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The marine brown algae of the East Aegean Sea and Dardanelles I. Ectocarpaceae, Pylaiellaceae, Chordariaceae, Elachistaceae and Giraudiaceae

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Abstract – In this paper 33 species of brown algae (Ectocarpaceae 20, Pylaiellaceae 1, Chordariaceae 9, Elachistaceae 2 and 1 Giraudiaceae) collected along the coast of the East Aegean Sea, Turkey, are reported. Six species are new to Turkey: *Hincksia ovata* (Kjellman) P.C. Silva, *Phaeostroma bertholdii* Kuckuck, *Streblonema* cf. *parasiticum* (Sauvageau) De Toni, *Elachista fucicola* (Velley) Areschoug, *Spongonema tomentosum* (Hudson) Kützing, *Cladosiphon irregularis* (Sauvageau) Kylin. The first four of them are also new to the Aegean Sea. Data concerning geographical distribution, morphology and ecology of each species are also given.

Aegean Sea / brown algae / Phaeophyceae / seaweed / Turkey

Résumé – **Algues brunes marines de la mer Egée Est et des Dardanelles. I. Ectocarpaceae, Pylaiellaceae, Chordariaceae, Elachistaceae and Giraudiaceae.** Dans cet article, les auteurs donnent la liste de 33 espèces d'algues brunes (Ectocarpaceae 20, Pylaiellaceae 1, Chordariaceae 9, Elachistaceae 2 et 1 Giraudiaceae) recueillies le long de la côte est de la Mer Egée, Turquie. Six espèces sont nouvelles pour la Turquie: *Hincksia ovata* (Kjellman) P.C. Silva, *Phaeostroma bertholdii* Kuckuck, *Streblonema* cf. *parasiticum* (Sauvageau) De Toni, *Elachista fucicola* (Velley) Areschoug, *Spongonema tomentosum* (Hudson) Kützing, *Cladosiphon irregularis* (Sauvageau) Kylin. Les quatre premières sont aussi nouvelles pour la Mer Egée. Pour chaque espèce sont indiquée des données sur la distribution géographique, la morphologie et l'écologie.

Algues brunes / Algue marine / Mer Égée / Phaeophyceae / Turquie

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INTRODUCTION

The first paper in which seaweeds from the Aegean coast of Turkey were reported is that by Forsskål (1775), who recorded three species from the islands of Imbros and Tenedos: *Ulva intestinalis* L., *Fucus pavonicus* L. and *Conferva viridis* Forsskål. Later, plants from Mytilene and the Gulf of Izmir were quoted by Kuckuck (1958). More recently, the marine algae of the Aegean Sea have been investigated by Guner (1970), Haritonidis & Tsekos (1974), Coppejans (1974), Ozturk & Guner (1986), Athanasiadis (1987), Dural *et al.* (1997), Kurt *et al.* (2000) and Taskin *et al.* (2004). The marine algae of the Dardanelles have been investigated by Aysel *et al.* (1991, 1993) and Taskin *et al.* (2003). Several studies including or dealing only with the brown algae of the Aegean Sea have been made by Nizamuddin & Lehnberg (1970), Tsekos & Haritonidis (1974), Haritonidis & Tsekos (1975), Guner *et al.* (1983-1984), Ozturk (1983, 1988, 1993, 1996a, 1996b), Athanasiadis (1985), Ozturk & Guner (1986) and Sartoni & De Biasi (1999). In particular, the families that are examined in this paper have been previously investigated by Ozturk & Guner (1986), Athanasiadis (1987) and Ozturk (1993, 1996b).

The first general list of the marine algae of Turkey was made by Guven & Oztig (1971), who recorded 174 species. The list by Zeybek *et al.* (1993) of the marine algae of Turkey consisted of 612 species. In particular, as concerns the brown algae, Ribera *et al*. (1992) reported 86 genera and 265 taxa at specific and infraspecific level from the Mediterranean Sea, 102 of which from Greece and 76 of which from Turkey. Conversely, Taskin *et al*. (2001) stated that a total of 144 Phaeophyceae occurred in Turkey.

The aim of the present study is to increase the knowledge of the marine algal flora of Turkey. Therefore, we carried out a detailed floristic study of a narrow area along the Aegean coast of Turkey.

In this first contribution, 33 brown algae are treated, six of which are new to Turkey: *Hincksia ovata* (Kjellman) P.C. Silva, *Phaeostroma bertholdii* Kuckuck, *Spongonema tomentosum* (Hudson) Kützing, *Streblonema* cf. *parasiticum* (Sauvageau) Levring, *Cladosiphon irregularis* (Sauvageau) Kylin and *Elachista fucicola* (Velley) Areschoug. In particular, *H. ovata*, *P. bertholdii*, *S.* cf. *parasiticum* and *E. fucicola* are new to the Aegean Sea.

MATERIALS AND METHODS

Sampling was made from six different localities between Dardanelles (40º 11'N and 26º 21'E) and Ayvalik (39º 19'N - 26º 41'E) in the years 2002 to 2004 (Fig. 1). The material was collected by SCUBA-diving, and specimens were preserved in 4 % formaldehyde in sea water. Voucher specimens are deposited in Botanic Garden and Herbarium Center (EGE), Ege University (Izmir). Samples were studied using light microscope (Nikon SE) and photomicrographs were taken using Olympus BX 50 microscope. For each species the phytogeographic element is given between brackets according to Furnari *et al.* (1999), using the following abbreviations: Boreo-Tropical Atlantic (BTA); Boreo-Atlantic (BA); Circumboreal (CB) Cosmopolite (C); Indo-Atlantic (IA); Subcosmopolite (SC); Mediterranean (M); Atlanto-Pacific cold temperate (AP); Circum boreo-austral (CBA).

Fig. 1. Map of the study area showing sample sites.

RESULTS

PHAEOPHYCEAE

ECTOCARPACEAE C. Agardh

Acinetospora Bornet

Acinetospora crinita (Carmichael) Sauvageau 1899: 118

Thallus filamentous, 6-8 cm long, uniseriate, phaeophycean hairs absent; cells of erect filaments containing discoid chloroplasts; plurilocular sporangia 40-50 µm long and 20 µm broad, sessile or with 1-celled stalk; crampons present. Collected at Eceabat, Canakkale and Ayvalik; found from March to July and from October to December; epiphytic on other algae at 1-2 m depth.

Voucher: Kilitbahir (Canakkale), 21.iii.2002, Ergun Taskin (ET), EGE 41000.

Distribution: NE Atlantic Ocean (Parke & Dixon, 1976; Athanasiadis, 1996; Bartsch & Kuhlenkamp, 2000; Haroun *et al*., 2002; Benhissoune *et al.*, 2002), SW Atlantic Ocean (Stegenga *et al.*, 1997), W Atlantic Ocean (Wynne, 1998), Australia (Womersley, 1987) and common in the Mediterranean Sea (Ribera *et al.,* 1992). [BTA].

Note: Kornmann (1953) considered the genus *Acinetospora* as a phase in the life history of some *Feldmannia* and *Giffordia* (=*Hincksia*) species, but Pedersen & Kristiansen (2001) stated that *Acinetospora* is a well-defined genus with characteristic features that clearly separates it from these genera. At the family level Peters & Ramírez (2001) emended the Acinetosporaceae to include also *Feldmannia, Geminocarpus, Hincksia, Pogotrichum* and *Pylaiella*, thus including both filamentous and parenchymatous algae in the family. In this study we follow the classification used by Ribera *et al.* (1992) for the genera *Acinetospora, Feldmannia* and *Hincksia* and that by Pedersen (1984) for the genus *Pylaiella*.

Ectocarpus Lyngbye

Ectocarpus fasciculatus Harvey 1841: 40

Thallus filamentous, 5 cm long, uniseriate, phaeophycean hairs absent; cells of erect filaments containing ribbon-shaped chloroplasts; plurilocular sporangia abundant, 80-115 µm long and 25-30 µm broad, sessile or on 1-3 celled stalks, usually 3-6 in series adaxially on laterals or scattered on axis. Collected at Eceabat, Canakkale and Ayvalik; found from March to June; epilithic and epiphytic at 0-2 m depth.

Voucher: Kilitbahir (Canakkale), 21.iii.2002, ET, EGE 41001.

Distribution: NE Atlantic Ocean (Parke & Dixon, 1976; Coppejans, 1995; Athanasiadis, 1996; Bartsch & Kuhlenkamp, 2000), SW Atlantic Ocean (Stegenga *et al.*, 1997), W Atlantic Ocean (Wynne, 1998), Pacific (Kim & Lee, 1992a), Australia (Womersley, 1987) and common in the Mediterranean Sea (Ribera *et al.,* 1992). [AP].

Ectocarpus siliculosus (Dillwyn) Lyngbye 1819: 131 **var. *siliculosus***

Thallus filamentous, to 15 cm long, uniseriate, phaeophycean hairs absent; cells of erect filaments containing several ribbon-shaped chloroplasts; plurilocular sporangia abundant, (50) 150-180 (250) µm long and 20-25 µm broad, 1-6 celled stalks or sometimes sessile. Collected from all sites; found from January to December; abundant; epilithic and epiphytic at 0-5 m depth.

Voucher: Assos (Canakkale), 21.iii.2003, ET, EGE 41002.

Distribution: NE Atlantic Ocean (Parke & Dixon, 1976; Athanasiadis, 1996; Bartsch & Kuhlenkamp, 2000; Haroun *et al.*, 2002), SW Atlantic Ocean (Stegenga *et al.*, 1997), W Atlantic Ocean (Wynne, 1998), Pacific Ocean (Kim & Lee, 1992a), Indian Ocean (Silva *et al.*, 1996), Australia (Womersley, 1987) and common in the Mediterranean Sea (Ribera *et al.,* 1992). [C].

Note: *Ectocarpus siliculosus* var. *hiemalis* (P.L. *et* H.M. Crouan *ex* Kjellman) Gallardo and *Ectocarpus siliculosus* var. *penicillatus* C. Agardh were treated as synonyms of *Ectocarpus siliculosus* var. *siliculosus* by Guiry *et al.* (2005), but no reasons for such a treatment were given. We follow the traditional treatment as adopted by Gallardo (1992) and Ribera *et al.* (1992).

Ectocarpus siliculosus* var. *crouaniorum (Thuret) Gallardo 1992: 325

Thallus filamentous, uniseriate, phaeophycean hairs absent; cells of erect filaments containing ribbon-shaped chloroplasts; plurilocular sporangia to 200 µm long and 20-25 µm broad, stalked. Collected at Ayvalik; found from March to April; epiphytic on other algae at 1 m depth.

Voucher: Ayvalik (Balikesir), 30.iv.2002, ET, EGE 41003.

Distribution: NE Atlantic Ocean [Cardinal, 1964 as *Ectocarpus confervoides* Le Jolis var. *crouaniorum* "*crouanii*" (Thuret) Cardinal] and Mediterranean Sea [Turkey (Ozturk & Guner, 1986 as *Ectocarpus crouaniorum* "*crouanii*" Thuret; Ribera *et al.*, 1992), Morocco (Benhissoune *et al.*, 2002)]. [BA].

Note: *Ectocarpus siliculosus* var. *crouaniorum* has long pedicellate plurilocular sporangia in lower portion and sessile sporangia in upper portion (Cardinal, 1964 as *Ectocarpus confervoides* var. *crouaniorum* "*crouanii*"). In a study on the Korean Ectocarpaceae, this variety was not recognized as taxonomically distinct by Kim & Lee (1992a) who treated it within the species *E. siliculosus* as "*Crouanii Type*".

Ectocarpus siliculosus* var. *dasycarpus (Kuckuck) Gallardo 1992: 325

Thallus filamentous, to 4 cm long, uniseriate, phaeophycean hairs absent; cells of erect filaments containing ribbon-shaped chloroplasts; plurilocular sporangia 230-250 µm long and 10-15 µm broad, stalked. Collected at Eceabat; found from March to May; epiphytic on other algae at 1-2 m depth.

Voucher: Kilitbahir (Canakkale), 21.iii.2002, ET, EGE 41004.

Distribution: NE Atlantic Ocean [Rosenvinge & Lund, 1941 as *Ectocarpus confervoides* Le Jolis f. *dasycarpus* (Kuckuck) Rosenvinge *et* Lund; Cardinal, 1964 as *E. confervoides* f. *dasycarpus*; Athanasiadis, 1996] and Mediterranean Sea [Turkey (Ozturk & Guner, 1986 as *Ectocarpus dasycarpus* Kuckuck; Ribera *et al.*, 1992), France (Verlaque, 2001), Italy (Ribera *et al.*, 1992; Furnari *et al.*, 1999), Black Sea (Ribera *et al.*, 1992)]. [BA].

Ectocarpus siliculosus* var. *hiemalis (P.L. *et* H.M. Crouan *ex* Kjellman) Gallardo 1992: 325

Thallus filamentous, uniseriate, phaeophycean hairs absent; cells of erect filaments containing ribbon-shaped chloroplasts; plurilocular sporangia to 250 µm long and 10-15 µm broad, stalked. Collected at Eceabat; found from March to April; epiphytic on other algae at 0-2 m depth.

Voucher: Eceabat (Canakkale), 20.iii.2003, ET, EGE 41005.

Distribution: NE Atlantic Ocean [Rosenvinge & Lund, 1941 as *Ectocarpus confervoides* Le Jolis f. *hiemalis* (P.L. *et* H.M. Crouan) Kjellman; Cardinal, 1964 as *E. confervoides* f. *hiemalis*] and Mediterranean Sea [Turkey (Ozturk & Guner, 1986; Ribera *et al.*, 1992), Black Sea (Ribera *et al.*, 1992)]. [BA].

Ectocarpus siliculosus* var. *penicillatus C. Agardh 1824: 162

Thallus filamentous, to 6 cm long, uniseriate, phaeophycean hairs absent; cells of erect filaments containing ribbon-shaped chloroplasts; plurilocular sporangia 75-100 µm long and 25 µm broad, sessile or on 1-3 celled stalks, usually in series. Collected at Eceabat, Canakkale, Geyikli and Assos; found from March to July; epilithic and epiphytic at 0-2 m depth.

Voucher: Geyikli (Canakkale), 21.iii.2003, ET, EGE 41006.

Distribution: NE Atlantic Ocean (Rosenvinge & Lund, 1941 as *Ectocarpus confervoides* f. *penicillatus* (C. Agardh) Kjellman; Cardinal, 1964 as *Ectocarpus penicillatus* (C. Agardh) Kjellman), W Atlantic Ocean (South & Cardinal, 1970 as *Ectocarpus penicillatus*), Pacific Ocean (Kim & Lee, 1992a as *Ectocarpus penicillatus*) and Mediterranean Sea [Turkey (Aysel *et al.*, 1993), Morocco (Benhissoune *et al.*, 2002), Spain, Greece, Italy, Adriatic Sea and Black Sea (Ribera *et al.*, 1992)]. [BA].

Note: The taxonomic status of *Ectocarpus penicillatus* varies. Cardinal (1964) and Kim & Lee (1992a) treated this as a distinct species, while Athanasiadis (1987) placed it in synonymy with *E. siliculosus*. Kim & Lee (1992a) added some additional characters to separate it from *E. siliculosus* and *E. fasciculatus*, and mentioned in particular the subdichotomous branching and adaxial, fasciculate branches.

Feldmannia G. Hamel

Feldmannia caespitula (J. Agardh) Knoepffler-Péguy **var. *lebelii*** (Areschoug *ex* P.L. *et* H.M. Crouan) Knoepffler-Péguy 1970: 160

Thallus filamentous, 3-5 mm long, uniseriate, phaeophycean hairs absent; cells of erect filaments containing discoid chloroplasts; plurilocular sporangia 80-130 µm long and 25-30 µm broad, sessile or with 1-celled stalk, unilocular sporangia not observed. Collected at Eceabat, Canakkale and Ayvalik; found from March to April and from September to October; epiphytic on other algae at 0-2 m depth.

Voucher: Ayvalik (Balikesir), 22.iii.2003, ET, EGE 41007.

Distribution: NE Atlantic Ocean [Parke & Dixon, 1976 as *Feldmannia lebelii* (Areschoug *ex* P.L. *et* H.M. Crouan) G. Hamel; Benhissoune *et al.*, 2002], Australia (Womersley, 1987 as *Feldmannia lebelii*) and Mediterranean Sea [Turkey (Ozturk & Guner, 1986 as *Feldmannia lebelii*; Ribera *et al.*, 1992), Morocco (Benhissoune *et al.*, 2002), Italy, Adriatic Sea, Spain, France, Algeria and Black Sea (Ribera *et al.*, 1992)]. [BA].

Note: The name *Feldmannia lebelii* was established on the basis of *Ectocarpus lebelii* Areschoug *ex* P.L. *et* H.M. Crouan by Hamel (1939: xvii). Later, this species was treated as a variety of *Feldmannia caespitula* by Knoepffler-Péguy (1970: 160), who was the only author to have undertaken experimental studies on this species. We follow the traditional treatment as adopted by Gallardo (1992) and Ribera *et al.* (1992).

Feldmannia irregularis (Kützing) G. Hamel 1939: xvii

Thallus filamentous, 1-3 mm long, uniseriate, phaeophycean hairs absent; cells of erect filaments containing discoid chloroplasts; plurilocular sporangia to 80 µm long and 30-35 µm broad, elongate conical, generally sessile. Collected at all sites; found from January to December; epiphytic on *Posidonia oceanica* (Linnaeus) Delile and various algal species at 0-5 m depth; abundant.

Voucher: Ayvalik (Balikesir), 22.iii.2003, ET, EGE 41008.

Distribution: NE Atlantic Ocean (Parke & Dixon, 1976; Athanasiadis, 1996; Haroun *et al.*, 2002; Benhissoune *et al.*, 2002), SW Atlantic Ocean (Stegenga *et al.*, 1997), W Atlantic Ocean (Wynne, 1998), Indian Ocean (Silva *et al.*, 1996), Pacific Ocean (Abbott & Hollenberg, 1976; Kim & Lee, 1994), Australia (Clayton, 1974 as

Giffordia irregularis (Kützing) Joly; Womersley, 1987) and common in the Mediterranean Sea (Ribera *et al.,* 1992). [C].
Note: Kim & Lee (1994) proposed that *Ectocarpus arabicus* Figari *et* De Notaris and *Ectocarpus coniferus* "*conifer*" Børgesen should be distinguished as distinct species under the genus *Hincksia*, while Silva *et al.* (1996) treated both species as synonyms of *Feldmannia irregularis*.

Feldmannia padinae (Buffham) G. Hamel 1939: 67

Thallus filamentous, 2-3 mm long, uniseriate, phaeophycean hairs absent; cells of erect filaments containing discoid chloroplasts; plurilocular sporangia 80-100 µm long and 20-30 µm broad, lateral on erect filaments or on the basal layer, stalked, unilocular sporangia not observed. Collected at Assos and Ayvalik; found from August to October; epiphytic on other algae at 0-1 m depth.
Voucher: Ayvalik (Balikesir), 19.ix.2002, ET, EGE 41009.
Distribution: NE Atlantic Ocean (Parke & Dixon, 1976), Indian Ocean (Silva *et al.*, 1996) and Mediterranean Sea [Turkey (Ozturk & Guner, 1986; Ribera *et al.*, 1992), Spain, Corsica, Italy and Adriatic Sea (Ribera *et al.*, 1992)]. [IA].

Feldmannia paradoxa (Montagne) G. Hamel 1931: 47

Thallus filamentous, 4-5 mm long, uniseriate, phaeophycean hairs absent; cells of erect filaments containing discoid chloroplasts; plurilocular sporangia to 80 µm long and 30-35 µm broad, 1-3 celled stalks. Collected at Canakkale, Geyikli and Ayvalik; found from April to June; epiphytic on other algae at 0-3 m depth.
Voucher: Intepe (Canakkale), 20.vi.2003, ET, EGE 41010.
Distribution: NE Atlantic Ocean [Rosenvinge & Lund, 1941 as *Ectocarpus paradoxus* Montagne; Cardinal, 1964 as *Feldmannia globifera* (Kützing) G. Hamel; Haroun *et al.*, 2002], SW Atlantic Ocean (Wynne, 1998), Pacific Ocean (Abbott & Hollenberg, 1976 as *Feldmannia globifera*), Australia (Womersley, 1987) and Mediterranean Sea **[**Turkey (Ozturk & Guner, 1986 as *Feldmannia globifera*; Ribera *et al.*, 1992 as *Feldmannia globifera*), Spain (Ribera *et al.*, 1992), France, Italy and Greece (Ribera *et al.*, 1992 as *Feldmannia globifera*)]. [SC].
Note: Kim & Lee (1994) considered *Feldmannia globifera* as a synonym of *Feldmannia paradoxa*. Kuckuck (1958 as *Feldmannia globifera*) reported this species from the Aegean Sea as having thalli 7 cm long, plurilocular sporangia 70-100 µm long and 50-80 µm broad.

Hincksia J.E. Gray

Hincksia granulosa (J.E. Smith) P.C. Silva in Silva *et al.* 1987: 130

Thallus filamentous, 4-5 cm long, uniseriate, oppositely branched, phaeophycean hairs absent; cells of erect filaments containing discoid chloroplasts; plurilocular sporangia oval, 60-80 µm long and 40-50 µm broad, sessile, generally oppositely branched. Collected at Ayvalik; found from March to April; epiphytic on other algae at 0-2 m depth.
Voucher: Ayvalik (Balikesir), 22.iii.2003, ET, EGE 41011.
Distribution: NE Atlantic Ocean [Parke & Dixon, 1976 as *Giffordia granulosa* (J.E. Smith) G. Hamel; Coppejans, 1995; Bartsch & Kuhlenkamp, 2000; Rindi & Guiry, 2004], SW Atlantic Ocean (Stegenga *et al.*, 1997), W Atlantic Ocean (Wynne, 1998), Pacific Ocean (Abbott & Hollenberg, 1976 as *Giffordia granulosa*; Yoshida *et al.*, 1990; Kim & Lee, 1992b), Indian Ocean (Silva *et al.*, 1996), Australia (Clayton, 1974 as *Giffordia granulosa*) and Mediterranean Sea [Turkey (Ozturk &

Guner, 1986 as *Giffordia granulosa*; Ribera *et al.*, 1992), Morocco (Benhissoune *et al.*, 2002), Spain, France, Italy and Adriatic Sea (Ribera *et al.*, 1992)]. [SC].

Hincksia mitchelliae (Harvey) P.C. Silva *in Silva et al*. 1987: 73, 130

Thallus filamentous, 4-5 (-10) cm long, uniseriate, phaeophycean hairs absent; cells of erect filaments containing several discoid chloroplasts; plurilocular sporangia 50-70 µm long and 20-30 µm broad, sessile, cylindrical, scattered or sometimes in series; unilocular sporangia observed. Collected at all sites; found from January to December; epiphytic on *Zostera* spp., *Posidonia oceanica* and various algae at 0-5 m depth.

Voucher: Eceabat (Canakkale), 27.iv.2002, ET, EGE 41012.

Distribution: NE Atlantic Ocean [Rosenvinge & Lund, 1941; Parke & Dixon, 1976 as *Giffordia mitchelliae* (Harvey) G. Hamel; Haroun *et al.*, 2002; Benhissoune *et al.*, 2002; Rindi & Guiry, 2004], SW Atlantic Ocean (Wynne, 1998), Pacific Ocean (Abbott & Hollenberg, 1976 as *Giffordia mitchelliae*; Yoshida *et al.*, 1990; Kim & Lee, 1992b), Indian Ocean (Silva *et al.*, 1996), Australia (Clayton, 1974 as *Giffordia mitchelliae*) and common in the Mediterranean Sea (Ribera *et al.,* 1992). [C].

Hincksia ovata (Kjellman) P.C. Silva *in* Silva *et al.* 1987: 130 **(Figs 2-3)**

Thallus medium brown, 1 cm long, irregularly or oppositely branched; cells of main axes 20 µm broad and 50-60 µm long, containing discoid chloroplasts with pyrenoids. Plurilocular sporangia usually opposite, sessile or on a unicellular pedicel, conical, 60-70 µm long and 30-35 µm broad. Unilocular sporangia were not observed. This species is epilithic and was collected at Dardanelles, in March, at 0-1 m depth.

Voucher: Intepe (Canakkale), 20.iii.2003, ET, EGE 41013.

Distribution: NE Atlantic Ocean [Rosenvinge & Lund, 1941 as *Ectocarpus ovatus* Kjellman and *Ectocarpus ovatus* var. *intermedius* Rosenvinge; Cardinal, 1964 as *Giffordia ovata* (Kjellman) Kylin; Parke & Dixon, 1976 as *Giffordia ovata*; Coppejans, 1995; Haroun *et al.*, 2002], W Atlantic Ocean (Wynne, 1998), Pacific Ocean (Yoshida *et al.*, 1990), Indian Ocean (Silva *et al.*, 1996), Australia (Womersley, 1987 as *Giffordia ovata*), Mediterranean Sea [Turkey (this study), Italy (Furnari *et al.*, 1999), Morocco (Benhissoune *et al.*, 2002), Spain and France (Ribera *et al.*, 1992)] and Aegean Sea (This study). [SC].

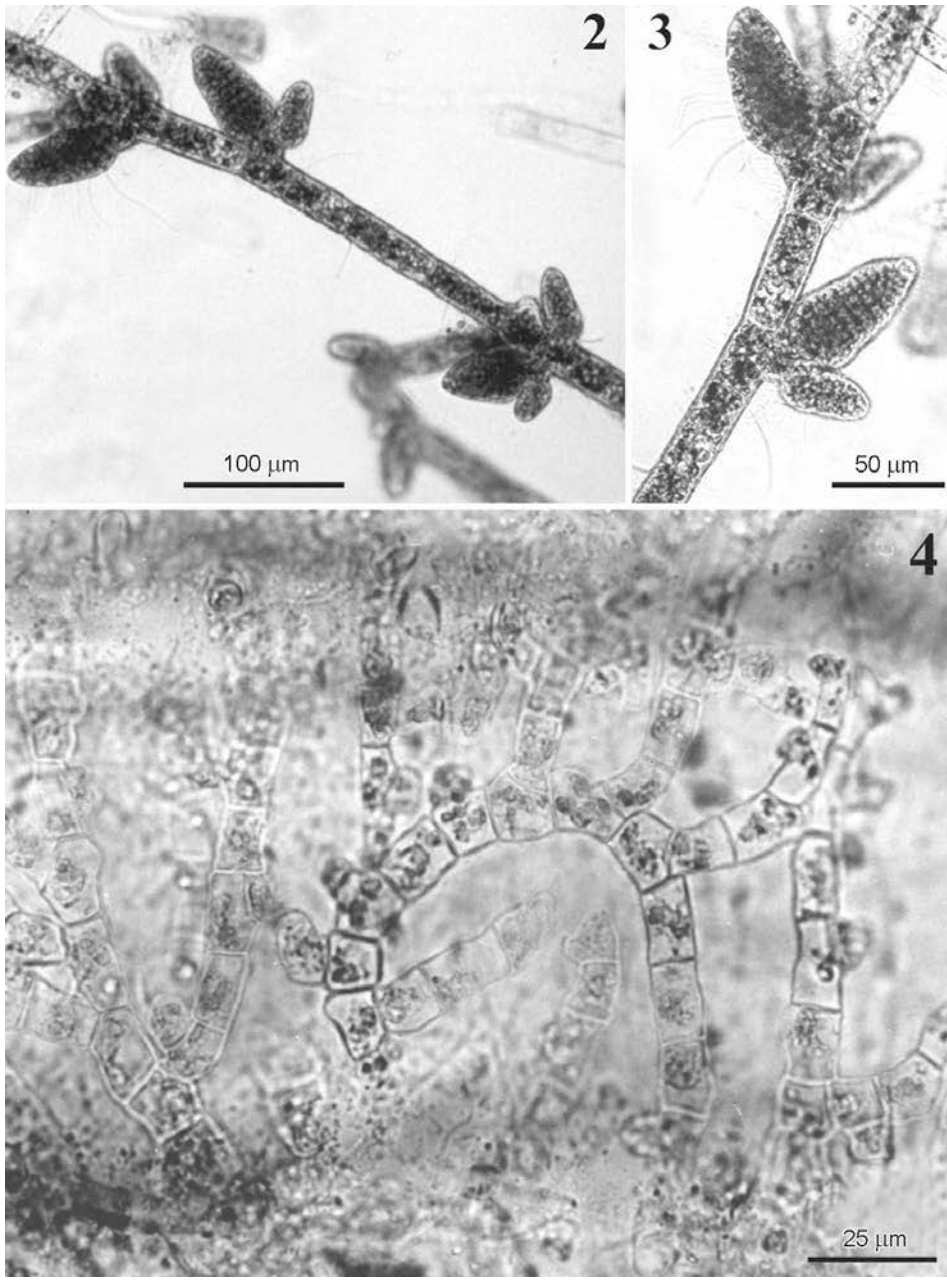
Note: *Hincksia fuscata* (Zanardini) P.C. Silva is morphologically similar to *H. ovata*. But it is larger (4-6 cm) than *H. ovata* that never exceeds a few millimetres in length (Clayton, 1974 as *Giffordia ovata*). Kim & Lee (1992b) considered *H. fuscata* a synonym of *H. ovata,* but this is not generally accepted [*e.g.* Norris & Wynne (1968), Pedersen (1979, who studied *G. ovata* in culture), Furnari *et al.* (1999) and Silva *et al.* (1996)].

Hincksia sandriana (Zanardini) P.C. Silva *in* Silva *et al.* 1987: 130

Thallus filamentous, 3-4 cm long, uniseriate, phaeophycean hairs absent; cells of erect filaments containing discoid chloroplasts; plurilocular sporangia 35-50 µm long and 15-18 µm broad, sessile, usually 8-15 in series adaxially on laterals; unilocular sporangia not observed. Collected at Eceabat; found from March to May; epiphytic on other algae at 1-2 m depth.

Voucher: Kilitbahir (Canakkale), 18.v.2002, ET, EGE 41014.

Distribution: NE Atlantic Ocean [Rosenvinge & Lund, 1941 as *Ectocarpus sandrianus* Zanardini; Cardinal, 1964 as *Giffordia sandriana* (Zanardini)



Figs 2-4. **2.** *Hincksia ovata*, plurilocular sporangia. **3.** *Hincksia ovata*, plurilocular sporangia. **4.** *Mikrosyphar polysiphoniae*, epiphytic on *Ceramium* sp.

G. Hamel; Parke & Dixon, 1976 as *Giffordia sandriana*; Bartsch & Kuhlenkamp, 2000; Haroun *et al.*, 2002], W Atlantic Ocean (Wynne, 1998), Pacific Ocean (Abbott & Hollenberg, 1976 as *Giffordia sandriana*; Yoshida *et al.*, 1990; Kim & Lee, 1992b), Indian Ocean (Silva *et al.*, 1996), Australia (Clayton, 1974 as *Giffordia sandriana*) and common in the Mediterranean Sea (Ribera *et al.,* 1992). [SC].

Kuetzingiella Kornmann *in* Kuckuck

Kuetzingiella battersii (Bornet *ex* Sauvageau) Kornmann *in* Kuckuck 1956: 314-319

Thallus filamentous, 1-2 mm long, uniseriate, phaeophycean hairs absent; cells of erect filaments containing discoid chloroplasts. Collected at Eceabat, Canakkale, Assos and Ayvalik; found in May; epiphytic on *Dictyota dichotoma* (Hudson) J.V. Lamouroux and other algae at 0-2 m depth.

Voucher: Canakkale, 21.v.2003, ET, EGE 41015.

Distribution: NE Atlantic Ocean (Cardinal, 1964; Haroun *et al.*, 2002), Indian Ocean (Silva *et al.,* 1996) and Mediterranean Sea [Turkey (Ozturk & Guner, 1986 as *Feldmannia battersii* (Bornet *ex* Sauvageau) G. Hamel), Italy (Furnari *et al.*, 1999), Egypt (Aleem, 1993), Adriatic Sea, Algeria and Levant States (Ribera *et al.,* 1992)]. [IA].

Note: Our specimens belong to the autonym and not to the var. *mediterranea* (Sauvageau) Gómez *et* Ribera based on the diameter of the erect filaments never exceeding 15 µm (15-21 µm in var. *mediterranea*, Hamel, 1931) and the plurilocular sporangia being ovoid (globular in var. *mediterranea*, Hamel, 1931). *Kuetzingiella battersii* was treated in the family Acinetosporaceae by Wynne (2005).

Mikrosyphar Kuckuck

Mikrosyphar polysiphoniae Kuckuck 1897: 381 **(Fig. 4)**

Thallus consists of branched creeping filaments. Collected at Canakkale and Ayvalik; found from January to May; epiphytic on *Ceramium* sp. at 0-2 m depth.

Voucher: Canakkale, 28.i.2003, ET, EGE 41016.

Distribution: NE Atlantic Ocean (Parke & Dixon, 1976; Coppejans, 1995; Bartsch & Kuhlenkamp, 2000), W Atlantic Ocean (South & Cardinal, 1970) and Mediterranean Sea [Turkey (Dural *et al.*, 1990)]. [BA].

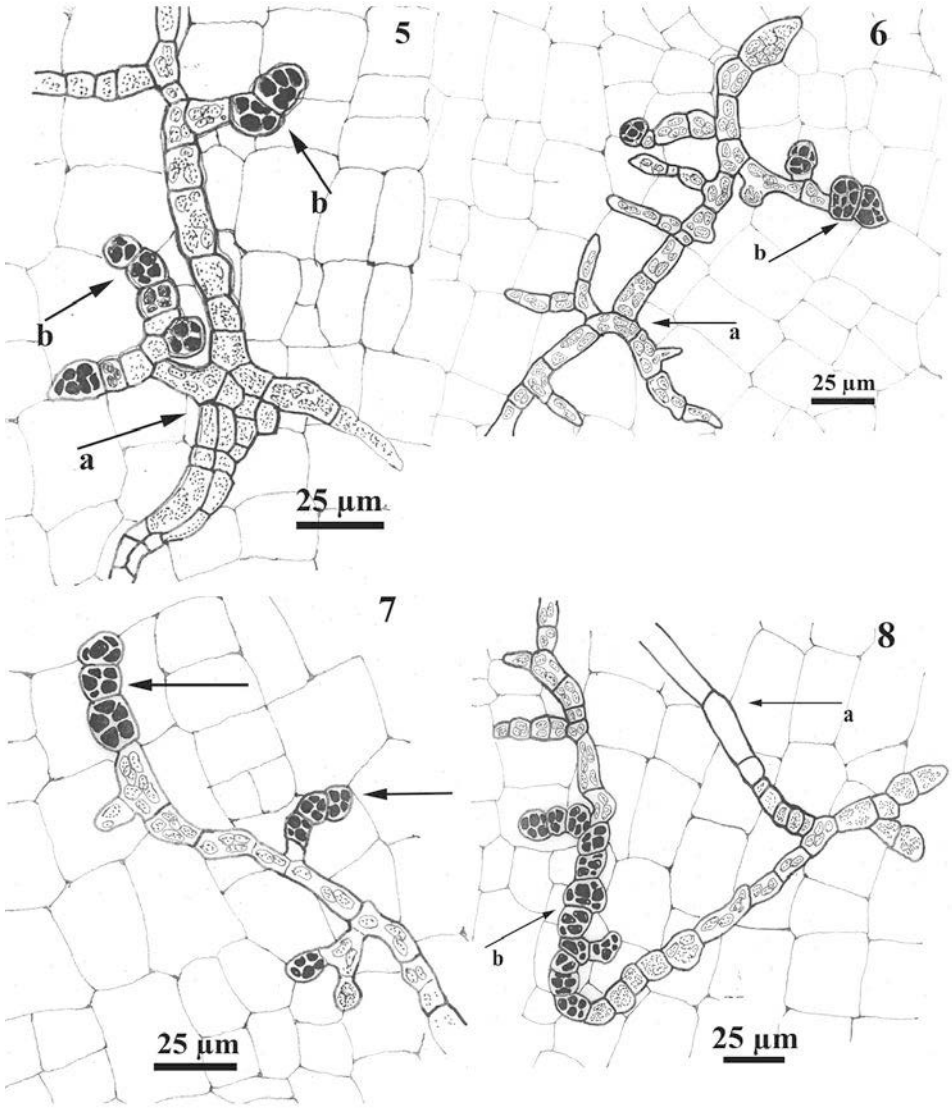
Note: Kuckuck (1897) described the species as endophytic in *Polysiphonia urceolata* (Lightfoot *ex* Dillwyn) Greville [=*Polysiphonia stricta* (Dillwyn) Greville] from Helgoland, whereas the Turkish plants were found to be epiphytic on *Ceramium* sp. Coppejans (1995) also found this species as an epiphyte on *Ceramium deslongchampsii* Chauvin *ex* Duby in the Atlantic coast of France.

Phaeostroma Kuckuck

Phaeostroma bertholdii Kuckuck 1895: 187 **(Figs 5-8)**

Thallus consists of branched creeping filaments. They may be also be pseudoparenchymatous with marginal uniseriate filaments. Phaeophycean hairs present, 10-11 µm broad. Plurilocular sporangia clustered, often intercalary or terminal. This species was collected at Ayvalik, epiphytic on *Stictyosiphon adriaticus* Kützing at 3-5 m depth, found from April to June.

Voucher: Ayvalik (Balikesir), 24.iv.2003, ET, EGE 41017.



Figs 5-8. *Phaeostroma bertholdii* **5.** Pseudoparenchymatous thallus (a) and plurilocular sporangia (b) (arrows). **6.** Creeping filaments (a) and plurilocular sporangia (b) (arrows). **7.** Plurilocular sporangia (arrow). **8.** Phaeophycean hair (a) and plurilocular sporangia (b) (arrows).

Distributed only in the Mediterranean Sea (type locality Naples): Turkey (this study), Italy, Black Sea (Ribera *et al.*, 1992) and Aegean Sea (This study). [M].

Note: Turkish specimens are epiphytic on *Stictyosiphon adriaticus* in agreement with Kuckuck (1895). Thallus of the host (*S. adriaticus*) light brown, polystichous, terete, 15-20 cm long, 1-3 mm broad, generally with opposite branches, phaeophycean hairs present. Oltmanns (1922) reported that this species as epiphytic on *Scytosiphon* sp.

Spongonema Kützing

Spongonema tomentosum (Hudson) Kützing 1849: 461 **(Fig. 9)**

Thallus erect, filamentous, 3-5 cm long, medium brown and epiphytic on *Zostera* spp. leaves. Cells of main filaments 8-10 µm broad, 15-25 µm long and containing one (rarely two) ribbon-shaped chloroplast. The filaments have short hooked branches. Plurilocular sporangia abundant, terminal or lateral on erect filaments or on the basal layer, on 1-3 celled stalks, sometimes hooked, 55-65 µm long and 8-10 µm broad. Unilocular sporangia oval and sessile, 15-18 × 20-25 µm. This species was collected at Eceabat and Canakkale, found from April to May, at 0-2 m depth.

Voucher: Canakkale, 28.i.2003, ET, EGE 41018.

Distribution: NE Atlantic Ocean [Rosenvinge & Lund, 1941 as *Ectocarpus tomentosus* (Hudson) Lyngbye; Cardinal, 1964; Parke & Dixon, 1976; Coppejans, 1995; Bartsch & Kuhlenkamp, 2000; Haroun *et al.*, 2002; Rindi & Guiry, 2004], W Atlantic Ocean (Wynne, 1998), Pacific Ocean (Abbott & Hollenberg, 1976; Yoshida *et al.*, 1990), Arctic Ocean (Lindstrom, 2001) and Mediterranean Sea [Turkey (this study), Sicily (Ribera *et al.*, 1992), Greece [Gerloff & Geissler, 1974. According to Athanasiadis (1987), such a record should be confirmed]. [CB].

Note: Rosenvinge & Lund (1941 as *Ectocarpus tomentosus*) and Kuckuck (1960, fig. 6) stated that plurilocular sporangia have recurved stalks. Coppejans (1995) reported three types of plurilocular sporangia in *S. tomentosum*: 1) lateral, curved, sessile or on 1-3 celled stalks, 10-15 µm broad and 40-50 µm long; 2) intercalary, uniseriate; 3) intercalary, pluriseriate.

Streblonema Derbès *et* Solier

Note: Pedersen (1978) showed that the type species (*Streblonema sphaericum*) is probably a microthallus of *Myriotrichia clavaeformis* Harvey.

Streblonema* cf. *parasiticum (Sauvageau) De Toni 1895: 575 **(Figs 10-11)**

Thallus composed of creeping filaments. Plurilocular sporangia 30 µm long, 8-10 µm broad, with 9-10 loculi, usually biseriate, sessile or on 1-celled stalk. Unilocular sporangia not observed. This species was epiphytic on or endophytic in *Punctaria plantaginea* (Roth) Greville. Collected in May at 1-2 m depth.

Voucher: Canakkale, 22.v.2003, ET, EGE 41019.

Distribution: NE Atlantic Ocean (Parke & Dixon, 1976; Athanasiadis, 1996; Benhissoune *et al.*, 2002), W Atlantic Ocean (Wynne, 1998), Mediterranean Sea [Turkey (this study), Sicily and Black Sea (Ribera *et al.*, 1992)] and Aegean Sea (This study). [BA].

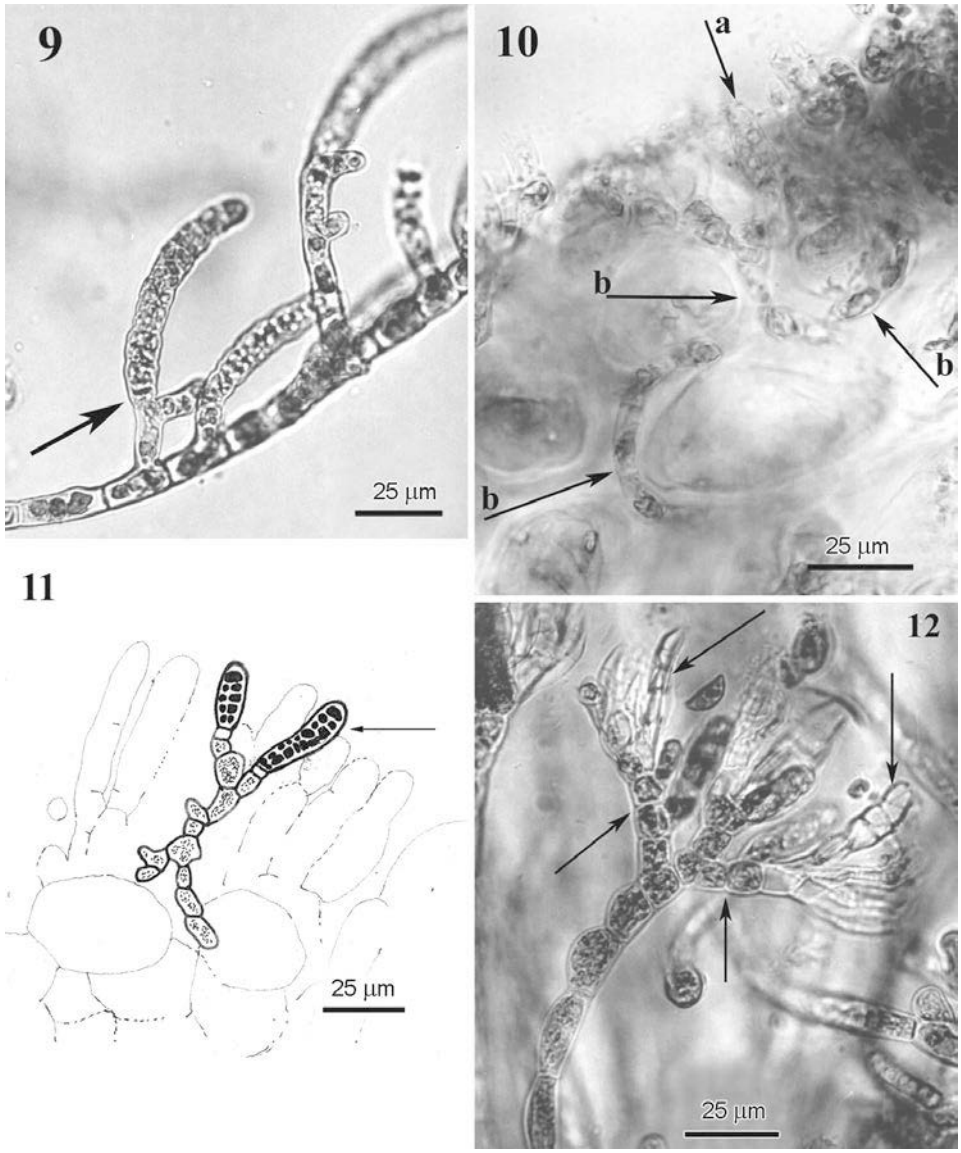
Note: Hamel [1939 as *Entonema parasiticum* (Sauvageau) G. Hamel] reported plurilocular sporangia that are biseriate, sessile or on 1-2 celled stalks, 9-10 broad and 50 µm long. Thallus of the host (*P. plantaginea*) erect, 10-15 cm long, 1-3 cm broad, 6-8 cells in thickness and in transverse section blades to 260 µm thick.

PYLAIELLACEAE Pedersen

Pylaiella Bory de Saint-Vincent

Pylaiella littoralis (L.) Kjellman 1872: 99

Thallus light brown, 10-12 cm long, filamentous with cells containing discoid chloroplasts; irregularly or sometimes oppositely branched; both plurilocular and



Figs 9-12. **9.** *Spongonema tomentosum*, hooked plurilocular sporangia (arrow). **10.** *Streblonema* cf. *parasiticum*, plurilocular sporangia (a) and endophytic filaments in *Punctaria plantaginea* (b) (arrows). **11.** *Streblonema* cf. *parasiticum*, plurilocular sporangia (arrow). **12.** *Cladosiphon contortus*, branched upper assimilatory filament and plurilocular sporangia (arrows).

unilocular sporangia intercalary on the separate plants. Collected at Eceabat and Canakkale; found from March to April; epiphytic on algae at 4-5 m depth.

Voucher: Kilitbahir (Canakkale), 21.iii.2002, ET, EGE 41020.

Distribution: NE Atlantic Ocean (Parke & Dixon, 1976; Cardinal, 1964; Benhissoune *et al.*, 2002; Rindi & Guiry, 2004), W Atlantic Ocean (Wynne, 1998),

Pacific Ocean (Abbott & Hollenberg, 1976), Indian Ocean (Silva *et al.,* 1996), Australia (Clayton, 1974) and Mediterranean Sea [Turkey (Aysel *et al.*, 1993), France (Verlaque, 2001, Spain, Adriatic Sea and Italy (Ribera *et al.,* 1992), Greece [Gerloff & Geissler, 1974. According to Athanasiadis (1987), such a record should be confirmed]. [SC].

Note: The previous Aegean record was reported as *Pylaiella littoralis* f. *fluviatilis* (Kützing) Hauck (Hauck, 1885), an entity based on *Ectocarpus fluviatilis* Kützing that is currently associated with *Ectocarpus siliculosus* (Athanasiadis, 1996).

CHORDARIACEAE Greville

Cladosiphon Kützing

Cladosiphon contortus (Thuret) Kylin 1940: 27 **(Fig. 12)**

Thallus pseudoparenchymatous (haplostichous), brownish, 10-15 cm long, 3-5 mm broad, mucilaginous; phaeophycean hairs present; plurilocular sporangia abundant and unilocular sporangia rare, at the base of the assimilatory filaments. Collected at Eceabat and Canakkale; found from March to July; epiphytic on *Zostera* spp. leaves at 0-5 m depth.

Voucher: Kilitbahir (Canakkale), 21.vi.2003, ET, EGE 41021.

Distribution: NE Atlantic Ocean (Parke & Dixon, 1976; Athanasiadis, 1996) and Mediterranean Sea [Turkey (Ribera *et al.*, 1992; Ozturk, 1993 as *Castagnea contorta* Thuret). Sicily, Adriatic Sea and Black Sea (Ribera *et al.*, 1992)]. [BA].

Cladosiphon irregularis (Sauvageau) Kylin 1940: 29 **(Figs 13 & 14)**

Thallus soft and pseudoparenchymatous, olive green, 10-15 mm long, to 1 mm broad. Medullary cells bearing curved assimilatory filaments up to 300-500 µm long (8-15 cells) and 10 µm broad. Plurilocular sporangia occur abundantly and develop by transformation of the apical cells of the assimilating filaments. They are 40 µm long and 10-15 µm broad, with 6-8 loculi. Unilocular sporangia not observed. Phaeophycean hairs are present. Collected at Ayvalik, found in May, epiphytic on the leaves of *P. oceanica* at 10-12 m depth.

Voucher: Ayvalik (Balikesir), 24.v.2002, ET, EGE 41022.

Distributed only in the Mediterranean Sea: Turkey (this study), Spain, France, Corsica, Italy, Greece and Tunisia (Ribera *et al.*, 1992). [M].

Cladosiphon mediterraneus Kützing 1843: 329

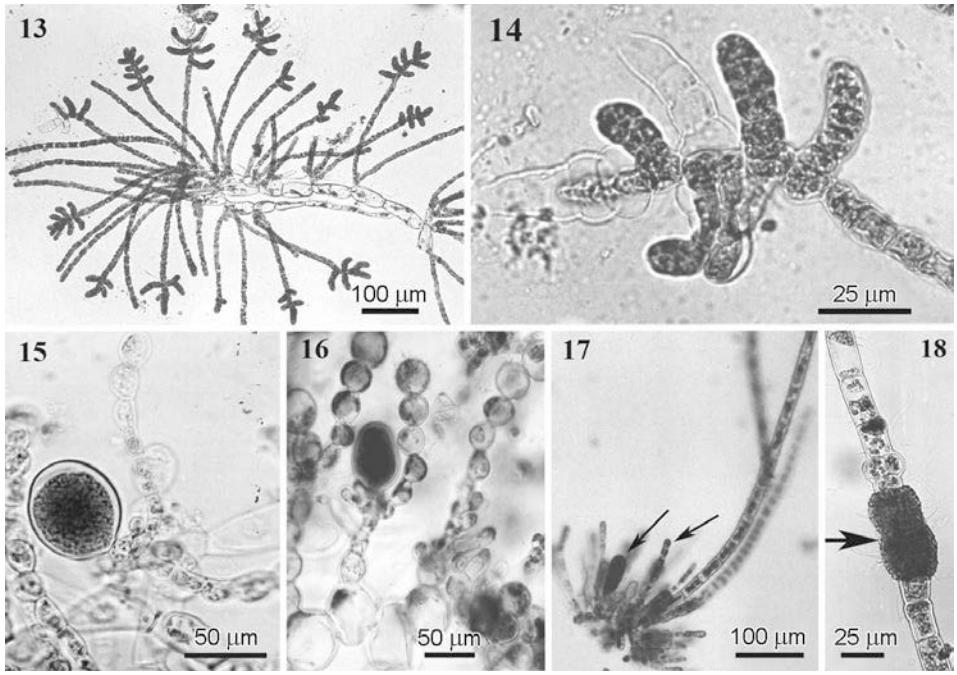
Thallus pseudoparenchymatous, brownish, to 15 cm long, 2-3 mm broad, mucilaginous; phaeophycean hairs present; plurilocular sporangia and unilocular sporangia on the same or separate plants, plurilocular sporangia abundant, borne at the ends of the assimilatory filaments, 15 µm long and 8-10 µm broad. Collected at Eceabat, Canakkale and Ayvalik; found from March to July; epiphytic on both *Zostera* spp. and *P. oceanica* leaves at 0-5 m depth.

Voucher: Ayvalik (Balikesir), 24.iv.2003, ET, EGE 41023.

Distributed only in the Mediterranean Sea: Common (Ribera *et al.*, 1992). [M].

Cladosiphon zosterae (J. Agardh) Kylin 1940: 28

Thallus pseudoparenchymatous, brownish, 15-16 cm long, 3-4 mm broad, mucilaginous; phaeophycean hairs present; plurilocular sporangia and unilocular sporangia known, plurilocular sporangia 45-50 µm long and 12-16 µm broad.



Figs 13-18. **13.** *Cladosiphon irregularis*, assimilatory filaments and plurilocular sporangia. **14.** *Cladosiphon irregularis*, empty plurilocular sporangia. **15.** *Mesogloia lanosa*, assimilatory filaments and unilocular sporangia. **16.** *Mesogloia vermiculata,* assimilatory filaments and unilocular sporangia. **17.** *Elachista fucicola*, paraphyses and unilocular sporangia (arrows). **18.** *Halothrix lumbricalis,* plurilocular sporangia in sori (arrow).

Collected at Eceabat, Canakkale and Ayvalik; found from March to May; epiphytic on *Zostera* spp. leaves at 0-5 m depth.
Voucher: Canakkale, 18.v.2002, ET, EGE 41024.
Distribution: NE Atlantic Ocean (Parke & Dixon, 1976; Haroun *et al.*, 2002; Benhissoune *et al.*, 2002), W Atlantic Ocean (South & Cardinal, 1970) and Mediterranean Sea [Turkey (Ribera *et al.*, 1992; Ozturk, 1993), France (Verlaque, 2001), Sicily and Adriatic Sea (Ribera *et al.*, 1992)]. [BA].

Eudesme J. Agardh

Eudesme virescens (Carmichael *ex* Berkeley) J. Agardh 1882: 31

Thallus pseudoparenchymatous, brownish, 15-20 cm long, 2-3 mm broad, mucilaginous; phaeophycean hairs present; unilocular sporangia abundant, borne at the base of the assimilatory filaments 100-150 µm long and 50-80 µm broad and plurilocular sporangia rare. Collected at Eceabat, Canakkale and Ayvalik; found from March to July; abundant; epiphytic on leaves of *Zostera* spp. at 0-8 m depth.
Voucher: Eceabat (Canakkale), 18.v.2002, ET, EGE 41025.
Distribution: NE Atlantic Ocean (Parke & Dixon, 1976; Athanasiadis, 1996; Bartsch & Kuhlenkamp, 2000; Rindi & Guiry, 2004), W Atlantic Ocean (South & Cardinal, 1970), Pacific Ocean (Yoshida *et al.*, 1990), Indian Ocean (Silva *et al.*, 1996), Arctic Ocean (Lindstrom, 2001) and Mediterranean Sea [Turkey (Ribera *et al.*, 1992; Ozturk, 1993), Italy, Balearic Islands and Black Sea (Ribera *et al.*, 1992)]. [SC].

Note: This species was reported in the Indian Ocean (Rodrigues Island) by Silva *et al.* (1996). This record was considered as a possible misidentification of *Cladosiphon mauritianus* "*mauritianum*" Børgesen by Coppejans *et al.* (2004).

Liebmannia J. Agardh

Liebmannia leveillei J. Agardh 1842: 35

Thallus pseudoparenchymatous, brownish, 10-15 cm long, 3-5 mm broad, mucilaginous; phaeophycean hairs present; plurilocular sporangia and unilocular sporangia on the same or separate plants, both borne at the base of the assimilatory filaments, plurilocular sporangia abundant, stalked, sometimes clustered, 60-120 µm long and 25-30 µm broad. Collected at Eceabat, Canakkale, Geyikli and Ayvalik; found from January to July; abundant; epiphytic on both *Zostera* spp. and *P. oceanica* leaves at 0-10 m depth.

Voucher: Canakkale, 18.v.2002, ET, EGE 41026.

Distribution: NE Atlantic Ocean (Parke & Dixon, 1976; Benhissoune *et al.*, 2002; Haroun *et al.*, 2002) and common in the Mediterranean Sea (Ribera *et al.,* 1992). [BA].

Mesogloia C. Agardh

Mesogloia lanosa P.L. *et* H.M. Crouan 1867: 166 **(Fig. 15)**

Thallus pseudoparenchymatous, brownish, to 10 cm long, mucilaginous; phaeophycean hairs present; only unilocular sporangia known and borne at the base of the assimilatory filaments. Collected at Canakkale and Ayvalik; found in April; epilithic and epiphytic at 0-3 m depth.

Voucher: Canakkale, 24.iv.2003, ET, EGE 41027.

Distribution: NE Atlantic Ocean (Parke & Dixon, 1976) and Mediterranean Sea [Turkey (Ribera *et al.*, 1992; Ozturk, 1993), Italy (Cormaci & Furnari, 1988), Greece and Adriatic Sea (Ribera *et al.*, 1992)]. [BA].

Note: This species differs from *Mesogloia vermiculata* in the moniliform cells of the assimilatory filaments (these progressively becoming larger and spherical towards the apices in *M. vermiculata*) (Hamel, 1935; Athanasiadis, 1987).

Mesogloia vermiculata (J.E. Smith) S.F. Gray 1821: 320 **(Fig. 16)**

Thallus pseudoparenchymatous, brownish, to 15 cm long, mucilaginous; phaeophycean hairs present; only unilocular sporangia known and borne at the base of the assimilatory filaments. Collected at Eceabat, Canakkale and Ayvalik; found from April to May; epiphytic at 0-5 m depth.

Voucher: Canakkale, 17.v.2002, ET, EGE 41028.

Distribution: NE Atlantic Ocean (Athanasiadis, 1996; Bartsch & Kuhlenkamp, 2000; Parke & Dixon, 1976; Rindi & Guiry, 2004; Haroun *et al.*, 2002; Benhissoune *et al.*, 2002) and Mediterranean Sea [Turkey (Ozturk, 1993), Spain, France, Italy, Adriatic Sea and Tunisia (Ribera *et al.,* 1992)]. [BA].

Note: Hamel (1935) stated that this species differs from *Liebmannia leveillei* in having only unilocular sporangia (only plurilocular in *L. leveillei*).

Sauvageaugloia G. Hamel *ex* Kylin

Sauvageaugloia griffithsiana (Greville *ex* W. Hooker) G. Hamel *ex* Kylin 1940: 33

Thallus pseudoparenchymatous, brownish, to 10-12 cm long, 1-2 mm broad, mucilaginous; phaeophycean hairs present; only unilocular sporangia

known and borne at the base of the assimilatory filaments. Collected at Eceabat, Canakkale and Ayvalik; found from March to May; epiphytic on *P. oceanica* leaves at 0-2 m depth.

Voucher: Canakkale, 24.iv.2003, ET, EGE 41029.

Distribution: NE Atlantic Ocean (Parke & Dixon, 1976; Bartsch & Kuhlenkamp, 2000; Benhissoune *et al.*, 2002), Indian Ocean coast of Australia (Silva *et al.*, 1996) and common in the Mediterranean Sea (Ribera *et al.,* 1992). [CBA].

Note: Guiry *et al.* (2005) consider *S. chordariaeformis* (P.L. & H.M. Crouan) Kylin and *S. divaricata* (Clemente) Cremades as synonyms of *S. griffithsiana*. If such a synonymy was accepted, the species should be named *S. divaricata* since *Ulva divaricata* Clemente (1807) is the oldest available name.

However, Cremades (in Cremades & Pérez-Cirera, 1990) when proposing the new combination *S. divaricata*, listed in the synonyms *S. chordariaeformis* and not *S. griffithsiana*, presumably indicating a distinction between *S. divaricata* and *S. griffithsiana*. This taxonomic viewpoint is shared by Benhissoune *et al.* (2002).

It should be noted that *S. griffithsiana* contains unilocular sporangia only [Hamel, 1935 as *Mesogloia griffithsiana* Greville *ex* W. Hooker and Kuckuck, 1929 as *Castagnea griffithsiana* (Greville *ex* W. Hooker) J. Agardh], whereas *S. chordariaeformis* has both plurilocular and unilocular sporangia [Hamel, 1935 as *Castagnea chordariaeformis* (P.L. *et* H.M. Crouan) Thuret and Kuckuck, 1929 as *Castagnea chordariaeformis*].

ELACHISTACEAE Kjellman

Elachista Duby

Elachista fucicola (Velley) Areschoug 1842: 235 **(Fig. 17)**

Thallus medium to dark brown, brush-like tufts, epiphytic, with erect filaments uniseriate, to 10 mm long, the cells of erect filaments 40 µm long, 10-12 µm broad. Each cell contains discoid chloroplasts. Paraphyses arising directly from basal layer, simple, slightly curved, to 100 µm long, 5-6 celled. Unilocular sporangia common, at the base of the assimilating filaments, pyriform, 60 µm long and 30 µm broad. Plurilocular sporangia not observed. Phaeophycean hairs absent. This species was collected at Ayvalik, found in March, epiphytic on *Cystoseira barbata* (Stackhouse) C. Agardh at 1-2 m depth.

Voucher: Ayvalik (Balikesir), 22.iii.2003, ET, EGE 41030.

Distribution: NE Atlantic Ocean (Parke & Dixon, 1976; Coppejans, 1995; Athanasiadis, 1996; Bartsch & Kuhlenkamp, 2000; Rindi & Guiry, 2004), W Atlantic Ocean (Wynne, 1998), Pacific Ocean (Abbott & Hollenberg, 1976; Uwai *et al.*, 2000) and Mediterranean Sea [Turkey (this study), Italy (Cecere *et al.*, 1996), Adriatic Sea and Black Sea (Ribera *et al.*, 1992)] and Aegean Sea (This study). [AP].

Halothrix Reinke

Halothrix lumbricalis (Kützing) Reinke 1888: 19 **(Fig. 18)**

Thalli epiphytic on both *Zostera* spp. and *Posidonia oceanica* leaves, 5-8 mm long, cells of erect filament containing several discoid chloroplasts; the characteristic plurilocular sporangia in sori in the assimilating filaments,

phaeophycean hairs and unilocular sporangia unknown. Collected at all sites; found from January to July; abundant; at 0-3 m depth.

Voucher: Canakkale, 20.iii.2003, ET, EGE 41031.

Distribution: NE Atlantic Ocean (Parke & Dixon, 1976; Fletcher, 1987; Athanasiadis, 1996), W Atlantic Ocean (South & Cardinal, 1970), Pacific Ocean (Yoshida *et al.*, 1990) and Mediterranean Sea [Turkey (Ribera *et al.*, 1992; Ozturk, 1993), France (Verlaque, 2001), Italy (Ribera *et al.*, 1992)]. [AP].

Note: Pedersen (1979) stated that *Halothrix lumbricalis* has a direct type of life history. Swarmers from the plurilocular sporangia germinate without copulation into sterile prostrate systems from which develop new erect filaments again bearing plurilocular sporangia. Unilocular sporangia are unknown (Pedersen, 1979). This species is generally rare in the Mediterranean Sea, but it occurs abundantly in our area.

GIRAUDIACEAE G. Hamel *ex* J. Feldmann

Giraudia Derbès *et* Solier

Giraudia sphacelarioides Derbès *et* Solier 1851: 101

Thalli epiphytic on both *Zostera* spp. and *Posidonia oceanica* leaves, 10 mm long; phaeophycean hairs present, terminal or lateral, only plurilocular sporangia known. Collected at all sites; found from March to November; at 0-3 m depth; abundant.

Voucher: Canakkale, 20.iii.2003, ET, EGE 41032.

Distribution: NE Atlantic Ocean (Parke & Dixon, 1976; Athanasiadis, 1996; Haroun *et al.*, 2002), W Atlantic Ocean (South & Cardinal, 1970), Indian Ocean coast of Australia (Silva *et al.*, 1996) and common in the Mediterranean Sea (Ribera *et al.,* 1992). [IA].

Note: We have observed three types of plurilocular sporangia in the Turkish plants: 1) basal, simple or branched, clustered, stalked, multiseriate, at the base of the assimilating filaments 2) lateral, elongate, clustered, from 1-4 peripheral cells of axis 3) arising by divisions of the peripheral cells near the apices surrounding the axis ("manchon"-like).

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