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RESEARCH PAPER

Some New Records for Marine Diatom Flora of Turkey from Akliman, Sinop (Black Sea)

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Abstract

Marine benthic diatoms are important tools for food web and photosynthesis. In December 2012, epipelic diatom samples were taken from Akliman Bay, Sinop and were examined to determine the marine benthic diatom flora. As a result, 31 taxa from genus *Amphora*, *Berkeleya*, *Biremis*, *Chamaepinnularia*, *Fallacia*, *Gomphonemopsis*, *Halamphora*, *Licmophora*, *Mastogloia*, *Navicula*, *Neosynedra*, *Nitzschia*, *Opephora*, *Parlibellus*, *Planothidium* and *Seminavis* were found as new records for "Turkish marine benthic diatom flora". Also, *Biremis*, *Gomphonemopsis* and *Neosynedra* are new genera records for "Turkish marine benthic diatom flora".

Keywords: Benthic, diatom, marine, new record, Turkey.

Introduction

Diatoms are unicellular, sessile, photosynthetic algae which compose silica cell wall. They are found in diverse habitats like freshwater, marine and brackish. They are important tools for determining ecological conditions and play an important role of the primary production in these habitats. Marine diatoms can represent 60-90% of organisms in littoral and benthic habitats (Alvarez-Gongora & Herrera-Silveira, 2006; Coelho, Gamito & Pérez-Rufaza, 2007). Particularly in mud-flat intertidal habitats, they compose a biofilm which is important food source for zoobenthos (Mitbavkar & Anil, 2002). Also, they play a vital role on the photosynthesis in aquatic habitats.

Black Sea is an ancient sea which is an anoxic sea. Several studies had been performed in Black Sea in the last decades (Nevrova, Witkowski, Kulikoskiy & Kociolek, 2013; Witkowski, Nevrova, Lange-Bertalot & Gogorev, 2010, Witkowski, Nevrova, Lange-Bertalot & Kociolek 2014). Regarding to the benthic marine diatoms, there is no study while, there are some studies on phytoplankton composition in the Turkish Black Sea coasts (e.g. Taş & Okuş 2006, Baytut, Gönülol & Koray, 2005; Baytut & Gönülol, 2016 and Türkoğlu & Koray, 2002).

The aim of this study is to present new records of diatoms in Turkey from different genera along with morphological characteristics of the species identified.

Materials and Methods

Study Area

Sinop province is located in the central north of the southern Black Sea coast in Turkey. Area has an importance regarding to be both affected by the currents from the Sea of Azov and much warmer currents from the East Black Sea from the Caucasus region.

Sampling

The samples were collected in December 2012 from Akliman Bay in Sinop (42°02'36.29" N, 35°02'46.63" E) (Figure 1). Diatom samplings were made from epipelic habitat. Therefore, pipette aspirators were used for sampling and ecological parameters were measured (Table 1).

The samples were prepared by boiling with H_2O_2 and washed by distilled water respectively (Swift, 1967). Frustules were mounted with Naphrax and then, the frustules were investigated with Olympus BX-51 microscope.

Diatoms were identified according to Blanco & S. Blanco (2014), Danielidis & Mann (2003), Hartley, Barber & Carter (1996), Hendey (1964), Jensen (1985), Krammer (2003), Lange-Bertalot, Külbs, Lauser, Nörpel-Schempp & Willmann, (1996), Levkov (2009), Loir & Novarino (2013), Peragallo &

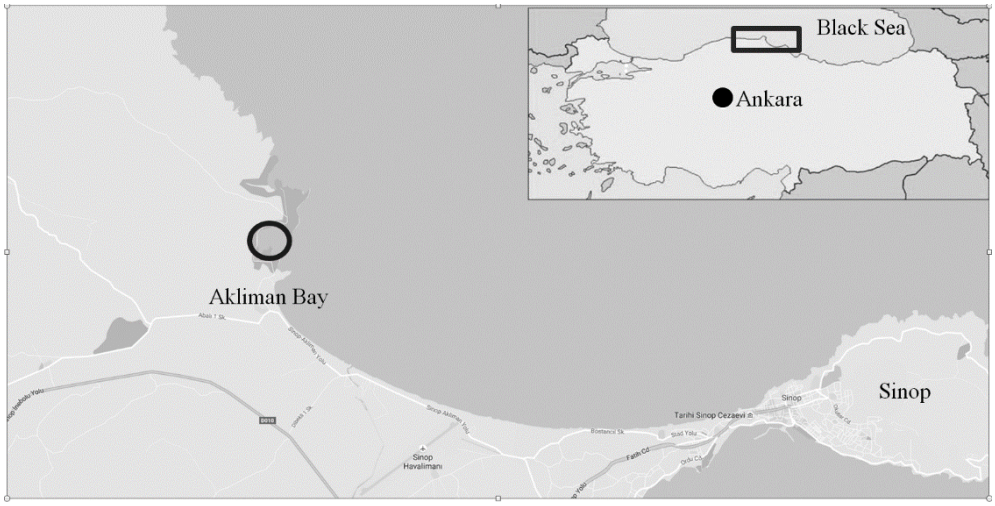

Figure 1. Sampling Station

Table 1. Measured Ecological Parameters in Akliman Bay, Sinop in December-2012

Parameters	
Salinity (ppt)	14.4
Temperature (°C)	14.5
Conductivity (mS/cm)	19.27
pH	8.47
O2 (mg/L)	9.61

Peragallo (1897-1908), Riberio (2010), Simonsen (1987), Wachnicka & Gaiser (2007), Witkowski, Lange-Bertalot & Metzeltin (2000), Witkowski *et al*. (2010) and Witon & Witkowski (2006). The distribution of Turkish flora was prepared according to Gönülol (2016). We have attempted to use the latest classification system for diatoms (Fourtanier & Kociolek, 2011). Author names have been abbreviated according to Brummit & Powell (1992).

Results

In this study, the samples from Akliman Bay were investigated and as a result, 31 taxa from genus *Amphora*, *Berkeleya*, *Biremis*, *Chamaepinnularia*, *Fallacia*, *Gomphonemopsis*, *Halamphora*, *Licmophora*, *Mastogloia*, *Navicula*, *Neosynedra*, *Nitzschia*, *Opephora*, *Parlibellus*, *Planothidium* and *Seminavis* were found as new records for Turkish marine benthic diatom flora. Also, *Biremis*, *Gomphonemopsis* and *Neosynedra* are new genera records for Turkish flora.

Amphora helenensis Giffen Figure.2: 1
Ref.: Witkowski *et al*., 2000 (p.139, pl.163: 31-33).
Dimensions: Valve length 14 µm and breadth 2.64 µm, 23 striae in 10 µm.
Distribution: Baltic Sea, South Africa (Witkowski *et al*., 2000).

Berkeleyamicans(Lyngb.)Grunow Figure.2: 2
Basionym: *Bangia micans* Lyngb.
Ref.: Peragallo & Peragallo, 1897-1908 (p.50, pl.7: 9); Hartley *et al*., (p.84, pl.34: 1).
Dimensions: Valve length 78 µm and breadth 4.70 µm, 26 striae in 10 µm.
Distribution: Britain (Hartley *et al*., 1996).

Berkeleya obtusa (Grev.) Grunow Figure.2: 3
Basionym: *Monema obtusum* Grev.
Ref.: Peragallo & Peragallo, 1897-1908 (p.51, pl.7: 16); Witkowski *et al*. 2000, (p.156, pl.62: 25-28).
Dimensions: Valve length 25.30 µm and breadth 6.70 µm.
Distribution: Marine to brackish water species in coastal areas (Witkowski *et al*., 2000).

Berkeleya sparsa M. Mizuno Figure.2: 4-8
Ref.: Witkowski *et al*. 2000, (p.158, pl.62: 7-9).
Dimensions: Valve length 20-27.97 µm and breadth 4.07-4.58 µm
Distribution: Bear Island (Witkowski *et al*., 2000).

Biremis lucens (Hust.) Sabbe, Witkowski & Vyverman Figure.2: 9-10
Basionym: *Navicula lucens* Hust.
Ref: Simonsen 1987, (p.174, pl.275: 27-29); Witkowski *et al*., 2000 (p.159, pl.155: 9-15).
Dimensions: Valve length 11.58-11.67 µm and breadth 3.22-3.30 µm, 13-14 striae in 10 µm.

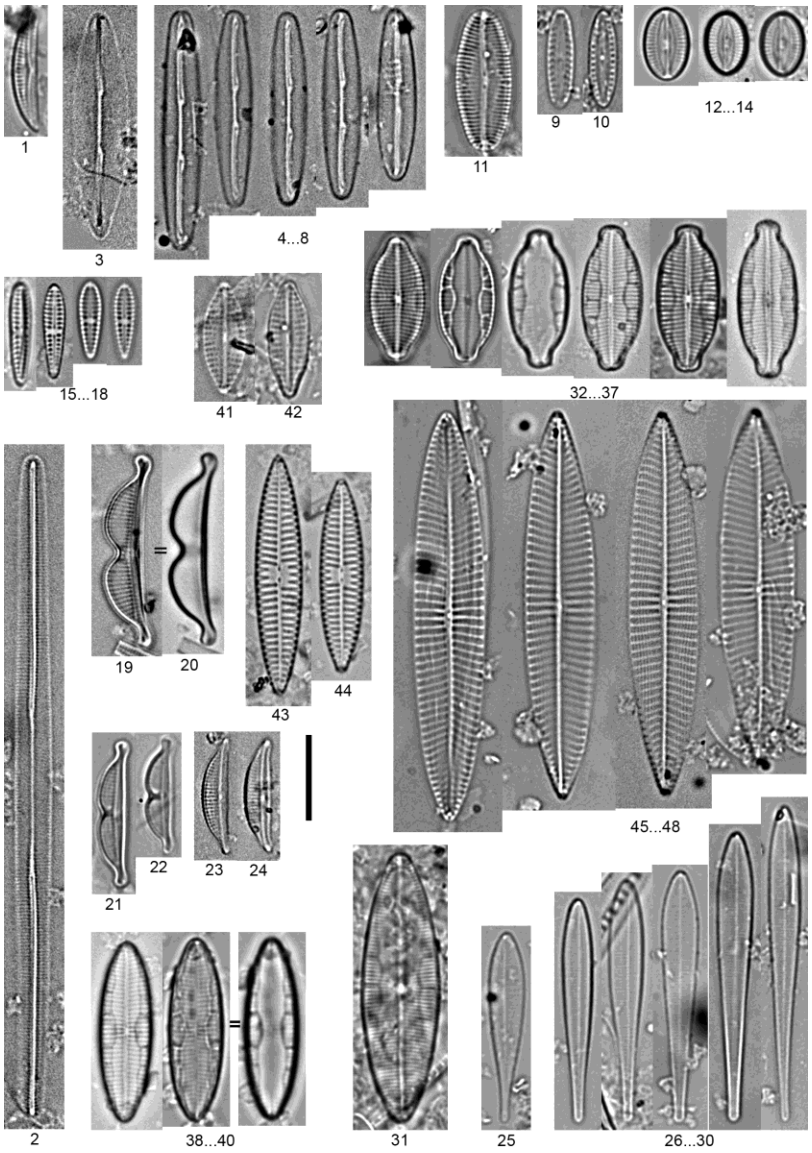

Figure 2. 1 – *Amphora helenensis* Giffen; 2 – *Berkeleya micans* (Lyngb.) Grunow; 3 – *Berkeleya obtusa* (Grev.) Grunow; 4-8 – *Berkeleya sparsa* M. Mizuno; 9-10 – *Biremis lucens* (Hust.) Sabbe, Witkowski & Vyverman; 11 – *Chamaepinnularia clamans* (Hust.) Witkowski, Lange-Bert. & Metzeltin; 12-14 – *Fallacia florinae* (M. Møller) Witkowski; 15-18 – *Gomphonemopsis obscura* (Krasske) Lange-Bert.; 19-20 – *Halamphora capitata* (Hagelst.) Álvarez-Blanco & S. Blanco; 21-22 – *Halamphora kolbei* (Aleem) Álvarez-Blanco & S. Blanco; 23-24 *Halamphora tenerrima* (Aleem & Hust.) Levkov; 25 – *Licmophora dalmatica* (Kütz.) Grunow; 26-30 – *Licmophora debilis* (Kütz.) Grunow ex Van Heurck; 31 – *Mastogloia pusilla* Grunow; 32-37 – *Mastogloia pusilla* var. *subcapitata* Hust.; 38-40 – *Mastogloia urveae* Witkowski; 41-42 – *Navicula germanopolonica* Witkowski & Lange-Bert. 43-44 – *Navicula parapontica* Witkowski,

Distribution: Miang Besar, Borneo (Simonsen, 1987).

Chamaepinnularia clamans (Hust.) Witkowski, Lange-Bert. & Metzeltin Figure. 2: 11
Basionym: *Navicula clamans* Hust.
Ref.: Simonsen, 1987 (p.257, pl. 379: 20, 22); Hartley *et al*., 1996 (p.284, pl.134: 3); Witkowski *et al*. 2000, (p.169, pl.69: 12).
Dimensions: Valve length 17.59 µm and breadth 6.70 µm, 20 striae in 10 µm.
Distribution: Cosmopolitan (Witkowski *et al*., 2000), Britain (Hartley *et al*., 1996).

Fallacia florinae (M.Møller) Witkowski Figure.2: 12-14
Basionym: *Navicula floriniae* M.Møller
Ref.: Hendey, 1964 (p.213, pl.33: 6, 7); Hartley *et al*., 1996 (p.298, pl.141: 15); Witkowski *et al*., 2000 (p.204, pl.71: 45-49); Álvarez -Blanco & S. Blanco, 2014 (p.74, pl.31: 12, 13).
Dimensions: Valve length 7.48-8.64 µm and breadth 5.16-5.44 µm, 22-24 striae in 10 µm.
Distribution: Cosmopolitan (Witkowski *et al*., 2000), Britain (Hartley *et al*., 1996), Holland, Denmark and Germany coasts (Hendey, 1964).

Gomphonemopsis obscura (Krasske) Lange-Bert. Figure.2: 15-18
Basionym: *Gomphonema obscurum* Krasske

Ref.: Lange-Bertalot *et al*., 1996 (p.91, pl.40: 19-23); Witkowski *et al*., 2000 (p.221, pl.61: 4-9; Witon & Witkowski 2006, (p.193, fig: 246-248).
Dimensions: Valve length 8.85-12.13 µm and breadth 2.30-2.64 µm, 16-18 striae in 10 µm.
Distribution: Baltic Sea, Falkland Islands, Bear Island (Witkowski *et al*., 2000).

Halamphora capitata (Hagelst.) Álvarez-Blanco & S. Blanco Figure.2:19-20
Basionym: *Amphora bigibba* var. *capitata* Hagelst.
Ref.: Wachnicka & Gaiser 2007, (p.415, fig: 98, 99); Álvarez-Blanco & S. Blanco, 2014 (p.63, pl.36: 9).
Dimensions: Valve length 22.70 µm and breadth 4.48 µm, 21 striae in 10 µm.
Distribution: Mallorca, Spain (Álvarez-Blanco & S. Blanco 2014), Florida Bay (Wachnicka & Gaiser, 2007).

Halamphora kolbei (Aleem) Álvarez-Blanco & S. Blanco Figure.2: 21-22
Basionym: *Amphora kolbei* Aleem
Ref.: Witkowski *et al*., 2000 (p.141, pl.163: 26); Wachnicka & Gaiser, 2007 (p.415, fig: 100); Álvarez-Blanco & S. Blanco, 2014 (p.65, pl.34: 7-9).
Dimensions: Valve length 13.80-17 µm and breadth 3.16-3.40 µm, 22 striae in 10 µm.
Distribution: Murcia, Spain (Álvarez-Blanco & S. Blanco, 2014).

Halamphora tenerrima (Aleem & Hust.) Levkov Figure.2: 23-24
Basionym: *Amphora tenerrima* Aleem & Hust.
Ref.: Simonsen, 1987 (p.366, pl.551: 26-30); Wachnicka & Gaiser, 2007 (p.400, fig: 41, 42); Levkov, 2009 (p.235, fig.90: 51-59); Álvarez-Blanco & S. Blanco, 2014 (p.66, pl.34: 10-12, 81: 5).
Dimensions: Valve length 13.11-13.64 µm and breadth 3.02-3.11 µm, 26 striae in 10 µm.
Distribution: Murcia, Spain (Álvarez-Blanco & S. Blanco, 2014), England (Simonsen, 1987).

Licmophora dalmatica (Kütz.) Grunow Figure.2: 25
Basionym: *Rhipidophora dalmatica* Kütz.
Ref.: Peragallo & Peragallo, 1897-1908 (p.347, pl.84: 14, 15); Álvarez-Blanco & S. Blanco, 2014 (p.114, pl.13: 4-6, 58: 2).
Dimensions: Valve length 22.37 µm and breadth 4.22 µm.
Distribution: Rhodes, Greece (Álvarez-Blanco & S. Blanco, 2014).

Licmophora debilis (Kütz.) Grunow ex Van Heurck Figure.2: 26-30
Basionym: *Podosphenia debilis* Kütz.
Ref.: Peragallo & Peragallo, 1897-1908 (p.348, pl.85: 19); Witkowski *et al*., 2000 (p.64, pl.19: 16-19); Álvarez-Blanco & S. Blanco, 2014 (p.114, pl.13: 7-14, pl.57: 1-5).
Dimensions: Valve length 26.16-36.84 µm and breadth 3.73-4.46 µm, 27-29 striae in 10 µm.
Distribution: Santorini, Greece; Denia, Spain (Álvarez-Blanco & S. Blanco, 2014).

Mastogloia pusilla Grunow Figure.2: 31
Ref.: Loir & Novarino, 2013 (p.44, pl.20: a).
Dimensions: Valve length 31.64 µm and breadth 9 µm, 23 striae in 10 µm.
Distribution: Caribbean Sea (Loir & Novarino, 2013).

Mastogloia pusilla* var. *subcapitata Hust. Figure.2: 32-37
Ref.: Loir & Novarino, 2013 (p.45, pl.20: b); Jensen, 1985 (p.481, fig: 1002-e).
Dimensions: Valve length 16.70-18 µm and breadth 6.89-7.08 µm, 22-23 striae in 10 µm.
Distribution: Miang Besar, Borneo (Jensen, 1985), Caribbean Sea (Loir & Novarino, 2013).

Mastogloia urveae Witkowski Figure.2: 38-40
Ref. Witkowski *et al*. 2000 (p.263, pl.84: 22, 23); Loir & Novarino 2013 (p.50, pl.24: a).
Dimensions: Valve length 20.70 µm and breadth 6 µm, 28 striae in 10 µm.
Distribution: Gulf of Mexico (Witkowski *et al*., 2000), Caribbean Sea (Loir & Novarino, 2013).

Navicula germanopolonica Witkowski & Lange-Bert. Figure.2: 41-42
Ref.: Witkowski *et al*., 2000 (p.279, pl.119: 13-18).
Dimensions: Valve length 13.30-13.65 µm and breadth 4.70-4.72 µm, 16-17 striae in 10 µm.
Distribution: Baltic Sea, European Atlantic coast (Witkowski *et al*., 2000).

Navicula parapontica Witkowski, Kulikovskiy, Nevrova & Lange-Bert. Figure.2: 43-44
Ref.: Witkowski *et al*., 2010 (p.311, Fig.1: L-Y, Fig.3: A-G).
Dimensions: Valve length 22.54 -28.36 µm and breadth 5.08-5.59 µm, 13-14 striae in 10 µm.
Distribution: Black Sea (Witkowski *et al*., 2010).

Navicula pavillardii Hust. Figure.2: 45-48
Ref.: Hartley *et al*., 1996 (p.322, pl.153: 4); Witkowski *et al*., 2000 (p.295, pl.116: 5, 6, 131: 2-6); Álvarez-Blanco & S. Blanco, 2014 (p.56, pl.30: 9-11).
Dimensions: Valve length 45.05 µm and breadth 8.14 µm, 11 striae in 10 µm.
Distribution: Cosmopolitan (Witkowski *et al*., 2000), Britain (Hartley *et al*., 1996).

Navicula subagnita Proshk.-Lavr. Figure.3: 49-50
Ref.: Witkowski *et al*., 2000 (p.308, pl.131: 15-19).
Dimensions: Valve length 40.75-50.40 µm and breadth 7.16-7.76 µm, 11 striae in 10 µm.
Distribution: Black Sea, widespread in the Mediterranean (Witkowski *et al*., 2000).

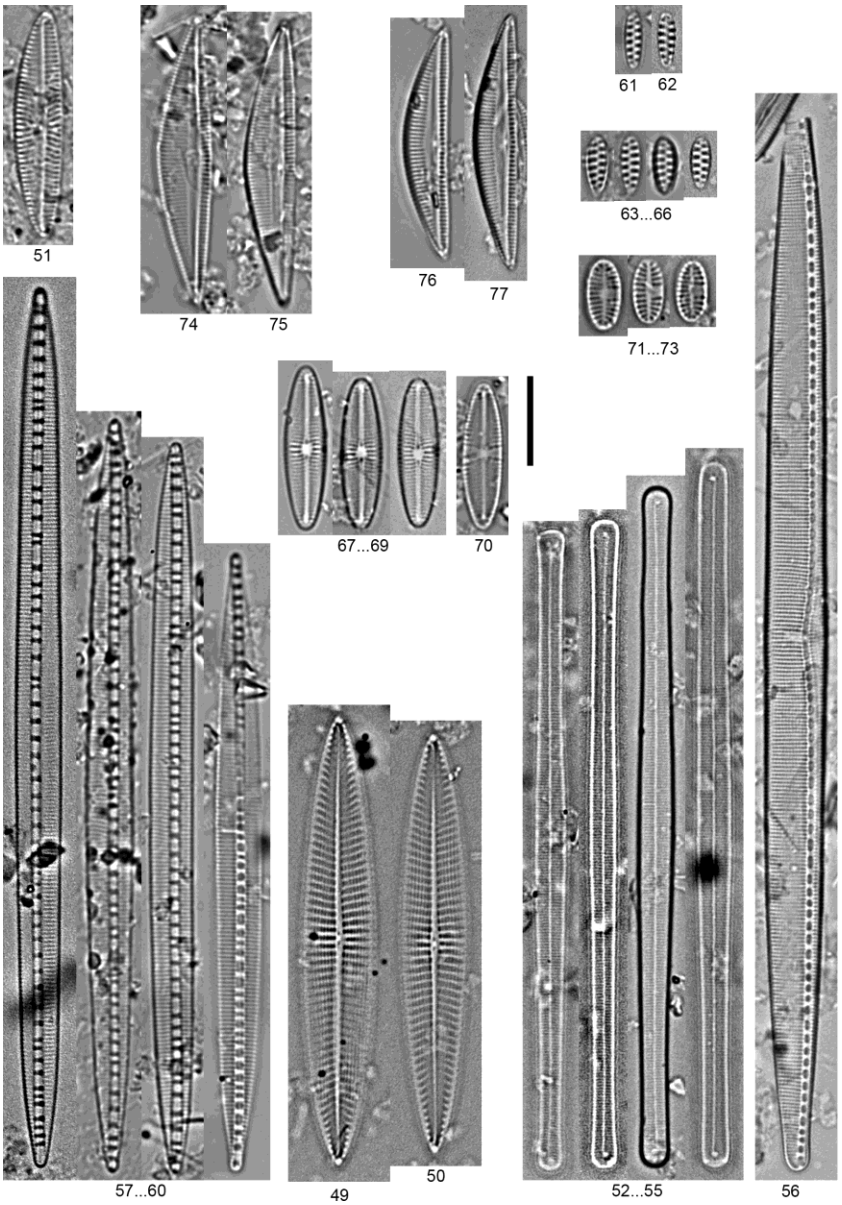

Figure 3. 49-50 – *Navicula subagnita* Proshk.-Lavr.; 51 – *Navicymbula pusilla* (Grunow) Kramm. var. *lata* Kramm.; 52-55 – *Neosynedra provincialis* (Grunow) Williams & Round; 56 – *Nitzschia prolongata* Hust.; 57-60 – *Nitzschia socialis* W. Greg. var. *masiliensis* Grunow; 61-62 – *Opephora guenter-grassii* (Witkowski & Lange-Bert.) Sabbe & Vyverman; 63-66 – *Opephora mutabilis* (Grunow) Sabbe & Vyverman; 67-69 – *Parlibellus berkeleyi* (Kütz.) Cox; 70 – *Parlibellus calvus* Witkowski, Metzeltin & Lange-Bert.; 71-73 – *Planothidium depertidum* (Giffen) Witkowski, Lange-Bert. & Metzeltin; 74-75 – *Seminavis insignis* Álvarez-Blanco & S. Blanco 76-77 – *Seminavis striaosa* (Hust.) Danieledis & Econ.-Amilli. Scale bar: 10 µm.

Navicymbula pusilla W. Sm. **var.** ***lata*** Kramm. Figure.3: 51
Ref.: Krammer, 2003 (p.125, 167, pl.138: 14-17, 141: 1-4).
Dimensions: Valve length 25.24 µm and breadth 5.42 µm, 18 striae in 10 µm.
Distribution: Oman (Krammer, 2003).

Neosynedra provincialis (Grunow) Williams & Round Figure.3: 52-55
Basionym: *Synedra provincialis* Grunow
Ref.; Peragallo & Peragallo, 1897-1908 (p.316, pl.80: 11); Jensen, 1985 (p.197, fig: 705); Hartley *et al*., 1996 (p.582, pl.283: 6); Witkowski *et al*., 2000 (p.68, pl.17: 6-7, 29: 4).
Dimensions: Valve length 71.30-78 µm and breadth 3.30-3.70 µm, 29-31 striae in 10 µm.
Distribution: The Mediterranean, Black Sea (Witkowski *et al*., 2000), Britain (Hartley *et al*., 1996).

Nitzschia prolongata Hust. Figure.3: 56
Ref.: Witkowski *et al*., 2000 (p.402, pl.200: 26).
Dimensions: Valve length 118.7 µm and breadth 6.7 µm, 22 striae in 10 µm, 8 fibulae 10 µm.
Distribution: Britain (Hartley *et al*., 1996).

Nitzschia socialis W.Greg. **var.** ***massiliensis*** Grunow

Figure.3: 57-60
Ref.: Peragallo & Peragallo, 1897-1908 (p.280, pl.72: 10).
Dimensions: Valve length 69.20-98.42 µm and breadth 4.69-5.10 µm, 22 striae in 10 µm.
Distribution: Villefranche (Peragallo & Peragallo, 1897-1908).

Opephora guenter-grassii (Witkowski & Lange-Bert.) Sabbe & Vyverman Figure.3: 61-62
Basionym: *Fragilaria guenter-grassii* Witkowski & Lange-Bert.
Ref.: Witkowski *et al*., 2000 (p.70, pl.24: 40-44).
Dimensions: Valve length 6-7.30 µm and breadth 2-2.70 µm, 12-14 striae in 10 µm.
Distribution: Baltic Sea, North Sea (Witkowski *et al*., 2000).

Opephora mutabilis (Grunow) Sabbe & Vyverman Figure.3: 63-66
Basionym: *Sceptroneis mutabilis* Grunow
Ref.: Riberio, 2010 (p.150, pl.4: 29-35).
Dimensions: Valve length 5.93-7.82 µm and breadth 2.26-2.57 µm, 9-11 striae in 10 µm.
Distribution: Portugal (Riberio, 2010).

Parlibellus berkeleyi (Kütz.) Cox Figure.3: 67-69
Basionym: *Micromega berkeleyi* Kütz.
Ref.: Hartley *et al*., 1996 (p.414, pl.156: 13-15); Witkowski *et al*., 2000 (p.320, pl.104: 24-26).
Dimensions: Valve length 16.70-18.46 µm and breadth 4.30-4.60 µm, 23-24 striae in 10 µm.
Distribution: European coasts, Baltic Sea (Witkowski *et al*., 2000), Britain (Hartley *et al*., 1996).

Parlibellus calvus Witkowski, Metzeltin & Lange-Bert. Figure.3: 70
Ref.: Witkowski *et al*., 2000 (p.320, pl.104: 18-19, 105:17-21).
Dimensions: Valve length 16.61 µm and breadth 4.52 µm, 21 striae in 10 µm.
Distribution: Bear Island, Mecklenburg Bay (Witkowski *et al*., 2000).

Planothidium depertidum (Giffen) Witkowski, Lange-Bert. & Metzeltin Figure.3: 71-73
Basionym: *Cocconeis deperdita* Giffen
Ref.: Witkowski *et al*., 2000 (p.119, pl.36:31-33, 49: 12-13).
Dimensions: Valve length 6.70-7.87 µm and breadth 3.30-3.92 µm, 16-18 striae in 10 µm.
Distribution: South Africa, Mississippi Delta (Witkowski *et al*., 2000).

Seminavis insignis Álvarez-Blanco & S. Blanco Figure.3: 74-75
Ref.: Álvarez-Blanco & S. Blanco, 2014 (p.57, pl.36: 1-6).
Dimensions: Valve length 31.18-32.20 µm and breadth 5.96-6.18 µm, 23-24 striae in 10 µm.
Distribution: Mallorca, Spain (Álvarez-Blanco & S. Blanco, 2014).

Seminavis strigosa (Hust.) Danieledis & Econ.-Amilli Figure.3: 76-77
Basionym: *Amphora strigosa* Hust.
Ref.: Simonsen, 1987 (p.352, pl.537: 12-15); Danielidis & Mann, 2003 (p.30, fig: 23-32).
Dimensions: Valve length 25.90-32 µm and breadth 4.7-5.3 µm, 19-24 striae in 10 µm.
Distribution: Mesolonghi lagoon, Western Greece (Danielidis & Mann, 2003), Sinai, Wâdi Islêt (Simonsen, 1987).

Discussion

In this study, marine benthic diatoms were examined from Akliman, Sinop in Black Sea and as a result, these taxa were found for the first time in the Turkish coasts. Among the taxa, *Nitzschia socialis* var. *massiliensis* showed narrower valve outline and variety was differentiated by striae number (22 in 10 µm) according to Peragallo & Peragallo (1897-1908). The taxon is close to *Bacillaria socialis* but the striae density is lower (14-15 in 10 µm) (Witkowski *et al*., 2000). Three different *Berkeleya* taxa were found; *Berkeleya micans*, *B. obtusa* and *B. sparsa*. *Berkeleya micans* is different from the other taxa by having longer valves and external central endings. The taxon was found common in different seas (Vilicic, Marasovic & Mikovic, 2002; Hartley *et al*., 1996). *B. obtusa* has obtuse valve endings in contrast to *B. sparsa* which has acute valve endings and has narrower valves. *B. sparsa* was described from Japan by Mizuno (1981) and Bear Island by Witkowski *et al*. (2000). However, *Berkeleya* species have very soft striae and in some valves striae are not discernible under light microscope in Akliman and different locations in Turkish coasts. *Chamaepinnularia clamans* was also reported by Witkowski *et al*. (2000) as widespread in the coastal areas however this taxon shows wide range in terms of striae formation according to Simonsen (1987) and Witkowski *et al*. (2000). The current specimen has parallel striae along raphe and fits Hustedt's type specimens (Simonsen, 1987 pl.379: 20, 22). *Fallacia florinae* is a cosmopolitan species reported from different parts of Europe (Guiry & Guiry, 2017) and recently Álvarez-Blanco & S. Blanco (2014) found the taxon from Spain. *Halamphora capitata* and *H. kolbei* are similar taxa to each other. Nevertheless, *H. capitata* shows convex valve outline in the ventral margin, whereas *H. kolbei* has a straight ventral margin. Wachnicka & Gaiser (2007) found both species in Florida. *H. tenerrima* is small celled taxon which can be confused by other small *Halamphora* species (*H. pseudotenuissima* etc.). However, Levkov (2009) reported the taxon having shortly protracted and capitate valve endings and our specimens fit the

description. *Licmophora dalmatica* and *L. debilis* are also similar species. Peragallo & Peragallo (1897-1908; pl. 84: 14, 15 & pl. 85: 19) illustrations showing that *L. dalmatica* has a narrower valve ending, while *L. debilis* has broader valve ending at the foot pole. Both *Licmophora* species were reported from different locations (Vilicic *et al*., 2002; Hendey, 1964; Witkowski *et al*., 2000). *Mastogloia pusilla* is a common taxon found in the Mediterranean and Black Sea (Vilicic *et al*., 2002; Pantazidou, Louvrou & Economou-amili, 2006; Caraus, 2012). *M. pusilla var. subcapitata* is distinguished from *M. pusilla* by having sub-capitate valve endings, this taxon was reported from the Caribbean Sea (Loir & Novarino, 2013). *M. urveae* was described from the Gulf of Mexico by Witkowski *et al*. (2000) and also found by Loir & Novarino (2013) from the Caribbean Sea. *M. urvae* and *M. pusilla* size descriptions are similar given by the authors (Witkowski *et al*., 2000; Loir & Novarino, 2013) but single large median partecta exists in *M. urvae* while *M. pusilla* has two median partecta (Loir & Novarino, 2013). *Navicula parapontica* was recently described from Black Sea (Witkowski *et al*., 2010). The taxon is similar with *N. pontica* by its valve outline. However, *N. pontica* have broader lineolae striae comparing to *N. parapontica*. *N. parapontica* is smaller in size (22-38 µm and *N. pontica*, 34-70 µm) and have higher striae density (12-14 in 10 µm) than *N. pontica* (7-10 in 10 µm). According to Witkowski *et al*. (2010), *N. pontica* was found only in Black Sea and *N. parapontica* was the dominant species in the same habitat. *Navicula pavillardii* and *N. subagnita* are similar species and should be checked while description of the taxa (Álvarez-Blanco & S. Blanco, 2014). In our specimens, *N. pavillardii* have lanceolate and broader valves comparing to similar taxon which have acute valve endings, while *N. subagnita* valves are lanceolate to narrowly lanceolate (Witkowski *et al*., 2000) and our specimens match the description. Two *Parlibellus* species that we found from Akliman Bay shows valve outline differences. *Parlibellus berkeleyi* has narrower valves 4.30-4.60 µm in this study, while *P. bennikei* was reported by Çolak (2012) in a brackish lagoon (6.05 µm). According to Witkowski *et al*. (2000), *P. calvus* is relatively smaller celled diatom which has a fascia extending to margins and reported these taxa from Baltic Sea. Moreover, *Biremis*, *Gomphonemopsis* and *Neosynedra* genera are new genus records for Turkish Marine Diatom Flora. *Biremis lucens* was found by Hustedt from Borneo as *Navicula lucens* (Simonsen, 1987) and according to Hendey (1974) and Witkowski *et al*. (2000), the taxon was cosmopolitan. *Neosynedra provincialis* was reported as common taxa from the Mediterranean (Álvarez-Blanco & S. Blanco, 2014) and Black Sea (Witkowski *et al*., 2000).

The first marine diatom study was done by Ehrenberg (1843) from Sea of Marmara. Regarding to marine diatom studies, phytoplankton were investigated more than benthic diatoms. There were three comprehensive phytoplankton marine diatoms check-lists reviewed by Koray (2001) for Turkish seas, by Balkıs (2004) for Sea of Marmara and also, Taş & Okuş (2006) for Black Sea. Also, Baytut & Gönülol (2016) studied freshwater-marine transition zone in the Kızılırmak River Basin and found 209 diatom species, and recorded 31 species as new for Turkish marine flora. However, marine benthic diatoms are not studied sufficiently for Turkey coasts. The number of diatom-related publications available for Turkey is not representative of the great diversity of aquatic systems in the country. From a taxonomic standpoint, it is difficult to build even a preliminary catalogue of diatoms because current research practices did not allow the inclusion of rare taxa in published results. It is imperative that this style of research is promptly changed in order to get a clearer picture of the diversity of diatoms in Turkish waters (Solak, Ector, Wojtal, Ács, & Morales, 2012).

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