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Marine Flora Between South Çeşme and Cape Teke (Izmir, Aegean Sea, Turkey)*

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Özet: ***Güney Çeşme-Teke Burnu (İzmir, Türkiye) arası deniz florası.*** Bu araştırmada, Güney Çeşme-Teke Burnu (İzmir, Türkiye) arasında üst infralittoral bölgede yayılış gösteren mavi-yeşil algler (Cyanophyceae, 29 takson), kırmızı algler (Rhodophyceae, 65 takson), kahverengi algler (Phaeophyceae, 33 takson), yeşil algler (Chlorophyceae, 25 takson) ve deniz çayırları (Liliopsida, 3 takson) üyeleri çalışılmıştır. Toplam 155 takson tayin edilmiştir ve Cyanophyceae üyelerinden beş tür (*Aphanothece microscopica* Nägeli, *Chroococcus macrococcus* (Kützing) Rabenhorst, *Merismopedia elegans* A. Braun *ex* Kützing, *Lyngbya birgei* G. M. Smith, *Oscillatoria subuliformis* Kützing *ex* Gomont) Türkiye denizleri için, iki tür ise (*Leptolyngbya foveolarum* (Gomont) Anagnostidis *et* Komárek, *Microcoleus chthonoplastes* (Mertens) Zanardini *ex* Gomont) Ege Denizi için yeni kayıt olarak verilmiştir.

Anahtar Kelimeler: Takson, mavi-yeşil algler, kırmızı algler, kahverengi algler, yeşil algler, deniz çayırları.

Abstract: In this study, specimens of blue-green algae (29 taxa), red algae (65 taxa), brown algae (33 taxa), green algae (25 taxa) and seagrasses (3 taxa), which spread in the upper infralittoral zone between south Çeşme and Cape Teke (Izmir, Aegean Sea, Turkey), were identified. A total of 155 taxa were determined. Among these, five species (*Aphanothece microscopica* Nägeli, *Chroococcus macrococcus* (Kützing) Rabenhorst, *Merismopedia elegans* A. Braun *ex* Kützing, *Lyngbya birgei* G. M. Smith and *Oscillatoria subuliformis* Kützing *ex* Gomont) belonging to the class Cyanophyceae have been identified as new records regarding the flora of Turkish Seas in general and two other species (*Leptolyngbya foveolarum* (Gomont) Anagnostidis *et* Komárek and *Microcoleus chthonoplastes* (Mertens) Zanardini *ex* Gomont) belonging to the same class (Cyanophyceae) have been identified as new records regardindg the algal flora of Aegean coast in particular.

Key Words: Taxon, blue-green algae, red algae, brown algae, green algae, seagrasses.

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Introduction

Algae are the organisms that have been paid specific attention for many years and used in different fields including pharmaceuticals and food industry etc. Around the world, early investigations on algal flora started in 1800s. C. A. Agardh (1823, 1828), Kützing (1849), and Hauck (1885) were the pioniers of this research. In the following years, others such as Migula (1909), Oltmanns (1822), Børgesen (1925, 1926, 1927, 1936), Taylor (1928), Schiffner-Vatova (1937), Feldmann (1937), Hamel (1939) continued to work on algae.

First investigations on algal flora of Turkey were performed by Fritsch (1899), Öztığ (1957) and Zeybek (1966). Following studies on the algal flora of Turkey were done by Sukatar et al. (1984), Güner et al. (1994), Aysel et al (2000) etc.

The Aegean Sea is by far the most investigated region of the Turkish coasts as far as the marine flora is concerned. Studies until 1992 were carried out by either scanning large areas by traditional means or searching single taxonomic units. However, recently there has been a tendency towards investigating small areas in more details taking seasonal variations and distribution in restricted areas into consideation (Rüdar 1996, Kurt 1999). Primary advantages of this kind of research are the enhanced possibility of finding new records and availability of research in differing seasonal variations. These have been the case for the present study which gave rise to finding of new species for the Turkish seas.

The aim of study was to determine the marine flora of the region between south Çeşme and Cape Teke in relation to seasonal changes.

Material and Methods

Samples of Cyanophyta, Rhodophyta, Heterokontophyta, Chlorophyta, and Magnoliophyta which are naturally distributed in the upper infralittoral zone of the coastal area located between south Çeşme and Cape Teke were collected during spring, summer and fall seasons of 2001 and 2002.
All collections were fixed in 4 % formaldehyde-sea water. Most of specimens were identified either by naked eye or after dissecting under a stereo microscope. 10% HCl was used to identified some of the taxa such as *Polysiphonia* Greville and *Herposiphonia* Nägeli species.

The study area, which is open to the waves, lies between 26°14' and 26°36' E longitudes and 38°06' and 38°16' N latitudes. A total of five stations were designated for this study as depicted in Fig. 1.

The first station located in the western part of Tursite is a small cove open to a continuous wind action. The bottom part

of this station is formed by sand and sediments. The east and west parts of the cove were covered by rocks which offer a wide range of habitats for the algae.

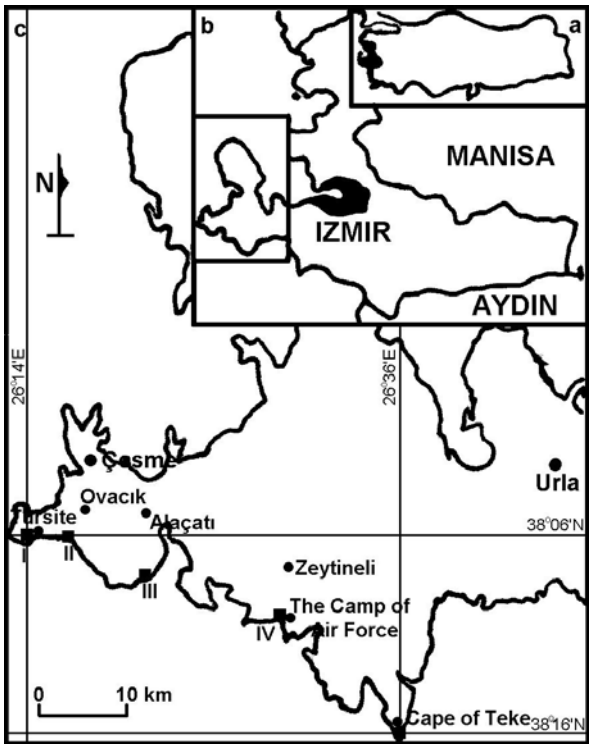

Figure 1. Location of the research area. **a.** Location of Izmir. **b.** Location of the research area in Izmir. **c.** The actual research area on a large scale showing the research cites (■).

The second station located in Ovacık is a cove formed by large rocky substratum with large hollows suitable for the algal growth and habitation. In this station, the bottom gets deeper sharply after 0.5 m. The sea is rough but clear.

The third station located in Alaçatı, a very small rocky cove, where there is no human activity. The coast is entirely covered by dead *Posidonia oceanica* (Linnaeus) Delile which forms a layer being almost 50 cm in height. The sea in this cite is also rough.

The fourth station located in the Camp of Air Force is a big cove with a sandy shore. There is a fresh water spring in the western part of the cove. The bottom is also formed by very fine sand and sediments and covered mostly by seagrasses of *Posidonia oceanica*, *Zostera marina* Linneaeus, and *Cymodocea nodosa* (Ucria) Ascherson.

The fifth station located in Cape Teke, a cove surrounded by hills. The eastern part of the cove is covered by rocks and stones and the bottom is formed by mud and sediments. A strong current at the bottom was observed. Due to prevailing weather conditions, samples were collected only twice (once on September 08, 2001 and the next time on May 07, 2002). Moreover, there is a fish net-pens in this cove used as part of a fish farm and *Caulerpa racemosa* (Forsskål) J. Agardh, a green algae, covers the entire bottom starting from the coastline. At the middle of the cove *Posidonia oceanica* was recognized. However, they appeared to be deformed and covered by epiphytes.

Results and Discussion

Table 1 depicts the taxonomic list of the species of algae and seagrasses collected from the stations.

The taxa were listed in evolutionary order. In this list, the upper part including the class category was organized after van den Hoek et al. (1997). The part between the class and family category was based on the systematic of Silva et al. (1996) and the part of the species of Cyanophyta and Rhodophyta, Heterokontophyta, and Chlorophyta was based on the systematic of Ribera et al. (1992) and Gallardo et al. (1993), respectively.

The most diverse marine flora was found at the first station located in westernmost point. Algal diversity clearly diminished throughout eastern part of the study area. Especially in the last station (station V), only species which can tolerate the pollution were observed and species of *Cystoseira* did not exist at all.

In the study area, algal taxa having the highest frequency were *Rivularia atra* and *Lyngbya adriae* of Cyanophyta; *Stylonema alsidii*, *Jania rubens*, *Hydrolithon farinosum*, *Ceramium flaccidum*, *Boergeseniella fruticulosa*, *Chondria dasyphylla* and *Herposiphonia secunda* of Rhodophyta; *Sphacelaria cirrosa*, *Padina pavonica*, *Stypocaulon scoparium*, *Cystoseira crinita*, *Dictyota fasciola*, *D. linearis* and *Dilophus mediterraneus* var. *crassus* of Heterokontophyta and *Halimeda tuna* of Chlorophyta. However, algal taxa having the lowest frequency (f=1) were C*hroococcus macrococcus*, *Merismopedia elegans*, *M. glauca* f. *mediterranea*, *Anabaena* sp., *Calothrix contarenii*, *Leptolyngbya foveolarum*, *Lyngbya birgei*, *Oscillatoria curviceps*, *O. limosa*, *O. subuliformis*, *Microcoleus chthonoplastes*, *Phormidium chlorinum* and *Spirulina subsalsa* of Cyanophyta; *Sahlingia subintegra*, *Melobesia membranacea*, *Hypnea musciformis*, *Gracilaria gracilis*, *Lomentaria articulata*, *Ceramium deslongchampsii*, *Pleonosporium borreri*, *Pterothamnion plumula*, *Dasya rigidula*, *Chondrophycus papillosus*, *Laurencia pyramidalis*, *Lophosiphonia reptabunda*, *Osmundaria volubilis*, *Polysiphonia biasolettoana*, *P. denudata*, *P. opaca*, *P. scopulorum*, *P. sertularioides* and *P. variegata* of Rhodophyta; *Ectocarpus siliculosus* var. *dasycarpus*, *Feldmannia caespitula* var. *lebelii*, *F. irregularis*, *Hincksia mitchelliae*, *H. sandriana*, *Asperococcus bullosus*, *Hydroclathrus clathratus*, *Dictyopteris polypodioides*, *Cystoseira barbata*, *C. elegans* and *Sargassum vulgare* of Heterokontophyta; *Ulothrix implexa*, *Ulva olivascens*, *Chaetamorpha linum*, *Cladophora laetevirens*, *C. lehmanniana*, *C. pellucida*, *C. rupestris*, *Valonia utricularis* and *Pedobesia simplex* of Chlorophyta.

Table 2 shows the number of species and taxa inferior to species found in the present study and compares it to the findings of previous studies performed at Turkish Seas.

Table 1. Distribution of marine flora between the area of south Çeşme and Cape Teke. Specimens were collected on August and November 2001, and May and July 2002 (I = Tursite, II = Ovacık, III = Alaçatı, IV = The Camp of Air Force, V = Cape Teke; 1: 9th August 2001; 2: 6th November 2001; 3: 24th May 2002; 4: 5th July 2002).

Species	Site I			Site II			Site III			Site IV			Site V	
	1	2	3	1	2	3	1	2	3	1	2	3	1	4
CYANOPHYTA														
CYANOPHYCEAE														
Chroococcales														
Chroococcaceae														
Aphanothece *microscopica* Nägeli		+											+	+
Chroococcus *macrococcus* (Kützing)Rabenhorst							+							
Microcystaceae														
Merismopedia *elegans* A.Braun *ex* Kützing													+	
M. glauca f. *mediterrane* (Nägeli) Collins													+	
Microcystis *halophila* B.Martens *et* Pankow				+						+				
M. *marina* (Hansgirg)P.C.Silva	+									+				
Oscillatoriales														
Oscillatoriaceae														
Leptolyngbya *foveolarum* (Gomont) Anagnostidis *et* Komárek													+	
Lyngbya *adriae* Ercegovic		+		+	+	+	+		+		+		+	+
L. birgei Smith				+										
L. confervoides C.Agardh		+	+	+						+			+	+
L. majuscula (Dillwyn) Harvey *ex* Gomont			+			+			+	+			+	+
L. semiplena (C.Agardh) J.Agardh			+									+		
Lyngbya sp.						+							+	
Oscillatoria *curviceps* C.Agardh								+						
O. limosa C.Agardh													+	
O. sancta (Kützing) Gomont			+						+					
O. subuliformis Kützing *ex* Gomont														+
Oscillatoria sp.												+		
Phormidiaceae														
Microcoleus *chthonoplastes* (Mertens) Zanardini *ex* Gomont												+		
Phormidium *anomala* C.B.Rao			+	+					+			+	+	
P. chlorinum (Kützing) Umezaki *et* Watanabe													+	
P. nigroviride (Thwaites *ex* Gomont) Anagnostidis *et* Komárek			+			+		+	+				+	
Spirulina *subsalsa* Oersted								+						
Nostocales														
Nostocaceae														
Anabaena sp.													+	
Rivulariaceae														
Calothrix *aeruginea* (Kützing) Thuret			+			+						+		
C. confervicola (Dillwyn) C.Agardh *ex* Bornet *et* Flahault			+										+	
C. contarenii (Zanardini) Bornet *et* Flahault											+			
Rivularia *atra* Roth *ex* Bornet	+	+	+	+	+	+		+		+	+	+		
R. bullata (Poiret) Berkeley		+			+		+							
RHODOPYHTA														
RHODOPHYCEAE														
BANGIOPHYCIDAE														
Porphyridiales														
Goniotrichaceae														
Chroodactylon *ornatum* (C.Agardh) Basson		+	+					+	+		+	+		
Porphridiaceae														
Stylonema *alsidii* (Zanardini) K.M.Drew	+	+	+	+	+	+	+	+	+	+	+		+	
Compsopongonales														
Erythropeltidaceae														
Erythrotrichia *carnea* (Dillwyn) J.Agardh	+	+	+		+			+		+	+		+	
Sahlingia *subintegra* (Rosenvinge) Kornmann		+												
FLORIDOPHYCIDAE														
Acrochaetiales														
Acrochaetiaceae														
Audouinella *daviesii* (Dillwyn) Woelkerling	+	+	+				+		+		+	+	+	
A. secundata (Lyngbye) Woelkerling							+				+			
Nemaliales														
Helminthocladiaceae														
Liagora *viscida* (Forsskål) C.Agardh	+	+	+	+	+		+	+	+					

Table 1. continued					
Bonnemasoniales					
Bonnemasoniaceae					
Falkenbergia *rufolanosa* (Harvey) F.Schmitz	+				+ +
Corallinales					
Corallinaceae					
Amphiroa *rigida* J.V.Lamouroux	+	+	+ + +		
Corallina *elongata* J.Ellis *et* Solander	+	+	+		
C. officinalis Linnaeus	+		+		
Hydrolithon *farinosum* (J.V.Lamouroux) D.Penrose *et* Y.M.Chamberlain	+ + +	+ +	+ + +	+	+ +
Melobesia *membranacea* (Esper) J.V.Lamouroux		+			
Jania *rubens* (Linnaeus) J.V.Lamouroux	+ +	+	+ + +	+ +	
Titanoderma *pustulatum* (J.V.Lamouroux) Nägeli		+		+	
Gigartinales					
Hypneaceae					
Hypnea *musciformis* (Wulfen) J.V.Lamouroux					+
Gracilariales					
Gracilariaceae					
Gracilaria *gracilis* (Stackhouse) Steentoft, L.M.Irvine *et* Farnham				+	
Rhodymeniales					
Rhodymeniaceae					
Botryocladia *botryoides* (Wulfen) Feldmann	+	+	+		
Lomentariaceae					
Lomentaria *articulata* (Hudson) Lyngbye			+		
Ceramiales					
Ceramiaceae					
Anotrichium *tenue* (C.Agardh) Nägeli	+	+			+ +
Callithamnion *corymbosum* (J.E.Smith) Lyngbye				+ +	
Corallophila *cinnabarina* (Grateloup *ex* Bory de Saint-Vincent) R.E.Norris		+	+		+ +
Ceramium *ciliatum* (J.Ellis) Ducluzeau	+ + +	+		+	
C. circinatum (Kützing) J.Agardh	+	+	+ +		
C. deslongchampsii Chauvin *ex* Duby	+				
C. diaphanum (Lightfoot) Roth	+ + +	+	+ +	+ +	
C. flaccidum (Kützing) Ardissone	+ +	+ +	+ + +	+ +	+ +
C. tenerrimum (G.Martens) Okamura	+	+			
Crouania *attenuata* (C.Agardh) J.Agardh	+		+ +		
Griffithsia *devoniensis* Harvey	+ +	+			
Pleonosporium *borreri* (J.E.Smith) Nägeli		+			
Pterothamnion *plumula* (J.Ellis) Nägeli		+			
Spermothamnion *repens* (Dillwyn) Rosenvinge	+			+	
Spyridia *filamentosa* (Wulfen) Harvey	+ +			+ + +	+ +
Wrangelia *penicillata* (C.Agardh) C.Agardh		+	+ +		
Dasyaceae					
Dasya *rigidula* (Kützing) Ardissone	+				
Halydictyon *mirabile* Zanardini	+		+		
Heterosiphonia *crispella* (C.Agardh) M.J.Wynne	+ +	+ +	+	+ +	
Delesseriaceae					
Hypoglossum *hypoglossoides* (Stackhouse) F.S.Collins *et* Hervey	+	+	+		
Rhodomelaceae					
Borgeseniella *fruticulosa* (Wulfen) Kylin	+ + +	+ + +	+ + +	+ +	
Chondria *capillaris* (Hudson) M.J.Wynne	+ +	+ +	+ +		
C. dasyphylla (Woodward) C.Agardh	+ + +	+ +	+ + +	+	
Chondrophycus *papillosus* (C.Agardh) Garbary *et* Harper			+		
Dipterosiphonia *rigens* (Shousboe *ex* C.Agardh) Falkenberg		+ + +	+		
Erythrocystis *montagnei* (Derbès *et* Solier) P.C.Silva	+ +	+	+ + +		
Halopithys *incurva* (Hudson) Batters	+ + +	+			
Herposiphonia *secunda* (C.Agardh) Ambronn	+ + +	+ + +	+ +	+	
H. secunda f. *tenella* (C.Agardh) M.J.Wynne	+ +	+			
Laurencia *obtusa* J.V.Lamouroux	+ + +	+ +	+ + +		
L. pyramidalis Bory de Saint-Vincent *ex* Kützing	+				
Lophosiphonia *cristata* Falkenberg	+ + +				
L. obscura (C.Agardh) Falkenberg	+	+	+	+ +	
L. reptabunda (Suhr) Kylin				+	
Osmundaria *volubilis* (Linnaeus) R.E.Norris				+	
Polysiphonia *atra* Zanardini	+	+ + +			
P. biasolettoana Zanardini			+		
P. denudata (Dillwyn) Greville *ex* Harvey				+	

Table 1. continued						
P. opaca (C.Agardh) Morris *et* De Notaris		+				
P. scopulorum Harvey	+					
P. sertularioides (Grateloup) J.Agardh			+			
P. stuposa Zanardini *ex* Kützing	+	+				
P. tenerrima Kützing		+		+		
P. tripinnata J.Agardh		+			+	
P. variegata (C. Agardh) Zanardini		+				
Rytiphlaea *tinctoria* (Clemente) C.Agardh			+	+	+ +	
HETEROKONTOPHYTA (=FUCOPHYTA, PHAEOPHYTA)						
FUCOPHYCEAE (=PHAEOPHYCEAE)						
Ectocarpales						
Ectocarpaceae						
Ectocarpus *siliculosus* var. *dasycarpus* (Kuckuck) Gallardo					+	
Feldmannia *caespitula* var. *lebelii* (Areschoug *ex* P.L.Crouan *et* H.M.Crouan) Knoepffler-Péguy		+				
F. irregularis (Kützing) G.Hamel					+	
Hincksia *mitchelliae* (Harvey) P.C.Silva						+
H. sandriana (Zanardini) P.C.Silva					+	
Dictyosiphonales						
Punctariaceae						
Asperococcus *bullosus* J.V.Lamouroux						+
Scytosiphonales						
Scytosiphonaceae						
Hydroclathrus *clathratus* (C.Agardh) Howe						+
Sphacelariales						
Choristocarpaceae						
Discosporangium *mesarthrocarpum* (Meneghini) Hauck		+		+ +		
Cladostephaceae						
Cladostephus *spongiosus* (Hudson) C.Agardh				+	+ + +	
Sphacelariaceae						
Sphacelaria *cirrosa* (Roth) C.Agardh	+ + +		+ + +		+ +	+ + +	+ +
S. fusca (Hudson) S.F.Gray		+			+		
S. rigidula Kützing		+				+	
Stypocaulaceae						
Halopteris *filicina* (Grateloup) Kützing		+		+		+		+ +		+
Stypocaulon *scoparium* (Linnaeus) Kützing	+ + +			+	+ + +	+		+		+
Dictyotales						
Dictyotaceae						
Dictyopteris *polypodioides* (A.D.de Candolle) J.V.Lamouroux							+
Dictyota *dichotoma* (Hudson) J.V.Lamouroux		+ +		+ +	+ + +		
D. dichotoma var. *intricata* (C.Agardh) Greville	+ + +			+		+ +		
D. divaricata J.V.Lamouroux	+			+			+	
D. fasciola (Roth) J.V.Lamouroux	+ + +		+ + +			+ +	+ +	
D. linearis (C.Agardh) Greville	+ + +			+ +	+	+	+ +	
D. spiralis Montagne	+	+					
Dilophus *mediterraneus* var. *crassus* Schiffner	+ + +		+	+	+		+ + +	
Padina *pavonica* (Linnaeus) Thivy	+ + +		+ + +		+ + +		+ + +		+
Fucales						
Cystoseriaceae						
Cystoseira *amentacea* var.*stricta* Montagne				+			+
C. barbata (Stackhouse) C.Agardh						+	
C. compressa (Esper) Gerloff *et* Nizamuddin	+ + +			+ +		+		+ +	
C. corniculata (Turner) Zanardini				+ +		+			
C. crinita Duby		+ +	+ + +		+ +	+ + +		
C. elegans Sauvageau							+	
C. mediterranea Sauvageau	+			+			+	
C. schiffneri G.Hamel				+			+ + +	
Sargassaceae						
Sargassum *vulgare* C.Agardh						+	
CHLOROPHYTA						
ULVOPHYCEAE						
Codiolales						
Ulothrichaceae						
Ulothrix *flacca* (Dillwyn) Thuret						+ +
U. implexa (Kützing) Kützing					+	
U. tenerrima Kützing		+		+			+
Ulvales						

Table 1. continued																				
Ulvaceae																				
Enteromorpha *clathrata* (Roth) Greville																			+	+
E. intestinalis (Linnaeus) Link			+														+			
E. linza var. *minor* Schiffner																	+			+
Ulva *olivascens* P.J.L..Dangeard																			+	
CLADOPHOROPHYCEAE																				
Cladophorales																				
Anadyomeneceae																				
Anadyomene *stellata* (Wulfen) C.Agardh	+	+		+	+		+	+	+											
Cladophoraceae																				
Chaetamorpha *linum* (O.F.Müller) Kützing			+																	
Cladophora *dalmatica* Kützing			+													+				
C. laetevirens (Dillwyn) Kützing		+																		
C. lehmanniana (Lindenberg) Kützing																+				
C. pellucida (Hudson) Kützing				+																
C. prolifera (Roth) Kützing	+												+							
C. rupestris (Linnaeus) Kützing					+															
C. sericea (Hudson) Kützing	+																+			
Valoniaceae																				
Valonia *utricularis* (Roth) C.Agardh								+												
BRYOPSIDOPHYCEAE																				
Bryopsidales																				
Table 1. continued																				
Derbesiaceae																				
Pedobesia *simplex* (Meneghini *ex* Kützing) M.J.Wynne *et* Leliaert			+																	
Caulerpaceae																				
Caulerpa *rasemosa* (Forsskål) J.Agardh																+	+	+	+	+
Codiaceae																				
Codium *bursa* (Linnaeus) C.Agardh					+															+
Halimedales																				
Halimedaceae																				
Halimeda *tuna* (J.Ellis *et* Solander) J.V.Lamouroux	+	+	+	+	+	+	+	+	+											
Udoteaceae																				
Flabellia *petiolata* (Turra) Nizamuddin	+			+	+	+	+	+		+		+								
DASYCLADOPHYCEAE																				
Dasycladales																				
Dasycladaceae																				
Dasycladus *vermicularis* (Scopoli) Krasser		+	+	+	+	+					+									
Polyphysaceae																				
Acetabularia *acetabulum* (Linnaeus) P.C.Silva	+	+	+				+			+		+								
MAGNOLIOPHYTA (=SPERMATOPHYTA)																				
LILIOPSIDA(=MONOCOTYLEDONEAE)																				
ALISMATIDAE(=HELOBIAE)																				
Potamogetonales																				
Cymodoceaceae																				
Cymodocea *nodosa* (Ucria) Ascherson	+	+	+	+	+	+	+	+	+	+	+	+								
Posidoniaceae																				
Posidonia *oceanica* (Linnaeus) Delile	+	+	+	+	+	+	+	+	+	+	+	+	+	+						
Zosteraceae																				
Zostera *marina* Linnaeus	+	+	+		+		+			+	+	+	+	+						

Table 2. Comparison of the number of species and taxa inferior to species determined in study area with that of the Turkish Seas. (PSA: Present Study Area, BS: Black Sea, MS: Marmara Sea, AS: Aegean Sea, M: Mediterranean).

Divisio	Turkish Seas					Total
	PSA	BS	MS	AS	M	
Cyanophyta	29	30	43	78	50	97
Rhodophyta	65	139	264	253	241	412
Heterokontophyta	33	53	103	99	83	144
Chlorophyta	25	55	90	92	87	138
Charophyta	*	2	2	1	*	3
Chrysophyta	*	*	*	1	*	1
Magnoliophyta	3	3	5	5	5	6
Total	**155**	**282**	**507**	**529**	**466**	**801**

** : not observed.*

When compared to the study by Aysel et al. (2000), the present study has determined that number of Cyanophyta members has reached to 78 in the Aegean Sea and 97 in Turkish Seas. Likewise, the number of algae was determined to have risen to 529 in the Aegean Sea and 801 Turkish Seas (Table 2).

Table 3 shows the division dominance found in the study area and compares it with the study performed by Aysel et al. (2000) in the Aegean Sea.

Results in the Table 3 stress that approximately 36 % of the deviation, especially in R/Cy and C/Cy ratios, was noted. This high deviation level can be ascribed to the high deviation

level in Cyanophyta and low deviation level in Rhodophyta and especially in Chlorophyta.

Table 3. Comparison of the level of division dominance found in the present study with that of study of Aysel et al. (2000). (R: Rhodophyta, H: Heterokontophyta, C: Chlorophyta, Cy: Cyanophyta).

	R/H	R/C	R/Cy	H/C	H/Cy	C/Cy
Study Area	1.97	2.60	2.24	1.32	1.14	0.86
Aegeaen Sea	2.56	2.75	3.24	1.08	1.27	1.18

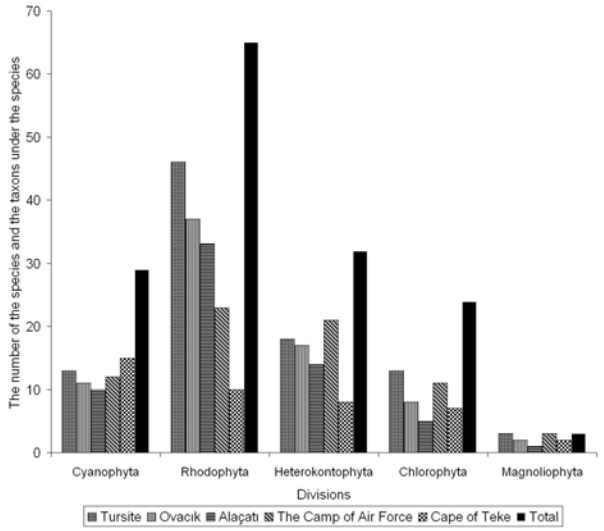

Figure 2. Distribution of the number of species and taxa inferior to species.

The results of the total distribution of algae among stations reflect that the highest abundance level on the algal species were found in Rhodophyta, Heterokontophyta and Cyanophyta respectively and the less abundance was observed in the division Chlorophyta (Fig.2). Except for the increase in the division Cyanophyta, the number of algal species show similar trends to that of the previous studies. The highest deviation observed was in the station V (Cape Teke) where 19 species of Cyanophyta, 8 species of Chlorophyta, 7 species of Heterokontophyta, and 16 species of Rhodophyta were identified. In other stations, the number of species of Cyanophyta and Chlorophyta was similar to that of station V. However, species of Cyanophyta in the first four stations were found to be individual (not colonized), living as epiphyte on other algae and being in smaller number compared to those of the station V. Cyanophyta members of latter station showed quantative and qualitive dominancy compared to the other division members. This is explained by the fact that the species of Cyanophyta have the ability to tolerate different environmental conditions. In addition to this, *Enteromorpha clathrata* of Chlorophyta appeared to be the most abundant species whereas *Ulva olivascens* (Chlorophyta) was the less abundant species in station V. Moreover, no *Cystoseira* species was seen and only species such as *Hypnea musciformis*, *Coralliphila cinnabarina*, *Spyridia filamentosa* which like the sunlight and tolerate the highly organic waste water conditions were observed in station V.

Green algae, especially species of Ulvales, were seldom seen in the study area. Ulvales members are normally abundant in areas where there is human activity or domestic household pollution. As mentioned earlier, none of stations was located nearby any human activities.

The members of Magnoliophyta were noted in all stations. However, these species was too seldom in the last station (station V). *Posidonia oceanica* and *Cymodocea nodosa* were also noticed being deformed and covered by epiphytes in station V.

Oscillatoria sancta (Oscillatoriaceae), *Phormidium anomala* (Phormidiaceae), *Discosporangium mesarthrocarpum* (Sphacelariales), and *Halydictyon mirabile* (Ceramiales) found in the research area were previously reported as rare species for Turkish Seas by earlier researchers such as Kurt (1999), Rüdar (1996) and Aysel (1987). In this study, *Phormidium anomala* was found in all stations only in May and August. This species was first reported for Turkish Seas in Dikili Bay by Kurt (1999). *Discosporangium mesarthrocarpum* and *Halimeda tuna* were detected together in May and November at the first and the second stations, which was usually the case for these two species. *Discosporangium mesarthrocarpum* was reported for the first time for Turkish Seas in Ildır Bay (Izmir, Aegea Sea, Turkey) by Rüdar (1996). *Halydictyon mirabile* and *Halimeda tuna* were observed together at the first and the second stations in May and *Halydictyon mirabile* was also observed in the study of Aysel (1987).

Previous studies were performed in the large areas on the sea basis such as Aegean, Marmara and Black Seas. However, by conducting the researches in narrower or smaller areas on the cave or bay basis or by narrowing down the research area to only the cost of a certain city or state, more detailed information on Turkish marine flora with respect to its seasonal distribution can be obtained.

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