

THE GENUS POLYSIPHONIA IN THE NETHERLANDS

by

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(Leiden).

The vegetative characters — especially those which are important for identification of the species — together with the distribution of the *Polysiphonia* species occurring in Netherland's waters were subject of the following study.

The material used consisted for the greater part of dried specimens, present in the following collections: Rijksherbarium (Leiden), herbarium Van Goor, Zoological Station (Den Helder), herbarium of the "Koninklijke Nederlandse Botanische Vereniging" (Rijksherbarium, Leiden) and the herbaria of the Universities of Amsterdam, Groningen and Utrecht.

As the collection of the Rijksherbarium at Leiden contains i. a. the herbarium of Kützing, it was possible to study the type-specimens of most of his species. Thanks to the Director of the Royal Botanic Gardens, Kew, the type specimens of the following species, present in the Kew Herbarium, could be studied as well: *Conferva brodiaei* Dillw., *Conferva denudata* Dillw..

The dimensions given in the description of the species are taken from dried specimens, which were soaked in fresh water. In some cases they may be smaller than those of living plants. However, it may be supposed, that the ratio between length and breadth of the articulations have nearly the same value as those in living specimens.

Of the previous, taxonomical work on Netherland's *algae* may be mentioned: "Algae" in "Prodromus Florae Batavae", II, by R. van den Bosch (1853) and "Die Holländischen Meeressalgen", by A. van Goor (Verh. Kon. Akad. Wetensch. Amsterdam, Sect. 2, 23, 1923). For further work on this subject, the survey given by J. Th. Koster may be referred to (A review of the taxonomical and ecological studies on Netherlands' Algae, Recueil des Travaux botaniques Néerlandais, vol. 36, 1939).

I am pleased to thank all those who made this study possible. Especially to Dr Joséphine Th. Koster, the author is greatly indebted for helpful assistance and criticism.

Key to the species of *Polysiphonia* in Netherlands waters.

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|--|------------------------|
| 1. Pericentral cells 4 (with or without cortication) | 2 |
| More than 4 pericentral cells | 4 |
| 2. Thallus without cortication | 1. <i>P. urceolata</i> |
| Thallus corticated (sometimes only near the base) | 3 |

3. Ultimate filaments fusiform, main branches very stout, cartilaginous; heavily corticated; pericentral cells in the main branches difficult to be distinguished 2. *P. elongata*
 Ultimate filaments equally thick, tapering to the top, main branches not very coarse; cortication sometimes restricted to the thallus base; when main branches also corticated, pericentral cells easy to be distinguished between the cortical cells 3. *P. violacea*
4. Pericentral cells 5—8 5
 More than 8 pericentral cells 6
5. Pericentral cells 5—7, thallus ecorcicated, or very slightly corticated near base 4. *P. denudata*
 Pericentral cells 6—8; main axis and principal branches heavily corticated 5. *P. brodiaei*
6. Pericentral cells 12—24, branching dichotomous, all articulations shorter than their breadth; epiphytic nearly always on *Ascophyllum nodosum* 6. *P. lanosa*
 Not so 7
7. Pericentral cells 8—13, more or less spirally curved; ultimate filaments fusiform; thallus ecorcicated 7. *P. nigra*
 Pericentral cells 10—20, usually not spirally curved. Ultimate filaments tapering to the top; thallus ecorcicated or corticated 8
8. Pericentral cells 10—12; diameter of central cell $\frac{1}{4}$ — $\frac{1}{5}$ of diameter of filament; thallus ecorcicated 8. *P. simulans*
 Pericentral cells 12—20; diameter of central cell $\frac{1}{3}$ — $\frac{2}{5}$ of diameter of filament; in large specimens main axis and principal branches in lower parts of thallus corticated 9. *P. nigrescens*

1. *Polysiphonia urceolata* (Lightf.) Grev., Fl. Edinensis, 1824, p. 309; Harvey, Phyc. Brit., 1846—51, t. 167; J. Ag., Sp., Gen., Ord. 2, 3, 1863, p. 970; Kütz., Sp. Alg., 1849, p. 824, Tab. Phyc., 13, 1863, t. 92; Hauck, Meeresalg., 1885, p. 221; De Toni, Syll. Alg., 4, 1889—1905, p. 875; Falkenberg, Rhodomel., 1901, p. 150; Preda, Fl. Ital. Crypt. 1, 1908, p. 231; Rosenvinge, Mar. Alg. of Denm., 1923—24, p. 406; Batten in Journ. Linn. Soc., 46, 1922—24, p. 289; Van Goor, Holl. Meeresalg., 1923, p. 29; Lakowitz, Algenfl. Ostsee, 1929, p. 338; Taylor, Mar. Alg. N. Am., 1937, p. 368; Kylin, Rhodoph. Schwed. W. Küste, 1944, p. 82. — *Confervaria urceolata* Lightf. ex Dillwyn, Brit. Conf., 1809, p. 82, t. G — *Polysiphonia denticulata* Kütz., Sp. Alg., 1849, p. 824, Tab. Phyc., 13, 1863, t. 90.

Thallus bright reddish purple, to 10 cm high, forming dense tufts from creeping base; attached by rhizoids, formed by procumbent branches and lower parts of erect branches, branching pseudo-dichotomous to alternate. Central cell with smaller diameter than the 4 pericentral cells; the latter sometimes more or less spirally curved. Articulations near the base approximately as long as their breadth (50—150 μ), in principal branches 2 to 4 or 5 times as long as their breadth (resp. 200—325 μ and 65—97 μ), in ultimate branches to two times as broad as their length (e.g. 32 μ and 16 μ) — fig. 2, 12.

Dutch records: Holwerd, July 1851, May 1852 (*Spree*); Stavoren, Sept. 1845 (*Suringar*); dike Hoorn-Edam, Sept. 1854 (*Suringar*); Den Helder, Dec. 1909 (*Stomps*), June 1939 (*Vervoort*); Huisduinen, July 1948 (*Barkman*); Ymuiden, March 1949 (*Lucas*); Hoek van Holland, Febr. 1936 (*van Roon*), Febr. 1938 (*Koster, Vervoort*), Febr. 1948 (*Henneke*); Zierikzee, April 1939 (*Vervoort*); Walcheren, near Vere, Oct. 1940; Kanaal door Walcheren (canal), Aug., Sept., Oct. 1940; Canal Nieuwland—Arne-muiden, Aug. 1941, Dec. 1943; Nieuw en St. Joosland, June 1941; Zuid-Beveland, Bieselingse Ham, March 1941; Kanaal door Zuid-Beveland (canal), Sept. 1941 (all *Brakman*); Oosterschelde and Zandkreek, May 1840, March 1843, April 1845 (*van den Bosch*).

Habitat: Occurring on stones, woodwork, *Balanus*, *Laminaria*; near low water mark.

Distribution: Atlantic shores of Northern Europe (Batten) and N. America (Taylor), Adriatic (Hauck).

f. roseola (Ag.) J. Ag., Sp. Gen., Ord., 2, 3, 1863, p. 971; Rosenvinge, Mar. Alg. of Denm., 1923—1924, p. 411; Taylor, Mar. Alg. N. Amer., 1937, p. 369; Kylin, Rhodoph. Schwed. W. Küste, 1944, p. 82 — *Hutchinsia roseola* Ag., Sp. Alg., 1828, p. 92 — *Polysiphonia stricta* f. *gracilis* Kütz., Sp. Alg., 1849, p. 820.

Filaments slender, articulations mostly to 8—9 times as long as their breadth (e.g. diam. 130 μ , length 1087 μ), sometimes still larger (12 times as long as their breadth, (e.g., diam. 115 μ , length 1420 μ) — fig. 1.

Dutch records: Harlingen, 1904—1906 (*Kruizinga*); Texel, Oudeschild, near harbour, April 1949 (*Veldkamp*); Den Helder, May 1868 (coll. unknown), April 1898 (*Resink*), July 1899 (*Weevers*), May 1907 (*Postuma*), May 1931 (*Sobels*); Febr., March 1949 (*den Hartog*); April 1949 (*Swennen*), June 1949 (*Stock*), Hoek van Holland, June 1948 (*Koster, Lucas*), Zierikzee, April 1939 (*Vervoort*), Zandkreek, May 1847 (*van den Bosch*).

Habitat: Growing probably always below low water mark.

2. *Polysiphonia elongata* (Huds.) Harv. ex Smith's Engl. Fl., 1833, p. 133; Harvey, Phyc. Brit., 1846—1851, t. 292, 293; Kütz. Sp. Alg., 1849, p. 828; Tab. Phyc., 14, 1864, t. 4; van den Bosch in Prodr., 2, 2, 1853, p. 171; Ag., Sp., Gen., Ord., 2, 3, 1863, p. 1004; Hauck, Meeresalg., 1885, p. 227; De Toni, Syll. Alg., 4, 1889—1905, p. 903; Falkenberg, Rhodomel., 1901, p. 126; Preda, Fl. Ital. Crypt., 1, 1908, p. 226; Batten in Journ. Linn. Soc., 46, 1922—1924, p. 297; Van Goor, Holl. Meeresalg., 1923, p. 32; Rosenvinge, Mar. Alg. of Denm., 1923—1924, p. 415; Lakowitz, Algenfl. Ostsee, 1929, p. 342; Taylor, Mar. Alg. N. Am., 1937, p. 367; Kylin, Rhodoph. Schwed. W. Küste, 1944, p. 83 — *Conferva elongata* Huds., Fl. Engl. 2, 1778, p. 599 — *P. arborescens* Kütz., Tab. Phyc., 14, 1864, t. 12 — *P. chalarophloea* Kütz., ibid., t. 12 — *P. haematitis* Kütz., ibid., t. 8 — *P. macroclonia* Kütz., ibid., t. 13 — *P. stenocarpa* Kütz., ibid., t. 11 — *P. trichodes* Kütz., ibid., t. 10 — *P. robusta* Kütz., ibid., t. 11 (not found in the herbarium Kützing).

Remarks: It is not fully clear if *P. clavigera* Kütz. (Tab. Phyc., 14, 1863, t. 14) and *P. laxa* Kütz. (Tab. Phyc., 14, 1863, t. 3) can be regarded as synonyms of *P. elongata* (Huds.) Harv. The former has a rather slender habit, the main branches are not very coarse and the cortication is not as heavy as may be expected; as to the habit and cortication, the latter comes nearer to *P. elongata*, but the ultimate filaments, in a number of cases, do not distinctly taper at base and apex.

Thallus bright reddish-brown; to \pm 20 cm high, attached by a disc; lower parts of thallus more or less bare; branching dichotomous to alternate. Main branches very coarse, the 4 pericentral cells surrounded by a cortex of considerable thickness. Whole thallus corticated, except to the end of ultimate filaments; the latter alternately branched, fusiform. Most articulations in the ultimate filaments shorter than their breadth — fig. 10, 13.

Dutch records: Terschelling, Bosplaat, Aug. 1949 (*Lucas*); Vlieland, near harbour, Aug. 1947, Vliehors, Aug. 1947 (*Lensink, Schijfsmo*); Texel, near de Cocksduorp,

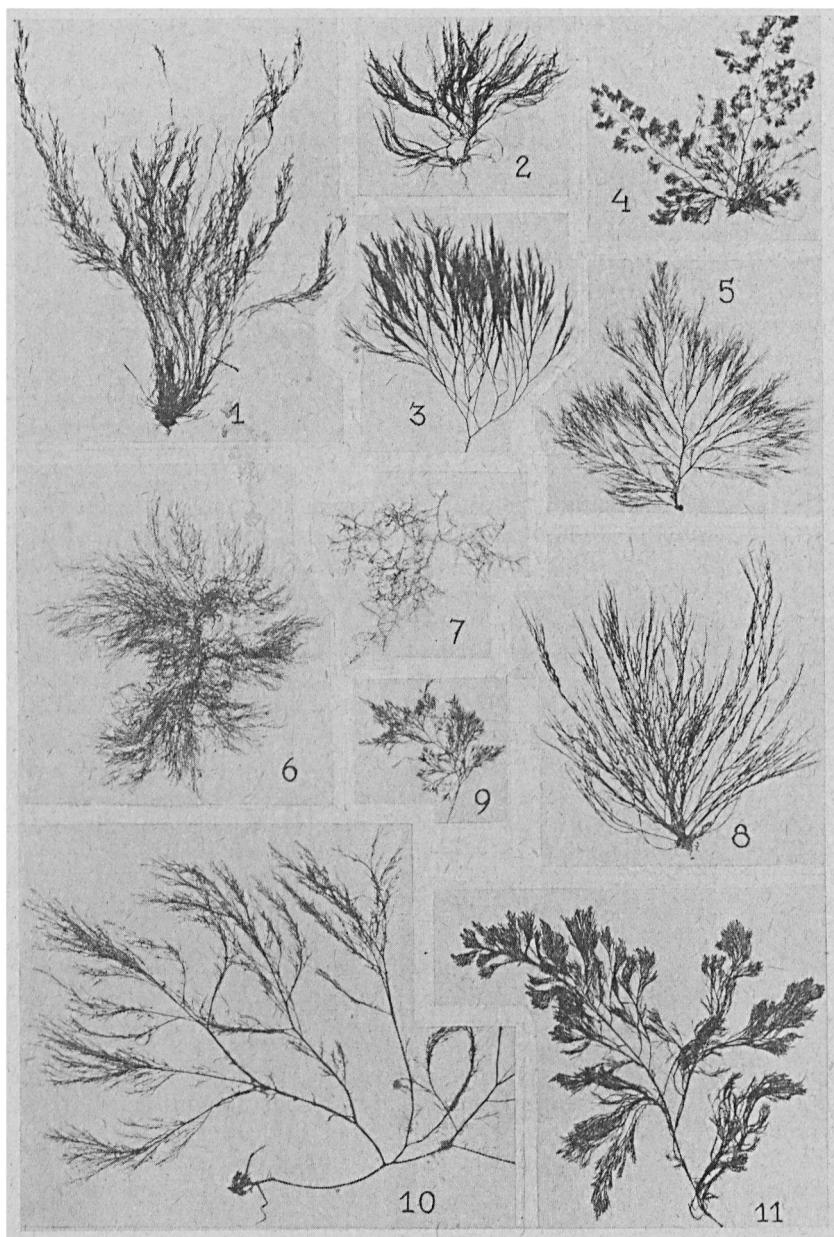


Fig. 1 — *Polysiphonia ureolata* (Lightf.) Grev. f. *roseola* (Ag.) J. Ag.; 2 — *P. ureolata* (Lightf.) Grev.; 3 — *P. denudata* (Dillw.) Kütz.; 4 — *P. brodiaei* (Dillw.) Grev.; 5 — *P. violacea* (Roth) Grev.; 6 — *P. violacea* (Roth) Grev. f. *tenuissima* Aresch.; 7 — *P. violacea* (Roth) Grev. f. *fibrillosa* (Dillw.) Aresch.; 8 — *P. nigra* (Huds.) Batters; 9 — *P. simulans* Harvey; 10 — *P. elongata* (Huds.) Harv.; 11 — *P. nigrescens* (Huds.) Grev.

Aug. 1946 (*Meeuwse*); Texel, N. of Oudeschild, drifting ashore, April 1949 (*Veldkamp*); Den Helder, Sept. 1885 (*Heinsius*), May 1919 (*van Goor*), April 1938 (*Zool. Station*); near Afsluitdijk, June 1939 (*Vervoort*); Oosterschelde, March 1843 (*van den Bosch*), Ierseke, Sept. 1947 (*Korringa*).

Habitat: Mostly growing solitary, on stones and shells, often on a muddy soil, to be found as well on shallow coasts as on greater depth.

Distribution: Atlantic coasts of Europe (Batten, Börgesen, Hauck, Kylin, Rosenvinge, Lakowitz), Mediterranean and Adriatic (Hauck, Falkenberg), Atlantic coasts of United States from New York to Prince Edward Island (Taylor).

3. *Polysiphonia violacea* (Roth) Grev., emend. Rosenvinge, Mar. Alg. of Denm., 1923—1924, p. 422; Greville ex Smith, Engl. Fl., 1833, p. 332; Harvey, Phyc. Brit., 1846—1851, t. 209; Aresch., Phyc. Scand. Mar., 1850, p. 51; van den Bosch in Prodr., 2, 2, 1853, p. 171; J. Ag., Sp., Gen. Ord. 2, 3, 1863, p. 988; Kütz., Tab. Phyc., 13, 1863, t. 97, 98; Hauck, Meeresalg., 1885, p. 225; De Toni, Syll. Alg. 4, 1889—1905, p. 900; Falkenberg, Rhodomel., 1901, p. 115; Preda, Fl. Ital. Crypt., 1, 1908, p. 225; Batten, in Journ. Linn. Soc. 46, 1922—1924, p. 302; van Goor, Holl. Meeresalg., 1923, p. 30; Lakowitz, Algenfl. Ostsee, 1929, p. 340; Kylin, Rhodoph. Schwed. W. Küste, 1944, p. 83 — *Ceramium violaceum* Roth, Catal. Bot., 1797, 1, p. 150.

Thallus brownish-red, to 15 cm high, attached by a disc; branching alternate, main axis \pm 600 μ thick, branched from the base; pericentral cells 4, surrounded by cortical cells in older parts of thallus. Articulations to about 5 times as long as their breadth (e. g. length 1400 μ , diam. 275 μ). Ultimate filaments equally thick, tapering to the top — fig. 5, 14.

Dutch record: Goes, floating near harbour, Sept. 1942 (*Brakman*).

Distribution: Atlantic shores of Northern Europe, Baltic (Batten, Lakowitz).

f. *tenuissima* Aresch., Phyc. Scand., 1850, p. 54; Hauck, Meeresalg., 1885, p. 227; Batten in Journ. Linn. Soc. 46, 1922—1924, p. 302; Lakowitz, Algenfl. Ostsee, 1929, p. 341 — f. *tenuis* Rosenv., Mar. Alg. of Denm., 1923—1924, p. 422.

Remarks: *Polysiphonia roseola* Kütz., Tab. Phyc., 13, 1863, t. 80, is slightly corticated near the base and must be regarded as a synonym of *P. violacea* f. *tenuissima* Aresch. and not as a synonym of *P. urceolata* f. *roseola* (Ag.) J. Ag. Kützing regarded his *P. roseola* as a synonym of *Hutchinsia roseola* Ag., according to his remark, that is added to the specimen (Herb. Lugd. Bat. no. 941239 29), described in Tab. Phyc., 13, 1863, t. 80.

Thallus reddish brown, to \pm 7 cm high, delicate; main axis thin (100—250 μ). Cortication restricted to thallus base. Articulations to 8 times as long as their breadth (resp. 100—1300 μ and 50—165 μ) — fig. 6.

Dutch records: Dike Hoorn-Edam, several specimens growing on *Fucus*, Sept 1854 (*Suringar*); Den Helder, several epiphytic specimen, Aug. 1891 (*Moll*).

f. *fibrillosa* (Dillw.) Aresch., Phyc. Scand., 1850, p. 52; Rosenvinge, Mar. Alg. of Denm., 1923—1924, p. 422 — *Conferva fibrillosa* Dillwyn, Brit. Conf., 1809, p. 86 — *Polysiphonia fibrillosa* (Dillw.) Grev., ex Smith,

Engl. Fl., 1833, p. 334; Harvey, Phyc. Brit., 1846—1851, t. 302; J. Ag., Sp. Gen., Ord. 2, 3, 1863, p. 991; De Toni, Syll. Alg., 4, 1889—1905, p. 919; Batten, in Journ. Linn. Soc., 46, 1922—1924, p. 300; Lakowitz, Algenfl. Ostsee, 1, 929, p. 343; Taylor, Mar. Alg. N. Am., 1937, p. 364; Kylin, Rhodoph. Schwed. W. Küste, 1944, p. 83.

Thallus reddish brown (more yellowish in sunny places), to ± 4 cm high; branches spreading, clothed with short branchlets (the latter in the Netherlands specimens often nearly perpendicular to the former). Nearly whole thallus corticated, but only in lower part of main axis pericentral cells completely covered by cortical cells. Articulations to ± 2.5 diameter long (resp. diam. 90 — 150μ , length 150 — 350μ) — fig. 7.

Dutch records: Den Helder, where several specimens drifted ashore on *Zostera*, July 1899 (*Weevers*); Goes, Sept. 1942 (probably drifted ashore, *Brakman*).

Distribution: Atlantic shores of Europe, Baltic, Mediterranean (Batten), Long Island to Southern Massachusetts (Taylor).

4. *Polysiphonia denudata*. (Dillw.) Kütz., Sp. Alg., 1849, p. 824, Tab. Phyc. 13, 1863, t. 90; Hoyt in Bull. U. S. Bur. Fisheries 36, 1920, p. 503; Williams in Am. Journ. of Bot. 35, 1948, p. 694 — *Conferva denudata* Dillwyn, Brit. Conf., 1809, p. 85, t. G — *Hutchinsia denudata* Agardh, Sp. Alg. 2, 1828, p. 73 — *Hutchinsia variegata* Agardh, Syst. Alg., 1824, p. 153, Sp. Alg. 2, 1828, p. 81 — *Polysiphonia variegata* (Ag.) Zanardini, Syn., 1841, p. 60; J. Ag., Alg. Med., 1842, p. 129, Sp. Gen., Ord. 2, 3, 1863, p. 1030; Kütz., Sp. Alg., 1849, p. 821, Tab. Phyc. 13, 1863, t. 81; Harvey, Phyc. Brit., 1846—1851, t. 155, van den Bosch in Prodr., 2, 2, 1853, p. 172; Bornet et Thuret, Etud. Phyc., 1878, t. 42; Hauck, Meeresalg., 1885, p. 236; De Toni, Syll. Alg. 4, 1889—1905, p. 922; Falkenberg, Rhodomel., 1901, p. 119; Preda, Fl. Ital. Crypt., 1, 1908, p. 218; Batten in Journ. Linn. Soc., 46, 1922—1924, p. 271; van Goor, Holl. Meeresalg., 1923, p. 32; Taylor, Mar. Alg. N. Am., 1937, p. 370 — *Polysiphonia leptura* Kütz., Sp. Alg., 1849, p. 824, Tab. Phyc., 13, 1863, t. 89 — *Polysiphonia vidovichii* Menegh. ex Kütz., Sp. Alg., 1849, p. 816, Tab. Phyc., 13, 1863, t. 68.

Remarks: Not to be regarded as synonyms of *P. denudata* (Dillw.) Kütz. are: *P. aurantiaca* Kütz., Tab. Phyc., 13, t. 73, which has 4 pericentral cells; *P. gonatophora* Kütz., which also has 4 pericentral cells; so Kützing's statement in Phyc. gener., 1843, p. 426 is right, his statement in Sp. Alg., 1849, p. 826, is wrong; *P. lusitanica* Kütz., Tab. Phyc., 13, 1863, t. 74, has the same structure as *P. denudata* (Dillw.) Kütz., but a quite different habit.

Thallus, purple-reddish brown to 15 cm high, attached by a disc, branched from the base; branching more or less dichotomous; lower branches widely divergent, upper branches more erect. Pericentral cells 5, 6 or 7 (mostly 6); thallus ecorticated or very slightly corticated near the base. Articulations near the base and in the ultimate branches shorter than their breadth (resp. diam. $\pm 290 \mu$, length $\pm 260 \mu$ and diam. $\pm 110 \mu$, length $\pm 95 \mu$), in the principal branches mostly to about three times as long as broad (e.g. length 480μ , breadth 150μ). Sometimes still longer, ± 5 times as long as their breadth (e.g. length 550μ , breadth 100μ) — fig. 3.

Dutch records: Den Helder, numerous specimens were found floating near Nieuwediep, Oct. 1947, Nov. 1947 (*Kristensen*); Schouwen, dike of the south coast, Aug. 1939 (*Bakker*), Aug. 1948 (*Stam*); Walcheren, Arnemuidens kanaal, Aug. 1947; Canal Nieuwland—Arnemuiden, Aug. 1940, Aug. 1941, Aug. 1947 (both *Brakman*); Zuid-Beveland, Goes, Nov. 1846 (*van den Bosch*; Kützing was wrong in regarding these specimens as *P. Richardsoni* Hook.); Goes, Sept. 1947; Kanaal door Zuid-Beveland (canal), Sept. 1941 (both *Brakman*); Ierseke, Sept. 1947 (*Korringa*).

Habitat: On stones, oyster-shells and on *Zostera*. According to Falkenberg, occurring only in polluted waters.

Distribution: Great Britain, Atlantic shores of Belgium, France and Spain, Mediterranean and Adriatic (Batten). Atlantic shores of United States, from Florida to Prince Edward Island (Taylor).

5. *Polysiphonia brodiaei* (Dillw.) Grev. ex Smith, Engl. Fl., 1833, p. 328; Harvey, Phyc. Brit., 1846—1851, t. 95; Kütz., Sp. Alg., 1849, p. 827, Tab. Phyc., 14, 1864, t. 1; J. Ag., Sp., Gen. Ord., 2, 3, 1863, p. 993; Hatice, Meeresalg., 1885, p. 237; De Toni, Syll. Alg. 4, 1889, 1905, p. 947; Prede, Fl. Ital. Crypt., 1, 1908, p. 213; Rosenvinge, Mar. Alg. of Denmark, 1923—1924, p. 430; Batten in Journ. Linn. Soc., 46, 1922—1924, p. 303; Kylin, Rhodoph. Schwed. W. Küste, 1944, p. 84 — *Conferva brodiaei* Dillwyn, Brit. Conf., 1809, t. 107.

Remarks: Not to be regarded as a synonym of *P. brodiaei* (Dillw.) Grev. are *P. callitricha* Kütz., Tab. Phyc., 14, 1864, t. 2, *P. polycarpa* Kütz., Tab. Phyc., 14, 1864, t. 2, *P. polychotoma* Kütz., Sp. Alg., 1849, p. 828; they all have only 4 pericentral cells.

Thallus reddish-brown, to 15 cm high, attached by rhizoids. Main axis (1—1.5 mm thick) and principal branches heavily corticated; 6—8 pericentral cells (mostly 7). Branching irregular. Ramuli forming distinct tufts. Articulations in the ultimate branches mostly broader than their length — fig. 4.

Dutch records: Ierseke, June 1937, on oyster-shell, near low water mark (*Korringa*).

Distribution: England and Atlantic shores of Europe, from Scandinavia as far south as France (Batten, Kylin).

6. *Polysiphonia lanosa* (L.) Tandy in Journ. of Bot., 31, 1931, p. 225; Taylor, Mar. Alg. N. Am., 1937, p. 373 — *Fucus lanosus* L., Syst. Nat., ed. 12, 1767, p. 718 — *Polysiphonia fastigiata* Grev., Fl. Edinensis, 1824, p. 308; Harvey, Phyc. Brit., 1846—1851, t. 299; Kütz., Sp. Alg., 1849, p. 809, Tab. Phyc., 13, 1863, t. 44; *van den Bosch* in Prodr., 2, 2, 1853, p. 173; J. Ag., Sp., Gen. Ord., 2, 3, 1863, p. 1029; Hauck, Meeresalg., 1885, p. 245; De Toni, Syll. Alg. 4, 1889—1905, p. 945; Gibson in Journ. of Bot., 1891, p. 129; Falkenberg, Rhodomel. 1901, p. 149; Batten in Journ. Linn. Soc. 46, 1922—1924, p. 290; *van Goor*, Holl. Meeresalg., 1923, p. 34.

Thallus dark brownish purple, to 5 cm high, attached by rhizoids, penetrating the tissue of the host; branching dichotomous. Pericentral cells 12—24 (often more than 20). All articulations shorter than their breadth. Central cell with thick wall, except in the middle; when focussing on the surface of the filaments the cell-contents may be seen as dark nodules in the wide lumen in the middle of the cell. Every pericentral cell is connected with this central nodulus by a thin, canal-like pit. A

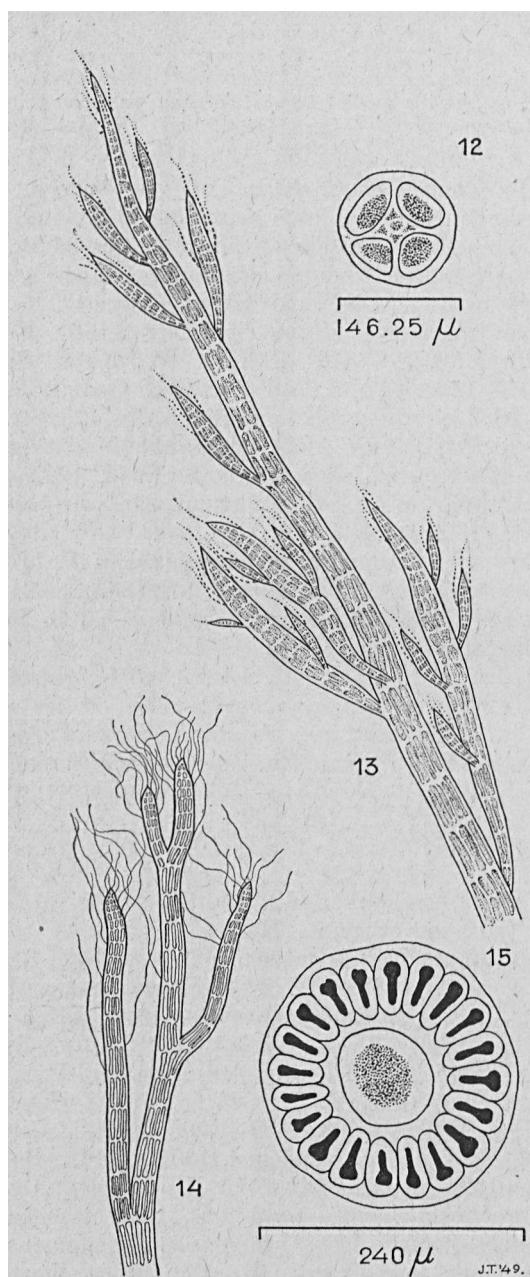


Fig. 12 — *Polysiphonia urceolata* (Lightf.) Grev., transverse section of thallus;
 13 — *P. elongata* (Huds.) Harv., ultimate filament, 50 X; 14 — *P. violacea* (Roth)
 Grev., ultimate filament, 50 X; 15 — *P. nigrescens* (Huds.) Grev., transverse section
 of thallus.

ring-shaped intercellular space often to be seen between central- and pericentral cells at the junction of two articulations.

Dutch records: Delfzijl, April 1885 (*Weber*); Den Helder, May 1895 (*Moll*), April 1908 (*Honing*), April 1916 (*Havinga*), June 1933 (*Zaneweld*), April 1935, Dec. 1936, April 1939, June 1939 (*Zool. Station*); Schouwen, Serooskerke, April 1939, April 1941 (*Viergever*); Noord-Beweland, Kortgene, Febr. 1941 (*Brakman*); Zuid-Beweland, Sept. 1841 (*van den Bosch*); Kattendijke, March 1941 (*Brakman*); Walcheren, Vere, Oct. 1940 (*Brakman*); Arnemuiden, Nov. 1940 (*Brakman*).

Habitat: On *Ascophyllum nodosum*; very rarely on other *Fucales*.

Distribution: England (Batten), Atlantic shores of Belgium, France and Spain (Chalon, 1905), Faeroes (Börgesen). Not to be found in the Baltic (Börgesen in Tandy 1931). Atlantic coasts of N. America, from New Jersey to Prince Edward Island (Taylor).

7. *Polysiphonia nigra* (Huds.) Batters, Cat. Brit. Mar. Alg., 1902, p. 81, Taylor, Mar. Alg. N. Am., 1937, p. 371 — *Conferva nigra* Hudson, Fl. Angl., 1798, p. 595 — *Polysiphonia atrorubescens* (Dillw.) Grev., Fl. Edinensis, 1824, p. 308; Harvey, Phyc. Brit., 1849, t. 172; Kütz., Sp. Alg., 1849, p. 821, Tab. Phyc., 13, 1863, t. 82; van den Bosch in Prodr., 2, 2, 1853, p. 171; J. Ag., Sp. Gen. Ord., 2, 3, 1863, p. 1035; Hauck, Meeresalg., 1885, p. 243; De Toni, Syll. Alg. 4, 1889—1905, p. 938; Rosenvinge, Mar. Alg. of Denm., 1923—1924, p. 435; Batten in Journ. Linn. Soc. 46, 1922—1924, p. 289.

Thallus reddish brown to nearly black, to \pm 15 cm high, attached by rhizoids; main axis and principal branches pseudodichotomously branched. Ultimate filaments fusiform. Pericentral cells 8—13, more or less spirally curved, except to the end of ultimate filaments; thallus ecorticated. Articulations in main branches to 3—4 diameter long (diam. 80—250 μ , length 110—890 μ), sometimes still larger, about 5—6 times as long as broad (e.g. diam. 210 μ , length 1140 μ); becoming shorter in ultimate branches — fig. 8.

Dutch records: Den Helder, May 1869 (coll. unknown), Febr. 1919 (drifted ashore (*van Goor*), May 1919 (*van Goor*), Oosterschelde, March 1843, April 1844 (*van den Bosch*).

Distribution: Atlantic coasts of Europe (Batten) and N. America from Long Island to Northern Massachusetts (Taylor).

8. *Polysiphonia simulans* Harvey, Man. Brit. Mar. Alg., Ed. 2, 1849, p. 89; J. Ag., Sp. Gen. Ord., 2, 3, 1863, p. 1051; De Toni, Syll. Alg. 4, 1889—1905, p. 935; Batten, in Journ. Linn. Soc. 46, 1922—1924, p. 295.

Thallus brownish-red, to 5 cm high, bearing regularly inserted pyramid-shaped tufts; branching pseudo-dichotomous to alternate. Ultimate filaments tapering to the top. Pericentral cells 10—12; diameter of central cell $\frac{1}{4}$ — $\frac{1}{5}$ of filament diameter; thallus ecorticated. Articulations in main axis to about 5 diameters long (e.g. diam. 275 μ , length 1300 μ), in main branches to about twice as long as their breadth (e.g. diam. 162 μ , length 324 μ); in ultimate filaments length of articulations equal to their breadth (e.g. 80 μ \times 80 μ), or shorter than their breadth (near the top) — fig. 9.

Dutch record: Ylieland, May 1891 (*Weber—van Bosse*). Although the articulations of this specimen are longer than those described by Harvey, it seems to be probable that it belongs to this species.

Distribution: England (Batten) and shores of the Channel (Chalon, 1905).

9. *Polysiphonia nigrescens* (Huds.) Grev., ex Smith, Engl. Fl., 1833, p. 332; Harvey, Phyc. Brit., 1846—1851, t. 277; Kütz., Sp. Alg., 1849, p. 813, Tab. Phyc., 13, 1863, t. 56; van den Bosch in Prodr., 2, 2, 1853, p. 172 (incl. syn.); J. Ag., Sp., Gen., Ord., 2, 3, 1863, p. 1057; Hauck, Meeresalg., 1885, p. 244; De Toni, Syll. Alg. 4, 1889—1905, p. 940; Falkenberg, Rhodomel., 1901, p. 129; Rosenvinge, Mar. Alg. of Denm., 1923—1924, p. 439; Batten in Journ. Linn. Soc., 46, 1922—1924, p. 306; van Goor, Holl. Meeresalg., 1923, p. 33; Lakowitz, Algenfl. Ostsee, 1929, p. 344; Taylor, Mar. Alg., N. Am., 1937, p. 371, Kylin, Rhodoph. Schwed. W. Küste, 1944, p. 84 — *Conferva nigrescens* Hudson, Fl. Engl. p. 602 (not seen) — *Polysiphonia dichocephala* Kütz., Tab. Phyc., 13, 1863, t. 53 — *Polysiphonia lophura* Kütz., ibid., t. 52 — *Polysiphonia regularis* Kütz., ibid., t. 51 — *Polysiphonia sentosa* Kütz., ibid., t. 51 — *Polysiphonia violascens* Kütz., ibid., t. 54.

Thallus purple to black, to 25 cm high, attached by rhizoids; base of main axis disc-like. Branching alternate (sometimes very regularly); tufts sometimes more or less pyramid-shaped, often more or less corymbose. Ultimate filaments tapering to the top. Pericentral cells sometimes slightly spirally curved, only in large plants surrounded by cortical cells near thallus base. Pericentral cells (in older parts of thallus more numerous than in younger ones) 12—20; diameter of central cell $\frac{1}{3}$ — $\frac{2}{5}$ of filament diameter. Articulations about as long as broad near thallus base, becoming longer in upper parts, (to 5 diameters long; e.g. diameter \pm 300 μ , length \pm 1500 μ); articulations near the end of ultimate filaments shorter than their breadth — fig. 11, 15.

Dutch records: Dijkshoek, May 1852; Holwerd, May 1852 (both *Spree*); Terschelling, S. of Midstrand, July 1947 (*Koster*); Oosterend, June 1949 (*Lucas*); West Terschelling, harbour, Aug. 1949 (*Lucas*); Texel, Nov. 1884 (*Weber-van Bosse*); Texel, harbour Oudeschild, April 1949 (*Veldkamp*); Den Helder, June 1886 (*Weber-van Bosse*), Aug. 1897 (coll. unknown), Aug. 1897 (*Bonnema*), April 1898 (*Resink*), July 1899 (*Weevers*), July 1904 (*Geerts*), Nov. 1909 (*Stomps*), May 1930 (*Lamjouw*), May 1931 (*Sobels*), June 1939 (*Vervoort*), July 1939 (*Koster*), Dec. 1948 (*den Hartog*), June 1948 (*Lucas*), Febr. 1949 (*Swennen, den Hartog*), March 1949 (*den Hartog*); Medemblik, Aug. 1905 (coll. unknown); Enkhuizen, July 1905 (coll. unknown); Hoorn-Edam, Sept. 1854 (*Suringar*); Monnikendam, July 1905 (coll. unknown); IJmuiden, June 1884 (*Weber-van Bosse*); Hock van Holland, Febr. 1938 (*Vervoort*), July 1947 (*Koster*), Oct. 1949 (*Lucas*); Schouwen, Scharendijke, April 1939; Westerschouwen, April 1939, Zierikzee, April 1939 (*Vervoort*); Burgsluis, June 1949 (*Hoogland*); Bergen op Zoom, Nov. 1943 (*Maas Geesteranus*); Oosterschelde, March 1843, April 1844, May 1845, May 1847; Zandkreek, April 1842, May 1844, June 1845; Zuid-Beveland, Terschendamme, Sept. 1841 (all *van den Bosch*); Kanaal door Zuid-Beveland (canal), Sept. 1941, Dec. 1941 (*Brakman*).

Though most of the Dutch material seems to belong to f. *fucoides* (Huds.) Harv., it is evident that f. *flaccida* Aresch. and f. *affinis* (Moore) Harv. are among the specimens collected by Spree (Holwerd, 1852).

Distribution: Atlantic shores of Europe (Batten) and of N. America from South Carolina to Prince Edward Island (Taylor).