

## Inventory of sponge fauna from the Singapore Strait to Taiwan Strait along the western coastline of the South China Sea

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**Abstract.** An inventory of the sponge fauna from the Singapore Strait to the Taiwan Strait along the western coastline of the South China Sea was compiled from published and grey literature from the following regions: Singapore, peninsular Malaysia, Thailand, Cambodia, Vietnam, southern China and Taiwan. This study provides a partial update to the “Checklist of sponges (Porifera) of the South China Sea region” published 15 years ago. A total of 388 sponge species belonging to 24 orders, 78 families and 158 genera are listed, with the following regional species diversities: Singapore (130); east coast of peninsular Malaysia (25); Gulf of Thailand (90); Vietnam (141); southern China (138); and Taiwan (64). A total of 12 new species and over 200 new records were added to the Porifera inventory of the South China Sea since 2001. Of the 388 species, only 16 species (4%) are widespread. They are: *Aaptos suberitoides*, *Acanthella cavernosa*, *Biemna fortis*, *Cinachyrella australiensis*, *Clathria (Thalysias) reinwardti*, *Coelocarteria singaporesis*, *Echinodictyum asperum*, *Hyrtios erectus*, *Haliclona (Gellius) cymaeformis*, *Iotrochota baculifera*, *I. purpurea*, *Mycale (Zygomycale) parishii*, *Neopetrosia exigua*, *Oceanapia sagittaria*, *Spheciopspongia vagabunda*, *Xestospongia testudinaria*. Only *X. testudinaria*, *M. (Zygomycale) parishii* and *C. australiensis* are present along the entire coastline from Singapore Strait to Taiwan Strait. Distinct sponge faunal assemblages occur between the equator and 25°N along the western coastline of the South China Sea.

**Key words.** Porifera, species inventory, biodiversity, Singapore, peninsular Malaysia, Thailand, Cambodia, Vietnam, southern China, Taiwan, South China Sea

### INTRODUCTION

This paper is a partial but much required update to “Annotated checklist of sponges (Porifera) of the South China Sea region” by Hooper et al. (2000) for sponge fauna from the Singapore Strait to the Taiwan Strait along the western coastline of the South China Sea (see IHO, 1953 for definition), encompassing over 6000 km of coastline from the equator to 25°N in the Indo-West Pacific region. The study regions lying along this body of water are Singapore, peninsular Malaysia, Thailand, Cambodia, Vietnam, southern China and Taiwan. This water body is also referred to by various other names: the Chinese call it “南海” (Nan-hai) or “South Sea”; the Vietnamese call

it “Biển Đông” or “East Sea” while the rest of the countries (Cambodia, Thailand, Malaysia and Singapore) commonly refer to it as “South China Sea”. The South China Sea also encompasses several prominent water bodies, which include the Singapore Strait, Gulf of Thailand, Gulf of Tonkin, Qiongzhou Strait (琼州海峡) and Taiwan Strait.

Biodiversity work on sponges has progressed rapidly worldwide after the work of Hooper et al. (2000), with the advent of the Systema Porifera (Hooper & Van Soest, 2002) and World Porifera Database (Van Soest et al., 2016). However, sponge workers working in the South China Sea have conducted diversity studies mostly independently in their respective countries for the past decade. This timely study is a coordinated regional effort to consolidate knowledge of sponge fauna biodiversity and their distribution, to agree on the identification of sponges, and provide an accurate sponge inventory of the South China Sea region.

The South China Sea is probably one of the richest in terms of marine invertebrate biodiversity (see Ng & Tan, 2000; Hooper et al., 2000; Morton & Blackmore, 2001; Hoeksema, 2007; Huang et al., 2015). Much remains to be done on the identity of sponge fauna in this region. Many regional collections harbour a large number of sponge “Operation Taxonomic Units” (OTUs) and many species remain undetermined, judging from the new records and new species that are surfacing frequently. This study provides an inventory of all sponge species known from Singapore to Taiwan along the western coastline of the South China Sea.

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The following sections provide chronological accounts of sponge fauna studies carried out in Singapore, peninsular Malaysia, Thailand, Cambodia, Vietnam, southern China and Taiwan.

**Singapore.** The Neptune's Cup sponge, *Cliona patera* (Hardwicke, 1820), was the first sponge described from Singapore in the 19th century. This was followed by *Leucosolenia flexilis* (Haeckel, 1872), *Coelocarteria singaporensis* (Carter, 1883), and *Callyspongia (Cladochalina) diffusa* Ridley (1884). Subsequently, Dragnewitsch (1906) recorded 24 sponge species from Tanjong Pagar and Pulau Brani in the Singapore Strait. Recent additions to the species list include observations from general biodiversity surveys carried out by the Department of Zoology, University of Singapore (Chuang, 1961, 1973, 1977; Chou & Wong, 1985). During this period, a Dutch student, H. Moll, collected over 100 sponge specimens consisting of about 50 species in 1977–1978 (Van Soest pers. comm.) and they were deposited at Naturalis Biodiversity Center (formerly the Rijksmuseum van Natuurlijke Historie and the Zoölogisch Museum of the University of Amsterdam). Hooper et al. (2000) reported some 80 species with 13 new records. De Voogd & Cleary (2009) also recorded some 80 species with 26 new records. In the same year, Lim et al. (2009) recorded 62 species of fouling sponges on navigational buoys with 10 new records. Notably, a number of new species were reported recently: *Tethycometes radicosa* Lim & Tan, 2008 was dredged from a muddy seabed in the Singapore Strait; *Suberites diversicolor* Becking & Lim, 2009 was described from estuarine waters; *Forcepia (Forcepia) vansoesti* Lim et al. (2012a) collected from fringing reefs in the Singapore Strait; Van Soest & De Voogd (2015) described *Clathrina sororcula* and *Anamixilla singaporesis* from the Sisters' Islands Marine Park, Singapore's first Marine Park that was established in 2014. The famed Neptune's Cup sponge in Singapore waters was rediscovered recently after over 100 years (Lim et al., 2012b). Recently *Geodia distincta* and *G. picteti* were recorded from the Johor Straits (Lim, 2015), while Van Soest & De Voogd (2015) recorded *Uteopsis argentea* in the Singapore Strait. The latest addition, *Theonella laena* Lim & Tan, 2016 associated with a siliquariid mollusc was described from specimens obtained off Raffles Lighthouse from 40 m depth during the Comprehensive Marine Biodiversity Survey expedition to the Singapore Strait (Lim & Tan, this volume).

**Peninsular Malaysia.** The first sponge fauna report from the east coast of peninsular Malaysia was by Sollas (1902) who described five new species and recorded two species from Trengganu. Since then only Qaralleh et al. (2011) reported *Xestospongia testudinaria* and *Neopetrosia exigua* from Pahang and Hoeksema et al. (2014) reported the presence of *Terpios hoshinota* from Pulau Tioman Marine Parks. Similarly, there is only a handful of sponge fauna studies conducted in the west coast of peninsular Malaysia in the Malacca Strait. Gray (1858) described *Aphrocallistes beatrix* from Malacca and Bowerbank (1875) described a total of 14 new species from Malacca. The small number of species recorded from peninsular Malaysia is definitely not a reflection of the true sponge diversity in this rich marine

biodiversity area (see Harborne et al., 2000; Mazlan et al., 2005; Hoeksema, 2007; Huang et al., 2015).

**Thailand.** Topsent (1925) described the first sponge species, *Amorphinopsis siamensis* from the Gulf of Thailand. Many years later, McCauley et al. (1993) reported four species of sponges in Surat Thani province. In the same year, Hooper et al. (1993) redescribed *Oceanapia sagittaria* from the Gulf of Thailand. Since Hooper et al. (2000) listed eight species from the Gulf of Thailand, a number of studies have greatly increased the number of sponge records. Kritsanapuntu et al. (2001) reported 126 sponge species from coral reef in the eastern Gulf of Thailand with 20 new records. Putchakarn and co-workers subsequently added a new species (*Cladocroce burapha* Putchakarn et al., 2004b) and some 59 new records from the Gulf of Thailand (Putchakarn et al., 2004a, 2006, 2008; Putchakarn, 2006, 2007, 2011a, b; 2013; Putchakarn & Monkongsomboon, 2007; Putchakarn & Hongpatarakiri, 2012, 2013; Putchakarn, 2013). Hongpadharakiree et al. (2008) and Pumbua et al. (2009) contributed five new records during this period.

**Cambodia.** The coastline of Cambodia stretches some 300 km in the eastern Gulf of Thailand, lying between 11°33'N, 102°54'E and 10°22'N, 104°25'E. It is one of the least studied areas in this region. Dawydoff (1952) was the first author to record sponges from Cambodia, which were identified by Topsent. Three species are attributable to this area: *Cliothosa hancocki*, *Lissodendoryx (Waldoschmittia) schmidti* and *Hyrtios erectus*. Dawydoff's study included samples from Ca Mau to Phu Quoc islands, Nam Du island (now Vietnam), and Ream to Kohkong (now Cambodia). Most species in Dawydoff (1952) should be attributed to Vietnam as Phu Quoc (Vietnam) is just beside Ream (Cambodia). We feel that it is better to assign only the three species with Ream as locality (in the Gulf of Thailand) to Cambodia instead of all the species (some from as far north at Ha Long Bay) to Cambodia. No work on Cambodia sponge fauna has been done since Dawydoff (1952).

**Vietnam.** Lindgren (1898) recorded 20 species from Nha Trang bay (southern Vietnam) including the description of three new species. Subsequently Dawydoff (1952) listed 119 putative species (102 of which were identified to species level) in a paper on the Indo-Chinese marine benthic fauna, and some 60 new records were added (identifications by Topsent). Lévi (1961) recorded 28 species from Nha Trang that included four new species and 21 new records, and a further six sponge species were recorded from the intertidal rocky shores of Nha Trang Bay by Tran & Tran (1965). Gurjanova & Tran (1972) reported *Placospongia melobesioides* and *Tethya japonica* from the Tonkin Gulf, whilst Nguyen et al. (1977) produced an inventory of Vietnam sponge fauna with a total of 160 species including eight new records. Three decades later, identified samples collected in 2003 and 2004 deposited at the Museum of the Institute of Oceanography in Nha Trang. Eighty-nine species belonging to 63 genera, 36 families and 11 orders of sponge from the Nha Trang Bay were reported of which 18 were new records. A checklist of sponges recorded from

the South China Sea by Hooper et al. (2000) reported 176 morphospecies of demosponges with 129 species identified to species level from the coast of Vietnam. Calcinai et al. (2006) reported nine boring species from Halong Bay and added seven new records. Azzini et al. (2007) reported 63 species from Halong Bay as well and added 16 new records during a recent survey. The most recent review of Vietnam sponge fauna by Thai (2013) who reported a total of 299 species. He is currently working on a large collection from southern Vietnam with some 1500 specimens deposited at the National Oceanographic Museum, Institute of Oceanography in Nha Trang. Another team at the Research Institute for Marine Fisheries (RIMF, Haiphong) led by Nguyen Khac Bat has a substantial collection from Co To and Ba Mun at the north, Con Co, Hai Van Son Cha, Hon Cau, Phu Quy at the central and Phu Quoc at the south are being identified (Nguyen Khac Bat, pers. comm.).

**Southern China.** Gray (1858b) described the first sponge recorded from southern China, *Aphroceras alcicornis*, which was collected in Hong Kong. Subsequently, the “Challenger” expedition provided two more sponge species, *Stelletta purpurea* and *Haliclona scyphonoides* from Hong Kong, both of which were described by Ridley (1884). Lindgren (1897) described *Caminus chinensis* and Brøndsted (1929) described three new species and recorded one more species off southern China. Many years later, Lévi (1964) described *Cladorhiza microchela* from the “China Sea” (mer de Chine) at 4330 m depth. Pulitzer-Finali (1982) recorded 10 species from Hong Kong, of which six were new species and Van Soest (1982) together recorded another nine species from Hong Kong. Li (1986) made a large collection from southern China and reported 27 fouling sponge species including five new species and five new records. Over 1000 sponge specimens were accumulated under his care at the Institute of Oceanology Chinese Academy of Sciences and he has since recorded 190 sponge species from China waters (Li, 2008) of which some 80 species were from the South China Sea. The sponge diversity in the South China Sea is considered the highest among the four major seas, i.e., China South Sea, China Bo Hai Sea, China Yellow Sea, and China East Sea (Zhang et al., 2003; Liu, 2013).

**Taiwan.** *Theonella swinhonis* was the first sponge described from Taiwan (Gray, 1868), followed by *Stelletta purpurea*, which was described by Lindgren (1897). Nearly a century later, several new species were collected: Bavestrello et al. (1995) described *Cliona desmoni* and *Spiroxys acus*, Calcinai et al. (2001) described *Spiroxys macroxesta* and *Holoxea excavans*, and Tabachnick & Janussen (2004) described *Fieldingia valentini tizardi*. The majority of the recent sponge studies focused on bioactive compounds in sponges for medical and pharmaceutical applications (Hung, 1999; Lo, 1999; Huang, 2002; Liao, 2003; Jhou, 2004; Su et al., 2011). However, many of these sponges were often not suitably identified in these studies. There are also a number of publications on sponge ecology and reproduction e.g., *Spongia ceylonensis* (Chung et al., 2010) and *Cinachyrella australiensis* (Chen, 1988; Huang, 1995; Chen et al., 1997; Lu, 2003). Other studies focused on the

symbiotic microbial community in association with sponges (Yang, 2006), e.g., *Terpios hoshinota*, causing the “black disease” of reef-building corals at Green Island, Taiwan (Liao, 2007; Liao et al., 2007). In 2007, a preliminary survey on sponge fauna in southern Taiwan (Green Island and Kenting) carried out by De Voogd and Soong recorded 65 species (Shao et al., 2008). Li (2013) reported 28 species from the Penghu (Pescadores) archipelago of which 11 are new records. Hitherto, a total of 55 species belonging to 2 classes, 12 orders, and 24 families are reported from the Penghu archipelago and it is estimated that the total sponge diversity exceeds 100 species when cryptic and encrusting species are taken into account (Huang et al., 2016). Chou Yalan is currently working on the sponge fauna of Dongsha, Green Island and Orchid Island.

## MATERIAL AND METHODS

All sponge species records were obtained from available literature (both published and grey) to the best of our knowledge. The sponge fauna of six coastal regions encompassing an area between latitudes 1–25°N and longitudes 103–122°E along the western coastline of the South China Sea, namely Singapore, peninsular Malaysia, Thailand, Vietnam (including three species from Cambodia: *Cliothosa hancocki*, *Lissodendoryx (Waldoschmittia) schmidti* and *Hyrtios erectus*), southern China (from Hainan to Fujian, including Hong Kong and Macau) and Taiwan, are provided in the inventory along with distribution data of each species (Table 1). Species distributions (presence/absence) were also compiled from existing literature. The sponge species in the list are all recorded within the “territorial waters”, i.e., 12 nautical miles from the coast of the country as defined by the 1982 United Nations Convention on the Law of the Sea (UN General Assembly, 2016) unless indicated otherwise. The six study regions fall partially or fully inside the nine provinces of the Marine Ecoregions of the World (Spalding et al., 2007) namely: 1) East China Sea (no. 52, off Fujian province); 2) Gulf of Tonkin (no. 112, off East Vietnam); 3) Southern China (no. 113, off Fujian province); 4) South China Sea Oceanic Islands (no. 114, off China and Vietnam); 5) Gulf of Thailand (no. 115, Thailand); 6) Southern Vietnam (no. 116, off Southeast Vietnam); 7) Sunda Shelf/Java Sea (no. 117, off Southern Vietnam and East of Malaysia peninsula); 8) Malacca Strait (no. 118, tip of Malay peninsula and Singapore); and 9) South Kuroshio (no. 121, off East Taiwan). Only records with full Linnaean species names that were reliably identified are included. Only the first reference for each species is listed in the inventory for simplicity (see Introduction section for references to each region). The validity of all species entries were checked against the ‘World Porifera Database’ maintained by Van Soest et al. (2016). Synonyms and species typically distributed in the Atlantic, Mediterranean, Caribbean and etc., other than the Indo-Pacific, were excluded from the list.

Bray-Curtis similarity cluster analysis and Multidimensional scaling (MDS) analysis based on Jaccard similarity matrices were carried out from the species composition presence/absence data among study regions. Data from Singapore and

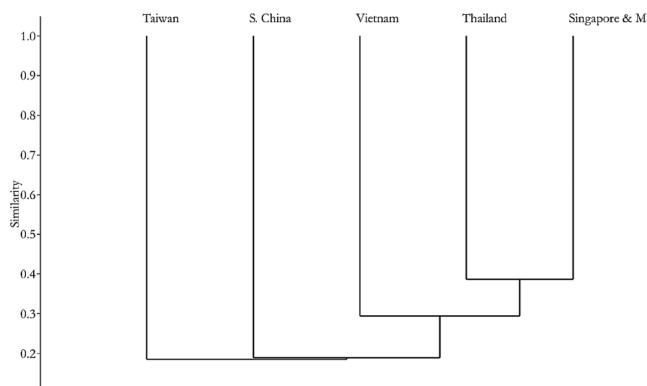


Fig. 1. Dendrogram based on Bray-Curtis similarity cluster analysis of sponge fauna in Singapore (combined with peninsular Malaysia), Thailand, Vietnam, southern China and Taiwan.

peninsular Malaysia were combined, data from peninsular Malaysia is too small and far from being complete. PAST (Paleontological Statistics software package for education, Version 3.11) by Hammer Ø et al. (2001) was used for the above statistical analyses.

The phylum Porifera is currently classified into four classes and seven subclasses. All the names in this study follow the “Systema Porifera” by Hooper & Van Soest (2002) and the major revisions in Demospongiae proposed by Morrow & Cárdenas (2015) as presented below.

Phylum Porifera Grant, 1836  
Class Homoscleromorpha Bergquist, 1978  
Class Demospongiae Sollas, 1885

Subclass Verongimorpha Erpenbeck et al. 2012  
Subclass Keratosa Grant, 1861  
Subclass Heteroscleromorpha Cárdenas, Perez & Boury-Esnault, 2012

Class Calcarea Bowerbank, 1862  
Subclass Calcaronea Bidder, 1898  
Subclass Calcinea Bidder, 1898  
Class Hexactinellida Schmidt, 1870  
Subclass Amphidiscophora Schulze, 1886  
Subclass Hexasterophora Schulze, 1886

## RESULTS AND DISCUSSION

**Species diversity.** A total of 388 sponge species (i.e., with full Linnaean classification), belonging to 24 orders, 78 families and 158 genera are listed in this work. The number of species recorded for each region is as follows: Singapore (130); east coast of Peninsular Malaysia (25); Thailand (90); Cambodia (3); Vietnam (141); southern China (138); and Taiwan (64). The sponge inventory has been expanded significantly since the work of Hooper et al (2000) (except for Malaysia and Cambodia), with an addition of 12 new species and over 200 new records. These include Singapore with 80 new records and six new species; Thailand with some 80 new records and one new species; Vietnam with some 40 new records; southern China with some 50 new records and six

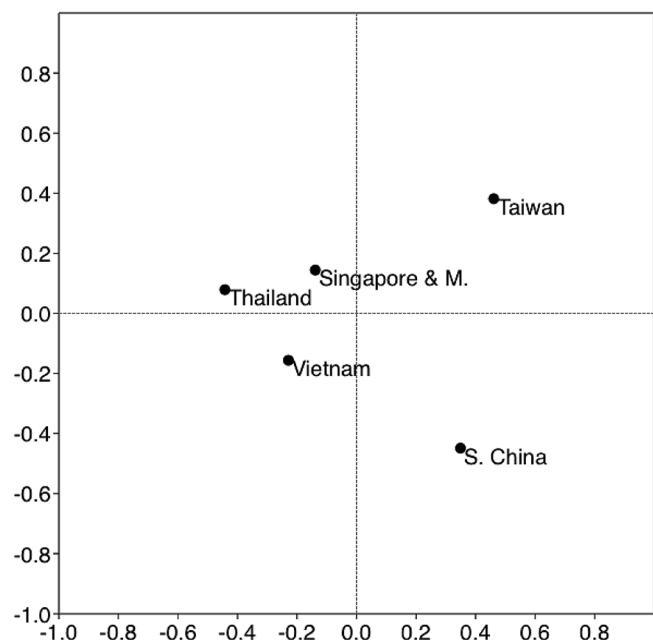


Fig. 2. MDS (multi-dimensional scaling) ordination based on the Jaccard similarity matrix of sponge species occurring in Singapore (combined with peninsular Malaysia), Thailand, Vietnam, southern China and Taiwan.

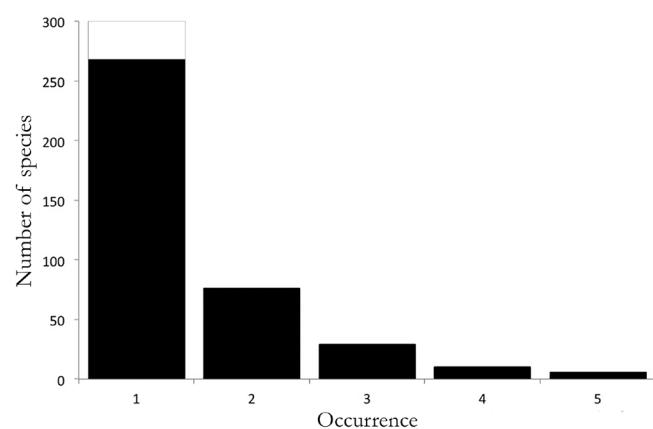


Fig. 3. Frequency of co-occurrence of sponge species in five regions along the western coastline fringing the South China Sea. A total of 267 (out of 388) species were documented from only one region. Only 16 sponge species were found to be widespread, co-occurring in either four or five localities. The regions consisted of Singapore (combined with peninsular Malaysia), Thailand, Vietnam, southern China and Taiwan.

new species; and Taiwan with 60 new records. However, the current number of 388 species is still an underestimate of the true diversity of the study area, and this applies similarly for each region, especially peninsular Malaysia and Cambodia. The number is also far lower than the figure of approximately 1500 species presented in Hooper et al. (2000). The main reason is because the islands of Indonesia, and the Philippines, the northern coast of Borneo, the Malacca Strait and Andaman Sea were not considered in this study. In addition, a large number of OTUs and extrinsic species names were excluded. These extrinsic names included synonyms and species with obvious disjunct distributions in the Atlantic Ocean, Caribbean Sea, etc. Such species names appeared in a number of publications on sponges in the South China Sea

Table 1. Inventory of sponge species from Singapore, peninsular Malaysia, Thailand, Vietnam (including Cambodia), southern China to Taiwan, as represented by S, M, Th; V; C and Ta respectively, along the western coastline of the South China Sea.

S/N	Species	Reference
<b>Phylum Porifera</b>		
<b>Class Homosclerophorida</b>		
<b>Homosclerophorida; Plakinidae; <i>Plakortis</i></b>		
1	<i>Plakortis lita</i> De Laubenfels, 1954	Ta, Shao et al. (2008)
<b>Class Demospongiae</b>		
<b>Subclass Verongimorpha</b>		
<b>Chondrosiida; Chondrosiidae; <i>Chondrosia</i></b>		
2	<i>Chondrosia chucalla</i> De Laubenfels, 1954	Ta, Shao et al. (2008)
3	<i>Chondrosia corticata</i> Thiele, 1900	S, Lim et al. (2012a); Ta, Huang et al. (2016)
4	<i>Chondrosia reticulata</i> (Carter, 1886)	Th, Kritsanapuntu et al. (2001)
<b>Chondrillida; Chondrillidae; <i>Chondrilla</i></b>		
5	<i>Chondrilla australiensis</i> Carter, 1873	S, De Voogd & Cleary (2009); Th, Kritsanapuntu et al. (2001); V, Lindgren (1897)
6	<i>Chondrilla mixta</i> Schulze, 1877	S, Lim et al. (2012a)
<b>Chondrillida; Halisarcidae; <i>Halisarca</i></b>		
7	<i>Halisarca ectofibrosa</i> Vacelet, Vasseur & Lévi, 1976	Th, Putchakarn et al. (2004a)
<b>Verongida; Aplysinellidae; <i>Aplysinella</i></b>		
8	<i>Aplysinella strongylata</i> Bergquist, 1980	V, Chervyakova (2007)
<b>Verongida; Aplysinellidae; <i>Suberea</i></b>		
9	<i>Suberea aff. clavata</i> (Pulitzer-Finali, 1982)	Ta, Shao et al. (2008)
10	<i>Suberea aff. praetensa</i> (Row, 1911)	Th, Putchakarn et al. (2008)
<b>Verongida; Ianthellidae; <i>Hexadella</i></b>		
11	<i>Hexadella indica</i> Dendy, 1905	S, Lim et al. (2012a)
<b>Verongida; Ianthellidae; <i>Ianthella</i></b>		
12	<i>Ianthella flabelliformis</i> (Pallas, 1766)	V, Nguyen et al. (1977)
<b>Verongida; Pseudoceratinidae; <i>Pseudoceratina</i></b>		
13	<i>Pseudoceratina purpurea</i> (Carter, 1880)	S, De Voogd & Cleary (2009); Th, Putchakarn et al. (2004a); C, Van Soest (1982)
14	<i>Pseudoceratina verrucosa</i> Bergquist, 1995	V, Chervyakova (2007)
<b>Subclass Keratosa</b>		
<b>Dendroceratida; Darwinellidae; <i>Chelonaplysilla</i></b>		
15	<i>Chelonaplysilla erecta</i> (Row, 1911)	S, Lim et al. (2009); Th, Putchakarn et al. (2004a)
<b>Dendroceratida; Darwinellidae; <i>Dendrilla</i></b>		
16	<i>Dendrilla membranosa</i> (Pallas, 1766)	V, Dawydoff (1952)
17	<i>Dendrilla rosea</i> Lendenfeld, 1883	C, Li (2008)
<b>Dendroceratida; Dictyodendrillidae; <i>Igernella</i></b>		
18	<i>Igernella mirabilis</i> Lévi, 1961	C, Xu et al. (2010)
<b>Dendroceratida; Dictyodendrillidae; <i>Spongionella</i></b>		
19	<i>Spongionella monoprocta</i> Lévi, 1961	V, Lévi (1961)
<b>Dictyoceratida; Dysideidae; <i>Citronia</i></b>		
20	<i>Citronia aff. vasiformis</i> (Bergquist, 1995)	Ta, Shao et al. (2008)
<b>Dictyoceratida; Dysideidae; <i>Dysidea</i></b>		
21	<i>Dysidea arenaria</i> Bergquist, 1965	Th, Putchakarn et al. (2004a); C, Qiu & Wang (2008)
22	<i>Dysidea cinerea</i> Keller, 1889	V, Azzini et al. (2007); C, Van Soest (1982)
23	<i>Dysidea digitata</i> (Sollas, 1902)	M, Sollas (1902)
24	<i>Dysidea frondosa</i> Bergquist, 1995	S, De Voogd & Cleary (2009); Ta, Shao et al. (2008)
25	<i>Dysidea granulosa</i> Bergquist, 1965	Ta, Shao et al. (2008)

S/N	Species	Reference
26	<i>Dysidea marshalli</i> (Lendenfeld, 1889)	C, Huang et al. (2008)
27	<i>Dysidea septosa</i> (Lamarck, 1814)	C, Huang et al. (2008)
28	<i>Dysidea villosa</i> (Lendenfeld, 1886)	C, Li et al. (2009)
29	<b>Dictyoceratida; Dysideidae; Euryspongia</b> <i>Euryspongia delicatula</i> Berquist, 1995	Ta, Huang et al. (2016)
30	<b>Dictyoceratida; Dysideidae; Lamellocyrtidae</b> <i>Lamellocyrtidae herbacea</i> (Keller, 1889)	S, De Voogd & Cleary (2009); Th, Putchakarn et al. (2004a); V, Dawydoff (1952)
31	<b>Dictyoceratida; Irciniidae; Ircinia</b> <i>Ircinia aruensi</i> (Hentschel, 1912)	C, Xu et al. (2008)
32	<i>Ircinia clavosa</i> (Ridley, 1884)	V, Dawydoff (1952)
33	<i>Ircinia echinata</i> (Keller, 1889)	V, Azzini et al. (2007)
34	<i>Ircinia fusca</i> (Carter, 1880)	C, Li (2008)
35	<i>Ircinia irregularis</i> (Poléjaeff, 1884)	S, De Voogd & Cleary (2009)
36	<i>Ircinia mutans</i> (Wilson, 1925)	Th, Putchakarn et al. (2004a); C, Pang et al. (2009)
37	<i>Ircinia pinna</i> Hentschel, 1912	C, Van Soest (1982)
38	<i>Ircinia ramosa</i> (Keller, 1889)	S, Chuang (1961) Ta, Huang et al. (2016)
39	<i>Ircinia selaginea</i> (Lamarck, 1814)	C, Li (2008)
40	<b>Dictyoceratida; Irciniidae; Sarcotragus</b> <i>Sarcotragus australis</i> Lendenfeld, 1888	V, Chervyakova (2007)
41	<b>Dictyoceratida; Spongillidae; Coscinoderma</b> <i>Coscinoderma matthewsi</i> (Lendenfeld, 1886)	S, De Voogd & Cleary (2009)
42	<b>Dictyoceratida; Spongillidae; Hippoponaria</b> <i>Hippoponaria ammata</i> De Laubenfels, 1954	V, Chervyakova (2007)
43	<i>Hippoponaria communis</i> (Lamarck, 1814)	V, Nguyen et al. (1977)
44	<i>Hippoponaria mollissima</i> Lendenfeld, 1889	S, Dragnewitsch (1905)
45	<b>Dictyoceratida; Spongillidae; Hyattella</b> <i>Hyattella intestinalis</i> (Lamarck, 1814)	S, Chuang (1961); Th, Putchakarn (2007); V, Azzini et al. (2007)
46	<i>Hyattella tubaria</i> (Lamarck, 1814)	S, De Voogd & Cleary (2009)
47	<b>Dictyoceratida; Spongillidae; Spongia</b> <i>Spongia (Spongia) ceylonensis</i> Dendy, 1905	S, De Voogd & Cleary (2009); C, Van Soest (1982); Ta, Chung et al. (2010)
48	<i>Spongia (Spongia) hispida</i> Lamarck, 1814	C, Li (2008)
49	<i>Spongia (Spongia) irregularis</i> (Lendenfeld, 1889)	V, Dawydoff (1952); C, Li (2008)
50	<i>Spongia (Spongia) suriganensis</i> (Wilson, 1925)	C, Xu & Yang (2006)
51	<i>Spongia reticulata</i> (Lendenfeld, 1886)	C, Li (2008)
52	<b>Dictyoceratida; Thorectidae; Carteriospongia</b> <i>Carteriospongia foliascens</i> (Pallas, 1766)	V, Dawydoff (1952); C, Li (2008)
53	<b>Dictyoceratida; Thorectidae; Dactylospongia</b> <i>Dactylospongia elegans</i> (Thiele, 1899)	S, Hooper et al. (2000); C, Lopez et al. (1994); Ta, Shao et al. (2008)
54	<i>Dactylospongia metachromia</i> (De Laubenfels, 1954)	C, Shen et al. (2001); Ta, Shao et al. (2008)
55	<b>Dictyoceratida; Thorectidae; Fasciospongia</b> <i>Fasciospongia costifera</i> (Lamarck, 1814)	V, Nguyen et al. (1977)
56	<i>Fasciospongia rimosa</i> (Lamarck, 1814)	C, Sun et al. (2003)
57	<i>Fasciospongia turgida</i> (Lamarck, 1814)	V, Lévi (1961)
58	<b>Dictyoceratida; Thorectidae; Hyrtios</b> <i>Hyrtios erectus</i> (Keller, 1889)	S, Lim et al. (2012a); Th, Dawydoff (1952); V, Dawydoff (1952); C, Qiu et al. (2004); Ta, Shao et al. (2008)
59	<b>Dictyoceratida; Thorectidae; Lendenfeldia</b> <i>Lendenfeldia chondrodes</i> (De Laubenfels, 1954)	S, Lim et al. (2009)
60	<i>Lendenfeldia frondosa</i> (Lendenfeld, 1889)	C, Li (2008)

S/N	Species	Reference
	<b>Dictyoceratida; Thorectidae; <i>Luffariella</i></b>	
61	<i>Luffariella variabilis</i> (Poléjaeff, 1884)	S, De Voogd & Cleary (2009)
	<b>Dictyoceratida; Thorectidae; <i>Phyllospongia</i></b>	
62	<i>Phyllospongia papyracea</i> (Esper, 1794)	C, Li (2008)
	<b>Dictyoceratida; Thorectidae; <i>Strepsichordaiida</i></b>	
63	<i>Strepsichordaiida lendenfeldi</i> Bergquist, Ayling & Wilkinson, 1988	C, Li (2008)
	<b>Subclass Heteroscleromorpha</b>	
	<b>Haplosclerida:Callyspongiidae; <i>Callyspongia</i></b>	
64	<i>Callyspongia (Callyspongia) bullata</i> (Lamarck, 1814)	C, Li (2008)
65	<i>Callyspongia (Callyspongia) monilata</i> (Ridley, 1884)	V, Lévi (1961)
66	<i>Callyspongia (Callyspongia) ramosa</i> (Gray, 1843)	S, Dragnewitsch (1905); V, Nguyen et al. (1977)
67	<i>Callyspongia (Callyspongia) serpentina</i> (Lamarck, 1814)	S, Dragnewitsch (1905)
68	<i>Callyspongia (Cladochalina) diffusa</i> (Ridley, 1884)	S, Ridley (1884); Th, Putchakarn (2006); C, Li (1986)
69	<i>Callyspongia (Cladochalina) fibrosa</i> (Ridley & Dendy, 1886)	S, Dragnewitsch (1905); V, Lindgren (1897); C, Liao et al. (2005)
70	<i>Callyspongia (Cladochalina) orieminens</i> Pulitzer-Finali, 1982	C, Pulitzer-Finali (1982)
71	<i>Callyspongia (Cladochalina) samarensis</i> (Wilson, 1925)	S, Lim et al. (2012a)
72	<i>Callyspongia (Cladochalina) spinosissima</i> (Dendy, 1887)	S, De Voogd & Cleary (2009)
73	<i>Callyspongia (Cladochalina) subarmigera</i> (Ridley, 1884)	Th, Putchakarn et al. (2004a); V, Lindgren (1897); C, Li (2008)
74	<i>Callyspongia (Euplacella) cf. communis</i> (Carter, 1881)	S, Lim et al. (2009); Ta, Huang et al. (2016)
75	<i>Callyspongia (Euplacella) pulvinata</i> (Lindgren, 1897)	C, Van Soest (1982)
76	<i>Callyspongia (Toxochalina) aff. fenestrata</i> (Desqueyroux-Faúndez, 1984)	Ta, Shao et al. (2008)
77	<i>Callyspongia (Toxochalina) dendyi</i> (Burton, 1931)	S, Chuang (1973)
78	<i>Callyspongia (Toxochalina) folioides</i> (Bowerbank, 1875)	S, Lim et al. (2009); M, Bowerbank (1875)
79	<i>Callyspongia (Toxochalina) pseudofibrosa</i> (Desqueyroux-Faúndez, 1984)	Th, Putchakarn (2007)
80	<i>Callyspongia (Toxochalina) robusta</i> (Ridley, 1884)	V, Tran (1967)
81	<i>Callyspongia aurantiaca</i> (Lendenfeld, 1887)	S, Dragnewitsch (1905)
82	<i>Callyspongia clathrata</i> (Dendy, 1905)	V, Nguyen et al. (1977)
83	<i>Callyspongia confoederata</i> (sensu Ridley, 1884)	V, Lévi (1961); Ta, Shao et al. (2008)
84	<i>Callyspongia euplax</i> (Lendenfeld, 1887)	S, Dragnewitsch (1905)
85	<i>Callyspongia globosa</i> Pulitzer-Finali, 1982	S, Lim et al. (2009); C, Pulitzer-Finali (1982)
86	<i>Callyspongia joubini</i> (Topsent, 1897)	S, De Voogd & Cleary (2009); Th, Kritsanapuntu et al. (2001)
87	<i>Callyspongia megalorrhaphis</i> (Ridley & Dendy, 1886)	V, Lindgren (1897)
88	<i>Callyspongia ridleyi</i> Burton, 1934	C, Li (2008)
89	<i>Callyspongia spinulosa</i> (Lendenfeld, 1887)	S, Dragnewitsch (1905)
90	<i>Callyspongia truncata</i> (Lindgren, 1897)	V, Lindgren (1897)
91	<i>Callyspongia tubulifera</i> (Lindgren, 1897)	V, Lindgren (1897)
	<b>Haplosclerida; Callyspongiidae; <i>Dactylia</i></b>	
92	<i>Dactylia syphonoides</i> (Lamarck, 1814)	C, Li (2008)
	<b>Haplosclerida; Chalinidae; <i>Chalinula</i></b>	
93	<i>Chalinula amoyensis</i> (Brøndsted, 1929)	C, Brøndsted (1929); Ta, Brøndsted (1929)
94	<i>Chalinula camerata</i> (Ridley, 1884)	V, Dawyoff (1952)
95	<i>Chalinula crassiloba</i> (Lamarck, 1814)	C, Li (1986)
96	<i>Chalinula nematifera</i> (De Laubenfels, 1954)	V, Chervyakova (2007)
	<b>Haplosclerida; Chalinidae; <i>Cladocroce</i></b>	
97	<i>Cladocroce burapha</i> Putchakarn et al., 2004	Th, Putchakarn et al. (2004b)
	<b>Haplosclerida; Chalinidae; <i>Haliclona</i></b>	
98	<i>Haliclona (Gellius) amboinensis</i> (Lévi, 1961)	S, Lim et al. (2012a); Th, Kritsanapuntu et al. (2001); V, Lévi (1961)
99	<i>Haliclona (Gellius) cymaeformis</i> (Esper, 1794)	S, Lim et al. (2012a); Th, Putchakarn et al. (2004a); V, Tran (1967); C, Van Soest (1982); Ta, Huang et al. (2016)
100	<i>Haliclona (Gellius) microcea</i> (Li, 1986)	C, Li (1986)

S/N	Species	Reference
101	<i>Haliclona (Gellius) ridleyi</i> (Hentschel, 1912)	V, Lévi (1961)
102	<i>Haliclona (Gellius) toxia</i> (Topsent, 1897)	V, Dawyoff (1952); C, Pulitzer-Finali (1982)
103	<i>Haliclona (Gellius) varia</i> (Bowerbank, 1875)	M, Bowerbank (1875); V, Nguyen et al. (2007); C, Li (1986)
104	<i>Haliclona (Halichoclona) caminata</i> (Bergquist & Warne, 1980)	C, Li (2008)
105	<i>Haliclona (Halichoclona) centrangulata</i> (Sollas, 1902)	M, Sollas (1902)
106	<i>Haliclona (Haliclona) cribriformis</i> (Ridley, 1884)	V, Dawyoff (1952)
107	<i>Haliclona (Reniera) clathrata</i> (Dendy, 1895)	V, Dawyoff (1952)
108	<i>Haliclona (Reniera) infundibularis</i> Ridley & Dendy, 1887	Th, Putchakarn (2006)
109	<i>Haliclona (Reniera) ligniformis</i> (Dendy, 1922)	C, Li (2008)
110	<i>Haliclona (Reniera) toxius</i> (Topsent, 1897)	Th, Putchakarn et al. (2004a)
111	<i>Haliclona (Reniera) violacea</i> (De Laubenfels, 1950)	Th, Kritsanapuntu et al. (2001)
112	<i>Haliclona (Rhizoniera) australis</i> (Lendenfeld, 1888)	S, Dragnewitsch (1905)
113	<i>Haliclona baeri</i> (Wilson, 1925)	S, Lim et al. (2012a); Th, Putchakarn (2006); C, Li (2008)
114	<i>Haliclona decidua</i> (Topsent, 1906)	V, Dawyoff (1952)
115	<i>Haliclona koremella</i> De Laubenfels, 1954	S, Chuang (1973); Th, Kritsanapuntu et al. (2001)
116	<i>Haliclona madreporea</i> (Dendy, 1889)	V, Dawyoff (1952)
117	<i>Haliclona pigmentifera</i> (Dendy, 1905)	C, Li (2008)
118	<i>Haliclona scyphonoides</i> (Ridley, 1884)	V, Dawyoff (1952); C, Lindgren (1897)
119	<i>Haliclona turquoisia</i> (De Laubenfels, 1954)	V, Chervyakova (2007)
	<b>Haplosclerida; Niphatidae; Amphimedon</b>	
120	<i>Amphimedon chinensis</i> (Pulitzer-Finali, 1982)	C, Pulitzer-Finali (1982)
121	<i>Amphimedon lexa</i> (Pulitzer-Finali, 1982)	C, Pulitzer-Finali (1982)
	<b>Haplosclerida; Niphatidae; Cribrochalina</b>	
122	<i>Cribrochalina punctata</i> (Ridley & Dendy, 1886)	C, Li (2008)
	<b>Haplosclerida; Niphatidae; Dasychalina</b>	
123	<i>Dasychalina fragilis</i> Ridley & Dendy, 1886	Th, Putchakarn (2006); V, Chervyakova (2007); Ta, Huang et al. (2016)
124	<i>Dasychalina melior</i> Ridley & Dendy, 1886	V, Dawyoff (1952); C, Li (2008)
	<b>Haplosclerida; Niphatidae; Gelliodes</b>	
125	<i>Gelliodes callista</i> De Laubenfels, 1954	V, Lévi (1961)
126	<i>Gelliodes carnosa</i> Dendy, 1889	C, Li (2008)
127	<i>Gelliodes fibulat</i> (Carter, 1881)	S, Hooper et al. (2000); V, Dawyoff (1952); Ta, Shao et al. (2008)
128	<i>Gelliodes gracilis</i> Hentschel, 1912	C, Li (2008)
129	<i>Gelliodes incrustans</i> Dendy, 1905	C, Li (2008)
130	<i>Gelliodes petrosioides</i> Dendy, 1905	Th, Putchakarn (2006)
131	<i>Gelliodes pumila</i> (Lendenfeld, 1887)	C, Van Soest (1982)
132	<i>Gelliodes spinosella</i> Thiele, 1899	S, Dragnewitsch (1905); C, Deng et al. (1998)
	<b>Haplosclerida; Niphatidae; Hemigellius</b>	
133	<i>Hemigellius renieroides</i> (Lendenfeld, 1887)	C, Li (1986)
	<b>Haplosclerida; Niphatidae; Niphates</b>	
134	<i>Niphates aga</i> (De Laubenfels, 1954)	C, Li (2008)
135	<i>Niphates olemda</i> (De Laubenfels, 1954)	V, Chervyakova (2007)
	<b>Haplosclerida; Petrosiidae; Acanthostrongylophora</b>	
136	<i>Acanthostrongylophora ingens</i> (Thiele, 1899)	S, De Voogd & Cleary (2009)
	<b>Haplosclerida; Petrosiidae; Neopetrosia</b>	
137	<i>Neopetrosia carbonaria</i> (Lamarck, 1814)	S, De Voogd & Cleary (2009)
138	<i>Neopetrosia compacta</i> (Ridley & Dendy, 1886)	S, Dragnewitsch (1905); V, Dawyoff (1952)
139	<i>Neopetrosia exigua</i> (Kirkpatrick, 1900)	S, Hooper et al. (2000); M, Qaralleh et al. (2011); Th, Putchakarn et al. (2004a); C, Li et al. (2011); Ta, Shao et al. (2008)
140	<i>Neopetrosia seriata</i> (Hentschel, 1912)	V, Lévi (1961)
141	<i>Neopetrosia similis</i> (Ridley & Dendy, 1886)	S, Dragnewitsch, (1905); V, Nguyen et al. (1977); C, Li (2008)

S/N	Species	Reference
<b>Haplosclerida; Petrosiidae; <i>Petrosia</i></b>		
142	<i>Petrosia (Petrosia) aff. solida</i> Hoshino, 1981	Ta, Shao et al. (2008)
143	<i>Petrosia (Petrosia) hoeksemai</i> De Voogd & Van Soest, 2002	S, De Voogd & Cleary (2009); Th, Putchakarn (2006)
144	<i>Petrosia (Petrosia) nigricans</i> Lindgren, 1897	V, Azzini et al. (2007)
145	<i>Petrosia (Strongylophora) corticata</i> (Wilson, 1925)	Ta, Shao et al. (2008)
146	<i>Petrosia (Strongylophora) durissima</i> (Dendy, 1905)	C, Li (2008)
147	<i>Petrosia (Strongylophora) strongylata</i> (Thiele, 1903)	Ta, Shao et al. (2008)
148	<i>Petrosia aff. aruensis</i> (Hentschel, 1912)	Th, Putchakarn (2006)
<b>Haplosclerida; Petrosiidae; <i>Xestospongia</i></b>		
149	<i>Xestospongia mammillata</i> Pulitzer-Finali, 1982	Th, Putchakarn et al. (2008)
150	<i>Xestospongia testudinaria</i> (Lamarck, 1815)	S, Chuang (1961); M, Qaralleh et al. (2011); Th, Putchakarn et al. (2004a); V, Azzini et al. (2007); C, Li (2008); Ta, Shao et al. (2008)
151	<i>Xestospongia vansoesti</i> Nishiyama & Bakus, 2000	S, Lim et al. (2012a); Ta, Shao et al. (2008)
<b>Haplosclerida; Phloeodictyidae; <i>Oceanapia</i></b>		
152	<i>Oceanapia amboinensis</i> Topsent, 1897	Th, Putchakarn et al. (2008)
153	<i>Oceanapia elastica</i> (Keller, 1891)	V, Dawydoff (1952)
154	<i>Oceanapia sagittaria</i> (Sollas, 1902)	S, Chuang (1977); M, Sollas (1902); Th, Hooper et al. (1993); V, Chervyakova (2007); Ta, Huang et al. (2016)
<b>Haplosclerida; Phloeodictyidae; <i>Siphonodictyon</i></b>		
155	<i>Siphonodictyon maldiviense</i> (Calcinaï et al., 2007)	S, Lim et al. (2012a)
156	<i>Siphonodictyon mucosum</i> Bergquist, 1965	S, De Voogd & Cleary (2009); Th, Putchakarn et al. (2004a); V, Calcinaï et al. (2006);
<b>Scopalinida; Scopalinidae; <i>Styliissa</i></b>		
157	<i>Styliissa carteri</i> (Dendy, 1889)	S, Hooper et al. (2000); V, Dawydoff (1952); Ta, Huang et al. (2016)
158	<i>Styliissa flexibili</i> (Lévi, 1961)	V, Lévi (1961)
159	<i>Styliissa massa</i> (Carter, 1887)	S, Lim et al. (2012a); Th, Putchakarn (2006); C, Li (2008)
<b>Axinellida; Axinellidae; <i>Dragmacidon</i></b>		
160	<i>Dragmacidon australe</i> (Bergquist, 1970)	Th, Putchakarn et al. (2004a)
<b>Axinellida; Axinellidae; <i>Phakellia</i></b>		
161	<i>Phakellia fusca</i> Thiele, 1898	C, Li (2008)
<b>Axinellida; Heteroxyidae; <i>Didiscus</i></b>		
162	<i>Didiscus aceratus</i> (Ridley & Dendy, 1886)	V, Hooper et al. (2000); Ta, Shao et al. (2008)
<b>Axinellida; Heteroxyidae; <i>Myrmekioderma</i></b>		
163	<i>Myrmekioderma aff. granulatum</i> (Esper, 1794)	Ta, Shao et al. (2008)
<b>Axinellida; Raspailiidae; <i>Echinodictyum</i></b>		
164	<i>Echinodictyum asperum</i> Ridley & Dendy, 1886	S, De Voogd & Cleary (2009); Th, Kritsanapuntu et al. (2001); V, Dawydoff (1952); Ta, Huang et al. (2016)
165	<i>Echinodictyum axinelloides</i> Brøndsted, 1929	C, Brøndsted (1929); Ta, Brøndsted (1929)
166	<i>Echinodictyum conulosum</i> Kieschnick, 1900	S, Lim et al. (2009); Th, Kritsanapuntu et al. (2001)
167	<i>Echinodictyum flabelliform</i> (Keller, 1889)	V, Dawydoff (1952)
168	<i>Echinodictyum lacunosum</i> Kieschnick, 1901	S, Dragnewitsch, (1905)
169	<i>Echinodictyum mesenterinum</i> (Lamarck, 1814)	S, Hooper et al. (2000); Th, Putchakarn (2011b)
<b>Axinellida; Raspailiidae; <i>Endectyon</i></b>		
170	<i>Endectyon (Endectyon) fruticosum aruense</i> Hentschel, 1912	Th, McCauley et al. (1993)
<b>Axinellida; Raspailiidae; <i>Raspailia</i></b>		
171	<i>Raspailia (Parasyringella) nuda</i> Hentschel, 1911	S, Hooper et al. (2000)
<b>Axinellida; Raspailiidae; <i>Thrinacophora</i></b>		
172	<i>Thrinacophora cervicornis</i> Ridley & Dendy, 1886	S, Lim et al. (2012a)
173	<i>Thrinacophora incrassata</i> (Kieschnick, 1896)	Th, Putchakarn (2006)
<b>Axinellida; Stelligeridae; <i>Higginsia</i></b>		
174	<i>Higginsia massalis</i> Carter, 1885	Th, Putchakarn (2011b)

S/N	Species	Reference
	<b>Bubarida; Desmanthidae; <i>Desmanthus</i></b>	
175	<i>Desmanthus incrustans</i> (Topsent, 1889)	V, Azzini et al. (2007)
176	<i>Desmanthus rhabdophorus</i> (Hentschel, 1912)	S, Lim et al. (2012a); Th, Putchakarn (2013)
	<b>Bubarida; Dictyonellidae; <i>Acanthella</i></b>	
177	<i>Acanthella cavernosa</i> Dendy, 1922	S, De Voogd & Cleary (2009); V, Dawydoff (1952); C, Qiu et al. (2008); Ta, Huang et al. (2016)
178	<i>Acanthella dendyi</i> (Bergquist, 1970)	C, Li (2008)
179	<i>Acanthella hispida</i> Pulitzer-Finali, 1982	V, Azzini et al. (2007); C, Pulitzer-Finali (1982)
180	<i>Acanthella oviforma</i> Tanita & Hoshino, 1989	C, Li (2008)
181	<i>Acanthella vulgata</i> Thiele, 1898	C, Li (2008)
	<b>Bubarida; Dictyonellidae; <i>Lipastrotethya</i></b>	
182	<i>Lipastrotethya</i> aff. <i>hilgendorfi</i> (Thiele, 1898)	Ta, Shao et al. (2008)
	<b>Bubarida; Dictyonellidae; <i>Raphoxya</i></b>	
183	<i>Raphoxya pallida</i> (Dendy, 1897)	C, Cen et al. (1997)
	<b>Bubarida; Dictyonellidae; <i>Scopalina</i></b>	
184	<i>Scopalina</i> aff. <i>australiensis</i> Pulitzer-Finali, 1982	Th, Putchakarn (2006)
	<b>Biemnida; Biemnidae; <i>Biemna</i></b>	
185	<i>Biemna fistulos</i> Topsent, 1897	C, Pulitzer-Finali (1982)
186	<i>Biemna flabellata</i> Bergquist, 1970	C, Li (2008)
187	<i>Biemna fortis</i> (Topsent, 1897)	S, De Voogd & Cleary (2009); M, Sollas (1902); Th, Putchakarn et al. (2004a); V, Lévi (1961); C, Li (2008)
188	<i>Biemna megalosigma</i> Hentschel, 1912	V, Azzini et al. (2007)
189	<i>Biemna tetraphis</i> Tanita & Hoshino, 1989	C, Li (2008)
190	<i>Biemna tubulata</i> (Dendy, 1905)	Th, Putchakarn (2006)
	<b>Biemnida; Biemnidae; <i>Neofibularia</i></b>	
191	<i>Neo ibularia chinensis</i> Pulitzer-Finali, 1982	C, Pulitzer-Finali (1982)
	<b>Biemnida; Rhabderemiidae; <i>Rhabderemia</i></b>	
192	<i>Rhabderemia acanthostyla</i> Thomas, 1968	V, Hooper (1990)
193	<i>Rhabderemia indica</i> Dendy, 1905	Th, Van Soest & Hooper (1993)
	<b>Tetractinellida; Ancorinidae; <i>Asteropus</i></b>	
194	<i>Asteropus simplex</i> (Carter, 1879)	C, Van Soest (1982)
	<b>Tetractinellida; Ancorinidae; <i>Ecionema</i></b>	
195	<i>Ecionema acervus</i> Bowerbank, 1864	S, Dragnewitsch (1905); Th, Kritsanapuntu et al. (2001); V, Chervyakova (2007)
	<b>Tetractinellida; Ancorinidae; <i>Holoxea</i></b>	
196	<i>Holoxea excavans</i> Calcinai et al., 2001	Ta, Calcinai et al. (2001)
	<b>Tetractinellida; Ancorinidae; <i>Jaspis</i></b>	
197	<i>Jaspis splendens</i> (De Laudenfels, 1954)	S, De Voogd & Cleary (2009); Ta, Shao et al. (2008)
198	<i>Jaspis stellifera</i> (Carter, 1879)	V, Dawydoff (1952); C, Tang et al. (2012)
	<b>Tetractinellida; Ancorinidae; <i>Penares</i></b>	
199	<i>Penares nux</i> (De Laubenfels, 1954)	Th, Kritsanapuntu et al. (2001)
200	<i>Penares sollasi</i> Thiele, 1900	Th, Putchakarn et al. (2008); V, Azzini et al. (2007)
	<b>Tetractinellida; Ancorinidae; <i>Rhabdastrella</i></b>	
201	<i>Rhabdastrella distincta</i> (Thiele, 1900)	C, Lv et al. (2004)
202	<i>Rhabdastrella globostellata</i> (Carter, 1883)	S, Dragnewitsch (1905); C, Li (2008); Ta, Shao et al. (2008)
	<b>Tetractinellida; Ancorinidae; <i>Stelletta</i></b>	
203	<i>Stelletta aruensis</i> Hentschel, 1912	V, Azzini et al. (2007)
204	<i>Stelletta clavosa</i> Ridley, 1884	S, Burton & Rao (1932); Th, Putchakarn (2006); V, Lindgren (1897)
205	<i>Stelletta purpurea</i> Ridley, 1884	V, Lindgren (1897); C, Lindgren (1897); Ta, Lindgren (1897)
	<b>Tetractinellida; Geodiidae; <i>Caminus</i></b>	
206	<i>Caminus chinensis</i> Lindgren, 1897	V, Dawydoff (1952); C, Lindgren (1897)

S/N	Species	Reference
	<b>Tetractinellida; Geodiidae; <i>Erylus</i></b>	
207	<i>Erylus placenta</i> Thiele, 1898	V, Dawyoff (1952)
208	<i>Erylus proximus</i> Dendy, 1916	Ta, Huang et al. (2016)
	<b>Tetractinellida; Geodiidae; <i>Geodia</i></b>	
209	<i>Geodia arripiens</i> Lindgren, 1897	V, Lindgren (1897)
210	<i>Geodia berryi</i> (Sollas, 1888)	V, Lindgren (1897)
211	<i>Geodia distincta</i> Lindgren, 1897	S, Lim (2015)
212	<i>Geodia japonica spherulifera</i> Wilson, 1925	C, Zhang & Che (2001)
213	<i>Geodia nigra</i> (Lindgren, 1897)	V, Dawyoff (1952)
214	<i>Geodia picteti</i> (Topsent, 1897)	S, Lim (2015); Th, Putchakarn (2006)
	<b>Tetractinellida; Pachastrellidae; <i>Dercitus</i></b>	
215	<i>Dercitus (Stoeba) pauper</i> Sollas, 1902	M, Sollas (1902)
	<b>Tetractinellida; Theneidae; <i>Thenea</i></b>	
216	<i>Thenea wyvillei</i> Sollas, 1886	V, Dawyoff (1952)
	<b>Tetractinellida; Theonellidae; <i>Discodermia</i></b>	
217	<i>Discodermia calyx</i> Döderlein, 1884	C, He et al. (2013)
	<b>Tetractinellida; Theonellidae; <i>Theonella</i></b>	
218	<i>Theonella cylindrica</i> Wilson, 1925	S, Hooper et al. (2000)
219	<i>Theonella laena</i> Lim & Tan, 2016	S, Lim & Tan (2016)
220	<i>Theonella swinhonis</i> Gray, 1868	C, Zhang et al. (2010a); Ta, Gray (1868)
	<b>Tetractinellida; Thoosidae; <i>Neamphius</i></b>	
221	<i>Neamphius huxleyi</i> (Sollas, 1888)	Ta, Shao et al. (2008)
	<b>Tetractinellida; Tetillidae; <i>Cinachyrella</i></b>	
222	<i>Cinachyrella arabica</i> (Carter, 1869)	S, Dragnewitsch (1905)
223	<i>Cinachyrella australiensis</i> (Carter, 1886)	S, De Voogd & Cleary (2009); M, Sollas (1902); Th, Kritsanapuntu et al. (2001); V, Lévi (1961); C, Xiao et al. (2005); Ta, Chen et al. (1997)
	<b>Tetractinellida; Tetillidae; <i>Craniella</i></b>	
224	<i>Craniella abracadabra</i> De Laubenfels, 1954	S, Lim et al. (2012a); Th, Kritsanapuntu et al. (2001)
	<b>Tetractinellida; Tetillidae; <i>Paratetilla</i></b>	
225	<i>Paratetilla bacca</i> (Selenka, 1867)	S, De Voogd & Cleary (2009); Th, Kritsanapuntu et al. (2001)
	<b>Tetractinellida; Tetillidae; <i>Tetilla</i></b>	
226	<i>Tetilla japonica</i> Lampe, 1886	Th, Putchakarn (2006); V, Dawyoff (1952)
227	<i>Tetilla ridleyi</i> Sollas, 1888	M, Sollas (1902)
	<b>Agelasida; Agelasidae; <i>Agelas</i></b>	
228	<i>Agelas aff. ceylonica</i> Dendy, 1905	Ta, Shao et al. (2008)
229	<i>Agelas cavernosa</i> Thiele, 1903	S, Lim et al. (2012a); Ta, Huang et al. (2016)
230	<i>Agelas mauritiana</i> (Carter, 1883)	V, Nguyen et al. (1977); C, Yang et al. (2012)
231	<i>Agelas nakamurai</i> Hoshino, 1985	Ta, Shao et al. (2008)
232	<i>Agelas nemoechinata</i> Hoshino, 1985	Ta, Shao et al. (2008)
233	<i>Agelas robusta</i> Pulitzer-Finali, 1982	C, Pulitzer-Finali (1982); Ta, Shao et al. (2008)
	<b>Agelasida; Astroscleridae; <i>Astrosclera</i></b>	
234	<i>Astrosclera willeyana</i> Lister, 1900	C, Yang & Li (2012)
	<b>Agelasida; Hymerhabdiidae; <i>Prosüberites</i></b>	
235	<i>Prosüberites oleteira</i> De Laubenfels, 1957	S, Lim et al. (2009)
	<b>Desmacellida; Desmacellidae; <i>Desmacella</i></b>	
236	<i>Desmacella democratica</i> (Sollas, 1902)	M, Sollas (1902)
237	<i>Desmacella tylostrongyla</i> (Li, 1986)	C, Li (1986)
	<b>Poecilosclerida; Acarnidae; <i>Acarnus</i></b>	
238	<i>Acarnus bergquistae</i> Van Soest, Hooper & Hiemstra, 1991	V, Dawyoff (1952)
239	<i>Acarnus primigenius</i> Hiemstra & Hooper, 1991	S, Lim et al. (2012a)

S/N	Species	Reference
240	<i>Acarnus ternatus</i> Ridley, 1884	S, Lim et al. (2012a)
241	<i>Acarnus wolfgangi</i> Keller, 1889	S, Lim et al. (2012a)
	<b>Poecilosclerida; Acarnidae; <i>Damiria</i></b>	
242	<i>Damiria simplex</i> Keller, 1891	S, Lim et al. (2012a); V, Chervyakova (2007)
	<b>Poecilosclerida; Cladorthizidae; <i>Chondrocladia</i></b>	
243	<i>Chondrocladia (Chondrocladia) arenifera</i> Brøndsted, 1929	C, Brøndsted (1929); Ta, Brøndsted (1929)
	<b>Poecilosclerida; Crambeidae; <i>Monanchora</i></b>	
244	<i>Monanchora clathrata</i> Carter, 1883	S, Lim et al. (2012a); V, Lévi (1961);
245	<i>Monanchora pulchra</i> (Lambe, 1895)	C, Li (2008)
246	<i>Monanchora unguiculata</i> (Dendy, 1922)	S, Lim et al. (2012a); Th, Putchakarn et al. (2004a); V, Chervyakova (2007)
	<b>Poecilosclerida; Crellidae; <i>Crella</i></b>	
247	<i>Crella (Grayella) aff. papillata</i> (Lévi, 1958)	Ta, Shao et al. (2008)
	<b>Poecilosclerida; Coelosphaeridae; <i>Coelosphaera</i></b>	
248	<i>Coelosphaera (Coelosphaera) navicelligera</i> (Ridley, 1884)	Th, Hongpadharakiree et al. (2008); V, Lindgren (1897)
249	<i>Forcepia (Foecepia) vansoesti</i> Lim et al., 2012	S, Lim et al. (2012a)
	<b>Poecilosclerida; Coelosphaeridae; <i>Lissodendoryx</i></b>	
250	<i>Lissodendoryx (Lissodendoryx) ternatensis</i> (Thiele, 1903)	C, Brøndsted (1929); Ta, Brøndsted (1929)
251	<i>Lissodendoryx (Lissodendoryx) tylostyla</i> Li, 1986	C, Li (1986)
252	<i>Lissodendoryx (Waldoschmittia) schmidti</i> (Ridley, 1884)	Th, Dawydoff (1952); V, Lindgren (1897)
	<b>Poecilosclerida; Desmacididae; <i>Desmapsamma</i></b>	
253	<i>Desmapsamma vervoorti</i> Van Soest, 1998	Th, Putchakarn (2006)
	<b>Poecilosclerida; Esperiopsidae; <i>Esperiopsis</i></b>	
254	<i>Esperiopsis plumosa</i> Tanita, 1965	C, Li (2008)
	<b>Poecilosclerida; Guitarridae; <i>Tetrapocillon</i></b>	
255	<i>Tetrapocillon patbergquistae</i> Fromont et al., 2011	S, Lim et al. (2012a)
	<b>Poecilosclerida; Hymedesmiidae; <i>Phorbas</i></b>	
256	<i>Phorbas arborescens</i> (Ridley, 1884)	Th, Kritsanapuntu et al. (2001)
	<b>Poecilosclerida; Iotrochotidae; <i>Iotrochota</i></b>	
257	<i>Iotrochota baculifera</i> Ridley, 1884	S, Hooper et al. (2000); Th, Kritsanapuntu et al. (2001); V, Lindgren (1897); C, Fan et al. (2010); Ta, Huang et al. (2016)
258	<i>Iotrochota iota</i> (De Laubenfels, 1954)	C, Li (2008)
259	<i>Iotrochota purpurea</i> (Bowerbank, 1875)	S, De Voogd & Cleary (2009); M, Bowerbank (1875); Th, Kritsanapuntu et al. (2001); V, Dawydoff (1952); C, Shen et al. (2012)
	<b>Poecilosclerida; Isodictyidae; <i>Coelocarteria</i></b>	
260	<i>Coelocarteria aff. agglomerans</i> Azzini, Calcinai & Pansini 2007	Ta, Shao et al. (2008)
261	<i>Coelocarteria singaporensis</i> (Carter, 1883)	S, Carter (1883b); Th, Kritsanapuntu et al. (2001); V, Lindgren (1897); C, Li (2008)
	<b>Poecilosclerida; Isodictyidae; <i>Isodictya</i></b>	
262	<i>Isodictya palmata</i> (Ellis & Solander, 1786)	C, Li (2008)
	<b>Poecilosclerida; Latrunculiidae; <i>Latrunculia</i></b>	
263	<i>Latrunculia laevis</i> Lindgren, 1897	V, Lindgren (1897)
	<b>Poecilosclerida; Microcionidae; <i>Clathria</i></b>	
264	<i>Clathria (Clathria) chelifera</i> (Hentschel, 1911)	V, Hooper (1996)
265	<i>Clathria (Clathria) gorgonioides</i> (Dendy, 1916)	V, Dawydoff (1952)
266	<i>Clathria (Clathria) transiens</i> Hallmann, 1912	S, Chuang (1961)
267	<i>Clathria (Microciona) aceratoobtusa</i> (Carter, 1887)	Th, Hooper et al. (2000)
268	<i>Clathria (Microciona) anonyma</i> Burton, 1959	Th, Putchakarn (2006)
269	<i>Clathria (Thalysias) cervicornis</i> (Thiele, 1903)	S, Hooper et al. (2000)
270	<i>Clathria (Thalysias) coralliophila</i> (Thiele, 1903)	V, Dawydoff (1952)
271	<i>Clathria (Thalysias) erecta</i> (Thiele, 1899)	V, Lévi (1961)

S/N	Species	Reference
272	<i>Clathria (Thalysias) fasciculata</i> Wilson, 1925	C, Xiao et al. (2002)
273	<i>Clathria (Thalysias) filifer</i> (Ridley & Dendy, 1886)	S, Dragnewitsch (1905); V, Dawydoff (1952)
274	<i>Clathria (Thalysias) reinwardti</i> Vosmaer, 1880	S, Hooper et al. (2000); Th, Kritsanapuntu et al. (2001); V, Dawydoff (1952); Ta, Shao et al. (2008)
275	<i>Clathria (Thalysias) robusta</i> (Dendy, 1922)	S, Burton & Rao (1932)
276	<i>Clathria (Thalysias) spinifera</i> (Lindgren, 1897)	V, Lindgren (1897)
277	<i>Clathria (Thalysias) tingens</i> (Hooper, 1996)	Th, Pumbua et al. (2009)
278	<i>Clathria (Thalysias) toxifera</i> (Hentschel, 1912)	S, Hooper et al. (2000); Th, Hooper et al. (2000)
279	<i>Clathria (Thalysias) vulpina</i> (Lamarck, 1814)	S, Hooper et al. (2000); M, Bowerbank (1875); V, Dawydoff (1952); Ta, Shao et al. (2008)
280	<i>Clathria (Wilsonella) foraminifera</i> (Burton & Rao, 1932)	S, De Voogd & Cleary (2009)
281	<i>Clathria (Wilsonella) lindgreni</i> Hooper, 1996	V, Dawydoff (1952)
282	<i>Clathria (Wilsonella) tuberosa</i> (Bowerbank, 1875)	S, Hooper et al. (2000); M, Bowerbank (1875)
<b>Poecilosclerida; Microcionidae; Echinocalina</b>		
283	<i>Echinocalina (Echinocalina) intermedia</i> (Whitelegge, 1902)	V, Chervyakova (2007)
<b>Poecilosclerida; Microcionidae; Holopsamma</b>		
284	<i>Holopsamma laminaefavosa</i> (Carter, 1885)	S, Dragnewitsch (1905)
<b>Poecilosclerida; Mycalidae; Mycale</b>		
285	<i>Mycale (Aegogropila) adhaerens</i> (Lambe, 1893)	C, Li (2008)
286	<i>Mycale (Aegogropila) crassissima</i> (Dendy, 1905)	S, De Voogd & Cleary (2009); V, Lévi (1961)
287	<i>Mycale (Aegogropila) pellucida</i> (Ridley, 1884)	V, Dawydoff (1952)
288	<i>Mycale (Aegogropila) philippensis</i> (Dendy, 1896)	V, Lindgren (1897); C, Pulitzer-Finali (1982)
289	<i>Mycale (Aegogropila) plumosa</i> sensu Hoshino, 1981	C, Li (2008)
290	<i>Mycale (Aegogropila) sulcovoidea</i> Sollas, 1902	S, Lim et al. (2009); M, Sollas (1902); Th, Pumbua et al. (2009)
291	<i>Mycale (Carmia) murrayi</i> (Ridley & Dendy, 1886)	S, Dragnewitsch (1905)
292	<i>Mycale (Carmia) phyllophila</i> Hentschel, 1911	V, Tran (1967); C, Van Soest (1982)
293	<i>Mycale (Mycale) grandis</i> Gray, 1867	S, Lim et al. (2012a); Th, Putchakarn et al. (2004a)
294	<i>Mycale (Mycale) gravelyi</i> Burton, 1937	V, Nguyen et al. (1977)
295	<i>Mycale (Mycale) indica</i> (Carter, 1887)	S, Lim et al. (2012a)
296	<i>Mycale (Mycale) sulcata</i> Hentschel, 1911	S, Lim et al. (2012a)
297	<i>Mycale (Zygomycale) parishii</i> (Bowerbank, 1875)	S, Burton & Rao (1932); M, Bowerbank (1875); Th, Putchakarn et al. (2004a); V, Azzini et al. (2007); C, Li (2008); Ta, Huang et al. (2016)
298	<i>Mycale vermistyla</i> Li, 1986	C, Li (1986)
<b>Poecilosclerida; Myxillidae; Psammochela</b>		
299	<i>Psammochela elegans</i> Dendy, 1916	Th, Putchakarn et al. (2008)
300	<i>Psammochela psammodes</i> (Hentschel, 1911)	S, Lim et al. (2012a)
<b>Poecilosclerida; Podospongidae; Diacarnus</b>		
301	<i>Diacarnus megaspinorhabdos</i> Kelly-Borges & Vacelet, 1995	Ta, Shao et al. (2008)
<b>Poecilosclerida; Podospongidae; Negombata</b>		
302	<i>Negombata corticata</i> (Carter, 1879)	C, Chao et al. (2010)
<b>Poecilosclerida; Tedaniidae; Tedania</b>		
303	<i>Tedania (Tedania) brevispiculata</i> Thiele, 1903	V, Lévi (1961)
304	<i>Tedania (Tedania) maeandrica</i> Thiele, 1903	Th, Putchakarn (2006)
305	<i>Tedania (Tedania) strongyla</i> Li, 1986	C, Li (1986)
<b>Clionaida; Clionaidae; Cliona</b>		
306	<i>Cliona albimarginata</i> Calcinai, Bavestrello & Cerrano, 2005	Th, Pumbua et al. (2009)
307	<i>Cliona aurivilli</i> (Lindgren, 1897)	Th, Putchakarn et al. (2004a); V, Azzini et al. (2007)
308	<i>Cliona cf. celata</i> Grant, 1826	Th, Putchakarn & Hongpatarakiri (2012); V, Dawydoff (1952)
309	<i>Cliona desmoni</i> Bavestrello, Calcinai & Sarà, 1995	Ta, Bavestrello et al. (1995)
310	<i>Cliona mucronata</i> Sollas, 1878	V, Dawydoff (1952)
311	<i>Cliona orientalis</i> Thiele, 1900	S, Lim et al. (2012a); Th, Putchakarn & Hongpatarakiri (2012); V, Calcinai et al. (2006)
312	<i>Cliona patera</i> (Hardwicke, 1820)	S, Hardwicke (1820); V, Dawydoff (1952)
313	<i>Cliona utricularis</i> Calcinai, Bavestrello & Cerrano, 2005	S, Lim et al. (2012a); Th, Pumbua et al. (2009)

S/N	Species	Reference
	<b>Clionaida; Clionaidae; <i>Cliothosa</i></b>	
314	<i>Cliothosa aurivillii</i> (Lindgren, 1897)	V, Dawydoff (1952)
315	<i>Cliothosa hancocki</i> (Topsent, 1888)	Th, Dawydoff (1952); V, Calcinai et al. (2006)
	<b>Clionaida; Clionaidae; <i>SpheciOSPONGIA</i></b>	
316	<i>SpheciOSPONGIA areolata</i> (Dendy, 1897)	V, Dawydoff (1952)
317	<i>SpheciOSPONGIA inconstans</i> (Dendy, 1887)	S, Chuang (1961); M, Sollas (1902); V, Chervyakova (2007)
318	<i>SpheciOSPONGIA lacunosa</i> (Kieschnick, 1898)	S, Dragnewitsch (1905)
319	<i>SpheciOSPONGIA purpurea</i> (Lamarck, 1815)	S, Chuang (1961); C, Li (2008)
320	<i>SpheciOSPONGIA solida</i> (Ridley & Dendy, 1886)	Th, Putchakarn (2006); V, Calcinai et al. (2006)
321	<i>SpheciOSPONGIA tentorioides</i> (Dendy, 1905)	V, Calcinai et al. (2006)
322	<i>SpheciOSPONGIA vagabunda</i> (Ridley, 1884)	S, Chuang (1973); Th, Kritsanapuntu et al. (2001); V, Chervyakova (2007); C, Xiao et al. (2004)
	<b>Clionaida; Clionaidae; <i>Spiroxya</i></b>	
323	<i>Spiroxya acus</i> (Bavestrello, Calcinai & Sarà, 1995)	Ta, Bavestrello et al. (1995)
324	<i>Spiroxya macroxeata</i> (Calcinai, Bavestrello, Cerrano & Sarà, 2001)	Ta, Calcinai et al. (2001)
	<b>Clionaida; Spirastrellidae; <i>Spirastrella</i></b>	
325	<i>Spirastrella decumbens</i> Ridley, 1884	S, Lim et al. (2012a); V, Calcinai et al. (2006)
	Clionaida; Placospongiidae; Placospongia	
326	<i>Placospongia carinata</i> (Bowerbank, 1858)	S, Lim et al. (2012a); V, Chervyakova (2007)
327	<i>Placospongia melobesioides</i> Gray, 1867	S, De Voogd & Cleary (2009); Th, Putchakarn (2011a); V, Dawydoff (1952);
	<b>Tethyida; Tethyidae; <i>Tethya</i></b>	
328	<i>Tethya ingalli</i> Bowerbank, 1858	M, Sollas (1902); V, Dawydoff (1952);
329	<i>Tethya japonica</i> Sollas, 1888	V, Dawydoff (1952); C, Li (2008)
330	<i>Tethya robusta</i> (Bowerbank, 1873)	S, Lim et al. (2009); Th, Putchakarn & Hongpatarakiri (2012); C, Li (2008)
331	<i>Tethya seychellensis</i> (Wright, 1881)	Th, Putchakarn (2006); V, Azzini et al. (2007)
	<b>Tethyida; Tethyidae; <i>Tethycometes</i></b>	
332	<i>Tethycometes radicosa</i> Lim & Tan, 2008	S, Lim & Tan (2008)
	<b>Tethyida; Tethyidae; <i>Xenospongia</i></b>	
333	<i>Xenospongia patelliformis</i> Gray, 1858	V, Lévi (1961)
	<b>Tethyida; Timeidae; <i>Timea</i></b>	
334	<i>Timea aurantiaca</i> (Bergquist, 1968)	Th, Pumbua et al. (2009)
	<b>Suberitida; Suberitidae; <i>Aaptos</i></b>	
335	<i>Aaptos laxosuberites</i> (Sollas, 1902)	M, Sollas (1902)
336	<i>Aaptos suberitoides</i> (Brøndsted, 1934)	S, De Voogd & Cleary (2009); V, Lévi (1961); C, Liu et al. (2012); Ta, Shao et al. (2008)
	<b>Suberitida; Suberitidae; <i>Protosuberites</i></b>	
337	<i>Protosuberites proteus</i> (Hentschel, 1909)	V, Dawydoff (1952)
	<b>Suberitida; Suberitidae; <i>Pseudosuberites</i></b>	
338	<i>Pseudosuberites cava</i> Sollas, 1902	S, Lim et al. (2012a); M, Sollas (1902)
339	<i>Pseudosuberites lobulatus</i> (Lévi, 1961)	V, Lévi (1961)
	<b>Suberitida; Suberitidae; <i>Suberites</i></b>	
340	<i>Suberites diversicolor</i> Becking & Lim, 2009	S, Becking & Lim (2009)
341	<i>Suberites tylotusus</i> Lévi, 1958	C, Li et al. (2000)
	<b>Suberitida; Suberitidae; <i>Terpios</i></b>	
342	<i>Terpios cruciata</i> (Dendy, 1905)	S, Lim et al. (2012a); V, Azzini et al. (2007)
343	<i>Terpios granulosa</i> Bergquist, 1967	S, Lim et al. (2012a); Th, Putchakarn et al. (2004a)
344	<i>Terpios hoshinota</i> Rützler & Muzik, 1993	M, Hoeksema et al. (2014); Ta, Liao et al. (2007)

S/N	Species	Reference
<b>Suberitida; Halichondriidae; <i>Amorphinopsis</i></b>		
345	<i>Amorphinopsis excavans</i> Carter, 1887	S, Lim et al. (2009); Th, Putchakarn et al. (2004a); V, Azzini et al. (2007)
346	<i>Amorphinopsis fenestrata</i> (Ridley, 1884)	V, Lindgren (1897)
347	<i>Amorphinopsis foetida</i> (Dendy, 1889)	V, Lévi (1961); C, Li (2008)
348	<i>Amorphinopsis siamensis</i> (Topsent, 1925)	Th, Topsent (1925)
<b>Suberitida; Halichondriidae; <i>Axinyssa</i></b>		
349	<i>Axinyssa aplysinoides</i> (Dendy, 1922)	Th, Putchakarn (2006); C, Li (2008)
350	<i>Axinyssa pitys</i> (De Laubenfels, 1954)	S, Chuang (1973)
351	<i>Axinyssa variabilis</i> (Lindgren, 1897)	V, Lindgren (1897); C, Li (2008)
<b>Suberitida; Halichondriidae; <i>Ciocalypta</i></b>		
352	<i>Ciocalypta aff. tyleri</i> Bowerbank, 1873	Ta, Huang et al. (2016)
353	<i>Ciocalypta melichlora</i> Sollas, 1902	M, Sollas (1902)
354	<i>Ciocalypta rutilla</i> Sollas, 1902	M, Sollas (1902)
<b>Suberitida; Halichondriidae; <i>Epipolasis</i></b>		
355	<i>Epipolasis suluensis</i> (Wilson, 1925)	S, Lim et al. (2012a)
<b>Suberitida; Halichondriidae; <i>Halichondria</i></b>		
356	<i>Halichondria (Halichondria) armata</i> Lindgren, 1897	C, Li (2008)
357	<i>Halichondria (Halichondria) cartilaginea</i> (Esper, 1794)	S, Lim et al. (2012a); Th, Kritsanapuntu et al. (2001); V, Lévi (1961)
<b>Suberitida; Halichondriidae; <i>Hymeniacidon</i></b>		
358	<i>Hymeniacidon agminata</i> Ridley, 1884	C, Li (2008)
<b>Suberitida; Halichondriidae; <i>Spongisorites</i></b>		
359	<i>Spongisorites lapidiformis</i> Dendy, 1905	C, Li (2008)
<b>Suberitida; Halichondriidae; <i>Topsentia</i></b>		
360	<i>Topsentia rugosa</i> (Ridley & Dendy, 1886)	C, Li (2008)
<b>Class Calcarea</b>		
<b>Subclass Calcinea</b>		
<b>Clathrinida; Clathrinidae; <i>Clathrina</i></b>		
361	<i>Clathrina flexili</i> (Haeckel, 1872)	S, Haeckel (1872)
362	<i>Clathrina sororcula</i> Van Soest & De Voogd, 2015	S, Van Soest & De Voogd (2015)
<b>Clathrinida; Clathrinidae; <i>Guancha</i></b>		
363	<i>Guancha macleayi</i> (Lendenfeld, 1885)	V, Dawydoff (1952)
<b>Clathrinida; Leucettidae; <i>Leucetta</i></b>		
364	<i>Leucetta chagosensis</i> Dendy, 1913	Ta, Shao et al. (2008)
<b>Clathrinida; Leucaltidae; <i>Leucettusa</i></b>		
365	<i>Leucettusa haeckeliana</i> (Poléjaeff, 1883)	V, Dawydoff (1952)
<b>Leucosolenida; Jenkinidae; <i>Anamixilla</i></b>		
366	<i>Anamixilla singaporesis</i> Van Soest & De Voogd, 2015	S, Van Soest & De Voogd (2015)
<b>Leucosolenida; Grantiidae; <i>Aphroceras</i></b>		
367	<i>Aphroceras alcicornis</i> Gray, 1858	C, Gray (1858b)
<b>Leucosolenida; Heteropiidiae; <i>Heteropia</i></b>		
368	<i>Heteropia glomerosa</i> (Bowerbank, 1873)	C, Li (2008)
369	<i>Heteropia striata</i> Hozawa, 1916	V, Dawydoff (1952)
<b>Subclass Calcaronea</b>		
<b>Leucosolenida; Grantiidae; <i>Leucandra</i></b>		
370	<i>Leucandra capillata</i> (Poléjaeff, 1883)	V, Dawydoff (1952)
371	<i>Leucandra loricata</i> (Poléjaeff, 1883)	V, Dawydoff (1952)

S/N	Species	Reference
	<b>Leucosolenida; Jenkinidae; <i>Uteopsis</i></b>	
372	<i>Uteopsis argentea</i> (Poljæff, 1883)	S, Van Soest & De Voogd (2015)
	<b>Class Hexactinellida</b>	
	<b>Subclass Amphidiscophora</b>	
	<b>Amphidiscosida; Hyalonematidae; <i>Hyalonema</i></b>	
373	<i>Hyalonema (Leptonema) acuferum</i> (Schulze, 1893)	C, Li (2008)
	<b>Amphidiscosida; Monorhaphidae; <i>Monorhaphis</i></b>	
374	<i>Monorhaphis chuni</i> Schulze, 1904	C, Li (2008)
	<b>Amphidiscosida; Pheronematidae; <i>Pheronema</i></b>	
375	<i>Pheronema hemisphaericum</i> (Gray, 1873)	C, Li (2008)
	<b>Subclass Hexasterophora</b>	
	<b>Hexactinosida; Aphrocallistidae; <i>Aphrocallistes</i></b>	
376	<i>Aphrocallistes beatrix</i> Gray, 1858	M, Gray (1858a); C, Li (2008)
	<b>Hexactinosida; Euretidae; <i>Eurete</i></b>	
377	<i>Eurete schmidti</i> Schulze, 1886	C, Li (2008)
	<b>Hexactinosida; Euretidae; <i>Myliusia</i></b>	
378	<i>Myliusia verrucosa</i> Iijima, 1927	C, Li (2008)
	<b>Hexactinosida; Euretidae; <i>Pararete</i></b>	
379	<i>Pararete farreopsis</i> (Carter, 1877)	C, Li (2008)
380	<i>Pararete farreopsis jakosalemi</i> Iijima, 1927	C, Li (2008)
	<b>Hexactinosida; Fieldingiidae; <i>Fieldingia</i></b>	
381	<i>Fieldingia valentini tizardi</i> Tabachnick & Janussen, 2004	Ta, Tabachnick & Janussen (2004)
	<b>Hexactinosida; Tretodictyidae; <i>Tretodictyum</i></b>	
382	<i>Tretodictyum tubulosum</i> Schulze, 1886	C, Li (2008)
	<b>Lychniscosida; Aulocystidae; <i>Neoaulocystis</i></b>	
383	<i>Neoaulocystis zitteli</i> (Marshall & Meyer, 1877)	C, Li (2008)
	<b>Lyssacinosida; Euplectellidae; <i>Euplectella</i></b>	
384	<i>Euplectella aspergillum</i> Owen 1841	C, Li (2008)
385	<i>Euplectella timorensis</i> Iijima, 1927	C, Li (2008)
	<b>Lyssacinosida; Euplectellidae; <i>Holascus</i></b>	
386	<i>Holascus ridleyi</i> Schulze, 1886	C, Li (2008)
	<b>Lyssacinosida; Rossellidae; <i>Crateromorpha</i></b>	
387	<i>Crateromorpha (Crateromorpha) meyeri</i> Gray, 1872	C, Li (2008)
	<b>Lyssacinosida; Rossellidae; <i>Lophocalyx</i></b>	
388	<i>Lophocalyx suluana</i> Iijima, 1927	C, Li (2008)

in the past when the concepts of biogeography and sponge distribution were poorly defined. It is now generally accepted that species from the Atlantic Ocean and the Caribbean are unlikely to be conspecific with South China Sea sponges (see Van Soest, 1994; Van Soest et al., 2012, 2016) and are thus not included in our list. Nevertheless, there are exceptions. The interesting example of *Celtodoryx ciocalyptoides* is a case in point. This species was originally described from the Sea of Japan by Burton (1935) but was later discovered on the west coast of France (Perez et al., 2006) and the Netherlands (Van Soest et al., 2007). Both studies expressed a likely connection with shellfish culture but were unable to provide evidence for this other than that the species was

previously unknown from their areas (see Van Soest et al., 2012). However, Henkel & Janussen (2011) discovered the likely source populations are in the northwest Pacific, and they provided convincing proof of the conspecificity of the Asian and European populations. In any case, sponge species that have been discovered for some time typically have a restricted distribution; could be one or a few MEOW provinces in Spalding et al. (2007), or widely distributed in the an entire ocean such as Pacific Ocean, Indian Ocean and Atlantic Ocean. Disjunct distributions of Atlantic Ocean and Pacific Ocean should always be viewed in doubt until further examinations and studies prove otherwise.

**Species distribution.** A north-south gradient of sponge faunal assemblages from Singapore (combined with peninsular Malaysia) to Taiwan can be seen in the Bray-Curtis cluster analysis dendrogram (Fig. 1). Singapore and Thailand showed the highest similarity with each other, with 46 co-occurring species. The biogeographical affinities revealed by classification (cluster analysis) based on the Bray–Curtis similarity index and Jaccard similarity ordination (MDS) (Fig. 2) revealed the presence of a few groupings corresponding to the province and ecoregion outlined in the ‘Marine Ecoregions of the World’ (MEOW) classification system (Spalding et al., 2007). The main group consists of Singapore, Peninsular Malaysia and Thailand corresponding to the province “Sunda Shelf”. The second is Vietnam, comprising two ecoregions, “Gulf of Tonkin” and “Southern Vietnam”. The region Southern China and Taiwan are depicted to be very different in the MDS plot, corresponding to the ecoregion “Southern China” and “South Kuroshio”. Tropical elements probably draw the Singapore, Thailand and Vietnam together. The subtropical element of Southern China separates it from the tropical group. The weak affinity between southern China and Taiwan is probably due to the influence of the warm Kuroshio current off Taiwan. There is a slight tropical element in Taiwan as revealed in the MDS plot, which draws the fauna of Taiwan closer to Singapore and Thailand.

Sixteen species are widely distributed and are present in at least four of the regions. They are: *Aaptos suberitoides*, *Acanthella cavernosa*, *Biemna fortis*, *Cinachyrella australiensis*, *Clathria (Thalysias) reinwardti*, *Coelocarteria singaporenensis*, *Echinodictyum asperum*, *Hyrtios erectus*, *Haliclona (Gellius) cymaeformis*, *Iotrochota baculifera*, *I. purpurea*, *Mycale (Zygomycale) parishii*, *Neopetrosia exigua*, *Oceanapia sagittaria*, *Spheciopsis vagabunda* and *Xestospongia testudinaria*. Of these, six are reported to be widely distributed species in the Indo-Pacific (Hooper et al., 2000): *Hyrtios erectus* (as *erecta*), *X. testudinaria*, *S. (as Spirastrella) vagabunda*, *I. baculifera*, *Haliclona (Gellius) cymaeformis* and *Cinachyrella (as Cinachyra) australiensis*. Three species, *C. australiensis*, *M. (Z.) parishii* and *X. testudinaria*, occur all the regions. *Mycale (Zygomycale) parishii* has been reported to be a fouling species in Hawaii and Singapore (see De Laubenfels, 1950; Bergquist, 1967; Eldredge & Smith, 2001; Lim et al., 2009) but it is common and abundant in natural habitats in Singapore waters (Lim et al., 2012a) and elsewhere in the region. *Xestospongia testudinaria*, also commonly known as the “Pacific Barrel Sponge”, is probably the one of the most conspicuous and abundant species in our study. It is widely distributed from Seychelles to the Great Barrier Reef (see Van Soest et al., 2016) and is the subject of a wide range of studies involving their biochemistry (see Blunt et al., 2013), microbiology (see Polonia et al., 2014; Cleary et al., 2015), reproduction (Fromont & Bergquist, 1994), and population genetics (Swierts et al., 2013; Setiawan et al., 2016). Its Caribbean congener *Xestospongia muta* has been labeled “Redwoods of the Reef” and estimated to live as long as 2000 years (McMurray et al., 2008). Another notable widespread species

is *Terpios hoshinota*, a coral-killing sponge (Bryan, 1973). It was first described from the Ryukyu Archipelago, Japan and Guam (Rützler & Muzik, 1993), and has now been recorded from Taiwan (Liao, 2007; Liao et al., 2007), Great Barrier Reef (Fujii et al., 2011), Indonesia (De Voogd et al., 2013), peninsular Malaysia (Hoeksema et al., 2014) and Indian Ocean (Montano et al., 2015; Thinesh et al., 2015). This sponge has not been recorded in the rest of the regions to date apart from Taiwan and peninsular Malaysia but it might be present cryptically in low numbers.

All the widely distributed species listed above are commonly found on fringing reefs, which is the most widely sampled habitat in the South China Sea. However, there are many other habitats are present in the South China Sea (see Morton & Blackmore, 2001; Vo et al., 2013). Lagoons, beaches, seagrass beds, intertidal reef flats, mangroves, mudflats estuaries and man-made structures such fish farms, seawalls, pontoons, jetties and ports are common, but they may not have been sampled extensively. Substrata in these habitats include mud, sand, rock, boulder, coral rubble, shelf grit and cement. An unique habitat can be found off NE Taiwan where over 30 hydrothermal vents emitting hydrothermal fluids and volcanic gases at less than 30 m depth (Chen et al. 2005). Distinctive sponges have been discovered from these shallow hydrothermal vents (Huang et al., unpublished data).

Two other major groups of habitat are the intertidal reef flat and man-made structures. Some other habitats for sponges such as reef-flat, estuaries, and to a much lesser extent the mangroves are often found in the intertidal zone. Three different kinds of tides (diurnal, semi-diurnal, and mixed) can be found in our study area (see Wyrtki, 1961), and the tidal range, low tide and high tide marks between different regions can be highly variable. For example, Thuan An (Vietnam) has a tidal range of 0.45 m whereas Xiamen (China) has the largest tidal range of 5.88 m. However, intertidal sponges are found in all the regions at tidal height with limited air exposure of less than 2–3 hours. A high number of 99 intertidal species were recorded in Singapore with semi-diurnal tide with typical tidal height of 3.0 m where they are exposed to the air (at below 0.3 m tide) for a few hours in a few days a month during the low spring tides (Lim et al., 2012). Widespread and common intertidal species on reef flats in Singapore include *Bienma fortis*, *Cinachyrella australiensis*, *Clathria (Thalysias) reinwardti*, *Coelocarteria singaporenensis*, *Haliclona (Gellius) cymaeformis* and *Paratetilla bacca*. The estuaries and mangroves are characterised by low salinity and high sediment load and species like *Amorphinopsis excavans*, *Spheciopsis vagabunda*, *Suberites diversicolor* and *Tethya robusta* thrive in the estuaries. Mangroves are found in the entire study area from Singapore to Xiamen (China) which is the northern limit of large scale mangroves. However, few sponges can be found on mangroves unlike those in the Caribbean (see Rützler, 1995; Diaz, 2012; Rützler et al., 2000) and Indonesia (Becking et al., 2013). The reason is probably that the mangrove plants are largely situated above the highest tidal limit for sponges that exceed the air exposure tolerance of intertidal sponges.

Most species listed in Table 1 are restricted to the tropics but a large latitudinal difference of over 25° exists between Singapore at the equator and southern China/Taiwan in the north. A number of sponge species that may be restricted to the tropics were found only in Thailand and Singapore. These were *Craniella abracadabra*, *Paratetilla bacca*, *Geodia picteti*, *Cliona utricularis*, *Terpios granulosa*, *Desmanthus rhabdophorus*, *Clathria (Thalysias) toxifera*, *Echinodictyum conulosum*, *Echinodictyum mesenterinum*, *Mycale (Mycale) grandis*, *Callyspongia joubini*, *Haliclona koremella*, *Siphonodictyon maldiviensis*, *Petrosia (Petrosia) hoeksemai* and *Chelonaplysilla erecta*. On the other hand, 195 species were confined to southern China and Taiwan, with only seven species recorded in both southern China and Taiwan, and not in other regions. Southern China and Taiwan are at the northern limit of tropical corals and mangroves and it is also the southern limit for temperate species (Morton & Blackmore, 2001). The Northeast Monsoon pushes cooler coastal waters down through the Taiwan Strait during winter (see Chen, 1999; Morton & Blackmore, 2001). However, the Kuroshio brings warm current to the east coast of Taiwan. This explains some of the tropical species such as *Clathria (Thalysias) reinwardti* and *Oceanapia sagittaria* being present in Taiwan but absent in southern China.

Apart from the apparent distinction between north and south assemblages of sponges, some 267 species (some 70% of the total species) have only been recorded from one region only (Fig. 3): Singapore (52 species); peninsular Malaysia (9 species); Thailand (30 species); Vietnam (67 species); southern China (83 species); Taiwan (27 species). Results from a number of studies have suggested high endemism in many groups of sponges—Van Soest (1994) found that over 70% of all species were confined to one of the 35 areas in which he divided the globe; Xavier & Van Soest (2012) reported more than half of the total Northeast Atlantic and Mediterranean species occur in only 1–3 out of the 28 study areas. Endemism seems to hold true even at small spatial scales. Hooper & Kennedy (2002) found that 60% of all the species from a restricted coastal area of southeast Queensland occurred only a single reef within a 50 km radius in eastern Australia.

However, we think that most of our “restricted” species are probably not endemic species, as obvious environmental boundaries do not exist between the study areas along the South China Sea. A few factors could have contributed to the large number of “restricted” species. Firstly, many of the collections are collected at different times using a variety of collection methods. Many species recorded in the past have not yet been recorded again; some of the notable large collections done in the past are by Dragnewitsch (1905) in Singapore, Sollas (1902) in Peninsular Malaysia, Lindgren (1897) and Dawyckoff (1952) in Vietnam. These species might have become rare or simply ceased to exist. In the case of Singapore, its shallow waters have lost up to 65% of their live coral cover due to intensive land reclamation that began 50 years ago. It is definitely not surprising that some species were lost after drastic changes in the environment. However, some species recorded long ago, like *Coelocarteria*

*singaporensis* (Carter, 1883) is still very common and abundant at its type locality and surrounding areas. The Neptune’s Cup, *Cliona patera* which was described close to two centuries ago by Hardwicke (1820), disappeared for a long time and was only rediscovered again in Singapore (Lim et al., 2012a) even after having lost over 90% of its natural coastline due to urbanisation and land reclamation (Chou, 2006). The second reason is misidentification by both past and contemporary workers as many sponges are difficult to identify and characters are not easy to recognise. Sponge species descriptions written in the early years are brief, poorly illustrated or without figures altogether. This makes the task of identification very difficult, if not impossible, given the highly diverse sponge fauna found in this region. Very often, sponge characters for many groups only become clear after examination of type material but voucher specimens are lodged in far away museums in Europe and not easily available to sponge workers in Southeast Asia. In addition, the phylogeny of many sponge groups is still not clear, even after the recent major revision by Morrow & Cárdenas (2015). Several orders and many families are still considered to be polyphyletic and remain unresolved. A substantial number of misidentifications were unavoidable as we were unable to examine and verify many species and records in the list. Thirdly, a large number of OTUs in many collections have not been identified to species, as the sponge fauna diversity in the South China Sea is simply too overwhelming for the few sponge workers. More OTUs identified will definitely expand the geographical distribution of many species and reduce the number of “restricted” species in this study. In addition, many areas in our study have not been adequately sampled and “restricted” species could well be present in these areas.

This work has improved the knowledge of sponge fauna in Singapore, peninsular Malaysia, Thailand, Cambodia, Vietnam, southern China and Taiwan along the South China Sea but we are still far from a complete picture of the actual diversity of sponges. Many more areas remain to be explored and many recorded undetermined taxa are yet to be identified and named.

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