Corymorpha tomoensis Ikeda, 1910 (Cnidaria, Hydrozoa); first record of a corymorphid hydropolyp from Indonesian waters and a review of the species of *Corymorpha* M. Sars, 1835

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A description is given of a corymorphid polyp, *Corymorpha tomoensis* Ikeda, 1910, collected during an expedition of the National Museum of Natural History, Leiden, The Netherlands, to the Indonesian island of Ambon. This is the first record of a polyp of the genus *Corymorpha* M. Sars, 1835 from Indonesian waters; corymorphid medusae were collected during the Siboga Expedition and described by Maas (1905) as *Euphysora bigelowi*; the polyp of that species was subsequently reared in the laboratory (Sassaman & Rees, 1978) and identified as a species of *Corymorpha*. Species now classified in *Corymorpha* M. Sars, 1835 are briefly reviewed and their status and distribution discussed.

Introduction

During the Fauna Malesiana Maluku Expedition 1996 of the National Musem of Natural History, Leiden, The Netherlands, to the Indonesian island of Ambon and surroundings, the late drs J.C. den Hartog, at that time in charge of the collections of Cnidaria of the National Museum and a specialist of Actiniaria, studied sand-dwelling Ceriantharia along the beaches of Ambon and neighbouring islands (van der Land, 2003; Slierings, 2003). In the course of these activities he also observed and collected a sand-dwelling corymorphid hydropolyp which was subsequently handed to me for identification. The specimen proved to be fertile, was beautifully expanded and properly preserved. The record of a species of the generally boreo-arctic anthoathecate genus *Corymorpha* is of particular interest, since no polyps of this comparatively large genus have so far been recorded from Indonesian waters, the nearest being those from Australia (*Corymorpha rubicincta* Watson, 2008, polyp). Maas (1905) described a new hydromedusa collected in Indonesian waters during the Siboga Expedition as *Euphysora bigelowi*. This medusa was later on found in Monterey Bay, U.S.A. and cultivated in the laboratory; the polyp reared from this medusa proved to be a *Corymorpha*. The medusa *Corymorpha intermedia* was described by Schuchert (1996) from New Zealand waters. In addition there is a doubtful record of a *Corymorpha* medusa from Bombay waters (cf. Kramp, 1968: 11); Uchida (1947) mentioned a *Steenstrupia* medusa from Palau in the western Pacific, but the specimen was neither described nor figured.

Taxonomic part

Family Corymorphidae Allman, 1872

Genus *Corymorpha* M. Sars, 1835

For this genus the definition presented by Bouillon et al. (2006: 228), including the genus *Monocaulus* Allman, 1864, has been followed, accepting the fact that neither the branched or unbranched condition of the blastostyles nor reduction of the medusa phase are valid criteria to separate genera in Corymorphidae (cf. Svoboda & Stepanjants (2001) for a contrary opinion). We have not followed Schuchert (1996: 102) in including the genera *Gotoea* Uchida, 1927, *Vannucia* Brinckmann-Voss, 1967 and *Eugotoea* Margulis, 1989. For a diagnosis of these genera we refer to Bouillon et al. (2006). The genus *Lampra* Bonnevie, 1898 is here included in *Corymorpha.*

Corymorpha tomoensis Ikeda, 1910
(figs 1, 2)

Corymorpha tomoensis Ikeda, 1910: 152-163, pl. 5; Stechow, 1913: 7; Jäderholm, 1919: 3; Stechow, 1923: 3; Okada, 1927: 599, figs 1-16; Yamada, 1959: 17; Hirohito, 1988: 12; Stepanjants & Svoboda, 1999: 52; Svoboda & Stepanjants, 2001: 58, 59, 60.

Material.— Fauna Malesiana Maluku Expedition of the National Museum of Natural History, Leiden, The Netherlands, November 1996. Stn MAL 05: Indonesia, Ambon, N coast, Manuala Beach, W. of Hila, 03°35'S 128°05'E, gradually sloping sandy bottom, with scattered coral heads; snorkelling and diving, depth 0-24 m, 07.xi1996; single polyp (RMNH-Coel. 31493).

Description (all details relate to a single preserved specimen).— Total length of polyp, from base of pedicel to top of hydranth, c. 34 mm, of which 10 mm for the vasiform hydranth (fig. 1). Pedicel weak, covered by thin, transparent perisarc through which c.10 peripheral canals are indistinctly visible. Basal 8 mm of pedicel well separated from apical part and provided with slightly thicker perisarc bearing longitudinally arranged, elongated papillae, becoming slightly longer towards the base, which is covered in a mass of agglutinated fine

Fig. 1. *Corymorpha tomoensis* Ikeda, 1910. Stn MAL 05, Fauna Malesiana Maluku Expedition of the National Museum of Natural History, Leiden, The Netherlands, November 1996. Indonesia, Ambon, N coast, Manuala Beach, W. of Hila, 03°35'S 128°05'E. Preserved specimen, total length 34 mm. Photograph Eelco Kruidenier.

fibres, mucus and sand grains. Pedicel of almost uniform diameter throughout its length, widening almost imperceptibly just below the hydranth, but distinctly separated from base of hydranth by a shallow groove. Body of hydranth vasiform, with a aboral whorl of c. 40 hollow, filiform tentacles of 8-10 mm length, hydranth slightly swollen above insertion of filiform aboral tentacles; a whorl of 10 large, racemose blastostyles is inserted on that swollen portion just above the attachment of the aboral tentacles. Blastostyles in structure resembling those of *Corymorpha sagamina* as described by Hirohito (1988: 12, fig. 2b), i.e. each blastostyle with fairly thick axis with more or less alternating, thick, stubby side branches that carry a large number of gonophores. Number of gonophores per blastostyle varied and estimated to vary between 50 and 60, all more or less in the same phase of development with exception of the most apical, which are slightly larger and show distinct gonadal development on the manubrium; at that phase the end of the manubrium does not reach the rim of the umbrella. Individual gonophores dome-shaped, attached to ramifications of spadix by means of a short stalk; four distinct radial canals and a ring canal, three tentacular knobs and a short, finger-shaped tentacle with a concentration of nematocysts at the slightly swollen end. They may develop into free medusae. Hydranth body narrows distally; there are several, at least three, whorls of c. 1 mm long, hollow, filiform oral tentacles surrounding the oral field. Peristome and mouth opening invisible.

Fig. 2. *Corymorpha tomoensis* Ikeda, 1910, detached gonophore; total length, including tentacle rudiment, 850 μm.

One of best developed gonophores isolated and measured (fig. 2). Height of bell c. 650 μm; height, incl. tentacle c. 850 μm; maximal diameter of bell c. 375 μm.

Nematocysts.— Study of the nematocysts in preserved material and in undischarged condition did not present favourable results. The aboral tentacles apparently have two size classes of stenoteles, large and small, of which the small size dominates; a small number of desmonemes has been observed. In the oral tentacles the large stenoteles dominate and a limited number of desmonemes has been observed. No small stenoteles appear to be present. There are few large stenoteles on the tentacle bulbs of the gonophore, the small-sized class distinctly dominating. No desmonemes were observed and quite a small number of anisorhizas, presumed to be heterotrichous, was observed. The large stenoteles are almost globular, in favourable position they show to be ovoid with an only slightly elevated, bluntly pointed apical portion; the small-sized stenoteles are slightly more slender. The (undischarged) desmones

Table 1. Size and distribution of nematocysts in mμ

Part	Large stenoteles	Small stenoteles	Desmonemes	Microbasic mastigophores	Heterotrichous anisorhizas
Oral tentacles	a 15-16 × 16-17	not observed	r c. 7 × 9	not observed	not observed
Aboral tentacles	a 12-13 × 14-16	a 8-10 × 10-12	r c. 7 × 9	not observed	not observed
Primary tentacle and tentacle bulbs of gonophore	c 13-14 × 14-15	a 8.5-9 × 10-11	not observed	not observed	r diameter 13-14

a, abundant; c, present in small number; r, rare.

are symmetrically ovoid. The anisorhizas present a perfect globe. No mastigophores were recognized.

Diagnosis: Height of polyp c. 35 mm, of which one third to one fourth for hydranth. Pedicel weak, with thin perisarc, c. 10 peripheral canals visible in coeosarc. Basal part of pedicel with longitudinally arranged, elongated papillae. C. 40 hollow, 8-10 mm long aboral tentacles in one whorl and 3 whorls of short oral tentacles. Ten large, racemose blastostyles inserted above aboral tentacles. Each blastostyle with thick axis and thick, stubby, alternating branches carrying a total of 50 to 60 gonophores. Individual gonophores dome-shaped, with four radial canal and ring canal, three tentacular rudiments and a short, finger-shaped tentacle with terminal concentration of nematocysts; they may develop into free medusae. Tentacles of polyp with large and small stenoteles and a small number of desmones. Tentacle of gonophore with large and small stenoteles and a small number of anisorhizas.

Distribution.— Originally described from Tomo, Bingo Province, Japan; about 50 specimens were obtained by trawl, depth and conditions of bottom not stated; apparently the specimens were not obtained from great depths. Additional Japanese material originates from the Inland Sea of Japan (Yamada, 1959) and from Goto Islands, off Kyushu (Jäderholm, 1919). The present specimen was collected by the late J.C. den Hartog of the National Museum of Natural History, Leiden, the Netherlands, while searching for ceriantharian sea anemones in shallow water off Manuala Beach, Ambon, Indonesia (total depth of the search area 0-24 m depth); only a single specimen was obtained.

The following species now classified in *Corymorpha* M. Sars, 1835 are briefly reviewed.

Corymorpha abyssalis Broch, 1910

Lampra Sarsii Bonnevie, 1898: 468, 478, 479, pl. 26 fig. 2; 1899: 18-21, pl. 2 fig. 3 ; Svoboda & Stepanjants, 2001: 67, fig. 1b : 5.
Corymorpha abyssalis Broch, 1910: 196.

Purple-coloured, deep water polyp of the north-eastern Atlantic, c. 8-10 cm high; gonophores attached directly to spadix of blastostyle, defined as 'pseudo-medusoid' (= cryptomedusoid) with one rudimentary tentacle; several eggs developing in the female gonophores, leaving gonophores at an early stage but remaining attached to 'mouth of gonophore' for some time. Type locality: Stn 248, Norske Nordhavn Expedition, 67.56°N 04.11°E, 1423 m depth. Several specimens were obtained.

This species is here kept separate from *Corymorpha groenlandica* (Allman, 1876), with which it is occasionally synonymized, because of the condition of the cryptomedusoid gonophores that have one distinct tentacle rudiment.

Corymorpha adventitia Fraser, 1941

Corymorpha adventitia Fraser, 1941: 79, 80, pl. 13 fig. 3.

Described after the polyp, 20 mm high, of which hydranth about one fourth. Pedicel of uniform diameter, with downwardly directed 'adventitious shoots' serving as accessory means of attachment. Aboral tentacles 20-24, in a single whorl, oral tentacles much more numerous, in several irregular whorls. Blastostyles thin and elongated, unbranched, in one whorl above the aboral tentacles but fewer in number; the apparently cryptomedusoid gonophores are attached to the blastostyles with a short stalk (Fraser, 1941). Insufficiently described species, type in National Museum of Natural History, Washington D.C., U.S.A. (USNM 43451); type locality presumable Panama (7°33'N, 78°34'20"W, 85 fms).

Corymorpha antarctica Pfeffer, 1889

Corymorpha antarctica Pfeffer, 1889: 53; 1890: 518, 567; Stepanjants & Svoboda, 1999: 53.

Insufficiently described species after polyp from Antarctic (South Georgian) waters.

The pedicel of both in alcohol preserved polyps is strongly contracted and conical, the walls slightly swollen ('blasig aufgetrieben'), basally attenuated, distally separated from the hydranth by a strong constriction. Hydranth about as high as wide, with a basal whorl of c. 20 long, slender tentacles. Tentacles of oral part in several compact whorls; therefore exact number could not be counted, probably c. 80. Gonophores with short pedicel attached to unbranched blastostyles that fill space between oral and aboral tentacles, undeveloped. Height of polyp 7 mm, height of hydranth 5 mm, length of aboral tentacles 5 mm. Colour of live specimen transparently yellow. Collected at low tide. (Translated from Pfeffer, 1889).

Corymorpha appelloefi Bonnevie, 1901

Corymorpha appellöfi Bonnevie, 1901: 5-6, pl. 1 fig. 2; Kramp, 1938: 66; 1949: 189.

Described after the polyp, c. 5 cm high; hydranth 10 mm long, peristome elongated into a proboscis, tentacles reduced. Basal part of hydranth swollen, with 2 closely set whorls of long, branched blastostyles, each branch shortly stalked, bearing a number of gonophores, each gonophore with 4 radial canals, one well-developed tentacle and three reduced tentacles. They probably develop into free medusae. West coast of Norway, Skjærgaard, 40-50 m depth. Single specimen.

Corymorpha bigelowi (Maas, 1905)

Euphysora bigelowi Maas, 1905: 7-8, pl. 1 figs 1-3.
Corymorpha bigelowi; Sassaman & Rees, 1978: 485-495, figs 1-3.

Originally described as medusa from Indonesian waters and found to be distributed over the tropical Indo-Pacific (Sassaman & Rees, 1978), it has also been recorded from Chilean waters (Kramp, 1952). It was subsequently discovered in the plankton of Monterey Bay on the west coast of the United States. The polyp was raised in the laboratory from gametes released by the medusae and cultured until liberation of medusae; the polyp, extensively described by Sassaman & Rees (1978), has unmistakable characters of a *Corymorpha* polyp so the species, which represents the type species of the genus *Euphysora* Maas, 1905, should be relegated to the genus *Corymorpha* M. Sars, 1835, of which genus *Euphysora* Maas, 1905 becomes a junior synonym. The full-grown medusa is **c.** 5 mm high and c. 2.5 mm wide; it has a distinct, pointed apical projection with or without remnants of an apical canal. There are four distinct radial canals and a ring canal. One of the tentacles is elongated and has a varied number of globular nematocyst aggregations (11-31) and an apical swelling rich in nematocysts; all aggregations are adaxially orientated. The three remaining tentacles are of reduced length and have no aggregations of the nematocysts; the tentacle opposite the elongated one is usually slightly longer than the 'lateral' tentacles. Manubrium reaching rim of umbrella or protruding slightly beyond. Polyp 13 mm high, of which 3 mm for the hydranth. Pedicel with a reduced number of endodermal canals (2-3), slightly increasing in diameter basally (c. 1.5 mm), with thin, membranous periderm, forming anchoring rootlets with inflated tips and terminating in a thickened ring at the base of the hydranth. Base of hydranth slightly contracted at place of diaphragm. Aboral tentacles number 15-20, not greatly contractile; oral tentacles 35 in irregular whorls around peristome, nematocysts dispersed, aggregated towards tentacle tips. Blastostyles columnar, in a whorl directly above aboral tentacles, but fewer in number; gonophore development at the tip where several gonophores in various stages of development may be present. Blastostyles with medusa-buds finishing their development curve downwards, outside aboral tentacle whorl; medusa when released 1.3 mm high and 1.2 mm wide. At that stage it has one developing tentacle and three tentacle buds. The oral and aboral tentacles of the polyp have large and small stenoteles, desmones and microbasic mastigophores (Sassaman & Rees, 1978).

Corymorpha carnea (Clark, 1876)

Rhizonema carnea Clark, 1876: 233-234; Clarke, 1903 : 953-958.
Corymorpha carnea; Stechow, 1909: 47, pl. 5 figs 7-9; Hirohito, 1988: 10-12, fig. 1; Yamada, 1959: 18.

Polyp may reach a height of 150 mm, of which about one fifth to one sixth for the hydranth. The stem widens gradually towards its base (from 4 tot c. 8 mm) where it is distinctly swollen (c. 18 mm diameter) and carries rooting filaments anchoring the polyp in soft sediment. There is a zone of thicker perisarc above the rooting filaments with transverse lines. Stem covered with thin but firm perisarc with a pattern of longitudinal lines; there are many longitudinal endodermal canaliculi (c. 60), partly anastomosing. Stem well separated from hydranth, the latter with many (c. 100) long, filiform aboral tentacles in one whorl and a large number (c. 200) short oral tentacles in 4 indistinct whorls. About 40 blastostyles of 20-25 mm length in a whorl inserted above aboral tentacles, each blastostyle with c. 10 more or less alternating, dichotomously branched ramifications each of which have a terminal cluster of developing gonophores. Gono-

phores eumedusoid, not developing into free medusae, with four distinct radial canals and a ring canal; margin of umbrella with three tentacular buds and a short, rudimentary tentacle. Manubrium reaching velar opening but not protruding, with developing gonads all along its length. Colour of living specimens deep coral-red, fading after preservation to milky white with reddish hue in the polyp; blastostyles yellowish brown. Originally described from Norton Sound, near St. Michael, Alaska (type locality) and extending southwards along the American Pacific coast (Clark, 1876; Yamada, 1959); Hirohito (1988) described the species from Sagami Bay, Japan.

Corymorpha cingulata Vanhöffen, 1910 (perhaps in *Gymnogonos*)

Tubularia (?) *cingulata* Vanhöffen, 1910: 279-280, fig. 5a, b.
Gymnogonos cingulatus; Stepanjants & Svoboda, 2001: 252. fig. 6; Peña Cantero, 2004: 768.

Described from Antarctic waters from a single, sterile polyp of which the basal part (pedicel and rooting filaments) was missing. The hydranth had a diameter of 2 mm and a height of 3 mm and was strongly contracted, so that only part of the oral tentacles could be observed; their number was estimated at 8; the much longer aboral tentacles were in one whorl and numbered 20. The periderm of the pedicel probably continued for some distance on the base of the hydranth, terminating in a constriction above which the hydranth body showed longitudinal striation. This doubtful species is placed in *Gymnogonos* Bonnevie, 1898 by Stepanjants and Svoboda (2001: 252), a genus principally differentiated from *Corymorpha* by characters of the gonosome which is unknown for *Tubularia* (?) *cingulata* Vanhöffen, 1910. (See also Stepanjants & Svoboda (2008:1623-1625) for additional information).

Corymorpha forbesii (Mayer, 1894)

Hybocodon forbesii Mayer, 1894: 236, pl. 1 fig. 1.
Vannuccia forbesii; Bouillon, Gravili, Pagès, Gili & Boero, 2006: 233, fig. 131I, J.

Medusa described from tropical and subtropical Atlantic and Pacific waters and occasionally referred to *Corymorpha* M. Sars, 1835; the hydroid phase was described by Brinckmann-Voss (Brinckmann, 1967). Though Kramp (1961: 42) considered its systematic position 'doubtful' it is here, in accordance with Bouillion et al. (2006), referred to *Vannucia* Brinckmann-Voss, 1967, of which genus it is the type species.

Corymorpha glacialis M. Sars, 1860

Corymorpha glacialis M. Sars, 1860: 96-105 (345, 348, 350 in German translation); Broch, 1916: 32-33, text-fig. H ; Schuchert, 2000: 413: 2001: 38, fig. 25.
Amalthea islandica Allman, 1874: 179; 1876: 256, pl. 9 figs 5, 6.
Lampra glacialis; Stepanjants & Svoboda, 1999: 52, 53, fig. 2 no. 4.
Monocaulus glacialis; Sirenko, 2001: 33; Svoboda & Stepanjants, 2001: 58, 59, 60, 66, fig. 1c.

Polyp 4-10 cm high, basal part of stem swollen and there with rooting filaments and papillae. Coenosarc of stem with numerous longitudinal canals, visible through thin

perisarc which reaches as far as base of hydranth, this base widened at insertion of filiform, laterally compressed, 20 mm long aboral tentacles, numbering about 40. Oral tentacles short, 1-2 mm, in three indistinct whorls. Twenty-30 blastostyles inserted above aboral tentacles, thick, mostly unbranched, occasionally forked. Gonophores either solitary or in clusters attached to blastostyles, eumedusoid, with manubrium, four radial canals and rudimentary tentacle bulbs (Schuchert, 2001). Development of eggs is said to take place inside the gonophores which liberate young polyps (Naumov, 1969). Colour (of preserved specimens) white to creamy. Northern boreal to Arctic species: Faroes, Iceland, Spitzbergen, northern Norway, White Sea, Barents Sea, Kara Sea, Laptev Sea, Greenland; type locality Varanger Fjord, Norway (Schuchert, 2001). Depth range 10-50 m (Naumov, 1960).

Corymorpha groenlandica (Allman, 1876)

Monocaulus groenlandicus Allman, 1876: 257, pl. 9 figs 7, 8; Svoboda & Stepanjants, 2001: 58, 59, 60, 66, fig. 2a, b.
Lampra atlantica Bonnevie, 1898: 479; 1899: 21, pl. 2 fig. 4, pl. 4 fig. 1; Svoboda & Stepanjants, 2001: 67, fig. 1b: 1, 2.
Lampra purpurea Bonnevie, 1898: 478; 1899: 21-22, pl. 3 fig. 1; Svoboda & Stepanjants, 2001: 67, fig. 1b: 3, 4.
Lampra socia Swenander, 1904: 6, figs 1-3.
Lampra arctica Jäderholm, 1907: 371; 1909: 41, pl. 1 figs 9, 10.
Corymorpha spitzbergensis Broch, 1910: 140, fig. 2.
Corymorpha groenlandica; Broch, 1916: 33-37, text-fig. I; Schuchert, 2000: 413; 2001: 38-40, fig. 26A-B.
Lampra groenlandica; Stepanjants & Svoboda, 1999: 53, fig. 2 no. 5.

Polyp 1.5-10 mm high, bright red or orange, occasionally purple, with longitudinal stripes on a pedicel of uniform diameter (3 mm). Aboral row of c. 10 tentacles, 1-2 cm long, and several rows of short oral tentacles. Blastostyles just above aboral tentacles but in smaller number, simply rod-shaped, unbranched, with 6-10 gonophores directly attached to blastostyle, pear-shaped to spherical, without traces of radial canals, circular canal or tentacles, female gonophores with 8-10 eggs. Distribution: Greenland (Davis strait, Cape Farewell), Iceland, Spitsbergen, Faroes, northern Norway, Barents Sea, Laptev Sea, Liverpool Bay, Beaufort Sea; depth range 120-1253 m (Schuchert, 2001). Type locality of *Lampra atlantica* Bonnevie, 1898 in the North Atlantic, 63.22°N 05.29°E, depth 2222 m. Type locality of *Lampra purpurea* Bonnevie, 1898 is the northern Atlantic, 67.24°N, 08.58°E, 827 m depth. *Lampra socia* Swenander, 1904, was described from Trondheimsfjord, Norway, *Lampra arctica* Jäderholm, 1909 from Storfjord, Spitzbergen, 78°37'N, 28.08.1864, and *Corymorpha spitzbergensis* Broch, 1910 also from Spitzbergen (station 4 of the 'Helgoland' expedition, Broch, 1910: 140). Synonymy of this species as given here is based on Broch (1916: 35-37) and Schuchert (2001: 38-40). *Corymorpha carnea* (Clark, 1876) has been considered a separate species.

Corymorpha intermedia Schuchert, 1996

Corymorpha intermedia Schuchert, 1996: 104-105, fig. 62a, b.

New Zealand species, only known from the medusa; the polyp may live there on soft bottoms. Medusa c. 2.5 mm high including a fairly prominent, apically rounded

projection without remnant of apical canal. Four radial canals and ring canal narrow but distinct. Four marginal bulbs of which one bigger and with a tentacle having 10 rings of nematocysts and one apical nematocyst cluster. No nematocysts on exumbrella. Velum distinct, one-third to half of diameter at that place. Manubrium almost completely surrounded by gonads, leaving narrow zone free above mouth, not reaching velar opening. Nematocysts consist of several size classes of stenoteles, desmonemes, anisorhizas and microbasic euryteles. Type locality: surface plankton near Goat Island, Leigh Marine Reserve, New Zealand.

Corymorpha iyoensis Yamada, 1958

Corymorpha iyoensis Yamada, 1958: 51, 52, fig. 1; 1959: 18.

Japanese species (polyp) from Matsuyama (Yamada, 1958, 1959). Polyp 8 mm high, growing on tetraxonian sponge. Hydranth distinctly separated from pedicel, with 14-20 aboral and 16-24 oral tentacles. Basal part of hydrocaulus 'sends out some processes to sides or is divided into some irregular root-like processes (Yamada, 1959; compare also *Corymorpha adventitia* Fraser, 1941). Condition of gonophores undescribed. Not rediscoved or redescribed since Yamada's original record.

Corymorpha januarii (Steenstrup, 1854)

Corymorpha Januarii Steenstrup, 1854: 46.
Corymorpha januarii; Da Silveira & Migotto, 1992: 81-88, figs 1-4; Stepanjants & Svoboda, 1999: 52.

Large, white to deep purple polyp from tropical/subtropical Atlantic coasts of southern Brazil, initially described by Steenstrup and subsequently rediscovered and redescribed by Da Silveira and Migotto (1992). The polyp may reach a height of 17.5 cm (mean 92.1 mm); hydranth 18-30 mm high with a diameter of 5.4-14.7 mm. Pedicel basally 4.3-12.0 mm wide (mean 7.5 mm), with rooting filaments and papillae, narrowing apically and distinctly separated from hydranth. Branching and anastomosing longitudinal endodermal canals are visible through perisarc. Hydranth vasiform, with 41-74 long (20.7-63.9 mm), aboral tentacles in one whorl and 200-437 oral tentacles in several whorls around peristome. There are 25-63 long (3.0-18.7 mm), branched blastostyles that hang downwards amongst aboral tentacles, each short branch with clusters of developing gonophores, which ripen on blasostyles and are released as sexually mature but morphologically reduced medusae, c. 0.9 mm high and 0.67 mm wide (female medusa). Medusoid subspherical, rounded apical process with short apical canal, four radial canals and a ring canal, four tentacle rudiments of varied development, a rather wide velum, opening of umbrella perpendicular to length axis of medusa. Ripe male manubrium swollen, not reaching velar opening; female manubrium larger. Gametes are set free either shortly before or soon after release of the medusoids. Type locality: tropical Atlantic coast of Brazil.

Corymorpha microrhiza (Hickson & Gravely, 1907)

Lampra microrhiza Hickson & Gravely, 1907: 1, 3, 17, 18, pl. 2 fig. 14; Stepanjants & Svoboda, 1999: 53, fig. 2 no. 7.

Monocaulus microrhiza; Svoboda & Stepanjants, 2001: 58, 59, 60, 63-64, fig. 2c, d; Stepanjants, Svoboda & Anokhin, 2002: 147.

Originally described from off the Barrier, McMurdo Sound, Ross Sea, Antarctica; fully re-described and figured by Svoboda & Stepanjants, 2001. The c. 65 mm high polyp has a blackish-brown colour; the hydranth is not separated from the pedicel by a constriction and that pedicel is loosely covered by 'chitinous', shrunken perisarc (at least in preserved specimens). There are 30-50 long and hollow filiform aboral tentacles and several whorls of 7 mm long oral tentacles, total number 100-200. There are several (2-4) whorls of 3-12 mm long, unbranched blastostyles on body of hydranth between oral and aboral tentacles, each with 15-40 stalked, cryptomedusoid gonophores attached directly to blastostyle. The species has also been found in the Weddell Sea.

Corymorpha nana Alder, 1857

Corymorpha nana Alder, 1857: 108, pl. 9 figs 7, 8; Kramp, 1949: 184, 189, fig. 7b; Svoboda & Stepanjants, 2001: 58, 59, 60.

Polyp 20-25 mm high, with thin, membranous perisarc on pedicel, which is basally attached in sediment with fine attachment filaments and apically separated from hydranth by a constriction. Hydranth body with 15-25 proximal (aboral) tentacles, 5-7 mm long; distal (oral) tentacles number 16-18 and are placed in one whorl. Ten-15 blastostyles in a whorl on hydranth body above proximal tentacles, unbranched, stubby, with a small number (4-5) of gonophores developing into free medusae with one fully developed tentacle and 3 tentacle rudiments (description mainly taken from Bonnevie, 1899). Distribution: dispersed localities in the North Sea and along the coast of southern Norway. The medusa phase of this species is insufficiently known.

Corymorpha nutans M. Sars, 1835

Corymorpha nutans M. Sars, 1835: 7, pl. 1 fig. 3a, g3; Svoboda, 1973: 145-150, figs 1-2; Schuchert, 2001: 40-41; Svoboda & Stepanjants, 2001: 58, 59, 60; Bouillon, Medel, Pagès, Gili, Boero & Gravili, 2004: 91-92, fig. 49A-C ; Bouillon, Gravili, Pagès, Gili & Boero, 2006: 228, figs 26O, 112B, C.
Steenstrupia rubra Forbes, 1848: 73, pl. 13 fig. 1.
Steenstrupia galanthus Haeckel, 1879: 31.
Steenstrupia nutans; Kramp, 1961: 45-46.

Pretty well known species producing free medusae that were formerly identified as *Steenstrupia nutans* (M. Sars, 1835). Polyp up to 100 mm high, of which hydranth 10-15 mm, in living condition usually inclined downwards under an angle of 60°. Basal part of pedicel slightly swollen, attached in sediment by means of rooting filaments above which a zone with papillae; endoderm of pedicel with longitudinal canals. Aboral tentacles number c. 50, to 30 mm long; oral tentacles in 6 or 7 whorls, numbering c. 80. Blastostyles bunch-shaped, inserted just above oral tentacles. Gonophores developing into free medusae with one long tentacle and three bud-shaped tentacle rudiments; long tentacle present before release of medusa. Adult medusa conical, to 6 mm high, with prominent, conical apical projection and rudiment of apical canal. Mesogloea fairly thick, velum broad. Four distinct radial canals and ring canal. Three tentacle bulbs

and one long tentacle with whorls of nematocysts. Gonads cover almost whole length of manubrium, leaving small zone free above mouth, slightly protruding beyond velar opening. Colour of polyp milky-white, gonophores orange-red; tentacles, bulbi and manubrium of medusa reddish or yellowish, as occasionally are also radial canals and ring canal.

Distribution: Boreal species from the Atlantic coasts of northwestern Europe, from northern France to the Lofoten along the Norwegian coast. Also known from the Mediterranean Sea and the Black Sea. Usually in fairly shallow waters (maximal depth c. 100 m) on muddy to sandy bottoms. Development of the medusa from gonophores of the polyp was observed and described by M. Sars (1835).

Corymorpha palma Torrey, 1902

Corymorpha palma Torrey, 1902: 36-43, pl. 2 fig. 21; Hartlaub, 1916: 116, fig. 43; Allen, 1970: 28, fig. 54.

Apparently a common species along the Pacific coast of California. Stem 5-10 cm high, basally thickest, gradually tapering distally, with a dense tangle of rooting filaments and covered by perisarc for about half its length or less. Hydranth with an aboral whorl of 18-30 filiform tentacles, 10-15 mm long; oral tentacles twice as numerous, in several whorls around oral aperture. Gonophores eumedusoid, attached to blastostyles arranged in a whorl immediately above aboral tentacles. Gonophores apparently permanently attached, with ring canal, four radial canals and four tentacle rudiments; manubrium large and swollen, protruding for at least half its length beyond velar opening; manubrium largest in male gonophores. Several (6-10) eggs ripen simultaneously. Type locality: San Pedro, California.

Corymorpha parvula (Hickson & Gravely, 1907)

Lampra parvula Hickson & Gravely, 1907: 3, 17, pl. 3 figs 15, 16, pl. 4 fig. 35; Stepanjants & Svoboda, 1999: 53, fig. 2 no. 6.

Corymorpha parvula; Stepanjants, 1972: 60, fig. 5; 1979: 22, pl. 2 fig. 5.

Monocaulus parvula; Svoboda & Stepanjants, 2001: 58, 59, 60, 64-66, fig. 2e, f; Stepanjants, Svoboda & Anokhin, 2002: 147, fig. 6.

Antarctic species known from Ross and Weddell Seas, 3-450 m depth. Length of polyp 20-110 mm, in living state white with orange-coloured gonophores and faintly violet oral tentacles, reddish-orange after formalin preservation, including the thin, opaque perisarc. Hydranth and pedicel distinctly separated, basal part of pedicel swollen (1.5-11 mm), with many rooting filaments. Endodermal canals vaguely visible through opaque perisarc. Hydranth 3-15 mm long, with 20-50 hollow aboral tentacles in one whorl, 1.5-25 mm long; 5-200 hollow oral tentacles in several compact whorls, 0.3-1.5 mm long. Twelve -50 short, unbranched blastostyles (0.5-6 mm long) in 2 irregular rows between oral and aboral tentacles, each with 15-40 cryptomedusoid gonophores (no radial canals), to 1 mm long; no tentacle rudiments. Type locality: off Hut Point and Flagon Point, McMurdo Sound, Ross Sea, Antarctica, depth 10-20 fms. Found on muddy bottoms, attached to bryozoans and attached to sponge spicules.

Corymorpha pendula L. Agassiz, 1862

Corymorpha pendula L. Agassiz, 1862: 276, 343, pl. 26 figs 7-17.
Hybocodon pendula; Kramp, 1961: 42-43.

Described as hydroid from the Atlantic coasts of the United States and placed in *Hybocodon* by Mayer, 1910 as *Hybocodon pendula*. Suggested to be the polyp phase of *Euphysa tentaculata* Linko, 1904 (cf. Kramp, 1961: 43), but this is not substantiated by culture experiments.

Corymorpha rubicincta Watson, 2008

Corymorpha rubicincta Watson, 2008: 185-188, figs 1-4.

Australian species described from Point Richards in Port Phillip, Victoria (type locality), after the polyp living at 4.5-6 m depth. The polyp was studied alive by Dr Watson and she gives the following vivid description of its colours: "Rooting filaments colourless to greenish; lower two thirds of hydrocaulus yellow to reddish, colour gradually fading distally to primary band; primary band brick red; papillae below band cream. Body of hydranth pale flesh-colour, hypostome white to cream, usually a band of red spots just above oral tentacles and similar spots on bases of inner row of oral tentacles; blastostyle and gonophores colourless to white. Tentacles translucent white". The polyp is 20-40 mm high; stem cylindrical, with a transverse red band ('primary band') at one third of its height; base of stem slightly swollen, attached in sediment by means of thin rooting filaments. Perisarc below band gelatinous, with numerous 'digitate, pendulous papillae'. Hydranth vasiform, separated from stem by a constriction, in life inclined downwards, with a single adoral whorl of 20-24 filiform tentacles 12-14 mm long and two whorls of c. 30 oral tentacles, 3.8-4.5 mm long; tentacles in the two rows alternating (amphicoronate arrangement). Blastostyles to 1.5 mm long, inserted above aboral tentacles but less in number, with cryptomeduoid gonophores attached to the blastostyles directly or in small groups, with thick epidermal layer heavily armed with nematocysts; female geonophores with many small eggs. Nematocysts stenoteles (in five size classes), desmonemes, microbasic mastigophores and heterotrichous anisorhizas (Watson, 2008).

Corymorpha sagamina Hirohito, 1988

Corymorpha sagamina Hirohito, 1988: 12-14, fig. 2; Stepanjants & Svoboda, 1999: 52; Svoboda & Stepanjants, 2001: 58, 59, 60; Anonymous, 2002: 10, fig.

Species described after a single polyp; gonophores supposed to develop into free medusae, though these have not yet been described. Sagami Bay, Japan, 120 m depth. Total length c. 40 mm. Basal part of stem swollen, forming a clavate portion apically drawn out in a blunt point, both parts with rooting filaments. Remainder of stem attenuating towards hydranth, covered by thin, transparent perisarc through which 10 longitudinal endodermal canals are visible; perisarc externally with 10 longitudinal ridges each with a row of papillae on both sides in lower half of stem. Hydranth vasiform, 30 long

aboral tentacles in one whorl and c. 40 oral tentacles in 4 irregular whorls. Sixteen blastostyles inserted just above oral tentacles, each blastostyle with alternate branches that are packed with gonophores in all stages of development. Only a single specimen was obtained and the gonophores at that stage had four radial canals and a ring canal, while one of the four tentacular bulbs had produced a short, stubby rudimentary tentacle.

Corymorpha sarsii Steenstrup, 1854

Corymorpha nutans M. Sars, 1851: 124, 135.
Corymorpha sarsii Steenstrup, 1854: 48; Stepanjants & Svoboda, 1999: 52; Svoboda & Stepanjants, 2001: 58, 59, 60.
Amalthaea sarsii; Stechow, 1912: 338, pl. 12 fig. 2.
Corymorpha sarsi; Stechow, 1934: 197-198..

Five to 10 cm high polyp described from soft bottoms of Vestfjorden, Lofoten, Norway. Attached in bottom by means of rooting filaments of the basal part of the stem, remainder of stem covered with transparent perisarc through which a number of c. 10 longitudinal endodermal canals is visible. The hydranth has 30-40 long aboral tentacles and numerous shorter oral tentacles in several whorls. Blastostyles inserted in hydranth body above aboral tentacles numbering 8-25, unbranched except at the tip where several developing gonophores may have a communal attachment to the blastostyle. Ripe gonophores elongated bell-shaped, with indistinct apical projection, apical canal, four thin radial canals and ring canal, margin of umbrella with four tentacular bulbs that may each develop a short, rudimentary tentacle. Manubrium of female gonophore filling subumbrellar cavity, not protruding beyond velar opening, fully covered by gonads on the surface of which a number of ripe, amoeboid eggs may occur; after fertilization inside subumbrellar cavity they develop into globular eggs that may remain attached for some time to the gonadal tissue. Male gonophores have a much longer manubrium, protruding for more than half its length outside the velar opening. Both sexes with nematocysts around oral aperture. The gonophores are considered to detach only under abnormal conditions (e.g. strong water movement). A comparable medusa has been described by Haeckel (1879: 38, pl. 1 figs 10, 11) from Lanzarote, Canary Islands, as *Amalthaea amoebigera*, differing from *Corymorpha sarsii* bij de shape of the umbrella, said to be cubic ('Würfelförmig'), the considerable development of the marginal bulbs (which have no reduced tentacles) and the greater length of the (female) blastostyle, which protrudes from the subumbrellar cavity by half its total length and has a large number of amoeboid eggs attached. This species was found free-living in the plankton; the polyp phase is unknown. It has not been recorded since Haeckel's observations were published (1879).

Corymorpha tentaculata (Linko, 1904)

Euphysa tentaculata Linko, 1904: 214
Corymorpha tentaculata; Hartlaub, 1917: 394.

Medusa described from the Barents Sea, recorded from various localities in the eastern North Atlantic; maybe the medusa phase of *Hybocodon pendula* (L. Agassiz, 1862) [see above under *Corymorpha pendula* (L. Agassiz, 1862)].

Corymorpha uvularis (Fraser, 1941)

Lampra uvularis Fraser, 1941: 80, pls 14 fig. 4.

Summarily described polyp, 22 mm high, of which stem 15 mm and hydranth 7 mm; aboral tentacles 18-20, long and slender; oral tentacles 40-48, short, in 4 indistinct whorls; blastostyles 8, inserted above aboral tentacles, 'looking like compact bunches of grapes', gonophores spherical, no sign of tentacular processes. May well be *Corymorpha glacialis* or *C. carnea.* Type in NMNH (no. 43453). Type locality Thistle Ledge, Stephens Pass, Alaska, 131 fms, 14.July 1903.

Corymorpha uvifera (O. Schmidt, 1852)

Amalthaea uvifera Schmidt, 1852: 13, pl. 9 fig. 2.
Corymorpha uvifera; Kramp, 1943: 42.

The original description of this species could not be consulted. It was described from Loppen Island, 10 miles from Hammerfest, Norway, found at a depth of 1 fathom. It is characterized by the structure of the blastostyles, that are described as being like bunches of grapes, attached to the body of the hydranth above the aboral tentacles, each blastostyle with 30-40 gonophores which have four tentacular bulbs of identical shape. The gonophores were not observed to be set free. According to Broch (1910: 195) it is undoubtedly a synomym of *Corymorpha vardoeensis* (Loman, 1889), itself likely a synonym of *Corymorpha sarsii* Steenstrup, 1854.

Corymorpha vardoeensis (Loman, 1889)

Amalthaea vardöensis Loman, 1889: 271-279, text-fig. 95, pl. 13.

About 50 mm high polyp described from Vardø, northern Norway, attached in sandy bottom of Busse Sound, 71°N; colour in life transparently reddish. Number of aboral tentacles c. 50, number of blastostyles 16-20. Numerous oral tentacles in 7 to 9 whorls. Developing gonophores with four radial canals, a ring canal and four tentacle bulbs. Though the author suggests that gonophores develop into free medusae, this seems quite unlikely. The specimens were stained and prepared for histological examination; the histology of this species is treated in detail. Stechow (1912) fully redescribed the species after material sent by Loman. It is probably synonymous with *Corymorpha sarsii* Steenstrup, 1854.

Corymorpha sp.

Monocaulus sp. Svoboda & Stepanjants, 2000: 67, fig. 1b: 6.

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