

## 6.1. SPONGES OF THE SEYCHELLES

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### abstract

351 sponge species (totalling >1200 specimens) were collected from the Seychelles-Amirantes area by hand (snorkling and diving to 30 m), grabs, trawls and dredges (15-600 m). So far 160 species were successfully identified to species level, the remaining species to genus level. A total of 109 new records for the Seychelles-Amirantes area was established (including fully identified species as well as non-identified species belonging to genera not previously recorded for the area). An estimated 11% of the identified species appeared to be endemic to the area (but many more may be found among the 191 species not identified beyond the genus level). A further 18% comprised Western Indian Ocean regional endemics, while another 10% is shared between India and the Seychelles-Amirantes area. The remaining 60% of the identified species (about 27% of the total number of species) appeared to belong to species found also in Indonesia and/or Australia. Many of these are widespread and common reef sponges occurring from the Red Sea to the Central Pacific; examples are *Hyrtios erectus*, *Axinella carteri* and *Acanthella cavernosa*. Phototrophic sponges were found to be common on carbonate islands, but absent on high granitic islands.

### introduction

The sponge research consisted of four separate projects. The first and main project centers around the hypothesis that the Seychelles-Amirantes area has faunal elements of its own, different from adjacent and/or more distant Indo-Pacific areas. This hypothesis is based on the geological history of the area with its prolonged period of isolation away from the main continental blocks of Asia and Africa (e.g. Stoddart, 1984; Mart, 1988). Previous field experience in Indonesia is used to judge the degree of similarity with the Seychelles sponge fauna. Below some preliminary conclusions will be given. The three other projects were smaller or represent cooperative efforts with other research groups. Results of these will be mentioned only briefly.

### general activities

At 81 stations a total of 1200+ samples (consisting each of one or more specimens of a given species) were obtained. This collecting effort included a 12 day sampling period on Mahé prior to the arrival of the *Tyro* in Victoria. Approximately 150 samples were

obtained there. The remaining 1050 samples were collected at 70 stations made by the *Tyro*. The efficiency of dredge (20-600 m) versus hand collecting (diving, snorkling, wading, 0-25 m) was about equal (averaging 13 samples in a dredge and 16 in hand collecting). Both sampling strategies are largely non-overlapping and complimentary, due to the zoned occurrence of many sponge species and the cryptic occurrence in the optimal coral reef zone between 5 and 15 m which seems to be especially characteristic for the Indian Ocean (Rützler, 1971). As a result an evenly intensive sampling effort has been obtained between 0 and 60 m, ensuring a comprehensive picture of sponge occurrence and distribution in the visited localities. These were almost evenly spread over the Seychelles proper (43 stations) and the Amirantes (33 stations). Deep water samples were few and far apart, so knowledge of deep water sponges remains incidental.

All collected specimens have been examined and identified to at least the genus level. They are stored in the Zoölogisch Museum, University of Amsterdam.

### acknowledgements

Without the help of many of the participants of the Seychelles expedition, it would not have been possible to assemble such a comprehensive sponge collection of the area. This help is gratefully acknowledged. Jan Vermeulen assisted in making microscopic preparations of the material examined in Amsterdam.

### faunal survey and biogeography

The list of identified species and genera is given in an appendix. Asterisks denote newly recorded species and genera for the area.

Surprisingly, perhaps, there were already 167 species of sponges known from the Seychelles-Amirantes area (Ridley, 1884; Topsent, 1893; Dendy, 1921, 1922; Thomas, 1973, 1978), and a further five genera not mentioned in these studies were reported by Selin *et al.* (1992). Especially the reports of Dendy (*Sea Lark Expedition*) contain many good descriptions and photographs. This made identification to species level often possible, especially of the dredge samples. However, several common genera such as *Clathria*, *Mycale* and *Ircinia* are very difficult to identify. Thus many species are simply characterized as e.g. "*Clathria* spec. orange crust".

The studied samples were assigned to 351 separate species of which 160 were fully identified. 82 of the latter were already known, thus yielding 78 definite new records for the area. A further 31 not fully identified species belonged to genera not recorded before from the area, and thus are probably also new records, bringing the total to 109.

One species deserves special mentioning: a scleros-

ponge, *Astrosclera willeyana*, was found in cryptic habitats of the St François reefs. This is a new record for a species widespread in the Indo-West Pacific. About ten characteristic species reported for the area by previous authors were definitely *not* found. In order to be able to answer (preliminarily) the question of Western Indian Ocean endemicity, the occurrence of the firmly identified species was traced on a checklist made from previous field trips (Van Soest, unpublished) and trustworthy literature records. The following results were obtained:

*Seychelles - Amirantes faunal relationships*: of the 351 identified separate species, only 121 are shared between the Seychelles and the Amirante islands. The former are decidedly more diverse: 135 species were found exclusively on the Seychelles proper, against 95 exclusively in the Amirante Islands. 16 of the shared species are only shared between Bird Island and the Amirantes, indicating a connection with carbonate environments. Possibly, the Seychelles are more diverse because both granitic and carbonate environments are found there, while the Amirantes are exclusively carbonate; however, this difference may also be attributed to the larger numbers of stations made in the Seychelles area, especially around Mahé.

*Seychelles-Amirantes endemics* (Table 6.1.1): 18 species (11% of identified species) collected by us so far seem to be confined to the study area. Apart from these definite identifications, there are about 190 species awaiting identification to species level. It is

expected that quite a few of these will prove to be new to science and potentially are endemic to the area. A further three species not found by us, seem to be confined to the area, although they were reported only once.

*Regional endemics* (Table 6.1.2): Species occurring in the Seychelles area and adjacent Western Indian Ocean regions are more frequent: 28 species (18% of the identified species). Again this list is tentative, because several of the species so far not identified to species level, might turn out to be members of Western Indian Ocean species.

*Species shared with the coasts of India* (Table 6.1.3): 15 species (10 % of identified material) are not known from further westwards or eastwards. This list likewise is tentative because of uncertainty posed by the large number of unidentified species.

Thus of the well established species 11% are Seychelles-Amirantes endemics 18% are Western Indian Ocean endemics, and 10% are Indian Ocean endemics. The remaining 60 % (27% of the total number) occurs also elsewhere in the Indo-West Pacific, notably in Indonesia (Van Soest unpublished check-list of Indonesian sponges based on identified material of the Siboga and Snellius-II expeditions). Well established and commonly encountered examples are listed in Table 6.1.4. Of this list the ones with an asterisk (together comprising about 50%) were likewise among the most common species encountered during the Snellius II expedition (see Van Soest, 1989, 1990).

Table 6.1.1. Sponge species collected during the Oceanic Reefs cruise known exclusively from the Seychelles-Amirantes area

Species	Remarks
<i>Aurora cribrophora</i>	
<i>A. rowi</i>	
<i>Stelletta cylindrica</i>	so far endemic to Mahé
<i>Stelletta jonesi</i>	
<i>Jaspis bouilloni</i>	
<i>Erylus cylindrigerus</i>	so far endemic to the Amirante arc
<i>Tethya stellagrandis</i>	so far endemic to the Amirante arc
<i>Cliona</i> spec. black	so far endemic to the Amirante arc
<i>Polymastia tubulifera</i>	
<i>Halichondria retiderma</i>	so far endemic to Mahé
<i>Clathria (Colloclathria) ramosa</i>	so far endemic to the Amirante arc
<i>Acarnus topsenti</i>	
<i>Cornulella lundbecki</i>	so far endemic to the Amirante arc
<i>Coelosphaera ramosa</i>	so far endemic to the Amirante arc
<i>Forcepia stephensi</i>	
<i>Monanchora laevisissima</i>	
<i>Cacospongia herdmani</i>	
<i>Fasciospongia seychellensis</i>	

Table 6.1.2. Sponge species collected during the Oceanic Reefs cruise known from other Western Indian Ocean areas (Mascarenes, Red Sea, Arabian Sea, East Africa, Madagascar and South Africa).

*Plakortis kenyensis*  
*Ecionemia rotunda*  
*Cinachyra providentiae*  
*Amphibleptula herdmani*  
*Spirastrella inconstans*  
*Diplastrella gardineri*  
*Timea stellivarians*  
*Hemiasporea intermedia*  
*Amorphinopsis fistulosa*  
*Halichondria (Ciocalypta) tyleri*  
*Dictyonella conglomerata*  
*Acanthella conulifera*  
*Higginsia higgini*  
*Rhabdermia bistylifera*  
*Aulospongus gardineri*  
*Hemitedania wilsoni*  
*Tedaniopsamma arenosa*  
*Phorbos clathrodes*  
*Crella cyathophora*  
*Crella ula*  
*Biemna ciocalyptoides*  
*Hamacantha simplex*  
*Psammascus lamella*  
*Xestospongia viridenigra*  
*Haliclona bawiana*  
*Euryspongia lactea*

Table 6.1.3. Sponge species collected during the Oceanic Reefs cruise known from the coasts of India but not from more eastern or western Indo-Pacific areas.

*Plakinastrella ceylonensis*  
*Geodia lindgreni*  
*Cliona ensiformis*  
*Timea curvistellifera*  
*Timea stellivarians*  
*Collocalypta digitata*  
*Petromica massalis*  
*Axinella agariciformis*  
*Agelas ceylonica*  
*Mycale tenuispiculata*  
*Biemna tubulata*  
*Guitarra indica*  
*Aka minuta*  
*Callyspongia reticulata*  
*Haliclona microsigma*  
*Dictyodendrilla retiara*

From the great morphological similarity between specimens from these widely spread areas it can only be concluded that these sponge species have managed to spread over the entire Indo-West Pacific area in fairly recent times and possibly maintain genetic exchange between adjacent overlapping populations. Are the Seychelles and Western Indian Ocean endemics relicts from a period of isolation between the South East Asian - Australian area and the Western Indian Ocean - India area? For this we need information on the phylogenetic relationship of the collected sponge species. To date such information is available only for *Acarus topsenti*, *A. bicladotylota* and *A. bergquistae* (cf. Van Soest *et al.*, 1991), *Myrmekioderma granulata* (cf. Van Soest, 1993) and *Rhabdermia bistylifera* (cf. Van Soest & Hooper, 1994). *A. topsenti* and *R. bistylifera* are regional endemics. The first species occupies an isolated position in the cladogram of its

Table 6.1.4. Sponge species commonly encountered during the Oceanic Reefs cruise known also from Indonesian waters. \* indicates species listed as common in Indonesian waters by Van Soest (1989, 1990).

*Ecionemia acervus*  
*Erylus lendenfeldi*  
 \**Cinachyra australiensis*  
 \**Tethya robusta*  
 \**Spirastrella decumbens*  
 \**Spirastrella vagabunda*  
*Spirastrella pachyspira*  
 \**Spirastrella solida*  
 \**Aaptos suberitoides*  
*Terpios cruciata*  
 \**Myrmekioderma granulata*  
*Amorphinopsis excavans*  
*Axinyssa aplysinoides*  
 \**Liosina paradoxa*  
 \**Acanthella cavernosa*  
 \**Axinella carteri*  
*Pseudaxinella durissima*  
*Agelas mauritiana*  
*Clathria vulpina*  
*Acarus bicladotylota*  
*Iotrochota baculifera*  
*Iotrochota purpurea*  
*Lissodendoryx schmidti*  
*Mycale grandis*  
*Aka mucosa*  
 \**Xestospongia exigua*  
 \**Acervochalina confusa*  
 \**Hirtios erectus*  
 \**Dysidea herbacea*  
 \**Druinella purpurea*

genus, which fits in well with the idea that it is an old relict. The second has a West African species (*R. africana*) as its nearest relative, which again points to isolation from the other Indo-Pacific areas. The two other *Acarinus* species and *Myrmekioderma granulata* are widespread Indo-West Pacific species with close relatives in different parts of the world, making it difficult to hypothesize on their origin.

Deep water species were too few to draw conclusion on possible relicts. They seem to belong to widespread genera characteristic for slope locations. In fact, this part of the project (to check upon possible Cretaceous faunas persisting on the slopes of the Seychelles continental fragment) has failed due to lack of samples.

### Agelas biogeography

A second, smaller project was to collect deep-frozen (-83°C) samples of members of the genus *Agelas* for an attempt to investigate phylogenetic relationships within the circumtropical genus based on protein electrophoresis. In previous trips of research assistant F. Hiemstra, who is currently studying the problem, ultrafrozen samples of species from the Caribbean and the Mediterranean were collected. The present collecting efforts yielded nine samples of *Agelas mauritiana* and a single sample of *A. ceylonica*, which is sufficient to answer the question whether members of the genus from the Caribbean are more closely related to each other than to species in the Indo-West Pacific, and also will enable to determine the relative position of the single species from the Mediterranean. Preliminary results obtained by student Ms M. van der Eerden point towards a basal position of *A. mauritiana* in the cladogram of phylogenetic relationships of species of *Agelas*. This result is still tentative because only few enzyme systems were found to be active in material of

this genus. However, if this result will be confirmed by ongoing investigations it will support the monophyly of the Caribbean species of *Agelas*.

In addition to the *Agelas* samples, ultrafrozen material of about 40 other species of sponges, spread over the various orders and families, was collected for future molecular systematic studies. The unique possibility of the *Tyro* collecting equipment, field trips and the presence of an ultrafreezer were thus fully exploited.

### phototrophic sponges

A further smaller project comprised the confirmation of observations and theories of the Australian scientist Wilkinson (*e.g.* Wilkinson, 1981; Wilkinson & Cheshire, 1989) on the occurrence of so called phototrophic sponges. These are sponges living in symbiosis with cyanobacteria in a way comparable to that of corals and zooxanthellae. They share a similar morphology in that they have a thin-bladed form equipped to collect ultraviolet radiation. 50 % or more of the nutrient supply of these sponges is accounted for by the symbionts and thus these organisms are in effect primary producers. Wilkinson has made a transect over the Great Barrier Reef from west to east and found a distinct correlation between the occurrence and abundance of these phototrophic sponges and the distance to the continental shore. In oceanic oligotrophic waters they abound, in inshore nutrient-enriched areas they are rare or absent.

The Seychelles-Amirantes trip offered a unique possibility to check whether such a pattern is more general. The geographic situation is dramatically different from that of the Great Barrier Reef area, but there are high granitic islands with terrigenous effluents providing extra nutrients as well as low carbonate islands surrounded by oligotrophic waters. Mario de Kluijver

Table 6.1.5. Occurrence of phototrophic sponges in granitic ("high") and carbonate ("low") islands of the Seychelles-Amirantes area noted during the Oceanic Reefs cruise.

Locality	High/Low	<i>Dysidea</i>	<i>Phyllospongia</i>	<i>Carteriospongia</i>
Mahé	high	absent	absent	absent
Praslin	high	absent	absent	absent
Aride	high	absent	absent	absent
La Digue	high	absent	absent	absent
Bird	low	4.5% cover	absent	common
St Joseph	low	common	common	absent
Poivre	low	0.5% cover	common	absent
Desroches *	low	not found	not found	not found
Desnoeuufs *	low	not found	not found	not found
Alphonse	low	2.0% cover	common	absent
Platte	low	common	common	absent

\*) not well examined

and I noted the occurrence of phototrophs (species: *Dysidea herbacea*, *Carteriospongia foliascens* and *Phyllospongia cf. alcornis*) in each locality, and where they seemed especially common made a quantitative survey to provide some hard data. The results are presented in Table 6.1.5.

Conclusions are inescapable: all the high islands lack the three phototrophs. With the exception of Desroches and Desnoeuvs, which were only visited glancingly, all low carbonate islands demonstrated abundant populations of these curious sponges, confirming the validity of Wilkinson's observations. Thomas (1973) recorded two specimens of *Carteriospongia foliascens* from Mahé, but the possibility that this material came from Bird Island cannot be excluded; at present the species certainly does not occur in shallow waters around Mahé.

### natural products from sponges

This is a cooperative effort with the Université Libre de Bruxelles (Dr J.C. Braekman), Dept. of Bio-Organic Chemistry. About 60 specimens of sponges (belonging to 40 species) comprising samples of 100 cm<sup>3</sup> or more were delivered for investigation of their secondary metabolite contents. These compounds will be tested for their anti-viral, anti-fungal and anti-biotic properties and if found active, will be further analyzed for their structure. Possible use for medicinal and pharmaceutical purposes is the ultimate research goal.

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**Appendix to chapter 6.1.: List of species of sponges collected during the expedition**

\* indicates new record for the Seychelles-Amirantes area

S indicates: collected only on the Seychelles Bank

A indicates: collected only on the Amirante Arc

C indicates: collected in carbonate environments of both areas (Amirantes + Bird Island)

Numbers refer to stations in which one or more specimens were collected.

**Class Hexactinellida**

\**Aphrocallistes* spec. 795 (A)

**Class Calcarea**

*Clathrina* spec. light blue 609, 717, 735, 744 (S)

*Leucosolenia* spec. white 792 (A)

*Scypha* spec. 612, 719, 783

*Leuconia* spec. yellow 612, 788, 792

*Leuconia* spec. brownish 612, 711, 717, 735, 792

\**Soleniscus* spec. 714 (S)

Calcarea indet. 743, 752, 774, 776, 783, 792

**Class Demospongiae**

Order Homosclerophorida

Family Plakinidae

*Oscarella* cf. *lobularis* 609 (S)

\**Placinolopha bedoti* 730 (S)

\**Plakinastrella clathrata* 618, 768

\**Plakortis nigra* 735, 775, 796

\**Plakortis* cf. *kenyensis* 723, 796 (C)

\**Plakortis* cf. *lita* 792 (A)

*Plakortis* spec. 717 (S)

Order Choristida

Family Ancorinidae

\**Aurora cribriporosa* 601, 604, 606 (S)

*Aurora rowi* 604 (S)

*Ecionemia acervus* 603, 612, 618, 717, 778

\**Ecionemia rotunda* 778 (A)

*Ecionemia* spec. 719 (S)

*Ancorina* spec. 716, 719 (S)

*Stelletta cylindrica* 602, 609, 612 (S)

\**Stelletta parva* 601, 602, 618, 717 (S)

\**Stelletta jonesi* 782, 786, 792 (A)

*Stelletta purpurea* 714 (S)

*Stelletta* spec. white 783 (A)

*Stelletta* spec. orange 749 (S)

*Stelletta* spec. purple-brown 778 (A)

*Stelletta* spec. rose 776 (A)

*Penares* cf. *intermedia* 702, 730 (S)

*Penares* spec. 702, 778

\**Calthropella* spec. grey-black 612, 717, 735, 787, 792

Family Coppatiidae

*Asteropus simplex* 612, 792

*Jaspis bouilloni* 713, 716, 719, 720, 721, 738, 753, 756, 778, 782, 783, 788, 792, 796

*Jaspis* spec. yellow 618, 723, 750

*Jaspis* spec. red 749 (S)

Family Geodiidae

*Erylus lendenfeldi* 612, 752, 792

*Erylus cylindrigera* 788, 792 (A)

*Erylus* spec. rose 752 (A)

*Geodia lindgreni* 603, 604, 608, 734, 735 (S)

*Geodia* spec. rosy 772 (A)

Family Pachastrellidae

*Pachastrella* spec. 612 (S)

Family Theneidae

\**Thenea* spec. 794 (A)

Order Spirophorida

Family Tetillidae

*Cinachyra australiensis* 605, 606, 612, 618, 703, 720, 729, 740, 749, 754, 775, 788

\**Cinachyra providentiae* 721 (S)

*Cinachyra* spec. 604, 752

*Paratetilla bacca* 603 (S)

*Tetilla* spec. grey-brown

Order Lithistida

Family Theonellidae

\**Racodiscula* spec. 755 (A)

*Theonella* spec. 778 (A)

Family Scleritodermidae

*Amphibleptula herdmani* 721, 730, 782 (C)

\**Scleritoderma nodosum* 721 (S)

Family Siphoniidae

*Leiodermatium* spec. 752 (A)

Order Hadromerida

Family Tethyidae

*Tethya seychellensis* 612 (S)

\**Tethya stellagrandis* 766, 776 (A)

\**Tethya fastigiata* 703 (S)

*Tethya robusta* 604, 717 (S)

*Tethya* spp. 603, 604, 609, 612, 615, 618, 711, 717, 719, 734, 740, 768, 766, 772

Family Spirastrellidae

*Cliona schmidti* 780 (A)

*Cliona carpenteri* 612 (S)

*Cliona ensiformis* 605, 716 (S)

*Cliona* spec. black 753, 759, 767, 768, 779, 780, 796 (A)

*Cliona* spec. brown 780, 792 (A)

*Cliona* spec. orange red 755, 783, 788 (A)  
*Cliona* spec. yellow 734, 738 (S)  
*Cliona* spec. bright yellow 788 (A)  
 \**Diplastrella gardineri* 708, 753, 792  
 \**Diplastrella spiniglobata* 717, 792  
 \**Placospongia carinata* 602, 603, 604, 618, 716, 719, 738, 740 (S)  
 \**Placospongia* spec. orange 716 (S)  
*Spirastrella inconstans* 609, 612, 702, 713, 715, 716, 719, 720, 721, 723, 724, 759, 766, 767, 768, 772, 783  
 \**Spirastrella decumbens* 603, 604, 612, 615, 618, 702, 735, 740, 779  
*Spirastrella pachyspira* 606, 609, 623 (S)  
*Spirastrella vagabunda* 723, 754, 792 (C)  
*Spirastrella solida* 603, 604, 605, 618, 716, 778  
*Spirastrella* spec. 612, 713, 716 (S)  
*Spirastrella* spec. 2 787 (A)  
*Timea stellata* 749 (S)  
*Timea* cf. *stelligera* 717 (S)  
*Timea stellivarians* 717, 721 (S)  
*Timea curvistellifera* 723 (S)  
*Timea* spec. orange red 606, 612, 618, 711, 715, 717, 721, 723, 735, 772  
*Timea* spec. green 775 (A)

#### Family Hemiasterellidae

\**Hemiasterella intermedia* 751, 752 (A)

#### Family Polymastiidae

\**Aptos suberitoides* 603, 604, 612, 615, 703, 711, 735, 740, 772  
*Aptos* spec. 716, 749 (S)  
 \**Polymastia tubulifera* 745, 795  
*Radiella* spec. 794 (A)  
*Terpios cruciata* 612, 711, 717, 720, 731, 735, 735, 754, 788  
 \**Terpios granulosa* 723, 759, 788 (C)  
*Terpios* spec. yellow 619 (S)  
*Pseudosuberites andrewsi* 602, 604, 605, 608, 618, 749 (S)  
 \**Pseudosuberites* spec. orange 729, 792 (C)  
*Laxosuberites* spec. beige-brown 604, 612 (S)  
*Laxosuberites* spec. whitish 794 (A)  
*Laxosuberites* spec. orange 752 (A)

#### Order Chondrosida

##### Family Chondrosiidae

*Chondrilla* cf. *nucula* 606, 609, 619, 703, 717, 723, 753, 772, 782, 786  
 \**Chondrilla sacciformis* 604, 767  
 \**Chondrosia debilis* 601, 602, 603, 604, 612, 618, 740, 749, 779

#### Order Halichondrida

##### Family Halichondriidae

*Myrmekioderma granulata* 716, 717, 729, 754, 756  
 \**Topsentia halichondrioides* 716, 721 (S)  
*Topsentia* spec. 604, 612, 751, 752, 755  
*Amorphinopsis excavans* 618, 749, 751, 796  
 \**Amorphinopsis subaceratus* 718, 745, 776  
 \**Amorphinopsis fistulosus* 745, 749, 750  
*Amorphinopsis* spec. 618, 723, 750, 772  
*Axinyssa aplysinoides* 796 (A)  
*Axinyssa* spec. yellow 603, 735, 767, 789  
*Axinyssa* spec. yellow-brown 603 (S)  
 ?*Spongosorites* spec. 605, 618 (S)  
 \**Halichondria (Ciocalypta) tyleri* 715, 750  
*Halichondria* cf. *retiderma* 603 (S)  
*Halichondria* spec. orange 778, 780 (A)  
*Halichondria* spec. white 794 (A)  
*Halichondria* spec. beige 703, 796  
*Hymeniacidon* spec. orange 601, 604, 606, 612, 618, 719, 731, 738, 740 (S)  
*Hymeniacidon* spec. yellow 603, 705, 733 (S)  
 \**Collocalypta digitata* 716, 721 (S)  
 \**Petromica massalis*

#### Family Dictyonellidae

*Dictyonella* cf. *conglomerata* 720 (S)  
 \**Dictyonella* spec. red 603, 720 (S)  
 \**Scopalina* spec. 602, 604, 717 (S)  
 \**Liosina arenosa* 767, 788, 792, 796 (A)  
 \**Liosina paradoxa* 601, 609, 703, 734, 735, 736, 749 (S)

#### Family Desmoxyidae

\**Higginsia higgini* 766 (A)  
*Higginsia petrosioides* 721 (S)  
*Higginsia* spec. (715) (S)

#### Family Axinellidae

*Acanthella cavernosa* 619, 702, 705, 717, 735, 756, 759, 767, 772, 780, 783, 788, 792, 796  
*Acanthella* cf. *conulifera* 779 (A)  
*Acanthella* spec. 1 (n. sp. ?) 721 (S)  
*Acanthella* spec. 2 702 (S)  
*Acanthella* spec. 3 789 (A)  
*Axinella carteri* 702, 713, 716, 717, 721, 723, 730, 735, 738, 756, 759, 764, 767, 772, 774, 780, 782, 796  
 \**Axinella agariciformis* 716, 720, 738 (S)  
 \**Axinella* spec. 744, 751  
 \**Bubaris* aff. *vermiculata* 776 (A)  
 \**Bubaris* spec. 612, 785  
 \**Dragmaxia* spec. 740 (S)  
*Pseudaxinella durissima* 612, 702, 705, 713, 716, 723, 724, 738, 745, 753, 756, 767, 768, 771, 772, 783, 796  
*Pseudaxinella* spec. slimy red 606, 619, 737, 779, 783, 788, 792  
*Ptilocaulis spiculifer* 716, 783  
 \**Ptilocaulis* spec. strawberry 772 (A)

\**Ptilocaulis* spec. ochrous fan 778 (A)

Order Agelasida

Family Agelasidae

*Agelas ceylonica* 612, 792

\**Agelas mauritiana* 735, 753, 776, 796

\**Astrosclera willeyana* 792 (A)

Order Poecilosclerida

Family Rhabderemiidae

\**Rhabderemia bistylifera* 621

Family Raspailiidae

*Cyamon* cf. *vickersi* 716, 750, 766

\**Ectyoplasia* spec. 794 (A)

\**Echinodictyum conulosum* 745 (S)

*Echinodictyum* spec. 786 (A)

*Eurypon* spec. pale red 702, 783

*Eurypon* spec. salmon 754 (A)

*Eurypon* spec. orange red 766 (A)

*Eurypon* spec. beige 749, 772, 794

*Eurypon* spec. strawberry red 719, 776 (C)

\**Eurypon* (*Fasubera*) spec. orange brown 744, 759

*Aulospongus gardineri* 721 (S)

Family Microcionidae

*Antho* spec. red 731, 788

*Clathria chelifera* 719 (S)

*Clathria dichela* 786 (A)

*Clathria madrepora* 719, 723 (S)

*Clathria procera* 729, 735 (S)

*Clathria robusta* 612

*Clathria vulpina* 604, 713, 716, 719, 720, 721, 734, 753, 766

*Clathria* (*Microcionia*) spec. 715 (S)

*Clathria* (*Rhaphidoplus*) spec. 609, 702, 719 (S)

*Clathria* spec. no microscleres 711 (S)

*Clathria* spec. beige 702, 778

*Clathria* spec. rose-veined 723, 767

*Clathria* spec. strawberry crust 702, 717, 778

*Clathria* spec. red creepers 705, 713, 717, 721, 729 (S)

*Clathria* spec. hollow red strings 734, 735, 738

*Clathria* spec. orange clathrate 750 (A)

*Clathria* spec. dull red fan 716(S)

*Clathria* spec. brown-red-white stars 767 (A)

*Clathria* spec. yellow branches 702 (S)

*Clathria* spec. bright red lobes 734, 753, 796

*Clathria* spec. orange slime crust 719 (S)

*Clathria* spec. orange tree 767 (A)

*Clathria* spec. brown 715, 717, 719, 753, 763

*Clathria* bspec. right red bush 766 (A)

\**Clathria* (*Astylinifer*) spec. red crust 782, 796 (A)

*Colloclathria ramosa* 759, 766, 776 (A)

\**Rhaphidoplus cervicornis* 764 (A)

Family Iophonidae

\**Acarus bergquistae* 605, 618(S)

*Acarus bicladotylota* 609(S)

*Acarus ternatus* 735 (S)

\**Acarus topsenti* 735, 767, 780, 782

*Cornulella lundbecki* 766 (A)

*Cornulum* spec. 792 (A)

*Damiria* aff. *simplex* 605, 749, 788, 792

*Paracornulum* spec. 717 (S)

*Zyzya massalis* 612, 716, 739 (S)

*Echinoclathria intermedia* 703 (S)

Family Myxillidae

\**Myxilla dendyi* 702 (S)

\**Ectyomyxilla* spec. 785 (A)

*Iotrochota baculifera* 603, 702, 716, 734, 776, 779, 780, 783, 787, 788

*Iotrochota purpurea* 702, 711, 730, 753, 764, 766, 772, 778, 782

*Tedania* cf. *anhelans* 754 (A)

*Tedania* spec. orange yellow creepers 719, 720, 749, 767, 792, 796

*Tedania* spec. (three raphides) 750 (A)

*Tedania* spec. black-brown 717 (S)

\**Tedanione wilsoni* 759, 766, 792 (A)

\**Tedaniopsamma arenosa* 796 (A)

*Coelosphaera ramosa* 750 (A)

*Coelosphaera* spec. orange 745, 750, 755

*Xytopsues* spec. 782 (A)

*Forcepia* cf. *stephensi* 602 (S)

*Forcepia* (*Trachyforcepia*) spec. 721 (S)

*Lissodendoryx schmidtii* 705, 738, 772, 776

\**Lissodendoryx* spec. whitish 794 (A)

*Lissodendoryx* spec. red 749 (S)

Family Hymedesmiidae

\**Phorbas* cf. *clathrodes* 735 (S)

*Hymedesmia* spec. red 715, 783

*Hymedesmia* spec. bright red 767 (A)

*Hymedesmia* (*Stylopus*) spec. yellow 767, 788 (A)

Family Crellidae

\**Crella cyathophora* 604, 605, 708, 717, 737, 749, 767, 780, 788, 792

\**Crella ula* 702 (S)

Family Mycalidae

*Mycale grandis* 609, 713, 714, 715, 749, 796

\**Mycale parasitica* 612 (S)

\**Mycale* cf. *laxissima* 703, 720, 738 (S)

\**Mycale* (*Carmia*) *tenuispiculata* 796 (A)

*Mycale* (*Carmia*) aff. *magnirhaphidifera* 612, 703, 735 (S)

\**Mycale sulevoida* 612 (S)

*Mycale* aff. *digitata* 742 (S)



*Mycale cleistochela* 764 (A)  
\**Mycale (Paresperella)* spec. 774, 796 (A)  
*Mycale* spec. light grey blue 768 (A)  
*Mycale* spec. orange yellow 714, 729, 759, 767, 779, 782, 783, 796  
*Mycale* spec. red-algal symbiosis 796 (A)  
*Mycale* spec. light brown 702 (S)  
*Mycale (Carmia)* spec. purple 715 (S)

Family Desmacellidae

*Biemna ciocalyptoides* 702, 703, 720, 729, 782  
*Biemna tubulata* 605, 606, 731, 749, 796  
*Biemna fortis* 604, 716, 767  
\**Biemna* cf. *microstrongyla* 740 (S)  
*Biemna* spec. orange fistules 740, 788  
*Biemna* spec. purple tubes 749, 779  
*Biemna* spec. 753, 796 (A)  
\**Neofibularia* spec. 795 (A)  
\**Hamacantha* spec. 795 (A)

Family Guitarridae

\**Guitarra indica* 601, 609, 735 (S)

Family Crambeidae

\**Monanchora unguiculata* 723, 756, 759, 768, 783 (C)  
\**Monanchora laevis* 702 (S)  
*Monanchora* spec. 730 (S)  
\**Psammascus lamella* 755, 764 (A)  
*Psammoclema* spec. 715, 719, 729, 731, 734, 735, 778, 792  
\**Batzella* spec. brown black 609, 749, 768, 786  
\**Batzella* spec. orange red 703, 734, 792  
\**Batzella* spec. dark red 606, 609, 703 (S)  
\**Batzella* spec. violet 606 (S)

Order Haplosclerida

Family Phloeodictyidae

*Aka minuta* 601 (S)  
\**Aka mucosa* 754, 778 (A)  
*Aka* spec. yellow 738, 792  
*Aka* spec. white 739 (S)  
*Oceanapia* cf. *isodictyiformis* 745 (S)  
*Oceanapia* spec. black brown 778 (A)  
*Oceanapia* spec. orange 715, 716 (S)  
*Oceanapia* spec. white fistules 702, 712, 714, 751, 764, 772, 780, 783  
*Oceanapia* spec. with sigmata 720 (S)

Family Petrosiidae

*Petrosia* spec. rosy 723 (S)  
*Petrosia* spec. beige 776 (A)  
*Petrosia* spec. yellowish white 772, 792 (A)  
\**Xestospongia viridenigra* 609, 703, 711, 716, 719, 720, 721, 772

\**Xestospongia exigua* 603, 606, 618, 764, 792  
\**Xestospongia carbonaria* 749, 788, 792  
*Xestospongia* spec. rosy white 606, 609, 713, 717, 720, 721, 735, 739, 748, 749, 750, 754, 764, 771, 772, 778, 783, 792, 796  
*Xestospongia* spec. slimy white 715, 745 (S)  
*Xestospongia* spec. brown 723 (S)  
*Xestospongia* spec. with strongyles 735 (S)

Family Callyspongiidae

\**Arenosclera* spec. 705, 715, 734, 735, 745, 752  
\**Callyspongia reticulata* 602, 604, 606, 609, 612, 740, 759, 772, 783, 788, 792  
*Callyspongia* cf. *clathrata* 605, 711, 749 (S)  
*Callyspongia* spec. rosy 601, 779  
*Callyspongia* spec. soft brown 609, 702 (S)  
*Callyspongia* spec. spiny branches 702 (S)  
*Callyspongia* spec. beige 705, 711, 716, 738 (S)  
*Callyspongia* spec. blue purple raised oscules 753, 780, 786, 788, 792 (A)  
*Callyspongia* spec. purple brown 711, 749, 788, 792  
*Callyspongia* spec. red 703 (S)  
*Callyspongia* spec. yellow 780 (A)  
\**Chalinopsilla micropora* 752 (A)

Family Niphatidae

\**Amphimedon* cf. *viridis* 719, 723, 754, 767, 776, 780, 792, 796 (C)  
*Amphimedon* spec. red 618 (S)  
*Amphimedon* spec. rosy slimy 720, 763, 764, 792 (C)  
*Geliodes* spec. white yellow, weak 772 (A)  
*Geliodes* spec. white 774 (A)  
*Geliodes* spec. purple 759, 786 (A)

Family Chalinidae

*Acervochalina confusa* 602, 719, 735, 753, 759, 764, 767, 778, 786, 788, 796  
*Acervochalina* spec. 719, 729, 776 (C)  
\**Dendroxea* spec. 735, 740, 789  
\**Haliclona microsigma* 612 (S)  
*Haliclona bawiana* 720 (S)  
*Haliclona toxius* 711, 767, 788, 798  
*Haliclona* cf. *cinerea* 618, 749, 759, 767, 772  
*Haliclona* spec. light purple 618 (S)  
*Haliclona* spec. rosy 767 (A)  
*Haliclona* spec. dark violet 767 (A)  
*Haliclona* spec. transparent white 603, 606, 717, 735, 772, 794  
*Haliclona* spec. white with sigmata 612, 767, 794  
*Haliclona* spec. red 720, 730 (S)  
*Haliclona* spec. green fistule 731 (S)  
*Haliclona* spec. purple fan 776 (A)  
*Haliclona* spp. 604, 606, 612, 618, 719,

Order Dictyoceratida

Family Spongiidae

- Spongia ceylonensis* 754, 786, 792 (A)  
*Spongia* spec. 609 (S)  
*Carteriospongia foliascens* 717, 725 (S)  
*Phyllospongia* cf. *alcicornis* 760, 767, 779, 787, 788, 792, 796 (A)  
*\*Coscinoderma* spec. 735 (S)  
*Hyattella intestinalis* 619, 702, 750, 792, 796  
*Hyattella* spec. red 711, 792, 796  
*Dactylospongia* spec. 702, 723, 752, 755

Family Irciniidae

- Hyrtilos erectus* 601, 603, 605, 606, 609, 612, 702, 711, 715, 716, 717, 719, 721, 723, 730, 735, 740, 749, 751, 753, 766, 767, 768, 772, 779, 783, 787, 792, 796  
*\*Hyrtilos* spec. black fistules 723, 767, 772, 783, 786, 792, 796 (C)  
*\*Hyrtilos* spec. smooth large conules 736 (S)  
*Hyrtilos* spec. orange rough 796 (A)  
*Hyrtilos* spec. grey 776, 778, 782  
*\*Cacospongia herdmani* 717 (S)  
*\*Smenospongia* spec. 730, 774 (C)  
*Fasciospongia seychellensis* 719, 730, 731, 734, 738, 752, 766, 776  
*Fasciospongia* cf. *cavernosa* 612 (S)  
*Fasciospongia* spec. dark brown 721, 754 (C)  
*Ircinia (Sarcotragus)* spec. red-brown 720, 796 (C)  
*Ircinia* spec. white 612, 786  
*Ircinia* spec. grey white 601 (S)  
*Ircinia* spec. dark hollow 735 (S)  
*Ircinia* spec. rosy grey 721, 730 (S)  
*Ircinia* spec. dark grey branches 735, 749 (S)  
*Ircinia* spec. white branches 723 (S)  
*Ircinia* spec. green 779 (A)  
*Ircinia* spec. beige 767 (A)

Order Dendroceratida

Family Dysideidae

- \*Dysidea herbacea* 717, 723, 725, 754, 767, 768, 779, 780, 787, 792, 796 (C)  
*\*Dysidea arenaria* 796 (A)  
*Dysidea* aff. *janina* 749 (S)  
*Dysidea* spec. grey red 712 (S)  
*Dysidea* spec. grey brown fingers 714, 721, 730, 742 (S)  
*Dysidea* spec. red brown crust 721, 739, 745 (S)  
*Dysidea* spec. grey purple strings 742, 753  
*Dysidea* spec. light blue lobes 754, 778, 792, 796 (A)  
*Dysidea* spec. purple fan 734 (S)  
*Euryspongia lactea* 788 (A)

Family Aplysillidae

- \*Aplysilla* cf. *sulphurea* 763 (A)  
*\*Aplysilla* spec. brown black 605 (S)  
*\*Pleraplysilla* spec. yellow 702, 767  
*\*Chelonaplysilla noevus* 738, 788  
*\*Chelonaplysilla* spec. yellow 702, 715, 753, 767  
*\*Chelonaplysilla* spec. purple 752, 779, 786, 792, 796 (A)  
*\*Darwinella gardineri* 792 (A)  
*Igernella mirabilis* 715, 764  
*\*Dictyodendrilla retiara* 702, 720(S)  
*\*Dendrilla* cf. *mertoni* 720, 730, 764

Order Verongida

Family Aplysinellidae

- Druinella purpurea* 618, 703, 725, 735, 738, 749, 753, 759, 768, 772, 782, 783, 788, 796  
*\*Pseudoceratina durissima* 601, 711 (S)  
*\*Bajalus* spec. 759, 786 (A)