

STOLIDOBANCHIA

Like Phlebobranchia, the suborder Stolidobranchia (order Pleurogona) has the gut embedded in the parietal body wall outside the large branchial sac with its internal longitudinal branchial vessels. However, the branchial sac itself is folded (unlike the unfolded pharyngeal wall of Phlebobranchia), and the regenerative tissue in replication is ectodermal, from test vessels or the parietal body wall (unlike the endodermal-epicardial-regenerative tissue in most Aplousobranchia and the mesodermal tissue in Clavelinidae and Perophoridae).

The suborder appears to have evolved from a phlebobranch ancestor through selection for adaptations associated with relatively large solitary organisms. Thus, in comparison with Phlebobranchia, the muscles of the parietal body wall form thicker layers of crowded fibres; the filtering area of the branchial sac is amplified by the development of the deep folds; the glandular part of the stomach wall projects out into folds or pockets and sometimes an arborescent liver branches off the pyloric region; gonads are on both sides of the body, and their size or number is increased to the extent that they sometimes cover much of the body wall outside the gut loop, although sometimes the gonads on the left side are enclosed in the gut loop. The test has become more fibrous and tough (unlike the firm but gelatinous test of most phlebobranch ascidians) with strong adhesive properties. Stalks and root-like extensions contribute to firm adherence or stability in sandy substrates and sometimes hair-like extensions grow out all over the test and attach a thick layer of insulating and protective sand around it. Sand and other foreign particles are often included in the test, making it hard and brittle (as in some aplousobranch colonies and a few phlebobranch species). Decoration of the outer surface of the test with hairs, spines and scales also occurs. Usually both siphons are lined with crowded overlapping scales or spines directed outwards toward the external aperture and usually they continue onto the test around the outside of the opening, directed away from it. Probably also protective, possibly detecting and/or filtering larger particles or predators from the incurrent water, are the branched and bushy tentacles at the base of the branchial siphon that are characteristic of both Pyuridae and Molgulidae. In the Styelidae (as in other suborders) the tentacles are simple and unbranched, but crowded.

The genus *Cynthia* Savigny, 1816 contained sessile ascidians with coriaceous test, four-lobed apertures, branchial folds, simple or branched tentacles and gut and gonads at the side of the pharynx. In fact all stolidobranch taxa were contained in the four subgenera or divisions of *Cynthia*, namely, *Simplices*, *Caesira*, *Pandocia* and *Dendrodoa*. Savigny did not assign type species to either *Cynthia* or its subgenera and in due course the genus was recognised as a supra-generic grouping, new genera were erected, and some pre-existing ones were found to accommodate the various components of the hyper-genus *Cynthia* (Heller 1877).

Colonial forms occur in subfamilies of the Styelidae, but not in Pyuridae or Molgulidae. Changes associated with the evolution of this habit are the reverse of those that occurred in the evolution of Stolidobranchia: they parallel the evolutionary changes in Aplousobranchia, namely size reduction and simplification of zooids, development of colonial systems, viviparity, and the development of larval organs.

The characters relevant at familial level are the body muscles; The numbers of branchial folds and form of the stigmata; the form of digestive diverticula; the numbers and position of gonads, the form of branchial tentacles; and the colonial status of the taxa. Most families, with the exception only of some abyssal ones, occur in Australian waters (Kott 1985).

References

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- Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440

HEXACROBYLIDAE

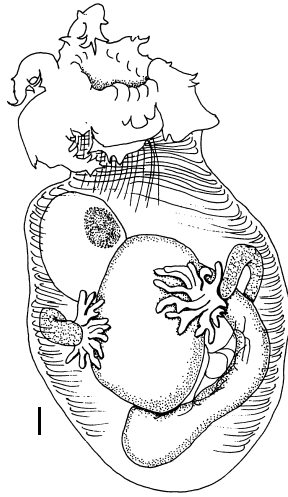


Fig. 19. *Oligotrema psammites* Bourne, 1903, individual, removed from test, from ventral surface. (Scale bar = 2.0 mm). [from Kott 1989]

The family Hexacrobylidae Seeliger, 1906 is characterised by a large buccal cavity surrounded by six arms (usually branched) containing muscles (continuous with longitudinal bands of the body wall), a reduced pharynx (limited to a short band behind the buccal cavity), ciliated stigmata opening into the atrial cavity from complex branchial pouches in the pharyngeal wall, a long oesophagus (with or without a large digestive diverticulum), a large stomach, gonads of the molgulid type with testis follicles separate from the ovarian tube, and a large vesicle (that appears to be a homologue of the molgulid kidney).

A proposal (Monniot *et al.* 1975) that the family represents a class of Tunicata separate from the Ascidiacea cannot be sustained (see Kott 1989). The family has close affinities with Molgulidae—closer than between Molgulidae and other taxa of the Ascidiacea. It appears to have evolved, probably from a molgulid ancestor, by profound changes in the pharynx and other parts of the gut. The powerful, branched,

muscular, external arms, large stomach and conspicuous gut diverticula appear to be adaptations for a carnivorous habit, probably following isolation in ocean trenches.

This is one of the few deep (abyssal) water families so far recorded from the Australian region. Its occurrence in Australian waters has been reviewed by Kott (1989, 1992).

References

- Kott, P. (1989). The family Hexacrobylidae Seeliger, 1906 (Ascidiacea, Tunicata). *Mem. Queensl. Mus.* **27**(2): 517–534
- Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655
- Monniot, C., Monniot, F. & Gaill, F. (1975). Les Sorberacea: une nouvelle classe des tuniciers. *Arch. Zool. Exp. Gén.* **116**: 77–122
- Seeliger, O. (1906). Appendicularien und Ascidien, Tunicata. Manteltiere. pp. 1041–1168 in Bronn, H.G. *Klassen und Ordnungen des Tier-Reichs*. Leipzig: C.F. Winter Vol. 3 Suppl.

Asajirus Kott, 1989

Asajirus Kott, P. (1989). The family Hexacroblylidae Seeliger, 1906 (Asciadiacea, Tunicata). *Mem. Queensl. Mus.* **27**(2): 517–534 [520].

Type species: *Hexacroblylus indicus* Oka, 1913 by original designation.

Hexadactylus Monniot, C. & Monniot, F. (1990). Revision of the class Sorberacea (benthic tunicates) with descriptions of seven new species. *Linn. Soc. Zool.* **99**: 239–290 [271] [junior objective synonym of *Asajirus*].

Type species: *Hexacroblylus indicus* Oka, 1913 by original designation.

Extralimital distribution: Arctic, north Atlantic Ocean, southeast Atlantic Ocean, southwest Atlantic Ocean, tropical central Atlantic Ocean, east Pacific and Indian Ocean basins. See: Kott, P. (1989). The family Hexacroblylidae Seeliger, 1906 (Asciadiacea, Tunicata). *Mem. Queensl. Mus.* **27**(2): 517–534. Generic reference: Kott, P. (1992). The Australian Asciadiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [648].

Asajirus indicus (Oka, 1913)

Hexacroblylus indicus Oka, A. (1913). Zur Kenntnis der zwei aberranten Ascidiien Gattungen *Dicopia* Sluiter and *Hexacroblylus* Sluiter. *Zool. Anz.* **43**: 1–10 [6].

Type data: syntypes (probable) IM*.

Type locality: near Sri Lanka, 4000 m, Indian Ocean.

Hexacroblylus arcticus Hartmeyer, R. (1923). Asciadiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiienfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365 [133].

Type data: holotype ZMUC*.

Type locality: 67°40'N 15°40'W, 890 m, and 63°26'N 7°30'W, 1280 m, NE Atlantic Ocean.

Hexacroblylus eunuchus Monniot, C. & Monniot, F. (1976). Tuniciers abyssaux du bassin argentin récoltés par 'l'Atlantis II'. *Bull. Mus. Natl. Hist. Nat. Paris* (3)**269**(387): 629–662 [658].

Type data: holotype MNHP H-HEX 8, slides H36, H37*.

Type locality: west Atlantic Ocean (type locality not recorded).

Hexadactylus longitestis Monniot, C. & Monniot, F. (1990). Revision of the class Sorberacea (benthic tunicates) with descriptions of seven new species. *Linn. Soc. Zool.* **99**: 239–290 [275].

Type data: syntypes MNHP H-HEX33*.

Type locality: south of New Caledonia on both sides of the Norfolk Ridge [24°19'06"S 167°48'42"E].

Hexadactylus millari Monniot, C. & Monniot, F. (1990). Revision of the class Sorberacea (benthic tunicates) with descriptions of seven new species. *Linn. Soc. Zool.* **99**: 239–290 [277].

Type data: syntypes (probable) ZMUC (depository uncertain, not found).

Type locality: 600 m, Bali Sea, Indonesia [03°25'S 117°03'E].

Hexadactylus seeligeri Monniot, C. & Monniot, F. (1990). Revision of the class Sorberacea (benthic tunicates) with descriptions of seven new species. *Linn. Soc. Zool.* **99**: 239–290 [281].

Type data: syntypes MNHP H-HEX 17*.

Type locality: 3450 m, Comoro Is., Indian Ocean [11°59'S 45°42'36"E].

Taxonomic decision for synonymy: Kott, P. (1992). The Australian Asciadiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [648].

Distribution: NSW (SE oceanic), QLD (NE oceanic, SE oceanic), TAS (SE oceanic); abyssal basins of the Indian Ocean, west, north and northeast Atlantic Ocean, south Indian and Pacific Basins.

Ecology: benthic, marine; depths of 800–5000 m.

Oligotrema Bourne, 1903

Oligotrema Bourne, G.C. (1903). *Oligotrema psammites*; a new ascidian belonging to the family Molgulidae. *Q. J. Microsc. Sci.* **47**: 233–272 [233].

Type species: *Oligotrema psammites* Bourne, 1903 by monotypy.

Hexacroblylus Sluiter, C.P. (1905). Zwei merkwürdige Ascidiien von der Siboga-Expedition. *Tijdschr. Ned. Dierk. Ver.* (2)**9**: 325–327 [325].

Type species: *Hexacroblylus psammates* Sluiter, 1905 by monotypy.

Gasterascidia Monniot, C. & Monniot, F. (1968). Les ascidies de grandes profondeurs récoltées par le navire océanographique Américain 'Atlantis II'. *Bull. Inst. Océanogr. Monaco* **67**(1379): 1–48 [36].

Type species: *Gasterascidia sandersi* Monniot & Monniot, 1968 by monotypy.

Sorbera Monniot, C. & Monniot, F. (1974). Ascidiens abyssales de l'Atlantique récoltées par le 'Jean Charcot' (Campagnes, Naratlante, Walda Polygas A). *Bull. Mus. Natl. Hist. Nat. Paris* (3)**154**(226): 721–786 [777].

Type species: *Sorbera unigonas* Monniot & Monniot, 1974 by monotypy.

Taxonomic decision for synonymy: Kott, P. (1989). The family Hexacroblylidae Seeliger, 1906 (Asciadiacea, Tunicata). *Mem. Queensl. Mus.* **27**(2): 517–534 [524].

Extralimital distribution: north Atlantic Ocean, east Atlantic Ocean, west Indian Ocean, tropical west Pacific Ocean basin, southern polar Pacific Ocean basin. See: Kott, P. (1989). The family Hexacroblylidae Seeliger, 1906 (Asciadiacea, Tunicata). *Mem. Queensl. Mus.* **27**(2): 517–534.

Oligotrema psammites Bourne, 1903

Oligotrema psammites Bourne, G.C. (1903). *Oligotrema psammites*; a new ascidian belonging to the family Molgulidae. *Q. J. Microsc. Sci.* **47**: 233–272 [233].

Type data: holotype whereabouts unknown.

Type locality: near Lifu, 90 m, New Britain.

Hexacroblylus psammates Sluiter, C.P. (1905). Zwei merkwürdige Ascidiien von der Siboga-Expedition. *Tijdschr. Ned. Dierk. Ver.* (2)**9**: 325–327 [326].

Type data: holotype ZMA TU564.

Type locality: 1158 m, Laut Banda, Indonesia [5°40'42"S 120°45'30"E].

HEXACROBYLIDAE

- Sorbera digonas*** Monniot, C. & Monniot, F. (1984). Nouvelles Sorberacea (Tunicata) profondes de l'Atlantique sud et de l'Océan Indien. *Cahiers de Biologie Marine* **25**: 197–215 [209].
Type data: holotype MNHP H-SOR13*.
Type locality: 11°44'S 47°35'E, 3716 m, Comoro Is., Indian Ocean, see Monniot, C. & Monniot, F. (1990). Revision of the class Sorberacea (benthic tunicates) with descriptions of seven new species. *Linn. Soc. Zool.* **99**: 239–290.
- Taxonomic decision for synonymy: Kott, P. (1989). The family Hexacrobylidae Seeliger, 1906 (Asciacea, Tunicata). *Mem. Queensl. Mus.* **27**(2): 517–534 [524]; Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [650].
- Distribution: Indonesia, New Caledonia, NSW (SE oceanic), Papua New Guinea; SE Atlantic Basin.
Ecology: benthic, marine; depths of 1200–4600 m and 92 m off New Britain.

MOLGULIDAE

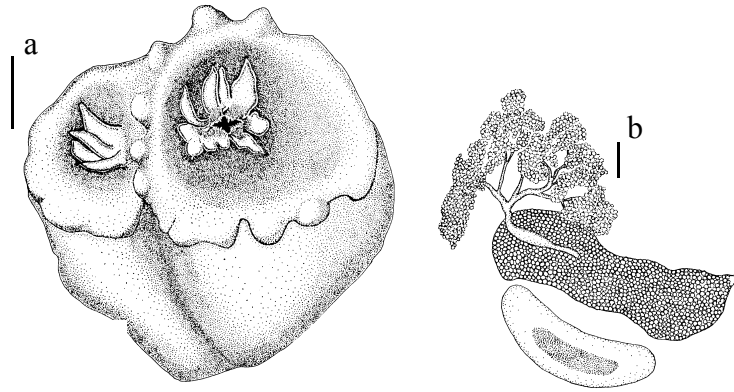


Fig. 20. *Molgula sabulosa* (Quoy & Gaimard, 1934): **a**, external appearance of nodose specimen; **b**, right side of body showing kidney and gonad with clumps of male follicles at proximal end of ovary. (Scales: a = 5.0 mm; b = 2.0 mm). [from Kott 1985]

The Molgulidae Lacaze-Duthiers, 1877 have a thin but often sand-embedded test, branched branchial tentacles and stigmata coiled around cones that project into the branchial folds, or that coil on a flat branchial wall or around cones that project independently into the pharynx. They also have a closed kidney derived from the embryonic epicardial sacs on the parietal wall of the right side of the body and compact folds and pouches (probably glandular) occur in the stomach wall. As in Pyuridae, a single gonad on each side of the body is inside or outside the gut loop or crosses over it. The testis follicles spread out on the body wall around the tubular or sac-like ovary, or parts of it, and do not form a compact covering over the ovary, nor are the gonads subdivided (as usually is the case in Pyuridae). The body muscles are formed into bands and in some species short parallel bands are aligned around the apertures to withdraw them between folds of brittle sand-filled test or to flatten the body (like the sandy phlebobranchs, *Ascidia scaevola*, *Microgastra granosa* and certain Agneziidae).

Certain species of the Molgulidae, like some *Polycarpa* (Styelidae), have viviparous larvae and some develop directly without passing through a tailed larval stage. Berrill (1955) has suggested that these species, characterised by the brittle sand-embedded test and muscles to withdraw apertures and flatten the body, are adapted for life on the open sea floor and have evolved strategies that reduce the time that either gametes or larvae are vulnerable to dispersal.

The family is well represented in Australia by the genus *Molgula* (12 species), *Eugyra* (3 species) and a species of *Pareugyrioides*. In *Molgula* the left gonad is outside the gut loop. *Eugyrioides*, with gonads on both sides of the body, is very likely a synonym of *Eugyra* which has a gonad only on the left (partially or completely enclosed in the gut loop).

The genera not represented in the Australian fauna are known from polar waters or from deeper abyssal waters (see Kott 1985). Around the Australian coast, deeper waters have not yet been explored adequately for these benthic organisms.

References

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- Lacaze-Duthiers, F.J.H. (1877). Histoire des ascidies simples des côtes de France Pt 2. *Arch. Zool. Exp. Gén.* **6**: 457–676
- Eugyra* Alder & Hancock, 1870**
- Eugyra*** Alder, J. & Hancock, A. in Hancock, A. (1870). On the larval state of *Molgula*; with descriptions of several new species of simple ascidians. *Ann. Mag. Nat. Hist.* (4) **6**: 353–368 [367].
Type species: *Molgula arenosa* Alder & Hancock, 1848 by original designation.
- Gamaster*** Pizon, A. (1896). Description d'un nouveau genre d'ascidie simple de la famille des Molgulidées, *Gamaster dakarensis*. *Compt. Rend. Acad. Sci. Paris* **122**: 1345–1347 [1345].
Type species: *Gamaster dakarensis* Pizon, 1896 by monotypy.
- Eugyrioides*** Seeliger, O. (1906). Appendicularien und Ascidien, Tunicata. Manteltiere. pp. 1041–1168 in Bronn, H.G. *Klassen und Ordnungen des Tier-Reichs*. Leipzig : C.F. Winter Vol. 3 Suppl. [1189].
Type species: *Cynthia glutinans* Moeller, 1842 by original designation.
- Taxonomic decision for synonymy: Ärnäck-Christie-Linde, A. (1928). Northern and Arctic invertebrates in the collection of the Swedish State Museum. IX Tunicata, Part 3. Molgulidae and Pyuridae. *K. Sven. Vetensk.-Akad. Handl.* (3) **4**(9): 1–101 [72]; Huus, J. (1937). Ascidiaceae. pp. 545–692 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin : Walter de Gruyter Vol. 5(2) **6** [677].
- Extralimital distribution: worldwide. See: Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiendfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365; Ärnäck-Christie-Linde, A. (1928). Northern and Arctic invertebrates in the collection of the Swedish State Museum. IX Tunicata, Part 3. Molgulidae and Pyuridae. *K. Sven. Vetensk.-Akad. Handl.* (3) **4**(9): 1–101; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* **133**: 1–354; Millar, R.H. (1962). Further descriptions of South African ascidians. *Ann. S. Afr. Mus.* **56**(7): 113–221; Kott, P. (1969). Antarctic Ascidiacea. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* **13**: i–xv 1–239; Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440;
- Nishikawa, T. (1991). The ascidians of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **35**(1–3): 26–170.
- Eugyra mammillata* Kott, 1985**
- Eugyra mammillata*** Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [390].
Type data: holotype WAM 83.75, paratype(s) QM GH757.
Type locality: Albatross Bay, Gulf of Carpentaria, northern Australia.
Distribution: QLD (Gulf of Carpentaria, NE coast).
Ecology: benthic, marine.
- Eugyra millimetra* Kott, 1985**
- Eugyra millimetra*** Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [391].
Type data: syntypes NMV F51475.
Type locality: Bass Strait, 5 m, VIC [40°09'12"S 147°31'54"E].
Distribution: VIC (Bass Strait); known only from type locality.
Ecology: sand bottom; shell substrate.
- Eugyra molguloides* Sluiter, 1904**
- Caesira pellucida*** Macdonald, J.D. (1859). On the anatomical characters of three Australian species of Tunicata referable to Savigny's subgenus *Caesira*. *Trans. Linn. Soc. Lond.* **22**: 367–371 [369] [*Caesira* Fleming, 1822 was suppressed in favour of its junior synonym *Molgula* Forbes, 1848; *Pera* Stimpson, 1852 also is a junior synonym of *Molgula*; *Caesira pellucida* Macdonald, 1859 consequently became a junior homonym of *Molgula pellucida* (Stimpson, 1852)].
Type data: type status unknown.
Type locality: Shark Bay, WA.
- Eugyra molguloides*** Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidien. *Siboga Exped.* **56A**: 1–126 [111].
Type data: lectotype ZMA TU1265, paralectotype(s) ZMA TU534.
Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [178].
Type locality: Salibabu Is., 36 m, Indonesia.
- Eugyra moretonensis*** Kott, P. (1972). Some sublittoral ascidians in Moreton Bay and their seasonal occurrence. *Mem. Queensl. Mus.* **16**(2): 233–260 [252].

Type data: holotype QM G6328, paratype(s) QM G5961–71, G5974–6.

Type locality: 0.5 mile SE of Southwest Rocks, 7–2 m, Moreton Bay, QLD.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [393]; Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne: CSIRO Publishing, Australia Vol. 34 298 pp. (new status assignment for *Eugyra molguloides*).

Distribution: Indonesia, QLD (Central E coast, NE coast), VIC (Bass Strait), WA (Central W coast, Lower W coast).

Ecology: benthic, marine, viviparous.

Molgula Forbes, 1848

Caesira Fleming, J. (1822). *The Philosophy of Zoology*. Vol. 2. Edinburgh and London pp. 508–518. [511] [senior synonym suppressed in favour of *Molgula* Forbes, 1848 as *nomen conservandum*, see Hemming, F. & Noakes, D. (eds) (1958). *Official List of Generic Names in Zoology*. First instalment. London: International Trust for Zoological Nomenclature 200 pp.; Hartmeyer, R. (1908). Zur Terminologie der Familien und Gattungen der Ascidien. *Zool. Annl.* **3**: 1–63 (18)]. Type species: *Cynthia dione* Savigny, 1816 by original designation.

Cystingia Macleay, W.S. (1825). Anatomical observations on the natural group of the Tunicata, with the description of three species collected in the Fox Channel. *Trans. Linn. Soc. Lond.* **14**: 527–555 [541] [senior synonym suppressed in favour of *Molgula* Forbes, 1848, as *nomen conservandum*, see Hemming, F. & Noakes, D. (eds) (1958). *Official List of Generic Names in Zoology*. First instalment. London: International Trust for Zoological Nomenclature 200 pp.; Huntsman, A.G. (1922). The ascidian family Caesiridae. *Trans. R. Soc. Canada (3)* **16**: 211–234 (216)]. Type species: *Cystingia griffithsi* Macleay, 1825 by original designation.

Syphonotethis Gervais, F.L.P. (1840). *Ascidies*. In: Dictionnaire des Sciences Naturelles. *Suppl. 1*. Paris and Strasbourg: F.G. Levrault [407] [senior synonym suppressed in favour of *Molgula* Forbes, 1848, as *nomen conservandum*, see Hemming, F. & Noakes, D. (eds) (1958). *Official List of Generic Names in Zoology*. First instalment. London: International Trust for Zoological Nomenclature 200 pp.; Hartmeyer, R. (1914). Diagnosen einiger neuer Molgulidae aus der Sammlung des Berliner Museums nebst Bemerkungen über die Systematik und Nomenklatur dieser Familie. *Sber. Ges. Naturf. Freunde Berl.* **1914**: 1–27 (4)]. Type species: *Ascidia tumulus* Quoy & Gaimard, 1834 (see also under *Species Inquirendae*) by original designation.

Molgula Forbes, E. (1848). In: Forbes, E. & Hanley, S.C.T. *A History of British Mollusca and their Shells*. Vol. 1 pp. 1–54. London: John van Voorst. [36] [*nomen conservandum* Hemming, F. & Noakes, D. (eds) (1958). *Official List of Generic Names in Zoology*. First instalment. London: International Trust for Zoological Nomenclature 200 pp.; Hartmeyer, R. (1914). Diagnosen einiger neuer

Molgulidae aus der Sammlung des Berliner Museums nebst Bemerkungen über die Systematik und Nomenklatur dieser Familie. *Sber. Ges. Naturf. Freunde Berl.* **1914**: 1–27 (7)].

Type species: *Molgula oculata* Forbes, 1848 by subsequent designation, see Hartmeyer, R. (1915). *Ascidiarum nomina conservanda*. pp. 247–258 in Apstein, C. *Nomina Conservanda*. *Sber. Ges. Naturf. Freunde Berl.* **1915b**: 247–258.

Pera Stimpson, W. (1852). Several new ascidians from the coast of the United States. *Proc. Bost. Soc. Nat. Hist.* **4**: 228–232 [232].

Type species: *Pera pellucida* Stimpson, 1852 by monotypy.

Gymnocystis Giard, A.M. (1872). Etudes critique des travaux d'embryogénie relatifs à la parenté des Vertébrés et de Tuniciers. *Arch. Zool. Exp. Gén.* **1**: 233–235, 397–428 [405]. Type species: *Molgula ampulloides* Beneden, 1847 by original designation.

Lithonephyra Giard, A.M. (1872). Etudes critique des travaux d'embryogénie relatifs à la parenté des Vertébrés et de Tuniciers. *Arch. Zool. Exp. Gén.* **1**: 233–235, 397–428 [405].

Type species: *Molgula complanata* Alder & Hancock, 1870 by original designation.

Anurella Lacaze-Duthiers, F.J.H. (1877). Histoire des ascidies simples des côtes de France Pt 2. *Arch. Zool. Exp. Gén.* **6**: 457–676 [495].

Type species: *Anurella bleizi* Lacaze-Duthiers, 1877 by monotypy.

Ctenicella Lacaze-Duthiers, F.J.H. (1877). Histoire des ascidies simples des côtes de France Pt 2. *Arch. Zool. Exp. Gén.* **6**: 457–676 [604].

Type species: *Molgula appendiculata* Heller, 1877 by original designation.

Ascopera Herdman, W.A. (1881). Preliminary report on the Tunicata of the Challenger Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [238].

Type species: *Ascopera gigantea* Herdman, 1881 by original designation.

Eugyropsis Roule, L. (1885). Recherches sur les ascidies simples des côtes de Provence (Cynthiades). *Ann. Sci. Nat.* (6) **20**: 136–229 [205].

Type species: *Eugyropsis intermedia* Roule, 1885 by monotypy.

Astropera Pizon, A. (1898). Etude anatomique et systématique des molgulidées appartenant aux collections du Muséum de Paris. *Ann. Sci. Nat.* (8) **7**: 305–381 [343].

Type species: *Astropera sabulosa* Pizon, 1898 by monotypy.

Meristocarpus Pizon, A. (1899). Description d'un nouveau genre d'ascidie simple de la famille des Molgulidées, *Meristocarpus*. *Bull. Mus. Natl. Hist. Nat. Paris* **5**: 42–43 [42].

Type species: *Meristocarpus fuscus* Pizon, 1899 by monotypy.

Molgulidium Seeliger, O. (1907). Appendicularien und Ascidien, Tunicata. Manteltiere. pp. 1041–1280 in Bronn, H.G. (ed.) *Klassen und Ordnungen des Tier-Reichs*. Leipzig: C.F. Winter Vol. 3 Suppl. 68–80 [1174] [junior objective synonym of *Ctenicella* Lacaze-Duthiers, 1877].

Type species: *Molgula appendiculata* Heller, 1877 by original designation.

Molgulina Hartmeyer, R. (1914). Diagnosen einiger neuer Molgulidae aus der Sammlung des Berliner Museums nebst Bemerkungen über die Systematik und Nomenklatur dieser Familie. *Sber. Ges. Naturf. Freunde Berl.* **1914**: 1–27 [8].
Type species: *Molgula eugyrioides* Traustedt, 1883 by original designation.

Euritteria Huntsman, A.G. (1922). The ascidian family Caesiridae. *Trans. R. Soc. Canada (3)* **16**: 211–234 [225].
Type species: *Caesira cooperi* Huntsman, 1922 by original designation.

Taxonomic decision for synonymy: Hartmeyer, R. (1914). Diagnosen einiger neuer Molgulidae aus der Sammlung des Berliner Museums nebst Bemerkungen über die Systematik und Nomenklatur dieser Familie. *Sber. Ges. Naturf. Freunde Berl.* **1914**: 1–27 [5]; Huntsman, A.G. (1922). The ascidian family Caesiridae. *Trans. R. Soc. Canada (3)* **16**: 211–234 [216]; Kott, P. (1969). Antarctic Ascidiacea. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* **13**: i–xv 1–239 [156].

Extralimital distribution: Antarctic Region; worldwide. See: Huntsman, A.G. (1922). The ascidian family Caesiridae. *Trans. R. Soc. Canada (3)* **16**: 211–234; Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiendfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* **133**: 1–354; Millar, R.H. (1962). Further descriptions of South African ascidians. *Ann. S. Afr. Mus.* **56**(7): 113–221; Kott, P. (1969). Antarctic Ascidiacea. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* **13**: i–xv 1–239; Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Molgula calvata Sluiter, 1904

Molgula calvata Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidien. *Siboga Exped.* **56A**: 1–126 [116].
Type data: holotype ZMA TU690.1.
Type locality: reef, Saleyer Is., Indonesia.

Molgula reducta Hartmeyer, R. (1922). Miscellanea Ascidiologica. *Mitt. Zool. Mus. Berl.* **10**: 299–323 [306].
Type data: syntypes (probable) ZMB 3829*.
Type locality: Oyster Harbour, 0.75–5.5 m, Albany, WA.

Molgula medusa Kott, P. (1952). Ascidians of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [297].
Type data: syntypes AM Y794, Y1900.
Type locality: Oyster Harbour, Albany, WA.

Molgula minuta Kott, P. (1952). Ascidians of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [295].
Type data: syntypes AM Y793.
Type locality: reef undercuts, Triggs Is., WA.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [369].

Distribution: WA (SW coast); NE coast, central E coast, lower E coast, QLD, NSW.
Ecology: benthic, marine, viviparous.

Molgula diversa Kott, 1972

Molgula diversa Kott, P. (1972). Some sublittoral ascidians in Moreton Bay and their seasonal occurrence. *Mem. Queensl. Mus.* **16**(2): 233–260 [252].
Type data: holotype QM G6320, paratype(s) QM G5992, G6321, G5989, G5991.
Type locality: 0.5 mile S of Southwest Rocks, Moreton Bay, 7.7 m, QLD.

Distribution: Hong Kong, QLD (Central E coast, NE coast).

Ecology: benthic, marine; sand, shell grit and sandy mud substrates.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Molgula ellistoni Kott, 1972

Molgula ellistoni Kott, P. (1972). The ascidians of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [190].
Type data: holotype SAMA E907.
Type locality: Elliston Bay, SA.

Distribution: SA (Great Australian Bight); known only from type locality.

Ecology: benthic, marine, viviparous; development direct, in caves subjected to strong swell.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Molgula ficus (Macdonald, 1859)

Caesira ficus Macdonald, J.D. (1859). On the anatomical characters of three Australian species of Tunicata referable to Savigny's subgenus *Caesira*. *Trans. Linn. Soc. Lond.* **22**: 367–371 [368].
Type data: type status unknown.
Type locality: Shark Bay, WA.

Molgula forbesi Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae; Molgulidae. *Proc. R. Soc. Edinb.* **11**(4): 233–240 [236].
Type data: holotype (probable) BMNH* (depository uncertain, not found in BMNH).
Type locality: Port Jackson, 4–20 m, NSW.

- Molgula martensii*** Traustedt, M.P.A. (1885). Ascidiæ simplices far det Stille Ocean. *Vidensk. Meddr. Dansk Naturh. Foren.* **1884**: 1–160 [19].
Type data: syntypes ZMH K14*, USNM 5557*.
Type locality: Dampier Archipelago, WA.
- Ascopera nana*** Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [57].
Type data: syntypes AM U268, G2501.
Type locality: Port Jackson, NSW.
- Molgula godeffroyi*** Michaelsen, W. (1908). Die Molguliden des Naturhistorischen Museums zu Hamburg. *Mitt. Zool. Mus. Hamburg* **25**(2): 117–152 [142].
Type data: holotype ZMH*.
Type locality: Bowen, QLD.
- Molgula mortoni*** Kesteven, H.L. (1909). Studies on Tunicata no. 1. *Proc. Linn. Soc. N.S.W.* **34**: 276–295 [289].
Type data: holotype AM U559.
Type locality: Hobart, 14–40 m, TAS.
- Molgula batemani*** Kott, P. (1952). Ascidiæ of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [296].
Type data: syntypes AM Y789, Y1884.
Type locality: piles and ship's hull, Fremantle Harbour, WA.
Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [374]; Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne: CSIRO Publishing, Australia Vol. 34 298 pp. [173] (*Ascopera nana*; see also *Ascidia tumulus* Quoy & Gaimard, 1834 under *Species Inquirendae* p.250.).
Distribution: Singapore, Hong Kong; circum-australian, QLD, NSW, VIC, TAS, SA, WA, NT, Gulf of Siam.
Ecology: benthic, marine.
- Molgula incidata*** Kott, 1985
- Molgula incidata*** Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [377].
Type data: holotype QM GH1806, paratype(s) QM GH1807.
Type locality: Mission Beach, QLD.
Distribution: New Caledonia, Norfolk Island, QLD (NE coast, SE oceanic).
Ecology: benthic, marine, viviparous; epibiont on *Ascidia* sp., intertidal on rubble.
- Molgula malvinensis*** Ärnäck., 1938
- Molgula malvinensis*** Ärnäck-Christie-Linde, A. (1938). Ascidiacea. *Further zool. Results Swed. Antarct. Exped. 1901–1* **3**(4): 1–54 [5].
Type data: syntypes NHRM 1499*.
Type locality: Falkland Is., Subantarctic.
- Molgula spiralis*** Kott, P. (1954). Tunicata, Ascidiæ. *Rep. B.A.N.Z. Antarct. Res. Exped.* **1**(4): 121–182 [134].
Type data: holotype AM Y1921.
Type locality: Enderby Land, 193 m, Antarctica.
- Molgula herdmani*** Brewin, B.I. (1958). Ascidiæ of New Zealand, Part 11. Ascidiæ of the Stewart Island region. *Trans. R. Soc. N.Z.* **85**(3): 439–453 [451].
Type data: holotype OMNZ*.
Type locality: Stewart Is., New Zealand.
- Molgula bathamae*** Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117 [91].
Type data: holotype MONZ ASC12*, paratype(s) MONZ ASC11*.
Type locality: continental slope E of Otago, 480 m, South Island, New Zealand [45°56'S 171°00'E].
- Molgula longivascula*** Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117 [93].
Type data: holotype NZOI H-270*, paratype(s) NZOI P-528*.
Type locality: near Macquarie Is., 91 m, New Zealand [54°36'24"S 158°57'E].
Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [378].
Distribution: New Zealand, VIC (Bass Strait); Antarctica, Subantarctica.
Ecology: benthic, marine.
- Molgula manhattensis*** (DeKay, 1843)
- Ascidia manhattensis*** DeKay, J.E. (1843). Mollusca Part 5. In DeKay, J.E. (ed.) *Natural History of New York*. Albany: New York Assembly vii + 271 pp. [259].
Type data: type status unknown AMNH (depository uncertain, not found).
Type locality: Manhattan Is., New York, USA.
- Molgula sordida*** Stimpson, W. (1852). Several new ascidiæ from the coast of the United States. *Proc. Bost. Soc. Nat. Hist.* **4**: 228–232 [229].
Type data: syntypes (probable) HMN* (whereabouts of other syntype(s) unknown).
Type locality: Charleston Harbour, South Carolina, USA.
Taxonomic decision for synonymy: Van Name, W.G. (1945). The North and South American ascidiæ. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476 [385].
Distribution: Japan, United States of America, California, NSW (Central E coast, Lower E coast), QLD (Central E coast), VIC (Bass Strait); Atlantic coast, USA, Mediterranean.
Ecology: benthic, marine; wharf piles, ships etc, sea grass, sand or muddy substrates in large aggregates, to 30 m, in salinity 11 to over 20 parts/thousand.
Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [379].
- Molgula mollis*** Herdman, 1899
- Molgula mollis*** Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [444] [*nom. nud.*].
- Molgula sydneyensis*** Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [444] [*nom. nud.*].

- Molgula mollis*** Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [54].
Type data: syntypes AM G12226, G2052.
Type locality: Port Jackson, NSW.
- Molgula sydneyensis*** Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [55].
Type data: holotype AM U276.
Type locality: Port Jackson, NSW.
- Taxonomic decision for synonymy: Kott, P. (1952). Ascidians of Australia. I. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [298].
- Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), SA (S Gulfs coast), VIC (Bass Strait).
Ecology: benthic, marine.
- Molgula mortenseni*** Michaelsen, 1922
- Ctenicella mortenseni*** Michaelsen, W. (1922). Ascidiæ Ptychobranchiæ und Diktyobranchiæ von Neuseeland und dem Chatham-Inseln. Papers from Dr. Th. Mortensen's Pacific Expedition 1914–1916, XI. *Vidensk. Meddr. Dansk Naturh. Foren.* **73**: 359–498 [365].
Type data: holotype ZMUC*.
Type locality: Bay of Islands, New Zealand.
- Distribution: New Zealand, VIC (Bass Strait).
Ecology: sand bottom; shell substrate.
- Molgula rima*** Kott, 1972
- Molgula rima*** Kott, P. (1972). Some sublittoral ascidians in Moreton Bay and their seasonal occurrence. *Mem. Queensl. Mus.* **16**(2): 233–260 [250].
Type data: holotype QM G6324, paratypes QM G6023–8, QM G6030–6, QM G6325–7, QM G6037–44.
Type locality: 0.5 mile S of Southwest Rocks, Moreton Bay, 7.7 m, QLD.
- Distribution: QLD (Central E coast).
Ecology: benthic, marine; sand, shell-grit, sandy mud, to 10 m.
Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.
- Molgula sabulosa*** (Quoy & Gaimard, 1834)
- Ascidea sabulosa*** Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris : Pilet Ainé. [614].
Type data: syntypes MNHP S3 MOL.A 178–181.
Type locality: Westernport, VIC.
- Caesira parasitica*** Macdonald, J.D. (1859). On the anatomical characters of three Australian species of Tunicata referable to Savigny's subgenus *Caesira*. *Trans. Linn. Soc. Lond.* **22**: 367–371 [367].
Type data: type status unknown.
Type locality: King George's Sound, Albany, WA.
- Molgula nodosa*** Hartmeyer, R. (1922). Miscellanea Ascidiologica. *Mitt. Zool. Mus. Berl.* **10**: 299–323 [304].
Type data: syntypes (probable) ZMB 3827, 3728*.
Type locality: Cottesloe Beach, WA.
- Molgula janis*** Kott, P. (1952). Ascidiens of Australia. I. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [295].
Type data: syntypes AM Y792, Y1891.
Type locality: Victor Harbour, west side of Granite Is., SA.
Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [386].
- Distribution: SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait), WA (Lower W coast, SW coast).
Ecology: benthic, marine.
- Molgula sphaera*** Kott, 1972
- Molgula sphaera*** Kott, P. (1972). Some sublittoral ascidians in Moreton Bay and their seasonal occurrence. *Mem. Queensl. Mus.* **16**(2): 233–260 [251].
Type data: holotype QM G6319, paratype(s) QM G6081–4, G6318.
Type locality: 0.5 mile S of Southwest Rocks, Moreton Bay, QLD.
- Molgula discogona*** Millar, R.H. (1975). Ascidiens from the Indo-West Pacific region in the Zoological Museum, Copenhagen (Tunicata, Ascidiacea). *Steenstrupia* **3**(20): 205–336 [325].
Type data: holotype ZMUC 12.xii.1906*.
Type locality: Singapore.
- Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [388].
- Distribution: Singapore, QLD (Central E coast), WA (SW coast).
Ecology: benthic, marine; sand, shell-grit and sandy mud, to 10 m.
- Pareugyrioides*** Hartmeyer, 1914
- Pareugyrioides*** Hartmeyer, R. (1914). Diagnosen einiger neuer Molgulidae aus der Sammlung des Berliner Museums nebst Bemerkungen über die Systematik und Nomenklatur dieser Familie. *Sber. Ges. Naturf. Freunde Berl.* **1914**: 1–27 [22].
Type species: *Eugyrioides dalli* Ritter, 1913 by original designation.
- Extralimital distribution: Antarctic Region; north, tropical west Pacific Ocean. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.
- Pareugyrioides exigua*** (Kott, 1972)
- Molgula exigua*** Kott, P. (1972). Some sublittoral ascidians in Moreton Bay and their seasonal occurrence. *Mem. Queensl. Mus.* **16**(2): 233–260 [249].
Type data: holotype QM 5990, paratype(s) QM 5993–8, 6000–19, 6021–2, 6323.
Type locality: 0.5 miles S of Southwest Rocks, Moreton Bay, 7.7 m, QLD.

MOLGULIDAE

Eugyra flabelligona Millar, R.H. (1975). Ascidians from the Indo-West Pacific region in the Zoological Museum, Copenhagen (Tunicata, Ascidiacea). *Steenstrupia* **3**(20): 205–336 [328].

Type data: holotype ZMUC 5.iv.29*.

Type locality: Bali Strait, 70 m, Indonesia [8°23'S 114°29'E].

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [394].

Distribution: Indonesia, QLD (Central E coast), VIC (Bass Strait).

Ecology: benthic, marine; sand and shell-grit, to 10 m.

PYURIDAE

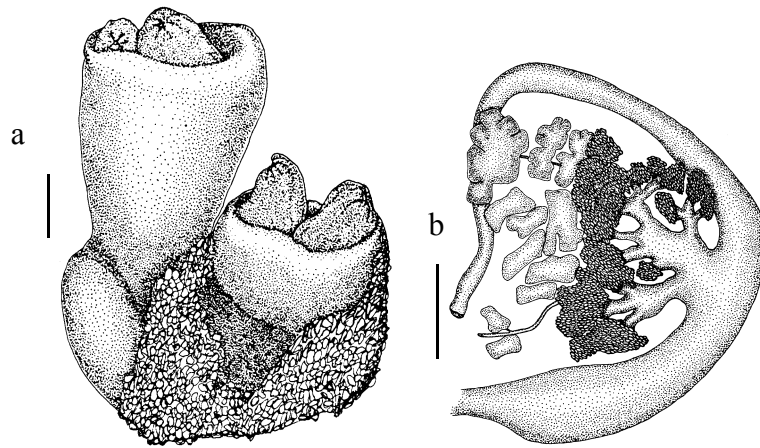


Fig. 21. *Pyrua* spp.: **a**, *Pyrua stolonifera* (Heller, 1878), external appearance; **b**, *Pyrua abradata* Kott, 1985, gut with arborescent liver, and gonad. (Scale bars: a = 10.0 mm; b = 5.0 mm). [from Kott 1985]

The family Pyuridae Hartmeyer, 1908 contains robust species with tough fibrous tests, branched branchial tentacles, more than four branchial folds on each side of the body and usually a single gonad on each side (although often it is lobed or partially divided along its length). Glandular folds, lobes and sometimes branched diverticula from the pyloric region of the gut wall are particularly elaborate. The body muscles are strong, the bands radiating out from each of the siphons and crossing one another over the sides of the body. These muscle bands usually form an almost continuous coat.

Siphonal and test armature such as spines, bristles and scale-like thickenings often occur in the surface test, as well as hair and root-like extensions of the test that adhere to sand and other foreign particles creating a coating around the outside of the test, and/or forming a firm attachment in sediments or on hard substrates. In some species, the hard test forms a long, narrow stalk from the anterior end of the body which holds it above the substrate and enables it to move with surge or currents, always presenting the incurrent aperture to the on-coming current to enhance the ciliary feeding capacity (Kott 1989). At the same time, the excurrent aperture is pointed in the opposite direction, expelling the waste products and gametes into the passing stream of water. Many species (e.g. those of *Pyrua* and *Herdmania*) have calcareous spicules embedded in the test.

Pyuridae are represented in Australian waters by the diverse shallow water genera, namely, *Pyrua* Molina, 1782 (26 species, with dorsal languets and an arborescent liver) and *Microcosmus* Heller, 1877 (11 species, with dorsal lamina). In addition, five of the less diverse genera are each represented by one or two species: *Hartmeyeria* Ritter, 1913 (one species), *Halocynthia* Verrill & Rathbun, 1879 (two species), *Herdmania* Lahille, 1888 (two species), and *Claudenus* (*nom. nov.* for *Ctenicella* Kott, 1972; one species) and *Ctenyura* Van Name, 1918 (two species). *Boltenia* Savigny, 1816 is the only well known genus from continental shelf locations recorded from Indonesia as well as the Northern Hemisphere that has not been reported from Australia.

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Claudenus Kott, 1998

Ctenicella Kott, P. (1972). The ascidians of South Australia I. Spencer Gulf, St Vincent Gulf and Encounter Bay. *Trans. R. Soc. S. Aust.* **96**(1): 1–52 [44] [junior homonym of *Ctenicella* Lacaze-Duthiers, 1877].
Type species: *Ctenicella antipoda* Kott, 1972 by subsequent designation, see Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. [177].

Claudenus Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. [177] [*nom. nov.* for *Ctenicella* Kott, 1972].

Extralimital distribution: known only from type species.

Claudenus antipodus (Kott, 1972)

Ctenicella antipoda Kott, P. (1972). The ascidians of South Australia I. Spencer Gulf, St Vincent Gulf and Encounter Bay. *Trans. R. Soc. S. Aust.* **96**(1): 1–52 [44].
Type data: holotype SAMA E877.
Type locality: off Yankalilla Bay, 12–20 m, SA.

Distribution: SA (S Gulfs coast).
Ecology: benthic, marine; to 20 m.
Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Ctenyura Van Name, 1918

Ctenyura Van Name, W.G. (1918). Ascidians from the Philippines and adjacent waters. *Bull. U.S. Natl Mus.* **100**(1): 49–174 [71].
Type species: *Ctenyura intermedia* Van Name, 1918 by monotypy.

Extralimital distribution: tropical west Pacific Ocean. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Ctenyura tetraplexa* Kott, 1985**

Ctenyura tetraplexa Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [334].

Type data: holotype ZMUC, paratype(s) ZMUC.

Type locality: off Cape Howe, 60–100 m, VIC [37°05'S 150°05'E].

Distribution: VIC (Bass Strait); known only from type locality.

Ecology: benthic, marine; 60–100 m.

***Ctenyura tortuosa* Kott, 1985**

Ctenyura tortuosa Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [336].

Type data: holotype NMV H379, paratypes NMV H740, NMV F51564.

Type locality: Bass Strait, 84 m, VIC [29°01'S 143°22'06"E].

Distribution: VIC (Bass Strait); known only from type locality.

Ecology: benthic, marine.

***Culeolus* Herdman, 1881**

Culeolus Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [82].

Type species: *Culeolus murrayi* Herdman, 1882 by subsequent designation, see Herdman, W.A. (1882). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt I, Ascidiaceae simplices. *Zool. Chall. Exped.* **6**(17): 1–296 [91].

***Culeolus herdmani* Sluiter, 1904**

Culeolus herdmani Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die sozialen und holosomen Ascidiaceen. *Siboga Exped.* **56A**: 1–126 [105].

Type data: syntypes ZMA TU 397.1-4*.

Type locality: 0°23.8'N 127°29'E, 472 m, channel between Makjan and Halmahera; 5°28.4'S 132°0.2'E, 204 m; 7°35.4'S 117°28.6'E, 521 m; 10°27.9'S 123°28.7'E, 216 m, Indonesia.

Distribution: Philippines, Indonesia, New Caledonia, WA (NW coast); Sea of Japan.

Ecology: benthic, marine; 200–1,700 m depth.

Reference: Kott, P. (2002). *Culeolus herdmani* Sluiter, 1904 (Ascidiacea, Tunicata) from the north-western Australian continental slope with an overview of the genus. *Rec. West. Aust. Mus.* **21**: 63–70.

***Halocynthia* Verrill, 1879**

Tethyum Bohadsch, J.B. (1761). *Bohadsch dequibusdam Animalibus marinis eorumque protietatibus liber. cap. vii (De Tethys)*, pp. 128–135 pl. x fig. 1–6 Dresden. [130] [senior homonym suppressed in favour of *Halocynthia*

Verrill, 1879, see Melville, R.V. (1981). Opinion 1182. Tethyidae in Mollusca, Porifera and Tunicata: Removal of homonymy. *Bull. Zool. Nomencl.* **38**(3): 174–177; Hartmeyer, R. (1915). Ascidiarum nomina conservanda. pp. 247–258 in Apstein, C. Nomina Conservanda. *Sber. Ges. Naturf. Freunde Berl.* **1915b**: 247–258; Hartmeyer, R., Michaelsen, W. & Sluiter, C.P. (1915). Tunicata. Ascidiaceae. In, Apstein, C. Nomina Conservanda. *Sber. Ges. Naturf. Freunde Berl.* **1915**: 185–186].

Type species: *Tethyum papillosum* Gunnerus, 1765 by subsequent designation, see Huntsman, A.G. (1912). Ascidiaceae from the coasts of Canada. *Trans. R. Can. Inst.* **9**: 111–148 [135].

Halocynthia Verrill, A.E. (1879). Contributions to the natural history of Arctic America, made in connection with the Howgate Polar Expedition, 1877–78. Molluscoids. *Bull. U.S. Natl. Mus.* **15**: 147–150 [147] [*nomen conservandum*, see Melville, R.V. (1981). Opinion 1182. Tethyidae in Mollusca, Porifera and Tunicata: Removal of homonymy. *Bull. Zool. Nomencl.* **38**(3): 174–177; Hartmeyer, R. (1915). Ascidiarum nomina conservanda. pp. 247–258 in Apstein, C. Nomina Conservanda. *Sber. Ges. Naturf. Freunde Berl.* **1915b**: 247–258; Hartmeyer, R., Michaelsen, W. & Sluiter, C.P. (1915). Tunicata. Ascidiaceae. In, Apstein, C. Nomina Conservanda. *Sber. Ges. Naturf. Freunde Berl.* **1915**: 185–186].

Type species: *Tethyum papillosum* Gunnerus, 1765 by subsequent designation, see Huntsman, A.G. (1912). Ascidiaceae from the coasts of Canada. *Trans. R. Can. Inst.* **9**: 111–148 [135].

Extralimital distribution: north Pacific Ocean to California and Japan, north Atlantic Ocean, Mediterranean Sea, Red Sea, Indian Ocean. See: Hartmeyer, R. (1923). Ascidiaceae, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiaceenfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365; Harant, H. (1929). Ascidiaceae provenant des croisières du Prince Albert Ier de Monaco. *Résultats de Campagnes Scientifique accomplies (Monaco)* **75**: 1–110; Van Name, W.G. (1945). The North and South American ascidiaceans. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Millar, R.H. (1962). Further descriptions of South African ascidiaceans. *Ann. S. Afr. Mus.* **56**(7): 113–221; Kott, P. (1985). The Australian Ascidiaceae Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440; Nishikawa, T. (1991). The ascidiaceans of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **35**(1–3): 26–170.

***Halocynthia dumosa* (Stimpson, 1855)**

Cynthia dumosa Stimpson, W. (1855). Tunicata in descriptions of some new marine invertebrates. *Proc. Acad. Nat. Sci. Phila.* **7**: 387–388 [388].

Type data: type status unknown USNM (depository uncertain, not found).

Type locality: Port Jackson, NSW.

Cynthia hispida Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [61].

Type data: type status unknown BMNH (depository uncertain, not found).

Type locality: Bass Strait, VIC.

Cynthia crinitistellata Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* 7(1): 443–450 [445] [*nom. nud.*].

Cynthia crinitistellata Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* 17: 1–139 [34].

Type data: syntypes AM U273 (G2068), AM G12230.

Type locality: Port Jackson, NSW.

Taxonomic decision for synonymy: Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne: CSIRO Publishing, Australia Vol. 34 298 pp. [178] (based on Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [342]).

Distribution: Sri Lanka, NSW (Lower E coast), QLD (NE coast), SA (S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine.

Halocynthia papillosa (Gunnerus, 1765)

Tethyum coriaceum Bohadsch, J.B. (1761). *Bohadsch dequibusdam Animalibus marinis eorumque protietatibus liber. cap. vii (De Tethys)*, pp. 128–135 pl. x fig. 1–6 Dresden. [senior synonym suppressed in favour of *Tethyum papillosum* Gunnerus, 1765, see Hartmeyer, R., Michaelsen, W. & Sluiter, C.P. (1915). Tunicata. Ascidae. In, Apstein, C. Nomina Conservanda. *Sber. Ges. Naturf. Freunde Berl.* 1915: 185–186.].

Type data: type status unknown.

Type locality: Mediterranean.

Tethyum papillosum Gunnerus, J.E. (1765). Söe-Pungen (*Tethyum sociabile*) fulständige beskreven. *Trondhj. Selsk. Skrift.* 3: 81–102 [100] [Translated 1767: Vollständige Beschreibung des Seebeutels. *Drontheim Gesellsh. Skrift* 3: 69 [100]].

Type data: type status unknown.

Type locality: Mediterranean.

Ascidia rustica Risso, A. (1826). *Histoire naturelle des principales productions de l'Europe méridionale*. Vol. 4. Paris & Strasbourg pp. 273–285. [274] [as *Ascidia rustica*; junior homonym of *Ascidia rustica* Linnaeus, 1767 (= *Styela rustica* (Linnaeus, 1767))].

Type data: type status and whereabouts unknown.

Type locality: Europe méridionale.

Taxonomic decision for synonymy: Hartmeyer, R. (1909). Ascidiens (continuation of work by Seeliger). pp. 1281–1488 in Bronn, H.G. *Klassen und Ordnungen des Tier-Reichs*. Leipzig: C.F. Winter Vol. 3, suppl. pts 81–87 [1340]; Huntsman, A.G. (1912). Ascidiens from the coasts of Canada. *Trans. R. Can. Inst.* 9: 111–148 [135].

Distribution: New Caledonia, NSW (SE oceanic), QLD (Great Barrier Reef, SE oceanic); Atlantic coast of France, Mediterranean Sea.

Ecology: benthic, marine; coralline algae, sand and shell grit, coral debris, 13 m (Heron Is.).

References: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [344]; Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* 29(1): 267–298 [288].

Hartmeyeria Ritter, 1913

Hartmeyeria Ritter, W.E. (1913). The simple ascidians from the north-eastern Pacific in the collection of the United States National Museum. *Proc. U. S. Natl. Mus.* 45: 427–505 [461]. Type species: *Hartmeyeria triangularis* Ritter, 1913 by original designation.

Ectorchis Huntsman, A.G. (1922). The ascidian family Caesiridae. *Trans. R. Soc. Canada (3)* 16: 211–234 [222].

Type species: *Caesira hupferi* Michaelsen, 1908 by original designation.

Taxonomic decision for synonymy: Monniot, C. & Monniot, F. (1976). Les ascidies de la côte du Mozambique. *Rev. Zool. Afr.* 90(2): 357–393 [380].

Extralimital distribution: north Pacific Ocean, Gulf of Aden, west and east coast of Africa, west Pacific Ocean (China and Japan). See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [362].

Hartmeyeria formosa Herdman, 1881

Hartmeyeria formosa Herdman, W.A. (1881). Preliminary report on the Tunicata of the Challenger Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* 11(3): 52–88 [58].

Type data: holotype BMNH 1887.2.4.51.

Type locality: Torres Strait.

Cynthia spinifera Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* 7(1): 443–450 [445] [*nom. nud.*].

Cynthia spinifera Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* 17: 1–139 [32] [junior homonym of *Ascidia spinifera* Quoy & Gaimard, 1834 = *Pyura spinifera* (Quoy & Gaimard, 1834)].

Type data: holotype AM G2067.

Type locality: Port Jackson, NSW.

Microcosmus acanthifera Hartmeyer, R. (1909). Ascidiens (continuation of work by Seeliger). pp. 1281–1488 in Bronn, H.G. *Klassen und Ordnungen des Tier-Reichs*. Leipzig: C.F. Winter Vol. 3, suppl. pts 81–87 [1341] [unnecessary *nom. nov.* for *Cynthia spinifera* Herdman, 1899].

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [363].

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), TAS (Bass Strait), VIC (Bass Strait).

Ecology: benthic, marine; to 95 m.

Reference: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* 29(1): 267–298.

Herdmania Lahille, 1888

Herdmania Lahille, F. (1888). Etude systématique des tuniciers. *Compt. Rend. Ass. Fr. Avanc. Sci.* **1887**(2): 667–677 [677].

Type species: *Cynthia momus* Savigny, 1816 by original designation.

Rhabdocynthis Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [575].

Type species: none designated; originally included nominotypical species: *Rhabdocynthis complanata* Herdman, 1882; *Rhabdocynthis pallida* Heller, 1878; *Rhabdocynthis papietensis* Herdman, 1892; *Rhabdocynthis subfusca* Herdman, 1891; *Rhabdocynthis tenuis* Herdman, 1891.

Taxonomic decision for synonymy: Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476 [341].

Extralimital distribution: Australian Region; pantropical. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Herdmania fimbriae Kott, 2002

Herdmania fimbriae Kott, P. (2002). The genus *Herdmania* Lahille, 1888 (Tunicata) in Australian waters. *J. Linn. Soc. London Zool.* **134**: 359–374 [361].

Type data: holotype SAMA E2892, paratype(s) SAMA E2891.

Type locality: Point Turton jetty on piles and weed, 3–4 m, SA.

Distribution: QLD (NE coast), SA (Great Australian Bight, S Gulfs coast), TAS (Tas. coast).

Ecology: benthic, marine.

Herdmania grandis (Heller, 1878)

Cynthia grandis Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* **77**(1): 83–109 [97].

Type data: holotype ZMH*.

Type locality: Port Jackson, NSW.

Cynthia complanata Herdman, W.A. (1882). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt I, Ascidiæ simplices. *Zool. Chall. Exped.* **6**(17): 1–296 [145].

Type data: holotype BMNH*.

Type locality: Port Jackson, NSW.

Microcosmus julinii Drasche, R. von (1884). Ueber einige neue und weniger gekannte aussereuropäische einfache Ascidiën. *Denkschr. Akad. Wiss. Wien* **48**: 369–387 [371].

Type data: type status and whereabouts unknown*.

Type locality: Port Jackson, NSW.

Microcosmus draschii Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [575].

Type data: holotype AM U138.

Type locality: Port Stephens, NSW.

Herdmania armata Monniot, F. & Monniot, C. (2001). Ascidiens from the tropical western Pacific. *Zoosystema* **23**(2): 201–383 [337].

Type data: holotype MNHP S2 HER 20.

Type locality: 10–18 m, Nivani, Papua New Guinea [10°47.46'S 152°33.08'E].

Taxonomic decision for synonymy: Kott, P. (2002). The genus *Herdmania* Lahille, 1888 (Tunicata) in Australian waters. *J. Linn. Soc. London Zool.* **134**: 359–374 [363–365].

Distribution: Papua New Guinea, NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), SA (Great Australian Bight, S Gulfs coast), TAS (Tas. coast), VIC (Bass Strait), WA (Central W coast, Lower W coast, NW coast, SW coast).

Ecology: benthic, marine.

Herdmania mentula Kott, 2002

Herdmania mentula Kott, P. (2002). The genus *Herdmania* Lahille, 1888 (Tunicata) in Australian waters. *J. Linn. Soc. London Zool.* **134**: 359–374 [365].

Type data: holotype WAM Z11771, paratype(s) WAM Z11759.

Type locality: Mary Anne Passage, 27 m, NW Australia [21°15'S 115°50'E].

Distribution: WA (Central W coast, Lower W coast, NW coast).

Ecology: benthic, marine.

Herdmania momus (Savigny, 1816)

Cynthia momus Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. *In Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [143].

Type data: type status unknown MNHP (depository uncertain, not found).

Type locality: Red Sea.

Cynthia papietensis Herdman, W.A. (1882). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt I, Ascidiæ simplices. *Zool. Chall. Exped.* **6**(17): 1–296 [143].

Type data: holotype BMNH*.

Type locality: Tahiti.

Herdmania momus curvata Kott, P. (1952). Ascidiens of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [143] [as *Herdmania momus* var. *curvata*].

Type data: holotype AM Y1811.

Type locality: Northwest Is., Capricorn Group, Great Barrier Reef, QLD.

Herdmania contorta Monniot, C. (1992). Ascidiens de Nouvelle-Calédonie XI. Phlebobranches et Stolidobranches du Plateau des Chesterfield. *Bull. Mus. Natl. Hist. Nat. Paris* (**4**)**14A**(1): 3–22 [18].

Type data: holotype MNHP 52 HERI*.

Type locality: Bampton Is., Chesterfield IIs, New Caledonia.

Taxonomic decision for synonymy: Michaelsen, W. (1918). *Ascidia Ptychobranchia* und *Dictyobranchia* des Roten Meeres. Expedition Schiff *Pola* in das Rote Meer, nördliche und südliche Hälfte 1895/1896–1897/1898. *Zoologische Ergebnisse* **32**: 1–120 3 pls [30]; Kott, P. (2002). The genus *Herdmania* Lahille, 1888 (Tunicata) in Australian waters. *J. Linn. Soc. London Zool.* **134**: 359–374 [366].

Distribution: Philippines, Indonesia, French Polynesia, Fiji, QLD (Central E coast, Great Barrier Reef); Coral Sea Plateau, Indian Ocean, Red Sea.

Ecology: benthic, marine; to 100 m.

Reference: Kott, P. (2002). The genus *Herdmania* Lahille, 1888 (Tunicata) in Australian waters. *J. Linn. Soc. London Zool.* **134**: 359–374 [366].

Herdmania pallida (Heller, 1878)

Cynthia pallida Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* **77**(1): 83–109 [96].

Type data: syntypes (probable) ZMH* (depository uncertain).

Type locality: Mauritius, Palau IIs, Tahiti.

Rhabdocynthia ceylonica Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* **39**: 295–348 [309].

Type data: holotype BMNH*.

Type locality: Sri Lanka.

Taxonomic decision for synonymy: Kott, P. (2002). The genus *Herdmania* Lahille, 1888 (Tunicata) in Australian waters. *J. Linn. Soc. London Zool.* **134**: 359–374 [369–372].

Distribution: Japan, Taiwan, Philippines, Indonesia, Palau, Hawaii, Fiji, South Africa, QLD (NE coast), WA (Central W coast, Lower W coast, NW coast); also west Indian Ocean, south China Sea, Tahiti, Arafura Sea.

Ecology: benthic, marine.

Microcosmus Heller, 1877

Microcosmus Heller, C. (1877). Untersuchungen über die Tunicaten des Adriatischen und Mittelmeeres (3). *Denkschr. Akad. Wiss. Wien* **37**(1): 241–275 [243].

Type species: *Ascidia sulcatus* Coquebert, 1797 (= *Microcosmus vulgaris* Heller, 1877) by subsequent designation; see Hartmeyer, R. (1923). *Ascidacea*, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiendfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365 [177].

Extralimital distribution: pantropical, western Europe to Adriatic Sea, N Atlantic. See: Hartmeyer, R. (1923). *Ascidacea*, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiendfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publ.* **133**: 1–354; Millar, R.H. (1962). Further descriptions of South African ascidians. *Ann. S. Afr. Mus.* **56**(7): 113–221; Kott, P. (1985). The Australian

Ascidacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440; Nishikawa, T. (1991). The ascidians of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **35**(1–3): 26–170.

Microcosmus australis Herdman, 1899

Microcosmus australis Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [444] [*nom. nud.*].

Microcosmus australis Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [23].

Type data: syntypes AM G2060.

Type locality: Port Jackson, NSW.

Microcosmus ramsayi Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [25].

Type data: syntypes AM G2061.

Type locality: Port Jackson, NSW.

Taxonomic decision for synonymy: Hartmeyer, R. & Michaelsen, W. (1928). *Ascidiae Diktyobranchiae und Ptychobranchiae*. *Fauna Südwest-Aust.* **5**: 251–460 [404].

Distribution: NSW (Central E coast, Lower E coast), NT (Gulf of Carpentaria), QLD (Central E coast, NE coast), VIC (Bass Strait), WA (Central W coast, Lower W coast).

Ecology: benthic, marine.

Microcosmus curvus Tokioka, 1954

Microcosmus curvus Tokioka, T. (1954). Contributions to Japanese ascidian fauna VII. Invertebrate fauna of the intertidal zone of the Tokara Islands. VII Ascidiens. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **3**(3): 239–264 [263].

Type data: syntypes SMBL 142, TK88*.

Type locality: Takarazima, Tokara IIs, Japan.

Microcosmus bitunicatus Monniot, F. & Monniot, C. (2001). Ascidiens from the tropical western Pacific. *Zoosystema* **23**(2): 201–383 [348].

Type data: holotype MNHP S2 MIC 157.

Type locality: Cebu Straits, Cabilao Is., 10 m, Philippines [9°53.39'N 123°45.45'E,].

Taxonomic decision for synonymy: Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1649].

Distribution: Wake Island, Palau, QLD (Great Barrier Reef); Marianas Is., Tokara Is., Tahiti, Indian Ocean, Gulf of Manaar.

Ecology: benthic, marine.

Reference: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298.

Microcosmus exasperatus Heller, 1878

Microcosmus distans Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* **77**(1): 1–28 [18].

Type data: type status unknown NHMW (depository uncertain, not found).

Type locality: Jamaica, West Indies.

- Microcosmus exasperatus*** Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* 77(1): 1–28 [17].
Type data: type status unknown NHMW (depository uncertain, not found).
Type locality: Jamaica, West Indies.
- Microcosmus variegatus*** Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* 77(1): 1–28 [17].
Type data: type status unknown NHMW (depository uncertain, not found).
Type locality: Antilles, tropical west Atlantic Ocean.
- Microcosmus biconvolutus*** Sluiter, C.P. (1898). Tuniciers récoltés en 1896 par la *Chazalie* dans la Mer des Antilles. *Mem. Soc. Zool. Fr.* 11: 5–34 [26].
Type data: type status unknown ZMA TU618*.
Type locality: Schottegat, Curaçao, West Indies.
- Microcosmus miniatus*** Verrill, A.E. (1900). Additions to the Tunicata and Molluscoidea of the Bermudas. *Trans. Connecticut Acad. Sci.* 10: 588–594 [590].
Type data: type status and whereabouts unknown.
Type locality: shallow water, on reefs, under stones, Bermuda.
- Microcosmus haemisphaerium*** Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidiën. *Siboga Exped.* 56A: 1–126 [52].
Type data: syntypes ZMA TU635.2*.
Type locality: reef, Saleyer Is., Indonesia.
- Taxonomic decision for synonymy: Hartmeyer, R. & Michaelsen, W. (1928). Ascidiæ Diktyobranchiæ und Ptychobranchiæ. *Fauna Südwest-Aust.* 5: 251–460 [403].
- Distribution: Fiji, Philippines, Hawaii, New Caledonia, Bermuda, Brazil, Indonesia, Florida, NSW (Central E coast, Lower E coast), NT (N coast), QLD (Central E coast, NE coast), WA (Central W coast, Lower W coast, N coast, NW coast); West Indies, E Africa, Red Sea.
Ecology: benthic, marine.
- References: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [348]; Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* 20: 37–81 [73].
- Microcosmus helleri*** Herdman, 1881
- Microcosmus helleri*** Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* 11(3): 52–88 [54].
Type data: holotype BMNH 1887.2.4.44.
Type locality: Torres Strait, 58 m, north Australia [9°59'S 139°42'E].
- Microcosmus manaarensis*** Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* 39: 295–348 [311].
Type data: syntypes BMNH 1907.8.30.11* (whereabouts of other syntype(s) unknown).
Type locality: Sri Lanka.
- Microcosmus goanus*** Michaelsen, W. (1918). Die Ptychobranchen und Diktyobranchen Ascidiën des westlichen Indischen Ozeans. *Jahrb. Hamb. Wiss. Anst.* 35(2): 1–71 [12].
Type data: holotype (probable) ZMH*.
Type locality: Delgoa Bay, Maputo, Mozambique (as near Lourenço Marques, Portuguese East Africa).
Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [349].
Distribution: Taiwan, Sri Lanka, Singapore, Indonesia, NT (Gulf of Carpentaria), QLD (Gulf of Carpentaria, NE coast), SA (S Gulfs coast), VIC (Bass Strait), WA (Lower W coast, NW coast); West Indies, East Africa.
Ecology: benthic, marine.
- Microcosmus madagascariensis*** Michaelsen, 1918
- Microcosmus madagascariensis*** Michaelsen, W. (1918). Die Ptychobranchen und Diktyobranchen Ascidiën des westlichen Indischen Ozeans. *Jahrb. Hamb. Wiss. Anst.* 35(2): 1–71 [20].
Type data: holotype (probable) ZMH*.
Type locality: Nossi Bé, Malagasy.
- Microcosmus agglutinans*** Hartmeyer, R. (1919). Ascidiën. In, Results of Dr E. Mjöberg's Swedish scientific expeditions to Australia 1910–1913. *K. Svenska Vetensk.-Akad. Handl.* 60(4): 1–150. [26].
Type data: holotype NHRM 1490**.
Type locality: 45 miles WSW Cape Jaubert, 144 m, N WA.
Taxonomic decision for synonymy: Hartmeyer, R. & Michaelsen, W. (1928). Ascidiæ Diktyobranchiæ und Ptychobranchiæ. *Fauna Südwest-Aust.* 5: 251–460 [398].
Distribution: Malagasy, WA (Central W coast, Lower W coast, NW coast, SW coast).
Ecology: benthic, marine.
Reference: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* 29(1): 267–298 [291].
- Microcosmus planus*** Kott, 1975
- Microcosmus planus*** Kott, P. (1975). The ascidians of South Australia III. Northern sector of the Great Australian Bight and additional records. *Trans. R. Soc. S. Aust.* 99(1): 1–20 [15].
Type data: holotype NMV 4284, paratypes SAMA E1032, QM G7510.
Type locality: off Ceduna, south of Goat Is., Great Australian Bight, 31 m, SA.
Distribution: SA (Great Australian Bight), VIC (Bass Strait).
Ecology: benthic, marine; 31 m, upright habit and sandy habitat.
References: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [291]; Kott, P. (1990).

The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298.

Microcosmus propinquus Herdman, 1881

Microcosmus propinquus Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [55].

Type data: holotype BMNH 1887.2.4.45–46.
Type locality: E of Moncoeur Is., Bass Strait, 76–80 m, VIC.

Microcosmus nicholli Kott, P. (1952). Ascidiaceans of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [290].

Type data: syntypes AM Y1800.
Type locality: Flinders Is., VIC.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [353].

Distribution: QLD (Central E coast), SA (S Gulfs coast), VIC (Bass Strait).

Ecology: benthic, marine; 8–80 m.

Microcosmus pupa (Savigny, 1816)

Cynthia pupa Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris: G. Dufour. [151].

Type data: type status unknown MNHP (depository uncertain, not found).
Type locality: Red Sea.

Microcosmus pacificus Monniot, F. & Monniot, C. (2001). Ascidiaceans from the tropical western Pacific. *Zoosystema* **23**(2): 201–383 [349].

Type data: holotype MNHP S2 MIC 159.
Type locality: Milne Bay Province, Samurais Is., 27 m, Papua New Guinea [10°36.98'S 150°39.77'E].

Taxonomic decision for synonymy: Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1649].

Distribution: Philippines, Papua New Guinea, QLD (NE coast); the Red Sea.

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [356].

Microcosmus squamiger Michaelsen, 1927

Microcosmus exasperatus australis Michaelsen, W. (1908). Die Pyuriden (Halocynthiiden) des Naturhistorischen Museum zu Hamburg. *Mitt. Zool. Mus. Hamburg* **25**(2): 227–287 [272] [junior homonym of *Microcosmus australis* Herdman, 1899].

Type data: syntypes ZMH*.
Type locality: Bowen, QLD.

Microcosmus claudicans squamiger Michaelsen, W. (1927). Einige neue westaustralische Ptychobranchiate Ascidien. *Zool. Anz.* **71**: 193–203 [197] [*nom. nov.* for *Microcosmus exasperatus australis* Michaelsen, 1908].

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), SA (S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Central W coast, Lower W coast, SW coast).

Ecology: benthic, marine; rocky substrate, on concrete, cave walls, often among oysters.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [356].

Microcosmus stoloniferus Kott, 1952

Microcosmus stolonifera Kott, P. (1952). Ascidiaceans of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [291].

Type data: syntypes AM Y1798.
Type locality: coast of King Is., Bass Strait.

Distribution: QLD (Central E coast, NE coast), SA (S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait); Torres Strait.

Ecology: benthic, marine.

References: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [359]; Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [291].

Microcosmus tuberculatus Kott, 1985

Microcosmus tuberculatus Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [361].

Type data: holotype QM GH1405, paratype(s) QM GH1406.
Type locality: Swain Reefs, Great Barrier Reef, QLD [21°52'24"S 142°12'36"E].

Distribution: QLD (Great Barrier Reef); known only from type locality.

Ecology: benthic, marine.

Reference: Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [646].

Pyura Molina, 1782

Pyura Molina, G.I. (1782). *Animali de Chili. In, Saggio sulla storia naturale de Chili*. Bologna: Stamperia di S. Tomaso d'Aquino 2 1810th Edn 367 pp. [196, 349] [English Translation 1808; *nomen conservandum*, see Melville, R.V. (1981). Opinion 1182. Tethyidae in Mollusca, Porifera and Tunicata: Removal of homonymy. *Bull. Zool. Nomencl.* **38**(3): 174–177].

Type species: *Pyura chilensis* Molina, 1782 by monotypy.

Forbesia Lacaze-Duthiers, F.J.H. & Délage, Y. (1892). Faune des Cynthiades de Roscoff et côtes de Bretagne. *Mém. pres. div. Sav. Acad. Sci. Inst. Fr.* **45**(2): 1–319 [138]. Type species: *Cynthia tessellata* Forbes, 1848 by original designation.

- Cynthiopsis** Michaelsen, W. (1904). Die stolidobranchiaten Ascidien der deutschen Tiefsee-Expedition. *Wiss. Ergebn. dt. Tiefsee-Exped. 'Valdivia'* 7: 183–260 [200].
Type species: *Cynthiopsis valdivia* Michaelsen, 1904 (= *Cynthia stolonifera* Heller, 1878) by original designation.
- Pyuroopsis** Michaelsen, W. (1912). Die Tethyiden (Styeliden) des Naturhistorischen Museum zu Hamburg, nebst nachtrag und Anhang einige anderen Familien betreffend. *Jahrb. Hamb. Wiss. Anst.* 28(2): 109–186 [112].
Type species: *Cynthia stubenrauchi* Michaelsen, 1900 by original designation.
- Podocynthia** Oka, A. (1929). Ueber eine neue gestielte Monascidie *Podocynthia turboja* n.g. n.sp. *Proc. Imp. Acad. Japan* 5: 94–95 [94].
Type species: *Podocynthia turboja* Oka, 1929 by monotypy.
- Hyalocynthia** Oka, A. (1930). Ueber eine merkwürdige Cynthiide aus der Bucht von Sagami. *Proc. Imp. Acad. Japan* 6: 317–320 [317].
Type species: *Hyalocynthia histrix* Oka, 1930 by monotypy.
- Paracynthia** Ärnäck-Christie-Linde, A. (1938). Ascidiacea. *Further zool. Results Swed. Antarct. Exped. 1901–1* 3(4): 1–54 [125].
Type species: *Paracynthia distincta* Ärnäck, 1938 (= *Cynthia paessleri* Michaelsen, 1900) by original designation.
- Taxonomic decision for synonymy: Hartmeyer, R. (1911). Die Ascidien der Deutschen Südpolar Expedition 1901–1903. *Dt. Südpol-Exped. (1905–1931)* 12(4): 407–606 [554]; Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidienfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* 2(6): 1–365 [174]; Huus, J. (1937). Ascidiaceae. pp. 545–692 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin: Walter de Gruyter Vol. 5(2)6 [677]; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* 84: 1–476 [329, 330].
- Extralimital distribution: Afrotropical Region, Neotropical Region; worldwide. See: Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidienfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* 2(6): 1–365; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* 84: 1–476; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* 133: 1–354; Kott, P. (1969). Antarctic Ascidiacea. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* 13: i–xv 1–239; Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* 85: 1–117; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440; Nishikawa, T. (1991). The ascidians of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* 35(1–3): 26–170.
- Pyura abradata** Kott, 1985
- Pyura abradata** Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [287].
Type data: holotype QM G10001.
Type locality: American River Inlet, Kangaroo Is., SA.
Distribution: SA (S Gulfs coast), VIC (Bass Strait).
Ecology: benthic, marine.
- Pyura arenosa** (Herdman, 1881)
- Cynthia arenosa** Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* 11(3): 52–88 [59].
Type data: holotype BMNH 1887.2.4.52/4.
Type locality: Arafura Sea.
- Cynthia jacatrensis** Sluiter, C.P. (1890). Die Evertrebraten aus der Sammlung des Königlichen Naturwissenschaftlichen Vereins in Niederländisch Indien in Batavia. *Nat. Tijdschr. Ned. Ind.* 50: 329–348 [331].
Type data: holotype ZMA TU387.
Type locality: Bay of Jakarta (as Djakarta), Indonesia.
Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [289].
Distribution: Indonesia, Palau, NT (N coast), QLD (NE coast), VIC (Bass Strait), WA (Lower W coast, N coast); Arafura Sea.
Ecology: benthic, marine; common component of benthic fauna of sandy substrates in shallow water.
Reference: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* 29(1): 267–298.
- Pyura australis** (Quoy & Gaimard, 1834)
- Sea Tulips
- Ascidia australis** Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris: Pilet Ainé [614].
Type data: syntypes MNHP S2 PYU67*, MNHP S2 PYU68*, MNHP S2 PYU260*, MNHP S2 PYU261*, MNHP S2 PYU263*, MNHP S2 PYU264*.
Type locality: King George Sound, Albany, WA.
- Pyura australis parvispinatus** Kott, P. (1952). Ascidiaceae of Australia. I. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* 3(3): 206–333 [268] [as *Pyura australis* var. *parvispinatus*].
Type data: holotype AM 1836.
Type locality: Rottneest Is., WA.
Distribution: NSW (Lower E coast), SA (Great Australian Bight, S Gulfs), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Great Australian Bight, Lower W coast, SW coast); one record from Lizard Is., QLD.
Ecology: benthic, marine; subtidal waters–20 m.
Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [291].

***Pyura confragosa* Kott, 1985**

Pyura confragosa Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [293].

Type data: holotype QM GH366.

Type locality: Moreton Is., Moreton Bay, 15 m, QLD.

Distribution: New Caledonia, QLD (Central E coast, Great Barrier Reef, NE coast).

Ecology: benthic, marine; shallow, subtidal–60 m.

***Pyura crassacipitata* Kott, 1985**

Pyura crassacipitata Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [295].

Type data: holotype QM G11910.

Type locality: on black beacon, reef edge, Mudjimbah, Maroochydhore, QLD.

Distribution: QLD (Central E coast), SA (S Gulfs coast), WA (Lower W coast).

Ecology: benthic, marine; shallow, sublittoral water–10 m.

***Pyura curvigona* Tokioka, 1950**

Pyura curvigona Tokioka, T. (1950). Ascidiens from the Palao Is. I. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **1**(3): 115–150 [147] [publication date established from Tokioka, T. (1967). Pacific Tunicata of the United States National Museum. *Bull. U.S. Natl Mus.* **251**: 1–242].

Type data: holotype SMBL 100*.

Type locality: Palau Island, west Pacific Ocean.

Distribution: Indonesia, Palau, QLD (Great Barrier Reef), WA (Central W coast).

Ecology: benthic, marine; 5–37 m.

Reference: Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [645].

***Pyura elongata* Tokioka, 1952**

Pyura elongata Tokioka, T. (1952). Ascidiens collected by Messrs Renzi Wada and Seizi Wada from the Pearl Oyster bed in the Arafura Sea in 1940. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **2**(2): 91–142 [136].

Type data: type status and whereabouts unknown.

Type locality: pearl oyster beds, Arafura Sea.

Distribution: Indonesia, Hong Kong, NSW (Central E coast, Lower E coast), QLD (Central E coast, Great Barrier Reef, NE coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Central W coast, Lower W coast, N coast, NW coast, SW coast); Arafura Sea.

Ecology: benthic, marine; to 15 m, wedged in crevices, adheres to under-surfaces.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [299].

***Pyura fissa* (Herdman, 1881)**

Cynthia fissa Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. *Cynthiidae*, *Molgulidae*. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [58].

Type data: holotype BMNH 1887.2.4.48–9.

Type locality: Bass Strait, VIC.

Distribution: VIC (Bass Strait).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [301].

***Pyura gangelion* (Savigny, 1816)**

Cynthia gangelion Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. *In Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [90].

Type data: no type designated; Red Sea.

Halocynthia sansibarica Michaelsen, W. (1908). Die Pyuriden (Halocynthiiden) des Naturhistorischen Museum zu Hamburg. *Mitt. Zool. Mus. Hamburg* **25**(2): 227–287 [251].

Type data: holotype MGH T 91*.

Type locality: Zanzibar.

Pyura obesa Hartmeyer, R. (1919). Ascidien. *In*, Results of Dr E. Mjöberg's Swedish scientific expeditions to Australia 1910–1913. *K. Svenska Vetensk.-Akad. Handl.* **60**(4): 1–150. [14] [junior synonym of *Pyrua obesa* Sluiter, 1912].

Type data: holotype NHRM 1041.

Type locality: 45 miles WSW Cape Jaubert, 120–144 m, WA.

Pyura robusta Hartmeyer, R. (1922). Miscellaneous Ascidiologica. *Mitt. Zool. Mus. Berl.* **10**: 299–323 [319] [*nom. nov.* for *Pyrua obesa* Hartmeyer, 1919].

Pyura albanyensis Michaelsen, W. (1927). Einige neue westaustralische ptychobranchiate Ascidien. *Zool. Anz.* **71**: 193–203 [193].

Type data: holotype MGH K1395.

Type locality: Oyster Harbour, Albany, 0.75–5.5 m, WA.

Pyura scoresbiensis Kott, P. (1972). The ascidians of South Australia I. Spencer Gulf, St Vincent Gulf and Encounter Bay. *Trans. R. Soc. S. Aust.* **96**(1): 1–52 [36].

Type data: holotype SAMA E876, paratype(s) SAMA E892, E912.

Type locality: off Semaphore, Gulf St Vincent, 18 m, SA.

Pyura tongaea Monniot, C. & Monniot, F. (1976). Les ascidies de la côte du Mozambique. *Rev. Zool. Afr.* **90**(2): 357–393 [381].

Type data: holotype MNHP S2 PYU 21.

Type locality: d'Inhaca, Mozambique.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [315] (*P. albanyensis*, *P. scoresbiensis*); Monniot, C. (2002). Stolidobranch ascidians from the tropical western Indian Ocean. *J. Linn. Soc. London Zool.* **135**: 65–102 [100] (*Halocynthia sansibarica*); Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [73].

Distribution: Papua New Guinea, Palau, New Caledonia, Djibouti, NT (N coast), SA (S Gulfs coast), WA (N coast, SW coast); Red Sea, Zanzibar.

Ecology: benthic, marine.

Pyura gibbosa (Heller, 1878)

Taxonomic decision for subspecific arrangement: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [302].

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast), SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Lower W coast).

Pyura gibbosa draschii Kott, 1972

Pyura pachydermatina draschii Kott, P. (1972). The ascidians of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [187].

Type data: holotype WAM 1246.83.

Type locality: Cockburn Sound, WA.

Distribution: SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Lower W coast).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [305].

Pyura gibbosa gibbosa (Heller, 1878)

Cynthia gibbosa Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* **77**(1): 1–28 [27].

Type data: holotype (probable) ZMH.

Type locality: Bass Strait, VIC.

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [302].

Pyura irregularis (Herdman, 1881)

Cynthia irregularis Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [60].

Type data: type status unknown BMNH (depository uncertain, not found).

Type locality: Port Jackson, NSW.

Distribution: NSW (Lower E coast), TAS (Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine; 5–60 m.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [305].

Pyura isobella Kott, 1985

Pyura isobella Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [307].

Type data: holotype QM GH1448, paratype(s) QM G8576.

Type locality: on rocks, Ulladulla, NSW.

Distribution: NSW (Lower E coast), WA (Lower W coast).

Ecology: benthic, marine.

Pyura littoralis (Kott, 1956)

Culeolus littoralis Kott, P. (1956). A new species of ascidian (Genus *Culeolus* Herdman, Family Pyuridae) from the west coast of Tasmania. *Rec. Aust. Mus.* **24**(6): 59–60 [59].

Type data: syntypes AM Y1745, QM GH2311.

Type locality: between Lighthouse Point and Cutter Rock, Cuvier Bay, west coast Hunter Is., NW TAS.

Taxonomic decision for new combination: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [310] (as *Pyura littoralis*).

Distribution: TAS (Bass Strait); known only from type locality.

Ecology: benthic, marine; intertidal zone.

Pyura molguloides (Herdman, 1899)

Cynthia molguloides Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [445] [*nom. nud.*].

Cynthia molguloides Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [27].

Type data: holotype AM U275.

Type locality: Port Jackson, NSW.

Pyura tendata Kott, P. (1972). The ascidians of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [187].

Type data: holotype NMV H156.

Type locality: Investigator Strait, 30 m, SA.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [312]; taxonomic decision for new combination: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [312] (as *Pyura molguloides*).

Distribution: NSW (Lower E coast), SA (Great Australian Bight), VIC (Bass Strait).

Ecology: benthic, marine; 22–220 m.

Pyura navicula Kott, 1985

Pyura navicula Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [314].

Type data: holotype QM GH369.

Type locality: Cowan Cowan, Moreton Is., Moreton Bay, 20 m, QLD.

Distribution: QLD (Central E coast); known only from type locality.

Ecology: benthic, marine.

Pyura ostreophila Michaelsen, 1927

Pyura ostreophila Michaelsen, W. (1927). Einige neue westaustralische ptychobranchiate Ascidiën. *Zool. Anz.* **71**: 193–203 [195].

Type data: holotype ZMB 3786* (an aggregate of 40 specimens).

Type locality: Oyster Harbour, Albany, 0.75–5.5 m, WA.

Distribution: VIC (Bass Strait), WA (SW coast).

Ecology: benthic, marine; relatively shallow (to 5 m), aggregates embedded in sponge *Halisarca* sp. [Halisarcidae].

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [318].

Pyura rapaformis Kott, 1990

Pyura rapaformis Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [287].

Type data: holotype WAM 190.87, paratypes WAM 27.87, QM GH4309.

Type locality: reef near pylon, Cottesloe, 2 m, WA.

Distribution: SA (Great Australian Bight, S Gulfs coast), WA (Lower W coast, SW coast).

Ecology: benthic, marine; on jetty piles.

Reference: Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [646].

Pyura sacciformis (Drasche, 1884)

Cynthia sacciformis Drasche, R. von (1884). Ueber einige neue und weniger gekannte aussereuropäische einfache Ascidiën. *Denkschr. Akad. Wiss. Wien* **48**: 369–387 [376].

Type data: holotype (probable) ZMB 57*.

Type locality: Yokohama, Japan.

Cynthia japonica Traustedt, M.P.A. (1885). Ascidiæ simplices far det Stille Ocean. *Vidensk. Meddr. Dansk Naturh. Foren.* **1884**: 1–160 [30].

Type data: holotype ZMUC*.

Type locality: Japan.

Cynthia sanderi Traustedt, M.P.A. & Weltner, W. (1894). Bericht über die von Herrn Dr Sander gesammelten Tunicaten. *Arch. Naturgesch.* **60**(1): 10–14 [11].

Type data: syntypes (probable) ZMB 382, 383*.

Type locality: Nagasaki, Japan.

Halocynthia jokoboja Oka, A. (1906). Notizen über japanische ascidien I. *Annot. Zool. Jpn.* **6**(1): 37–52 [47].

Type data: holotype UTZM 338 M22*.

Type locality: Tatyama, Japan.

Halocynthia michaelseni Oka, A. (1906). Notizen über japanische ascidien I. *Annot. Zool. Jpn.* **6**(1): 37–52 [46].

Type data: type status unknown UTZM (depository uncertain, not found).

Type locality: Ozika Peninsula, Japan.

Halocynthia histrix Oka, A. (1930). Ueber eine merkwürdige Cynthiide aus der Bucht von Sagami. *Proc. Imp. Acad. Japan* **6**: 317–320 [317].

Type data: holotype UTZM 242* (M124).

Type locality: Sagami Bay, Japan.

Pyura aspera Tokioka, T. (1949). Contributions to the Japanese ascidian fauna I. Ascidiens collected by Prof. Mijadi and Mr Masui during the bottom survey 1934–1940. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **1**: 1–18 [10].

Type data: holotype SML 357*.

Type locality: Matoya Bay, Japan.

Pyura masuii Tokioka, T. (1949). Contributions to the Japanese ascidian fauna II. Notes on some ascidiens collected chiefly along the coast of Kii Peninsula. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **1**(2): 39–64 [57].

Type data: syntypes SML 102*.

Type locality: Tokyo Bay, Japan.

Pyura plicata Kott, P. (1952). Ascidiens of Australia. I. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [278].

Type data: holotype AM Y1856.

Type locality: on jetty piles, Hamelin Bay, WA.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [321]; Nishikawa, T. (1991). The ascidiens of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **35**(1–3): 26–170 [131].

Distribution: Korea, Japan, Fiji, NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), TAS (Tas. coast), WA (SW coast).

Ecology: benthic, marine; sometimes covered with sand or epibionts including Porifera.

Pyura scortea Kott, 1985

Pyura scortea Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [324].

Type data: holotype QM G9666.

Type locality: Cockburn Sound, WA.

Distribution: WA (Lower W coast); known only from type locality.

Ecology: benthic, marine.

Pyura spinifera (Quoy & Gaimard, 1834)

Ascidia spinifera Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris : Pilet Ainé. [617].

Type data: holotype MNHP S2 PYU 265*.

Type locality: King George Sound, Albany, WA.

Boltenia australiensis Carter, H.J. (1885). Descriptions of sponges from the neighbourhood of Port Phillip Heads, South Australia, continued. *Ann. Mag. Nat. Hist.* (5) **15**: 196–222 [197].

Type data: holotype ZMH K51.

Type locality: Back Stairs Passage, Port Phillip Bay, VIC.

- Boltenia tuberculata*** Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [571].
Type data: syntypes AM U286, AM U290 (G2056), AM U350 (G2057).
Type locality: Port Jackson, NSW.
- Cynthia multiradicata*** Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [445] [*nom. nud.*].
- Cynthia multiradicata*** Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [30].
Type data: holotype AM U384 (G2065).
Type locality: Port Stephens, NSW.
- Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [325].
- Distribution: NSW (Lower E coast), TAS (Bass Strait), WA (Lower W coast, SW coast).
Ecology: benthic, marine; to 80 m, whole body, including stalk, covered with sponge *Halisarca australiensis* Carter, 1885 [Halisarcidae].
- Pyura spinosa*** (Quoy & Gaimard, 1834)
- Ascidie spinosa*** Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in: *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris : Pilet Ainé. [615].
Type data: holotype MNHP S2 PYU 160*.
Type locality: King George Sound, Albany, WA.
- Cynthia cerebriiformis*** Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [57].
Type data: holotype BMNH 1887.2.4.47.
Type locality: Port Jackson, NSW.
- Cynthia cataphracta*** Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [445] [*nom. nud.*].
- Cynthia cataphracta*** Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [31].
Type data: syntypes AM U250 (G2066).
Type locality: Port Jackson, NSW.
- Pyura leeuwinia*** Kott, P. (1952). Ascidiaceans of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [277].
Type data: syntypes AM Y1840, Y1841.
Type locality: north side of Trigg's Is., WA.
- Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [327].
- Distribution: NSW (Lower E coast), TAS (Tas. coast), VIC (Bass Strait), WA (SW coast).
Ecology: benthic, marine; turbulent conditions off rocky coasts.
- Pyura stolonifera*** (Heller, 1878)
- Cunjevoi
- Cynthia praeputialis*** Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* **77**(1): 1–28 [12].
Type data: holotype ZMH K93.
Type locality: Port Jackson, NSW.
- Cynthia stolonifera*** Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* **77**(1): 1–28 [10].
Type data: type status unknown NHMW (depository uncertain).
Type locality: Simons Bay, South Africa.
- Microcosmus herdmani*** Drasche, R. von (1884). Ueber einige neue und weniger gekannte aussereuropäische einfache Ascidien. *Denkschr. Akad. Wiss. Wien* **48**: 369–387 [370].
Type data: holotype (probable) ZMB (depository uncertain).
Type locality: Simons Bay, South Africa.
- Microcosmus coalitus*** Sluiter, C.P. (1898). Beiträge zur Kenntnis der Fauna von Südafrika II. Tunicaten. *Zool. Jahrb. Syst.* **11**: 1–64 [57].
Type data: holotype ZMA TU603*.
Type locality: Port Nolloth, SW coast, South Africa.
- Cynthiopsis valdiviae*** Michaelsen, W. (1904). Die stolidobranchiaten Ascidien der deutschen Tiefsee-Expedition. *Wiss. Ergebn. dt. Tiefsee-Exp. 'Valdivia'* **7**: 183–260 [201].
Type data: holotype (probable) ZMH K96, paratype(s) (probable) ZMB 1654, 1681*.
Type locality: Plettenberg Bay, 100 m, South Africa [34°07'18"S 23°27'48"E].
- Halocynthia vanhoeffeni*** Michaelsen, W. (1904). Die stolidobranchiaten Ascidien der deutschen Tiefsee-Expedition. *Wiss. Ergebn. dt. Tiefsee-Exp. 'Valdivia'* **7**: 183–260 [197].
Type data: holotype ZMB 1653*.
Type locality: Luderitz Bay, South Africa.
- Pyura bradleyi*** Van Name, W.G. (1931). New North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **61**: 207–225 [221].
Type data: holotype YPM 2934*, paratype(s) AMNH 871*.
Type locality: Zorritos, Peru.
- Taxonomic decision for synonymy: Michaelsen, W. (1923). Neue und altbekannte ascidien aus dem Reichsmuseum zu Stockholm. *Mitt. Zool. Mus. Hamburg* **40**: 1–60 [50]; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [328].
- Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast), SA (S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Central W coast, Lower W coast, SW coast); equatorial west coasts of South America and west and south-east Africa.
Ecology: benthic, marine; aggregations on sediment free rocky substrate, solitary on sandy substrate.

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Pyura tasmanensis Kott, 1985

Pyura tasmanensis Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [331].

Type data: holotype TMH D1881, paratype(s) TMH D720.

Type locality: Neck Canal, Ralph's Bay, TAS.

Distribution: TAS (Tas. coast).

Ecology: benthic, marine; to 154 m, large numbers washed up on beaches after storms.

Pyura viarecta Kott, 1985

Pyura viarecta Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [333].

Type data: holotype QM GH1388.

Type locality: southern reef slope, Heron Is., 10 m, QLD.

Distribution: QLD (NE coast); known only from type locality.

Ecology: benthic, marine.

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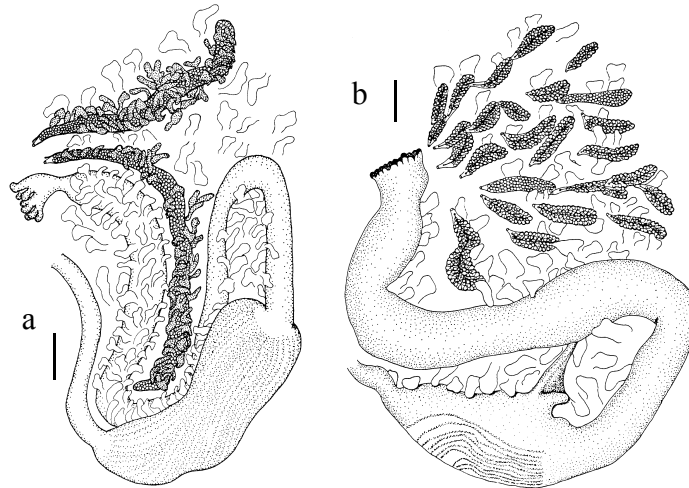


Fig. 22. Styelid species, left body wall showing gut and gonads, with scattered endocarps: **a**, *Styela plicata* (Lesueur, 1823); **b**, *Polycarpa aurita* (Sluiter, 1890). (Scale bars = 2.0 mm). [from Kott 1985]

The family Styelidae Sluiter, 1895 is diverse, containing solitary species (Styelinae) as well as colonial ones, some with cloacal systems (Botryllinae) and others without (Polyzoinae). Family characters, evident in the larger solitary species, are often reduced or absent in the smaller and more simplified zooids of colonial taxa. Basically the family is distinguished by having four pharyngeal folds on each side of the body, simple (unbranched) branchial tentacles, a thick external coat of circular muscles over a layer of longitudinal muscle bands, internal glandular folds in the stomach wall, usually more than one gonad on each side of the body, those on the left outside the gut loop, and the internal parietal body wall often raised into upright leaf-like or flat-topped bodies known as endocarps projecting into the atrial cavity. The function of the endocarps is not known, although it appears that they would interrupt the excurrent stream of water as it moves through the atrial cavity and in some cases (e.g. in *Polycarpa*) may impede the release of gametes from the atrial cavity.

The best known genera of the solitary Styelinae are *Styela* Fleming, 1822, with branching male follicles in the body wall around the outside of the long ovarian tubes that converge to the atrial apertures; *Cnemidocarpa* Huntsman, 1912, with similar ovarian tubes but with compact testis follicles closely applied to the sides or beneath the ovarian tube, the vasa efferentia joining the vas deferens along the mesial surface of the ovary, and *Polycarpa* Heller, 1877, with many short ovarian sacs (often in several rows, or scattered), their short ducts usually distant from the excurrent aperture. The testis follicles are beneath the ovaries. *Asterocarpa* Brewin, 1946 has branched gonads of the cnemidocarp type around the ventral margin of the body; and *Monandrocarpa* Michaelsen, 1904 has polycarp-type gonads but each gonad has only a single pair of testis follicles. In *Styela* and *Cnemidocarpa* the number of gonads on the left is often only one or two, although they are more numerous on the right.

Polycarpa is unusual in having some viviparous species in which the oviducts are directed ventrally or in which the ovaries with their short oviducts are present only ventrally, resulting in the retention of eggs in the atrial cavity where they are fertilised and the embryos are incubated. Berrill (1955) has proposed that viviparous species are adapted for life in the open

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sea in that gametes are less vulnerable to dispersal and populations are maintained more tightly. *Polycarpa* (like *Molgula*, in the Molgulidae) contains solitary species with a morphology amenable to adaptations for egg retention, and with test and body shape that can adapt to a free living existence on the open sea floor, e.g. with a strong feeding current from a large branchial sac rather than the small currents of colonial zooids; and with a rigid sand-encrusted test that protects the body from eroding sediments. The viviparous larvae in these genera also tend to lack the light sensitive ocellus—implying that light sensitivity is not advantageous where there are no shadows, such as on the open sea floor (see Berrill 1955).

Like Aplousobranchia (which are almost exclusively colonial), colonial subfamilies Polyzoinae and Botryllinae have viviparous larvae. These are convergent with aplousobranch larvae and it appears, therefore, that viviparity is associated with a colonial habit rather than an open sea habitat. Like aplousobranch larvae, the larvae of Botryllidae and Polyzoinae are light sensitive (negatively phototropic on settlement, being attracted into shaded habitats such as in crevices and on under-surfaces).

Polyzoinae, characterised by their separately opening atrial apertures, are a diverse subfamily with numerous genera, ranging from semi-independent zooids joined by basal stolons, to fully embedded ones. The subfamily well demonstrates the trend to simplification of morphology with replication and size reduction of zooids. The smaller zooids have flat branchial sacs with as few as three internal longitudinal vessels, and small and ephemeral gonads, while the larger forms (e.g. *Polyandrocarpa*) have all the characteristics of genera of the Styelinae—well-formed branchial folds and larger and persistent gonads. In the Botryllinae, the zooids form well-integrated cloacal systems comparable with those in the aplousobranch families Polyclinidae and Didemnidae and certain genera in the Holozoidae (*Sycozoa*, *Distaplia*, *Hypsistozoa* and *Hypodistoma*). Species have been assigned to one of two genera, *Botryllus* and *Botrylloides*, although a high degree of intraspecific variability in many of the taxa and a simple zooid morphology have resulted in difficulties in defining the parameters of both species and genera (see Sabbadin 1979; Monniot & Monniot 1987; Monniot 1988; Kott 2003).

The most diverse genera of the Styelinae in Australian waters are *Cnemidocarpa* (14 species) and *Polycarpa* (33 species). Both genera are well represented especially by indigenous species. The Indo-west Pacific tropical genus *Polycarpa* is known in Tasmania and New Zealand but not further south. *Styela*, never speciose, is represented by three, possibly introduced, opportunistic species, each with a cosmopolitan range. *Monandrocarpa* Michaelsen, 1904 and *Asterocarpa* Brewin, 1946 are each represented by a single species, and both genera are known only from the Southern Hemisphere.

Polyzoinae, are also well represented by the *Polycarpa*-like *Polyandrocarpa* Michaelsen, 1904 (10 species of which eight are indigenous), *Ocularia* Gray, 1868 (monotypic) and *Eusynstyela* Michaelsen, 1904 (two species); one genus with reduced numbers of branchial folds, *Stolonica* Lacaze-Duthiers & Delage, 1892 (10 species); and those without branchial folds, *Polyzoa* Lesson, 1830 (one species), *Metandrocarpa* Michaelsen, 1904 (three species), *Symplegma* Herdman, 1886 (three species) and *Chorizocarpa* Michaelsen, 1904 (three species). In Botryllinae, four species each in both *Botryllus* Gaertner, 1774 and *Botrylloides* Milne-Edwards, 1841 are presently recorded from Australia.

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Botrylloides Milne-Edwards, 1841

Botrylloides Milne-Edwards, H. (1841). Observations sur les ascidies composées des côtes de la Manche. *Mem. Acad. Sci. Inst. Fr.* **18**: 217–326 [301].

Type species: *Botrylloides rotifera* Milne-Edwards, 1841 by original designation.

Sarcobotrylloides Drasche, R. von (1883). Die Synascidien der Bucht von Rovigno (Istrien). In: *Ein Beitrag zur Fauna der Adria* Wien: Carl Gerolds Sohn. 41 pp. [14].

Type species: *Sarcobotrylloides superbum* Drasche, 1883 by monotypy.

Metrocarpa Ärnäck-Christie-Linde, A. (1923). Northern and Arctic invertebrates in the collection of the Swedish State Museum. IX Tunicata, Part 2. Botryllidae. *K. Sven. Vetensk.-Akad. Handl.* (2) **63**(9): 1–25 [5] [junior subjective synonym of *Botrylloides* Milne-Edwards, 1841].

Type species: *Botryllus leachii* Savigny, 1816 by original designation.

Taxonomic decision for synonymy: Huus, J. (1937). Ascidiaceae. pp. 545–692 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin: Walter de Gruyter Vol. 5(2)6 [674].

Extralimital distribution: worldwide in temperate and tropical seas. See: Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiendfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publ.* **133**: 1–354; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440; Monniot, C. & Monniot, F. (1987). Les ascidies de Polynésie française. *Mém. Mus. Natl. Hist. Nat. Paris* **136**: 1–155; Monniot, C. (1988). Ascidies de Nouvelle-Calédonie IV. Styelidae (suite). *Bull. Mus. Natl. Hist. Nat. Paris* (4) **10A**(2): 163–196; Nishikawa, T. (1991). The ascidians of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **35**(1–3): 26–170.

Botrylloides anceps (Herdman, 1891)

Sarcobotrylloides anceps Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [609].

Type data: holotype AM U272 (G2118; with *Chorizocormus subfuscus* Herdman, 1891).

Type locality: Port Jackson, NSW.

Botrylloides nigrum magnicoecum Hartmeyer, R. (1912). Die Ascidien der Deutschen Tiefsee Expedition. *Wiss. Ergebn. dt. Tiefsee-Exped. 'Valdivia'* **16**(3): 223–392 [271].

Type data: holotype NHMW 57816*.

Type locality: South Africa.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [276].

Distribution: Hong Kong, South Africa, NSW (Lower E coast), QLD (NE coast), SA (Great Australian Bight, S Gulfs coast), South Island, TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Central W coast). Ecology: benthic, marine.

Botrylloides firmus (F. Monniot & C. Monniot, 1996)

Botryllus firmus Monniot, F. & Monniot, C. (1996). New collections of ascidians from the western Pacific and Southeastern Asia. *Micronesica* **29**(2): 133–279 [238].

Type data: holotype MNHP S1 Bot B 108.

Type locality: Port Moresby, Baselisk Passage, 28 m, Papua New Guinea [9°32.32'S 147°08.04'E].

Distribution: Papua New Guinea, Palau, QLD (Central E coast, NE coast).

Ecology: benthic, marine.

References: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [279]; Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1647] (as *Botrylloides violaceus*).

Botrylloides leachii (Savigny, 1816)

Botryllus leachii Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris: G. Dufour. [199].

Type data: type status unknown MNHP (depository uncertain, not found).

Type locality: ?Mediterranean Sea.

Botrylloides albicans Milne-Edwards, H. (1841). Observations sur les ascidies composées des côtes de la Manche. *Mem. Acad. Sci. Inst. Fr.* **18**: 217–326 [304].

Type data: type status unknown.

Type locality: unknown.

Botrylloides rotifera Milne-Edwards, H. (1841). Observations sur les ascidies composées des côtes de la Manche. *Mem. Acad. Sci. Inst. Fr.* **18**: 217–326 [303].

Type data: type status unknown.

Type locality: unknown.

Botrylloides rubrum Milne-Edwards, H. (1841). Observations sur les ascidies composées des côtes de la Manche. *Mem. Acad. Sci. Inst. Fr.* **18**: 217–326 [303].

Type data: type status unknown.

Type locality: unknown.

Botrylloides radiata Alder, J. & Hancock, A. (1848). Tunicata in Catalogue of the Mollusca of Northumberland and Durham. *Transactions of the Tyneside Field Club* **1**: 195–207 [206] [dated 1846–1850].

Type data: holotype HMN*.

Type locality: Cullercoates, Yorkshire, England.

- Botrylloides ramulosa** Alder, J. & Hancock, A. (1848). Tunicata in Catalogue of the Mollusca of Northumberland and Durham. *Transactions of the Tyneside Field Club* **1**: 195–207 [207] [dated 1846-1850].
Type data: type status unknown BMNH or HMN (depository uncertain, not found).
Type locality: unknown.
- Botrylloides pusilla** Alder, J. (1863). Observations on the British Tunicata with descriptions of several new species. *Ann. Mag. Nat. Hist.* (3)**11**: 153–173 [173].
Type data: type status unknown BMNH or HMN (depository uncertain, not found).
Type locality: Grand Havre, Guernsey.
- Botrylloides sparsa** Alder, J. (1863). Observations on the British Tunicata with descriptions of several new species. *Ann. Mag. Nat. Hist.* (3)**11**: 153–173 [172].
Type data: holotype HMN*.
Type locality: St Peters Port, Guernsey, Channel Islands.
- Botrylloides clavelina** Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [632].
Type data: type status unknown (destroyed with Wimereux Laboratory).
Type locality: unknown.
- Botrylloides insigne** Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [633].
Type data: type status unknown (destroyed with Wimereux Laboratory).
Type locality: (on beaches after storms).
- Botrylloides prostratum** Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [632].
Type data: type status unknown (destroyed with Wimereux Laboratory).
Type locality: unknown.
- Botrylloides boloniense** Giard, A.M. (1875). Laboratoire de Zoologie maritime à Wimereux (Pas-de-Calais). *Compt. Rend. Ass. Fr. Avanc. Sci.* **3**: 72, 77 [77].
Type data: type status unknown (destroyed with Wimereux Laboratory).
Type locality: Bologne, English Channel.
- Botrylloides fulgurale** Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiæ compositæ. *Zool. Chall. Exped.* **14**(38): 1–425 [52].
Type data: holotype BMNH 1883.12.13.62*.
Type locality: 530 fathoms, north Atlantic Ocean [59°26'N 7°20'W].
- Botrylloides purpureum** Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiæ compositæ. *Zool. Chall. Exped.* **14**(38): 1–425 [41] [junior primary homonym of *Botrylloides purpureum* Drasche, 1883].
Type data: holotype BMNH (depository uncertain, lost?).
Type locality: off the Philippines [11°37'N 123°31'E].
- Botrylloides tyreum** Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiæ compositæ. *Zool. Chall. Exped.* **14**(38): 1–425 [41, 344, 381] [*nom. nov.* for *Botrylloides purpureum* Herdman, 1886].
- Botrylloides cyanescens** Giard, A.M. (1888). Le Laboratoire de Wimereux en 1888 (recherches fauniques). *Bull. Scient. Fr. Belg.* **9**: 495–496, 512–513 [513].
Type data: type status unknown (destroyed with Wimereux Laboratory).
Type locality: English Channel.
- Botrylloides parvulus** Huitfield-Kaas, H.J. (1896). Synascidiæ. *Den Norske Nordhavs-Expedition 1876–1878, 23 Zoology*, Tunicata **1**: 1–27. pp. 1–27 [24].
Type data: type status unknown BMBN (depository uncertain, not found).
Type locality: Norwegian coast, north Atlantic Ocean.
- Sarcobotrylloides espevaerense** Huitfield-Kaas, H.J. (1896). Synascidiæ. *Den Norske Nordhavs-Expedition 1876–1878, 23 Zoology*, Tunicata **1**: 1–27. pp. 1–27 [25].
Type data: type status unknown BMBN (depository uncertain, not found).
Type locality: north Atlantic Ocean.
- Botrylloides leptum** Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [101].
Type data: syntypes AM U361 (G2120), AM Y1584.
Type locality: Port Jackson, NSW.
- Sarcobotrylloides jacksonianum** Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [102].
Type data: syntypes AM G2121.
Type locality: Port Jackson, NSW.
- Sarcobotrylloides pannosum** Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [105].
Type data: syntypes AM Y2123.
Type locality: Port Stephens, NSW.
- Botrylloides translucidum** Hartmeyer, R. (1912). Die Ascidien der Deutschen Tiefsee Expedition. *Wiss. Ergebn. dt. Tiefsee-Exped. 'Valdivia'* **16**(3): 223–392 [272].
Type data: syntypes NHMW 57817, 57818*.
Type locality: Cape of Good Hope, South Africa.
- Botrylloides vinosa** Alder, J. & Hancock, A. (1912). The British Tunicata III J. Hopkinson, editor. *Ray Soc. Publs* **8**: 1–113 [81].
Type data: type status and whereabouts unknown.
Type locality: Japan.
- Taxonomic decision for synonymy: Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiënfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365 [361]; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* **133**: 1–354 [224].
- Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), SA (Great Australian Bight), VIC (Bass Strait), WA (Central W coast, Lower W coast, NW coast, SW coast); north-east Atlantic Ocean, North Sea, Mediterranean Sea, Black Sea, Adriatic, Red Sea and tropical Indo-west Pacific Ocean.
Ecology: benthic, marine.
Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [275].

Botrylloides perspicuus Herdman, 1886

Botrylloides perspicuum Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiacea compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [45].

Type data: syntypes BMNH 1887.2.4.209, 1887.2.4.210*.

Type locality: 20 m, Philippines [6°54'N 122°18'E].

Distribution: Philippines, Indonesia, Hong Kong, Lord Howe Island, QLD (Central E coast, SE oceanic), SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Central W coast, Lower W coast, NW coast).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [278].

Botrylloides saccus Kott, 2003

Botrylloides saccus Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1645].

Type data: syntypes SAMA E2868.

Type locality: Peneshaw Jetty, 4–6 m, Kangaroo Is., SA.

Distribution: SA (S Gulfs coast); known only from type locality.

Ecology: benthic, marine.

Botryllus Gaertner, 1774

Alcyonium Pallas, P.S. (1766). *Elenchus zoophytorum sistens generum adumbrationes generaliores et specierum cognitarum succinctas descriptiones cum selectis auctorum synonymis*. Hagae-comitum: P. van Cleef 451 pp. [342] [senior synonym suppressed in favour of *Botryllus* Gaertner, 1774 as *nomen conservandum*, see Hemming, F. & Noakes, D. (eds) (1958). *Official List of Generic Names in Zoology*. First instalment. London: International Trust for Zoological Nomenclature 200 pp. [47]; Hartmeyer, R. (1915). Ascidiarum nomina conservanda. pp. 247–258 in Apstein, C. Nomina Conservanda. *Sber. Ges. Naturf. Freunde Berl.* **1915b**: 247–258; junior homonym of *Alcyonium* Linnaeus, 1758 (Coelenterata), see Neave, S.A. (1975). *Nomenclator Zoologicus [1940–1975]*. London: The Zoological Society Vol. 1–7].

Type species: *Alcyonium schlosseri* Pallas, 1766 by monotypy.

Botryllus Gaertner, J. (1774). Zoophyta, quaedam minuta. pp. 24–41 in Pallas, P.S. *Specilegia Zoologia*. Berolini: G.A. Lange fasc. 10 [35] [*nomen conservandum*, see Hartmeyer, R. (1915). Ascidiarum nomina conservanda. pp. 247–258 in Apstein, C. Nomina Conservanda. *Sber. Ges. Naturf. Freunde Berl.* **1915b**: 247–258].

Type species: *Botryllus stellatus* Gaertner, 1774 by subsequent designation, see Hemming, F. & Noakes, D. (eds) (1958). *Official List of Generic Names in Zoology*. First instalment. London: International Trust for Zoological Nomenclature 200 pp.

Polycyclus Lamarck, J.B.P. (1815). Suites des Polypiers empâtés. *Mém. Mus. Natl. Hist. Paris* **1**: 331–340 [338]. Type species: *Polycyclus renieri* Lamarck, 1815 by monotypy.

Leptobotrylloides Oka, A. (1927). Zur kenntnis der japanischen Botryllidae. *Proc. Imp. Acad. Japan* **3**(9): 607–609 [607].

Myxobotrus Oka, A. (1931). Ueber *Myxobotrus*, eine neue Synascidien-Gattung. *Proc. Imp. Acad. Japan* **7**(6): 238–240 [238].

Type species: *Myxobotrus japonicus* Oka, 1931 by monotypy.

Psammobotrus Oka, A. (1932). Ueber *Psammobotrus purpureus* n.g. n.sp., eine mit sand bedeckte Botryllide. *Proc. Imp. Acad. Japan* **8**: 102–104 [102].

Type species: *Psammobotrus purpureus* Oka, 1932 by monotypy.

Parabotryllus Kott, P. (1975). The ascidians of South Australia III. Northern sector of the Great Australian Bight and additional records. *Trans. R. Soc. S. Aust.* **99**(1): 1–20 [11].

Type species: *Parabotryllus nemorus* Kott, 1975 by monotypy.

Taxonomic decision for synonymy: Huus, J. (1937). Ascidiaceae. pp. 545–692 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin: Walter de Gruyter Vol. 5(2)6 [674]; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [267, 269].

Extralimital distribution: worldwide in temperate and tropical seas. See: Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiendfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* **133**: 1–354; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440; Monniot, C. & Monniot, F. (1987). Les ascidies de Polynésie française. *Mém. Mus. Natl. Hist. Nat. Paris* **136**: 1–155; Monniot, C. (1988). Ascidies de Nouvelle-Calédonie IV. Styelidae (suite). *Bull. Mus. Natl. Hist. Nat. Paris* (4)**10A**(2): 163–196; Nishikawa, T. (1991). The ascidians of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **35**(1–3): 26–170.

Botryllus purpureus (Oka, 1932)

Psammobotrus purpureus Oka, A. (1932). Ueber *Psammobotrus purpureus* n.g. n.sp., eine mit sand bedeckte Botryllide. *Proc. Imp. Acad. Japan* **8**: 102–104 [102].

Type data: syntypes UTZM 255 * (S408).

Type locality: Japan.

Distribution: Japan, WA (Lower W coast).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [267].

Botryllus schlosseri (Pallas, 1766)

Sea Daisies

Alcyonium schlosseri Pallas, P.S. (1766). *Elenchus zoophytorum sistens generum adumbrationes generaliores et specierum cognitarum succinctas descriptiones cum selectis auctorum synonymis*. Hagae-comitum : P. van Cleef 451 pp. [355].

Type data: type status unknown.

Type locality: Falmouth, English Channel.

Botryllus stellatus Gaertner, J. (1774). Zoophyta, quaedam minuta. pp. 24–41 in Pallas, P.S. *Specilegia Zoologia*. Berolini : G.A. Lange fasc. 10 [37].

Type data: type status unknown.

Type locality: shores of Cornwall to Penzance, England.

Alcyonium borlasii Turton, W. (1807). pp. 132, 207–208 in *The British Fauna, containing a compendium of the Zoology of the British Islands*. Swansea : J. Evans [207].

Type data: type status and whereabouts unknown.

Type locality: Mounts Bay, English Channel.

Botryllus polycyclus Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [47, 84, 202].

Type data: type status unknown.

Type locality: Suez Canal.

Botryllus gemmeus Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [203].

Type data: type status and whereabouts unknown.

Type locality: Suez Canal.

Botryllus minutus Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. In *Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris : G. Dufour. [204].

Type data: type status and whereabouts unknown.

Type locality: Suez Canal.

Aplidium verrucosum Dalyell, J.D. (1839). *Edinburgh New Philosophy Journal*. **26**: 152–158. [155].

Type data: type status and whereabouts unknown.

Type locality: Firth of Forth, Scotland.

Botryllus violaceus Milne-Edwards, H. (1841). Observations sur les ascidies composées des côtes de la Manche. *Mem. Acad. Sci. Inst. Fr.* **18**: 217–326 [305] [junior homonym of *Botryllus violaceus* Quoy & Gaimard, 1834].

Type data: type status and whereabouts unknown.

Type locality: Saint-Vaast-la-Hougue, (Channel coast) France.

Botryllus smaragdus Milne-Edwards, H. (1841). Observations sur les ascidies composées des côtes de la Manche. *Mem. Acad. Sci. Inst. Fr.* **18**: 217–326 [307].

Type data: type status and whereabouts unknown.

Type locality: Saint-Vaast-la-Hougue, (Channel coast) France.

Botryllus bivittatus Milne-Edwards, H. (1841). Observations sur les ascidies composées des côtes de la Manche. *Mem. Acad. Sci. Inst. Fr.* **18**: 217–326 [308].

Type data: type status and whereabouts unknown.

Type locality: Langrune, (Channel coast) France.

Botryllus rubens Alder, J. & Hancock, A. (1848). Tunicata in Catalogue of the Mollusca of Northumberland and Durham. *Transactions of the Tyneside Field Club* **1**: 195–207 [204] [dated 1846-1850].

Type data: type status and whereabouts unknown.

Type locality: Cullercoats, Northumberland, England.

Botryllus castaneus Alder, J. & Hancock, A. (1848). Tunicata in Catalogue of the Mollusca of Northumberland and Durham. *Transactions of the Tyneside Field Club* **1**: 195–207 [205] [dated 1846-1850].

Type data: holotype HMN*.

Type locality: Cullercoats, Northumberland, England.

Botryllus virescens Alder, J. & Hancock, A. (1848). Tunicata in Catalogue of the Mollusca of Northumberland and Durham. *Transactions of the Tyneside Field Club* **1**: 195–207 [205] [dated 1846-1850].

Type data: holotype HMN*.

Type locality: Cullercoats, Northumberland, England.

Botryllus gouldii Verrill, A.E. (1871). Descriptions of some imperfectly known and new ascidians from New England. *Amer. J. Sci.* (3)**1**: 54–58, 93–100, 211–212, 288–294, 443–446 [211].

Type data: syntypes (probable) YPM 1383* (whereabouts of other syntype(s) unknown).

Type locality: Brooklyn, Long Island, New York.

Botryllus calendula Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [623].

Type data: type status and whereabouts unknown.

Type locality: Roscoff, France.

Botryllus pruinus Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [627].

Type data: type status and whereabouts unknown.

Type locality: Roscoff, France.

Botryllus aurolineatus Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [629].

Type data: type status and whereabouts unknown.

Type locality: Roscoff, France.

Botryllus morio Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [629].

Type data: type status and whereabouts unknown.

Type locality: Roscoff, France.

Botryllus marionis Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [630].

Type data: type status and whereabouts unknown.

Type locality: Roscoff, France.

Botryllus rubigo Giard, A.M. (1872). Recherches sur les ascidies composées ou synascidies. *Arch. Zool. Exp. Gén.* **1**: 613–662 [631].

Type data: type status and whereabouts unknown.

Type locality: Roscoff, France.

Botryllus violatinctus Hartmeyer, R. (1909). Ascidien (continuation of work by Seeliger). pp. 1281–1488 in Bronn, H.G. *Klassen und Ordnungen des Tier-Reichs*. Leipzig : C.F. Winter Vol. 3, suppl. pts 81–87 [1379] [*nom. nov.* for *Botryllus violaceus* Milne-Edwards, 1841].

- Botryllus badius*** Alder, J. & Hancock, A. (1912). The British Tunicata III J. Hopkinson, editor. *Ray Soc. Publs* **8**: 1–113 [70].
 Type data: holotype HMN*.
 Type locality: Isle of Man, England.
- Botryllus calyculatus*** Alder, J. & Hancock, A. (1912). The British Tunicata III J. Hopkinson, editor. *Ray Soc. Publs* **8**: 1–113 [70].
 Type data: holotype HMN*.
 Type locality: Peterhead, east coast of Scotland.
- Botryllus miniatus*** Alder, J. & Hancock, A. (1912). The British Tunicata III J. Hopkinson, editor. *Ray Soc. Publs* **8**: 1–113 [76].
 Type data: holotype HMN*.
 Type locality: Falmouth, Cornwall, England.
 Taxonomic decision for synonymy: Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiendfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365 [344].
- Distribution: Hong Kong, New Zealand, QLD (Central E coast, NE coast), SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Central W coast, Lower W coast); north Atlantic Ocean, North Sea, Mediterranean Sea, Black Sea and Adriatic.
 Ecology: benthic, marine; mainly in temperate waters.
 References: Sabbadin, A. (1979). Ascidian colonial structure and genetics. pp. 433–444 in Larwood, G.L. & Rosen, B.R. (eds) *Biology and Systematics of Colonial Organisms*. London: Academic Press; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [267].
- Botryllus stewartensis*** Brewin, 1958
- Botryllus stewartensis*** Brewin, B.I. (1958). Ascidians of New Zealand, Part 11. Ascidians of the Stewart Island region. *Trans. R. Soc. N.Z.* **85**(3): 439–453 [447].
 Type data: holotype OMNZ*.
 Type locality: Paterson Inlet, Stewart Is., 18 fathoms, New Zealand.
- Parabotryllus nemorus*** Kott, P. (1975). The ascidians of South Australia III. Northern sector of the Great Australian Bight and additional records. *Trans. R. Soc. S. Aust.* **99**(1): 1–20 [11].
- Type data: holotype SAMA E1031, paratypes AM Y1981, QM G7507.
 Type locality: upper Spencer Gulf, 9 m, SA.
 Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [269].
- Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast), SA (S Gulfs coast), South Island, VIC (Bass Strait).
 Ecology: benthic, marine.
 Reference: Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655.
- Botryllus tuberatus*** Ritter & Forsyth, 1917
- Botryllus tuberatus*** Ritter, W.E. & Forsyth, R.A. (1917). Ascidians of the littoral zone of southern California. *Univ. Calif. Publ. Zool.* **16**: 439–512 [461].
 Type data: type status and whereabouts unknown.
 Type locality: Santa Barbara, California, USA.
- Botryllus communis*** Oka, A. (1927). Zur kenntnis der japanischen Botryllidae. *Proc. Imp. Acad. Japan* **3**(9): 607–609 [607].
 Type data: syntypes (probable) UTZM 4(S33)*, UTZM 87(S184)*, UTZM 108(S15)*, UTZM 336(S175)*, UTZM 364(S1)*.
 Type locality: Japan.
- Botryllus gracilis*** Michaelsen, W. (1927). Einige neue westaustralische ptychobranchiate Ascidiend. *Zool. Anz.* **71**: 193–203 [203].
 Type data: syntypes ZMH*.
 Type locality: South Passage, Dirk Hartog Is., Shark Bay, WA.
 Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [271].
- Distribution: Japan, Indonesia, Palau, Kiribati, California, NSW (Central E coast), QLD (Central E coast, NE coast), WA (Lower W coast); southern California.
 Ecology: benthic, marine; reef flat habitats on the under-surface of rubble.
 Reference: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298.

POLYZOINAE

Botryllocarpa Hartmeyer, 1909

Protobotryllus Pizon, A. (1908). Ascidies d'Amboine. *Rev. Suisse Zool.* **16**: 195–248 [233] [proposed as a genus in the Botryllinae; junior homonym of *Protobotryllus* Rankin, 1903 (= *Botryllus* Gaertner, 1774)].

Type species: *Protobotryllus viridis* Pizon, 1908 by monotypy.

Botryllocarpa Hartmeyer, R. (1909). Ascidien (continuation of work by Seeliger). pp. 1281–1488 in Bronn, H.G. *Klassen und Ordnungen des Tier-Reichs*. Leipzig: C.F. Winter Vol. 3, suppl. pts 81–87 [1484] [*nom. nov.* for *Protobotryllus* Pizon, 1908].

Extralimital distribution: west Pacific Ocean. See: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298.

Botryllocarpa elongata Kott, 1990

Botryllocarpa elongata Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [283].

Type data: holotype AM Y2122.

Type locality: Phillip Is., Bass Strait, VIC.

Distribution: TAS (Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine.

Chorizocarpa Michaelsen, 1904

Chorizocarpa Michaelsen, W. (1904). Revision der compositen Styeliden oder Polyzoinen. *Jahrb. Hamb. Wiss. Anst.* **21**(2): 1–124 [92].

Type species: *Chorizocormus sydneyensis* Herdman, 1891 by original designation.

Extralimital distribution: west Pacific Ocean. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Chorizocarpa guttata Michaelsen, 1904

Chorizocarpa guttata Michaelsen, W. (1904). Revision der compositen Styeliden oder Polyzoinen. *Jahrb. Hamb. Wiss. Anst.* **21**(2): 1–124 [104].

Type data: syntypes ZMH, AM Y2012, Y2013 (depository uncertain).

Type locality: Port Jackson, NSW, to 20 m.

Distribution: NSW (Lower E coast); known only from type locality.

Ecology: benthic, marine; 20 m.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [261].

Chorizocarpa michaelsoni (Sluiter, 1900)

Synstyela michaelsoni Sluiter, C.P. (1900). Berichtigung über eine *Synstyela*-Art. *Zool. Anz.* **23**: 110 [110].

Type data: holotype ZMA TU1081.

Type locality: Thursday Is., Torres Strait.

Distribution: New Caledonia, QLD (Gulf of Carpentaria).

Ecology: benthic, marine.

Reference: Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1644].

Chorizocarpa sydneyensis (Herdman, 1891)

Chorizocormus sydneyensis Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [636].

Type data: syntypes AM U261, U257.

Type locality: Port Jackson, NSW.

Chorizocormus leucophaeus Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [636].

Type data: syntypes AM U169 (G2119).

Type locality: Port Jackson, NSW.

Chorizocormus subfuscus Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [636].

Type data: holotype AM U272 (G2118).

Type locality: Port Jackson, NSW.

Gynandrocarpa purpurea Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidien. *Siboga Exped.* **56A**: 1–126 [96].

Type data: syntypes ZMA TU551, TU552, TU553.

Type locality: reef, Pulu Sebangkatan; reef, Kabaena Is.; reef, North Top of Tiur Is., Indonesia.

Gynandrocarpa systematica Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidien. *Siboga Exped.* **56A**: 1–126 [98].

Type data: lectotype ZMA TU562.4, paralectotype(s) ZMA TU1264.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200.

Type locality: reef, NE tip of Timor, Indonesia.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [262].

Distribution: Indonesia, NSW (Lower E coast), QLD (NE coast); west Pacific Ocean.

Ecology: benthic, marine.

***Eusynstyela* Michaelsen, 1904**

Michaelsenia Van Name, W.G. (1902). The ascidians of the Bermuda Islands. *Trans. Conn. Acad. Arts Sci.* **11**: 325–412 [380] [junior homonym of *Michaelsena* Ude, 1896 (Oligochaeta)].

Type species: *Michaelsenia tincta* Van Name, 1902 by monotypy.

Eusynstyela Michaelsen, W. (1904). Revision der compositen Styeliden oder Polyzoinen. *Jahrb. Hamb. Wiss. Anst.* **21**(2): 1–124 [36] [*nom. nov.* for *Michaelsenia* Van Name, 1902].

Extralimital distribution: tropical west Atlantic Ocean, west Pacific Ocean to Japan, the Red Sea and Gulf of Suez. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Eusynstyela grandis* Kott, 1990**

Eusynstyela grandis Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [276].

Type data: holotype QM GH4281.

Type locality: Wistari Reef, Capricorn Group, Great Barrier Reef, QLD.

Distribution: New Caledonia, QLD (Great Barrier Reef).

Ecology: benthic, marine; under rubble near reef crest.

***Eusynstyela latericius* (Sluiter, 1904)**

Gynandrocarpa latericius Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidien. *Siboga Exped.* **56A**: 1–126 [94].

Type data: holotype ZMA TU562.1.

Type locality: Sarassa Is., 36 m, Indonesia.

Gynandrocarpa (Eusynstyela) imthurni Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* **39**: 295–348 [330].

Type data: type status unknown BMNH (depository uncertain, not found).

Type locality: Chilaw Paar, 16–22 m, Sri Lanka.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [228].

Distribution: Japan, Vietnam, Thailand, Sri Lanka, Philippines, Indonesia, New Caledonia, NT (N coast), QLD (Central E coast, NE coast), WA (N coast, NW coast); Gulf of Thailand, Indian Ocean.

Ecology: benthic, marine; to 82 m, often epibiont on other stolidobranch ascidians.

***Metandrocarpa* Michaelsen, 1904**

Metandrocarpa Michaelsen, W. (1904). Revision der compositen Styeliden oder Polyzoinen. *Jahrb. Hamb. Wiss. Anst.* **21**(2): 1–124 [69].

Type species: *Goodsiria dura* Ritter, 1896 by monotypy.

Okamia Brewin, B.I. (1948). Ascidians of the Hauraki Gulf, Part 1. *Trans. R. Soc. N.Z.* **77**(1): 115–138 [122].

Type species: *Metandrocarpa thilenii* Michaelsen, 1922 by monotypy.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [250].

Extralimital distribution: Nearctic Region; west coast of North America, west Pacific Ocean to New Zealand. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Metandrocarpa agitata* Kott, 1985**

Metandrocarpa agitata Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [251].

Type data: holotype WAM 970.83, paratype(s) WAM 41.84. Type locality: 92 km W of Dongara, 110 m, WA [29°07'30"S 113°57'24"E].

Distribution: QLD (Central E coast), WA (Lower W coast).

Ecology: benthic, marine; to 110 m, rubble with sponges.

***Metandrocarpa indica* Kott, 1972**

Metandrocarpa indica Kott, P. (1972). The ascidians of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [182].

Type data: holotype NMV H159, paratype(s) NMV H158.

Type locality: Investigator Strait, 23 m, SA.

Distribution: SA (S Gulfs coast), WA (Lower W coast).

Ecology: benthic, marine; to 44 m, sand and shell bottom in strong surge.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [253].

***Metandrocarpa miniscula* Kott, 1985**

Metandrocarpa miniscula Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [254].

Type data: syntypes QM GH1500.

Type locality: Mission Beach, QLD.

Distribution: QLD (NE coast).

Ecology: benthic, marine; intertidal epibiont on *Ascidia* sp., underside of rubble.

***Oculinaria* Gray, 1868**

Oculinaria Gray, J.E. (1868). Note on *Oculinaria*, a new genus of social Ascidia. *Proc. Zool. Soc. Lond.* **1868**: 564–565 [564].

Type species: *Oculinaria australis* Gray, 1868 by monotypy.

***Oculinaria australis* Gray, 1868**

Oculinaria australis Gray, J.E. (1868). Note on *Oculinaria*, a new genus of social Ascidia. *Proc. Zool. Soc. Lond.* **1868**: 564–565 [564].

Type data: holotype BMNH 1861.9.20.12*.

Type locality: Fremantle, WA.

Distribution: NSW (Lower E coast), SA (Great Australian Bight), TAS (Bass Strait), VIC (Bass Strait), WA (Lower W coast, SW coast).

Ecology: benthic, marine; to 44 m, around stems of weed and other material.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [226].

***Polyandrocarpa* Michaelsen, 1904**

Polyandrocarpa Michaelsen, W. (1904). Revision der compositen Styeliden oder Polyzoinen. *Jahrb. Hamb. Wiss. Anst.* **21**(2): 1–124 [34].

Type species: *Goodsiria lapidosa* Herdman, 1891 by monotypy.

Extralimital distribution: tropical east Atlantic Ocean, west Pacific Ocean. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Polyandrocarpa abjornseni* (Michaelsen, 1927)**

Polycarpa abjornseni Michaelsen, W. (1927). Einige neue westaustralische ptychobranchiate Ascidien. *Zool. Anz.* **71**: 193–203 [200].

Type data: syntypes (probable) ZMB 3800*, ZMB 3801.

Type locality: Fremantle, south of the town, Cockburn sound, on the beach, WA.

Distribution: WA (Lower W coast).

Ecology: benthic, marine.

***Polyandrocarpa australiensis* Kott, 1952**

Polyandrocarpa australiensis Kott, P. (1952). Ascidiens of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [249].

Type data: syntypes AM Y796, AM Y797, AM Y1570, AM Y1572, AM Y1573.

Type locality: reef, just south of the jetty, Thompson Bay, Rottnest Is., WA.

Distribution: QLD (NE coast), WA (Lower W coast).

Ecology: benthic, marine; to 24 m.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [217].

***Polyandrocarpa colemani* Kott, 1992**

Polyandrocarpa colemani Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [641].

Type data: holotype QM GH5724, paratype(s) QM GH5392.

Type locality: Cook Is., off Queensland border, 9 m, NSW.

Distribution: NSW (Central E coast, Lower E coast).

Ecology: benthic, marine; top of ridges where subjected to maximum current.

Reference: Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [641].

***Polyandrocarpa lapidosa* (Herdman, 1891)**

Goodsiria lapidosa Herdman, W.A. (1891). A revised classification of the Tunicata, with definitions of the orders, sub-orders, families, sub-families and genera, and analytical keys to the species. *J. Linn. Soc. Lond. Zool.* **23**: 558–652 [637].

Type data: syntypes AM U352 (G2116).

Type locality: Port Jackson, NSW.

Distribution: NSW (Lower E coast), SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait).

Ecology: benthic, marine; hard vertical surfaces, strong currents, to 25 m.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [219].

***Polyandrocarpa rollandi* Tokioka, 1961**

Polyandrocarpa rollandi Tokioka, T. (1961). Ascidiens collected during the Melanesian Expedition of the Osaka Museum of Natural History. I. Ascidiens presented by Dr R.L.A. Catala of the aquarium of Noumea. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **9**(1): 103–138 [116].

Type data: syntypes OMNH IV1321*.

Type locality: Noumea, New Caledonia.

Distribution: New Caledonia, French Polynesia, Mauritius, QLD (NE coast).

Ecology: benthic, marine; to 15 m.

Reference: Monniot, C. (1987). Ascidiens de Nouvelle-Calédonie I. Phlebobranches du Lagon. *Bull. Mus. Natl. Hist. Nat. Paris* (4)**9A**(1): 3–31 [303].

***Polyandrocarpa simulans* Kott, 1972**

Polyandrocarpa simulans Kott, P. (1972). The ascidiens of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [184].

Type data: holotype NMV H162, paratype(s) NMV H160, H161, H163.

Type locality: Investigator Strait, SA.

Distribution: SA (Great Australian Bight, S Gulfs coast).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [222].

***Polyandrocarpa sparsa* Kott, 1985**

Polyandrocarpa sparsa Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [222].

Type data: holotype QM G9591.

Type locality: N Solitary Is., 6 m, NSW.

Distribution: NSW (Lower E coast); known only from type locality.
Ecology: benthic, marine.

***Polyandrocarpa triggsiensis* Kott, 1952**

Polyandrocarpa triggsiensis Kott, P. (1952). Ascidians of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [248].
Type data: syntypes AM Y1301, Y1575.
Type locality: north outer reef, Trigg's Is., WA.

Distribution: WA (Lower W coast); known only from type locality.

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [224].

***Polyandrocarpa watsonia* Kott, 1985**

Polyandrocarpa watsonia Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [225].
Type data: holotype NMV H170.
Type locality: 28 km S off Mallacoota Inlet, Rams Head, 6 m, VIC.

Distribution: VIC (Bass Strait); known only from type locality.

Ecology: benthic, marine; to 6 m.

***Polyzoa* Lesson, 1831**

Polyzoa Lesson, R.P. (1831). Zoologie. pp. 433–440 in Lesson, R.P. *Voyage autour du Monde sur la Corvette La Coquille pendant 1822–1825*. Paris : P. Pourret Freres Vol. 2(1) [437].
Type species: *Polyzoa opuntia* Lesson, 1831 by monotypy.

Goodsiria Cunningham, R.O. (1871). Notes on the reptiles, amphibia, fishes, Mollusca and Crustacea obtained during the voyage of H.M.S. *Nassau* in the years 1866–1869. *Trans. Linn. Soc. Lond.* **27**: 465–502 [489].
Type species: *Goodsiria coccinea* Cunningham, 1871 by monotypy.

Chorizocormus Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiæ compositæ. *Zool. Chall. Exped.* **14**(38): 1–425 [345].
Type species: *Chorizocormus reticulatus* Herdman, 1886 by monotypy.

Monobotryllus Oka, A. (1915). Report upon the Tunicata in the collection of the Indian Museum. *Mem. Indian Mus.* **6**: 1–33 [20].
Type species: *Monobotryllus violaceus* Oka, 1915 by monotypy.

Dictyostyela Oka, A. (1926). On the mode of gemmation in *Dictyostyela depressa* n.g., n.sp. (Ascidiæ Sociales). *Proc. Imp. Acad. Japan* **2**: 348–351 [348].
Type species: *Dictyostyela depressa* Oka, 1926 by monotypy.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [249].

Extralimital distribution: Antarctic Region; subantarctic, southern California, Indo-West Pacific Ocean. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Polyzoa exigua* Kott, 1990**

Polyzoa exigua Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [280].
Type data: holotype QM GH4628, paratype(s) QM GH4629–30.
Type locality: Albany, WA.

Distribution: WA (SW coast); known only from type locality.

Ecology: benthic, marine; epizooic on *Polycarpa flava* [Styelidae] from seagrass beds.

***Polyzoa nodosa* Kott, 1990**

Polyzoa nodosa Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [282].
Type data: holotype SAMA E2031, paratype(s) QM GH4154.
Type locality: Price Is., SA.

Distribution: SA (Great Australian Bight); known only from type locality.

Ecology: benthic, marine; 15–20 m.

***Polyzoa violacea* (Oka, 1915)**

Monobotryllus violacea Oka, A. (1915). Report upon the Tunicata in the collection of the Indian Museum. *Mem. Indian Mus.* **6**: 1–33 [20].
Type data: syntypes IM*.
Type locality: Puri, Orissa, on oyster shell, India.

Dictyostyela depressa Oka, A. (1926). On the mode of gemmation in *Dictyostyela depressa* n.g., n.sp. (Ascidiæ Sociales). *Proc. Imp. Acad. Japan* **2**: 348–351 [348].
Type data: type status unknown UTZM (depository uncertain, not found).
Type locality: Honshu, on *Haliotis* [Mollusca] shell, Japan.

Polyzoa sagamiana Tokioka, T. (1953). *Ascidiæ of Sagami Bay*. Tokyo : Iwanami Shoten 313 pp. 79 pls [245].
Type data: holotype BLIH 199*.
Type locality: Hasaki, off Sazima, Sagami Bay, 16 m, Japan.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [249].

Distribution: Japan, Fiji, QLD (NE coast), WA (NW coast); Indian Ocean.

Ecology: benthic, marine; often growing on *Cnemidocarpa areolata* [Styelidae] and *Herdmania momus* [Pyuridae], also from rubble shells and other material, intertidal waters–64 m.

***Stolonica* Lacaze-Duthiers & Délage, 1892**

Stolonica Lacaze-Duthiers, F.J.H. & Délage, Y. (1892). Faune des Cynthiadiées de Roscoff et côtes de Bretagne. *Mém. pres. div. Sav. Acad. Sci. Inst. Fr.* **45**(2): 1–319 [249]. Type species: *Cynthia aggregata* Forbes, 1848 (*nom. nov.* for *Stolonica socialis* Hartmeyer, 1903, see Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiendfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365) by original designation.

Amphicarpa Michaelsen, W. (1922). Ascidiae Ptychobranchiae und Diktyobranchiae von Neuseeland und dem Chatham-Inseln. Papers from Dr. Th. Mortensen's Pacific Expedition 1914–1916, XI. *Vidensk. Meddr. Dansk Naturh. Foren.* **73**: 359–498 [415]. Type species: *Stolonica prolifera* Sluiter, 1905 by original designation.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [277].

Extralimital distribution: northeast Atlantic, tropical west Pacific Ocean. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Stolonica agnata* Kott, 1985**

Stolonica agnata Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [232]. Type data: holotype QM GH723. Type locality: off mouth of Don River, Abbot Point, 15 m, QLD.

Distribution: New Caledonia, QLD (NE coast), WA (Lower W coast). Ecology: benthic, marine; 15 m, coarse sand with mud.

***Stolonica aluta* Kott, 1985**

Stolonica aluta Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [233]. Type data: holotype WAM 968.83, paratype(s) WAM 40.84, 969.83. Type locality: 82 km W of Dongara, 164 m, WA [29°14'S 114°04'E–29°14'48"S 114°05'06"E].

Distribution: WA (Lower W coast). Ecology: benthic, marine; 164 m, small stones and sand with sponges.

***Stolonica australis* Michaelsen, 1927**

Stolonica australis Michaelsen, W. (1927). Einige neue westaustralische ptychobranchiate Ascidien. *Zool. Anz.* **71**: 193–203 [202]. Type data: syntypes ZMH K1522*. Type locality: Middleton Beach, Albany, 5.5–8 m, WA.

Amphicarpa meridiana Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [246].

Type data: holotype QM GH2231, paratype(s) QM G10172. Type locality: Fly Point, Port Stephens, 10 m, NSW.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [278].

Distribution: SA (S Gulfs coast), TAS (Tas. coast), WA (SW coast).

Ecology: benthic, marine.

***Stolonica brevigastra* Kott, 2003**

Stolonica brevigastra Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1644].

Type data: holotype SAMA E2853, paratype(s) QM GH1308, GH1310.

Type locality: Top Gallant Is., in caves and overhangs, 20 m, SA.

Distribution: SA (S Gulfs coast); known only from type locality.

Ecology: benthic, marine.

***Stolonica carnosa* Millar, 1963**

Stolonica carnosa Millar, R.H. (1963). Australian ascidians in the British Museum (Natural History). *Proc. Zool. Soc. Lond.* **141**(4): 689–746 [735].

Type data: holotype BMNH 1962.1.12.25.

Type locality: Cottesloe, WA.

Distribution: SA (S Gulfs coast), VIC (Bass Strait), WA (Lower W coast).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Stolonica diptycha* (Hartmeyer, 1919)**

Distomus diptychos Hartmeyer, R. (1919). Ascidien. In, Results of Dr E. Mjöberg's Swedish scientific expeditions to Australia 1910–1913. *K. Svenska Vetensk.-Akad. Handl.* **60**(4): 1–150. [87].

Type data: holotype NHRM 714*, paratype(s) ZMH K1533. Type locality: 45 miles WSW Cape Jaubert, 144 m, north WA.

Distribution: WA (Central W coast, NW coast, SW coast).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

***Stolonica duplopicata* Sluiter, 1913**

Stolonica duplopicata Sluiter, C.P. (1913). Ascidien von den Aru-Inseln. *Abh. Senckenb. Naturforsch. Ges.* **35**: 65–78 [67].

Type data: syntypes ZMA TU986.

Type locality: Pulu Bambu, Aru Is., 10 m, Indonesia.

Distribution: Philippines, WA (NW coast); Torres Strait.

Ecology: benthic, marine; 10–64 m.

Stolonica nodula (Kott, 1985)

Amphicarpa nodula Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [247].

Type data: holotype QM GH702.

Type locality: Abbot Point, 20 m, QLD.

Taxonomic decision for new combination: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [279] (as *Stolonica nodula*).

Distribution: QLD (NE coast).

Ecology: benthic, marine; 20 m, sandy mud.

Stolonica reducta (Sluiter, 1904)

Styela reducta Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die sozialen und holosomen Ascidiien. *Siboga Exped.* **56A**: 1–126 [72].

Type data: syntypes ZMA TU1050.

Type locality: 73 m, Indonesia [8°30'S 119°07'30"E].

Amphicarpa elongata Kott, P. (1952). Ascidiens of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [236].

Type data: syntypes AM Y1597, Y1599.

Type locality: north end of outer reef, Trigg's Is., WA.

Taxonomic decision for synonymy: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [280].

Distribution: Indonesia, WA (Lower W coast); Coral Sea.

Ecology: benthic, marine.

Stolonica styeliformis Van Name, 1918

Stolonica styeliformis Van Name, W.G. (1918). Ascidiens from the Philippines and adjacent waters. *Bull. U.S. Natl Mus.* **100**(1): 49–174 [107].

Type data: holotype USNM 6042, paratype(s) USNM 5994, 5995, 5996.

Type locality: off Jolo Light, 58 m, Philippines.

Distribution: Philippines, NT (Gulf of Carpentaria).

Ecology: benthic, marine.

Reference: Kott, P. (1972). The fauna of the Gulf of Carpentaria: Ascidiacea (Chordata: Tunicata). *Fish. Notes Qld (n.s.)* **2**: 39–54 [50] (see *Amphoplicata dupplicata*).

Stolonica truncata Kott, 1972

Stolonica truncata Kott, P. (1972). The ascidiens of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [183].

Type data: holotype SAMA E893, paratype(s) SAMA E894, E909.

Type locality: 1 km NW Waldegrave Is., Great Australian Bight, 23 m, SA.

Distribution: SA (Great Australian Bight), WA (Lower W coast).

Ecology: benthic, marine; rocky bottom with sand patches, 3–25 m.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [238].

Symplegma Herdman, 1886

Symplegma Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiaceae compositae. *Zool. Chall. Exped.* **14**(38): 1–425 [144].

Type species: *Symplegma viride* Herdman, 1886 by monotypy.

Diandrocarpa Van Name, W.G. (1902). The ascidiens of the Bermuda Islands. *Trans. Conn. Acad. Arts Sci.* **11**: 325–412 [382].

Type species: *Diandrocarpa botryllopsis* Van Name, 1902 by monotypy.

Taxonomic decision for synonymy: Huus, J. (1937). Ascidiaceae. pp. 545–692 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin: Walter de Gruyter Vol. 5(2)6 [675].

Extralimital distribution: tropical west Pacific, Atlantic Ocean. See: Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* **133**: 1–354; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Symplegma arenosa Kott, 1972

Symplegma arenosa Kott, P. (1972). The ascidiens of South Australia II. Eastern Sector of the Great Australian Bight and Investigator Strait. *Trans. R. Soc. S. Aust.* **96**(4): 165–196 [182].

Type data: holotype SAMA E904, paratype(s) SAMA E985.

Type locality: off Waldegrave Is., Great Australian Bight, SA.

Distribution: SA (Great Australian Bight); known only from type locality.

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Symplegma bahraini C. & F. Monniot, 1997

Symplegma bahraini Monniot, C. & Monniot, F. (1997). Records of ascidiens from Bahrain, Arabian Gulf, with three new species. *J. Nat. Hist.* **31**: 1623–1643 [1638].

Type data: holotype MNHP S1 SYM 51, paratype(s) MNHP SYM 52.

Type locality: Bahrain, 7 m, on seagrass, Mozambique [24°09.07'N 50°39.32'E].

Distribution: Mozambique, NT (N coast).

Ecology: benthic, marine.

Reference: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [70].

Symplegma brakenhielmi (Michaelsen, 1904)

Diandrocarpa brakenhielmi Michaelsen, W. (1904). Revision der compositen Styeliden oder Polyzoinen. *Jahrb. Hamb. Wiss. Anst.* **21**(2): 1–124 [50].
Type data: holotype MGH T205.
Type locality: Veracruz, Gulf of Mexico.

Gynandrocarpa quadricornulis Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidien. *Siboga Exped.* **56A**: 1–126 [126].
Type data: holotype ZMA TU562.4.
Type locality: Tual Anchorage, Kei Islands, Indonesia.

Symplegma oecania Tokioka, T. (1961). Ascidiens collected during the Melanesian Expedition of the Osaka Museum of Natural History. I. Ascidiens presented by Dr R.L.A. Catala of the aquarium of Noumea. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **9**(1): 103–138 [114].
Type data: syntypes OMNH IV1320*.
Type locality: encrusting polychaete tubes, Noumea, New Caledonia.

Taxonomic decision for synonymy: Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. [203] (based on Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 (207)); Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [71].

Distribution: Indonesia, Hong Kong, China (People's Republic), Palau, New Caledonia, Fiji, Sri Lanka, NT (N coast), QLD (Central E coast, Great Barrier Reef, NE coast), SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait), WA (Central W coast, Lower W coast, NW coast); Noumea, also West Indian Ocean, Gulf of Mexico, Caribbean.
Ecology: benthic, marine.

Symplegma rubra Monniot, 1972

Symplegma rubra Monniot, C. (1972). Ascidies stolidobranches des Bermudes. *Bull. Mus. Natl. Hist. Nat. Paris (3(57) Zoology)* **43**: 617–643 [622].
Type data: type status unknown* (not found).
Type locality: Bermuda.

Distribution: Jamaica, Guadeloupe, Brazil, Bermuda, NT (N coast); Atlantic Ocean, West Indian Ocean.
Ecology: benthic, marine.
Reference: Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [72].

Symplegma teruakii Kott, 2004

Symplegma teruakii Kott, P. (2004). Ascidiacea (Tunicata) in Australian waters of the Timor and Arafura Seas. *Beagle, Rec. Mus. Art Galleries NT* **20**: 37–81 [72].
Type data: holotype QM GH2603, paratype(s) QM GH2636.
Type locality: Wistari Reef, low tide rubble fauna, QLD.

Distribution: QLD (Great Barrier Reef).
Ecology: benthic, marine.

STYELINAE

Asterocarpa Brewin, 1946

Asterocarpa Brewin, B.I. (1946). Ascidiens in the vicinity of the Portobello Marine Biological Station, Otago Harbour. *Trans. R. Soc. N.Z.* **76**(2): 87–131 [113].
Type species: *Styela cerea* Sluiter, 1900 by original designation.

Extralimital distribution: temperate waters of Indian and Pacific Oceans. See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Asterocarpa humilis (Heller, 1878)

Styela humilis Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* **77**(1): 83–109 [107].

Type data: type status unknown NHMW (depository uncertain, not found).

Type locality: New Zealand.

Styela cerea Sluiter, C.P. (1900). Tunicaten aus dem Stillen Ocean. *Zool. Jahrb. Syst.* **13**: 1–35 [24].

Type data: holotype ZMA TU1087.

Type locality: d'Urville Is., New Zealand.

Dendrodoa gregaria Kesteven, H.L. (1909). Studies on Tunicata no. 1. *Proc. Linn. Soc. N.S.W.* **34**: 276–295 [291].

Type data: syntypes AM U563, U562, ZMB 2562*.

Type locality: Hobart, TAS.

Tethyum (Styela) asymmetron Hartmeyer, R. (1912). Die Ascidiens der Deutschen Tiefsee Expedition. *Wiss. Ergebn. dt. Tiefsee-Exped. 'Valdivia'* **16**(3): 223–392 [253].

Type data: holotype ZMB 22.x.1885*, paratype(s) ZMB 1077*.

Type locality: Cape of Good Hope, S. Africa (Expedition 'Prince Adalbert').

Cnemidocarpa robinsoni Hartmeyer, R. (1916). Neue und alte Styeliden aus der Sammlung des Berliner Museums. *Mitt. Zool. Mus. Berl.* **8**(2): 203–230 [224].

Type data: syntypes (probable) ZMB 2256*.

Type locality: Juan Fernandez.

Cnemidocarpa aucklandica Boviën, P. (1922). Ascidiæ from the Auckland and Campbell Islands (holosomatous forms). Papers from Dr. Th. Mortensen's Pacific Expedition 1914–1916 No. IV. *Vidensk. Meddr. Dansk Naturh. Foren.* **73**: 33–47 [36].

Type data: type status unknown ZMUC (depository uncertain, not found).

Type locality: Auckland, New Zealand.

Taxonomic decision for synonymy: Michaelsen, W. (1922). Ascidiæ Ptychobranchiæ und Diktyobranchiæ von Neuseeland und dem Chatham-Inseln. Papers from Dr. Th. Mortensen's Pacific Expedition 1914–1916, XI. *Vidensk. Meddr. Dansk Naturh. Foren.* **73**: 359–498 [418]; Van Name, W.G. (1945). The North and South American ascidiens. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476 [271].

Distribution: New Zealand, South Africa, SA (S Gulfs coast), TAS (Bass Strait, Tas. coast), WA (SW coast); east Pacific Ocean.

Ecology: benthic, marine.

Cnemidocarpa Huntsman, 1912

Cnemidocarpa Huntsman, A.G. (1912). Ascidiens from the coasts of Canada. *Trans. R. Can. Inst.* **9**: 111–148 [132].

Type species: *Styela joannae* Herdman, 1898 (= *Polycarpa finmarkiensis* Kiaer, 1893) by subsequent designation, see Huntsman, A.G. (1913). The classification of the Styelidae. *Zool. Anz.* **41**: 482–501 [500].

Ypsilocarpa Årnbäck-Christie-Linde, A. (1922). Northern and Arctic invertebrates in the collection of the Swedish State Museum VIII: Tunicata. I. Styelidae and Polyzoidea. *K. Sven. Vetensk.-Akad. Handl.* (2)**63**: 1–62 [24].

Taxonomic decision for synonymy: Huus, J. (1937). Ascidiaceae. pp. 545–692 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin: Walter de Gruyter Vol. 5(2)6 [676].

Extralimital distribution: worldwide. See: Hartmeyer, R. (1923). Ascidiaceae, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiensfauna auf tier-geographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365; Van Name, W.G. (1945). The North and South American ascidiens. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* **133**: 1–354; Millar, R.H. (1962). Further descriptions of South African ascidiens. *Ann. S. Afr. Mus.* **56**(7): 113–221; Kott, P. (1969). Antarctic Ascidiaceae. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* **13**: i–xv 1–239; Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440; Nishikawa, T. (1991). The ascidiens of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **35**(1–3): 26–170.

Cnemidocarpa aculeata Kott, 1985

Cnemidocarpa aculeata Kott, P. (1985). The Australian Ascidiaceae Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [121].

Type data: holotype QM GH1326, paratype(s) AM GH1327, GH1328.

Type locality: Cleveland Bay, QLD [18°42'S 147°01'E].

Distribution: QLD (NE coast), VIC (Bass Strait).

Ecology: benthic, marine; 20–92 m, muddy sand.

Cnemidocarpa amphora Kott, 1992

Cnemidocarpa amphora Kott, P. (1992). The Australian Ascidiaceae, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [636].

Type data: holotype SAMA E2531, paratype(s) SAMA E2536.

Type locality: 200 m offshore, North Point, Sir Joseph Banks Group, 7 m, SA.

Distribution: SA (Great Australian Bight).

Ecology: benthic, marine; sand, rubble, seagrass beds.

Cnemidocarpa barbata Vinogradova, 1962

Cnemidocarpa barbata Vinogradova, N.G. (1962). Ascidiæ simplices of the Indian part of the Atlantic. Biological results of the Soviet Antarctic Expedition (1955–1958). 1, Explorations of the fauna of the seas. *Akad. Nauk. SSSR Zoological Institute* **1**(9): 195–215 [202].

Type data: holotype (probable) VNIRO* (depository uncertain).

Type locality: 65°14'S 107°33'E, 639 m, Antarctica.

Distribution: Kerguelen Island, NSW (Central E coast); Indian Ocean.

Ecology: benthic, marine; 1200–1639 m.

Reference: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [268].

Cnemidocarpa completa Kott, 1985

Cnemidocarpa completa Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [124].

Type data: holotype NMV H634.

Type locality: Little Squally Cove, Deal Is., 10 m, VIC.

Distribution: NSW (Central E coast), VIC (Bass Strait).

Ecology: benthic, marine.

Reference: Kott, P. (2003). New syntheses and new species in the Australian Ascidiacea. *J. Nat. Hist.* **37**: 1611–1653 [1641].

Cnemidocarpa fissa Kott, 1985

Cnemidocarpa fissa Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [125].

Type data: holotype WAM 223.73.

Type locality: E side Cockburn Sound, 9–10 m, WA [32°10'51"S 115°45'12"E].

Distribution: WA (Lower W coast); known only from type locality.

Ecology: benthic, marine.

Cnemidocarpa floccosa (Sluiter, 1904)

Styela floccosa Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidien. *Siboga Exped.* **56A**: 1–126 [64].

Type data: lectotype ZMA TU976.13, paralectotype(s) ZMA TU1260.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [193].

Type locality: reef, Key Is., Indonesia.

Distribution: QLD (Central E coast, NE coast); Arafura Sea.

Ecology: benthic, marine; on sand, coral and mud substrates.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [126].

Cnemidocarpa intestinata Kott, 1985

Cnemidocarpa intestinata Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [128].

Type data: holotype QM G9681.

Type locality: Gladstone Harbour, 9 m, QLD [24°48'39"S 151°13'19"E].

Distribution: NT (N coast), QLD (Central E coast, NE coast).

Ecology: benthic, marine; mud and coarse sand with mud, concrete blocks at about 10 m.

Cnemidocarpa irene (Hartmeyer, 1906)

Styela esther Hartmeyer, R. (1906). Ein Beitrag zur Kenntnis der japanischen Ascidienfauna. *Zool. Anz.* **31**: 1–30 [8].

Type data: syntypes ZMB 2799*.

Type locality: Fukuura, Sagami Bay, Japan.

Styela irene Hartmeyer, R. (1906). Ein Beitrag zur Kenntnis der japanischen Ascidienfauna. *Zool. Anz.* **31**: 1–30 [7].

Type data: holotype ZMB 2230*.

Type locality: Myazu, Wakasa Bay, Japan.

Cnemidocarpa valborgi Hartmeyer, R. (1919). Ascidien. In, Results of Dr E. Mjöberg's Swedish scientific expeditions to Australia 1910–1913. *K. Svenska Vetensk.-Akad. Handl.* **60**(4): 1–150. [35].

Type data: holotype NHRM 1491*.

Type locality: 45 miles WSW Cape Jaubert, 144 m, WA.

Cnemidocarpa hartogi Michaelsen, W. (1927). Einige neue westaustralische ptychobranchiate Ascidien. *Zool. Anz.* **71**: 193–203 [198].

Type data: holotype (probable) ZMB* (depository uncertain).

Type locality: Brown Station, Dirk Hartog Is., Shark Bay, 0.5–3 m, WA.

Cnemidocarpa irma Hartmeyer, R. (1927). Zur Kenntnis phlebobranchiater und dictyobranchiater Ascidien. *Mitt. Zool. Mus. Berl.* **13**: 157–194 [168].

Type data: holotype ZMB 3830*.

Type locality: NNE of Northpoint of Heirisson Prong, Shark Bay, 11–12.5 m, WA.

Styela pavementis Kott, P. (1952). Ascidians of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [226].

Type data: holotype AM Y1696.

Type locality: jetty piles, Thompson's Bay, Rottneest Is., WA.

Cnemidocarpa legalli Gravier, R. (1955). Ascidies récoltées par le Président Théodore Tissier (campagne de printemps 1951). *Revue Travaux de l'Institut des Pêches Maritime* **19**: 611–631 [621].

Type data: type status and whereabouts unknown.

Type locality: Lesser Antilles, Caribbean.

Taxonomic decision for synonymy: Tokioka, T. (1967). Pacific Tunicata of the United States National Museum. *Bull. U.S. Natl Mus.* **251**: 1–242 [181]; Monniot, C. & Monniot, F. (1984). Ascidies littorales de Guadeloupe VII. Espèces

nouvelles et complémentaire à l'inventaire. *Bull. Mus. Natl. Hist. Nat. Paris* (4) **6A**(3): 567–582 [577] (as *Cnemidocarpa areolata* Heller, 1878); Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [122] (as *Cnemidocarpa areolata* Heller, 1878); Nishikawa, T. (1991). The ascidians of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **35**(1–3): 26–170 [96].

Distribution: Vietnam, Hong Kong, Palau, New Caledonia, Fiji, Japan, NSW (Central E coast, Lower E coast), NT (N coast), QLD (Central E coast, Great Barrier Reef, NE coast), SA (S Gulfs coast), VIC (Bass Strait), WA (Lower W coast, N coast, NW coast, SW coast); west Pacific Ocean, Marianas, Korea, Guadeloupe.

Ecology: benthic, marine; shallow waters–70 m.

***Cnemidocarpa lobata* (Kott, 1952)**

Styela lobata Kott, P. (1952). Ascidiacea of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [222].

Type data: syntypes AM Y1683 1 specimen (whereabouts of other syntype(s) unknown).

Type locality: D'Entrecasteaux Channel, TAS.

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), SA (S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Lower W coast, SW coast).

Ecology: benthic, marine; on wharf piles, on muddy or sandy substrates.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [129].

***Cnemidocarpa longata* (Kott, 1954)**

Styela longata Kott, P. (1954). Tunicata, Ascidiacea. *Rep. B.A.N.Z. Antarct. Res. Exped.* **1**(4): 121–182 [145].

Type data: holotype AM Y996.

Type locality: off north-east Tasmania.

Distribution: TAS (Tas. coast); known only from type locality.

Ecology: benthic, marine.

***Cnemidocarpa oligocarpa* (Sluiter, 1885)**

Styela oligocarpa Sluiter, C.P. (1885). Ueber einige einfachen Ascidiaceen von der Insel Billiton. *Nat. Tijdschr. Ned. Ind.* **45**: 160–232 [187].

Type data: syntypes ZMA TU1032.

Type locality: between Mendanau and Belleton, 12 m, Indonesia.

Distribution: Indonesia, QLD (NE coast).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [131].

***Cnemidocarpa pedata* (Herdman, 1881)**

Polycarpa pedata Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [71].

Type data: holotype BMNH 1887.2.4.125.

Type locality: Philippines.

Styela whiteleggii Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [445] [*nom. nud.*].

Styela whiteleggii Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [40].

Type data: syntypes AM U142, U282.

Type locality: Port Stephens and Port Jackson, NSW.

Taxonomic decision for synonymy: Van Name, W.G. (1918). Ascidiacea from the Philippines and adjacent waters. *Bull. U.S. Natl. Mus.* **100**(1): 49–174 [97]; taxonomic decision for new combination: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 (as *Cnemidocarpa pedata*).

Distribution: Japan, Philippines, Indonesia, NSW (Central E coast, Lower E coast), QLD (Central E coast, Great Barrier Reef, NE coast), SA (Great Australian Bight), VIC (Bass Strait).

Ecology: benthic, marine; 10–60 m.

***Cnemidocarpa personata* (Herdman, 1899)**

Styela personata Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [445] [*nom. nud.*].

Styela personata Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [41].

Type data: syntypes AM U144 (G2074).

Type locality: Port Jackson, NSW.

Tethyum (Styela) godeffroyi Michaelsen, W. (1912). Die Tethyiden (Styeliden) des Naturhistorischen Museum zu Hamburg, nebst nachtrag und Anhang einige anderen Familien betreffend. *Jahrb. Hamb. Wiss. Anst.* **28**(2): 109–186 [125].

Type data: syntypes (probable) ZMH*.

Type locality: Sydney, NSW.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [134].

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, Great Barrier Reef), TAS (Tas. coast).

Ecology: benthic, marine.

***Cnemidocarpa posthuma* Hartmeyer, 1927**

Cnemidocarpa posthuma Hartmeyer, R. (1927). Zur Kenntnis phlebobranchiater und dictyobranchiater Ascidiaceen. *Mitt. Zool. Mus. Berl.* **13**: 157–194 [169].

Type data: holotype (probable) ZMB* (depository uncertain).

Type locality: NW of Heirrisson Prong, Shark Bay, 11–12.5 m, WA.

Distribution: WA (Central W coast); known only from type locality.

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [136].

Cnemidocarpa radicata (Herdman, 1882)

Styela radicata Herdman, W.A. (1882). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt I, Ascidiaceae simplices. *Zool. Chall. Exped.* **6**(17): 1–296 [163].

Type data: holotype BMNH 1887.2.4.86.

Type locality: Bass Strait, VIC.

Styela etheridgii Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [445] [*nom. nud.*].

Styela etheridgii Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [38].

Type data: syntypes AM U143 (G2071), AM G12232.

Type locality: Port Stephens, NSW.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [136]; taxonomic decision for new combination: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 (as *Cnemidocarpa radicata*).

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast), SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (Lower W coast).

Ecology: benthic, marine; to 50 m in *Macrocystis* [Lessoniaceae] beds, on sandy or rocky substrates.

Cnemidocarpa stolonifera (Herdman, 1899)

Styela stolonifera Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [445] [*nom. nud.*].

Styela stolonifera Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [42].

Type data: holotype AM U145 (G2075).

Type locality: Moreton Bay, QLD.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [138].

Distribution: NSW (Central E coast, Lower E coast), QLD (Central E coast, Great Barrier Reef, NE coast).

Ecology: benthic, marine; sandy substrates, to 33 m.

Cnemidocarpa tribranchiata Kott, 1992

Cnemidocarpa tribranchiata Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [638].

Type data: holotype SAMA E2533, paratype(s) SAMA E2534.

Type locality: Seal Rocks, Encounter Bay, 15 m, SA.

Distribution: SA (Great Australian Bight); known only from type locality.

Ecology: benthic, marine.

Cnemidocarpa tripartita Kott, 1985

Cnemidocarpa tripartita Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [140].

Type data: holotype NMV H728, paratype(s) NMV H725.

Type locality: Bass Strait, 76 m, VIC [40°10'48"S 145°44'12"E].

Distribution: VIC (Bass Strait).

Ecology: benthic, marine; mud with sponges, 68–76 m.

Monandrocarpa Michaelsen, 1904

Monandrocarpa Michaelsen, W. (1904). Revision der compositen Styeliden oder Polyzoinen. *Jahrb. Hamb. Wiss. Anst.* **21**(2): 1–124 [53].

Type species: *Monandrocarpa tritonis* Michaelsen, 1904 by monotypy.

Monoandrocarpa Kott, P. (1972). Notes on some ascidians from Port Jackson, Botany Bay and Port Hacking NSW. *Proc. Linn. Soc. N.S.W.* **97**(4): 241–257 [250].

Type species: *Monoandrocarpa plana* Kott, 1972 by original designation.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [210].

Extralimital distribution: tropical west Pacific Ocean.

See: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Monandrocarpa plana (Kott, 1972)

Monoandrocarpa plana Kott, P. (1972). Notes on some ascidians from Port Jackson, Botany Bay and Port Hacking NSW. *Proc. Linn. Soc. N.S.W.* **97**(4): 241–257 [250].

Type data: holotype AM Y852.

Type locality: off Cronulla, 160 m, NSW.

Polycarpa simplicigona Millar, R.H. (1975). Ascidiaceae from the Indo-West Pacific region in the Zoological Museum, Copenhagen (Tunicata, Ascidiaceae). *Steenstrupia* **3**(20): 205–336 [286].

Type data: holotype ZMUC*.

Type locality: 15 miles W of Jolo, 457 m, Philippines.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [210].

Distribution: Philippines, NSW (Lower E coast).

Ecology: benthic, marine.

Polycarpa Heller, 1877

Pandocia Fleming, J. (1822). *The Philosophy of Zoology*. Vol. 2. Edinburgh and London pp. 508–518. [511] [senior synonym suppressed in favour of *Polycarpa* Heller, 1877 as *nomen conservandum*, see Hartmeyer, R. (1915). Ascidiarum nomina conservanda. pp. 247–258 in Apstein, C. Nomina Conservanda. *Sber. Ges. Naturf. Freunde Berl.* **1915b**: 247–258; Sneli, J.A. & Gulliksen, B. (1975). *Ascidia*

singularis Gunnerus, 1770 and *Distomus mammillaris* Pallas, 1774: proposed suppression; *Polycarpa* Heller, 1877 (Tunicata, Ascidiacea) proposed type species designation under the Plenary Powers. *Bull. Zool. Nomencl.* **32**(3): 158–160].

Type species: *Pandocia conchilega* Fleming, 1822 by original designation.

Glandula Stimpson, W. (1852). Several new ascidians from the coast of the United States. *Proc. Bost. Soc. Nat. Hist.* **4**: 228–232 [230] [senior synonym suppressed in favour of *Polycarpa* Heller, 1877 as *nomen conservandum*, see Hartmeyer, R. (1915). Ascidiarum nomina conservanda. pp. 247–258 in Apstein, C. Nomina Conservanda. *Sber. Ges. Naturf. Freunde Berl.* **1915b**: 247–258; Hartmeyer, R. (1924). Ascidiacea, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidiendfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(7): 1–275; Snell, J.A. & Gulliksen, B. (1975). *Ascidia singularis* Gunnerus, 1770 and *Distomus mammillaris* Pallas, 1774: proposed suppression; *Polycarpa* Heller, 1877 (Tunicata, Ascidiacea) proposed type species designation under the Plenary Powers. *Bull. Zool. Nomencl.* **32**(3): 158–160].

Type species: *Glandula fibrosa* Stimpson, 1852 by subsequent designation, see Heller, C. (1875). Untersuchungen über die Tunicaten des Adriatischen Meeres (2). *Denkschr. Akad. Wiss. Wien* **36**: 107–125.

Polycarpa Heller, C. (1877). Untersuchungen über die Tunicaten des Adriatischen und Mittelmeeres (3). *Denkschr. Akad. Wiss. Wien* **37**(1): 241–275 [259] [*nomen conservandum*, see Hartmeyer, R. (1915). Ascidiarum nomina conservanda. pp. 247–258 in Apstein, C. Nomina Conservanda. *Sber. Ges. Naturf. Freunde Berl.* **1915b**: 247–258; Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiendfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365]. Type species: *Polycarpa varians* Heller, 1877 (= *Cynthia pomaria* Heller, 1816) by original designation.

Paratona Huntsman, A.G. (1913). The classification of the Styelidae. *Zool. Anz.* **41**: 482–501 [501].

Type species: *Polycarpa elata* Heller, 1878 by original designation.

Taxonomic decision for synonymy: Huus, J. (1937). Ascidiaceae. pp. 545–692 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin: Walter de Gruyter Vol. 5(2)6 [676].

Extralimital distribution: Neotropical Region, Palaearctic Region; subtropical convergence to tropical west Pacific Ocean, Japan, Mediterranean, tropical Atlantic Ocean, northeast Atlantic Ocean. See: Hartmeyer, R. (1923). Ascidiacea, part I. Zugleich eine Übersicht über die Arktische und boreale Ascidiendfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(6): 1–365; Harant, H. (1929). Ascidies provenant des croisières du Prince Albert 1er de Monaco. *Résultats de Campagnes Scientifique accomplies (Monaco)* **75**: 1–110; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Berrill, N.J. (1950). The Tunicata. *Ray Soc. Publs* **133**: 1–354; Millar, R.H. (1962). Further descriptions of South African ascidians. *Ann. S. Afr. Mus.* **56**(7): 113–221;

Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440; Nishikawa, T. (1991). The ascidians of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **35**(1–3): 26–170.

Polycarpa argentata (Sluiter, 1890)

Styela argentata Sluiter, C.P. (1890). Die Evertebraten aus der Sammlung des Königlichen Naturwissenschaftlichen Vereins in Niederländisch Indien in Batavia. *Nat. Tijdschr. Ned. Ind.* **50**: 329–348 [340].

Type data: holotype ZMA TU993.

Type locality: Bay of Jakarta (as Djakarta) on coral reef between Leiden Is. and Enkhuizen Is., 20 m, Indonesia.

Styela nutrix Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidien. *Siboga Exped.* **56A**: 1–126 [86].

Type data: syntypes ZMA TU976.18, TU976.19*.

Type locality: Haingsisi, reef, Samau Is., Indonesia.

Polycarpa iwayamae Tokioka, T. (1950). Ascidians from the Palau Is. I. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **1**(3): 115–150 [143] [publication date established from Tokioka, T. (1967). Pacific Tunicata of the United States National Museum. *Bull. U.S. Natl. Mus.* **251**: 1–242].

Type data: syntypes SMBL 77*.

Type locality: Palau Islands, west Pacific Ocean.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [148].

Distribution: Indonesia, Palau, Kiribati, NSW (Central E coast), QLD (Central E coast, Great Barrier Reef, NE coast), WA (NW coast); west Pacific Ocean. Ecology: benthic, marine.

Polycarpa aurata (Quoy & Gaimard, 1834)

Ascidia aurata Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris: Pilet Ainé. [559].

Type data: holotype MNHP S1 POL.B 121*.

Type locality: New Guinea.

Polycarpa sulcata Herdman, W.A. (1882). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt I, Ascidiaceae simplices. *Zool. Chall. Exped.* **6**(17): 1–296 [179].

Type data: type status unknown BMNH (depository uncertain, not found).

Type locality: Banda, Moluccas, 34 m, Indonesia.

Styela psoloessa Sluiter, C.P. (1890). Die Evertebraten aus der Sammlung des Königlichen Naturwissenschaftlichen Vereins in Niederländisch Indien in Batavia. *Nat. Tijdschr. Ned. Ind.* **50**: 329–348 [337].

Type data: syntypes ZMA TU1048*.

Type locality: Ambon, Indonesia.

Styela (Polycarpa) pneumonodes Sluiter, C.P. (1895). Tunicaten. In, Semon, R. Zoologische Forschungsreisen in Australien und den Malayischen Archipel. *Denkschr. Med.-Naturw. Ges. Jena* **8**: 163–186; Nachtrag zu den tunicaten: 325–326. [179].

Type data: syntypes ZMA TU1046*.
Type locality: Ambon, Indonesia.

Pandocia (Polycarpa) botryllifera Michaelsen, W. (1912). Die Tethyiden (Styeliden) des Naturhistorischen Museum zu Hamburg, nebst nachtrag und Anhang einige anderen Familien betreffend. *Jahrb. Hamb. Wiss. Anst.* **28**(2): 109–186 [143].

Type data: holotype ZMH*.
Type locality: Samoa, west Pacific Ocean.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [150].

Distribution: Sri Lanka, Philippines, Indonesia, Palau, New Guinea, QLD (Great Barrier Reef, NE coast); Caroline Is., west Pacific Ocean.
Ecology: benthic, marine; 3–20 m.

Polycarpa aurita (Sluiter, 1890)

Styela aurita Sluiter, C.P. (1890). Die Evertebraten aus der Sammlung des Königlichen Naturwissenschaftlichen Vereins in Niederländisch Indien in Batavia. *Nat. Tijdschr. Ned. Ind.* **50**: 329–348 [338].

Type data: lectotype ZMA TU1011, paralectotype(s) ZMA TU1255.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [192].

Type locality: Bay of Jakarta (as Djakarta), between Leiden Is. and Enkhuzen Is., 20 m, Indonesia.

Styela circumarata Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidien. *Siboga Exped.* **56A**: 1–126 [70].

Type data: holotype ZMA TU1108.

Type locality: 16–23 m, Indonesia [6°07'30"N 120°26'E].

Polycarpa polyphlebodes Hartmeyer, R. (1919). Ascidien. In, Results of Dr E. Mjöberg's Swedish scientific expeditions to Australia 1910–1913. *K. Svenska Vetensk.-Akad. Handl.* **60**(4): 1–150. [74].

Type data: syntypes NHRM 1097*.

Type locality: 45 miles WSW of Cape Jaubert, 144 m, WA.

Styela ramificata Kott, P. (1952). Ascidiens of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [214].

Type data: holotype AM Y1691.

Type locality: southside, Peel Is., Moreton Bay, QLD.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [152].

Distribution: Philippines, Indonesia, New Caledonia, NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), WA (Central W coast, Lower W coast, N coast, NW coast); Japan Sea, Caribbean, west Pacific Ocean, tropical west Atlantic Ocean.
Ecology: benthic, marine; low tide–40 m, on silt, sand and coral substrates.

Reference: Kott, P. (1992). The Australian Ascidiacea, supplement 2. *Mem. Queensl. Mus.* **32**(2): 621–655 [640].

Polycarpa biforis (Sluiter, 1904)

Styela biforis Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidien. *Siboga Exped.* **56A**: 1–126 [78].

Type data: holotype ZMA TU101.4.

Type locality: 32 m, Indonesia [1°42'S 130°47'30"E].

Distribution: Philippines, Indonesia, QLD (Great Barrier Reef), WA (Lower W coast); Coral Sea.

Ecology: benthic, marine; known from carapace of xanthid crab.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [155].

Polycarpa chinensis (Tokioka, 1967)

Cnemidocarpa chinensis Tokioka, T. (1967). Pacific Tunicata of the United States National Museum. *Bull. U.S. Natl. Mus.* **251**: 1–242 [188].

Type data: holotype USNM 11799, paratype(s) USNM 11800.

Type locality: Hsia-men, China.

Distribution: Vietnam, China (People's Republic), QLD (Central E coast, NE coast), VIC (Bass Strait), WA (Lower W coast, NW coast).

Ecology: benthic, marine; partially embedded in sandy substrates.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [157].

Polycarpa clavata Hartmeyer, 1919

Polycarpa aurata clavata Hartmeyer, R. (1919). Ascidien. In, Results of Dr E. Mjöberg's Swedish scientific expeditions to Australia 1910–1913. *K. Svenska Vetensk.-Akad. Handl.* **60**(4): 1–150. [40] [proposed with subspecific rank in *Polycarpa aurata* Quoy & Gaimard, 1834].

Type data: syntypes NHRM 687*.

Type locality: 45 miles WSW Cape Jaubert, 108 m, WA.

Distribution: New Caledonia, QLD (Great Barrier Reef, NE coast), SA (Great Australian Bight, S Gulfs coast), WA (Central W coast, Lower W coast, NW coast, SW coast); west Pacific Ocean.

Ecology: benthic, marine; sandy and rocky substrates, to 40 m.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [159].

Polycarpa contecta (Sluiter, 1904)

Styela contecta Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidien. *Siboga Exped.* **56A**: 1–126 [66].

Type data: syntypes ZMA TU1019.

Type locality: Banda Is., 18–36 m, Indonesia.

Distribution: Indonesia, New Caledonia, QLD (NE coast).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [162].

Polycarpa decipiens Herdman, 1906

Polycarpa decipiens Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* **39**: 295–348 [324].

Type data: holotype BMNH 1907.8.3.20.

Type locality: 10 miles N of Cheval Paar, 18 m, Sri Lanka.

Polycarpa sigmilineata Millar, R.H. (1975). Ascidiaceans from the Indo-West Pacific region in the Zoological Museum, Copenhagen (Tunicata, Ascidiacea). *Steenstrupia* **3**(20): 205–336 [287].

Type data: holotype ZMUC*, paratype(s) ZMUC*.

Type locality: low tide, Singapore.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [163].

Distribution: Sri Lanka, Singapore, QLD (NE coast).

Ecology: benthic, marine; 8–30 m, on silt and sand substrates.

Polycarpa directa Kott, 1990

Polycarpa directa Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [271].

Type data: holotype NMV F54203, paratype(s) NMV F53298, F53306.

Type locality: Western Port, Crib Point, 15 m, VIC.

Distribution: VIC (Bass Strait).

Ecology: benthic, marine.

Polycarpa flava Kott, 1985

Polycarpa flava Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [165].

Type data: holotype QM GH48.

Type locality: reef, Point Nepean, 16 m, VIC.

Distribution: SA (Great Australian Bight, S Gulfs coast), TAS (Bass Strait, Tas. coast), VIC (Bass Strait), WA (SW coast).

Ecology: benthic, marine; common in seagrass beds.

Reference: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [171].

Polycarpa fungiformis Herdman, 1899

Polycarpa fungiformis Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [446] [*nom. nud.*].

Polycarpa fungiformis Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [43].

Type data: holotype AM U146 (G2081).

Type locality: Moreton Bay, QLD.

Distribution: QLD (NE coast).

Ecology: benthic, marine; stalk and lower half of body reported to be buried in sandy substrate in sparse sea grass beds, also in shell and grit.

References: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [166]; Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [272].

Polycarpa hartmeyeri Michaelsen, 1927

Polycarpa hartmeyeri Michaelsen, W. (1927). Einige neue westaustralische ptychobranchiate Ascidiaceen. *Zool. Anz.* **71**: 193–203 [199].

Type data: holotype ZMB 3745.

Type locality: Shark Bay, 12 m, WA.

Polycarpa lucilla Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [171].

Type data: holotype QM GH1396.

Type locality: deep, Abbot Point, 20 m, QLD.

Taxonomic decision for synonymy: Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne : CSIRO Publishing, Australia Vol. 34 298 pp. [209].

Distribution: QLD (NE coast), SA (S Gulfs coast), WA (NW coast, SW coast).

Ecology: benthic, marine; temperate records from seagrass beds.

Reference: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [272].

Polycarpa intonata Kott, 1985

Polycarpa intonata Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [168].

Type data: holotype QM GH681, paratypes QM GH669, QM GH682–3, QM GH732, QM GH738.

Type locality: Euri Creek, Abbot Point, 15–20 m, QLD.

Distribution: QLD (NE coast).

Ecology: benthic, marine, viviparous; 4–20 m, sand, and sand and silt substrates.

Polycarpa kapala Kott, 1990

Polycarpa kapala Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298 [272].

Type data: holotype AM Y2123, paratype(s) AM Y2124. Type locality: off the Continental Shelf, 1200 m, NSW [34°27'S 151°02'E].

Distribution: NSW (SE oceanic); known only from type locality.

Ecology: benthic, marine; 1200 m.

Polycarpa longiformis Tokioka, 1952

Polycarpa longiformis Tokioka, T. (1952). Ascidians collected by Messrs Renzi Wada and Seizi Wada from the Pearl Oyster bed in the Arafura Sea in 1940. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* 2(2): 91–142 [119].
Type data: syntypes SMBL 108*.
Type locality: Arafura Sea.

Distribution: QLD (NE coast), WA (NW coast); Arafura Sea.

Ecology: benthic, marine; to 40 m.

References: Tokioka, T. (1955). Ascidians from the Palao Islands II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* 5(1): 43–57 [213]; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440.

Polycarpa molguloides Herdman, 1882

Polycarpa molguloides Herdman, W.A. (1882). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt I, Ascidiaceae simplices. *Zool. Chall. Exped.* 6(17): 1–296 [173].
Type data: syntypes BMNH 1887.2.4.99–100*.
Type locality: Bass Strait, VIC.

Distribution: VIC (Bass Strait).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [173].

Polycarpa nigricans Heller, 1878

Polycarpa nigricans Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* 77(1): 1–28 [20].
Type data: holotype ZMH*, paratypes ZMA TU726, ZMB 698*, ZMUC 26/6-1902*, USNM 5558*.
Type locality: Mauritius.

Distribution: Philippines, Indonesia, QLD (Great Barrier Reef, NE coast), WA (Lower W coast); west Pacific Ocean, west Indian Ocean.

Ecology: benthic, marine; in habitats with strong water movement, to 20 m.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [174].

Polycarpa nota Kott, 1985

Polycarpa nota Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [176].
Type data: holotype QM GH940.
Type locality: reef flat, Heron Is., QLD.

Distribution: QLD (Great Barrier Reef); known only from type locality.

Ecology: benthic, marine.

Reference: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* 29(1): 267–298 [274].

Polycarpa obscura Heller, 1878

Polycarpa obscura Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* 77(1): 1–28 [22].

Type data: lectotype ZMH*.

Subsequent designation: Michaelsen, W. (1905). Revision von Heller's Ascidiaceen-Typen aus dem Museum Godeffroy. *Zool. Jahrb. (Suppl.)* 8: 71–120 (by holotype inference, syntype material from Bowen, Bass Strait and Samoa: Bowen specimen not found, Samoan specimen considered to be conspecific with *Polycarpa aurita* (Quoy & Gaimard, 1834), Bass Strait specimen redescribed as 'holotype').

Type locality: Bass Strait, VIC.

Styela cryptocarpa Sluiter, C.P. (1885). Ueber einige einfachen Ascidiaceen von der Insel Billiton. *Nat. Tijdschr. Ned. Ind.* 45: 160–232 [210].

Type data: lectotype ZMA TU1280*, paralectotype(s) ZMA TU102*.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* 1(13): 157–200 [193].

Type locality: between Mendanau and Billiton, 12 m, Indonesia.

Polycarpa bassi Herdman, W.A. (1886). Report on the Tunicata collected during the voyage of H.M.S. *Challenger* during the years 1873–1876. Pt II, Ascidiaceae compositae. *Zool. Chall. Exped.* 14(38): 1–425 [413].

Type data: holotype BMNH*.

Type locality: Bass Strait, VIC.

Styela albomarginata Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidiaceen. *Siboga Exped.* 56A: 1–126 [65].

Type data: lectotype ZMA TU992.1, paralectotype(s) ZMA TU991.

Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* 1(13): 157–200 [191].

Type locality: Hamgsisi, Samau Is., Indonesia.

Polycarpa unilineata Kott, P. (1952). Ascidians of Australia. I. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* 3(3): 206–333 [246].

Type data: holotype AM Y1776.

Type locality: Mackay, 10 m, QLD.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [177]; Kott, P. (1998). Tunicata. pp. 51–259 in Wells, A. & Houston, W.W.K. (eds) *Zoological Catalogue of Australia*. Hemichordata, Tunicata, Cephalochordata. Melbourne: CSIRO Publishing, Australia Vol. 34 298 pp. [211] (for *Polycarpa bassi*).

Distribution: Indonesia, QLD (Central E coast, Great Barrier Reef, NE coast), VIC (Bass Strait), WA (Lower W coast, NW coast); west Pacific Ocean.

Ecology: benthic, marine.

- Reference: Kott, P. (1990). The Australian Ascidiacea, Phlebobranchia and Stolidobranchia, supplement. *Mem. Queensl. Mus.* **29**(1): 267–298.
- Polycarpa olitoria*** (Sluiter, 1890)
Styela olitoria Sluiter, C.P. (1890). Die Evertebraten aus der Sammlung des Königlichen Naturwissenschaftlichen Vereins in Niederländisch Indien in Batavia. *Nat. Tijdschr. Ned. Ind.* **50**: 329–348 [341].
 Type data: holotype ZMA TU1034.
 Type locality: Bay of Jakarta (as Djakarta), between Leiden Is. and Enkhuizen Is., 20 m, Indonesia.
- Styela solvens* Sluiter, C.P. (1895). Tunicaten. In, Semon, R. Zoologische Forschungsreisen in Australien und den Malayischen Archipel. *Denkschr. Med.-Naturw. Ges. Jena* **8**: 163–186; Nachtrag zu den tunicaten: 325–326 [182].
 Type data: syntypes ZMA TU1060.
 Type locality: Ambon, Indonesia.
- Polycarpa seriata*** Michaelsen, W. (1905). Revision von Heller's Ascidiata-Typen aus dem Museum Godeffroy. *Zool. Jahrb. (Suppl.)* **8**: 71–120 [112] [= *Styela elata* Heller: Sluiter, 1885].
 Type data: holotype (probable) ZMB 2003*.
 Type locality: Billiton, Indonesia.
- Styela ascidioides* Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* **39**: 295–348 [317].
 Type data: holotype BMNH 1907.8.30.14*.
 Type locality: Alentura Paar, Gulf of Manaar, 18–52 m, Sri Lanka.
- Pandocia (Polycarpa) madagascariensis*** Michaelsen, W. (1912). Die Tethyiden (Styeliden) des Naturhistorischen Museum zu Hamburg, nebst nachtrag und Anhang einige anderen Familien betreffend. *Jahrb. Hamb. Wiss. Anst.* **28**(2): 109–186 [139].
 Type data: holotype ZMB* (depository uncertain).
 Type locality: Nossi-Bé, Malagasy.
- Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [180].
- Distribution: Sri Lanka, Indonesia, Malagasy, QLD (NE coast), VIC (Bass Strait), WA (Central W coast, NW coast); west Indian Ocean.
 Ecology: benthic, marine.
- Polycarpa ovata*** Pizon, 1908
Polycarpa ovata Pizon, A. (1908). Ascidies d'Amboine. *Rev. Suisse Zool.* **16**: 195–248 [211].
 Type data: syntypes GMNH T1/88*.
 Type locality: Ambon (as Amboine), Indonesia.
- Distribution: Indonesia, QLD (NE coast).
 Ecology: benthic, marine.
 Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [182].
- Polycarpa papillata*** (Sluiter, 1885)
Styela captiosa Sluiter, C.P. (1885). Ueber einige einfachen Ascidien von der Insel Billiton. *Nat. Tijdschr. Ned. Ind.* **45**: 160–232 [202].
 Type data: holotype ZMA TU1015*.
 Type locality: between Mendanau and Billiton, 12 m, Indonesia.
- Styela papillata*** Sluiter, C.P. (1885). Ueber einige einfachen Ascidien von der Insel Billiton. *Nat. Tijdschr. Ned. Ind.* **45**: 160–232 [192].
 Type data: lectotype ZMA TU1035, paralectotype(s) ZMA TU1279.
 Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [195].
 Type locality: between Mendanau and Billiton, 8 m, Indonesia.
- Styeloides abranchiata*** Sluiter, C.P. (1885). Ueber einige einfachen Ascidien von der Insel Billiton. *Nat. Tijdschr. Ned. Ind.* **45**: 160–232 [219].
 Type data: holotype ZMA TU990*.
 Type locality: between Mendanau and Billiton, 12 m, Indonesia.
- Styela (Polycarpa) phaula*** Sluiter, C.P. (1895). Tunicaten. In, Semon, R. Zoologische Forschungsreisen in Australien und den Malayischen Archipel. *Denkschr. Med.-Naturw. Ges. Jena* **8**: 163–186; Nachtrag zu den tunicaten: 325–326 [182].
 Type data: holotype ZMA TU1044*.
 Type locality: Thursday Is., Torres Strait.
- Polycarpa attollens*** Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [446] [*nom. nud.*].
- Polycarpa attollens*** Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [53].
 Type data: holotype AM U149 (G2086).
 Type locality: Port Jackson, NSW.
- Polycarpa mutilans*** Herdman, W.A. (1906). Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* **39**: 295–348 [319].
 Type data: syntypes BMNH 1907.8.30.22*.
 Type locality: north part of Gulf of Manaar, Sri Lanka.
- Polycarpa capricornia*** Kott, P. (1952). Ascidiens of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [239].
 Type data: holotype AM Y1747.
 Type locality: Thursday Is., 6–9 m, QLD.
- Polycarpa intestinata*** Kott, P. (1952). Ascidiens of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [238].
 Type data: holotype AM Y1750.
 Type locality: near Point Charles, WA [24°54'S 113°16'E].
- Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [184].
- Distribution: Indonesia, Solomon Islands, Palau, Sri Lanka, Malagasy, NSW (Central E coast*, Lower E coast), NT (Gulf of Carpentaria, N coast), QLD (Central E coast, Great Barrier Reef, Gulf of Carpentaria, NE coast), SA (S Gulfs coast), VIC (Bass Strait), WA (Central W coast, Lower W coast,

N coast, NW coast); Arafura Sea, west Pacific Ocean, Marianas, west Indian Ocean.
Ecology: benthic, marine.

***Polycarpa papyra* Kott, 1985**

***Polycarpa papyra* Kott, P. (1985).** The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [188].
Type data: holotype QM GH1501, paratype(s) QM GH1502.
Type locality: 4.6 km SSW John Brewer Reef, Cleveland Bay, QLD.

Distribution: QLD (NE coast); known only from type locality.
Ecology: benthic, marine.

***Polycarpa pedunculata* Heller, 1878**

***Polycarpa pedunculata* Heller, C. (1878).** Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* **77**(1): 1–28 [24].
Type data: syntypes ZMH* (depository uncertain).
Type locality: Bass Strait, VIC.

***Polycarpa radicata* Herdman, W.A. (1881).** Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [74].
Type data: syntypes BMNH*.
Type locality: Port Jackson and Twofold Bay, NSW.

Taxonomic decision for synonymy: Michaelsen, W. (1905). Revision von Heller's Asciden-Typen aus dem Museum Godeffroy. *Zool. Jahrb. (Suppl.)* **8**: 71–120 [98].

Distribution: New Caledonia, NSW (Central E coast, Lower E coast), QLD (Central E coast), SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait), WA (Lower W coast).
Ecology: benthic, marine.
Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [189].

***Polycarpa pigmentata* Herdman, 1906**

***Polycarpa pigmentata* Herdman, W.A. (1906).** Report on the Tunicata. *Ceylon Pearl Oyster Fisheries Suppl. Rept.* **39**: 295–348 [318].
Type data: type status unknown BMNH (depository uncertain, not found).
Type locality: Jokkenpiddi Paar, Gulf of Manaar, 17–20 m, Sri Lanka.

***Polycarpa picteti* Pizon, A. (1908).** Ascides d'Amboine. *Rev. Suisse Zool.* **16**: 195–248 [207].
Type data: holotype GMNH T1/87*.
Type locality: Ambon (as Amboine), Indonesia.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [192].

Distribution: Japan, Sri Lanka, Indonesia, Solomon Islands, Kiribati, Fiji, NSW (Central E coast), QLD (Central E coast, Great Barrier Reef), VIC (Bass

Strait), WA (Lower W coast, NW coast); west Pacific Ocean — Marshall Is., Truk Is.; Red Sea.
Ecology: benthic, marine; common in shallow, non-cryptic habitats around coral reefs.

***Polycarpa plenovata* Kott, 1985**

***Polycarpa plenovata* Kott, P. (1985).** The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [194].
Type data: holotype NMV F51567, paratype(s) NMV F51568.
Type locality: Bass Strait, 71 m, VIC [38°53'42"S 147°55'12"E].

Distribution: VIC (Bass Strait).
Ecology: benthic, marine; sand, shelly sand substrates.

***Polycarpa procera* (Sluiter, 1885)**

***Styela procera* Sluiter, C.P. (1885).** Ueber einige einfachen Asciden von der Insel Billiton. *Nat. Tijdschr. Ned. Ind.* **45**: 160–232 [196].
Type data: holotype ZMA TU1047.
Type locality: between Mendanau and Billiton, 12 m, Indonesia.

***Polycarpa doderleini* Hartmeyer, R. (1906).** Ein Beitrag zur Kenntnis der japanischen Ascidenfauna. *Zool. Anz.* **31**: 1–30 [15] [as *Polycarpa döderleini*].
Type data: syntypes ZMB 2232*.
Type locality: Sagami Bay, 100–200 m, Japan.

***Polycarpa fristedti* Michaelsen, W. (1923).** Neue und altbekannte ascidien aus dem Reichsmuseum zu Stockholm. *Mitt. Zool. Mus. Hamburg* **40**: 1–60 [46].
Type data: holotype NHRM 1486*.
Type locality: Sri Lanka.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [196].

Distribution: Japan, Sri Lanka, Singapore, Indonesia, NSW (Central E coast), QLD (Central E coast, NE coast), SA (S Gulfs coast), VIC (Bass Strait), WA (Central W coast, Lower W coast, NW coast).
Ecology: benthic, marine; sea floor habitats, partially embedded in substrate.

***Polycarpa reniformis* (Sluiter, 1904)**

***Styela reniformis* Sluiter, C.P. (1904).** Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Asciden. *Siboga Exped.* **56A**: 1–126 [67].
Type data: holotype ZMA TU976.30.
Type locality: Sailus Ketjil, Paternoster Is., Indonesia.

Distribution: Indonesia, Norfolk Island, QLD (Great Barrier Reef, SE oceanic); Torres Strait.
Ecology: benthic, marine.

***Polycarpa rigida* Herdman, 1881**

***Polycarpa longisiphonica* Herdman, W.A. (1881).** Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [77].

Type data: type status unknown BMNH (depository uncertain, not found).

Type locality: Port Jackson, NSW.

Polycarpa rigida Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [76].

Type data: syntypes BMNH 1887.2.4.117, BMNH 1887.2.4.118.

Type locality: Bass Strait, TAS.

Polycarpa sluiteri Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [446] [*nom. nud.*].

Polycarpa sluiteri Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [46].

Type data: holotype AM U254 (G2083).

Type locality: Port Jackson, NSW.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [199].

Distribution: NSW (Lower E coast), SA (Great Australian Bight), TAS (Bass Strait, Tas. coast), VIC (Bass Strait).

Ecology: benthic, marine; to 180 m.

Polycarpa sobria (Sluiter, 1904)

Styela sobria Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidiien. *Siboga Exped.* **56A**: 1–126 [63].

Type data: syntypes ZMA TU976.32.

Type locality: reef, Saloyer Is., Indonesia.

Taxonomic decision for new combination: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 (as *Polycarpa sobria*).

Distribution: Indonesia, WA (Lower W coast).

Ecology: benthic, marine; to 50 m.

Polycarpa stirpes Kott, 1985

Polycarpa stirpes Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [202].

Type data: holotype QM G9771.

Type locality: between Lizard Is. and Nymph Is., 18–29 m, QLD.

Distribution: Philippines, Indonesia, New Caledonia, QLD (NE coast).

Ecology: benthic, marine.

Polycarpa thelyphanes (Sluiter, 1904)

Styela thelyphanes Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidiien. *Siboga Exped.* **56A**: 1–126 [68].

Type data: holotype ZMA TU976.33.

Type locality: Sulu Archipel, 14 m, Philippines.

Distribution: Philippines, VIC (Bass Strait), WA (Lower W coast, SW coast).

Ecology: benthic, marine.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440.

Polycarpa tinctor (Quoy & Gaimard, 1834)

Ascidia tinctor Quoy, J.R.C. & Gaimard, J.P. (1834). Zoologie, Mollusques pp. 559–626. in, *Voyages de découvertes de l'Astrolabe 1826–1829*, Vol. 3. Paris : Pilet Ainé. [608].

Type data: syntypes MNHP 51 POL.B 113*.

Type locality: Cape Dromedary, NSW.

Distribution: NSW (Lower E coast).

Ecology: benthic, marine, viviparous; development direct.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [205].

Polycarpa tinctorella Kott, 1985

Polycarpa tinctorella Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [207].

Type data: holotype ZMUC, paratype(s) ZMUC.

Type locality: 60–100 m, off Cape Howe, VIC [37°05'S 150°05'E].

Distribution: known only from type locality, lower E coast, VIC.

Ecology: benthic, marine, viviparous; development direct.

Polycarpa viridis Herdman, 1881

Polycarpa viridis Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [74].

Type data: holotype BMNH 1887.2.4.127*, paratype(s) BMNH 1887.2.4.89–92*.

Type locality: Bass Strait, VIC.

Polycarpa moebii Michaelsen, W. (1905). Revision von Heller's Ascidiien-Typen aus dem Museum Godeffroy. *Zool. Jahrb. (Suppl.)* **8**: 71–120 [104].

Type data: holotype (probable) ZMH*.

Type locality: Bass Strait, TAS.

Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [208].

Distribution: NSW (Lower E coast), SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait), WA (Lower W coast).

Ecology: benthic, marine.

Styela Fleming, 1822

Styela Fleming, J. (1822). *The Philosophy of Zoology*. Vol. 2. Edinburgh and London pp. 508–518. [511].

Type species: *Cynthia canopus* Savigny, 1816 by original designation.

- Goniocarpa** Huntsman, A.G. (1912). Ascidians from the coasts of Canada. *Trans. R. Can. Inst.* **9**: 111–148 [131].
Type species: *Ascidia lovenii* Sars, 1851 (= *Cynthia coriacea* Alder & Hancock, 1848) by original designation.
- Katatropa** Huntsman, A.G. (1912). Ascidians from the coasts of Canada. *Trans. R. Can. Inst.* **9**: 111–148 [139].
Type species: *Katatropa vancouverensis* Huntsman, 1912 by original designation.
- Redikorzevia** Oka, A. (1929). Ueber *Redikorzevia* eine neue Genus von einfachen Ascidiern. *Proc. Imp. Acad. Japan* **5**: 434–437 [434].
Type species: *Redikorzevia cylindrica* Oka, 1929 by monotypy.
- Vannamea** Oka, A. (1932). Ueber *Vannamea*, eine neue Styeliden-Gattung. *Proc. Imp. Acad. Japan* **8**: 321–323 [321].
Type species: *Vannamea kurilensis* Oka, 1932 by monotypy.
- Taxonomic decision for synonymy: Huus, J. (1937). Ascidiaceae. pp. 545–692 in Kükenthal, W. & Krumbach, T. (eds) *Handbuch der Zoologie*. Berlin: Walter de Gruyter Vol. 5(2)6 [676].
- Extralimital distribution: worldwide. See: Hartmeyer, R. (1924). Ascidiaceae, part II. Zugleich eine Übersicht über die Arktische und boreale Ascidiendfauna auf tiergeographischer Grundlage. *Ingolf-Exped.* **2**(7): 1–275; Harant, H. (1929). Ascidies provenant des croisières du Prince Albert 1er de Monaco. *Résultats de Campagnes Scientifique accomplies (Monaco)* **75**: 1–110; Van Name, W.G. (1945). The North and South American ascidians. *Bull. Am. Mus. Nat. Hist.* **84**: 1–476; Kott, P. (1969). Antarctic Ascidiaceae. A monographic account of the known species based on specimens collected under U.S. Government auspices 1947 to 1963. *Antarct. Res. Ser.* **13**: i–xv 1–239; Millar, R.H. (1982). The marine fauna of New Zealand. *Mem. N.Z. Oceanogr. Inst.* **85**: 1–117; Kott, P. (1985). The Australian Ascidiaceae Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440; Nishikawa, T. (1991). The ascidians of the Japan Sea. II. *Publ. Seto Mar. Biol. Lab. Kyoto Univ.* **35**(1–3): 26–170.
- Styela canopus** (Savigny, 1816)
- Cynthia canopus* Savigny, J.C. (1816). Recherches anatomiques sur les ascidies composées et sur les ascidies simples—Système de la classe des Ascidies pp. 1–239. *In Mémoires sur les Animaux sans Vertèbres*, Pt 2. Paris: G. Dufour. [45].
Type data: type status unknown MNHP (depository uncertain, not found).
Type locality: Red Sea.
- Styela partita** Stimpson, W. (1852). Several new ascidians from the coast of the United States. *Proc. Bost. Soc. Nat. Hist.* **4**: 228–232 [231].
Type data: syntypes (probable) ANSP* (depository uncertain).
Type locality: Boston Harbour, west of Governor's Island, USA.
- Styela variabilis** Hancock, A. (1868). On the anatomy and physiology of the Tunicata. *J. Linn. Soc. Lond. Zool.* **9**: 309–346 [318].
Type data: holotype (probable) HMN*, paratype(s) BMNH 00.4.4.90*.
Type locality: Herm and Guernsey, Channel Is., UK.
- Cynthia stellifera** Verrill, A.E. (1871). Descriptions of some imperfectly known and new ascidians from New England. *Amer. J. Sci.* (3) **1**: 54–58, 93–100, 211–212, 288–294, 443–446 [93].
Type data: type status and whereabouts unknown.
Type locality: Vineyard Sound, New Haven, Connecticut, USA.
- Styela canopoides** Heller, C. (1877). Untersuchungen über die Tunicaten des Adriatischen und Mittelmeeres (3). *Denkschr. Akad. Wiss. Wien* **37**(1): 241–275 [254].
Type data: holotype (probable) NHMW* (depository uncertain).
Type locality: Lesina, Adriatic Sea.
- Styela partita bermudiensis** Van Name, W.G. (1902). The ascidians of the Bermuda Islands. *Trans. Conn. Acad. Arts Sci.* **11**: 325–412 [338] [as *Styela partita* var. *bermudiensis*].
Type data: type status and whereabouts unknown.
Type locality: Bermuda.
- Styela orbicularis** Sluiter, C.P. (1904). Die Tunicaten der Siboga-Expedition. Pt. I, Die socialen und holosomen Ascidiern. *Siboga Exped.* **56A**: 1–126 [71].
Type data: lectotype ZMA TU976.22, paralectotype(s) ZMA TU976.21.
Subsequent designation: Spoel, S. van der (1969). Catalogue of the type specimens of Tunicata in the Zoological Museum in Amsterdam. *Bull. Zool. Mus. Amsterdam* **1**(13): 157–200 [195].
Type locality: 538 m, Indonesia [7°19'24"S 116°49'30"E].
- Styela marquesana** Michaelsen, W. (1918). Die Ptychobranchen und Diktyobranchen Ascidiern des westlichen Indischen Ozeans. *Jahrb. Hamb. Wiss. Anst.* **35**(2): 1–71 [27].
Type data: holotype ZMB 3300*.
Type locality: Delgoa Bay, near Lourenço Marques, Mozambique.
- Styela barbaris** Kott, P. (1952). Ascidians of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [224].
Type data: holotype AM Y1689.
Type locality: southside, Peel Is., 3 m, Moreton Bay, QLD.
- Styela rectangularis** Kott, P. (1952). Ascidians of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* **3**(3): 206–333 [224].
Type data: syntypes AM Y1700, Y783.
Type locality: jetty piles, or hull of ship, Fremantle, WA.
- Taxonomic decision for synonymy: Kott, P. (1985). The Australian Ascidiaceae Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [112].
- Distribution: Japan, France, Indonesia, Hong Kong, NSW (Central E coast), QLD (Central E coast, NE coast), WA (Lower W coast, NW coast); Torres Strait, Coral Sea, west Pacific Ocean, Korea, tropical and temperate Atlantic Ocean, Persian Gulf,

Adriatic, Mediterranean, Ascension Is., Channel Is., west coast of France.
Ecology: benthic, marine.

Styela clava Herdman, 1881

Styela clava Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* **11**(3): 52–88 [70].
Type data: holotype BMNH 1887.2.4.82*.
Type locality: off Kobé, 16 m, Japan [34°35'N 135°10'E].

Styela mammiculata Carlisle, D.B. (1954). *Styela mammiculata* n.sp., a new species of ascidian from the Plymouth area. *J. Mar. Biol. Ass. U.K.* **32**(2): 329–334 [329].
Type data: type status unknown.
Type locality: Plymouth, UK.

Distribution: Japan, VIC (Bass Strait); English Channel, Irish Sea, north-west Pacific Ocean.

Ecology: benthic, marine; probably introduced to Australian waters.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [115].

Styela plicata (Lesueur, 1823)

Ascidia plicata Lesueur, C.A. (1823). Descriptions of several new species of *Ascidia*. *J. Acad. Nat. Sci. Philad.* **3**(1): 2–8 [5].

Type data: holotype ANSP* (depository uncertain).
Type locality: on bottom of vessel, Philadelphia Harbour, USA.

Styela gyrosa Heller, C. (1877). Untersuchungen über die Tunicaten des Adriatischen und Mittlemeeres (3). *Denkschr. Akad. Wiss. Wien* **37**(1): 241–275 [255].

Type data: holotype (probable) ZMB 2288*.

Type locality: Adriatic Sea, Trieste.

Styela pinguis Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7**(1): 443–450 [445] [*nom. nud.*].

Styela pinguis Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* **17**: 1–139 [40].

Type data: syntypes AM U141 (G2070).

Type locality: Port Jackson, NSW.

Taxonomic decision for synonymy: Van Name, W.G. (1921). Ascidiens of the West Indian region and south-eastern United States. *Bull. Am. Mus. Nat. Hist.* **44**: 283–494 [435].

Distribution: Japan, Philippines, NSW (Central E coast, Lower E coast), QLD (Central E coast, NE coast), SA (Great Australian Bight, S Gulfs coast), VIC (Bass Strait), WA (Lower W coast, NW coast); west Indian Ocean, West Indies.

Ecology: benthic, marine; tolerates brackish and polluted waters.

Reference: Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 [116].

UNPLACED SPECIES

The following names cannot be placed with certainty, for reasons given below, and are listed here as *Species Inquirendae*.

Species Inquirenda

Cynthia sabulosa Stimpson, W. (1855). Tunicata in descriptions of some new marine invertebrates. *Proc. Acad. Nat. Sci. Phila.* 7: 387–388 [387] [not *Ascidia sabulosa* Quoy & Gaimard, 1834 (= *Molgula sabulosa*); it is a styelid, although the generic placement cannot be determined from the original description].

Type data: holotype whereabouts unknown.

Type locality: Port Jackson, NSW.

Molgula inconspicua Stimpson, W. (1855). Tunicata in descriptions of some new marine invertebrates. *Proc. Acad. Nat. Sci. Phila.* 7: 387–388 [387] [unidentifiable from the information given].

Type data: holotype whereabouts unknown.

Type locality: Port Jackson, NSW.

Cynthia arcuata Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* 77(1): 1–28 [11] [may be a specimen of *Pyura stolonifera* (Heller, 1878), see Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [331]].

Type data: holotype whereabouts unknown.

Type locality: New South Wales.

Polycarpa elata Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* 77(1): 1–28 [25] [Michaelsen, W. (1905). Revision von Heller's Ascidiaceen-Typen aus dem Museum Godeffroy. *Zool. Jahrb. (Suppl.)* 8: 71–120 (112) redescribed the holotype including the upright endocarps on the body wall, lobed anal border, and numerous sausage-shaped gonads; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 (1814) thought it a probable senior synonym of *Polycarpa papillata* (Sluiter, 1885); the holotype has not been re-examined].

Type data: holotype ZMH*.

Type locality: Bowen, QLD.

Polycarpa nebulosa Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* 77(1): 1–28 [24] [Michaelsen, W. (1905). Revision von Heller's Ascidiaceen-Typen aus dem Museum Godeffroy. *Zool. Jahrb. (Suppl.)* 8: 71–120 redescribed the holotype; it is possible synonym of *Polycarpa papillata* (Sluiter, 1885) the anal border being fringed with long lobes, but the arrangement of endocarps and gonads that would confirm its identity is not known; the holotype has not been re-examined].

Type data: holotype ZMH* (depository uncertain).

Type locality: QLD.

Polycarpa stimpsoni Heller, C. (1878). Beiträge zur nähern Kenntnis der Tunicaten. *Sber. Akad. Wiss. Wien* 77(1): 1–28 [23] [has a wide gut loop and the atrial aperture further back along the dorsal surface than in *Polycarpa tinctor* (Quoy & Gaimard, 1834) and *Polycarpa procera* (Sluiter, 1885), which otherwise have similar egg-shaped bodies with sand-encrusted test; Michaelsen, W. (1905). Revision von Heller's Ascidiaceen-Typen aus dem Museum Godeffroy. *Zool. Jahrb. (Suppl.)* 8: 71–120 found the holotype dried out and other details of its structure could not be determined; a specimen

from Bass Strait identified by Heller as *P. stimpsoni* is not conspecific; Heller thought the species may be identical *Cynthia sabulosa* Stimpson, 1855, from the same locality, but there is no evidence that this is so].

Type data: holotype ZMH* (depository uncertain).

Type locality: Port Jackson, NSW.

Styela exigua Herdman, W.A. (1881). Preliminary report on the Tunicata of the *Challenger* Expedition. Cynthiidae, Molgulidae. *Proc. R. Soc. Edinb.* 11(3): 52–88 [68] [Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 [141] believed that this is a member of the genus *Cnemidocarpa*, however insufficient information is available to confirm either the generic or specific identity; gonads were not detected in the holotype].

Type data: holotype BMNH 1887.2.4.79.

Type locality: Port Jackson, NSW.

Cynthia laevissima Stimpson, W. (1855). Tunicata in descriptions of some new marine invertebrates. *Proc. Acad. Nat. Sci. Phila.* 7: 387–388 [387] [described as having a pale orange, smooth, glossy body with small red apertures; the presence of 20 branchial folds (10 per side?) and 'fimbriated' tentacles suggests the genus *Microcosmus*, although at this stage its identity cannot be determined].

Type data: holotype whereabouts unknown.

Type locality: Port Jackson, NSW.

Cynthia solanoides Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* 17: 1–139 [29] [Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 (318) thought it was *Microcosmus solanoides*; it may be a specimen of *Pyura stolonifera* (Heller, 1878) but the holotype is in poor condition and it is not possible to confirm its identity].

Type data: holotype AM U360.

Type locality: Port Jackson, NSW.

Molgula recumbens Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* 17: 1–139 [56] [name first listed by Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* 7(1): 443–450 (444), *nom. nud.*; Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* 23: 1–440 (379) suggests that this may be an early introduction of *Molgula manhattensis* (Kay, 1843)].

Type data: holotype whereabouts unknown.

Type locality: Port Jackson, NSW.

Polycarpa sacciformis Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue* 17: 1–139 [48] [name first listed by Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* 7(1): 443–450 [446], *nom. nud.*; Kott, P. (1952). Ascidiaceans of Australia. 1. Stolidobranchiata and Phlebobranchiata. *Aust. J. Mar. Freshwat. Res.* 3(3): 206–333 (241) found the holotype in poor condition, only the gut being intact, but inadequate for confident characterisation].

UNPLACED SPECIES

Type data: holotype AM U249/ G2084.

Type locality: Port Jackson, NSW.

Polycarpa stephenensis Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue 17*: 1–139 [45] [although Kott, P. (1985). The Australian Ascidiacea Pt 1, Phlebobranchia and Stolidobranchia. *Mem. Queensl. Mus.* **23**: 1–440 thought this probably conspecific with *Polycarpa pigmentata* Herdman, 1906, this may be a valid species with more numerous gonads than others in the *pendunculata* group].

Type data: holotype AM U148/ G2082.

Type locality: Port Jackson, NSW.

Halocynthia flynni Herdman, W.A. (1923). Ascidiæ simplices. *Sci. Rep. Aust. Antarctic Exped. 1911–1914 (C)3(3)*: 1–35 2 pls [22] [the 2cm, ovate specimen has a tough

coriaceous test and overlapping pointed spines lining the siphons; it may be conspecific with *Pyura tasmanensis* but the single specimen taken has not been located to confirm this].

Type data: holotype whereabouts unknown*.

Type locality: NE Tasmania.

Polycarpa jacksoniana Herdman, W.A. (1899). Descriptive catalogue of the Tunicata in the Australian Museum. *Australian Museum, Sydney, Catalogue 17*: 1–139 [50] [name first listed by Herdman, W.A. (1898). Note on the Tunicata fauna of Australian seas. *Ann. Mag. Nat. Hist.* **7(1)**: 443–450 [446], *nom. nud.*; information on gonads that would allow precise characterisation is not available; the holotype has not been re-examined].

Type data: holotype AM G2085.

Type locality: Port Jackson, NSW.