

The marine brown algae of the East Aegean Sea and Dardanelles

II. Ectocarpaceae, Chordariaceae and Scytosiphonaceae

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Abstract – This paper reports 31 species of Phaeophyceae (1 Ectocarpaceae, 24 Chordariaceae and 6 Scytosiphonaceae) from the Dardanelles and the Aegean coast of Turkey. Four species are reported for the first time from the coast of Turkey and the Aegean Sea: *Kuckuckia spinosa* (Kützinger) Kornmann, *Botrytella micromora* Bory, *Petrospongium* sp. and *Hecatonema terminale* (Kützinger) Kylin. Notes on geographical distribution, morphology and ecology are given for each species.

Aegean Sea / brown algae / Phaeophyceae / Turkey

Résumé – **Algues brunes marines de la mer Égée Est et des Dardanelles. II. Ectocarpaceae, Chordariaceae et Scytosiphonaceae.** Cet article énumère 31 espèces de Phaeophyceae (1 Ectocarpaceae, 24 Chordariaceae et 6 Scytosiphonaceae) des Dardanelles et la côte Égéenne de Turquie. Quatre espèces sont signalées pour la première fois pour la côte de Turquie et de la Mer Égée : *Kuckuckia spinosa* (Kützinger) Kornmann, *Botrytella micromora* Bory, *Petrospongium* sp. et *Hecatonema terminale* (Kützinger) Kylin. Pour chaque espèce l'auteur précise la distribution géographique, la morphologie et l'écologie.

Algues brunes / Algues marines / Mer Égée / Phaeophyceae / Turquie

INTRODUCTION

Turkey has four coastal regions with different physical characteristics: the Black Sea coast, the coast of the Sea of Marmara, the Aegean coast and the Mediterranean coast. The diversity and abundance of marine brown algae is greater in the Aegean Sea and the Sea of Marmara than in the Turkish part of the Mediterranean Sea or in the Black Sea (Taskin *et al.*, 2008). Several studies have been made on marine brown algae from Turkey (see Taskin *et al.*, 2007b; Taskin & Ozturk, 2007).

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The present paper is the second part of a survey of marine brown algae from the Dardanelles and the Aegean coast of Turkey, the first one being Taskin & Ozturk (2007) which included 33 taxa of brown algae (20 Ectocarpaceae, 1 Pylaiellaceae, 9 Chordariaceae, 2 Elachistaceae and 1 Giraudiaceae). In the present paper 31 taxa are reported: 1 Ectocarpaceae, 24 Chordariaceae s.l. (1 Sorocarpaceae, 5 Corynophlaeaceae, 3 Myrionemataceae, 1 Myriotrichiaceae, 7 Punctariaceae, 4 Spermatochnaceae, 3 Striariaceae) and 6 Scytosiphonaceae. Four of these – *Kuckuckia spinosa* (Kützinger) Kornmann, *Botrytella micromora* Bory, *Petrospongium* sp. and *Hecatonema terminale* (Kützinger) Kylin are reported for the first time from Turkey.

MATERIAL AND METHODS

Samples were collected by snorkeling and SCUBA-diving from seven sites located between the Dardanelles (40° 11'N and 26° 21'E) and Ayvalik (39° 19'N - 26° 41'E) during 2002-2004 (Taskin & Ozturk, 2007: fig. 1). Specimens were preserved in 4% formaldehyde in sea water. Voucher specimens were deposited in the Botanic Garden and Herbarium Center, Ege University (Izmir) (EGE). Samples were studied using a Nikon SE light microscope, and photographs were taken with an Olympus PM-C35 camera mounted on an Olympus BX 50 microscope. For each species the phytogeographic affinity is given in brackets according to Furnari *et al.* (1999), using the following abbreviations: Boreo-Tropical Atlantic (BTA); Boreo-Atlantic (BA); Cosmopolite (C); Indo-Atlantic (IA); Subcosmopolitan (SC); Mediterranean Sea (M); Atlanto-Pacific temperate (AP); Circum boreo-austral (CBA); and Circumboreal (CB).

RESULTS

PHAEOPHYCEAE

ECTOCARPACEAE C. Agardh

Kuckuckia Hamel

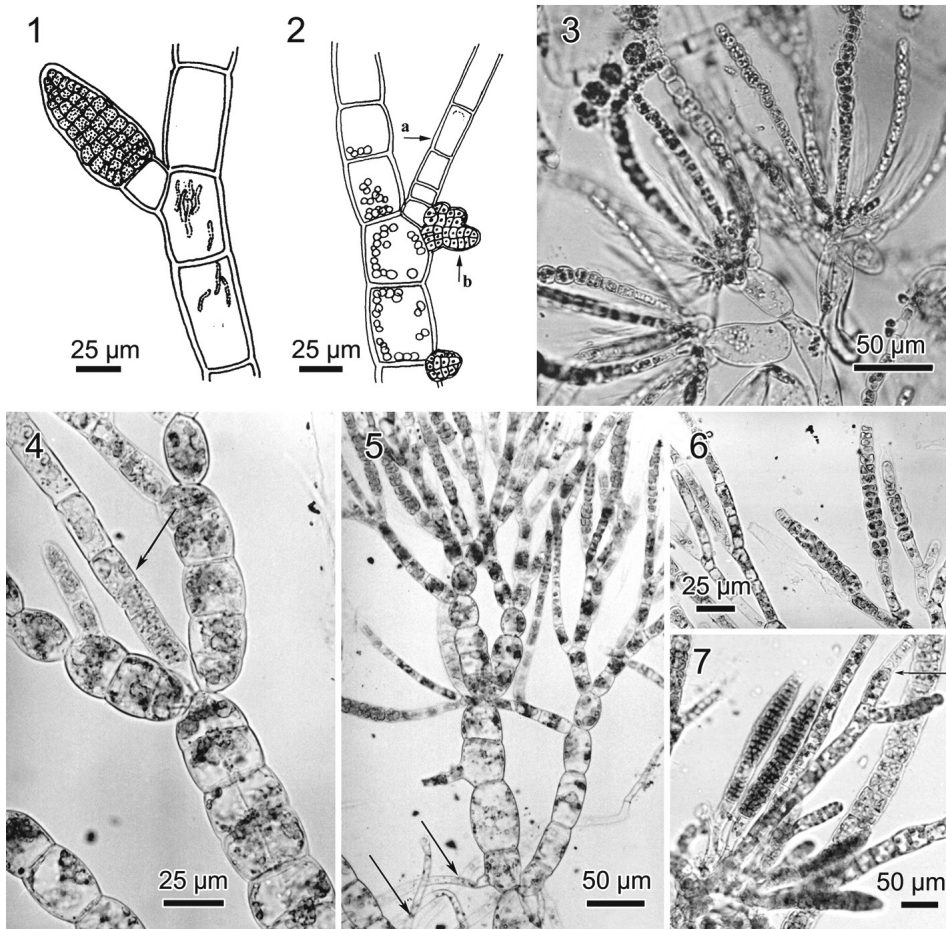
Kuckuckia spinosa (Kützinger) Kornmann *in* Kuckuck 1958: 172 (Fig. 1)

Thallus erect, filamentous, 1-3 cm long. Cells 30-45 µm wide, 40-50 µm long, with ribbon-shaped chloroplasts. Sporangia plurilocular, conical or cylindrical, 20-30 µm wide and 60-100 µm long, sessile or provided with 1-2 pedicells, lateral or terminal on branchlets. True hairs lateral or terminal, 12-15 µm in diameter. Collected at 1 m depth as an epiphyte on *Dictyota dichotoma* (Hudson) Lamouroux and other large algae.

Voucher: Ayvalik, 24.v.2003, Ergun Taskin (ET), EGE 41063.

Distribution: NE Atlantic Ocean (Cardinal, 1964; Bartsch & Kuhlenkamp, 2000; Haroun *et al.*, 2002), Western Atlantic (Wynne, 2005), Southern Australia (Clayton, 1974; Womersley, 1987) and Mediterranean Sea (Turkey: this study; Spain, France, Italy, Greece, Sicily, Corsica and Algeria: Ribera *et al.*, 1992). [CBA].

Note: Cardinal (1964) recognized two species of *Kuckuckia*: *K. spinosa* and *K. kylinii* Cardinal. However Pedersen (1989) interpreted *K. kylinii* as a juvenile



Figs 1-7. 1. *Kuckuckia spinosa*, plurilocular sporangium. 2. *Botrytella micromora*, phaeophycean hair (a) and clustered plurilocular sporangia on the main axes (b). 3. *Microcoryne ocellata*, medullary filaments and paraphyses. 4. *Petrospongium* sp., phaeophycean hair (arrow). 5. *Petrospongium* sp., erect filaments and rhizoids (arrows). 6. *Petrospongium* sp., plurilocular sporangia. 7. *Hecatonema terminale*, plurilocular sporangia and phaeophycean hair (arrow).

form of *K. spinosa*. The genus *Kuckuckia* resembles *Ectocarpus* in its morphology and ribbon-shaped chloroplasts, but differs from it in the presence of lateral and terminal true hairs. Unilocular sporangia on erect filaments were reported by Kuckuck (1958, fig. 2S) and Womersley (1987). Unilocular sporangia were not observed in the specimens from Turkey.

CHORDARIACEAE Greville

Botrytella Bory

Botrytella micromora Bory 1822: 426

(Fig. 2)

Thallus erect, filamentous, 2-3 cm long. Cells in the middle part of the main filaments (60-) 70-75 µm long and 40-50 µm wide. Cells with several discoid

chloroplasts, 4-5 µm in diameter. Plurilocular sporangia ovoid to conical, 20-40 µm long and 15-20 µm wide, clustered in the terminal parts of the laterals. Branching usually scarce. Lateral and terminal true phaeophyceyan hairs 12-15 µm in diameter. Collected at 0.5-1 m depth as an epiphyte on *Zostera* spp.

Voucher: Canakkale, 28.iv.2002, ET, EGE 41062.

Distribution: NE Atlantic Ocean (Lund, 1959; Rosenvinge & Lund, 1941; Kornmann & Sahling, 1983, Nielsen *et al.*, 1995; Athanasiadis, 1996; Bartsch & Kuhlenkamp 2000; Hardy & Guiry, 2003), Pacific Ocean (Yoshida *et al.*, 1990), Western Atlantic (Wynne, 2005), Southern Australia (Clayton, 1974; Womersley, 1987) and Mediterranean Sea (Turkey: this study; Greece: Gerloff & Geissler, 1974 and Haritonidis & Tsekos, 1976 as *Sorocarpus micromorus* (Bory de Saint-Vincent) P.C. Silva). [AP].

Note: Curiel *et al.* (1999) reported the genus *Sorocarpus* (a synonym of *Botryella*) in the Mediterranean Sea for the first time, stating that their newly recorded taxon was neither *Sorocarpus reinboldii* (Reinke) Kornmann *et* Sahling nor *S. micromorus* (Bory) P.C. Silva, and that it resembled *Sorocarpus* sp. (Form A) in Kornmann & Sahling (1984).

Corynophlaea Kützing

Corynophlaea umbellata (C. Agardh) Kützing 1843: 331

Collected at all sites throughout the year; epiphytic on *Cystoseira* spp. at 1-2 m depth; abundant. Thallus 1-3 mm across, spherical, gelatinous, light or dark brown, paraphyses erect, 4-7 (-10) cells long, phaeophyceyan hairs common.

Voucher: Canakkale, 21.v.2003, ET, EGE 41033.

Distribution: only in the Mediterranean Sea (Turkey: Ribera *et al.*, 1992 and Ozturk, 1993; Spain, France, Adriatic Sea, Italy and Black Sea: Ribera *et al.*, 1992). [M].

Note: This Mediterranean species was also recorded as an introduced species from the NE Atlantic by Fletcher & Farrell (1999), and more recently also from the Atlantic coast of Morocco by Benhissoune *et al.* (2002). Taskin (2006) published the first record from the Mediterranean Sea of *Corynophlaea crispa* (Harvey) Kuckuck collected from the Aegean coast of Turkey, which differs from *C. umbellata* in its long (9-18 cells), recurved paraphyses.

Microcoryne Strömfelt

Microcoryne ocellata Strömfelt 1888: 382

(Fig. 3)

Collected at Eceabat, Canakkale and Ayvalik; found from March to June; epiphytic on the leaves of *Zostera* spp. at 0-2 m depth. Thallus erect and finger-like, 3-5 mm long, 2-3 mm wide, soft and gelatinous, paraphyses simple, curved, pigmented, 10-15 (-18) cells long, plurilocular sporangia uniseriate, unilocular sporangia not observed, phaeophyceyan hairs present.

Voucher: Canakkale, 20.iii.2003, ET, EGE 41035.

Distribution: NE Atlantic Ocean (Parke & Dixon, 1976; Fletcher, 1987; Athanasiadis, 1996; Haroun *et al.*, 2002) and Mediterranean Sea (Turkey: Aysel *et al.*, 1993 and Taskin *et al.*, 2007a; Italy: Furnari *et al.*, 2003). [BA].

Myriactula Kuntze

Myriactula arabica (Kützing) Feldmann 1937: 276

Collected at Canakkale and Ayvalik; found from March to April; epiphytic on *Cystoseira* spp. at 0-2 m depth. Thallus 2-3 mm across, gelatinous,

plurilocular sporangia uniseriate, 80-90 μm long and 6-8 μm broad, unilocular sporangia not observed, phaeophycean hairs present. This species differs from *Myriactula rivulariae* (Suhr) Feldmann in its cylindrical paraphyses.

Voucher: Canakkale, 28.iv.2002, ET, EGE 41036.

Distribution: Atlantic Ocean (Benhissoune *et al.*, 2002), Indian Ocean (Silva *et al.*, 1996), Australia (Womersley, 1987) and Mediterranean Sea (Turkey: Ozturk, 1993; Italy, Algeria and Black Sea: Ribera *et al.*, 1992). [AP].

***Myriactula rivulariae* (Suhr) Feldmann 1937: 274**

Collected at all sites; found from March to July; epiphytic on *Cystoseira* spp. at 0-2 m depth. Thallus 2-3 mm across, gelatinous, paraphyses fusiform, to 400 μm long, plurilocular sporangia uniseriate, borne at the base of paraphyses, 100 μm long and 6.5-8 μm broad, unilocular sporangia not observed, phaeophycean hairs present and 10 μm broad. *M. rivulariae* differs from *M. arabica* in its fusiform paraphyses.

Voucher: Canakkale, 21.vi.2003, ET, EGE 41037.

Distribution: NE Atlantic Ocean (Fletcher, 1987; Rindi & Guiry, 2004) and Mediterranean Sea (Turkey: Ribera *et al.*, 1992 and Ozturk, 1993; Spain, France, Corsica, Italy, Sicily, Adriatic Sea, Greece, Algeria and Black Sea: Ribera *et al.*, 1992). [BA].

***Petrospongium* Nägeli ex Kützing**

***Petrospongium* sp.**

(Figs 4-6)

Collected at Ayvalik (Aegean Sea, Turkey) at 1-2 m depth on calcareous worm tubes in March. Thallus globose, 4-5 mm in diameter, spongy, light brown, filaments dichotomously branched. Medullary filaments consisting of barrel-shaped cells, 50-70 μm long, 25-30 μm broad and containing rhizoids. Assimilatory filaments consisting of pigmented cells. Phaeophycean hairs present, 11-12 μm broad. Plurilocular sporangia common, biseriate, cylindrical, terminal and lateral on erect filaments, 50-80 μm long and 10 μm broad, 1-4 celled stalks. Unilocular sporangia not observed.

Voucher: Ayvalik, 22.iii.2002, ET, EGE 41034.

Distributed in the Mediterranean Sea: Aegean Sea and Turkey (this study). [M].

Note: These specimens differ from *Petrospongium berkeleyi* (Greville) Nägeli ex Kützing in the cell-shape of the terminal filaments (cylindrical in the specimens from Turkey vs. barrel-shaped in *P. berkeleyi*) (Fletcher, 1987, fig. 33). The specimens from Turkey differ from *Cylindrocarpus microscopicus* P.L. Crouan *et* H.M. Crouan (1851) in the dichotomous branching (Oltmanns, 1922).

***Myrionema* Greville**

***Myrionema orbiculare* J. Agardh 1848: 48**

Collected at all sites; found throughout the year; epiphytic on the leaves of *Zostera* spp. and *Posidonia oceanica* (Linnaeus) Delile at 0.5-2 m depth. Thallus discoid, 0.5-1 mm in diameter, monostromatic, erect filaments uniseriate, 50-100 μm long, cells containing discoid chloroplasts, phaeophycean hairs present, ascocysts common, plurilocular sporangia 70-100 μm long, 5-7 μm broad, uniseriate, sometimes biseriate.

Voucher: Canakkale, 21.v.2003, ET, EGE 41038.

Distribution: NE Atlantic Ocean (Haroun *et al.*, 2002), Pacific Ocean (Yoshida *et al.*, 1990), Indian Ocean (Silva *et al.*, 1996 as *Ascocylus orbicularis* (J. Agardh) Kjellman) and common in the Mediterranean Sea (Ribera *et al.*, 1992). [SC].

Note: Although Ribera *et al.* (1992) treated *Myrionema magnusii* (Sauvageau) Loiseaux as a taxonomic synonym of *M. orbiculare* J. Agardh, Loiseaux's (1967) criteria for distinguishing between the two species are accepted here. *Myrionema orbiculare* is widely distributed in the Mediterranean and typically grows epiphytically on *Posidonia*, while *M. magnusii* is a NW Atlantic species (M. J. Wynne, pers. comm.).

***Myrionema strangulans* Greville 1828: 300**

Collected at all sites; found from November to August; epiphytic on *Ulva* at 0-1 m depth. Thallus discoid, 1-2 mm across, monostromatic, erect filaments uniseriate, cells containing discoid chloroplasts, phaeophycean hairs present, unilocular sporangia abundant, pyriform, 60 µm long, 20 µm broad, plurilocular sporangia uniseriate.

Voucher: Canakkale, 20.vi.2003, ET, EGE 41039.

Distribution: NE Atlantic Ocean (Fletcher, 1987; Pankow, 1990; Coppejans, 1995; Athanasiadis, 1996; Bartsch & Kuhlenkamp, 2000; Haroun *et al.*, 2002; Benhissoune *et al.*, 2002; Hardy & Guiry, 2003; Rindi & Guiry, 2004), W Atlantic Ocean (Wynne, 2005), Pacific Ocean (Abbott & Hollenberg, 1976), Indian Ocean (Silva *et al.*, 1996), Australia (Womersley, 1987), Arctic Ocean (Lindstrom, 2001) and common in the Mediterranean Sea (Ribera *et al.*, 1992). [C].

***Protectocarpus* Kornmann in Kuckuck**

***Protectocarpus speciosus* (Børgesen) Kornmann in Kuckuck 1955: 120**

Collected at Eceabat and Canakkale; found from January to October; epiphytic on *Zostera* spp., *Posidona oceanica* leaves and *Cladophora* sp. at 0-2 m depth. Thallus minute, a few mm in diameter, filamentous, cells of erect filaments 15-20 µm long and 6-8 µm broad, usually unilaterally branched, plurilocular sporangia abundant, sessile or stalked, 170-180 µm long, 10-15 µm broad, unilocular sporangia borne on the base of erect filaments, 50 µm long and 20 µm broad.

Voucher: Canakkale, 21.iii.2002, ET, EGE 41040.

Distribution: NE Atlantic Ocean (Børgesen, 1902 as *Myrionema speciosum* Børgesen; Cardinal, 1964; Fletcher, 1987; Athanasiadis, 1996; Bartsch & Kuhlenkamp, 2000; Haroun *et al.*, 2002; Hardy & Guiry 2003; Rindi & Guiry, 2004), W Atlantic Ocean (Wynne, 2005), Pacific Ocean (Yoshida *et al.*, 1990), Indian Ocean (Silva *et al.*, 1996) and Mediterranean Sea (Turkey: Aysel *et al.*, 1993; Black Sea: Ribera *et al.*, 1992). [IA].

***Myriotrichia* Harvey**

***Myriotrichia clavaeformis* Harvey 1834: 300**

Collected at Eceabat and Canakkale; found from March to May; epiphytic on *Liebmannia leveillei* J. Agardh at 0-4 m depth. Thallus filamentous, uniseriate (in young thalli), multiseriate (in old thalli), cells of erect filaments containing discoid chloroplasts, phaeophycean hairs present, plurilocular sporangia uniseriate, clustered, 5-6 loculi, 20 µm long and 8-10 µm broad.

Voucher: Canakkale, 18.v.2002, ET, EGE 41041.

Distribution: NE Atlantic Ocean (Fletcher, 1987; Athanasiadis, 1996; Haroun *et al.*, 2002; Hardy & Guiry, 2003; Rindi & Guiry, 2004), W Atlantic Ocean (Wynne, 2005), Australia (Womersley, 1987) and Mediterranean Sea (Turkey: Aysel *et al.*,

1993; Corsica, Greece, Tunisia, Italy, Adriatic Sea and Black Sea: Ribera *et al.*, 1992). [CBA].

Note: In this study, the life stage *Streblonema sphaericum* (Derbés et Solier) Thuret was observed as an endophyte in *Cladosiphon* spp.

Asperococcus J.V. Lamouroux

Asperococcus bullosus J.V. Lamouroux 1813: 277

Collected at Canakkale and Ayvalik; found from March to May; epiphytic on *Posidonia oceanica* at 5-10 m depth. Thallus erect, bulbous, brownish, phaeophyceae hairs present, unilocular sporangia abundant, 40-50 µm in diameter.

Voucher: Ayvalik, 25.iv.2003, ET, EGE 41042.

Distribution: NE Atlantic (Fletcher, 1987 as *A. turneri*; Athanasiadis, 1996; Haroun *et al.*, 2002 as *A. turneri*; Benhissoune *et al.*, 2002; Hardy & Guiry, 2003; Rindi & Guiry, 2004), Pacific Ocean (Yoshida *et al.*, 1990), Indian Ocean (Silva *et al.*, 1996), Australia (Womersley, 1987) and common in the Mediterranean Sea (Ribera *et al.*, 1992, including *A. bullosus* f. *profundus* J. Feldmann). [SC].

Asperococcus ensiformis (Delle Chiaje) M.J. Wynne 2003: 474

Collected at Eceabat, Canakkale and Ayvalik; found from March to April; epiphytic on *Cystoseira barbata* (Stackhouse) C. Agardh at 1-3 m depth. Thallus erect, dorso-ventrally compressed, 30-40 cm long, 1-3 cm broad, phaeophycean hairs present, unilocular sporangia 30-35 µm in diameter.

Voucher: Canakkale, 27.iv.2002, ET, EGE 41043.

Distribution: NE Atlantic Ocean (Fletcher, 1987 as *A. compressus*; Coppejans, 1995 as *A. compressus*; Benhissoune *et al.*, 2002 as *A. compressus*), Australia (Womersley, 1987 as *A. compressus*) and Mediterranean Sea (Turkey: Ribera *et al.*, 1992 as *A. compressus*, and Ozturk, 1996; Spain, France, Corsica, Italy and Adriatic Sea: Ribera *et al.*, 1992, as *A. compressus*). [CBA].

Asperococcus fistulosus (Hudson) W.J. Hooker 1833: 277

Collected at Canakkale and Ayvalik; found from March to June; epilithic at 0-3 m depth. Thallus erect, cylindrical 10-20 cm long, 3-5 mm broad, phaeophycean hairs present, plurilocular sporangia not observed.

Voucher: Ayvalik, 24.v.2003, ET, EGE 41044.

Distribution: NE Atlantic Ocean (Fletcher, 1987; Athanasiadis, 1996; Bartsch & Kuhlenskamp, 2000; Haroun *et al.*, 2002; Hardy & Guiry, 2003; Rindi & Guiry, 2004), W Atlantic Ocean (Wynne, 2005), Australia (Womersley, 1987) and Mediterranean Sea (Turkey: Ribera *et al.*, 1992, Ozturk, 1996, Taskin *et al.*, 2003; Corsica, Italy, Adriatic Sea and Greece: Ribera *et al.*, 1992). [BTA].

Hecatonema Sauvageau

Hecatonema terminale (Kützinger) Kylin 1937: 8-9

(Fig. 7)

Thalli epiphytic on *Zostera* spp. at 1-2 m depth, composed of branched filaments, basal layer monostromatic sometimes distromatic. Erect filaments uniseriate or sometimes biseriata, cells 10-15 µm broad, each cell containing discoid plastids with pyrenoids. Phaeophycean hairs with a basal sheath present, usually terminal on erect filaments, 8-12 µm broad. Plurilocular sporangia common, multiseriate, terminal on both erect filaments and the basal layer, 100-110 µm long and 12-18 µm broad with 20-25 loculi. Unilocular sporangia not observed. Collected at Eceabat and Canakkale, from March to June.

Voucher: Eceabat (Canakkale), 22.v.2003, ET, EGE 41045.

Distribution: NE Atlantic Ocean (Cardinal, 1964; Fletcher, 1987 as *H. maculans*; Haroun *et al.*, 2002; Hardy & Guiry, 2003), W Atlantic Ocean (Wynne, 2005), Pacific Ocean (Yoshida *et al.*, 1990), Australia (Womersley, 1987 as *H. maculans*) and Mediterranean Sea (Aegean Sea and Turkey: this study; Corsica and Sicily: Ribera *et al.*, 1992, as *H. maculans*). [CBA].

Note: This taxon is probably a microthallus in the life histories of *Punctaria* or *Asperococcus* (Clayton, 1974; Pedersen, 1984).

Punctaria Greville

Punctaria latifolia Greville 1830: 52

Collected at Eceabat, Canakkale and Ayvalik; found from November to July; epiphytic on *Posedonia oceanica* and epilithic at 0-3 m depth. Thallus erect, soft and flaccid, 15-25 cm long, 2-5 cm broad, olive green to brownish, dorsiventral flattened, surface cells containing discoid chloroplasts, phaeophycean hairs abundant, blades 100-150 µm thick in transverse section (2-4 layers of cells).

Voucher: Eceabat (Canakkale), 27.iv.2002, ET, EGE 41046.

Distribution: NE Atlantic Ocean (Fletcher, 1987; Coppejans, 1995; Athanasiadis, 1996; Bartsch & Kuhlenkamp, 2000; Hardy & Guiry, 2003; Rindi & Guiry, 2004), W Atlantic Ocean (Wynne, 2005), Pacific Ocean (Yoshida *et al.*, 1990), Australia (Womersley, 1987) and common in the Mediterranean Sea (Ribera *et al.*, 1992). [CBA].

Punctaria plantaginea (Roth) Greville 1830: 53

Collected at Eceabat; found in May; epiphytic on *Posidonia oceanica* and epilithic at 1-2 m depth. Thallus erect, firm and subcoriaceous, 10-15 cm long, 1-3 cm broad and blades ca. 260 µm thick in transverse section (6-8 cells).

Voucher: Eceabat (Canakkale), 22.v.2003, ET, EGE 41047.

Distribution: NE Atlantic Ocean (Fletcher, 1987; Athanasiadis, 1996; Bartsch & Kuhlenkamp, 2000; Hardy & Guiry, 2003), W Atlantic Ocean (Wynne, 2005), Pacific Ocean (Yoshida *et al.*, 1990), Arctic Ocean (Lindstrom, 2001) and Mediterranean Sea (Turkey: Aysel *et al.*, 1993; Black Sea: Ribera *et al.*, 1992). [AP].

Punctaria tenuissima (C. Agardh) Greville 1830: xlii, 54

Collected at Eceabat; found in May; epiphytic on *P. oceanica* and epilithic at 0.5-2 m depth. Thallus erect, soft and flaccid, ribbon shaped, 5-15 mm width, 2-4 cells in thickness and in transverse section blades 60-100 µm thick.

Voucher: Eceabat (Canakkale), 22.v.2003, ET, EGE 41048.

Distribution: NE Atlantic Ocean (Fletcher, 1987; Athanasiadis, 1996; Bartsch & Kuhlenkamp, 2000; Hardy & Guiry, 2003), W Atlantic Ocean (Wynne, 2005), Indian Ocean (Silva *et al.*, 1996), Arctic Ocean (Lindstrom, 2001) and Mediterranean Sea (Turkey: Aysel *et al.*, 2004; France and Black Sea: Ribera *et al.*, 1992). [CB].

Nemacystus Derbès et Solier

Nemacystus flexuosus (C. Agardh) Kylin var. *giraudyi* (J. Agardh) de Jong *in de Jong et Prud'homme van Reine* 1997: 15

Collected at Eceabat, Canakkale, Assos and Ayvalik; found from January to May and October; epiphytic on other algae at 1-3 m depth. Thallus haplostichous, 5-20 cm long, 0.5-2 mm broad, light to dark brown, gelatinous,

phaeophycean hairs present, unilocular sporangia 60-65 µm long, 30-35 µm broad, plurilocular sporangia cylindrical, uniseriate with 15-20 loculi, 50 µm long, 10 µm broad.

Voucher: Canakkale, 21.v.2003, ET, EGE 41055.

Distribution in the Mediterranean Sea: Turkey: Ribera *et al.*, 1992 as *Nemacystus flexuosus* (C. Agardh) Kylin; Ozturk, 1993 as *Nemacystus ramulosus* Derbés et Solier; Spain, France, Corsica, Italy, Sicily, Adriatic Sea, Greece and Tunisia: Ribera *et al.*, 1992 as *Nemacystus flexuosus*. [M].

Note: De Jong & Prud'homme van Reine (1997) reported *N. flexuosus* var. *giraudyi* only from the Mediterranean Sea.

Spermatochnus Kützing

Spermatochnus paradoxus (Roth) Kützing 1843: 96

Collected at Ayvalik; found from March to May; epiphytic on *Cystoseira* spp. at 1-2 m depth. Thallus haplostichous, 15-20 cm long, 1-2 mm broad, cylindrical, light brown, gelatinous, phaeophycean hairs present, unilocular sporangia 50-60 µm long, 25-30 µm broad, plurilocular sporangia not observed.

Voucher: Ayvalik, 24.v.2003, ET, EGE 41056.

Distribution: NE Atlantic Ocean (Athanasiadis, 1996; Hardy & Guiry, 2003), Australia (Womersley, 1987) and common in the Mediterranean Sea (Ribera *et al.*, 1992). [AP].

Stilophora J. Agardh

Stilophora nodulosa (C. Agardh) P.C. Silva in Silva *et al.* 1996: 929

Collected at Canakkale; found from April to May; epiphytic on *Cystoseira* spp. at 1-2 m depth. Thallus haplostichous, 5-10 cm long, 0.5-1 (-2) mm broad, cylindrical, dark brown, gelatinous, covered by tufts of secondary assimilatory filaments.

Voucher: Canakkale, 21.v.2003, ET, EGE 41057.

Distribution: NE Atlantic Ocean (Parke & Dixon, 1976 as *Stilophora tuberculata* (Hornemann) Reinke), Mediterranean Sea (Turkey: Aysel & Erdugan, 1995 as *Stilophora tuberculosa* Reinke; Black Sea: Ribera *et al.*, 1992 as *Stilophora tuberculosa*). [BA].

Stilophora tenella (Esper) P.C. Silva in Silva *et al.*, 1996: 624

Collected at all sites; found from January to July; epiphytic on *Cystoseira* spp. at 1-3 m depth. Thallus haplostichous, 5-15 cm long, 0.5-2 mm broad, cylindrical, light brownish, gelatinous, tufts of secondary assimilatory filaments sparse with each cell containing several discoid chloroplasts, phaeophycean hairs present, unilocular and plurilocular sporangia borne on the secondary assimilatory filaments, unilocular sporangia oval, plurilocular sporangia uniseriate.

Voucher: Canakkale, 21.v.2003, ET, EGE 41058.

Distribution: NE Atlantic Ocean (Parke & Dixon, 1976 as *Stilophora rhizodes* (C. Agardh) J. Agardh; Haroun *et al.*, 2002; Hardy & Guiry, 2003), W Atlantic Ocean (Wynne, 2005), Indian Ocean (Silva *et al.*, 1996) and common in the Mediterranean Sea (Ribera *et al.*, 1992 as *Stilophora rhizodes*). [SC].

Note: *Stilophora tenella* (Esper) P.C. Silva differs from *S. nodulosa* in its sparse sori, which are never completely confluent (as opposed to completely confluent in *S. nodulosa*).

Stictyosiphon Kützing***Stictyosiphon adriaticus*** Kützing 1843: 301

Collected at Eceabat, Canakkale and Ayvalik; found from March to June; epilithic at 1-4 m depth. Thallus polystichous, terete, tubulose, light brown, 15-20 cm long, 1-3 mm broad, generally with opposite branches, phaeophycean hairs present.

Voucher: Ayvalik, 24.iv.2003, ET, EGE 41059.**Distribution:** Common in the Mediterranean Sea (Ribera *et al.*, 1992). [M].**Note:** *Phaeostroma bertholdii* Kuckuck was found as an epiphyte on this species (Taskin & Ozturk, 2007).***Stictyosiphon soriferus*** (Reinke) Rosenvinge in Rosenvinge *et* Lund 1935: 9

Collected at Eceabat and Canakkale; found from April to May; epilithic at 1-2 m depth. Thallus polystichous, 5-10 cm long, light brown, phaeophycean hairs present, apical portion of branches uniseriate with a terminal phaeophycean hair, plurilocular sporangia formed by subdivision of one or a small group of cortical cells.

Voucher: Eceabat (Canakkale), 18.v.2002, ET, EGE 41060.**Distribution:** NE Atlantic Ocean (Coppejans, 1995; Athanasiadis, 1996; Bartsch & Kuhlenkamp, 2000; Hardy & Guiry, 2003), Pacific Ocean (Yoshida *et al.*, 1990 as *Kjellmania arasakii* Yamada), Australia (Womersley, 1987) and Mediterranean Sea (Turkey: Aysel *et al.*, 1993; Spain, France, Corsica and Black Sea: Ribera *et al.*, 1992). [AP].***Striaria*** Greville***Striaria attenuata*** (Greville) Greville 1828: 44

Collected at Eceabat, Canakkale and Ayvalik; found from January to July; epilithic at 1-4 m depth. Thallus polystichous, 10-20 cm long, 1-2 mm broad, irregularly or opposite branched, phaeophycean hairs present, unilocular sporangia in sori, oval, 50 µm long and 40 µm broad, plurilocular sporangia unknown.

Voucher: Ayvalik, 24.iv.2003, ET, EGE 41061.**Distribution:** NE Atlantic Ocean (Athanasiadis, 1996; Bartsch & Kuhlenkamp, 2000; Hardy & Guiry, 2003), W Atlantic Ocean (Wynne, 2005), Pacific Ocean (Yoshida *et al.*, 1990), Australia (Womersley, 1987) and Mediterranean Sea (Turkey: Ribera *et al.*, 1992 and Ozturk, 1996; Balearic Islands, France, Corsica, Italy, Sicily, Adriatic Sea, Greece and Black Sea: Ribera *et al.*, 1992). [AP].

SCYTOSIPHONACEAE Farlow

Colpomenia (Endlicher) Derbès *et* Solier***Colpomenia peregrina*** Sauvageau 1927: 321

Collected at Eceabat and Canakkale; found from January to May; epiphytic on *Zostera* spp. leaves and epilithic at 1-4 m depth. Thallus spherical, hollow, 2-5 cm across, olive green or light brownish, phaeophycean hairs present, in transverse section 250-300 µm thick.

Voucher: Canakkale, 28.i.2003, ET, EGE 41049.**Distribution:** NE Atlantic Ocean (Coppejans, 1995; Athanasiadis, 1996; Benhissoune *et al.*, 2002; Haroun *et al.*, 2002; Hardy & Guiry, 2003), Indian Ocean (Silva *et al.*, 1996), Pacific Ocean (Abbott & Hollenberg, 1976), Australia

(Womersley, 1987) and Mediterranean Sea (Turkey: Aysel *et al.*, 2000; Spain, France, Corsica, Sicily and Algeria: Ribera *et al.*, 1992; Morocco: Benhissoune *et al.*, 2002). [SC].

Colpomenia sinuosa (Mertens *ex* Roth) Derbès *et* Solier 1851: 95

Collected at all sites; found from November to June; epilithic at 1-4 m depth. Thallus globular, lobed, hollow, 5-8 cm across, phaeophycean hairs present, in transverse section plant 700-800 µm thick.

Voucher: Assos (Canakkale), 19.v.2002, ET, EGE 41050.

Distribution: NE Atlantic Ocean (Haroun *et al.*, 2002; Benhissoune *et al.*, 2002), W Atlantic Ocean (Wynne, 2005), Pacific Ocean (Abbott & Hollenberg, 1976; Yoshida *et al.*, 1990), Indian Ocean (Silva *et al.*, 1996), Australia (Womersley, 1987) and common in the Mediterranean Sea (Ribera *et al.*, 1992). [SC].

Hydroclathrus Bory de Saint-Vincent

Hydroclathrus clathratus (C. Agardh) M. Howe 1920: 590

Collected at Assos and Ayvalik; found from April to May; epilithic at 0-2 m depth. Thallus clathrate, hollow, having holes, 6-8 cm across, yellowish brown, phaeophycean hairs present.

Voucher: Ayvalik, 24.v.2003, ET, EGE 41051.

Distribution: NE Atlantic Ocean (Haroun *et al.*, 2002; Benhissoune *et al.*, 2002), W Atlantic Ocean (Wynne, 2005), Pacific Ocean (Abbott & Hollenberg, 1976; Yoshida *et al.*, 1990), Indian Ocean (Silva *et al.*, 1996), Australia (Womersley, 1987) and Mediterranean Sea (Ribera *et al.*, 1992). [SC].

Petalonia Derbès *et* Solier

Petalonia fascia (O.F. Müller) Kuntze 1898: 419

Collected at all sites; found from November to June; epilithic at 0-2 m depth. Thallus erect, 5-25 cm long, 2-3 cm broad, dorsi-ventrally flattened, olive greenish brown to dark brown, parenchymatous, phaeophycean hairs present, blades 100 µm thick in transverse section.

Voucher: Canakkale, 21.iii.2002, ET, EGE 41052.

Distribution: NE Atlantic Ocean (Fletcher, 1987; Coppejans, 1995; Athanasiadis, 1996; Bartsch & Kuhlenskamp, 2000; Haroun *et al.*, 2002; Benhissoune *et al.*, 2002; Hardy & Guiry, 2003; Rindi & Guiry, 2004), SE Atlantic Ocean (Stegenga *et al.*, 1997), W Atlantic Ocean (Wynne, 2005), Pacific Ocean (Abbott & Hollenberg, 1976; Yoshida *et al.*, 1990), Indian Ocean (Silva *et al.*, 1996), Australia (Womersley, 1987), Arctic Ocean (Lindstrom, 2001) and common in the Mediterranean Sea (Ribera *et al.*, 1992). [C].

Petalonia zosterifolia (Reinke) Kuntze 1898: 419

Collected at Eceabat and Canakkale; found in March; epilithic at 0-1 m depth. Thallus erect, 10-15 cm long, 2-5 mm broad, dorsi-ventral flattened, olive green, parenchymatous, phaeophycean hairs present.

Voucher: Canakkale, 20.iii.2003, ET, EGE 41053.

Distribution: NE Atlantic Ocean (Fletcher, 1987; Athanasiadis, 1996; Bartsch & Kuhlenskamp, 2000; Hardy & Guiry, 2003; Rindi & Guiry, 2004), W Atlantic Ocean (Wynne, 2005), Pacific Ocean (Yoshida *et al.*, 1990), Arctic Ocean (Lindstrom, 2001) and Mediterranean Sea (Turkey: Aysel *et al.*, 1993; Italy: Furnari *et al.*, 1999; Adriatic Sea and Black Sea: Ribera *et al.*, 1992). [CB].

Scytosiphon C. Agardh**Scytosiphon lomentaria** (Lyngbye) Link 1833: 232 *nom. cons.*

Collected at all sites; found from November to July; epilithic at 0-4 m depth. Thallus erect, cylindrical, tubular, 20-30 cm long, 5-10 mm broad, yellowish brown, constricted at intervals when mature, parenchymatous, plurilocular sporangia present, phaeophycean hairs present.

Voucher: Canakkale, 21.iii.2002, ET, EGE 41054.

Distribution: NE Atlantic Ocean (Coppejans, 1995; Athanasiadis, 1996; Bartsch & Kuhlenskamp, 2000; Haroun *et al.*, 2002; Hardy & Guiry, 2003; Rindi & Guiry, 2004), SE Atlantic Ocean (Stegenga *et al.*, 1997), W Atlantic Ocean (Wynne, 2005), Pacific Ocean (Abbott & Hollenberg, 1976; Yoshida *et al.*, 1990), Indian Ocean (Silva *et al.*, 1996), Arctic Ocean (Lindstrom, 2001) and common in the Mediterranean Sea (Ribera *et al.*, 1992). [C].

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