**Appendices 1-3 for: Schönberg.** Happy relationships between marine sponges and sediments – a review and some observations from Australia. *Journal of the Marine Biological Association of the United Kingdom*

**Appendix 1.** Marine sponges that have scientific names suggesting a relationship with sediments, mostly referring to sand-inclusion in their bodies. Information collected from Van Soest *et al.* (2015), with taxa regarded as valid as of the 23. June 2015. Searches were conducted to retrieve names containing parts of ‘glarea’, ‘glaria’, ‘sabulum’ (Latin: gravel, coarse sand), ‘(ps)ammos’ (Greek: sand), ‘(h)arena’ (Latin: sand), ‘fango’ (Italian: mud), ‘glomerare’ (Latin: collect, amass), ‘(ag)glutinare’ (Latin: adhere (to)) – for the latter two cases species were checked indiviually to confirm that the reference was to adhering to loose particles, not to rock or parts of the sponge itself. Name parts that were checked but could not be found are ‘izima’, ‘katakathi’, ‘ilys’ (Greek: sediment), ‘crassamen’ (Latin: sediment), ‘sedimento’ (Italian: sediment), ‘chaliki’ (Greek: gravel), ‘saburra’ (Latin: gravel, ballast), ‘sabbia’ (Italian: sand), ‘laspi’, ‘borboros’ (Greek: mud), ‘skoni’, ‘xeskonizo’ (Greek: dust, asconema, ascon), ‘lutum’ (Latin: mud, clay), ‘pulvis’ (Latin: dust, powder), ‘argilla’ (Italian: loam, clay). The following dictionaries were consulted: Whitaker (2007), Kypros-Net (2014), LEO (2014). Where it became obvious that the name related to incorporating sediments even if it did not contain a clear reference to the sediment, it was also included here (e.g. *Chondrosia collectrix*). Because they could not be reliably be searched for further names with indirect reference to sediments were ignored, e.g. *Pseudoceratina* ***durissima***, which was named for its hard consistency that is caused by sediment incorporation, or *Cinachyra* ***barbata***, the ‘bearded *Cinachyra*’ with a thick tuft of anchoring spicules, or ***Columnitis*** *squamata*, which forms a massive central core made of embedded sediments. For references and further details, please refer to Appendix 2.

| Species name | Taxon authority | Etymology, comments |
| --- | --- | --- |
| *▪ Aaptos* ***glutinans*** | Moraes, 2011 | ‘binding *Acarnus*’ |
| *▪ Acarnus* ***sabulum*** | Aguilar-Camacho *et al.*, 2013 | ‘sand *Acarnus*’ |
| *▪ Aplysilla* ***arenosa*** | Hentschel, 1929 | ‘sandy *Aplysilla*’ |
| *▪* invalid: **Areno**chalininae, accepted as Mycalidae | Lundbeck, 1905 | ‘Subfamily of sand chalinas’ |
| ***Areno****sclera* | Pulitzer-Finali, 1982 | The genus is named for incorporating sand: ‘sand-skeleton’. |
| *▪* ***Areno****sclera arabica* | (Keller, 1889) | ‘Arabian *Arenosclera*’ |
| *▪* ***Areno****sclera brasiliensis* | Muricy & Ribeiro, 1999 | ‘Brasilian *Arenosclera*’ |
| *▪* ***Areno****sclera digitata* | (Carter, 1882) | ‘branching *Arenosclera*’ |
| *▪* ***Areno****sclera heroni* | Pulitzer-Finali, 1982 | ‘*Arenosclera* from Heron Island’ |
| *▪* ***Areno****sclera parca* | Pulitzer-Finali, 1982 | ‘sparing, frugal *Arenosclera*’ (likely referring to light sand use) |
| *▪* ***Areno****sclera rosacea* | Desqueyroux-Faúndez, 1984 | ‘rose coloured *Arenosclera*’ |
| *▪ Bubaris* ***ammo****sclera* | Hechtel, 1969 | ‘sand skeleton *Bubaris*’ |
| *▪ Callyspongia* ***psammo****phera* | De Laubenfels, 1954 | named for its sand-filled fibres: ‘sand bearing *Callyspongia*’ |
| *▪ Carteriospongia* ***silicata*** | (Von Lendenfeld, 1889) | ‘siliceous *Carteriospongia*’; the species incorporates spicules and sand grains, and it was here assumed that the name refers to this |
| *▪ Chelonaplysilla* ***arenosa*** | (Topsent, 1925) | ‘sandy *Chelonaplysilla*’ |
| *▪ Chelonaplysilla* ***psammo****phila* | (Topsent, 1928) | ‘sand loving *Chelonaplysilla*’ |
| *▪ Chondrocladia (Chondrocladia)* ***areni****fera* | Brøndsted, 1929 | ‘sand bearing *Chondrocladia*’ |
| *▪ Chondropsis* ***arenacea*** | (Dendy, 1917) | ‘sandy *Chondropsis*’; *Chondropsis* is a genus of sponges packed with sediments. |
| *▪ Chondropsis* ***areni****fera* | Carter, 1886 | ‘sand bearing *Chondropsis*’ |
| *▪ Chondropsis macro****psamma*** | (Von Lendenfeld, 1888) | ‘coarse sand *Chondropsis*’ |
| *▪ Chondrosia* ***collectrix*** | (Schmidt, 1870) | ‘(sediment) collecting *Chondrosia*’ |
| *▪ Cinachyrella* ***arenosa*** | (Van Soest & Stentoft, 1988) | ‘sandy *Cinachyrella*’ |
| *▪ Clathria (Thalysias) basi****arenacea*** | (Boury-Esnault, 1973) | ‘basally sandy *Clathria*’ |
| invalid: *Clathrio****psamma***, accepted as *Clathria (Wilsonella)* | Carter, 1885 | ‘sand lattice sponges’ |
| *▪* invalid: *Clathrio****psamma*** *cercidochela*, accepted as *Clathria (Wilsonella) cercidochela* | (Vacelet & Vasseur, 1971) | ‘blossom-chela *Clathriopsamma*’ |
| *▪* invalid: *Clathrio****psamma*** *lobosa*, accepted as *Clathria (Wilsonella) australiensis* | Carter, 1885 | ‘lobed *Clathriopsamma*’ |
| *▪* invalid: *Clathrio****psamma*** *pseudonapya*, accepted as *Clathria (Wilsonella) pseudonapya* | (De Laubenfels, 1930) | ‘pseudonapya *Clathriopsamma*’ |
| *▪* invalid: *Clathrio****psamma*** *reticulata*, accepted as *Clathria (Wilsonella) reticulata* | (Von Lendenfeld, 1888) | ‘reticulated *Clathriopsamma*’ |
| *▪* taxon inquirendum: *Cliona* ***arenosa*** | (Schmidt, 1870) | ‘sandy *Cliona*’ |
| *▪ Coelosphaera (Coelosphaera)* ***calcifera*** | (Burton, 1934) | ‘calcium carbonate bearing *Coelosphaera*’, the sponge is covered in shell debris |
| *▪ ▪ Crella incrustans var.* ***arenacea*** | (Carter, 1885) | ‘encrusting *Crella* of the sandy variety*’* |
| *▪ Desmacella* ***areni****fibrosa* | Hentschel, 1911 | ‘sand-fibrous *Desmacella*’ |
| *Desma****psamma*** | Burton, 1934 | ‘sand filled bundle sponge’ |
| *▪ Desma****psamma*** *anchorata* | (Carter, 1882) | ‘anchored *Desmapsamma*’ |
| *▪ Desma****psamma*** *turbo* | (Carter, 1885) | ‘whorl *Desmapsamma*’ |
| *▪ Desma****psamma*** *vervoorti* | Van Soest, 1998 | ‘Vervoort’s *Desmapsamma*’ |
| *▪ Dictyonella* ***arenosa*** | (Rützler, 1981) | ‘sandy *Dictyonella*’ |
| *▪ Dysidea* ***arenaria*** | Bergquist, 1965 | ‘sand pit *Dysidea*’ |
| *▪* invalid: *Echinoclathria* ***arenifera*** accepted as *Holo****psamma*** *laminaefavosa* | Carter, 1885 | ‘sand carrying *Echinoclathria*’ |
| *▪ Echinodictyum* ***arenosum*** | Dendy, 1896 | ‘sandy *Echinodictyum*’ |
| *▪* invalid: *Ecionemia* ***agglutinans***, accepted as *Ecionemia acervus* | Bowerbank, 1864 | ‘binding *Ecionemia*’ |
| *▪ Euryspongia* ***arenaria*** | Bergquist, 1961 | ‘sand pit *Eurospongia*’ |
| ***Fango****philina* | Schmidt, 1880 | genus of ‘mud loving’ sponges |
| *▪* ***Fango****philina gilchristi* | (Kirkpatrick, 1902) | ‘Gilchrist’s *Fangophilina*’ |
| *▪* ***Fango****philina hirsuta* | Von Lendenfeld, 1907 | ‘hairy *Fangophilina*’ |
| *▪* ***Fango****philina kirkpatricki* | Von Lendenfeld, 1907 | ‘Kirkpatrick’s *Fangophilina*’ |
| *▪* ***Fango****philina submersa* | Schmidt, 1880 | ‘submersed *Fangophilina*’ |
| *▪ Forcepia (Forcepia)* ***agglutinans*** | Burton, 1933 | ‘binding, adhering *Forcepia*’ |
| *▪ Forcepia (Forcepia)* ***arenosa*** | Hentschel, 1911 | ‘sandy *Forcepia*’ |
| *▪ Forcepia (Forcepia)* ***psammo****phila* | (Cabioch, 1968) | ‘sand loving *Forcepia*’ |
| *▪ Geodia* ***glariosa*** | (Sollas, 1886) | ‘sandy *Geodia*’ |
| *▪ Halichondria (Halichondria)* ***agglomerans*** | Cabioch, 1968 | ‘binding *Halichondria*’ |
| *▪ Halichondria (Halichondria)* ***arenacea*** | Dendy, 1895 | ‘sand-like *Halichondria*’ |
| *▪ Halichondria (Halichondria)* ***arenosa*** | Hentschel, 1929 | ‘sandy *Halichondria*’ |
| *▪ Haliclona (Soestella)* ***arenata*** | Griessinger, 1971 | ‘sandy Soest’s *Haliclona*’ |
| *▪ Haliclona* ***arenosa*** | (Carter, 1882) | ‘sandy *Haliclona*’ |
| *▪ Haliclona* ***sabulosa*** | Bergquist & Warne, 1980 | The species was named for having almost the entire spicular skeleton replaced by sand: ‘sandy *Haliclona*’. |
| *▪ ▪ Halisarca australiensis* var.***arenacea*** | Carter, 1886 | ‘Australian *Halisarca* in the sandy variety’ |
| *Holo****psamma*** | Carter, 1885 | ‘wholly sand sponge genus’ |
| *▪ Holo****psamma*** *arborea* | (Von Lendenfeld, 1888) | ‘tree-like *Holopsamma*’ (but not published as a sand-sponge) |
| *▪ Holo****psamma*** *crassa* | Carter, 1885 | ‘thick *Holopsamma*’ |
| *▪ Holo****psamma*** *elegans* | (Von Lendenfeld, 1888) | ‘elegant *Holopsamma*’ (but not published as a sand-sponge) |
| *▪ Holo****psamma*** *favus* | (Carter, 1885) | ‘honeycomb *Holopsamma*’ |
| *▪ Holo****psamma*** *laminaefavosa* | Carter, 1885 | ‘laminated honeycomb *Holopsamma*’ |
| *▪ Holo****psamma*** *macropora* | (Von Lendenfeld, 1888) | ‘large-pored *Holopsamma*’ (but not published as a sand-sponge) |
| *▪ Holo****psamma*** *pluritoxa* | (Pulitzer-Finali, 1982) | ‘multi-toxate *Holopsamma*’ |
| *▪ Holo****psamma*** *ramosa* | (Hallmann, 1912) | ‘branching *Holopsamma*’ |
| *▪ Holo****psamma*** *rotunda* | (Hallmann, 1912) | ‘rounded *Holopsamma*’ |
| *▪ Holo****psamma*** *simplex* | (Von Lendenfeld, 1886) | ‘simple *Holopsamma*’ |
| *▪ Hymeniacidon* ***calci****fera* | Row, 1911 | ‘calcium carbonate bearing *Hymeniacidon*’ |
| *▪ Hyrtios* ***arenosus*** | (Thiele, 1905) | ‘sandy *Hyrtios*’ |
| *Iotrocho****psamma*** | De Laubenfels, 1936 | genus of ‘sand *Iotrochota*’ |
| *▪ Iotrocho****psamma*** *arbuscula* | (Whitelegge, 1906) | ‘shrub *Iotrochotopsamma*’ |
| *▪ Iotrochota* ***agglomerata*** | Lehnert & van Soest, 1999 | ‘binding *Iotrochota*’ |
| *▪ Iotrochota* ***arenosa*** | Rützler et al., 2007 | ‘sandy *Iotrochota*’ |
| *▪ Ircinia pauci****arenaria*** | Boury-Esnault, 1973 | ‘lightly sand-filled *Ircinia*’ |
| *▪ Liosina* ***arenosa*** | (Vacelet & Vasseur, 1971) | ‘sandy *Liosina*’ |
| *▪ Lissodendoryx (Ectyodoryx)* ***arenaria*** | Burton, 1936 | ‘sand pit *Lissodendoryx*’ |
| *▪* invalid: *Megalopastas* ***areni****fribrosa*, accepted as *Lendenfeldia plicata* | (Esper, 1794) | ‘sandy fibre *Megalopastas*’ |
| *Mycale (****Areno****chalina)* | Von Lendenfeld, 1887 | ‘sandy *Chalina*, sand scarf *Mycale*’ |
| *▪ Mycale (****Areno****chalina) africamucosa* | Van Soest *et al.*, 2014 | ‘African slimy arenochalid *Mycale*’ |
| *▪ Mycale (****Areno****chalina) anatipes* | (De Lamarck, 1813) | ‘Anatipes arenochalid *Mycale*’ |
| *▪ Mycale (****Areno****chalina) anomala* | (Ridley & Dendy, 1886) | ‘abnormal arenochalid *Mycale*’ |
| *▪ Mycale (****Areno****chalina) aplysilloides* | (Von Lendenfeld, 1888) | ‘*Aplysilla*-like arenochalid *Mycale*’ |
| *▪ Mycale (****Areno****chalina) euplectellioides* | (Row, 1911) | ‘*Euplectella*-like arenochalid *Mycale*’ |
| *▪ Mycale (****Areno****chalina) euplectellioides var. regularis* | Wilson, 1925 | ‘*Euplectella*-like arenochalid *Mycale* in the regular variety’ |
| *▪ Mycale (****Areno****chalina) flammula* | (De Lamarck, 1814) | ‘flame-like arenochalid *Mycale*’ |
| *▪ Mycale (****Areno****chalina) incrustans* | (Burton, 1932) | ‘encrusting arenochalid *Mycale*’ |
| *▪ Mycale (****Areno****chalina) laxissima* | (Duchassaing & Michelotti, 1864) | ‘softest arenochalid *Mycale*’ |
| *▪ Mycale (****Areno****chalina) mirabilis* | (Von Lendenfeld, 1887) | ‘miraculous arenochalid *Mycale*’ |
| *▪ Mycale (****Areno****chalina) pluriloba* | (De Lamarck, 1814) | ‘manifold arenochalid *Mycale*’ |
| *▪ Mycale (****Areno****chalina) setosa* | (Keller, 1889) | ‘bristly arenochalid *Mycale*’ |
| *▪ Mycale (****Areno****chalina) tenuityla* | (Pulitzer-Finali, 1982) | ‘slender-tyled arenochalid *Mycale*’ |
| *▪ Mycale (****Areno****chalina) trincomalensis* | Rao, 1941 | ‘Trincomalee arenochalid *Mycale*’ |
| *▪ Mycale (****Areno****chalina) truncatella* | (Von Lendenfeld, 1887) | ‘*Truncatella* arenochalid *Mycale*’ |
| *▪* invalid: *Mycale* ***arenosa***, accepted as *Mycale (Grapelia) australis* | (Gray, 1867) | ‘sandy *Mycale*’ |
| *▪ Mycale (Mycale)* ***arenaria*** | Hajdu & Desqueyroux-Faúndez, 1994 | ‘sand pit *Mycale*’ |
| *▪ Mycale (Mycale)* ***areni****cola* | (Ridley & Dendy, 1886) | ‘sand dwelling *Mycale*’ |
| *▪ Myxilla (Ectyomyxilla)* ***arenaria*** | Dendy, 1905 | ‘sand pit *Myxilla*’ |
| *▪ Niphates* ***arenata*** | Rützler et al., 2014 | ‘sandy *Niphates*’ |
| *▪ Oceanapia* ***arenosa*** | Rao, 1941 | ‘sandy *Oceanapia’* |
| *▪ Phoriospongia* ***areni****fibrosa* | (Dendy, 1896) | ‘sand-fibre *Phoriospongia*’ |
| *▪ Polymastia* ***agglutinans*** | Ridley & Dendy, 1886 | ‘binding, adhering *Polymastia*’ |
| *▪ Prosuberites* ***psammo****philus* | (Pulitzer-Finali, 1986) | ‘sand loving *Prosuberites*’ |
| invalid: ***Psamm****aplysilla*, accepted as *Pseudoceratina* | (Carter, 1885) | ‘sand *Aplysilla*’ |
| *▪* invalid: ***Psamm****aplysilla arabica*, accepted as *Pseudoceratina arabica* | (Keller, 1889) | ‘Arabian *Psammaplysilla*’ |
| *▪* invalid: ***Psamm****aplysilla purpurea*, accepted as *Pseudoceratina purpurea* | (Carter, 1880) | ‘purple *Psammaplysilla*’ |
| invalid: **Psamm**ascidae, accepted as Chondropsidae | Carter, 1886 | ‘sand bladder sponges’ |
| invalid: ***Psamm****ascus*, accepted as ***Psammo****clema* | (Keller, 1889) | ‘sand bag, sand taker’ |
| *▪* invalid: ***Psamm****ascus lamella*, accepted as *Chondropsis lamella* | (von Lendenfeld, 1888) | ‘lamellar *Psammascus*’ |
| *▪* invalid: ***Psamm****ascus psellus*, accepted as *Hyrtios proteus* | Duchassaing & Michelotti, 1864 | ‘Psellus *Psammascus*’ |
| ***Psamm****astra* | Sollas, 1886 | ‘sand star’ |
| *▪* ***Psamm****astra conulosa* | Kieschnick, 1896 | ‘conulous *Psammastra*’ |
| *▪* invalid: ***Psamm****astra gigas*, accepted as *Ancorina robusta* | (Carter, 1883) | ‘huge *Psammastra*’ |
| *▪* ***Psamm****astra murrayi* | Sollas, 1886 | ‘Murray’s *Psammastra*’ |
| *▪* ***Psamm****astra oxygigas* | Lévi, 1993 | ‘huge oxea *Psammastra*’ |
| ***Psammo****chela* | Dendy, 1916 | ‘sand claw’ |
| *▪* ***Psammo****chela chaliniformis* | (Carter, 1885) | ‘*Chalina*-like *Psammochela*’ |
| *▪* ***Psammo****chela elegans* | Dendy, 1916 | ‘elegant *Psammochela*’ |
| *▪* ***Psammo****chela fibrosa* | (Ridley, 1884) | ‘fibrous *Psammochela*’ |
| *▪* ***Psammo****chela* ***psammo****des* | (Hentschel, 1911) | ‘sandy *Psammochela*’ |
| *▪* invalid: ***Psammo****chela recife*, accepted as *Lissodendoryx (Anomodoryx) recife* | (Boury-Esnault, 1973) | ‘reef *Psammochela*’ |
| *▪* ***Psammo****chela rigida* | (Bowerbank, 1875) | ‘rigid *Psammochela*’ |
| *▪* ***Psammo****chela tutiae* | De Voogd, 2012 | ‘Tuti’s *Psammochela*’ |
| *▪* invalid: ***Psammo****chela tylota*, accepted as *Lissodendoryx (Anomodoryx) tylota* | (Boury-Esnault, 1973) | ‘tylote *Psammochela*’ |
| ***Psammo****cinia* | Von Lendenfeld, 1889 | ‘sand flower’ |
| *▪* ***Psammo****cinia* ***amodes*** | De C. Cook & Bergquist, 1998 | ‘sandy *Psammocinia*’ |
| *▪* ***Psammo****cinia* ***arenosa*** | (Von Lendenfeld, 1888) | ‘sandy *Psammocinia*’ |
| *▪* ***Psammo****cinia beresfordae* | De C. Cook & Bergquist, 1996 | ‘Beresford’s *Psammocinia*’ |
| *▪* ***Psammo****cinia bergquistae* | Sim & Lee, 2001 | ‘Bergquist’s *Psammocinia*’ |
| *▪* ***Psammo****cinia bulbosa* | Bergquist, 1995 | ‘bulbous *Psammocinia*’ |
| *▪* ***Psammo****cinia charadrodes* | De C. Cook & Bergquist, 1998 | ‘riven *Psammocinia*’ |
| *▪* ***Psammo****cinia compacta* | (Poléjaeff, 1884) | ‘compact *Psammocinia*’ |
| *▪* ***Psammo****cinia conulosa* | Lee & Sim, 2004 | ‘conulous *Psammocinia*’ |
| *▪* ***Psammo****cinia gageoensis* | Sim & Lee, 2001 | ‘*Psammocinia* from Gageonse’ |
| *▪* ***Psammo****cinia halmiformis* | (Von Lendenfeld, 1888) | ‘*Psammocinia* shaped like *Holopsamma* (referring to old genus name ‘*Halme*’)’ |
| *▪* ***Psammo****cinia hawere* | De C. Cook & Bergquist, 1996 | ‘Hawere *Psammocinia*’ |
| *▪* ***Psammo****cinia hirsuta* | De C. Cook & Bergquist, 1998 | ‘hairy *Psammocinia*’ |
| *▪* ***Psammo****cinia irregularis* | (Poléjaeff, 1884) | ‘irregular *Psammocinia*’ |
| *▪* ***Psammo****cinia jejuensis* | Sim, 1998 | ‘*Psammocinia* from Jeju Island’ |
| *▪* ***Psammo****cinia lobatus* | Sim & Lee, 2002 | ‘lobed *Psammocinia*’ |
| *▪* ***Psammo****cinia mammiformis* | Sim, 1998 | ‘breast shaped *Psammocinia*’ |
| *▪* ***Psammo****cinia maorimotu* | De C. Cook & Bergquist, 1998 | ‘Maorimotu *Psammocinia*’ |
| *▪* ***Psammo****cinia mosulpia* | Sim, 1998 | ‘Mosulpia *Psammocinia*’ |
| *▪* ***Psammo****cinia papillata* | De C. Cook & Bergquist, 1998 | ‘papillate *Psammocinia*’ |
| *▪* ***Psammo****cinia perforodosa* | De C. Cook & Bergquist, 1998 | ‘perforated *Psammocinia*’ |
| *▪* ***Psammo****cinia rubra* | Sim & Lee, 2002 | ‘red *Psammocinia*’ |
| *▪* ***Psammo****cinia samyangensis* | Sim & Lee, 1998 | ‘*Psammocinia* from Samyang’ |
| *▪* ***Psammo****cinia ulleungensis* | Lee & Sim, 2004 | ‘*Psammocinia* from Ulleung Island’ |
| *▪* ***Psammo****cinia verrucosa* | De C. Cook & Bergquist, 1996 | ‘warty *Psammocinia*’ |
| *▪* ***Psammo****cinia vesiculifera* | (Poléjaeff, 1884) | ‘bubble-bearing *Psammocinia*’ |
| *▪* ***Psammo****cinia wandoensis* | Sim & Lee, 1998 | ‘*Psammocinia* from Wando’ |
| ***Psammo****clema* | Marshall, 1880 | ‘branching sand sponge’ |
| *▪* ***Psammo****clema* ***arenaceum*** | (Lévi, 1958) | ‘sand-like *Psammoclema*’ |
| *▪* ***Psammo****clema bitextum* | Wiedenmayer, 1989 | ‘two-texture *Psammoclema*’ |
| *▪* ***Psammo****clema callosum* | (Marshall, 1880) | ‘tough *Psammoclema*’ |
| *▪* ***Psammo****clema decipiens* | (Marshall, 1880) | ‘deceiving *Psammoclema*’ |
| *▪* ***Psammo****clema densum* | (Marshall, 1880) | ‘dense *Psammoclema*’ |
| *▪* ***Psammo****clema digitiferum* | (Von Lendenfeld, 1889) | ‘finger-like *Psammoclema*’ |
| *▪* ***Psammo****clema finmarchicum* | (Hentschel, 1929) | ‘*Psammoclema* from Finnmark (Norway)’ |
| *▪* ***Psammo****clema fissuratum* | Wiedenmayer, 1989 | ‘split *Psammoclema*’ |
| *▪* ***Psammo****clema foliaceum* | Poléjaeff, 1884 | ‘leaf-like *Psammoclema*’ |
| *▪* ***Psammo****clema fuliginosum* | (Carter, 1885) | ‘soot-black *Psammoclema*’ |
| *▪* ***Psammo****clema goniodes* | Wiedenmayer, 1989 | ‘angled *Psammoclema*’ |
| *▪* ***Psammo****clema inordinatum* | (Kirkpatrick, 1903) | ‘unusual *Psammoclema*’ |
| *▪* ***Psammo****clema marshalli* | (Von Lendenfeld, 1888) | ‘Marshall’s *Psammoclema*’ |
| *▪* ***Psammo****clema nicaeense* | (Pulitzer-Finali & Pronzato, 1980) | ‘*Psammoclema* from Nice’ |
| *▪* ***Psammo****clema nodosum* | (Carter, 1885) | ‘knotty *Psammoclema*’ |
| *▪* ***Psammo****clema porosum* | (Poléjaeff, 1884) | ‘porous *Psammoclema*’ |
| *▪* ***Psammo****clema radiatum* | Wiedenmayer, 1989 | ‘ray *Psammoclema*’ |
| *▪* ***Psammo****clema ramosum* | Marshall, 1880 | ‘branching *Psammoclema*’ |
| *▪* ***Psammo****clema rubrum* | (Lévi, 1958) | ‘red *Psammoclema*’ |
| *▪* ***Psammo****clema rugosum* | (Von Lendenfeld, 1888) | ‘rough *Psammoclema*’ |
| *▪* ***Psammo****clema stellidermatum* | (Carter, 1885) | ‘star-skinned *Psammoclema*’ |
| *▪* ***Psammo****clema stipitatum* | Wiedenmayer, 1989 | ‘stake-like *Psammoclema*’ |
| *▪* ***Psammo****clema tuberculatum* | (Von Lendenfeld, 1889) | ‘pimpled *Psammoclema*’ |
| *▪* ***Psammo****clema vansoesti* | Wiedenmayer, 1989 | ‘Van Soest’s *Psammoclema*’ |
| *▪* ***Psammo****clema vosmaeri* | Poléjaeff, 1884 | ‘Vosmaer’s *Psammoclema*’ |
| invalid: ***Psammo****pemma*, accepted as ***Psammo****clema* | Marshall, 1880 | ‘sand eating, sand consuming sponge’ |
| *▪* invalid: ***Psammo****pemma commune*, accepted as *Hyrtios communis* | (Carter, 1885) | ‘common *Psammopemma*’ |
| invalid: ***Psammo****toxa*, accepted as *Clathria (Wilsonella)* | (Carter, 1885) | ‘sand bow sponge’ |
| *▪* invalid: ***Psammo****toxa guettardi*, accepted as *Clathria (Wilsonella) guettardi* | (Topsent, 1933) | ‘Guettard’s *Psammotoxa*’ |
| *▪* invalid: ***Psammo****toxa nigra*, accepted as *Clathria (Wilsonella) nigra* | (Boury-Esnault, 1973) | ‘dark, black *Psammotoxa*’ |
| *▪ ▪ Rhabdastrella aurora var.* ***arenosa*** | (Hentschel, 1909) | ‘sunrise *Rhabdastrella*, in the sandy variety’ |
| *▪ Spongosorites* ***arenatus*** | Díaz et al., 1993 | ‘sandy *Spongosorites*’ |
| *▪ Spongosorites* ***calci****cola* | Picton & Goodwin, 2007 | ‘lime dwelling *Spongosorites*’ |
| *▪ Stelletta* ***agglutinans*** | (Dendy, 1905) | ‘binding, adhering *Stelletta*’ |
| *▪ Stelletta* ***arenaria*** | Bergquist, 1968 | ‘sand pit *Stelletta*’ |
| *Strongyl****amma*** | Hallmann, 1917 | ‘strongyle-sand sponge’ |
| *▪ Strongyl****amma******arenosa*** | (Vacelet & Vasseur, 1971) | ‘sandy *Strongylamma*’ |
| *▪ Strongyl****amma*** *baki* | (Van Soest, 1984) | ‘Bak’s *Strongylamma*’ |
| *▪ Strongyl****amma*** *carteri* | (Dendy, 1895) | ‘Carter’s *Strongylamma*’ |
| *▪ Strongyl****amma*** *nigra* | Moraes, 2011 | ‘dark *Strongylamma*’ |
| *▪ Strongyl****amma*** *wilsoni* | (Dendy, 1922) | ‘Wilson’s *Strongylamma*’ |
| invalid: *Tedanio****psamma***, accepted as *Phoriospongia* | Marshall, 1880 | ‘sand *Tedania*’ |
| *▪* invalid: *Tedanio****psamma*** *flabellopalmata*, accepted as *Phoriospongia flabellopalmata* | (Carter, 1885) | ‘hand-shaped fan sand *Tedania*’ |
| invalid: *Thorecto****psamma***, accepted as *Hyrtios* | Duchassaing & Michelotti, 1864 | ‘sand *Thorecta*’ |
| *▪* invalid: *Thorecto****psamma*** *benoiti*, accepted as *Fasciospongia benoiti* | (Thomas, 1979) | ‘Benoit’s *Thorectopsamma*’ |
| *▪* invalid: *Thorecto****psamma*** *chromogenia*, accepted as *Hyrtios caracasensis* | (Carter, 1882) | ‘coloured *Thorectopsamma*’ |
| *▪* invalid: *Thorecto****psamma*** *irregularis* and *Thorecto****psamma*** *mela*, accepted as *Hyrtios erectus* | (Keller, 1889) | ‘irregular and tune *Thorectopsamma*’ |
| *▪* invalid: *Thorecto****psamma*** *xana*, accepted as *Pseudoceratina purpurea* (already listed under ***Psamm****aplysilla*) | (Carter, 1880) | ‘repeated *Thorectopsamma*’ |
| *▪* invalid: *Stelletta* ***areni****tecta*, accepted as *Stelletta tuberculata* | (Carter, 1886) | ‘sand cover, sand roof *Stelletta*’ |
| *▪ Tethyopsis* ***calci****fera* | (Bergquist, 1968) | ‘calcium carbonate carrying *Tethyopsis*’ |
| *▪ Xestospongia* ***arenosa*** | Van Soest & De Weerdt, 2001 | ‘sandy *Xestospongia*’ |

**Appendix 2.** Summary of literature on sponge-sediment relationships. Taxon examples for any given observation are listed alphabetically by genus and species name, ignoring the subgenus, and more accurately identified taxa are listed before less accurately identified one. Higher taxon sequence is phylum: class: order: family, with respective subtaxa given in brackets where applicable. Taxon allocations, validities and authorities were confirmed in June 2015 according to Van Soest *et al.* (2015) and include decisions proposed by Morrow & Cárdenas (2015). ‘Armour’ refers to any sediment crust embedded in the sponge surface, ‘crust’ to an external layer of sediments adhering to the sponge surface.

| Observation, environmental condition | Species | Location | Classification | Taxon authority | Reference |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
| AGGLUTINATION, BINDING, ANCHORING: Description. ‘Three specimens of a brown and massive sponge. […] In places the surface perhaps hispid or covered in small pebbles, always at the base.’ | *Aaptos aaptos* | coasts of Brazil, Atlantic, 75 m | Po: Dem (Heteroscleromorpha): Suberitida: Suberitidae | (Schmidt, 1864) | Boury-Esnault, 1973 |
| AGGLUTINATION: Description. The sponge agglutinates and incorporates coarse biogenic pebbles, but also binds stones and sediments by growing as ‘putty’ nto crevices. The type is pictured in situ and fixed. | *Aaptos glutinans* | Das Rocas Atoll, W Atlantic, 1.5 m | Po: Dem (Heteroscleromorpha): Suberitida: Suberitidae | De Moraes, 2011 | De Moraes, 2011 |
| INCORPORATION: Description. In *A. australis* all fibres are strongly cored with detritus. | *Acanthodendrilla australis* | type locality: Caribbean, depth not stated | Po: Dem (Keratosa): Dendroceratida: Dictyodendrillidae | Bergquist, 1995 | Bergquist & De C. Cook, 2002a |
| ANCHORING: Description. ‘Surface extremely hispid with a lateral fringe extending about 5 mm from body. […] Rooted by spicule tufts into muddy substrate. […] The sponges also have a distinctive fringe of extremely long spicules at the edge of their flattened or concave tops, and have a spicule root for stabilisation in a muddy substrate.’ | *Acanthopolymastia acanthoxa* | Ross Sea, Antactica, Southern Ocean, 3200-3300 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | (Koltun, 1964) | Kelly-Borges & Bergquist, 1997 |
| ANCHORING: Description. ‘Rooted in muddy substrate. […] Lévi noted that the Norfolk Ridge specimens differed from the holotype description of *A. acanthoxa* in the reduced dimensions of the spicules, and in the form of the fringe megascleres being tylostyles instead of styles.’ | *Acanthopolymastia pisiformis* | Norfolk Ridge, new Caledonia, Pacific, 900-2110 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Kelly-Borges & Bergquist, 1997 | Kelly-Borges & Bergquist, 1997 |
| INCORPORATION: Description. ‘Massive, solid and heavy. […] Very hard; composed chiefly of coarse sand arranged in dense, stout, close-packed, radiating columns, whose ends may form a meandriniform pattern on the upper surface. Colour in spirit sandy brown. The spicular skeleton is reduced to insignificance in comparison with the coarse sand, but slender spicules are abundantly scattered through the soft tissues.’ | *Acarnus guentheri* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Acarnidae | (Dendy, 1896) | Dendy, 1896 (as *Microtylotella*) |
| CRUST: Guides. *A. nicoleae* incorporates much sediment and has an external sediment crust. | *Acarnus nicoleae* | Brazil, W Atlantic, 7-10 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Acarnidae | Van Soest *et al.*, 1991 | Muricy *et al*., 2008 |
| INCORPORATION: Description. ‘Specimens are characterized by an amount of sediment in the choanosome. […] Named ‘sabulum’, which means sand in Latin, because this species incorporates sand grains in the choanosome.’ | *Acarnus sabulum* | Baja California, Pacific, 3-4 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Acarnidae | Aguilar-Camacho et al., 2013 | Aguilar-Camacho *et al*., 2013 |
| INCORPORATION: Description. ‘Sand is found in the choanosome.’ | *Acheliderma fulvum* | Mexican Pacific, 6-10 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Acarnidae | Aguilar-Camacho et al., 2013 | Aguilar-Camacho *et al*., 2013 |
| BINDING: Description. ‘The single specimen is massive, compact, cushion-shaped, rather irregular, but with rounded outlines, somewhat flattened above and attached below by a broad base to a mass of calcareous debris.’ | *Aciculites orientalis* | Sri Lanka, Indian Ocean, depth not stated | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Scleritodermidae | Dendy, 1905 | Dendy, 1905 |
| ANCHORING: Description. Euplectellidae are glass sponges that have spicule tufts that anchor them in sediments (basalia). The monospecific genus *Acoelocalyx* has a single spicule tuft emerging from the end of a stalk. The tuft and the stalk in *A. brucei* look like a paint brush. | *Acoelocalyx brucei* | museum specimens, Wedell Sea, Antarctica, 4547 m | Po: Hex (Hexasterophora): Lyssacinosida: Euplectellidae (Euplectellinae) | Topsent, 1910 | Tabachnick, 2002a |
| AGGLUTINATION, BINDING: Description. ‘Some pebbles can be incorporated in the surface.’ The sponge is figured. | *Agelas dispar* | coasts of Brazil, Atlantic, 27-75 m | Po: Dem (Heteroscleromorpha): Agelasida: Agelasidae | Duchassaing & Michelotti, 1864 | Boury-Esnault, 1973 |
| CRUST: Guide. A crossection is shown in which *A. dispar* displays a dark top layer of foreign material. The layer looks external. | *Agelas dispar* | Brazil, W Atlantic, 10-101 m | Po: Dem (Heteroscleromorpha): Agelasida: Agelasidae | Duchassaing & Michelotti, 1864 | Muricy *et al*., 2008 |
| ARMOUR?, CRUST?, INCORPORATION: Description. ‘Foreign material may be abundant [on? or in? the ectosome…]. The flesh contains varied amounts of sand and spicular debris.’ | *Agelas schmidti* | Barbados, Caribbean, depth not stated | Po: Dem (Heteroscleromorpha): Agelasida: Agelasidae | Wilson, 1902 | Hechtel, 1969 |
| INCORPORATION: Guide. A crossection is shown in which *A. schmidtii* has a few pockets of incorporated material. | *Agelas schmidti* | Brazil, W Atlantic, 62-63 m | Po: Dem (Heteroscleromorpha): Agelasida: Agelasidae | Wilson, 1902 | Muricy *et al*., 2008 |
| AGGLUTINATION, ANCHORING, PSAMMOBIOSIS?: Description. ‘Sponge massive, depressed, sessile, irregular, thickly encrusted with shell debris and other rubbish. Lower surface sending out numerous rather slender, elongated, rootlike processes, attached to which are pebbles, &c. Upper surfaces give off a few irregular, slender, elongated fistulae, most of which are closed at the apex (? Two open naturally). These hollow fistulae branch irregularly, and some have distinctly reticulate walls. The body of the sponge is dense and compact, and is enclosed on all sides by a rather thin but very dense and hard cortex.’ | *Amphiastrella birotulifera* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Iotrochotidae | (Carter, 1886) | Dendy, 1896 |
| PRODUCING SEDIMENTS through bioerosion, BINDING?: The bioeroding status of this species has been discussed and may be doubtful. If not eroding, this species is encrusting and nestling, thus providing the exact opposite function: binding. | *Amorphinopsis excavans* | Mergui Archipelago, Andaman Sea, Indian Ocean, depth not stated | Po: Dem (Heteroscleromorpha): Suberitida: Halichondriidae | Carter, 1887 | Erpenbeck & van Soest, 2002 |
| PSAMMOBIOSIS?: The fragments that became available had fistules and obviously belonged to massive sponges. The morphology suggested endopsammic life style. | cf. *Amorphinopsis* *foetida* | Montgomery Reef, Kimberley, NW Australia, 21 m | Po: Dem (Heteroscleromorpha): Suberitida: Halichondriidae | (Dendy, 1889) | Schönberg, unpubl. data |
| INCORPORATION, ANCHORING: Description. The specimen had centrally and basally embedded sediments. | *Amorphinopsis* sp. CERF 1 | Carnarvon Shelf NW Australia, Indian Ocean, 43 m | Po: Dem (Heteroscleromorpha): Suberitida: Halichondriidae | indet. | Schönberg *et al.*, 2012 |
| BIOEROSION: Description. ‘Filling cavities and crevices in coral rock, 3-15 mm below the substratum surface. No epilithic structures were seen except small, white tubules and fistules that turned out to belong to a co-occurring *Siphonodictyon*. From calcareous fragments and pitting of the substratum it seems that the sponge is excavating.’ | *Amorphinopsis* sp. | Belize, Caribbean, 20 m | Po: Dem (Heteroscleromorpha): Suberitida: Halichondriidae | indet. | Rützler *et al.,* 2014 |
| INCORPORATION: Field study comparing incorporated to ambient sediments. *Amphimedon* spp. incorporated sediments and selected for specific grain sizes. | *Amphimedon compressa* | Belize, Caribbean, 1 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Niphatidae | Duchassaing & Michelotti, 1864 | Cerrano *et al.*, 2004a |
| INCORPORATION: Description. A view of ectosomal fibres is pictured tangentially, with sand grains adhering to the spongin, but not entirely embedded. | *Amphimedon* aff. *compressa* | Fernando de Noronha Island and Das Rocas Archipelago, W Atlantic, 1-10 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Niphatidae | Duchassaing & Michelotti, 1864 | De Moraes, 2011 |
| BINDING, ANCHORING: Description. Creeping branches of this species had attached to a number of rhodolith balls, thus binding them | *Amphimedon* cf. *paraviridis* | Carnarvon Shelf NW Australia, Indian Ocean, 47-48 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Niphatidae | Fromont, 1993 | Schönberg *et al.*, 2012 |
| INCORPORATION: Field study comparing incorporated to ambient sediments. *Amphimedon* spp. incorporated sediments and selected for specific grain sizes. | *Amphimedon viridis* | Belize, Caribbean, 1 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Niphatidae | Duchassaing & Michelotti, 1864 | Cerrano *et al.*, 2004a |
| ANCHORING: Description. Schmidt described *A. synapta* as having several smaller spicule tufts that extend into the substrate in different directions. | *Amphoriscus synaptus* | not stated, assumed Atlantic | Po: Cal (Calcaronea): Leucosolenida: Amphoriscidae | (Schmidt in Haeckel, 1872) | Schmidt, 1870 (as *Sycura synapta*) |
| INCORPORATION: Description. ‘Sponge consisting of a massive, irregular, intensely and coarsely sandy body; invested in a thin, delicate membrane rising up above into rather short, hollow, thin-walled processes, some widely open and some closed. Body sand-coloured, projections pale yellow in spirit. Skeleton, the main skeleton of the body is a dense agglomeration of sand grains with spicules in the interstices. The sand may be arranged in stout, flattened columns, running vertically upwards and appearing on the surface in the form of meandering sandy tracts. Many of the sand grains are abundantly echinated by spined styli. The other spicules are scattered irregularly between them.’ | *Ancheliderma fistulatum* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Acarnidae | (Dendy, 1896) | Dendy, 1896 (as *Fusifer fistulatus*) |
| AGGLUTINATION: Description. The suface is ‘bald’, but attached are ‘large, up to 9 mm long bivalve shells and other foreign bodies.’ | *Ancorina multistella* | Cape Bojeador, W Africa, Atlantic, 146 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 (as *Sanidastrella*) |
| ANCHORING: Description. *A. ijimai* is depicted with a few long, whispy spicule tufts trailing from the basal part of the sponge. | *Anoxycalyx (Anoxycalyx) ijimai* | museum specimens, Antarctic and Arctic Oceans, 46-306 m | Po: Hex (Hexasterophora): Lyssacinosida: Rossellidae (Rosselinae) | Kirkpatrick, 1907 | Tabachnick, 2002b |
| ANCHORING: Description. *A. joubini* is depicted with a thick, short basal bundle of anchoring spicules of about 3 cm length. | *Anoxycalyx (Scolymastra) joubini* | museum specimens, Antarctic Ocean, 20-440 m | Po: Hex (Hexasterophora): Lyssacinosida: Rossellidae (Rosselinae) | (Topsent, 1916) | Tabachnick, 2002b |
| INCORPORATION: 2004a – Field study comparing incorporated to ambient sediments. 2007a – Review. Sponges unselectively incorporated sediments available in the environment. | *Aplysilla longispina* | Belize, Caribbean, 1 m | Po: Dem (Keratosa): Dendroceratida: Darwinellidae | George & Wilson, 1919 | Cerrano *et al.*, 2004a, 2007a |
| INCORPORATION: Description. ‘The ectosome and endosome are loaded with foreign debris. Much of this foreign material consists of broken spicules of various sorts from other sponges occurring in the vicinity.’ | *Aplysilla polyrhaphis* | Micronesia, Pacific, 5 m | Po: Dem (Keratosa): Dendroceratida: Darwinellidae | De Laubenfels, 1930 | De Laubenfels, 1954 |
| ARMOUR, CRUST: Description. ‘Upper surface mostly glabrous, lipostomous, contains scattered and clustered sand grains at or just below the surface.’ | *Aplysilla rosea* | Bass Strait, depth not stated | Po: Dem (Keratosa): Dendroceratida: Darwinellidae | (Barrois, 1876) | Wiedenmayer, 1989 |
| ARMOUR, INCORPORATION: Description. ‘The skeleton consists of an exceedingly loose network of longitudonal areniferous fibres 0.5 millim. thick, and taverse fibres 0.14 millim. thick, which contain only few foreign bodies.’ | *Aplysina cacos* | Sydney Harbour, Australia, Pacific, depth not stated | Po: Dem (Verongimorpha): Verongiida: Aplysinidae | Von Lendenfeld, 1888 | Von Lendenfeld, 1888 |
| AGGLUTINATION, BINDING: Description of habitus. ‘Marine. Attaching itself to all objects with which it may come into contact while growing. […] Growing upon hard objects.’ No sediment inclusions. | *Aplysina cauliformis* | Bahamas, W Atlantic, depth not stated | Po: Dem (Verongimorpha): Verongiida: Aplysinidae | (Carter, 1882) | Carter, 1882 (partly as *Luffaria*, partly as *Aplysina*) |
| BINDING: Field experiment observing the fate of loose materials (coral rubble) in three different depths with or without sponge fragments added. Sponge-bound aggregates survived better than unconsolidated piles. *A cauliformis* fragments were very suitable as they had high survival rates. | *Aplysina cauliformis* | Curaçao, Caribbean, 2-8 m | Po: Dem (Verongimorpha): Verongiida: Aplysinidae | (Carter, 1882) | Biggs, 2013 |
| INCORPORATION: Field study comparing incorporated to ambient sediments. Sponges incorporated sediments and selected for specific grain sizes, with *A. lacunosa* taking in grains larger than 5 mm. | *Aplysina lacunosa* | Belize, Caribbean, 1 m | Po: Dem (Verongimorpha): Verongiida: Aplysinidae | (De Lamarck, 1814) | Cerrano *et al.*, 2004a |
| ARMOUR, INCORPORATION: The ectosome of this species was armoured, choanosomal fibres were cored with sediments. | *Aplysina* sp. CERF 3 | Carnarvon Shelf NW Australia, Indian Ocean, 41-42 m | Po: Dem (Verongimorpha): Verongiida: Aplysinidae | indet. | Schönberg *et al.*, 2012 |
| BINDING: Field experiment observing the fate of loose materials (coral rubble) in three different depths with or without sponge fragments added. Sponge-bound aggregates survived better than unconsolidated piles. | *Aplysina* sp. | Curaçao, Caribbean, 2-8 m | Po: Dem (Verongimorpha): Verongiida: Aplysinidae | indet. | Biggs, 2013 |
| INCORPORATION: Description. ‘In many specimens, particularly the type, there are numerous bits of foreign material, such as broken shell fragments. These shells give every indication of being in a process of solution, being much eroded and softened. Where this species rested on coral, the latter was also altered to a sort of white mush or porridge.’ | *Aplysinella rhax* | Marshall Islands, Micronesia, Pacific, 2-5 m | Po: Dem (Verongimorpha): Verongiida: Aplysinellidae | (De Laubenfels, 1954) | De Laubenfels, 1954 (as *Dysidea*) |
| ARMOUR, INCORPORATION: Description. ‘The main fibres of the skeleton are 0.18 millim. thick, and cored with an axial string of very small sand-grains. […] A single layer of moderately sized sand-grains and a few scattered spicule-fragments are observed in the skin, forming a very regular reticulation.’ As *A. digitata*: ‘Large sand-grains form a column in the [main fibres].’ | *Aplysinopsis elegans* | N and E Australia, Torres Strait and Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | Von Lendenfeld, 1888 | Von Lendenfeld, 1888 (also as *Aplysinopsis digitata*) |
| ARMOUR, INCORPORATION: Description. In *A. elegans* the surface is thinly and regularly armoured and the primary fibres are cored, secondary fibres uncored. | *Aplysinopsis elegans* | type locality: Australia, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | Von Lendenfeld, 1888 | De C. Cook & Bergquist, 2002a |
| ARMOUR, INCORPORATION: Description. *Arenosclera* spp. have a ‘dermal skeleton consisting of a tangential regular network of foreign debris joined by scarce spongin and a choanosomal rather irregular reticulated skeleton of spongin fibres cored by both foreign material and proper diactines in variable proportion.’ Secondary fibres are uncored or cored by spicules. The author transferred *Arenochalina arabica* into this new genus. | *Arenosclera arabica* | Red Sea, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | (Keller, 1889) | Pulitzer-Finali, 1982 |
| ARMOUR, INCORPORATION: Description. ‘Surface is rough to touch, filled with abundant debris and sand particles. […] Spongin fibres cored by 2-10 spicules and abundant sand grains.’ The sponge occurs at sites where it is exposed to abrasion by sand. | *Arenosclera brasiliensis* | Brazil, Atlantic, 3-5 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | Muricy & Ribeiro, 1999 | Muricy & Ribeiro, 1999 |
| INCORPORATION: ‘Fibre kerasine, resilient, cored or axiated with acerate spicules, among which there are many microscopic foreign objects, sand grains &e.’ | *Arenosclera digitata* | Perth, Australia, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | (Carter, 1882) | Carter, 1882 (as *Cavochalina digitata* var. *arenosa*) |
| ARMOUR, INCORPORATION: Description. *Arenosclera* spp. have a ‘dermal skeleton consisting of a tangential regular network of foreign debris joined by scarce spongin and a choanosomal rather irregular reticulated skeleton of spongin fibres cored by both foreign material and proper diactines in variable proportion.’ Secondary fibres are uncored or cored by spicules. | *Arenosclera heroni* | S Great Barrier Reef, Coral Sea, Australia, 12 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | Pulitzer-Finali, 1982 | Pulitzer-Finali, 1982 |
| ARMOUR, INCORPORATION: Description. The sponge has an arenaceous surface and choanosomal fibres that contain sand. | *Arenosclera heroni* | New Caledonia, Pacific, 25-35 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | Pulitzer-Finali, 1982 | Desqueroux-Faúndez, 1984 |
| ARMOUR, INCORPORATION: Description. *Arenosclera* spp. have ‘choanosomal fibres […] with foreign debris, spicules or both, […] thicker tracts cored by foreign debris, proper spicules or both.’ *A. heroni* has an ‘ectosomal, a tangential irregular network, formed by foreign debris and spicules agglutinated by scarce spongin.’ Its thicker tracts of choanosomal fibres are ‘alternatively cored by foreign debris and by spicules.’ Secondary fibres only contain single spicules. | *Arenosclera heroni* | S Great Barrier Reef, Coral Sea, Australia, 12 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | Pulitzer-Finali, 1982 | Desqueyroux-Faúndez & Valentine, 2002 |
| ARMOUR, INCORPORATION: Description. *Arenosclera* spp. have a ‘dermal skeleton consisting of a tangential regular network of foreign debris joined by scarce spongin and a choanosomal rather irregular reticulated skeleton of spongin fibres cored by both foreign material and proper diactines in variable proportion.’ Secondary fibres are uncored or cored by spicules. | *Arenosclera parca* | S Great Barrier Reef, Coral Sea, Australia, 10-13 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | Pulitzer-Finali, 1982 | Pulitzer-Finali, 1982 |
| ARMOUR, INCORPORATION: Description. The sponge has an arenaceous surface and choanosomal fibres that contain sand. | *Arenosclera parca* | New Caledonia, Pacific, 12-45 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | Pulitzer-Finali, 1982 | Desqueroux-Faúndez, 1984 |
| ARMOUR: Description. Some of the spongin fibres are completely filled with sand, which are fibres close to the surface. | *Arenosclera rosacea* | New Caledonia, Pacific, 0.6-15 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | Desqueroux-Faúndez, 1984 | Desqueroux-Faúndez, 1984 |
| ANCHORING?: Description. ‘Composed of tortuous, hollow or tubulated, thread-like fiaments, almost infinitely and irregularly branching and anastomosing; compactly reticulated above, becoming looser and more open in structure below, where it finally ends in a few of the same kind of hollow filaments, which are attached to the object (mussel-shell) on which it may be growing.’ The author comments that at the sample site were no rocks, so the sponge grows on bivalve shells and shell debris. | *Ascaltis cavata* | Bass Strait, depth not stated | Po: Cal (Calcinea): Clathrinida: Leuascidae | (Carter, 1886) | Carter, 1886 (as *Clathrina*) |
| CRUST: Faunistic inventory. The name refers to the sandy habitat in which the sponge was smapled, but the surface is encrusted with sediment and epibionts. | *Asteropus arenosus* | Oman, Indian Ocean, 12 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Van Soest & Beglinger, 2008 | Van Soest & Beglinger, 2008 |
| BINDING: Description. ‘The single specimen is a small, irregular crust which has probably been attached by the base, to which fragments of calcareous debris are still adherent.’ | *Asteropus haeckeli* | Sri Lanka, Indian Ocean, 9 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Dendy, 1905 | Dendy, 1905 |
| CRUST: Description. ‘Massive sponge […] covered in numerous sand grains.’ | *Asteropus simplex* | coasts of Brazil, Atlantic, 75 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Carter, 1879) | Boury-Esnault, 1973 |
| CRUST: Identification guide. The sponge is depicted with a crust of mud adhering to the very hispid surface. | *Axinella parva* | N Ireland, Atlantic, 30-35 m | Po: Dem (Heteroscleromorpha): Axinellida: Axinellidae | Picton & Goodwin, 2007 | Van Soest, 2015 |
| PSAMMOBIOSIS, ANCHORING: Field survey. Observations using dye and corrosion cast study. During endopsammic life disadvantages (risk of clogging, complete burial, dislodgement, lack of oxygen) have to be balanced by advantages (shelter). Erect parts containing the exhalants apically extended above the sediment, while inhalants were on the buried body that was anchored to beach-stone. | *Biemna ehrenbergi* | N Red Sea, 0.5-18 m | Po: Dem (Heteroscleromorpha): Biemnida: Biemnidae | (Keller, 1889) | Ilan & Abelson, 1995; Rützler, 2004 |
| PSAMMOBIOSIS: Description. ‘This sponge appears as a mass or cake from which numerous chimneys arise. No. M. 466 was an exception in this regard in that the whole top of the sponge protruded above the dirty sand, but all the other specimens noted had the basic mass completely under the mud, and only the chimneys protruding. […] The surface is uneven and almost always obscured by mud. […] With the mass of the sponge so deeply buried, it seems problematical that pores would be effective in the usual location. Can it be that some of the large openings, ostensibly oscules, may have been really inhalant, as others were exhalant? The oscules are from 5 to 8 mm in diameter, by the inside measurement of the tubes or chimneys. The latter may rise as much as 5 to 10 cm above the main mass of the sponge (well above the sand or mud)’. | *Biemna fortis* | Micronesia and Palau, Pacific, 30 cm to 3 m | Po: Dem (Heteroscleromorpha): Biemnida: Biemnidae | (Topsent, 1897) | De Laubenfels, 1954 |
| PSAMMOBIOSIS, INCORPORATION, ANCHORING, BINDING: 2002a – Field survey with sampling for SEM and sediment analyses and corrosion cast study. Endopsammic life habit selects against competition and predation, it reduces irradiation, the risk of desiccation or being damaged by storms. *B. fortis* massive forms incorporated more sediment than deeply buried conical forms. Sediment incorporation was used by the sponges for anchoring and preventing dislodgement, it increased their weight and created irregularities on their surfaces. By their actions, they consolidated sediments. Sediment uptake depended on sponge growth forms, which varied with thickness of the sediment layer over rock. *B. fortis* massive forms incorporated more sediment than deeply buried conical forms, but displayed no selectivity. | *Biemna fortis* | Bunaken, Sulawesi, Celebes Sea, Indonesia, W Pacific, intertidal to 30 m | Po: Dem (Heteroscleromorpha): Biemnida: Biemnidae | (Topsent, 1897) | Cerrano *et al.*, 2002, 2007a |
| PSAMMOBIOSIS: Field study in coastal marine karst lakes that had muddy bottoms, were very turbid and experience a wide range of environmental fluctuation. *B. megalosigma* occurred in coastal areas outside of the lakes, partially buried in sediments, and had fistules. | *Biemna megalosigma* | Gulf of Tonkin, South China Sea, N Vietnam, 1-3 and 7-8 m | Po: Dem (Heteroscleromorpha): Biemnida: Biemnidae | Hentschel, 1912 | Azzini *et al.*, 2007 |
| Morphology suitable for PSAMMOBIOSIS: Desciption. Morphological characters suggest psammobiosis, possibly with emerging structures being photosynthetic. ‘The sponge is encrusting to massive with prominent oscular fistules. […] In life, external upper surfaces purple […], interior and basal areas yellow.’ | *Biemna rufescens* | New Zealand, Pacific, 12-18 m | Po: Dem (Heteroscleromorpha): Biemnida: Biemnidae | Bergquist & Fromont, 1988 | Bergquist & Fromont, 1988 |
| INCORPORATION, BINDING: Description. *B. ammosclera*: ‘Some [surface] peels contain a considerable amount of fine debris and a few foreign spicules. Some tylostyles are scattered in confusion [in the choanosome], but many are implanted vertically by their bases on all sides of calcareous fragments.’ The growth form of the sponge was a ‘thin film, less than 0.5 cm in thickness, extending overcoral and continued as a mat binding clumps of fine to coarse sediment.’ Hechtel listed two other *Bubaris* spp. that bound sediments in a similar way. | 1 – *Bubaris ammosclera*  2 – *Bubaris salomonensis*  3 – *Bubaris vermiculata* | Barbados, Caribbean, 14-15 m | Po: Dem (Heteroscleromorpha): Bubarida: Bubaridae | 1 – Hechtel, 1969  2 – Dendy, 1922  3 – (Bowerbank, 1866) | Hechtel, 1969 |
| INCORPORATION: Description. ‘The main fibres […are…] cored with abundant spicule-fragments.’ | *Cacospongia levis* | Barra Grande, Brazil, Atlantic, Australian coasts, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | Poléjaeff, 1884 | Von Lendenfeld, 1888 (as *Stelospongia australis* var. *levis*) |
| INCORPORATION: Description. In *Cacospongia* spp. the surface is never armoured and the primary fibres are cored, secondary fibres uncored. This is also the case for *C. mollior*. | *Cacospongia mollior* | type locality: Mediterranean, depth presently not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | Schmidt, 1862 | De C. Cook & Bergquist, 2002a |
| INCORPORATION: Guide. *Cacospongia* sp. is shown with coarse sediments adhering to its surface and in crossection with sediments incorporated in some of the spongin fibres. | *Cacospongia* sp. | Brazil, W Atlantic, 68-75 m | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | indet. | Muricy *et al*., 2008 |
| INCORPORATION: Description. The sponge is pictured with fibres cored with sand grains. Only primary fibres are cored. | *Cacospongia* sp. | Brazilian oceanic islands, W Atlantic, <1 m | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | indet. | De Moraes, 2011 |
| INCORPORATION: Description. ‘Flesh scanty, trympanising some of meshes, contains fine calcareous sediment.’ | *Callyspongia (Cladochalina) asparagus* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | (De Lamarck, 1814) | Wiedenmayer, 1989 |
| INCORPORATION: Guide. A crossection is shown in which *C. fallax* has some incorporated material associated with spongin fibres. | *Callyspongia (Callyspongia) fallax* | Brazil, W Atlantic, 62-63 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | Duchassaing & Michelotti, 1864 | Muricy *et al*., 2008 |
| ARMOUR, INCORPORATION: Description. The surface ‘primary fibers are full of foreign material, [the] finer fibers also contain coarse material, the particles of which often are as much as 50 [x in diameter.’ The endosomal fibres ‘contain coarse debris. […] This species is unique within the genus *Callyspongia* for its sand-filled fibers.’ | *Callyspongia psammophera* | Marshall Islands, Pacific, 10 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | De Laubenfels, 1954 | De Laubenfels, 1954 |
| ARMOUR, INCORPORATION: Description. ‘Ectosomal reticulum poorly defined even at intermediate magnification, masked by dermis and ill-sorted sediment.’ Choanosomal primary and secondary fibres cored by proper spicules, but some sediment including foreign spicules occur in between fibres. […] Content of foreign debris scattered throughout the choanosome variable: coarse lithic fragments, foreign spicules (various megascelers and their fragments, microscleres), and fine sediment, the latter most variable in abundance.’ | *Callyspongia (Callyspongia) ramosa* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | (Gray, 1843) | Wiedenmayer, 1989 |
| AGGLUTINATION, BINDING: Description of habitus. ‘Marine. Growing upon hard objects.’ | *Callyspongia (Cladochalina) tenerrima* | Bahamas, W Atlantic, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | Duchassaing & Michelotti, 1864 | Carter, 1882 (as *Aplysina longissima*) |
| INCORPORATION: Description. ‘Main skeleton an irregular meshwork of clear, pale, weak spongin fibres, always free of proper spicules and foreign inclusions.’ | *Callyspongia toxifera* | Bass Strait, 55-79 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | Wiedenmayer, 1989 | Wiedenmayer, 1989 |
| INCORPORATION: Description. ‘The surface-skeleton consists of a network of horny fibres, without foreign bodies. […] In the dermal membrane abundant sand-grains and other foreign bodies are found between the fibres of this tangential network; thus a thin but very tough cortex is formed. The main characters of the supporting-skeleton are the uniformity and thickness of main and connecting fibres and the absence of foreign bodies in the fibres.’ | *Callyspongia velum* | W Australia, Indian Ocean, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Phyllospongia*) |
| ANCHORING, BINDING: Description. The sponge is pictured on coarse, rubbly sediment, to which it is anchored with body extensions (‘feet’). | *Caminus carmabi* | Bonaire, Caribbean 120-198 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Geodiidae (Erylinae) | Van Soest *et al*., 2014 | Van Soest *et al*., 2014 |
| ARMOUR, INCORPORATION: Description. In *C. flabellata* the surface is heavily armoured, the simple primary fibres are cored, the secondary are uncored. | *Candidaspongia flabellata* | type locality: Australian Great Barrier Reef, Coral Sea, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Phyllospongiinae) | Bergquist *et al.*, 1999 | De C. Cook & Bergquist, 2002a |
| ARMOUR, INCORPORATION: Description. ‘The outer surface of the tubes is smooth, strewn with small sand grains (about 50 μm across) which neither form a continuous layer nor a tangential reticulation.’ Inner surfaces of tubes were free of debris. Choanosomal ‘fibres consist of foreign debris (mostly sand) which generally do not exceed 50 μm across.’ | *Carteriospongia delicata* | northern Great Barrier Reef, Coral Sea, Pacific, depth not stated, assumed shallow | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Phyllospongiinae) | Pulitzer-Finali, 1982 | Pulitzer-Finali, 1982 |
| ARMOUR, INCORPORATION: Description. For ‘*P. elegans*’: ‘The surface-skeleton consists of a thin sand-cortex. […] The main fibres of the supporting-skeleton are only 0.05 millim. thick, and contain small, axially situated, scattered sand-grains.’ Connecting fibres are uncored. For ‘*P. foliascens*’: ‘The skeleton consists of a network of fibres in the interior of a dense sand-cortex on the surface. The main fibres […] have an uneven surface, and are charged with large axially situated sand-grains, which lie so close together that they form a continuous column. {…The} connecting fibres […] are entirely free of foreign bodies of any kind.’ | *Carteriospongia foliascens* | W and E Australia, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Phyllospongiinae) | (Pallas, 1766) | Von Lendenfeld, 1888 (as *Phyllospongia foliascens* and *Phyllospongia elegans*) |
| ARMOUR, INCORPORATION: Description. The interior surface of the funnel-shaped sponge and the ascending primary fibres were ‘loaded with coarse foreign material’. | *Carteriospongia foliascens* | Palau, Philippine Sea, Pacific, 2 m | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Phyllospongiinae) | (Pallas, 1766) | De Laubenfels, 1954 (as *Phyllospongia lekanis*) |
| ARMOUR, INCORPORATION: Description. In *Carteriospongia* spp.the surface is heavily armoured with foreign debris, the primary fibres are heavily cored with foreign debris, the secondary fibres either cored or uncored, and tertiary fibres are uncored. *C. foliascens* has ‘sand-encrusted islands’ on the surface. | *Carteriospongia foliascens* | type locality: India, Indian Ocean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Phyllospongiinae) | (Pallas, 1766) | De C. Cook & Bergquist, 2002a |
| INCORPORATION: Experimental study on dredging effects on sponges. The authors showed with micro-computed tomography that the sponge embeds sand particles that are associated with its spongin skeleton. It also frequently contained symbiotic barnacles. | *Carteriospongia foliascens* | central Great Barrier Reef, Coral Sea, Pacific, low intertidal and reef flat | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Phyllospongiinae) | (Pallas, 1766) | Büttner & Siebler, 2013 |
| ARMOUR, INCORPORATION: Description. ‘Armoured ectosome 100-135 μm thick, with packed to crowded mixed detritus in variable proportions: spicule fragments dominate in some areas, lithic and skeletal grains in others. […] Periphery [with] interstitially scattered spicule fragments. Deeper main skeleton highly irregular, primaries thicker (up to 250 μm), very lumpy, with single very large lithic grains (mostly quartz) almost exclusively, completely enveloped in spongin.’ | *Carteriospongia silicata* | Bass Strait and Great Barrier Reef, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Phyllospongiinae) | (Von Lendenfeld, 1889) | Wiedenmayer, 1989 |
| ARMOUR, INCORPORATION: Description. ‘Partially incorporated lacy bryozoans and fragments of clam shells, including an almost complete *Pecten* valve. […] Surface contains conspicuous, scattered detrital grains and foraminifera. […] Regular meshes of reticulum formed by armoured ectosome. [Primary fibres] half filled with spicule fragments and lithic grains in disorderly fashion, often off-axis and protruding. […] Ectosome packed with ill-sorted mixed detritus (spicule fragments, skeletal and lithic grains up to 700 μm wide), about 200-300 μm thick.’ | *Carteriospongia vermicularis* | Bass Strait, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Phyllospongiinae) | (Von Lendenfeld, 1889) | Wiedenmayer, 1989 |
| ANCHORING: Description. *C. tener* is depicted with a weakly pronounced spicule tuft at the base of a slender stalk. | *Caulocalyx tener* | museum specimens, central Indian Ocean and central Atlantic, 3160-3700 m | Po: Hex (Hexasterophora): Lyssacinosida: Euplectellidae (Bolosominae) | Schulze, 1886 | Tabachnick, 2002a |
| PSAMMOBIOSIS, INCORPORATION, CRUST, ANCHORING, BINDING: 1997 – Field study conducted with fluorescent dye, and laboratory analyses with light microscopy and TEM. The body of *C. cuspidifera* was buried in sediments, while incurrent fistules extended above the substrate. This direction of the water stream is unusual, but lowers the risk of clogging by sediments. The sponge also incorporated sediments and had a significant crust of sediments around the outside. By the endopsammic life style the sponges contributed to consolidation, venting and enrichment of the nearby sediments. 2002 – Description. The endopsammic life style of *Cervicornia* is presently a diagnostic character. The sponge ‘sends root-like exhalant tubes deep into the substrate’. 2004 – Review. Summary of above information. | *Cervicornia cuspidifera* | Belize, Caribbean, 4-10 m | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | (De Lamarck, 1815) | Rützler, 1997 (as *Spheciospongia*), 2002, 2004 |
| ANCHORING: Description. Hyalonematidae are glass sponges with a single tuft of spicules rooting them in sediments (basalia). In the genus *Chalaronema* basalia are spicules forming a broad and loose basal tuft that is not twisted. In *C. sibogae* ‘the basalia protrude at about 100 mm forming a broad tuft […] over 150 mm long up to 200 mm in diameter.’ | *Chalaronema sibogae* | museum specimens, Indonesia, Arafura Sea, 296 m | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | Ijima, 1927 | Tabachnick & Menshenina, 2002a |
| ANCHORING: Database listing collection specimens. For *C. sibogae* a photograph is shown. The sponge has a basal spicule bundle. | *Chalaronema sibogae* | Siboga expedition specimen, type is from Indonesia (Van Soest *et al.,* 2014), depth not stated | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | Ijima, 1927 | Ogawa *et al.*, 2006-2012 |
| ANCHORING: Review on the Hexactinellida. ‘Most hexactinellids require a hard substratum for settlement (either rocks or shell debris), but two groups, all Amphidiscophora (including *Hyalonema* and *Monorhaphis*) and Euplectellinae (including *Euplectella*) anchor in soft sediments with special basal spicules.’ | *Chalaronema sibogae* | as general statement, no location given, deep sea | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | Ijima, 1927 | Leys *et al.*, 2007 |
| Morphology suitable for PSAMMOBIOSIS: Description. Massive sponge with ‘cylindrical outgrowth’. | *Characella connectens* | Atlantic between Canary Islands and Africa, 1300 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Pachastrellidae | (Schmidt, 1870) | Burton, 1954 (as *Stryphnus pachastrelloides*) |
| CRUST: Description. ‘Rough/hispid surface due to protruding spicules, which cause strong accumulation of sediment.’ | *Characella poecilastroides* | Bonaire, Caribbean, 168 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Pachastrellidae | Van Soest *et al*., 2014 | Van Soest *et al.*, 2014 |
| ANCHORING: Description. Euplectellidae are glass sponges that have spicule tufts that anchor them in sediments (basalia). The genus *Chaunangium* has several distinctly separated spicule tufts per specimen. In *C. crater* tufts arise basally in fascicles. | *Chaunangium crater* | museum specimens, Andaman and Nicobar Islands, Indian Ocean, 362-805 m | Po: Hex (Hexasterophora): Lyssacinosida: Euplectellidae (Euplectellinae) | Schulze, 1904 | Tabachnick, 2002a |
| ANCHORING: Database listing collection specimens. For *C. cavernosa* a photograph is shown. The sponge has a basal spicule bundle (truncated). | *Chaunoplectella cavernosa* | Japan, Paciofic, depth not stated | Po: Hex (Hexasterophora): Lyssacinosida: Leucopsacidae | Ijima, 1896 | Ogawa *et al.*, 2006-2012 |
| ARMOUR: Description. This species has a sand-reinforced ectosome. | *Chelonaplysilla arenosa* | Coastal S and E Australia, Pacific, depth not stated | Po: Dem (Keratosa): Dendroceratida: Darwinellidae | (Topsent, 1925) | Topsent, 1925 (as *Aplysilla*) |
| INCORPORATION: Description. Fibres cored with a large quantity of foreign material, mainly sand grains and sponge spicules. Fibres are pictured. | *Chelonaplysilla erecta* | Brazilian oceanic islands, W Atlantic, 2-50 m | Po: Dem (Keratosa): Dendroceratida: Darwinellidae | (Row, 1911) | De Moraes, 2011 |
| INCORPORATION: Field guide. *C.* cf. *erecta* has sediment-cored spongin fibres. | *Chelonaplysilla* cf. *erecta* | Bahia, Brazil, W Atlantic, 7-8 m | Po: Dem (Keratosa): Dendroceratida: Darwinellidae | (Row, 1911) | Hajdu *et al.*, 2011 |
| ARMOUR: Identification guide. ‘Surface bears a characteristic reticulation of sand grains visible to the naked eye (*C. noevus* surface). […] Surface reticulation of sand grains with meshes of 160-170 µm diameter.’ | *Chelonaplysilla noevus* | Roscoff, Naples, Monaco, Azores, Cape Verde Islands; a rare species in Western Europe; depth not stated | Po: Dem (Keratosa): Dendroceratida: Darwinellidae | (Carter, 1876) | Van Soest, 2015 |
| CRUST: Description. ‘The granular appearance of the undamaged skin is the result of a dense accumulation of small snad grains that occupy the entire surface between the perforations.’ Spongin fibres in the body are uncored. | *Chelonaplysilla psammophila* | Josephine Seamount, W of Gibraltar, Atlantic, 208 m | Po: Dem (Keratosa): Dendroceratida: Darwinellidae | (Topsent, 1928) | Topsent, 1928 (as *Aplysilla*) |
| CRUST: Description. The surface in *C. violacea* is ‘very distinctive with a white superficial reticulation of sand and spicule fragments visible over underlying darker tissue.’ | *Chelonaplysilla violacea* | New Zealand, Pacific, 0.5-15 m | Po: Dem (Keratosa): Dendroceratida: Darwinellidae | (Von Lendenfeld, 1883) | Bergquist, 1996 |
| BINDING: Description. ‘The specimens of this sponge [are] spreading over masses of calcareous debris.’ | *Chondrilla australiensis* | Sri Lanka, Indian Ocean, 37-55 m and from ‘deep water’ | Po: Dem (Verongimorpha): Chondrillida: Chondrillidae | Carter, 1973 | Dendy, 1905 (also as *C. australiensis* var. *lobata*) |
| INCORPORATION: Description. ‘Due to the incorporated sand the sponge feels hard and rough everywhere. […] The fibres as well as the dermal membrane itself are strongly supported by small sand grains; namely in the latter they lie so densely that they structurally form a thin crust.’ | *Chondrocladia (Chondrocladia) arenifera* | Taiwan Strait, South China Sea, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Cladorhizidae | Brøndsted, 1929 | Brøndsted, 1929 |
| ANCHORING: Review. *C. lampadiglobus* is depicted *in situ*, with the stalk in mud substrate. | *Chondrocladia (Chondrocladia) lampadiglobus* | Pacific, deep sea | Po: Dem (Heteroscleromorpha): Poecilosclerida: Cladorhizidae | Vacelet, 2006 | Van Soest *et al.*, 2012 |
| ANCHORING: Description. The sponges were ‘observed on soft abyssal plain sediment with their root structures (rhizoids) mostly buried’. Sponges ‘with either a basal disc for attachment to rock or basal root (rhizoid) adaptations for anchoring in soft sediment. […] The number, orientation, and general configuration of these curved anchoring appendages vary considerably. Some rhizoids show evidence of secondary anchor-like branching in the portions buried within the substrate. However, it is impossible to assess the extent of subsurface branching, as these branches may have been torn off during collection. The main and more basal anchors are curved, thicker at their base, and become thinner near their tips, which penetrate the substrate, looking much like curved claws. Holotype rhizoid diameters ranged 1.5–5.2 mm with a mean of 3.2 mm, and lengths ranged 12.3–64.8 mm with a mean of 37.8 mm.’ | *Chondrocladia (Symmetrocladia) lyra* | Escanaba Ridge and Monterey Canyon, NE Pacific, 3316 - 3399 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Cladorhizidae | Lee et al., 2012 | Lee *et al.*, 2012 |
| INCORPORATION: Assessing sponges that incorporate sediments (present in the Poecilosclerida, Haplosclerida and Dictyoceratida) the author commented on a prevalence of this phenomenon to occur in some Poecilosclerida (especially common in the Chondropsidae and the Myxillidae), partially to replace siliceous spicules. Due to this character, these sponges are called ‘sand sponges’. | Chondropsidae | N Moluccas, Indonesia, SCUBA depth | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | Hajdu et al., 1994 | De Voogd, 2012 |
| INCORPORATION: Description. *C. arenacea* ‘is a typical sand sponge with much reduced spiculation, and were that species alone available for study it would hardly be possible to form a definite conclusion as to its proper position. […] Sponge massive, sessile, solid, with evenly rounded convex upper surface showing parallel sandy tracts, separated by intervening areas with minutely reticulate dermal membrane. Vents small, scattered in intervening areas. Texture incompressible, friable, intensely sandy, the sand being arranged in a lamino-reticulate fashion.’ | *Chondropsis arenacea* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Dendy, 1917) | Dendy, 1917 (as *Collosclerophora*) |
| INCORPORATION: Description. ‘Spicules of two forms, accompanied by a great quantity of sand. […] Sand diffused, not circumscribed, that is not in the form of fibre. Structure from without inwards consisting of a thin reticulate dermis whose fibre is charged with minute acuates mixed with grains of sand, passing into a cartilaginous fibreless tissue partly charged with the spicules above mentioned in yellow sarcode, and partly with grains of sand throughout, that is presenting no nuclear condensation. When dry the sand appears in aggregations distinct from the yellow sarcode, then of a brown colour like glue, in which the spicules are chiefly imbedded.’ | *Chondropsis arenifera* | Bass Strait, 36.6 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | Carter, 1886 | Carter, 1886 |
| ARMOUR, INCORPORATION: Description. ‘The texture (in spirit) is rather soft and resilient, sandy, and the colour grey throughout. The main skeleton consists of very loose and irregular sandy fibres (with little or no spongin), running vertically to the surface. The beautifully reticulate, highly porous dermal mambrane contains numerous small, scattered foreign bodies, but there is no distinct dermal skeleton.’ | *Chondropsis arenifera* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | Carter, 1886 | Dendy, 1895 |
| INCORPORATION: Description. *Chondropsis* spp. are ‘sand sponges with feebly developed spicular skeletons.’ *C. arenifera* is described as ‘sandy and soft […] Predominantly a reticulation of rather coarse sand-tracts glued together by spongin.’ | *Chondropsis arenifera* | Port Philipp Heads, Victoria, Australia, Bass Strait, 36 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | Carter, 1886 | Van Soest, 2002a |
| INCORPORATION, CRUST: Description. ‘The skeleton is arenaceous, with abundant sand grains packing the matrix. […] Foreign material, finer than found in the choanosome, lies [externally] above the spicule tufts.’ | *Chondropsis* sp. (cf. *arenifera*?) | New Zealand, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | Carter, 1886 | Bergquist & Fromont, 1988 |
| ARMOUR, INCORPORATION: Description. *C. australis* ‘is comparatively tough and can be compressed without breaking when alive, but it is fragile and more or less friable in the dry state. The skeleton consists of a network of fibres, composed of dense masses of sand-grains, uniformly 0.03 millim. in size, which are held together by a very small quantity of spongin. These sand-grains are so well packed that the surface of the fibres appears smooth. […] The outer surface is protected by a cortex, 0.1 millim. thick, of densely packed sand-grains, which are similar to those in the fibres. A single layer of small sand-grains underlies the wall of the oscular tube. There do not appear to be any scattered sand-grains in the interior, although such have been described by Marshall, who gives a somewhat different account of the structure of the skeleton. The ends of the fibres of the supporting-skeleton are joined to the cortex. Proper [innate] spicules are observed in the ground-substance. […] The cortex is not continuous, but appears as a reticulation of arenaceous bands of varying breadth, the meshes between which are irregular, rounded, and on an average 0.2 millim. wide. Fine membranes, which are free from foreign bodies and which contain small spicules, chiefly small sigmata, are spread out in them.’ | *Chondropsis australis* | Sydney Harbour, Bass Strait, Australia, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Sigmatella australis* and the varieties *tubaria* and *flabellum*) |
| INCORPORATION, ARMOUR: Description. ‘Texture very sandy, sometimes with a dermal layer almost free from sand or with a beautiful minute sandy reticulation on the surface. Internally the sand is arranged in stout radiating columns whose ends may form pock-like markings on the surface. […] The spicular skeleton is very much reduced, consisting mainly of slender strongyla scattered through the ground substance between the sandy columns and occasionally arranged in loose whisps,especially towards the surface. There may be a well-developed dermal reticulation of broken foreign spicules.’ | *Chondropsis australis* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Von Lendenfeld, 1888) | Dendy, 1896 (as *Desmacidon*) |
| ARMOUR, INCORPORATION: Description. ‘The color in life was a dull rose pink, with a distinctive opaque appearance, due to the presence of much sand in the ectosome. [The choanosome] is packed with detritus. The endosome contains foreign material but not to so large an extent. […] The skeleton, other than the foreign material (especially sand) comprises smooth oxeas and sigmas.’ | *Chondropsis ceratosus* | Micronesia, Pacific, 3 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | Kirkpatrick, 1900 | De Laubenfels, 1954 (as *Psammascus*) |
| ARMOUR, INCORPORATION: Description. ‘The surface is subglabrous with sandy reticulation showing through the thin dermal membrane. Texture slightly compressible, very sandy, friable. […] The main skeleton is an irregular network of coarse sandy fibre, the sand particles being comparatively large, and the spongin cement very scanty. There is no special dermal skeleton. The spicular elements are very insignificant, and loosely scattered in the soft tissues. | *Chondropsis chaliniformis* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (*sensu* Von Lendenfeld, 1889) | Dendy, 1895 |
| ARMOUR, INCORPORATION: Description. ‘Massive, irregular, solid, heavy, compact. Surface very uneven, beset with short, flattened, rounded or ridge-like prominences, where the sandy columns come to the surface […]. Interior densely charged with sand, arranged in very stout radiating columns; soft and gelatinous between. Skeleton, the main skeleton is composed of the very stout columns of sand above-mentioned, in which the sand-grains, though closely aggregated, appear to be scarcely if at all connected by spongin. The few and feebly developed spicules are irregularly scattered or collected into loose whisp-like bundles, especially towards the surface. There is no dermal skeleton.’ | *Chondropsis columnifer* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | Dendy, 1895 | Dendy, 1895 |
| INCORPORATION: Description. ‘Fibre arenaceous.’ | *Chondropsis kirkii* | Bass Strait, ‘depth variable’ | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Bowerbank, 1841) | Carter, 1885 (as *Dysidea*) |
| INCORPORATION: Description. ‘This species is one of the most common sponges in Australian waters. […] The skeleton consists of a network of fibres composed entirely of foreign bocies, spicule-fragments, sand-grains, &c., cemented by a very small quantity of spongin. […] In the ground-substance proper [innate] spicules of two kinds are met with.’ | *Chondropsis kirkii* | S Africa, Mauritius, coasts of Australia, New Zealand, Indo-Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Bowerbank, 1841) | Von Lendenfeld, 1888 (as *Sigmatella corticata* and the varieties *papillosa*, *mammillata*, *flabellum* and *serrata*) |
| ARMOUR, INCORPORATION: Description. ‘The main skeleton is a very beautiful, irregular, tracery-like network of very fine-grained sand-fibre. There is a close-meshed dermal network of similar sandy fibre. The spicular elements are greatly reduced, though the megascleres may still be observed in radiating: tufts towards the surface.’ | *Chondropsis kirkii* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Bowerbank, 1841) | Dendy, 1895 |
| ARMOUR, INCORPORATION: Description. ‘The choanosomal skeleton consists of plumo-reticulate or reticulate tracts of strongyles, which have sand grains or foreign spicules incorporated to varying degrees. […] sand grains and foreign spicules […] form a dermal crust of varying thickness.’ | *Chondropsis kirkii* | New Zealand, Pacific, 7-37 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Bowerbank, 1841) | Bergquist & Fromont, 1988 |
| ARMOUR, INCORPORATION: Description. Consistency ‘firm, crumbly as in stale bread, slightly compressible to rigid, conspicuously sandy and slimy. […] Choanosomal skeleton consists of (1) curved compressed trabeculae packed with sand, around polygonal alveoles, similar in size to meshwork at surface; (2) interstitially scattered proper spicules.’ | *Chondropsis kirkii* | Bass Strait, 3-6 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Bowerbank, 1841) | Wiedenmayer, 1989 (as *Phoriospongia*) |
| ARMOUR, INCORPORATION: Description. ‘In the living state and in spirit the sponge is pretty tough, but inflexible; it can easly be broken. Dry specimens are more or less friable. The skeleton consists of isolated sand-grains, 0.4-0.8 millim. in size, which form single interrupted series, which anastomose to an irregular network with rounded meshes about 1 millim. wide. The surface is protected by a cortex 0.8 millim. thick, composed of large, loosely scattered sand-grains, similar to those in the interior. Abundant [innate] spicules are observed in the ground-substance […]. The outermost layer of the superficial cortex is composed of small foreign bodies, intermingled with both kinds of sigmata.’ | *Chondropsis lamella* | Sydney Harbour, Australia, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Phoriospongia lamella* and *P. lamella* var. *panis*) |
| ARMOUR, INCORPORATION: Description. ‘They are intensely sandy throughout, incompressible and friable.’ | *Chondropsis lamella* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Von Lendenfeld, 1888) | Dendy, 1895 |
| ARMOUR, INCORPORATION: Descriptions.’The fibres of the skeleton [of *C. macropsamma*] are composed of large sand-grains. Microsclera strongyla […], very abundant.’ | *Chondropsis macropsamma* | Sydney Harbour, Australia, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Sigmatella*) |
| ARMOUR, INCORPORATION: Description. ‘Texture compact, gritty, friable, densely charged with coarse sand. […] The main skeleton is composed of flattened columns of rather coarse sand running vertically to the surface. These columns may unite by their edges in a honeycomb fashion, so that their ends form a polyogonal-meshed reticulation beneath the dermal membrane. The meshes of this reticulation are about 1-3 mm. in diameter and the plate-like sandy columns about 0.2 mm. in thickness. Little if any spongin cement is developed. Between the sandy plates in the body of the sponge the foreign bodies are few and small, but in the minutely reticulate, porous dermal membrane numerous small foreign bodies occur scattered irregularly.’ | *Chondropsis topsenti* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | Dendy, 1895 | Dendy, 1895 |
| ARMOUR, INCORPORATION: Description. ‘An encrusting sponge of variable thickness. The surface is reticulate where the external layer of sand grains is absent. […] The surface is faintly corrugated due to the arenaceous choanosomal reticulation. In some parts of the surface, sand grains fill in the reticulation and the surface is flat and even. […] The skeleton consists of plumose tracts of sand grains running vertically to the surface. […] At the surface there is a thick spongin layer with sand grains embedded in it.’ | *Chondropsis topsenti* | New Zealand, Pacific, 2-20 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | Dendy, 1895 | Bergquist & Fromont, 1988 |
| ARMOUR, INCORPORATION: Description. ‘On the prominent parts of the surface small scar-like sandy areas are scattered, but there is no sandy dermal reticulation. Texture tough, very sandy internally but rather soft and compressible. […] Skeleton, stout columns of comparatively coarse sand, more or less widely separated from one another, run vertically to the surface, where they terminate in the scar-like sandy areas already mentioned. The sand grains are cemented together by spongin, and stout clear horny fibres occasionally run across from one sandy column to another. Between the sandy columns loose whisps of megascleres, often more or less enveloped in spongin, run towards the surface.’ | *Chondropsis wilsoni* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | Dendy, 1895 | Dendy, 1895 |
| ARMOUR, INCORPORATION: Description. Specimen firm, patterned (Figure 3A in main text). The surface was lightly armoured. Sediments in the choanosome were densely embedded in almost invisible spongin fibres that generated a very regular mesh in almost hexagonal pattern (Figure 3B in main text). | *Chrondropsis* sp. CERF 1 = WAM sp. Ng 2 | Carnarvon Shelf, Western Australia, 40-48 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | indet. | Schönberg *et al.*, 2012 |
| INCORPORATION: Field study. Sediments formed the major part of the skeleton of this sponge that grew relatively fast and recovered space rapidly after damage. | *Chondropsis* sp. | N New Zealand, Pacific, 12 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | indet. | Ayling, 1983 |
| ARMOUR, INCORPORATION: The erect-laminar sponge was armoured and had sediment-cored fibres. | *Chondropsis* sp. | Montgomery Reef, Kimberley, NW Australia, 23.9 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | indet. | Schönberg, unpubl. data |
| ARMOUR, INCORPORATION: Description. ‘Skeleton composed largely of sand and other foreign bodies, usually (?always) arranged in distinct fibres or columns. Spicular skeleton greatly reduced.’ | *Chondropsis wilsoni* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | NA | Dendy, 1895 |
| INCORPORATION: Description. Sponges ‘with a skeleton that incorporates vaying degrees of sand and foreign material. Spongin fibre development frequently accompanies the foreign material and the skeleton organisation overall is plumose or plumo-reticulate. The spicule skeleton is always reduced quantitatively.’ | *Chondropsis* spp. | New Zealand, Pacific, shallow depths | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | NA | Bergquist & Fromont, 1988 |
| INCORPORATION: Description of *Psammochela tutiae* as a new species, discussing ‘sand sponges’ (see last entry of this table). The genus *Chondropsis* has a skeleton cored by foreign material and its own spicules. | *Chondropsis* spp. | N Moluccas, Indonesia, SCUBA depth | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | NA | De Voogd, 2012 |
| INCORPORATION, ANCHORING: Description. ‘The body contains a great quantity of freign material, portions of hydroid skeletons, sand &c.; the sponge body itself only appears as a cement between these foreign bodies; there are fewer in the outer layers than near the base of the sponge.’ | *Chondrosia chuculla* | Sydney Harbour, Pacific, depth not stated | Po: Dem (Verongimorpha): Chondrosiida: Chondrosiidae | De Laubenfels, 1936 | Von Lendenfeld, 1888 (as *Chondrosia collectrix*) |
| INCORPORATION, AGGLUTINATION, ANCHORING, BINDING: Description. Numerous foreign particles such as mollusc fragments and calcareous sand were embedded in this sponge. Except for the basis the surface was more or less free of these inclusions, but basally they were superficially agglutinated and embedded to various degrees. | *Chondrosia collectrix* | Tortugas, Florida, Gulf of Mexico, 22 m | Po: Dem (Verongimorpha): Chondrosiida: Chondrosiidae | (Schmidt, 1870) | Schmidt, 1870 (as *Cellulophana*) |
| INCORPORATION: Description. ‘The sponge contains a very limited amount of foreign matter.’ | *Chondrosia collectrix* | Jamaica, Caribbean, 1-6 m | Po: Dem (Verongimorpha): Chondrosiida: Chondrosiidae | (Schmidt, 1870) | Pulitzer-Finali, 1986 |
| INCORPORATION: 1995 – Observations by SEM after application of the following quartz sediment treatments: acid purified marine sand (mostly monocrystalline fragments, 125-250 m), laboratory sand (round grains, 250-450 m), biterminate grains (monocrystalline, prismatic, 2 mm), chalcedony and opal. Quartz was dissolved by sponge. 1996 – Field study, comparing sediments collected by traps to those found incorporated in the sponge. 1998a – Aquarium experiment treating sponges with laboratory quartz sand (250-500 μm), carbonate sand of organ pipe coral (250-500 μm) and of coralline algae (3-5 mm). 1998b – Aquarium experiment, treating sponges with laboratory sand and with sponge spicules, followed by EM studies. 1999 – Monthly field sampling and sediment traps. 2003: Review on silica incorporation in sponges, with strong focus on *C. reniformis. C. reniformis* incorporates sediment particles that adhere to its mucoid surface to supplement their otherwise aspicular body with inorganic skeleton. Uptake depends on supply, i.e. ambient grain size and amount of resuspension. This process avoided taking up carbonate sediment with lower body parts and selected for quartz particles, but not for grain size (incorporating 30-40 μm grains under natural conditions). Carbonate sediments were taken up to be embedded in buds, however, and detached sponges lost selectivity for mineralogy. Depending on the crystallography, quartz particles were incorporated in a different way and selectively etched (crystals were etched, hydrated silicates such as sponge spicules, chalcedony and opal were not). Particles were moved with a speed of 6.4 μm min-1 and were transported away from areas with pores. | *Chondrosia reniformis* | Ligurian Sea, Mediterranean, 3-25 m | Po: Dem (Verongimorpha): Chondrosiida: Chondrosiidae | Nardo, 1847 | Bavestrello *et al.*, 1995, 1996, 1998a, 1998b, 2003; Cerrano *et al.*, 1999, 2007a |
| INCORPORATION, ANCHORING: Description. ‘Consistence very hard. It contains in the ground-substance a great quyantity of foreign material, sand-grains, &c., some of which have a diameter of 1 millim. and more.’ | *Chondrosia reticulata* | Sydney Harbour, Pacific, depth not stated | Po: Dem (Verongimorpha): Chondrosiida: Chondrosiidae | (Carter, 1886) | Von Lendenfeld, 1888 (*Reniera collectrix*) |
| INCORPORATION: Description. ‘Cortex 0.5 to 1.5 cm thick, marked by absence of foreign detritus. […] Foreign debris scattered to crowded throughout choanosome, packed in some places, ill-sorted, up to 600 μm in diameter.’ | *Chondrosia reticulata* | Bass Strait, depth not stated | Po: Dem (Verongimorpha): Chondrosiida: Chondrosiidae | (Carter, 1886) | Wiedenmayer, 1989 |
| ANCHORING: The sponge has a basal spicule root mass, containing protriaenes. | *Cinachyra barbata* | Kerguele Islands, Southern Ocean, to 110 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | Sollas, 1886 | Von Lendenfeld, 1907 |
| ANCHORING: 2002 – Description. *C. barbata* specimens are ‘globular sponges seated on a dense spicular basal mass’ that becomes more pronounced with age, is then as wide as the sponge body and apparently functions as a root system anchoring the sponge in sediment-rich bottoms. 2014 – Database. The type specimen was sampled from volcanic mud. | *Cinachyra barbata* | Kerguelen Islands, Patagonia, Antarctica, 45-549 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | Sollas, 1886 | Van Soest & Rützler, 2002; Van Soest *et al.*, 2014 |
| CRUST: Description. On the hispid surface of this globular sponge a thick, dense, external surface crust of sediments was established that was ca. 2 mm thick but firmly attached, well visible in crossection. | *Cinachyra* sp. CERF 1 (CERF-2-45-1-5) | Carnarvon Shelf NW Australia, Indian Ocean, 34-37 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | indet. | Schönberg *et al.*, 2012 |
| CRUST: The surface of this sponge is obscured by a 1-2 mm layer of carbonate sand. | *Cinachyrella albabidens* | Tonga, SW Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Von Lendenfeld, 1907) | Von Lendenfeld, 1907 (as *Cinachyra*) |
| CRUST: The surface of this sponge is obscured by a 1-2 mm layer of carbonate sand. | *Cinachyrella albaobtusa* | Kaniet Islands, N Papua New Guinea, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Von Lendenfeld, 1907) | Von Lendenfeld, 1907 (as *Cinachyra*) |
| CRUST: The surface of this sponge is obscured by a 1.5-3 mm layer of carbonate sand. | *Cinachyrella albatridens* | Chagos Archipel, Indian Ocean, depth not stated | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Von Lendenfeld, 1907) | Von Lendenfeld, 1907 (as *Cinachyra*) |
| CRUST: ‘Covered with algae and sediments.’ The sopnge is figured as a furry ball only showing sponge tissue in the osculum. In crossection the crust is in places several mm thick. | *Cinachyrella alloclada* | Panama, Caribbean, 15 m, and collection material from Brazil, Florida and Bahamas | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Uliczka, 1929) | Cárdenas *et al.*, 2009 |
| CRUST: Field guide. A specimen is pictured with a thick coat of sediment. The surface is hispid, but due to the thickness of the external crust the sponge does not appear rough. | *Cinachyrella alloclada* | Bahia, Brazil, W Atlantic, intertidal to 30 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Uliczka, 1929) | Hajdu *et al.*, 2011 |
| CRUST: Description. ‘The surface [of the type] is rather uneven, minutely hispid, and thinly encrusted with sand.’ | *Cinachyrella anomala* | Sri Lanka, Indian Ocean, 18-66 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Dendy, 1905) | Dendy, 1905 (as *Tetilla*) |
| CRUST: ‘The surface is very hispid, which hides the true color of the sponge, and gives it a rather sandy color.’ The sopnge is figured as a hispid ball catching sediments between the spicules. In crossection the crust is 1-2 mm thick. | *Cinachyrella apion* | Panama, Caribbean, 1 m, and collection material from Brazil and Florida | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Uliczka, 1929) | Cárdenas *et al.*, 2009 |
| CRUST: Description. The sponge has a very hispid surface and accumulates a crust of sand grains. The encrusted specimen is pictured, as well as a crossection through the surface. | *Cinachyrella apion* | Fernando de Noronha Archipelago, W Atlantic, 4 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Uliczka, 1929) | De Moraes, 2011 |
| CRUST: Field guide. Three specimens are pictured. All are hispid and have a layer of fine sediments on their surfaces. | *Cinachyrella apion* | Bahia, Brazil, W Atlantic, intertidal to 30 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Uliczka, 1929) | Hajdu *et al.*, 2011 |
| CRUST: Faunistic inventory. ‘Globular sponge (fig. 2) of 4-5 cm, with upper surface heavily cov- ered by dark sediment and algae.’ | *Cinachyrella arabica* | Oman, Indian Ocean, littoral | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Carter, 1869) | Van Soest & Beglinger, 2008 |
| BINDING: Description. The lentil-shaped body has a thickened part of the rim that is attached to a small stone. | *Cinachyrella australiensis* | NE coast of Minahasa, Celebes, Celebes Sea, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Carter, 1886) | Thiele, 1899 (as *Tetilla australiensis*) |
| CRUST: The sponge is pictured with an external crust. | *Cinachyrella australiensis* | NW Australia, Mermaid Strait, Indian Ocean, depth not stated | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Carter, 1886) | Von Lendenfeld, 1907 (as *Cinachyra isis*) |
| CRUST: Field survey. *C. australiensis* is adapted to perturbed sites and high sedimentation levels. Its bristly surface catches sediments, but keeps pores free. | *Cinachyrella australiensis* | Spermonde Archipelago, Sulawesi, Indonesia, Makassar Strait, 3-15 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Carter, 1886) | De Voogd & Cleary, 2007 |
| CRUST: Description. ‘In all [specimens] the surface is more or less hispid from projecting spicules, and encrusted with a layer of dirt in between, to which the colour of the surface is due, this colour varying with the nature of the foreign matter.’ | *Cinachyrella hirsuta* | Sri Lanka, Indian Ocean, shallow to deep water | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Dendy, 1889) | Dendy, 1905 (as *Tetilla*) |
| CRUST: Field guide. *C. kuekenthali* is pictured with a coat of sediment and algae. | *Cinachyrella kuekenthali* | Bahia, Brazil, E Atlantic, 10-101 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Uliczka, 1929) | Muricy *et al.*, 2008 |
| CRUST: ‘Strongly hispid. Often covered with sand, green and red algae or more rarely macro-epibionts (ascidians, sponges).’ The sopnge is figured as an encrusted ball, but the many pores are clean. In cossection the crust is comparatively loose and irregular and 1-2 mm thick. | *Cinachyrella kuekenthali* | Panama, Caribbean, 3-15 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Uliczka, 1929) | Cárdenas *et al.*, 2009 |
| CRUST: Description. The sponge has a hispid surface and accumulates patches of sediments on its surface. Two specimens are pictured with sediments on their surfaces. | *Cinachyrella kuekenthali* | Das Rocas Atoll, W Atlantic, 0.2-7 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Uliczka, 1929) | De Moraes, 2011 |
| CRUST: Field guide. A specimen is pictured with a coat of sediment and algae. | *Cinachyrella kuekenthali* | Bahia, Brazil, W Atlantic, >10 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Uliczka, 1929) | Hajdu *et al.*, 2011 |
| CRUST, ANCHORING: Description. On the hispid surface of this globular sponge a thick, dense, external surface crust of sediments was established that was several mm thick but firmly attached (Figure 5C). It appeared to consist of fairly well sorted sand, as observed in skeletal sections. The base of the short stalk was encrusted with coarse sediment. | *Cinachyrella* sp. CERF 1 (CERF-2-53-1-13) | Carnarvon Shelf NW Australia, Indian Ocean, 36-57 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | indet. | Schönberg *et al.*, 2012 |
| CRUST, ANCHORING: Description. On the hispid surface of this globular sponge a thick, dense, external surface crust of sediments was established, but porocalces remained clean. Surface crust came off when sectioning for skeletal preparations, when protruding spicules were damaged. | *Cinachyrella* sp. CERF 2 (WAM Z45982) | Carnarvon Shelf NW Australia, Indian Ocean, 43 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | indet. | Schönberg *et al.*, 2012 |
| PSAMMOBIOSIS: Description. ‘Sponge […] consisting of a flat, wide-spreading, encusting base, […] from which arise erect, digitiform processes widely separated from one another by widely spaced intervals. These processes vary much in size […] They usually taper to a sharp apex and are, as a rule at any rate, unbranched. The surface of the basal crust […] is covered by a good deal of foreign matter.’ | *Ciocalypta digitata* | Sri Lanka, Indian Ocean, depth not stated | Po: Dem (Heteroscleromorpha): Suberitida: Halichondriidae | (Dendy, 1905) | Dendy, 1905 (as *Collocalypta*) |
| PSAMMOBIOSIS?: Descriptions suggesting psammobiotic habit. *C. penicillus* is a ‘distinctive sponge with lumplike base, which is produced above into many long fine, tapering fistules. It is often taken in dredge hauls from muddy sand and shell deposits.’ | *Ciocalypta penicillus* | New Zealand, Pacific, 15-49 m | Po: Dem (Heteroscleromorpha): Suberitida: Halichondriidae | Bowerbank, 1862 | Bergquist, 1970 |
| PSAMMOBIOSIS: Description. ‘Basal mass [of *Ciocalypta* spp.] usually buried in the soft sediment with conically tapering erect finger-shaped fistules rising above the sediment.’ For *C. penicillus*: ‘Basal cushion of up to 10 cm in diameter buried in sand or gravel, from which project large conical, translucent, ridged, thick-walled, non-contractible fistules.’ | *Ciocalypta penicillus* | SE England, North Sea, depth not stated | Po: Dem (Heteroscleromorpha): Suberitida: Halichondriidae | Bowerbank, 1862 | Erpenbeck & Van Soest, 2002 |
| PSAMMOBIOSIS: Identification guide. ‘Very characteristic. The sponge consists of a basal cushion of up to 10 cm in diameter buried in sand or gravel, from which project large conical, translucent, ridged, thick walled, non-contractile fistules, normally up to about 5-9 cm high, 0.5-0.6 mm in diameter. The surface of the fistule has a glassy, translucent appearance, through which vertical spicule fibres can be seen with the unaided eye. […] In clear water. Always with basal cushion buried in sand or gravel (never mud), which may be covered by a layer of silt. The usual habitat of clean coarse sand with some gravel indicates a preference for a degree of exposure to wave action.’ | *Ciocalypta penicillus* | European seaboard of Atlantic from Helgoland south to Spain, Portugal, Mediterranean, etc. Recorded in the British Isles from Coll/Tiree (W coast of Scotland) and Lundy; depth not stated | Po: Dem (Heteroscleromorpha): Suberitida: Halichondriidae | Bowerbank, 1862 | Van Soest, 2015 |
| Morphology suitable for PSAMMOBIOSIS: Description. ‘Massive sponge with numerous, irregular, mostly fistular processes arising from the upper surface. The sponge is attached by a broad base.’ | *Ciocalypta polymastia* | E Australia, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Suberitida: Halichondriidae | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Stylotella*) |
| PSAMMOBIOSIS?: Descriptions suggesting psammobiotic habit. *C. polymastia* develops in ‘thick *encrustation* to a massive sponge, always with long finger-like projections from the upper surface’. It forms crusts on rocky substrates, massive forms on shell detritus of mud flats. | *Ciocalypta polymastia* | New Zealand, Pacific, intertidal to 18 m | Po: Dem (Heteroscleromorpha): Suberitida: Halichondriidae | (Von Lendenfeld, 1888) | Bergquist, 1970 |
| Morphology suitable for PSAMMOBIOSIS, BINDING: Description. The sponge had overgrown coralline fragments.and has finger-like processes (fistules, see Topsent’s figure). | *Ciocalypta porrecta* | Azores, Atlantic, 91 m | Po: Dem (Heteroscleromorpha): Suberitida: Halichondriidae | Topsent, 1928 | Topsent, 1928 |
| Morphology suitable for PSAMMOBIOSIS: Description. ‘The single specimen consists of a flattened, cushion-shaped body of oval outline, with a number […] of slender, upright, digitiform processes springing from the upper surface. The processes are long and conical, tapering gradually almost to a point, and with no visible vents; the walls, however, are pierced by numerous small dermal pores.’ | *Ciocalypta tyleri* | Sri Lanka, Indian Ocean, 40 m | Po: Dem (Heteroscleromorpha): Suberitida: Halichondriidae | Bowerbank, 1873 | Dendy, 1905 (as *C. tyleri* var. *aberrans*) |
| PSAMMOBIOSIS, ANCHORING: Field survey in area with fine sediments. At least one specimen of *C. tyleri* was observed to live partially buried in the sediments. Vertical, columnar fistules were elevated well above the sediments and contained photopigments. The basal parts of the sponge were attached to a platey, coral-like rock. | *Ciocalypta tyleri* | Onslow, NW Australia, Indian Ocean, 10-15 m | Po: Dem (Heteroscleromorpha): Suberitida: Halichondriidae | Bowerbank, 1873 | Schönberg *et al.*, unpubl. data |
| INCORPORATION: Description. The unarmoured *Citronia* spp. have primary fibres cored with foreign debris and uncored secondary fibres. The skeleton of *C. vasiformis* has ‘lightly cored primary fibres.’ | *Citronia vasiformis* | type locality: New Caledonia, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Bergquist, 1995) | De C. Cook & Bergquist, 2002b |
| ANCHORING: Review. *C. abyssicola* is depicted with a stalk and with a finely branching root system. | *Cladorhiza abyssicola* | not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Cladorhizidae | Sars, 1872 | Van Soest *et al.*, 2012 |
| ANCHORING: The sponge is not a typically soft-substrate adapted species, but as long as it can attach its root-like basal processes to a firm piece of substrate, it can colonise muddy environments. | *Cladorhiza gelida* | Svalbard Basin, Arctic Ocean, 2000-2609 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Cladorhizidae | Lundbeck, 1905 | Barthel & Tendal, 1993 |
| ANCHORING: Review. *Cladorhiza* sp. is depicted with a root system. Its body is stalked and lentil-shaped, with a corona-like fringe, apparently of spicule bundles. | *Cladorhiza* sp. | W Norfolk Ridge near new Zealand, Pacific, not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Cladorhizidae | indet. | Van Soest *et al.*, 2012 |
| ANCHORING: Review. ‘Their stalk may be attached to hard substrate by an enlarged base or rooted in the sediment.’ | Cladorhizidae | deep sea, with one species sampled from 8840 m (depth record for sponges) | Po: Dem (Heteroscleromorpha): Poecilosclerida: Cladorhizidae | NA | Van Soest et al., 2012 |
| INCORPORATION: Description. ‘The skeleton cobnsists of longitudinal main fibres 0.1 millim. thick, and simple transverse connecting-fibres 0.03 millim. thick. Abundant foreign bodies are found in both. The fibres are [also] echinated. | *Clathria (Wilsonella) australiensis* | Sydney Harbour, Australia, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Microcionidae (Microcioninae) | Carter, 1885 | Von Lendenfeld, 1888 (as *Clathriopsamma lobosa*) |
| INCORPORATION, ARMOUR: Description. ‘This appears to be simply a *Clathria* with a large amount of foreign matter (sand and broken spicules) in and between the fibres and on the surface. The sand is especially abundant in the primary fibres. A considerable amount of spongin is also present.’ | *Clathria (Wilsonella) australiensis* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Microcionidae (Microcioninae) | Carter, 1885 | Dendy, 1896 |
| INCORPORATION: Description. ‘The skeleton is reticulate; the fibres are charged with abundant foreign particles.’ A synonym by Von Lendenfeld was *Clathriopsamma lobosa*. | *Clathria (Wilsonella) australiensis* | Australia, ‘Endeavour’ specimen, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Microcionidae (Microcioninae) | Carter, 1885 | Hallmann, 1912 |
| INCORPORATION: Description. ‘*Clathria* with sand grains and foreign spicules partially or completely replacing coring spicules inside fibres […] with fibres cored by sand grains and detritus and varying quantities of principal spicules.’ Genus synonyms *Clathriopsamma* and *Psammotoxa* suggest a close relationship with sediments. | *Clathria (Wilsonella) australiensis* | Port Philipp Bay, Victoria, Australia, Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Microcionidae (Microcioninae) | Carter, 1885 | Hooper, 2002a |
| ANCHORING, INCORPORATION: Description. ‘A layer of sand grains is incorporated in the base. This structure is analogous to [*Lissodendoryx (Ectyodoryx) arenaria*] Burton, 1936 and {*Clathria (Microciona) ixauda* Lévi, 1969].’ | *Clathria (Thalysias) basiarenacea* | Fernando Noronha Island, Atlantic, 6-10 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Microcionidae (Microcioninae) | (Boury-Esnault, 1973) | Boury-Esnault, 1973 (as *Rhaphidophlus*) |
| ANCHORING, BINDING: Description. ‘The specimens afford no certain evidence of their mode of attachment; but, judging from adhering fragments, it is highly probable that they grew upon branching calcareous bryozoans to which they were attached at many points.’ | *Clathria (Clathria) conectens* | Fraser Island, Australia, Pacific, 44-48 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Microcionidae (Microcioninae) | (Hallmann, 1912) | Hallmann, 1912 |
| ANCHORING, INCORPORATION: Description for *Clathria (Thalysias) basiarenacea*. ‘A layer of sand grains is incorporated in the base. This structure is analogous to [*Lissodendoryx (Ectyodoryx) arenaria*] Burton, 1936 and {*Clathria (Microciona) ixauda* (Lévi, 1969)].’ | *Clathria (Thalysias) ixauda* | NA | Po: Dem (Heteroscleromorpha): Poecilosclerida: Microcionidae (Microcioninae) | (Lévi, 1969) | Boury-Esnault, 1973 |
| CRUST? AGGLUTINATION?: Description. ‘Blackish sponge, enveloped by numerous [pieces of] debris.’ | *Clathria (Wilsonella) nigra* | Brazil, Atlantic, 75 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Microcionidae (Microcioninae) | (Boury-Esnault, 1973) | Boury-Esnault, 1973 (as *Psammotoxa*) |
| INCORPORATION: Field study comparing incorporated to ambient sediments. *Clathria* spp. incorporated sediments and selected for specific grain sizes. | 1 – *Clathria (Thalysias) schoenus*  2 – *Clathria (Microciona) spinosa* | Belize, Caribbean, 1 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Microcionidae (Microcioninae) | 1 – (De Laubenfels, 1936)  2 – (Wilson, 1902) | Cerrano *et al.*, 2004a |
| INCORPORATION: 2004 – Field study comparing incorporated to ambient sediments. 2007 – Literature review. Sponges unselectively incorporated sediments available in the environment. | *Clathria (Wilsonella)* sp*.* | Belize, Caribbean, 1 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Microcionidae (Microcioninae) | indet. | Cerrano *et al.*, 2004a, 2007a |
| ANCHORING: Review. *C. lacunosa* is depicted with an umbilical-looking basal extension. | *Clathrina lacunosa* | NW Mediterranean Sea, not stated | Po: Cal (Calcinea): Clathrinida: Clathrinidae | Johnston, 1842 | Van Soest *et al.*, 2012 (as *Guancha*) |
| ANCHORING?: Description. ‘Globular, stipitate, presenting on the summit a short, cylindrical, hollow process [exhalant], and ending below in one or more filiform stems fixed to the object on which it has grown.’ | *Clathrina osculum* | Bass Strait, depth not stated | Po: Cal (Calcinea): Clathrinida: Clathrinidae | Carter, 1886 | Carter, 1886 |
| INCORPORATION: Description. *C. arenosa* tends to incorporate foreign material. | *Cliona arenosa* | Florida, Atlantic, depth not stated | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | (Schmidt, 1870) | Schmidt, 1870 (as *Papillina*) |
| CRUST: Guide. *C.* [cf.] *celata* is pictured in both publications in encrusting growth form, accumulating much debris on the surface areas between the papillae. | *Cliona celata* [complex species] | Brazil, W Atlantic, 0-3 m | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | Grant, 1826 | Muricy *et al*., 2008; Hajdu *et al*., 2011; but see Xavier *et al*., 2010 and De Paula *et al*. 2012 with regards to cryptic species within ‘*Cliona celata*’ |
| INCORPORATION: 2004 – Field study comparing incorporated to ambient sediments. 2007 – Review. Sponges unselectively incorporated sediments available in the environment. | *Cliona varians* | Belize, Caribbean, 1 m | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | (Duchassaing & Michelotti, 1864) | Cerrano *et al.*, 2004a, 2007a |
| PSAMMOBIOSIS, INCORPORATION: 1999 – Field study and observations using dye and corrosion cast study. The sponge occurs in different growth forms. The endolithic form lives in the cliffs, but massive species live partially embedded in bottom sediments 3-5 cm deep. Endopsammic specimens can form substantially elevated oscular chimneys and have a tendency to have ostiae on the outer walls of those chimneys, thus removing the inhalants from the sediment as well. The canal system of these two forms differs as well, possibly reflecting environmental conditions. The sponge incorporates sediment, especially accumulating larger particles over 5 mm in diameter compared to ambient availability. Incorporated material is eroded. 2007b **–** Field experiment, experimental specimens were buried in sediments of different grain size and mineralogy. Sponges took up sediments, not distinguishing between mineralogies, but selecting for larger grain size. They grew better when able to incorporate biological (carbonate) sediments, while specimens incorporating quartz shrank. Under natural conditions incorporated material could make up >85% of the dry weight, more under experimental conditions (near 100%). | *Cliona viridis* (beta form) | Ligurian Sea, Mediterranean, 5-45 m | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | (Schmidt, 1862) | Calcinai *et al.*, 1999, 2007b (both as *C. nigricans*) |
| INCORPORATION, trends for PSAMMOBIOSIS: The sponge was described to incorporate coarse, mostly calcareous, sediments in its tissues in and unordered manner. No fixed external crust was observed, but specimens were usually covered in sediments, i.e. being half-buried. | *Cliona viridis* | Maricás Archipelago, SE Brazil, Atlantic, 10-12 m | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | (Schmidt, 1862) | Leal *et al.*, this volume |
| INCORPORATION: Description. The specimen had a choanosome packed with sediments. The ectosomal palisade was free of sediments. Where the sponge was seen in the field it usually had a clean surface. | *Cliona* sp. CERF 3 (aff. *C. viridis*) | Carnarvon Shelf NW Australia, Indian Ocean, 44 m | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | indet. | Schönberg *et al.*, 2012 |
| INCORPORATION: Collection from survey. Specimens of this species had incorporated sediments. Despite the high sedimentation in the area the surfaces of all specimens (beta growth, i.e. encrusting morphology) were mostly clean. | *Cliona* sp. PB1 (aff. *C. viridis*) | Onslow coast, NW Australia, Indian Ocean, 10-15 m | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | indet | Schönberg *et al.*, unpubl. data |
| PRODUCING SEDIMENTS through bioerosion: All species within the family Clionaidae should be considered as capable of bioerosion. Massive specimens have been found to retain their erosion capabilities or to incorporate and erode foreign calcareous particles. The sponge chips they produce are not always entirely expelled, but can in some species form accumulations in the tissues or line the walls of the erosion chanbers. | Clionaidae | NA | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | D’Orbigny, 1851 | Hatch, 1980; Calcinai *et al.*, 1999; Rützler, 2002a; Ise *et al.*, 2004; Schönberg, pers. obs. |
| Morphology suitable for PSAMMOBIOSIS, AGGLUTINATION, BINDING, ANCHORING?: Description. ‘The holotype is massive globose. […] Fistules are concentrated in the upper part of the specimen and represent the incurrent part of the sponge. They may be cylindrical, branching lobate or club shaped. Their maximum height in the holotype is 3 cm, but in other specimens they can be as high as 6 cm. […] The body surface is almost entirely covered by epibiotic organisms, mainly coralline algae, bryozoans and other sponges. [Pieces of] coral debris are overgrown by the sponge and embedded into its body. […] The sponge sticks to dead corals and other debris that then become embedded in its body during growth. The body is almost completely overgrown by other organisms as described for the holotype.’ | *Coelocarteria agglomerans* | Sulawesi Sea, Pacific, 20-23 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Isodictyidae | Azzini *et al.*, 2007 | Azzini *et al.*, 2007 |
| PSAMMOBIOSIS?: The fragments and specimens that became available had long fistules and were usually encrusted with sediments or epibionts. The morphology suggested endopsammic life style. | *Coelocarteria* cf. *agglomerans* | Montgomery Reef, Kimberley, NW Australia, 27.4 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Isodictyidae | Azzini et al. 2007 | Schönberg, unpubl. data |
| PSAMMOBIOSIS: Description. ‘The sponge was living partially buried in coral sand. […] From this buried portion chimneys arise at intervals. These hollow cylinders are commonly 3 to 4 cm high and reach 14 mm in diameter.’ | *Coelocarteria singaporensis* | Palau, Pacific, 2 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Isodictyidae | (Carter, 1883) | De Laubenfels, 1954 (as *Ichnodonax kanpe*) |
| CRUST?, PSAMMOBIOSIS?: Description. The surface of this encrusting fistulate sponge was ‘almost covered with fine shell debris.’ | *Coelosphaera (Coelosphaera) calcifera* | Cambell Plateau, New Zealand, Pacific, 84 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Coelosphaeridae | (Burton, 1934) | Bergquist & Fromont, 1988 |
| Morphology suitable for PSAMMOBIOSIS: Description. The habit is consistent with an endopsammic life style. | *Coelosphaera (Coelosphaera) globosa* | New Zealand, Pacific, 480-720 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Coelosphaeridae | Bergquist, 1961 | Bergquist & Fromont, 1988 |
| Morphology suitable for PSAMMOBIOSIS: Description. ‘Hemispherical, sessile sponges, with a hard and dense rind about 1 millim. thick, composed of closely packed tylota. The surface is covered with numerous papillae, some of which bear terminal vents.’ | *Coelosphaera (Coelosphaera) navicelligerum* | New Guinea, Sydney Harbour, Australia, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Coelosphaeridae | (Ridley, 1885) | Von Lendenfeld, 1888 (as *Sideroma navicelligerum*) |
| Morphology suitable for PSAMMOBIOSIS, ANCHORING: Description. ‘Sponge consisting of a massive body throwing off hollow fistulae from the upper surface and (sometimes) with root-like processes below.’ | *Coelosphaera (Coelosphaera) verrucosa* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Coelosphaeridae | (Dendy, 1896) | Dendy, 1896 (as *Histoderma verrucosum*) |
| Morphology suitable for PSAMMOBIOSIS: Description. The specimen was globular with short fistules covering the upper half, a habit suitable for psammobiosis. | *Coelosphaera (Coelosphaera)* sp. CERF 2 = WAM sp. SS 3 | Carnarvon Shelf NW Australia, Indian Ocean, 100-113 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Coelosphaeridae | indet. | Schönberg *et al.*, 2012 |
| Morphology suitable for PSAMMOBIOSIS: Description. The specimen was a fragment, but presumably globular with fistules covering the upper half. | *Coelosphaera (Coelosphaera)* sp. CERF 3 = WAM sp. SS 3 | Carnarvon Shelf NW Australia, Indian Ocean, 79-82 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Coelosphaeridae | indet. | Schönberg *et al.*, 2012 |
| INCORPORATION: Description. The specimen had coarse sediments in the choanosome. | *Coelosphaera (Coelosphaera)* sp. CERF 4 | Carnarvon Shelf NW Australia, Indian Ocean, 44 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Coelosphaeridae | indet. | Schönberg *et al.*, 2012 |
| INCORPORATION: Description. In *Collospongia* spp. and *C. auris* the surface is unarmoured but ‘may be encrusted with sand patches’ that do not form consistent armour. The very primary fibres are lightly cored, secondary fibres are uncored. | *Collospongia auris* | type locality: Great Barrier Reef, Coral Sea, Pacific, Australia, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | Bergquist et al., 1990 | De C. Cook & Bergquist, 2002a |
| INCORPORATION: Descriptions. ‘The surface is not covered by sand in spite of the large amount inside the sponge.’ This is despite the dense distribution of proper spicules. | *Columnitis anomala* | Nicaragua, Caribbean, 34 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | Sarà & Bavestrello, 1996 | Sarà & Bavestrello, 1996 |
| BINDING, ANCHORING: Description. *C. squamata* grows as a crust across shell fragments, binding them by basal agglutination. | *Columnitis squamata* | Antilles, Caribbean, depth not stated | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | Schmidt, 1870 | Schmidt, 1870 |
| INCORPORATION: Descriptions. 1996 – ‘A large amount of sand inside the sponge, also in masses. […] The sponges incorporate fragments of shells and other detritus. […] The surface is not covered by sand in spite of the large amount inside the sponge.’ 2000 – ‘A large amount of sediment, forming a massive central core, is included inside the sponge’ and is regarded as a diagnostic character (therefore the name). | *Columnitis squamata* | Gulf of Mexico, 30 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | Schmidt, 1870 | Sarà & Bavestrello, 1996; Sarà, 2002 |
| ANCHORING: Review on the Hexactinellida. ‘Most hexactinellids require a hard substratum for settlement (either rocks or shell debris), but two groups, all Amphidiscophora (including *Hyalonema* and *Monorhaphis*) and Euplectellinae (including *Euplectella*) anchor in soft sediments with special basal spicules.’ | *Compsocalyx gibberosa* | given as general statement, no location given, deep sea | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | Schulze, 1904 | Leys *et al.*, 2007 |
| BIOEROSION: Description. ‘Minute, whitish fistules protruding from the dead coral substratum. Their dimensions are 1.5-2.5 mm diameter, 3-5 mm height; they are spaced a few millimeters apart from each other, over a surface area of about 10 to 50 cm2, or more. About half of the fistules are closed at the distal end and seem to serve as incurrent structures, the others (tubules) are open, end in an osculum. The choanosomal parts of the sponge are mostly inside the substratum, penetrating or excavating small cavities that are filled with tissue. The initial impression of this sponge is that of a miniature *Siphonodictyon* species.’ | *Cornulum johnsoni* | Belize, Caribbean, 1-20 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Acarnidae | Rützler *et al.,* 2014 | Rützler *et al.,* 2014 |
| CRUST? AGGLUTINATION?: Description. ‘Small soft sponge, of 1 cm across, has incorporated numerous pebbles.’ | *Cornulum tylota* | Brazil, Atlantic, 27 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Acarnidae | (Boury-Esnault, 1973) | Boury-Esnault, 1973 (as *Artemisina*) |
| ARMOUR, INCORPORATION: Description. ‘Armoured ectosome 700-800 μm thick. [Primary fibres] knotty, with spicule fragments and scarce other debris disorderly enclosed, many protruding, rarely filling whole fibre.’ | *Coscinoderma pesleonis* | Bass Strait, 3-6 m | Po: Dem (Keratosa): Dictyoceratida: Spongillidae | (De Lamarck, 1813) | Wiedenmayer, 1989 |
| ARMOUR, INCORPORATION: Description. *Coscinoderma* spp. have a thin, evenly distributed surface armour and cored primary fibres. In *C. pesleonis* the surface is ‘visibly sandy in life. […] Primary fibres are regularly-spaced, cored with foreign debris, and are 55-80 μm in diameter. Secondary fibres are uncored.’ | *Coscinoderma pesleonis* | type locality: Australia, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (De Lamarck, 1813) | De C. Cook & Bergquist, 2002c |
| ARMOUR, INCORPORATION: Description. The species had distinct surface armour like a cortex. Further sediments were loosely distributed throughout the choanosome, associated to the fibres. | *Coscinoderma* sp. CERF 1 | Carnarvon Shelf NW Australia, Indian Ocean, 79-82 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | indet. | Schönberg *et al.*, 2012 |
| ARMOUR, INCORPORATION: Description. The specimen was largely unarmoured, but armoured in patches, mostly with spicule debris, which also stretched across membranes within the sponge and lined inner walls of canals. | *Coscinoderma* sp. CERF 2 | Carnarvon Shelf NW Australia, Indian Ocean, 100 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | indet. | Schönberg *et al.*, 2012 |
| ANCHORING: The sponge has a basal root tuft with anatriaenes with small cladomes. | *Craniella coactifera* | Kerguele Islands, Southern Ocean, shallow | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Von Lendenfeld, 1907) | Von Lendenfeld, 1907 (als *Tethya*) |
| ANCHORING: Description. According to Schmidt *C. crania* has a short spicule tuft. | *Craniella cranium* | England, Ireland, Florida, Atlantic, 278-335 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Müller, 1776) | Schmidt, 1870 (as *Tethya* or *Tetilla cranium*) |
| ANCHORING: The sponge has a basal root tuft or mass made of a pelt of spicules. | *Craniella cranium* | Atlanto-Caribbean distribution, 110-713 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Müller, 1776) | Von Lendenfeld, 1907 (als *Tethya*) |
| ANCHORING: Description. The sponge is ‘attached by numerous long filiform anchoring-spicules which arise from the hinder part of the body.’ | *Craniella polyura* | Florida, depth not stated | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Schmidt, 1870) | Gray 1870 |
| ANCHORING: Description. Schmidt described *C. polyura* as having spicules emerging from the body surface as well as several spicule tufts that extend into the substrate in different directions. On his plate they emerge from cunular tissue elevations, the spicules ending in barbed terminations (anatriaenes). | *Craniella polyura* | not stated, assumed Atlantic | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Schmidt, 1870) | Schmidt, 1870 (as *Tetilla*) |
| ANCHORING: Description. For genus *Craniella* it was observed that ‘at the base there are bundles of spicules acting as a root’. *C. polyura* has ‘characteristic numerous rooting spicules’. | *Craniella polyura* | Arctic Ocean, Iceland, United Kingdom, depth not stated | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Schmidt, 1870) | Van Soest & Rützler, 2002 |
| ANCHORING: Description. The sponge is goblet-shaped with a thick stalk of the length of the body, ‘ending below in a multitude of spiciliferous filaments extending some way into the mass of sandy mud’. | *Crateromorpha (Crateromorpha) meyeri* | Talisay, Cebu, Philippines, Pacific, depth not stated | Po: Hex (Hexasterophora): Lyssacinosida: Rosselidae (Rossellinae) | Gray, 1872b | Gray, 1972a |
| INCORPORATION: Description. ‘An encrusting sponge […]. Pieces of coralline algae and bryozoa are incorporated into the Poor Knights specimen. […] A quantity of foreign material is incorporated into the choanosomal skeleton, chiefly bryozoan fragments. […] Dendy (1924) noted an abundance of foreign material, chiefly gorgonian spicules, in the skeleton of the species.’ | *Crella (Pytheas) fristedti* | New Zealand, Pacific, 15-183 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Crellidae | (Dendy, 1924) | Bergquist & Fromont, 1988 |
| INCORPORATION: Description. ‘This is probably merely a variety of [*C.*] *incrustans*, of very robust habit, with sandy fibre and dermal crust of spined styli.’ | *Crella incrustans* var. *arenacea* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Crellidae | (Carter, 1885) | Dendy, 1896 (as *Plumohalichondria arenacea*) |
| INCORPORATION: Description. ‘Foreign particles are in some cases included in the fibres.’ For *C. incustans* var. *arenacea*: ‘Foreign bodies, chiefly large sand grains, occur at usually irregular intervals in the fibres, and sometimes in small patches in the ground substance. Different specimens exhibit considerable differences in regard to the amount of ioreign material included.’ | *Crella incrustans* | Port Philipp Bay, Victoria, Australia, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Crellidae | (Carter, 1885) | Hallmann, 1912 (also as variety *arenacea*) |
| Quasi-PSAMMOBIOSIS, suitable morphology: Description. ‘The tiny pyriform, off-white specimens (4.5 x 3 mm maximum dimensions), are attached to and penetrate leathery membranes at their thicker end. The membranes, which coat burrows in coral rock, are presumed to be remnants of boring polychaetes. The incurrent and exhalant openings are at opposite ends of the longer axis. Longitudinal inhalant-exhalant canals extend from the narrow end, where the ostia are located, to the sieve-like base that serves as the osculum.’ | *Cryptosyringa membranophila* | Belize, Caribbean, 26 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Vacelet, 1979 | Rützler *et al.,* 2014 |
| INCORPORATION: Description. ‘In all fibres foreign bodies of small size are found; these form a dense axial column about two thirds as thick as the fibre in the centre. The superficial portion of the fibre is free from foreign bodies. The building-material used by this sponge consists of a variety of things, among which tetraxon foreign spicules and sand-grains predominate.’ | *Dactylia elegans* | W Australia, Indian Ocean, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Chalinoplysilla*) |
| ARMOUR, INCORPORATION: Description. ‘All the fibres are charged with foreign bodies – siliceous spicules, sand, &c.; these form an axial thread in the main fibres of the supporting-skeleton, which is about half as thick as the fibre, and surrounded by a clear layer of spongin. At the joining-points of the connecting-fibres these columns of foreign bodies are drawn out to form conic points, which extend to some distance into the connecting fibres. In the connecting fibres themselves an often interrupted series of foreign bodies is observed, which lies axially, and appears as a continuation of the conic protruberances on the columns in the main fibres above mentioned. The foreign spicule-fragments in these fibres are situated nearly longitudonally; at the joining-points, however, their position is very irregular. The fibres of the surface-skeleton contain similar foreign bodies.’ | *Dactylia dichotoma* | E Australia, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 (as *Chalinoplysilla*) |
| ARMOUR, INCORPORATION: Description. ‘In the main fibres of the supporting-skeleton, and also in the primary fibres of the surface-skeleton, scattered small foreign bodies (sand-grains with an average diameter of 0.04 millim.) are met with.’ | *Dactylia imitans* | E Australia, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 (as *Chalinoplysilla*) |
| ARMOUR, INCORPORATION: Description. ‘The surface-skeleton consists of a network of fibres, composed of sand-grains of various size [… 0.1-0.2 mm]. The inhalant pores are situated in the membranes, which are expanded in the meshes: between them abundant scattered sand-grains, similar to those constituting the fibres of the surface-skeleton, are found. The supporting-skeleton […] fibres contain numerous scattered axially situated sand-grains, which average 0.4 millim. in size. […] There are no foreign bodies in the connecting-fibres.’ | *Dactylia impar* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | Carter, 1885 | Von Lendenfeld, 1888 (as *Chalinoplysilla*) |
| INCORPORATION: Description. ‘No sand is found in the skin. […] The main fibres of the supporting-skeleton […] are filled with sand-grains, which cause the surface of the fibres to become very knotty.’ | *Dactylia repens* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | (Carter, 1886) | Von Lendenfeld, 1888 (as *Chalinoplysilla*) |
| ARMOUR, INCORPORATION: Description. ‘The sponge is pretty hard, fairly compressible, and very inelastic. […] The surface-skeleton consists of a network of threads composed of foreign bodies (sand-grains), which are held together by a very small and hardly perceptible quantity of spongin. […] The foreign bodies forming the surface-skeleton are small snad-grains, about 0.05 millim. in diameter; they are packed very closely. In the main fibres of the supporting-skeleton scattered and large sand-grains are met with, on average 0.25 millim. thick and 0.3 millim. apart, always situated axially. In the connecting-fibres very small monaxonid siliceous spicules are sometimes observed; these form a single axial row. They are often fragmentary, but sometimes also intact. […] I am inclined to consider them as foreign.’ | *Dactylia varia* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | (Gray, 1843) | Von Lendenfeld, 1888 (as *Chalinoplysilla arborea* and variations thereof; for the variations, however he lists synonyms of various valid sponge species from different orders, which suggests that Lendenfeld’s *Chalinoplysilla arborea* is a complex of very different species) |
| ARMOUR, INCORPORATION: Description. *Dactylia* spp. have ectosomal ‘aspicular fibres cored by abundant foreign material. Choanosomal principal fibres [are foreign material and] sand cored’, but fine secondary fibres are free of inclusions. The ectosome of *D. varia* is ‘masked by foreign material’ and it has primary choanosomal fibres that are ‘apicular but abundantly cored by foreign material. […] Foreign inclusions, present inside and/or outside the fibres make it difficult to observe the skeleton or skeletal framework.’ | *Dactylia varia* | Port Philipp Heads, Victoria, Australia, Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | (Gray, 1843) | Desqueyroux-Faúndez & Valentine, 2002 (as *D. chaliniformis*) |
| INCORPORATION: Description. The species is often dredged from sandy, shelly grounds and incorporates sand into its spongin fibres, making the diameter of the fibres irregular. Primary fibres are cored, secondaries are not. | *Dactylia varia* | New Zealand, Pacific, 12-100 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Callyspongiidae | (Gray, 1843) | Bergquist & Warne, 1980 (as *D. palmata*) |
| INCORPORATION: Description. Primary fibres contain only occasionally foreign inclusions (sponge spicules). | *Dactylospongia elegans* | NE coast of Minahasa, Celebes, Celebes Sea, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Thiele, 1899) | Thiele, 1899 (as *Luffariella*) |
| INCORPORATION, CRUST: Field sampling in Antarctica, analysing sponges for their diatom content. Frustule concentration was very low at the beginning of November in all the species, and increased in January, to reach maximum values early February. Compared to other species diatom abundances and pigment concentrations were significantly higher in *H. dancoi* tissues. Chlorophaeopigments, very low at the beginning of November, increased between early/mid December, before the peak of diatoms. The planktonic *Fragilariopsis curta* was the most common diatom species recorded inside sponges. Diatom concentration inside the sponge tissues was related to the summer phytoplankton bloom. The shift between the pigment and frustule peaks strongly suggests that diatoms are used as a food source by sponges and that their frustules were accumulated inside the sponge body. The lack of frustules at the beginning of summer indicates that diatom frustules were expelled or dissolved during winter. | *Dendrilla antarctica* | Terra Nova Bay, Ross Sea, Antarctica, 25-35 m | Po: Dem (Keratosa): Dendroceratida: Darwinellidae | Topsent, 1905 | Cerrano *et al.*, 2004c |
| INCORPORATION: Description. *D camera* ‘had almost no debris in the fibres.’ | *Dendrilla camera* | Caribbean, depth not stated | Po: Dem (Keratosa): Dendroceratida: Darwinellidae | (De Laubenfels, 1936) | De Laubenfels, 1954 (as *Cacospongia*) |
| INCORPORATION: Description. Some fibres in this sponge were packed with sediment, including spicule debris. | *Dendrilla rosea* | Carnarvon Shelf NW Australia, Indian Ocean, 51 m | Po: Dem (Keratosa): Dendroceratida: Darwinellidae | Von Lendenfeld, 1883 | Schönberg *et al.*, 2012 |
| BINDING: Description. ‘Sponge thin, encrusting, spreading extensively over the surface and into the cavities of a mass of calcareous debris (Melobesia, Polyzoa, Coral, worm tubes &c., mixed together).’ | *Dercitus (Stoeba) extensus* | Sri Lanka, Indian Ocean, 18-64 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Dendy, 1905) | Dendy, 1905 (as *Stoeba extensa*) |
| PRODUCING SEDIMENTS through bioerosion: Genus review. ‘The type species is known from the Indian Ocean (Gulf of Manaar, Andaman Sea), excavating Melobesian nodules and other calcareous structures, from uncertain depth.’ Whether other *Dercitus (Soeba)* spp. are bioeroders is unknown. But: ‘All known species are encrusting and often filling cavities in calcareous substrata.’ | *Dercitus (Stoeba) simplex* | Sri Lanka, Indian Ocean, depth not stated | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Carter, 1880) | Maldonado, 2002 (as *Stoeba simplex*) |
| BINDING: Description. The observed sponges were attached to shell fragments and various debris, which is more or less enveloped by the sponges. | *Desmacella inornata* | Sicily, Mediterranean, Azores, Atlantic, 150-749 m | Po: Dem (Heteroscleromorpha): Desmacellida: Desmacellidae | (Bowerbank, 1866) | Topsent, 1928 |
| ARMOUR, INCORPORATION: Description. ‘The ectosomal structure is distinct […but] this structure is obscured by the fact that the sides of the meshes are made by numerous scarcely aligned spicules together with grains of sand. [In] The choanosomal skeleton […] a large qunatitiy of foreign material is present.’ | *Desmapsamma anchorata* | Dominican Republic, Puerto Rico, Jamaica, Caribbean, 4-25 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Desmacididae | (Carter, 1882) | Pulitzer-Finali, 1986 (as *Holopsamma helwigi*) |
| INCORPORATION: Description. In *Desmapsamma* spp. ‘sand is normally incorporated in variable quantities. […] sand grains forming a narrow-meshed reticulation sometimes completely replacing oxeas. [… Colour of *D. anchorata*] depending on the quantity and colour of sand grains available in the environment. […] oxeas covered and partly obscured by variable quantities of sand grains […] The cohesiveness of the ectosomal skeleton is influenced strongly by the quantity of foreign material. […] In the choanosome] the bundles and tracts may be strengthened and partly replaced by variable quantities of sand grains and broken spicules.’ | *Desmapsamma anchorata* | Antigua, Caribbean, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Desmacididae | (Carter, 1882) | Van Soest, 2002b |
| INCORPORATION, ARMOUR: Guide. *D. anchorata* incorporates fine sediments, forming tracts and an armour. | *Desmapsamma anchorata* | Brazil, W Atlantic, 7-25 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Desmacididae | (Carter, 1882) | Muricy *et al*., 2008 |
| INCORPORATION: Description. ‘Surface smooth, consisting of an areniferous dermis. Pores plentifully scattered all over the dermis. Vent single at the bottom of the depression in the summit. Parenchyma cancellous, areniferous, without fibre.’ | *Desmapsamma turbo* | Bass Strait, 33 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Desmacididae | (Carter, 1885) | Carter, 1885 (as *Holopsamma*) |
| ARMOUR, INCORPORATION: Description. ‘Surface encrusted by a thinner or thicker coat of sand grains […] Surface irregular, a bit rough in appearance, sand-encrusted. Oscules free from sand crust, […] Ectosomal skeleton an isotropic reticulation of oxeas and sand grains, in variable quantities. In the holotype the sand coat is relatively light and spicules are readily recognized, in other specimens the coat is much thicker and consists almost entirely of a sand reticulation. […] The choanosomal skeleton also is basically an isotropic arrangement of tracts consisting of 2-5 oxeas, in places encrusted or strengthened by sand grains and broken spicules. The reticulation is rather irregular and occasionally confused. Sand grains are less dominant than at the surface. [*D. vervoorti*] is apparently common in sedimented reef areas | *Desmapsamma vervoorti* | museum material, Indo-Pacific, 1-36 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Desmacididae | Van Soest, 1998 | Van Soest, 1998 |
| INCORPORATION: Description of *Psammochela tutiae* as a new species, discussing ‘sand sponges’ (see last entry of this table). The genus *Desmapsamma* is here described as ‘sand bearing’. | *Desmapsamma* spp. | N Moluccas, Indonesia, SCUBA depth | Po: Dem (Heteroscleromorpha): Poecilosclerida: Desmacididae | NA | De Voogd, 2012 |
| AGGLUTINATION: Description. The sponge agglutinated coarse material of 0.5-1.5 cm diameter to its surfaces. The tissue appreared to be free of inclusions. | *Dictyodendrilla* sp. CERF 1 | Carnarvon Shelf NW Australia, Indian Ocean, 53 m | Po: Dem (Keratosa): Dendroceratida: Dictyodendrillidae | indet. | Schönberg *et al.*, 2012 |
| ARMOUR, INCORPORATION: Description. Ectosome of *D. arenosa* full of fine sand grains (10-15 µm in diameter), in places forming a 0.5 mm cortex. Foreign particles also dispersed throughout choanosome. | *Dictyonella arenosa* | Belize, Caribbean, 1-4 m | Po: Dem (Heteroscleromorpha): Bubarida: Dictyonellidae | (Rützler, 1981) | Rützler, 1981 (as *Ulosa*) |
| INCORPORATION: Description. ‘The ectosome is a transparent membrane containing some foreign debris and, occasionally, some scattered spicules.’ | *Dictyonella australiensis* | S Great Barrier Reef, Coral Sea, Pacific, 12-17 m | Po: Dem (Heteroscleromorpha): Bubarida: Dictyonellidae | Pulitzer-Finali, 1982 | Pulitzer-Finali, 1982 |
| INCORPORATION: Description. *D. funicularis* with ‘abundance of foreign spicules and sand… throughout the tissue’ | *Dictyonella funicularis* | Belize, Caribbean, 1-4 m | Po: Dem (Heteroscleromorpha): Bubarida: Dictyonellidae | (Rützler, 1981) | Rützler, 1981 (as *Ulosa*) |
| PSAMMOBIOSIS, INCORPORATION, ANCHORING: Study on museum material to investigate oscular arrangements in sponges, finding that Sollas included material of different species under the same name. The morphology of fitting parts suggests that water is drawn into the sponges from root-like endopsammic parts and ejected from the tube extending above the sediment. *D. dissimilis* incorporated sediment and shell fragments in the endopsammic part with four canals. | *Disyringa dissimilis* | Sollas’ samples from the British Museum | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Ridley, 1884) | Fry & Fry, 1979 |
| PSAMMOBIOSIS, CRUST: Description. The species has a bulbous body and a fistula-like extension that apically ends in a spicule halo, creating a flattened top (figured). The surface of the body agglutinates larger sand grains and other foreign material. | *Disyringa nodosa* | NW Australia, Indian Ocean, 94 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
| PSAMMOBIOSIS, INCORPORATION, ANCHORING: Study on museum material to investigate oscular arrangements in sponges, finding that Sollas included material of different species under the same name. The morphology of fitting parts suggests that water is drawn into the sponges from root-like endopsammic parts and ejected from the tube extending above the sediment. | *Disyringa nodosa* | Sollas’ samples from the British Museum | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Von Lendenfeld, 1907 | Fry & Fry, 1979 |
| PSAMMOBIOSIS?: Description. The specimen was obviously endopsammic, but the fistule was shorn off by the dredge and was the only material recovered. | *Disyringa* sp. CERF 1 | Carnarvon Shelf NW Australia, Indian Ocean, 68-83 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | indet. | Schönberg *et al.*, 2012 |
| ANCHORING: Description. Euplectellidae are glass sponges that have spicule tufts that anchor them in sediments (basalia). The genus *Docosaccus* has several spicule tufts per specimen. In the examined sample for *D. ancoratus* the tufts are not preserved. | *Docosaccus ancoratus* | museum specimens, Andaman and Nicobar Islands, Indian Ocean, 362-805 m | Po: Hex (Hexasterophora): Lyssacinosida: Euplectellidae (Euplectellinae) | Topsent, 1910 | Tabachnick, 2002a |
| INCORPORATION: Description. ‘Choanosomal skeleton […] loaded with broken spicules and cemented by spongin.’ | *Dragmacidon agariciforme* | Sri Lanka, Indian Ocean, depth not stated | Po: Dem (Heteroscleromorpha): Axinellida: Axinellidae | (Dendy, 1905) | Alvarez & Hooper, 2002 |
| CRUST: Guide. *D. reticulatum* is displayed in crossection and shows a dense crust that appears to be external. | *Dragmacidon reticulatum* | Brazil, W Atlantic, 13-101 m | Po: Dem (Heteroscleromorpha): Axinellida: Axinellidae | (Ridley & Dendy, 1886) | Muricy *et al*., 2008 |
| BINDING: Description. The sponge had overgrown coralline fragments. | *Dragmacidon tuberosum* | Azores, Atlantic, 91 m | Po: Dem (Heteroscleromorpha): Axinellida: Axinellidae | Topsent, 1928 | Topsent, 1928 |
| INCORPORATION: Description. ‘The skeleton network is very coarse, with rectangular meshes, and densely charged throughout with sand.’ | *Dysidea avara* | Sri Lanka, Indian Ocean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Schmidt, 1862) | Dendy, 1905 (as *Spongelia fragilis* var. *ramosa*) |
| INCORPORATION: Description. The sponge incorporates foreign spicules and sand grains into the majority of its fibres, these inclusions act as a skeleton. | *Dysidea avara* | Toulon, Mediterranean, 40-20-50 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Schmidt, 1862) | Topsent, 1928 (as *Spongelia*) |
| INCORPORATION: Description. The fibers are ‘crowded with foreign material, sand grains, and fragments of foreign spicules.’ | *Dysidea avara* | Marshall Islands, Micronesia, Pacific, 5 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Schmidt, 1862) | De Laubenfels, 1954 |
| INCORPORATION: Description. ‘The tissue consists of thick, reticulated and very grainy fibres, but in which the spongin is still well visible, however.’ | *Dysidea avara* | Brazil, Atlantic, 49 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Schmidt, 1862) | Boury-Esnault, 1973 |
| ARMOUR, INCORPORATION: Description. Surface conules in one specimen ‘roughened by protruding sand grains. [Choanosomal] fibres 100-500 μm thick, commonly almost packed with mixed and ill-sorted detritus. Sand grains attain 0.5 mm in size. Most fibres have irregularly knotty contours, and many thinner fibres abruptly expand to 2-4 times their diameter. […] Much detritus also interstitially, scattered and clustered. In F52058, thin fibres commonly 60 μm thick. Mixed detritus in all fibres generally finer and better sorted than in F52057, but larger lithic or skeletal grains occur interstitially.’ | *Dysidea avara* | Bass Strait, 3-6 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Schmidt, 1862) | Wiedenmayer, 1989 |
| INCORPORATION: Identification guide. ‘A reticulation of spongin fibres filled with sand grains. Primary fibres always filled, secondary fibres may be sometimes completely free.’ | *Dysidea avara* | Galicia, Mediterranean, 1-100 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Schmidt, 1862) | Van Soest, 2015 |
| INCORPORATION: Description. ‘The skeleton is composed of a network of smooth fibres 0.16 millim. thick, which are charged with abundant small foreign bodies.’ | *Dysidea cacos* | Sydney Harbour, Australia, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Spongelia cacos*) |
| INCORPORATION: Description. This sponge has comparatively coarse main fibres ‘filled with much larger foreign particles [than in *D. pallescens*] (sand grains), and in the more areniferous character of the connecting fibres, which, however, are still occasionally quite free of sand.’ | *Dysidea crassa* | Sri Lanka, Indian Ocean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Dendy, 1905) | Dendy, 1905 (as *Spongelia elastica* var. *crassa*) |
| INCORPORATION: Identification guide. ‘[The skeleton consits of] columns of sand grains of several mm in diameter […] cemented by spongin, interconnected by similar sand filled fibres.’ | *Dysidea dendyi* | NW Sapin, Atlantic, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Ferrer Hernandez, 1923) | Van Soest, 2015 (as *Hyrtios*, but discussing the possibility of it being a *Dysidea*) |
| INCORPORATION: 1986a – SEM observations and time lapse video in flow through tanks (applying 112 μm carbonate sands), 5 week field growth experiment on explants with particle application every 2nd day (112, 250 and 540 μm carbonate sand) and particle depletion, using 1 initial application of siliceous sediments to be incorporated as reference. Sponges actively transported sediments at 7.5 μm min-1 by cell migration to where the particles were incorporated into sponge fibres to function as skeleton in this aspicular sponge. The process functions like spicule transport in other sponges. Lack of sediment supply hampered fibre growth. | *Dysidea etheria* | Bermuda, W Atlantic, not stated, assumed shallow | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | De Laubenfels, 1936 | Teragawa, 1986a, 1986b; Rützler, 2004 |
| INCORPORATION, ARMOUR: Description. The sponge includes sand grains, sponge spicules and foraminiferan tests. It forms and armour and has cored primary fibres, but secondary fibres are free of inclusions. | *Dysidea etheria* | Brazilian oceanic islands, W Atlantic, shallow depth <50 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | De Laubenfels, 1936 | De Moraes, 2011 |
| INCORPORATION: Field guide. *D. etheria* has spongin fibres cored with sediment. | *Dysidea etheria* | Bahia, Brazil, W Atlantic, intertidal to 18 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | De Laubenfels, 1936 | Hajdu *et al.*, 2011 |
| INCORPORATION: Description. ‘A reticulation of fibers (70-300 μm thick) charged with sediment grains (sand particles and foreign spicules).’ | *Dysidea etheria* | Belize, Caribbean, 1 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | De Laubenfels, 1936 | Rützler *et al.,* 2014 |
| INCORPORATION: Description. ‘There is very little organised substance in the sponge compared with the quantity of foreign bodies in the skeleton […]. Both the thick and slender fibres are charged with foreign bodies; the former to such an extent that they attain a knotty surface. Among these, foreign siliceous spicules are particularly prevalent. Sand-grains, on an average 0.12 millim. in size, are abundant in the thick, but absent in the slender fibres. The foreign bodies in the latter appear as an axial string of broken foreign siliceous spicules. These fragments are very uniform in size and on average 0.06 millim. long. Some spicules appear intact: None seem, however, to be proper spicules.’ | *Dysidea flabellum* | E Australia, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 (as *Halme*) |
| INCORPORATION: Description. ‘arenaceous throughout.’ | *Dysidea fragilis* | British coasts, Atlantic, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Montagu, 1814) | Carter, 1885 |
| INCORPORATION: Description. Fibres are difficult to observe due to a multitude of foreign bodies. | *Dysidea fragilis* | Channel, Atlantic, 40-240 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Montagu, 1814) | Topsent, 1928 (as *Spongelia*) |
| INCORPORATION: Description. The fibers are ‘loaded with foreign debris.’ | *Dysidea fragilis* | Marshall Islands, Pacific, subtidal | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Montagu, 1814) | De Laubenfels, 1954 |
| INCORPORATION: Description. ‘The epidermal thickenings are always marked by sand grains. The tissue is made up of reticulated horny fibres full of foreign bodies almost completely masking the spongin.’ | *Dysidea fragilis* | Brazil, Atlantic, 22-48 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Montagu, 1814) | Boury-Esnault, 1973 |
| INCORPORATION: Description. In the unarmoured Dysideidae and *Dysidea* spp. ‘all fibres are filled with detritus’. *D. fragilis* is ‘packed with sand, the sand colour will dominate. […] The skeletal fibre retriculum consists of ascending primary and connective secondary fibres, partially to fully packed with foreign debris.’ | *Dysidea fragilis* | type locality: Devon, England, Atlantic, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Montagu, 1814) | De C. Cook & Bergquist, 2002b |
| INCORPORATION: Identification guide. ‘It lacks a spicule skeleton, in stead it has a network of fibres loaded with sand grains, broken spicules and other foreign material (microscopic examination). […] In cases where sand grains predominate over organic matter the sponge can assume the colour of sand. […] The elasticity depends on the ratio of spongin (elastic) to inorganic matter. […] A reticulation of spongin fibres partially or wholly obscured by foreign inclusions (enclosed in the spongin fibres and sometimes loose in the matrix), e.g. sand grains, spicules of other sponges, diatom valves, etc.’ | *Dysidea fragilis* | Atlantic coasts of Europe, Arctic, Mediterranean; depth not stated | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Montagu, 1814) | Van Soest, 2015 |
| ARMOUR?, INCORPORATION: In crossection the sponge looked very patchy, with pockets of dense sediment accumulations of varying origin. Grains were enclosed in densely cored spongin. The surface was lightly armoured with spicule debris. | *Dysidea* cf. *frondosa* | Carnarvon Shelf NW Australia, Indian Ocean, 57 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | Bergquist, 1995 | Schönberg *et al.*, 2012 |
| INCORPORATION: Description. ‘Vertical and lateral fibre, all arenaceous.’ | *Dysidea hirciniformis* | Bass Strait, 35 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | Carter, 1885 | Carter, 1885 |
| INCORPORATION: Description. ‘The dermal reticulation is completely obliterated by the sand cortex. […] The skeleton consists in the first place of the dense arenaceous cortex, which is well developed everywhere, except in the thin dermal membrane of the pore-areas […]. This cortex is about 0.5 millim. thick. Internally the skeleton also consists chiefly of sand-grains, arranged in irregular tracts rather than in well-defined fibres, but oftebn held together by sponging-cement. Between those tracts are wide areas free from sand.’ | *Dysidea incrustata* | Sri Lanka, Indian Ocean, from ‘outside pearl banks and deep water’ | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Dendy, 1905) | Dendy, 1905 (as *Spongelia*) |
| INCORPORATION: TEM study of sponge photosymbionts. The sponge can replace sediment incorporation with an association with a coralline red alga (*Jania adhaerens* Lamouroux, 1816). | *Dysidea janiae* | Bermuda, W Aatlantic, 0-20 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Duchassaing & Michelotti, 1864) | Rützler, 1990 |
| INCORPORATION: Description. ‘The main fibres are 0.4 millim. thick, knotty, and completely filled with foreign bodies. The connecting-fibres are simple, unbranched, irregularly curved, and about 0.2 millim. thick ; they do not contain so many foreign bodies as the main fibres. A sheath of oval siliceous bodies surrounds the fibres.’ | *Dysidea navicularis* | New Zealand, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Haastia*) |
| INCORPORATION: Description. ‘The primary fibres of the skeleton, ending in the conuli, are abundantly charged with foreign matter, chiefly sponge spicules, while the connecting fibres are almost free from foreign matter.’ | *Dysidea pallescens* | Sri Lanka, Indian Ocean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Schmidt, 1862) | Dendy, 1905 (as *Spongelia elastica* var. *lobosa*) |
| INCORPORATION: Description. ‘The slceleton consists of knotty main fibres, 0.2 millim. thick, which are 1.5-3 millim. apart. They are closer together in *S. e. massa* than in the other varieties, and appear as columns of pretty densely packed large foreign bodies, which are cemented by a small quantity of spongin. The connecting-fibres are 0.04-0.06 millim. thick, and mostly free from foreign bodies.’ | *Dysidea pallescens* | Mediterranean, N Atlantic, Bass Straight, Sydney Harbour, Australia, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Schmidt, 1862) | Von Lendenfeld, 1888 (as *Spongelia elastica*) |
| INCORPORATION: Description. ‘The main fibres of the skeleton are very knotty and charged with sand-grains, which are on average 0.25 millim. in size; the connecting-fibres contain scattered foreign bodies, and are 0.1 millim. thick.’ | *Dysidea ramsayi* | Mauritius, New Zealand, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Spongelia ramsayi*) |
| INCORPORATION: Field guide. *D. robusta* has spongin fibres abundantly cored with foreign material. | *Dysidea robusta* | Bahia, Brazil, W Atlantic, intertidal | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | Vilanova & Muricy, 2001 | Hajdu *et al.*, 2011 |
| INCORPORATION: Description. ‘The skeleton consists of a network of fibres charged with particularly large sand-grains.’ | *Dysidea sagum* | Sydney Harbour, Australia, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Spongelia sagum*) |
| ARMOUR, INCORPORATION: Description. ‘The skeleton consists of longitudonal irregularly ramifying fibres, which are 0.1 millim. thick, and contain more or less abundant spicule-fragments.’ | *Dysidea spiculifera* | Bass Strait and E Australia, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Aplysina*) |
| INCORPORATION: Description. The fibers ‘are regularly packed with foreign objects, which at first seem to be sponge spicules. A few of them are clear-cut spicules, may be studied in boiled-out preparations, and are undoubtedly derived from neighboring specimens of Porifera. The vast majority of these objects dissolve in boiling nitric acid, yet with little or no carbon dioxide gas formed. They are, therefore, almost certainly neither silica nor calcium carbonate.’ | *Dysidea variabilis* | Marshall Islands, Micronesia, Pacific, 2-5 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Duchassaing & Michelotti, 1864) | De Laubenfels, 1954 (as *D. crowshayi*) |
| ARMOUR, INCORPORATION: Description. ‘The skeleton consists of a pretty regular network of fibres which do not contain any foreign bodies. […] AT the joining-points of the fibres, in the true body of the sponge, only sand-granules 0.14 millim. in size are situated, one in each joining-point. These sand-grains, which form an integral part of the skeleton, are enclosed in a spongin coating {…}. There can be no doubt that these sand-grains are originally attached to the tips of the conuli, and from thence apparently wander centripetrally, as they actually remain in the same place whilst the sponge grows, and the conuli extend beyond them. | *Dysidea villosa* | Sydney Harbour, Australia, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 (as *Halme villosa* and *Halme villosa* var. *auloplegma*) |
| ARMOUR, INCORPORATION: Description. The species embeds sediments in the surface, forming armour, and loosely in the larger fibres. The material includes sand grains and spicules. | aff. *Dysidea* sp. CERF 1 | Carnarvon Shelf NW Australia, Indian Ocean, 36-97 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | indet. | Schönberg *et al.*, 2012 |
| ARMOUR, INCORPORATION: Description. The sponge had light armour, but primary and secondary spongin fibres were strongly cored with sediments and spicule fragments. | aff. *Dysidea* sp. CERF 2 | Carnarvon Shelf NW Australia, Indian Ocean, 69-100 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | indet. | Schönberg *et al.*, 2012 |
| ARMOUR, INCORPORATION: Description. Only a fragment was available, but the sponge was obviously barrel shaped. It had clearly separated, cortex-like armour and abundant sediments in the tissue, both embedded in fibres and in the choanosome (including sponge chips). Fibres ran more or less at right angle to surface. | aff. *Dysidea* sp. CERF 3 | Carnarvon Shelf NW Australia, Indian Ocean, 69-72 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | indet. | Schönberg *et al.*, 2012 |
| INCORPORATION: Description. ‘Massive, depressed, spreading. Upper surface even, almost flat, with meandriniform sandy pattern and minutely-reticulate dermal membrane between. Vents minute, scattered. Incompressible, intensely sandy and friable, with radiately columnar structure, due to the arrangement of the sandy tracts. Colour in spirit pale grey and sandy. Skeleton, composed chiefly of sand arranged in dense tracts as above described. Between these sandy tracts are scattered numerous slender tylostrongyla or tylota. […] The sand grains in the interior of the sponge are sparsely echinated by spined styli.’ | *Echinodictyum arenosum* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Axinellida: Raspailiidae | Dendy, 1896 | Dendy, 1896 |
| CRUST: Description. The globular sponges were more strongly hispid on the upper half, where sediments were caught between the spicules. | *Ecionemia* sp. CERF 3 = WAM sp. SS 2 | Carnarvon Shelf NW Australia, Indian Ocean, 100 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | indet. | Schönberg *et al.*, 2012 |
| ARMOUR: Guide. A crossection is shown in which *E. fexox* displays loose armour of coarse sediment. | *Ectyoplasia ferox* | Brazil, W Atlantic, 13-101 m | Po: Dem (Heteroscleromorpha): Axinellida: Raspailiidae (Raspailiinae) | (Duchassaing & Michelotti, 1864) | Muricy *et al*., 2008 |
| AGGLUTINATION: Description. Surface ‘with several attached foreign objects (calcareous discs).’ | *Ecionemia acervus* | NE coast of Minahasa, Celebes, Celebes Sea, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Bowerbank, 1864 | Thiele, 1899 (as *Ecionemia agglutinans*) |
| AGGLUTINATION: Description. ‘This specimen is massive, and quite irregular in shape, with a number of foreign bodies attached to it.’ | *Ecionemia acervus* | Sri Lanka, Indian Ocean, shallow to 15 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Bowerbank, 1864 | Dendy, 1905 (as *E. carteri*) |
| AGGLUTINATION or INCORPORATION: Guide. *E. formosus* is pictured with small stones adhering to its surface and sunk in far enough to be almost embedded. | *Erylus formosus* | Rio Grande do Norte, E Brazil, W Atlantic, 30-160 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Geodiidae (Erylinae) | Sollas, 1886 | Muricy *et al.,* 2008 |
| AGGLUTINATION: Description. ‘A 10–15 mm thick crust covering about 60 cm2 of the rock. Surface smooth, except for a few serpulid worm tubes and small bryozoans crusts, but bumpy, with scattered, elevated oscula.’ | *Erylus formosus* | Belize, Caribbean, 30 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Geodiidae (Erylinae) | Sollas, 1886 | Rützler *et al.,* 2014 |
| ANCHORING: Description. Euplectellidae are glass sponges that have spicule tufts that anchor them in sediments (basalia). The genus *Euplectella* has a single spicule tuft. The tuft in *E. aspergllum* is anchor-like and protrudes 2-8 cm. | *Euplectella aspergillum* | museum specimens,  all major oceans except poles, 36-5050 m | Po: Hex (Hexasterophora): Lyssacinosida: Euplectellidae (Euplectellinae) | Owen, 1841 | Tabachnick, 2002a |
| ANCHORING: Material study. *E. aspergillum* anchors itself in soft sediments by the use of spicule tufts. | *Euplectella aspergillum* | not stated | Po: Hex (Hexasterophora): Lyssacinosida: Euplectellidae (Euplectellinae) | Owen, 1841 | **Sand**ford, 2003 |
| ANCHORING: Study on basalia optical properties, which may be a secondary effect of biologically more meaningful fracture-resistance properties. Basalia of *E. aspergillum* are 5-10 cm long and 40-70 μm in diameter and have barb-like processes along the spicule shafts closer to the sponge body, affording more resistance to displacement and better anchoring properties than entirely smooth spicules would have. Spicules have a solid core and layers, with a reduction in organic content and hydration towards the surface. Finer structure reveals silica spheres that increase in diameter from the core to outer layers (<50 μm to 200 μm). | *Euplectella aspergillum* | not stated | Po: Hex (Hexasterophora): Lyssacinosida: Euplectellidae (Euplectellinae) | Owen, 1841 | Aizenberg *et al.*, 2004 |
| ANCHORING: Material studies. 2006 – *E. aspergillum* has a tuft of spicules to anchor in soft sediment. These spicules are layered, alternating a thick silica layer with a very thin organic layer, a structure which deflects crack paths. ‘[…] the silica matrix is built from small colloids with a diameter in the order of 2.8 nm.’ 2010 – Nanoindentation and 3 point bending tests | *Euplectella aspergillum* | Philippines, Pacific, depth not stated | Po: Hex (Hexasterophora): Lyssacinosida: Euplectellidae (Euplectellinae) | Owen, 1841 | Woesz *et al.*, 2006, 2010 |
| ANCHORING: Material studies. *E. aspergillum* is depitcted with a short, bushy, dense spicule tuft, made up of about 2000 spicules that have ‘a smooth distal and a barbed proximal region that is terminated by an apical spinous process. This design strategy forms an effective anchoring apparatus that secures the sponge in the soft sediments of the sea floor. The smooth portions of these spicules become incorporated into the main vertical spicular struts of the skeletal lattice and terminate approximately 1/3 of the way up the cylinder.’ Reliable anchoring is achieved through extreme material flexibility. | *Euplectella aspergillum* | Philippines, Pacific, depth not stated | Po: Hex (Hexasterophora): Lyssacinosida: Euplectellidae (Euplectellinae) | Owen, 1841 | Weaver *et al.*, 2007 |
| ANCHORING: Material property study. Resistance to desilification with hydrofluoric acid was average: *Monorhaphis chuni* 3-10 d, *Hyalonema sieboldii* 14-30 d, *E. aspergillum* 3-6 mo, *Aphrocallistes vastus* 6-8 mo, *Farrea occa* 6-12 mo (CS: not sure whether that refers to body or anchoring spicules). | *Euplectella aspergillum* | not stated | Po: Hex (Hexasterophora): Lyssacinosida: Euplectellidae (Euplectellinae) | Owen, 1841 | Voznesenskiy *et al.*, 2011 |
| ANCHORING: Database listing collection specimens. For *E. curvistellata* a photograph is shown. The sponge has a large basal spicule bundle. | *Euplectella curvistellata* | Satsuma, Kagoshima, Japan, Pacific, 70-100 m | Po: Hex (Hexasterophora): Lyssacinosida: Euplectellidae (Euplectellinae) | Ijima, 1901 | Ogawa *et al.*, 2006-2012 |
| ANCHORING: Study on material properties of basalia. The ‘inorganic–organic composite structure accounts for the exceptional flexibility of the spicules, which, although being silica based, can still bend without breaking and serve as a tough yet flexible mechanical skeletal support’. The spicules have a homogeneous core, a layered sheath and a central organic matrix. | *Euplectella marshalli* | Philippines, Pacific, depth not stated | Po: Hex (Hexasterophora): Lyssacinosida: Euplectellidae (Euplectellinae) | Ijima, 1895 | Dericioglu *et al.*, 2012 |
| ANCHORING: Description. Euplectellidae are glass sponges that have spicule tufts that anchor them in sediments (basalia). The genus *Euplectella* has a single spicule tuft. | *Euplectella simplex* | museum specimens,  Indian Ocean, depth not stated | Po: Hex (Hexasterophora): Lyssacinosida: Euplectellidae (Euplectellinae) | Schulze, 1896 | Tabachnick, 2002a |
| ANCHORING: Database listing collection specimens. For *E. timorensis* a photograph is shown. The sponge has a basal spicule bundle. | *Euplectella timorensis* | Timor Sea, Sigoga expedition specimen, type location Indonesia (Van Soest *et al.,* 2014), depth not stated | Po: Hex (Hexasterophora): Lyssacinosida: Euplectellidae (Euplectellinae) | Ijima, 1927 | Ogawa *et al.*, 2006-2012 |
| ANCHORING: Unlike the rest of the skeleton the basalia (anchoring spicule tuft) in *Euplectella* sp. are not rigidly cemented together and allow a certain degree of flexibility when currents push on the sponge anchored in soft sediments. As figured by the authors *Euplectella* sp. has a spicule tuft. | *Euplectella* sp. | Western Pacific, deep sea | Po: Hex (Hexasterophora): Lyssacinosida: Euplectellidae (Euplectellinae) | indet. | Aizenberg *et al.*, 2005 |
| ANCHORING: Review. The Euplectellidae have developed anchoring spicules and are able to live on soft substrate, even if they prefer *Globigerina*, Pteropoda shell or mixed coarse substrates. | Euplectellidae | deep sea | Po: Hex (Hexasterophora): Lyssacinosida: Euplectellidae | NA | Tabachnick, 1991 |
| CRUST: Description. *E. scabiosum* is a hispid, encrusting sponge, and mud and particles become trapped between the spicules on the surface. | *Eurypon scabiosum* | Azores, Atlantic, 650-919 m | Po: Dem (Heteroscleromorpha): Axinellida: Raspailiidae | Topsent, 1927 | Topsent, 1928 (as *Acantheurypon*) |
| INCORPORATION: Description. ‘The main fibres consist of coarse sand grains joined by scarcely apparent spongin.’ Secondary fibres are uncored. ‘Foreign matter (almost exclusively sand) is also incorporated in the flesh.’ | *Euryspongia heroni* | S Great Barrier Reef, Coral Sea, Pacific, 10 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | Pulitzer-Finali, 1982 | Pulitzer-Finali, 1982 |
| INCORPORATION: Description. In the unarmoured *Euryspongia* spp. ‘only primary fibres are axially to fully cored, whereas secondary fibres are uncored’, and the pithing is often obscured by the debris. Sponges can become fragile by the large amounts of incorporated foreign material. The colour of the type of *E. lactea* is ‘milky white, due to the large quantites of white-grey mud that the sponge has ingested and incorporated. […] Primary fibres are cored.’ Secondaries are uncored. | *Euryspongia lactea* | type locality: Suez, Red Sea, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | Row, 1911 | De C. Cook & Bergquist, 2002b |
| INCORPORATION: Description. The fibers are, ‘in many places, particularly in the larger fibers, they are cored with foreign material. This foreign material often represents only about the central third of the fiber. | *Euryspongia phlogera* | Marshall Islands, Pacific, 12 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | De Laubenfels, 1954 | De Laubenfels, 1954 |
| ANCHORING: Description. The sponge has a large spicule mass. | *Fangophilina hirsuta* | Dar es Salaam, E Africa, Indian Ocean, 400 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
| ANCHORING: Description. *F. submersa* is depicted with a thick basal tuft of anchoring spicules about as long as the sponge body. | *Fangophilina submersa* | Caribbean, depth not stated | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | Schmidt, 1880 | Van Soest & Rützler, 2002 |
| INCORPORATION: Description. In *F. reticulata* the surface is unarmoured and the very large-diameter primary fibres are cored with foreign debris, large secondary fibres are uncored. | *Fascaplysinopsis reticulata* | type locality: Indonesia, NE Australia, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Hentschel, 1912) | De C. Cook & Bergquist, 2002a |
| INCORPORATION: Description. The surface of this specimen was unarmoured, but primary fibres were occasionally cored with sediment. | *Fascaplysinopsis* sp. CERF 1 | Carnarvon Shelf NW Australia, Indian Ocean, 96 m | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | indet. | Schönberg *et al.*, 2012 |
| INCORPORATION: Description. For *Stelospongia costifera*: Fibres ‘are 0.2 millim. thick, on an average 0.3 millim. apart, and cored with a very slender axial thread of small longitudonally disposed foreign spicule-fragments.’ For *Stelospongia pulcherrima*: ‘The main fibres […are…] cored with abundant spicule-fragments. The transverse fibres […] contain scattered spicule-fragments.’ | *Fasciospongia costifera* | coasts of Australia, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (De Lamarck, 1814) | Von Lendenfeld, 1888 (as *Stelospongia costifera* and *Stelospongia pulcherrima*) |
| INCORPORATION: Description. Fibres do not contain any inclusions. | *Fasciospongia pikei* | Mauritius, E Australia, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Hyatt, 1877) | Von Lendenfeld, 1888 (as *Euspongia pikei*) |
| No INCORPORATION?: Description. The main fibres ‘are free from foreign bodies.’ | *Fasciospongia rimosa* | S and E coasts of Australia, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (De Lamarck, 1814) | Von Lendenfeld, 1888 (as *Stelospongia canalis*) |
| INCORPORATION: Description. Primaries with ‘straggling core of mixed detritus, including spicule fragments, comparatively fine and well sorted.’ | *Fasciospongia rimosa* | Bass Strait, 10 m | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (De Lamarck, 1814) | Wiedenmayer, 1989 |
| INCORPORATION: Description. ‘Longitudonal main fibres which […] are cored with a pretty slender axial string of foreign spicule-fragments. […Connecting fibres] are free from foreign bodies.’ | *Fasciospongia turgida* | coasts of Australia, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (De Lamarck, 1814) | Von Lendenfeld, 1888 (as *Stelospongia australis*, also as var. *conulata*, var. *conulissima* and var. *fovea*) |
| INCORPORATION: Description. In *Fasciospongia* spp. and in *F. turgida* the surface is unarmoured and the large-diameter primary fibres are cored with foreign debris, secondary fibres are uncored. | *Fasciospongia turgida* | type locality: Vanuatu, Coral Sea, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (De Lamarck, 1814) | De C. Cook & Bergquist, 2002a |
| INCORPORATION: Description. In *Fenestraspongia* spp. and in *F. intertexta* the surface is unarmoured and the primary fibres are cored, secondary and tertiary fibres are uncored. | *Fenestraspongia intertexta* | type locality: SE Australia, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Carter, 1885) | De C. Cook & Bergquist, 2002a |
| INCORPORATION: Description. ‘Sponge small, thinly encrusting, with numerous fragments of calcareous incorporated in its substance.’ | *Forcepia (Forcepia) agglutinans* | Still Bay, South Africa, Indian Ocean, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Coelosphaeridae | Burton, 1933 | Burton, 1933 |
| INCORPORATION: Description. ‘Sponge massive, irregular. Surface very uneven, with scabid, subdivided sandy areas. Texture cavernous, compact between, with large sandy tracts; firm. […] Skeleton, composed chiefly of sand, not arranged in fibres but in dense irregular accumulations with comparatively clear areas of soft tissue between. There are also numerous megascleres, mostly arranged in very loose and irregular whisps.’ | *Forcepia (Forcepia) carteri* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Coelosphaeridae | Dendy, 1896 | Dendy, 1896 |
| PSAMMOBIOSIS, ANCHORING, BINDING: Field survey and description. The sponge can occur with half of the body buried in sediments (in sandy or pebbly environments). It agglutinates particulate material to the basis of the body. | *Forcepia (Forcepia) topsenti* | Svalbard Basin, Arctic Ocean, 2309-2602 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Coelosphaeridae | Lundbeck, 1905 | Barthel & Tendal, 1993 |
| INCORPORATION: Description. *E. trilabis* ‘is a crust of violet colour with a fistule, enclosing many pebbles. […] A constant criterion that appears useful to underline is the presence of foreign sand grains in the matter of the choanosomal tissue in the five specimens.’ | *Forcepia (Forcepia) trilabis* | coasts of Brazil, Atlantic, 45-48 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Coelosphaeridae | (Boury-Esnault, 1973) | Boury-Esnault, 1973 (as *Ectoforcepia*) |
| INCORPORATION: Description. ‘Main skeleton irregular, often obscured by much scattered to clustering detritus and macrosymbionts. Fine sediment dominates, especially at surface, over foraminifera and other debris, whole branches of bryozoans, and foreign spicules, chiefly triradiates, probably from neighbouring calcareous sponge […].’ Fibres cored by proper spicules. | *Gelliodes incrustans* | Bass Strait, 10-12 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Niphatidae | Dendy, 1905 | Wiedenmayer, 1989 |
| INCLUSION: Description. ‘The specimen is erect and goblet-shaped, witli broad base, and contains much foreign matter. The oxea are a good deal slenderer than in the type, and the whole skeleton i« very irregular.’ | *Gelliodes poculum* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Niphatidae | Ridley & Dendy, 1886 | Dendy, 1895 |
| AGGLUTINATION, BINDING: Faunistic inventory. A specimen is pictured with a few coarse fragments adhering to its upper surface. | *Geodia areolata* | Oman, Indian Ocean, 13.5-38 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Geodiidae (Geodiinae) | Carter, 1880 | Van Soest & Beglinger, 2008 |
| INCORPORATION: Field sampling and sample analysis. Ca. 7% of the sampled specimens of *G. barretti* had pockets of embedded sediment that was walled off with internal cortices that formed bladder-like walls around the inclusions. The observation was interpreted as wound healing after damage, when sediments collected in the concave wounds and were sealed off to avoid further material settling into it. This is not what is understood here as ‘inclusion’, where sediments are actively taken up or allowed to remain distributed in the tissues. | *Geodia barretti* | W Norway coast, North Sea, 200-300 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Geodiidae (Geodiinae) | Bowerbank, 1858 | Hoffmann *et al.*, 2004 |
| ANCHORING, INCORPORATION, AGGLUTINATION, BINDING: Field survey for distributions. ‘Some of the specimens of *G. barretti* had stones of various sizes and gravel incorporated underneath’. | *Geodia barretti* | various locations in the NE Atlantic, 50-220 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Geodiidae (Geodiinae) | Bowerbank, 1858 | Klitgaard & Tendal, 2004 |
| INCORPORATION: Taxonomic study. The authors noted that shallow-water *G. barretti* incorporated a single species of diatom in the cortex. No other diatom species were incorporated, nor was this seen in deep sea specimens that live in higher water silica concentrations. | *Geodia barretti* | various locations in the E Atlantic, mostly Norway, 30-40 and 139-1818 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Geodiidae (Geodiinae) | Bowerbank, 1858 | Cárdenas & Rapp, 2013 |
| AGGLUTINATION, BINDING, INCORPORATION: Identification guide. ‘*Geodia conchilega* Schmidt (1862) is an irregularly tuberose, orange sponge characteristically covered by attached pieces of shells and stones. […] Irregularly tuberose, with pieces of shell or small pebbles attached to the surface. Often agglutinating stones or insinuating in crevices. […] The choanosomal skeleton is pulpy, confused, with radiate skeleton apparent only in the peripheral parts. Riddled with foreign material, sand, shells, diatoms etc.’ | *Geodia conchilega* | NW Spain, Mediterranean; depth not stated | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Geodiidae (Geodiinae) | Schmidt, 1862 | Van Soest, 2015 |
| AGGLUTINATION, BINDING: Identification guide. ‘Often [with] encrusted surface. […] Surface irregular, generally hispid, but here and there smooth, encrusted by shells and pebbles.’ | *Geodia cydonium* | British Isles, Roscoff, Norway, Atlantic, Mediterranean; depth not stated | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Geodiidae (Geodiinae) | (Jameson, 1811) | Van Soest, 2015 |
| AGGLUTINATION: Guide. *G. gibberosa* is pictured with coarse biogenic particles adhering to its surface. | *Geodia gibberosa* | Rio Grande do Norte, E Brazil, W Atlantic, 40 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Geodiidae (Geodiinae) | Sollas, 1886 | Muricy *et al.,* 2008 |
| AGGLUTINATION, BINDING, ANCHORING: Faunistic inventory. ‘Massively encrusting sponge, agglutinating and covering small stones and rubble, with several upright digitations 1-2 cm high.’ | *Geodia globostellifera* | Oman, Indian Ocean, intertidal | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Geodiidae (Geodiinae) | Carter, 1880 | Van Soest & Beglinger, 2008 |
| ARMOUR: Guide. *G. neptuni* is described to incorporate much sediment into the surface. | *Geodia neptuni* | Rio Grande do Norte, E Brazil, W Atlantic, ca. 39-160 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Geodiidae (Geodiinae) | (Sollas, 1886) | Muricy *et al.,* 2008 |
| AGGLUTINATION, BINDING: Faunistic inventory. A specimen is pictured with a few coarse fragments adhering to its upper surface. | *Geodia perarmata* | Oman, Indian Ocean, 38 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Geodiidae (Geodiinae) | Bowerbank, 1873 | Van Soest & Beglinger, 2008 (as *Isops*) |
| AGGLUTINATION: Description. The roughly globular specimen had stones attached to its surfaces (stones 1.5-4 cm in diameter). Room between the stones showed clean tissue, and there were no inclusions in the tissues. | *Geodia* sp. CERF 1 | Carnarvon Shelf NW Australia, Indian Ocean, 53 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Geodiidae (Geodiinae) | indet. | Schönberg *et al.*, 2012 |
| ANCHORING, AGGLUTINATION: Field survey for distributions. ‘The geodiid sponges often appeared on deck with stones of different sizes attached to one side’. | Geodiidae | various locations in the NE Atlantic, 167-1200 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Geodiidae | NA | Klitgaard & Tendal, 1997 |
| ANCHORING: Description. According to Schmidt *G. capillosa* has a thick but short root. It is not clear whether this refers to tissue extensions or spicule tufts. | *Grantia capillosa* | not stated, assumed Atlantic | Po: Cal (Calcaronea): Leucosolenida: Grantiidae | (Schmidt, 1862) | Schmidt, 1870 (as *Sycon*) |
| INCORPORATION: Description. ‘Massive, solid […]. Texture hard, friable and incompressible, owing to the immense quantity of coarse sand of which the interior is chiefly made up. The dermal membrane is free of sand in places, and then appears, thin, delicate and minutely reticulated. Colour in spirit brown, owing to the sand. Skeleton, consisting chiefly of the coarse sand grains irregularly and closely aggregated. Between the sand grains is a scanty, irregular spicular network, scarcely fibrous and almost Renierine in character.’ | *Halichondria (Halichondria) arenacea* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Suberitida: Halichondriidae | Dendy, 1895 | Dendy, 1895 |
| INCORPORATION: Identification guide. ‘It agglomerates sand and other bottom particles. […] Interior cavernous, loaded with debris and sand. […] Abundant debris is packed in the deeper parts of the sponge.’ | *Halichondria (Halichondria) agglomerans* | Roscoff, Atlantic, 75 m | Po: Dem (Heteroscleromorpha): Suberitida: Halichondriidae | Cabioch, 1968 | Van Soest, 2015 |
| Morphology suitable for PSAMMOBIOSIS: Description. ‘Sponge consisting of a massive body bearing elongated mammiform projections with vents at their apices. […] The genus resembles *Oceanapia* in external appearance.’ | *Halichondria (Eumastia) schmidti* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Suberitida: Halichondriidae | (Dendy, 1895) | Dendy, 1895 (as *Eumastia*) |
| Morphology suitable for PSAMMOBIOSIS: Identification guide. ‘*Halichondria (Eumastia) sitiens* (Schmidt, 1870) is a cushion-shaped sponge with numerous, characteristic upstanding papillae.’ | *Halichondria (Eumastia) sitiens* | Norway, Northern Ireland, Iceland, Greenland, NE Canada, Atlantic, 15-160 m | Po: Dem (Heteroscleromorpha): Suberitida: Halichondriidae | (Schmidt, 1870) | Van Soest, 2015 |
| INCORPORATION: Description. ‘Fibre keratine, resilient, covered or axiated with acerate spicules, among which there are many microscopic foreign objects, sand grains, &e.’ | *Haliclona arenosa* | New Zealand and Australia, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Chalinidae | (Carter, 1882) | Carter, 1882 (as *Chalina digitata* var. *arenosa*) |
| INCORPORATION: 2004 – Field study comparing incorporated to ambient sediments. 2007 – Review. Sponges unselectively incorporated sediments available in the environment. | *Haliclona (Soestella) caerulea* | Belize, Caribbean, 1 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Chalinidae | (Hechtel, 1965) | Cerrano *et al.*, 2004a, 2007a |
| AGGLUTINATION: Field guide. *H. caerulea* is pictured with shelly material adhering to its surface. | *Haliclona (Soestella) caerulea* | Bahia, Brazil, W Atlantic, intertidal to infralitoral | Po: Dem (Heteroscleromorpha): Haplosclerida: Chalinidae | (Hechtel, 1965) | Hajdu *et al.*, 2011 |
| PSAMMOBIOSIS?: Description. The sponge is encrusting, but has elevated fistule-like structures that resemble morphologies known from *Ciocalypta*. | *Haliclona (Reniera) ciocalyptoides* | Still Bay, South Africa, Indian Ocean, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Chalinidae | Burton, 1933 | Burton, 1933 |
| INCORPORATION, CRUST: Field sampling in Antarctica, analysing sponges for their diatom content. Frustule concentration was very low at the beginning of November in all the species, and increased in January, to reach maximum values early February. Compared to other species diatom abundances and pigment concentrations were significantly higher in *H. dancoi* tissues. Chlorophaeopigments, very low at the beginning of November, increased between early/mid December, before the peak of diatoms. The planktonic *Fragilariopsis curta* was the most common diatom species recorded inside sponges. Diatom concentration inside the sponge tissues was related to the summer phytoplankton bloom. The shift between the pigment and frustule peaks strongly suggests that diatoms are used as a food source by sponges and that their frustules were accumulated inside the sponge body. The lack of frustules at the beginning of summer indicates that diatom frustules were expelled or dissolved during winter. | *Haliclona dancoi* | Terra Nova Bay, Ross Sea, Antarctica, 25-35 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Chalinidae | (Topsent, 1913) | Cerrano *et al.*, 2004c |
| Morphology suitable for PSAMMOBIOSIS?: Identification guide. ‘*Haliclona (Halichoclona) fistulosa* (Bowerbank, 1866) forms a whitish to pinkish massive base with irregular, partly erect, partly sprawling fistules, the thicker ones of which have oscules. […] More frequent on vertical than on horizontal substrates, but may tolerate some silt.’ | *Haliclona (Haliclona) fistulosa* | Shetland, British Isles, Channel Islands, France, Atlantic coast of Spain, reaching south to the Azores and the Mediterranean, infralittoral to 50 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Chalinidae | (Bowerbank, 1866) | Van Soest, 2015 |
| INCORPORATION, CRUST: Field sampling in Antarctica, analysing sponges for their diatom content. Frustule concentration was very low at the beginning of November in all the species, and increased in January, to reach maximum values early February. Compared to other species diatom abundances and pigment concentrations were significantly higher in *H. dancoi* tissues. Chlorophaeopigments, very low at the beginning of November, increased between early/mid December, before the peak of diatoms. The planktonic *Fragilariopsis curta* was the most common diatom species recorded inside sponges. Diatom concentration inside the sponge tissues was related to the summer phytoplankton bloom. The shift between the pigment and frustule peaks strongly suggests that diatoms are used as a food source by sponges and that their frustules were accumulated inside the sponge body. The lack of frustules at the beginning of summer indicates that diatom frustules were expelled or dissolved during winter. | *Haliclona penicillata* | Terra Nova Bay, Ross Sea, Antarctica, 25-35 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Chalinidae | (Topsent, 1908) | Cerrano *et al.*, 2004c |
| INCORPORATION: Description. Almost the complete spicular skeleton of this species is replaced by sand, and it was named after this peculiarity. | *Haliclona sabulosa* | New Zealand, Pacific, 8 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Chalinidae | Bergquist & Warne, 1980 | Bergquist & Warne, 1980 |
| BIOEROSION, BINDING: Description. ‘The original authors of this species (De Weerdt *et al*., 1999) suspected its limestone excavating capability. This we could confirm on sections of epoxy resin-embedded sponge-substratum interface, where sponge tissue is seen that penetrated rock crevices and dislodged fragments of limestone resembling clionaid excavation chips. […] The sponge also encrusts the calcareous plates of dead Halimeda algae.’ | *Haliclona (Halichoclona) vansoesti* | Belize, Caribbean, 24 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Chalinidae | De Weerdt *et al.*, 1999 | Rützler *et al.,* 2014 |
| CRUST, INCORPORATION: Description. A massive crust of sediments that appreared to be external (?), few sediments also in the tissues. | *Haliclona (Haliclona)* sp. CERF 5 = WAM sp. SS 3 | Carnarvon Shelf NW Australia, Indian Ocean, 40 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Chalinidae | indet. | Schönberg *et al.*, 2012 |
| ANCHORING: Description. Schmidt described *H. stellata* as having a stalk and a root (CS: but likely for attachment on hard substrate). | *Halicometes stellata* | Cuba, Caribbean, 580-629 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | (Schmidt, 1870) | Schmidt, 1870 (as *Cometella stellata*) |
| INCORPORATION: Field experiment. Longer exposure to light sedimentation could result in mortality, but some specimens of *Halisarca* sp. survived this, grew and incorporated sediments (‘packed’), while other species shrank or died. | *Halisarca* sp. | Fanning Island, central Pacific, 0.2-1.5 m | Po: Dem (Verongimorpha): Chondrillida: Halisarcidae | indet. | Bakus, 1968 |
| Morphology suitable for PSAMMOBIOSIS?: Identification guide. ‘*Hamacantha (Hamacantha) papillata* Vosmaer (1885) is a brownish, cushion-shaped sponge with characteristic high, cone-shape papillae which are lighter coloured at their summit.’ | *Hamacantha (Vomerula) papillosa* | Arctic, Greenland, Iceland, Norway, Azores, Atlantic, down to 1420 m | Po: Dem (Heteroscleromorpha): Merliida: Hamacanthidae | Vosmaer, 1885 | Van Soest, 2015 (as *Hamacantha (Hamacantha)*) |
| ANCHORING: Review. ‘…the basal long diactines that anchor the sponge to the substrate fuse long after the spicules are secreted.’ | Hexactinellida | review, location and depth not stated | Po: Hex | NA | Uriz *et al.*, 2003 |
| ANCHORING: Review. ‘Basal monaxon spicules (diactins) of the deepwater sponges combine three unique properties: they are robust, flexible, and transparent. Glass deepwater sponges of the bloodlines *Hyalonematidae*, *Monorhaphidae* and some types of *Pheronematidae* and *Euplectellidae* dwell in conditions of mouldy and damp subsoils [muddy and deep?]. One of the strategies of survival in such conditions is the formation of rootlike structures, which would make it impossible for the body of an animal to immerse itself into the subsoil. The representatives of the mentioned bloodlines are fixed on the substrate with stolone, which is formed by the fascicle of the megascleres. The height of this stolone can amount to 2 m, and it can twist around its axis under the effect of underflow.’ | Hexactinellida | deep sea | Po: Hex | NA | Voznesenskiy *et al.*, 2011 |
| CRUST: All specimens retrieved of this thickly branching sponge were covered in a light layer of mud. | cf. *Higginsia* sp. | Montgomery Reef, Kimberley, NW Australia, 20.9 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Axinellida: Stelligeridae | indet. | Schönberg, unpubl. data |
| INCORPORATION: Description. ‘The meshes of the network [of main fibres…] consist of sand-garins, which measure 0.15-0.28 millim. […] The connecting fibres never contain foreign bodies. […] The sand-core of the fibres is a direct continuation of the sand in the skin [aranaceous cortex].’ | *Hippospongia canaliculata* | S and E Australia, Chatham Islands, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 (also as the varieties *dura*, *elastica* and *mollissima*) |
| INCORPORATION: Description. Ascending fibres are rare and ‘loaded with foreign material’. | *Hippospongia communis* | central Pacific, 2-5 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (De Lamarck, 1814) | De Laubenfels, 1954 |
| INCORPORATION: Description. In the unarmoured *Hippospongia* spp. primary fibres are almost completely absent, they occur at the surface and may be lightly cored. In *H. communis* the surface is unarmoured. ‘Primary fibres are rare, cored with foreign debris.’ | *Hippospongia communis* | type locality: Mediterranean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (De Lamarck, 1814) | De C. Cook & Bergquist, 2002c |
| INCORPORATION: Description. ‘The skeleton consists of main fibres0.04-0.07 millim. Thick, which are slightly knotty and cored with more or less longitudonally disposed fragments of foreign siliceous spicules. The connecting-fibres […] are free from foreign bodies.’ | *Hippospongia galea* | Tasmania and E Australia, (Indo-?) Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 |
| ANCHORING: Description. Euplectellidae are glass sponges that have spicule tufts that anchor them in sediments (basalia). The genus *Holascus* has a single spicule tuft. In *H. stellatus* the tuft is about 2 cm long and short compared to the sponge body. | *Holascus stellatus* | museum specimens, all major oceans, 494-6328 m | Po: Hex (Hexasterophora): Lyssacinosida: Euplectellidae (Euplectellinae) | Schulze, 1886 | Tabachnick, 2002a |
| ARMOUR, INCORPORATION: Description. ‘Colour, when fresh, ‘bright orangeyellow,’ now light brown, varying with that of the sand of which it is composed. Surface more or less uneven, according to the form assumed by the subdermal sand. Pores in the intervals between the dermal projections, wherein the sarcode may or may not be charged with foreign material. Vents numerous and large, chiefly situated on the most projecting parts or ridges, or on the opposite side to that of the pores. Structure coarse from the large size of the grains of sand of which the species is composed.’ | *Holopsamma crassa* | Bass Strait, <37 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Microcionidae (Microcioninae) | Carter, 1885 | Carter, 1885 |
| ARMOUR, INCORPORATION: Description. As *Halme globosa*: ‘In the living state the sponge has a greyish-purple colour, which is subject to variations. The purple is always the same, but the grey varies, according to the nature of the foreign bodies in the deremal lamella. […] The skeleton consists of main and reticulating connecting fibres.’ As *Halme micropora*: ‘The sponge is hard and incompressible, the surface is protected by an arenaceous cortex. The supporting skeleton consists of irregular rows of sand-grains about 0.15 millim. in size, which are not in contact with each other.’ | *Holopsamma crassa* | S and E coasts of Australia, Indo-Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Microcionidae (Microcioninae) | Carter, 1885 | Von Lendenfeld, 1888 (as *Halme globosa* and *Halme micropora*) |
| INCORPORATION: Description. The specimens ‘are extremely irregular and friable, and densely charged with coarse sand, over which a distinct pellucid dermal membrane, free from sand, is frequently stretched. […] The sand grains are not arranged in distinct fibres, but in ill-defined bands forming an irregular reticulation. They are connected at the points of contact by a very small quantity of sponging cement.’ | *Holopsamma crassa* | Sri Lanka, Indian Ocean, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Microcionidae (Microcioninae) | Carter, 1885 | Dendy, 1905 (as *Psammopemma crissum* var. *clathrata*) |
| ARMOUR, INCORPORATION: Description. ‘Fleshy dermis, reinforced by scattered sand grains […] In alcohol greyish buff to yellow, finely mottled by sand grains. […] Sand always coarse, packed at surface, irregularly scattered to crowded internally.’ | *Holopsamma crassa* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Microcionidae (Microcioninae) | Carter, 1885 | Wiedenmayer, 1989 (as *Echinoclathria globosa*) |
| CRUST, INCORPORATION: Description. This genus is characterised by spongin-‘coring spicules replaced partially or completely by detritus. [… *H. crassa* has a] thick sandy external cortex [… and] spongin fibres fully cored by sand grains.’ | *Holopsamma crassa* | Port Philipp Bay, Victoria, Bass Strait, Australia, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Microcionidae (Microcioninae) | Carter, 1885 | Hooper, 2002a |
| INCORPORATION: Description. ‘Consistency tender, friable, coarse, gritty.’ | *Holopsamma laminaefavosa* | Bass Strait, <37 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Microcionidae (Microcioninae) | Carter, 1885 | Carter, 1885 |
| INCORPORATION, ARMOUR: Description. As *Halme*: ‘In spirit and dry [the sponge] is grey, and has the colour of the sand, which forms its cortex. […The main fibres] are on an average 0.3 millim. thick, and filled with a dense mass of large sand-grains. […] The connecting-fibres are free from foreign bodies. […] The cortex must be regarded as an integral part of the skeleton, as the main fibres are coalesced with it. The sand-grains of the cortex measure 0.1 millim. in diameter, and are cemented by spongin. The cortex has a thickness of about 0.35 millim. The canals leading into the vestibular lacunae are short and circular, cylindrical perforations of the external lamella. In their walls the layer of sand-grains is only half as thick as on the outer surface. As we proceed downward, the size of the sand-grains and the thickness of the cortex decrease rapidly, until in the interior the sand-grains measure only 0.02 millim. in diameter and the cortex 0.65 millim. in thickness. We must assume that the sponge exerts some active influence on the selection and distribution of the sand-grains.’ As *Aulena laxa* ‘The main fibres contain large scattered sand-grains. […] The surface itself is protected by a layer of sand 0.1 millim. thick.’ As *Aulena gigantea* ‘The fibres forming this network are on an average 0.1 millim. thick, and cored with an axial series of large sand-grains. They contain no siliceous spicules, and are not echinated. From their outer side short fibres arise which extend perpendicularly to the surface, and appear to consist of fragments of foreign siliceous spicules, cemented by a small quantity of spongin.’ | *Holopsamma laminaefavosa* | coasts of Australia, Indo-Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Microcionidae (Microcioninae) | Carter, 1885 | Von Lendenfeld, 1888 (as *Halme nidus vesparum*, as *Aulena laxa* and the varieties *minima* and *digitata*, *Aulena gigantea* and the varieties *macropora, micropora* and *intermedia*) |
| INCORPORATION: Description. ‘The sponge is honeycombed as usual but intensely sandy. The spicules are difficult to make out, apparently smooth.’ | *Holopsamma laminaefavosa* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Microcionidae (Microcioninae) | Carter, 1885 | Dendy, 1896 (as *Echinoclathria arenifera*) |
| INCORPORATION, ARMOUR: Description. ‘The sponge is resilient when fresh, brittle and friable in the dry state. The skeleton is composed of main and connecting-fibres. The former appear as simple, uniserial, pretty straight columns of nearly spherical sand-grains 0.07 millim. in size, which are not invested by a conspicuous spongin coating, and held together by a minimum quantity of horny cement. […] The surface is protected by an arenaceous cortex.’ | *Holopsamma simplex* | Mauritius, Northern Territory, Torres Strait, Bass Strait, Australia, Indo-Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Microcionidae (Microcioninae) | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 (as *Halme*) |
| INCORPORATION: Genus diagnosis for *Echinoclathria*. ‘External form various; sponge made up of a honeycomb-like mass of anastomosing flattened trabecules. Skeleton – except, perhaps, even foreign particules are included in excessive abundance – a reticidation of fibres usually well provided with spongin.’ CS: However, *Holopsamma* is a genus synonym, and Hallmann lists *Holopsamma favus*, *H. laminaefavosa*, *H. ramosa* and *H. rotunda* as part of this account, i.e. the sandy specimens he referred to may rather belong to *Holopsamma*! | some *Holopsamma* spp. | Australia, various sites | Po: Dem (Heteroscleromorpha): Poecilosclerida: Microcionidae (Microcioninae) | NA | Hallmann, 1912 (as various *Echinoclathria*) |
| INCORPORATION: Description. Sponges ‘lacking a spicule skeleton and possessing instead a skeleton composed of sand grains and other detritus, the elements of the skeleton being partly joined together by slender spongin fibres.’ | *Holopsamma* spp. | Port Chalmers, New Zealand, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Microcionidae (Microcioninae) | NA | Bergquist & Fromont, 1988 (as *Psammopemm*a) |
| AGGLUTINATION, BINDING: Description. ‘The surface is rugose, torn and in places covered by pebbles.’ | *Holoxea violacea* | coasts of Brazil, Atlantic, 27 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Boury-Esnault, 1973 | Boury-Esnault, 1973 |
| ANCHORING: Description. ‘Many species and genera [of the Suberitidae] live in sedimented environment, often at some depth, [some being aided] by rooted stalks.’ *H. balfourensis* has ‘a system of roots, stolons or branches creeping over the substrate.’ | *Homaxinella balfourensis* | Subantarctic and Antarctic waters, 35-200 m | Po: Dem (Heteroscleromorpha): Suberitida: Suberitidae | (Ridley & Dendy, 1886) | Van Soest, 2002g |
| INCORPORATION, CRUST: Field sampling in Antarctica, analysing sponges for their diatom content. Frustule concentration was very low at the beginning of November in all the species, and increased in January, to reach maximum values early February. Compared to other species diatom abundances and pigment concentrations were significantly higher in *H. dancoi* tissues. Chlorophaeopigments, very low at the beginning of November, increased between early/mid December, before the peak of diatoms. The planktonic *Fragilariopsis curta* was the most common diatom species recorded inside sponges. Diatom concentration inside the sponge tissues was related to the summer phytoplankton bloom. The shift between the pigment and frustule peaks strongly suggests that diatoms are used as a food source by sponges and that their frustules were accumulated inside the sponge body. The lack of frustules at the beginning of summer indicates that diatom frustules were expelled or dissolved during winter. | *Homaxinella flagelliformis* | Terra Nova Bay, Ross Sea, Antarctica, 25-35 m | Po: Dem (Heteroscleromorpha): Suberitida: Suberitidae | (Ridley & Dendy, 1886) | Cerrano *et al.*, 2004c (as *Suberites*) |
| ANCHORING: Database listing collection specimens. For *H. sagamiensis* a photograph is shown. The sponge is small (few cm) and has a loose tuft of anchoring spicules as well as long, sparse spicules radiating off the body. | *Hyalascus sagamiensis* | Sagami Bay?, Japan, Pacific, depth not stated | Po: Hex (Hexasterophora): Lyssacinosida: Rosselidae (Rossellinae) | Ijima, 1896 | Ogawa *et al.*, 2006-2012 |
| ANCHORING: Account on genus. Hyalonematidae are glass sponges with a single tuft of spicules rooting them in sediments (basalia). Possibly with the exception for *H. (Oonema) bianchoratum* Wilson, 1904 *Hyalonema* basalia of grown specimens are a compact twisted tuft. In *H. apertum* the anchor looks like a whisk or narrow grass bundle. In *H. campanula* the basalia are very slender and long compared to the sponge body. In *H. alcocki* basalia are a twisted tuft of spicules 12 cm in length and 4 mm in diameter, in *H. topsenti* over 25 cm in length. In *H. kirkpatricki*, *H. obtusum*, *H. brevancora*, *H. agujanum* and *H.* *thamnophorum* basalia appear to be fragile as they were broken in accessed museum specimens. | 1 – *Hyalonema* (*Prionema*) *agujanum*  2 – *Hyalonema* (*Paradisconema*) *alcocki*  3 – *Hyalonema* (*Cyliconema*) *apertum*  4 – *Hyalonema* (*Phialonemiella*) *brevancora*  5 – *Hyalonema* (*Leptonema*) *campanula*  6 – *Hyalonema* (*Coscinonema*) *kirkpatricki* | museum specimens from various locations:  1, 3-4 – all major oceans  1 – 1067-4243 m  3 – 100-6235 m  4 – 1967-4243 m  2 – Indian Ocean and Arafura Sea, 397-3300 m  5-6 – cosmopolitan except poles  5 – 489-5300 m  6 – 327-4525 m | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | 1 & 4-5 – Von Lendenfeld, 1915  2 – Schulze, 1895  3 – Schulze, 1886  6 – Ijima, 1927 | Tabachnick & Menshenina, 2002a |
| ANCHORING: Description. The sponge has a long spicule tuft. | *Hyalonema (Leptonema) lusitanicum* | Azores and Morocco, Atlantic, 2165-5000 m | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | Barboza du Bocage, 1864 | Topsent, 1928 |
| ANCHORING: Account on genus. Hyalonematidae are glass sponges with a single tuft of spicules rooting them in sediments (basalia). In *H. owstoni* basalia are a twisted tuft of spicules up to 40 cm in length. | 1 – *Hyalonema* (*Onconema*) *obtusum*  2 – *Hyalonema* (*Corynonema*) *owstoni* | museum specimens from various locations:  1 – Pacific, 2375-4504 m  2 – Indo-Pacific, 370-4504 m | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | 1 – Von Lendenfeld, 1915  2 – Ijima, 1894 | Tabachnick & Menshenina, 2002a |
| ANCHORING: Database listing collection specimens. For *H. owstoni* a photograph is shown. The sponge has a long, slim stalk and a basal spicule bundle. | *Hyalonema* (*Corynonema*) *owstoni* | Japan, Pacific, depth not stated | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | Ijima, 1927 | Ogawa *et al.*, 2006-2012 |
| ANCHORING: Account on genus. Hyalonematidae are glass sponges with a single tuft of spicules rooting them in sediments (basalia). In the genus *Hyalonema* basalia of grown specimens are usually a compact twisted tuft. In *H. sieboldii* the tuft is longer than the sponge body (40–65 cm). | *Hyalonema (Hyalonema) sieboldii* | museum specimen:  Indo-Pacific, 300-1235 m | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | Gray, 1835 | Tabachnick & Menshenina, 2002a |
| ANCHORING: Studies into material properties of sponges. Depicted by the authors (2006) *H. sieboldii* is a goblet-shaped sponge whose stem or stalk is several mm in diameter and can be twisted as result of currents, and can be as long as 1 m (2005 and 2006). It ends in a bundle of megascleres, obviously anchoring the sponge in soft sediment. These skeletal materials have a high flexibility probably due to the layered structure. ‘The glass sponges of the families Hyalonematidae; Monorhaptidae; Pheronematidae; and, partially, Euplectellidae inhabit loose muddy substrates.’ | *Hyalonema (Hyalonema) sieboldii* | 12°N, 137°E, Philippine Sea, Pacific, 5000 m | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | Gray, 1835 | Ehrlich *et al.*, 2005, 2006 |
| ANCHORING: Review on the Hexactinellida. *H. sieboldii* is pictured with a stalk made of twisted spicules, terminating in a whisk-like tuft (figure from Schultze, 1860). | *Hyalonema (Hyalonema) sieboldii* | not stated, assumed Pacific | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | Gray, 1835 | Leys *et al.*, 2007 |
| ANCHORING: Material studies on hexactinellid spicules. 2008 – ‘It is shown that skeletal spicules represent a bundle of composite fibres cemented with silicon dioxide, which imparts a high mechanical strength to spicules’, which is further supported by ‘layered organosilicon structure at the nanometre scale in the spicule cross section’. The material and structure of the spicules (organosilicon lamination) makes them function as one-dimensional photonic crystals and also makes them fracture resistant and flexible. 2010a – ‘Basal spicules of the *H. sieboldii* sponge, which are intended to keep the sponge body at a height of up to meter from the bottom substrate and resist the stream, have a high flexibility. […] The distribution of Na+ and K+ cations’ concentration points to the network of composite material with a layered structure and a complex combination of regions with high- and low-condensated silicate. Hard central cylinder (only K+ cations) and, conversely, the elastic laminating shell (only Na+ cations) enhance the flexibility of the entire spicule construction.’ | *Hyalonema (Hyalonema) sieboldii* | Philippine Sea, 5000 m | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | Gray, 1835 | Kul’chin *et al.*, 2007, 2008; Voznesenskiy *et al.*, 2010a |
| ANCHORING: Material study. *H. sieboldii* is depicted *in situ* anchored in mud, and a specimen is shown with a long tuft of twisted anchoring spicules. Resistance to desilification with hydrofluoric acid was comparatively weak: *Monorhaphis chuni* 3-10 d, *H. sieboldii* 14-30 d, *Euplectella aspergillum* 3-6 mo, *Aphrocallistes vastus* 6-8 mo, *Farrea occa* 6-12 mo (CS: not sure whether that refers to body or anchoring spicules). | *Hyalonema (Hyalonema) sieboldii* | not stated | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | Gray, 1835 | Voznesenskiy *et al.*, 2011 |
| ANCHORING: Account on genus. Hyalonematidae are glass sponges with a single tuft of spicules rooting them in sediments (basalia). In *H.* *thamnophorum* basalia appear to be fragile as they were broken in accessed museum specimens. | *Hyalonema* (*Thamnonemiella*) *thamnophorum* | museum specimens from the Indo-Pacific, 2798-5200 m | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | Ijima, 1927 | Tabachnick & Menshenina, 2002a |
| ANCHORING: Database listing collection specimens. For *H. thamnophorum* a photograph is shown. The sponge has basal anchoring spicules. | *Hyalonema* (*Thamnonemiella) thamnophorum* | Siboga expedition specimen, type is from Indonesia (Van Soest *et al.,* 2015), depth not stated | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | Ijima, 1927 | Ogawa *et al.*, 2006-2012 |
| ANCHORING: Description. This species has a root tuft. | *Hyalonema* (*Cycliconema) thomsoni* | Azores, Atlantic, 650-6674 m | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | Marshall, 1875 | Topsent, 1928 |
| ANCHORING: Database listing collection specimens. For *H. timorense* a photograph is shown. The sponge has a basal spicule bundle. | *Hyalonema* (*Cycliconema) timorense* | Siboga expedition specimen, type is from Indonesia (Van Soest *et al.,* 2015), depth not stated | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | Ijima, 1927 | Ogawa *et al.*, 2006-2012 |
| ANCHORING: Account on genus. Hyalonematidae are glass sponges with a single tuft of spicules rooting them in sediments (basalia). In the genus *Hyalonema* basalia of grown specimens are usually a compact twisted tuft. In *H. topsenti* the tuft is over 25 cm in length. | *Hyalonema* (*Ijimaonema*) *topsenti* | museum specimens from the Indo-Pacific, 310-2920 m | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | Ijima, 1927 | Tabachnick & Menshenina, 2002a  (subgenus *Ijimaonema* as *Pteronema*) |
| ANCHORING: Database listing collection specimens. For *H. topsenti* a photograph is shown. The specimen has a long, curved spicule bundle. | *Hyalonema* (*Ijimaonema*) *topsenti* | Siboga expedition specimen, type is from Indonesia (Van Soest *et al.,* 2014), depth not stated | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | Ijima, 1927 | Ogawa *et al.*, 2006-2012 |
| ANCHORING: Description of a fossil. In this hexactinellid sponge fossil the anchoring spicule tuft is best preserved. It is about 4.5 cm in length, while the sponge body measures about 1 cm. | *Hyalonema vetteri* (fossil) | Arnager limestone formation, late Cretaceous, Bornholm, Denmark | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | Janussen, 2014 | Janussen, 2014 |
| ANCHORING: Material study. *Hyalonema* sp. anchors itself in soft sediments by the use of spicule tufts. It has layered spicules. | *Hyalonema* sp. | not stated, Coe College Biology Department collection | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | indet. | **Sand**ford, 2003 |
| ANCHORING: Review. *Hyalonema* sp. is depicted with a stalk merging into a spicule tuft anchored in fine sediment. | *Hyalonema* sp. | Bahamas, W Atlantic, depth not stated | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | indet. | Van Soest *et al.*, 2012 |
| ANCHORING: Review on the Hexactinellida. ‘Most hexactinellids require a hard substratum for settlement (either rocks or shell debris), but two groups, all Amphidiscophora (including *Hyalonema* and *Monorhaphis*) and Euplectellinae (including *Euplectella*) anchor in soft sediments with special basal spicules.’ All *Hyalonema* spp. anchor in soft substrate, and there are 113 species (Van Soest et al. 2014). ‘The most well known are the basalia extending from the lower body, for example the basal spicule tuft of *Hyalonema*, that provide support of the body over the benthic surface but also enable anchorage in soft muds and grapnel attachment to irregular hard substrates. Basalia are typically monactins or diactins with specialised toothed anchors or pentactins or rough diactins serving as very effective grapnels. […] *Hyalonema* is able to colonise soft substrates. Every individual of this remarkable genus lives suspended on a tall shaft of spicules anchored in 20–40 cm of sediment.’ | *Hyalonema* spp. | as general statement, no location given, deep sea | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | NA | Leys *et al.*, 2007 |
| ANCHORING: These sponges had a twisted anchoring spicule tuft. | *Hyalonema* spp. | fossil, Upper Cretaceous to Recent | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | NA | Mehl, 1996 |
| ANCHORING: Review. The Hyalonematidae have developed anchoring spicules and are able to live on soft substrate, and *Hyalonema* spp. generally live on true fine-grained mud, while other hexactinellids with anchoring spicules may prefer coarser sediments. | Hyalonematidae | deep sea | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | NA | Tabachnick, 1991 |
| ANCHORING: A drawing of a fragment of the twisted anchoring spicule tuft of *H. archaica* is figured. | *Hyalosinica archaica* | fossil, Tommotium (China) | Po: Hex: (‘Rossellimorpha’) | Mehl & Reitner, 1993 | Mehl, 1996 |
| ANCHORING: These sponges had a twisted anchoring spicule tuft. | *Hyalostelia* spp. | fossil, Carbon | Po: Hex (no further information given) | NA | Mehl, 1996 |
| INCORPORATION: Description. ‘A considerable amount of calcareous and other foreign matter is attached to [the surface…]. Usually the fibres are quite free from foreign bodies, but broken spicules may be found occasionally in fibres […] There is no special dermal skeleton.’ | *Hyattella cavernosa* | Sri Lanka, Indian Ocean, deep water | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (Pallas, 1766) | Dendy, 1905 (as *Hippospongia dura*) |
| INCORPORATION: Description. Scarce primary fibres have foreign inclusions, always sponge spicules. Secondaries have no inclusions. | *Hyattella cavernosa* | Brazil, Atlantic, 27-34 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (Pallas, 1766) | Boury-Esnault, 1973 (as *Spongia bresiliana*) |
| INCORPORATION: Guide. *H. cavernosa* incorporates detritus into spongin fibres. | *Hyattella cavernosa* | Brazil, W Atlantic, 7-160 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (Pallas, 1766) | Muricy *et al*., 2008 |
| ARMOUR: Description. ‘The ectosome of this sponge is loaded with foreign spicules and sand particles often 10 μ to 20 μ in diameter.’ | *Hyattella concertina* | Marshall Islands, central Pacific, 10 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (De Laubenfels, 1954) | De Laubenfels, 1954 (as *Aulena*) |
| INCORPORATION: Description. ‘The skeleton consists of a very dense network. The main fibres are 0.1 millim. thick, 0.4 millim. apart, and contain very little sand in the axis.’ | *Hyattella intestinalis* | India, Aden, coasts of Australia, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (De Lamarck, 1813) | Von Lendenfeld, 1888 (as *Hyattella clathrata*) |
| INCORPORATION: Description. ‘Primary fibres cored with foreign bodies are visible here and there.’ For another specimen (described as *Hippospongia anomala*): ‘The skeleton is […] free from foreign bodies. Occasionally only one observes much stouter primary fibres, composed principally of broken sponge spicules. […] There is no specially differentiated skeleton.’ | *Hyattella intestinalis* | Sri Lanka, Indian Ocean, deep water | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (De Lamarck, 1813) | Dendy, 1905 (as *Hippospongia intestinalis* and *Hippospongia anomala*) |
| INCORPORATION: Description. ‘The primary fibres are made by sand grains.’ | *Hyattella intestinalis* | Bahamas, Atlantic, 0.5-1.5 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (De Lamarck, 1813) | Pulitzer-Finali, 1986 |
| INCORPORATION, PSAMMOBIOSIS: Description. *Hyattella* spp. are unarmoured and have cored primary fibres, uncored secondary fibres. In *H. intestinalis* the primary fibres ‘contain very little coring.’ | *Hyattella intestinalis* | type locality: Indian Ocean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (De Lamarck, 1813) | De C. Cook & Bergquist, 2002c |
| INCORPORATION: Description. The surface was unarmoured or had some patches with a light scattering of spicule debris. Fibres largely uncored, where cored lightly and mostly with spicule fragments. | *Hyattella intestinalis* | Carnarvon Shelf NW Australia, Indian Ocean, 41-75 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (De Lamarck, 1813) | Schönberg *et al.*, 2012 |
| PSAMMOBIOSIS: General account on genus. ‘Some species are buried in the substratum, with osculae bearing fistules protruding from the sediment.’ | *Hyattella* spp. | - | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | NA | De C. Cook & Bergquist, 2002c |
| BINDING: Field survey and description. This encrusting sponge colonises sandy sediments and binds them. | *Hymedesmia (Hymedesmia) stylata* | Svalbard Basin, Arctic Ocean, 2538-2609 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Hymedesmiidae | Lundbeck, 1910 | Barthel & Tendal, 1993 |
| AGGLUTINATION, ANCHORING, BINDING: Description. ‘Sponge encrusting, agglutinating […] The holotype is a thin and flattened, somewhat irregular plate, with a number of bivalve shells incorporated in its lower surface.’ | *Hymeniacidon glabrata* | Belize, Caribbean, 6 m | Po: Dem (Heteroscleromorpha): Suberiritida: Halichondriidae | Burton, 1954 | Burton, 1954 |
| PSAMMOBIOSIS: Study on sponge-associated microbes. ‘They are often found in the interface between rocky an dsandy bottoms, with the base covered by sand and precipitated organic matter, leaving only the papillae exposed.’ | *Hymeniacidon heliophila* | Rio de Janeiro, Brazil, Atlantic, 7 m | Po: Dem (Heteroscleromorpha): Suberiritida: Halichondriidae | (Parker, 1910) | Turque *et al.*, 2008 |
| PSAMMOBIOSIS: Description. *H. perlevis* can occur ‘buried in sand (then developing relatively long papillae).’ | *Hymeniacidon perlevis* | Wales, Irish Sea, depth not stated | Po: Dem (Heteroscleromorpha): Suberiritida: Halichondriidae | (Montagu, 1818) | Erpenbeck & van Soest, 2002 |
| PSAMMOBIOSIS?: Identification guide. ‘It is orange and has an irregular surface, often with lower or higher irregular projections. […] It occurs from the mid-littoral ddown into the shallow sublittoral, and it prefers slightly silted environments. […] May be buried deep into the sediment with long projection sticking out to the surface.’ | *Hymeniacidon perlevis* | British Isles, Netherlands, Belgium, France, Spain, Canary Islands, Azores, Atlantic, Mediterranean, intertidal and shallow waters | Po: Dem (Heteroscleromorpha): Suberiritida: Halichondriidae | (Montagu, 1818) | Van Soest, 2015 |
| CRUST: Identification guide. ‘Hispid, thin, non-descript crust.’ It is pictured with a layer of mud caught in the hispid spicules. | *Hymeraphia elongata* | N Ireland, Atlantic, 29-34 m | Po: Dem (Heteroscleromorpha): Axinellida: Rasapiliidae | Picton & Goodwin, 2007 | Van Soest, 2015 |
| CRUST: Identification guide. ‘Very thin sheet, less than 1 mm thick, almost impossible to remove from the substratum except in tiny pieces. Surface usually silt covered with regularly spaced red raised bumps showing through, occasionally clean with these raised bumps. Villose, due to scattered long spicules which penetrate the surface. The oscules are small, at the summits of the raised bumps mentioned above. […] Tolerant of silt and found in sheltered places on dead shells as well as on bedrock in both exposed and sheltered locations.’ | *Hymeraphia stellifera* | British Isles, France, Atlantic, Mediterranean, mostly deeper than 30 m, occasionally as shallow as 20 m | Po: Dem (Heteroscleromorpha): Axinellida: Raspailiidae | Bowerbank, 1864 | Van Soest, 2015 |
| INCORPORATION, BINDING: ‘Fibres kerasine, resilient, cored to a great extent with foreign bodies (sand-grains &c.). […] Growing on hard objects.’ | *Hyrtios caracasensis* | Venezuela and Bahamas, Caribbean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Carter, 1882) | Carter, 1882 (as *Hircinia*) |
| AGGLUTINATION, ARMOUR, INCORPORATION: Identification guide. ‘Surface irregularly but strongly encrusted by algae and other sponges. Consistency firm, barely compressible, due to the great amounts of sand. […] The ectosomeis […] charged with sand and other foreign material. […] Spongin fibres completely filled with foreign objects like sand grains, broken spicules, etc. […] The name refers to the sand collected by this sponge.’ The figure provided shows the sponge with calacreous debris attached to it. | *Hyrtios collectrix* | W Portugal, Galicia, Madeira, Atlantic, Mediterranean 0-150 m, mostly in deeper water | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Schulze, 1880) | Van Soest, 2015 |
| INCORPORATION: Description. Practically all fibres are ‘densely packed with foreign material, chiefly fragments of spicules.’ | *Hyrtios communis* | Micronesia, Pacific, <30 cm | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Carter, 1885) | De Laubenfels, 1954 (as *Heteronema eubamma*) |
| INCORPORATION: Description. ‘The skeleton consists of a uniform network of fibres 0.12 millim. thick, which are filled with large sand-grains.’ | *Hyrtios digitatus* | Sydney Harbour, Australia, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Dysideopsis digitata*) |
| INCORPORATION: Description. ‘The skeleton consists of fibres 0.06-0.08 millim. thick, which are pretty smooth, and completely filled with small sand-grains.’ | *Hyrtios elegans* | Queensland, Australia, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Dysideopsis*) |
| ARMOUR, INCORPORATION: Description. *H. erectus* was mostly unarmoured, but occasionally specimens had ‘scattered bits of sand and other debris’ in the surface. The principal fibres ‘always contain much foreign material and, in somecases, are so densely filled with coarse foreign material that their outlines are extremely lumpy.’ the secondary fibres were also mostly cored. | *Hyrtios erectus* | Marshall Islands, Micronesia, Palau, Pacific, subtidal to 10 m | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Keller, 1889) | De Laubenfels, 1954 (as *Thorectopsamma mela*) |
| INCORPORATION: Description. In *Hyrtios* spp. the surface is unarmoured, but primary and secondary fibres are heavily cored, which in some species can obscure the stratified nature of the sponges. In *H. proteus* choanosomal ‘skeletal fibres are cored with foreign debris.’ | *Hyrtios proteus* | type locality: Caribbean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | Duchassaing & Michelotti, 1864 | De C. Cook & Bergquist, 2002a |
| INCORPORATION: Description. ‘As a rule fibres 120-130 µm thick and suffused in their core with numerous foreign bodies such as sand grains, sponge spicules and similar.’ | *Hyrtios reticulatus* | NE coast of Minahasa, Celebes, Celebes Sea, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Thiele, 1899) | Thiele, 1899 (as *Dysideopsis reticulata*) |
| INCORPORATION: Description. ‘The main fibres consist of coarsely cemented debris, mostly sand.’ The connecting fibres are partially cored. | *Hyrtios violaceus* | Bahamas, Atlantic, 0.5-1.5 m | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Duchassaing & Michelotti, 1864) | Pulitzer-Finali, 1986 |
| INCORPORATION: The sponge was unarmoured, but had fibres densely packed with sediments. | thorectid sponge, cf. *Hyrtios* | Montgomery Reef, Kimberley, NW Australia, 27.4 m | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | indet. | Schönberg, unpubl. data |
| INCORPORATION: Description. ‘Small, massive sponge, approximately 2 cm wide. Sand grains make up the ridges on the surface, elevated in conules by the terminations of the fibres. The body is formed of reticulated spongin fibres containing a very large number of inclusions and spiculoids with 3 or 4 actines. The spongin fibres are completely deformed by the inclusions of sand grains.’ | *Igernella notabilis* | Brazil, Atlantic, 52-58 m | Po: Dem (Keratosa): Dendroceratida: Dictyonellidae | (Duchassaing & Michelotti, 1864) | Boury-Esnault, 1973 (as *I. joyeuxi*) |
| INCORPORATION: Description. The fibres are ‘moderately cored by sand grains. […] The secondary fibres […] contain only occasional grains.’ | *Igernella notabilis* | Jamaica, Caribbean, 40-45 m | Po: Dem (Keratosa): Dendroceratida: Dictyonellidae | (Duchassaing & Michelotti, 1864) | Pulitzer-Finali, 1986 |
| INCORPORATION: Description. In *Igernella* spp. fibres ‘can be obscured by detritus’. In *I. notabilis* ‘primary fibres are cored’, and pithing can be obscured by detritus. | *Igernella notabilis* | type locality: Caribbean, depth not stated | Po: Dem (Keratosa): Dendroceratida: Dictyonellidae | (Duchassaing & Michelotti, 1864) | De C. Cook & Bergquist, 2002b |
| INCORPORATION: Description. Primary fibres are cored with sand grains, secondaries free of inclusions. | *Igernella notabilis* | Fernando de Noronha Island, W Atlantic, 3-12 m | Po: Dem (Keratosa): Dendroceratida: Dictyonellidae | (Duchassaing & Michelotti, 1864) | De Moraes, 2011 |
| INCORPORATION: Description. ‘Sediment particles occur throughout the body, some are incorporated in the fibers.’ | *Igernella notabilis* | Belize, Caribbean, 1 m | Po: Dem (Keratosa): Dendroceratida: Dictyonellidae | (Duchassaing & Michelotti, 1864) | Rützler *et al.,* 2014 |
| INCORPORATION: Description. ‘Other than these birotulate microscleres, however, no spicules were found. Instead, a considerable quantity of sand and other foreign material was present in the skeleton of this sponge. This constitutes such a great difference from other genera that it is considered worthy of being elevated to full generic rank. *Iotrochopsamma* has as type, and for the present as its only species, *arbuscula*, and may be defined as having a principal skeleton of sand accompanied by birotulate microscleres.’ | *Iotrochopsamma arbuscula* | ‘New South Wales coast, South Australia, trawled from some depth’ (Van Soest 2002c) | Po: Dem (Heteroscleromorpha): Poecilosclerida: Iotrochotidae | (Whitelegge, 1906) | De Laubenfels, 1954 |
| INCORPORATION: Description. ‘Rectangular reticulation of spongin fibres cored by sand grains, no proper megascleres.’ *I. arbuscula* has primary and secondary ‘fibres both cored with sand grains and foreign spicule fragments.’ The genus *Iotrochopsamma* is monospecific. | *Iotrochopsamma arbuscula* | refering to original description: ‘New South Wales coast, South Australia, trawled from some depth’ | Po: Dem (Heteroscleromorpha): Poecilosclerida: Iotrochotidae | (Whitelegge, 1906) | Van Soest, 2002c |
| INCORPORATION, ANCHORING, PSAMMOBIOSIS: Description and field observations. *I. arenosa* ‘incorporates abundant coarse carbonate sand and small coral fragments. Spicule tracts present among sediment grains in the choanosome (55–85 μm thick). […] Upper surface leathery smooth, except for embedded coarse sediment grains (1-4 mm). […] Lower sponge surface incorporates large sand grains (6 mm, and more), covered by thin layer of ectosome. Few large particles exposed, having served as attachment points for sponges that generally lay loose on the bottom, except where wrapped around seagrass (*Thalassia*) blades and algae. No signs of necrosis or colour fading where up to half of sponge grows buried in sediment, indicating adaptation to life in sand substrata rather than accidental burial. [Consistency] smooth except for partially embedded sediment grains. Large quantity of embedded sand conspicuous when cutting specimens. Sand derived from habitat substratum, consisting of carbonate shells and skeletal remains of calcified algae (e.g. Corallinaceae, *Halimeda),* protozoans (foraminiferans) and invertebrates (corals, molluscs, echinoids). Spongin fibres packed with spicules (styles I, strongyles I) meandering among embedded sand grains, forming loose meshwork’ | *Iotrochota arenosa* | Belize, Caribbean, 1-6 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Iotrochotidae | Rützler et al., 2007 | Rützler *et al.*, 2007 |
| INCORPORATION, ARMOUR?: Description. ‘The surface of the sponge has a fine sand coating, which may cause some confusion with *Psammocinia,* however, this is not organised into a distinct sand crust. […] Primary fibres are strongly fascicular and heavily cored with consistently fine material. The distinction between fascicular and non-fascicular primary fibres can be difficult to ascertain as some fascicles are completely charged with a sandy core. Secondary fibres have occasional inclusions but are essentially clear […] A moderate to large amount of fine to very fine foreign debris is scattered throughout the mesohyl.’ | *Ircinia akaroa* | Akaroa Paninsula, New Zealand, Pacific, 110 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | De C. Cook & Bergquist, 1999 | De C. Cook & Bergquist, 1999 |
| INCORPORATION: Description. ‘The surface is not sandy, except sometimes in the apices of the conuli. The skeleton […] is an extremely irregular network of highly araneceous fibres. […] The fibres themselves vary a good deal in thickness and in the amount of foreign matter, which they contain. Usually there is a very large proportion of sand or sponge spicules, and comparatively little spongin; occasionally, however, I have seen fibres without foreign inclusions.’ | *Ircinia anomala* | Sri Lanka, Indian Ocean, from ‘deep water’ | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Dendy, 1905) | Dendy, 1905 (as *Hircinia*) |
| INCORPORATION, partial ARMOUR: Description. ‘There is some sand and grit embedded within the cortex, though not forming a continuous crust. […] Primary fibres are massive, axially to fully cored with fine foreign material, are often fascicular and may support massive secondary webs. Secondary fibres are generally uncored, with only occasional inclusions.’ | *Ircinia aucklandensis* | Ocean Island, New Zealand, Pacific, intertidal | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | De C. Cook & Bergquist, 1999 | De C. Cook & Bergquist, 1999 |
| INCORPORATION: Description. ‘The skeleton consists of longitudonal fascicles of fibres, in which large sand-grains are contained, chiefly at the joining points of the slender fibres which form the trellis-like fascicules.’ | *Ircinia caliculata* | W and E Australia, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Hircinia calyculata*) |
| ARMOUR, INCORPORATION: Description. ‘Armoured ectosome 250-400 μm thick, with packed spicule fragments dominating in outer half, coarse sand grains crowded below. Similar segregation in choanosome: spicule fragments crowded around walls of larger canals, coarse sand grains and few spicule fragments scattered interstitially. […] Commonly little distinction of primaries and secondaries, as almost all fibres contain much mixed detritus, but ascending finresn often more knotty and lacunose. Fibres occasionally in loose fascicles. Few thinner fibres, around 50 μm, with few or no foreign inclusions.’ | *Ircinia caliculata* | Bass Strait, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Von Lendenfeld, 1888) | Wiedenmayer, 1989 |
| INCORPORATION, ARMOUR: Description. ‘The skeleton consists of radially situated columns of pretty closely packed foreign bodies 0.2 millim. thick, attached to each other partly by continuous masses of spongin cement. […] Pretty abundant foreign bodies are found in the skin.’ | *Ircinia campana* | Bahamas, Florida, Atlantic, Caribbean, and Sydney Harbour, Pacific?, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (De Lamarck, 1814) | Von Lendenfeld, 1888 (as *Hircinia*) |
| INCORPORATION: Description. The fibres contain a large number of foreign particles. | *Ircinia campana* | Brazil, Atlantic, 34-33 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (De Lamarck, 1814) | Boury-Esnault, 1973 |
| INCORPORATION, ARMOUR, BINDING?: Identification guide. ‘Sponge with conulose branches of 1-2 cm diameter creeping over the substrate. […] The ectosome consists of a tough epidermis charged with small uniformly shape sand grains, here and there forming a reticulation. The choanosomal skeleton is made up of spongin fibres of which the primary fibres are filled with foreign material (sand grains, broken spicules); their diameter is 120-200 µm. Secondary fibres are 30-90 µm in diameter, stratified but free from sand grains.’ | *Ircinia dendroides* | Portugal, NW Spain, Atlantic, Mediterranean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Schmidt, 1862) | Van Soest, 2015 |
| ARMOUR, INCORPORATION: Description and revision. *Ircinia* spp. incorporate sediments into spongin fibres and the choanosome. The amount of choanosomal sediment was determined by availability, while amounts of dermal crusts and inclusions into fibres were species specific and useful in taxonomy. | *Ircinia felix* | W Floria, Gulf of Mexico, and Belize, Caribbean, 3-25 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Duchassaing & Michelotti, 1864) | Pronzato *et al*., 2004; Cerrano *et al.*, 2007a |
| INCORPORATION: Description. Primary fibres are cored with foreign material, secondaries are not. Tissue and fibres are figured in crossection. | *Ircinia felix* | Brazilian oceanic islands, W Atlantic, 2-30 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Duchassaing & Michelotti, 1864) | De Moraes, 2011 |
| INCORPORATION: Field guide. *I. felix* incorporates sediments into spongin fibres and into surface conules. | *Ircinia felix* | Brazil, W Atlantic, infralitoral, 0-370 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Duchassaing & Michelotti, 1864) | Muricy *et al*., 2008; Hajdu *et al.*, 2011 |
| INCORPORATION: Description. ‘Ascending, fasciculated primary fibers (300-500 μm thick) support the conules and are loaded with sediment particles. The connecting secondaries (20-100 μm) are mostly clear of debris.’ | *Ircinia felix* | Belize, Caribbean, 0.5 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Duchassaing & Michelotti, 1864) | Rützler *et al.,* 2014 |
| INCORPORATION: Description. ‘The primary fibres are axially to fully cored with foreign inclusions and are often fascicular. […] Secondaries are uncored, or lightly and haphazardly cored.’ | *Ircinia fistulosa* | Poor Knights Island, New Zealand, Pacific, 20 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | De C. Cook & Bergquist, 1999 | De C. Cook & Bergquist, 1999 |
| ARMOUR, INCORPORATION: Description. The ectosome is ‘encrusted by a thick continuous coating of fine sediment. [The choanosomal] skeletal structure is confused, consisting of sand grains scattered or organised in irregular tracts.’ | *Ircinia funiculata* | S Great Barrier reef, Coral Sea, Pacific, 8-12 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | Pulitzer-Finali, 1982 | Pulitzer-Finali, 1982 |
| INCORPORATION, ARMOUR: Description. The studied specimens contain sand. ‘The skeleton is composed principally of large sand-grains, with a comparatively small quantity of spongin: arranged as follows: – (1) Very stout columns or tracts of sand-grains run vertically through the sponge and end in the surface conuli. These columns are compound structures, in which the sand-grains are held together by numerous short, slender spongin threads running from one to the other […] (2) A very irregular network of more slender secondary fibres composed of sand-grains held together by spongin threads as in the main columns, but the large sand-grains often only in single series. (3) In the dermal membrane there is a thin layer of broken sponge-spicules and large sand-grains, the former lying somewhat more superficially than the latter. Numerous broken spicules also occur along with the sand in the deeper parts of the sponge.’ | *Ircinia fusca* | Sri Lanka, Indian Ocean, from ‘deep waters’ | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | Carter, 1880 | Dendy, 1905 (as *Hircinia*) |
| ARMOUR, INCORPORATION: Description. ‘Sand grains with a rather uniform size of 15-25 μm, incorporated in the ectosome, form a continuous thin layer. [The choanosomal] spongin is often entirely obscured by an accumulation of debris, but also amber-coloured fibres with a much reduced content of foreign matter can be observed. Scattered and ill-organised sand grains are abundant. | *Ircinia microconulosa* | S Great Barrier reef, Coral Sea, Pacific, reef flat | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | Pulitzer-Finali, 1982 | Pulitzer-Finali, 1982 |
| INCORPORATION: Description. ‘Primary fibres are fascicular, though not massively so, and irregularly cored with foreign inclusions. […] Secondary fibres may contain occasional inclusions.’ | *Ircinia novaezealandiae* | Hauraki Gulf, New Zealand, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | Bergquist, 1961 | De C. Cook & Bergquist, 1999 |
| INCORPORATION: Description. ‘The tissue consists of perforated fibres mostly free from inclusions, but can nevertheless contain some sand grains and foreign spicules.’ The scarcity of inclusions is here used as a taxonomic character. | *Ircinia pauciarenaria* | Brazil, Atlantic, 14-51 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | Boury-Esnault, 1973 | Boury-Esnault, 1973 |
| ARMOUR, INCORPORATION: Description. ‘The ectosome, not separable, is encrusted by debris up to 100 μm in diameter which, however, do not form a thick coating. [In the choanosomal fibres] foreign debris predominates over the amber-coloured spongin. Often the latter, cementing irregularly arranged particles, is not apparent. Scattered sand grains are present, also irregularly joined in clusters. The fibres projecting from the surface consist of strong columns of sand grains with very scarce spongin.’ | *Ircinia pilosa* | S Great Barrier reef, Coral Sea, Pacific, 8-20 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | Pulitzer-Finali, 1982 | Pulitzer-Finali, 1982 |
| INCORPORATION: Description. Fascicular ascending and connecting fibres contained more or less foreign material. The tissue appeared to be free of inclusions. | *Ircinia ramosa* | Palau and Micronesia, Pacific, 2-5 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Keller, 1889) | De Laubenfels, 1954 |
| INCORPORATION: Description. Primary fibres have inclusions, secondary fibres are uncored. | *Ircinia ramosa* | Brazil, Atlantic, 34-37 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Keller, 1889) | Boury-Esnault, 1973 |
| ARMOUR, INCORPORATION: Review. *Ircinia* spp. incorporate sediments into spongin fibres and the choanosome. *I. retidermata* had a homogeneous ectosomal coat of quartzgrains. The amount of choanosomal sediment was determined by availability, while amounts of dermal crusts and inclusions into fibres were species specific and useful in taxonomy. | *Ircinia retidermata* | 1 - W Floria, Gulf of Mexico, and Belize, Caribbean, 3-25 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | Pulitzer-Finali & Pronzato, 1981 | Cerrano *et al.*, 2007a |
| INCORPORATION, BINDING: Description. Sponge ‘attached at many points to fragments of calcareous debris, amongst which it appears to creep. […] The main fibres are […] containing a good many fragments of sponge-spicules. The connecting fibres are entirely free from foreign matter.’ | *Ircinia schulzei* | Sri Lanka, Indian Ocean, from ‘deep water’ | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Dendy, 1905) | Dendy, 1905 (as *Hircinia*) |
| INCORPORATION: Description. Most of the fascicular ascending fibres contain foreign material. | *Ircinia strobilina* | Palau, Philippine Sea, Pacific, 2 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (De Lamarck, 1816) | De Laubenfels, 1954 |
| INCORPORATION, CRUST: Description. The surface is covered with sand grains. Choanosomal fibres include much sand and sponge spicules. | *Ircinia strobilina* | Brazil, Atlantic, 34-37 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (De Lamarck, 1816) | Boury-Esnault, 1973 |
| INCORPORATION: Description. Primary and secondary fibres are cored, predominantly with sand grains. Tissue and fibres are figured in crossection. | *Ircinia strobilina* | Brazilian oceanic islands, W Atlantic, 1-30 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (De Lamarck, 1816) | De Moraes, 2011 |
| INCORPORATION: Field guide. *I. strobilin* incorporates sediments into spongin fibres and into surface conules, but also into the tissue, as shown in a crossection in Muricy *et al*. (2008). | *Ircinia strobilina* | Bahia, Brazil, W Atlantic, infralitoral, 12-174 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (De Lamarck, 1816) | Muricy *et al*., 2008; Hajdu *et al.*, 2011 |
| INCORPORATION, ARMOUR: Description. ‘The ectosome is a tough skin, with sand grains embedded. The fiber network is very similar to that in Ircinia felix, but coarser: primary, fasciculated fibers can be nearly 1 mm thick and are connected by branching secondaries.’ | *Ircinia strobilina* | Belize, Caribbean, 0.5 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (De Lamarck, 1816) | Rützler *et al.,* 2014 |
| INCORPORATION, ARMOUR: Description. ‘This species is moderately soft and compressible, tough to tear, and has characteristic papery texture, conferred by a light dusting of sand embedded in the ectosome. […] Primary fibres form complex fascicles and are axially to fully cored with foreign material. Secondary fibres may produce mesh-like secondary webs and are essentially uncored, except for occasional inclusions, or light irregular coring in some specimens. […] There is also a distinct tangential dermal fibre network, supported by spicule fragments and fine filaments. The coring of dermal fibres would contribute to the papery texture of this species.’ | *Ircinia subaspera* | Tutukaka Harbour, New Zealand, Pacific, 12-20 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | De C. Cook & Bergquist, 1999 | De C. Cook & Bergquist, 1999 |
| INCORPORATION, ARMOUR: Description. The sponge body is ‘mixed up and partially coated with carlcareous debris. [The surface has] foreign adhesions […] Texture extremely coarse and gritty throughout […] There is a distinct but thin sand-cortex in the parchment-like dermal membrane. […The fibres are] partly enclosing and partly connecting together the very numerous sand-grains and other foreign bodies with which the sponge is filled.’ | *Ircinia tuberosa* | Sri Lanka, Indian Ocean, from ‘deep water’ | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Dendy, 1905) | Dendy, 1905 (as *Hircinia*) |
| INCORPORATION, ARMOUR?, CRUST?, ANCHORING, habit suitable for PSAMMOBIOSIS?: Description. ‘All specimens had medium to coarse gravel or pebbles embedded in their bases. Some specimens developed low, irregular fistules, which bear large terminal oscules, 2-7 mm in diameter; conules around the oscular rim produce a distinct crown-like appearance. [… The holotype] has an axinellid sponge […] growing over its surface. […] a thin layer of grit lies between the dictyoceratid and the axinellid sponge. […] Primary fibres form braided or rope-like fascicles with numerous fine branchings and are axially to fully cored with foreign inclusions, however, there are sections of primary fibre that are completely clear of debris. […] Secondary fibres are essentially uncored, though some do have occasional inclusions. There is also a fine, tangential, dermal fibre reticulum, in which spicule debris is embedded.’ | *Ircinia turrita* | Chatham Rise, New Zealand, Pacific, 345-402 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | De C. Cook & Bergquist, 1999 | De C. Cook & Bergquist, 1999 |
| INCORPORATION: Description. ‘Primary fibres are axially to fully cored with foreign inclusions. […] Secondary fibres are uncored.’ | *Ircinia undulans* | Cape Rodney, New Zealand, Pacific, 12 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | De C. Cook & Bergquist, 1999 | De C. Cook & Bergquist, 1999 |
| INCORPORATION: Description. ‘The main fibres are cored with foreign bodies, chiefly spicule-fragments, which are not very abundant, and irregularly scattered. […] Very scarce scattered foreign bodies are found in [the connecting fibres].’ | *Ircinia variabilis* | sampling site and depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Schmidt, 1862) | Von Lendenfeld, 1888 (as *Hircinia variabilis* Schulze) |
| ARMOUR, INCORPORATION: 2004 – Description and revision. *Ircinia* spp. incorporate sediments into spongin fibres and the choanosome. *I. variabilis* incorporated sand grains in the fibres and sponge spicules and sand grains in the sameproportion both in the ectosome and in the choanosome. The amount of choanosomal sediment was determined by availability, while amounts of dermal crusts and inclusions into fibres were species specific and useful in taxonomy. | *Ircinia variabilis* | various locations in the Mediterranean, 1-25 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Schmidt, 1862) | Pronzato *et al.*, 2004, Cerrano *et al.*, 2007a |
| INCORPORATION, ARMOUR: Identification guide. ‘The ectosome is strengthened by sand grains, which form a coat over the surface, may form a reticulation or may be absent locally. The choanosomal skeleton consists of a system of primary fibres of 100-250 µm in diameter, always cored by sand grains and other foreign material, and secondary fibres, thinner: 40-70 µm, mostly devoid of inclusions.’ | *Ircinia variabilis* | Portugal, Galicia, Atlantic, Mediterranean, 0-150 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Schmidt, 1862) | Van Soest, 2015 |
| AGGLUTINATION, BINDING: Description. Two roughly globular specimens had stones attached to their surfaces (2-6 cm in diameter). Room between the stones was partly filled with shelly, foraminiferal debris also attached to the sponge’s surface. | *Ircinia* sp. CERF 1 = QM 1244 | Carnarvon Shelf NW Australia, Indian Ocean, 53 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | indet. | Schönberg *et al.*, 2012 |
| AGGLUTINATION, BINDING: Description. The branch-like piece of sponge was covered with rounded stones attached to its surface, stones were rhodolith-like and had a diameter of 1-5 cm. | *Ircinia* sp. CERF 2 | Carnarvon Shelf NW Australia, Indian Ocean, 57 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | indet. | Schönberg *et al.*, 2012 |
| INCORPORATION: Description. The sponges contain foreign inclusions. | *Ircinia* spp. | Antilles, Caribbean and Florida, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | NA | Schmidt, 1870 (as *Filifera*, *Hircinia* and *Polytherses*); Pronzato *et al.*, 2004, Cerrano *et al.*, 2007a |
| AGGLUTINATION: Field sampling. This sponge species had large particles adhering to its surfaces that were mostly mollusc shells. | irciniid sponge, cf. *Ircinia* or *Sarcotragus* | Montgomery Reef, Kimberley, NW Australia, 20.9 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | indet. | Schönberg, unpubl. data |
| CRUST: Identification guide. *G. phlegraei* is ‘a globular, yellowish grey, hispid sponge, often encrusted or sedimented.’ | *Geodia phlegraei* | Sweden, Norway, Atlantic, 85-900 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Geodiidae (Geodiinae) | (Sollas, 1880) | Van Soest, 2015 (as *Isops*, but discussed in comparison with *Geodia*) |
| BINDING, CRUST: Description. ‘The single specimen is much elongated, irregularly sub-cylindrical, creeping over and to a slight extent encrusted by calcareous debris.’ | *Jaspis reptans* | Sri Lanka, Indian Ocean, 9 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Dendy, 1905) | Dendy, 1905 (as *Coppatias*) |
| INCORPORATION: Description. ‘Massive, enclosing bivalve shells an inch in diameter in its tissue.’ | *Jaspis stellifera* | Bass Strait, 36.6 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Carter, 1879) | Carter, 1886 |
| INCORPORATION: Description. The specimen had a few isolated, comparatively large particles in its tissues. | *Jaspis* cf. *stellifera* | Carnarvon Shelf NW Australia, Indian Ocean, 36 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Carter, 1879) | Schönberg *et al.*, 2012 |
| INCORPORATION, CRUST: Field sampling in Antarctica, analysing sponges for their diatom content. Frustule concentration was very low at the beginning of November in all the species, and increased in January, to reach maximum values early February. Compared to other species diatom abundances and pigment concentrations were significantly higher in *H. dancoi* tissues. Chlorophaeopigments, very low at the beginning of November, increased between early/mid December, before the peak of diatoms. The planktonic *Fragilariopsis curta* was the most common diatom species recorded inside sponges. Diatom concentration inside the sponge tissues was related to the summer phytoplankton bloom. The shift between the pigment and frustule peaks strongly suggests that diatoms are used as a food source by sponges and that their frustules were accumulated inside the sponge body. The lack of frustules at the beginning of summer indicates that diatom frustules were expelled or dissolved during winter. | *Kirkpatrickia variolosa* | Terra Nova Bay, Ross Sea, Antarctica, 25-35 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Hymedesmiidae | (Kirkpatrick, 1907) | Cerrano *et al.*, 2004c |
| INCORPORATION: Field experiment with photosynthetic sponges. *L. chlorea* had a spongin skeleton that was cored with ‘sand and debris’. | *Lamellodysidea chlorea* | Palau, Pacific, depth not stated, assumed shallow | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (De Laubenfels, 1954) | Thacker, 2005 |
| ARMOUR?, INCORPORATION: Description. As *Dysidea*: The fibres ‘are loaded with foreign debris’. As *Phyllospongia*: ‘The ectosome is a debris-filled dermis’, and primary fibres contain some foreign material. | *Lamellodysidea herbacea* | Marshall Islands and Micronesia, Pacific, 2-5 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Keller, 1889) | De Laubenfels, 1954 (as *Dysidea* and as *Phyllospongia complex*) |
| ARMOUR, INCORPORATION: Description. In the *Lamellodysidea* spp. ‘all skeletal fibres are cored with foreign debris.’ In *L. herbacea* ‘a layer of foreign material is present in the dermis that may extend into the body of the sponge. […] All fibres are cored with sand grains of variable size.’ | *Lamellodysidea herbacea* | type locality: Suakin, Red Sea, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Keller, 1889) | De C. Cook & Bergquist, 2002b |
| CRUST?, INCORPORATION: Description. ‘Sediment particles are abundant on the surface and inside the sponge.’ | *Laxotethya dampierensis* | Dampier Archipelago, Western Australia, Indian Ocean, 20 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | Sarà & Sarà, 2002 | Sarà, 2002 |
| ARMOUR, INCORPORATION: Description. ‘The surface skeleton consists of fibres […] free from foreign bodies. […] A few scattered sand-grains are also found in the skin. The main fibres of the supporting-skeleton […are] cored with large, irregular, longitudonally disposed spicule-fragments. The connecting fibres […] are free from foreign bodies.’ | *Leiosella caliculata* | W and E Australia, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | Von Lendenfeld, 1889 | Von Lendenfeld, 1888 (as *L. compacta*) |
| ARMOUR, INCORPORATION: Description. Primary fibres ‘knotty; contain spicule fragments almost exclusively, rarely filling whole fibre. […] Some spicule fragments scattered interstitially. Dermis around 330 μm thick, armoured with scattered to crowded spicule fragments.’ | *Leiosella caliculata* | Bass Strait, 3-6 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | Von Lendenfeld, 1889 | Wiedenmayer, 1989 |
| ARMOUR, INCORPORATION: Description. ‘The shagreen-like surface […is] chiefly composed f sand-grains and foreign spicule fragments. […] The surface-skeleton consists of a network of stout ridges composed of large sand-grains and spicule fragments, which are held together by a small quantity of spongin cement. The spongin is here and there drawn out to form short and slender fibres connecting more distant sand-grains with each other. The main fibres […] are filled with very irregularly disposed abundant spicule-fragments and sand-grains. The connecting fibres […] are free from foreign bodies.’ | *Leiosella levis* | Southern half of Australia, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 |
| ARMOUR, INCORPORATION: Description. ‘Main skeleton almost devoid of primaries. Few portions of thicker fibres contain debris. […] Much mixed detritus scattered interstitially, crowded around walls of canals. Armoured ectosome of two layers: (1) outer one, 320-420 μm thick, packed with debris, including many coarse sand grains; (2) inner one, 320-580 μm thick, with numerous crypts, crowded mixed debris (chiefly spicule fragments).’ | *Leiosella levis* | Bass Strait, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (Von Lendenfeld, 1886) | Wiedenmayer, 1989 |
| ARMOUR, INCORPORATION: Description. *Leiosella* spp. are lightly armoured spongiids (‘thin, regular sand armour’). ‘Primary fibres are usually lightly cored.’ *L. levis* has a ‘network of irregularly cored fibres’ with foreign debris. | *Leiosella levis* | type locality: New South Wales, Australia, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (Von Lendenfeld, 1886) | De C. Cook & Bergquist, 2002c |
| ARMOUR, INCORPORATION: Description. ‘The skeleton of the surface consists of scattered spicule-fragments and sand-grains. […] The main fibres of the supporting-skeleton are […] cored with irregularly disposed spicule-fragments and a few sand-grains. The connecting fibres […] contain relatively abundant spicule-fragments in their axis.’ | *Leiosella silicata* | N and E Australia, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 |
| INCORPORATION: Description. In *Lendenfeldia* spp.and *L. frondosa* the surface is unarmoured, the primary fibres are cored with debris, the secondary and tertiary fibres are uncored. | *Lendenfeldia frondosa* | type locality: Indo-West Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Phyllospongiinae) | (Von Lendenfeld, 1889) | De C. Cook & Bergquist, 2002a |
| ARMOUR, INCORPORATION: Description. Skeletal sections through *L. plicata* showed that sediment was incorporated in the surface and in the primary fibres. Much of this consisted of spicule debris. | *Lendenfeldia plicata* | Carnarvon Shelf NW Australia, Indian Ocean, 88-92 m | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Phyllospongiinae) | (Esper, 1794) | Schönberg *et al.*, 2012 |
| ANCHORING: Identification guide. *‘Leucilla echinus* (Haeckel, 1870) is a small, spiny, greyish ball-shaped calcareous sponge, with a single oscule. It occurs in deep water, lying unattached on soft bottoms.’ | *Leucilla echina* | Norway, Atlantic, Norwegian Sea, 92 m | Po: Cal (Calcaronea): Leucosolenida: Amphoriscidae | (Haeckel, 1870) | Van Soest, 2015 |
| ANCHORING, tolerates partial PSAMMOBIOSIS?: Identification guide. ‘This sponge tends to grow in the shallow sublittoral, where it is characteristic of mixed sediments, growing upright (?) in small patches on shells, algae, hydroids and ascidians, and on horizontal rock, including undersides of boulders; often found in sea lochs. It has been recorded as often half buried in mud and sediment, which induces longer oscular tubes.’ | *Leucosolenia variabilis* | Arctic, Northern Ocean, North Sea and Atlantic coasts of Europe, Mediterranean, intertidal and shallow-subtidal | Po: Cal (Calcaronea): Leucosolenida: Amphoriscidae | (Haeckel, 1870) | Van Soest, 2015 |
| ARMOUR, INCORPORATION: Description. ‘Ectosomal region a crust of reddish brown, peculiar-looking mud particles enclosed in sponge tissue membranes. The ectosomal mud particles form a dense layer of about 1 mm thickness […] The choanosome likewise has a high density of mud particles, partly covering and engulfing irregular bundles of spicules.’ | *Liosina paradoxa* | wide-spread in Indo-Pacific, shallow water on reefs | Po: Dem (Heteroscleromorpha): Bubarida: Dictyonellidae | Thiele, 1899 | Van Soest *et al.*, 2002 |
| ANCHORING, INCORPORATION: Description for *Clathria (Thalysias) basiarenacea*. ‘A layer of sand grains is incorporated in the base. This structure is analogous to [*Lissodendoryx (Ectyodoryx) arenaria*] Burton, 1936 and {*Clathria (Microciona) ixauda* (Lévi, 1969)].’ | *Lissodendoryx (Ectyodoryx) arenaria* | NA | Po: Dem (Heteroscleromorpha): Poecilosclerida: Coelosphaeridae | Burton, 1936 | Boury-Esnault, 1973 |
| INCORPORATION: ‘Growing about and enclosing Flahellaria opuntia in the West Indies, or densely charged with miliary gravel at Acapulco. […] The specimens, which are charged with the miliary gravel among which the sponge has thus grown, were dredged in the harbour of Acapulco.’ The sponge also has proper spicules. | *Lissodendoryx (Lissodendoryx) isodictyalis* | Venezuela, Caribbean and Acapulco, Mexico, E Pacific, 7-16 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Coelosphaeridae | (Carter, 1882) | Carter, 1882 (as *Halichondria*) |
| INCORPORATION: Description. ‘Massive sponge (4-5 cm), completely arenaceous.’ | *Lissodendoryx (Anomodoryx) recife* | Brazil, Atlantic, 33-45 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Coelosphaeridae | (Boury-Esnault, 1973) | Boury-Esnault, 1973 (as *Psammochela*) |
| INCORPORATION: Field observation. In contrast to a sheltered harbour site, sponges at a more exposed beach site were ‘found to contain varying quantities of sand particles in their bodies’. | *Lissodendoryx (Lissodendoryx) similis* | Madras, E India, W Inian Ocean, depth not stated, assumed shallow | Po: Dem (Heteroscleromorpha): Poecilosclerida: Coelosphaeridae | Thiele, 1899 | Ali, 1960 |
| INCORPORATION: Field study comparing incorporated to ambient sediments. *L. strongylata* incorporated sediments and selected for specific grain sizes. | *Lissodendoryx (Lissodendoryx) strongylata* | Belize, Caribbean, 1 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Coelosphaeridae | (Van Soest, 1984) | Cerrano *et al.*, 2004a |
| INCORPORATION: Description. ‘Formless fragment, maroon-violet, full of sand grains. It seems that it has more debris than sponge [tissue].’ | *Lissodendoryx (Anomodoryx) tylota* | Brazil, Atlantic, 34 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Coelosphaeridae | (Boury-Esnault, 1973) | Boury-Esnault, 1973 (as *Psammochela*) |
| ANCHORING: Description. ‘The hinder half of the sponge has sundry distant cylindrical tufts of elongated siliceous fibres spreading out from the sponge and then directed backwards.’ | *Lophocalyx philippinensis* | Cebu, Philippines, Pacific, depth not stated | Po: Hex (Hexasterophora): Lyssacinosida: Rossellidae (Lanuginellinae) | (Gray, 1872b) | Gray, 1972a (as *Rosella*) |
| ANCHORING: Description. The genus has representatives that anchor themselves in soft sediment and those that attach to hard substrate. *L. philippinensis* has numerous beard-like spicule tufts that are emerging from basal and lateral conules. | *Lophocalyx philippinensis* | museum specimens, in all major oceans and Antarctica, 155-4231 m | Po: Hex (Hexasterophora): Lyssacinosida: Rossellidae (Lanuginellinae) | (Gray, 1872b) | Tabachnick, 2002b |
| ANCHORING: Review. Some Rossellidae have developed anchoring spicules (e.g. *Rossella* and *Lophocalyx*) and are able to live on soft substrate, even if they prefer *Globigerina*, Pteropoda shell or mixed coarse substrates. In the Rossellidae have several spicule tufts on the lower part of their bodies, which may be long enough to join into a single tuft (e.g. *Lophocalyx* spp.). | *Lophocalyx* spp. | deep sea | Po: Hex (Hexasterophora): Lyssacinosida: Rossellidae (Lanuginellinae) | NA | Tabachnick, 1991 (*Rossella* partly as *Aulorossella*) |
| ANCHORING: Description. Hyalonematidae are glass sponges with a single tuft of spicules rooting them in sediments (basalia). In the genus *Lophophysema* basalia are a twisted spicule tuft. In all specimens of *L. inflatum* the basalia were broken, ‘the longest are over 450 mm. The basalia are obviously twisted in a single tuft as in well-preserved specimens with rather long basalia.’ | *Lophophysema inflatum* | museum specimens, E Indian and W Pacific Ocean, 368-1385 m | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | Schulze, 1900 | Tabachnick & Menshenina, 2002a |
| ANCHORING: Review on the Hexactinellida. ‘Most hexactinellids require a hard substratum for settlement (either rocks or shell debris), but two groups, all Amphidiscophora (including *Hyalonema* and *Monorhaphis*) and Euplectellinae (including *Euplectella*) anchor in soft sediments with special basal spicules.’ All *Lophophysema* spp. anchor in soft substrate, and there are 3 species (Van Soest et al. 2014). | *Lophophysema* spp. | as general statement, no location given, deep sea | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | NA | Leys *et al.*, 2007 |
| INCORPORATION: Description. ‘The very thick, granular ‘pith’ [of the primary fibres] contains abundant broken sponge spicules as foreign inclusions. […] The secondary fibres are free from foreign matter. […] In the digitiform processes the main fibres – containing broken spicules – run longitudinally and give off short branches – also containing broken spicules – into the surface conuli.’ | *Luffariella herdmani* | Sri Lanka, Indian Ocean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Dendy, 1905) | Dendy, 1905 (as *Aplysina*) |
| ARMOUR, INCORPORATION: Description. ‘The main fibres are knotty, 0.2 millim. thick and 1.5-2 millim. apart, and cored with an axial string of sand-grains. […] The surface is protected by abundant sand-grains which are embedded in it.’ | *Luffariella variabilis* | Torres Strait and S Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Polejaeff, 1884) | Von Lendenfeld, 1888 (as *Luffaria*) |
| INCORPORATION: Description. In *Luffariella* spp. and in *L. variabilis* the surface is unarmoured and the large-diameter primary fibres are cored with foreign debris, but can be sparse, depending on species. Secondary and tertiary fibres are uncored. | *Luffariella variabilis* | type locality: Vanuatu, Coral Sea, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Polejaeff, 1884) | De C. Cook & Bergquist, 2002a |
| ANCHORING: Description. Euplectellidae are glass sponges that have spicule tufts that anchor them in sediments (basalia). *Malacosaccus* spp. are known only from fragments, and presently the tufts were not described in detail. Only Euplectellinae all have tufts, not Bolosominae or Corbitellinae (but these are often damaged…, and latter usually attach to hard substrate). | *Malacosaccus vastus* | museum specimens, cosmopolitan except Arctic Ocean, 2510-6328 m | Po: Hex (Hexaterophora): Lyssacinosida: Euplectellidae (Euplectellinae) | Schulze, 1886 | Tabachnick, 2002a |
| ANCHORING: Description. The body was ‘attached with several root-like extensions, and some of the latter are terminally widened, others pointed, perhaps these {wider ones] were fastened to a hard body, those [pointed ones] remained in the loose soil or without contact with the ground.’ | *Melophlus sarasinorum* | NE coast of Minahasa, Celebes, Celebes Sea, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Geodiidae (Erylinae) | Thiele, 1899 | Thiele, 1899 |
| PSAMMOBIOSIS?, ANCHORING: Description suggests psammobiosis. ‘At the distal end, each branches into a number of short small subdivisions. These roots ramify among the fragments of coral or the coral sand in which the sponge grows and serve to give it ample support. There are usually more than five, and sometimes as many as fifteen such roots per specimen.’ | *Melophlus sarasinorum* | Guam, Marshall Islands, Pacific, 1-5 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Geodiidae (Erylinae) | Thiele, 1899 | De Laubenfels, 1954 (as *Stellettinopsis isis*) |
| INCORPORATION: Description. ‘The flesh contains debris and isochelas in varying abundance. […] Foreign spicules are present in the clumps of debris and in spicule strews.’ | *Monanchora arbuscula* | Barbados, Caribbean, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Crambeidae | (Duchassaing & Michelotti, 1864) | Hechtel, 1969 (as *M. barbadensis*) |
| INCORPORATION: Guide. A section of *M. arbuscula* is pictured that shows coarse-grained inclusions. | *Monanchora arbuscula* | Brazil, W Atlantic, 15-160 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Crambeidae | (Duchassaing & Michelotti, 1864) | Muricy *et al*., 2008 |
| ANCHORING: Material study. Anchoring spicules were several mm in diameter and up to one m in length of which the upper third holds the sponge’s body, with inhalants on the concave side of the curved morphology, facing the prevailing current. There is an unstructured core in the spicule of about 150 μm in diameter, with layers around it making up the spicule diameter of 2.4 μm. The layers become progressively thinner towards the surface, while K2O levels decrease and Na2O levels increase. Spicules are about 5x more flexible and breaking resistant than pure silica rods of the same dimensions, while the elastic modulus is about half of vitreous silica. | *Monorhaphis chuni* (species name not given, but genus is monospecific) | S of New Caledonia, Pacific, 800-1000 m | Po: Hex (Amphidiscophora): Amphidiscosida: Monorhaphididae | Schulze, 1904 | Lévi *et al.*, 1989 |
| ANCHORING: Review. ‘The stalk of *Monorhaphis*, the largest siliceous structure in living beings, cosists of a single spicule up to 3 m in length and anout 8.5 mm in diameter.’ Being raised on that single anchoring spicule *Monorhaphis* avoids the risk of burial and is one of the few hexactinellids, which mostly live on very fine-grained mud. | *Monorhaphis chuni* | deep sea | Po: Hex (Amphidiscophora): Amphidiscosida: Monorhaphididae | Schulze, 1904 | Tabachnick, 1991, 2002a |
| ANCHORING: Material study. *M. chuni* ‘has a single anchoring spicule with a diameter of up to 8 mm and a length of 3 m. […] This giant spicule is, much like the hair-like anchor spicules of *E. aspergillum*, constructed from silica layers [up to 10 μm thick] separated from each other by thin layers of organic matter’ that cause crack path deflection. | *Monorhaphis chuni* | near Lifou, W new Caledonia, Pacific, 1905 m | Po: Hex (Amphidiscophora): Amphidiscosida: Monorhaphididae | Schulze, 1904 | Woesz *et al.*, 2006 |
| ANCHORING: Review on the Hexactinellida. ‘Most hexactinellids require a hard substratum for settlement (either rocks or shell debris), but two groups, all Amphidiscophora (including *Hyalonema* and *Monorhaphis*) and Euplectellinae (including *Euplectella*) anchor in soft sediments with special basal spicules.’ | *Monorhaphis chuni* | as general statement, no location given, deep sea | Po: Hex (Amphidiscophora): Amphidiscosida: Monorhaphididae | Schulze, 1904 | Leys *et al.*, 2007 |
| ANCHORING: Material study. Hexactinellid spicules ‘consist of a central core of monolithic hydrated silica, surrounded by alternating layers of hydrated silica and proteinaceous material.’ Indentation testing on *M. chuni* anchor spicules showed: ‘First, the load required to form well-defined radial cracks from a sharp indent in the laminated region is two orders of magnitude greater than that for the monolithic material. Secondly, its fracture toughness is about 2.5 times that of the monolith, whereas the modulus and hardness are about 20% lower. [Therefore] the predicted increase in the threshold load is a factor of about 80, broadly consistent with the experimental measurements.’ There is an asymmetry in the layering probab ly caused by unidirectional bending loads (currents). | *Monorhaphis chuni* | near Lifou, W new Caledonia, Pacific, 1905 m and  Norfolk Ridge, Pacific, 1200 m | Po: Hex (Amphidiscophora): Amphidiscosida: Monorhaphididae | Schulze, 1904 | Miserez *et al.*, 2008 |
| ANCHORING: Material study. ‘Using [*M. chuni* giant anchoring] spicules as a model, basic knowledge on the morphology, formation, and development of the skeletal elements could be achieved. They are formed by a proteinaceous scaffold (composed of a 27‐kDa protein), which mediates the formation of the siliceous lamellae, into which the proteins are encased. The high number of 800 of 5–10 μm thick lamellae is concentrically arranged around the axial canal. The silica matrix is composed of almost pure silicon oxide, providing it with unusually optophysical properties, which are superior to those of man‐made waveguides. Experiments might suggest that the spicules function *in vivo* as a nonocular photoreception system. In addition, the spicules have exceptional mechanical properties, combining mechanical stability with strength and stiffness.’ | *Monorhaphis chuni* | only abstract wasobtained | Po: Hex (Amphidiscophora): Amphidiscosida: Monorhaphididae | Schulze, 1904 | Wang *et al.*, 2009 |
| ANCHORING: Material study using nanoindentation, 3-point bending tests and solid state 29Si nuclear magnetic resonance. In contrast to the other species studied in *M. chuni* ‘skeletal support and benthic anchoring is provided by a single monolithic anchoring spicule measuring up to three meters long and almost one centimeter thick. […] Presumably as a consequence of its large size and in response to the local environmental conditions (prevailing currents, etc.), the spicule develops a natural curvature (Figs. 8A, B). This creates spicule zones of maximum tension and compression and is accompanied by a distinct asymmetry in silica layer thickness; the thinnest exterior layers under maximum tension help limit the depth of crack penetration, while the thickest exterior layers prevent buckling in the zone of maximum compression. In many instances, large spicules (greater than 2 m in length and containing nearly 500 separate silica layers) develop an elliptical cross-section, with the major axis of the ellipse coinciding with the direction of curvature. The layer asymmetry observed in *M. chuni* is unique to this species and is most likely a stress-induced response to the predominantly unidirectional bending regimes of this monolithic structure. […] No other described species of sponge synthesizes spicules that are even remotely comparable in dimensions with that encountered in this species. […] Additional information obtained from high load nanoindentation studies revealed the remarkable energy-dissipating properties of this laminated architecture. Nanoindentation results demonstrate that when compared with the monolithic material encountered in the central cylinder region immediately surrounding the axial filament, the laminated architecture effectively inhibits crack initiation from the corners of the indents. All of the applied energy appears to be dissipated locally with no net effect on the macroscopic structural integrity of the spicule. […] Cross-sections through a fractured spicule clearly reveal the crack-stopping properties of the organic interlayers, which exhibit a distinctive stair step-like crack pattern resulting from multiple sequential arrests and renucleations during crack propagation. In addition to the crack deflecting capabilities of the organic interlayers, a propagating crack can even be confined to a specific radial depth as it travels parallel to the long axis of the spicule in a helical fashion, fracturing only the silica layers immediately adjacent to the crack trajectory. The energy dissipated in this damage mode is significant if one considers that a 2-m long spicule measuring 5 mm in diameter can propagate a crack over 1m long through the spicule without any significant loss in its structural integrity.’ In 3-point bending tests the spicule strength was x10 higher than in synthetic glass rods. | *Monorhaphis chuni* | near Lifou, W new Caledonia, Pacific, 1905 m and  Norfolk Ridge, Pacific, 1200 m | Po: Hex (Amphidiscophora): Amphidiscosida: Monorhaphididae | Schulze, 1904 | Weaver *et al.*, 2010 |
| ANCHORING: Material study. *M. chuni* is depicted *in situ* anchored in mud. Resistance to desilification with hydrofluoric acid was comparatively weak: *M. chuni* 3-10 d, *Hyalonema sieboldii* 14-30 d, *Euplectella aspergillum* 3-6 mo, *Aphrocallistes vastus* 6-8 mo, *Farrea occa* 6-12 mo (CS: not sure whether that refers to body or anchoring spicules). | *Monorhaphis chuni* | not stated | Po: Hex (Amphidiscophora): Amphidiscosida: Monorhaphididae | Schulze, 1904 | Voznesenskiy *et al.*, 2011 |
| ANCHORING: Material study. ‘Laminated spicules [of *M. chuni*] show about 2.5 times higher fracture toughness compared to the monolithic core, which has been attributed to the process of crack deflection within the organic layers involved.’ | *Monorhaphis chuni* | reference to another publication | Po: Hex (Amphidiscophora): Amphidiscosida: Monorhaphididae | Schulze, 1904 | Dericioglu *et al.*, 2012 |
| ANCHORING: Review. ‘Iconic hexactinellids include […] *Monorhaphis chuni*, which anchors its body in the soft deep-sea floor with a single giant (up to 3 m long) spicule.’ | *Monorhaphis chuni* | not stated | Po: Hex (Amphidiscophora): Amphidiscosida: Monorhaphididae | Schulze, 1904 | Van Soest *et al.*, 2012 |
| CRUST, INCORPORATION: Weekly field sampling for 3 months, sample analysis by chlorophyll extraction and SEM. During the warmer time of the year and during summer blooms sponges took up diatoms that otherwise lived on the outer surface. Observations are interpreted that diatoms are taken in to be digested, frustules remaining behind are dissolved or expelled during winter. | *Mycale (Oxymycale) acerata* | Terra Nova Bay, Antarctica, Southern Ocean, 25-35 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Mycalidae | Kirkpatrick, 1907 | Cerrano *et al.*, 2004b |
| ARMOUR: Description. ‘Surface with coarse sediment embedded, elevated into volcaniform projections topped by oscula (usually 1–2 mm diameter). […] Foreign particles, as sand grains, occur ramdomly [in the ectosome]. | *Mycale (Mycale) alagoana* | Alagoas, Brazil, Atlantic, 0-3 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Mycalidae | Cedro *et al.*, 2011 | Cedro *et al.*, 2011 |
| INCORPORATION: ‘Brittle, extremely sandy.’ | *Mycale (Mycale) arenicola* | Bass Strait, 69 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Mycalidae | (Ridley & Dendy, 1886) | Ridley & Dendy, 1886 (as *Esperella*); Dendy, 1896 |
| INCORPORATION: Description. ‘Choanosomal skeleton often bearing a remarkable number of sand grains, with megascleres merely filling-in interstices, Sand-cored fibres more than 1 mm wide.’ | *Mycale (Grapelia) australis* | Tasmania, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Mycalidae | (Gray, 1867) | Van Soest & Hajdu, 2002 |
| INCORPORATION: Description. ‘Sponge intensely arenaceous. […] The main skeleton of the sponge, between the closely aggregated sand-grains, consists of slender megascleres, mostly loosely scattered, but occasionally collected in fairly stout multispicular fibres. […] the araneceous habit […] has doubtless caused considerable reduction in the proper skeleton. I know of no other case where one can trace such a close and evident relationship between an araneceous sponge with reduced skeleton and a non-araneceous congener [i.e. M*ycale (Paresperella) serratohama*]. | *Mycale (Paresperella) bidentata* | Sri Lanka, Indian Ocean, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Mycalidae | Dendy, 1905 | Dendy, 1905 (as *Paresperella*) |
| INCORPORATION, ARMOUR: Description. ‘The main skeleton is made up almost entirely of sand, not arranged in definite tracts or fibres, with the very much reduced proper spicules scattered in the soft tissues between. The dermal membrane is free from coarse sand but contains many foreign spicules arranged in a very loose and irregular network.’ | *Mycale (Carmia) crassa* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Mycalidae | (Dendy, 1896) | Dendy, 1896 (as *Esperella*) |
| BINDING: ‘Growing over all kinds of objects in its course, which seems to have been vagrant about the seabottom, as some of the pieces, besides enclosing shells.’ | *Mycale (Mycale) laevis* | Venezuela, Caribbean, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Mycalidae | (Carter, 1882) | Carter, 1882 (as *Esperia*) |
| INCORPORATION: Description. *Arenochalina* spp. have sand in the main fibres and spicules in the connecting fibres. 1887: ‘Main fibres are irregular, filled with large sand grains, but without spicules, 0.05 mm wide. The average size of the sand grains is 0.02 mm. Connecting fibres smooth, filled with spicules.’ 1888: ‘The main fibres are charged with sand.’ | *Mycale (Arenochalina) mirabilis* | Torres Strait, N Australia, Indo-Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Mycalidae | (Von Lendenfeld, 1887) | Von Lendenfeld, 1887, 1888 (as *Arenochalina mirabilis*) |
| INCORPORATION: Description. For *M. mirabilis*: ‘Sand grains are enclosed in the fibres with considerable variability:’ in some specimens it is scarce, in some making up almost all of the fibres that also contain spicules. As *M. ‘tylostrongylata’*: ‘Spongin fibres […] almost entirely charged with sand grains and containing few proper megascleres.’ Secondary fibres uncored. | *Mycale (Arenochalina) mirabilis* | S Great Barrier Reef, Coral Sea, Pacific, 11-18 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Mycalidae | (Von Lendenfeld, 1887) | Pulitzer-Finali, 1982 (also as *Mycale tylostrongylata*) |
| INCORPORATION: Description. ‘In finer specimens all [primary fibres] contain foreign detritus of variable ditribution and sorting, spicular and non-spicular fragments in about equal proportions, thickly coring fibres, with spongin coating grains thickly and evenly. With poor sorting, finer contours knotty. […] Proper megascleres in primaries never abundant […]. Secondaries cored by proper megascleres only.’ | *Mycale (Arenochalina) mirabilis* | Bass Strait, 10-47 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Mycalidae | (Von Lendenfeld, 1887) | Wiedenmayer, 1989 |
| INCORPORATION: Description. ‘Texture very coarse, with much sand internally, compressible, resilient. […] No special dermal skeleton.’ | *Mycale (Mycale) rara* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Mycalidae | (Dendy, 1896) | Dendy, 1896 (as *Esperella*) |
| INCORPORATION: Description. ‘Texture (in spirit) soft and spongy, but intensely gritty from the presence of an immense quantity of coarse sand, chiefly in the interior of the sponge. […] The skeleton is to a large extent replaced by the abundant sand-grains, which may be held together in very irregular bands by sponging cement. [The sponge has an] intensely arenaceous habit and the consequent reduction of the proper skeleton.’ | *Mycale (Carmia) tenuispiculata* | Sri Lanka, Indian Ocean, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Mycalidae | (Dendy, 1905) | Dendy, 1905 (as *Esperella*) |
| INCORPORATION: Description. The sponge had some sediment embedded in its tissues, not in the fibres. | *Mycale (Aegogroplia)* sp. CERF 1 | Carnarvon Shelf NW Australia, Indian Ocean, 51 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Mycalidae | indet. | Schönberg *et al.*, 2012 |
| INCORPORATION: Description. ‘Texture compact, fleshy, but with much calcareous debris embedded.’ | *Myrmekioderma granulatum* | Sri Lanka, Indian Ocean, from deep water | Po: Dem (Heteroscleromorpha): Axinellida: Heteroxyidae | (Esper, 1794) | Dendy, 1905 (as *Acanthotoxifer ceylonensis*) |
| CRUST: Description. ‘The exterior was regularly covered with considerable quantities of debris – diatoms and bits of sand – so that it appeared dark drab, with the exception of the pore cracks, to be mentioned below, which showed yellow through the detritus.’ | *Myrmekioderma granulatum* | Micronesia, Pacific, 4-5 m | Po: Dem (Heteroscleromorpha): Axinellida: Heteroxyidae | (Esper, 1794) | De Laubenfels, 1954 (as *M. tylota*) |
| CRUST, INCORPORATION: Description. The sponge ‘is heavily sedimented and contains a very large quantity of foreign material consisting exclusively of calcareous sand.’ | *Myrmekioderma rea* | Dominican Republic, Caribbean, 15-25 m | Po: Dem (Heteroscleromorpha): Axinellida: Heteroxyidae | (De Laubenfels, 1934) | Pulitzer-Finali, 1986 (as *M. styx*) |
| BINDING: Identification guide. ‘Thinly encrusting, about 1 mm in thickness, agglutinating shell debris.’ | *Myxilla (Styloptilon) ancorata* | NW France, Northern Ireland, Atlantic, 30-85 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Myxillidae | (Cabioch, 1968) | Van Soest, 2015 |
| INCORPORATION: Description. ‘Sponge massive, irregular; intensely and coarsely sandy. […] Colour (in spirit) light brown (the colour of the sand) or grey; texture very friable. Main skeleton composed almost entirely of sand, with slender strongyle scattered between sand-grains and also collected in in loose, whispy fibres; and with small spined tylostyli or styli very sparsely echinating the sand-grains. […] As usual in sand-sponges, the proper skeleton is reduced in accordance with the araneceous habit.’ | *Myxilla (Ectyomyxilla) arenaria* | Sri Lanka, Indian Ocean, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Myxillidae | Dendy, 1905 | Dendy, 1905 |
| INCORPORATION: Description. ‘Amorphous mass, soft, mucous, pervaded with algae and polychaete tubes.’ | *Myxilla (Myxilla) mucronata* | Jamaica, Caribbean, 1-10 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Myxillidae | Pulitzer-Finali, 1986 | Pulitzer-Finali, 1986 |
| INCORPORATION: Description. ‘Sponge consisting of a group of short, rather thin-walled tubes […] The walls of the tubes contain a great number of large sand-grains embedded rather sparsely in them. […] The outer surface of the tube-wall is rough, with more or less embedded sand-grains.’ | *Negombo tenuistellata* | Sri Lanka, Indian Ocean, 22-37 m | Po: Dem (Heteroscleromorpha): Axinellida: Heteroxyidae | Dendy, 1905 | Dendy, 1905 |
| PSAMMOBIOSIS: Description. ‘This species was locally common […], often half buried in the sand.’ | *Neopetrosia carbonaria* | Puerto Rico, Jamaica, Caribbean, 0.5-35 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Petrosiidae | (De Lamarck, 1814) | Pulitzer-Finali, 1986 |
| INCORPORATION: Field study comparing incorporated to ambient sediments. *N. carbonaria* incorporated sediments and selected for specific grain sizes. | *Neopetrosia carbonaria* | Belize, Caribbean, 1 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Petrosiidae | (De Lamarck, 1814) | Cerrano *et al.*, 2004a |
| ARMOUR, INCORPORATION: Description. ‘Encrusting to cushion-shaped Niphates, pinkish orange in color, with sediment incorporated in net- like pattern in the ectosome and abundant throughout the choanosome. […] The ectosome shows a tangential network of spicules and multispicular fibers and is charged with fine sand and foreign spicules; brushes of perpendicular primary fibers disrupt the pattern. Circular areas of ostial groups are surrounded and crossed by spicule fibers. In the choanosome, spicules are arranged in an isotropic network, interrupted by multispicular tracts, 30-130 μm thick, that lead toward and penetrate the ectosome. There are also loose spicules without orientation and sand grains occur throughout the choanosome but are particularly numerous along the fibers tracts.’ | *Niphates arenata* | Belize, Caribbean, 25 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Niphatidae | Rützler *et al.,* 2014 | Rützler *et al.,* 2014 |
| BINDING: Field experiment observing the fate of loose materials (coral rubble) in 3 different depths with or without sponge fragments added. Sponge-bound aggregates survived better than unconsolidated piles. | *Niphates erecta* | Curaçao, Caribbean, 2-8 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Niphatidae | Duchassaing & Michelotti, 1864 | Biggs, 2013 |
| CRUST, INCORPORATION: Descriptions. 1996 – The finely hispid surface is ‘covered by sand, also abundant inside the sponge. […] Some characters such as the massive irregular shape, the external appearance, the indistinct cortex and the occurrence of sand show that *Nucleotethya* belongs to the same clade of Tethyidae of *Columnitis* and *Tectitethya.*’ 2000 – Inner areas of the sponge are ‘made of a confused network of megascleres accompanied by megasters, micrasters and sediment […] Surface covered by sediment, abundant also inside the sponge.’ | *Nucleotethya bifida* | Gulf of Mexico, SW Florida, 85 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | Sarà & Bavestrello, 1996 | Sarà & Bavestrello, 1996; Sarà, 2002 |
| INCORPORATION: Field sampling for corrosion cast and SEM. Amounts of the incorporated sediments in *O. amboinensis* reached over 80% of the dry weight, selecting for grains >2 mm in diameter, but has ectosomal areas in which sediments are completely lacking. | *Oceanapia amboinensis* | Bunaken, N Sulawesi, Indonesia, Celebes Sea, Pacific, 0.5-1 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | Topsent, 1897 | Bavestrello *et al.*, 2002 |
| PSAMMOBIOSIS, INCORPORATION, BINDING: 2002 – Field survey with sampling for SEM and sediment analyses and corrosion cast study. Endopsammic life habit shelters against competition and predation, it reduces irradiation, the risk of desiccation or being damaged by storms. Prevention of suffocation or inhaling sediments was assured by inhalants being erect structures (*O. amboinensis*), while blocking in subterranean exhalants was avoided by large size of openings. Sediment incorporation was used by the sponges for anchoring and preventing dislodgement, it increased their weight and created irregularities on their surfaces. Sediment uptake depended on sponge growth forms, which varied with thickness of the sediment layer over rock. *O. amboinensis* massive forms incorporated more sediment than branching forms and selected for larger particle sizes (2+ mm), more sediment is in the lower body parts. By their actions, they consolidated sediments. *Oceanapia* spp.are often only partially buried, andmore sediment is in the lower body parts. For additional anchoring some species have root-like fistules on the lower body, which are more numerous, longer and slimmer in fine than in coarse sediments. | *Oceanapia ambionensis* | Bunaken, Sulawesi, Celebes Sea, Indonesia, W Pacific, intertidal to 30 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | Topsent, 1897 | Cerrano *et al.*, 2002, 2007a |
| INCORPORATION: Field study. In contrast to a sheltered harbour site, sponges at a more exposed beach site were ‘found to contain varying quantities of sand particles in their bodies’. | *Oceanapia arenosa* | Madras, E India, W Indian Ocean, depth not stated, assumed shallow | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | Rao, 1941 | Ali, 1960 |
| PSAMMOBIOSIS, CRUST: Guide. *O. bartschi* has the typical habit for living endopsammic: fistules and a central, apical oscular tube. In one figure it is displayed buried in sand, but it can also rest on top of the substrate, then with a thick external layer of sediments | *Oceanapia bartschi* | Brazil, W Atlantic, 30-160 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (De Laubenfels, 1934) | Muricy *et al*., 2008 |
| Morphology maybe suitable for PSAMMOBIOSIS: Description. ‘Spherical specimen, 5 cm diameter, with eight fistules (distally closed) and oscular tubes protruding. These fistular processes reach 25 mm in height, 5 mm in diameter. The surface, where not covered by epizoans, is leathery smooth, the consistency firm but elastic, compressible.’ | *Oceanapia bartschi* | Belize, Caribbean, 20 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (De Laubenfels, 1934) | Rützler *et al.,* 2014 |
| Morphology maybe suitable for PSAMMOBIOSIS: This specimen was n cylindrical fragment made up of some twenty united tubes terminating in as many vents, all lying close together at the truncated end of the sponge. | *Oceanapia cohaerens* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Carter, 1886) | Dendy, 1895 |
| Morphology suitable for PSAMMOBIOSIS: Description. Sponges with fistules. | *Oceanapia coriacea* | Azores, Atlantic, 919-1229 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Topsent, 1904) | Topsent, 1928 (as *Phloeodictyon coriaceum*) |
| Morphology suitable for PSAMMOBIOSIS: Description. Sponges with large fistules. | *Oceanapia elongata* | Azores, Atlantic, 2460 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Topsent, 1892) | Topsent, 1928 (as *Phloeodictyon elongatum*) |
| Morphology suitable for PSAMMOBIOSIS: Description. ‘The fistular processes are long and may be ramified. They sometimes appear to be naturally closed at the extremity (except, perhaps, for small pores), and sometimes open.’ | *Oceanapia fistulosa* | Sri Lanka, Indian Ocean, 22-37 m, and from ‘deep water’ | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Bowerbank, 1873) | Dendy, 1905 (as *Phloeodictyon fistulosum*) |
| Morphology suitable for PSAMMOBIOSIS: Description. Globular or elongated sponges with fistules. | *Oceanapia fistulosa* | Azores, Atlantic, 1229 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Bowerbank, 1873) | Topsent, 1928 (as *Phloeodictyon fistulosum*) |
| PSAMMOBIOSIS, AGGLUTINATION: Description. The sponge ‘was growing below sand, with only its fistular outgrowths emerging. […] The surface is encrusted by various debris.’ | *Oceanapia fistulosa* | Dominican Republic, Jamaica, Caribbean, 0-50 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Bowerbank, 1873) | Pulitzer-Finali, 1986 |
| PSAMMOBIOSIS, INCORPORATION, BINDING: 2002 – Field survey with sampling for SEM and sediment analyses and corrosion cast study. Endopsammic life habit shelters against competition and predation, it reduces irradiation, the risk of desiccation or being damaged by storms. Prevention of suffocation or inhaling sediments was assured by inhalants being erect structures (*O. amboinensis*), while blocking in subterranean exhalants was avoided by large size of openings. Sediment incorporation was used by the sponges for anchoring and preventing dislodgement, it increased their weight and created irregularities on their surfaces. Sediment uptake depended on sponge growth forms, which varied with thickness of the sediment layer over rock. By their actions, they consolidated sediments. *Oceanapia* spp.are often only partially buried, andmore sediment is in the lower body parts. For additional anchoring some species have root-like fistules on the lower body, which are more numerous, longer and slimmer in fine than in coarse sediments. | *Oceanapia fistulosa* | Bunaken, Sulawesi, Celebes Sea, Indonesia, W Pacific, intertidal to 30 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Bowerbank, 1873) | Cerrano *et al.*, 2002, 2007a |
| INCORPORATION: Field sampling for corrosion casts and SEM. The buried portion of *O. fistulosa* incorporated fragments such as coral, sand and shell fragments, especially at lower ends of ‘roots’. | *Oceanapia fistulosa* | Bunaken, N Sulawesi, Indonesia, Celebes Sea, Pacific, 30 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Bowerbank, 1873) | Bavestrello *et al.*, 2002 |
| Morphology maybe suitable for PSAMMOBIOSIS: Description. ‘This species is represented in the collection by a squarish chunk evidently cut from the upper part of a large massive specimen The upper surface is flattened, subglabrous, and very minutely reticulate. It bears numerous very small, thimble-shaped, blind fistulae, with reticulate walls and only about one-fifth of an inch high.’ | *Oceanapia imperfecta* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | Dendy, 1895 | Dendy, 1895 |
| PSAMMOBIOSIS, AGGLUTINATION, ANCHORING, INCORPORATION: Identification guide. *O. isodictyiformis* ‘forms a basal mass from which long dirty white-brown fistules with paper thin walls stick out. It is very fragile and partly buried in the sediment in the shallow sublittoral. […] The holotype consists of a firm piece of agglomerated shell-detritus, 4.5 x 2.5 x 2 cm, completely overgrown by and intermixed with the body of the sponge. At the surface of the sponge there are numerous partly broken-off, very fragile fistules. They are 1-2 mm in diameter and 15 mm long. […] Some small shell fragments are incorporated into the basal part.’ | *Oceanapia isodictyiformis* | Ireland, Spain, Tenerife, Atlantic, Mediterranean, shallow water | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Carter, 1882) | Van Soest, 2015 |
| PSAMMOBIOSIS?: Description. The specimens were massive-ovate, with the lower, conical end in the substrate and short protruberances on the upper surface, including one or few thick, sieve-closed fistules. The habit suggested psammobiosis. | *Oceanapia* cf. *macrotoxa* | NW Australia, Carnarvon Shelf and Onslow area, Indian Ocean, 11-75 m, | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Hooper, 1984) | Schönberg *et al.*, 2012 |
| Morphology suitable for PSAMMOBIOSIS, AGGLUTINATION: Description. The sponge was sampled as fragments, and one fragment had foreign material attached to it, another fragment had fistules. | *Oceanapia media* | Canary Islands, Atlantic, 400 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Topsent, 1928) | Topsent, 1928 (as *Phloeodictyon medium*) |
| Morphology suitable for PSAMMOBIOSIS: Description. ‘Massive, irregular; with numerous large, prominent, collared vents, rising up from the general surface and leading out of great exhalant canals. Surface uneven, sometimes ridged, sub-glabrous, minutely reticulate, with a few extremely small and insignificant-looking, closed fistulae.’ | *Oceanapia mollis* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | Dendy, 1895 | Dendy, 1895 |
| Morphology suitable for PSAMMOBIOSIS, AGGLUTINATION, ANCHORING: Description. ‘Sponge encrusting or massive, with up to a hundred (usually 10-30) delicate fistules, 2-5 mm in diameter and up to 4 cm high. The base often agglomerates coarse sediment, to a point where it is doubtful whether it is perforating the substrate. […] The base is often covered by algae, hydroids, and ectoprocts, but the fistules are usually clean from epibionts.’ | *Oceanapia nodosa* | Brazil, Atlantic, 1-5 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (George & Wilson, 1919) | Muricy & Ribeiro, 1999 |
| Morphology suitable for PSAMMOBIOSIS: Description. The sponge was sampled as fragments, but had fistules. | *Oceanapia nodulosa* | Azores, Atlantic, 650-914 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Topsent, 1928) | Topsent, 1928 (as *Phloeodictyon nodulosum*) |
| PSAMMOBIOSIS, ANCHORING: Description. Schmidt described short ‘tubes’ on the upper (fistules, sometimes more or less the only parts emerging from the substrate) and ‘roots’ on the lower half of the sponge. Specimens lived partially in mud or sand, partially between corals and worm tubes, there with good water exchange. Schmidt interpreted all fistules as inhalants, the water being ejected from the roots. | *Oceanapia oleracea* | Antilles, Caribbean, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Schmidt, 1870) | Schmidt, 1870 (as *Rhizochalina oleracea* and *R. carotta*, referring to anchoring by roots) |
| PSAMMOBIOSIS: Field observations on two *Oceanapia* spp. and aquarium experiments on *O. peltata* using dye. Both species of *Oceanapia* live endopsammic on the slopes of Colombian reefs. Inhalant fistules extended above the sediment, the body and exhalant ducts at the base were embedded in coarse, unconsolidated sediment in 18 m or deeper water. | *Oceanapia oleracea* | Colombia, Caribbean, 18-30 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Schmidt, 1870) | Werding & Sanchez, 1991 |
| Morphology suitable for PSAMMOBIOSIS: ‘Rounded, elongate, narrowing below into a short stout peduncle […] Fistuale very short (? all broken off).’ | *Oceanapia pedunculata* | New Hebrides, 109-128 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Ridley & Dendy, 1886) | Ridley & Dendy, 1886 (as *Rhizochalina*) |
| PSAMMOBIOSIS: Field observations on two *Oceanapia* spp. and aquarium experiments on *O. peltata* using dye. Both species of *Oceanapia* live endopsammic on the slopes of Colombian reefs. Inhalant fistules extended above the sediment, the body and exhalant ducts at the base were embedded in coarse, unconsolidated sediment in 18 m or deeper water. Direction of water flow was confirmed for *O. peltata*. | *Oceanapia peltata* | Colombia, Caribbean, 18-30 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Schmidt, 1870) | Werding & Sanchez, 1991 |
| PSAMMOBIOSIS, ANCHORING, BINDING: Field study conducted with fluorescent dye, and laboratory analyses with light microscopy and TEM. Inhalant fistules were the only parts not buried in the sediment in *O. peltata*. Exhalants were root-like fistules in the sediment. By the endopsammic life style the sponges contributed to consolidation, venting and enrichment of the nearby sediments | *Oceanapia peltata* | Belize, Caribbean, 4-10 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Schmidt, 1870) | Rützler, 1997; Rützler, 2004 |
| PSAMMOBIOSIS: Antifouling study. ‘*Oceanapia peltata* is a massive globular species that is usually embedded in the sand; it has fistular cylindrical projections that protrude from the sand and have smooth ends or projections with pagoda form, with 2-4 cm width and 1 mm thickness.’ | *Oceanapia peltata* | Colombia, Caribbean, shallow | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Schmidt, 1870) | Puentes *et al.*, 2014 |
| INCORPORATION, Morphology suitable for PSAMMOBIOSIS: Description. ‘The sponge consists of a massive, sessile, depressed body, coated and charged with foreign matter, and sending up a number of elongated, hollow fistuhe, ranging up to about three inches in length and one-third of an inch in diameter. These processes may either end blindly and bluntly, or bear small vents at the summit.’ | *Oceanapia philippensis* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | Dendy, 1895 | Dendy, 1895 |
| Morphology suitable for PSAMMOBIOSIS: Description. ‘Large, massive, subspherical. Upper surface bearing numerous short closed filstulae directed upwards.’ | *Oceanapia putridosa* | Bass Strait, 69 m, Sydney Harbour, Pacific, 55-64 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (De Lamarck, 1815) | Ridley & Dendy, 1886 |
| ARMOUR?, INCORPORATION, PSAMMOBIOSIS?: Description of a fragment, upper half. ‘Surface smooth, finely wrinkled over base, contains scattered sediment. […] Deeper choanosome indistinctly stratified, fleshy, contains ill-sorted detritus.’ Fistular habit would support psammobiosis. | *Oceanapia putridosa* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (De Lamarck, 1815) | Wiedenmayer, 1989 |
| Morphology suitable for PSAMMOBIOSIS: Description. ‘Large spherical massive sponges, attaining a diameter of 250 millim., attached by stout roots, arising from the lower side, to the mud of the seabottom. These roots attain a length of 300 millim. and are repeatedly branched. From the upper surface and the sides numerous fistular tubes, with an average width of 4 millim. and a height of 35 millim., arise, which stand close together and are parallel, all tending upwards.’ | *Oceanapia ramsayi* | Sydney Harbour, Australia, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Rhizochalina*) |
| PSAMMOBIOSIS?, ANCHORING: Description. *O.* cf. *ramsayi* was globular, with short wart-like fistules on the upper half and a central root or few roots on the bottom – a habit that suggested psammobiosis. | *Oceanapia* cf. *ramsayi* | Carnarvon Shelf, Western Australia, 53 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Von Lendenfeld, 1888) | Schönberg *et al.*, 2012 |
| Morphology suitable for PSAMMOBIOSIS: Description. Sponges with long fistules. | *Oceanapia robusta* | Azores, Atlantic, 1331 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Bowerbank, 1866) | Topsent, 1928 |
| Morphology suitable for PSAMMOBIOSIS: Identification guide. *O. robusta* is a ‘globular to turnip-shaped sponge with prominent thick-walled fistules protruding from the body. […] In deeper water, on sandy bottom.’ | *Oceanapia robusta* | E Greenland, Iceland, Faroes, Shetlands, Norway, Ireland, Azores, Atlantic, 80-1700 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Bowerbank, 1866) | Van Soest, 2015 |
| PSAMMOBIOSIS: Field observations and laboratory analyses. The sponge lives endopsammic in reef sand, with the main body buried up to 20 cm deep, connected with the water column by a long fistule (partly exposed) and an apical capitum (exposed). Exposed parts were chemically defended, and defence was significantly decreasing with sediment depth, suggesting that psammobiosis may be a refuge from predators. | *Oceanapia* sp. (aff. *sagittaria*) | Micronesia, Pacific, 1-3 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | Norman, 1869 | Schupp *et al.*, 1999 |
| PSAMMOBIOSIS, INCORPORATION, BINDING: 2002 – Field survey with sampling for SEM and sediment analyses and corrosion cast study. Endopsammic life habit shelters against competition and predation, it reduces irradiation, the risk of desiccation or being damaged by storms. Prevention of suffocation or inhaling sediments was assured by inhalants being erect structures (*O. amboinensis*), while blocking in subterranean exhalants was avoided by large size of openings. Sediment incorporation was used by the sponges for anchoring and preventing dislodgement, it increased their weight and created irregularities on their surfaces. Sediment uptake depended on sponge growth forms, which varied with thickness of the sediment layer over rock. By their actions, they consolidated sediments. *Oceanapia* spp.are often only partially buried, andmore sediment is in the lower body parts. For additional anchoring some species have root-like fistules on the lower body, which are more numerous, longer and slimmer in fine than in coarse sediments. | *Oceanapia sagittaria* | Bunaken, Sulawesi, Celebes Sea, Indonesia, W Pacific, intertidal to 30 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Sollas, 1902) | Cerrano *et al.*, 2002, 2007a |
| PSAMMOBIOSIS?, AGGLUTINATION, CRUST: Description. ‘The single specimen appears to be half of a pear-shaped sponge which has been torn in two longitudinally. It has probably been fixed by the narrower end, and bears a single rather large vent (?) opening out of a wide oscular tube near the broad upper end. The surface is encrusted with large Foraminifera and sand-grains.’ | *Oceanapia zoologica* | Sri Lanka, Indian Ocean, depth not stated | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Dendy, 1905) | Dendy, 1905 (as *Reniera*) |
| INCORPORATION: Description. This *Oceanapia* species had a few pockets of loose sediments in its tissues. | cf. *Oceanapia* sp. CERF 9 | Carnarvon Shelf, Western Australia, 40 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | indet. | Schönberg *et al.*, 2012 |
| ANCHORING: Descriptions. Some *Oceanapia* spp. have ‘rootlike extensions’ that insinuate into cracks in corals or rocks and move between mollusc shells. | *Oceanapia* spp. | not stated, assumed Atlantic | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | NA | Schmidt, 1870 (as *Rhizochalina*) |
| PSAMMOBIOSIS, AGGLUTINATION: Field observations from area with fine sediments. Several *Oceanapia* spp. were observed to live half buried in the sediments. They had vertical fistules that were elevated well above the sediments. Where these sponges contained photosymbionts, they were located in the fistules or in exposed upper body parts. Coarser particles were often attached to the lower surfaces. | *Oceanapia* spp. | Onslow, NW Australia, Indian Ocean, 10-15 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | NA | Schönberg *et al.*, unpubl. data |
| INCORPORATION: Description. “Closely underneath the surface numerous sand grains, foraminiferan tests and other foreign bodies can be found, fewer in the interior.’ | *Pachastrella chuni* | Cape Bojeador, W Africa, Atlantic, 146 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Pachastrelllidae | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
| Morphology suitable for PSAMMOBIOSIS, CRUST, INCORPORATION: Description. ‘The surface consists of sand grains except for the numerous thin papillae, which extend beyond the substrate. The basal region of the sponge is not visible. […] The skeleton is disordered and contains abundant foreign material, mainly sand grains.’ | *Paracornulum sinclairae* | New Zealand, Pacific, intertidal | Po: Dem (Heteroscleromorpha): Poecilosclerida: Acarnidae | Bergquist & Fromont, 1988 | Bergquist & Fromont, 1988 |
| CRUST: *P. corrugata* was found to be adapted to perturbed sites and high sedimentation levels, and had a bristly surface that caught sediments and kept pores free. | *Paratetilla corrugata* | Spermonde Archipelago, Sulawesi, Indonesia, Makassar Strait, Pacific, 3-15 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | Dendy, 1922 | De Voogd & Cleary, 2007 (as *P. bacca*) |
| CRUST: Identification guide. ‘Often there is adhering detritus due to the long projecting spicule brushes. […] Surface strongly villose, very bristly, with long projecting spicules (to 2 mm), which often trap quantities of silt.’ | *Paratimea constellata* | Channel coast of France, SW Ireland, Azores, Atlantic, Mediterranean, 25-800 m | Po: Dem (Heteroscleromorpha): Axinellida: Stelligeridae | (Topesnt, 1893) | Van Soest, 2015 |
| AGGLUTINATION: Description. ‘The brown, very irregular surface is covered in pebbles.’ The sponge is figured. | *Penares anisoxia* | Brazil, Atlantic, 50 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Geodiidae (Erylinae) | Boury-Esnault, 1973 | Boury-Esnault, 1973 |
| PSAMMOBIOSIS: Guide. *P. ciocalyptoides* has the typical habit for endpsammic species, with an encrusting body from which fistules arise, the body usually being covered with sediments. | *Petromica (Chaladesma) ciocalyptoides* | Brazil, W Atlantic, 8-40 m | Po: Dem (Heteroscleromorpha): Bubarida: Desmanthidae | (Van Soest & Zea, 1986) | Muricy *et al*., 2008 |
| PSAMMOBIOSIS: Field guide. *P. ciocalyptoides* attaches to hard substrate, but is covered by a layer of sand, from which long fistules emerge. | *Petromica (Chaladesma) ciocalyptoides* | Bahia, Brazil, W Atlantic, 2-21 m | Po: Dem (Heteroscleromorpha): Bubarida: Desmanthidae | (Van Soest & Zea, 1986) | Hajdu *et al.*, 2011 |
| CRUST?, INCORPORATION: Description. In *Petrosaspongia* spp. and *P. nigra* the surface is unarmoured. The primary fibres are cored. ‘Coring material is regular and occupies approximately half of the fibre diameter. The surface is encrusted with a fine, evenly dispersed sand layer that does not form an armoured crust. [… Partly due to the] incorporation of moderate amounts of interstitial debris throughout the sponge, the texture is extremely hard and incompressible.’ | *Petrosaspongia nigra* | type locality: New Caledonia, Pacific, Australia, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | Bergquist, 1995 | De C. Cook & Bergquist, 2002a |
| PSAMMOBIOSIS?: Descriptions. Some *Petrosia* spp. had globular specimens with fistules, but we could not confirm they relationship with the substrate. | *Petrosia (Petrosia)* spp. | Carnarvon Shelf NW Australia, Indian Ocean, 40-92 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Petrosiidae | NA | Schönberg *et al.*, 2012 |
| INCLUSION: Description. ‘The sponge also contains a good deal of sand.’ | *Phelloderma radiatum* | off La Plata River Delta, Atlantic, 1094 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Phellodermidae | Ridley & Dendy, 1886 | Ridley & Dendy, 1886 |
| ANCHORING: Description. The type specimen of this sponge has 25 anchoring tufts shorter than the sponge body. | *Pheronema annae* | Santa Cruz, California, Monterey Bay, E Pacific, depth not stated | Po: Hex (Amphidiscophora): Amphidiscosida: Pheronematidae | Leidy, 1868 | Gray, 1870 |
| ANCHORING: Description. Pheronematidae are glass sponges that are anchored on hard or in soft substrate with spicule tufts (basalia). In the genus *Pheronema* basalia are usually represented by several separate tufts or by one broad, loose tuft. *P. annae* has several tufts that protrude 2-4.5 cm from the base of the sponge. | *Pheronema annae* | museum specimens, all major oceans except poles, 90-4789 m | Po: Hex (Amphidiscophora): Amphidiscosida: Pheronematidae | Leidy, 1868 | Tabachnick & Menshenina, 2002b |
| ANCHORING: Description. Gray described this sponge as ‘globular anchor-sponge’ with ‘anchoring filaments in a wisp, and all entangled together’. After untangling it became apparent that they ‘form a ring-like series of tufts round the lower end of the body of the sponge’. They were longer than the sponge body and ‘spread out in the mud and hold the sponge in its place. For this purpose they have at the end of the filament a whorl of three or four hooks, like grapnel, and a few scattered recurved hooks above them.’ | *Pheronema carpenteri* | Portugal and North Sea, depth not stated | Po: Hex (Amphidiscophora): Amphidiscosida: Pheronematidae | (Thomson, 1869) | Gray, 1870 (as *P. grayi* and *Holtenia carpenteri*) |
| ANCHORING: Description. The sponge is depicted with a basal spicule tuft. | *Pheronema carpenteri* | Azores, Atlantic, 845 m | Po: Hex (Amphidiscophora): Amphidiscosida: Pheronematidae | (Thomson, 1869) | Topsent, 1928 (as *P. grayi*) |
| PSAMMOBIOSIS?, ANCHORING: Description and ecological discussion. Schmidt described *P. carpenteri* as ‘almost entirely buried in mud.’ Because the sponge is thus not exposed to currents that may turn the sponge, its anchoring spicule tuft is not twisted. | *Pheronema carpenteri* | not stated, assumed Atlantic | Po: Hex (Amphidiscophora): Amphidiscosida: Pheronematidae | (Thomson, 1869) | Schmidt, 1870 (as *Holtenia carpenteri*) |
| ANCHORING: *P. carpenteri* is pictured with a thick spicule tuft (figure from original description). | *Pheronema carpenteri* | not stated, assumed Atlantic | Po: Hex (Amphidiscophora): Amphidiscosida: Pheronematidae | (Thomson, 1869) | Leys *et al.*, 2007 |
| ANCHORING: Biomaterial studies. *P. raphanus* is depicted with long spicules extending from the entire body surface and with thick, dense spicule tuft on the bottom. 2010a – ‘Basal spicules used to adhere the sponge to the substrate are fine fibers 40–70 μm in thickness and up to 2-3 cm long.’ Spicules extending from the body have a central cylinder that is most resistant against etching with fluohydric acid, followed by organosilicate layers. The main material is hydrated silica, and removing the water by heating makes the spicule brittle. 2010b – The authors hypothesis that the light-transmitting character of such spicules is to support cyanobacteria found in the tissues through bioluminescence. | *Pheronema raphanus* | South China Sea, 140-300 m | Po: Hex (Amphidiscophora): Amphidiscosida: Pheronematidae | Schulze, 1895 | Voznesenskiy *et al.*, 2010a, 2010b, 2011 |
| ANCHORING: Database listing collection specimens. For *P. weberi* a photograph is shown. The small specimen appears to have an extensive mass of anchoring spicules that are coiled to a bundle larger than the specimen. | *Pheronema weberi* | Siboga expedition specimen, type is from Indonesia (Van Soest *et al.,* 2014), depth not stated | Po: Hex (Amphidiscophora): Amphidiscosida: Pheronematidae | Ijima, 1927 | Ogawa *et al.*, 2006-2012 |
| ANCHORING: Material studies on hexactinellid spicules. 2008: ‘It is shown that skeletal spicules represent a bundle of composite fibres cemented with silicon dioxide, which imparts a high mechanical strength to spicules’, which is further supported by ‘layered organosilicon structure at the nanometre scale in the spicule cross section’. The material and structure of the spicules (organosilicon lamination) makes them function as one-dimensional photonic crystals and also makes them fracture resistant and flexible. | *Pheronema* sp. | not stated | Po: Hex (Amphidiscophora): Amphidiscosida: Pheronematidae | indet. | Kul’chin *et al.*, 2007, 2008 |
| ANCHORING: Biomaterial study. *Pheronema* sp. had spicules with a central cylinder followed by organosilicate layers ca. 50-150 nm thick. The main material was hydrated silica, made up of globules of 40-70 nm in diameter. | *Pheronema* sp. | South China Sea, 215 m | Po: Hex (Amphidiscophora): Amphidiscosida: Pheronematidae | indet. | Voznesenskiy *et al.*, 2010a |
| ANCHORING: Review on the Hexactinellida. ‘Most hexactinellids require a hard substratum for settlement (either rocks or shell debris), but two groups, all Amphidiscophora (including *Hyalonema* and *Monorhaphis*) and Euplectellinae (including *Euplectella*) anchor in soft sediments with special basal spicules.’ All *Pheronema* spp. anchor in soft substrate, and there are 18 species (Van Soest et al. 2014) | *Pheronema* spp. | as general statement, no location given, deep sea | Po: Hex (Amphidiscophora): Amphidiscosida: Pheronematidae | NA | Leys *et al.*, 2007 |
| ANCHORING: Review. The Pheronematidae have developed anchoring spicules and are able to live on soft substrate, even if they prefer *Globigerina*, Pteropoda shell or mixed coarse substrates. | Pheronematidae | deep sea | Po: Hex (Amphidiscophora): Amphidiscosida: Pheronematidae | NA | Tabachnick, 1991 |
| INCORPORATION: Field study comparing incorporated to ambient sediments. *P. amaranthus* incorporated sediments and selected for specific grain sizes. | *Phorbas amaranthus* | Belize, Caribbean, 1 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Hymedesmiidae | Duchassaing & Michelotti, 1864 | Cerrano *et al.*, 2004a |
| INCORPORATION: Guide. *P. amaranthus* incorporates large quantities of sediment. | *Phorbas amaranthus* | Brazil, W Atlantic, 21-70 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Hymedesmiidae | Duchassaing & Michelotti, 1864 | Muricy *et al*., 2008 |
| CRUST: Description. The sponge can accumulate sediments on hispid patches of the surface (see crossection pictured in de Moraes, 2011). | *Phorbas amaranthus* | Fernando de Noronha Island, W Atlantic, 5-28 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Hymedesmiidae | Duchassaing & Michelotti, 1864 | De Moraes, 2011 |
| CRUST, INCORPORATION: SEM observations on Antarctic sponges. Exopinacocytes took up benthic diatoms which settle on the sponge surfaces. In P. glaberrima, planktonic diatoms were also observed penetrating through the inhalant system. Diatoms accumulating in the mesohyl underneath the exopinacoderm are thought to strengthen the sponge cortex and may be an alimentary source during oligotrophic periods. | *Phorbas glaberrimus* | Terra Nova Bay, Antarctic, Southern Ocean, 80-120 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Hymedesmiidae | (Topsent, 1917) | Gaino *et al.*, 1994 |
| INCORPORATION: Description. ‘Massive, compact, solid. Intensely and coarsely sandy. Sand arranged in stout vertical columns ending in slight conuli on the curface. Surface subglabrous between the sandy points. Vents rather large, scattered, with wide, vertical oscular tubes. Texture hard, friable. Colour in spirit sandy brown, with grey flesh. Skeleton composed chiefly of sand, with numerous spined styli echinating the sand grains, and other spicules scattered between. At the surface the oxea form radiating tufts.’ | *Phorbas gravidus* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Hymedesmiidae | (Dendy, 1896) | Dendy, 1896 (as *Plumohalichondria gravida*) |
| INCORPORATION: Description. ‘Skeleton a reticulation of thick soft fibres echinated and sometimes cored by acanthostyles, 130 x 11 μ in maximum size. Foreign bodies present in the fibres and ground substance.’ | *Phorbas mollis* | Australia, ‘Endeavour’ specimen, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Hymedesmiidae | (Kirkpatrick, 1903) | Hallmann, 1912 (as *Clathria*) |
| ARMOUR, INCORPORATION: Description. ’Scattered and clustered sand grains everywhere in dermis. […] Sand grains more numerous below surface, scattered in dense, collagenous choanosome.’ | *Phorbas* cf. *tenacior* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Hymedesmiidae | (Topsent, 1925) | Wiedenmayer, 1989 |
| INCORPORATION: Description. ‘Surface subglabrous, very minutely reticulate. […] The main skeleton is a very definite and fairly uniformly distributed but not very regular reticulation of stoutish pale coloured horny fibre, almost filled throughout with sand and broken spicules. […] There is a very well-developed, close-meshed dermal reticulation, composed of sand and broken spicules and with small rounded meshes.’ | *Phoriospongia arenifibrosa* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Dendy, 1896) | Dendy, 1896 (as *Desmacidon*) |
| INCORPORATION: Description. ‘Armoured ectosome 320-500 μm thick. Choanosome fleshy, firm, with debris in tracts wavy to meandering in periphery. […] Debris tends to sorting by size and nature: in choanosome, larger fragments, strewn intersticially. In ectosome, coarser lithic fragments pack inner, thicker portion; finer material, chiefly spicule fragments and spicules of didemnid tunicates, fill thinner surface layer.’ | *Phoriospongia argentea* | Bass Strait, 3-6 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Marshall, 1880) | Wiedenmayer, 1989 |
| INCORPORATION: Description. ‘Detritus in ectosome and choanosome ill-sorted, variably dense, in meandering tracts below ectosome. […] Armoured ectosome around 100 μm thick, chiefly of spicule fragments, with fine lithic detritus interspersed. […] Detritus in choanosome coarser than at surface, ill-sorted, of foreign spicules, their fragments, lithic grains in about equal proportions; mostly in meandering, chiefly ascending tracts, without visible spongin. […] Proper spicules […] in deeper choanosome concentrated in and around tracts of debris.’ | *Phoriospongia carcinophila* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Von Lendenfeld, 1889) | Wiedenmayer, 1989 |
| INCORPORATION, ARMOUR: Description. ‘The main skeleton is an irregular, wide-meshed reticulation of stout horny fibre, everywhere abundantly cored with foreign bodies (broken spicules), but with a layer of more or less clear, transparent spongin outside the core. The dermal skeleton is a very beautiful, close-meshed reticulation of foreign bodies (broken spicules) held together by spongin.’ | *Phoriospongia flabellopalmata* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Carter, 1885) | Dendy, 1895 (as *Stylotrichophora rubra*) |
| INCORPORATION: Description. ‘The skeleton includes spongin uniting spicules into tracts which are not at all echinated but which contain some spicules and even more foreign material, such as small bits of sand.’ | *Phoriospongia flabellopalmata* | Marshall Islands, Pacific, 5 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Carter, 1885) | De Laubenfels, 1954 (as *Stylotrichophora rubra*) |
| INCORPORATION: Description. ‘When alive the sponge is pretty tough and slightly elastic. The skeleton consists of a rather irregular reticulation of fibres 0.01 millim. thick. In the body of the sponge, but not in the membranes pervading the vestibular lacunse, roundish sand-grains, 0.2-0.3 millim. in size, are scattered. These are on an average 0.5 millim. apart, surrounded by a layer of spongin, and attached to each other by the fibres of the skeleton-net. Siliceous spicules of two kinds are scattered throughout the sponge. These spicules are not in connection with the supporting skeleton-net.’ | *Phoriospongia levis* | Sydney Harbour, Australia, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | Von Lendenfeld, 1888 | Von Lendenfeld, 1888 |
| INCORPORATION, ARMOUR: Description. ‘The skeleton consists of an irregular network of tortuous bands, 0.6-l millim. broad, composed of loosely scattered sand-grains, which do not appear to be at all connected with each other. The sand-grains are on average 0.2 millim. broad and about equally far apart. The meshes between these bands of sand-grains are 1-3 millim. wide. In the surface la ayer, 0.5 millim. thick, of similar isolated sand-grains is observed. [Innate] spicules are very abundant in the ground-substance. […] Slender canals lead down from them to the subdermal cavities penetrating the sand-cortex.’ | *Phoriospongia reticulum* | Sydney Harbour, Bass Strait, Australia, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | Marshall, 1880 | Von Lendenfeld, 1888 |
| INCORPORATION, ARMOUR: Description. *Phoriospongia* spp. are ‘Chondropsidae with skeletal columns cored by styles and foreign material (sand, broken spicules) […] Sandy, variable amount and distribution of foreign detritus.’ *P. solida* has a ‘slimy skin, through which larger and smaller foreign debris is visible. […] In cross section there is only a mass of sand and shell debris subdivided by an irregular system of canals.’ | *Phoriospongia solida* | Tasmania, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | Marshall, 1880 | Van Soest, 2002a |
| INCORPORATION: Description. ‘The dry skeleton is hard, slightly compressible, and elastic. It is composed of main fibres 0.1 millim., and simple connecting fibres 0.03-0.05 millim. thick. Both kinds of fibres are free from foreign bodies.’ | *Phoriospongia squalida* | N, E and S Australia, New Zealand, Indo-Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Thorecta squalidus*) |
| INCORPORATION, CRUST?: Description. Primary fibres contain numerous foreign inclusions, secondary fibres are uncored. ‘On one side of the sponge a 25-35 µm thick, homogeneous layer can be found which contains numerous foreign bodies, mostly in one layer; […] on the other side such a surface layer seems to be only hinted, is in any case much less clear, but foreign bodies are taken up here as well.’ | *Phyllospongia palmata* | NE coast of Minahasa, Celebes, Celebes Sea, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Phyllospongiinae) | Thiele, 1899 | Thiele, 1899 |
| INCORPORATION, CRUST?: Description. Surface properties vary per side as in *P. palmatea*. ‘While a thin superficial layer exists, it is only the outher boundary of the tissue, and underneath in the tissue lie numerous small lumps of a incorporated substance that has become blue in hematoxylin […] and surrounds small, firm particles, among which are sand grains and sponge spicules, but only occasionally. This dermal layer is quite strong at the edge of the sponge, but is only weak on the other side of the sponge and contains more sponge spicules here, but not those lumps. It consists of a compact, cell-rich connective tissue that is quite sharply distinguished from the choanosomal tissue.’ | *Phyllospongia papyracea* | NE coast of Minahasa, Celebes, Celebes Sea, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Phyllospongiinae) | (Esper, 1794) | Thiele, 1899 (as *P. coriacea*) |
| INCORPORATION: Description. ‘The fibres are mostly free from foreign matter, but the primary lines, radiating to the surface, contain many comparatively large sand-grains.’ For specimens he identified as *P. holdsworthi*: ‘The inner surface only […] is covered by a thin sand-cortex […] There is no sand-cortex on the outer surface. [Fibres are mostly] free from sand, but with stouter primary lines radiating to the surface and containing numerous comparatively large sand-grains, especially towards the inner surface of the sponge.’ | *Phyllospongia papyracea* | Sri Lanka, Indian Ocean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Phyllospongiinae) | (Esper, 1794) | Dendy, 1905 (also as *P. holdsworthi*) |
| CRUST, INCORPORATION: Description. In *Phyllospongia* spp. and *P. papyracea* the surface is unarmoured but has a sand crust, the primary fibres are axially cored with foreign debris. The secondary and tertiary fibres are uncored. | *Phyllospongia papyracea* | type locality: India, Indian Ocean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Phyllospongiinae) | (Esper, 1794) | De C. Cook & Bergquist, 2002a |
| CRUST: Description. The sponge has a sediment crust. A specimen is pictured, as well as a crossection through the surface. | *Pione enigmaticas* | Das Rocas Archipelago, W Atlantic, 7 m | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | De Moraes, 2011 | De Moraes, 2011 |
| INCORPORATION: Description. Sediments were loosely embedded in the sponge tissue, apparently more fine materials associated to spongin fibres, coarser grains loose in the tissue. | *Pipestela* sp. CERF 2 = WAM sp. Ng 1 | Carnarvon Shelf NW Australia, Indian Ocean, 73-91 m | Po: Dem (Heteroscleromorpha): Axinellida: Axinellidae | indet. | Schönberg *et al.*, 2012 |
| ANCHORING: Description. Euplectellidae are glass sponges that have spicule tufts that anchor them in sediments (basalia). *P. solutum* has several ‘stringy’ spicule tufts that make up a common, loosely arranged tuft. | *Placopegma solutum* | museum specimens, Indian Ocean, 1253-3008 m | Po: Hex (Hexasterophora): Lyssacinosida: Euplectellidae (Euplectellinae) | Schulze, 1896 | Tabachnick, 2002a |
| ANCHORING: Description. Pheronematidae are glass sponges that are anchored on hard or in soft substrate with spicule tufts (basalia). In the genus *Platylistrum* basalia are represented by a single rather compact tuft. In *P. platessa* the tuft protrudes 1.5-4 cm from the basal peduncle of the sponge. | *Platylistrum platessa* | museum specimens, W Indian Ocean, 660-1700 m | Po: Hex (Amphidiscophora): Amphidiscosida: Pheronematidae | Schulze, 1904 | Tabachnick & Menshenina, 2002b |
| ANCHORING: Review on the Hexactinellida. ‘Most hexactinellids require a hard substratum for settlement (either rocks or shell debris), but two groups, all Amphidiscophora (including *Hyalonema* and *Monorhaphis*) and Euplectellinae (including *Euplectella*) anchor in soft sediments with special basal spicules.’ | *Platylistrum platessa* | as general statement, no location given, deep sea | Po: Hex (Amphidiscophora): Amphidiscosida: Pheronematidae | Schulze, 1904 | Leys *et al.*, 2007 |
| INCORPORATION: Description. ‘The skeleton consists of a number of separate dendritically ramified fibres which are not connected with each other by any transverse fibres. These dendritic fibres consist of an axial column of sand-grains and spicule-fragments, which is surrounded by a stout layer of stratified spongin.’ | *Pleraplysilla spinifera* | Bass Straight, Sydney Harbour, Australia, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Schulze, 1879) | Von Lendenfeld, 1888 (as *Spongelia*) |
| INCORPORATION: Description. In the unarmoured Dysideidae and *Pleraplysilla* spp. ‘all fibres are filled with detritus’. *P. spinifera* ‘all fibres are centrally cored.’ | *Pleraplysilla spinifera* | type locality: Adriatic Sea, Mediterranean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Schulze, 1879) | De C. Cook & Bergquist, 2002b |
| INCORPORATION: Identification guide. ‘The center of the fibres is filled with debris of spicules and sand grains.’ | *Pleraplysilla spinifera* | North Sea, W coasts of France, Atlantic, Mediterranean, down to 50 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | (Schulze, 1879) | Van Soest, 2015 (as *P. minchini*) |
| INCORPORATION: Description. The fibres are ‘abundantly cored by foreign material.’ | *Pleraplysilla stocki* | Puerto Rico, Caribbean, 0.5-1.5 m | Po: Dem (Keratosa): Dictyoceratida: Dysideidae | Van Soest, 1978 | Pulitzer-Finali, 1986 |
| ANCHORING: Description. Pheronematidae are glass sponges that are anchored on hard or in soft substrate with spicule tufts (basalia). In the genus *Poliopogon* basalia are relatively broad tufts. In *P. amadou* the tuft protrudes 3 cm from the basal end of the sponge and is broad and loose. | *Poliopogon amadou* | museum specimens, all major oceans, 700-4270 m | Po: Hex (Amphidiscophora): Amphidiscosida: Pheronematidae | Thomson, 1878 | Tabachnick & Menshenina, 2002b |
| ANCHORING: Review on the Hexactinellida. ‘Most hexactinellids require a hard substratum for settlement (either rocks or shell debris), but two groups, all Amphidiscophora (including *Hyalonema* and *Monorhaphis*) and Euplectellinae (including *Euplectella*) anchor in soft sediments with special basal spicules.’ All *Polyopogon* spp. anchor in soft substrate, and there are 6 species (Van Soest et al. 2014). | *Poliopogon* spp. | as general statement, no location given, deep sea | Po: Hex (Amphidiscophora): Amphidiscosida: Pheronematidae | NA | Leys *et al.*, 2007 |
| BINDING, AGGLUTINATION, possible ANCHORING, morphology suitable for PSAMMOBIOSIS: Description. ‘Sessile, subglobular, enveloping pebbles &c., and cementing onto its own surface numerous small foreign objects. Giving off long, stiff, slender, cylindrical, hollow processes closed at the top, free from foreign objects. {…} A dermal layer of dense brushes of small spicules only present between the foreign bodies, which replace it.’ | *Polymastia agglutinans* | Off Azores, Atlantic, 820 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Ridley & Dendy, 1886 | Ridley & Dendy, 1886 |
| CRUST, AGGLUTINATION: Discussion on debris and sediment-using *Polymastia* spp. ‘Two species of *Polymastia, P. agglutinans* and *P. isidis,* are known to agglutinate sand and shell fragments at their surface.’ | *Polymastia agglutinans* | Off Azores, Atlantic, 820 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Ridley & Dendy, 1886 | Kelly-Borges & Bergquist, 1997 |
| AGGLUTINATION, morphology suitable for PSAMMOBIOSIS: Identification guide. ‘*Polymastia agglutinans* Ridley and Dendy, 1886 is a small *Polymastia* species with only a few papillae. Its characteristic is the foreign material (shell debris, sand etc.) that adheres to the surface, which is otherwise smooth. […] Cushion with a few papillae. Size 1-3 cm in diameter, papillae may reach 2 cm in length. Surface encrusted by numerous fragments of shells, grains of sand, etc. […] The presence of the foreign objects at the surface modifies the architecture of the skeleton of the cortex: the palisade of ectosomal small tylostyles can only be observed between the incorporated fragments.’ | *Polymastia agglutinans* | Plymouth, Roscoff, Azores, W Africa, Atlantic, more common beyond 50 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Ridley & Dendy, 1886 | Van Soest, 2015 |
| Morphology suitable for PSAMMOBIOSIS: Description. The species has fistules that would enable survival under intense sedimentation or in psammobiosis. | *Polymastia bicolor* | Bass Strait, 12.8 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Carter, 1886 | Carter, 1886 (also as *P. bicolor* var. *glomerata*) |
| Morphology suitable for PSAMMOBIOSIS: Identification guide. *P. boletiformis* ‘is a brightly coloured orange-yellow fistulose sponge with a thick, massive base. […] Most commonly found on sediment covered, upward facing rock or boulder tops on the bottom plain, associated with a bryozoan/hydroid turf. Found in conditions varying from quite rapidly flowing water to those in which silt falls out of suspension.’ | *Polymastia boletiformis* | Arctic, Atlantic coasts of Europe and North America, Mediterranean, from tidal pools to 2300 m, common from 15 m downwards | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | (Lamarck, 1815) | Van Soest, 2015 |
| Morphology suitable for PSAMMOBIOSIS: Identification guide. *P. conigera* ‘is a small cream-coloured *Polymastia*, similar to *P*. *penicillus* but much more hispid, the papillae are simultaneously exhalant and inhalant and its larger tylostyles are polytylote. […] Sandy areas, on shells.’ | *Polymastia conigera* | Channel near Roscoff, Atlantic, 15-85 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Bowerbank, 1874 | Van Soest, 2015 |
| Morphology suitable for PSAMMOBIOSIS: Description. The species has fistules that would enable survival under intense sedimentation or in psammobiosis. | *Polymastia crassa* | Bass Strait, 34.7 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Carter, 1886 | Carter, 1886 (as *P. bicolor* var. *crassa*) |
| ANCHORING, BINDING?: Description. One specimen was ‘growing on sand. […] Base incrusted with sand.’ | *Polymastia crassa* | Bass Strait, 25-30 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Carter, 1886 | Wiedenmayer, 1989 |
| CRUST, AGGLUTINATION, ANCHORING: Discussion on debris and sediment-using *Polymastia* spp. ‘*Polymastia crassa* (Carter) has sand and shell debris embedded throughout its body. […] Re-examination of the type material and sections here confirm that the species differs from *P. echinus* in that sand, debris, and shells are completely and abundantly embedded throughout the base of the sponge, rather than just at the surface.’ | *Polymastia crassa* | Bass Strait, 21 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Carter, 1886 | Kelly-Borges & Bergquist, 1997 |
| INCORPORATION, morphology suitable for PSAMMOBIOSIS: Description. ‘With irregularly spaced blind mammillate papillae […] up to 8 mm high […]. Surface and interior speckled with small white dots, which are associated foraminifera. […] Foraminifera are particularly dense in the choanosome, along the cortex-choanosome boundary, and on the surface of the sponge.’ | *Polymastia crocea* | New Zealand, Pacific, 10-24 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Kelly-Borges & Bergquist, 1997 | Kelly-Borges & Bergquist, 1997 |
| CRUST, AGGLUTINATION, morphology suitable for PSAMMOBIOSIS: Description. ‘Surface covered in distinctive smooth tapering cylindrical papillae, 15 mm high, 3-4 mm basal diameter, closely and regularly distributed over sponge surface, between which is covered in sand, shell, small pebbles, and fragments of calcareous material […] papillae completely free of any foreign material. […] Sandgrains, shell, and other calcareous debris are embedded in the surface of the sponge, disrupting the palisade so that the debris sits upon the lower semi-tangential layer of the cortex.’ | *Polymastia echinus* | New Zealand, Pacific, 12 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Kelly-Borges & Bergquist, 1997 | Kelly-Borges & Bergquist, 1997 |
| PSAMMOBIOSIS, AGGLUTINATION, ANCHORING: Description. ‘*P. fluegeli* is disc-shaped and lives partly buried in the sediment, with only the papillae protruding above the surface. This new species has a basal layer of agglutinated sediment particles occurring between the choanosome and the ectosomal lower layer.’ | *Polymastia fluegeli* | Aleutian Islands, Bering Sea, N Pacific, 82 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Lehnert *et al.*, 2005 | Lehnert *et al.*, 2005 |
| Morphology suitable for PSAMMOBIOSIS: Description. ‘Crowded with wart-like papillae 2-5 mm high on sponge periphery, thin multi-tipped conical papillae up to 15 mm high in centre of sponge.’ | *Polymastia fusca* | New Zealand, Pacific, 0.5-20 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Bergquist, 1961 | Kelly-Borges & Bergquist, 1997 |
| Morphology suitable for PSAMMOBIOSIS, ANCHORING: Identification guide. ‘This species is disc-shaped and fixed only by certain points to the substrata. At the limit between the upper face and the lower face a rather long fringe of bristles may be observed. The papillae are very numerous and located on the upper face. The upper face is hispid and the lower face smooth. Size may be up to 20 cm in diameter, and such a specimen may have almost 300 papillae.’ | *Polymastia grimaldii* | Boreal Atlantic, deep water, 70-650 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | (Topsent, 1913) | Van Soest, 2015 |
| CRUST, PSAMMOBIOSIS: Description. ‘Papillae are widely spaced, microscopically smooth, squat, irregularly lumpy, conical with a wider base than they are high, 3-12 mm wide, 1-10 mm high. […] Surface between papillae is often brown […] with collected silt. […] Attached to subtidal sloping rock surfaces or embedded within sand and sediment.’ | *Polymastia hirsuta* | New Zealand, Pacific, 10-34 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Bergquist, 1968 | Kelly-Borges & Bergquist, 1997 |
| Morphology suitable for PSAMMOBIOSIS: Identification guide. ‘*Polymastia inflata* Cabioch, 1968 is a small rather thin cushion with 1-3 papillae of 1.5 cm long. […] Sandy areas, on rocks and on shells.’ | *Polymastia inflata* | Roscoff, Galicia, West Africa, Atlantic, Mediterranean, 15-150 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Cabioch, 1968 | Van Soest, 2015 |
| Morphology suitable for PSAMMOBIOSIS, ANCHORING?: Description. The specimen has fistules and a basal hispid fringe that catches sediments (specimens are depicted by Topsent). | *Polymastia infrapilosa* | Azores, Atlantic, 75 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Topsent, 1927 | Topsent, 1928 |
| CRUST, AGGLUTINATION: Discussion on debris and sediment-using *Polymastia* spp. ‘Two species of *Polymastia, P. agglutinans* and *P. isidis,* are known to agglutinate sand and shell fragments at their surface.’ | *Polymastia isidis* | Antarctica, Southern Ocean, depth not cited | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Thiele, 1905 | Kelly-Borges & Bergquist, 1997 |
| PSAMMOBIOSIS: Study on sponge-associated microbes. ‘They are often found in the interface between rocky and sandy bottoms, with the base covered by sand and precipitated organic matter, leaving only the papillae exposed.’ | *Polymastia janeirensis* | Rio de Janeiro, Brazil, Atlantic, 7 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | (Boury-Esnault, 1973) | Turque *et al.*, 2008 |
| Morphology suitable for PSAMMOBIOSIS: Description. ‘Small encrustation, 5-7 mm thick, 40 mm wide, 40 mm long; surface has 12 hollow papillae, 6-60 mm long.’ | *Polymastia lorum* | New Zealand, Pacific, 10 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Kelly-Borges & Bergquist, 1997 | Kelly-Borges & Bergquist, 1997 |
| Morphology suitable for PSAMMOBIOSIS, CRUST: Identification guide. ‘The type specimen is a fragment of a cushion-shaped, attached sponge approximately 35 x 18 x 7 mm thick. The upper surface is hispid. The surface of the sponge traps silt and the colour is only discernible on the papillae. The specimen has 26 inhalant papillae and one exhalant. The mean length of the inhalant papillae is 8 x 2 mm in diameter. The exhalant papillae is 11 mm long and approximately 4 mm in diameter.’ | *Polymastia mamillaris* | Swedish W coast and Skagerrak, North Sea, 76-225 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | (Müller, 1806) | Van Soest, 2015 |
| PSAMMOBIOSIS, CRUST, ANCHORING: Identification guide. ‘*Polymastia penicillus* (Montagu, 1818) is a pale greyish yellow to orange-yellow fistulose sponge growing in crevices among rocks. The main body mass is often partly buried in sediment with its fistules sticking out. […] The sponge is firmly attached to rock beneath the sediment. […] The surface of the body is hispid, roughened by projecting spicules, which trap sediment particles, ranging from mud to fine gravel. On a few occasions when the surface is clear of sediment, the sponge may be seen enveloped in algae or bryozoans, etc. The papillae are smooth and clean. […] This species is often found at the sediment/bedrock interface on upward rock (rarely on boulder tops), with the body beneath a layer of sediment. Prefers conditions where some silt is held in suspension by flowing water.’ | *Polymastia penicillus* | Arctic-Atlantic coasts of Europe and North America; Mediterranean. Recently known from many sites on the western and southern coasts of the British Isles, littoral to 2300 m, optimum depth 5-15 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | (Montagu, 1814) | Van Soest, 2015 |
| Morphology suitable for PSAMMOBIOSIS: Identification guide. ‘This little sponge is characterized externally by the length of the papillae which exceed 5 cm for a body of about 1 cm2. | *Polymastia spinula* | N North Sea and Atlantic between Shetlands and Bay of Biscaye, deep water, below 63 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Bowerbank, 1866 | Van Soest, 2015 |
| Morphology suitable for PSAMMOBIOSIS: Description. ‘Upper surface covered with broad conical papillae, 1-5 mm high.’ But occurs on bare rock. | *Polymastia pepo* | New Zealand, Pacific, intertidal to 22 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Kelly-Borges & Bergquist, 1997 | Kelly-Borges & Bergquist, 1997 |
| CRUST, morphology suitable for PSAMMOBIOSIS: Description. ‘Surface covered with microscopically smooth, generally flattened triangular-shaped papillae […] surface between papillae obscured by silt and sand trapped by projecting spicules. […] The sponge is commonly covered with silt and only visible as small closely spaced papillae.’ | *Polymastia tapetum* | New Zealand, Pacific, 0.5-12 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Kelly-Borges & Bergquist, 1997 | Kelly-Borges & Bergquist, 1997 |
| Morphology suitable for PSAMMOBIOSIS: Faunistic inventory. ‘This is a characteristic *Polymastia* with several long thin papillae and a smooth surface.’ | *Polymastia tubulifera* | Oman, Indian Ocean, 13.5 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Dendy, 1922 | Van Soest & Beglinger, 2008 |
| Morphology suitable for PSAMMOBIOSIS, BINDING: Identification guide. ‘*Polymastia uberrima* (Schmidt, 1870) is a spherical sponge provided with numerous osculiferous papillae on the upper side. […] It is fixed on pebbles and fragments of bryozoans.’ | *Polymastia uberrima* | Iceland, Norway, Greenland, Norway Sea, North Polar Sea, 26-1000 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | (Schmidt, 1870) | Van Soest, 2015 |
| INCORPORATION?: Description. ‘The sponge interior is dense with foraminifera.’ | *Polymastia umbraculum* | New Zealand, Pacific, 6 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Kelly-Borges & Bergquist, 1997 | Kelly-Borges & Bergquist, 1997 |
| Morphology suitable for PSAMMOBIOSIS: Description. ‘Incrusting sponges, which attain a thickness of 15 millim. and a horizontal extent of 60 millim. From the surface peculiar tuberecles and digitate processes arise, which may attain a height of 15 millim.; these processes have a circular transverse section, and are at the base 6 millim. thick.’ | *Polymastia zitteli* | Sydney Harbour, Australia, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Sideroma zitteli*) |
| AGGLUTINATION, BINDING: Description. Specimens were attached to rhodolith stones and pebbles, and similar material occasionally adhered to upper surfaces. | *Polymastia* sp. cf. CERF 1 = WAM sp. SS 5 | Carnarvon Shelf NW Australia, Indian Ocean, 57 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | indet. | Schönberg *et al.*, 2012 |
| ANCHORING, AGGLUTINATION, INCORPORATION, BINDING: Description. Coarse, mostly calcareous sediments were agglutinated to and embedded in the lower side of the specimen. | *Polymastia* sp. cf. CERF 3 | Carnarvon Shelf NW Australia, Indian Ocean, 81-83 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | indet. | Schönberg *et al.*, 2012 |
| PSAMMOBIOSIS: Field observations. The sponges’ ‘surfaces are covered in a thick layer of sediment’ and ‘may be exploiting interstitial water’. | *Polymastia* spp. | S Ireland, Atlantic, 0-30 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | NA | Bell & Barnes, 2000 |
| INCORPORATION: Description. ‘We examined a peel of the ectosomal membrane by compound light microscope, using both transmitted and polarized ligh, and found that the reflective white appearance is caused by calcareous crystals, unlike any particles seen in nearby reef sediments.’ | *Prosuberites carriebowensis* | Belize, Caribbean, 20 m | Po: Dem (Heteroscleromorpha): Agelasida: Hymerhabdiidae | Rützler *et al.,* 2014 | Rützler *et al.,* 2014 |
| INCORPORATION: Description. ‘All three [specimens] incorporate a very large quantity of sand.’ | *Prosuberites psammophilus* | Dominican Republic, Puerto Rico, Caribbean, 4-30 m | Po: Dem (Heteroscleromorpha): Agelasida: Hymerhabdiidae | (Pulitzer-Finali, 1986) | Pulitzer-Finali, 1986 (as *Laxosuberites*) |
| Morphology suitable for PSAMMOBIOSIS: Description. On the convex side of the body there are ten conical fistules of 1-2 cm length. | *Proteleia sollasi* | St. Francis Bay, South Africa, Indian Ocean, 100 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Dendy & Ridley, 1886 | Von Lendenfeld, 1907 |
| ANCHORING: Review on the Hexactinellida. *P. tetranema* is pictured with a slim anchoring spicule tuft (reproduced from original decription). | *Protospongia tetranema* | fossil, Early Palaeozoic | Po: Hex: Reticulosida: (Protospongioidea) Protospongiidae | Dawson, 1888 | Mehl, 1996; Leys *et al.*, 2007 |
| CRUST: Description. In *P. murrayi* the ‘cortex [is] often completely encrusted with thin sediment’ that is ‘finely calibrated’. | *Psammastra murrayi* | Bass Strait, Victoria, Australia, 70 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Sollas, 1996 | Uriz, 2002 |
| INCORPORATION: Description. ‘Surface even, but minutely wrinkled from the sinking of the dermal pore- membrane upon the subjacent arenated fibre. Pores plentifully scattered throughout the dermal membrane. […] Structure fibrous, fibre arenated throughout; texture fine.’ | *Psammochela chaliniformis* | Bass Strait, 35 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Myxillidae | (Carter, 1885) | Carter, 1885 (as *Dysidea*) |
| INCORPORATION: Description. In *Psammochela* spp. ‘the skeleton consists of a reticulation of megascleres and sand grains. […] Ectosomal skeleton with fine-meshed reticulation of small sand grains, choanosomal skeleton irregularly reticulate, composed of thin fibres with poor spongin, cored with sand and styles, and numerous sand particles and spicules dispersed within the mesohyle. […] The three species united here under *Psammochela* share the presence of sand columns replacing the choanosomal skeleton. [*P. elegans*] is one of the sand sponges which so frequently demonstrate reduced skeleton and spicule development.’ Drawings for *P. elegans* and *P. chaliniformis* are figured. | *Psammochela* spp.:  1 – *P. chaliniformis*  2 – *P. elegans* | 1 – type locality South Australia, depth unknown  2 – India, Indonesia, 5-7 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Myxillidae | 1 – (Carter, 1885)  2 – Dendy, 1916 | Van Soest, 2002d |
| INCORPORATION: Description of *P. tutiae* as a new species, discussing ‘sand sponges’ (see last entry of this table). All presently known species of this genus incorporate sand grains or other foreign material to form a reticuate skeleton that gives them a brittle consistency. ‘The ectosomal skeletons of all [species] are also very similar having a tight meshed reticulation of fine sand grains’. In *P. chaliniformis* megascleres are completely replaced by sand grains. Similarities to the genera *Chondropsis* and *Desmapsamma* are discussed. | *Psammochela* spp.:  1 – *P. chaliniformis*  2 – *P. elegans*  3 – *P. fibrosa* | 1 – type locality South Australia  2 – type locality India  3 – type locality Torres Strait  depths unknown | Po: Dem (Heteroscleromorpha): Poecilosclerida: Myxillidae | 1 – (Carter, 1885)  2 – Dendy, 1916  3 – (Ridley, 1884) | De Voogd, 2012 |
| INCORPORATION: Description. In *Psammochela* spp. ‘the skeleton consists of a reticulation of megascleres and sand grains. […] Ectosomal skeleton with fine-meshed reticulation of small sand grains, choanosomal skeleton irregularly reticulate, composed of thin fibres with poor spongin, cored with sand and styles, and numerous sand particles and spicules dispersed within the mesohyle. […] The three species united here under *Psammochela* share the presence of sand columns replacing the choanosomal skeleton. [*P. elegans*] is one of the sand sponges which so frequently demonstrate reduced skeleton and spicule development.’ Drawings for *P. elegans* and *P. chaliniformis* are figured. | *Psammochela psammodes* | type locality Western Australia, depth unknown | Po: Dem (Heteroscleromorpha): Poecilosclerida: Myxillidae | (Hentschel, 1911) | Van Soest, 2002d |
| INCORPORATION: Description of *P. tutiae* as a new species, discussing ‘sand sponges’ (see last entry of this table). All presently known species of this genus incorporate sand grains or other foreign material to form a reticuate skeleton that gives them a brittle consistency. ‘The ectosomal skeletons of all [species] are also very similar having a tight meshed reticulation of fine sand grains’. Similarities to the genera *Chondropsis* and *Desmapsamma* are discussed. | *Psammochela* spp.:  1 – *P. psammodes*  2 – *P. rigida*  3 – *P. tutiae* | 1 – type locality Western Australia, depth unknown  2 – type locality Malcca Strait, depth unknown  3 – N Moluccas, Indonesia, 27 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Myxillidae | 1 – (Hentschel, 1911)  2 – Bowerbank, 1875  3 – De Voogd, 2012 | De Voogd, 2012 |
| ARMOUR, INCORPORATION: Description and genus revision. ‘The surface is smooth and leathery to touch, occasioned by the surface armouring of very fine sand. This very fine material overlays a deeper, more coarse armour layer. The armoured layer in total is 563 μm thick (437-679 μm). [In juveniles] very small amount of detritus is scattered through the sponge. Primary fibres are axially to fully cored with foreign material and show some fasciculation near the sponge surface. Secondary fibres may be lightly cored axially or uncored.’ | *Psammocinia amodes* | Ahipara Bank, N New Zealand, Pacific, 192 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | De C. Cook & Bergquist, 1998 | De C. Cook & Bergquist, 1998 |
| INCORPORATION: Description. ‘The skeleton consists of knotty and irregular fibres, 0.2 millim. thick, […]. These fibres contain a continuous series of large sand-grains, and appear, in fact, as a single column of large sand-grains cemented together by spongin.’ Von Lendenfeld observed different layers of fibres. ‘Large sand-grains are frequently observed at their joining points. The distal ramifications of these fibres enter the sand-cortex on the surface.’ | *Psammocinia arenosa* | W, S and E Australia, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Hircinia arenosa*) |
| ARMOUR, INCORPORATION: Description and genus revision. ‘A firm and incompressible sponge, with a very heavy, thick crust of fine lightcoloured sand. […] Primary fibres are cored, irregular, and 200 μm in diameter. Secondary fibres may be cored at the intersections of fibres, and are 50 μm in diameter.’ | *Psammocinia arenosa* | New South Wales, Australia, Pacific, 20 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Von Lendenfeld, 1888) | De C. Cook & Bergquist, 1998 |
| INCORPORATION: Description and genus revision. ‘A distinctive species with a moderately low, compact base, from which extend solid, broad-based regular fistules, with terminal oscules, 3-7 mm in diameter. Adjacent fistules may also be joined together in a contiguous array. […] Primary fibres are cored, and secondary fibres are mainly uncored, though some larger secondary fibres may contain a small amount of axial debris.’ | *Psammocinia beresfordae* | not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | De C. Cook & Bergquist, 1996 | De C. Cook & Bergquist, 1998 |
| ARMOUR, INCORPORATION, morphology suitable for PSAMMOBIOSIS?: Description and genus revision. ‘A massive species, with long, characteristic fistules. […] A loose, irregular network of cored primary fibres, which form strong fascicles up to 700 μm in diameter. Secondary fibres are also irregular, 30-50 µm in diameter and usually cored.’ Their figure also shows armour. | *Psammocinia bulbosa* | New Caledonia, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | Bergquist, 1995 | De C. Cook & Bergquist, 1998 |
| PSAMMOBIOSIS, ANCHORING, AGGLUTINATION: Field observations from area with fine sediments. *P.* cf. *bulbosa* was observed to live buried in the sediments. It had vertical, columnar fistules that were elevated well above the sediments and some columnar extensions on the bottom that acted as roots. Some specimens had particles attached to their lower bodies. | *Psammocinia* cf. *bulbosa* | Onslow, NW Australia, Indian Ocean, 10-15 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | Bergquist, 1995 | Schönberg *et al.*, unpubl. data |
| ARMOUR, INCORPORATION: Description and genus revision. ‘A massive species with distinctive surface features, comprising strong elongate upright conules, with rounded tips, consisting of an aggregation of fine foreign material. […] The surface is visibly armoured with moderately coarse material, and has a granular appearance. […] The upper surface is hard and slightly compressible, whereas the sides, which are less armoured, are firm and compressible. The sponge matrix looks fleshy and collagenous, and has a moderate amount of coarse foreign debris scattered throughout. […] This species has massive, strongly fasciculated primary fibres which are heavily cored, and contains a moderate density of fine filaments.’ | *Psammocinia charadrodes* | Chatham Rise, New Zealand, Pacific, 96 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | De C. Cook & Bergquist, 1998 | De C. Cook & Bergquist, 1998 |
| INCORPORATION: Description and genus revision. ‘"The skeleton consists of abundant large sand grains which are connected with each other by slender fibres" (Polejaeff 1884). Primary fibres are heavily cored, as described by Polejaeff above. Secondary fibres may also be heavily cored, such that they can only be distinguished by their orientation relative to the surface and primary fibres. Secondary fibres are completely free of inclusions, and there are limited traces of secondary webbing. There is also a moderate amount of foreign spicule debris scattered throughout the mesohyl.’ | *Psammocinia compacta* | Bahía, Brazil, Atlantic, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Poléjaeff, 1884) | De C. Cook & Bergquist, 1998 |
| INCORPORATION, ARMOUR: Guide. *P. compacta* contains large quantities of sand, in form of a thick cortex and obscuring spongin fibres. | *Psammocinia compacta* | Brazil, W Atlantic, 10 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Poléjaeff, 1884) | Muricy *et al*., 2008 |
| INCORPORATION: Description. ‘The skeleton consists of a pretty uniform network of loose columns of large sand-grains, 0.8 millim. thick. The meshes formed by this network are elongate, oval, on an average 2 millim. long and 0.8 millim. broad. The sand-grains in the column are on an average 0.2 millim. apart, and connected by short, straight, and unbranched spongin-fibres, 0.03-0.05 millim. thick. Each sand-grain is enveloped by a thin coating of spongin. | *Psammocinia halmiformis* | W Australia, Indian Ocean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Hircinia halmiformis*) |
| INCORPORATION: Description. ‘The fibers contain rather large foreign material, sand grains often as much as 50 μ in diameter.’ | *Psammocinia halmiformis* | Marshall Islands, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Von Lendenfeld, 1888) | De Laubenfels, 1954 (as *Ircinia*) |
| ARMOUR, INCORPORATION: Description and genus revision. ‘This species is firm and incompressible, with a very heavy, thick sand armour. […] "The skeleton consists of a pretty uniform network of loose columns of large sand grains, 0.8 mm thick." "The sand grains in the column are on an average 0.2 mm apart, and connected by short, straight and unbranched spongin fibres, 0.03-0.05 mm thick." (Lendenfeld 1889). This was confirmed.’ | *Psammocinia halmiformis* | S and E Australia, Pacific, e.g. 25 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Von Lendenfeld, 1888) | De C. Cook & Bergquist, 1998 |
| ARMOUR, INCORPORATION: Description. ‘*Psammocinia* spp. are characterised by their sand-armoured surface […] Primary fibres are usually cored and secondary fibres may be uncored to fully cored’ occasionally obscuring the skeletal structure. ‘Sand and debris scattered throughout the mesohyl can render the sponges brittle.’ *P. halmiformis* has a ‘thick sand armour. [The choanosomal skeleton is] cored with loose columns of sand grains, 800 μm thick.’ | *Psammocinia halmiformis* | type locality: Australia, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | Von Lendenfeld, 1888 | De C. Cook & Bergquist, 2002d |
| ARMOUR, INCORPORATION: Description. Some specimens had thick armour made up of an outer layer of spicules placed in palisade and an inner crust of sediments. One specimen had a thin armour with only sediment. The species had abundant sediments in the tissue, embedded in fibres that ran more or less at right angle to surface or in more or less plumose orientation. The sediments appeared to be well-sorted and were sand grains of a similar size, comparatively coarse, with some spicule fragments. | *Psammocinia halmiformis* | Carnarvon Shelf NW Australia, Indian Ocean, 35-42 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | Von Lendenfeld, 1888 | Schönberg *et al.*, 2012 |
| ARMOUR, INCORPORATION: Description and genus revision. ‘Primary fibres are cored with foreign material and are often fascicular. The core may form an axial core of fine material, and range to fully cored, distorting the surface of the fibre. Secondary fibres are sometimes axially cored.’ Their figure also shows armour. | *Psammocinia hawere* | NE New Zealand, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | De C. Cook & Bergquist, 1996 | De C. Cook & Bergquist, 1998 |
| ARMOUR, INCORPORATION: Description and genus revision. ‘The surface is visibly sandy, with fine grit embedded in places and with areas of smooth, stretched pinacoderm between some conules. The fine sand, lightly-coloured armouring layer is 400 μm thick (100-900 μm), sometimes thicker around conules. Most specimens have abundant interstitial foreign debris. […] This species has relatively sparse fibres, a moderately high filament density and fully cored fibres. Primary fibres are cored, and secondaries are uncored, to fully cored with large particles. It may be difficult to distinguish secondary fibres, as they are often obscured by heavy coring.’ | *Psammocinia hirsuta* | New Zealand, Pacific, 16-75 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | De C. Cook & Bergquist, 1998 | De C. Cook & Bergquist, 1998 |
| INCORPORATION: Description. ‘No foreign bodies, or only very few, are contained’ in the canals leading off the inhalant pores. | *Psammocinia irregularis* | NE Australia, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Poléjaeff, 1884) | Von Lendenfeld, 1888 (as *Hircinia gigantea*) |
| ARMOUR?, INCORPORATION: Species descriptions with a discussion of the spongin fibres and sand inclusion. *Psammocinia* is taxonomically characterised by how sand grains are incorporated into their bodies and spongin fibres and whether they form surface enforcement. This is interpreted as a strategy to gain support and stability. | 1 – *Psammocinia jejuensis*  2 – *Psammocinia lobatus*  3 – *Psammocinia mammiformis* | 1-3 – S Korea, East China Sea, Pacific, 10-25 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | 1, 3 – Sim, 1998  2 – Sim & Lee, 2002 | Sim & Lee, 1999, 2002 |
| ARMOUR, INCORPORATION: Description and genus revision. ‘Fine armouring material overlays a coarser layer of sand and debris. The armouring layer is 757 μm thick (534-970 μm). A small to moderate amount of coarse foreign detritus is scattered throughout the mesohyl. […] Primary fibres are fully and heavily cored, some of which become slightly fascicular near the surface. Secondary fibres are axially cored. | *Psammocinia maorimotu* | New Zealand, Pacific, 16 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | De C. Cook & Bergquist, 1998 | De C. Cook & Bergquist, 1998 |
| ARMOUR?, INCORPORATION: Species description with a discussion of the spongin fibres and sand inclusion. *Psammocinia* is taxonomically characterised by how sand grains are incorporated into their bodies and spongin fibres and whether they form surface enforcement. This is interpreted as a strategy to gain support and stability. | *Psammocinia mosulpia* | S Korea, East China Sea, Pacific, 10-25 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | Sim, 1998 | Sim & Lee, 1999 |
| ARMOUR, INCORPORATION: Description and genus revision. ‘Surface armouring averages 600 μm thick (97-1067 μm), and more coarsely conulose areas, where adjacent conules are joined by low ridges forming a reticulate pattern, are more heavily armoured. […] There is a distinct demarcation between the armoured cortex and the underlying mesohyl, with some grey surface pigment extending into the mesohyl. Coarse foreign material is scattered throughout the mesohyl. […] Primary fibres are fully cored, sometimes with large particles so that fibres appear as trails of sand and rock grains connected by small amounts of spongin. Primary fibres may show some fasciculation just below the surface. Secondary fibres are axially to fully cored. Heavily cored secondary fibres may be difficult to distinguish from primary fibres.’ | *Psammocinia papillata* | New Zealand, Pacific, 10-15 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | De C. Cook & Bergquist, 1998 | De C. Cook & Bergquist, 1998 |
| ARMOUR, INCORPORATION: Description and genus revision. ‘The surface armouring is 805 μmthick (485-1067 |Am) and consists of a dense layer of sand, foreign spicules, and rock fragments. There is a small amount of coarse foreign material scattered interstitially. […] All fibres are heavily and fully cored with moderately large particles, such as occur in the surface armour.’ | *Psammocinia perforodorsa* | New Zealand, Pacific, 11 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | De C. Cook & Bergquist, 1998 | De C. Cook & Bergquist, 1998 |
| ARMOUR?, INCORPORATION: Species descriptions with a discussion of the spongin fibres and sand inclusion. *Psammocinia* is taxonomically characterised by how sand grains are incorporated into their bodies and spongin fibres and whether they form surface enforcement. This is interpreted as a strategy to gain support and stability. | 1 – *Psammocinia rubra*  2 – *Psammocinia samyangensis* | 1-2 – S Korea, East China Sea, Pacific, 10-25 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | 1 – Sim & Lee, 2002  2 – Sim & Lee, 1998 | Sim & Lee, 1999, 2002 |
| ARMOUR, INCORPORATION: Description and genus revision. ‘The surface is characterised by a fine reticulate pattern and is armoured with a dense layer of fine sand and debris, 250 μm deep. It is difficult to distinguish the fibres as they are indistinct and colourless in histological sections, though they can be identified by the presence of coring material. Primary fibres are often fasciculated and consist of a tangle of spicule fragments, cemented by sparse spongin fibre. Not all secondaries are cored, but where coring occurs it may be axial to full.’ | *Psammocinia verrucosa* | NE New Zealand, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | De C. Cook & Bergquist, 1996 | De C. Cook & Bergquist, 1998 |
| INCORPORATION: Description and genus revision. ‘The skeleton is simple. Primary fibres are cored and, on average, are 200 (im in diameter. Secondary fibres are uncored.’ | *Psammocinia vesiculifera* | Port Jackson, New South Wales, Australia, Pacific, 13 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Poléjaeff, 1884) | De C. Cook & Bergquist, 1998 |
| ARMOUR?, INCORPORATION: Species descriptions with a discussion of the spongin fibres and sand inclusion. *Psammocinia* is taxonomically characterised by how sand grains are incorporated into their bodies and spongin fibres and whether they form surface enforcement. This is interpreted as a strategy to gain support and stability. | *Psammocinia wandoensis* | S Korea, East China Sea, Pacific, 10-25 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | Sim & Lee, 1998 | Sim & Lee, 1999 |
| ARMOUR, INCORPORATION: Description and genus revision. ‘Surface finely and densely conulose, with distinct surface armouring.’ Fibres cored. | *Psammocinia* sp. A (SDCC/NZ l84) | New Zealand, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | De C. Cook & Bergquist, 1998 | De C. Cook & Bergquist, 1998 |
| ARMOUR, INCORPORATION: Description and genus revision. This species has ‘a fine, dense surface armour’. A figure shows sediment incorporation. | *Psammocinia* sp. B (SDCC/NZ l75) | New Zealand, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | De C. Cook & Bergquist, 1998 | De C. Cook & Bergquist, 1998 |
| ARMOUR, INCORPORATION: Description and genus revision. ‘Well embedded with sand and heavily encrusted with epiflora and epifauna. […] Some cored fibres appear as bits of detritus strung together with spongin, rather than cored fibres.’ | *Psammocinia* sp. C (SDCC/NZ 067) | New Zealand, Pacific, 8 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | De C. Cook & Bergquist, 1998 | De C. Cook & Bergquist, 1998 |
| ARMOUR, INCORPORATION: Description and genus revision. ‘This specimen has cored, fascicular primary fibres and uncored or partially cored secondary fibres. Moderately dense fine filaments and ample foreign material are embedded in the mesohyl. […] The surface looks sandy and gives the sponge a dirty, greyish-white colour (in alcohol).’ | *Psammocinia* sp. D (SDCC/NZ 103) | Chatham Rise, New Zealand, Pacific, 102 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | De C. Cook & Bergquist, 1998 | De C. Cook & Bergquist, 1998 |
| ARMOUR, INCORPORATION: Description. The specimen had thick armour made up of an outer layer of spicule debris. The subdermal layer was reinforced with spicule debris and large sediments. Latter were also coring spongin. | *Psammocinia* sp. CERF 1 | Carnarvon Shelf NW Australia, Indian Ocean, 35 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | indet. | Schönberg *et al.*, 2012 |
| ARMOUR, INCORPORATION: Description. ‘Thin armoured ectosome discontinuous. […] Main skeleton is twofold: (1) Ill-defined columns of foreign debris agglutinated by spongin, barely visible around contours of grains and interstitially. Columns dendritic, straggling, 85 to 360 μm wide. (2) Interstitial irregular meshwork of clear spongin fibres.’ | *Psammoclema bitextum* | Bass Strait, 55 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | Wiedenmayer, 1968 | Wiedenmayer, 1989 |
| ARMOUR, INCORPORATION: Description. ‘Leathery, rough and gritty. [Surface regularly with] packed ill-sorted sand everywhere. […] Ectosome 175-860 m thick, packed with foreign debris of wide size range, including many spicules and their fragments. Main skeleton of very irregular, lax and unoriented reticulation of straggling, knotty fibres, containing some kind of ill-sorted detritus as in ectosome, agglutinated and outlined by pale, clear spongin. Grains 80 to 350 μm. Some debris interstitially.’ | *Psammoclema callosum* | Bass Strait, 3-6 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Marshall, 1880) | Wiedenmayer, 1989 |
| ARMOUR, INCORPORATION: Description. ‘Well-sorted sand grains conspicuous, crowded [in the surface]. Armoured ectosome frequently only 1-2 sand grains thick, with much spicular detritus, ciefly on the surface. One-half of volume of choanosome occupied by sand grains (including calcareous shell debris), with few foreign spicules and their fragments, mostly packed in vague columns or irregular masses, rarely scattered. Mean grain size 175 μm. Grains agglutinated by colourless, barely visible spongin; thin clear spongin fibres with irregular, trellis-like meshwork between neighbouring grains.’ | *Psammoclema densum* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Marshall, 1880) | Wiedenmayer, 1989 |
| INCORPORATION, ARMOUR: Identification guide. ‘The species is characterized by having non-anastomosed columns of sandgrains as skeletal material (can be observed with the naked eye). […] The skeleton consists entirely of sand grains arranged in thick columns up to 850 µm in diameter, rising from the substrate. These are irregularly and sparingly connected by thin sand ‘fibres’. The interior is often completely filled with sand grains. No visible spongin. Surface skeleton a more or less continuous layer of fine sand grains.’ | *Psammoclema finmarchicum* | Norway, N Atlantic, in fjords, 50-200 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Hentschel, 1929) | Van Soest, 2015 |
| ARMOUR, INCORPORATION: Description. ‘Thin armoured ectosome discontinuous. […] Main skeleton is twofold: (1) Ill-defined columns of foreign debris agglutinated by spongin, barely visible around contours of grains and interstitially. Columns dendritic, straggling, 85 to 360 μm wide. (2) Interstitial irregular meshwork of clear spongin fibres.’ | *Psammoclema fissuratum* | Bass Strait, 55 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | Wiedenmayer, 1968 | Wiedenmayer, 1989 |
| INCORPORATION: Description. ‘Texture small-grained.’ | *Psammoclema fuliginosum* | Bass Strait, depth unknown | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Carter, 1885) | Carter, 1885 (as *Holopsamma*) |
| ARMOUR, INCORPORATION: Description. [Surface structure] somewhat obscured by sand on surface, [and] recessed fleshy interstices with fine secondary reticulum of spicule fragments. […] Main skeleton in holotype an angular and irregular reticulation of fibres, with little orientation and distinction in thickness, packed with detritus, mostly spicule fragments; few fibres with about equal proportions of other fragments. Very few interstitial inclusions. Most spicule fragments longitudonally arranged, but many oriented at random. Pale clear spongin agglutinating and enveloping detritus. […] Between choanosome and armoured ectosome, fibres packed by ill-sorted detritus, also interstitially. Spicular and other (lithic and shelly) components in about equal proportions, both interstitially and in fibres. Abundance of coarse grains higher at the surface, armoured ectosome not distinct. […].’ | *Psammoclema goniodes* | Bass Strait, 52-79 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Marshall, 1880) | Wiedenmayer, 1989 |
| INCORPORATION: Description. ‘Colour dark grey-brown on the surface, lighter internally from the presence of the white particles of foreign material. [Internally] charged diffusively with arenaceous foreign material.’ | *Psammoclema nodosum* | Bass Strait, depth unknown | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Carter, 1885) | Carter, 1885 (as *Sarcocornea*) |
| ARMOUR, INCORPORATION: Description. ‘Armoured ectosome a stratified, collageneous cortex around 1 mm thick. […] Stratification also by sorting of detritus. […] Internal detritus ill-sorted, in vague, wide, dendritic and meandering tracts, some interstitially. [Outer cortex material] about equal parts of spicular and non-spicular components, except surface, where spicular fragments dominate, often erect, producing faint hispidation. Inner cortex more collagenous, with better sorted detritus (spicular fragments often dominating) loosely scattered to crowded, extending inward in linings of large exhalant canals. […] Main skeleton of moderately abundant, ill-sorted foreign detritus.’ | *Psammoclema nodosum* | Bass Strait, 10 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Carter, 1885) | Wiedenmayer, 1989 |
| ARMOUR, INCORPORATION: Description. ‘Crumbly, conspicuously sandy. […] Outer convex surfaces exhalant, packed ith rounded lithic and shelly grains, 150-800 μm, mostly around 350-500 μm. […] Sand in inner, concave faces packed only in ridges, elsewhere crowded to clustered. Interstices, up to 1 mm wide, and sand grains covered by pellucid dermis. […] Choanosome packed to crowded, without order, by sand as at the surface. Thin superficial coat of foreign spicules, forming dermal reticulum. Most spicules entire megascleres.’ | *Psammoclema radiatum* | Bass Strait, 52 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | Wiedenmayer, 1989 | Wiedenmayer, 1989 |
| ARMOUR, INCORPORATION: Description. Repent sponge. ‘Main skeleton chiefly of dendritic fibres, packed disorderly by moderately sorted detritus, with spicular and non-spicular fragments in equal proportions. […] Some detritus scattered interstitially. Ectosome armoured to variable degree, chiefly by foreign spicules and their fragments, 65-135 μm thick.’ | *Psammoclema ramosum* | Bass Strait, 25-30 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | Marshall, 1880 | Wiedenmayer, 1989 |
| ARMOUR, INCORPORATION: Description. *Psammoclema* spp. are ‘Chondropsidae without proper spicules, just sand [… They have a] choanosomal skeleton [with] dendritic tracts composed only of sand grains united by spongin, or amorphously packed with sand. […] Skeleton of the periphery [of *P. ramosum*] is a dense palisade of broken spicules and sand grains forming a tight-meshed surface skeleton […] The choanosomal skeleton is an irregularly anastomosing system of sand columns, which may be up to 1000 μm or more in diameter, runninng the length of the branches in the centre and forming an axial core […] Spicules absent.’ | *Psammoclema ramosum* | Bass Strait, 69.5 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | Marshall, 1880 | Van Soest, 2002a |
| INCORPORATION: Description. ‘The skeleton consists of longitudinal bands of large sand-grains, 1 millim. thick, which are connected by transverse arenaceous fibres 0.003 millim. thick, in which the amount of spongin is comparatively great. The sand-grains in the longitudinal bands are for the most part isolated, although some of them appear cemented by a very small quantity of spongin where they come in con-tact with each other.’ | *Psammoclema rugosum* | Sydney Harbour, Australia, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Psammopemma*) |
| ARMOUR, INCORPORATION: Description. On the surfaces are ‘sandy rugae. […] Ectosome armoured with sand grains and spicule debris, not stratified, 700 to 1300 μm thick. Main skeleton of sand grains agglutinated and encased by spongin, in irregular reticulation. [Some fibres] almost filled with debris, others partly, or devoid of short portions. […] Choanosome contains scattered foreign spicules and their fragments, more densely sometimes packed, in canal linings.’ | *Psammoclema stipitatum* | Bass Strait, 52 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | Wiedenmayer, 1989 | Wiedenmayer, 1989 |
| ARMOUR, INCORPORATION: Description. ‘Cortex of smooth inhalant areas compound, stratified, 1000 to 1300 μm thick. Outer layer (quarter to third of total) with parallel and perpendicular ectochones of about 20 μm wide and 100 μm apart, packed with spicule fragments, mostly without orientation, locally erect. Inner layer contains scattered to packed sand grains and few foreign spicules and their fragments. Interstices often correspond to fine stratified crypts, lowest layer discontinuous between cortex and choanosome. Main skeleton similar to that in *Psammoclema nodosum*, but detritus even less sorted and less abundant in fibres, with spongin more evident, weakly and irregularly stratified. Interstitial detritus chiefly loosely strewn spicule fragments.’ | *Psammoclema vansoesti* | Bass Strait, 3-6 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | Wiedenmayer, 1989 | Wiedenmayer, 1989 |
| INCORPORATION: Description. *P. durissima* ‘had a great deal of foreign material.’ | *Pseudoceratina durissima* | Australia, depth not stated | Po: Dem (Verongimorpha): Verongiida: Pseudoceratinidae | Carter, 1885 | De Laubenfels, 1954 (as *Druinella rotunda*) |
| INCORPORATION: Description. Consistency ‘firmly rubbery, moderately to very little compressible, depending on amount of incorporated sand. [Growth form 1 with] thin ectosome, columns and round enclaves of packed, agglutinated sand grains in periphery. [Growth form 2 with] thick ectosome, regularly scattered to crowded detritus. […] In basal part of lamella of both specimens, choanosome almost packed with sand, thus vitually incompressible. In periphery, conules cored by tips of straggling, dendritic columns of packed sand grains, agglutinated here and there by little spongin, becoming indistinct 1-2 cm below the surface. Also large round enclaves of lumped debris. Interstices always contain scattered to crowded ill-sorted debris. […] Ectosome 50-90 μm thick and contains uniformly fine detritus, chiefly spicule fragments [or] with reticulum by slightly raised bands of fine detritus enclosing round or elongated meshes (depressions) bearing single ostia. […] Ectosome 200-400 μm thick […] contains few scattered foreign inclusions of medium dimensions, and much fine detritus, chiefly in outer portion. no relationship between papillae of surface and tips of fibres generally ending just below ectosome, no regular crowding of peripheral sand grains below papillae. Ill-sorted detritus in choanosome, including coarse, angular grains.’ | *Pseudoceratina durissima* | Bass Strait, depth not stated | Po: Dem (Verongimorpha): Verongiida: Pseudoceratinidae | Carter, 1885 | Wiedenmayer, 1989 (partly as *Druinella rotunda*; description on the left as given for *Pseudoceratina durissima*) |
| INCORPORATION: Description. In *P. durissima* fibres are typically clear of inclusions of foreign material, but they ‘may contain sand grains’ and the choanosome ‘may incorporate debris’. | *Pseudoceratina durissima* | type locality: Port Philipp Heads, Victoria, Australia, Bass Strait, depth not stated | Po: Dem (Verongimorpha): Verongiida: Pseudoceratinidae | Carter, 1885 | Bergquist & De C. Cook, 2002d |
| INCORPORATION: Description. ‘The skeleton consists of longitudinal, quite crowded fibres with crossections of very different form and with many inclusions of foreign bodies, especially of fine sands and single spicules.’ Secondary fibres are sparsely cored. | *Pseudoceratina purpurea* | NE coast of Minahasa, Celebes, Celebes Sea, Pacific, depth not stated | Po: Dem (Verongimorpha): Verongiida: Pseudoceratinidae | (Carter, 1880) | Thiele, 1899 (as *Druinella ramosa*) |
| INCORPORATION: Description. The principal fibres of *P. purpurea* ‘usually (but not always) contain a central core, which is filled with foreign debris.’ But the debris can be sparse. | *Pseudoceratina purpurea* | Marshall Islands, Micronesia, Palau, Pacific, subtidal to 5 m | Po: Dem (Verongimorpha): Verongiida: Pseudoceratinidae | (Carter, 1880) | De Laubenfels, 1954 (as *Dendrilla veringiformis, Druinella tyoeis* and *Thorectopsamma xana*) |
| ARMOUR, INCORPORATION: Description. The tissue of this *Pseudoceratina* sp. was densely packed with all sorts of embedded debris, including spicules. Due to pigmentation it was difficult to see whether the material was associated with fibres, but the surface is lightly armoured. | *Pseudoceratina* sp. CERF 1 = cf. WAM sp. SS 2 | Carnarvon Shelf NW Australia, Indian Ocean, 90 m | Po: Dem (Verongimorpha): Verongiida: Pseudoceratinidae | indet. | Schönberg *et al.*, 2012 |
| INCORPORATION, CRUST: Field sampling in Antarctica, analysing sponges for their diatom content. Frustule concentration was very low at the beginning of November in all the species, and increased in January, to reach maximum values early February. Compared to other species diatom abundances and pigment concentrations were significantly higher in *H. dancoi* tissues. Chlorophaeopigments, very low at the beginning of November, increased between early/mid December, before the peak of diatoms. The planktonic *Fragilariopsis curta* was the most common diatom species recorded inside sponges. Diatom concentration inside the sponge tissues was related to the summer phytoplankton bloom. The shift between the pigment and frustule peaks strongly suggests that diatoms are used as a food source by sponges and that their frustules were accumulated inside the sponge body. The lack of frustules at the beginning of summer indicates that diatom frustules were expelled or dissolved during winter. | *Pseudosuberites montiniger* | Terra Nova Bay, Ross Sea, Antarctica, 25-35 m | Po: Dem (Heteroscleromorpha): Suberitida: Suberitidae | (Kirkpatrick, 1907) | Cerrano *et al.*, 2004c (as *Suberites*) |
| ANCHORING: Identification guide. *R. hemisphaerica* ‘is a hemispherical papillate sponge with a characteristic fringe of long spicules. […] More or less hemispherical, with the lower surface circular; the upper surface evenly convex. The circular edge rather sharp, and closely bordered with a ring of numerous radiate long spicules. Of the whole sponge there is only the upper convex surface which projects above the mud. From this upper surface arise a greater or lesser number of obtusely conical, fistular processes, each having at its extremity an osculum. […] On soft clay bottom.’ | *Radiella hemisphaerica* | Norway, Norwegian Sea, 40-360 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | (Sars, 1872) | Van Soest, 2015 |
| ANCHORING: The sponge is disc-shaped, has anchoring rootlets and a ring-shaped frame of hispid spicules that prevent sinking into soft sediments. | *Radiella hemisphaerica* | Barents Sea, depth not stated | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | (Sars, 1872) | P. Cárdenas, pers. comm., see Figure 8B |
| ANCHORING: Description. ‘Resembling [*R. sarsi*] in general shape, but less regular, thicker, and with strongly hispid upper surface. […] Spicules […] often projecting 1 millim beyond the surface.’ | *Radiella irregularis* | W of Valparaiso, Pacific, 3937 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | (Ridley & Dendy, 1886) | Ridley & Dendy, 1886 (as *Trichostemma*) |
| ANCHORING: Description. ‘Discoidal; flattened, especially on tbe upper surface. […] Skeleton: A dense thatch of spicules covers the lower convex surface, radiating outwards and upwards.’ | *Radiella sarsi* | off Azores, Atlantic, 1829 m; Cape York, Australia, Pacific, 2552 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | (Ridley & Dendy, 1886) | Ridley & Dendy, 1886 (as *Trichostemma sarsii*) |
| ANCHORING: Description. The sponge was disc-shaped and has a circular fringe of spicules sticking out. | *Radiella sol* | Cuba, Caribbean, 293-1176 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Schmidt, 1870 | Schmidt, 1870 |
| PSAMMOBIOSIS, ANCHORING: Field survey and description. The sponge lived on the surface of mud (as disc) or was embedded in it (as cone) and was anchored by being attached to a stone when cone-shaped or not attached when disc-shaped, but had a halo of spicules that prevented it from sinking into the mud, keeping the flat upper surface at level with the sediment surface. | *Radiella sol* | Svalbard Basin, Arctic Ocean, 2309-2602 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | Schmidt, 1870 | Barthel & Tendal, 1993 (as *Trichostemma*) |
| INCORPORATION: Description. In this genus some ‘species are also known to incorporate detritus into their skeletons.’ *R. arbuscula* has spongin in ‘longitudonal tracts, without special category of choanosomal megascleres, but with aspicular fibres or echinating spicules secondarily incorporated into fibres.’ | *Raspailia (Clathriodendron) arbuscula* | Port Jackson, New South Wales, Australia, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Axinellida: Raspailiidae (Raspailiinae) | Von Lendenfeld, 1888 | Hooper, 2002b |
| PSAMMOBIOSIS?, CRUST: Identification guide. ‘*Raspailia (Raspailia) virgultosa* (Bowerbank, 1866) consists of greenish grey transparent digitations sticking out of the sediment. […] Surface uneven, hispid. [According to the figure provided, the sponge traps sediments in the surface spicules] In sedimented localities.’ | *Raspailia (Raspailia) virgultosa* | Norway, Shetland, Ireland, Belgium, NW France, Atlantic, sublittoral down to 400 m | Po: Dem (Heteroscleromorpha): Axinellida: Raspailiidae (Raspailiinae) | (Bowerbank, 1866) | Van Soest, 2015 |
| ANCHORING: Description. Some *Raspailia* spp. have ‘rootlike extensions’. | *Raspailia* spp. | not stated, assumed Atlantic | Po: Dem (Heteroscleromorpha): Axinellida: Raspailiidae (Raspailiinae) | NA | Schmidt, 1870 |
| ANCHORING: Observation. These sponges had a twisted anchoring spicule tuft. | *Retifungus* spp., e.g. *Retifungus rudens* | fossil, Devon | Po: Hex (no further information given) | Rietschel, 1970 | Mehl, 1996 |
| CRUST: Description. ‘Two irregularly globose specimens of this sponge are available, both externally resembling [*Rhabdastrella*] *aurora* var. *arenosa* Hentschel from south-west Australia. […] The characteristic feature of these specimens is the coarsely sandy cortex.’ | *Rhabdastrella aurora* | New Zealand, Foveaux Strait, Pacific, 27-68 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Hentschel, 1909) | Bergquist, 1968 |
| BINDING: Description. ‘The specimen encrusts and almost completely envelopes some large fragments of shell.’ | *Rhabderemia indica* | Sri Lanka, Indian Ocean, depth not stated | Po: Dem (Heteroscleromorpha): Biemnida: Rhabderemiidae | Dendy, 1905 | Dendy, 1905 |
| INCORPORATION: Description. ‘Dermis around 175 µm thick, fibrillous, clearer than choanosome, with scarce foreign spicules and debris.’ | *Rhaphoxya cactiformis* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Bubarida: Dictyonellidae | (Carter, 1885) | Wiedenmayer, 1989 |
| ANCHORING: Description. ‘Suberitid sponges include many forms capable of living in sedimented environments, […] through the development of stalked or arborescent forms with root systems for attachment.’ Species of the genus *Rhizaxinella* are ‘pedunculate sponges, with spherical, ovoid or cylindrical body carried on a simple or ramified stalk, normally attached to the substrate by a root system’. In *R. pyifera* the ‘stalk [is] fixed in or to [the] substratum by a fine-threaded root system’. | *Rhizaxinella pyrifera* | Mediterranean, 70-600 m | Po: Dem (Heteroscleromorpha): Suberitida: Suberitidae | (Delle Chiaje, 1828) | Van Soest, 2002g |
| ANCHORING, BINDING?: Description. *R. shikmonae* was sampled from deep, soft sediment habitats and has an elaborate root system, ‘with a 1-3 mm long hollow peduncle (in some cases the stalk may be more than 1 cm long).’ The roots were attached to small rocks. | *Rhizaxinella shikmonae* | N Israel, Mediterranean, 1227-1493 m | Po: Dem (Heteroscleromorpha): Suberitida: Suberitidae | Ilan et al., 2003 | Ilan *et al.*, 2003 |
| INCORPORATION: Description. *R. odorabile* is unarmoured, but has cored primary fibres. | *Rhopaloeides odorabile* | type locality: Great Barrier Reef, Coral Sea, Pacific, Australia, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | Thompson et al., 1987 | De C. Cook & Bergquist, 2002c |
| ANCHORING: Description. *R. antarctica* usually has a large tuft of basal anchoring spicules that can be about 1 cm long. | *Rossella antarctica* | museum specimens, Antarctica and southern parts of all major oceans, Azores, 8-2000 m | Po: Hex (Hexasterophora): Lyssacinosida: Rossellidae (Rossellinae) | Carter, 1872 | Tabachnick 2002b |
| ANCHORING: Study on epibionts. *R. racovitzae* has anchoring basalia that extended from conules spread over the surface. This was found for all studied individuals. *R. antarctica* and *R. nuda* only few individuals had basalia. | 1 – *Rossella antarctica*  2 – *Rossella nuda*  3 – *Rossella racovitzae* | Wedell Sea, Antarctic, 185-705 m | Po: Hex (Hexasterophora): Lyssacinosida: Rossellidae (Rossellinae) | 1 – Carter, 1872  2-3 – Topsent, 1901 | Kunzmann, 1996 |
| ANCHORING: Study on nanomechanical properties of R. racovitzea spicules. They ‘are 10–20 cm long with a circular cross section of diameter 200–600 μm, […] composed of 2–10-μm-thick layers of siliceous material that has no detectable crystallinity [and has] uniform properties regardless of layering. Both the elastic modulus and nanohardness values of the spicules are about half of that of either fused silica or commercial glass optical fibers. The fracture strength and fracture energy […] are several times those of silica rods of similar diameter. These sponge spicules are highly flexible and tough possibly because of their layered structure and hydrated nature of the silica.’ | *Rossella racovitzae* | Antarctica, depth information not available, compiled from abstract | Po: Hex (Hexasterophora): Lyssacinosida: Rossellidae (Rossellinae) | Topsent, 1901 | Sarikaya *et al.*, 2001 |
| ANCHORING: Review. Some Rossellidae have developed anchoring spicules (e.g. *Rossella* and *Lophocalyx*) and are able to live on soft substrate, even if they prefer *Globigerina*, Pteropoda shell or mixed coarse substrates. In the Rossellidae have several spicule tufts on the lower part of their bodies, which may be long enough to join into a single tuft (e.g. *Lophocalyx* spp.). | Rossellidae | deep sea | Po: Hex (Hexasterophora): Lyssacinosida: Rossellidae | NA | Tabachnick, 1991 (*Rossella* partly as *Aulorossella*) |
| BIOEROSION, INCORPORATION: Description. ‘Excavating and filling crevices in and between vacated serpulid worm tubes. […] Abundance of foreign spicules accumulated from the sediment.’ | *Samus anonymus* | Belize, Caribbean, 18-25 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Samidae | Gray, 1867 | Rützler *et al.,* 2014 |
| INCORPORATION: Description. ‘The skeleton consists of very dense longitudonal fascicles of simple main fibres in which an irregular row of scattered sand-grains is observed.’ | *Sarcotragus australis* | Sydney Harbour, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Hircinia*) |
| ARMOUR?, CRUST?, INCORPORATION: Description. *Sarcotragus* spp. are described as unarmoured, and primary fibres being uncored or only with light, intermittent coring. ‘The surface [of *S. fasciculatus*] is often irregularly covered with sand, but this does not form a consistent crust as in *Psammocinia*. [… Choanosomal] primary fibres are always cored.’ | *Sarcotragus fasciculatus* | type location Mediterranean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | (Pallas, 1766) | De C. Cook & Bergquist, 2002d (*S. fasciculatus* as *Ircinia*) |
| ARMOUR: Identification guide. ‘The ectosome is a tough thick epidermis charged with a reticulation of sand grains. The choanosomal skeleton is a system of primary and secondary fibres, which are free from foreign inclusions.’ | *Sarcotragus foetidus* | Galicia, W Africa, Atlantic, Mediterranean, from tide mark down to 400 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | Schmidt, 1862 | Van Soest, 2015 (as *S. muscarum*) |
| ARMOUR?, CRUST?, INCORPORATION: Description. *Sarcotragus* spp. are described as unarmoured, and primary fibres being uncored or only with light, intermittent coring. *S. spinosulus* is unarmoured, and its fibres are uncored. | *Sarcotragus spinosulus* | type location Mediterranean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | Schmidt, 1862 | De C. Cook & Bergquist, 2002d (*S. fasciculatus* as *Ircinia*) |
| ARMOUR: Identification guide. ‘The ectosome is a tough thick epidermis charged with a reticulation of sand grains. The choanosomal skeleton is a system of primary and secondary fibres, which are free from foreign inclusions.’ | *Sarcotragus spinosulus* | Portugal, Galicia, Atlantic, Mediterranean, 1-300 m, especially common between 8 and 25 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | Schmidt, 1862 | Van Soest, 2015 |
| INCORPORATION: Description. No surface armour was detectable in this specimen, but primary fibres were cored with odd sediment, some of it spicule debris. | *Sarcotragus* sp. CERF 2 | Carnarvon Shelf NW Australia, Indian Ocean, 100 m | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | indet. | Schönberg *et al.*, 2012 |
| INCORPORATION: Description. The sponges contained foreign inclusions. | *Sarcotragus* spp. | Antilles, Caribbean and Florida, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Irciniidae | NA | Schmidt, 1870 (as *Filifera*, *Hircinia* and *Polytherses*) |
| INCORPORATION: Description. ‘The tissue consists of primary fibres with weakly developed mark and from time to time some inclusions.’ | *Scalarispongia cincta* | Brazil, Atlantic, 75 m | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Boury-Esnault, 1973) | Boury-Esnault, 1973 (as *Cacospongia*) |
| INCORPORATION: Description. In *Scaralispongia* spp. and *S. scalaris* the surface is unarmoured, the primary fibres are cored with foreign material, the secondary fibres are uncored. | *Scalarispongia scalaris* | type locality: Mediterranean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Schmidt, 1862) | De C. Cook & Bergquist, 2002a |
| INCORPORATION: Identification guide. ‘Primary fibres […] have a core of foreign material […]. Secondary fibres free of inclusions.’ | *Scalarispongia scalaris* | Portugal, Atlantic, Mediterranean, shallow to 250 m | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Schmidt, 1862) | Van Soest, 2015 |
| ANCHORING: Description. Pheronematidae are glass sponges that are anchored on hard or in soft substrate with spicule tufts (basalia). In *S. gigas* the basalia are very short and resemble a ‘dense bush of corresponding spicules which protude about 30 mm from the lower part of the conical body’. | *Schulzeviella gigas* | museum specimens, S Pacific, 850-1153 m | Po: Hex (Amphidiscomorpha): Amphidiscosida: Pheronematidae | (Schulze, 1886) | Tabachnick & Menshenina, 2002b |
| ANCHORING: Review on the Hexactinellida. ‘Most hexactinellids require a hard substratum for settlement (either rocks or shell debris), but two groups, all Amphidiscophora (including *Hyalonema* and *Monorhaphis*) and Euplectellinae (including *Euplectella*) anchor in soft sediments with special basal spicules.’ | *Schulzeviella gigas* | as general statement, no location given, deep sea | Po: Hex (Amphidiscomorpha): Amphidiscosida: Pheronematidae | (Schulze, 1886) | Leys *et al.*, 2007 |
| INCORPORATION: Description. ‘The ectosome is a transparent membrane containing some foreign debris, and, occasionally, some scattered spicules.’ | *Scopalina australiensis* | Heron Island, southern Great Barrier Reef, Coral Sea, Pacific, 17 m | Po: Dem (Heteroscleromorpha): Scopalinida: Scopalinidea | Pulitzer-Finali, 1982 | Pulitzer-Finali, 1982 (as *Dictyonella*) |
| INCORPORATION: Description. In *Semitapongia* spp. and *S. incompta* the surface is unarmoured, the primary fibres are cored, the secondary fibres are uncored. | *Semitaspongia incompta* | type locality: New Zealand, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | De C. Cook & Bergquist, 2000 | De C. Cook & Bergquist, 2002a |
| ANCHORING: Material study. *S. cucumis* is depicted with a thick tuft of anchoring spicules. | *Semperella cucumis* | not stated | Po: Hex (Amphidiscophora): Amphidiscosida: Pheronematidae | Schulze, 1895 | Miserez *et al.*, 2008 |
| ANCHORING: Descriptions. 1872a – ‘The stem cylindrical, thick, ending in a thick cylindrical tuft of elongated glassy fibres, evidently anchoring the sponge in the sand’. 1872b – ‘The elongate transparent spicules by which the sponge is anchored to the bottom are placed in very numerous cylindrical fascicles rather close together in a circle on the edge on the truncated circular base of the stem of the sponge. These […] fascicles may […] extend […] throughout the whole length of the body, terminating in small tufts of naked spicules round the apex…’ The sponge is goblet-shaped and has a stalk. | *Semperella schultzei* | Philippines, Pacific, depth not stated | Po: Hex (Amphidiscophora): Amphidiscosida: Pheronematidae | (Semper, 1868) | Gray, 1872a, 1872b (as *Meyerella claviformis* and *Meyerina claviformis*) |
| ANCHORING: Description. Pheronematidae are glass sponges that are anchored on hard or in soft substrate with spicule tufts (basalia). In the genus *Semperella* basalia are represented by a compact short, broad tuft. In *S. schultzei* the tuft origin is as wide as the lower sponge body, but widens into a conical shape. | *Semperella schultzei* | museum specimens, Indo-West Pacific, 90-4732 m | Po: Hex (Amphidiscophora): Amphidiscosida: Pheronematidae | (Semper, 1868) | Tabachnick & Menshenina, 2002b |
| ANCHORING: Review on the Hexactinellida. ‘Most hexactinellids require a hard substratum for settlement (either rocks or shell debris), but two groups, all Amphidiscophora (including *Hyalonema* and *Monorhaphis*) and Euplectellinae (including *Euplectella*) anchor in soft sediments with special basal spicules.’ All *Semperella* spp. anchor in soft substrate, and there are 10 species (Van Soest et al. 2014). | *Semperella* spp. | as general statement, no location given, deep sea | Po: Hex (Amphidiscomorpha): Amphidiscosida: Pheronematidae | NA | Leys *et al.*, 2007 |
| ANCHORING: Description. Pheronematidae are glass sponges that are anchored on hard or in soft substrate with spicule tufts (basalia). In the genus *Sericolophus* basalia are represented by a compact long tuft. In *S. reflexus* the tuft is 4-20 cm long and 4-10 mm in diameter. | *Sericolophus reflexus* | museum specimens, central and E Pacific and Timor Sea, 590-4732 m | Po: Hex (Amphidiscophora): Amphidiscosida: Pheronematidae | (Semper, 1868) | Tabachnick & Menshenina, 2002b |
| ANCHORING: Material study. The anchoring spicules of *Sericolophus* sp. have a solid core surrounded by numerous organosilicon layers, which makes hexactinellid anchoring spicules flexible and resistant against breakage. | *Sericolophus* sp. | not stated | Po: Hex (Amphidiscophora): Amphidiscosida: Pheronematidae | Ijima, 1901 | Kul’chin *et al.*, 2011 |
| ANCHORING: Review on the Hexactinellida. ‘Most hexactinellids require a hard substratum for settlement (either rocks or shell debris), but two groups, all Amphidiscophora (including *Hyalonema* and *Monorhaphis*) and Euplectellinae (including *Euplectella*) anchor in soft sediments with special basal spicules.’ All *Sericolophus* spp. anchor in soft substrate, and there are 5 species (Van Soest et al. 2014). | *Sericolophus* spp. | as general statement, no location given, deep sea | Po: Hex (Amphidiscomorpha): Amphidiscosida: Pheronematidae | NA | Leys *et al.*, 2007 |
| PSAMMOBIOSIS, ANCHORING: Field survey. *S. mucosum* lives in calcium carbonate blocks buried in sediments, a habit that protects it against desiccation at low tide. Its erect fistules protect it against sediment-inhalation and smothering, and it occurs in different sediment types (sand to mud). The fistules represent both inhalant and exhalant structures. | *Siphonodictyon mucosum* | central Great Barrier Reef, Coral Sea, Pacific, 0-4 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | Bergquist, 1965 | Schönberg, 2000, 2001 (as *Aka*) |
| PSAMMOBIOSIS: Field survey with sampling for SEM and sediment analyses and corrosion cast study. Endopsammic life habit selects against competition and predation, it reduces irradiation, the risk of desiccation or being damaged by storms. Prevention of suffocation or inhaling sediments was assured by having in- and exhalants extended above the sediment surface. Sediment incorporation was used by the sponges for anchoring and preventing dislodgement, it increased their weight and created irregularities on their surfaces. | *Siphonodictyon mucosum* | Bunaken, Sulawesi, Celebes Sea, Indonesia, W Pacific, intertidal to 30 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | Bergquist, 1965 | Cerrano *et al.*, 2002, 2007a (as *Aka*) |
| PSAMMOBIOSIS, ANCHORING: Description. This species ‘was noted protruding from sand, attached to a stone.’ | *Siphonodictyon siphonum* | Bahamas, Atlantic, 0-1 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | Pulitzer-Finali, 1986 | Pulitzer-Finali, 1986 |
| PSAMMIOBIOSIS, ANCHORING: Description. The main sponge body is in a buried piece of calcium carbonate, which anchors it. | *Siphonodictyon viridescens* | Barbados, Caribbean, 180 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | (Schmidt, 1880) | Van Soest *et al*., 2014 |
| CRUST, INCORPORATION: Description. This *Siphonodictyon* sp. had coarse sediments irregularly distributed in the tissue, obviously not only resulting from bioeroding activities. Fistules had an external crust of fine debris, becoming thicker and coarser towards bottom of fistules. | *Siphonodictyon* sp. CERF 4 | Carnarvon Shelf NW Australia, Indian Ocean, 40-57 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | indet. | Schönberg *et al.*, 2012 |
| INCORPORATION: Description. This *Siphonodictyon* sp. had very coarse sediments, well-sorted distributed throughout the tissue, obviously not only resulting from bioeroding activities. | *Siphonodictyon* sp. CERF 8 = cf. WAM sp. SS 6 | Carnarvon Shelf NW Australia, Indian Ocean, 41-42 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | indet. | Schönberg *et al.*, 2012 |
| PRODUCING SEDIMENTS through bioerosion: All *Siphonodictyon* spp. are presently considered to be active bioeroders producing sponge chips. The sponge chips are not always entirely expelled, but some can be retained in the tissues of some species. | *Siphonodictyon* spp. | NA | Po: Dem (Heteroscleromorpha): Haplosclerida: Phloeodictyidae | Bergquist, 1965 | Desqueyroux-Faúndez & Valentine, 2002 (as *Aka*); Schönberg, pers. obs. |
| INCORPORATION: Description. In *Smenospongia* spp. and in *S. aurea* the surface is unarmoured and the ascending primary fibres are cored, secondary fibres are uncored. | *Smenospongia aurea* | type locality: Caribbean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Hyatt, 1875) | De C Cook & Bergquist, 2002a |
| INCORPORATION: Description. The ‘transverse fibres […] are loaded with foreign material.’ | *Smenospongia dysodes* | Palau, Philippine Sea, Pacific, 1 m | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (De Laubenfels, 1954) | De Laubenfels, 1954 (as *Polyfibrospongia*) |
| Morphology suitable for PSAMMOBIOSIS?, CRUST: Identification guide. ‘The hispidity [of the sponge] causes quantities of mud and other debris to collect at the surface. […] Massive or occasionally globular, provided with several coarse papillae.’ | *Sphaerotylus capitatus* | Arctic, North Polar Sea, Norway, N Atlantic, Southern Ocean, 50-440 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | (Vosmaer, 1885) | Van Soest, 2015 (as *S. schoenus)* |
| PSAMMOBIOSIS, AGGLUTINATION: Description. The sponge has a basally massive body from which fistules arise. A specimen is pictured that has a pew coarse particles adhering to the lower part of its body. | *Spheciospongia inconstans* | NE coast of Minahasa, Celebes, Celebes Sea, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | (Dendy, 1887) | Thiele, 1899 |
| PSAMMOBIOSIS, INCORPORATION, ANCHORING, BINDING, AGGLUTINATION: Field collection and taxonomic studies. Most of the sponge’s body was buried in lagoonal sediments (calcareous sands), but some specimens occurred endolithic in rock. They incorporated and agglutinated larger sediment particles for anchoring (see Figures 1and 4 in Ise et al. 2004). Incorporated sediments were etched and bioeroded. | *Spheciospongia inconstans* | Ryukyu Islands SW Japan, Pacific, intertidal to 5 m | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | (Dendy, 1887) | Ise *et al.*, 2004 |
| PSAMMOBIOSIS?: Description. The sponge has a habit suitable for psammobiosis (Hallmann’s Fig. 3 on Pl. XXI). | *Spheciospongia montiformis* | Double Island Point, Queensland, Australia, Pacific, 60 m | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | (Hallmann, 1912) | Hallmann, 1912 (as *Spirastrella*) |
| INCORPORATION: Description. ‘Foreign debris widely scattered throughout choanosome and cortex in two flabellate specimens. In massive specimen choanosome often packed with sand, while cortex contains very few grains.’ | *Spheciospongia papillosa* | Bass Strait, 5 m | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | (Ridley & Dendy, 1886) | Wiedenmayer, 1989 (as *Spirastrella*) |
| PSAMMOBIOSIS, ANCHORING: Description. The sponge ‘appeared as mere hollow cylinders protruding out of the mud, rising a distance of 2 or 3 cm above the surface of the mud, and having a diameter of 2 or 3 cm. […] It was obvious that there might be considerable quantities of the sponge buried in the mud’. The lower end of the fistules ‘is adorned with conspicuous tufts, which look like rooting tufts’. | *Spheciospongia peleia* | Palau, Pacific, 30 cm | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | (De Laubenfels, 1954) | De Laubenfels, 1954 (as *Ridleia*) |
| INCORPORATION, ANCHORING: Description. ‘Very firm and hard, with much foreign matter at base.’ | *Spheciospongia solida* | Philippines, Pacific, 33 m | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | (Ridley & Dendy, 1886) | Ridley & Dendy, 1886 (as *Spirastrella*) |
| PSAMMOBIOSIS, INCORPORATION, ANCHORING, BINDING: Field survey with sampling for SEM and sediment analyses and corrosion cast study. Endopsammic life habit selects against competition and predation, it reduces irradiation, the risk of desiccation or being damaged by storms. Prevention of suffocation or inhaling sediments was assured by having in- and exhalants extended above the sediment surface. Sponges often only have pigments in parts that extend above the sediments. Sediment incorporation was used by the sponges for anchoring and preventing dislodgement, it increased their weight and created irregularities on their surfaces. By their actions, they consolidated sediments. Sediment uptake depended on sponge growth forms, which varied with thickness of the sediment layer over rock. *S. solida* displayed no selectivity. | *Spheciospongia solida* | Bunaken, Sulawesi, Celebes Sea, Indonesia, W Pacific, intertidal to 30 m | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | (Ridley & Dendy, 1886) | Cerrano *et al.*, 2002, 2007a |
| BINDING, ANCHORING?, PSAMMOBIOSIS?: Description. ‘The specimen is attached below to a mass of calcareous debris by a broad base.’ The morphology may be suitable for psammobiosis. | *Spheciospongia tentorioides* | Sri Lanka, Indian Ocean, depth not stated | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | (Dendy, 1905) | Dendy, 1905 (as *Spirastrella*) |
| PSAMMOBIOSIS: Faunistic inventory. ‘Erect masses, tending to have a narrow base and a broader lobate-convoluted upper surface […]. Individual lobes grouped together in the sandy habitat to form local concentrations which issue from a broader buried mass.’ | *Spheciospongia tentorioides* | Oman, Indian Ocean, 5.5-38 m | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | (Dendy, 1905) | Van Soest & Beglinger, 2008 |
| PSAMMOBIOSIS?, INCORPORATION, BINDING?: Description. The massive body (of var. *trincomaliensis*) with finger-like extensions agrees with a morphology suitable for psammobiosis. The sponge has ‘little or no imbedded foreign matter’. Another specimen (var. *tubulodigitata*) ‘consists of hollow, finger-shaped processes or ‘fistulae’ rising from a sandy base.’ Another specimen (var. *fungoides*) grows ‘amongst a quantity of nullipore and other calcareous debris […] the specimen contains a great deal of imbedded foreign matter.’ Another specimen (var. *gallensis*) ‘contains a good deal of coarse sand imbedded in it.’ | *Spheciospongia vagabunda* and var. *trincomaliensis* | Sri Lanka, Indian Ocean, depth not stated or ‘deep water’ | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | (Ridley, 1884) | Dendy, 1905 (as *Spirastrella*, as *Spirastrella vagabunda* var. *tubulodigitata*, var. *fungoides* and var. *gallensis*) |
| PSAMMOBIOSIS, ANCHORING: Description. ‘This species probably has always a basal ramifying mass, which is often buried under sand or muddy sand. From this, conspicuous and numerous cylindrical or conical projections arise. These are often 2 or 3 cm in diameter and may be as much as 12 cm high.’ | *Spheciospongia vagabunda* | Marshall Islands, Micronesia and Palau, Pacific, intertidal to 5 m, one specimen from 35 m | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | (Ridley, 1884) | De Laubenfels, 1954 (as *Anthosigmella*) |
| ANCHORING, AGGLUTINATION, BINDING: Field study. The retrieved specimens all had coarser material such as shells and stones adhering to their bases, or had attached themselves to various stones, binding them together. | *Spheciospongia* cf. *vagabunda* | Montgomery Reef, Kimberley, NW Australia, 20.9 m | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | (De Lamarck, 1815) | Schönberg, unpubl. data |
| CRUST?: Description. One sponge was described as ‘heavily sdimented’. | *Spheciospongia vesparium* | Dominican Republic, Puerto Rico, Jamaica, Caribbean, Bahamas, Atlantic, 1-30 m | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | (De Lamarck, 1815) | Pulitzer-Finali, 1986 |
| PSAMMOBIOSIS: Field study conducted with fluorescent dye, and laboratory analyses with light microscopy and TEM. *S. vesparium* can be endolithic and endopsammic, was anchored in the sediment and had apical exhalants on chimneys. By the endopsammic life style the sponges contributed to venting and enrichment of the nearby sediments. | *Spheciospongia vesparium* | Belize, Caribbean, 4-10 m | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | (De Lamarck, 1815) | Rützler, 1997 |
| PSAMMOBIOSIS, ANCHORING, AGGLUTINATION, INCORPORATION: Field onservations from an area with fine sediments. Several clionaid species were observed to live half buried in the sediments. They usually had vertical, fistular body parts that were elevated above the sediments. Anchoring can be facilitated by partly inhabiting a rock, by agglutinating coarse material to the body and/or by embedding coarse sediment into the body. | *Spheciospongia* spp. | Onslow, NW Australia, Indian Ocean, 10-15 m | Po: Dem (Heteroscleromorpha): Clionaida: Clionaidae | NA | Schönberg *et al.*, unpubl. data |
| Morphology suitable for PSAMMOBIOSIS?, means for ANCHORING?: Identification guide. ‘Cushions of several cm in diameter and thickness, with one or several papillae, which may bear oscules. Surface optically smooth on the upper parts, but may be hispid on the sides, due to long projecting spicules.’ But ‘on gravel bottom’. | *Spinularia spinularia* | Shetlands, Ireland, Sweden, Norway, Azores, Atlantic, 80-4000 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | (Bowerbank, 1866) | Van Soest, 2015 |
| PRODUCING SEDIMENTS through bioerosion: ‘Encrusting sponges with limestone-excavating capability in early stages but without adult endolithic habit.’ | Spirastrellidae | NA | Po: Dem (Heteroscleromorpha): Clionaida: Spirastrellidae | Ridley & Dendy, 1886 | Rützler, 2002b |
| ARMOUR, INCORPORATION: Identification guide. ‘Ectosome strengthened by a light reticulation of sand grains. Primary fibres cored by sand grains, […] secondary fibres free from inclusions.’ | *Spongia (Spongia) agaricina* | Portugal, Atlantic, Mediterranean, in caves at 5-15 m, on rock faces in deeper water, down to 300 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | Pallas, 1766 | Van Soest, 2015 |
| INCORPORATION: Description. Fibres do not contain any inclusions. | *Spongia (Spongia) bailyi* | W Australia, Indian Ocean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 (as *Euspongia bailyi*) |
| INCORPORATION, ANCHORING?: Description. ‘The base is somewhat constricted and charged with pebbles and other foreign matter. […] The primary fibres […are] composed chiefly of broken sponge spicules, with comparatively little sponging cementing them together. […] Secondary fibres […] only rarely contain foreign matter. […] Owing to the quantity of broken spicules which they contain, the primary fibres are distinctly visible to the naked eye in the macerated sponge.’ | *Spongia (Spongia) ceylonensis* | Sri Lanka, Indian Ocean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (Dendy, 1905) | Dendy, 1905 (as *Euspongia officinalis* var. *ceylonensis*) |
| INCORPORATION, ARMOUR: Description. ‘The pinacoderm is supported in places by a fine, tangential network, with the fibres cored with foreign spicules. […] Primary fibres are simple, may branch near the surface, and are cored exclusively with foreign sponge spicules. The uncored secondary fibre and pseudotertiary fibre reticulum dominate the skeleton.’ | *Spongia (Heterofibria) corrugata* | Chatham Rise, E of New Zealand, Pacific, 50-100 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | De C. Cook & Bergquist, 2001 | De C. Cook & Bergquist, 2001 |
| INCORPORATION: Description. 2001 – ‘There is a scattering of sand throughout the mesohyl, with a slight dermal concentration of fine sand and spicule debris. […] Primary fibres are sparse, and are irregularly cored with foreign material. Secondary and pseudo-tertiary fibres are uncored and dominate the skeleton.’ 2002c – The surface is unarmoured and the primary ‘fibres are irregularly cored with foreign material. Secondary and pseudo-tertiary fibres are uncored and dominate the skeleton.’ | *Spongia (Heterofibria) cristata* | Maori island and Omaha Bay, New Zealand, Pacific, 15-20 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | De C. Cook & Bergquist, 2001 | De C. Cook & Bergquist, 2001, 2002c |
| INCORPORATION, some ‘ARMOUR’: Description. ‘Fine grit is scattered though the mesohyl, and as a diffuse layer through the pinacoderm. This layer is heavier in the paratype (SDCC/NZ137) but does not form a discrete armoured crust, as seen in *Coscinoderma* or in some members of the Thorectidae. […] This species has a reticulate skeleton of relatively sparse, cored primary fibres.’ | *Spongia (Heterofibria) gorgonocephalus* | Bay of Islands, Poor Knights Islands, New Zealand, Pacific, 90-152 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | De C. Cook & Bergquist, 2001 | De C. Cook & Bergquist, 2001 |
| INCORPORATION: Description. 2001 – ‘The surface of the sponge has a dusting of sand and debris. […] Primary fibres are cored, though coring is intermittent, and coring material may be much larger than the fibre diameter, producing a beaded necklace effect.’ 2002c – The surface is unarmoured and the primary fibres are cored, ‘though coring is intermittent, and coring material may be much larger than the fibre diameter, resembling a beaded necklace.’ | *Spongia (Australospongia) gracilis* | Clatham Rise, E of New Zealand, Pacific, 80 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | De C. Cook & Bergquist, 2001 | De C. Cook & Bergquist, 2001, 2002c |
| INCORPORATION: Description. ‘The main fibres contain abundant foreign bodies in their axis; these are chiefly siliceous spicules of other sponges, forming 90 per cent. Of all the foreign bodies, the other 10 per cent. Are Foraminifera-shells, &c., but there is hardly any sand. As the foreign bodies are only found in the axis, the surface of the main fibres is smooth. […].’ | *Spongia (Spongia) hispida* | S and E Australia, Chatham Islands, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | De Lamarck, 1814 | Von Lendenfeld, 1888 (as *Euspongia irregularis* var. *silicata*) |
| ARMOUR, INCORPORATION: Description. The primary fibres are ‘filled with foreign detritis, chiefly spicule fragments, many almost compete, generally well aligned with tips protruding here and there, hence knotty contour of some fibres. Sand grains or other debris rare. Encasing pale yellow spongin barely visible. Debris (spicules, lithic fragments, foraminifera) also interstitially, loosely scattered or clustered.’ Secondaries never have inclusions. ‘Dermis in both specimens armoured by spicule fragments.’ | *Spongia (Spongia) hispida* | Bass Strait, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | De Lamarck, 1814 | Wiedenmayer, 1989 |
| INCORPORATION: Description. ‘The main fibres are cored with foreign bodies. […] The connecting-fibres are always free from foreign bodies.’ | *Spongia (Spongia) irregularis* | sample location or depth not stated | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (Von Lendenfeld, 1989) | Von Lendenfeld, 1888 (as *Euspongia irregularis*) |
| INCORPORATION, some ‘ARMOUR’: Description. ‘There is a light dusting of fine spicule fragments and fine sand on the surface. […] Primary fibres are formed by secondary fibres converging and coalescing into a single fibre, sometimes becoming slightly fascicular; they are abundant, axially cored with foreign debris and sponge spicules, and can be seen to radiate up to the sponge surface. […] Very fine sand is scattered throughout the mesohyl.’ | *Spongia (Spongia)* cf. *irregularis* | Northland, New Zealand, Pacific, 15-20 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (Von Lendenfeld, 1989) | De C. Cook & Bergquist, 2001 (as *Spongia (Heterofibria)*) |
| INCORPORATION: Description. ‘The main fibres […] are completely filled with foreign bodies, chiefly sand-grains.’ | *Spongia (Spongia) lignea* | Australia, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | Hyatt, 1877 | Von Lendenfeld, 1888 (as *Euspongia officinalis* var. *dura*) |
| INCORPORATION, some ‘ARMOUR’: Description. ‘There is a scattering of fine sand throughout the mesohyl and on the surface, though the sponge is not armoured. […] Primary fibres are sparse, and are wholly or partially cored with foreign material, predominantly foreign spicule debris. Most cored primary fibres are reasonably compact, but some branch and produce secondary webbing in between the primary fibres. In the paratype SDCC/NZ070, some primary fibres formed massive fascicles charged with foreign spicule debris, or accumulate large clumps of foreign debris within the primary fibre.’ | *Spongia (Heterofibria) manipulatus* | Hauraki Gulf, New Zealand, Pacific, 12-15 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | De C. Cook & Bergquist, 2001 | De C. Cook & Bergquist, 2001 |
| INCORPORATION, habit suitable for PSAMMOBIOSIS?: Description. ‘This species has a solid base, from which arise distinct conical turrets. […] Primary fibres are axially to fully cored with foreign debris and may branch.’ | *Spongia (Heterofibria) mokohinau* | Moko Hinau, Poor Knights Island, New Zealand, Pacific, 15 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | De C. Cook & Bergquist, 2001 | De C. Cook & Bergquist, 2001 |
| Not incorporating sediments: Identification guide. ‘At the surface there is a fine-meshed tangential reticulation of fibres with smaller meshes than those of the choanosome. Primary fibres of the choanosomal skeleton 20-90 µm, which are devoid of any inclusions.’ | *Spongia (Spongia) nitens* | Portugal, Atlantic, Mediterranean, in caves and under overhangs down to at least 25 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (Schmidt, 1862) | Van Soest, 2015 |
| INCORPORATION, BINDING: Description. ‘Fibre for the most part tough, translucent, resilient, and yellowish in colour, terminating on the surface in pointed knots or tags, cored with a little sand, from which the psammonematous filament, otherwise difficulty distinguishable, may be traced internally. […] Growing on hard objects.’ | *Spongia (Spongia) officinalis* | Venezuela, Caribbean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | Linnaeus, 1759 | Carter, 1882 |
| INCORPORATION: Description. ‘Although foreign bodies are generally pretty abundant in the skin, no special cortex is produced. […] The main fibres are knotty or pretty smooth, and always contain foreign bodies, these are generally pretty scarce, scattered, and confined to the axis. Secondary fibres […] are always free from foreign bodies.’ | *Spongia (Spongia) officinalis* | sample area not stated, only for ‘var. *mollissima*’: Mediterranean, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | Linnaeus, 1759 | Von Lendenfeld, 1888 (as *Euspongia officinalis* and *Euspongia officinalis* var. *mollissima*) |
| INCORPORATION: Description. The ascending fibres are ‘crowded with small foreign includions, such as grains of sand and fragments of foreign spicules.’ | *Spongia (Spongia) officinalis* | Micronesia and Marshall Islands, central Pacific, intertidal to shallow depths | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | Linnaeus, 1759 | De Laubenfels, 1954 |
| INCORPORATION: Identification guide. ‘A system of primary fibres cored by foreign material and uncored secondary fibres. The primary fibres are relatively rare, not differing from the secondary fibres in size, only recognizable by the core of spicule debris and small sand grains.’ | *Spongia (Spongia) officinalis* | Galicia, Atlantic, Mediterranean, sublittoral | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | Linnaeus, 1759 | Van Soest, 2015 |
| INCORPORATION: Description. ‘Main fibres not clearly distinguishable, occasionally with inclusions.’ | *Spongia (Spongia) pertusa* | Puerto Rico, Caribbean, 0.5-1.5 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | Hyatt, 1877 | Pulitzer-Finali, 1986 |
| INCORPORATION: Description. ‘The skeleton consists of smooth main fibres […] which are cored with abundant small sand-grains (0.009 millim.).’ CS: !! According to the international scale (ISO 14688-1) this is no longer sand, but mud (silt). Either this is a printing error having one zero too many (more likely?) or an extremely rare occurrence of a sponge incorporating very fine sediments. | *Spongia reticulata* | E Australia, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 (as *Hippospongia reticulata*) |
| INCORPORATION: Description. ‘The surface is more or less concealed by coarse, calcareous debris, such as the shells of large Foraminifera, &c. […] Here and there primary fibres can be recognised running into the surface conuli, and these may contain a rather slender core of broken sponge-spicules.’ | *Spongia (Spongia) tenuiramosa* | Sri Lanka, Indian Ocean, shallow water | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (Dendy, 1905) | Dendy, 1905 (as *Euspongia*) |
| Morphology suitable for PSAMMOBIOSIS: Description. ‘Encrusting sponge that raises tubular extensions that can reach 4-5 cm in height.’ | *Spongia (Spongia) virgultosa* | Brazil, Atlantic, 27-51 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (Schmidt, 1868) | Boury-Esnault, 1973 |
| Morphology suitable for PSAMMOBIOSIS (but covered in other biota, not in sediment), INCORPORATION: Identification guide. ‘*Spongia virgultosa* (Schmidt, 1868) is a massive sponge, that may not be easily recognized as such because it is always overgrown by other organisms, including other sponges. Because of the ‘buried’ way of life it develops fistule-like outgrowths. […] Primary fibres have inclusions, mostly spicular debris […]. Secondary fibres are devoid of inclusion.’ | *Spongia (Spongia) virgultosa* | Portugal, Atlantic, Mediterranean, 1-150 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | (Schmidt, 1868) | Van Soest, 2015 |
| INCORPORATION: Description. The ascending principal fibres are ‘crowded with foreign debris’. | *Spongia (Spongia) zimocca* | Micronesia and Palau, Pacific, intertidal to 5 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | Linnaeus, 1759 | De Laubenfels, 1954 |
| ARMOUR?, INCORPORATION: Description. Spicule fragments of oxeas were occasionally embedded in the primary fibres in loose distribution. The surface was largely unarmoured or contained a minute amount of spicule debris. | *Spongia* sp. CERF 1 | Carnarvon Shelf NW Australia, Indian Ocean, 35-37 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | indet. | Schönberg *et al.*, 2012 |
| ARMOUR, INCORPORATION: Description. Very light use of embedded sediments: The surface armour was only one grain thick, and there was very little sediment in the tissue, associated to reduced primary fibres and to walls of body cavities. Some sediment occurred free in the tissue. | *Spongia* sp. CERF 4 | Carnarvon Shelf NW Australia, Indian Ocean, 43-44 m | Po: Dem (Keratosa): Dictyoceratida: Spongiidae | indet. | Schönberg *et al.*, 2012 |
| BINDING: Description. One specimen ‘has grown partially around several loose calcareous nodules.’ The sponge has mound-like or digitiform processes that may be beneficial in habitats with high sedimentation rates. | *Spongosorites topsenti* | Sri Lanka, Indian Ocean, 46 m | Po: Dem (Heteroscleromorpha): Suberitida: Halichondriidae | Dendy, 1905 | Dendy, 1905 |
| BINDING, AGGLUTINATION, INCORPORATION: Description. ‘The single specimen […] consists of a more or less spherical body from which radiate irregular finger-like processes of varying shape, long or short, cylindrical or flattened, and sometimes expanded at the free end. Between these projections the surface of the sponge is for the most part concealed by a great quantity of calcareous debris, which firmly adheres to the sponge, including melobesian nodules of considerable size, worm-tubes, Foraminifera, &c., the whole forming an irregular mass in the midst of which the body of the sponge is scarcely recognisable. Calcareous debris may also be found in the interior of the sponge, even within the choanosome.’ The sponge has thus an ‘enormous quantity of foreign matter adhering to the surface.’ | *Stelletta agglutinans* | Sri Lanka, Indian Ocean, depth not stated | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Dendy, 1905) | Dendy, 1905 (as *Cryptotethya*) |
| AGGLUTINATION, BINDING: Description. ‘Spherical sponge, measuring 2-4 cm in diameter on whose surface adhere numerous foreign bodies.’ The sponge is figured. | *Stelletta anancora* | coasts of Brazil, Atlantic, 34-50 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Sollas, 1886) | Boury-Esnault, 1973 (as *Myriastra*) |
| ARMOUR: Description. The species differs from others by ‘the great reduction of the triaenes and their replacement by a cortex filled with foreign matter’. | *Stelletta arenaria* | New Zealand, Pacific, ‘on low tidal rocks’ | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Bergquist, 1968 | Bergquist, 1968 |
| AGGLUTINATION, BINDING: Description. The surface of this species is ‘rough, with fragments of shell and bryozoan adhering in several places.’ | *Stelletta communis* | New Zealand, Pacific, 55-110 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Sollas, 1886) | Bergquist, 1968 |
| AGGLUTINATION, BINDING: Description. The sponge agglutinates large debris, mostly coralline algae, and is figured with large lumps adhering to its surface. | *Stelletta crassispicula* | Cape Verde Islands, Atlantic, 71 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Sollas, 1886) | Von Lendenfeld, 1907 (as *S. crassiclada*) |
| AGGLUTINATION, BINDING: Description. The sponge is remarkable by its habit to attach diverse debris to most parts of its surface (depicted by Topsent), including mollusc shells, bryozoans and corallines. Attachment is with spongin and is thought to be for surface reinforcement and carmouflage. Inner parts of the sponge generally do not have inclusions. | *Stelletta crassispicula* | Azores, Atlantic, 91 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Sollas, 1886) | Topsent, 1928 |
| ANCHORING, BINDING: ‘The sponge is irregularly massive, attached to a mass of coralline algae.’ | *Stelletta fibrosa* | Puert Rico, Caribbean, 0.51 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Schmidt, 1870) | Pulitzer-Finali, 1986 |
| ARMOUR, ANCHORING, INCORPORATION, AGGLUTINATION?, BINDING: ‘A few short root-like structures (ca. 1 cm) are present at the base of the sponge […] The lectotype and ZMAPOR 12608 both had abundant sand grains incorporated in the ectocortex, while ZMAPOR 04585a had few and our specimen none.’ The lectotype is also figured with coarse grit adhering to its surface. | *Stelletta fibrosa* | Panama, Caribbean, 15 m, additional collection material from Florida, Curaçao and Colombia | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Schmidt, 1870) | Cárdenas *et al.*, 2009 |
| AGGLUTINATION: Guide. *S. gigas* is pictured with a dense crust of coarse fragments adhering to its surface. | *Stelletta gigas* | Rio Grande do Norte, E Brazil, W Atlantic, 36-37 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Sollas, 1886) | Muricy *et al.,* 2008 |
| CRUST, AGGLUTINATION: Description. The sponge has a hispid surface is covered in algae and/or sediment, which can be very coarse or even pebble-size and partially embedded. Severeal specimens are pictured. | *Stelletta gigas* | St. Peter and St. Paul Archipelago, W Atlantic, 3-40 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Sollas, 1886) | De Moraes, 2011 |
| CRUST: Identification guide. *S. grubii* ‘is an inconspicous whitish mass overgrown with epibionts (other sponges, hydroids, etc.). The sponge surface is rough. […] Usually found on dark vertical or overhung rock faces, caves, etc., maybe in presence of some silt. Seems to avoid the light.’ The specimen pictured is caked in sediment and soft detritus. | *Stelletta grubii* | Great Britain, Ireland, France, Spain, Atlantic Mediterranean, littoral to 135 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Schmidt, 1862 | Van Soest, 2015 |
| PSAMMOBIOSIS?, INCORPORATION?: Description. ‘Sponge quite irregular in shape; sometimes vallate; sometimes with occasional digitiform or mammiform projections; often very much mixed up with coarse calcareous debris.’ | *Stelletta hermani* | Sri Lanka, Indian Ocean, to 183 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Dendy, 1905 | Dendy, 1905 |
| CRUST, AGGLUTINATION: Identification guide. ‘*Stelletta hispida* (Buccich, 1886) is a massive, occasionally cup-shaped, coarsely hispid sponge. It is basically white but often covered with sand and epifauna [… with the surface] often obscured by foreign objects.’ | *Stelletta hispida* | Galicia, Atlantic, Mediterranean, sublittoral | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Buccich, 1886) | Van Soest, 2015 |
| PSAMMOBIOSIS?: Study on museum material to investigate oscular arrangements in sponges. The habit and morphology of *S. individua* are like in *D. dissimilis* and thus suggest similar functions, i.e. that *S. individua* lives endospammic. | *Stelletta individua* | Samples from the British Museum | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Schmidt, 1870) | Fry & Fry, 1979 (as *Disyringa*) |
| CRUST: Description. ‘Surface rough, being more or less covered with grains of sand agglutinated to the dermis.’ | *Stelletta mamilliformis* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Carter, 1886 | Carter, 1886 |
| CRUST: Description. Every specimen has a sediment crust on one side (the upper surface?). | *Stelletta megaspina* | Three Kings Island, New Zealand, Pacific, 169 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
| ANCHORING?: A deep sea sample of *S. normani* is pictured with a massive hispid spicule coat. The surface looks clean, however. | *Stelletta normani* | shelf edge W of Ireland, E Atlantic, 1350 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Sollas, 1880 | Kennedy *et al.*, 2014 |
| CRUST: Identification guide. ‘Surface hispid due to projecting spicules, and these also ‘collect’ encrusting organisms (e.g. foraminiferans) and sediment.’ | *Stelletta normani* | Arctic, North Polar Sea, Sweden, Norway, Azores, N Atlantic, 85-200 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Sollas, 1880 | Van Soest, 2015 |
| ANCHORING, BINDING: Description. ‘The surface is heavily sedimented and incorporates various debris.’ | *Stelletta pudica* | Bahamas, Atlantic, 0.5-1 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Wiedenmayer, 1977) | Pulitzer-Finali, 1986 |
| ANCHORING, BINDING, AGGLUTINATION: Description. ‘The sponge has a strong tendency to attach itself to foreign objects by means of short, root-like processes. […] with a fairly smooth but rather uneven and finely granular surface, to which a number of foreign bodies, such as shell-fragments, Foraminifera, &c., are attached.’ | *Stelletta purpurea* | Sri Lanka, Indian Ocean, shallow to 183 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Ridley, 1884 | Dendy, 1905 (as *Pilochrota haeckeli* and *Pilochrota hornelli*) |
| AGGLUTINATION, BINDING: Faunistic inventory. Specimens are pictured with coarse fragments adhering to their surfaces. It is not obvious whether these are upper or lower surfaces. | *Stelletta purpurea* | Oman, Indian Ocean, 13.5 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Ridley, 1884 | Van Soest & Beglinger, 2008 |
| ANCHORING: Description. ‘In the larger specimens a dense mass of long, hair-like spicules projects from more or less of the lower surface.’ | *Stelletta tethyopsis* | Sri Lanka, Indian Ocean, 183 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Dendy, 1905) | Dendy, 1905 (as *Myriastra*) |
| CRUST?, ARMOUR, INCORPORATION: Description. ‘Surface conspicuously sandy. […] Cortex 1-2 mm thick, packed with sand. Small enclaves of sand in the choanosome. [*S. tuberculata*] falls within a small group of species containing much foreign detritus.’ The invalid species name refers to this. | *Stelletta tuberculata* | Bass Strait, 3-6 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Carter, 1886) | Wiedenmayer, 1989 (as *S. arenitecta*) |
| INCORPORATION, ARMOUR, CRUST?: Description. ‘Specimen irregular in shape, massive, encrusting, and containing many calcareous foreign bodies. […] The skeleton is a confused reticulation of megascleres, mingled with foreign bodies and sometimes collected into loose fibres; with a thin dermal crust of asters, also much mixed with freign bodies.’ The sponge has vestigial spicules. | *Stelletta vestigium* | Sri Lanka, Indian Ocean, 18-26 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Dendy, 1905 | Dendy, 1905 |
| PSAMMOBIOSIS, ANCHORING: Description. This *Stelletta* sp. was very common and was able to live endopsammic. In contracted form it looked like an onion, being globular, with a drawn-out top and a root or root-system on the bottom that consists of spicules and tissue. | *Stelletta* sp. CERF 1 | Carnarvon Shelf, Western Australia, 79-113 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | indet. | Schönberg *et al.*, 2012 |
| AGGLUTINATION, BINDING: Description. This *Stelletta* sp. agglutinated coarse materials onto its surface, which were overgrown by epibionts. Exhalants were free. | *Stelletta* sp. CERF 2 | Carnarvon Shelf, Western Australia, 73-75 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | indet. | Schönberg *et al.*, 2012 |
| AGGLUTINATION, BINDING: Description. This *Stelletta* sp. agglutinated coarse materials onto its very hispid surface, including mostly calcareous fragments, e.g. from coralline algae or small mollusc shells. | *Stelletta* sp. CERF 3 | Carnarvon Shelf, Western Australia, 73-74 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | indet. | Schönberg *et al.*, 2012 |
| INCORPORATION: Description. ‘Mussels and oysters are embedded in it.’ | *Stelletta* sp. | Panama, Caribbean, 1 m, on mangrove root | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | indet. | Cárdenas *et al.*, 2009 |
| AGGLUTINATION, CRUST: Description. ‘The greater part of the surface is encrusted with coarse calcareous debris, chiefly Foraminifera and shell-fragments.' | *Stellettinopsis laviniensis* | Sri Lanka, Indian Ocean, shallow to 15 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Dendy, 1905) | Dendy, 1905 (as *Ecionemia*) |
| AGGLUTINATION, INCORPORATION, BINDING: Description. ‘One very large specimen found on coral rubble in Solarte south was sub-circular, 8 cm high and with a diameter of 15 cm; it had cemented and integrated coral rubble pieces.’ | *Stellettinopsis megastylifera* | Panama, Caribbean, 0.4-20 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Wintermann-Kilian & Kilian, 1984) | Cárdenas *et al.*, 2009 (as *Ecionemia*) |
| AGGLUTINATION, BINDING: Faunistic inventory. ‘Encrusting masses under and between stones, enveloping the stones and consolidating shells and sediment, forming lobes up to 5 cm in thickness.’ | *Stellettinopsis solida* | Oman, Indian Ocean, littoral | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Lévi, 1965 | Van Soest & Beglinger, 2008 (as *Ecionemia*) |
| CRUST: Identification guide. ‘Pale yellow sponges with a strongly hispid surface. […] Usually there is adhering detritus, which has to be brushed aside to see the features. […] Surface strongly villose (very bristly) with long projecting spicules (to 2 mm), which often trap quantities of silt.’ | *Stelligera rigida* | British lsles, Channel coast of France, Atlantic, 10-20 m | Po: Dem (Heteroscleromorpha): Axinellida: Stelligeridae | (Montagu, 1814) | Van Soest, 2015 |
| CRUST: Identification guide. ‘*Stelligera stuposa* (Ellis and Solander, 1786) is a fairly large (up to 10 cm high) yellow branching sponge with a hairy, rather slimy surface, which accumulates mud and particles, giving it a characteristic habit. […] The particles are easily seen with the unaided eye. […] Nematode worms often live in the outer silt-covered layers of the sponge. | *Stelligera stuposa* | Britain, France, Spain, Atlantic, Mediterranean, 4-110 m | Po: Dem (Heteroscleromorpha): Axinellida: Stelligeridae | (Ellis & Solander, 1786) | Van Soest, 2015 |
| CRUST, INCORPORATION: Description. ‘The surface is covered with sediment, which is also found inside the sponge.’ | *Stellitethya extensa* | N Western Australia, Shark Bay, Indian Ocean, 7-8 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | (Hentschel, 1909) | Sarà, 2002 |
| INCORPORATION: Description. ‘Surface arenaceous, uniformly granulated. Pores on the outer and vents on the inner side of the cup among the granulations. Wall almost entirely composed of short-jointed keratose fibre of a sponge-yellow colour, in which there is very little sand, and that chiefly towards the surface, while there is a great deal outside the fibre in the adjoining sarcode.’ | *Strepsichordaia caliciformis* | Bass Strait, depth unknown | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Phyllospongiinae) | (Carter, 1885) | Carter, 1885 (as *Carteriospongia*) |
| ARMOUR, INCORPORATION: Description of this calyx shaped species. ‘Armoured ectosome of F52040b 125-375 μm thick on inner surface, mostly 150 μm thick on outer surface. [Knotty primaries] charged with foreign debris (mostly spicule fragments, poorly aligned, sometimes discontinuous). Irregularly scattered detritus also interstitially. [Main skeleton below exhalants with] more interstitial detritus than below opposite surface, with many lithic grains.’ | *Strepsichordaia caliciformis* | Bass Strait, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Phyllospongiinae) | (Carter, 1885) | Wiedenmayer, 1989 (as *Carteriospongia*) |
| ARMOUR, INCORPORATION: Description. In *Strepsichordaia* spp.the surface is heavily armoured, the primary fibres are heavily cored with foreign debris, the secondary are cored to a similar extent, and tertiary fibres are uncored. In *S. lendenfeldi* primary and secondary fibres are heavily cored with coarse debris, varying in dimensions with coring material (50-250 μm). | *Strepsichordaia lendenfeldi* | type locality: Australian Great Barrier Reef, Coral Sea, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Phyllospongiinae) | Bergquist et al., 1988 | De C. Cook & Bergquist, 2002a |
| INCORPORATION: TEM study on sponges with photosymbionts. The sponge embedded spicules and sand particles into spongin fibres. | *Strongylacidon griseum* | Bermuda, W Atlantic, 0-20 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Schmidt, 1870) | Rützler, 1990 |
| INCORPORATION: Description. In *Strongylacidon* spp. are ‘sand may be present in low quantities but is not dominating the fibres […] fibres cored by strongyles and occasionally some detritus.’ *P. griseum* ‘contained sand grains in the fibres. […] The extent to which sand is incorporated determined whether this should be assigned to *Strongylacidon* or *Chondropsis*.’ | *Strongylacidon griseum* | Bass Strait, 69.5 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | Marshall, 1880 | Van Soest, 2002a |
| ARMOUR, INCORPORATION: Description. The surface of *S. inaequale* can contain some sand grains. The aurthor lists frequency and nature of material incorporated into tissues in his Table 2. | *Strongylacidon inaequale* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Hentschel, 1911) | Wiedenmayer, 1989 (as *Stylotella inaequalis*) |
| INCORPORATION: Description. ‘The main skeleton consists of numerous stout sandy tracts or fibres running more or less parallel with one another towards the surface, and varying greatly in thickness and definition. These sandy fibres are accompanied by numerous strongyla, and occasionall connected transversely by loose bands of the same distinctly enveloped in spongin. The strongyla also occur abundantly scattered through the ground substance, and in loose whisp-like tracts running towards the surface. There is a soft dermal cortex, a little more than a millimetre thick, beneath which the sandy fibres cease.’ | *Strongylamma carteri* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Chondropsidae | (Dendy, 1895) | Dendy, 1895 (as *Chondropsis*) |
| INCORPORATION: Description. ‘Choanosomal skeleton of whispy loose tracts of strongyles containing also some sand grains.’ | *Strongylamma carteri* | Port Philipp Heads, Victoria, Australia, Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Poecilosclerida: Tedaniidae | Dendy, 1895 | Van Soest, 2002e |
| INCORPORATION, PSAMMOBIOSIS?: Field survey for distributions. ‘Most specimens of *Stryphnus ponderosus* have deposits of sand incorporated in the tissues and specimens seen in photographs sit on sand, sometimes partly covered by the sand.’ | *Stryphnus ponderosus* | Faroe Island, NE Atlantic, 237-833 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Bowerbank, 1866) | Klitgaard & Tendal, 1997 |
| ANCHORING: Description. *S. borealis* inhabits muddy environments where, according to Schmidt, it anchors itself with a spicule tuft (rootlets?). Schmidt states that this sponge has ‘pseudo cross spicules’ (Pseudokreuznadeln). | *Stylocordyla borealis* | NE Finland, N Atlantic, ca. 366 m | Po: Dem (Heteroscleromorpha): Suberitida: Stylocordylidae | (Lovén, 1868) | Schmidt, 1870 (as *Hyalonema boreale*) |
| ANCHORING: Description. *S. borealis* is ‘club-shaped on long thin stalk, provided with a proliferated root system.’ | *Stylocordyla borealis* | North Atlantic, deep water | Po: Dem (Heteroscleromorpha): Suberitida: Stylocordylidae | (Lovén, 1868) | Van Soest, 2002f |
| INCORPORATION: Description. ‘We observed fragments of verongid fibers and a great variety of spicules and other sediment particles throughout the tissue. All spicules seem to be foreign, as were those described and figured by Hofman & Kielman (1992).’ | *Suberea? flavolivescens* | Belize, Caribbean, 1 m | Po: Dem (Keratosa): Verongiida: Aplysinellidae | (Hofman & Kielman, 1992) | Rützler *et al.,* 2014 (after tentative genus transfer from *Axinyssa*) |
| ANCHORING, BINDING: Description. ‘Two specimens […] apparently were rooted in mud compacted around fine shell fragments.’ | *Suberites australiensis* | New Zealand, Pacific, 73-128 m | Po: Dem (Heteroscleromorpha): Suberitida: Suberitidae | Bergquist, 1968 | Bergquist, 1968 |
| ANCHORING: Identification guide. ‘Sometimes found in muddy places attached to shells or stones buried in the mud.’ | *Suberites carnosus* | Arctic, North Polar Sea, Atlantic coasts of Europe, Mediterranean, down to 108 m | Po: Dem (Heteroscleromorpha): Suberitida: Suberitidae | (Johnston, 1842) | Van Soest, 2015 |
| INCORPORATION: Description. ‘The Australian specimens lead a similar mode of life to the European *Suberites domuncula*; they alawys form the abode of a crab.’ European *S. domuncula* enclose shells inhabited by hermit crabs. | *Suberites domuncula* | Bass Strait and E Australia, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Suberitida: Suberitidae | (Olivi, 1792) | Von Lendenfeld, 1888 |
| INCORPORATION, BINDING: Identification guide. ‘Growth forms may include specimens enveloping gastropod shells and encrusting scallops. […] The massive-lobose form is typical, but growth forms include specimens encrusting or enveloping mollusc shells. […] Sometimes growing around empty gastropod shells inhabited by hermit crabs, and on *Chlamys* valves. In still water it sometimes occurs free-living, having initially settled on a piece of hard debris which is subsequently enveloped.’ | *Suberites ficus* | Widespread throughout North Polar Sea and Atlantic, depth not stated, but assumed shallow (‘Occurs mostly in places with tidal currents.’) | Po: Dem (Heteroscleromorpha): Suberitida: Suberitidae | (Johnston, 1842) | Van Soest, 2015 |
| CRUST: Description. The sponge is very hispid and accumulates sediment on its surface, between tylostyles, e.g. foraminifer tests, which gives the sponge a grey colour. | *Suberites hirsutus* | Azores, Atlantic, 2460 m | Po: Dem (Heteroscleromorpha): Suberitida: Suberitidae | Topsent, 1927 | Topsent, 1928 |
| Morphology suitable for PSAMMOBIOSIS: Identification guide. ‘*Suberites massa* Nardo (1847) is a yellow-orange massive sponge with irregular [often fistula-like] lobes, plates and ridges. It is often somewhat buried under silt, showing only the tops of the lobes. […] Massive-lobose, often having the form of a flattened hemisphere composed of a network of anastomosing plates and ridges, with the orange crests showing through but the interstices usually being filled with silt. […] Found in the silty brackish water of harbours, estuaries and lagoons where there are moderate tidal currents.’ | *Suberites massa* | Mediterranean, S England, France, Netherlands, Atlantic, usually sublittoral | Po: Dem (Heteroscleromorpha): Suberitida: Suberitidae | Nardo, 1847 | Van Soest, 2015 |
| INCORPORATION: Identification guide. ‘*Suberites suberia* (Montagu, 1818) is an orange elongated globular sponge inhabited by a hermit crab (mostly *Pagurus*). This characteristic association is known from another *Suberites* species occurring to the south (Mediterranean, West Africa), and the two can only be told apart by microscopic examination. Some authors consider them as synonyms of a single species *S*. *domuncula.* […] The sponge envelops a dead gastropod shell, which is inhabited by a hermit crab (it is a "mobile sponge"). […] On sandy bottoms.’ | *Suberites suberia* | North Sea, W Britain, Ireland, France, Atlantic, possibly Mediterranean, 20-50 m | Po: Dem (Heteroscleromorpha): Suberitida: Suberitidae | (Montagu, 1814) | Van Soest, 2015 |
| ANCHORING: Identification guide. ‘Elongate, wedge-shaped sponge of up to 20 cm in length and up to 15 cm in diameter. The upper parts of the sponge are broad and may be lobate, the lower parts gradually taper towards the substrate, which is invariably a dead shell of a mollusc (gastropods, bivalves, *Dentalium*) which are partly or wholly buried in the sand. […] On sandy bottom, on mollusc shells.’ | *Suberites virgultosus* | North Sea, 30-50 m | Po: Dem (Heteroscleromorpha): Suberitida: Suberitidae | (Johnston, 1842) | Van Soest, 2015 |
| INCORPORATION: Description. ‘Undescribed. Liverpool Free Museum. Structure charged with grit, sea-bottom detritus; colour deep carmine. Australia.’ | *Suberites* sp. | Australia, depth not stated | Po: Dem (Heteroscleromorpha): Suberitida: Suberitidae | indet. | Carter, 1882 |
| INCORPORATION: About the genus. ‘The habit of enclosing fragments of hard calcareous objects, which finally disappear among the substance, is very common among the *Suberites*, giving them a gritty character; but whether this be for the organic or mineral matter, or both, that they contain, I am not able to say; it may be for the carbonic acid with the lime; but be this as it may, *Suberites domuncula* is often found under a shell-like form, having thus destroyed the shell itself on which it grew, while the destruction of shell-tissue by the burrowing (excavating) sponges is notorious.’ | *Suberites* spp. | genral account | Po: Dem (Heteroscleromorpha): Suberitida: Suberitidae | indet. | Carter, 1882 |
| CRUST?: Identification guide. ‘Surface usually finely papillate and hairy, though occasionally smooth.’ The figured specimens look as if they are coated in fine sediments that were trapped on the hispid surfaces. | *Sycon ciliatum* | Arctic to Gibraltar, common in shallow sublittoral, present in deeper water | Po: Cal (Calcaronea): Leucosolenida: Sycettidae | (Fabricius, 1780) | Van Soest, 2015 |
| ANCHORING: Description. *S. nux* has a stalk ending in a spicule tuft that is intermeshed. | *Sympagella nux* | Florida, Atlantic, 179-225 m | Po: Hex (Hexasterophora): Lyssacinosida: Rosselidae (Lanuginellinae) | Schmidt, 1870 | Schmidt, 1870 |
| ANCHORING: Description. Hyalonematidae are glass sponges with a single tuft of spicules rooting them in sediments (basalia). In *T. polybasalia* the basalia can be slightly twisted or untwisted and reach a lenth of 12 cm. | *Tabachnickia polybasalia* | museum specimens, central Pacific, 1530-2747 m | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | (Tabachnick, 1988) | Tabachnick & Menshenina, 2002a (*Tabachnicki*a as *Platella*) |
| ANCHORING: Review on the Hexactinellida. ‘Most hexactinellids require a hard substratum for settlement (either rocks or shell debris), but two groups, all Amphidiscophora (including *Hyalonema* and *Monorhaphis*) and Euplectellinae (including *Euplectella*) anchor in soft sediments with special basal spicules.’ | *Tabachnickia polybasalia* | as general statement, no location given, deep sea | Po: Hex (Amphidiscophora): Amphidiscosida: Hyalonematidae | (Tabachnick, 1988) | Leys *et al.*, 2007 |
| INCORPORATION: Description. ‘The main fibres of the skeleton are 0.1 millim. thick, very knotty, and cored with a single row of exceedingly large sand-grains 0.6 millim. apart.’ | *Taonura colus* | W and E Australia, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (De Lamarck, 1814) | Von Lendenfeld, 1888 (as *Thorecta gracillimus*) |
| INCORPORATION: Description. In *Taonura* spp. the surface is unarmoured and the primary fibres are cored, secondary fibres uncored. This is also the case for *T. flabelliformis*. | *Taonura flabelliformis* | type locality: Australia, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | Carter, 1882 | De C. Cook & Bergquist, 2002a |
| INCORPORATION: Description. ‘The skeleton consists of very knotty main fibres, 0.07-0.1 millim. thick, which are cored with large sand-grains. […] The surface-skelton consists of bands of sand-grains, 0.7 millim. broad, which form a dense network with more or less circular meshes 0.4 millim. wide. In the perforated membranes, which are spread out in them, spicule fragments are abundant.’ | *Taonura marginalis* | W, S and E Australia, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Thorecta exemplum* var. *marginalis*) |
| CRUST, INCORPORATION: Description. ‘The colour in life was dull greenish, the surface much sdimented. […] The choanosome contains much sand.’ | *Tectitethya crypta* | Dominican Republic, Caribbean, Bahamas, Atlantic, 2-10 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | (De Laubenfels, 1949) | Pulitzer-Finali, 1986 (as *Tethya cripta*) |
| INCORPORATION, CRUST: Descriptions. 1996 – The surface ‘is covered by sand or seaweeds. Sediment occurs also inside the sponge. […] Scattered megascleres and foreign body fill the interstices between the bundles.’ 2000 – ‘The surface is covered by sediment or sea-weed, and sediment may also be found inside the sponge.’ | *Tectitethya crypta* | Bahamas, W Atlantic, depth not stated | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | (De Laubenfels, 1949) | Sarà & Bavestrello, 1996; Sarà, 2000 |
| CRUST, PSAMMOBIOSIS, BINDING: Field study conducted with fluorescent dye, and laboratory analyses with light microscopy and TEM. *T. crypta* was covered in sand, except for the oscular cone with contractible, apical exhalants, inhalants could become covered. By the endopsammic life style the sponges contributed to consolidation, venting and enrichment of the nearby sediments. | *Tectitethya crypta* | Belize, Caribbean, 4-10 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | (De Laubenfels, 1949) | Rützler, 1997; Rützler, 2004 |
| INCORPORATION, ANCHORING: 2004 – Field study comparing incorporated to ambient sediments. 2007 – Review. *T. crypta* is adapted to environments with abundant sediments, selected for finer (40-50 μm), siliceous sediments (sponge spicules, radiolarian and diatom tests) and allocated them selectively within the tissues: In the choanosome fine material <500 μm was arranged in little clusters (nuclei), whereas coarse particles were more evenly distributed and also accumulated in the lower portion of the body where they contributed to the anchoring of the sponge. | *Tectitethya crypta* | Belize, Caribbean, 1 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | (De Laubenfels, 1949) | Cerrano *et al.*, 2004a, 2007a |
| CRUST: Field study. *T. crypta* was able to tolerate strong sedimentation and effects of storms and was usually covered with sediments. | *Tectitethya crypta* | Florida Keys, Gulf of Mexico, 2.5-2.7 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | (De Laubenfels, 1949) | Stevely *et al.*, 2011 |
| CRUST, INCORPORATION: Description. ‘Black brownish, but with a grayish coat due to the sediment on the tubercles and other parts of the surface. […] Sand and foreign bodies are incorporated.’ | *Tectitethya keyensis* | Florida Keys, Gulf of Mexico, 1-2 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | Sarà & Bavestrello, 1996 | Sarà & Bavestrello, 1996 |
| INCORPORATION: Description. ‘The surface, in the ethanol preserved specimens, appears clean, without sediment. […] Foreign bodies, likely organic detritus 20-50 μm in diameter, are incorporated by giant amoebocytes which are scattered into the whole sponge but more densely around the channels, the lacunes, the sponge surface and the megasclere bundles.’ | *Tectitethya macrostellata* | Florida Keys, Gulf of Mexico, 7-52 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | Sarà & Bavestrello, 1996 | Sarà & Bavestrello, 1996 |
| INCORPORATION: Description. ‘In this specimen as in the other *Tectitethya* foreign bodies are englobed in giant amoebocytes.’ | *Tectitethya raphyroides* | Cuba, Caribbean, 1-2 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | Sarà & Bavestrello, 1996 | Sarà & Bavestrello, 1996 |
| INCORPORATION: Description. ‘Tubular or encrusting sponge, always with some incorporated sand grains.’ | *Tedania (Tedania) anhelans* | coasts of Brazil, Atlantic, 22-51 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Tedaniidae | (Vio in Olivi, 1792) | Boury-Esnault, 1973 |
| INCORPORATION: Description. ‘Soft and compact, with much foreign matter.’ | *Tedania (Tedania) commixta* | Bass Strait, 69 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Tedaniidae | Ridley & Dendy, 1886 | Ridley & Dendy, 1886 |
| INCORPORATION: Description. ‘A thick encrusting sponge […] the Leigh specimen is rounded and has incorporated a quantity of small stones and algae.’ | *Tedania (Tedania) diversirhaphidiophora* | New Zealand, Pacific, 20-73 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Tedaniidae | Brøndted, 1924 | Bergquist & Fromont, 1988 |
| CRUST, INCORPORATION: SEM observations on Antarctic sponges. Exopinacocytes took up benthic diatoms which settle on the sponge surfaces. Diatoms accumulating in the mesohyl underneath the exopinacoderm are thought to strengthen the sponge cortex and may be an alimentary source during oligotrophic periods. | Tedania (Tedaniopsis) charcoti | Terra Nova Bay, Antarctic, Southern Ocean,  80-120 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Tedaniidae | Topsent, 1907 | Gaino *et al.*, 1994 |
| ANCHORING, AGGLUTINATION, PSAMMOBIOSIS: Description. The sponge is pictured with basally agglutinated coarser particleas and two conical fistules, which suggest that it is able to live endopsammic. | *Tedania (Tedania) ignis* | Fernando de Noronha Island and St. Peter and St. Paul Archipelago, W Atlantic, 1-13 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Tedaniidae | (Duchassaing & Michelotti, 1864) | De Moraes, 2011 |
| CRUST, PSAMMOBIOSIS: Field guide. As pictured, *T. ignis* can occur in the intertidal on mudflats, where concave parts of the body can have a significant layer of fine sediments. It has fistula-like oscules and can live endopsammic when entirely covered. But it can also have a clean surface. | *Tedania (Tedania) ignis* | Bahia, Brazil, W Atlantic, intertidal to litoral | Po: Dem (Heteroscleromorpha): Poecilosclerida: Tedaniidae | (Duchassaing & Michelotti, 1864) | Hajdu *et al.*, 2011 |
| Potential for PSAMMOBIOSIS?: Description. ‘Thickly encrusting, amorphous mats, up to 16 cm in greatest horizontal width and 2 cm thick; loosely adhering to rocky coralline substrate and partially buried in sand, with surface barely protruding through substrate. [Oscules] commonly apical on short conulose projections up to 4mm high and 8mm diameter, but also flush with surface.’ | *Tedania (Tedania) strongylostyla* | Vanuatu, Pacific, 0.3 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Tedaniidae | Kennedy & Hooper, 2000 | Kennedy & Hooper, 2000 |
| ANCHORING: These sponges had a twisted anchoring spicule tuft. | *Teganiella ovata* | fossil, Middle Devonian (Nevada) | Po: Hex: (‘Rossellimorpha’) | Rigby, 1979 | Mehl, 1996 |
| ANCHORING: Description. *T. levantinum* has a basal plate that was interpreted as an adaptation for living on soft sediments – it prevents the sinking into the mud. In specimens on mud the plate is larger in diameter than their body, when attached to hard substratum smaller. | *Tentorium levantinum* | N Israel, Mediterranean, 1243-1493 m | Po: Dem (Heteroscleromorpha): Polymastiida, Polymastiidae | Ilan et al., 2003 | Ilan *et al.*, 2003 |
| PSAMMOBIOSIS, AGGLUTINATION, ANCHORING: Field survey and description. *T. semisuberites* can live on the sediment surface or is psammobiotic and very versatile with respect to substrate. It can attach to firm substrate or agglutinate particles or amass basal spicules to form an achoring platform. Some specimens have a basal spicule tuft that contains living cells and can terminate in a bud. The sponge is cylindrical with all pores on the upper surface, but the exhalant as a little central cone. The softer the sediment the more fully buried the sponge usually is. | *Tentorium semisuberites* | Svalbard Basin, Arctic Ocean, 2538-2603 m | Po: Dem (Heteroscleromorpha): Polymastiida, Polymastiidae | (Schmidt, 1870) | Barthel & Tendal, 1993 |
| PSAMMOBIOSIS, ANCHORING: Field study examining seasonal reproduction in 3 deepwater sponges. *T. semisuberites* produces asexual buds that develop below the sediment surface layer, and it anchors in soft sediment by agglutinating sediment grains, foraminiferan shells etc., or by developing an anchoring spicule root tuft. | *Tentorium semisuberites* | Norwegian Sea, Barents Sea, 2300 m | Po: Dem (Heteroscleromorpha): Polymastiida, Polymastiidae | (Schmidt, 1870) | Witte, 1996 |
| PSAMMOBIOSIS, ANCHORING: Study on sponge microbial association. ‘In the absence of appropriate hard substrates, which is a common feature for the central Greenland Sea, sponges are partly buried and anchor in the sediment with root-like structures.’ | *Tentorium semisuberites* | Norwegian Sea, Barents Sea, 2300 m | Po: Dem (Heteroscleromorpha): Polymastiida, Polymastiidae | (Schmidt, 1870) | Pape *et al.*, 2006 |
| Morphology suitable for PSAMMOBIOSIS, ANCHORING: Identification guide. ‘Short, squat cylinders with a convex upper side bearing one or several elevated/elongated papillae. Size up to 3.5 cm high, 3 cm in diameter. Surface smooth, slippery. Papillae thin-walled. […] The basal part has longitudinal bundles of long tylostyles.’ | *Tentorium semisuberites* | Arctic , North Polar Sea, Norway, Ireland, Southern Ocean, 26-2970 m | Po: Dem (Heteroscleromorpha): Polymastiida, Polymastiidae | (Schmidt, 1870) | Van Soest, 2015 |
| INCORPORATION: Description. ‘The endosome is extremely full of coarse sand’, which distinguishes it from other species of this genus. | *Terpios aploos* | Guam, Marshall Islands, Pacific, 1-5 m | Po: Dem (Heteroscleromorpha): Suberitida: Suberitidae | De Laubenfels, 1954 | De Laubenfels, 1954 |
| BINDING, CRUST: Description. ‘This [sponge] is represented by two spherical specimens growing side by side on a mass of calcareous and other debris. […] The surface is […] to a considerable extent covered by adherent foreign matter.’ | *Tethya aurantium* | Sri Lanka, Indian Ocean, 18-33 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | (Pallas, 1766) | Dendy, 1905 (as *Tethya lyncurium*) |
| ANCHORING: Description. *T. aurantium* has ‘basal rooting processes’. | *Tethya aurantium* | New Zealand, Pacific, 398 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | (Pallas, 1766) | Bergquist, 1968 |
| ANCHORING: Identification guide. ‘Massive-globose (usually spherical to hemispherical) up to 6 cm in diameter, sometimes with 'rooting' processes. […] On rock surfaces usually in open water, although it has been reported in harbours. A common species on horizontal or sloping rocky surfces in clean water but tolerant of silt.’ | *Tethya citrina* | Mediterranean, E Atlantic, apparently absent from the North Sea, littoral to 930 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | Sarà & Melone, 1965 | Van Soest, 2015 |
| ANCHORING: Description. According to Schmidt some specimens of *T. diploderma* had few roots of 1-2 cm for attachment, which suggests it lives on hard susbstrate. | *Tethya diploderma* | Antilles, Caribbean, depth not stated | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | Schmidt, 1870 | Schmidt, 1870 |
| ANCHORING: ‘Abundant on the muddy bottom, attached to fragments of shells.’ | *Tethya diploderma* | Puerto Rico, Jamaica, Caribbean, 0.5-10 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | Schmidt, 1870 | Pulitzer-Finali, 1986 |
| ANCHORING, INCORPORATION: Description. ‘From the base rootlets originate, which attain a length of 20 millim. and more, are much and irregularly curved, and have a thickness of 2-4 millim. […] In the pulpa irregular canals descending from the subdermal cavities are met with some of these extend tangentially in a lacunose manner; sand-grains are observed in their walls.’ | *Tethya fissurata* | E Australia, New Zealand, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | Von Lendenfeld, 1888 | Von Lendenfeld, 1888 |
| CRUST: Identification guide. ‘Surface conulose (expanded state) to papillose (contracted state), frequently heavily loaded with sediment.’ Figured specimen is densely encrusted. | *Tethya hibernica* | N Ireland, Irish Sea, Atlantic, depth not stated, assumed shallow | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | Heim *et al.*, 2007 | Van Soest, 2015 |
| ANCHORING: Description. *T. ingalli* was observed ‘occasionally with rooting processes’. | *Tethya ingalli* | New Zealand, Pacific, 11–398 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | Bowerbank, 1858 | Bergquist, 1968 |
| ANCHORING: Description. The surface od *T. ingalli* ‘is […} prominently tuberculated’, and it has ‘root-like appendages’. | *Tethya ingalli* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | Bowerbank, 1858 | Carter, 1886 |
| ANCHORING: Description. For ‘*Tethya philippinensis*’: ‘The kidney-shaped specimens are always attached at the indendure. Sometimes thick and short, root-like appendages are developed.’ For ‘*Tethyorrhaphis conulosa*’: ‘The surface is covered with high conical protruberances […] towards the base they become pointed, and those which surround the base itself are prolongued to form thread-shaped rootlets, which may attain a length of 15 millim.’ | *Tethya ingalli* | Bass Strait, depth not stated | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | Bowerbank, 1858 | Von Lendenfeld, 1888 (as *Tethya philippensis* and *Tethyorrhaphis conulosa*) |
| ANCHORING: Description. *T. ingalli* is pictured with a group of basal extensions for anchoring. | *Tethya ingalli* | Bass Strait, 10-12 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | Bowerbank, 1858 | Wiedenmayer, 1989 |
| AGGLUTINATION, BINDING: Description. ‘Verrucose, small sphere of 1.5 cm in diameter, whose surface is in places covered by pebbles.’ | *Tethya japonica* | coasts of Brazil, Atlantic, 45 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | Sollas, 1888 | Boury-Esnault, 1973 |
| ANCHORING, AGGLUTINATION, BINDING: The circumference ‘is fimbriated by irregular lacinulate processes of variable length, ending in thin expansions of attachment, by which they become adherent, like the tendrils of a scandent plant, to the hard objects (empty shells, &c.) among which the sponge may be growing; terminal expansions of the processes charged with the flesh-spicules of the species, into which the ‘white line’ in the process, consisting of a bundle of skeletal spicules, is spread out. […] The filaments from the circumference seem to serve the purpose of propagation as well as attachment.’ | *Tethya multifida* | Acapulco, Mexico, E Pacific, 7-16 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | (Carter, 1882) | Carter, 1882 (as *Donatia*) |
| ANCHORING: ‘Some species [of *Tethya*] have anchoring rhizoids,’ | *Tethya* spp. | general comment, location not stated | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | NA | Sarà, 2002 |
| PSAMMOBIOSIS?, ANCHORING?, CRUST, AGGLUTINATION, BINDING: Description. The sponge has ‘a globular body covered with calcareous debris and [is] supporting a single, slightly curved oscular tube.’ | *Tethyopsis calcifera* | New Zealand, Pacific, depth not stated | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Bergquist, 1968) | Bergquist, 1968 (as *Monosyringia*) |
| PSAMMOBIOSIS?: Study on museum material to investigate oscular arrangements in sponges. The habits and morphologies of the studied *Tethyopsis* spp. were like in *D. dissimilis* and thus suggested similar functions, i.e. that these *Tethyopsis* spp. live endospammic. | *Tethyopsis columnifer* | samples from the British Museum | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Stewart, 1870 | Fry & Fry, 1979 |
| CRUST, AGGLUTINATION, ANCHORING: Description. *T. columnifer* accumulates larger particles (several mm in diameter) of foreign debris that adheres to the globular basal part of its body. | *Tethyopsis columnifer* | type from Philippines, species found in the Pacific and Atlantic 54-117 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Stewart, 1870 | Van Soest & Rützler, 2002 |
| PSAMMOBIOSIS?: Description, morphology suggesting endopsammic life. ‘A globular sponge surmounted by a long parchment-like tube.’ | *Tethyopsis mortenseni* | New Zealand, Pacific, 55-110 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Brøndsted, 1924) | Bergquist, 1968 (as *Monosyringia*) |
| PSAMMOBIOSIS?: Study on museum material to investigate oscular arrangements in sponges. The habits and morphologies of the studied *Tethyopsis* spp. were like in *D. dissimilis* and thus suggested similar functions, i.e. that these *Tethyopsis* spp. live endospammic. | *Tethyopsis mortenseni* | Samples from the British Museum | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Brøndsted, 1924) | Fry & Fry, 1979 (as *Monosyringa*) |
| AGGLUTINATION, CRUST, INCORPORATION, ANCHORING?: Description. Sand grains and coarse materials are attached to the surface. Some material is embedded in the sponge tissues, decreasing in abundance with distance from the surface. The sponge may also be anchoring: ‘The thinner end part of all pieces is free of foreign material.’ | *Tethyopsis radiata* | N New Zealand, Pacific, 85-847 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | (Marshall, 1884) | Von Lendenfeld, 1907 |
| ANCHORING: Description. *T. euplocamos* inhabits muddy environments where it anchors itself with a strongly twisted spicule tuft. | *Tetilla euplocamos* | not stated, assumed Atlantic | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | Schmidt, 1868 | Schmidt, 1870 |
| ANCHORING: Description. *Tetilla* spp. usually have ‘spicule strands at the base, acting as root system’. The long ‘root’ of *T. euplocamos* consists of a twisted strand of spicules. | *Tetilla euplocamos* | Rio de Janeiro, Brazil, Atlantic, intertidal | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | Schmidt, 1868 | Van Soest & Rützler, 2002 |
| ANCHORING: Description. ‘Crust and thin cushion spreading over about 30 cm are, also penetrating cavities in the substratum.’ | *Tetilla laminaris* | Belize, Caribbean, 0.3 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | George & Wilson, 1919 | Rützler *et al.,* 2014 |
| ANCHORING: Description. The body has basal ‘spicule root cushions’ of 10-15 mm length. | *Tetilla leptoderma* | Kerguele Islands and Heard Island, Southern Ocean, 18-274 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | Sollas, 1886 | Von Lendenfeld, 1907 (als *Tethya grandis*) |
| ANCHORING: Description. ‘Sponge […] anchored in the mud by a great mass of fine silky spicules attached to the base. […] The root-tuft […] is nearly as large as the specimen itself, and in its present condition consists of a mass of soft mud held together by the extremely long and slender silky anchoring spicules, which individually are scarcely visible to the naked eye. […] The root-tuft [is] composed of anatriaenes with extremely long and slender shafts, irregularly matted together.’ | *Tetilla limicola* | Sri Lanka, Indian Ocean, depth not stated | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | Dendy, 1905 | Dendy, 1905 |
| ANCHORING: Field observations. ‘When settling, [*T. mutabilis*] fastens itself in the mud by a strong, slender stalk [and thousands can be found near Harbor Island]. This stalk, which is about two inches long, consists of a number of fine strands which are fringed at their lower ends so they anchor the animal firmly. [When the sponge reaches the size of a pigeon’s egg] it usually breaks loose from the stalk and is rolled about over the mud flats by the tides. It may move a considerable distance from the place where it settled, continuing to grow until it becomes an irregular mass, six inches or more in diameter.’ | *Tetilla mutabilis* | S California, Pacific, shallow depths (mud flats, estuaries) | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | De Laubenfels, 1930 | McGintie, 1938 |
| CRUST: Description. ‘The surface of the sponge is uneven, and thinly encrusted with sand-grains.’ | *Tetilla poculifera* | Sri Lanka, Indian Ocean, sampling depth for one specimen described as ‘deep water’ | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | Dendy, 1905 | Dendy, 1905 |
| ANCHORING: The sponge has a basal root tuft (figured). | *Tetilla sansibarica* | Zanzibar Channel, E Africa, Indian Ocean, 463 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | (Von Lendenfeld, 1907) | Von Lendenfeld, 1907 (als *Tethya*) |
| CRUST: Most samples were strongly hispid and had mud adhering to their spicule coat. | Tetillidae | Montgomery Reef, Kimberley, NW Australia, 26.2-28 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Spirophorina): Tetillidae | indet. | Schönberg, unpubl. data |
| CRUST, AGGLUTINATION: Some globular or massive astrophorid sponges had larger particles adhering to their surfaces, possibly for camouflage. Some sponges were hispid, some had smooth surfaces. | Tetractinellida | Montgomery Reef, Kimberley, NW Australia, 20.9-28 m | Po: Dem (Heteroscleromorpha): Tetractinellida | NA | Schönberg, unpubl. data |
| ANCHORING: Description. *Thenea* spp. have a ‘symmetrical body form and are anchored to the bottom by long spicular rooting processes.’ *T. leviabyssorum* is triangular to mushroom-shaped and was not pictured. | *Thenea abyssorum* | Norwegian Sea, N, Atlantic, bathymetric range of 1070-3670 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Koltun, 1964 | Steenstrup & Tendal, 1982 |
| PSAMMOBIOSIS, ANCHORING: Field survey and description. The sponge lives in embedded mud and is anchored with a ray-like spicule tuft. In- and excurrent openings are on the sides of the body on the upper half of the body and just above the sediment, with the inhalants having a screen of spicules. Asexual reproduction via buds proceeds mostly on the surface of the lower, buried part of the body (1/3 of the specimens). | *Thenea abyssorum* | Svalbard Basin, Arctic Ocean, 2527-3296 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Koltun, 1964 | Barthel & Tendal, 1993 |
| PSAMMOBIOSIS: Field study examining seasonal reproduction in three deepwater sponges. *T. abyssorum* produced asexual buds that developed below the sediment surface layer. | *Thenea abyssorum* | Norwegian Sea, Barents Sea, 2300 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Koltun, 1964 | Witte, 1996 |
| ANCHORING: Description. ‘Small sub-spherical sponge (2.5 cm high, 2 cm wide) with root-like structures. Very hispid.’ The sponge is pictured with a slim strand of anchoring spicules and a shaggy appearance due to strong hispididy. The nature of the adhering sediments suggests fine mud. | *Thenea abyssorum* | N Norway, Norwegian Sea, 675-850 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Koltun, 1964 | Cárdenas & Rapp, 2012 |
| ANCHORING: The sponge has a spicule halo and spicule rootlets that contain oxeas, styles and anatriaenes. | *Thenea bojeadori* | Cape Bojeador, W Africa, E Atlantic, 146 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
| ANCHORING: Author assumes that damaged specimen had spicule rootlets | *Thenea levis* | Thomson Ridge, N Atlantic, 652 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
| ANCHORING: Description. *Thenea* spp. have a ‘symmetrical body form and are anchored to the bottom by long spicular rooting processes.’ *T. levis* is a usually flattened sponge. The species is pictured with a few slim spicule tufts. | *Thenea levis* | Norwegian Sea, N, Atlantic, bathymetric range of 240-1480 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Von Lendenfeld, 1907 | Steenstrup & Tendal, 1982 |
| ANCHORING: Description. ‘Pore and oscule areas (both with sieves) are along the longitudinal sides, opposite to each other. They are more or less long and high. A thick overhang protects the pore area. Small roots extend from the base of the sponge.’ | *Thenea levis* | SW of Rockall Bank, North Atlantic and Norwegian Sea, 844-857 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Von Lendenfeld, 1907 | Cárdenas & Rapp, 2012 |
| ANCHORING: The sponge has lateral spicule halos. | *Thenea malindiae* | Malindi, E Africa, Indian Ocean, 748 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
| ANCHORING: The sponge has several basal spicule roots. | *Thenea megastrella* | Cape Verde Islands, Atlantic, 217 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
| ANCHORING: The sponge has spicule rootlets (figured). | *Thenea mesotriaena* | Nicobar Islands, Andaman Sea, Indian Ocean, 752 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
| ANCHORING: The sponge has a body with a long basal root with anatriaenes (figured). | *Thenea microclada* | Cape Bojeandor, W Africa, Atlantic, 146 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
| ANCHORING: Description. Schmidt described *T. muricata* as having several smaller spicule tufts that extend into the substrate in different directions. The tufts were twisted, and Schmidt explained that with pressure from the membrane sheath and developmental and growth processes. | *Thenea muricata* | not stated, assumed Atlantic | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | (Bowerbank, 1858) | Schmidt, 1870 (as *Tisiphonia agariciformis*) |
| ANCHORING: Description. *Thenea* spp. have a ‘symmetrical body form and are anchored to the bottom by long spicular rooting processes.’ *T. muricata* is a mushroom-shaped to ovate sponge. The species is pictured with a few slim spicule tufts. | *Thenea muricata* | Norwegian Sea, N, Atlantic, bathymetric range of 90-2940 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | (Bowerbank, 1858) | Steenstrup & Tendal, 1982 |
| ANCHORING: Description. *Thenea* spp. are ‘Pachastrellidae with […] root-like processes for attachment to the substratum. […] Because most species live in deep, soft bottoms, the sponges are provided with basal, root-like processes for anchoring to the sediment or buried substrata’. ‘Most individuals [of *T. muricata*] develop a variable number of flexible root-like processes made of naked, entangled spicules that allow the anchoring of sponges in soft bottoms’. | *Thenea muricata* | NE Atlantic and Mediterranean, 120–4020 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | (Bowerbank, 1858) | Maldonado, 2002 |
| ANCHORING: Description. ‘All specimens have roots.’ | *Thenea muricata* | Norwegian Sea, 90-1232 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | (Bowerbank, 1858) | Cárdenas & Rapp, 2012 |
| ANCHORING: Identification guide. ‘*Thenea muricata* (Bowerbank, 1858) is a peculiar mushroom-shaped grey-brown sponge with a characteristic excavated equatorial region. It is often stalked or rooted, as it lives on muddy bottoms in deep water.’ | *Thenea muricata* | Norway, Azores, N Atlantic, Mediterranean, 90-2940 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | (Bowerbank, 1858) | Van Soest, 2015 |
| ANCHORING: The sponge has a thin tuft of anchoring spicules. | *Thenea muricata* | Norwegian Sea, depth not stated | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | (Bowerbank, 1858) | P. Cárdenas, pers. comm., see Figure 8A |
| ANCHORING: The sponge has rootlets that are up to 1 cm long. | *Thenea nicobarensis* | Nicobar Islands, Andaman Sea, Indian Ocean, 752 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
| ANCHORING: Description. ‘Small, relatively inconspicuous, rootlets project from the ventral and ventrolateral surfaces of the sponge.’ It is depicted with short basal spicule tufts and the typical mushroom-like top. | *Thenea novaezealandiae* | New Zealand, Pacific, 238 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Bergquist, 1961 | Bergquist, 1968 |
| ANCHORING: The sponge has a spicule halo and rootlets (figured). | *Thenea pendula* | Zanzibar Channel, E Africa< indian Ocean, 453 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
| ANCHORING: The damaged specimen appeared to have had rootlets. | *Thenea rotunda* | Dar es Salaam, E Africa, Indian Ocean, 400 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
| ANCHORING, CRUST: Description. *T. schmidti* is pictured. It is mushroom-shaped and has a few root-like extensions that appear to be made of spicules. It is strongly hispid, catching muddy sediment between the spicules, but the large, apical oscule is clean. | *Thenea schmidti* | Norwegian Sea, 90-1232 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Sollas, 1886 | Cárdenas & Rapp, 2012 |
| CRUST: Review. *T. schmidti* is depicted with a mud-filled fringe of macro-hispid spicules. | *Thenea schmidti* | Atlantic, bathyal | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Sollas, 1886 | Van Soest *et al.*, 2012 |
| ANCHORING: Tha basis of this sponge has small rootlets. | *Thenea tyla* | E Africa, Indian Ocean, 863 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
| ANCHORING: The sponge has a spicule halo (‘Nadelsaum’) and rootlets that contain orthotriaenes (figured). | *Thenea valdiviae* | SE of the Faroes, N Atlantic, 588-652 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
| ANCHORING: Description. *Thenea* spp. have a ‘symmetrical body form and are anchored to the bottom by long spicular rooting processes.’ *T. valdiviae* is a disc-shaped to massive sponge. The species is pictured with a few discrete spicule tufts. | *Thenea valdiviae* | Norwegian Sea, N, Atlantic, bathymetric range of 110-1900 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Von Lendenfeld, 1907 | Steenstrup & Tendal, 1982 |
| ANCHORING: Phylogenetic account comparing sets of spicules. *T. valdiviae* is depicted with several specimens with delicate rooting processes. | *Thenea valdiviae* | Norwegian Sea, N, Atlantic, depth not stated | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Theneidae | Von Lendenfeld, 1907 | Cárdenas *et al.*, 2011 |
| ARMOUR, INCORPORATION: Description. ‘The dry skeleton, destitute of the sand-cortex, appears light chestnut or greyish brown. […] The main fibres […are rarely] free from bodies. Generally they contain scattered sand-grains &c. The connecting fibres are […] free from foreign bodies.’ | *Thorecta exemplum* | sample site and depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 |
| ARMOUR, INCORPORATION: Description. As ‘var. *secunda*’: ‘The skeleton consists of knotty and irregular main fibres 0.08 millim. thick, which are free from foreign bodies.’ As ‘var. *tertia*’: ‘Dry specimens [are] destitute of the sand-cortex. […] The main fibres are cored with an axial string of pretty large sand-grains and spicule-fragments.’ | *Thorecta latus* | Australian coasts, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Carter, 1885) | Von Lendenfeld, 1888 (as *Thorecta exemplum* var. *secunda* and var. *tertia*) |
| ARMOUR, INCORPORATION: Description. In *Thorecta* spp. the surface is armoured and the primary fibres are cored, secondary fibres uncored. In *T. latus* ‘primary fibres are axially cored with large sand grains and spicule fragments.’ | *Thorecta latus* | type locality: Australia, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Carter, 1885) | De C. Cook & Bergquist, 2002a |
| INCORPORATION: Description. The skeleton consists of ‘numerous main fibres 0.2 millim. thick, which are charged with fairly abundant foreign bodies. The connecting fibres […] contain hardly any foreign bodies.’ | *Thorecta mirabilis* | E Australia, Bass Strait, Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Stelospongia*) |
| INCORPORATION: Description. ‘The skeleton consists of smooth or uneven main fibres 0.13 millim. thick, which contain very few and scattered foreign bodies. They are about 1 millim. apart.’ | *Thorecta prima* | N, E and S Australia, (Indo-?) Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Thorecta exemplum* var. *prima*) |
| INCORPORATION: Description. ‘The skeleton is comparatively dense and much harder than in other species. […] The skeleton consists of a network composed of main fibres 0.1 millim. thick, cored with abundant small sand-grains.’ | *Thorecta ramsayi* | E and W Australia, Indo-Pacific, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | Von Lendenfeld, 1888 | Von Lendenfeld, 1888 |
| ARMOUR, INCORPORATION: Description. ‘Individual ostia often separated by thin bridges of single sand grains or spicules, forming tertiary ectosomal reticulum; but not consistently developed. [At confluent inhalant fields] armoured ectosome best developed and continuous. […] F52053 has cortex 0.7-1 mm thick containing almost exclusively lithic grains (rare spicule fragments and shelly grains). […] Primaries 130-185 μm thick, with mixed detritus in core of variable thickness, occasionally displaced to one side; irregularly knotty with bulging grains and protruding spicule fragments.’ Secondaries clear. | *Thorecta tuberculata* | Bass Strait, 3-30 m | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Carter, 1885) | Wiedenmayer, 1989 |
| ARMOUR, INCORPORATION: Description. The species had a thick armour of coarse sediment. Choanosomal fibres occasionally cored with similar sediments. | *Thorecta* sp. CERF 1 | Carnarvon Shelf NW Australia, Indian Ocean, 41-42 m | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | indet. | Schönberg *et al.*, 2012 |
| INCORPORATION: Guide. *Thorecta* sp.incorporates detritus into spongin fibres. | *Thorecta* sp. | Brazil, W Atlantic, 61-160 m | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | indet. | Muricy *et al*., 2008 |
| PSAMMOBIOSIS: Field observations from an area with fine sediments. One *Thorecta* sp. was observed to live partially buried in the sediments. Vertical, columnar fistules were elevated well above the sediments. | *Thorecta* sp. | Onslow, NW Australia, Indian Ocean, 10-15 m | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | indet. | Schönberg *et al.*, unpubl. data |
| ARMOUR, INCORPORATION: Description. In *Thorectandra* spp. the surface is armoured and the large-diameter primary fibres are axially cored, secondary fibres uncored. In *T. boletus* ‘the surface is protected by a stout sand-cortex. [Choanosomal] main fibres of the supporting skeleton are 300 μm thick, and contain and irregular axial column of sand grains.’ | *Thorectandra boletus* | type locality: Australia, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (De Lamarck, 1815) | De C. Cook & Bergquist, 2002a |
| ARMOUR, INCORPORATION: Description. Surface ‘conspicuously sandt. […] Sandy surface over most of body. [Surface] formed by reticulation of finr ridges packed with sand. […] Translucent ectosome, lightly armoured with spicule fragments and fine sand grains. […] Groups of spicule fragments and single sand grains outlining ostia. […] On top of F52050, ectosome packed with mixed detritus, 400-500 μm thick. [Primary fibres in choanosome] regularly and thickly cored by mixed detritus. Few sand grains and spicule fragments reach surface.’ | *Thorectandra choanoides* | Bass Strait, depth not stated | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Bowerbank, 1872) | Wiedenmayer, 1989 (as *Thorecta*) |
| INCORPORATION, ARMOUR: ‘Surface deeply wrinkled with high ridges more or less interunited by ramification; the whole covered with a sandy incrustation in the form of a minutely reticulated or sieve-like structure, whose interstices are tympanized by the dermal membrane. Pores in the interstices of the retiform incrustation. […] Main fibre cored with foreign microscopic objects, sand, &c.; lateral or interuniting fibre cored only with the grey flocculent substance, the former psammonematous, the latter luffarid, both enclosed within the same kind of amber-coloured keratine. Sarcode of the interior thick and inspissate, scantily charged with foreign material.’ | *Thorectandra crateriformis* | Bass Strait, 35 m | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Carter, 1885) | Carter, 1885 (as *Pseudoceratina*) |
| ARMOUR, INCORPORATION: Description. ‘Lightly armoured outer ectosome masking subjacent tangential reticulation of trabeculae packed with debris. […] Densely armoured, lower reticulate ectosome probably discontinuous in life, large areas merely covered by dermal membrane with scattered detritus. [Other parts of surface] packed with ill-sorted mixed detritus, lithic grains (up to 600 μm wide) dominating, to depth 700 μm. In recessed interstices, ectosome 300 μm thick, with crowded detritus better sorted, proportionally more spicule fragments, smaller lithic grains. [Choanosomal primaries] thickly cored, rarely filled, with ill-sortedmixed detritus. Spicule fragments often disoriented, with one or both ends protruding, always enveloped by spongin. Fibre contours thus commonly knotty or serrated. Secondaries clear.’ | *Thorectandra glomerosus* | Bass Strait, 25-30 m | Po: Dem (Keratosa): Dictyoceratida: Thorectidae (Thorectinae) | (Wiedenmayer, 1989) | Wiedenmayer, 1989 (as *Thorecta*) |
| PRODUCING SEDIMENTS through bioerosion: All species of the Thoosidae are presently considered to be active bioeroders producing sponge chips. | Thoosidae | NA | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Thoosidae | Cockerell, 1925 | Rützler, 2002a, 2002c |
| INCORPORATION: Description. ‘A small amount of foreign material is frequently included in the choanosome.’ | *Thymosiopsis cuticulatus* | French Mediterranean, SCUBA depth | Po: Dem (Verongimorpha): Chondrillida: Chondrillidae | Vacelet & Perez, 1998 | Boury-Esnault, 2002 |
| INCORPORATION: Description. Crust that ‘possibly excavates, small cavities in the substratum.’ | *Timea oxyasterina* | Belize, Caribbean, 20 m | Po: Dem (Heteroscleromorpha): Tethyida: Timeidae | Rützler *et al.,* 2014 | Rützler *et al.,* 2014 |
| INCORPORATION, CRUST: Guide. *T. ophiraphidites* incorporates sediments. In crossection it also appears to have an external crust, building on its hispid surface. | *Topsentia ophiraphidites* | Brazil, W Atlantic, 7-370 m | Po: Dem (Heteroscleromorpha): Suberitida: Halichondriidae | (De Laubenfels, 1934) | Muricy *et al*., 2008 |
| PSAMMOBIOSIS: Study on museum material to investigate oscular arrangements in sponges. The habit and morphology of *Tribrachium* spp. are like in *D. dissimilis* and thus suggest similar functions, i.e. that these *Tribrachium* spp. live endospammic. | 1 – *Tribrachium fisheri*  2 – *Tribrachium schmidti* | samples from the British Museum, depth not stated | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | 1 – (De Laubenfels, 1934)  2 – Weltner, 1882 | Fry & Fry, 1979 (*T. fischeri* as *Kapnesolenia*) |
| PSAMMOBIOSIS: Field guide. *T. schmidti* is an endopsammic sponge, and all observed specimens originated from sand. Sollas’ historical plate on *Tribrachium* is reproduced. | *Tribrachium schmidti* | Bahia, Brazil, W Atlantic, 7-91 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | Weltner, 1882 | Hajdu *et al.*, 2011 |
| PSAMMOBIOSIS?, AGGLUTINATION, ANCHORING: Description. The species is obviously endopsammic, but the fistules were shorn off by the dredge and were the only material recovered. A fragment that may represent the root was covered in very coarse sediments and grit adhering to the outer surface. | *Tribrachium* WAM sp. SS 1 | Carnarvon Shelf NW Australia, Indian Ocean, 97-101 m | Po: Dem (Heteroscleromorpha): Tetractinellida (Astrophorina): Ancorinidae | indet. | Schönberg *et al.*, 2012 |
| ARMOUR: Description. *U. ada* has ‘sand in the dermal region.’ | *Ulosa ada* | Micronesia, Pacific, 5 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Esperiopsidae | De Laubenfels, 1954 | De Laubenfels, 1954 (as *Protophlitaspongia*) |
| ANCHORING: Description. *V. pourtalesii* has spicule tufts for anchoring in mud, and many long spicules extend from its surface (ca. 35 mm long). | *Vazella pourtalesii* | Gulf Stream, Florida, Atlantic, 282-593 m | Po: Hex (Hexasterophora): Lyssacinosida: Rosselidae (Rosselinae) | (Schmidt, 1870) | Schmidt 1870 (as *Holtenia*) |
| INCORPORATION: Field study comparing incorporated to ambient sediments. Sponges incorporated sediments and selected for specific grain sizes, with *V. gigantea* taking in grains larger than 5 mm. | *Verongula gigantea* | Belize, Caribbean, 1 m | Po: Dem (Verongimrpha): Verongiida: Aplysinidae | (Hyatt, 1875) | Cerrano *et al.*, 2004a (as *Aplysina compressa*) |
| Morphology suitable for PSAMMOBIOSIS: Identification guide. ‘*Vosmaeria crustacea* Fristedt (1885) forms whitish thin crusts with thin, sharply pointed papillae.’ But ‘on fjord walls’. | *Vosmaeria crustacea* | Arctic, North Polar Sea, Norway, Sweden, Skagerak, Atlantic, 25-311 m | Po: Dem (Heteroscleromorpha): Suberitida: Halichondriidae | Fristedt, 1885 | Van Soest, 2015 |
| ANCHORING, BINDING: Description. The specimen was attached to shell debris. | *Weberella bursa* | Azores, Atlantic, 150-932 m | Po: Dem (Heteroscleromorpha): Polymastiida: Polymastiidae | (Müller, 1806) | Topsent, 1928 |
| INCORPORATION, ANCHORING: Description. ‘The lower surface is formed by the agglutinated sand which makes up the greater part of the thickness of the disc. [… The grains are] firmly cemented together buy the tissues of the sponge [and by fibrous material]. The sand is exposed only on the lower surface. […] The upper third of the thickness of the disk is free from sand. […] The margin of the sponge is [hispid from the projection of the ends of large spicules].’ | *Xenospongia patelliformis* | Sri Lanka, Indian Ocean, 22-37 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | Gray, 1858 | Dendy, 1905 |
| INCORPORATION: Description. ‘Much sediment occurs in the deeper part of the choanosome. […] Sand grains in the lower two-thirds of the disk, surrounding the bases of styles and asters. […] The main peculiarities are the flattened discoid shape and the inner layer of sediment that surrounds the megasclere bases.’ | *Xenospongia patelliformis* | N Australia, Torres Strait to Sri Lanka, 20-35 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | Gray, 1858 | Sarà, 2002 |
| INCORPORATION, ANCHORING?: Description. Disc to cup-shaped, unattached sponges in which the more concave surface was heavily armoured with coarse sediments. | *Xenospongia patelliformis* | Carnarvon Shelf and Kimberley, NW Australia, Indian Ocean, 64-72 m | Po: Dem (Heteroscleromorpha): Tethyida: Tethyidae | Gray, 1858 | Schönberg *et al.*, 2012, Schönberg unpubl. data |
| PSAMMOBIOSIS: Description ‘Clusters of short irregular tubes and closed digitations and smaller fistules rising from a massive base, which is usually entirely covered by sediment, rubble and shells. […] It may be deduced that the species is an infaunal specialist of coarse sandy patches among reef corals.’ | *Xestospngia arenosa* | Curaçao, Caribbean, 3-41 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Petrosiidae | Van Soest & De Weerdt, 2001 | Van Soest & De Weerdt, 2001 |
| Morphology maybe suitable for PSAMMOBIOSIS, INCORPORATION: Description. ‘The specimen is a conical process rising from the substratum. […] Sand grains are common throughout the sponge’s interior. […] The type specimens were reported to have been found largely covered by sand and small-size coral rubble. Our specimen was free of sand cover but instead was light-protected inside a reef crevice. Sand grains inside the body showed its affinity for such foreign material.’ | *Xestospngia arenosa* | Belize, Caribbean, 20 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Petrosiidae | Van Soest & De Weerdt, 2001 | Rützler *et al.,* 2014 |
| PSAMMOBIOSIS, ANCHORING: Description ‘On a sandflat among reef corals, at 32 m, attached to coral substrate half buried in the sediment.’ | *Xestospngia caminata* | Jamaica, Curaçao, Caribbean, 10-33 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Petrosiidae | Pulitzer-Finali, 1986 | Van Soest & De Weerdt, 2001 |
| INCORPORATION: Description. Coarse, apparently well-sorted sediment was embedded in this specimen. | *Xestospongia* sp. CERF 2 = WAM sp. SS 3 | Carnarvon Shelf NW Australia, Indian Ocean, 44 m | Po: Dem (Heteroscleromorpha): Haplosclerida: Petrosiidae | indet. | Schönberg *et al.*, 2012 |
| PRODUCING SEDIMENTS through bioerosion: Description. The species erodes calcareous substrates in a manner similar to that described for Clionaidae. Part of the sponge chips can be retained in the tissues. | *Zyzzya criceta* | Great Barrier Reef, Coral Sea, Pacific, reef flat at shallow depths | Po: Dem (Heteroscleromorpha): Poecilosclerida: Acarnidae | Schönberg, 2000 | Schönberg, 2000 |
| PSAMMOBIOSIS, PRODUCING SEDIMENTS through bioerosion: Description. Van Soest *et al.* (1994) examined various museum specimens which they synonymised with *Z. fuliginisa*, among which were massive specimens and specimens that had invaded coral materials and were assumed to be actively excavating. For the W Australian specimen they noted: ‘A dark brown subspherical mass, with at least one third of its base lying in a shallow burrow in soft sediment. The upper surface tapers into a single fistule.’ | *Zyzzya fuliginosa* | Zanzibar, India, Madagascar, Mauritius, Seychelles, W Australia, Indian Ocean, (and Fiji , Pacific ?, the material descriped from Papua new Giunea, may well be *Z. criceta*) 1-200 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Acarnidae | (Carter, 1879) | Van Soest *et al*. 1994 |
| PRODUCING SEDIMENTS through bioerosion: Description. ‘Small black sponge sticking several fistules out of a crust covering a piece of coral debris. The sponge was found to have invaded the coral mass, and may tentatively be considered an excavating sponge. Galleries in the coral are irregular, not definitively identifyable.’ | *Zyzzya invemar* | Colombia, Caribbean, 25 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Acarnidae | Van Soest *et al*. 1994 | Van Soest *et al*. 1994 |
| PRODUCING SEDIMENTS through bioerosion: Description. ‘Long and thin fistules sticking out of dead calcareous rubble.’ | *Zyzzya papillata* | Ceylon, Indian Ocean, 3 m | Po: Dem (Heteroscleromorpha): Poecilosclerida: Acarnidae | (Thomas, 1968) | Van Soest *et al*. 1994 |
| PRODUCING SEDIMENTS through bioerosion: It is not entirely clear whether all species of *Zyzzya* are bioeroders, some species were originally described as free-living, massive sponges (*Z. coriacea, Z. fuliginosa*). The situation may be similar as in the Clionaidae, where massive sponges apparently retain their erosion capabilities. | *Zyzzya* spp. | NA | Po: Dem (Heteroscleromorpha): Poecilosclerida: Acarnidae | genus: De Laubenfels, 1936 | Schönberg, pers. obs. |
| BINDING: Field observations as part of a literature review. In areas of blast fishing, coral fragments can be consolidated by sponge tissue, and sponges are often the only organisms recolonising this kind of substrate (estimated to happen within 5-10 years). | cryptic and encrusting sponges | SE Sulawesi, Indo-Pacific, depth not stated | Po: Dem | Grant, 1863 | Bell, 2008 |

Taxon allocations: Po, Porifera (phylum); Cal, Calcarea; Dem, Demospongiae; Hex, Hexactinellida; Hom, Homoscleromorpha (classes); indet., not further identified; NA, not applicable, not available, may include new species. References to collections and operational taxonomy units: CERF, Commonwealth Environmental Research Facility (large collection from Carnarvon Shelf northwestern Australia; Schönberg & Fromont, 2012, Schönberg *et al.*, 2012; all respective vouchers at WAM); KIM, collection from Montgomery Reef, Kimberley, northwestern Australia (unpubl., vouchers at WAM); Ng, Ningaloo Reef; QM, Queensland Museum; SMF, Senckenberg Museum Frankfurt; SS, Research Vessel Southern Surveyor; WAM, Western Australian Museum. Cardinal directions: E, east; N, north; S, south; W, west. Methods: SEM, scanning electron microscopy; TEM, transmission electron microscopy.

**Appendix 3.** Marine sponges and their strategies of utilising sediments in taxonomic order. Information compiled distinguishing sediment incorporation, surface reinforcement with sediments and psammobiosis. Please see Appendix 2 for collection numbers and further taxonomic information. Sequence of listing within each taxon group is by alphabet ignoring subgenera and only including valid species, no subspecies or variations. Species were added from App. 1 as long as the relationship with sediments was reflected in the species name, i.e. having assurance that this species was named for its relationship with sediments and was not just a species included in a genus where this situation can occur. The system follows the changes proposed by Morrow & Cárdenas (2015) and were checked for valid names in Van Soest *et al.* (2015).

| Observation | | | | | | | | CLASS, (SUBCLASS), order and (suborder) | Species | Taxon author | Source |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sediment incorporation, body | Sediment incorporation, surface | External crust | Anchoring with spicules | Anchoring with body extensions | Anchoring by attachment | Psammobiosis | Binding |  |  |  |  |
|  |  |  |  |  |  |  |  | CALCAREA |  |  |  |
|  |  |  |  |  |  |  |  | (CALCARONEA) |  |  |  |
|  |  |  | AS |  |  |  |  | Leucosoleninda | *Amphoriscus synaptus* | (Schmidt in Haeckel, 1872) | Schmidt, 1870 (as *Sycura synapta*) |
|  |  |  | AS? | AB? |  |  |  |  | *Grantia capillosa* | (Schmidt, 1862) | Schmidt, 1870 |
|  |  |  | AS |  |  |  |  |  | *Leucilla echina* | (Haeckel, 1870) | Van Soest, 2015 |
|  |  |  |  |  | AA | can P? |  |  | *Leucosolenia variabilis* | (Haeckel, 1870) | Van Soest, 2015 |
|  |  | ES? |  |  |  |  |  |  | *Sycon ciliatum* | (Fabricius, 1780) | Van Soest, 2015 |
|  |  |  |  |  |  |  |  | (CALCINEA) |  |  |  |
|  |  |  |  | AB? | AA |  |  | Clathrinida | *Ascaltis cavata* | (Carter, 1886) | Carter, 1886 |
|  |  |  | AS? | AB? |  |  |  |  | *Clathrina lacunosa* | Johnston, 1842 | Van Soest *et al.*, 2012 (as *Guancha*) |
|  |  |  |  | AB? | AA? |  |  |  | *Clathrina osculum* | Carter, 1886 | Carter, 1886 |
|  |  |  |  |  |  |  |  | HOMOSCLEROMORPHA |  |  | no data available |
|  |  |  |  |  |  |  |  | Homosclerophorida |  |  |  |
|  |  |  |  |  |  |  |  | DEMOSPONGIAE |  |  |  |
|  |  |  |  |  |  |  |  | (HETEROSCLEROMORPHA) |  |  |  |
|  |  | ES, EP |  |  |  |  | B | Agelasida | *Agelas dispar* | Duchassaing & Michelotti, 1864 | Boury-Esnault, 1973; Muricy *et al*., 2008 |
| ST | SI? | ES? |  |  |  |  |  |  | *Agelas schmidti* | Wilson, 1902 | Hechtel, 1969; Muricy *et al*., 2008 |
|  | SI |  |  |  |  |  |  |  | *Prosuberites carriebowensis* | Rützler *et al.,* 2014 | Rützler *et al.,* 2014 |
| ST |  |  |  |  |  |  |  |  | *Prosuberites psammophilus* | (Pulitzer-Finali, 1986) | Pulitzer-Finali, 1986 (as *Laxosuberites*); App. 1 |
|  |  | ES |  |  |  |  |  | Axinellida | *Axinella parva* | Picton & Goodwin, 2007 | Van Soest, 2015 |
| SS |  |  |  |  |  |  |  |  | *Dragmacidon agariciforme* | (Dendy, 1905) | Alvarez & Hooper, 2002 |
|  |  | ES |  |  |  |  |  |  | *Dragmacidon reticulatum* | (Ridley & Dendy, 1886) | Muricy *et al*., 2008 |
|  |  |  |  |  |  |  | B |  | *Dragmacidon tuberosum* | Topsent, 1928 | Topsent, 1928 |
| SS | SI |  |  |  |  |  |  |  | *Echinodictyum arenosum* | Dendy, 1896 | Dendy, 1896; App. 1 |
|  | SI |  |  |  |  |  |  |  | *Ectyoplasia ferox* | (Duchassaing & Michelotti, 1864) | Muricy *et al*., 2008 |
|  |  | ES |  |  |  |  |  |  | *Eurypon scabiosum* | Topsent, 1927 | Topsent, 1928 (as *Acantheurypon*) |
|  |  | ES |  |  |  |  |  |  | *Hymeraphia elongata* | Picton & Goodwin, 2007 | Van Soest, 2015 |
|  |  | ES |  |  |  |  |  |  | *Hymeraphia stellifera* | Bowerbank, 1864 | Van Soest, 2015 |
| ST |  | ES |  |  |  |  |  |  | *Myrmekioderma granulatum* | (Esper, 1794) | Dendy, 1905 (as *Acanthotoxifer ceylonensis*); De Laubenfels, 1954 (as *M. tylota*) |
| ST |  | ES |  |  |  |  |  |  | *Myrmekioderma rea* | (De Laubenfels, 1934) | Pulitzer-Finali, 1986 (as *M. styx*) |
| ST |  | ES |  |  |  |  |  |  | *Negombo tenuistellata* | Dendy, 1905 | Dendy, 1905 |
|  |  | ES |  |  |  |  |  |  | *Paratimea constellata* | (Topesnt, 1893) | Van Soest, 2015 |
| SS, ST |  |  |  |  |  |  |  |  | *Pipestela* sp. CERF 2 = WAM sp. Ng 1 | indet. | Schönberg *et al.*, 2012 |
| SS |  |  |  |  |  |  |  |  | *Raspailia (Clathriodendron) arbuscula* | Von Lendenfeld, 1888 | Hooper 2002b |
|  |  | ES |  |  |  | P? |  |  | *Raspailia (Raspailia) virgultosa* | (Bowerbank, 1866) | Van Soest, 2015 |
| SS |  |  |  | AB |  |  |  |  | some *Raspailia* spp. | NA | Schmidt, 1870; Hooper, 2002b |
|  |  | ES |  |  |  |  |  |  | *Stelligera rigida* | (Montagu, 1814) | Van Soest, 2015 |
|  |  | ES |  |  |  |  |  |  | *Stelligera stuposa* | (Ellis & Solander, 1786) | Van Soest, 2015 |
|  |  |  |  |  | AR | P |  | Biemnida | *Biemna ehrenbergi* | (Keller, 1889) | Ilan & Abelson, 1995; Rützler, 2004 |
| ST? |  | ES? (mud) |  |  | AI | P |  |  | *Biemna fortis* | (Topsent, 1897) | De Laubenfels, 1954; Cerrano *et al.*, 2002, 2007a |
|  |  |  |  |  |  | P |  |  | *Biemna megalosigma* | Hentschel, 1912 | Azzini *et al.*, 2007 |
|  |  |  |  |  |  | M |  |  | *Biemna rufescens* | Bergquist & Fromont, 1988 | Bergquist & Fromont, 1988 |
|  |  |  |  |  |  |  | B |  | *Rhabderemia indica* | Dendy, 1905 | Dendy, 1905 |
| ST, SS | SI |  |  |  |  |  | B | Bubarida | *Bubaris ammosclera* | Hechtel, 1969 | Hechtel, 1969; App. 1 |
| ST | SI |  |  |  |  |  | B |  | *Bubaris salomonensis* | Dendy, 1922 | Hechtel, 1969 |
| ST | SI |  |  |  |  |  | B |  | *Bubaris vermiculata* | (Bowerbank, 1866) | Hechtel, 1969 |
| ST | SI |  |  |  |  |  |  |  | *Dictyonella arenosa* | (Rützler, 1981) | Rützler, 1981 (as *Ulosa*); App. 1 |
|  | some SI |  |  |  |  |  |  |  | *Dictyonella australiensis* | Pulitzer-Finali, 1982 | Pulitzer-Finali, 1982 |
| ST |  |  |  |  |  |  |  |  | *Dictyonella funicularis* | (Rützler, 1981) | Rützler, 1981 (as *Ulosa*) |
| SS | SI |  |  |  |  |  |  |  | *Liosina arenosa* | (Vacelet & Vasseur, 1971) | App. 1 |
| SS, SM | SI |  |  |  |  |  |  |  | *Liosina paradoxa* | Thiele, 1899 | Van Soest *et al.*, 2002 |
|  |  |  |  |  |  | P |  |  | *Petromica (Chaladesma) ciocalyptoides* | (Van Soest & Zea, 1986) | Muricy *et al*., 2008; Hajdu *et al.*, 2011 |
|  | some SI |  |  |  |  |  |  |  | *Rhaphoxya cactiformis* | (Carter, 1885) | Wiedenmayer, 1989 |
| ST? |  | ES |  | AB | AA | P | B, E | Clionaida | *Cervicornia cuspidifera* | (De Lamarck, 1815) | Rützler, 1997, 2002, 2004 |
|  |  |  |  |  |  | sand cover | E |  | *Cliona celata* | Grant, 1826 | Muricy *et al*., 2008; Hajdu *et al*., 2011 |
| ST |  |  |  |  |  |  | E |  | *Cliona varians* | (Duchassaing & Michelotti, 1864) | Cerrano *et al*., 2004a, 2007a |
| ST |  |  |  |  |  | P | E |  | *Cliona viridis* | (Schmidt, 1862) | Calcinai *et al.*, 1999; Cerrano *et al.*, 2007b (both as *Cliona nigricans*, beta growth form); Leal *et al*., in press |
| ST |  |  |  |  |  |  | E |  | *Cliona* sp. CERF 3 (aff. *viridis*) | indet. | Schönberg *et al.*, 2012 |
| ST |  |  |  |  |  |  | E |  | *Cliona* sp. PB1 (aff. *viridis*) | indet | Schönberg *et al.*, unpubl. data |
|  |  |  |  |  |  |  | E |  | Clionaidae | NA | Rützler, 2002a |
|  |  | ES |  |  |  |  | E |  | *Pione enigmatica* | De Moraes, 2011 | De Moraes, 2011 |
| ST |  |  |  |  | AA, AI, can AE | P | B, E |  | *Spheciospongia inconstans* | (Dendy, 1887) | Thiele, 1899; Ise *et al.*, 2004 |
|  |  |  |  |  |  | P? | E? |  | *Spheciospongia montiformis* | (Hallmann, 1912) | Hallmann, 1912 |
| ST | SI |  |  |  |  |  | E? |  | *Spheciospongia papillosa* | (Ridley & Dendy, 1886) | Wiedenmayer, 1989 |
|  |  |  |  | AB? |  | P | E? |  | *Spheciospongia peleia* | (De Laubenfels, 1954) | De Laubenfels, 1954 (*as Ridleia*) |
|  |  |  |  |  | AA, AI | P | B, E? |  | *Spheciospongia solida* | (Ridley & Dendy, 1886) | Ridley & Dendy, 1886 (as *Spirastrella*); Cerrano *et al.*, 2002, 2007a |
|  |  |  |  |  | AA? | P | B, E? |  | *Spheciospongia tentorioides* | (Dendy, 1905) | Dendy, 1905; Van Soest & Beglinger, 2008 |
| ST |  |  |  | AB | AA? | P | B?, E? |  | *Spheciospongia vagabunda* | (Ridley, 1884) | Dendy, 1905 (as *Spirastrella vagabunda* var. *trincomalensis*, var. *tubulodigitata*, var. *fungoides* and var. *gallensis*); De Laubenfels, 1954 (as *Anthosigmella*) |
|  |  | ES? |  |  | AE | P | E? |  | *Spheciospongia vesparium* | (De Lamarck, 1815) | Pulitzer-Finali, 1986; Rützler, 1997 |
|  |  |  |  |  | AA, AE, AI | P | some E |  | *Spheciospongia* spp. | Marshall, 1892 | Schönberg *et al.*, unpubl. data |
|  |  |  |  |  |  |  | E |  | Spirastrellidae | Ridley & Dendy, 1886 | Rützler, 2002b |
| SS |  |  |  |  |  |  |  | Desmacellida | *Desmacella arenifibrosa* | Hentschel, 1911 | App. 1 |
|  |  |  |  |  |  |  | B |  | *Desmacella inornata* | (Bowerbank, 1866) | Topsent, 1928 |
| SS |  |  |  |  |  |  |  | Haplosclerida | *Amphimedon compressa* | Duchassaing & Michelotti, 1864 | Cerrano *et al.*, 2004a; de Moraes, 2011 (as *A.* aff. *compressa*) |
|  |  |  |  |  | AA |  | B |  | *Amphimedon* cf. *paraviridis* | Fromont, 1993 | Schönberg *et al.*, 2012 |
| ST? |  |  |  |  |  |  |  |  | *Amphimedon viridis* | Duchassaing & Michelotti, 1864 | Cerrano *et al.*, 2004a |
| SS | SI |  |  |  |  |  |  |  | *Arenosclera arabica* | (Keller, 1889) | Pulitzer-Finali, 1982; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Arenosclera brasiliensis* | Muricy & Ribeiro, 1999 | Muricy & Ribeiro, 1999; App. 1 |
| SS |  |  |  |  |  |  |  |  | *Arenosclera digitata* | (Carter, 1882) | Carter, 1882 (as *Cavochalina digitata* var. *arenosa*) ; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Arenosclera heroni* | Pulitzer-Finali, 1982 | Pulitzer-Finali, 1982; Desqueroux-Faúndez, 1984; Desqueyroux-Faúndez & Valentine, 2002; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Arenosclera parca* | Pulitzer-Finali, 1982 | Pulitzer-Finali, 1982; Desqueroux-Faúndez, 1984; App. 1 |
|  | SI |  |  |  |  |  |  |  | *Arenosclera rosacea* | Desqueroux-Faúndez, 1984 | Desqueroux-Faúndez, 1984; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Arenosclera* spp. | Pulitzer-Finali, 1982 | Pulitzer-Finali, 1982; Desqueyroux-Faúndez & Valentine, 2002 |
| ST? |  |  |  |  |  |  |  |  | *Callyspongia (Cladochalina) asparagus* | (De Lamarck, 1814) | Wiedenmayer, 1989 |
| SS |  |  |  |  |  |  |  |  | *Callyspongia (Callyspongia) fallax* | Duchassaing & Michelotti, 1864 | Muricy *et al*., 2008 |
| SS | SI |  |  |  |  |  |  |  | *Callyspongia psammophera* | De Laubenfels, 1954 | De Laubenfels, 1954; App. 1 |
| SS, ST | SI |  |  |  |  |  |  |  | *Callyspongia (Callyspongia) ramosa* | (Gray, 1843) | Wiedenmayer, 1989 |
|  | SI |  |  |  |  |  |  |  | *Callyspongia velum* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Phyllospongia*) |
| SS | - |  |  |  |  |  |  |  | *Dactylia elegans* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Chalinoplysilla*) |
| SS | SI |  |  |  |  |  |  |  | *Dactylia dichotoma* | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 (as *Chalinoplysilla*) |
| SS | SI |  |  |  |  |  |  |  | *Dactylia imitans* | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 (as *Chalinoplysilla*) |
| SS | SI |  |  |  |  |  |  |  | *Dactylia impar* | Carter, 1885 | Von Lendenfeld, 1888 (as *Chalinoplysilla*) |
| SS | - |  |  |  |  |  |  |  | *Dactylia repens* | (Carter, 1886) | Von Lendenfeld, 1888 (as *Chalinoplysilla*) |
| SS | SI |  |  |  |  |  |  |  | *Dactylia varia* | (Gray, 1843) | Bergquist & Warne, 1980 (as *D. palmata*); Desqueyroux-Faúndez & Valentine, 2002 (as *D. chaliniformis*) |
| SS | SI |  |  |  |  |  |  |  | *Dactylia* spp. | NA | Bergquist & Warne, 1980 (as *D. palmata*); Desqueyroux-Faúndez & Valentine, 2002 (as *D. chaliniformis*) |
| ST | SI? |  |  |  |  |  |  |  | *Gelliodes incrustans* | Dendy, 1905 | Wiedenmayer, 1989 |
| ST |  |  |  |  |  |  |  |  | *Gelliodes poculum* | Ridley & Dendy, 1886 | Dendy, 1895 |
| ST? |  |  |  |  |  |  |  |  | *Haliclona (Soestella) arenata* | Griessinger, 1971 | App. 1 |
| SS |  |  |  |  |  |  |  |  | *Haliclona arenosa* | (Carter, 1882) | Carter, 1882 (as *Chalina digitata* var. *arenosa*); App. 1 |
| ST? |  | EP |  |  |  |  | B |  | *Haliclona (Soestella) caerulea* | (Hechtel, 1965) | Cerrano *et al.*, 2004a, 2007a; Hajdu *et al.*, 2011 |
|  |  |  |  |  |  | P? |  |  | *Haliclona (Reniera) ciocalyptoides* | Burton, 1933 | Burton, 1933 |
| ST diatoms |  | ES diatoms |  |  |  |  |  |  | *Haliclona (Rhizoniera) dancoi* | (Topsent, 1913) | Cerrano *et al.*, 2004c |
|  |  |  |  |  |  | M? |  |  | *Haliclona (Haliclona) fistulosa* | (Bowerbank, 1866) | Van Soest, 2015 |
| ST diatoms |  | ES diatoms |  |  |  |  |  |  | *Haliclona penicillata* | (Topsent, 1908) | Cerrano *et al.*, 2004c |
| SS |  |  |  |  |  |  |  |  | *Haliclona sabulosa* | Bergquist & Warne, 1980 | Bergquist & Warne, 1980; App. 1 |
|  |  |  |  |  |  |  | E, B |  | *Haliclona (Halichoclona) vansoesti* | De Weerdt *et al.*, 1999 | Rützler *et al.,* 2014 |
| ST |  | ES |  |  |  |  |  |  | *Haliclona (Haliclona)* sp. CERF 5 = WAM sp. SS 3 | indet. | Schönberg *et al.*, 2012 |
| ST |  |  |  |  |  | can P? |  |  | *Neopetrosia carbonaria* | (De Lamarck, 1814) | Pulitzer-Finali, 1986; Cerrano *et al.*, 2004a |
| SS, ST | SI |  |  |  |  |  |  |  | *Niphates arenata* | Rützler et al., 2014 | Rützler et al., 2014; App. 1 |
|  |  |  |  |  | AA |  | B |  | *Niphates erecta* | Duchassaing & Michelotti, 1864 | Biggs, 2013 |
| ST? |  |  |  | AB | AI | P | B |  | *Oceanapia amboinensis* | Topsent, 1897 | Bavestrello *et al.*, 2002, Cerrano *et al.*, 2002, 2007a |
| ST? |  |  |  |  |  |  |  |  | *Oceanapia arenosa* | Rao, 1941 | Ali, 1960; App. 1 |
|  |  | ES |  |  |  | P |  |  | *Oceanapia bartschi* | (De Laubenfels, 1934) | Muricy *et al*., 2008; Rützler *et al.,* 2014 |
|  |  |  |  |  |  | M? |  |  | *Oceanapia cohaerens* | (Carter, 1886) | Dendy, 1895 |
|  |  |  |  |  |  | M |  |  | *Oceanapia coriacea* | (Topsent, 1904) | Topsent, 1928 (as *Phloeodictyon coriaceum*) |
|  |  |  |  |  |  | M |  |  | *Oceanapia elongata* | (Topsent, 1892) | Topsent, 1928 (as *Phloeodictyon elongatum*) |
| ST? |  | EP |  | AB | AI | P | B |  | *Oceanapia fistulosa* | (Bowerbank, 1873) | Dendy, 1905 (as *Phloeodictyon fistulosum*); Topsent, 1928 (as *Phloeodictyon fistulosum*); Pulitzer-Finali, 1986; Bavestrello *et al.*, 2002, Cerrano *et al.*, 2002, 2007a |
|  |  |  |  |  |  | M? |  |  | *Oceanapia imperfecta* | Dendy, 1895 | Dendy, 1895 |
| PT |  |  |  |  | AI, AA | P | B |  | *Oceanapia isodictyiformis* | (Carter, 1882) | Van Soest, 2015 |
|  |  |  |  |  |  | M |  |  | *Oceanapia* cf. *macrotoxa* | (Hooper, 1984) | Schönberg *et al.*, 2012 |
|  |  |  |  |  | AA | M |  |  | *Oceanapia media* | (Topsent, 1928) | Topsent, 1928 (as *Phloeodictyon medium*) |
|  |  |  |  |  |  | M |  |  | *Oceanapia mollis* | Dendy, 1895 | Dendy, 1895 |
|  |  |  |  |  | AA | M | B |  | *Oceanapia nodosa* | (George & Wilson, 1919) | Muricy & Ribeiro, 1999 |
|  |  |  |  |  |  | M |  |  | *Oceanapia nodulosa* | (Topsent, 1928) | Topsent, 1928 (as *Phloeodictyon nodulosum*) |
|  |  |  |  | AB |  | P |  |  | *Oceanapia oleracea* | (Schmidt, 1870) | Schmidt, 1870; Werding & Sanchez, 1991 |
|  |  |  |  |  |  | M |  |  | *Oceanapia pedunculata* | (Ridley & Dendy, 1886) | Ridley & Dendy, 1886 (as *Rhizochalina*) |
|  |  |  |  | AB |  | P | B |  | *Oceanapia peltata* | (Schmidt, 1870) | Werding & Sanchez, 1991; Rützler, 1997, 2004; Puentes *et al.*, 2014 |
| ST? | SI? | ES?, EP? |  |  |  | M |  |  | *Oceanapia philippensis* | Dendy, 1895 | Dendy, 1895 |
| ST? | SI? |  |  |  |  | M |  |  | *Oceanapia putridosa* | (De Lamarck, 1815) | Ridley & Dendy, 1886 (as *Rhizochalina*); Wiedenmayer, 1989 |
|  |  |  |  | AB |  | M |  |  | *Oceanapia ramsayi* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Rhizochalina*); Schönberg *et al.*, 2012 (as cf.) |
|  |  |  |  |  |  | M |  |  | *Oceanapia robusta* | (Bowerbank, 1866) | Topsent, 1928; Van Soest, 2015 |
| ST? |  |  |  | AB | AI | P | B |  | *Oceanapia sagittaria* | (Sollas, 1902) | Schupp *et al.*, 1999 (as aff.), Cerrano *et al.*, 2002, 2007a |
|  |  | ES, EP |  |  | AA? | P?? | B |  | *Oceanapia zoologica* | (Dendy, 1905) | Dendy, 1905 (as *Reniera*) |
| ST |  |  |  |  |  |  |  |  | cf. *Oceanapia* sp. CERF 9 | indet. | Schönberg *et al.*, 2012 |
|  |  |  |  | AB |  | P |  |  | *Oceanapia* spp. | Norman, 1869 | Schmidt, 1870; Schönberg *et al.*, unpubl. data |
|  |  |  |  |  |  | M |  |  | *Petrosia (Petrosia)* spp. | NA | Schönberg *et al.*, 2012 |
|  |  |  |  |  | AE | P | E |  | *Siphonodictyon mucosum* | Bergquist, 1965 | Schönberg, 2000, 2001; Cerrano *et al.*, 2002, 2007a |
|  |  |  |  |  | AE | P | E |  | *Siphonodictyon siphonum* | Pulitzer-Finali, 1986 | Pulitzer-Finali, 1986 |
|  |  |  |  |  | AE | P | E |  | *Siphonodictyon viridescens* | (Schmidt, 1880) | Van Soest *et al*., 2014 |
| ST |  | ES |  |  |  |  | E? |  | *Siphonodictyon* sp. CERF 4 | indet. | Schönberg *et al.*, 2012 |
| ST |  |  |  |  |  |  | E? |  | *Siphonodictyon* sp. CERF 8 = cf. WAM sp. SS 6 | indet. | Schönberg *et al.*, 2012 |
|  |  |  |  |  |  |  | E |  | *Siphonodictyon* spp. | NA | Desqueyroux-Faúndez & Valentine, 2002 (as *Aka*); Schönberg, pers. obs. |
| ST |  |  |  |  |  | P |  |  | *Xestospongia arenosa* | Van Soest & De Weerdt, 2001 | Van Soest & De Weerdt, 2001; Rützler *et al.,* 2014; App. 1 |
|  |  |  |  |  | AR | P |  |  | *Xestospngia caminata* | Pulitzer-Finali, 1986 | Van Soest & De Weerdt, 2001 |
|  |  |  |  |  |  | M? |  | Merliida | *Hamacantha (Vomerula) papillosa* | Vosmaer, 1885 | Van Soest, 2015 (as *Hamacantha (Hamacantha)*) |
| SS? |  |  |  |  |  |  |  | Poecilosclerida | *Acarnus guentheri* | (Dendy, 1896) | Dendy, 1896 (as *Microtylotella*) |
| ST |  | ES |  |  |  |  |  |  | *Acarnus nicoleae* | Van Soest *et al.*, 1991 | Muricy *et al.*, 2008 |
| ST |  |  |  |  |  |  |  |  | *Acarnus sabulum* | Aguilar-Camacho *et al*., 2014 | Aguilar-Camacho *et al*., 2014; App. 1 |
| SS |  |  |  |  |  |  |  |  | *Acheliderma fistulatum* | (Dendy, 1896) | Dendy, 1896 (as *Fusifer fistulatus*) |
| ST |  |  |  |  |  |  |  |  | *Acheliderma fulvum* | Aguilar-Camacho *et al*., 2014 | Aguilar-Camacho *et al*., 2014 |
|  |  | EP |  | AB | AA | M | B |  | *Amphiastrella birotulifera* | (Carter, 1886) | Dendy, 1896 |
| SS | SI |  |  |  |  |  |  |  | *Chondrocladia (Chondrocladia) arenifera* | Brøndsted, 1929 | Brøndsted, 1929; App. 1 |
|  |  |  |  | AB | AR |  |  |  | *Chondrocladia (Chondrocladia) lampadiglobus* | Vacelet, 2006 | Van Soest *et al.*, 2012 |
|  |  |  |  | AB | AR |  |  |  | *Chondrocladia (Symmetrocladia) lyra* | Lee et al., 2012 | Lee *et al.*, 2012 |
| SS | SI |  |  |  |  |  |  |  | *Chondropsis arenacea* | (Dendy, 1917) | Dendy, 1917 (as *Collosclerophora*); App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Chondropsis arenifera* | Carter, 1886 | Carter, 1886; Dendy, 1895; Van Soest, 2002a; App. 1 |
| ST? |  | ES |  |  |  |  |  |  | *Chondropsis* sp. (cf. *arenifera*?) | Carter, 1886 | Bergquist & Fromont, 1988 |
| SS, ST” | SI |  |  |  |  |  |  |  | *Chondropsis australis* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Sigmatella australis* and the variations *tubaria* and *flabellum*); Dendy, 1896 (as *Desmacidon*) |
| ST? | SI |  |  |  |  |  |  |  | *Chondropsis ceratosus* | Kirkpatrick, 1900 | De Laubenfels, 1954 (as *Psammascus*) |
| SS | SI |  |  |  |  |  |  |  | *Chondropsis chaliniformis* | (*sensu* Von Lendenfeld, 1889) | Dendy, 1895 |
| SS | SI |  |  |  |  |  |  |  | *Chondropsis columnifer* | Dendy, 1895 | Dendy, 1895 |
| SS | SI |  |  |  |  |  |  |  | *Chondropsis kirkii* | (Bowerbank, 1841) | Carter, 1885 (as *Dysidea*); Von Lendenfeld, 1888 (as *Sigmatella corticata* and the varieties *papillosa*, *mammillata*, *flabellum* and *serrata*); Dendy, 1895; Bergquist & Fromont, 1988; Wiedenmayer, 1989 |
| ST, SS? | SI |  |  |  |  |  |  |  | *Chondropsis lamella* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Phoriospongia lamella* and *P. lamella* var. *panis*); Dendy, 1895 |
| SS |  |  |  |  |  |  |  |  | *Chondropsis macropsamma* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Sigmatella*); App. 1 |
| ST | SI | some ES |  |  |  |  |  |  | *Chondropsis topsenti* | Dendy, 1895 | Dendy, 1895; Bergquist & Fromont, 1988 |
| SS | SI |  |  |  |  |  |  |  | *Chondropsis wilsoni* | Dendy, 1895 | Dendy, 1895 |
| SS | some SI |  |  |  |  |  |  |  | *Chondropsis* sp. CERF 1 = WAM sp. Ng 2 | indet. | Schönberg *et al.*, 2012 |
| SS?, ST? |  |  |  |  |  |  |  |  | *Chondropsis* spp. | indet. | Ayling, 1983 |
| SS |  |  |  |  |  |  |  |  | *Chondropsis* spp., Chondropsidae | NA | Dendy, 1895; Bergquist & Fromont, 1988; De Voogd, 2012 |
|  |  |  |  | AB | AA? |  |  |  | *Cladorhiza abyssicola* | Sars, 1872 | Van Soest *et al.*, 2012 |
|  |  |  |  | AB | AA |  |  |  | *Cladorhiza gelida* | Lundbeck, 1905 | Barthel & Tendal, 1993 |
|  |  |  |  | AB? | AA? |  |  |  | *Cladorhiza* sp. | indet. | Van Soest *et al.*, 2012 |
|  |  |  |  | some AB | some AA |  |  |  | Cladorhizidae | NA | Van Soest *et al.*, 2012 |
| SS, ST | SI? |  |  |  |  |  |  |  | *Clathria (Wilsonella) australiensis* | Carter, 1885 | Von Lendenfeld, 1888 (as *Clathriopsamma lobosa*); Dendy, 1896; Hallmann, 1912; Hooper, 2002a |
| ST? |  |  |  |  | AI |  |  |  | *Clathria (Thalysias) basiarenacea* | (Boury-Esnault, 1973) | Boury-Esnault, 1973 (as *Rhaphidophlus*); App. 1 |
|  |  |  |  |  | AA |  | B |  | *Clathria (Clathria) conectens* | (Hallmann, 1912) | Hallmann, 1912 |
| ST? |  |  |  |  | AI |  |  |  | *Clathria (Thalysias) ixauda* | (Lévi, 1969) | Boury-Esnault, 1973 |
|  |  | ES?, EP? |  |  |  |  |  |  | *Clathria (Wilsonella) nigra* | (Boury-Esnault, 1973) | Boury-Esnault, 1973 (as *Psammotoxa*) |
| SS? ST? |  |  |  |  |  |  |  |  | *Clathria (Thalysias) schoenus* | (De Laubenfels, 1936) | Cerrano *et al.*, 2004a |
| SS? ST? |  |  |  |  |  |  |  |  | *Clathria (Microciona) spinosa* | (Wilson, 1902) | Cerrano *et al.*, 2004a |
| SS? ST? |  |  |  |  |  |  |  |  | *Clathria (Wilsonella)* sp*.* | Schmidt, 1862 | Cerrano *et al.*, 2004a, 2007a |
| PT |  | EP |  |  | AA | M, ‘P’ | B |  | *Coelocarteria agglomerans* | Azzini *et al.*, 2007 | Azzini *et al.*, 2007 |
|  |  |  |  |  |  | P |  |  | *Coelocarteria singaporensis* | (Carter, 1883) | De Laubenfels, 1954 (as *Ichnodonax kanpe*) |
|  | ES? |  |  |  |  | P? |  |  | *Coelosphaera (Coelosphaera) calcifera* | (Burton, 1934) | Bergquist & Fromont, 1988; App. 1 |
|  |  |  |  |  |  | M |  |  | *Coelosphaera (Coelosphaera) globosa* | Bergquist, 1961 | Bergquist & Fromont, 1988 |
|  |  |  |  |  |  | M |  |  | *Coelosphaera (Coelosphaera) navicelligerum* | (Ridley, 1885) | Von Lendenfeld, 1888 (as *Sideroma navicelligerum*) |
|  |  |  |  | AB |  | M |  |  | *Coelosphaera (Coelosphaera) verrucosa* | (Dendy, 1896) | Dendy, 1896 (as *Histoderma verrucosum*) |
|  |  |  |  |  |  | M |  |  | *Coelosphaera (Coelosphaera)* sp. CERF 2 = WAM sp. SS 3 | indet. | Schönberg *et al.*, 2012 |
|  |  |  |  |  |  | M |  |  | *Coelosphaera (Coelosphaera)* sp. CERF 3 = WAM sp. SS 3 | indet. | Schönberg *et al.*, 2012 |
| ST |  |  |  |  |  |  |  |  | *Coelosphaera (Coelosphaera)* sp. CERF 4 | indet. | Schönberg *et al.*, 2012 |
|  |  |  |  |  |  |  | E? |  | *Cornulum johnsoni* | Rützler *et al.,* 2014 | Rützler *et al.,* 2014 |
| ST |  |  |  |  |  |  |  |  | *Cornulum tylota* | (Boury-Esnault, 1973) | Boury-Esnault, 1973 (as *Artemisina*) |
| SS |  |  |  |  |  |  |  |  | *Crella (Pytheas) fristedti* | (Dendy, 1924) | Bergquist & Fromont, 1988 |
| SS, ST |  |  |  |  |  |  |  |  | *Crella incustans* (var. *arenacea*) | (Carter, 1885) | Dendy, 1896 (as *Plumohalichondria arenacea*); Hallmann, 1912; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Desmapsamma anchorata* | (Carter, 1882) | Pulitzer-Finali, 1986 (as *Holopsamma helwigi*); Van Soest, 2002b; Muricy *et al.*, 2008; App. 1 |
| ST | SI |  |  |  |  |  |  |  | *Desmapsamma turbo* | (Carter, 1885) | Carter, 1885 (as *Holopsamma*); App. 1 |
| SS | SI | ES |  |  |  |  |  |  | *Desmapsamma vervoorti* | Van Soest, 1998 | Van Soest, 1998; App. 1 |
| SS |  |  |  |  |  |  |  |  | *Desmapsamma* spp. | NA | Van Soest, 2002b; De Voogd 2012 |
| ST |  |  |  |  |  |  |  |  | *Forcepia (Forcepia) agglutinans* | Burton, 1933 | Burton, 1933; App. 1 |
| ST? |  |  |  |  |  |  |  |  | *Forcepia (Forcepia) arenosa* | Hentschel, 1911 | App. 1 |
| ST |  |  |  |  |  |  |  |  | *Forcepia (Forcepia) carteri* | Dendy, 1896 | Dendy, 1896 |
| ST? |  |  |  |  |  |  |  |  | *Forcepia (Forcepia) psammophila* | (Cabioch, 1968) | App. 1 |
|  |  |  |  |  | AA | P | B |  | *Forcepia (Forcepia) topsenti* | Lundbeck, 1905 | Berthel & Tendal, 1993 |
| PT, ST |  |  |  |  |  |  |  |  | *Forcepia (Forcepia) trilabis* | (Boury-Esnault, 1973) | Boury-Esnault, 1973 (as *Ectoforcepia*) |
| SS, ST? | SI | ES |  |  |  |  |  |  | *Holopsamma crassa* | Carter, 1885 | Carter, 1885; Dendy, 1905 (as *Psammopemma crassum* var. *clathrata*; Von Lendenfeld, 1888 (as *Halme globosa* and *Halme micropora*); Wiedenmayer, 1989 (as *Echinoclathria globosa*), Hooper 2002a; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Holopsamma laminaefavosa* | Carter, 1885 | Carter, 1885; Von Lendenfeld, 1888 (as *Halme nidus vesparum*, as *Aulena laxa* and the varieties *minima* and *digitata*, *Aulena gigantea* and the varieties *macropora, micropora* and *intermedia*); Dendy, 1896 (as *Echinoclathria arenifera*); App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Holopsamma simplex* | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 (as *Halme*); App. 1 |
| SS |  |  |  |  |  |  |  |  | *Holopsamma* spp. | Carter, 1886 | Bergquist & Fromont, 1988 (as *Psammopemm*a) |
|  |  |  |  |  | AA |  | B |  | *Hymedesmia (Hymedesmia) stylata* | Lundbeck, 1910 | Barthel & Tendal, 1993 |
| SS |  |  |  |  |  |  |  |  | *Iotrochopsamma arbuscula* | (Whitelegge, 1906) | De Laubenfels, 1954; Van Soest, 2002c; App. 1 |
| SS | SI |  |  |  | AA | ? |  |  | *Iotrochota arenosa* | Rützler et al., 2007 | Rützler *et al.*, 2007; App. 1 |
| ST diatoms |  | ES diatoms |  |  |  |  |  |  | *Kirkpatrickia variolosa* | (Kirkpatrick, 1907) | Cerrano *et al.*, 2004c |
| ST? |  |  |  |  | AI |  |  |  | *Lissodendoryx (Ectyodoryx) arenaria* | Burton, 1936 | Boury-Esnault, 1973; App. 1 |
| SS |  |  |  |  |  |  |  |  | *Lissodendoryx (Lissodendoryx) isodictyalis* | (Carter, 1882) | Carter, 1882 (as *Halichondria*) |
| ST? |  |  |  |  |  |  |  |  | *Lissodendoryx (Anomodoryx) recife* | (Boury-Esnault, 1973) | Boury-Esnault, 1973 (as *Psammochela*) |
| ST? |  |  |  |  |  |  |  |  | *Lissodendoryx (Lissodendoryx) similis* | Thiele, 1899 | Ali, 1960 |
| ST? |  |  |  |  |  |  |  |  | *Lissodendoryx (Lissodendoryx) strongylata* | (Van Soest, 1984) | Cerrano *et al.*, 2004a |
| ST? |  |  |  |  |  |  |  |  | *Lissodendoryx (Anomodoryx) tylota* | (Boury-Esnault, 1973) | Boury-Esnault, 1973 (as *Psammochela*) |
| ST |  |  |  |  |  |  |  |  | *Monanchora arbuscula* | (Duchassaing & Michelotti, 1864) | Hechtel, 1969 (as *M. barbadensis*); Muricy *et al.*, 2008 |
| ST (diatoms) |  | ES (diatoms) |  |  |  |  |  |  | *Mycale (Oxymycale) acerata* | Kirkpatrick, 1907 | Cerrano *et al.*, 2004b |
|  | SI |  |  |  |  |  |  |  | *Mycale (Mycale) alagoana* | Cedro *et al.*, 2011 | Cedro *et al.*, 2011 |
| SS? |  |  |  |  |  |  |  |  | *Mycale (Mycale) arenaria* | Hajdu & Desqueyroux-Faúndez, 1994 | App. 1 |
| ST?  much |  |  |  |  |  |  |  |  | *Mycale (Mycale) arenicola* | (Ridley & Dendy, 1886) | Ridley & Dendy, 1886 (as *Esperella*); Dendy, 1896; App. 1 |
| SS |  |  |  |  |  |  |  |  | *Mycale (Grapelia) australis* | (Gray, 1867) | Van Soest & Hajdu, 2002 |
| SS and ST? |  |  |  |  |  |  |  |  | *Mycale (Paresperella) bidentata* | Dendy, 1905 | Dendy, 1905 (as *Paresperella*) |
| SS? ST? | SI |  |  |  |  |  |  |  | *Mycale (Carmia) crassa* | (Dendy, 1896) | Dendy, 1896 (as *Esperella*) |
|  |  |  |  |  |  |  | B |  | *Mycale (Mycale) laevis* | (Carter, 1882) | Carter, 1882 (as *Esperia*) |
| SS |  |  |  |  |  |  |  |  | *Mycale (Arenochalina) mirabilis* | (Von Lendenfeld, 1887) | Von Lendenfeld, 1887, 1888 (as *Arenochalina*); Pulitzer-Finali, 1982 (also as *Mycale tylostrongylata*); Wiedenmayer 1989 |
| ST | - |  |  |  |  |  |  |  | *Mycale (Mycale) rara* | (Dendy, 1896) | Dendy, 1896 (as *Esperella*) |
| SS |  |  |  |  |  |  |  |  | *Mycale (Carmia) tenuispiculata* | (Dendy, 1905) | Dendy, 1905 (as *Esperella*) |
| ST |  |  |  |  |  |  |  |  | *Mycale (Aegogropila)* sp. CERF 1 | indet. | Schönberg *et al.*, 2012 |
|  |  |  |  |  |  |  | B |  | *Myxilla (Styloptilon) ancorata* | (Cabioch, 1968) | Van Soest, 2015 |
| ST |  |  |  |  |  |  |  |  | *Myxilla (Ectyomyxilla) areanaria* | Dendy, 1905 | Dendy, 1905; App. 1 |
| PT |  |  |  |  |  |  | B |  | *Myxilla (Myxilla) mucronata* | Pulitzer-Finali, 1986 | Pulitzer-Finali, 1986 |
| SS | SI? | ES? |  |  |  | M |  |  | *Paracornulum sinclairae* | Bergquist & Fromont, 1988 | Bergquist & Fromont, 1988 |
| ST? SS?  much sand |  |  |  |  |  |  |  |  | *Phelloderma radiatum* | Ridley & Dendy, 1886 | Ridley & Dendy, 1886 |
| ST? |  | ES |  |  |  |  |  |  | *Phorbas amaranthus* | Duchassaing & Michelotti, 1864 | Cerrano *et al.*, 2004a; Muricy *et al.*, 2008; de Moraes, 2011 |
| ST (diatoms) |  | ES (diatoms) |  |  |  |  |  |  | *Phorbas glaberrimus* | (Topsent, 1917) | Gaino *et al.*, 1994 |
| SS, ST? |  |  |  |  |  |  |  |  | *Phorbas gravidus* | (Dendy, 1896) | Dendy, 1896 (as *Plumohalichondria gravida*) |
| SS, ST |  |  |  |  |  |  |  |  | *Phorbas mollis* | (Kirkpatrick, 1903) | Hallmann, 1912 (as *Clathria*) |
| SS?, ST? | SI |  |  |  |  |  |  |  | *Phorbas* cf. *tenacior* | (Topsent, 1925) | Wiedenmayer, 1989 |
| SS | SI |  |  |  |  |  |  |  | *Phoriospongia arenifibrosa* | (Dendy, 1896) | Dendy, 1896 (as *Desmacidon*); App. 1 |
| SS, ST | SI |  |  |  |  |  |  |  | *Phoriospongia argentea* | (Marshall, 1880) | Wiedenmayer, 1989 |
| SS, ST | SI |  |  |  |  |  |  |  | *Phoriospongia carcinophila* | (Von Lendenfeld, 1889) | Wiedenmayer, 1989 |
| SS | SI |  |  |  |  |  |  |  | *Phoriospongia flabellopalmata* | (Carter, 1885) | Dendy, 1895 (as *Stylotrichophora rubra*); De Laubenfels, 1954 (as *Stylotrichophora rubra*) |
| SS |  |  |  |  |  |  |  |  | *Phoriospongia levis* | Von Lendenfeld, 1888 | Von Lendenfeld, 1888 |
| SS | SI |  |  |  |  |  |  |  | *Phoriospongia reticulum* | Marshall, 1880 | Von Lendenfeld, 1888 |
| SS, ST | SI |  |  |  |  |  |  |  | *Phoriospongia solida* | Marshall, 1880 | Van Soest, 2002a |
| -? |  |  |  |  |  |  |  |  | *Phoriospongia squalida* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Thorecta squalidus*) |
| SS, ST |  |  |  |  |  |  |  |  | *Phoriospongia* spp. | NA | Van Soest, 2002a |
| SS, ST | SI |  |  |  |  |  |  |  | *Psammochela chaliniformis* | (Carter, 1885) | Carter, 1885 (as *Dysidea*); Van Soest, 2002d; De Voogd, 2012; App. 1 |
| SS, ST | SI |  |  |  |  |  |  |  | *Psammochela elegans* | Dendy, 1916 | Van Soest, 2002d; De Voogd, 2012; App. 1 |
| SS, ST | SI |  |  |  |  |  |  |  | *Psammochela fibrosa* | (Ridley, 1884) | De Voogd, 2012; App. 1 |
| SS, ST | SI |  |  |  |  |  |  |  | *Psammochela psammodes* | (Hentschel, 1911) | Van Soest, 2002d; De Voogd, 2012; App. 1 |
| SS, ST | SI |  |  |  |  |  |  |  | *Psammochela rigida* | Bowerbank, 1875 | De Voogd, 2012; App. 1 |
| SS, ST | SI |  |  |  |  |  |  |  | *Psammochela tutiae* | De Voogd, 2012 | De Voogd, 2012; App. 1 |
| SS, ST | SI |  |  |  |  |  |  |  | *Psammochela* spp. | Dendy, 1916 | Van Soest, 2002d; De Voogd, 2012 |
| SS | SI |  |  |  |  |  |  |  | *Psammoclema aranaceum* | (Lévi, 1958) | Van Soest, 2002a; App. 1 |
| SS, ST | SI |  |  |  |  |  |  |  | *Psammoclema bitextum* | Wiedenmayer, 1968 | Wiedenmayer, 1989; App. 1 |
| SS, some ST | SI |  |  |  |  |  |  |  | *Psammoclema callosum* | (Marshall, 1880) | Wiedenmayer, 1989; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Psammoclema decipiens* | (Marshall, 1880) | Van Soest, 2002a; App. 1 |
| SS, some ST | SI |  |  |  |  |  |  |  | *Psammoclema densum* | (Marshall, 1880) | Wiedenmayer, 1989; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Psammoclema digitiferum* | (Von Lendenfeld, 1889) | Van Soest, 2002a; App. 1 |
| SS, ST | SI |  |  |  |  |  |  |  | *Psammoclema finmarchicum* | (Hentschel, 1929) | Van Soest, 2015; App. 1 |
| SS, ST | SI |  |  |  |  |  |  |  | *Psammoclema fissuratum* | Wiedenmayer, 1968 | Wiedenmayer, 1989; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Psammoclema foliaceum* | Poléjaeff, 1884 | Van Soest, 2002a; App. 1 |
| SS |  |  |  |  |  |  |  |  | *Psammoclema fuliginosum* | (Carter, 1885) | Carter, 1885 (as *Holopsamma*); App. 1 |
| SS, ST | SI |  |  |  |  |  |  |  | *Psammoclema goniodes* | Wiedenmayer, 1968 | Wiedenmayer, 1989; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Psammoclema inordinatum* | (Kirkpatrick, 1903) | Van Soest, 2002a; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Psammoclema marshalli* | (Von Lendenfeld, 1888) | Van Soest, 2002a; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Psammoclema nicaeense* | (Pulitzer-Finali & Pronzato, 1980) | Van Soest, 2002a; App. 1 |
| SS, SM, some ST | SI |  |  |  |  |  |  |  | *Psammoclema nodosum* | (Carter, 1885) | Carter, 1885; Wiedenmayer, 1989; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Psammoclema porosum* | (Poléjaeff, 1884) | Van Soest, 2002a; App. 1 |
| SS, ST? | SI |  |  |  |  |  |  |  | *Psammoclema radiatum* | Wiedenmayer, 1968 | Wiedenmayer, 1989; App. 1 |
| SS, some ST | SI |  |  |  |  |  |  |  | *Psammoclema ramosum* | Marshall, 1880 | Wiedenmayer, 1989; Van Soest, 2002a; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Psammmoclema rubrum* | (Lévi, 1958) | Van Soest, 2002a; App. 1 |
| SS |  |  |  |  |  |  |  |  | *Psammoclema rugosum* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Psammopemma*); App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Psammoclema stellidermatum* | (Carter, 1885) | Van Soest, 2002a; App. 1 |
| SS, ST | SI |  |  |  |  |  |  |  | *Psammoclema stipitatum* | Wiedenmayer, 1968 | Wiedenmayer, 1989; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Psammoclema tuberculatum* | (Von Lendenfeld, 1889) | Van Soest, 2002a; App. 1 |
| SS, ST | SI |  |  |  |  |  |  |  | *Psammoclema vansoesti* | Wiedenmayer, 1968 | Wiedenmayer, 1989; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Psmmaoclema vosmaeri* | Poléjaeff, 1884 | Van Soest, 2002a; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Psammoclema* spp. | NA | Van Soest, 2002a |
| SS |  |  |  |  |  |  |  |  | *Strongylacidon griseum* | (Schmidt, 1870) | Rützler, 1990; Van Soest, 2002a |
| SS | can SI |  |  |  |  |  |  |  | *Strongylacidon inaequale* | (Hentschel, 1911) | Wiedenmayer, 1989 (as *Stylotella inaequalis*) |
| some SS |  |  |  |  |  |  |  |  | *Strongylacidon* spp. | NA | Van Soest, 2002a |
| SS? |  |  |  |  |  |  |  |  | *Strongylamma arenosa* | (Vacelet & Vasseur, 1971) | App. 1 |
| some SS |  |  |  |  |  |  |  |  | *Strongylamma carteri* | Dendy, 1895 | Dendy, 1895 (as *Chondropsis*); Van Soest, 2002e; App. 1 |
| some ST |  |  |  |  |  |  |  |  | *Tedania (Tedania) anhelans* | (Vio in Olivi, 1792) | Boury-Esnault, 1973 |
| ST? SS?  much |  |  |  |  |  |  |  |  | *Tedania (Tedania) commixta* | Ridley & Dendy, 1886 | Ridley & Dendy, 1886 |
| some ST (coarse) |  |  |  |  |  |  |  |  | *Tedania (Tedania) diversirhaphidiophora* | Brøndted, 1924 | Bergquist & Fromont, 1988 |
| ST (diatoms) | SI (diatoms) | ES (diatoms) |  |  |  |  |  |  | Tedania (Tedaniopsis) charcoti | Topsent, 1907 | Gaino *et al.*, 1994 |
|  |  | can have ES |  |  | AA | can P | B |  | *Tedania (Tedania) ignis* | (Duchassaing & Michelotti, 1864) | De Moraes, 2011; Hajdu *et al.*, 2011 |
|  |  |  |  |  |  | P? |  |  | *Tedania (Tedania) strongylostyla* | Kennedy & Hooper, 2000 | Kennedy & Hooper, 2000 |
|  | SI |  |  |  |  |  |  |  | *Ulosa ada* | De Laubenfels, 1954 | De Laubenfels, 1954 (as *Protophlitaspongia*) |
|  |  |  |  |  |  |  | E |  | *Zyzzya criceta* | Schönberg, 2000 | Schönberg, 2000 |
|  |  |  |  |  |  |  | E |  | *Zyzzya fuliginosa* | (Carter, 1879) | Van Soest *et al*. 1994 |
|  |  |  |  |  |  |  | E |  | *Zyzzya invemar* | Van Soest *et al*. 1994 | Van Soest *et al*. 1994 |
|  |  |  |  |  |  |  | E |  | *Zyzzya papillata* | (Thomas, 1968) | Van Soest *et al*. 1994 |
|  |  |  |  |  |  |  | mostly E? |  | *Zyzzya* spp. | NA | Schönberg, pers. obs. |
|  |  |  |  | AS |  |  |  | Polymastiida | *Acanthopolymastia acanthoxa* | (Koltun, 1964) | Kelly-Borges & Bergquist, 1997 |
|  |  |  |  | AS |  |  |  |  | *Acanthopolymastia pisiformis* | Kelly-Borges & Bergquist, 1997 | Kelly-Borges & Bergquist, 1997 |
|  |  | EP |  |  | AA | M | B |  | *Polymastia agglutinans* | Ridley & Dendy, 1886 | Ridley & Dendy, 1886; Kelly-Borges & Bergquist, 1997; Van Soest, 2015; App. 1 |
|  |  |  |  |  |  | M |  |  | *Polymastia bicolor* | Carter, 1886 | Carter, 1886 |
|  |  |  |  |  |  | M |  |  | *Polymastia boletiformis* | (Lamarck, 1815) | Van Soest, 2015 |
|  |  |  |  |  |  | M |  |  | *Polymastia conigera* | Bowerbank, 1874 | Van Soest, 2015 |
|  |  |  |  |  | AA, AI | M | B |  | *Polymastia crassa* | Carter, 1886 | Carter, 1886; Wiedenmayer, 1989; Kelly-Borges & Bergquist, 1997 |
|  | SI (foraminif.) |  |  |  |  | M |  |  | *Polymastia crocea* | Kelly-Borges & Bergquist, 1997 | Kelly-Borges & Bergquist, 1997 |
|  | SI | ES, EP |  |  |  | M |  |  | *Polymastia echinus* | Kelly-Borges & Bergquist, 1997 | Kelly-Borges & Bergquist, 1997 |
|  |  |  |  |  | AA, AI | P | B |  | *Polymastia fluegeli* | Lehnert *et al.*, 2005 | Lehnert *et al.*, 2005 |
|  |  |  |  |  |  | M |  |  | *Polymastia fusca* | Bergquist, 1961 | Kelly-Borges & Bergquist, 1997 |
|  |  |  | AS |  |  | M |  |  | *Polymastia grimaldii* | (Topsent, 1913) | Van Soest, 2015 |
|  |  | ES |  |  |  | P |  |  | *Polymastia hirsuta* | Bergquist, 1968 | Kelly-Borges & Bergquist, 1997 |
|  |  |  |  |  |  | M |  |  | *Polymastia inflata* | Cabioch, 1968 | Van Soest, 2015 |
|  |  |  | AS? |  |  | M |  |  | *Polymastia infrapilosa* | Topsent, 1927 | Topsent, 1928 |
|  |  | ES, EP |  |  |  |  |  |  | *Polymastia isidis* | Thiele, 1905 | Kelly-Borges & Bergquist, 1997 |
|  |  |  |  |  |  | P |  |  | *Polymastia janeirensis* | (Boury-Esnault, 1973) | Turque *et al.*, 2008 |
|  |  |  |  |  |  | M |  |  | *Polymastia lorum* | Kelly-Borges & Bergquist, 1997 | Kelly-Borges & Bergquist, 1997 |
|  |  | ES |  |  |  | M |  |  | *Polymastia mamillaris* | (Müller, 1806) | Van Soest, 2015 |
|  |  | ES |  |  | AR | P |  |  | *Polymastia penicillus* | (Montagu, 1814) | Van Soest, 2015 |
|  |  |  |  |  |  | M |  |  | *Polymastia pepo* | Kelly-Borges & Bergquist, 1997 | Kelly-Borges & Bergquist, 1997 |
|  |  |  |  |  |  | M |  |  | *Polymastia spinula* | Bowerbank, 1866 | Van Soest, 2015 |
|  |  | ES |  |  |  | M? |  |  | *Polymastia tapetum* | Kelly-Borges & Bergquist, 1997 | Kelly-Borges & Bergquist, 1997 |
|  |  |  |  |  |  | M |  |  | *Polymastia tubulifera* | Dendy, 1922 | Van Soest & Beglinger, 2008 |
|  |  |  |  |  |  | M | B |  | *Polymastia uberrima* | (Schmidt, 1870) | Van Soest, 2015 |
| ST (foraminif.) |  |  |  |  |  |  |  |  | *Polymastia umbraculum* | Kelly-Borges & Bergquist, 1997 | Kelly-Borges & Bergquist, 1997 |
|  |  |  |  |  |  | M |  |  | *Polymastia zitteli* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Sideroma zitteli*) |
|  |  |  |  |  | AA, AI |  | B |  | *Polymastia* sp. cf. CERF 1 = WAM sp. SS 5 | indet. | Schönberg *et al.*, 2012 |
| ST |  |  |  |  | AA, AI |  | B |  | *Polymastia* sp. cf. CERF 3 | indet. | Schönberg *et al.*, 2012 |
|  |  |  |  |  |  | P? |  |  | *Polymastia* spp. | Bowerbank, 1864 | Bell & Barnes, 2000 |
|  |  |  |  |  |  | P? |  |  | *Proteleia sollasi* | Dendy & Ridley, 1886 | Von Lendenfeld, 1907 |
|  |  |  | AS (avoid sinking) | AB |  |  |  |  | *Radiella hemisphaerica* | (Sars, 1872) | Van Soest, 2015, Cárdenas, pers. comm. |
|  |  |  | AS |  |  |  |  |  | *Radiella irregularis* | (Ridley & Dendy, 1886) | Ridley & Dendy, 1886 (as *Trichostemma*) |
|  |  |  | AS |  |  |  |  |  | *Radiella sarsi* | (Ridley & Dendy, 1886) | Ridley & Dendy, 1886 (as *Trichostemma sarsii*) |
|  |  |  | AS (avoid sinking) |  | AR | can P |  |  | *Radiella sol* | Schmidt, 1870 | Schmidt, 1870; Barthel & Tendal, 1993 (as *Trichostemma*) |
|  |  | ES, EP |  |  |  | M? |  |  | *Sphaerotylus capitatus* | (Vosmaer, 1885) | Van Soest, 2015 (as *S. schoenus)* |
|  |  |  | AS? |  |  | M? |  |  | *Spinularia spinularia* | (Bowerbank, 1866) | Van Soest, 2015 |
|  |  |  | A plate |  | AR |  |  |  | *Tentorium levantinum* | Ilan et al., 2003 | Ilan *et al.*, 2003 |
|  |  | EP | AS |  | AA, AR | P |  |  | *Tentorium semisuberites* | (Schmidt, 1870) | Barthel & Tendal, 1993; Witte, 1996; Pape *et al.*, 2006; Van Soest, 2015 |
|  |  |  |  |  | AA |  | B |  | *Weberella bursa* | (Müller, 1806) | Topsent, 1928 |
|  | SI |  |  |  |  |  |  | Scopalinida | *Scopalina australiensis* | Pulitzer-Finali, 1982 | Pulitzer-Finali, 1982 |
|  |  |  |  |  | AA |  | B | Suberitida | *Aaptos aaptos* | (Schmidt, 1864) | Boury-Esnault, 1973 |
| ST (pebbles) |  | EP |  |  |  |  | B |  | *Aaptos glutinans* | De Moraes, 2011 | De Moraes, 2011; App. 1 |
|  |  |  |  |  |  |  | E? B? |  | *Amorphinopsis excavans* | Carter, 1887 | Erpenbeck & van Soest, 2002 |
|  |  |  |  |  |  | M |  |  | *Amorphinopsis* cf. *foetida* | (Dendy, 1889) | Schönberg, unpubl. data |
| ST |  |  |  |  |  |  |  |  | *Amorphinopsis* sp. CERF 1 | indet. | Schönberg *et al.*, 2012 |
|  |  |  |  |  |  |  | E |  | *Amorphinopsis* sp. | indet. | Rützler *et al.,* 2014 |
|  |  |  |  |  |  | P |  |  | *Ciocalypta digitata* | (Dendy, 1905) | Dendy, 1905 (as *Collocalypta*) |
|  |  |  |  |  |  | P |  |  | *Ciocalypta penicillus* | Bowerbank, 1862 | Bergquist, 1970; Erpenbeck & Van Soest, 2002; Van Soest, 2015 |
|  |  |  |  |  | AR | M |  |  | *Ciocalypta polymastia* | Von Lendenfeld, 1888 | Von Lendenfeld, 1888 (as *Stylotella*); Bergquist, 1970 |
|  |  |  |  |  |  | M | B |  | *Ciocalypta porrecta* | Topsent, 1928 | Topsent, 1928 |
|  |  |  |  |  | AR | P |  |  | *Ciocalypta tyleri* | Bowerbank, 1873 | Dendy, 1905 (as *C. tyleri* var. *aberrans*); Schönberg *et al.*, 2012 |
| ST |  |  |  |  | AI? |  |  |  | *Halichondria (Halichondria) agglomerans* | Cabioch, 1968 | Van Soest, 2015; App. 1 |
| ST | SI |  |  |  |  |  |  |  | *Halichondria (Halichondria) arenacea* | Dendy, 1895 | Dendy, 1895; App. 1 |
| ST? |  |  |  |  |  |  |  |  | *Halichondria (Halichondria) arenosa* | Hentschel, 1929 | App. 1 |
|  |  |  |  |  |  | M |  |  | *Halichondria (Eumastia) schmidti* | (Dendy, 1895) | Dendy, 1895 (as *Eumastia*) |
|  |  |  |  |  |  | M |  |  | *Halichondria (Eumastia) sitiens* | (Schmidt, 1870) | Van Soest, 2015 |
|  |  |  |  |  |  | M |  |  | *Halichondria (Eumastia)* spp. | NA | Dendy, 1895 (as *Eumastia*) |
|  |  |  |  | AB? |  |  |  |  | *Homaxinella balfourensis* | (Ridley & Dendy, 1886) | Van Soest, 2002b |
| ST  diatoms |  | ES  diatoms |  |  |  |  |  |  | *Homaxinella flagelliformis* | (Ridley & Dendy, 1886) | Cerrano *et al.*, 2004c |
|  |  |  |  |  | AA |  | B |  | *Hymeniacidon glabrata* | Burton, 1954 | Burton, 1954 |
|  |  |  |  |  |  | P |  |  | *Hymeniacidon heliophila* | (Parker, 1910) | Turque *et al.*, 2008 |
|  |  |  |  |  |  | P |  |  | *Hymeniacidon perlevis* | (Montagu, 1818) | Erpenbeck & Van Soest, 2002; Van Soest, 2015 |
| ST diatoms |  | ST diatoms |  |  |  |  |  |  | *Pseudosuberites montiniger* | (Carter, 1880) | Cerrano *et al.*, 2004c (as *Suberites*) |
|  |  |  |  | AB |  |  |  |  | *Rhizaxinella pyrifera* | (Delle Chiaje, 1828) | Van Soest, 2002a |
|  |  |  |  | AB | AR |  | B |  | *Rhizaxinella shikmonae* | Ilan et al., 2003 | Ilan *et al.*, 2003 |
| ST |  |  |  |  |  |  |  |  | *Spongosorites arenatus* | Díaz et al., 1993 | App. 1 |
|  |  |  |  |  |  |  | B |  | *Spongosorites topsenti* | Dendy, 1905 | Dendy, 1905 |
|  |  |  | AS? | AB |  |  |  |  | *Stylocordyla borealis* | (Lovén, 1868) | Schmidt, 1870 (as *Hyalonema boreale*); Van Soest, 2002a |
|  |  |  |  |  | AA |  | B |  | *Suberites australiensis* | Bergquist, 1986 | Bergquist, 1968 |
|  |  |  |  |  | AR |  |  |  | *Suberites carnosus* | (Johnston, 1842) | Van Soest, 2015 |
| PT |  |  |  |  |  |  |  |  | *Suberites domuncula* | (Olivi, 1792) | Von Lendenfeld, 1888 |
| PT |  |  |  |  | AA? |  | B |  | *Suberites ficus* | (Johnston, 1842) | Van Soest, 2015 |
|  |  | ES |  |  |  |  |  |  | *Suberites hirsutus* | Topsent, 1927 | Topsent, 1928 |
|  |  |  |  |  |  | M |  |  | *Suberites massa* | Nardo, 1847 | Van Soest, 2015 |
| PT |  |  |  |  |  |  |  |  | *Suberites suberia* | (Montagu, 1814) | Van Soest, 2015 |
|  |  |  |  |  | AR |  |  |  | *Suberites virgultosus* | (Johnston, 1842) | Van Soest, 2015 |
| ST? |  |  |  |  |  |  |  |  | *Suberites* sp. | indet. | Carter, 1882 |
| can ST? |  |  |  |  |  |  |  |  | *Suberites* spp. | NA | Carter, 1882 |
| ST |  |  |  |  |  |  |  |  | *Terpios aploos* | De Laubenfels, 1954 | De Laubenfels, 1954 |
| ST |  | ES |  |  |  |  |  |  | *Topsentia ophiraphidites* | (De Laubenfels, 1934) | Muricy *et al*., 2008 |
|  |  |  |  |  |  | M |  |  | *Vosmaeria crustacea* | Fristedt, 1885 | Van Soest, 2015 |
|  |  | EP |  |  |  |  | B | Tetractinellida (Astrophorina) | *Ancorina multistellata* | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 (as *Sanidastrella*) |
|  |  | ES |  |  |  |  |  |  | *Asteropus arenosus* | Van Soest & Beglinger, 2008 | Van Soest & Beglinger, 2008 |
|  |  |  |  |  |  |  | B |  | *Asteropus haeckeli* | Dendy, 1905 | Dendy, 1905 |
|  |  | ES |  |  |  |  |  |  | *Asteropus simplex* | (Carter, 1879) | Boury-Esnault, 1973 |
|  |  |  |  | AB | AA |  | B |  | *Caminus carmabi* | Van Soest *et al*., 2014 | Van Soest *et al*., 2014 |
|  |  |  |  |  |  | M |  |  | *Characella connectens* | (Schmidt, 1870) | Burton, 1954 (as *Stryphnus pachastrelloides*) |
|  |  | ES |  |  |  |  |  |  | *Characella poecilastroides* | Van Soest *et al*., 2014 | Van Soest *et al*., 2014 |
|  |  |  |  |  |  | M, ‘P’ |  |  | *Cryptosyringa membranophila* | Vacelet, 1979 | Rützler *et al.,* 2014 |
|  |  |  |  |  |  |  | B |  | *Dercitus (Stoeba) extensus* | (Dendy, 1905) | Dendy, 1905 (as *Stoeba extensa*) |
|  |  |  |  |  |  |  | E |  | *Dercitus (Stoeba) simplex* (and other *D. (Stoeba)* spp.?) | (Carter, 1880) | Maldonado, 2002 (as *Stoeba simplex*) |
| ST |  |  |  | AB | AI | P |  |  | *Disyringa dissimilis* | (Ridley, 1884) | Fry& Fry, 1979 |
|  |  | EP |  | AB |  | P | B |  | *Disyringa nodosa* | Von Lendenfeld, 1907 | Von Lendenfeld, 1907; Fry& Fry, 1979 |
|  |  |  |  |  |  | M |  |  | *Disyringa* sp. CERF 1 | indet. | Schönberg *et al.*, 2012 |
|  |  | EP |  |  |  |  | B |  | *Ecionemia acervus* | Bowerbank, 1864 | Thiele, 1899; Dendy, 1905 (as *E. carteri*); App. 1 |
|  |  | ES |  |  |  |  |  |  | *Ecionemia* sp. CERF 3 = WAM sp. SS 2 | indet. | Schönberg *et al.*, 2012 |
| ST? |  | EP |  |  |  |  |  |  | *Erylus formosus* | Sollas, 1886 | Muricy *et al.*, 2008; Rützler *et al.,* 2014 |
|  |  | EP |  |  |  |  | B |  | *Geodia areolata* | Carter, 1880 | Van Soest & Beglinger, 2008 |
|  | SI (diatoms) |  |  |  | AA, AI |  | B |  | *Geodia barretti* | Bowerbank, 1858 | Klitgaard & Tendal, 2004; but also see Hoffmann *et al*., 2004, Cárdenas & Rapp 2013 |
| ST |  | EP |  |  |  |  | B |  | *Geodia conchilega* | Schmidt, 1862 | Van Soest, 2015 |
|  |  | EP |  |  |  |  | B |  | *Geodia cydonium* | (Jameson, 1811) | Van Soest, 2015 |
|  |  | EP |  |  |  |  | B |  | *Geodia gibberosa* | De Lamarck, 1815 | Muricy *et al.*, 2008 |
|  |  |  |  |  | AA |  | B |  | *Geodia globostellifera* | Carter, 1880 | Van Soest & Beglinger, 2008 |
|  | SI |  |  |  |  |  |  |  | *Geodia neptuni* | (Sollas, 1886) | Muricy *et al.*, 2008 |
|  |  | EP |  |  |  |  | B |  | *Geodia perarmata* | Bowerbank, 1873 | Van Soest & Beglinger, 2008 (as *Isops*) |
|  |  | ES, EP? |  |  |  |  |  |  | *Geodia phlegraei* | (Sollas, 1880) | Van Soest, 2015 |
|  |  | EP |  |  |  |  | B |  | *Geodia* sp. CERF 1 | indet. | Schönberg *et al.*, 2012 |
|  |  | EP |  |  | AA |  | B |  | Geodiidae | Gray, 1867 | Klitgaard & Tendal, 1997 |
|  |  | EP |  |  |  |  |  |  | *Holoxea violacea* | Boury-Esnault, 1973 | Boury-Esnault, 1973 |
|  |  | EP |  |  |  |  | B |  | *Jaspis reptans* | (Dendy, 1905) | Dendy, 1905 (as *Coppatias*) |
| some ST |  |  |  |  |  |  |  |  | *Jaspis stellifera* | (Carter, 1879) | Carter, 1886; Schönberg *et al.*, 2012 (as *J.* cf. *stellifera*) |
|  |  |  |  | AB |  | P? | B? |  | *Melophlus saranisorum* | Thiele, 1899 | Thiele, 1899; De Laubenfels, 1954 (as *Stellettinopsis isis*) |
| ST | SI |  |  |  |  |  |  |  | *Pachastrella chuni* | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
|  |  | EP |  |  |  |  | B |  | *Penares anisoxia* | Boury-Esnault, 1973 | Boury-Esnault, 1973 |
|  |  | ES |  |  |  |  |  |  | *Psammastra murrayi* | Sollas, 1996 | Uriz, 2002 |
|  | SI |  |  |  |  |  |  |  | *Rhabdastrella aurora* | (Hentschel, 1909) | Bergquist, 1968; App. 1 |
| ST |  | EP |  |  |  |  | B |  | *Stelletta agglutinans* | (Dendy, 1905) | Dendy, 1905 (as *Cryptotethya*); App. 1 |
|  |  | EP |  |  |  |  | B |  | *Stelletta anancora* | (Sollas, 1886) | Boury-Esnault, 1973 (as *Myriastra*) |
|  | SI |  |  |  |  |  |  |  | *Stelletta areanaria* | Bergquist, 1968 | Bergquist, 1968; App. 1 |
|  |  | EP |  |  |  |  | B |  | *Stelletta communis* | (Sollas, 1886) | Bergquist, 1968 |
|  |  | EP |  |  |  |  | B |  | *Stelletta crassispicula* | (Sollas, 1886) | Von Lendenfeld, 1907 (as *S. crassiclada*); Topsent, 1928 |
|  | SI | EP |  | AB |  |  | B |  | *Stelletta fibrosa* | (Schmidt, 1870) | Pulitzer-Finali, 1986; Cárdenas *et al.*, 2009 |
|  |  | EP, ES |  |  |  |  | B |  | *Stelletta gigas* | (Sollas, 1886) | Muricy *et al*., 2008; de Moraes, 2011 |
|  |  | ES |  |  |  |  |  |  | *Stelletta grubii* | Schmidt, 1862 | Van Soest, 2015 |
| ST? |  |  |  |  |  | P? |  |  | *Stelletta herdmani* | Dendy, 1905 | Dendy, 1905 |
|  |  | ES, EP |  |  |  |  |  |  | *Stelletta hispida* | (Buccich, 1886) | Van Soest, 2015 |
|  |  |  |  |  |  | M |  |  | *Stelletta individua* | (Schmidt, 1870) | Fry & Fry, 1979 (as *Disyringa*) |
|  |  | ES |  |  |  |  | B |  | *Stelletta mamilliformis* | Carter, 1886 | Carter, 1886 |
|  |  | ES |  |  |  |  |  |  | *Stelletta megaspina* | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
|  |  | ES | AS? |  |  |  |  |  | *Stelletta normani* | Sollas, 1880 | Kennedy *et al.*, 2014; Van Soest, 2015 |
|  | PT | ES |  |  |  |  |  |  | *Stelletta pudica* | (Wiedenmayer, 1977) | Pulitzer-Finali, 1986 |
|  |  | EP |  | AB | AA |  | B |  | *Stelletta purpurea* | Ridley, 1884 | Dendy, 1905 (as *Pilochrota haeckeli* and *Pilochrota hornelli*); Van Soest & Beglinger, 2008 |
|  |  |  | AS |  |  |  |  |  | *Stelletta tethyopsis* | (Dendy, 1905) | Dendy, 1905 (as *Myriastra*) |
| ST | SI | ES? |  |  |  |  |  |  | *Stelletta tuberculata* | (Carter, 1886) | Wiedenmayer, 1989 |
| ST | SI | EP? |  |  |  |  |  |  | *Stelletta vestigium* | Dendy, 1905 | Dendy, 1905 |
|  |  |  |  | AB |  | P |  |  | *Stelletta* sp. CERF 1 | indet. | Schönberg *et al.*, 2012 |
|  |  | EP |  |  |  |  | B |  | *Stelletta* sp. CERF 2 | indet. | Schönberg *et al.*, 2012 |
|  |  | EP |  |  |  |  | B |  | *Stelletta* sp. CERF 3 | indet. | Schönberg *et al.*, 2012 |
| ST (coarse) |  |  |  |  | AI? |  |  |  | *Stelletta* sp. | indet. | Cárdenas *et al.*, 2009 |
|  |  | EP |  |  |  |  |  |  | *Stellettinopsis laviniensis* | (Dendy, 1905) | Dendy, 1905 (as *Ecionemia*) |
| ST (coarse) |  | EP |  |  |  |  | B |  | *Stellettinopsis megastylifera* | (Wintermann-Kilian & Kilian, 1984) | Cárdenas *et al.*, 2009 |
|  |  |  |  |  |  |  | B |  | *Stellettinopsis solida* | Lévi, 1965 | Van Soest & Beglinger, 2008 (as *Ecionemia*) |
| ST |  |  |  |  |  | P? |  |  | *Stryphnus ponderosus* | (Bowerbank, 1866) | Klitgaard & Tendal, 1997 |
|  |  | EP |  |  | AA? | M | B |  | *Tethyopsis calcifera* | (Bergquist, 1968) | Bergquist, 1968 (as *Monosyringia*) |
|  |  | EP |  |  | AA | M |  |  | *Tethyopsis columnifer* | Stewart, 1870 | Fry & Fry, 1979; Van Soest & Rützler, 2002 |
|  |  |  |  |  |  | M |  |  | *Tethyopsis mortenseni* | (Brøndsted, 1924) | Bergquist, 1968 (as *Monosyringia*); Fry & Fry, 1979 (as *Monosyringa*) |
| ST |  | EP |  | AB? |  |  |  |  | *Tethyopsis radiata* | (Marshall, 1884) | Von Lendenfeld, 1907 |
|  |  |  | AS |  |  | P |  |  | *Thenea abyssorum* | Koltun, 1964 | Steenstrup & Tendal, 1982; Barthel & Tendal, 1993; Witte, 1996; Cárdenas & Rapp, 2012 |
|  |  |  | AS |  |  |  |  |  | *Thenea bojeadori* | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
|  |  |  | AS |  |  |  |  |  | *Thenea levis* | Von Lendenfeld, 1907 | Streenstrup & Tendal, 1982; Cárdenas & Rapp, 2012 |
|  |  |  | AS  (halo) |  |  |  |  |  | *Thenea malindiae* | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
|  |  |  | AS |  |  |  |  |  | *Thenea megastrella* | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
|  |  |  | AS |  |  |  |  |  | *Thenea mesotriaena* | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
|  |  |  | AS |  |  |  |  |  | *Thenea microcalda* | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
|  |  |  | AS |  |  |  |  |  | *Thenea muricata* | (Bowerbank, 1858) | Schmidt, 1870 (as *Tisiphonia agariciformis*); Steenstrup & Tendal, 1982; Maldonado, 2002; Cárdenas & Rapp, 2012; Van Soest, 2015, Cárdenas, pers. comm. |
|  |  |  | AS |  |  |  |  |  | *Thenea nicobarensis* | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
|  |  |  | AS |  |  |  |  |  | *Thenea novaezealandiae* | Bergquist, 1961 | Bergquist, 1968 |
|  |  |  | AS |  |  |  |  |  | *Thenea pendula* | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
|  |  |  | AS |  |  |  |  |  | *Thenea rotunda* | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
|  |  | ES | AS |  |  |  |  |  | *Thenea schmidti* | Sollas, 1886 | Cárdenas & Rapp, 2012; Van Soest *et al.*, 2012 |
|  |  |  | AS |  |  |  |  |  | *Thenea tyla* | Von Lendenfeld, 1907 | Von Lendenfeld, 1907 |
|  |  |  | AS |  |  |  |  |  | *Thenea valdiviae* | Von Lendenfeld, 1907 | Von Lendenfeld, 1907; Streenstrup & Tendal, 1982; Cárdenas *et al.*, 2011 |
|  |  |  | AS |  |  |  |  |  | *Thenea* spp. | NA | Steenstrup & Tendal, 1982; Maldonado, 2002 |
|  |  |  |  |  |  |  | E |  | Thoosidae | Cockerell, 1925 | Rützler, 2002a, 2002c |
|  |  |  |  |  |  |  | E? |  | *Timea oxyasterina* | Rützler *et al.,* 2014 | Rützler *et al.,* 2014 |
|  |  |  |  |  |  | M |  |  | *Tribrachium fisheri* | (De Laubenfels, 1934) | Fry & Fry, 1979 (as *Kapnesolenia*) |
|  |  |  |  |  |  | M |  |  | *Tribrachium schmidti* | Weltner, 1882 | Fry & Fry, 1979; Hajdu *et al.*, 2011 |
|  |  |  |  | AB | AA | M |  |  | *Tribrachium* WAM sp. SS1 | indet. | Schönberg *et al.*, 2012 |
|  |  |  |  |  |  |  | B | Tetractinellida (Spirophorina) | *Aciculites orientalis* | Dendy, 1905 | Dendy, 1905 |
|  |  |  | AS |  |  |  |  |  | *Cinachyra barbata* | Sollas, 1886 | Von Lendenfel, 1907; Van Soest & Rützler, 2002; Van Soest *et al.*, 2014 |
|  |  | ES |  |  |  |  |  |  | *Cinachyra* sp. CERF 1 | indet. | Schönberg *et al.*, 2012 |
|  |  | ES |  |  |  |  |  |  | *Cinachyrella albabidens* | (Von Lendenfeld, 1907) | Von Lendenfeld, 1907 (as *Cinachyra*) |
|  |  | ES |  |  |  |  |  |  | *Cinachyrella albaobtusa* | (Von Lendenfeld, 1907) | Von Lendenfeld, 1907 (as *Cinachyra*) |
|  |  | ES |  |  |  |  |  |  | *Cinachyrella albatridens* | (Von Lendenfeld, 1907) | Von Lendenfeld, 1907 (as *Cinachyra*) |
|  |  | ES |  |  |  |  |  |  | *Cinachyrella alloclada* | (Uliczka, 1929) | Cárdenas *et al.*, 2009; Hajdu *et al.*, 2011 |
|  |  | ES |  |  |  |  |  |  | *Cinachyrella anmomala* | (Dendy, 1905) | Dendy, 1905 (as *Tetilla*) |
|  |  | ES |  |  |  |  |  |  | *Cinachyrella apion* | (Uliczka, 1929) | Cárdenas *et al.*, 2009; De Moraes, 2011; Hajdu *et al.*, 2011 |
|  |  | ES |  |  |  |  |  |  | *Cinachyrella arabica* | (Carter, 1869) | Van Soest & Beglinger, 2008 |
|  |  | ES? |  |  |  |  |  |  | *Cinachyrella arenosa* | (Van Soest & Stentoft, 1988) | App. 1 |
|  |  | ES |  |  |  |  | B |  | *Cinachyrella australiensis* | (Carter, 1886) | Thiele, 1899 (as *Tetilla*); De Voogd & Cleary, 2007 |
|  |  | ES |  |  |  |  |  |  | *Cinachyrella hirsuta* | (Dendy, 1889) | Dendy, 1905 (as *Tetilla*) |
|  |  | ES |  |  |  |  |  |  | *Cinachyrella kuekenthali* | (Uliczka, 1929) | Muricy *et al*., 2008; Cárdenas *et al.*, 2009; De Moraes, 2011; Hajdu *et al.*, 2011 |
|  |  | ES |  |  | AA |  |  |  | *Cinachyrella* sp. CERF 1 | indet. | Schönberg *et al.*, 2012 |
|  |  | ES |  |  |  |  |  |  | *Cinachyrella* sp. CERF 2 | indet. | Schönberg *et al.*, 2012 |
|  |  |  | AS |  |  |  |  |  | *Craniella coactifera* | (Von Lendenfeld, 1907) | Von Lendenfeld, 1907 (als *Tethya*) |
|  |  |  | AS |  |  |  | B? |  | *Craniella cranium* | (Müller, 1776) | Schmidt, 1870 (as *Tethya* or *Tetilla cranium*); Von Lendenfeld, 1907 (as *Tethya*) |
|  |  |  | AS |  |  |  |  |  | *Craniella polyura* | (Schmidt, 1870) | Gray, 1870; Schmidt, 1870 (as *Tetilla polyra*); Van Soest & Rützler, 2002 |
|  |  |  | AS |  |  |  |  |  | *Craniella* spp. | NA | Van Soest & Rützler, 2002 |
|  |  |  | AS |  |  |  |  |  | *Fangophilina hirsuta* | Von Lendenfeld, 1907 | Von Lendenfeld, 1907; App. 1 |
|  |  |  | AS |  |  |  |  |  | *Fangophilina submersa* | Schmidt, 1880 | Van Soest & Rützler, 2002; App. 1 |
|  |  | ES |  |  |  |  |  |  | *Paratetilla corrugata* | Dendy, 1922 | De Voogd & Cleary, 2007 (as *P. bacca*) |
| ST |  |  |  |  |  |  | E |  | *Samus anonymus* | Gray, 1867 | Rützler *et al.,* 2014 |
|  |  |  | AS |  |  |  |  |  | *Tetilla euplocamos* | Schmidt, 1868 | Schmidt, 1870; Van Soest & Rützler, 2002 |
|  |  |  |  | AB? |  |  | E? |  | *Tetilla laminaris* | George & Wilson, 1919 | Rützler *et al.,* 2014 |
|  |  |  | AS |  |  |  |  |  | *Tetilla leptoderma* | Sollas, 1886 | Von Lendenfeld, 1907 (als *Tethya grandis*) |
|  |  |  | AS |  |  |  |  |  | *Tetilla limicola* | Dendy, 1905 | Dendy, 1905 |
|  |  |  | AS |  |  |  |  |  | *Tetilla mutabilis* | De Laubenfels, 1930 | McGintie, 1938 |
|  |  | ES |  |  |  |  |  |  | *Tetilla poculifera* | Dendy, 1905 | Dendy, 1905 |
|  |  |  | AS |  |  |  |  |  | *Tetilla sansibarica* | (Von Lendenfeld, 1907) | Von Lendenfeld, 1907 (als *Tethya*) |
|  |  |  | usually AS |  |  |  |  |  | *Tetilla* spp. | NA | Van Soest & Rützler, 2002 |
| ST |  |  |  |  |  |  |  | Tethyida | *Columnitis anomala* | Schmidt, 1870 | Schmidt, 1870; Sarà & Bavestrello, 1996; Sarà, 2002 |
| ST |  |  |  |  | AA |  | B |  | *Columnitis squamata* | Schmidt, 1870 | Schmidt, 1870; Sarà & Bavestrello, 1996; Sarà, 2002 |
|  |  |  |  | AB | AA |  |  |  | *Halicometes stellata* | (Schmidt, 1870) | Schmidt, 1870 |
| ST? |  | ES? |  |  |  |  |  |  | *Laxotethya dampierensis* | Sarà & Sarà, 2002 | Sarà, 2002 |
| SS, ST |  | ES? |  |  |  |  |  |  | *Nucleotethya bifida* | Sarà & Bavestrello, 1996 | Sarà & Bavestrello, 1996; Sarà, 2002 |
| ST |  | ES |  |  |  |  |  |  | *Stellitethya extensa* | (Hentschel, 1909) | Sarà, 2002 |
| ST |  | ES |  |  | AI | P |  |  | *Tectitethya crypta* | (De Laubenfels, 1949) | Pulitzer-Finali, 1986 (as *Tethya cripta*); Sarà & Bavestrello, 1996; Rützler, 1997; Sarà, 2000; Cerrano *et al.*, 2004a; Rützler, 2004; Cerrano *et al.*, 2007a; Stevely *et al.*, 2011 |
| ST |  | ES |  |  |  |  |  |  | *Tectitethya keyensis* | Sarà & Bavestrello, 1996 | Sarà & Bavestrello, 1996 |
| ST |  |  |  |  |  |  |  |  | *Tectitethya macrostellata* | Sarà & Bavestrello, 1996 | Sarà & Bavestrello, 1996 |
| ST |  |  |  |  |  |  |  |  | *Tectitethya raphyroides* | Sarà & Bavestrello, 1996 | Sarà & Bavestrello, 1996 |
|  |  | ES | AS? | AB? |  |  | B |  | *Tethya aurantium* | (Pallas, 1766) | Dendy, 1905 (as *T. lyncurium*); Bergquist, 1968 |
|  |  |  |  | can AB |  |  |  |  | *Tethya citrina* | Sarà & Melone, 1965 | Van Soest, 2015 |
|  |  |  |  | AB | AA |  | B |  | *Tethya diploderma* | Schmidt, 1870 | Schmidt, 1870 |
| ST |  |  |  | AB |  |  |  |  | *Tethya fissurata* | Von Lendenfeld, 1888 | Von Lendenfeld, 1888 |
|  |  | ES |  |  |  |  |  |  | *Tethya hibernica* | Heim *et al.*, 2007 | Van Soest, 2015 |
|  |  |  |  | AB |  |  |  |  | *Tethya ingalli* | Bowerbank, 1858 | Carter, 1886; Von Lendenfeld, 1888 (as *Tethya philippensis* and *Tethyorrhaphis conulosa*); Bergquist, 1968; Wiedenmayer, 1989 |
|  |  | EP |  |  |  |  | B |  | *Tethya japonica* | Sollas, 1888 | Boury-Esnault, 1973 |
|  |  |  |  | AB | AA |  | B |  | *Tethya multifida* | (Carter, 1882) | Carter, 1882 (as *Donatia*) |
| ST | SI? |  | AS |  | AI? |  | B |  | *Xenospongia patelliformis* | Gray, 1858 | Dendy, 1905; Sarà, 2002; Schönberg *et al.*, 2012 |
| ST |  |  |  |  | AI? |  |  |  | *Xenospongia* sp. CERF 2 = WAM sp. SS 3 | indet. | Schönberg *et al.*, 2012 |
|  |  |  |  |  |  |  |  | Trachycladida |  |  |  |
|  |  |  |  |  |  |  |  | (KERATOSA) |  |  |  |
| SS |  |  |  |  |  |  |  | Dendroceratida | *Acanthodendrilla australis* | Bergquist, 1995 | Bergquist & De C. Cook, 2002a |
| ST |  |  |  |  |  |  |  |  | *Aplysilla arenosa* | Hentschel, 1929 | App. 1 |
| ST |  |  |  |  |  |  |  |  | *Aplysilla longispina* | De Laubenfels, 1930 | Cerrano *et al.*, 2004a, 2007a |
| ST | SI |  |  |  |  |  |  |  | *Aplysilla polyrhaphis* | (De Lamarck, 1814) | De Laubenfels, 1954 |
|  | SI | ES |  |  |  |  |  |  | *Aplysilla rosea* | (Narrois, 1876) | Wiedenmayer, 1989 |
|  | SI |  |  |  |  |  |  |  | *Chelonaplysilla arenosa* | (Topsent, 1925) | Topesent, 1925; App. 1 |
| SS |  |  |  |  |  |  |  |  | *Chelonaplysilla erecta* | (Row, 1911) | De Moraes, 2011; Hajdu *et al.*, 2011 (as *C.* cf. *erecta*) |
|  | SI |  |  |  |  |  |  |  | *Chelonaplysilla noevus* | (Carter, 1876) | Van Soest, 2015 |
|  | SI |  |  |  |  |  |  |  | *Chelonaplysilla psammophila* | (Topsent, 1928) | Topsent, 1928 (as *Aplysilla*); App. 1 |
|  | SI? |  |  |  |  |  |  |  | *Chelonaplysilla psammophila* | (Topsent, 1928) | Topsent, 1928 (as *Aplysilla*); App. 1 |
|  |  | ES |  |  |  |  |  |  | *Chelonaplysilla violacea* | (Von Lendenfeld, 1883) | Bergquist, 1996 |
| ST diatoms |  | ES diatoms |  |  |  |  |  |  | *Dendrilla antarctica* | Topsent, 1905 | Cerrano *et al.*, 2004c |
| some SS |  |  |  |  |  |  |  |  | *Dendrilla camera* | (De Laubenfels, 1936) | De Laubenfels, 1954 (as *Cacospongia*) |
| SS |  |  |  |  |  |  |  |  | *Dendrilla rosea* | Von Lendenfeld, 1883 | Schönberg *et al.*, 2012 |
|  |  | EP |  |  |  |  |  |  | *Dictyodendrilla* sp. CERF 1 | indet. | Schönberg *et al.*, 2012 |
| SS, ST |  |  |  |  |  |  |  |  | *Igernella notabilis* | (Duchassaing & Michelotti, 1864) | Boury-Esnault, 1973 (as *I. joyeuxi*); Pulitzer-Finali, 1986; De C. Cook & Bergquist, 2002d; De Moraes, 2011; Rützler *et al.,* 2014 |
| SS |  |  |  |  |  |  |  |  | *Igernella* spp. | NA | De C. Cook & Bergquist, 2002d |
| SS | SI |  |  |  |  |  |  | Dictyoceratida | *Aplysinopsis elegans* | Von Lendenfeld, 1888 | Von Lendenfeld, 1888 (also as *Aplysinopsis digitata*); De C. Cook & Bergquist, 2002a |
| SS |  |  |  |  |  |  |  |  | *Cacospongia levis* | Poléjaeff, 1884 | Von Lendenfeld, 1888 (as *Stelospongia australis* var. *levis*) |
| SS | - |  |  |  |  |  |  |  | *Cacospongia mollior* | Schmidt, 1862 | De C. Cook & Bergquist, 2002a |
| SS |  | EP |  |  |  |  |  |  | *Cacospongia* sp. | NA | Muricy *et al*., 2008; de Moraes, 2011 |
| SS | - |  |  |  |  |  |  |  | *Cacospongia* spp. | NA | De C. Cook & Bergquist, 2002a |
| SS | SI |  |  |  |  |  |  |  | *Candidaspongia flabellata* | Bergquist et al., 1999 | De C. Cook & Bergquist, 2002a |
| SS | SI? |  |  |  |  |  |  |  | *Carteriospongia delicata* | Pulitzer-Finali, 1982 | Pulitzer-Finali, 1982 |
| SS | SI |  |  |  |  |  |  |  | *Carteriospongia foliascens* | (Pallas, 1766) | Von Lendenfeld, 1888 (as *Phyllospongia foliascens* and *Phyllospongia elegans*); De Laubenfels, 1954 (as *Phyllospongia lekanis*); De C. Cook & Bergquist, 2002a |
| SS | SI |  |  |  |  |  |  |  | *Carteriospongia silicata* | (Von Lendenfeld, 1889) | Wiedenmayer, 1989; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Carteriospongia vermicularis* | (Von Lendenfeld, 1889) | Wiedenmayer, 1989 |
| SS | SI |  |  |  |  |  |  |  | *Carteriospongia* spp. | NA | De C. Cook & Bergquist, 2002a |
| SS | - |  |  |  |  |  |  |  | *Citronia vasiformis* | (Bergquist, 1995) | De C. Cook & Bergquist, 2002b |
| SS | -  some SI? |  |  |  |  |  |  |  | *Collospongia auris* | Bergquist et al., 1990 | De C. Cook & Bergquist, 2002a |
| SS | SI |  |  |  |  |  |  |  | *Coscinoderma pesleonis* | (De Lamarck, 1813) | Wiedenmayer, 1989; De C. Cook & Bergquistn 2002c |
| SS | SI |  |  |  |  |  |  |  | *Coscinoderma* sp. CERF 1 | indet. | Schönberg *et al.*, 2012 |
| SM | some SI |  |  |  |  |  |  |  | *Coscinoderma* sp. CERF 2 | indet. | Schönberg *et al.*, 2012 |
| SS | SI |  |  |  |  |  |  |  | *Coscinoderma* spp. | NA | Wiedenmayer, 1989; De C. Cook & Bergquist, 2002c |
| sparse SS |  |  |  |  |  |  |  |  | *Dactylospongia elegans* | (Thiele, 1899) | Thiele, 1899 |
| SS, ST | SI |  |  |  |  |  |  |  | *Dysidea avara* | (Schmidt, 1862) | Dendy, 1905 (as *Spongelia fragilis* var. *ramosa*); Topsent, 1928 (as *Spongelia*); De Laubenfels, 1954; Boury-Esnault, 1973; Wiedenmayer, 1989; Van Soest, 2015 |
| SS |  |  |  |  |  |  |  |  | *Dysidea cacos* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Spongelia cacos*) |
| SS |  |  |  |  |  |  |  |  | *Dysidea crassa* | (Dendy, 1905) | Dendy, 1905 (as *Spongelia elastica* var. *crassa*) |
| SS |  |  |  |  |  |  |  |  | *Dysidea dendyi* | (Ferrer Hernandez, 1923) | Van Soest, 2015 (as *Hyrtios*, but discussing the possibility of it being a *Dysidea*) |
| SS | SI |  |  |  |  |  |  |  | *Dysidea etheria* | De Laubenfels, 1936 | Teragawa, 1986a, 1986b; Rützler, 2004; de Moraes, 2011; Hajdu *et al.*, 2011; Rützler *et al.,* 2014 |
| SS |  |  |  |  |  |  |  |  | *Dysidea flabellum* | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 (as *Halme*) |
| SS | - |  |  |  |  |  |  |  | *Dysidea fragilis* | (Montagu, 1814) | Carter, 1885; Topsent, 1928 (as *Spongelia*); De Laubenfels, 1954; Boury-Esnault, 1973; De C. Cook & Bergquist, 2002b; Van Soest, 2015 |
| SS | some SI? |  |  |  |  |  |  |  | *Dysidea* cf. *frondosa* | Bergquist, 1995 | Schönberg *et al.*, 2012 |
| SS |  |  |  |  |  |  |  |  | *Dysidea hirciniformis* | Carter, 1885 | Carter, 1885 |
| SS | SI |  |  |  |  |  |  |  | *Dysidea incrustata* | (Dendy, 1905) | Dendy, 1905 (as *Spongelia*) |
| SS |  |  |  |  |  |  |  |  | *Dysidea janiae* | (Duchassaing & Michelotti, 1864) | Rützler, 1990 |
| SS |  |  |  |  |  |  |  |  | *Dysidea navicularis* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Haastia*) |
| SS |  |  |  |  |  |  |  |  | *Dysidea pallescens* | (Schmidt, 1862) | Von Lendenfeld, 1888 (as *Spongelia elastica*); Dendy, 1905 (as *Spongelia elastica* var. *lobosa*) |
| SS |  |  |  |  |  |  |  |  | *Dysidea ramsayi* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Spongelia ramsayi*) |
| SS |  |  |  |  |  |  |  |  | *Dysidea robusta* | Vilanova & Muricy, 2001 | Hajdu *et al.*, 2011 |
| SS |  |  |  |  |  |  |  |  | *Dysidea sagum* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Spongelia sagum*) |
| SS |  |  |  |  |  |  |  |  | *Dysidea spiculifera* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Aplysina*) |
| SS |  |  |  |  |  |  |  |  | *Dysidea variabilis* | (Duchassaing & Michelotti, 1864) | De Laubenfels, 1954 (as *D. crowshayi*) |
| some SS |  |  |  |  |  |  |  |  | *Dysidea villosa* | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 (as *Halme villosa* and *Halme villosa* var. *auloplegma*) |
| SS | SI |  |  |  |  |  |  |  | aff. *Dysidea* sp. CERF 1 | indet. | Schönberg *et al.*, 2012 |
| SS | some SI |  |  |  |  |  |  |  | aff. *Dysidea* sp. CERF 2 | indet. | Schönberg *et al.*, 2012 |
| SS | SI |  |  |  |  |  |  |  | aff. *Dysidea* sp. CERF 3 | indet. | Schönberg *et al.*, 2012 |
| SS | - |  |  |  |  |  |  |  | Dysideidae, *Dysidea* spp. | NA | De C. Cook & Bergquist, 2002b |
| SS |  |  |  |  |  |  |  |  | *Euryspongia arenaria* | Bergquist, 1961 | App. 1 |
| SS, ST |  |  |  |  |  |  |  |  | *Euryspongia heroni* | Pulitzer-Finali, 1982 | Pulitzer-Finali, 1982 |
| SS | - |  |  |  |  |  |  |  | *Euryspongia lactea* | Row, 1911 | De C. Cook & Bergquist, 2002b |
| SS |  |  |  |  |  |  |  |  | *Euryspongia phlogera* | De Laubenfels, 1954 | De Laubenfels, 1954 |
| SS | - |  |  |  |  |  |  |  | *Euryspongia* spp. | Row, 1911 | De C. Cook & Bergquist, 2002b |
| SS |  |  |  |  |  |  |  |  | *Fascaplysinopsis reticulata* | (Hentschel, 1912) | De C. Cook & Bergquist, 2002a |
| some SS |  |  |  |  |  |  |  |  | *Fascaplysinopsis* sp. CERF 1 | indet. | Schönberg *et al.*, 2012 |
| SS |  |  |  |  |  |  |  |  | *Fasciospongia costifera* | (De Lamarck, 1814) | Von Lendenfeld, 1888 (as *Stelospongia costifera* and *Stelospongia pulcherrima*) |
| - | - |  |  |  |  |  |  |  | *Fasciospongia pikei* | (Hyatt, 1877) | Von Lendenfeld, 1888 (as *Euspongia pikei*) |
| some SS |  |  |  |  |  |  |  |  | *Fasciospongia rimosa* | (DE Lamarck, 1814) | Von Lendenfeld, 1888 (as *Stelospongia canalis*); Wiedenmayer, 1989 |
| SS | - |  |  |  |  |  |  |  | *Fasciospongia turgida* | (De Lamarck, 1814) | Von Lendenfeld, 1888 (as *Stelospongia australis*, also as var. *conulata*, var. *conulissima* and var. *fovea*); De C. Cook & Bergquist, 2002a |
| SS | - |  |  |  |  |  |  |  | *Fasciospongia* spp. | NA | De C. Cook & Bergquist, 2002a |
| SS | - |  |  |  |  |  |  |  | *Fenestraspongia intertexta* | (Carter, 1885) | De C. Cook & Bergquist, 2002a |
| SS | - |  |  |  |  |  |  |  | *Fenestraspongia* spp. | NA | De C. Cook & Bergquist, 2002a |
| SS | SI |  |  |  |  |  |  |  | *Hippospongia canaliculata* | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 (also as the varieties *dura*, *elastica* and *mollissima*) |
| SS | - |  |  |  |  |  |  |  | *Hippospongia communis* | (De Lamarck, 1814) | De Laubenfels, 1954; De C. Cook & Bergquist, 2002c |
| SS |  |  |  |  |  |  |  |  | *Hippospongia galea* | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 |
| SS | - |  |  |  |  |  |  |  | *Hippospongia* spp. | NA | De C. Cook & Bergquist, 2002c |
| some SS | - |  |  |  |  |  |  |  | *Hyattella cavernosa* | (Pallas, 1766) | Dendy, 1905 (as *Hippospongia dura*); Boury-Esnault, 1973 (as *Spongia bresiliana*); Muricy *et al*., 2008 |
|  | SI |  |  |  |  |  |  |  | *Hyattella concertina* | (De Laubenfels, 1954) | De Laubenfels, 1954 (as *Aulena*) |
| some SS |  |  |  |  |  |  |  |  | *Hyattella intestinalis* | (De Lamarck, 1813) | Von Lendenfeld, 1888 (as *Hyattella clathrata*); Dendy, 1905 (as *Hippospongia intestinalis* and *Hippospongia anomala*); Pulitzer-Finali, 1986 ; De C. Cook & Bergquist, 2002c; Schönberg *et al.*, 2012 |
| SS | - |  |  |  |  | P |  |  | *Hyattella* spp. | Von Lendenfeld, 1888 | De C. Cook & Bergquist, 2002c |
| SS |  |  |  |  |  |  |  |  | *Hyrtios arenosus* | (Thiele, 1905) | App. 1 |
| SS |  |  |  |  |  |  | B |  | *Hyrtios caracasenis* | (Carter, 1882) | Carter, 1882 (as *Hircinia*) |
| SS | SI | EP |  |  |  |  |  |  | *Hyrtios collectrix* | (Schulze, 1880) | Van Soest, 2015 |
| SS |  |  |  |  |  |  |  |  | *Hyrtios communis* | (Carter, 1885) | De Laubenfels, 1954 (as *Heteronema eubamma*) |
| SS |  |  |  |  |  |  |  |  | *Hyrtios digitatus* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Dysideopsis digitata*) |
| SS |  |  |  |  |  |  |  |  | *Hyrtios elegans* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 |
| SS | some SI |  |  |  |  |  |  |  | *Hyrtios erectus* | (Keller, 1889) | De Laubenfels, 1954 (as *Thorectopsamma mela*) |
| SS | - |  |  |  |  |  |  |  | *Hyrtios proteus* | Duchassaing & Michelotti, 1864 | De C. Cook & Bergquist, 2002a |
| SS |  |  |  |  |  |  |  |  | *Hyrtios reticulatus* | (Thiele, 1899) | Thiele, 1899 (as *Dysideopsis reticulata*) |
| SS |  |  |  |  |  |  |  |  | *Hyrtios violaceus* | (Duchassaing & Michelotti, 1864) | Pulitzer-Finali, 1986 |
| SS | - |  |  |  |  |  |  |  | *Hyrtios* spp. | NA | De C. Cook & Bergquist, 2002a |
| SS, ST | SI? |  |  |  |  |  |  |  | *Ircinia akaroa* | De C. Cook & Bergquist, 1999 | De C. Cook & Bergquist, 1999 |
| SS |  |  |  |  |  |  |  |  | *Ircinia anomala* | (Dendy, 1905) | Dendy, 1905 (as *Hircinia*) |
| SS | partial SI |  |  |  |  |  |  |  | *Ircinia aucklandensis* | De C. Cook & Bergquist, 1999 | De C. Cook & Bergquist, 1999 |
| SS, SM | SI |  |  |  |  |  |  |  | *Ircinia caliculata* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Hircinia calyculata*); Wiedenmayer, 1989 |
| SS | SI |  |  |  |  |  |  |  | *Ircinia campana* | (De Lamarck, 1814) | Von Lendenfeld, 1888 (as *Hircinia*); Boury-Esnault, 1973 |
| SS | SI |  |  |  |  |  | B? |  | *Ircinia dendroides* | (Schmidt, 1862) | Van Soest, 2015 |
| SS, ST | SI |  |  |  |  |  |  |  | *Ircinia felix* | (Duchassaing & Michelotti, 1864) | Pronzato *et al.*, 2004; Cerrano *et al.*, 2007a; Muricy *et al*., 2008; de Moraes, 2011; Hajdu *et al.*, 2011; Rützler *et al.,* 2014 |
| SS |  |  |  |  |  |  |  |  | *Ircinia fistulosa* | De C. Cook & Bergquist, 1999 | De C. Cook & Bergquist, 1999 |
| SS, ST | SI |  |  |  |  |  |  |  | *Ircinia funiculata* | Pulitzer-Finali, 1982 | Pulitzer-Finali, 1982 |
| SS, ST? | SI |  |  |  |  |  |  |  | *Ircinia fusca* | Carter, 1880 | Dendy, 1905 (as *Hircinia*) |
| SS, ST | SI |  |  |  |  |  |  |  | *Ircinia microconulosa* | Pulitzer-Finali, 1982 | Pulitzer-Finali, 1982 |
| SS |  |  |  |  |  |  |  |  | *Ircinia novaezealandiae* | Bergquist, 1961 | De C. Cook & Bergquist, 1999 |
| some SS |  |  |  |  |  |  |  |  | *Ircinia pauciarenaria* | Boury-Esnault, 1973 | Boury-Esnault, 1973; App. 1 |
| SS, ST | SI? | ES? |  |  |  |  |  |  | *Ircinia pilosa* | Pulitzer-Finali, 1982 | Pulitzer-Finali, 1982 |
| SS |  |  |  |  |  |  |  |  | *Ircinia ramosa* | (Keller, 1889) | De Laubenfels, 1954; Boury-Esnault, 1973 |
| SS, ST | SI |  |  |  |  |  |  |  | *Ircinia retidermata* | Pulitzer-Finali & Pronzato, 1981 | Cerrano *et al.*, 2007a |
| SS |  |  |  |  |  |  | B |  | *Ircinia schulzei* | (Dendy, 1905) | Dendy, 1905 (as *Hircinia*) |
| SS, ST | SI | ES |  |  |  |  |  |  | *Ircinia strobilina* | (De Lamarck, 1816) | De Laubenfels, 1954; Boury-Esnault, 1973; Muricy *et al*., 2008; de Moraes, 2011; Hajdu *et al.*, 2011; Rützler *et al.,* 2014 |
| SS | SI |  |  |  |  |  |  |  | *Ircinia subaspera* | De C. Cook & Bergquist, 1999 | De C. Cook & Bergquist, 1999 |
| SS | SI | ES |  |  |  |  |  |  | *Ircinia tuberosa* | (Dendy, 1905) | Dendy, 1905 (as *Hircinia*) |
| SS | SI? | ES? |  |  | AA | P? |  |  | *Ircinia turrita* | De C. Cook & Bergquist, 1999 | De C. Cook & Bergquist, 1999 |
| SS |  |  |  |  |  |  |  |  | *Ircinia undulans* | De C. Cook & Bergquist, 1999 | De C. Cook & Bergquist, 1999 |
| SS, ST | SI |  |  |  |  |  |  |  | *Ircinia variabilis* | (Schmidt, 1862) | Von Lendenfeld, 1888 (as *Hircinia variabilis* Schulze); Pronzato *et al.*, 2004; Cerrano *et al.*, 2007a; Van Soest, 2015 |
|  |  | SE |  |  |  |  | B |  | *Ircinia* sp. CERF 1 = QM 1244 | indet. | Schönberg *et al.*, 2012 |
|  |  |  |  |  | AA |  | B |  | *Ircinia* sp. CERF 2 | indet. | Schönberg *et al.*, 2012 |
| SS, ST? | SI |  |  |  |  |  |  |  | *Ircinia* spp. | Nardo, 1833 | Schmidt, 1870 (as *Filifera*, *Hircinia* and *Polytherses*); Pronzato *et al.*, 2004, Cerrano *et al.*, 2007a |
| SS |  |  |  |  |  |  |  |  | *Lamellodysidea chlorea* | (De Laubenfels, 1954) | Thacker, 2005 |
| SS | SI |  |  |  |  |  |  |  | *Lamellodysidea herbacea* | (Keller, 1889) | De Laubenfels, 1954 (as *Dysidea* and as *Phyllospongia complex*); De C. Cook & Bergquist, 2002b |
| SS |  |  |  |  |  |  |  |  | *Lamellodysidea* spp. | NA | De C. Cook & Bergquist, 2002b |
| SS, ST | SI |  |  |  |  |  |  |  | *Leiosella caliculata* | Von Lendenfeld, 1889 | Von Lendenfeld, 1888 (as *L. compacta*); Wiedenmayer, 1989 |
| SS, ST | SI |  |  |  |  |  |  |  | *Leiosella levis* | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888; Wiedenmayer, 1989; De C. Cook & Bergquist, 2002c |
| SS | SI |  |  |  |  |  |  |  | *Leiosella silicata* | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 |
| SS, ST | SI |  |  |  |  |  |  |  | *Leiosella* spp. | NA | De C. Cook & Bergquist, 2002c |
| SS | - |  |  |  |  |  |  |  | *Lendenfeldia frondosa* | (Von Lendenfeld, 1889) | De C. Cook & Bergquist, 2002a |
| SS | SI |  |  |  |  |  |  |  | *Lendenfeldia plicata* | (Esper, 1794) | Schönberg *et al.*, 2012 |
| SS | - |  |  |  |  |  |  |  | *Lendenfeldia* spp. | NA | De C. Cook & Bergquist, 2002a |
| SS |  |  |  |  |  |  |  |  | *Luffariella herdmani* | (Dendy, 1905) | Dendy, 1905 (as *Aplysina*) |
| some SS | SI? |  |  |  |  |  |  |  | *Luffariella variabilis* | (Poléjaeff, 1884) | Von Lendenfeld, 1888 (as *Luffaria*); De C. Cook & Bergquist, 2002a |
| SS | - |  |  |  |  |  |  |  | *Luffariella* spp. | NA | De C. Cook & Bergquist, 2002a |
| SS, ST | - | ES? |  |  |  |  |  |  | *Petrosaspongia nigra* | Bergquist, 1995 | De C. Cook & Bergquist, 2002a |
| SS | - |  |  |  |  |  |  |  | *Petrosaspongia* spp. | NA | De C. Cook & Bergquist, 2002a |
| SS | SI? | ES? |  |  |  |  |  |  | *Phyllospongia palmata* | Thiele, 1899 | Thiele, 1899 |
| SS, sparse ST | SI? | ES |  |  |  |  |  |  | *Phyllospongia papyracea* | (Esper, 1794) | Thiele, 1899 (as *P. coriacea*); Dendy, 1905 (also as *P. holdsworthi*); De C. Cook & Bergquist, 2002a |
| SS | - |  |  |  |  |  |  |  | *Pleraplysilla spinifera* | (Schulze, 1879) | Von Lendenfeld, 1888 (as *Spongelia*); De C. Cook & Bergquist, 2002b; Van Soest, 2015 (as *P. minchini*) |
| SS |  |  |  |  |  |  |  |  | *Pleraplysilla stocki* | Van Soest, 1978 | Pulitzer-Finali, 1986 |
| SS | - |  |  |  |  |  |  |  | *Pleraplysilla* spp. | NA | De C. Cook & Bergquist, 2002b |
| SS | SI |  |  |  |  |  |  |  | *Psammocinia amodes* | De C. Cook & Bergquist, 1998 | De C. Cook & Bergquist, 1998; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Psammocinia arenosa* | (Poléjaeff, 1884) | Von Lendenfeld, 1888 (as *Hircinia arenosa*); De C. Cook & Bergquist, 1998; App. 1 |
| SS |  |  |  |  |  |  |  |  | *Psammocinia beresfordae* | De C. Cook & Bergquist, 1996 | De C. Cook & Bergquist, 1998; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Psammocinia bulbosa* | Bergquist, 1995 | De C. Cook & Bergquist, 1998; App. 1 |
|  |  |  |  | AB | AA | P |  |  | *Psammocinia* cf. *bulbosa* | Bergquist, 1995 | Schönberg *et al.*, unpubl. data |
| SS | SI |  |  |  |  |  |  |  | *Psammocinia charadrodes* | De C. Cook & Bergquist, 1998 | De C. Cook & Bergquist, 1998; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Psammocinia compacta* | (Poléjaeff, 1884) | De C. Cook & Bergquist, 1998; Hajdu *et al.*, 2011; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Psammocinia halmiformis* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Hircinia halmiformis*); De Laubenfels, 1954 (as *Ircinia*); De C. Cook & Bergquist, 1998; De C. Cook & Bergquist, 2002d; Schönberg *et al.*, 2012; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Psammocinia hawere* | De C. Cook & Bergquist, 1996 | De C. Cook & Bergquist, 1998; App. 1 |
| SS, ST | SI |  |  |  |  |  |  |  | *Psammocinia hirsuta* | De C. Cook & Bergquist, 1998 | De C. Cook & Bergquist, 1998; App. 1 |
| SM |  |  |  |  |  |  |  |  | *Psammocinia irregularis* | (Poléjaeff, 1884) | Von Lendenfeld, 1888 (as *Hircinia gigantea*); App. 1 |
| SS, ST | some SI |  |  |  |  |  |  |  | *Psammocinia jejuensis* | Sim, 1998 | Sim & Lee, 1999; App. 1 |
| SS |  |  |  |  |  |  |  |  | *Psammocinia lobatus* | Sim & Lee, 2002 | Sim & Lee, 2002; App. 1 |
| SS, ST |  | ES |  |  |  |  |  |  | *Psammocinia mammiformis* | Sim, 1998 | Sim & Lee, 1999; App. 1 |
| SS, ST | SI |  |  |  |  |  |  |  | *Psammocinia maorimotu* | De C. Cook & Bergquist, 1998 | De C. Cook & Bergquist, 1998; App. 1 |
| SS, ST |  | ES? |  |  |  |  |  |  | *Psammocinia mosulpia* | Sim, 1998 | Sim & Lee, 1999; App. 1 |
| SS, ST | SI |  |  |  |  |  |  |  | *Psammocinia papillata* | De C. Cook & Bergquist, 1998 | De C. Cook & Bergquist, 1998; App. 1 |
| SS, ST | SI |  |  |  |  |  |  |  | *Psammocinia perforodorsa* | De C. Cook & Bergquist, 1998 | De C. Cook & Bergquist, 1998; App. 1 |
| SS |  |  |  |  |  |  |  |  | *Psammocinia rubra* | Sim & Lee, 2002 | Sim & Lee, 2002; App. 1 |
| SS, ST | some SI |  |  |  |  |  |  |  | *Psammocinia samyangensis* | Sim & Lee, 1998 | Sim & Lee, 1999; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Psammocinia verrucosa* | De C. Cook & Bergquist, 1996 | De C. Cook & Bergquist, 1998; App. 1 |
| SS |  |  |  |  |  |  |  |  | *Psammocinia vesiculifera* | (Poléjaeff, 1884) | De C. Cook & Bergquist, 1998; App. 1 |
| SS, ST |  | ES? |  |  |  |  |  |  | *Psammocinia wandoensis* | Sim & Lee, 1998 | Sim & Lee, 1999; App. 1 |
| SS | SI |  |  |  |  |  |  |  | *Psammocinia* spp. A-B | indet. | De C. Cook & Bergquist, 1998 |
| SS |  |  |  |  |  |  |  |  | *Psammocinia* sp. C | indet. | De C. Cook & Bergquist, 1998 |
| SS, ST | SI |  |  |  |  |  |  |  | *Psammocinia* sp. D | indet. | De C. Cook & Bergquist, 1998 |
| SS, ST | SI |  |  |  |  |  |  |  | *Psammocinia* sp. CERF 1 | indet. | Schönberg *et al.*, 2012 |
| SS | can SI |  |  |  |  |  |  |  | *Psammocinia* spp. | (Von Lendenfeld, 1888) | Sim & Lee, 1999; De C. Cook & Bergquist, 2002d; Sim & Lee, 2002 |
| SS | - |  |  |  |  |  |  |  | *Rhopaloeides odorabile* | Thompson et al., 1987 | De C. Cook & Bergquist, 2002c |
| SS |  |  |  |  |  |  |  |  | *Sarcotragus australis* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Hircinia*) |
| SS | - | ES? |  |  |  |  |  |  | *Sarcotragus fasciculatus* | (Pallas, 1766) | De C. Cook & Bergquist, 2002d (*S. fasciculatus* as *Ircinia*) |
|  | SI |  |  |  |  |  |  |  | *Sarcotragus foetidus* | Schmidt, 1862 | Van Soest, 2015 (as *S. muscarum*) |
| - | SI? | ES? |  |  |  |  |  |  | *Sarcotragus spinosulus* | Schmidt, 1862 | De C. Cook & Bergquist, 2002d; Van Soest, 2015 |
| SS | - |  |  |  |  |  |  |  | *Sarcotragus* sp. CERF 2 | indet. | Schönberg *et al.*, 2012 |
| some SS, ST? | - |  |  |  |  |  |  |  | *Sarcotragus* spp. | Schmidt, 1862 | Schmidt, 1870 (as *Filifera*, *Hircinia* and *Polytherses*); De C. Cook & Bergquist, 2002d |
| some SS |  |  |  |  |  |  |  |  | *Scalarispongia cincta* | (Boury-Esnault, 1973) | Boury-Esnault, 1973 (as *Cacospongia*) |
| SS | - |  |  |  |  |  |  |  | *Scalarispongia scalaris* | (Schmidt, 1862) | De C. Cook & Bergquist, 2002a; Van Soest, 2015 |
| SS | - |  |  |  |  |  |  |  | *Scalarispongia* spp. | NA | De C. Cook & Bergquist, 2002a |
| SS | - |  |  |  |  |  |  |  | *Semitaspongia incompta* | De C. Cook & Bergquist, 2000 | De C. Cook & Bergquist, 2002a |
| SS | - |  |  |  |  |  |  |  | *Semitaspongia* spp. | NA | De C. Cook & Bergquist, 2002a |
| SS | - |  |  |  |  |  |  |  | *Smenospongia aurea* | (Hyatt, 1875) | De C Cook & Bergquist, 2002a |
| SS |  |  |  |  |  |  |  |  | *Smenospongia dysodes* | (De Laubenfels, 1954) | De Laubenfels, 1954 (as *Polyfibrospongia*) |
| SS | - |  |  |  |  |  |  |  | *Smenospongia* spp. | NA | De C Cook & Bergquist, 2002a |
| SS | some SI |  |  |  |  |  |  |  | *Spongia (Spongia) agaricina* | Pallas, 1766 | Van Soest, 2015 |
| - | - |  |  |  |  |  |  |  | *Spongia (Spongia) bailyi* | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 (as *Euspongia bailyi*) |
| SS |  |  |  |  | AA? |  |  |  | *Spongia (Spongia) ceylonensis* | (Dendy, 1905) | Dendy, 1905 (as *Euspongia officinalis* var. *ceylonensis*) |
| SS | some SI |  |  |  |  |  |  |  | *Spongia (Heterofibria) corrugata* | De C. Cook & Bergquist, 2001 | De C. Cook & Bergquist, 2001 |
| SS | - |  |  |  |  |  |  |  | *Spongia (Heterofibria) cristata* | De C. Cook & Bergquist, 2001 | De C. Cook & Bergquist, 2001, 2002c |
| SS, ST | some SI |  |  |  |  |  |  |  | *Spongia (Heterofibria) gorgonocephalus* | De C. Cook & Bergquist, 2001 | De C. Cook & Bergquist, 2001 |
| SS | - |  |  |  |  |  |  |  | *Spongia (Australospongia) gracilis* | De C. Cook & Bergquist, 2001 | De C. Cook & Bergquist, 2001, 2002c |
| SS | SI |  |  |  |  |  |  |  | *Spongia (Spongia) hispida* | De Lamarck, 1814 | Von Lendenfeld, 1888 (as *Euspongia irregularis* var. *silicata*); Wiedenmayer, 1989 |
| SS, ST | some SI |  |  |  |  |  |  |  | *Spongia (Spongia) irregularis* | (Von Lendenfeld, 1889) | Von Lendenfeld, 1888 (as *Euspongia irregularis*); De C. Cook & Bergquist, 2001 (as *Spongia (Spongia)* cf. *irregularis*) |
| SS |  |  |  |  |  |  |  |  | *Spongia (Spongia) lignea* | Hyatt, 1877 | Von Lendenfeld, 1888 (as *Euspongia officinalis* var. *dura*) |
| SS, ST | some SI |  |  |  |  |  |  |  | *Spongia (Heterofibria) manipulatus* | De C. Cook & Bergquist, 2001 | De C. Cook & Bergquist, 2001 |
| SS |  |  |  |  |  |  |  |  | *Spongia (Heterofibria) mokohinau* | De C. Cook & Bergquist, 2001 | De C. Cook & Bergquist, 2001 |
| - | - |  |  |  |  |  |  |  | *Spongia (Spongia) nitens* | (Schmidt, 1862) | Van Soest, 2015 |
| some SS | some SI |  |  |  |  |  | B |  | *Spongia (Spongia) officinalis* | Linnaeus, 1759 | Carter, 1882; Von Lendenfeld, 1888 (as *Euspongia officinalis* and *Euspongia officinalis* var. *mollissima*); De Laubenfels, 1954; Van Soest, 2015 |
| some SS |  |  |  |  |  |  |  |  | *Spongia (Spongia) pertusa* | Hyatt, 1877 | Pulitzer-Finali, 1986 |
| SS (!silt?) |  |  |  |  |  |  |  |  | *Spongia reticulata* | (Von Lendenfeld, 1886) | Von Lendenfeld, 1888 (as *Hippospongia reticulata*) |
| SS | SI? | SP |  |  |  |  | B |  | *Spongia (Spongia) tenuiramosa* | (Dendy, 1905) | Dendy, 1905 (as *Euspongia*) |
| SS |  |  |  |  |  | M |  |  | *Spongia (Spongia) virgultosa* | (Schmidt, 1868) | Boury-Esnault, 1973; Van Soest, 2015 |
| SS |  |  |  |  |  |  |  |  | *Spongia (Spongia) zimocca* | Linnaeus, 1759 | De Laubenfels, 1954 |
| some SS | almost no SI |  |  |  |  |  |  |  | *Spongia* sp. CERF 1 | indet. | Schönberg *et al.*, 2012 |
| some SS, some ST | light SI |  |  |  |  |  |  |  | *Spongia* sp. CERF 4 | indet. | Schönberg *et al.*, 2012 |
| SS | SI |  |  |  |  |  |  |  | *Strepsichordaia caliciformis* | (Carter, 1885) | Carter, 1885 (as *Carteriospongia*); Wiedenmayer, 1989 (as *Carteriospongia*) |
| SS | SI |  |  |  |  |  |  |  | *Strepsichordaia lendenfeldi* | Bergquist et al., 1988 | De C. Cook & Bergquist, 2002a |
| SS | SI |  |  |  |  |  |  |  | *Strepsichordaia* spp. | NA | De C. Cook & Bergquist, 2002a |
| SS |  |  |  |  |  |  |  |  | *Taonura colus* | (De Lamarck, 1814) | Von Lendenfeld, 1888 (as *Thorecta gracillimus*) |
| SS | - |  |  |  |  |  |  |  | *Taonura flabelliformis* | Carter, 1882 | De C. Cook & Bergquist, 2002a |
| SS |  |  |  |  |  |  |  |  | *Taonura marginalis* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Thorecta exemplum* var. *marginalis*) |
| SS | - |  |  |  |  |  |  |  | *Taonura* spp. | NA | De C. Cook & Bergquist, 2002a |
| SS | SI |  |  |  |  |  |  |  | *Thorecta exemplum* | Von Lendenfeld, 1888 | Von Lendenfeld, 1888 |
| SS | SI |  |  |  |  |  |  |  | *Thorecta latus* | (Carter, 1885) | Von Lendenfeld, 1888 (as *Thorecta exemplum* var. *secunda* and var. *tertia*); De C. Cook & Bergquist, 2002a |
| SS |  |  |  |  |  |  |  |  | *Thorecta mirabilis* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 (as *Stelospongia*) |
| SS |  |  |  |  |  |  |  |  | *Thorecta prima* | (Von Lendenfeld, 1888) | Von Lendenfeld, 1888 |
| SS |  |  |  |  |  |  |  |  | *Thorecta ramsayi* | Von Lendenfeld, 1888 | Von Lendenfeld, 1888 |
| SS | SI |  |  |  |  |  |  |  | *Thorecta tuberculata* | (Carter, 1885) | Wiedenmayer, 1989 |
| SS | some SI |  |  |  |  |  |  |  | *Thorecta* sp. CERF 1 | indet. | Schönberg *et al.*, 2012 |
| SS |  |  |  |  |  |  |  |  | *Thorecta* sp. | indet. | Muricy *et al*., 2008 |
| SS | SI |  |  |  |  |  |  |  | *Thorecta* spp. | NA | De C. Cook & Bergquist, 2002a |
| SS | SI |  |  |  |  |  |  |  | *Thorectandra boletus* | (De Lamarck, 1815) | De C. Cook & Bergquist, 2002a |
| SS | SI |  |  |  |  |  |  |  | *Thorectandra choanoides* | (Bowerbank, 1872) | Wiedenmayer, 1989 (as *Thorecta*) |
| SS, ST | SI |  |  |  |  |  |  |  | *Thorectandra crateriformis* | (Carter, 1885) | Carter, 1885 (as *Pseudoceratina*) |
| SS | SI |  |  |  |  |  |  |  | *Thorectandra glomerosus* | (Wiedenmayer, 1989) | Wiedenmayer, 1989 (as *Thorecta*) |
| SS | SI |  |  |  |  |  |  |  | *Thorectandra* spp. | NA | De C. Cook & Bergquist, 2002a |
|  |  |  |  |  |  |  |  | (VERONGIMORPHA) |  |  |  |
|  |  |  |  |  |  |  | B | Chondrillida | *Chondrilla australiensis* | Carter, 1873 | Dendy, 1905 (also as *C. australiensis* var. *lobata*) |
| ST |  |  |  |  |  |  |  |  | *Halisarca australiensis* var. *arenacea* | Carter, 1886 | App. 1 |
| ST |  |  |  |  |  |  |  |  | *Halisarca* sp. | indet. | Bakus, 1968 |
| some ST? |  |  |  |  |  |  |  |  | *Thymosiopsis cuticulatus* | Vacelet & Perez, 1998 | Boury-Esnault, 2002 |
| ST |  |  |  |  | AI |  |  | Chondrosiida | *Chondrosia chuculla* | De Laubenfels, 1936 | Von Lendenfeld, 1888 (as *Chondrosia collectrix*) |
| ST |  |  |  |  | AA, AI |  | B |  | *Chondrosia collectrix* | (Schmidt, 1870) | Schmidt 1870 (as *Cellulophana*); Pulitzer-Finali, 1986 |
| ST |  |  |  |  |  |  |  |  | *Chondrosia reniformis* | Nardo, 1847 | Bavestrello *et al.*, 1995, 1996, 1998a, 1998b, 2003; Cerrano *et al.*, 1999, 2007a |
| ST |  |  |  |  | AI |  |  |  | *Chondrosia reticulata* | (Carter, 1886) | Von Lendenfeld, 1888 (as *Reniera collectrix*); Wiedenmayer, 1989 |
| SS |  |  |  |  |  |  |  | Verongiida | *Aplysina cacos* | Von Lendenfeld, 1888 | Von Lendenfeld, 1888 |
| - | - |  |  |  | AA |  | B |  | *Aplysina cauliformis* | (Carter, 1882) | Carter, 1882; Biggs, 2013 |
| ST? |  |  |  |  |  |  |  |  | *Aplysina lacunosa* | (De Lamarck, 1814) | Cerrano *et al.*, 2004a |
| SS | SI |  |  |  |  |  |  |  | *Aplysina* sp. CERF 3 | indet. | Schönberg *et al.*, 2012 |
|  |  |  |  |  |  |  | B |  | *Aplysina* sp. | indet. | Biggs, 2013 |
| ST? |  |  |  |  |  |  |  |  | *Aplysinella rhax* | (De Laubenfels, 1954) | De Laubenfels, 1954 (as *Dysidea*) |
| SS, ST | SI |  |  |  |  |  |  |  | *Pseudoceratina durissima* | Carter, 1885 | De Laubenfels, 1954 (*P. durissima* as *Druinella rotunda*); Wiedenmayer, 1989; Bergquist & De C. Cook, 2002d |
| SS |  |  |  |  |  |  |  |  | *Pseudoceratina purpurea* | (Carter, 1880) | Thiele, 1899 (as *Druinella ramosa*); De Laubenfels, 1954 (*P. purpurea* as *Dendrilla veringiformis, Druinella tyoeis* and *Thorectopsamma xana*) |
| SS?, ST? | some SI |  |  |  |  |  |  |  | *Pseudoceratina* sp CERF 1 = cf. WAM sp. SS2 | indet. | Schönberg *et al.*, 2012 |
| SS |  |  |  |  |  |  |  |  | *Suberea? flavolivescens* | (Hofman & Kielman, 1992) | Rützler *et al.,* 2014 (after tentative genus transfer from *Axinyssa*) |
| SS?, ST? |  |  |  |  |  |  |  |  | *Verongula gigantea* | (Hyatt, 1875) | Cerrano *et al.*, 2004a (as *Aplysina compressa*) |
|  |  |  |  |  |  |  |  | HEXACTINELLIDA |  |  |  |
|  |  |  |  |  |  |  |  | (AMPHIDISCOPHORA) |  |  |  |
|  |  |  | AS |  |  |  |  | Amphidiscosida | *Chalaronema sibogae* (monospecific genus) | Ijima, 1927 | Tabachnick & Menshenina, 2002a; Ogawa *et al.*, 2006-2012, Leys et al. 2007 |
|  |  |  |  |  |  |  |  |  | *Compsocalyx gibberosa* (monospecific genus) |  | Leys et al. 2007 |
|  |  |  | AS |  |  |  |  |  | *Hyalonema* (*Prionema*) *agujanum* | Von Lendenfeld, 1915 | Tabachnick & Mensheninan 2002a |
|  |  |  | AS |  |  |  |  |  | *Hyalonema* (*Paradisconema*) *alcocki* | Schulze, 1895 | Tabachnick & Menshenina, 2002a |
|  |  |  | AS |  |  |  |  |  | *Hyalonema* (*Cyliconema*) *apertum* | Schulze, 1886 | Tabachnick & Menshenina, 2002a |
|  |  |  | AS |  |  |  |  |  | *Hyalonema* (*Phialonemiella*) *brevancora* | Von Lendenfeld, 1915 | Tabachnick & Menshenina, 2002a |
|  |  |  | AS |  |  |  |  |  | *Hyalonema* (*Leptonema*) *campanula* | Von Lendenfeld, 1915 | Tabachnick & Menshenina, 2002a |
|  |  |  | AS |  |  |  |  |  | *Hyalonema* (*Coscinonema*) *kirkpatricki* | Ijima, 1927 | Tabachnick & Menshenina, 2002a |
|  |  |  | AS |  |  |  |  |  | *Hyalonema* (*Leptonema*) *lusitanicum* | Barboza du Bocage, 1864 | Topsent, 1928 |
|  |  |  | AS |  |  |  |  |  | *Hyalonema* (*Onconema*) *obtusum* | Von Lendenfeld, 1915 | Tabachnick & Menshenina, 2002a |
|  |  |  | AS |  |  |  |  |  | *Hyalonema* (*Corynonema*) *owstoni* | Ijima, 1894 | Tabachnick & Menshenina, 2002a; Ogawa *et al.*, 2006-2012 |
|  |  |  | AS |  |  |  |  |  | *Hyalonema (Hyalonema) sieboldii* | Gray, 1835 | Tabachnick & Menshenina, 2002a; Ehrlich *et al.*, 2005, 2006; Kul’chin *et al.*, 2007, 2008; Voznesenskiy *et al.*, 2010a, 2011 |
|  |  |  | AS |  |  |  |  |  | *Hyalonema* (*Thamnonemiella*) *thamnophorum* | Ijima, 1927 | Tabachnick & Menshenina, 2002a; Ogawa *et al.*, 2006-2012 |
|  |  |  | AS |  |  |  |  |  | *Hyalonema* (*Cycliconema) timorense* | Ijima, 1927 | Ogawa *et al.*, 2006-2012 |
|  |  |  | AS |  |  |  |  |  | *Hyalonema* (*Ijimaonema*) *topsenti* | Ijima, 1927 | Tabachnick & Menshenina, 2002a (subgenus *Ijimaonema* as *Pteronema*); Ogawa *et al.*, 2006-2012 |
|  |  |  | AS |  |  |  |  |  | *Hyalonema* sp. | indet. | **Sand**ford, 2003 |
|  |  |  | AS |  |  |  |  |  | *Hyalonema* sp. | indet. | Van Soest *et al.*, 2012 |
|  |  |  |  |  |  |  |  |  | Hyalonema spp. | NA | Leys *et al*., 2007 |
|  |  |  | AS |  |  |  |  |  | Hyalonematidae | NA | Tabachnick, 1991 |
|  |  |  | AS |  |  |  |  |  | *Lophophysema inflatum* | Schulze, 1900 | Tabachnick & Menshenina, 2002a |
|  |  |  |  |  |  |  |  |  | *Lophophysema* spp. | NA | Leys *et al*., 2007 |
|  |  |  | AS |  |  |  |  |  | *Monorhaphis chuni* | Schulze, 1904 | Lévi *et al.*, 1989; Tabachnick, 1991; 2002c; Woesz *et al.*, 2006; Leys, *et al.* 2007; Miserez *et al.*, 2008; Wang *et al.*, 2009; Weaver *et al.*, 2010; Voznesenskiy *et al.*, 2011. Dericioglu *et al.*, 2012; Van Soest *et al.*, 2012 |
|  |  |  | AS |  |  |  |  |  | *Pheronema annae* | Leidy, 1868 | Gray, 1870; Tabachnick & Menshenina, 2002b |
|  |  |  | AS |  |  | P? |  |  | *Pheronema carpenteri* | (Thomson, 1869) | Gray, 1870 (as *P. grayi* and *Holtenia carpenteri*); Schmidt, 1870 (as *Holtenia carpenteri*); Topsent, 1928 (as *P. grayi*) |
|  |  |  | AS |  |  |  |  |  | *Pheronema raphanus* | Schulze, 1895 | Voznesenskiy *et al.*, 2010a, 2010b, 2011 |
|  |  |  | AS |  |  |  |  |  | *Pheronema weberi* | Ijima, 1927 | Ogawa *et al.*, 2006-2012 |
|  |  |  | AS |  |  |  |  |  | *Pheronema* sp. | indet. | Kul’chin *et al.*, 2007, 2008; Voznesenskiy *et al.*, 2010a |
|  |  |  | AS |  |  |  |  |  | *Pheronema* spp. | NA | Leys *et al.*, 2007 |
|  |  |  | AS |  |  |  |  |  | Pheronematidae | NA | Tabachnick, 1991 |
|  |  |  | AS |  |  |  |  |  | *Platylistrum platessa* (monospecific genus) | Schulze, 1904 | Tabachnick & Menshenina, 2002b; Leys *et al.*, 2007 |
|  |  |  | AS |  |  |  |  |  | *Poliopogon amadou* | Thomson, 1878 | Tabachnick & Menshenina, 2002b |
|  |  |  | AS |  |  |  |  |  | *Poliopogon* spp. | NA | Tabachnick & Menshenina, 2002b, Leys *et al.*, 2007 |
|  |  |  | AS |  |  |  |  |  | *Schulzeviella gigas* (monospecific genus) | (Schulze, 1886) | Tabachnick & Menshenina, 2002b; Leys *et al.*, 2007 |
|  |  |  | AS |  |  |  |  |  | *Semperella cucumis* | Schulze, 1895 | Miserez *et al.*, 2008 |
|  |  |  | AS |  |  |  |  |  | *Semperella schulzei* | (Semper, 1868) | Gray, 1872a, 1972b (as *Meyerella claviformis* and *Meyerina claviformis*); Tabachnick & Menshenina, 2002b |
|  |  |  | AS |  |  |  |  |  | *Semperella* spp. | NA | Tabachnick & Menshenina, 2002b; Leys *et al.*, 2007 |
|  |  |  | AS |  |  |  |  |  | *Sericolophus reflexus* | (Semper, 1868) | Tabachnick & Menshenina, 2002b |
|  |  |  | AS |  |  |  |  |  | *Sericolophus* sp. | indet. | Kul’chin *et al.*, 2011 |
|  |  |  | AS |  |  |  |  |  | *Sericolophus* spp. | NA | Tabachnick & Menshenina, 2002b; Leys *et al.*, 2007 |
|  |  |  | AS |  |  |  |  |  | *Tabachnickia polybasalia* (monospecific genus) | (Tabachnick, 1988) | Tabachnick & Menshenina, 2002a (*Tabachnicki*a as *Platella*), Leys et al. 2007 |
|  |  |  |  |  |  |  |  | (HEXASTEROPHORA) |  |  |  |
|  |  |  |  |  |  |  |  | Hexactinosida |  |  |  |
|  |  |  |  |  |  |  |  | Aulocalycoida |  |  |  |
|  |  |  |  |  |  |  |  | Lychniscosida |  |  |  |
|  |  |  | AS |  |  |  |  | Lyssacinosida | *Acoelocalyx brucei* | Topsent, 1910 | Tabachnick, 2002a |
|  |  |  | AS |  |  |  |  |  | *Anoxycalyx (Anoxycalyx) ijimai* | Kirkpatrick, 1907 | Tabachnick, 2002b |
|  |  |  | AS |  |  |  |  |  | *Anoxycalyx (Scolymastra) joubini* | (Topsent, 1916) | Tabachnick, 2002b |
|  |  |  | AS |  |  |  |  |  | *Caulocalyx tener* | Schulze, 1886 | Tabachnick, 2002a |
|  |  |  | AS |  |  |  |  |  | *Chaunangium crater* | Schulze, 1904 | Tabachnick, 2002a |
|  |  |  | AS |  |  |  |  |  | *Chaunangium* spp. | NA | Tabachnick, 2002a |
|  |  |  | AS |  |  |  |  |  | *Chaunoplectella cavernosa* | Ijima, 1896 | Ogawa *et al.*, 2006-2012 |
|  |  |  | AS |  |  |  |  |  | *Crateromorpha (Crateromorpha) meyeri* | Gray, 1872b | Gray, 1972a |
|  |  |  | AS |  |  |  |  |  | *Docosaccus ancoratus* | Topsent, 1910 | Tabachnick, 2002a |
|  |  |  | AS |  |  |  |  |  | *Docosaccus* spp. | NA | Tabachnick, 2002a |
|  |  |  | AS |  |  |  |  |  | *Euplectella aspergillum* | Owen, 1841 | Tabachnick, 2002a; **Sand**ford, 2003; Aizenberg *et al.*, 2004; Woesz *et al.*, 2006; Weaver *et al.*, 2007; Woesz *et al.*, 2010; Voznesenskiy *et al.*, 2011 |
|  |  |  | AS |  |  |  |  |  | *Euplectella curvistellata* | Ijima, 1901 | Ogawa *et al.*, 2006-2012 |
|  |  |  | AS |  |  |  |  |  | *Euplectella marshalli* | Ijima, 1895 | Dericioglu *et al.*, 2012 |
|  |  |  | AS |  |  |  |  |  | *Euplectella simplex* | Schulze, 1896 | Tabachnick, 2002a |
|  |  |  | AS |  |  |  |  |  | *Euplectella timorensis* | Ijima, 1927 | Ogawa *et al.*, 2006-2012 |
|  |  |  | AS |  |  |  |  |  | *Euplectella* sp. (*aspergillum*?) | indet. | Aizenberg *et al.*, 2005 |
|  |  |  | AS |  |  |  |  |  | Euplectellidae |  | Tabachnick, 1991 |
|  |  |  | AS |  |  |  |  |  | *Holascus stellatus* | Schulze, 1886 | Tabachnick, 2002a |
|  |  |  | AS |  |  |  |  |  | *Hyalascus sagamiensis* | Ijima, 1896 | Ogawa *et al.*, 2006-2012 |
|  |  |  | AS |  |  |  |  |  | *Lophocalyx philippinensis* | (Gray, 1872b) | Gray, 1972a (as *Rosella*); Tabachnick, 2002b |
|  |  |  | AS |  |  |  |  |  | *Lophocalyx* spp. | NA | Tabachnick, 2002b, 1991 |
|  |  |  | AS? |  |  |  |  |  | *Malacosaccus vastus* | Schulze, 1886 | Tabachnick, 2002a |
|  |  |  | AS |  |  |  |  |  | *Placopegma solutum* | Schulze, 1896 | Tabachnick, 2002a |
|  |  |  | AS |  |  |  |  |  | *Rossella antarctica* | Carter, 1872 | Kunzmann, 1996; Tabachnick, 2002b |
|  |  |  | AS |  |  |  |  |  | *Rossella nuda* | Topsent, 1901 | Kunzmann, 1996 |
|  |  |  | AS |  |  |  |  |  | *Rossella racovitzae* | Topsent, 1901 | Kunzmann, 1996; Sarikaya *et al.*, 2001 |
|  |  |  | AS |  |  |  |  |  | Rosselidae | NA | Tabachnick, 1991 |
|  |  |  | AS |  |  |  |  |  | *Sympagella nux* | Schmidt, 1870 | Schmidt, 1870 |
|  |  |  | AS |  |  |  |  |  | *Vazella pourtalesii* | (Schmidt, 1870) | Schmidt, 1870 (as *Holtenia*) |
|  |  |  | AS |  |  |  |  |  | hexactinellid sponges | NA | Uriz *et al.*, 2003, Voznesenskiy *et al*., 2011 |

AA, anchoring by agglutinating particles to lower body; AB, anchoring with body extensions or rootlets; AR, anchoring by attaching to buried rocks; AE, anchoring by living endolithic in buried rock; AI, anchoring by incorporation of sediments and larger particles in basal parts of the sponge body; AS, anchoring with spicules; B, binding (not as fully represented as the other adaptations); EP, external crust of larger particles including agglutinated stones; ES, external sediment crust; M, morphology suggesting psammobiosis; P, psammobiosis; PT, particle inclusion in the tissues (apart from basal parts, a process here listed as AI); SI, internal sediment crust or armour; SM, choanosomal sediment inclusion associated with membranes and canal linings; SS, sediment incorporation into spongin fibres; ST, sediment or particle incorporation into the tissue. References to collections and operational taxonomy units: CERF, Commonwealth Environmental Research Facility (large collection from Carnarvon Shelf northwestern Australia; Schönberg & Fromont, 2012, Schönberg *et al.*, 2012; all respective vouchers at WAM); KIM, collection from Montgomery Reef, Kimberley, northwestern Australia (unpubl., vouchers at WAM); Ng, Ningaloo Reef; QM, Queensland Museum; SMF, Senckenberg Museum Frankfurt; SS, Research Vessel Southern Surveyor; WAM, Western Australian Museum.

Appendices 1-3 references

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