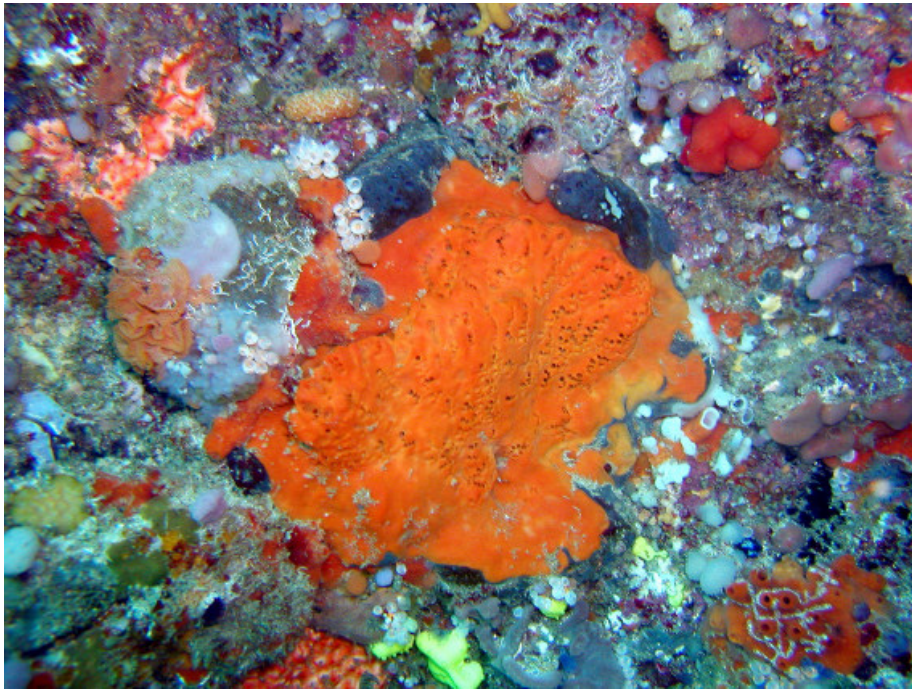


**A catalogue of shallow-water sponges from the
Investigator Islands, South Australia**



S.J. Sorokin, T.C.D. Laperousaz and S.L. Drabsch

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EXECUTIVE SUMMARY

A multidisciplinary expedition to the Investigator Islands was conducted in May 2006 to examine the natural history of the islands. As part of the expedition the diversity of marine sponges was investigated for the first time.

Sponges were collected by SCUBA divers from the fringing rocky reefs of 5 islands: Flinders, Pearson, Dorothee, Ward and Topgallant.

This document catalogues the sponge collection, with all sponges identified to genus. Voucher specimens, photographs and specimen slides are held at the Museum of South Australia, Adelaide.

This investigation was time limited and the collection of sponges is by no means comprehensive, but is a preliminary investigation of the sponge diversity of the Islands.

Of the 101 sponges collected, there were 71 species; 10 in the class Calcarea and 61 in the class Demospongiae. Four sponges from the Investigator Islands that were already lodged at the South Australian Museum are included in our list.

Many of the sponges had evidence of algal or cyanobacterial symbionts, reflecting the clear shallow-water conditions at the sites.

There was little overlap between this collection and an earlier collection from the Great Australian Bight Marine Park – Benthic Protection Zone, with only 3 sponges in common.

INTRODUCTION

The islands of the Investigator Group, off the west coast of Eyre Peninsula, South Australia, are within the waters of the eastern Great Australian Bight (GAB), which extends from the Head of Bight to Cape Catastrophe at the southern end of the Eyre Peninsula. The continental shelf here receives very little terrigenous input due to there being no major rivers in the region (Ward *et al* 2006). Inshore benthic assemblages of the GAB continental shelf include many benthic organisms only found in southern Australia (Edyvane, 1998).

The Investigator Group Conservation Park, which includes Topgallant, Ward, Pearson, Dorothee and the Veteran Isles, was established in 1972 to protect the islands' ecology as well as Australian sea lion and New Zealand fur seal haul out areas (DEH 2006).

Studies examining the subtidal marine benthos of the Investigator Islands, have previously been undertaken in this area as part of a program identifying priority areas for marine conservation management (Edyvane and Baker, 1999). The findings showed that the islands' marine flora and fauna were in an almost pristine state with high biodiversity, and consequently, a marine extension to the terrestrial Conservation Park was suggested (Edyvane and Baker, 1999). The studies mainly reported on the marine flora, and mention of only three sponge genera is made – *Tethya*, *Sycon* and *Neofibularia* (Edyvane 1995, Edyvane and Baker 1995, Edyvane and Baker, 1999).

The Australian Biological Resources Study (ABRS) list of sponges in the GAB, which lists only 18 species (Hooper and Wiedenmayer 1994, and subsequent updates), belies the scale of sponge diversity in this region. During recent studies in the GAB (Ward *et al* 2006), SARDI collected 351 species of sponge, indicating that the region supports a high diversity of sponges (Sorokin *et al* 2005). The latter study concentrated on the Benthic Protection Zone of the Great Australian Bight Marine Park and the eastern GAB outside the marine park, but the seafloor surrounding offshore islands was not sampled.

A multi-disciplinary expedition to the Investigator Islands provided an opportunity to extend the knowledge base for South Australian GAB sponges by assessing the sponge fauna on the shallow rocky reefs of the islands.

A list of 71 species of sponges collected from five islands is presented here, which we suggest is a preliminary investigation of the sponge diversity, because the study was time-limited, and we were only able to sample a small number of sites. We have included 4 sponges previously collected from the Investigator Group that were already lodged in the South Australian Museum.

METHODS

Collection of sponges

All but two sponges, which were collected by sled, were collected by SCUBA from the fringing rocky reefs around five islands in the Investigator Group (Figure 1). Depth, substrate and habitat, were recorded for each sponge, and an *in situ* digital photograph taken. Sponges were preserved in 75% ethanol and lodged at the South Australian Museum.

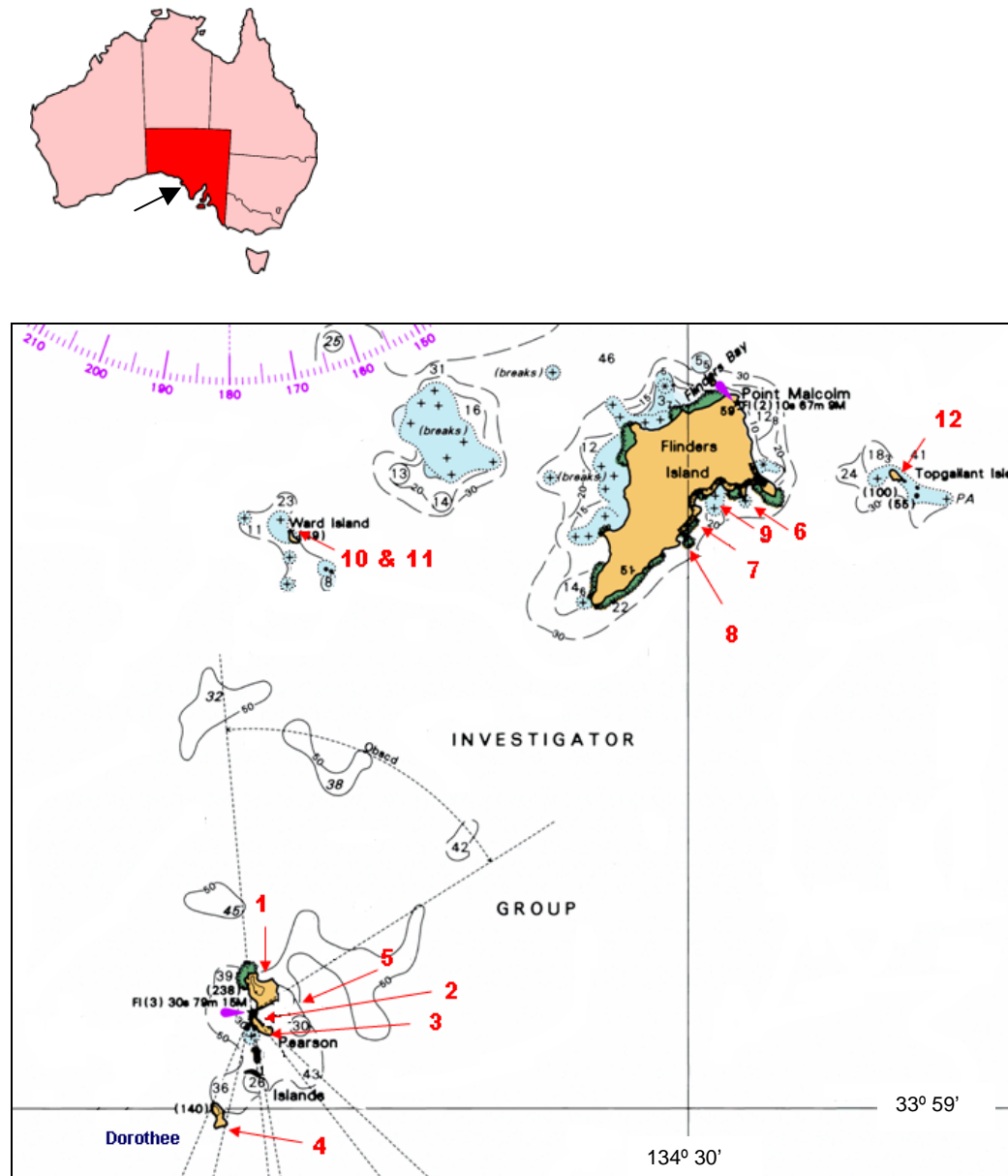


Figure 1 Map of the Investigator Islands showing sampling sites.

Site descriptions

1. Pearson Island “Northern Anchorage”

At this site the rocky reef meets sand at approximately 12 metres depth. The area is dominated by macro-algae. There is a complex reef of boulders, caverns, caves, overhangs and crevices from which most of the sponges were collected. The sessile macro-biota is dense, consisting principally of sponges, bryozoans and ascidians. The current was low and visibility was 12 metres. Sponges were collected between 10 and 11 metres on 23 May 2006 and were numbered INV001-012.

2. Pearson Island “South Anchorage”

This site is only a few metres off the island. The substrate is mainly sand, which supports small algae such as *Caulerpa* as well as dense seagrass beds. The terrain is gently sloping. The area appears to have a low diversity of sponges. Sponges were collected between 3 and 6 metres on 23 May 2006 and were numbered INV013-021.

3. Pearson Island. “South Point”

This is an algal dominated rocky reef of moderate relief and slope. Sponges were collected between 16 and 18 metres on 24 May 2006 and were numbered INV022-029.

4. Dorothee Island

This site is at the southern end of Dorothee Island. Algae, sponges and bryozoans dominate a vertical rock wall with many crevices. Sponges were collected between 13 and 16 metres at the entrance to a cave on 24 May 2006 and were numbered INV030 – INV037.

5. Sled Shot

Off Pearson Island. Sponges were collected by a sled from 29 metres on 24 May 2006 and were numbered INV038a – 039a.

6. Flinders Island, “Bob’s Nose”

This site was on the eastern side of Groper Bay, beneath a rocky outcrop called “Bob’s Nose”. The low rocky reef is gently sloping and was covered in a fine layer of sediment. The biota was of low density and dominated by short algae. There was a low current and 10 metres visibility. Sponges were collected between 12 and 13 metres on reef or growing on algae on 25 May 2006 and were numbered INV039b – 050 (& 38b).

7. Flinders Island, “Groper Bay”

This site is in the centre of Groper Bay; it is a low-relief rocky reef with a moderate cover of algae and encrusting invertebrates. There was visibility of 8 metres with a medium current and surge. Sponges were collected between 15 and 16 metres on 25 May 2006 and were numbered INV052 – 054c.

8. Flinders Island, “Boiler Reef”

A low-relief rocky reef on the exposed western-side of Groper Bay with a flat sandy bottom with some surge and low visibility. There is sparse biota, which includes small algae. Sponges were collected between 10 and 11 metres on rock and from shell of green-lip abalones, which are abundant at this site on 26 May 2006 and were numbered INV058 – 061.

9. Flinders Island, “Homestead Reef”

This site is in Groper Bay only 100 metres in front of the Flinders Island Homestead. A thin layer of sand lay over the rocky-reef, which is abundant in tall red and green algal cover. There was a medium current, strong surge and visibility of 8 metres. Sponges were collected between 4 and 5 metres from rocks crevices or growing on algae on 26 May 2006 and were numbered INV064 – 076.

10. Ward Island

This site on the north-western side of Ward Island comprised of a moderately sloping rocky-reef with dense biota dominated by algae outside caves and sponges inside caves. Sponges were collected between 6 and 8 metres on rocks and the walls of small caves on 27 May 2006 and were numbered INV077 – 078a.

11. Ward Island

This site was only 50 metres south of site 10 and had similar topographic relief. Dense biota is dominated by algae outside caves and sponges and ascidians inside caves. There was little current with 14 metres visibility. Sponges were collected between 5 and 6 metres on 27 May 2006 and were numbered INV089 – 095.

12. Topgallant Island

This site was at the north-eastern end of Topgallant Island. A moderately sloping limestone rocky reef, dominated by macro-algae and peppered with small caves diverse in sponges and ascidians. Coralline algae covered much of the rock surface, and sea fans edged the caves. Visibility was 16 metres. Sponges were collected between 12 and 13 metres on 28 May 2006 and were numbered INV096 – 103.

Preparation of sponge slides

To prepare the sponges for identification a skeletal section and a spicule slide were made for each sponge. A small section (1 cm³) of each sponge was cut and embedded in wax. Sponges were dehydrated using 70% ethanol (1hour), 80% ethanol (1 hour), 95% ethanol (2 hours), 100% ethanol (3 hours). They were subsequently cleared in Histolene (3 hours), infiltrated in Paraffin wax (6 hours) followed by vacuum infiltration for 30 minutes before cooling into blocks. The wax blocks were cut into 90 µm sections, placed on albumenised microscope slides and dried in a 40°C oven overnight. Sections were dewaxed in two 15-minute changes of Histolene (D-Limonene) and mounted in Gurr's Durcupan mounting medium.

To clearly distinguish the fibres, keratose sponges (orders Dictyoceratida and Dendroceratida) were stained in Mallory-Heidenhain rapid one-step stain. Following the dewaxing, sections were hydrated through an ethanol series (20 mins in 100%, 10 min 70%, 10 min 50%) then rinsed in distilled water before immersion in stain for seven minutes, washed in tap water, then dehydrated in 100% ethanol for 30 minutes, cleared in Histolene for 45 minutes and mounted in Durcupan.

Spicules were isolated from the sponge by heating small pieces of sponge, over an alcohol burner, directly on slides onto which 70% nitric acid was dropped with a pipette. Heating continued until the tissue was burnt off and only the spicules remained. Spicules of calcareous sponges dissolve in acid, so tissues of these sponges were dissolved in household bleach (Sodium Hypochlorite 42g/l), and rinsed in three washes of water and two washes of 75% ethanol, left to dry and mounted in DePeX mounting media. Sponges with excess sand were also prepared using bleach as the nitric acid reacts with sand to obscure the spicules.

RESULTS

Taxonomic composition

A total of 101 sponges were collected and in addition to 4 sponges from the SAM collection, were sorted into 71 species: 10 species in the Class Calcarea and 61 in the Class Demospongiae. Table 1 shows the taxonomic distribution of sponges found. Table 2 lists species identifications and their SAM numbers.

Table 1 Taxonomic distribution of sponges collected from the Investigator Islands

Class	Order	Family	No. genera	No. species
Demospongiae 9 orders 26 families 42 genera 61 species	Astrophorida 1 family 4 genera 8 species	Ancorinidae	4	8
	Hadromerida 3 families 3 genera 4 species	Clionidae Suberitidae Tethyidae	1 1 1	2 1 1
	Chondrosida 1 family 1 genus 1 species	Chondrillidae	1	1
	Poecilosclerida 7 families 9 genera 13 species	Chondropsidae Desmacellidae Hymedesmiidae Latrunculiidae Microcionidae Mycalidae Tedaniidae	2 1 1 1 2 1 1	3 1 1 1 5 1 1
	Halichondrida 2 families 2 genera 2 species	Dictyonellidae Halichondriidae	1 1	1 1
	Haplosclerida 3 families 4 genera 8 species	Callyspongiidae Petrosiidae Phloeodictyidae	1 1 2	4 1 3
	Dictyoceratida 4 families 13 genera 18 species	Dysideidae Irciniidae Thorectidae Spongiidae	1 2 7 3	1 2 11 4
	Dendroceratida 1 family 1 genus 1 species	Darwinellidae	1	1
	Verongida 2 families 2 genera 6 species	Aplysinidae Pseudoceratinidae	1 1	1 5
	Calcarea 10 species	-	-	-

Table 2 Taxonomic list of species and Museum registration numbers.

	Order	Family	Species	SAM reg Nos.		
Class: Calcarea	Leucosolenida	Grantiidae	<i>Teichonopsis labyrinthica</i>	S1001		
		Sycettidae	<i>Sycon</i> sp. 1	S1002-3, PS0266 ¹		
			<i>Sycon</i> sp. 2	S1004		
		Calcarea sp. 1	S1005			
		Calcarea sp. 2	S1006			
		Calcarea sp. 3	S1007			
		Calcarea sp. 4	S1008-9			
		Calcarea sp. 5	S1010			
		Calcarea sp. 6	S1011			
		Calcarea sp. 7	S1012			
Class: Demospongiae	Astrophorida	Ancorinidae	<i>Asteropus</i> sp.	S1013-16		
			<i>Ecionemia</i> sp. 1	S1017-19		
			<i>Ecionemia</i> sp. 2	S1020		
			<i>Ecionemia</i> sp. 3	S1021-24		
			<i>Rhabdastrella</i> sp. 1	S1025		
			<i>Rhabdastrella</i> sp. 2	S1026		
			<i>Stelletta tuberculata</i>	S1027		
			<i>Stelletta</i> sp. 2	S1028		
			Hadromerida	Clionidae	<i>Sphaciospongia</i> sp. 1	S1030-31
					<i>Sphaciospongia</i> sp. 2	S1032
		Suberitidae	<i>Protosuberites</i> sp.	S1033		
			Tethyidae	<i>Tethya bergquistae</i>	PS0205 ²	
	Chondrosida	Chondrillidae	<i>Chondrilla</i> sp.	S1105 ³		
	Poecilosclerida	Chondropsidae	<i>Chondropsis arenifera</i>	S1034-35		
			<i>Chondropsis</i> sp. 2	S1036-40		
			<i>Psammoclema</i> sp.	S1041		
			Desmacellidae	<i>Desmacella</i> sp.	S1042	
			Hymedesmiidae	<i>Phorbis</i> sp.	S1043	
			Latrunculiidae	<i>Latrunculia</i> sp.	S1029	
			Microcionidae	<i>Clathria (Clathria)</i> sp.	S1044	
				<i>Clathria (Thalysias)</i> cf. <i>cactiformis</i>	S1045	
				<i>Clathria (Wilsonella)</i> sp.	S1046	
				<i>Holopsamma laminaefavosa</i>	S1047-48	
				<i>Holopsamma</i> sp. indet.	S1049	
				Mycalidae	<i>Mycale (Arenochalina) mirabilis</i>	S1050-55
				Tedaniidae	<i>Hemitedania</i> sp.	S1056
			Halichondrida	Dictyonellidae	<i>Acanthella</i> sp.	S1057
				Hymeniacidon sp.	S1058	
			Haplosclerida	Callyspongiidae	<i>Callyspongia (Callyspongia)</i> sp. 1	S1059-60
					<i>Callyspongia (Callyspongia)</i> sp. 2	S1061
	<i>Callyspongia (Callyspongia)</i> sp. 3	S1062				
	<i>Callyspongia (Callyspongia)</i> sp. 4	S1063-64				
	Petrosiidae	<i>Petrosia</i> sp.		S1065		
	Phloeodictyidae	<i>Aka</i> sp. 1		S1066		
		<i>Aka</i> sp. 2		S1067		
				<i>Oceanapia</i> sp.	S1068	
	Dictyoceratida	Dysideidae		<i>Dysidea</i> sp.	S1069	
		Irciniidae		<i>Ircinia</i> sp.	S1070	
			<i>Psammocinia</i> sp.	S1071		
			<i>Cacospongia</i> sp.	S1072		
		Thorectidae	<i>Carteriospongia</i> cf. <i>silicata</i>	S1073-75, S770 ⁴		
			<i>Fenestraspongia</i> sp.	S1076		
			<i>Lendenfeldia</i> sp.	S1077		
			<i>Taonura</i> cf. <i>marginalis</i>	S1078		
			<i>Taonura</i> sp. 2	S1079-80		
			<i>Thorecta</i> sp.	S1081		
			<i>Thorectandra</i> cf. <i>choanoides</i>	S1082-84		
<i>Thorectandra</i> sp. 2			S1085			
<i>Thorectandra</i> sp. 3			S1086			
<i>Thorectandra</i> sp. 4			S1087			
Spongiidae		<i>Coscinoderma pesleonis</i>	S1088			
		<i>Leiosella</i> sp.	S1089			
			<i>Spongia (Spongia)</i> sp. 1	S1090		
		<i>Spongia (Spongia)</i> sp. 2	S1091			
		<i>Aplysilla rosea</i>	S1092			
Dendroceratida	Darwinellidae	<i>Suberea</i> sp. 1	S1093-95			
	Aplysinellidae	<i>Suberea</i> sp. 2	S1096-97			
<i>Suberea</i> sp. 3		S1098-99				
<i>Suberea</i> sp. 4 ?		S1100				
<i>Suberea</i> sp. 5?		S1101-102				
<i>Aplysina</i> sp.		S1103				
Verongida	Aplysinidae					

Sponge descriptions

The sponges identified below are lodged at the South Australian Museum in Adelaide, along with photographs and histological slides. Where more than one specimen for a species was collected, all have been retained for the collection as they were collected from different sites. All sponges are briefly described here; however, not every specimen was examined microscopically.

In the following brief descriptions the SAM registration number S1001 is followed in brackets by the field collection number (INV001). Photographs, referenced with the SAM number are in the Appendix.

Descriptions of the sponges are written in notation form. Sizes of spicules are used when it was necessary for identification. Spicules sizes are in microns (μm). Terminology used for spicules and skeletal layout follows the glossary by Boury-Esnault and Rutzler (1997). Gravid specimens are noted in the text and with a red asterisk. Many sponges were found to have evidence of algal/cyanobacterial symbionts and these are noted in the descriptions.

Sponge names are presented as *Genus species* (Order, Family). In the following descriptions, and in the photographs, the sponges are arranged by class, then taxonomically by order then alphabetically by family and genus. Where a species name is given, a reference is cited for comparison.

Class Calcarea

Unless well known, sponges in this class were not identified to genus as Australian sponges in the class Calcarea are currently under revision.

Teichonopsis labyrinthica (Leucosolenida, Grantiidae)

1 specimen

S1001 (INV070)

Site 9. Flinders Is.

Collected at 4.1 m depth on rock. White, Thin wavy, folded flower like. Stalk is 6 mm high; sponge measures 4.5 cm across the top of sponge. Consistency is hard. Other sample in SAM is S999 (coll. Backstairs Passage, SA). Compare Borojevic *et al* (2002) p. 1165.

Sycon sp. 1 (Leucosolenida, Sycettidae)

3 specimens

S1002 (INV030)

Site 4. Dorothee Is.

Collected at 13.2m from rocky reef wall. Bunch of tiny ovoid vases, bifurcating from a common base. Each 'vase' is 1.5 – 2 cm long, the bunch is 5 cm across. Cream coloured. Oscules are on the tip of each 'vase', which is crowned by a ring of spicules. Dry to touch. Consistency hard.

S1003 (INV065)

Site 9. Flinders Is.

Collected at 4.1 m depth underside of rock on rocky reef. Small cream vases/tubes, with oscular opening surrounded by a ring of spicules. The branches bifurcate from the wide base. There may be two species (second is a single tube, 15 x 5mm). Sponge is firm.

PS0266

Pearson Is

SA Museum specimen. Collected and identified by K. Gowlett-Holmes in 2001. Photo by K. Gowlett-Holmes.

Sycon sp. 2 (Leucosolenida, Sycettidae)

1 specimen

S1004 (INV102)

Site 12. Topgallant Is.

Collected at 11 m depth from cave wall. Anastomosing bunch of wide tubes with common base, sponge is 9 cm across. Oscules as wide as tube (4-6 mm. Vertical ring of spicules (4 mm long) is easily seen around each opening. Photograph taken out of water. Other samples of this sponge in the SAM are labelled *Sycon* sp. eg PS0161 (coll. Kangaroo Isl., SA).

Calcarea sp. 1

1 specimen

S1005 (INV008)

Site 1. Pearson Is.

Collected at 10.4 m on rock in crevice between boulders. Small, encrusting with lobes, 3 cm wide and 1 cm thick. Yellow externally and internally (white in ethanol). Pinprick sized oscules. Surface smooth and dry. Firm consistency.

Calcarea sp. 2

1 specimen

S1006 (INV023)

Site 3. Pearson Is.

Collected at 16.2 m attached to rock. Small, blue, creeping, with convoluted ridges, 2.5 cm thick. Colour in ethanol is pale blue to white (ethanol turns pale yellow). Oscules are 1 mm diam. Surface is porous and dry to touch. Consistency is firm.

Calcarea sp. 3

1 specimen

S1007 (INV031)

Site 4. Dorothee Is.

Collected at 15 m in cave. Hanging from rock ceiling as a yellow wall 9 cm across and 3-4 cm in height. Sponge is beige in ethanol. Oscules on ridge are 3-5 mm diam. Hard, brittle consistency.

Calcarea sp. 4

2 specimens

S1008 (INV036a)

Site 4. Dorothee Is.

Collected at 16.2 m from rocky reef. Sponge rises as a 4 cm-high wall, 0.5 – 1.5 cm thick. Grey underwater mauve out of water. Surface is smooth and dry to touch. Oscules (1 mm diam.) on ridge.

S1009 (INV048)

Site 6. Flinders Is.

Collected at 13 m depth from rocky reef. Grey wall. Small oscules (<1 mm diam). Consistency is hard.

Calcarea sp. 5

1 specimen

S1010 (INV049)

Site 6. Flinders Is.

Collected at 13 m depth on rocky reef. Small, yellow, surrounds a red algal stem (2 cm x 1.5 cm x 1cm). The sponge is very compressible, firm but delicate.

Calcarea sp. 6

1 specimen

S1011 (INV056)

Site 7. Flinders Is.

Collected at 15.7 m depth from rocky reef. Repent, small tubular and cream in colour, 2 mm in diameter. Oscular openings 1.5 mm. Surface is smooth and dry.

Calcarea sp. 7

1 specimen

S1012 (INV069b)

Site 9. Flinders Is.

Collected at 4 m attached to red algae (*Osmundaria*). Small spherical. Cream coloured. Oscules 2 mm diam. Consistency is hard.

Class Demospongiae

Order Astrophorida

The following sponges are put in *Asteropus* as they have no triaenes and the large oxeas have a confused semi-tangential arrangement at surface.

***Asteropus* sp. 1 (Astrophorida, Ancorinidae)**

4 specimens

S1013 (INV054b)

Site 7. Flinders Is.

Collected at 15.6 m from rock wall, this sponge is spherical, cream to grey externally, white internally. Firm and barely compressible. Megascleres are oxeas. Microscleres are oxyasters and sanidasters (mostly lining the canals). Algal cells can be seen in the skeletal slide, below the sponge surface.

S1014 INV089a [S]

Site 11. Ward Is.

Collected at 5 m from cave wall. In the photograph the encrusting sponge can be seen. The base sponge, which is identified here, is massive in shape. Megascleres are oxeas. Microscleres are oxyasters, sanidasters.

[The encrusting sponge is possibly in the family Raspailiidae (Order Poecilosclerida). It appears orange underwater but more red out of water. It has a convoluted spongy surface and is encrusted by lines of white zooanthids, which confound surface details in the skeletal slide. Oscules are 2 mm diam. Fibres are very sparsely cored with oxeas. Fibres are reticulated (but not neatly). Megascleres are oxeas and styles; inter-fibre spicules are long flexuous styles. No microscleres seen.]

S1015 (INV094)

Site 11. Ward Is.

Collected at 3.2 m from cave wall. In the photograph the encrusting sponge can be seen. The base sponge, which is identified here, is massive in shape. Thin layer of euasters on surface. Amphasters found in choanosome. There are oxeas but no triaenes. [The encrusting sponge is soft and very thin and difficult to separate from the base sponge. It has small oxeas and is possibly in the order Haplosclerida. Oscules are 4 mm diam.]

S1016 (INV095)

Site 11. Ward Is.

Collected at 3.2 m from cave wall. In the photograph the encrusting sponge can be seen. The base sponge, which is identified here, is massive in shape. Megascleres are oxeas. Microscleres are oxyasters, amphasters.

[The encrusting sponge is a *Clathria* sp (Poecilosclerida, Microcionidae). Very soft orange sponge with a 'lacy' appearance. It has a choanosome of fibres cored by styles (subtylote appearance) sparsely echinated by acanthostyles. Megascleres are oxeas, styles (with sharp ends) and acanthostyles. Microscleres are chelae.]

***Ecionemia* sp. 1 (Astrophorida, Ancorinidae)**

3 specimens

The following sponges are identified here as *Ecionemia*, rather than *Ancorina*, due to the microrhabds looking more rhabd-like than sanidaster-like (Uriz, 2002). However the histology of sponges identified as *Ancorina*, from the SA Museum, were not examined for comparison in this study.

S1017 (INV077)

Site 10. Ward Is.

Collected at 7.3 m from rock, this sponge is large, spherical with 4 large oscules. Sponge firm. Crustose red alga covers much of the surface. Megascleres are long-shafted triaenes and spiny long microrhabds at surface. Large and small oxeas sit between triaene shafts. Microscleres are

chiasters that are scattered, and around canals. Note: the reddish, brown shading colours of the *Ecionemia* sponges may be indicative of cyanobacterial symbionts.

S1018 (INV084)

Site 10. Ward Is.

Collected at 7.1 m on cave wall, this sponge is small, spherical, green underwater grey above water, beige internally. Sponge firm, barely compressible. Small red algae are attached.

S1019 (INV087b)

Site 11. Ward Is.

Collected at 5.1 m from cave wall, this sponge is large, brown, semi-spherical, beige internally. Sponge has 8 oscules on top and small fragments of red algae are attached. It has a firm consistency.

***Ecionemia* sp. 2 (Astrophorida, Ancorinidae)**

1 specimen

S1020 (INV040)

Site 6. Flinders Is.

Collected at 12.5 m from sand, this sponge is spherical, reddish brown, and beige internally. Sponge firm. Red algae attached. Sub ectosomal sand layer. No triaenes. Megascleres are oxeas. Microscleres are tylasters and long spiny microrhabds.

***Ecionemia* sp. 3 (Astrophorida, Ancorinidae)**

4 specimens

S1021 (INV013)

Site 2. Pearson Is.

Collected at 3.6 m from cave, this sponge is semi-spherical. Surface is covered in coralline algae. Sponge is green, beige with cyanobacterial symbionts. Cream inside. In ethanol sponge appears grey to white. Sponge solid and firm to touch. Megascleres are long-shafted anatriaenes and plagiotriaenes, and oxeas. Microscleres are oxyasters and long spiny microrhabds that are perpendicular to surface.

S1022 (INV019)

Site 2. Pearson Is.

Collected at 5.7 m, growing on rock on reef wall, this sponge is spherical, 11 cm across (rising from attachment of 5 cm diam). Pale grey in ethanol. Large oscule 12 mm diam. Sponge firm.

S1023 (INV027)

Site 3. Pearson Is.

Collected at 16.9 m from cave overhang, this sponge grows as semi-spherical lobes. Grey underwater, red/yellow out of water, yellow internally. There are 2 oscules on each lobe, oscules are 2-3 mm wide. Sponge firm, barely compressible. Green cellular material below surface is likely to be cyanobacterial symbionts. Megascleres are long-shafted triaenes, smaller oxeas. Microscleres are chiasters, long spiny microrhabds (seen as surface palisade).

S1024 (INV067)

Site 9. Flinders Is.

Collected at 4 m on sandy seafloor, this small sponge is encrusting on a 'shaggy sponge crab' *Lamarckdromia globosa*. Red/brown externally, beige internally. Surface layer of microrhabds. Sub ectosomal sand layer. Megascleres are oxeas, no triaenes. Microscleres are euasters and long spiny microrhabds.

***Rhabdastrella* sp. 1 (Astrophorida, Ancorinidae)**

1 specimen

S1025 (INV001)

Site 1. Pearson Is.

Collected at 10.4 m depth, in cave on rocky reef, sponge is half-vase/fan shape. Red and grey and white to dark grey in ethanol (ethanol turns pale yellow). Heavily ridged surface encrusted with red algae (including coralline). Surface cortex distinct from the choanosome. Sponge has large

canals. Fan is 2 to 5 cm thick. Cortex of asters over bouquets of oxeas. Megascleres are 2 sizes of oxeas, some with blunt ends, some sharp with one small step at end, and reduced plagiotriaenes. Microscleres are oxyspherasters (in cortex).

***Rhabdastrella* sp. 2 (Astrophorida, Ancorinidae)**

1 specimen

S1026 (INV022)

Site 3. Pearson Is.

Collected at 16 m growing on rock, in cave, this sponge is massive in shape and very solid. Colour is a spectacular rich blue (pale blue in ethanol - ethanol turns yellow). Pinprick-sized oscules in a band apically. Texture firm - barely compressible. Surface smooth; cortex can peel off. Megascleres are large oxeas perpendicular to surface, triaenes (rare). Microscleres are sterrasters (though not star-shaped actine tips) as cortex, small oxyasters scattered in choanosome and lining canals.

***Stelletta tuberculata* (Astrophorida, Ancorinidae)**

1 specimen

S1027 (INV012)

Site 1. Pearson Is.

Collected at 3.9 m from reef floor, this sponge is thick encrusting and lumpy. It is 10 cm across, 2 cm high and 4 cm wide. Pores 0.5 mm wide. Beige in ethanol. Surface is an arenaceous crust. Consistency hard. Other specimen in the SAM=S900. Compare Kennedy, 2000.

***Stelletta* sp. 2 (Astrophorida, Ancorinidae)**

1 specimen

S1028 (INV097b)

Site 12. Topgallant Is.

Collected at 12.8 m, this tiny spherical 'pea-like' sponge was found attached to other sponges (*Desmacella* sp (pictured) and *Holopsamma laminaefavosa*). Dark bright blue. Sponge compressible. This sponge is pictured in Bergquist and Skinner, 1982. Plate 1 (6). Other specimen in the SAM=S937, from the Benthic Protection Zone GAB.

Order Hadromerida

***Spheciospongia* sp. 1 (Hadromerida, Clionidae)**

2 specimens

S1030 (INV006)

Site 1. Pearson Is.

Collected at 11 m, this sponge is semi-spherical in shape, 6 cm high and 9 cm across. Pink and white externally, beige inside. (White in ethanol, ethanol is pale yellow). Smooth surface with raised oscules 2-3 mm (white). Solid with a firm consistency. When cut a white 'skin' is obvious in channel areas of the choanosome. Megascleres are styles in bouquets as a distinct cortex. Microscleres are diplasters scattered throughout choanosome but mainly around canals.

S1031 (INV017)

Site 2. Pearson Is.

Collected at 4.7 m from rock wall, this small sponge is semi-spherical and solid. Oscules are 2 mm diam. in a pair. Sponge is firm.

***Spheciospongia* sp. 2 (Hadromerida, Clionidae)**

1 specimen

S1032 (INV033)

Site 4. Dorothee Is.

Collected at 15 m, this sponge was attached to rock on cave wall. Massive, large (approx. 90 cm long by 40 cm wide) solid, bright orange with white patterning caused by zoanths, dull orange internally. (In ethanol oscules are bright orange, on yellow surface). Surface smooth with small craters for each oscule: craters 3-4 mm diam. with pinprick oscules. Sponge firm, barely compressible. Megascleres tylostyles perpendicular to surface, underscored by tangential layer of same. Microscleres streptasters of various types.

***Protosuberites* sp. (Hadromerida, Suberitidae)**

1 specimen

S1033 (INV058)

Site 8. Flinders Is.

Collected at 10 m from rock, this sponge is thin encrusting and orange. Papillae up to 20 mm long and pinprick-sized oscules. Sponge firm. Surface a neat palisade of tightly packed small tylostyles with one third of spicule length protruding beyond surface 'skin'. This layer is on top of fans of larger tylostyles. Very large styles and tylostyles in tracts. No fibres. No microscleres.

***Tethya bergquistae* (Hadromerida, Tethyidae)**

1 specimen

PS0205

Pearson Is.

SA Museum specimen. Collected and identified by K. Gowlett-Holmes in 2001. Photograph by K. Gowlett-Holmes.

Order Chondrosida***Chondrilla* sp. (Chondrosida, Chondrillidae)**

1 specimen

S1105

Topgallant Is.

Sponge surface is very smooth. No megascleres. Microscleres are in spherasters in three size categories. SA Museum specimen. Collected by N. Holmes in 1983. Photograph taken after preservation.

Order Poecilosclerida***Chondropsis arenifera* (Poecilosclerida, Chondropsidae)**

2 specimens

S1034 (INV038a)

Site 5. Sled shot.

Collected at 29 m by sled, this sponge has a pink-orange colour, arenaceous very soft. Sponge can be pulled apart easily. Compare Van Soest (2002a) p. 522.

S1035 (INV044)

Site 6. Flinders Is.

Collected at 12.5 m, epibiont on the alga *Ecklonia*. Sponge is pink (grey/pale orange pink in ethanol). Oscules 3 mm diam. Firm. Surface layer of debris, debris continues in choanosome in tracts. Strongyles sometimes in groups/vague tracts or individual and random. Megascleres are sinuous strongyles.

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

5 specimens

S1036 (INV041)

Site 6. Flinders Is.

Collected at 12.5 m epibiont on algae, this sponge is pale pink (orange in ethanol). Small and soft with skin-like surface. Oscules are 1 mm diam. along the top ridge. Surface and tracts are packed with debris of broken siliceous and calcareous spicules.

S1037 (INV043)

Site 6. Flinders Is.

Collected at 12.5 m, sponge is epibiont on a foliaceous red alga. Specimen small with 3 lobes on one short stalk. Granular surface. Pinprick-sized oscules.

S1038 (INV060)

Site 8. Flinders Is.

Collected at 10 m. from rock, this is an encrusting sponge, salmon (dull pink) (white in ethanol). Surface smooth to slightly irregular. Soft consistency. The ectosome and tracts are packed with debris. Megascleres are strongyles.

S1039 (INV061)

Site 8. Flinders Is.

Collected at 11 m. reef floor, this sponge is thickly encrusting on an abalone. Salmon. (cream-pink); dull orange internally. Oscules (2 mm diam) are sometimes on low conules. Sponge is soft.

S1040 (INV071)

Site 9. Flinders Is.

Collected at 4.1 m, this bright orange sponge is thick encrusting on red algae. Ectosome and tracts have foreign material. Megascleres are strongyles in vague tracts.

***Psammoclema* sp. (Poecilosclerida, Chondropsidae)**

1 specimen

S1041 (INV068)

Site 9. Flinders Is.

Collected at 4.1 m, this salmon-pink sponge is attached to red algae. Sponge has a 'dry' feel and is soft and compressible. Ectosome and tracts have foreign material. No megascleres.

***Desmacella* sp. (Poecilosclerida, Desmacellidae)**

1 specimen

S1042 (INV007)*

Site 1. Pearson Is.

Collected at 11 m from the wall of a cave, this sponge is thin encrusting from 0.5 to 1 cm thick. Bright orange externally, orange internally. Surface has a clathrid/ridged appearance. Very soft consistency. Gravid. Has small blue *Stelletta* sponge attached. Sparse bouquets of slightly tylote styles at surface. Fibres cored with styles. Megascleres thin subtylostyles – some sinuous, and oxeas. Microscleres are c-sigmas (rare).

***Phorbas* sp. (Poecilosclerida, Hymedesmiidae)**

1 specimen

S1043 (INV003)

Site 1. Pearson Is.

Collected at 10.4 m from cave, this is an orange small fan/cup sponge, 6 cm across with a 2 cm stalk. The fan is 8-10 mm thick. Pale orange in ethanol (ethanol turns yellow). Surface is skin like and is a yellower orange than the choanosome. Texture firm. Sponge has sieve-like oscules on convex and concave sides; the oscules can be seen as a pinker shade of orange giving the surface a slightly polka-dot appearance. Surface layer of chelae perched on perpendicular fans of tornotes, choanosome tracts of oxeas in fibres, a few random acanthostyles although not echinating. Megascleres are tornotes and acanthostyles. Microscleres are arcuate chelae and c-sigmas.

***Latrunculia* sp. (Poecilosclerida, Latrunculiidae)**

1 specimen

S1029 (INV054a)

Site 7. Flinders Is.

Collected at 15.6 m rock wall, this sponge is small, bright orange and thin encrusting. Surface layer of amphiasters pierced by straight styles/ and or oxeas. Choanosome has scattered styles some in tracts, and amphiasters. Megascleres are styles (315 x 7 µm, 270 x 7 µm). Oxeas (322 x 12 µm). Microscleres are amphiasters, at least three different forms (37, 15, 37 µm).

Clathria (Clathria) sp. (Poecilosclerida, Microcionidae)

1 specimen

S1044 (INV018)

Site 2. Pearson Is.

Collected at 4.7 m from reef wall. Sponge is very small with irregular lobes, dull orange (cream in ethanol). Consistency soft. Tight bunches of styles at surface, below which is a line of tangential styles. Choanosome has reticulate fibres, cored with spicules or sand and echinated by acanthostyles. Megascleres are two categories of styles; acanthostyles are club shaped and sparsely spined. Microscleres are long thin variously shaped toxas and very small palmate isochelae.

Clathria (Thalysias) cf. cactiformis (Poecilosclerida, Microcionidae)

1 specimen

S1045 (INV086)

Site 10. Ward Is.

Collected at 5 m on rock. Sponge is red externally and beige internally. Easily compressible and 'dry' to touch. Ectosome of tightly packed bunches (bouquets) of styles and some foreign spicules. Choanosome of reticulate fibres cored by styles and densely echinated by acanthostyles, obvious in secondary as well as primary fibres. Collected and photographed by J. Brook. Compare Hooper (1996) p. 294.

Clathria (Wilsonella) sp. (Poecilosclerida, Microcionidae)

1 specimen

S1046 (INV059)

Site 8. Flinders Is.

Collected at 10 m from rock. This is a very thick fan sponge. Beige underwater, dull orange externally and internally out of water. It has a thick rubbery 'skin cortex' with oscules (1-3 mm diam) on the wide ridge. Firm and barely compressible. Foreign spicules tightly arranged into perpendicular fortress-like surface armour and choanosomal tracts. Megascleres are styles and acanthostyles. Some acanthostyles are vertically aligned along canals.

Holopsamma laminaefavosa (Poecilosclerida, Microcionidae)

2 specimens

S1047 (INV047)

Site 6. Flinders Is.

Collected at 13.2 m from rock. Sponge is white underwater and grey out of water. It has a hexagonal open framework. Sponge measures 11 cm across and 4 cm high. Arenaceous. Firm. Crinoid attached. Compare Hooper (1996) p. 496.

S1048 (INV097a)

Site 12. Topgallant Is.

Collected at 12.8 m on rock in cave. Sponge is white underwater, grey out of water. It has an arenaceous open framework. Two small *Stelletta* 'pea' sponges and small orange sponge attached.

Holopsamma sp indet. (Poecilosclerida, Microcionidae)

1 specimen

S1049 (INV087a)

Site 10. Ward Is.

Collected at 5 m. This sponge appears as a group of small sandy mounds, of grey/pink colour. Firm, compressible. Surface of sand and broken spicules in a honeycomb arrangement at least at 'top' of sponge. Ectosome and choanosome are dense with sand and broken spicules, some in tracts. Collected and photographed by J. Brook. Compare Hooper (1996) p. 513.

Mycale (Arenochalina) mirabilis (Poecilosclerida, Mycalidae)

6 specimens

S1050 (INV021)

Site 2. Pearson Is.

Collected at 5 m, growing on rock on reef wall. Sponge is semi-spherical, pale blue, very soft and very mucoid. Fibres emerge a few millimetres out of sponge surface. Oscules 8 mm diam. *Ecklonia* is epibiont on sponge. Compare Van Soest and Hajdu (2002) p. 677.

S1051 (INV052)

Site 7. Flinders Is.

Collected at 15.9 m from rock. Rising from a short stalk, with a wide attachment. The red fibres are obvious throughout the cream-coloured sponge. Sponge has large oscules. Although the sponge is very soft and disintegrates out of water it becomes 'springy' and more firm in ethanol. Mucoïd. There is a surface palisade of styles, above a choanosome of thick fibres cored with styles, oxeas in mesohyl. Microscleres are occasional palmate anisochelae. Fibres are widely spaced compared to other sponges of this species collected here.

S1052 (INV080a)

Site 10. Ward Is.

Collected at 6.8 m on rock on sea floor. Subspherical sponge. Pale red, paler further down the sponge. Red fibres emerge from the sponge. There are 3 oscules on top (3-4 mm diam.), compressible. Mucoïd. Megascleres are mycalestyles. Microscleres are palmate anisochelae.

S1053 (INV083)

Site 10. Ward Is.

Collected at 7 m from a cave. Thin-encrusting sponge on rock. Cream coloured, with red fibres. Fibres have debris and filamentous algae. No spicules seen.

S1054 (INV096)

Site 12. Topgallant Is.

Collected at 12 m from rock cave roof, this sponge is very blue underwater. Once out of water this sponge disintegrates into a frame of red fibres and mucous. Mucous is beige and pale purple.

S1055 (INV098)

Site 12. Topgallant Is.

Collected at 13.4 m from a cave wall, this is a soft pale blue sponge, very mucoïd, disintegrates easily. Beige internally. There is a delicate fine fibre mesh on surface. The photograph was taken after preservation.

***Hemitedania* sp. (Poecilosclerida, Tedaniidae)**

1 specimen

S1056 (INV035)*

Site 4. Dorothee Is.

Collected at 15 m from cave floor. Thick encrusting sponge. Brown-grey underwater, orange out of water, dull orange internally. Sponge gravid with orange eggs. White membranous uneven surface. Texture is soft. Megascleres are mainly oxeas, different sizes (262 x 3 µm, 207 x 3 µm), microscleres are onychaetes (150 x 0.5 µm).

Order Halichondrida

***Acanthella* sp. (Halichondrida, Dictyonellidae)**

1 specimen

S1057 (INV078)

Site 10. Ward Is.

Collected at 7.2 m from cave, this sponge is bright orange, soft, compressible, bushy and coarsely conulose. surface is hispid due to protruding fibres. Megascleres are straight and flexuous oxeas that core thick fibres. No microscleres.

***Hymeniacion* sp. (Halicondrida, Halichondriidae)**

1 specimen

S1058 (INV085)*

Site 10. Ward Is.

Collected at 6.5 m from rocky reef floor, this is an orange sponge with an irregular massive shape. Surface membranous and undulating. Gravid with bright orange eggs. Oscules are 1.5 mm diam. Compressible. Associated barnacle. No fibres. Megascleres are large curved or straight styles (some sub-tylote) (largest eg 240 x 4 µm) para-tangential to surface. Styles in choanosome confused or in tracts of thinner styles. No microscleres.

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

2 specimens

S1059 (INV042)

Site 6. Flinders Is.

Collected at 12.5 m epibiont on algae. Small red sponge growing attached to red foliaceous algae (*Osmundaria prolifera*). Large raised oscules (2-3 mm diam). Sponge very compressible. Megascleres are oxeas. Reticulate fibres, slightly peripherally condensed. Primary fibres are paucispicular. Secondary fibres unispicular, 2 spicules long. Megascleres are curved, small thin oxeas (eg 44 x 2 µm).

S1060 (INV069a)

Site 9. Flinders Is.

Collected at 4 m from rock on reef floor. Repent digitate sponge. Oscules are 4 mm diam. Soft. Megascleres are very small oxeas.

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

1 specimen

S1061 (INV104)

Site 12. Topgallant Is.

Collected at 11 m from cave wall, this sponge is green underwater, brown out of water. It grows as flat long erect fingers arising from a very short stalk. Oscules are 1.5 mm diam. Sponge is compressible. Surface bunches of oxeas over tangential layer of 2 or 3 oxeas, scattered fine debris also at surface. (Green colouration underwater may be due to filamentous algae, which can be seen microscopically at surface of sponge and which partially masks surface layer). Fibres reticulate with some fasciculation. Primary fibres multispicular, secondary fibres uni or paucispicular. Photograph taken out of water shortly after collection.

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

1 specimen

S1062 (INV076)

Site 9. Flinders Is.

Collected at 5 m, this orange sponge grows as soft, repent, anastomosing tubes. It has a loose matrix of fibres, not in a regular reticulation. Fibres are cored with oxeas. Primary fibres are uni or paucispicular. Oxeas are 70-75 x 2 µm. No microscleres. Collected and photographed by J. Brook.

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

2 specimens

S1063 (INV011)

Site 1. Pearson Is.

Collected at 10.2 m from wall of cave. Encrusting, soft sponge with lobes. Beige (beige also in ethanol). The oscules are 2 mm in diam. Ectosome has raised blunt-ended thick multispicular fibres. Primary fibres thick and multispicular, secondary fibres same but some surface perpendicular fibres are only one spicule long, and paucispicular. Secondary fibres form round meshes. Megascleres are regular oxeas (eg 60 x 3 µm), no microscleres.

S1064 (INV100)

Site 12. Topgallant Is.

Collected at 13.5 m on rock. Upright creeping convoluted fan sponge rising from one attachment point. Beige. Oscules appear like white dots in a darker 1mm wide crater. Sponge compressible. Surface of bouquets of oxeas, extending from fibres.

***Petrosia* sp. (Haplosclerida, Petrosidae)**

1 specimen

S1065 (INV082)

Site 10. Ward Is.

Collected at 7.1 m from rock overhang. An encrusting sponge that is grey/beige, pale beige internally. There is a cluster of 2 small oscules (1 mm diam.) and one or two larger oscules (3 mm diam.). Surface smooth with star-like patterns on skin (not oscular). Firm barely compressible. Oxeas are tangential to surface and in a dense criss-cross multispicular arrangement forming isotropic round meshes. Megascleres oxeas (90 x 8 μm , 135 x 4 μm , 160 x 3 μm), strongyles (135 x 7 μm). Some oxeas are stongylote, some are quite bent with mucronate tips.

***Aka* sp. 1 (Haplosclerida, Phloeodictyidae)**

1 specimen

S1066 (INV080b)

Site 10. Ward Is.

Collected at 6.8 m on rock from reef floor, this sponge consists of white fistules with part of the base attached. Sponge has a firm, corky texture. Crustose red algae are attached. Surface has bunches of oxeas over a criss-cross layer of oxeas. Paucispicular tracts form horizontally oval meshes. Oxeas have conical ends and are mostly of uniform size (eg. 123 x 3 μm , 120 x 3 μm). No microscleres.

***Aka* sp. 2 (Haplosclerida, Phloeodictyidae)**

1 specimen

S1067 (INV081)

Site 10. Ward Is.

Collected at 6.6 m from rock, this is a white semi-buried sponge. Only the tops of fistules were collected, not the base. Cluster of three oscules (2 mm diam) on top of fistule. Hard consistency. Ectosome of vertical layers (rather than bunches) of oxeas, rising from tracts that anastomose to form vertically oval meshes. Oxeas are of various thicknesses (eg 140 x 4, 140 x 2, 165 x 5, 70 x 5 μm).

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

1 specimen

S1068 (INV093)

Site 11. Ward Is.

Collected at 4 m from cave roof. Sponge is very white. The specimen consists of large wide fistules with multiple oscules on surface, it is probable that the whole sponge was not collected. Firm compressible. Mucoïd. Oxeas tangential to surface, and form tracts of round to oval meshes. Megascleres curved oxeas or strongyles, some sinuous (eg. 155 x 6 μm , 140 x 7 μm , 130 x 7 μm).

Order Dictyoceratida***Dysidea* sp. (Dictyoceratida, Dysideidae)**

1 specimen

S1069 (INV020)

Site 2. Pearson Is.

Collected at 5.6 m, growing on rock. Very thin encrusting, pale grey. Texture soft. Conulose surface. Thin-walled fibres heavily cored with foreign spicules. Hydroid strands weave throughout the sponge.

***Ircinia* sp. (Dictyoceratida, Irciniidae)**

1 specimen

S1070 (INV037)

Site 4. Dorothee Is.

Collected at 16 m from reef floor. This sponge is grey, semi-spherical, 9 cm across, it has no stalk. Cream-coloured internally. Surface conules are in a spider web-like arrangement. Sponge solid, firm and barely compressible.

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

1 specimen

S1071 (INV025)

Site 3. Pearson Is.

Collected at 16.4 m from crevice, this sponge is 16 cm across, and 13 cm high. Vase-shaped with a stalk. Brown-grey underwater, beige internally. Arenaceous (sandy) throughout sponge, and the underside of vase is ridged. The texture is very firm. Ophiuroids and hair-like hydroids are epibiont on sponge. Sponge heavily armoured with sand. The fibres cored and fasciculated; filaments sparse.

***Cacospongia* sp. (Dictyoceratida, Thorectidae)**

1 specimen

S1072 (INV015)

Site 2. Pearson Is.

Collected at 3.6 m from cave roof. Semi-spherical, small, surface irregular - granular looking. Texture soft. Lightly armoured surface. Loose fibres cored with debris.

***Carteriospongia* cf. *silicata* (Dictyoceratida, Thorectidae)**

4 specimens

S1073 (INV045)

Site 6. Flinders Is.

Collected at 12.9 m from rock. Stalked. This foliose plate sponge has a double short stalk on wide base. Red-brown on top, beige underneath, the colour indicates cyanobacterial symbionts. There are convoluted ridges within cup of plate and on the ventral side. Ophiuroids are epibiont. Compare Wiedenmayer (1989) p. 126.

S1074 (INV050)

Site 6. Flinders Is.

Collected at 12.6 m from reef rock. This sponge grows as tiered 'plates'. It is 25 cm across, foliaceous, red-brown, (paler on underside); the russet colour indicates cyanobacterial symbionts. Sponge has a ridged arenaceous surface. Primary fibres cored by large sand grains that distort the fibres. Secondary fibres (eg 22 µm diam.) clear of debris. A tertiary network is not obvious.

S1075 (INV066)

Site 9. Flinders Is.

Collected at 4.1 m from sandy floor. This sponge is a small foliose 'plate'. Red-brown on top, beige underneath; the colour indicates cyanobacterial symbionts. Firm to hard. Armoured on one side by sand and the other by spicules.

S770

Flinders Is.

SA Museum specimen. Collected by L. Hobbs in 1991. Photograph taken after preservation.

***Fenestraspongia* sp. (Dictyoceratida, Thorectidae)**

1 specimen

S1076 (INV004)

Site 1. Pearson Is.

Collected at 10.4 m from cave wall. Sponge is 7 cm high and 11 cm across and 4 to 5 cm thick. In ethanol the sponge is grey to white externally and beige internally (ethanol is yellow). Surface ridged. Consistency hard. Oscules are 6 mm diam. Red algae and hydroids are attached to sponge. Surface is unarmoured. Laminated primary fibres. Has fine tertiary fibres.

***Lendenfeldia* sp. (Dictyoceratida, Thorectidae)**

1 specimen

S1077 (INV029)

Site 3. Pearson Is.

Collected at 18 m from cave floor. This sponges grows as a small erect fan/wall, it is 8 cm high. Reddish brown, beige internally; the colour may be indicative of cyanobacterial symbionts. Very soft. Unarmoured surface. Cored primary fibres.

***Taonura cf. marginalis* (Dictyoceratida, Thorectidae)**

1 specimen

S1078 (INV024)

Site 3. Pearson Is.

Collected at 16.2 m on rock in crevice. Erect, pedunculate club sponge. Green underwater, above water green on one side and yellow on the other (dark grey in ethanol). Surface has tiny conules giving it a granular appearance. Compressible and fibrous when cut, but not tough. Three oscules on top of sponge 2-10 mm diam. Sponge unarmoured. Cored primary fibres, fasciculated at sponge surface. Compare Cook and Bergquist (2002) p.1033.

***Taonura* sp. 2 (Dictyoceratida, Thorectidae)**

2 specimens

S1079 (INV016)*

Site 2. Pearson Is.

Collected at 4.7 m from reef floor. A stalked club sponge 12 cm high and 7 cm across. The stalk is 4 cm long and 1 cm thick. The brown beige colouring may be indicative of cyanobacterial symbionts. Surface of sponge is cratered. Sponge compressible. Lightly armoured. Fibres not cored. Gravid.

S1080 (INV039b)

Site 6. Flinders Is.

Collected at 12.5 m in sand. Stalked cup sponge, 12 cm across by 14 cm high with 3 cm stalk. Sponge very compressible.

***Thorecta* sp. (Dictyoceratida, Thorectidae)**

1 specimen

S1081 (INV036b)

Site 4. Dorothee Is.

Collected at 16.2 m from rock. This sponge is a grey thick-encrusting ridge 2 cm thick. Surface ridged with small conules between. Armoured with sand. Primary fibres cored (90 – 120 μm), secondary fibres clear (60-75 μm).

***Thorectandra cf. choanoides* (Dictyoceratida, Thorectidae)**

3 specimens

S1082 (INV028)

Site 3. Pearson Is.

Collected at 18 m from floor of cave. Stalked club sponge with turrets 14 cm high and 10 cm thick. Stalk thin. Oscules on the end of each turret (5-12 mm diam). Surface of sponge is ridged, with the ridges having a hexagonal appearance. Sponge is soft. Bryozoan, ophiuroids and tiny hair-like hydroids are epibionts. Surface moderately armoured with spicules and sand—armouring is very neat. Lacunate ectosome. Cored primary fibres (90, 120, 90 μm), secondary fibres clear (90 μm), some tertiary fibres (30 μm). Fibres sparsely arranged. Compare Wiedenmayer (1989) p. 137.

S1083 (INV038b)

Site 6. Flinders Is.

Collected at 12.5 m from sand. Thick flabellate fan sponge measuring 10 cm across and 8 cm high. Surface arenaceous, uneven and cratered and the sponge is mucoid. Oscules (4-6 mm diam) on ridge. Compressible. Heavily armoured surface. Large primary fibres are cored.

S1084 (INV064)

Site 9. Flinders Is.

Collected at 4.1 m from rock on sandy bottom. Thick curved fan sponge with a short stalk. Grey, but can see yellow of sponge beneath. Yellow internally. Surface cratered with darker arenaceous ridges. Sponge compressible. Surface heavily armoured. Primary fibres cored (90, 120 μm), secondary fibres clear (105, 60 μm), tertiary fibres (30 μm).

***Thorectandra* sp. 2 (Dictyoceratida, Thorectidae)**

1 specimen
S1085 (INV091)
Site 11. Ward Is.

Collected at 5.1 m on rock in cave, this sponge is tubular in growth, with a spider's web-like surface. Yellow with grey arenaceous fibres on surface; darker colouration on the outward facing side of the sponge may be indicative of cyanobacterial symbionts. Large oscules 9 mm diam. Dark fibres. Compressible. Heavily armoured with sand. Primary fibres cored with debris (225, 270, 300 μm). Secondary fibres clear (150, 120 μm). Sponge lacunate.

***Thorectandra* sp. 3 (Dictyoceratida, Thorectidae)**

1 specimen
S1086 (INV072)
Site 7. Flinders Is.

Collected at 4.1 m on rock on sandy sea floor. Grey-green, stalked club sponge. Consistency is soft. Surface heavily armoured. Sponge lacunate, with cored primary fibres (eg 120 μm), and clear secondary fibres (eg 70 μm).

***Thorectandra* sp. 4 (Dictyoceratida, Thorectidae)**

1 specimen
S1087 (INV039)
Site 5. Sled shot

Collected at 29 m by sled. Small club sponge with oscule at top. Dark grey. Sponge very soft. Surface has small rounded conules and is armoured. Primary fibres heavily cored.

***Coscinoderma pesleonis* (Dictyoceratida, Spongiidae)**

1 specimen
S1088 (INV074)
Site 9. Flinders Is.

Collected at 4 m. This is a grey, bulbous sponge with a thin tough stalk. Oscules elevated, in a ridge on top. Sandy. Surface heavily armoured with sand. Primary fibres cored (eg 90 μm). Secondary fibres tangled and regular (30-45 μm). Collected and photographed by J. Brook. Compare Wiedenmayer (1989) p. 128.

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

1 specimen
S1089 (INV079)
Site 10. Ward Is.

Collected at 7.2 m from rock overhang. Sub-foliose sponge with a membranous surface. Purple/brown on the upper surface, beige underside. Compressible. Strong odour. Surface lightly armoured with foreign spicules. Primary fibres cored with foreign spicules.

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

1 specimen
S1090 (INV002)
Site 1. Pearson Is.

Collected at 10.4 m from cave in rocky reef. Plate/lobe sponge that is 8 cm high. Surface has a granular appearance. Soft. Oscules 1 mm diam. A white *Calcarea* (*Clathrina*) sponge is attached. Fibres are uniform in size and mostly uncored, although some have foreign spicules.

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

1 specimen
S1091 (INV010)
Site 1. Pearson Is.

Collected at 10.2 m from wall of cave. This is an encrusting sponge that is olive green underwater and orange out of water. Turns water cloudy pink and ethanol red. Large open oscules 5-10 mm. Bumpy surface. Soft, but with a meat-like consistency. Red algae are epibiont on surface.

Order Dendroceratida***Aplysilla rosea* (Dendroceratida, Darwinellidae)**

1 specimen

S1092 (INV103)

Site 12. Topgallant Is.

Collected at 11 m from cave wall, this sponge 7 cm across and varies in thickness, from thin to thick-encrusting on the wall of cave. Sponge bright pink and very soft with a conulose surface. Photograph of sponge was taken shortly after collection. Compare Bergquist and Cook (2002) p. 1069.

Order Verongida***Suberea sp. 1* (Verongida, Aplysinellidae)**

3 specimens

All *Suberea* specimens had varying degrees of brown colouring over the yellow sponge. This is indicative of cyanobacterial symbionts. All of these sponges were found in caves, in half-light. This species is pictured in Wiedenmayer (1989) Plate 17 (8), and is identified as *P. durissima*, but his understanding of this genus was confused according to Bergquist (1995).

S1093 (INV014)

Site 2. Pearson Is. East

Collected at 3.6 m from cave roof. Yellow underwater, oxidises to blue out of water, sponge is black/blue in ethanol (the ethanol colours to orange). Sponge lobed, encrusting and rugose. Texture firm but quite compressible, fibrous and easy to cut. Heavily laminated fibres 60-135 µm diam.

S1094 (INV046)

Site 6. Flinders Is.

Collected at 13.2 m from reef wall. This sponge is a thick fan that has the appearance of lobes attached to each other, with oscule on top of each lobe (2 mm diam). Sponge yellow/brown initially brighter out of water, then oxidises to blue. Sponge feels slippery and smooth with a firm consistency.

S1095 (INV075)

Site 9. Flinders Is.

Collected at 5 m from cave wall. This sponge grows as a thick fan, tubular like lobes. Brown on top, yellow sides. Oxidises to blue. Collected and photographed by J. Brook.

***Suberea sp. 2* (Verongida, Aplysinellidae)**

2 specimens

S1096 (INV073)

Site 9. Flinders Is.

Collected at 4.8 m from cave, this sponge is a thick heavy fan. Yellow. Oxidises to blue. Pithed laminated fibres not cored; fibres 60-200 µm diam. Matrix very solid. The Opisthobranch (*Tylodina corticalis*) was found on this sponge; this species has previously been recorded associating with an 'aplysinellid' sponge (Willan, 1984).

S1097 (INV034)

Site 4. Dorothee Is.

Collected at 15.1 m from cave wall. Massive, yellow fan, oscules (3-4 mm diam.) on ridge of fan. Sponge firm, barely compressible, but fibrous and easy to cut. Oxidises to blue.

***Suberea sp. 3* (Verongida, Aplysinellidae)**

2 specimens

S1098 (INV092)

Site 11. Ward Is.

Collected at 4 m from cave roof, this sponge grows as a thick-walled vase. Yellow live and oxidises when collected, the fibres darken first. Firm, barely compressible. Dendritic, laminated

and pithed fibres, not cored. Very dense cellular matrix. Cuts smoothly like yellow cheese. Primary fibre diam. eg. 525 µm (pith is 330 µm diam).

S1099 (INV101)

Site 12. Topgallant Is.

Collected at 13.2 m from roof of cave, this sponge is club shaped and has a smooth surface between thick conules. It is firm. Oxidises from yellow to blue. Photograph taken after preservation.

***Suberea* sp. 4?* (Verongida, Aplysinellidae)**

1 specimen

S1100 (INV090)

Site 11. Ward Is.

Collected at 5 m. from rock cave roof. Massive, yellow/orange, yellow internally. Oxidises to blue. Very firm, barely compressible. The section shows a layer of lacunae below surface. Thick knotted fasciculated fibres, not cored. Very dense tissue matrix. Some debris in sponge.

**Further investigation may show that this is a new genus. (P. Bergquist pers. comm.)

***Suberea sp. 5?* (Verongida, Aplysinellidae)**

2 specimens

S1102 (INV009)

Site 1. Pearson Is.

Collected at 10.4 m from floor of cave. This sponge is thick encrusting on the rock. Pale yellow underwater and oxidises once collected- quickly on the inside, more slowly on the outside. Turns seawater blue. Oscules 2-3 mm. Solid, with firm consistency, endosome cuts like solid cheese. Low blunt conules on surface of sponge. Fibres knotted, some cored with debris.

S1103 (INV032)

Site 4. Dorothee Is.

Collected at 15.4 m from cave floor. Massive, yellow, thick encrusting. Surface has low blunt conules. Firm, barely compressible. Oxidises to blue.

***Aplysinia sp.* (Verongida, Aplysinidae)**

1 specimen

S1103 (INV053)

Site 7. Flinders Is.

Collected at 15.9 m from rock. Thin encrusting. Feels slippery. Oxidises from yellow to blue. Sponge soft and conulose. There are occasional dark fibres. Bark elements very dark, pith hard to see.

DISCUSSION

This is the first list of sponges from the Investigator Group of islands, South Australia. Diver surveys conducted here, between 6-16 metres depth, revealed that the underwater community was rich in invertebrate fauna, especially in small caves and overhangs. In some areas the overhangs, which were edged with sea fans, were densely covered with sponges and ascidians. Sponges were also found on the rocky slope, beneath the algal ‘canopy’. Although surveyed before, it is the Islands’ underwater algal diversity that has been previously emphasised (Shepherd and Womersley 1971, Edyvane and Baker, 1999). We suggest that the benthic faunal diversity is also diverse and worthy of further investigation towards assessing the islands fringing reefs as marine protected areas.

The Investigator Islands are situated within the Great Australian Bight, however there is very little similarity between the sponge fauna collected here and those collected in the GAB Marine Park (Sorokin et al, 2005), with only 4 species shared by both collections: *Stelletta* sp. 2, *Holopsamma laminaefavosa*, *Chondropsis arenifera* and *Hemitedania anonyma*. The habitat types in both areas are very different. The reefs of the Investigator Islands are shallow and fringing and surround islands based on calcarenite (Flinders), granite (Pearson and Dorothee), or granite topped by calcarenite (Ward and Topgallant) (Robinson *et al*, 1996). In the GAB Marine Park, the epibenthos grows either sparsely on sandy expanses of seafloor, or clustered in ‘islands’ (James et al, 2001). With possibly a third, of the sponges found in the Investigator Islands being species that support photosynthetic micro-organisms requiring light, it is likely that apparent variations in species composition are also related to depth differences; the Marine Park collection being from deeper water (50-198 m). It is also probable the Investigator Island sponge community is showing local endemism, which has been found in other sponge communities (eg Fromont *et al*. 2006, Hooper and Kennedy 2002, Sorokin *et al*. submitted). As with the collections from the GAB Marine Park (Sorokin *et al*, submitted), and Recherche Archipelago (McDonald *et al*, 2005), the inability to identify sponges reliably to species level reflects the need to revise historical literature and describe many new taxa in the southern bioregion of Australia.

The sponges from the Investigator Islands were collected from a clear-water shallow-reef environment and there was a notable presence of sponges that support symbiotic photosynthetic organisms in the form of cyanobacteria (eg *Ecionemia*, *Carteriospongia* and *Suberea*) or filamentous algae (eg *M. (A) mirabilis*). Symbioses between sponges and cyanobacteria are common in shallow-tropical and warm temperate environments (Wilkinson, 1983) and can provide up to 80% of sponge energy requirements on coral-reef flats (Wilkinson, 1987). However, there has been very little work on temperate phototrophic sponges, although a study in New South Wales estimated that 65% of their sponge species might contain symbiotic algae (Roberts *et al*. 1990). On the Great Barrier Reef light is a determining factor in the distribution of sponges, with photosynthetic sponges being more prevalent in shallow depths of the clear water and nutrient

deficient middle and outer reefs, and less so on the inner reefs that have more suspended nutrients (Wilkinson and Trott 1985). The GAB has almost no terrigenous input, with no major rivers in the region. It is possible that the abundance of phototrophic sponges on the reefs in the Investigator Islands indicates a clear-water low-nutrient environment for most of the year; however, coastal upwelling does occur in the eastern Bight in the summer (February/March), causing a seasonal increase of chlorophyll and zooplankton (Ward et al 2006). It was beyond the scope of this study to determine the details of symbiotic organisms, although sub-samples of each sponge have been taken for a future study of the symbionts.

This collection of sponges is by no means comprehensive. Easily visible sponges were targeted first, due to limitations in dive time. We felt that for museum documentation and future survey work, it was important to obtain a good photograph of each sponge *in situ*, and this took time. There were many other sponges that could not be collected during our survey (underwater photographs taken by colleagues at other sites during this expedition show sponges that do not appear in our collection). What we missed included cryptic sponges (eg. sponges at the back of caves, boring sponges etc), and sponges in deeper areas and in seagrass habitats. The present list is therefore preliminary, but does show a high diversity of sponges. On the western side of the GAB in the Recherche Archipelago, 435 different sponge species were collected from 7 islands (J. McDonald, unpublished data), and it is likely that the Investigator Islands may have similar diversity. The Recherche sponges are only identified to order or family, which makes species comparisons impossible at this stage.

The diversity of sponges found in this study (70 species, from 9 orders and 2 classes) demonstrates that they should not be overlooked in assessing the benthic biodiversity of these islands. Although excluded in many monitoring studies because of difficulties with identification, a recent study has shown that sponges can be effectively studied for monitoring purposes using morphological traits, which should help with monitoring and management of marine protected areas (Bell, 2007).

REFERENCES

- Bell, J.J. (2007) The use of volunteers for conducting sponge biodiversity assessments and monitoring using a morphological approach on Indo-Pacific coral reefs. *Aquatic Conservation: Marine and Freshwater Ecosystems* **17** 133-145.
- Bergquist, P.R. (1995) Dictyoceratida, Dendroceratida and Verongida from the New Caledonia Lagoon (Porifera: Demospongiae). *Memoirs of the Queensland Museum* **38** (1):1-51.
- Bergquist, P.R. & Cook, S de C. (2002) Family Darwinellidae. In Hooper, J.N.H. & Van Soest, R.W.M (eds). "Systema Porifera: A guide to the classification of sponges". Kluwer Academic/Plenum Publishers, New York. p. 1165. p. 1069.
- Bergquist, P.R. & Skinner, I.G. (1982) Sponges (Phylum Porifera). In Shepherd S.A., Thomas I.M. (Eds) "Marine Invertebrates of Southern Australia". (D.J. Woolman Printer, South Australia).
- Boury-Esnault, N. & Rutzler, K. (eds). (1997) "Thesaurus of sponge morphology". Smithsonian Contributions to Zoology No. 596. Smithsonian Institution Press, Washington, D.C.
- Borojevic, R. Boury-Esnault, N. Manuel, M. & Vacelet, J. (2002). Order Leucosolenida. In Hooper, J.N.H. & Van Soest, R.W.M (eds). "Systema Porifera: A guide to the classification of sponges". Kluwer Academic/Plenum Publishers, New York. p. 1165.
- Cook, S de C. & Bergquist, P.R. (2002) Family Thorectidae. In Hooper, J.N.H. & Van Soest, R.W.M (eds). "Systema Porifera: A guide to the classification of sponges". Kluwer Academic/Plenum Publishers, New York. p. 1165. p. 522.
- Department of Environment and Heritage (2006) Coastal or Island Protected Areas Contributing to Marine Species or Habitat Conservation.
www.environment.sa.gov.au/coasts/pdfs/contributing.pdf - Supplemental Result
- Edyvane, K. (1995) Marine biogeography and conservation values of the Elliston - Venus Bay - Investigator Group Region, South Australia. Consultancy to Primary Industries South Australia. West Beach; SARDI.
- Edyvane, K.S. (1998) Great Australian Bight Marine Park Management plan, Part B, Resource information. Department of Environment and Heritage and Aboriginal Affairs, Government of South Australia, Adelaide.
- Edyvane, K.S. & Baker, J.L. (1995) Marine benthic survey of the St. Francis Isles and Investigator Isles, South Australia - progress report by. Progress Report to the Australian Heritage Commission NEGP 1994/5 Grants project: Survey of the Coastal and marine habitats of SA: Biological communities. West Beach; SARDI.
- Edyvane, K.S. & Baker, J.L. (1999) Marine heritage values of the St. Francis Isles and Investigator Isles, South Australia by (Final report to the Australian Heritage Commission NEGP 1994/5 Grants project: Survey of the Coastal and marine habitats of SA: Biological communities.) West Beach; SARDI; January 1999.
- Fromont, J. Vanderliff, M.A., & Kendrick, G.A. (2006) Marine sponges of the Dampier Archipelago, Western Australia: patterns of species distributions, abundance and diversity. *Biodiversity and Conservation* **15** 3731-3750.
- Hooper, J.N.A. (1996). Revision of Microcionidae (Porifera: Poecilosclerida: Demospongiae), with description of Australian species. *Memoirs of the Queensland Museum*. **40** 1-626.

- Hooper, J.N.A. (1997) 'Sponguide'. Guide to sponge collection and identification. Electronic version. [<http://www.qmuseum.qld.gov.au/organization/sections/SessileMarineInvertebrates>]
- Hooper, J.N.A. & Kennedy, J.A. (2002) Small-scale patterns of sponge biodiversity (Porifera) on Sunshine Coast reefs, eastern Australia. *Invertebrate Systematics* **16** 637-653.
- Hooper, J.N.A and Wiedenmayer, F. (1994), Hooper, J.N.A. (1999). Australian Biological Resources Study, Australian Faunal Directory -PORIFERA. Online at: <http://www.deh.gov.au/biodiversity/abrs/online-resources/fauna/index.html?pstrVol=PORIFERA%3bpstrTaxa=4835%3bpstrChecklistMode=1>
- James, N.P., Bone, Y., Collins, L.B. and Kyser, T.K. (2001). Surficial sediments of the Great Australian Bight: facies dynamics and oceanography on a vast cool-water carbonate shelf. *Journal of Sedimentary Research*. **71**(4) 549-567.
- Kennedy, J.A. (2000). Resolving the '*Jaspis stellifera*' complex. *Memoirs of the Queensland Museum* **45**(2) 453-476.
- McDonald, J.I., Fromont, J. & Kendrick, G. (2005) Spatial patterns in sessile benthic sponge and ascidian communities of the Recherche Archipelago. SRFME Interim Final Report. 72-78.
- Roberts, D.E., Cummins, S.P., Davis, A.R. & Pangway, C. (1990) Evidence for symbiotic algae in sponges from temperate coastal reefs in New South Wales, Australia. *Memoirs of the Queensland Museum* **44** 493-497.
- Robinson, T., Canty, P., Mooney, T. & Rudduck, P. (1996) South Australia's offshore islands. Resource Management Branch, Department of Environment and Natural Resources, South Australia.
- Shepherd, S & Womersley, B. (1971) Pearson Island expedition 1969: 7. The subtidal ecology of benthic algae. *Transactions of the Royal Society of South Australia* **95** (3) 155-167.
- Sorokin, S.J. Currie, D.R, & Ward, T.M. (2005) Sponges from the Great Australian Bight Marine Park (Benthic Protection Zone). Report to Wildlife Conservation Fund for the Wildlife Advisory Committee, South Australian National Parks and Wildlife Council. SARDI Aquatic Science Publication No. RD04/0170.
- Sorokin, S.J., Fromont, J. & Currie, D.R. Demosponge biodiversity in the Benthic Protection Zone of the Great Australian Bight. *Transactions of the Royal Society of South Australia* (accepted for publication).
- Uriz, M.J. (2002). Family Ancorinidae. In Hooper, J.N.H. & Van Soest, R.W.M (eds). "Systema Porifera: A guide to the classification of sponges". Kluwer Academic/Plenum Publishers, New York.
- Van Soest, R.W.M. (2002a). Family Chondropsidae. In Hooper, J.N.H. & Van Soest, R.W.M (eds). "Systema Porifera: A guide to the classification of sponges". Kluwer Academic/Plenum Publishers, New York.
- Van Soest, R.W.M & Hajdu, E. (2002). Family Mycalidae. In Hooper, J.N.H. & Van Soest, R.W.M (eds). "Systema Porifera: A guide to the classification of sponges". Kluwer Academic/Plenum Publishers, New York.
- Ward, T.M., McLeay, L.J., McClatchie, S., Matthews, R., Kampf, J., & Van Ruth, P.D. (2006) Pelagic ecology of a northern boundary current system: effects of upwelling on the production and distribution of sardine (*Sardinops sagax*), anchovy (*Engraulis australis*) and southern bluefin tuna (*Thunnus maccoyii*) in the Great Australian Bight. *Fisheries Oceanography* **15**:3 191-207.

Ward, T.M, Sorokin, S.J., Currie, D.R., Rogers, P.J. & McLeay, L.J. (2006) Epifaunal assemblages of the eastern Great Australian Bight: Effectiveness of a benthic protection zone in representing regional biodiversity. *Continental Shelf Research* **26** 25-40.

Weidenmayer, F. (1989) Demosponge (Porifera) from the Northern Bass Strait, Southern Australia. *Memoirs of the Museum of Victoria*. **50** (1) 1-242.

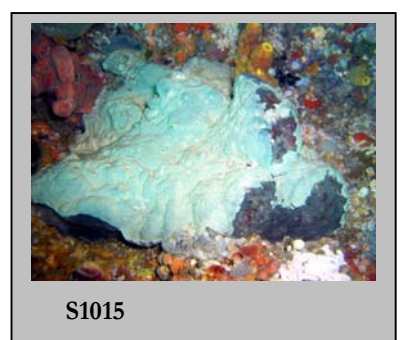
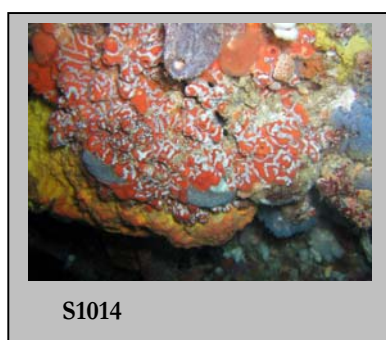
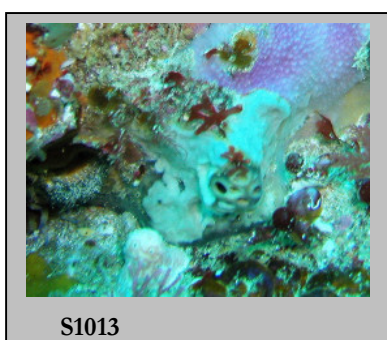
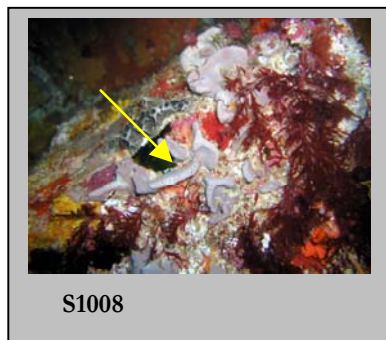
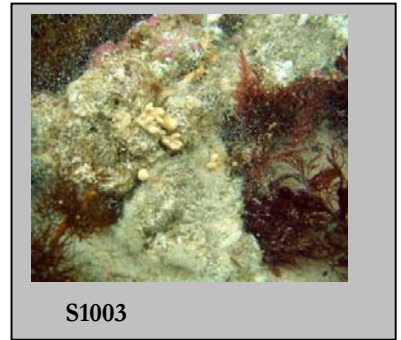
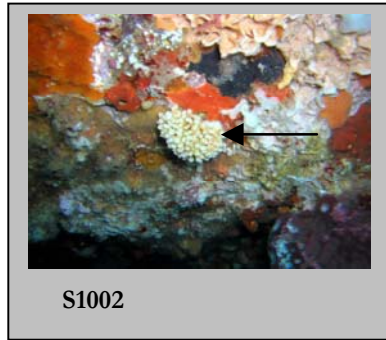
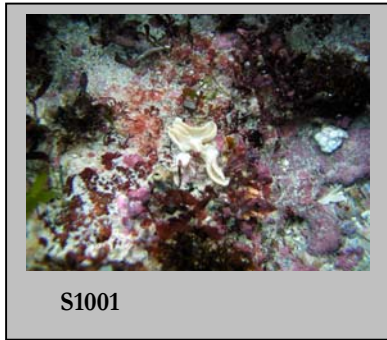
Wilkinson, C.R. (1983) Net primary productivity in coral reef sponges. *Science* **219** 410-412.

Wilkinson, C.R. (1987) Productivity and abundance of large sponge populations on Flinders Reef flats, Coral Sea. *Coral Reefs*. **5** 183-188.

Wilkinson CR, & Trott LA (1985) Light as a factor determining the distribution of sponges across the central Great Barrier Reef. *Proceedings of 5th International Coral Reef Congress* **5** 125-130.

Willan, R.C. (1984). A review of diets in the Notaspidea. *Journal of the Malacological Society of Australia* **6** 125-142.

APPENDIX

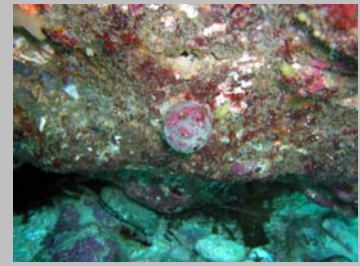




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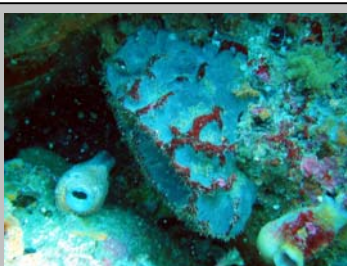
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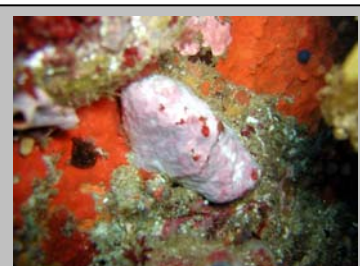
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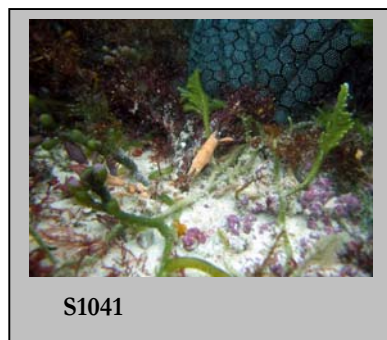
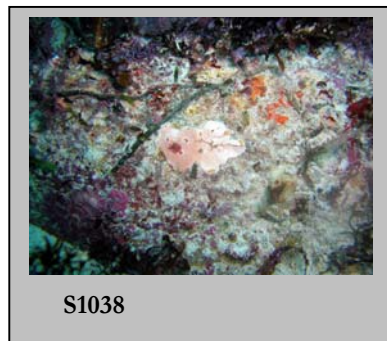
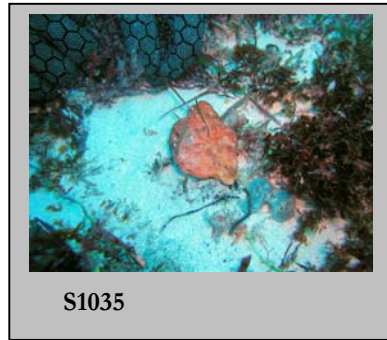
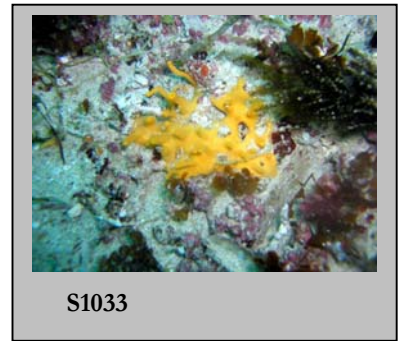
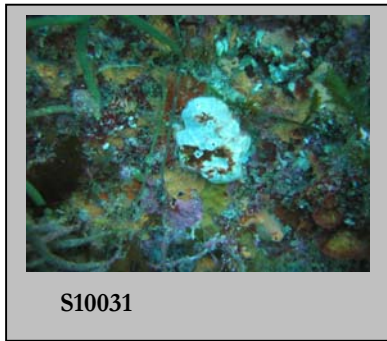
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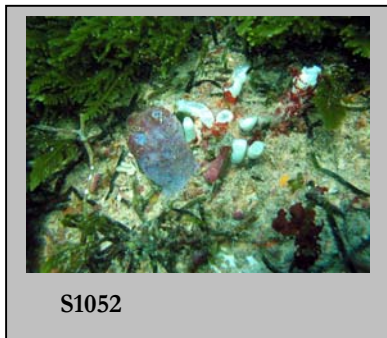
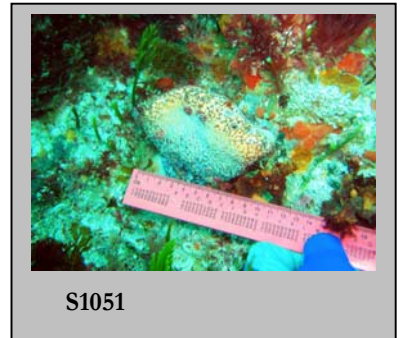
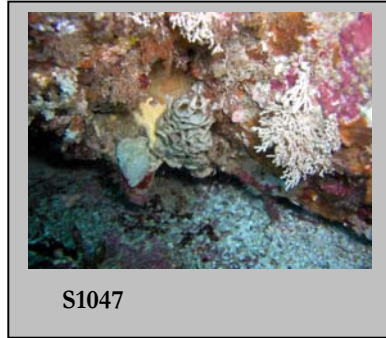


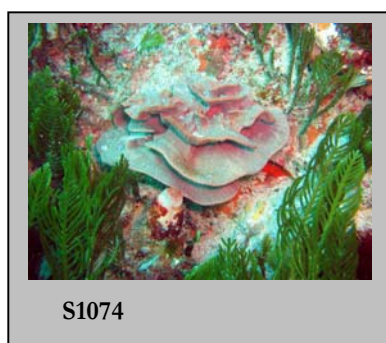
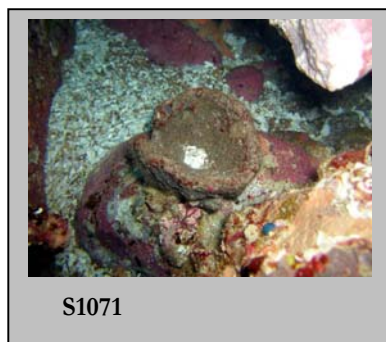
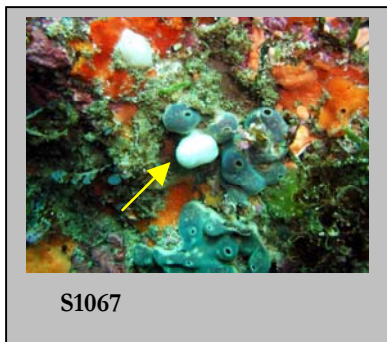
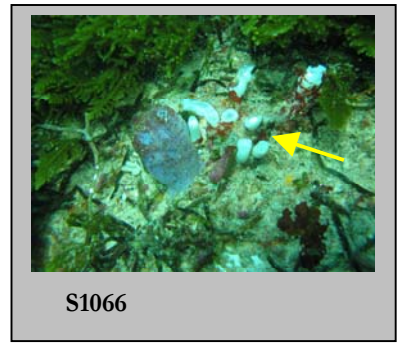
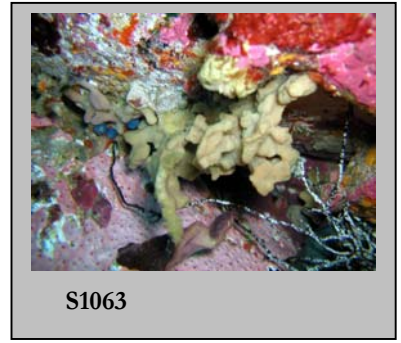
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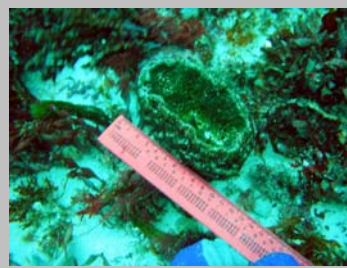
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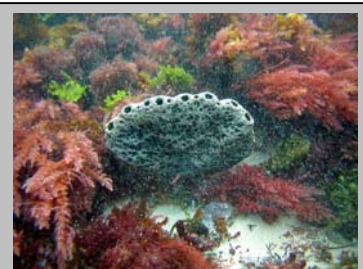
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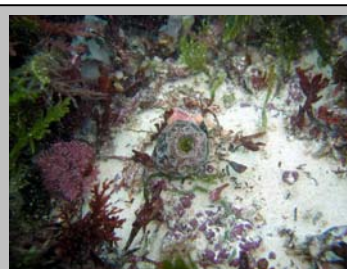
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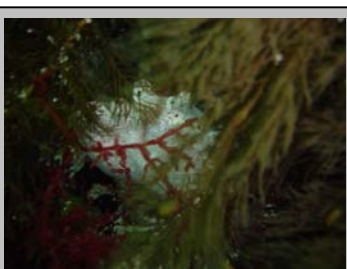
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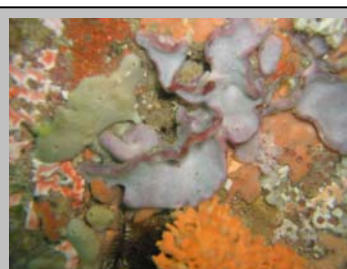
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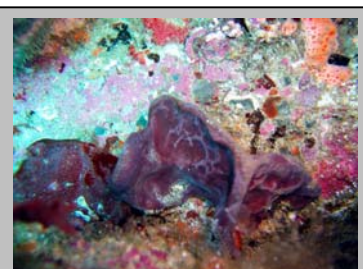
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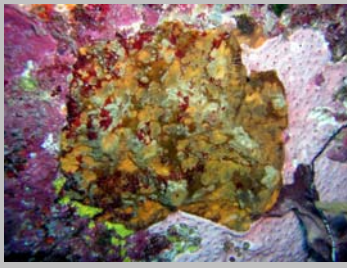
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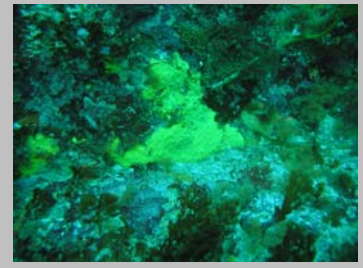
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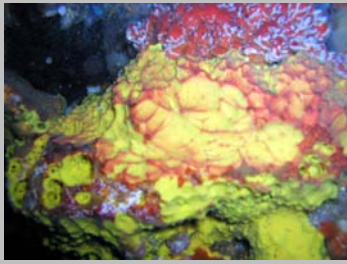
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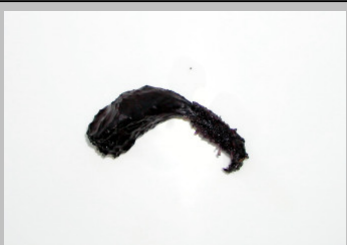
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Additional Investigator Island sponges from the SA Museum collection.



PS0266



PS0205



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