

Marine Algae and Seagrasses of Antalya Coastline (Mediterranean, Turkey)

Antalya Sahillerinde Deniz Algeri ve Deniz Çayırları

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Abstract

In this study, the upper infralittoral zone of Antalya (Turkish Mediterranean coast) was studied. 375 algae and five seagrasses were determined. There are (36 taxon) blue-green algae (*Cyanophyceae*), (198 taxon) red algae [*Rhodellophyceae* (1), *Compsopogonophyceae* (2), *Bangiophyceae* (5), *Florideophyceae* (190)], (74 taxon) brown algae (*Fucophyceae*), (67 taxon) green algae [*Chlorophyceae* (4), *Ulvophyceae* (18), *Cladophorophyceae* (23), *Bryopsidophyceae* (20), *Dasycladophyceae*(2)] and (5 taxon) seagrasses (*Liliopsida*). *Bonnemaisonia clavata* G. Hamel (*Rhodophyceae*) was given as new record for the Turkish Marines. *Leibleinia epiphytica* (Hieronymus) Anagnostidis and Komárek, *Microchaete grisea* Thuret, *Calothrix scopulorum* (Weber van Bosse and Mohr) C. Agardh (*Cyanophyceae*), *Gelidiocolax christinae* J. Feldman et G. Feldman, *Falkenbergia hildenbrandii* (Bornet) Falkenberg, *Hydrolithon farinosum* var. *chalicodictyum* (W.R. Taylor) Serio, *Acrodiscus vidovichii* (Meneghini) Zanardini, *Ceramium codii* (Richards) Feldmann Mazoyer, *Chondria mairei* Feldmann Mazoyer, *Polysiphonia paniculata* Montagne (*Rhodophyceae*) and *Ulva curvata* (Kützing) De Toni (*Ulvophyceae*) were given as new record for the Turkish coast of Mediterranean.

Key Words: Blue-green algae, red algae, brown algae, green algae, seagrasses, Antalya, Mediterranean, Turkey.

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Introduction

The first investigations of the Turkish Mediterranean algae were carried out by Ünal (1968-1970). Apaydın *et al.* (2002) published a new record for The Algal Flora of Turkey: *Chaetomorpha crassa* (C. Agardh) Kützing (Cladophoraceae, Chlorophyceae). Aysel and Gezerler-Şıpal (1996) published the check list of *Cyanophyceae*, *Chlorophyceae*, *Charophyceae* and *Angiospermae* of Turkish Mediterranean coast. Aysel (1997a, b) studied the check list of *Rhodophyta*, *Fucophyceae* and *Phaeophyceae* of the Turkish Mediterranean coast. Patara- Kalkan was investigated by Aysel *et al.* (1998). Aysel *et al.* (2002) published a new record for The Algal Flora of Turkey: *Caulerpa scalpelliformis* (R. Brown ex Turner) C. Agardh var. *denticulata* (Dacaisne) Weber van Bosse (*Caulerpaceae*, *Caulerpales*). Muğla was investigated Aysel *et al.* (2003). Aysel *et al.* (2005a,b,c) studied the distribution of marine macro algae in Adana, Hatay and Mersin shores. Cirik studied distribution of the marine algae in Akkuyu coast in 1986 and 1991. Cirik and Öztürk (1991) published about *Caulerpa racemosa* that distribution on Turkish Mediterranean coast. Ertan *et al.* published a new record for The Algal Flora of Turkey; *Caulerpa scalpelliformis* (Brown and Turner C. Agardh (*Caulerpaceae*, *Chlorophyceae*) in 1998. Everset *et al.* (1997) investigated macroscopic marine algae of the İskenderun Bay. Öztürk investigated distribution of *Cutleriales*, *Sphacelariales*, *Scytosiphonales*, *Dictyotales* (1988), and *Chordariales*, *Sporochnales* (1993), *Fucales* (1996a) and *Punctariales* (1996b) in the Aegean Sea and the Turkish Mediterranean coast. Öztürk and Güner (1986) studied on *Ectocarpales* (*Phaeophyta*) in the Aegean Sea and the Turkish Mediterranean coast., Taşkın *et al.* (2000a,b) investigated distribution of *Rhodophyta*, *Cyanophyceae* and *Chlorophyceae* in the İskenderun Gulf (Hatay coast). Taşkın *et al.* (2001) published three new record for The Algal Flora of Turkey. Turna *et al.* (2000a) published a new record for the Algal Flora of Turkey; *Botryocladia madagascariensis* G. Feldmann (*Rhodymeniaceae*, *Rhodophyceae*). Turna *et al.* (2000b) studied on distribution of *Chlorophyta* on Antalya bay. Turna *et al.* (2002) studied on seasonal variations in the Biomass of Macro-Algal Communities for the Gulf of Antalya. Turna *et al.* (2003) investigated distribution of Brown algae and Red algae in Antalya Bay

(Mediterranean). Yağcı and Turna (2002) published a new record for The Algal Flora of Turkey; *Chaetomorpha crassa* (C.Agardh) Kützing (*Cladophoraceae*, *Chlorophyceae*).

Material and Methods

Collected specimens were fixed by using 4 % formaldehyde. Specimens belonging to *Rhodomelaceae* and *Corallinaceae* were exceptionally treated with 10 % HCl in identification procedures for specific cell wall properties. Antalya is situated between 29° 16' 23" and 32° 33' 42" East longitudes (Figure 1).



Figure 1: Map of Antalya coastline

The distribution of algae on the Turkish marine that newly recorded for the Turkish coast of Mediterranean is given in Figure 3 [Artvin (1), Rize (2), Trabzon (3), Giresun (4), Ordu (5), Samsun (6), Sinop (7), Kastamonu (8), Bartın (9), Zonguldak (10), Düzce (11), Sakarya (12), Kocaeli (13), İstanbul (14), Kırklareli (15), Tekirdağ (16), Edirne (17), Çanakkale (18), Balıkesir (19), Bursa (20), Yalova (21), Gökçeada (22), Bozcaada (23), İzmir (24), Aydın (25), Muğla (26), Antalya (27), Mersin (28), Adana (29), Hatay (30)].

Results

Taxa distributed in the study area are listed in Table 1. In this list, classes and upper categories were arranged according to Van den Hoek *et al.* (1997) and Guiry and Dhonncha (2005). Arrangement of lower categories, presented in the list were followed by specialists [(Silva *et al.* (1996) for *Cyanophyta* and *Rhodophyta*, Stegenga (1985) for *Acrochaetiales*, Frederic and Hommersand (1989) for *Gracilariales*, Bressan and Babbini-Benussi (1995, 1996) for *Corallinales*, Gomez Garreta *et al.* (2001) for *Ceramiales*, Ribera *et al.* (1992) for *Fucophyceae*, Gallardo *et al.* (1993) for *Chlorophyceae*]. Additionally, the studies of Barbara and Cremades (1996), Ballantine and Aponte (1997) and Hardy and Guiry (2003) were used to create an evolutionary list of taxa above genus level. Taxa in species or below species level are listed alphabetically. New records for the Turkish Marines (***) and the Turkish coast of Mediterranean (*) are indicated with asteriks.

Table 1: Taxa distributed in Antalya (Mediterranean) coast of Turkey. (**): Türkish marines, (*): Turkish coasts of Mediterranean.

CYANOPHYTA	Foslie) Silva
[=CYANOBACTERIA]	
CYANOPHYCEAE	MERISMOPEDIACEAE
CHROOCOCCALES	GOMPHOSPHAERIOIDEAE
CHROOCOCCACEAE	<i>Gomphosphaeria aponina</i> Kützing
<i>Chroococcus dimidiatus</i> (Kützing)	
Nägeli	MERISMOPEDIOIDEA
<i>C. minor</i> (Kützing) Nägeli	<i>Aphanocapsa litoralis</i> Hansgirg
<i>C. minutus</i> (Kützing) Nägeli	(= <i>Microcystis halophila</i> B. Martens and Pankow)
DERMOCARPACEAE	OSCILLATORIALES
<i>Dermocarpa acervata</i> (Setchell and Gardner) Pham Hoàng Hô	OSCILLATORIACEAE
<i>D. schousboei</i> (Thuret) Bornet	<i>Leptolyngbya foveolarum</i>
	(Montagne ex Gomont)
	Anagnostidis and Komárek
HYELLACEAE	<i>Lyngbya adriae</i> Ercégovic
<i>Pleurocapsa crepidinum</i> Collins	<i>L. agardhii</i> (P.L. Crouan and H.M. Crouan) Gomont
	<i>L. confervoides</i> C. Agardh
MICROCYSTACEAE	<i>L. majuscula</i> (Dilliwyn) Harvey
<i>Gloeocapsa crepidinum</i> Thuret	
<i>Microcystis marina</i> (Hansgrig in	

L. polychroa (Meneghini)
Rabenhorst

Oscillatoria margaritifera Kützing
ex Gomont

O. miniata (Zanardini) Gomont

PHORMIDIOIDEAE

Phormidium autumnale C. Agardh
(Gomont)

P. limosum (Dillwyn) P.C. Silva

P. subfuscum Kützing ex Gomont

SPIRULINOIDEAE

Spirulina subsalsa Oersted

PSEUDOANABAENACEAE

Spirocoleus tenuis (Meneghini)
Silva

HETEROLEIBLEINIOIDEAE

Heteroleibleinia infixa (Frémy)
Anagnostidis and Komárek

LEPTOLYNGBYOIDEAE

Leibleinia baculum (Gomont)
Hoffmann

**L. epiphytica* (Hieronymus)
Anagnostidis and Komárek

L. williei (Setchell and Gardner) Silva

SCHIZOTHRICHACEAE

Schizothrix lacustris (Braun)
Gomont

NOSTOCALES

MICROCHAETACEAE

MICROCHAETOIDEAE

**Microchaete grisea* Thuret

RIVULARIACEAE

Calothrix aeruginea (Kützing)
Thuret

C. contarenii (Zanardini) Bornet and
Flahault

C. parasitica (Chauvin) Thuret
**C. scopulorum* (Webervan Bosse
and Mohr) C. Agardh

C. thermalis (Schwabe) Hasngirg

Isactis plana (Harvey) Thuret ex
Bornet and Flahault

Rivularia atra Roth ex Bornet and
Flahault

RHODOPHYTA

RHODELLOPHYTINA

RHODELLOPHYCEAE

STYLONEMATALES

STYLONEMATACEAE

Stylonema alsidii (Zanardini)
K. Drew

COMPSOPOGONOPHYCEAE

ERYTHROPELTIDALES

ERYTHROTRICHIACEAE

Erythrotrichia carnea (Dillwyn)
J. Agardh

Sahlingia subintegra (Rosenvinge)
Kornmann

MACRORHODOPHYTINA

BANGIOPHYCEAE

BANGIOPHYCIDAE

GONIOTRICHALES

GONIOTRICHACEAE

Chroodactylon ornatum
(C. Agardh) Basson

BANGIALES

BANGIACEAE

Bangia atropurpurea (Roth)
C. Agardh

Porphyra leucosticta Thuret in
Le Jolis

f. *leucosticta*

P. minor Zanardini

P. umbilicalis (Linnaeus) Kützing

FLORIDEOPHYCEAE**HILDENBRANDIOPHYCIDAE****HILDENBRANDIALES****HILDENBRANDIACEAE***Hildenbrandia rubra* (Sommerfelt)

Meneghini

NEMALIOPHYCIDAE**ACROCHAETIALES****ACROCHAETIACEAE***Acrochaetium crassipes* (Børgesen)

Børgesen

A. hallandicum (Kyllin) Hamel*A. mediterraneum* (Levring)

Boudouresque

A. microscopicum (Nägeli ex

Kützing) Nägeli

A. parvulum (Kyllin) Hoyt*A. rosulatum* (Rosenvinge)

Papenfuss

A. savianum (Meneghini) Nägeli*A. secundatum* (Lyngbye) Nägeli*A. virgatulum* (Harvey) Batters**COLACONEMATALES****COLACONEMATACEAE***Colaconema codicola* (Børgesen)

Stegenka, Bolton and Anderson

C. daviesii (Dillwyn) Stegenga**NEMALIALES****GALAXAURACEAE***Scinaia furcellata* (Turner)

J. Agardh

Tricleocarpa cylindrica (Ellis

and Solander) Huisman and

Borowitzka

T. fragilis (Linnaeus) Huisman and

Townsend

LIAGORACEAE*Ganonema farinosum* (Lamouroux)

Fan and Wang

Liagora distenta (Mertens ex Roth)

Lamouroux

L. viscida (Forsskål) C. Agardh**NEMALIACEAE***Nemalion helminthoides* (Velley)

Batters

RHODYMENIOPHYCIDAE**GELIDIALES****GELIDIACEAE***Gelidium affine* Schiffner*G. corneum* (Hudson) Lamourouxvar. *pectinatum* Ardissonne and
Strafforello*G. crinale* (Hare ex Turner) Gaillonvar. *crinale**G. pulchellum* (Turner) Kützing*G. pusillum* (Stackhouse) Le Jolisvar. *pusillum**G. spathulatum* (Kützing) Bornet*G. spinosum* (Gmelin) Silvavar. *spinosum*var. *hystrix* (J. Agardh) Furnarivar. *luxurans* (P.L. et H.M.Crouan) *nov. nomen**Pterocliadiella capillacea* (Gmelin)

Santelices and Hommersand

f. *capillacea***GELIDIPELLACEAE***Gelidiella lubrica* (Kützing)

Feldmann and Hamel

G. nigrescens (Feldmann) Feldmann

and Hamel

G. ramellosa (Kützing) Feldmann

and Hamel

Parviphycus antipai (Celan)

Santelices

P. tenuissimus (Feldmann and

Hamel) Santelices

GRACILARIALES**GRACILARIACEAE***Gracilaria bursapastoris* (Gmelin)

Silva
G. gracilis (Stackhouse) Steentoft,
Irvine and Farnham
var. *gracilis*

PTEROCLADIOPHILACEAE

**Gelidiocolax christinae* J. Feldman
et G. Feldman IL, M

BONNEMAISONIALES

BONNEMAISONIACEAE

***Bonnemaisonia clavata* G. Hamel
**Falkenbergia hildenbrandii*
(Bornet) Falkenberg
F. rufolanosa (Harvey) Schmitz
Trailliella intricata Batters

CORALLINALES

CORALLINACEAE

AMPHIROIDEAE

Amphiroa beauvoisii Lamouroux
A. cryptarthrodia Zanardini
A. rigida Lamouroux

CHOREONEMATOIDEAE

Choreonema thuretii (Bornet)
Schmitz

CORALLINOIDEAE

CORALLINEAE

Corallina elongata Ellis and Solander
C. panizzoi Schnetter and U. Richter
C. pinnatifolia (Manza) Dawson

JANIEAE

Haliptilon roseum (Lamarck)
Garbary and Johansen
var. *roseum*
H. squamatum (Linnaeus)
Johansen, Irvine and Webster
H. virgatum (Zanardini) Garbary and
Johansen
Jania adhaerens J.V. Lamouroux
J. longifurca Zanardini

J. rubens (Linne) Lamouroux
var. *rubens*
var. *corniculata* (Linnaeus) Yendo

MASTOPHOROIDEAE

Hydrolithon farinosum

(Lamouroux) D. Penrose and
Chamberlain
var. *farinosum*
* var. *chalicodictyum*
(W.R. Taylor) Serio

LITHOPHYLLOIDEAE

Lithophyllum cystoseirae (Hauck)

Heydrich

L. tortuosum (Esper) Foslie

f. *tortuosum*

f. *undulosum* (Bory de
Saint-Vincent) nov. comb.

Titanoderma pustulatum

(Lamouroux) Nägeli

MELOBESIOIDEAE

Melobesia membranacea (Esper)

Lamouroux sensu Chamberline and
Irvine

Mesophyllum expansum

(Philippi) Cabioch and Mendoza

M. lichenoides (Ellis) Lemoine

Phymatolithon lenormandii

(Areschoug) Adey

GIGARTINALES

ACROSYMPHYTACEAE

Acrosymphyton purpuriferum

(J. Agardh) Sjostedt

CALOSIPHONACEAE

Calosiphonia vermicularis

(J. Agardh) Schmitz

DUMONTIACEAE

Dudresnaya verticillata (Withering)

Le Jolis

FURCELLARIACEAE*Halarachnion ligulatum*

(Woodward) Kützing

GIGARTINACEAE*Chondracanthus acicularis* (Roth)

Fredericq

HYPNEACEAE*Hypnea divaricata* (C. Agardh)

Greville

H. musciformis (Wulfen in Jaquin)

Lamouroux

KALLYMENIACEAE*Kallymenia requienii* (J. Agardh) J.

Agardh

Meredithia microphylla (J. Agardh)

J. Agardh

PEYSSONNELICEAE*Metapeyssonnelia feldmannii*Boudouresque, Coppejans and
Marcot*Peyssonnelia bornetii*

Boudouresque and Denizot

P. coriacea Feldmann*P. crispata* Boudouresque and

Denizot

P. rubra (Greville) J. Agardh*P. squamaria* (Gmelin) Decaisne**PHYLLOPHORACEAE***Gymnogongrus palmettoides*

(J. Agardh) Ardissonne

Phyllophora crista (Hudson) Dixonf. *crispa**P. sicula* (Kützing) Guiry and Irvine**RHABDONIACEAE***Catenella caespitosa* (Withering)

Irvine in Parke and Dixon

NEMASTOMACEAE*Nemastoma dichotomum* J. Agardh**SCHIZYMENIACEAE***Platoma cyclocalpa* (Montagne)

Schmitz

SPHAEROCOCCACEAE*Sphaerococcus coronopifolius*

Stackhouse

WURDEMANNIACEAE*Wurdemannia miniata* (Sprengel)

Feldmann and Hamel

RHODYMENIALES**RHODYMENIACEAE***Botryocladia botryoides* (Wulfen)

Feldmann

B. chiajeana (Meneghini) Kylin*B. madagascariensis* G. Feldmann*B. microphysa* (Hauck) Kylin*Chrysymenia ventricosa*

(Lamouroux) J. Agardh

Rhodymenia ardissoni J. Feldmannvar. *ardissoni*var. *spathulata* (Schiffner) nov.
comb.*R. ligulata* Zanardini*R. pseudopalmata* (Lamouroux)

Silva

CHAMPIACEAE*Champia parvula* (C. Agardh)

Harvey

Chylocladia verticillata (Lightfoot)

Bliding

LOMENTARIACEAE*Lomentaria articulata* (Hudson)

Lyngbye

var. *articulata**L. clavellosa* (Turner) Gaillon

HALYMENIALES

GRATELOUPIACEAE

- Grateloupia dichotoma* J. Agardh
G. filicina (Lamouroux) C. Agardh
G. prolongata J. Agardh

HALYMENIACEAE

- **Acrodiscus vidovichii* (Meneghini)
Zanardini IL, CL, M
Halymenia floresii (Clemente
Rubio) C. Agardh

PLOCAMIALES

PLOCAMIACEAE

- Plocamium cartilagineum* Linnaeus
(Dixon)

CRYPTONEMIALES

CRYPTONEMACEAE

- Cryptonemia lomation* (Bertoloni)
J. Agardh

CERAMIALES

CERAMIACEAE

CALLITHAMNIOIDEAE

CALLITHAMNIEAE

- Aglaothamnion caudatum*
(J. Agardh) Feldmann Mazoyer
A. hookeri (Dillwyn) Maggs
and Hommersand
A. tenuissimum (Bonnemaison)
Feldmann Mazoyer
var. *tenuissimum*
Callithamnion corymbosum (Smith)
Lyngbye
C. granulatum (Ducluzeau)
C. Agardh

GYMNOTHAMNIEAE

- Gymnothamnion elegans*
(Schousboe ex C. Agardh)
J. Agardh

CERAMOIDEAE

ANTITHAMNIEAE

Antithamnion cruciatum

- (C. Agardh) Nägeli
var. *cruciatum*

CERAMIEAE

Ceramium ciliatum (Ellis)

- Ducluzeau
var. *ciliatum*
var. *robustrum* (J. Agardh)
Mazoyer
C. circinatum (Kützinger) J. Agardh
**C. codii* (Richards)
Feldmann Mazoyer
C. deslongchampsii Chauvin
ex Duby
C. flaccidum (Kützinger) Ardissonne
C. rubrum auctororum
var. *rubrum*
C. siliquosum (Kützinger) Maggs and
Hommersend
var. *siliquosum*
var. *elegans* (Roth) Furnari
C. tenerrimum (G. Martens)
Okamura
var. *tenerrimum*
var. *brevizonatum* (Peterson)
Feldmann Mazoyer
Centroceras clavulatum
(C. Agardh) Montagne

CROUANIEAE

- Crouania attenuata* (C. Agardh)
J. Agardh

GRIFFITHSIEAE

- Anotrichium barbatum* (C. Agardh)
Nägeli
A. tenue (C. Agardh) Nägeli
Griffithsia devoniensis Harvey
G. phyllamphora J. Agardh
G. schousboei Montagne
var. *schousboei*

PTEROTHAMNIEAE

Pterothamnion plumula (Ellis)
Nägeli

SPYRIDEAE

Spyridia filamentosa (Wulfen)
Harvey in W.J. Hooker

WRANGELIEAE

Wrangelia penicillata (C. Agardh)
C. Agardh

COMPSOTHAMNIOIDEAE

COMPSOTHAMNIEAE

Compsothamnion thuyoides (J.E.
Smith) Schmitz

SPERMOTHAMNIEAE

Lejolisia mediterranea Bornet
Ptilothamnion pluma (Dillwyn)
Thuret
Spermothamnion flabellatum Bornet

SPONGOCLONIEAE

Pleonosporium borrieri (J.E. Smith)
Nägeli

DASYACEAE

Dasya corymbifera J. Agardh
D. hutchinsiae Harvey in W.J.
Hooker
D. punicea (Zanardini) Meneghini
ex Zanardini
D. rigidula (Kützing) Ardissonne
Heterosiphonia crispella
(C. Agardh) Wynne

HYPOGLOSSEAE

Hypoglossum hypoglossoides
(Stackhouse) Collins and Harvey

NITOPHYLLOIDEAE

NITOPHYLLEAE

Nitophyllum punctatum (Stackhouse)

Greville

var. *punctatum*
Radicilingua thysanorhizans
(Holmes) Papenfuss

PHYCODRYOIDEAE

CRYPTOPLEUREAE

Acrosorium ciliolatum (Harvey)
Kyllin

RHODOMELACEAE

AMANSIEAE

Halopithys incurva (Hudson)
Batters
Osmundaria volubilis (Linnaeus)
R.E. Norris
Rytiphlaea tinctoria (Clemente)
C. Agardh

CHONDRIEAE

Acanthophora nayadiformis
(Delilei) Papenfuss
Chondria capillaris (Hudson)
Wynne
var. *capillaris*
C. dasyphylla (Woodward)
C. Agardh
**C. mairei* Feldmann Mazoyer

LAURENCIEAE

Chondrophycus paniculatus
(C. Agardh) Furnari
C. papillosus (C. Agardh) Garbary
and J. Harper
Erythrocyctis montagnei (Derbès
and
Solier) Silva
Laurencia glandulifera (Kützing)
Kützing
L. obtusa (Hudson) Lamouroux
var. *obtusa*
var. *gracilis* (Kützing) Hauck
var. *laxa* (Kützing) Ardissonne
L. pyramidalis Bory

de SaintVincent ex Kützing
Osmundea pelagosae (Schiffner)
Nam
Rodriguezella strafforelloi Schmitz
ex J.J.Rodriguez
var. *crassicaulis* Ercegovic

POLYSIPHONIEAE

Alsidium corallinum C. Agardh
A. helminthochorton
(Schwendimann) Kützing
Digenea simplex (Wulfen)
C. Agardh
Herposiphonia secunda
C. Agardh) Ambronn
f. *secunda*
f. *tenella* (C. Agardh) Wynne
Lophocladia lallemandii
(Montagne) Schmitz
Lophosiphonia cristata Falkenberg
L. obscura (C. Agardh) Falkenberg
L. scopulorum (Harvey) Womersley
L. subadunca (Kützing) Falkenberg
Polysiphonia atra Zanardini
P. elongata (Hudson) Sprengel
P. kellneri Zanardini
P. opaca (C. Agardh) Moris and
De Notaris
**P. paniculata* Montagne
P. sanguinea (C. Agardh) Zanardini
P. sertularioides (Grateloup)
J. Agardh
P. tenerrima Kützing
P. tripinnata J. Agardh
P. variegata (C. Agardh) Zanardini

POLYZONIEAE

Dipterosiphonia rigens (Shousboei)
Falkenberg

PTEROSIPHONIEAE

Pterosiphonia pennata (C. Agardh)
Sauvageau

OCHROPHYTA

[=HETEROKONTOPHYTA]

FUCOPHYCEAE

ECTOCARPALES

ECTOCARPACEAE

Ectocarpus siliculosus (Dillwyn)

Lyngbye

var. *siliculosus*

E. virescens Thuret ex Sauvageau

Feldmannia caespitula (J. Agardh)

KnoepfflerPéguy

var. *caespitula*

var. *lebelii* (Areschoug ex

P.L. Crouan) Knoepffler Péguy

F. irregularis (Kützing) Hamel

F. globifera (Kützing) Hamel

F. padinae (Buffham) Hamel

Hincksia mitchelliae (Harvey) Silva

Streblonema sphaericum (Derbès
and

Solier) Thuret

CHORDARIALES

MYRIONEMATACEAE

Myrionema strangulans Greville

ELACHISTACEAE

Halothrix lumbricalis (Kützing)

Reinke

LEATHESIACEAE

Leathesia mucosa Feldmann

CORYNOPHLAEACEAE

Corynophlaea umbellata

(C. Agardh) Kützing

Myriactula arabica (Kützing)

Feldmann

M. rivulariae (Shur) Feldmann

SPERMATOCHNACEAE

Spermatochnus paradoxus (Roth)

Kützing

Stilophora tenella (Esper) Silva

CHORDARIACEAE

- Cladosiphon mediterraneus*
Kützing
Liebmannia leveillei J. Agardh
Sphaerotrichia divaricata
(C. Agardh) Kylin

RALFSIALES

RALFSIACEAE

- Hapalospongidion macrocarpum*
(Feldmann) León Álvarez
and González
Ralfsia verrucosa (Areschoug)
Areschoug

CUTLERIALES

CUTLERIACEAE

- Cutleria chilosa* (Falkenberg) Silva
C. multifida (Turner) Greville
Zanardinia typus (Nardo) Furnari

SPHACELARIALES

SPHACELARIACEAE

- Sphacelaria cirrosa* (Roth)
C. Agardh
f. *cirrosa*
f. *mediterranea* Sauvageau
S. fusca (Hudson) S.F. Gray
S. rigidula Kützing
S. tribuloides Meneghini

STYPOCAULACEAE

- Halopteris filicina* (Grateloup)
Kützing
H. scoparia Linnaeus Sauvageau

CLADOSTEPHACEAE

- Cladostephus spongiosus* (Hudson)
C. Agardh
f. *verticillatus* (Lightfoot)
Prod'homme van Reine

DICTYOTALES

DICTYOTACEAE

- Dictyopteris polypodioides*
(De Candolle) Lamouroux
Dictyota dichotoma (Hudson)
Lamouroux
var. *intricata* (C. Agardh)
Greville
D. fasciola (Roth) Lamouroux
var. *fasciola*
var. *repens* (J. Agardh) Ardissonne
D. linearis (C. Agardh) Greville
f. *linearis*
D. mediterranea (Schiffner) Furnari
var. *mediterranea*
var. *crassa* (Schiffner) V Aysel,
H Erduğan, EŞ Okudan, H Erk
D. menstrualis (Hoyt) Schnetter,
Hornig and WeberPeukert
var. *menstrualis*
D. spiralis Montagne
Padina pavonica (Linnaeus) Thivy
Styopodium schimperi (Buchinger
ex Kützing) Verlaque and
Boudouresque
Taonia atomaria (Woodward)
J. Agardh
f. *atomaria*
f. *ciliata* (C. Agardh)
Nizamuddin
Zonaria tournefortii (Lamouroux)
Montagne

DICTYOSIPHONALES

MYRIOTRICHIAEAE

- Myriotrichia clavaeformis* Harvey

GIRAUDIACEAE

- Giraudia sphacelarioides* Derbès
and Solier

ASPEROCOCCACEAE

- Asperococcus bullosus* Lamouroux
f. *bullosus*
A. fistulosus (Hudson) W.J. Hooker

PUCTARIALES

PUNCTARIACEAE

Punctaria latifolia Greville

SCYTOSIPHONALES

COLPOMENIACEAE

Colpomenia sinuosa (Mertens ex
Roth) Derbès and Solier

Hydroclathrus clathratus
(C. Agardh) Howe

SCYTOSIPHONACEAE

Petalonia fascia (Müller) Kuntze

Scytosiphon simplicissimus
(Clemente) Cremades
var. *simplicissimus*

FUCALES

CYTOSEIRACEAE

Cystoseira amentacea Bory
var. *amentacea*

var. *stricta* Montagne

C. barbata (Stackhouse) C. Agardh
var. *barbata*

C. compressa (Esper) Gerloff and
Nizamuddin
f. *compressa*

C. corniculata (Turner) Zanardini
var. *corniculata*

C. crinita (Desfontaines) Bory
f. *crinita*

C. crinitophylla Ercégovic

C. dubia Valiante

C. elegans Sauvageau

C. foeniculacea (Linnaeus) Greville

C. humulis Schousboe ex Kützing
var. *humulis*

C. mediterranea Sauvageau
var. *mediterranea*

var. *valiantei* Sauvageau

C. spinosa Sauvageau

C. squarrosa De Notaris

SARGASSACEAE

Sargassum acinarum (Linnaeus)
Setchell

S. hornschurchii C. Agardh

S. vulgare C. Agardh
var. *vulgare*

CHLOROPHYTA

CHLOROPHYTINA

TETRASPOROPHYTAE

CHLOROPHYCEAE

PHAEOPHILALES

PHAEOPHILACEAE

Phaeophila dendroides (P. L.
Crouan and H. M. Crouan) Batters

CHLOROCOCCALES

ENDOSPHAERACEAE

Gomontia polyrhiza (Leigerheim)
Bornet and Flahault

CHAETOPHORALES

CHAETOPHORACEAE

Bolbocoleon piliferum Pringsheim
Entocladia viridis Reinke

ULVOPHYCEAE

ULVOPHYCEAE

ULOTRICHALES

BORODINELLACEAE

Planophila microcystis (Dangeard)
Kornmann and Sahling

ULOTRICHACEAE

Ulothrix zonata (Weber and Mohr)
Kützing

ULVALES

ULVACEAE

Enteromorpha clathrata (Roth)
Greville

E. compressa (Linnaeus) Nees
var. *compressa*

E. flexuosa (Wulfen) J. Agardh

subsp. *flexuosa*
E. intestinalis (Linnaeus) Nees
 var. *intestinalis*
E. kylinii Bliding
E. linza (Linnaeus) J. Agardh
 var. *linza*
E. muscoides (Clemente) Cremades
E. prolifera (Müller) J. Agardh
 subsp. *prolifera*
E. usneoides Bonnemaïson ex
 J. Agardh
 **Ulva curvata* (Kützing) De Toni
U. fasciata Delile
U. rigida C. Agardh
 f. *rigida*
U. taeniata (Setchell) Setchell
 and Gardner

ULVELLACEAE

Acrochaete repens Pringsheim
Epicladia flustrae Reinke
Ulvella lens P. L. Crouan and H. M.
 Crouan

CLADOPHOROPHYCEAE

CLADOPHOROPHYCEAE

CLADOPHORALES

ANADYOMENACEAE

Anadyomene stellata (Wulfen)
 C. Agardh

CLADOPHORACEAE

Chaetomorpha aerea (Dillwyn)
 Kützing
C. crassa (C. Agardh) Kützing
C. mediterranea (Kützing) Kützing
Cladophora aegagropila (Linnaeus)
 Rabenh
C. albida (Nees) Kützing
C. coelothrix Kützing
C. dalmatica Kützing
C. glomerata (Linnaeus) Kützing
 var. *glomerata*
 var. *marina* Lyngbye
C. hutchinsiae (Dillwyn) Kützing

C. laetevirens (Dillwyn) Kützing
C. lehmanniana (Lindenberg)
 Kützing
C. mediterranea Hauck
C. oblitterata Söderström
C. pellucida (Hudson) Kützing
 f. *pellucida*
C. prolifera (Roth) Kützing
C. sericea (Hudson) Kützing
C. trichotoma (C. Agardh) Kützing
Cladophoropsis modenensis
 (Kützing) Børgesen
Rhizoclonium tortuosum (Dillwyn)
 Kützing

SIPHONOCLADALES

VALONIACEAE

Valonia macrophysa Kützing
V. utricularis (Roth) C. Agardh

BRYOPSIDOPHYCEAE

BRYOPSIDALES

BRYOPSIDACEAE

Ptyopsis corymbosa J. Agardh
B. duplex De Notaris
B. flagellata Kützing
B. hypnoides Lamouroux
 var. *hypnoides*
 var. *arbuscula* (De Candolle)
 Schiffner
B. muscosa Lamouroux
B. plumosa (Hudson) C. Agardh
 var. *plumosa*

CODIALES

CODIACEAE

Codium adhaerens C. Agardh
C. bursa (Linnaeus) C. Agardh
C. effusum (Rafinesque) Delle
 Chiaje
C. fragile (Suringar) Hariot
 subsp. *tomentosoides* (van Goor)
 Silva

CAULERPALES

CAULERPACEAE

- Caulerpa ollivieri* Dostal
C. prolifera (Forsskål) Lamouroux
C. racemosa (Forsskål) J. Agardh
var. *racemosa*
var. *lamourouxii* (Turner)
Webervan Bosse
C. scalpelliformis (R. Brown ex
Turner) C. Agardh
var. *denticulata* (Dacaisne)
Weber van Bosse

UDOTEACEAE

- Flabellia petiolata* (Turra)
Nizamuddin
Pseudochlorodesmis furcellata
(Zanardini) Borgesen

HALIMEDALES

HALIMEDACEAE

- Halimeda tuna* (Ellis and Solander)
Lamouroux

DASYCLADOPHYCEAE

DASYCLADOPHYCEAE

DASYCLADALES

DASYCLADACEAE

- Dasycladus vermicularis* (Scopoli)
Krasser

ACETABULARIACEAE

- Acetabularia acetabulum*
(Linnaeus) Silva

TRACHEOPHYTA

[=MAGNOLIOPHYTA]

ANGIOSPERMAE

LILIOPSIDA

CYMODOCEALES

CYMODOCEACEAE

- Cymodocea nodosa* (Ucria)
Ascherson

POSIDONIALES

POSIDONIACEAE

- Posidonia oceanica* (Linnaeus)
Delile

ZOSTERALES

ZOSTERACEAE

- Zostera marina* Linnaeus
Z. noltii Homermann

HYDROCHARITALES

HYDROCHARITACEAE

- Halophila stipulacea* (Forsskål)
Ascherson

Discussion

380 taxa (375 algae and 5 seagrasses) have been found in the present study area. One of them [*Bonnemaisonia clavata* G. Hamel (*Rhodophyceae*)] is the new record for the Turkish Marines (Figure 2). 11 of them [*Leibleinia epiphytica* (Hieronymus) Anagnostidis and Komárek, *Microchaete grisea* Thuret, *Calothrix scopulorum* (Weber van Bosse and Mohr) C. Agardh (*Cyanophyceae*), *Gelidiocolax christinae* J. Feldman et G. Feldman, *Falkenbergia hildenbrandii* (Bornet) Falkenberg, *Hydrolithon farinosum* var. *chalicodictyum* (W.R. Taylor) Serio, *Acrodiscus vidovichii* (Meneghini) Zanardini, *Ceramium codii* (Richards) Feldmann

Mazoyer, *Chondria mairei* Feldmann Mazoyer, *Polysiphonia paniculata* Montagne (*Rhodophyceae*) and *Ulva curvata* (Kützing) De Toni (*Ulvophyceae*) are the new records for the Turkish coast of Mediterranean. Their distribution of the Turkish marines is seen in Figure 3. As seen in Table 2, the comparison of the number of algal species of Antalya with those of the other Mediterranean coastal cities of Turkey was given. Species richness of *Cyanophyta* is relatively lower in provinces such as Muğla, Antalya, Mersin, Adana and Hatay. Nevertheless Mersin, Adana and Hatay have also had a very poor position.

Phycologically, Antalya compared with the other cities of the Mediterranean, is one of the richest provinces of the southern Turkey.

Table 2: The number of algae species of Antalya and the other the Mediterranean coastal cities (AN: Antalya, AN*: (Aysel *et al.*, 1996, 1998, Aysel 1997a-b, Turna *et al* 2000a-b, 2002, 2003) MU: Muğla, MR: Mersin, AD: Adana, HT: Hatay).

Division	Studied Cities of Turkish Mediterranean Shore					
	AN	AN*	MU	MR	AD	HT
<i>Cyanophyta</i> (Cy)	36	31	40	36	27	30
<i>Rhodophyta</i> (R)	198	163	222	204	204	201
<i>Ochrophyta</i> (O)	74	71	99	82	78	73
<i>Chlorophyta</i> (C)	67	61	73	74	72	73
<i>Magnoliophyta</i>	5	5	5	5	5	5
Total	380	331	439	401	386	382

Species of *Cystoseira*, *Zanardinia* and *Dictyotaceae* are the most encountered algae along the Antalya shore. *Corallina mediterranea*, *Callithamnion corymbosum*, *Ceramium siliquosum* var. *siliquosum*, *Herposiphonia secunda* f. *secunda*, *Laurencia obtusa* var. *obtusa*, *Polysiphonia sertularioides* (*Rhodophyceae*), *Ectocarpus siliculosus* var. *siliculosus*, *Feldmannia irregularis* (*Fucophyceae*), *Enteromorpha linza* var. *linza*, *E. prolifera* subsp. *prolifera*, *Ulva rigida* f. *rigida* and *Cladophora albida* (*Chlorophyta*) are the common algae of the area.

As seen in Table 3, numbers of Cyanophyta species are low in Mersin, Adana and Hatay provinces. These divisions have not been sufficiently investigated in these cities. Because, especially the shores of Adana and Hatay are geographically located in the İskenderun Bay. This bay has been polluted by domestic or industrial pollution.

While common taxa of the seagrasses *Posidonia*, *Zostera* and *Cymodocea* are also found in Antalya shores, some algae, such as taxa of *Polysiphonia*, *Ceramium*, *Ectocarpus*, *Enteromorpha* and *Cladophora* are the common. The most of this genus are found as epiphytic forms on the marine phanerogams and the other different macro algae (*Cystoseira*, *Cladostephus*, *Hypnea*, *Ulva*, *Cladophora*, *Codium* etc.).

Table 3: Dominancy in division level amongst southern provinces of Turkey

Division	Dominancy as cities in division level from the mediterranean shores of Turkey					
	AN	AN*	MU	MR	AD	HT
R/O	2,675	2.295	2.242	2.487	2.615	2.753
R/C	2,955	2.672	3.041	2.756	2.833	2.753
R/CY	5,500	5.258	5.550	5.666	7.555	6.700
O/C	1,104	1.163	1.356	1.108	1.083	1
O/CY	2,055	2.290	2.475	2.277	2.888	2.433
C/CY	1,861	1.967	1.825	2.055	2.666	2.433

Dominancy of taxa depending upon the provinces is summarized in Table 3. In this table, R/O values are relatively close amongst all provinces and changes between 2,242 and 2,753. According to these data, it can be stated that Mediterranean shores of Turkey is not polluted heavily.

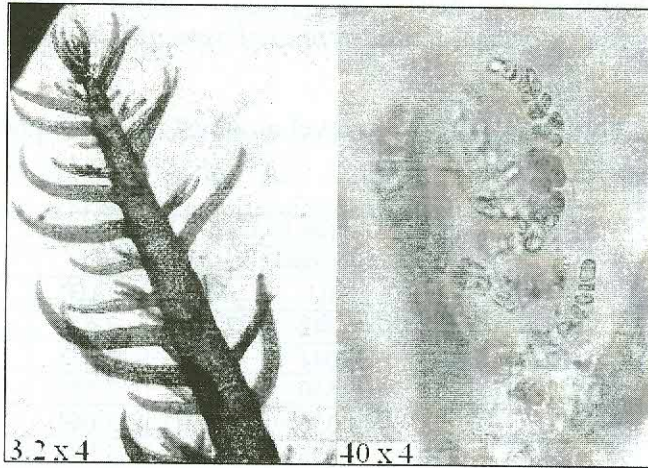


Figure 2. New records for the algal flora of Turkey (*Bonnemaisonia clavata* G. Hamel).

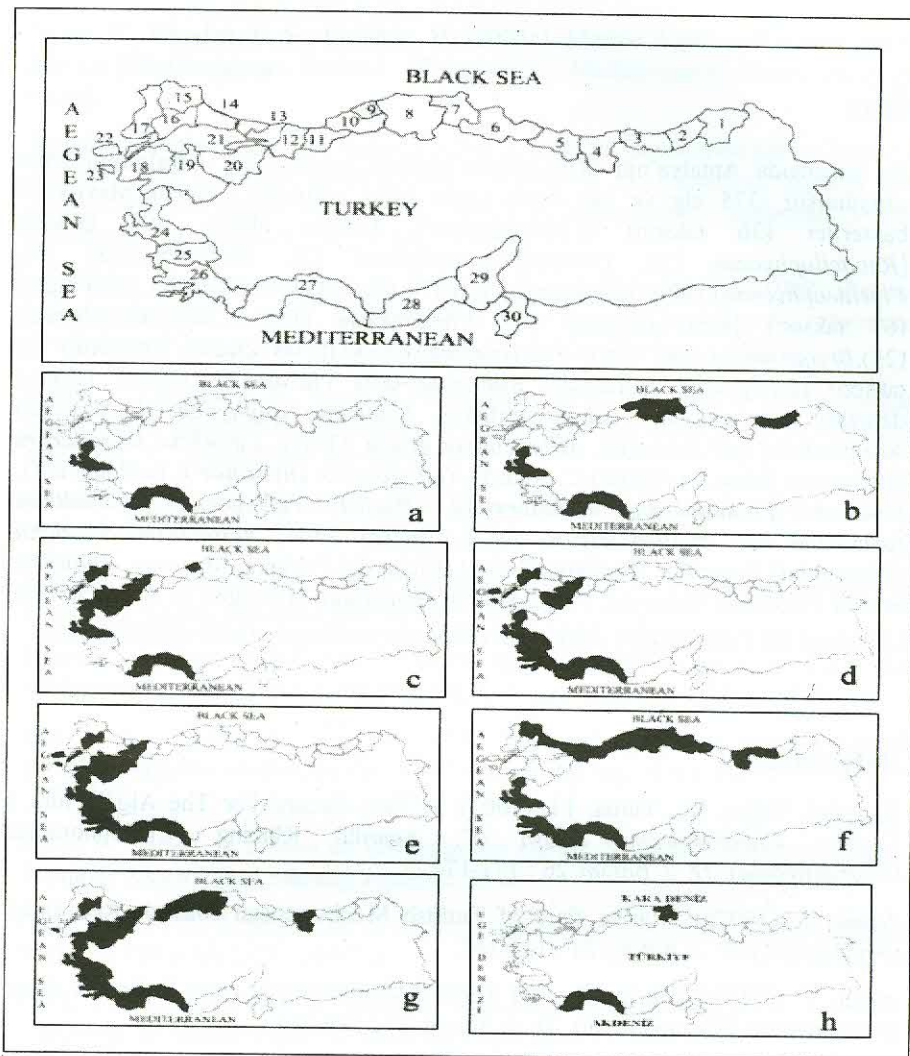


Figure 3. Distribution of algae on the Turkish marine newly recorded for the Turkish coast of Mediterranean. *Leibleinia epiphytica* (Hieronymus) Anagnostidis and Komárek (a), *Microchaete grisea* Thuret (a), *Calothrix scopulorum* (Weber van Bosse and Mohr) C. Agardh (f), *Gelidiocolax christinae* J. Feldman et G. Feldman (h), *Falkenbergia hildenbrandii* (Bornet) Falkenberg (d), *Hydrolithon farinosum* var. *chalicodictyum* (W.R. Taylor) Serio (a), *Acrodiscus vidovichii* (Meneghini) Zanardini (a), *Ceramium codii* (Richards) Feldmann Mazoyer (g), *Chondria mairei* Feldmann Mazoyer (e), *Polysiphonia paniculata* Montagne (b), *Ulva curvata* (Kützinger) De Toni (c)

Özet

Bu çalışmada Antalya'nın (Türkiye'nin akdeniz kıyıları) üst infralittoral zonu çalışılmıştır. 375 alg ve beş deniz çayırı tayin edilmiştir. Bunlar Mavi-yeşil bakteriler (36 takson) (*Cyanophyceae*), kırmızı algler (198 takson) [*Rhodellophyceae* (1), *Compsopogonophyceae* (2), *Bangiophyceae* (5), *Florideophyceae* (190)], kahverengi algler (74 takson) (*Fucophyceae*), yeşil algler (67 takson) [*Chlorophyceae* (4), *Ulvophyceae* (18), *Cladophorophyceae* (23), *Bryopsidophyceae* (20), *Dasycladophyceae*(2)] ve çiçekli bitkilerdir (5 takson) (*Liliopsida*). Bunlardan *Bonnemaisonia clavata* G. Hamel Türkiye denizleri için yeni kayıt olarak verilirken, *Leibleinia epiphytica* (Hieronymus) Anagnostidis and Komárek, *Microchaete grisea* Thuret, *Calothrix scopulorum* (Webervan Bosse and Mohr) C. Agardh, *Gelidiocolax christinae* J. Feldman et G. Feldman, *Falkenbergia hildenbrandii* (Bornet) Falkenberg, *Hydrolithon farinosum* var. *chalicodictyum* (W.R. Taylor) Serio, *Acrodiscus vidovichii* (Meneghini) Zanardini, *Ceramium codii* (Richards) Feldmann Mazoyer, *Chondria mairei* Feldmann Mazoyer, *Polysiphonia paniculata* Montagne ve *Ulva curvata* (Kützinger) De Toni Türkiye Akdeniz Kıyıları için yeni kayıt olarak verilmişlerdir.

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