoped, occasional subtylote (350-400x15 µm), anisostyles curved thin (350x3-5 µm).

Microscleres: None.

CAAB code: 10 092025; listed with ABRS: Yes

Geographical records: Indian Ocean (e.g. East Africa and Madagascar, Southern Red Sea), Indonesia, Great Barrier Reef.

Determination: L. Goudie, B. Glasby, 2016.

WPD Link: <http://www.marinespecies.org/porifera/porifera.php?p=taxdetails&id=165705>

IN2015_C02_174_N145 *Aulospongos* sp. (Axinellida, Raspailiidae)



Depth: 410 (400) m.

Growth form: Solid with thick short lobes.

Colour: White (in ethanol).

Oscules: Not seen.

Texture: Firm, tough.

Surface: Smooth to hispid.

Ectosomal skel: Bouquets of smooth styles at surface.

Choanosomal skel: Plumoreticulate. Acanthostyles fan out (echinate), though spongin very light.

Megascleres: Acanthostyles with slightly bend rounded heads. Occasional large style with blunt tip.

Microscleres: None.

Other specimens: cf. *Aulospongos* sp. SS1 Western Australian Museum Z35500 (Fromont and Gomez mudmaps, 2007).

IN2015_C02_126_N180 *Raspailia (Clathriodendron)* sp. 1 (Axinellida, Raspailiidae)



Depth: 388 (400) m.

Growth form: Stalked flabelliform frilly.

Colour: Very pale green (live); Light grey (in ethanol).

Oscules: Not seen.

Texture: Firm, spiculose.

Surface: Very hispid under light microscope.

Ectosomal skel: Protruding plumose principal spicules.

Choanosomal skel: Plumose tracts of larger principal spicules echinated by acanthostyles.

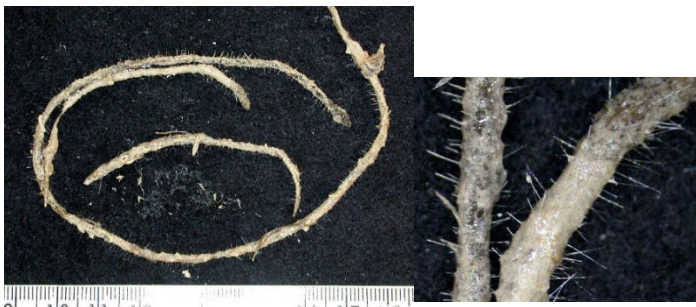
Megascleres: Subtylostyles lightly spined (e.g. 500x8 μ m) Acanthostyles subtylote club-shaped, evenly spined (e.g. 75-300 μ m).

Microscleres: None.

Remarks: Turned black in bleach.

Other specimens: IN2015_C02_174_N110.

IN2015_C02_126_N170 *Raspailia (Parasyringella)* sp. 1 (Axinellida, Raspailiidae)



Depth: 388 (400) m.

Growth form: Small whip 3 mm diam.

Colour: Dark grey (in ethanol).

Oscules: Not obvious.

Texture: Firm, flexible.

Surface: Very hispid under light microscope.

Ectosomal skel: Raspailiid, massive styles protrude from axial core surrounded by bouquets of smaller ectosomal styles.

Choanosomal skel: Axial core of long thick choanosomal styles.

Megascleres: Styles 2 size classes (dominant 525x10 μ m) (less common 1230x15 μ m).

Microscleres: None.

Remarks: No echinating spicules.

IN2015_C02_128_N141a *Raspailia (Parasyringella)* sp. 2 (Axinellida, Raspailiidae)



Depth: 221 (200) m.

Growth form: Small, thin erect twisted branched.

Colour: Cream (in ethanol).

Oscules: None obvious.

Texture: Firm, compressible.

Surface: Hispid.

Ectosomal skel: Spicules emerging from surface about 2/3 diam. of sponge. Arenaceous ectosome.

Choanosomal skel: Tract of mix of megascleres fanning to emerge through ectosome.

Megascleres: Aniso-oxeas – thicker at one end (e.g. 975x14 μm); bent oxeas (e.g. 660x18 μm); styles (e.g. 735x8 μm); plus sand and junk spicules.

Microscleres: None.

IN2015_C02_126_N169 *Raspailia (Raspailia)* sp. 1 (Axinellida, Raspailiidae)



Depth: 388 (400) m.

Growth form: Long whip, 5 mm diam.

Colour: Dark grey (in ethanol).

Oscules: Not obvious.

Texture: Firm, cartilaginous, spiculose.

Surface: Very hispid under light microscope.

Ectosomal skel: Choanosomal subtylostyles protrude surface and acanthostyles echinate.

Choanosomal skel: Dense radial arrangement of principal styles echinated by acanthostyles.

Megascleres: Subtylostyles large robust (750x25 μm) Styles (420x15 μm) Acanthostyles recurved spines evenly distributed (120 μm).

Microscleres: None.

IN2015_C02_398_N165 *Raspailia* (*Raspailia*) sp. 2 (Axinellida, Raspailiidae)



Depth: 199 (200) m.

Growth form: Cylindrical (2-5 mm), branching whip.

Colour: Cream (in ethanol).

Oscules: Not seen.

Texture: Cartilaginous, flexible.

Surface: Opaque, microconulose, hispid.

Ectosomal skel: Collagenous, megascleres lying tangentially beneath outer collagen, and echinated by acanthostyles; large subtylostyles protruding at centre of each conule surrounded by bouquet of smaller oxeas.

Choanosomal skel: Axial core of longitudinal megascleres.

Megascleres: Subtylostyles (500-1500 μ m); Acanthostyles club-shaped with recurved spines (90-100 μ m); Oxeas (600 μ m).

Microscleres: None.

Other specimens: IN2015_C02_191_N153.

IN2015_C02_126_N170a *Raspailia* (*Raspailia*) sp. 3 (Axinellida, Raspailiidae)



Depth: 388 (400) m.

Growth form: Single whip 5 mm diam.

Colour: Dark grey (in ethanol).

Oscules: Not obvious.

Texture: Firm, flexible.

Surface: Very hispid.

Ectosomal skel: Raspailiid, sand and foreign spicule fragments incorporated into ectosomal collagen (microscopic collagen fibrils visible) with fibres cored by smaller styles/oxeas protruding 500 μ m in length paratangential to surface and echinated heavily by acanthostyles. Occasional very large style protruding also.

Choanosomal skel: Axially compressed, dense reticulation of fibres cored by choanosomal styles and echinated by acanthostyles.

Megascleres: Styles/oxeas, large styles, acanthostyles evenly covered with recurved spines.

Microscleres: None

IN2015_C02_126_N173 *Raspailia (Raspaxilla)* sp. 1 (Axinellida, Raspailiidae)



Depth: 388 (400) m.

Growth form: Erect, whip-like (up to 5 mm thick), dichotomously branching, tapering to point.

Colour: Pale beige (live and in ethanol).

Oscules: Not seen.

Texture: Firm, flexible.

Surface: Translucent, minutely hispid and conulose.

Ectosomal skel: Palisade of acanthostyles at the surface surrounding protruding long styles.

Choanosomal skel: Plumose reticulation of acanthostyles.

Megascleres: Acanthostyles rhabdose, club-shaped (150 μ m), styles aniso (>1000 μ m).

Microscleres: None.

Other specimens: IN2015_C02_128_N134.

ORDER: CLIONAIDA

IN2015_C02_196_N134 *Placospongiid.* sp. 1 (? New species/genus) (Clionaida, Placospongiidae)



Depth: 1027 (1000) m.

Growth form: Stalked spherical with hexagonal plates covering surface.

Colour: Beige-white (In ethanol).

Oscules: Prominent raised single apical.

Texture: Firm to hard, very spiculose.

Surface: Translucent, hexagonal plate-like appearance.

Ectosomal skel: Dense layer of sterrasters 40-50 μ m.

Choanosomal skel: Dense radial bundles of megascleres.

Megascleres: Anisostyles/subtylostyles size range (450-1100 μ m).

Microscleres: Sterrasters 2 size classes (15-75 μ m).

Remarks: Photo is of IN2015_C01_114_147. This is possibly a new species of *Placospongia* although it differs in growth form from other *Placospongia* which are normally encrusting or branching (see Becking, 2013). It should be noted as possibly new – for further investigation.

Other specimens: IN2015_C01_110_N133, IN2015_C01_114_N147, IN2015_C02_131_N147, IN2015_C02_167_N104, IN2015_C02_292_N142 and SAMA S1461 (GAB BPZ collected by D. Currie 1000 m).

ORDER: HAPLOSCLERIDA

IN2015_C02_128_N101 *Callyspongia* (*Callyspongia*) sp. 1 (Haplosclerida, Callyspongiidae)



Depth: 221 (200) m.

Growth form: Large fan (pancake-like) with short stalk.

Colour: Beige (live and in ethanol).

Oscules: Small (2-3 mm diam.), stellate, densely scattered over one face, ostia on the other.

Texture: Spongy, fibrous, tough to tear.

Surface: Punctuate.

Ectosomal skel: Indistinct.

Choanosomal skel: Hierarchy of spongin fibres all cored by multispicular tracts of oxeas forming rounded to irregular mesh, very few single scattered spicules, little collagen.

Megascleres: Oxeas small curved (75-100 μ m).

Microscleres: None.

Other specimens: IN2015_C02_128_N102, IN2015_C02_128_N127, IN2015_C02_179_N125, IN2015_C02_181_N147, IN2015_C02_191_N137, IN2015_C02_191_N144_a, IN2015_C02_395_N191, IN2015_C02_398_N112. SAMA S902 (GAB-BPZ Identified by Sorokin et al. (2007) as *Cribrochalina* sp. 1) WAM Z35310 (Fromont and Gomez 2007 Mudmap ID *Callyspongia* (C) sp. SS4).

Geographical records: Great Australian Bight, South Australia and Western Australia.

IN2015_C02_179_N114 *Callyspongia* (*Callyspongia*) sp. 2 (Haplosclerida, Callyspongiidae)



Depth: 209 (200) m.

Growth form: Digitate, branching, planar.

Colour: Beige (live and in ethanol).

Oscules: Conspicuous, flush, 3-5 mm diam., scattered on one face/plane.

Texture: Soft, spongy, fibrous.

Surface: Translucent, porous, even.

Ectosomal skel: Indistinct.

Choanosomal skel: Hierarchy of cored fibres; primary multispicular, secondary bispicular, tertiary unispicular. Very open irregular mesh, no collagen visible.

Megascleres: Oxeas vestigial (70-80 μ m).

Microscleres: None.

IN2015_C02_128_N153 *Callyspongia* sp. 3 (Haplosclerida, Callyspongiidae)



Depth: 221 (200) m.

Growth form: Thin, erect, on stalk.

Colour: (in ethanol).

Oscules: One, 3 mm diam. half way up in bend of sponge.

Texture: Soft, hollow.

Surface: Smooth.

Ectosomal skel: Paucispicular mesh. There sand in ectosome, but not in the fibres.

Choanosomal skel: Regular spongin mesh, can be very square. Pauci to multispicular main fibres, with joining fibres paucispicular with mostly 2 spicules long.

Megascleres: Small oxeas (120 μ m).

Microscleres: None.

Other specimens: IN2015_C02_128_N157-b, IN2015_181_133a, IN2015_C02_191_N144, IN2015_C02_395_N205, IN2015_C02_398_N135-d.

IN2015_C02_179_N146 *Callyspongia* sp. 4 (Haplosclerida, Callyspongiidae)



Depth: 209 (200) m.

Growth form: Folded/amorphous.

Colour: Beige (in ethanol).

Oscules: not apparent but punctuate pores.

Texture: Very soft, easily torn.

Surface: Arenaceous, thin, and slightly rugose.

Ectosomal skel: Fibre arrangement masked by sand.

Choanosomal skel: Pauci to multi spicular primary and paucispicular secondary fibres. A regular square mesh in some places but there are a lot of free spicules as well.

Megascleres: Small oxeas (97x4 μ m).

Microscleres: None.

IN2015_C02_395_N179 *Chalinula* sp. 1 (Haplosclerida, Chalinidae)



Depth: 189 (200) m.

Growth form: Spherical, hollow.

Colour: Brown (in ethanol).

Oscules: Large (7 mm diam.).

Texture: Spongy.

Surface: Optically smooth, microconulose.

Ectosomal skel: Tangential with circular mesh of spicule bundles beneath.

Choanosomal skel: Anisotropic, multispicular tracts forming polygonal mesh with isodictyal single spicule mesh between; collagen present, spongin not visible.

Megascleres: Oxeas curved, uniform (180 μ m).

Microscleres: None.

Other specimens: IN2015_C02_128_N135, IN2015_C02_128_N167, IN2015_C02_128_N169, IN2015_C02_128_N171, IN2015_C02_398_N134.

IN2015_C02_179_N104 *Haliclona* (*Haliclona*) sp. 1 (Haplosclerida, Chalinidae)



Depth: 209 (200) m.

Growth form: Erect branching-flabelliform.

Colour: Beige (live) Dark grey/brown (in brown ethanol).

Oscules: Conspicuous (5-10 mm diam.), flush with surface, scattered laterally on branches.

Texture: Harsh, spongy.

Surface: Translucent porous sandy, microscopically hispid.

Ectosomal skel: Brushes of spicules protrude from ascending choanosomal tracts.

Choanosomal skel: Isodictyal mesh, primary fibres ascending-radial and multispicular, connecting fibres unispicular.

Megascleres: Oxeas uniform curved (115-155 x 4-8 μm).

Microscleres: None.

IN2015_C02_181_N161 *Haliclona* (*Haliclona*) sp. 2 (Haplosclerida, Chalinidae)



Depth: 283 (200) m.

Growth form: Branching, lobate.

Colour: Ruddy brown-grey (live and in ethanol).

Oscules: 1.5-2 mm diam., lateral on branches or apical, circular and flush with surface.

Texture: Easily compressible, easily torn.

Surface: Smooth (micro-rugose), hispid.

Ectosomal skel: Bouquets of oxeas, pigmentation and some sand incorporated.

Choanosomal skel: Pauci spicular fibres with unispicular joining fibres in a ladder-like network;

Isodictyal reticulation of spicules in uni-multispicular fibres of single spicule in length, connected by unispicular secondary lines.

Megascleres: Oxeas some with mucronate ends (140x7; 105x2 μm).

Microscleres: None.

Associated fauna: A hydroid grows through N143 sponge and emerges at the sponge's oscules.

Other specimens: IN2015_C02_181_N143 (RHS photo)

IN2015_C02_174_N116 *Amphimedon* sp. 1 (Haplosclerida, Niphatidae)



Depth: 410 (400) m.

Growth form: Sub-spherical.

Colour: Cream (in ethanol).

Oscules: Small oval mounds.

Texture: Firm, compressible, springy.

Surface: Smooth.

Ectosomal skel: Dense, but thin criss-cross of oxeas and junk spicules, subectosomal lacunae.

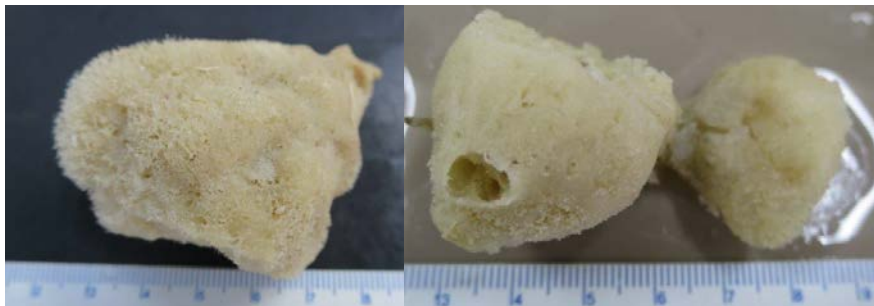
Choanosomal skel: There are some tracts running to the surface but mostly isotropic, isodictyal mesh. Has primary lines. Dese choanosomal skeleton, meshes hard to determine.

Megascleres: Straight to slightly curved oxeas, (e.g. 225x8 μ m).

Microscleres: None.

Remarks: Suspect this might have spongin fibre, needs it for Amphimedon.

IN2015_C02_179_N151 *Niphates* sp. 1 (Haplosclerida, Niphatidae)



Depth: 209 (200) m.

Growth form: Sub-spherical.

Colour: Cream (in ethanol).

Oscules: 5-6 mm diam.

Texture: Firm but spongy, very compressible, springy.

Surface: Smooth where surface has not worn off, but mostly exposed fibres giving a dried sponge look.

Ectosomal skel: Spongin emerges as a conule on the slide (not obvious on specimen), adherent ectosome.

Choanosomal skel: Multispicular fibres. Primaries and secondaries present. Reticulate fibre skeleton, somewhat meandering longitudinally. Centrally cored with oxeas.

Megascleres: Oxeas (140x5 140x2 μ m).

Microscleres: None.

Other specimens: IN2015_C02_179_N148 (RHS photo).

Determination: J. Fromont, L. Goudie, Sept. 2016.

IN2015_C02_191_N141 *Niphates* sp. 2 (Haplosclerida, Niphatidae)



Depth: 218 (200) m.

Growth form: Hollow tubes, some with fistules on end.

Colour: Beige (in ethanol).

Oscules: Fistules or oscules apical on sponge, and oscules 1 mm diam. flat on side of lobe.

Texture: Compressible.

Surface: Smooth.

Ectosomal skel: 3 dimensional, hispid tufts or bundles of oxeas protrude the surface.

Choanosomal skel: Circular mesh of bi-unispicular bundles, some multispicular tracts, almost obscured by halichondroid like confusion of spicules and detritus, collagen present, spongin light.

Megascleres: Oxeas (130-225 μ m).

Microscleres: None.

Other specimens: IN2015_C02_395_N182.

IN2015_C02_128_N155 *Niphates* sp. 3 (Haplosclerida, Niphatidae)



Depth: 221 (200) m.

Growth form: Amorphous.

Colour: Cream (in ethanol).

Oscules: 2-5 mm diam.

Texture: Firm, compressible.

Surface: Spongy/porous.

Ectosomal skel: Indistinct, choanosomal fibres protrude as conules or hispid endings.

Choanosomal skel: Spongin dominant, reticulation of fibres meandering, primary fibres cored by multispicular tracts of oxeas, occasionally fasciculate, connected by thinner paucispicular fibres, single spicules scattered in mesohyl.

Megascleres: Oxeas (e.g. 112x2, 135x5, 135x1 μ m).

Microscleres: None.

IN2015_C02_179_N150 Niphatid sp. 1 (Haplosclerida, Niphatidae)



Depth: 209 (200) m.

Growth form: Amorphous-massive.

Colour: Cream (in ethanol).

Oscules: None obvious.

Texture: Firm, solid, barely compressible, sticky, easily crumbled (bread crumb).

Surface: Slightly rugose-conulose, hispid.

Ectosomal skel: Indistinct, ascending tracts of oxeads protrude as conules.

Choanosomal skel: Densely spiculate, anisotropic, isodictyal arrangement of bundles of oxeads, some tracts ascend perpendicular to the surface, spongin light.

Megascleres: Oxeads uniform, curved, fusiform (210x2-5 μm).

Microscleres: None.

Remarks: May also be *Haliclona* but doesn't fit as well.

Other specimens: IN2015_C02_395_N162.

IN2015_C02_395_N194 Niphatid. sp. 2 (Haplosclerida, Niphatidae)



Depth: 189 (200) m.

Growth form: Specimen is a small broken piece of a branch.

Colour: Beige (in ethanol).

Oscules: Distinct on branch, 2-3 mm diam.

Texture: Compressible, spongy.

Surface: Smooth, porous.

Ectosomal skel: Multispicular mesh running horizontally along surface with some spicules sticking out.

Choanosomal skel: Dense multispicular rounded mesh.

Megascleres: Oxeads (150x5, 75x1 μm).

Microscleres: None.

Remarks: Has a bit of a Callyspongiid appearance, but very little spongin can be seen.

IN2015_C02_398_N129 Niphatid. sp. 3 (Haplosclerida, Niphatidae)



Depth: 199 (200) m.

Growth form: Hollow tubes.

Colour: Beige (in ethanol).

Oscules: At end of tubes 4-5 mm diam.

Texture: Firm, breaks easily.

Surface: Smooth, porous.

Ectosomal skel: Paucispicular fibres, some light sand armour in places.

Choanosomal skel: Rounded mesh, paucispicular fibres (3-5 spicules wide).

Megascleres: Oxeas with a definite bend (300x14, 180x1 μ m).

Microscleres: None.

Associated fauna: Encrusting bryozoans on surface of some pieces.

Remarks: Very like IN2015_C02_191_N141, but this (398-N129) sponge has larger tubes, they are a different colour and the oxeas are slightly larger and more bent in this sponge.

IN2015_C02_398_N125d Niphatid sp. 4 (Haplosclerida, Niphatidae)



Depth: 199 (200) m.

Growth form: Small blob.

Colour: Beige (in ethanol).

Oscules: 1 mm diam.

Texture: Firm.

Surface: Porous.

Ectosomal skel: Paucispicular mesh.

Choanosomal skel: Paucispicular-multispicular fibres, and paucispicular-multispicular mesh with little organization.

Megascleres: Oxeas.

Microscleres: None.

Associated fauna: One piece has calcareous worm tubes attached.

IN2015_C02_128_N143 *Hemigellius* sp? (Haplosclerida, Niphatidae)



Depth: 221 (200) m.

Growth form: Lobe on stalk.

Colour: White (in ethanol).

Oscules: Apical.

Texture: Easily compressible.

Surface: Smooth, but porous.

Ectosomal skel: Tangential oxeas, sometimes rising in small peaks.

Choanosomal skel: Isodictyal arrangement of oxeas. Some thicker tracts of oxeas running perpendicular to surface through width of section.

Megascleres: oxeas (240x10, 180x2 μ m).

Microscleres: c-sigmas.

IN2015_C02_179_N147 *Neopetrosia* sp. 1 (Haplosclerida, Petrosiidae)



Depth: 209 (200) m.

Growth form: Massive-amorphous.

Colour: Beige (in ethanol) ethanol is orange.

Oscules: Discrete, sunken (2-4 mm diam.).

Texture: Compressible, crumbly, exuding mucus.

Surface: Opaque, microconulose, relatively smooth.

Ectosomal skel: Collagenous with subectosomal bundles of oxeas protruding in support of conules.

Subectosomal lacunae. Not tangential, not easily detachable.

Choanosomal skel: Isodictyal arrangement of single spicules, mesohyl filled with pigment granules, rare internal canals, primary tracts of oxeas.

Megascleres: Oxeas uniform, curved, long slender, tapering (120 μ m).

Microscleres: None.

Other specimens: IN2015_C02_179_N128 (middle photograph), IN2015_C02_128_N147 (on right).

Determination: J. Fromont, L. Goudie, Sept. 2016.

IN2015_C02_395_N160 *Neopetrosia* sp. 2 (Haplosclerida, Petrosiidae)



Depth: 189 (200) m.

Growth form: Massive-lobate.

Colour: Cream (in ethanol).

Oscules: Conspicuous, apical on short, open fistules with surrounding rim of protruding oxeas.

Texture: Firm, friable.

Surface: Translucent, hispid, and relatively smooth.

Ectosomal skel: Collagenous with tangential surface bundles of oxeas, choanosomal bundles protruding. Some subdermal lacunae.

Choanosomal skel: Primary isodictyal reticulation of bundles of spicules, primary multispicular tracts ascending to the surface, generally circular mesh and secondary multispicular tracts.

Megascleres: Oxeas curved, uniform (120-150 μ m), long slender tapering.

Microscleres: None.

Remarks: Ectosome does not peel. Very neat and organized for a *Neopetrosia* skeleton, would need to check for spongin.

Determination: J. Fromont, L. Goudie, 2016.

IN2015_C02_128_N111 *Oceanapia* sp. 1 (Haplosclerida, Phloeodictyidae)



Depth: 221 (200) m.

Growth form: Stalked, single large fistule, solid body.

Colour: Sandy grey (in life and in ethanol).

Oscules: Grouped sunk within apical fistule.

Texture: Firm, harsh, friable.

Surface: Translucent, sandy.

Ectosomal skel: Multilayered tangential mesh of single oxeas.

Choanosomal skel: Densely spiculose, primary multispicular tracts vaguely parallel to surface layer, isodictyal arrangement of single oxeas, collagen and spongin present.

Megascleres: Oxeas curved (300-450 μ m).

Microscleres: None.

IN2015_C02_128_N108 *Oceanapia* sp. 2 (Haplosclerida, Phloeodictyidae)



Depth: 221 (200) m.

Growth form: Massive-spherical.

Colour: Yellow (live) black-brown with paler choanosome (in ethanol).

Oscules: Scattered, conspicuous, some barely raised, others with raised fistulose-like perimeter, 8-10 mm diam.

Texture: Harsh, friable, pulpy.

Surface: Translucent, smooth.

Ectosomal skel: Darkly pigmented, hispid brushes of choanosomal tracts, tangential missing?

Choanosomal skel: Densely spiculose, primary multispicular tracts vaguely parallel to surface layer, isodictyal arrangement of single oxeas, collagen and spongin present.

Megascleres: Oxeas curved (130-170 μ m).

Microscleres: None.

IN2015_C02_128_N117 *Oceanapia* sp. 3 (Haplosclerida, Phloeodictyidae)



Depth: 221 (200) m.

Growth form: Massive-globose, fistulose (short).

Colour: Orange (live) dark brown (in orange ethanol).

Oscules: Sunk within fistules.

Texture: Harsh, friable.

Surface: Translucent.

Ectosomal skel: Tangential mesh of oxeas, lightly pigmented.

Choanosomal skel: Densely spiculose, primary multispicular tracts vaguely parallel to surface layer, isodictyal arrangement of single oxeas, collagen and spongin present.

Megascleres: Oxeas curved (110-190x4-12 μ m).

Microscleres: None.

Other specimens: IN2015_C02_181_N148, IN2015_C02_181_N158.

IN2015_C02_181_N162 *Oceanapia* sp. 4 (Haplosclerida, Phloeodictyidae)



Depth: 283 (200) m.

Growth form: Bulbous, very long and wide fistule (longer than sponge body). Onion-like layers.

Colour: Cream (in ethanol).

Oscules: None seen, large fistule.

Texture: Compressible.

Surface: Smooth.

Ectosomal skel: Tangential dense oxeas.

Choanosomal skel: Large, dense, multispicular fibres connected by single oxeas.

Megascleres: Slightly curved regular oxeas.

Microscleres: None.

Other specimens: IN2015_C02_128_N170.

IN2015_C02_128_N174 *Oceanapia* sp. 5 (Haplosclerida, Phloeodictyidae)



Depth: 221 (200) m.

Growth form: Bulbous, with stalk/roots and long fistule.

Colour: Beige (in ethanol).

Oscules: 2 mm diam. on side of bulb, also long open fistule (opening is smaller than width of fistule).

Texture: Firm, barely compressible.

Surface: Smooth, but invested with sand.

Ectosomal skel: Tangential oxeas.

Choanosomal skel: Long pauci - multispicular tracts joined by single length single or paucispicular spicule mesh.

Megascleres: Slightly curved oxeas.

Microscleres: None.

Other specimens: IN2015_C02_128_N119, IN2015_C02_181_N159.

IN2015_C02_128_N121 *Oceanapia* sp. 6 (Haplosclerida, Phloeodictyidae)



Depth: 221 (200) m.

Growth form: Stalked, massive body, fistulose.

Colour: White (live/in ethanol).

Oscules: Apical on large fistules.

Texture: Harsh, spiculose, breadcrumb internally.

Surface: Translucent, porous, optically smooth.

Ectosomal skel: Tract of oxeas tangential to surface.

Choanosomal skel: Network (sometimes circular sometimes triangular) of dense multispicular fibres.

Megascleres: Oxeas one size (195x7 μm).

Microscleres: None.

IN2015_C02_179_N107 *Oceanapia* sp. 7 (Haplosclerida, Phloeodictyidae)



Depth: 209 (200) m.

Growth form: Spherical, large.

Colour: Orange (live).

Oscules: 6 mm diam. and large 20 mm diam. fistule (damaged).

Texture: Papery rather than pulpy.

Surface: Smooth.

Ectosomal skel: Distinct ectosomal layer of very dense tangential and criss-crossed oxeas.

Subectosomal spaces.

Choanosomal skel: Open multispicular network, not as rounded as normal *Oceanapia*.

Megascleres: Large oxeas 285x7 μm).

Microscleres: None.

Other specimens: IN2015_C02_181_N164, IN2015_C02_395_N147_a, IN2015_C02_398_N124.

IN2015_C02_181_N157 *Oceanapia* sp. 8 (Haplosclerida, Phloeodictyidae)



Depth: 283 (200) m.

Growth form: Bulbous.

Colour: Cream (slightly apricot) (live), Dark brown (in ethanol).

Oscules: Raised, apical. Surrounded by a ring of small closed fistules.

Texture: Easily compressed.

Surface: Smooth.

Ectosomal skel: Can detach. Tangential oxeads.

Choanosomal skel: Layers of network of oxea tracts.

Megascleres: Oxeas in two size categories (150x6, 120x1 μm).

Microscleres: None.

Remarks: Maybe gravid - there are small round hispid bodies, ?larvae or some diatom.

Other specimens:

IN2015_C02_128_N110 *Oceanapia* sp. 9 (Haplosclerida, Phloeodictyidae)



Depth: 221 (200) m.

Growth form: Bulbous with one fistule same length as sponge body. Bulb of sponge is invested with sand (maybe this part of the sponge was buried below surface).

Colour: White (live).

Oscules: Fistule opening 6 mm diam.

Texture: Hollow, firm.

Surface: Arenaceous - body of sponge is invested with sand.

Ectosomal skel: Sand armour.

Choanosomal skel: Thick tracts of oxeas in a network that is masked by large amount of sand.

Megascleres: Regular oxeas, several size categories (210x15, 180x5, 170x1 μm).

Microscleres: None.

IN2015_C02_128_N109 *Oceanapia* sp. 10 (Haplosclerida, Phloeodictyidae)



Depth: 221 (200) m.

Growth form: Large, spherical.

Colour: Beige white (live) Dark brown (in ethanol).

Oscles: Large on upper surface, central oscule ~10 mm diam., fistules on this sponge are short.

Texture: Hollow, firm.

Surface: Smooth to finely rugose.

Ectosomal skel: Tangential oxeads.

Choanosomal skel: Main fibres with oxeads run parallel to the surface and then get thinner to the point where there are spicule tracts with little spongin towards the centre of the sponge.

Megascleres: Oxeads with pointed stepped ends (mostly one category e.g. 160x6 µm).

Microscleres: None.

Other specimens: IN2015_C02_395_N147

IN2015_C02_128_N113 *Oceanapia* sp. 11 (Haplosclerida, Phloeodictyidae)



Depth: 221 (200) m.

Growth form: Spherical.

Colour: Cream (in ethanol).

Oscles: Two oscles (6 mm diam.) on top of sponge and fistules protruding near the base where the sponge is attached to rock.

Texture: Hollow, firm.

Surface: Smooth to finely rugose.

Ectosomal skel: Oxeads tangential to surface, along with sand. Surface layer does not detach.

Choanosomal skel: Multispicular fibres.

Megascleres: Oxeads.

Microscleres: None.

IN2015_C02_181_N167 *Oceanapia* sp. 12 (Haplosclerida, Phloeodictyidae)



Depth: 283 (200) m.

Growth form: Looks like it would have been a large bulb, but has collapsed and is in bits.

Colour: Cream (in ethanol).

Oscules: Several on top of sponge 2 mm diam.

Texture: Crumbly, compressible.

Surface: Smooth.

Ectosomal skel: Bunches of oxeads, sometimes tangential.

Choanosomal skel: Multilayered tracts of oxeads, spongin. Thick tracts are also perpendicular to the surface.

Megascleres: Oxeads (mostly 165x6 μm , some 105x2 μm).

Microscleres: None.

IN2015_C02_395_N159 *Oceanapia* sp. 13 (Haplosclerida, Phloeodictyidae)



Depth: 189 (200) m.

Growth form: Egg-shaped, ?fistular (broken off).

Colour: Pale beige (in ethanol).

Oscules: Fistule.

Texture: Firm.

Surface: Translucent, optically smooth.

Ectosomal skel: Thick surface layer of oxeads.

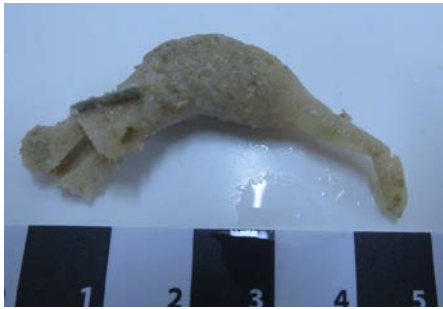
Choanosomal skel: Thick tracts of oxeads run between rounded mesh of oxeads.

Megascleres: Oxeads uniform (190x8 μm).

Microscleres: None.

Other specimens: N/A

IN2015_C02_128_N122 *Oceanapia?* sp. (Haplosclerida, Phloeodictyidae)



Depth: 221 (200) m.

Growth form: Hollow lobe with long fistule on top.

Colour: White (in ethanol).

Oscules: Fistule.

Texture: Firm, barely compressible, spiculose.

Surface: Slightly rugose, fistule is microscopically hispid.

Ectosomal skel: Collagen thicker at surface, with spicules horizontal to surface.

Choanosomal skel: Network of pauci- spicule rounded mesh.

Megascleres: Oxeas regular slightly bent in middle (commonly 300x6 μm , or more rarely thinner e.g. 250x3).

Microscleres: None.

Remarks: Although this has a hollow tube running through it, it does not have the open hollowness of normal *Oceanapia* and is very firm.

ORDER: POECILOSCLERIDA

IN2015_C02_179_N149 *Chondropsis* sp. 1 (Poecilosclerida, Chondropsidae)



Depth: 209 (200) m.

Growth form: Amorphous.

Colour: Cream (in ethanol).

Oscules: 2-3 mm diam.

Texture: Firm, compressible.

Surface: Delicate network, slightly conulose.

Ectosomal skel: Armour of sand.

Choanosomal skel: Regular mesh of fibres cored with foreign spicules and sand.

Megascleres: Junk spicules.

Microscleres: Sigmas (abundant).

Other specimens: IN2015_C02_191_N143, IN2015_C02_179_N162.

IN2015_C02_179_N154 *Chondropsis* sp. 2 (Poecilosclerida, Chondropsidae)



Depth: 209 (200) m.

Growth form: Amorphous.

Colour: Dirty grey on outside lighter on inside (in ethanol).

Oscules: 4 mm diam. (central canal in sponge).

Texture: Firm, compressible.

Surface: Smooth.

Ectosomal skel: Sand and foreign spicule armour.

Choanosomal skel: Thick fibres with foreign spicules and sand.

Megascleres: Strongyles (345x2 μ m) and many foreign broken spicules and sand.

Microscleres: None.

IN2015_C02_128_N149 *Chondropsis* sp. 3 (Poecilosclerida, Chondropsidae)



Depth: 221 (200) m.

Growth form: Erect lobes.

Colour: Light beige (in ethanol).

Oscules: Apical, oscules as wide as lobe.

Texture: Soft.

Surface: Arenaceous.

Ectosomal skel: Armoured with sand and foreign spicules.

Choanosomal skel: Thick tracts of sand, much foreign material.

Megascleres: Strongyles (330x1 μ m).

Microscleres: Sigmas.

Other specimens: IN2015_C02_181_N153.

IN2015_C02_181_N153 *Chondropsis* sp. 4 Poecilosclerida, Chondropsidae)



Depth: 283 (200) m.

Growth form: Large lobe on thick stalk

Colour: Pink-grey (live and in ethanol, turns ethanol reddish)

Oscules: 4 mm diam.

Texture: Quite soft, fleshy, arenaceous

Surface: Low conules/ wrinkled, pattern of sand on surface.

Ectosomal skel: Sand armour, skin like ectosome. Ectosome can be pulled off exposing dense pink-white choanosome.

Choanosomal skel: Reticulate fibre network. Gap between fibres ~ 1.5 mm.

Megascleres: Thin strongyles

Microscleres: Chelae, sigmas

Remarks: Pigmentation in sponge makes skeletal slide difficult to examine. Colour of this sponge is unusual for *Chondropsis*. (May have been stained by another sponge during collection).

IN2015_C02_126_N188 *Phoriospongia* sp. (Poecilosclerida, Chondropsidae)



Depth: 388 (400) m.

Growth form: Lobes.

Colour: Beige (live), grey (ethanol).

Oscules: Sunken, few, 3 mm diam.

Texture: Stony, incompressible.

Surface: Opaque, irregular, microscopically hispid.

Ectosomal skel: Indistinct.

Choanosomal skel: Mass of sand grains and spicular detritus bound together, subtylostyles scattered.

Megascleres: Subtylostyles.

Microscleres: None.

IN2015_C02_126_N184 *Coelosphaera* (*Coelosphaera*) sp. (Poecilosclerida, Coelosphaeridae)



Depth: 388 (400) m.

Growth form: Spherical, hollow, fistulose.

Colour: Pale pink (live), white (in ethanol).

Oscules: Not seen, possibly apical on fistules? Fistules appear closed.

Texture: Harsh, barely compressible.

Surface: Translucent, microscopically hispid.

Ectosomal skel: Dense mass of interwoven subtylotes 750-1000 μm thick.

Choanosomal skel: Collagen layer filled with subtylotes/tylotes and microscleres.

Megascleres: Tylotes (earbud like) (300-600 μm).

Microscleres: Isochela arcuate, c-s- and comma sigmas (65 μm).

Remarks: Hooper and Van Soest, 2002 p. 531. Both sponges in jar are the same (both examined).

IN2015-C02-126-N168a *Forcepia* (*Forcepia*) sp. (Poecilosclerida, Coelosphaeridae)



Depth: 388 (400) m.

Growth form: Small; Semi-spherical.

Colour: Light beige (in ethanol).

Oscules: Frequent, 1.5 mm in diam.

Texture: Very soft and easily compressible.

Surface: Gently rugose.

Ectosomal skel: Tylotes in tight bunches perpendicular or tangential to surface.

Choanosomal skel: Megascleres not bound by fibres in a lax fashion.

Megascleres: Styles (e.g. 600x8 μm), Tylotes, (e.g. 360x6 μm).

Microscleres: C-sigmas (e.g. 75 μm), forceps (e.g. 17 μm), tridentate chelae (e.g. 10 μm).

Note: Hooper and Van Soest (2002) p. 532.

IN2015_C02_174_N188 *Lissodendoryx (Anomodoryx) cf. dendyi* (Poecilosclerida, Coelosphaeridae)



Depth: 410 (400) m.

Growth form: Sub-spherical.

Colour: Brown (in ethanol).

Oscules: 5 mm diam.

Texture: Firm, compressible.

Surface: Clathrate, smooth.

Ectosomal skel: Tangential tornotes.

Choanosomal skel: Hard to distinguish due to dark pigmentation. Irregular groups of megascleres.

Megascleres: Tylotes (338x6 μm), lightly spined acanthostyles (750x9).

Microscleres: Arcuate chelae (30 μm), C-sigmas (38 μm).

Remarks: Possible irritant – take care handling.

Note: Hooper and van Soest p. 543.

IN2015_C02_330_N175a *Lissodendoryx (Lissodendoryx) sp.* (Poecilosclerida, Coelosphaeridae)



Depth: 412 (400) m.

Growth form: Sub-spherical.

Colour: Cream (in ethanol).

Oscules: 2 mm diam.

Texture: Very soft and spongy.

Surface: Soft rugose. There are also raised turrets which are firm.

Ectosomal skel: Tangential tylotes.

Choanosomal skel: Criss-cross of spicules sometimes in groups.

Megascleres: Styles, oxeas, tylotes.

Microscleres: C-sigmas, arcuate chelae.

Remarks: Another sponge (placed in a small tube in the voucher).

Other specimens: IN2015_C02_389_N128_a.

IN2015_C02_174_N187 *Crella* sp. (Poecilosclerida, Crellidae)



Depth: 410 (400) m.

Growth form: Solid thick lump.

Colour: White (in ethanol).

Oscules: 1-2 mm diam.

Texture: Firm, barely compressible.

Surface: Very smooth epidermis, but undulating.

Ectosomal skel: Acanthoxeas, tangential.

Choanosomal skel: Bundles of strongyles.

Megascleres: Acanthoxeas, smooth strongyles,

Microscleres: C-sigmas, chelae.

Remarks: Subgenus could not be determined. Similar megascleres to s.g. *Grayella* but this specimen also has chelae and sigmas.

IN2015_C02_179_N123 *Fibulia* sp. (Poecilosclerida, Dendoricellidae)



Depth: 209 (200) m.

Growth form: Digitate, thick (2-4 cm), hollow.

Colour: Pale yellow (live); Light beige (in ethanol).

Oscules: Sunken, and at end of tubes.

Texture: Firm, harsh.

Surface: Conulose-papillose.

Ectosomal skel: Thick crust of detritus 1-2 mm thick in some places, tangential tract of megascleres otherwise.

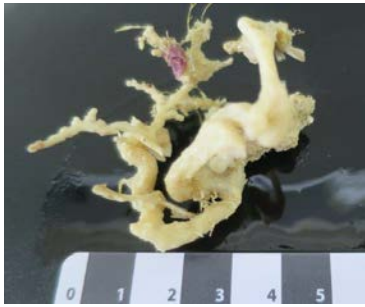
Choanosomal skel: Dense reticulation spicule bundles, almost halichondroid, large grain-size detritus scattered throughout collagen.

Megascleres: Oxeas (~400 μ m), strongyles.

Microscleres: Palmate isochelae and arcuate chelae, some aniso.

Remarks: See image Hooper and Van Soest (2002) p. 568

IN2015_C02_181_N117a *Dendoricellid. sp.* (Poecilosclerida, Dendoricellidae)



Depth: 283 (200) m.

Growth form: Small, tangled branches.

Colour: Cream (in ethanol).

Oscules: Not apparent.

Texture: Firm, compressible, tough.

Surface: Very slightly rugose, but mostly smooth.

Ectosomal skel: Skin that can be peeled off.

Choanosomal skel: Thick tracts of tangential tornotes and chelae.

Megascleres: Oxeas/tornotes, stylote oxeas.

Microscleres: Arcuate chelae (2 sizes categories).

Associated fauna: Bryozoa.

IN2015_C02_191_N162 *Clathria (Axosuberites) sp.* (Poecilosclerida, Microcionidae)



Depth: 218 (200) m.

Growth form: Digitate.

Colour: Cream (in ethanol).

Oscules: Very small ~ 0.5 mm diam.

Texture: Easily compressible, rubbery.

Surface: Microconulose.

Ectosomal skel: Sand armour on surface, some spicules protruding.

Choanosomal skel: Primary fibres are paucispicular joining fibres only one to 2 spicules and one spicule long.

Megascleres: Styles (225x12, 420x12 μ m), subtylostyles (330x3 μ m) + foreign spicules and sand

Microscleres: Toxas (135 μ m), palmate isochelae (rare) (15 μ m).

IN2015_C02_174_N130 *Mycale* (*Mycale*) sp. (Poecilosclerida, Mycalidae)



Depth: 410 (400) m.

Growth form: Small round blob.

Colour: White (in ethanol).

Oscules: Many on surface, 0.5 mm diam.

Texture: Soft, compressible.

Surface: Slightly rugose.

Ectosomal skel: Small anisochelae just below surface. Surface is penetrated by styles emerging from tracts.

Choanosomal skel: Styles, in tight bundles.

Megascleres: Mycalostyles.

Microscleres: Large chelae in rosettes, small anisochelae, raphides, c-sigmas.

Other specimens: IN2015_C02_186_N117, IN2015_C02_389_N128 (many specimens in jar).

IN2015_C02_186_N125 *Myxilla* sp. 1 (Poecilosclerida, Myxillidae)



Depth: 383 (400) m.

Growth form: Subspherical-lobate.

Colour: Pale purple (in ethanol).

Oscules: Not seen.

Texture: Firm, cartilaginous.

Surface: Opaque, porous, sandy.

Ectosomal skel: Collagenous, tylotes lying tangential in places and forming protruding brushes, styles echinating surface.

Choanosomal skel: Choanosome masked by sand, fibres not obvious, seemingly disorganised megascleres.

Megascleres: Tylotes; Styles curved, spined shaft and base (350-450 μ m).

Microscleres: Anchorate isochelae; Sigmas.

IN2015_C02_191_N161 Myxillinid sp. 1 (Poecilosclerida (Myxillina))



Depth: 218 (200) m.

Growth form: Cylindrical, branching, 3-5 mm diam.

Colour: Cream (in ethanol).

Oscules: Not seen.

Texture: Firm, cartilaginous.

Surface: Opaque, microconulose, microscopically hispid.

Ectosomal skel: Collagenous, filled with microscleres.

Choanosomal skel: Axial core of megascleres, becoming radial-plumose subectosomally.

Megascleres: Oxeas, occasionally stylote.

Microscleres: Arcuate isochelae robust.

Other specimens: IN2015_C02_398_N141.

ORDER: POLYMASTIIDA

IN2015_C02_395_N130 *Polymastia* sp. (Polymastiida, Polymastiidae)



Depth: 189 (200) m.

Growth form: Spherical-flattened (5-15 mm diam.) with single apical papilla 5-10 mm long.

Colour: Pale yellow (live); Beige-white (in ethanol).

Oscules: Apical on papilla?

Texture: Firm, spiculose.

Surface: Opaque, optically smooth, microscopically hispid.

Ectosomal skel: Distinct crust (200-300 μ m thick) separated from choanosome, tangential tract of large oxeas with paratangential felt of small styles.

Choanosomal skel: Radial-plumose tracts of oxeas with haphazard single styles filling collagen between. Subectosome open with radial tracts supporting surface layer.

Megascleres: Oxeas (600-1200 μ m) Subtylostyles slightly curved (120-240 μ m).

Microscleres: None.

Other specimens: IN2015_C02_398_N148.

ORDER: SUBERITIDA

IN2015_C02_181_N113 *Ciocalypta* sp. 1 (Suberitida, Halichondriidae)



Depth: 283 (200) m.

Growth form: Small, fistules.

Colour: White (in ethanol).

Oscules: Only fistules, no sponge body.

Texture: Delicate, compressible.

Surface: Microrugose.

Ectosomal skel: Criss-cross arrangement of oxeas tangential to surface.

Choanosomal skel: Long multispicular tracts run through length, although not central or axinellid like.

Megascleres: Oxeas of several thicknesses (e.g. 150x1, 200x6 202x11, 218x13 μm).

Microscleres: None.

Remarks: Base of sponge possibly buried in sediment.

IN2015_C02_191_N142 *Ciocalypta* sp. 2 (Suberitida, Halichondriidae)



Depth: 218 (200) m.

Growth form: Fistules (10-30 mm in length), blind, broken from base?

Colour: Cream (in ethanol).

Oscules: Not seen (apical on fistule in 395_N207).

Texture: Compressible.

Surface: Translucent, microconulose, irregular-tuberculose.

Ectosomal skel: Hispid, oblique brushes of smaller oxeas barely protruding the surface.

Choanosomal skel: Axial reticulation of bundles of larger oxeas becoming plumose in the subectosome.

Megascleres: Oxeas (120-400 μm). (IN2015_C02_395_N207 Oxeas large, curved, occasionally stylote (600-750x30 μm); Oxeas small (150-275 μm)).

Microscleres: None.

Other specimens: IN2015_C02_395_N207 (RHS photo), IN2015_C02_395_202, IN2015_C02_398_N163.

IN2015_C02_186_N130 *Halichondria* sp. (Suberitida, Halichondriidae)



Depth: 383 (400) m.

Growth form: Small, amorphous, long, tapering, blind fistules protrude.

Colour: White (in ethanol).

Oscules: Inconspicuous, scattered, sunken.

Texture: Firm, harsh, compressible.

Surface: Very hispid, translucent, conulose.

Ectosomal skel: Tangential with long single spicules protruding; fistular outgrowths consist of multispicular tracts of oxeas intermingled with flexuous strongyles.

Choanosomal skel: Tracts of oxeas.

Megascleres: Oxeas large size range.

Microscleres: None.

IN2015_C02_174_N141 *Halichondria?* sp. (Suberitida, Halichondriidae?)



Depth: 410 (400) m.

Growth form: Sub-spherical.

Colour: White (in ethanol).

Oscules: 5 mm diam.

Texture: Firm, spiculose.

Surface: Smooth, surface peels off.

Ectosomal skel: Not well defined, oxeas horizontal or slightly angled to surface.

Choanosomal skel: Oxeas not in tracts, microxeas scattered.

Megascleres: Blunt ended oxeas (e.g. 435x16 μ m).

Microscleres: Very thin small oxeas.

Associated fauna: Encrusting on dead coral.

IN2015_C02_128_N152 Halichondriid sp. 1 (Suberitida, Halichondriidae)



Depth: 221 (200) m.

Growth form: Small, lobe.

Colour: White (in ethanol).

Oscules: None obvious (very small specimen).

Texture: Firm.

Surface: Smooth to microscopically hispid, very thin armour of sand.

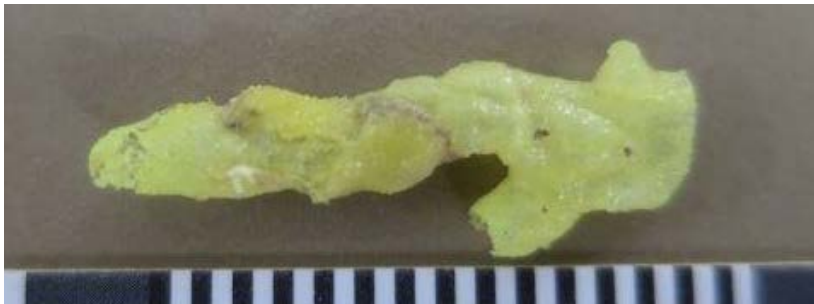
Ectosomal skel: Smaller oxeas in crossed mesh on surface.

Choanosomal skel: No fibres, large spicules perpendicular to surface.

Megascleres: Oxeas of several categories, some tips asymmetrical, some oxeas fatter in one half and thinner in the other (a bit club-like, but still oxeas) (e.g. 142x6, 292x8, 630x8, 638x9 μm).

Microscleres: None.

IN2015_C02_128_N148 Halichondriid. sp. 2 (Suberitida, Halichondriidae)



Depth: 221 (200) m.

Growth form: Fistule only. Very small.

Colour: Yellow transparent (in ethanol).

Oscules: Just fistule open at tip.

Texture: Papery.

Surface: Smooth.

Ectosomal skel: Loose mesh of crossed oxeas.

Choanosomal skel: N/A – hollow with very thin body wall.

Megascleres: Curved oxeas in one size (165x7 μm).

Microscleres: None.

Remarks: Only part of sponge.

IN2015_C02_398_N149 *Stylocordyla* sp. 1 (Suberitida, Stylocordylidae)



Depth: 199 (200) m.

Growth form: Stipitate, ovoid body, flattened top, fine stalk. Very small (3 cm long).

Colour: White (in ethanol).

Oscules: No oscule is obvious on top of sponge.

Texture: Firm, spiculose.

Surface: Microscopically hispid.

Ectosomal skel: Spicules emerging at right angles to surface.

Choanosomal skel: Dense tract of spicules from stalk branches in head of sponge and fans to surface.

Megascleres: Oxeas long centrotylote, stylote, small oxeas.

Microscleres: microxeas?

Other specimens: IN2015_C02_174_N183, IN2015_C02_389_N103, IN2015_C02_395_N206.

IN2015_C02_128_N130 *Pseudosuberites* sp. 1 (Suberitida, Suberitidae)



Depth: 221 (200) m.

Growth form: Small lobes.

Colour: Orange (live LHS photo), Dull yellow (in ethanol RHS photo) – ethanol stains yellow.

Oscules: Inconspicuous, sunken, <1 mm diam.

Texture: Tough, compressible.

Surface: Smooth but wrinkled glossy, opaque.

Ectosomal skel: Subtylostyles in dense tract tangential to surface.

Choanosomal skel: Densely collagenous with fibre reticulation. Subtylostyles in confused arrangement, becoming plumose bundles subectosomally.

Megascleres: Subtylostyles (almost styles) (390x4 - 1000x4 μ m).

Microscleres: None.

IN2015_C02_179_N152 *Pseudosuberites* sp. 2 (Suberitida, Suberitidae)



Depth: 209 (200) m.

Growth form: Encrusting on rock.

Colour: Beige (in ethanol).

Oscules: Inconspicuous small rare.

Texture: Tough, harsh.

Surface: Opaque, optically smooth.

Ectosomal skel: Tangential mat of haphazard tylostyles.

Choanosomal skel: Some large bundles of larger tylostyles below surface. Collagen present

Megascleres: Tylostyles occasional flexuous large size-range (60-825 μ m).

Microscleres: None.

IN2015_C02_128_N103 *Rhizaxinella* sp. (Suberitida, Suberitidae)



Depth: 221 (200) m.

Growth form: Stipitate, long, tough stalk (5-10 cm) with rootlets, flattened ovate body.

Colour: Orange (life) Beige (in ethanol).

Oscules: Apical?

Texture: Cartilaginous, tough axial core.

Surface: Opaque, optically smooth, wrinkled in ethanol.

Ectosomal skel: Tangential tracts of spicules, occasional tips of styles protruding as small process.

Choanosomal skel: Halichondroid arrangement of spicule tracts becoming plumose subectosomally and thicker longitudinal axially.

Megascleres: Styles/subtylostyles long wispy (360x2 μ m), occasionally flexuous.

Microscleres: None.

Remarks: This is not *Stylocordyla* as the spicules are not centrotylote oxeas, however neither are they obvious tylostyles.

Other specimens: IN2015_C02_191_N139, IN2015_C02_196_N129, IN2015_C02_395_N152, IN2015_C02_398_N131, IN2015_C02_435_N104.

IN2015_C02_126_N172 *Suberites* sp. 1 (Suberitida, Suberitidae)



Depth: 388 (400) m.

Growth form: Flattened disc with radial fringe of spicules.

Colour: Beige-white (in ethanol).

Oscules: Not observed (inconspicuous apical?).

Texture: Firm, spiculate, arenaceous.

Surface: Fringe of spicules around disc, apical surface hispid.

Ectosomal skel: Paratangential brushes of smaller tylostyles.

Choanosomal skel: Huge tracts of large tylostyles run longitudinally across disc protruding as lateral fringe. Deeper in choanosome tracts are less organized and collagen filled with detritus.

Megascleres: Tylostyles large size range (120-3500 μm) smaller curved.

Microscleres: None.

Remarks: We have put this in *Suberites* due to the spicules, but it is not globular but disc-like in shape.

Other specimens: IN2015_C02_126_N181 (photo on right), IN2015_C02_167_N108,

IN2015_C02_186_N121, IN2015_C02_186_N122, IN2015_C02_196_N133, IN2015_C02_292_N141,

IN2015_C02_330_N172, IN2015_C02_382_N122, IN2015_C02_389_N113, IN2015_C02_449_N133.

IN2015_C02_126_N183 *Suberites* sp. 2 (Suberitida, Suberitidae)



Depth: 388 (400) m.

Growth form: Spherical (30 mm diam.), short apical papilla.

Colour: Pale pink (live), pale grey (in ethanol).

Oscules: Very small pin-prick, inconspicuous, scattered.

Texture: Hard, harsh, spiculate.

Surface: Opaque, optically smooth, hispid.

Ectosomal skel: Continuous palisade of small tylostyles.

Choanosomal skel: Disorganised tracts of large tylostyles with smaller tylostyles scattered in collagen.

Megascleres: Tylostyles (190-600 μm).

Microscleres: None.

IN2015_C02_126_N178 *Suberites* sp. 3 (Suberitida, Suberitidae)



Depth: 388 (400) m.

Growth form: Spherical-oval growing around rock fragments.

Colour: Brown (in ethanol).

Oscules: Single apical, 2 mm diam., opposite end porous inhalant.

Texture: Firm, harsh, spiculose.

Surface: Hispid.

Ectosomal skel: Palisade of spicule brushes.

Choanosomal skel: Large bundles of tylostyles.

Megascleres: Tylostyles in large size range; occasional subtylostyles.

Microscleres: None.

Other specimens: IN2015_C02_126_N168c.

IN2015_C02_174_N116c *Suberites* sp. 4 (Suberitida, Suberitidae)



Depth: 410 (400) m.

Growth form: Small, Sub-spherical.

Colour: Cream (in ethanol).

Oscules: None obvious.

Texture: Firm.

Surface: Very hispid, arenaceous.

Ectosomal skel: Cortex of packed shorter subtylostyles, cortex appears whiter than rest of sponge.

Choanosomal skel: Radial spicules.

Megascleres: Subtylostyles at least 3 categories (e.g. 285x12, 540x12, 1725x18 μm).

Microscleres: None.

IN2015_C02_174_N120 *Suberites* sp. 5 (Suberitida, Suberitidae)



Depth: 410 (400) m.

Growth form: Sub-spherical.

Colour: Pinkish-cream (in ethanol).

Oscules: There is a raised section that looks like it could have been an oscule but it is damaged.

Texture: Firm to hard, barely compressible.

Surface: Smooth.

Ectosomal skel: Surface palisade of smaller subtylostyles.

Choanosomal skel: Radiating tracts of subtylostyles separated by areas of spongin and broken spicules.

Megascleres: Subtylostyles of various sizes (e.g. 165x8, 420x14, 1380x16, 2145x16 μm).

Microscleres: None.

ORDER: TETHYIDA

IN2015_C02_398_N103 *Tethya* sp. 1 (Tethyida, Tethyiidae)



Depth: 199 (200) m.

Growth form: Spherical with rootlets.

Colour: Dark pink (in life) pale pink (in ethanol).

Oscules: Small inconspicuous sunk between tubercles.

Texture: Firm, spiculose.

Surface: Opaque, tuberculose-papillose, microscopically hispid.

Ectosomal skel: Crust of asterose microscleres overlaying paratangential brushes of choanosomal megasclere tracts.

Choanosomal skel: Large radial tracts of megascleres. Dense collagen between filled with scattered asterose microscleres.

Megascleres: Styles (300-1200 μm).

Microscleres: Euasters (15-40 μm).

IN2015_C02_330_N109 *Tethycometes?* sp. 1 (Tethyida, Tethyiidae)



Depth: 412 (400) m.

Growth form: Long fine stalk (30-40 mm), small, ovoid body (3-5 mm long), slightly flattened apically.

Colour: White (in ethanol).

Oscules: Inconspicuous.

Texture: Firm, harsh.

Surface: Translucent, hispid.

Ectosomal skel: Thin cortex of asterose microscleres.

Choanosomal skel: Plumose-radial bundles of styles, microscleres packed in collagen.

Megascleres: Styles/Anisoxeas (750 μ m) occasional strongyle.

Microscleres: Euasters (40 μ m) spirasters (as in *Cliona*).

Remarks: This is not *Stylocordyla* as the spicules are not centrotylote, however neither are they tylostyles and asterose microscleres are present.

Other specimens: IN2015_C02_126_N168b, IN2015_C02_191_N140.

ORDER: TETRACTINELLIDA

N2015_C02_398_N164 *Asteropus* sp. 1 (Tetractinellida, Ancorinidae)



Depth: 199 (200) m.

Growth form: Massive-irregular.

Colour: Grey (in ethanol).

Oscules: Not seen.

Texture: Harsh, barely compressible.

Surface: Irregular, hispid.

Ectosomal skel: Thin layer of euasters (<100 μ m); Single large oxeas tangentially at the surface.

Choanosomal skel: Deep in choanosome confused arrangement of oxeas becoming radial bundles ascending in support of the surface separated by large spaces; collagen filled with sanidasters (not seen in spicule prep).

Megascleres: Oxeas large (>1000 μ m).

Microscleres: Tylasters spined (30 μ m).

IN2015_C02_174_N116a *Psammastra?* sp. (Tetractinellida, Ancorinidae)



Depth: 410 (400) m.

Growth form: Small, Sub-spherical.

Colour: Cream (in ethanol).

Oscules: There is one distinct tuft of spicules (? covering an oscule) or is this an attachment point? All emerging spicules point in the direction of this tuft.

Texture: Firm.

Surface: Conulose in some parts, hispid in others where spicules have broken through ectosome.

Ectosomal skel: The tuft of spicules is dominated by plagiotriaenes. Thin cortex at surface seems to be mostly sand.

Choanosomal skel: Radiating long spicules in tracts.

Megascleres: Very large aniso-oxeas (1545x28 μm), regular oxeas of various sizes (e.g. 540x15 μm). anatriaenes (2835x6 μm), plagiotriaene (1725x15 μm).

Microscleres: None seen in spicule or skeletal preparation.

IN2015_C02_126_N187 *Stelletta* sp. 1 (Tetractinellida, Ancorinidae)



Depth: 388 (400) m.

Growth form: Spherical (10-30 mm).

Colour: Cream (live); White (in ethanol).

Oscules: Unobserved.

Texture: Firm, harsh, spiculose.

Surface: Translucent, smooth.

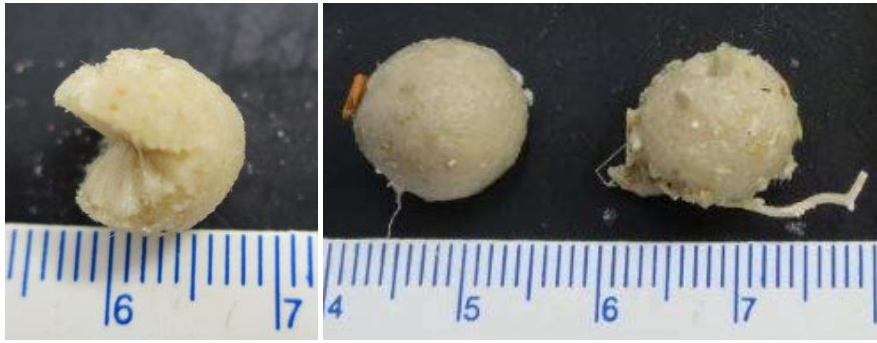
Ectosomal skel: Indistinct, clads of triaenes tangential with surface.

Choanosomal skel: Radial arrangement of megascleres, microscleres scattered between.

Megascleres: Oxeas, triaenes long rhabdome, thin anatriaenes, robust dichotriaenes (>1500 μm).

Microscleres: Euasters, no chiasmata.

IN2015_C02_174_N116b *Stelletta* sp. 2 (Tetractinellida, Ancorinidae)



Depth: 410 (400) m.

Growth form: Sub-spherical.

Colour: Cream (in ethanol).

Oscules: Not obvious.

Texture: Firm, harsh, spiculose.

Surface: Hispid.

Ectosomal skel: Formed from clades of plagiotriaenes, there is a gap of approximately 600 μm between this layer and the next layer of clades which includes a mix of plagio and ana triaenes.

Choanosomal skel: Dense tracts of triaenes in radial arrangement.

Megascleres: Anatriaenes (1560x15 μm), Oxeas (1650x18, 1950x45 μm), Plagiotriaenes (3930x60 μm).

Microscleres: Euasters (30 μm diam.), spined chiasters.

Other specimens: IN2015_C02_389_N102, IN2015_C02_398_N147, IN2015_C02_395_N203 (RHS photo, 200 m); IN2015_C02_395_N180 (200 m).

IN2015_C02_186_N109 *Stelletta* sp. 3 (Tetractinellida, Ancorinidae)



Depth: 383 (400) m.

Growth form: Sub-spherical lobe.

Colour: Cream (in ethanol).

Oscules: One on top.

Texture: Very firm.

Surface: Smooth.

Ectosomal skel: Clades of plagiotriaenes, and asters.

Choanosomal skel: Radial long shafted triaenes.

Megascleres: Long shafted Plagio (1350x15 μm) and ana (1000x6 μm) triaenes, oxeas (340x5 μm).

Microscleres: Euasters (20-28 μm).

Other specimens: IN2015_C02_174_N111.

IN2015_C02_395_N203c *Stelletta* sp. 4 (Tetractinellida, Ancorinidae)



Depth: 189 (200) m.

Growth form: Spherical.

Colour: Grey (in ethanol).

Oscules: Not seen.

Texture: Firm, compressible.

Surface: Translucent, regular, hispid.

Ectosomal skel: Outer layer of spined tylasters with clads of triaenes on the surface.

Choanosomal skel: Radial shafts of triaenes with tylasters scattered throughout.

Megascleres: Triaenes ana- pro- ortho- dico-.

Microscleres: Tylasters spined.

Remarks: Could be the same as IN2015_C02_174_N116b, but kept separate as this one's external appearance is different.

IN2015_C02_395_N150 *Stryphnus* sp. (Tetractinellida, Ancorinidae)



Depth: 189 (200) m.

Growth form: Massive, rounded.

Colour: Grey (in ethanol). Oscules: 2 mm diam.

Texture: Hard, not compressible, spiculose.

Surface: No cortex, densely and finely hispid.

Ectosomal skel: Sanidasters are more prevalent in the ectosome.

Choanosomal skel: Tangential oxeads, oxyasters scattered between large spicules. More collagenous material in choanosome.

Megascleres: Large oxeads (495x12, 900x14 μm); dichotriaenes (shaft 225 μm), subtylostyles (with some tytes below end of spicule 195x6 μm).

Microscleres: Sanidasters, oxyasters.

Remarks: Distinction between ectosome and choanosome is more noticeable on the skeletal slide under dissecting microscope. Although there are a few of them, the subtylostyles must be foreign for this diagnosis.

IN2015_C02_126_N185 Tetillid. sp. (? new) (Tetractinellida, Tetillidae)



Depth: 388 (400) m.

Growth form: Spherical, 4 prominent raised oscules.

Colour: Light beige, raised oscules white (live); White (in ethanol).

Oscules: 4 conspicuous raised porocalices (with perforated region at base) surrounded by ring of small pores, 2 mm diam.

Texture: Firm, harsh, spiculose.

Surface: Translucent, hispid, small groups of spicules emerge slightly from the surface (Urchin-like), drainage pattern visible.

Ectosomal skel: Criss-cross of oxeas on surface, some radial bundles of oxeas protrude surface, clads of triaenes at the surface (cannot see them).

Choanosomal skel: Radial bundles of oxeas, interwoven with thin triaenes, light collagen between filled with pigment/bacteria?

Megascleres: Robust oxeas/styles, long thin ana- pro-triaenes (up to 4 mm x 5 µm).

Microscleres: None.

Remarks: Possibly new? Difficult to fit into a Tetillid. genus.

IN2015_C02_126_N176 Theonellid sp. (Tetractinellida, Theonellidae)



Depth: 388 (400) m.

Growth form: Small thin flabelliform.

Colour: White (in ethanol).

Oscules: Not obvious.

Texture: Compressible, harsh.

Surface: Translucent, hispid, minutely conulose.

Ectosomal skel: Indistinct.

Choanosomal skel: Interlocking desmas with plumose bundles of styles protruding surface.

Megascleres: Anisostyles occasional strongylote/oxeote (1000 µm) desmas (500 µm) dichotriaenes?

Microscleres: None.

IN2015_C02_131_N146 *Thenaea* sp. 1 (Tetractinellida, Theneidae)



Depth: 1021 (1000) m.

Growth form: Oval to mushroom-shaped with defined 'waist' or transversal recess.

Colour: Sandy white (in ethanol).

Oscules: Grouped, sunk below single apical opening.

Texture: Firm, spiculate.

Surface: Translucent, porous.

Ectosomal skel: Clads of large dichotriaenes tangential to surface.

Choanosomal skel: Densely packed megascleres with microscleres adhering.

Megascleres: Short-shafted tetractines/pentactines/hexamactines with spined rhabdomes, large dichotriaene, long smooth monaxons.

Microscleres: Plesiasters.

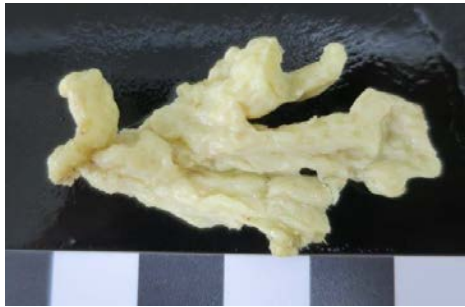
Remarks: This was the dominant sponge collected on the IN2015 voyage. Compare with *Thenaea grayi* Sollas 1886 which is listed as occurring in Southern Australia (off Sydney) and *Thenaea novaezealandiae* Bergquist 1961. Spicule dimensions of the IN2015 sponges fit with *T. novaezealandiae*, but the large oxeas seen in the GAB sponges do not appear in the description of the type specimen. The size of the plesiasters in *T. grayi* are described as a lot larger (143 µm) than in our specimen, whereas the size of the plesiasters in *T. novaezealandiae* (41 µm) match our specimens, however there are no spines on the plesiasters in the examined specimen. Note that the type specimen of *T. novaezealandiae* was requested from Canterbury Museum in Christchurch, but it was unable to be located. Specimens are varied in size and in length of protruding spicules and it's interesting to note that *T. grayi* is listed as having 3 varieties.

Other specimens: From this voyage: IN2015_C02_151_N118, IN2015_C02_159_N124, IN2015_C02_167_N103, IN2015_C02_167_N107, IN2015_C02_196_N105, IN2015_C02_196_N106, IN2015_C02_207_N102, IN2015_C02_227_N123, IN2015_C02_292_N147, IN2015_C02_292_N148, IN2015_C02_292_N150, IN2015_C02_330_N175, IN2015_C02_382_N115, IN2015_C02_382_N116, IN2015_C02_382_N117, IN2015_C02_389_N127, IN2015_C02_449_N136. Plus, IN2015_CO1_096_N114 (pictured above) and others from IN2015_C01 voyage and SAMA S1246 (SA Museum).

Geographical records: SA GAB, Southern Australia (off Sydney) if *T. Grayi*; NZ (if *T. novaezealandiae*).

ORDER: TRACHYCLADIDA

IN2015_C02_174_N121 *Trachycladus* sp. (Trachycladida, Trachycladidae)



Depth: 410 (400) m.

Growth form: Flat branching.

Colour: Yellow (pale yellow in ethanol, ethanol is yellow).

Oscules: Not apparent.

Texture: Firm rubbery compressible.

Surface: Thick skin (like a hide), smooth.

Ectosomal skel: Thick layer of spinispira.

Choanosomal skel: Tracts of subtylostyles and spinispira. Very dense. Difficult to see choanosome clearly.

Megascleres: Subtylostyles.

Microscleres: Acanthose spires (spinispira).

Remarks: No conules as described for *T. laevispirulifer*.

SUBCLASS: KERATOSA

ORDER: DICTYOCERATIDA

IN2015_C02_181_N126 cf. *Euryspongia* sp. 1 (Dictyoceratida, Dysideidae)



Depth: 283 (200) m.

Growth form: Encrusting on a stalk-like piece of substrate.

Colour: Purple (live and in ethanol).

Oscules: Single oscule 1.5 mm diam.

Texture: Soft, arenaceous.

Surface: Conulose, clear long fibres protrude, lace-like pattern.

Ectosomal skel: Sand-filled tangential fibres forming a cortex approx. 300 µm thick.

Choanosomal skel: Primary fibres cored. Purple pigmentation throughout mesohyl. Secondary fibres clear of detritus, laminated and with central pith, protruding surface conules in parts.

Megascleres: None (many foreign broken spicules).

Microscleres: None.

Associated fauna: Encrusting on other organism.

Remarks: Has conules, therefore prefer to assign to *Euryspongia* rather than *Thorecta*.

IN2015_C02_395_N131 cf. *Euryspongia* sp. 2 (Dictyoceratida, Dysideidae)



Depth: 189 (200) m.

Growth form: Small, stalked, lobate, pyriform.

Colour: Pale orange in ethanol.

Oscules: Discrete flush with surface 2-3 mm diam.

Texture: Spongy, soft, arenaceous.

Surface: Porous, lace-like network of surface fibres, evenly conulose.

Ectosomal skel: Surface fibres filled with small grain-size detritus forming a distinct cortex.

Choanosomal skel: Open, tending to rectangular mesh of laminated fibres pith visible, primary fibres cored, secondary fibres clear, mesohyl collagenous and filled with detritus.

Megascleres: None.

Microscleres: None.

Remarks: Cf. *Euryspongia*, due to delicate Dysideid surface and conules, although these specimens are not encrusting.

Other specimens: IN2015_C02_395_N132, (above right), IN2015_C02_N128_140.

IN2015_C02_181_N119 *Psammocinia* sp. 1 (Dictyoceratida, Irciniidae)



Depth: 283 (200) m.

Growth form: Small, 2 erect conulose branches come off this base.

Colour: Grey (in ethanol).

Oscules: None seen.

Texture: Firm compressible.

Surface: Conulose sandy, base of sponge invested with sand is non conulose.

Ectosomal skel: Armoured with sand.

Choanosomal skel: Filaments.

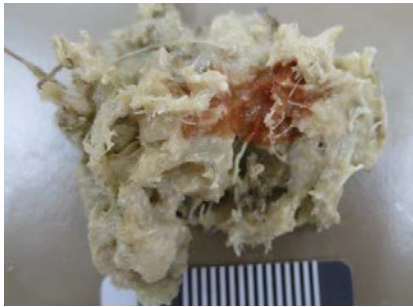
Megascleres: None.

Microscleres: None.

Remarks: Cut section is taken from base.

Other specimens: IN2015_C02_395_N155 (larger specimen).

IN2015_C02_389_N141 *Irciniid* (?) sp. (Dictyoceratida, Irciniidae (?))



Depth: 426 (400) m.

Growth form: Amorphous, encrusting on a lot of debris.

Colour: (in ethanol).

Oscules: None seen.

Texture: Firm, compressible.

Surface: Conulose in parts.

Ectosomal skel: Full of debris.

Choanosomal skel: Full of debris.

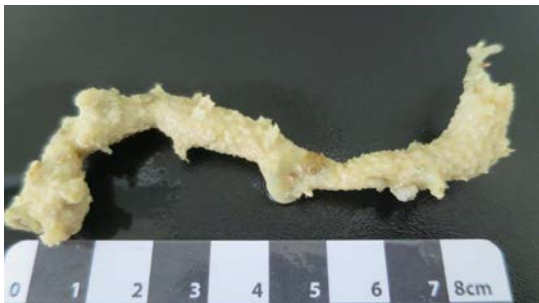
Megascleres: Foreign.

Microscleres: Foreign.

Associated fauna: This sponge is encrusted on dead bryozoans and other debris. Other sponges may also be caught up in this mixture.

Remarks: This has the appearance of an Irciniid and the sponge is tough, however the debris associated with this sponge has masked the skeletal slide.

IN2015_C02_128_N138 *Hyatella* sp. 1 (Dictyoceratida, Spongiidae)



Depth: 221 (200) m.

Growth form: Stalked, erect, cylindrical, branching.

Colour: Cream (in ethanol).

Oscules: Not obvious.

Texture: Firm but easily compressible, fibrous.

Surface: Translucent, markedly conulose.

Ectosomal skel: Thin layer of fine grain-size detritus.

Choanosomal skel: Lacunose, open-meshed reticulation of primary fibres cored, secondary clear.

Fibres appear homogeneous (unlaminated, no pith).

Megascleres: None.

Microscleres: None.

IN2015_C02_128_N142 *Leiosella* sp. 1 (Dictyoceratida, Spongiidae)



Depth: 221 (200) m.

Growth form: Small, erect.

Colour: Cream (in ethanol).

Oscules: None obvious.

Texture: Firm, compressible.

Surface: Conulose.

Ectosomal skel: Sand armour can be separated from choanosome.

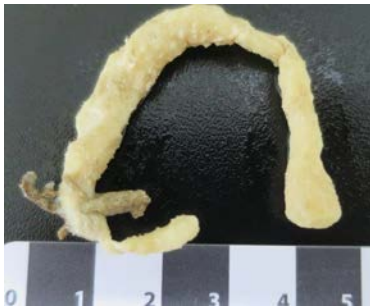
Choanosomal skel: Mesh of secondary fibres uncored ~ 30 µm in diam.

Megascleres: None.

Microscleres: None.

Associated fauna: Didemnid ascidian is encrusting over sponge at one end.

IN2015_C02_174_N115 *Leiosella* sp. 2 (Dictyoceratida, Spongiidae)



Depth: 410 (400) m.

Growth form: Ramose, branching.

Colour: White (in ethanol).

Oscules: 1 mm diam. on side of sponge.

Texture: Compressible.

Surface: Very small blunt conules.

Ectosomal skel: Thick (relative to size of sponge) sand armour.

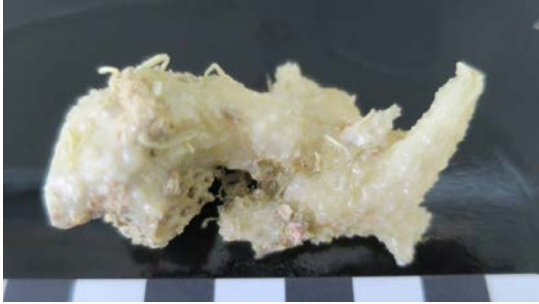
Choanosomal skel: Fibrous. Primary fibres cored, secondary fibres clear, and tightly packed.

Megascleres: Foreign and broken.

Microscleres: None.

Other specimens: IN2015_C02_179_N130, IN2015_C02_191_N152, IN2015_C02_395_N165, IN2015_C02_395_200, IN2015_C02_398_N123.

IN2015_C02_181_N117 *Leiosella* sp. 3 (Dictyoceratida, Spongiidae)



Depth: 283 (200) m.

Growth form: Encrusting on rock, with some lobes.

Colour: Cream (in ethanol).

Oscules: Not obvious.

Texture: Compressible, but tough.

Surface: Conulose. Skin-like and detachable.

Ectosomal skel: Thick sand armour.

Choanosomal skel: Tangled secondary fibres that are clear.

Megascleres: None apart from broken foreign.

Microscleres: None.

Associated fauna: Coral rock, dead bryozoan also on coral. Small worm tubes on sponge.

Other specimens: IN2015_C02_186_N126, IN2015_C02_186_N128.

IN2015_C02_398_N119 *Leiosella* sp. 4 (Dictyoceratida, Spongiidae)



Depth: 199 (200) m.

Growth form: Stalked, lobate.

Colour: Beige (in ethanol).

Texture: Firm, compressible, tough

Surface: Translucent.

Ectosomal skel: Armoured layer of spiculose detritus.

Choanosomal skel: A lot of detritus incorporated obscuring skeletal fibres, except clear uncored fibre network (tertiary?) visible in parts.

Megascleres: None.

Microscleres: None.

Other specimens: IN2015_C02_395_N145.

IN2015_C02_191_N150 *Spongia* sp. 1 (Dictyoceratida, Spongiidae)



Depth: 218 (200) m.

Growth form: Small, lobate, hollow.

Colour: Cream (in ethanol).

Oscules: Discrete, sunken, scattered.

Texture: Spongy.

Surface: Translucent, conulose, sandy.

Ectosomal skel: Indistinct, arenaceous but unarmoured.

Choanosomal skel: Mass of sand grains obscuring most of the skeleton but hierarchy of spongin fibres visible in parts, fibres homogeneous, not laminated and no pith, no fasciculation, primary fibres cored by a single line of spicular detritus, smaller fibres clear of coring material.

Megascleres: None native but some oxeas and strongyles appear in spicule prep as whole spicules.

Microscleres: None.

IN2015_C02_395_N189 *Spongia* sp. 2 (Dictyoceratida, Spongiidae)



Depth: 189 (200) m.

Growth form: Very small lobate.

Colour: Pale purple (in ethanol).

Oscules: Conspicuous, sunken.

Texture: Spongy.

Surface: Microconulose, translucent, fibres protruding surface.

Ectosomal skel: Thin, cored primary fibres tangential to surface and protruding as conules.

Choanosomal skel: Highly developed network of secondary fibres clear of detritus, primary fibres cored and most obvious near the surface, some fasciculation of secondary fibres.

Megascleres: None.

Microscleres: None.

IN2015_C02_191_N151 *Spongia* sp. 3 (Dictyoceratida, Spongiidae)



Depth: 218 (200) m.

Growth form: Ramose, branching.

Colour: Beige (in ethanol).

Oscules: 1 mm diam. on side of branches.

Texture: Compressible.

Surface: Small conules.

Ectosomal skel: Primary fibres cored and mainly at the surface (tangential as well as protruding as conules).

Choanosomal skel: Secondary network is predominant, fibres uncored, occasionally anastomosing, and every intersection has three fibres leading away from it. Very little interstitial collagen.

Megascleres: None.

Microscleres: None.

Other specimens: IN2015_C02_398_N128.

IN2015_C02_179_N127 Spongiid sp. 1 (Dictyoceratida, Spongiidae)



Depth: 209 (200) m.

Growth form: Massive irregular.

Colour: Pale grey (live and in ethanol).

Oscules: Scattered.

Texture: Spongy, arenaceous, crumbly.

Surface: Sandy, porous.

Ectosomal skel: Arenaceous, slightly conulose?

Choanosomal skel: Structure obscured by detritus, reticulation of tertiary homogeneous fibres visible and clear of detritus.

Megascleres: None.

Microscleres: None.

IN2015_C02_174_N127 Spongiid sp. 2 (Dictyoceratida, Spongiidae)



Depth: 410 (400) m.

Growth form: Ramose, irregular.

Colour: Beige (live); Pale beige (in ethanol).

Oscules: Sunken, 1 mm diam.

Texture: Compressible, tough to cut.

Surface: Opaque, conulose.

Ectosomal skel: Surface fibres cored with detritus (armoured).

Choanosomal skel: Dense reticulation of fibres cored with detritus, tertiary fibre network. vermiform, clear of detritus, homogeneous.

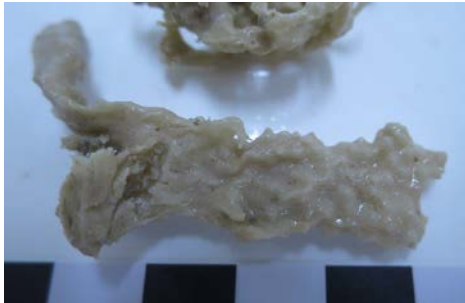
Megascleres: None.

Microscleres: None.

Associated fauna: Calcareous worm tubes.

Remarks: Leiosella? Difficult to see if the clear fibres are secondary or tertiary.

IN2015_C02_126_N174 Spongiid sp. 3 (Dictyoceratida, Spongiidae)



Depth: 388 (400) m.

Growth form: Ramose.

Colour: Cream (in ethanol).

Oscules: Not obvious.

Texture: Firm but easily compressible, fibrous.

Surface: Arenaceous; low blunt conules.

Ectosomal skel: Armour of sand, Surface is like a tough skin.

Choanosomal skel: Tangle of tertiary fibres.

Megascleres: Detritus.

Microscleres: None.

IN2015_C02_128_N139 Spongiid sp. 4 (Dictyoceratida, Spongiidae?)



Depth: 221 (200) m.

Growth form: Cylindrical, branching (one looks to be encrusting fibre skeleton).

Colour: Beige (in ethanol).

Oscules: Conspicuous.

Texture: Spongy.

Surface: Porous, very small conules.

Ectosomal skel: Indistinct.

Choanosomal skel: Obscured by detritus, collagen filled with microscleres and some oxeas.

Megascleres: Broken foreign spicules.

Microscleres: None.

Associated fauna: Hydroid running through sponge, also seen in slide and looks a bit like a large fibre and masks the natural fibres of the sponge, which here are very light.

IN2015_C02_382_N123 Spongiid sp. 5. (Dictyoceratida, Spongiidae)



Depth: 996 (1000) m.

Growth form: Amorphous bit of sponge.

Colour: Beige (in ethanol).

Oscules: Not seen.

Texture: Compressible.

Surface: Spongy, porous.

Ectosomal skel: -

Choanosomal skel: Tangled fibres.

Megascleres: None.

Microscleres: None.

Associated fauna: Black hydroid branches, bryozoans growing through sponge.

Remarks: No genus put on this as the sponge appears to have been dead on collection and is disintegrated.

IN2015_C02_398_N111 *Aplysinopsis* sp. (Dictyoceratida, Thorectidae)



Depth: 199 (200) m.

Growth form: Large flask like on stalk with roots.

Colour: Yellow (in ethanol). Turns ethanol orange. Fibres beige.

Oscules: Apical.

Texture: Fibrous, collagenous.

Surface: Opaque, conulose, fibres protruding, smooth between.

Ectosomal skel: Armour of sand.

Choanosomal skel: Primary fibres laminated, cored, occasionally fasciculate (150 μ m diam.).

Secondary fibres clear.

Megascleres: None.

Microscleres: None.

Other specimens: IN2015_C02_128_N120 (stalk only).

IN2015_C02_398_N113 *Fascaplysinopsis* sp. 1 (Dictyoceratida, Thorectidae)



Depth: 199 (200) m.

Growth form: Irregular-ramose.

Colour: Grey-beige-dark grey (in ethanol).

Oscules: Not seen.

Texture: Cartilaginous, compressible but firm, tough, very difficult to cut.

Surface: Opaque, markedly conulose with bifurcate tips.

Ectosomal skel: Light layer of small-grain detritus lying tangentially.

Choanosomal skel: Primary fibres fasciculate and cored with foreign spicular debris; secondary fibres clear of detritus, mesohyl densely collagenous.

Megascleres: None.

Microscleres: None.

Remarks: Confident to genus. This genus becomes very tough in ethanol.

Other specimens: IN2015_C02_395_N149.

IN2015_C02_179_N153 *Hyrtios* sp. 1 (Dictyoceratida, Thorectidae)



Depth: 209 (200) m.

Growth form: Ramose, encrusting.

Colour: Dark dull green (in ethanol).

Oscules: Not apparent.

Texture: Firm.

Surface: Small, low conules.

Ectosomal skel: Fibres full of sand can be seen emerging from conules.

Choanosomal skel: Laminated fibres. There is so much sand that the fibres are masked.

Megascleres: None.

Microscleres: None.

Associated fauna: Has gastropod attached. Sponge is encrusting on rock.

Other specimens: IN2015_C02_398_N139

IN2015_C02_191_N154 *Hyrtios* sp. 2 (Dictyoceratida, Thorectidae)



Depth: 218 (200) m.

Growth form: Digitate.

Colour: Beige (in ethanol).

Oscules: Not seen.

Texture: Tough.

Surface: Conulose.

Ectosomal skel: Patchy armour (under microscope) but does not appear armoured by eye.

Choanosomal skel: Thick strongly fascicular fibres. Primary fibres cored.

Megascleres: None.

Microscleres: None.

Associated fauna: Worm tubes on sponge.

IN2015_C02_395_N144 *Hyrtios* sp. 3 (Dictyoceratida, Thorectidae)



Depth: 189 (200) m.

Growth form: Ramose.

Colour: Brown (in ethanol), makes ethanol go very dark brown.

Oscules: 2 mm diam.

Texture: Firm.

Surface: Very conulose.

Ectosomal skel: Lightly armoured.

Choanosomal skel: Densely collagenous, detritus almost obscuring skeleton, primary and secondary fibres cored.

Megascleres: None.

Microscleres: None.

Associated fauna: A couple of different species of Bryozoa growing on surface of sponge.

IN2015_C02_398_N127 *Hyrtios?* sp. (Dictyoceratida, Thorectidae)



Depth: 199 (200) m.

Growth form: Massive/amorphous.

Colour: Light brown (in ethanol) makes ethanol go very dark greenish-brown.

Oscules: Only 2 small ones seen <1 mm diam.

Texture: Very firm, but easy to cut.

Surface: Arenaceous, smooth with a stretched-skin look in some places, rugose (sandy) in others, some softer areas (branches arising from amorphous mass) are conulose.

Ectosomal skel: Sand armour.

Choanosomal skel: Thick spongin fibres.

Megascleres: None.

Microscleres: None.

Associated fauna: Some small calcareous tubes, but possibly just part of the sand that is embedded.

Remarks: This sponge is armoured, except for a small branch, but does not fit the diagnosis of *Thorecta* or *Thorectandra*.

IN2015_C02_395_N133 *Thorecta* sp. 1 (Dictyoceratida, Thorectidae)



Depth: 189 (200) m.

Growth form: Stalked, lobate.

Colour: Sandy grey in ethanol (slight dark orange tinge).

Oscules: Conspicuous, scattered, flush with surface, 2-10 mm diam.

Texture: Spongy, arenaceous.

Surface: Porous slightly irregular-lumpy, not conulose, even lace-like pattern of surface fibres.

Ectosomal skel: Armoured crust 1-2 mm thick.

Choanosomal skel: Vaguely rectangular, open reticulation of laminated fibres, primary fibres cored with detritus, secondary fibres clear or lightly cored with spicular detritus; collagen pigmented orange-red.

Megascleres: None.

Microscleres: None.

Remarks: Good, clear x-section prep.

IN2015_C02_186_N113 *Thorectandra* sp. 2 (Dictyoceratida, Thorectidae)



Depth: 383 (400) m.

Growth form: Large lobe on thick stalk.

Colour: Pink-grey (live and in ethanol, turns ethanol reddish).

Oscules: 4 mm diam.

Texture: Quite soft, fleshy.

Surface: Low conules/ wrinkled, pattern of sand on surface.

Ectosomal skel: Sand armour, skin like ectosome. Ectosome can be pulled off exposing dense pink-white choanosome.

Choanosomal skel: Reticulate fibre network. Gap between fibres ~ 1.5 mm.

Megascleres: None.

Microscleres: None.

ORDER: DENDROCERATIDA

IN2015_C02_126_N171 *Dictyodendrilla* sp. (Dendroceratida, Dictyodendrillidae)



Depth: 388 (400) m.

Growth form: Erect.

Colour: Greeny blue (live and in ethanol).

Oscules: Not obvious.

Texture: Easily compressible.

Surface: Conulose with protruding fibres.

Ectosomal skel: Protruding fibres.

Choanosomal skel: Pigmented. Reticulate fibres. Primary fibres heavily laminated, not cored, pith not pronounced.

Megascleres: None.

Microscleres: None.

IN2015_C02_126_N182 Darwinellid/Suberitid spp. (Dendroceratida/Suberitida, Darwinellidae/Suberitidae)



Depth: 388 (400) m.

Growth form: Very small 10 mm elongate lobe with fibres protruding.

Colour: Cream (live).

Oscules: Not seen.

Texture: Compressible, fibrous, tissue is of a buttery consistency.

Surface: Optically smooth between very long fibres.

Ectosomal skel: Collagenous, foreign spicular detritus incorporated.

Choanosomal skel: Disorganised arrangement of tylostyles axially. Fibres are dendritic, uniform in size, clear of coring detritus, laminated with central pith and protrude from the centre of the sponge to well beyond the surface.

Megascleres: Tylostyles (150-350 μ m).

Microscleres: None.

Associated fauna: 2 sponge species, Dendroceratid encrusting a Hadromerid.

Other specimens: IN2015_C02_174_N113.

IN2015-C02_186-N126a *Dendroceratid. sp.* (Dendroceratida)



Depth: 383 (400) m.

Growth form: Small, very conulose, branching.

Colour: Cream (in ethanol).

Oscules: Not seen.

Texture: Compressible.

Surface: Conulose.

Ectosomal skel: Smooth, lightly armoured in some areas. Pigmented cells.

Choanosomal skel: Occasional fibre, pithed not cored. Foreign spicules.

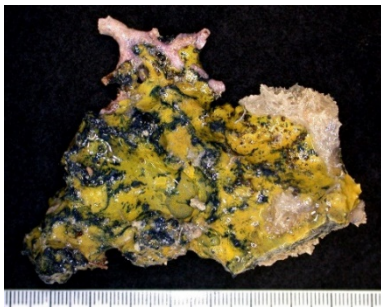
Megascleres: None.

Microscleres: None.

SUBCLASS: VERONGIMORPHA

ORDER: VERONGIIDA

IN2015_C02_181_N152 *Suberea sp. 1* (Verongida, Aplysinellidae)



Depth: 283 (200) m.

Growth form: Encrusting-massive.

Colour: Yellow (live) – oxidizing in air Dark purple (in ethanol).

Oscules: Scattered approx. 3-5 mm diam., sunken.

Texture: Hard, incompressible.

Surface: Opaque, irregular- conulose-tuberculose, optically smooth between.

Ectosomal skel: Indistinct.

Choanosomal skel: Not seen, obscured by dense collagenous mesohyl, fibres laminated but pith predominates.

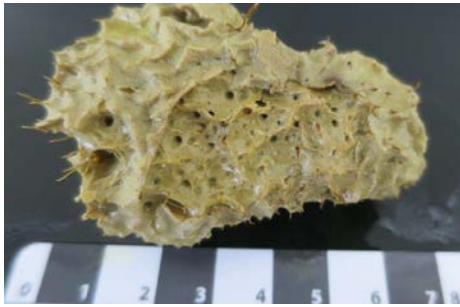
Megascleres: None.

Microscleres: None.

Associated fauna: Coral.

Remarks: cf *Pseudoceratina* in which bark (or lamination) is absent.

IN2015_C02_179_N105 *Aplysina* sp. (Verongida, Aplysinidae)



Depth: 209 (200) m.

Growth form: Amorphous.

Colour: (in ethanol), Ethanol yellow.

Oscules: 1-5 mm diam.

Texture: Firm, solid.

Surface: Conulose.

Ectosomal skel: Unarmoured.

Choanosomal skel: Large laminated fibres 270 μ m diam. Sponge fibres darker than yellow creamy sponge, bark, reticulate.

Megascleres: None.

Microscleres: None.

IN2015_C02_174_N113 ?Verongid. sp.



Depth: 410 (400) m.

Growth form: very small sample.

Colour: (in ethanol) ethanol is light pink.

Oscules: None seen.

Texture: Firm (as its encrusting).

Surface: Smooth, but with fibres emerging.

Ectosomal skel: Pigment cells on surface.

Choanosomal skel: Pithed but not cored fibres.

Megascleres: None.

Microscleres: None.

Associated fauna: Bryozoa.

CLASS: HEXACTINELLIDA

Notes on identification and mudmaps of Hexactinellida

The authors have limited experience in identifying sponges from this class. Identifications were done using Hooper and van Soest (2002). Identifications are to putative species. All these sponges need to be examined by a specialist for further identification. Sponges are arranged below by subclass, then alphabetically by order, family, genus and species/OTU. Vouchers along with skeletal and spicule preparations are lodged at the South Australian Museum, South Australia. Average depth of trawl is given with target depth in brackets.

Table 8. List of all sponges of class Hexactinellida, collected on IN2015_C02 with museum and field numbers

Family	Genus and Species	SAMA Number	Field Identifier
ORDER AMPHIDISCOSIDA			
Hyalonematidae	cf. Hylonematid. sp.	S2062	IN2015_C02_131_N151
Hyalonematidae	Hyalonematid. sp. 1	S2064	IN2015_C02_131_N141
Hyalonematidae	Hyalonematid. sp. 1	S2078	IN2015_C02_382_N118
Hyalonematidae	Hyalonematid. sp. 2	S2371	IN2015_C02_151_N119
Hyalonematidae	Hyalonematid. sp. 3	S2075	IN2015_C02_202_N107
Hyalonematidae	Hyalonematid. sp. 4	S2478	IN2015_C02_207_N109
Hyalonematidae	<i>Hyalonema (Leptonema) sp. 1</i>	S2073	IN2015_C02_196_N135
Hyalonematidae	<i>Hyalonema sp. 3</i>	S2068	IN2015_C02_131_N144
Hyalonematidae	<i>Hyalonema sp. 4</i>	S2069	IN2015_C02_131_N154
Hyalonematidae	<i>Hyalonema sp. 5</i>	S2477	IN2015_C02_207_N101
Hyalonematidae	<i>Hyalonema sp. 6</i>	S2079	IN2015_C02_449_N137
ORDER LYSSACINOSIDA			
Euplectellidae	Euplectellid. sp. 3	S2063	IN2015_C02_131_N153
Euplectellidae	<i>Walteria flemmingi</i>	S2077	IN2015_C02_292_N143
Leucopsacidae	Leucopsacid. sp. 1	S2076	IN2015_C02_281_N111
Rossellidae	Rossellid. sp. 4	S2065	IN2015_C02_131_N155
Rossellidae	Rossellid. sp. 5	S2066	IN2015_C02_131_N149
Rossellidae	Rossellid. sp. 6	S2067	IN2015_C02_131_N150
Rossellidae	<i>Aphorme sp.</i>	S2080	IN2015_C02_131_N152
	Lyssacinoid. sp. 1	S2070	IN2015_C02_134_N112

ORDER: AMPHIDISCOSIDA

IN2015_C02_196_N135 *Hyalonema (Leptonema)* sp. 1 (Amphidiscosida, Hyalonematidae)



Depth: 1027 (1000) m.

Growth form: Irregular-massive.

Colour: Muddy beige.

Oscules: Not seen.

Texture: Soft, harsh.

Surface: Porous, muddy.

Ectosomal skel: Dermal pinnular rays protrude the surface, whip-like spiny.

Choanosomal skel: Free spicules.

Megascleres: Diactines massive; anchors; pentactines large; macramphidiscs spined shaft umbels longer than wide (150 μm); pinnular pentactines; uncinates (spined diactine); hexactines spined rays (225 μm).

Microscleres: micramphidiscs (45 μm).

Remarks: Confident to genus.

IN2015_C02_131_N144 *Hyalonema* sp. 3 (Amphidiscosida, Hyalonematidae)



Depth: 1021 (1000) m.

Growth form: Mat, collapsed saccular?

Colour: Muddy.

Oscules: Not seen.

Texture: Muddy, soft.

Surface: Porous, muddy.

Ectosomal skel: Indistinct.

Choanosomal skel: Free spicules, collagen present.

Megascleres: Diactines some with central swelling (1500 μm); hexactines; pinnular pentactines; μm).

Microscleres: Micramphidiscs (40 μm) umbel longer than wide, smooth; hexactines.

Remarks: Confident to genus.

IN2015_C02_131_N154 *Hyalonema* sp. 4 (Amphidiscosida, Hyalonematidae)



Depth: 1021 (1000) m.

Growth form: Massive-oval, stipitate on long, twisted tuft of spicules, atrial cavity.

Colour: Beige-grey.

Oscules: Apical.

Texture: Compressible.

Surface: Porous.

Ectosomal skel: Pinnular pentactines protrude tangential surface.

Choanosomal skel: Mass of diactines.

Megascleres: Diactines with central swelling (>350 μ m); Pinnular pentactines; triactines.

Microscleres: Hexactines (40 μ m); micramphidiscs (40 μ m).

Remarks: Confident to genus.

IN2015_C02_207_N101 *Hyalonema* sp. 5 (Amphidiscosida, Hyalonematidae)



Depth: 2014 (2000) m.

Growth form: Small tissue mass on long, twisted tuft of spicules.

Colour: Beige-grey.

Oscules: Not seen.

Texture: Compressible.

Surface: Porous.

Choanosomal skel: Diactines.

Megascleres: Diactines with central swelling; pinnular pentactines with spined base; triactines.

Microscleres: Amphidiscs.

Remarks: Confident to genus.

IN2015_C02_449_N137 *Hyalonema* sp. 6 (Amphidiscosida, Hyalonematidae)



Depth: 2037 (2000) m.

Growth form: Small tissue mass on long, twisted basal spicules.

Colour: Beige-grey.

Oscules: Not seen.

Texture: Compressible.

Surface: Porous.

Choanosomal skel: Diactines.

Megascleres: Diactines with central swelling; pinnular pentactines with spined base; triactines.

Microscleres: Large amphidiscs.

Associated organisms: Amphianthid. anemone encrusting.

Remarks: Confident to genus.

IN2015_C02_131_N141 *Hyalonematid* sp. 1 (Amphidiscosida, Hyalonematidae)



Depth: 1021 (1000) m.

Growth form: Oval, lophophytose (basal spicules anchoring sponge).

Colour: Grey in ethanol.

Oscules: Scattered 2-5mm diam.

Texture: Compressible, harsh.

Surface: Porous, spiculose, muddy.

Ectosomal skel: Indistinct.

Choanosomal skel: Free spicules.

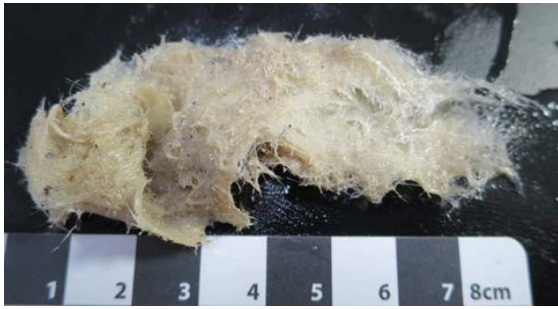
Megascleres: Diactines large; hexactines (120 μ m); amphidiscs (75 μ m); anchors.

Microscleres: Micramphidiscs (30 μ m); microhexactines.

Remarks: Good condition, whole sponge. Confident to family.

Other specimens: IN2015_C02_382_N118.

IN2015_C02_151_N119 Hyalonematid sp. 2 (Amphidiscosida, Hyalonematidae)



Depth: 2725 (3000) m.

Growth form: Spiculose mat.

Colour: White.

Oscules: Not seen.

Texture: Harsh.

Surface: Spiculose.

Ectosomal skel: Indistinct.

Choanosomal skel: Bundles of diactines, some collagen.

Megascleres: Diactines long flexuous central swelling; pentactines long unpaired ray spined; hexactines large smooth; macramphidisc (225 μ m).

Microscleres: microhexasters; micramphidiscs.

Remarks: Confident to family.

IN2015_C02_202_N107 Hyalonematid sp. 3 (Amphidiscosida, Hyalonematidae)



Depth: 1492 (1500) m.

Growth form: Piece only; whole sponge not seen.

Colour: Beige.

Oscules: Not seen.

Texture: Compressible, harsh.

Surface: Porous.

Ectosomal skel: Dermal pinnular rays whip-like spiny protrude the surface.

Choanosomal skel: Free spicules, collagen adhering filled with small hexactines.

Megascleres: Diactines massive; pentactines massive smooth; diactines smaller spined; pinnular pentactines (150 μ m).

Microscleres: Micramphidiscs; microhexactines curved rays.

Remarks: Macramphidiscs not seen to enable genus identification.

IN2015_C02_207_109 Hyalonematid sp. 4 (Amphidiscosida, Hyalonematidae)



Depth: 2014 (2000) m.

Growth form: Clumps of mud.

Colour: Muddy beige.

Oscules: Not seen.

Texture: Slimy, soft.

Surface: Muddy.

Ectosomal skel: Tangential arrangement of diactines.

Choanosomal skel: Free spicules.

Megascleres: Diactines long, stepped, central swelling, smooth; pentactines large, smooth; pinnular. pentactines short, spiny (60-100 μ m); macramphidiscs umbels as broad as long (100 μ m).

Microscleres: Micramphidiscs (12 μ m).

Remarks: Insufficient sample to ID Genus; confident to Family.

IN2015_C02_131_N151 cf Hyalonematid sp. (Amphidiscosida, Hyalonematidae)



Depth: 1021 (1000) m.

Growth form: Massive, central atrium divided into septa (see Hooper and van Soest, 2002 p1245).

Colour: Grey-beige.

Oscules: Scattered.

Texture: Compressible, harsh.

Surface: Porous.

Ectosomal skel: Tangential bundles of diactines, echinated by hypodermal pinnular pentactines.

Choanosomal skel: Bundles of diactines.

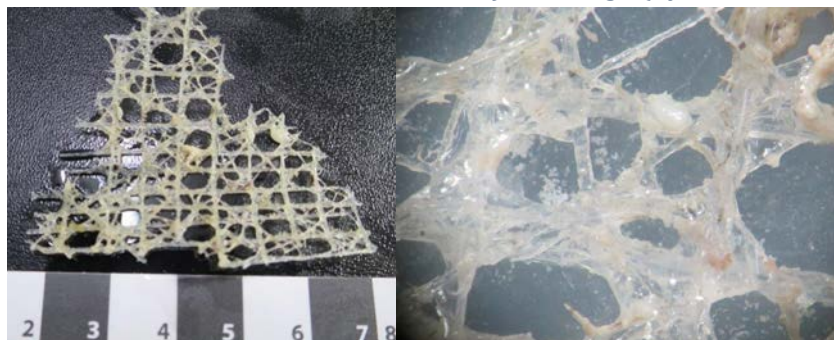
Megascleres: Diactines central swelling; pinnular pentactines very numerous (225 μ m).

Microscleres: Hemiheasters with oxyoidal (tapering to acute end) points (50 μ m); amphidiscs not seen.

Remarks: Amphidiscs not seen but all other features point to Family.

ORDER: LYSSACINOSIDA

IN2015_C02_292_N143 cf. *Walteria flemmingi* (Lyssacinosida, Euplectellidae)



Depth: 1005 (1000) m.

Growth form: Part only; lattice-like network

Colour: Glass

Oscules: N/A

Texture: Rigid/fused

Surface: N/A

Ectosomal skel: N/A

Choanosomal skel: Rigid/fused skeleton

Megascleres: Individual spicules not seen

Remarks: Confident to order

IN2015_C02_131_N153 Euplectellid sp. 3 (Lyssacinosida, Euplectellidae)



Depth: 1021 (1000) m.

Growth form: Flattened, collapsed saccular?, very thin walls, spiculose mat

Colour: Grey

Oscules: Not seen

Texture: Harsh, spiculose

Surface: Spiculose

Ectosomal skel: Tangential

Choanosomal skel: Free spicules

Megascleres: Diactines long; Anchors with spined shaft; Triactines

Remarks: Confident to Family

IN2015_C02_281_N111 *Leucopsacid* sp. 1 (Lyssacinosa, Leucopsacidae)



Depth: 1478 (1500) m.

Growth form: Small (2cm) oval, short peduncle.

Colour: White.

Oscules: Not seen.

Texture: Harsh, compressible.

Surface: Hispid.

Choanosomal skel: Unfused mass of hexactines, bundles of huge diactines (attachment?).

Megascleres: Hexactines large, most common; Pentactines; Diactines less common; Triactine large, pitchfork, one only.

Microscleres: Oxyhexasters.

Remarks: Confident to family.

IN2015_C02_131_N152 *Aphorme* sp. (Lyssacinosa, Rossellidae)



Depth: 1021 (1000) m.

Growth form: Oval/saccular?

Colour: Grey in ethanol.

Oscules: Discrete 1-3mm, scattered.

Texture: Compressible, harsh.

Surface: Muddy, spiculose.

Ectosomal skel: Indistinct.

Choanosomal skel: Free diactines, 'halichondroid', some collagen.

Megascleres: Diactines large; Hexactines; Pentactines large, spined; Diactines smaller spined (<1000um) some with central swelling.

Microscleres: Micrahexasters spined rays (75 µm).

Remarks: See spicule content *Aphorme* Hooper and van Soest, 2002 p1459 – Confident to family.

IN2015_C02_131_N155 Rossellid sp. 4 (Lyssacinosida, Rossellidae)



Depth: 1021 (1000) m.

Growth form: Irregular oval small 1-3 cm length.

Colour: Muddy grey.

Oscules: Small 2-5mm diam. discrete, apical.

Texture: Compressible, harsh.

Surface: Muddy, spiculose, hispid.

Ectosomal skel: Indistinct.

Choanosomal skel: Free spicules in 'halichondroid' arrangement, collagen present.

Megascleres: Diactines; pentactines large; hexactines small; anchor.

Remarks: Confident to order.

IN2015_C02_131_N149 Rossellid sp. 5 (Lyssacinosida, Rossellidae)



Depth: 1021 (1000) m.

Growth form: Small, long tuft of anchoring spicules.

Colour: Grey.

Oscules: Not seen.

Texture: Harsh, compressible.

Surface: Hispid.

Ectosomal skel: Indistinct.

Choanosomal skel: Free spicules.

Megascleres: Diactines/broken hexactines? spined; Hexactines/pentactines large, smooth; Sceptrue (400µm); Triactines.

Remarks: Confident to order.

IN2015_C02_131_N150 Rossellid sp. 6 (Lyssacinosida, Rossellidae)



Depth: 1021 (1000) m.
Growth form: Small, oval.
Colour: Grey.
Oscules: Not seen.
Texture: Compressible, harsh.
Surface: Sandy, porous.
Ectosomal skel: Tangential with long ray hypodermal pentactine protruding.
Choanosomal skel: Free spicules.
Megascleres: Diactines long; Tractines spined.
Remarks: Confident to order.

IN2015_C02_134_N112 Lyssacinosid sp. 1 (Lyssacinosida)



Depth: 1527 (1500) m.
Growth form: Small 10-20mm oval, solid.
Colour: White.
Oscules: Not seen.
Texture: Compressible, harsh.
Surface: Very hispid.
Ectosomal skel: Indistinct.
Choanosomal skel: Free spicules.
Megascleres: Pentactines large, smooth; Diactines spined; Anchors; Pinnular pentactines.
Microscleres: Hexactines with curved, fine tapering tips.
Remarks: Confident to order.

