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Investigation on Ostracoda (Crustacea) Fauna of Some Important Wetlands of Turkey

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Abstract: As a consequence of the examination of the materials that were collected from 63 wetlands (lake, marshes, lagoon) between the years 1997-2003 in Turkey. Materials were evaluated and 52 ostracod species belonging to 31 genera were determined.

Key words: Ostracoda, wetlands, crustacea, fauna, Turkey

INTRODUCTION

Turkey is a country rich in wetlands. These areas are very important for waterfowl as many migration routes intersect in Anatolia. The complex geology of Turkey has produced an interesting hydrological network and lakes have been formed by several processes. These processes include; tectonism, volcanism, glaciation, karstic geology, landslides, rivers and coastal impoundments. These different processes have produced lakes and catchments with great differences in morphology, age, water properties and ecology.

Inandik[1], Saracoglu[2], Publication of Minister of Environment[3], Magnin and Yarar[4], Publication of the Environment Foundation of Turkey[5], Munsuz and Unver[6], Kazanci *et al.*[7] were given important knowledge about of wetlands of Turkey. Also, Meisch[8] was given important ecological and taxonomical information about of ostracod species of Europe.

Preliminary researches on the Ostracoda species, which lives in the inland water of Turkey, were performed by Schäfer[9] and Hartmann[10]. Altinsacli and Griffiths[11] were given non-marine Ostracoda fauna checklist of Turkey. All findings of this study not related with all of published or unpublished other articles or study results on ostracods and all findings of this study are independence findings.

MATERIALS AND METHODS

In this study, materials were collected from 63 wetlands (Fig. 1) with a hand plankton net (0.025 mm mesh size) and fixed in 4% formaldehyde. Ostracod specimens preserved in plastic tubes in 70% ethanol. Soft body part and carapace morphology were used to identify the ostracod species. Wetlands, wetlands number and some features of all wetlands are given in Table 1.

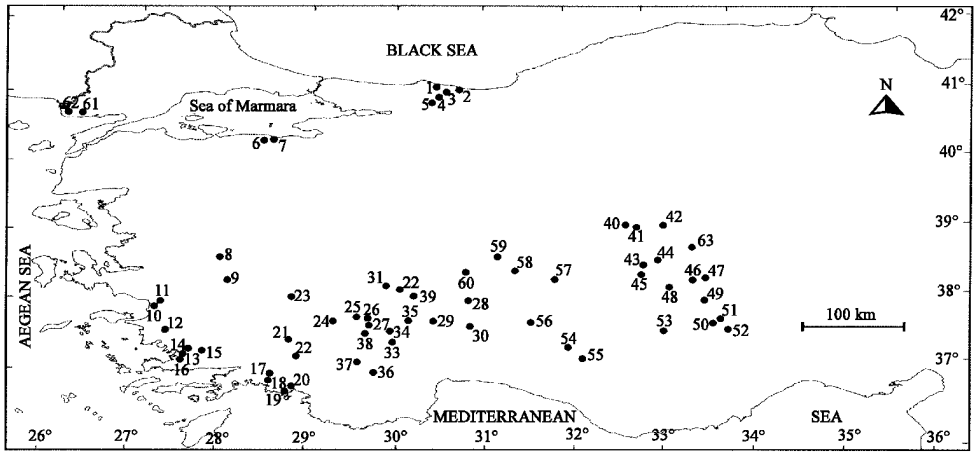

Fig. 1: Sampling localities in the study area (in numerical order)

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Table 1: Wetlands, wetlands number and some features of all wetlands (type of water sources are indicated in parentheses)

Wetlands No.	Wetlands name	Provinces	Altitude (m)	Surface area (ha)	Trophic state	Salinity classification
1	Lake Acarlar (lake)	Adapazari	4	500	Mesotrophic	Freshwater
2	Kuçukbogaz (lagoon)	Adapazari	1	20	Mesotrophic	Brackish
3	Buyuk Akgol (lake)	Adapazari	5	360	Mesotrophic	Freshwater
4	Kucük Akgol (lake)	Adapazari	25	25	Eutrophic	Freshwater
5	Taskisigi Golu (lake)	Adapazari	25	75	Eutrophic	Freshwater
6	Dalyan (Poyraz) (lagoon)	Bursa	0	1200	Eutrophic	Freshwater
7	Arapciftligi Lagunu (Lagoon)	Bursa	0	450	Mesotrophic	Brackish
8	Marmara Golu (lake)	Manisa	79	6800	Eutrophic	Freshwater
9	Golcuk Golu (lake)	Izmir	1049	400	Eutrophic	Freshwater
10	Elaman Golu (lagoon)	Izmir	1	70	Eutrophic	Brackish
11	Gebekirse Golu (lake)	Izmir	1	75	Eutrophic	Brackish
12	Azap Golu (lake)	Aydin	7	295	Eutrophic	Freshwater
13	Gulluk Lagunu (lagoon)	Mugla	0	1400	Eutrophic	Brackish
14	Karagol (Milas)	Mugla	10	25	Eutrophic	Freshwater
15	Denizcik Golu (lake)	Mugla	200	20	Mesotrophic	Freshwater
16	Tuzla Lagunu (lagoon)	Mugla	0	500	Mesotrophic	Brackish
17	Koycegiz Golu (lake)	Mugla	0	6350	Eutrophic	Brackish
18	Sulungur Lagunu (lagoon)	Mugla	0	250	Eutrophic	Brackish
19	Kocagol (lake)	Mugla	8	394	Eutrophic	Brackish
20	Badirnoz Golu (lake)	Mugla	1	150	Eutrophic	Brackish
21	Suluklu Golu (lake)	Denizli	825	2	Mesotrophic	Freshwater
22	Karagol Golu (lake)	Denizli	1320	100	Oligotrophic	Freshwater
23	Suleymanli Golu (lake)	Denizli	1100	100	Mesotrophic	Freshwater
24	Sakligol (lake)	Denizli	980	2	Mesotrophic	Freshwater
25	Karagol (lake)	Denizli	1290	3	Mesotrophic	Freshwater
26	Beylerli Golu (lake)	Denizli	850	300	Mesotrophic	Freshwater
27	Çorak Golu (lake)	Burdur	1050	1150	Mesotrophic	Brackish
28	Egirdir Golu (lake)	Isparta	918	47250	Mesotrophic	Freshwater
29	Golcuk Golu (crater lake)	Isparta	1420	100	Oligotrophic	Freshwater
30	Kovada Golu (lake)	Isparta	911	870	Eutrophic	Freshwater
31	Isikli Golu (lake)	Denizli	821	4000	Eutrophic	Freshwater
32	Gokgol (lake)	Afyon	824	40	Mesotrophic	Freshwater
33	Karatas Golu (lake)	Burdur	1053	1190	Mesotrophic	Freshwater
34	Yarisli Golu (lake)	Burdur	915	1400	Mesotrophic	Freshwater
35	Burdur Golu (lake)	Burdur	857	23700	Mesotrophic	Brackish
36	Yazir Golu (lake)	Burdur	1484	1840	Mesotrophic	Freshwater
37	Golhisar Golu (lake)	Burdur	944	900	Mesotrophic	Freshwater
38	Salda Golu (lake)	Burdur	1060	3700	Oligotrophic	Freshwater
39	Karakuyu Golu (lake)	Afyon	1100	1099	Mesotrophic	Freshwater
40	Samsam Golu (lake)	Konya	980	830	Mesotrophic	Freshwater
41	Saz Golu (lake)	Konya	925	50	Mesotrophic	Freshwater
42	Duden Golu (lake)	Konya	960	860	Mesotrophic	Brackish
43	Bolluk Golu (lake)	Konya	925	1150	Eutrophic	Brackish
44	Tersakan Golu (lake)	Konya	920	6400	Mesotrophic	Saline
45	Koy Golu (lake)	Konya	930	10	Mesotrophic	Freshwater
46	Esmekaya Sazligi (marshes)	Aksaray	945	800	Mesotrophic	Freshwater
47	Yesiltomek Sazliği (marshes)	Aksaray	910	100	Mesotrophic	Freshwater
48	Kizoren Golu (lake)	Konya	976	50	Mesotrophic	Freshwater
49	Meyilin Denizi Gölü (lake)	Konya	975	27	Oligotrophic	Freshwater
50	Meke Golu (crater lake)	Konya	940	50	Oligotrophic	Hypersaline
51	Acigöl Golu (crater lake)	Konya	950	54	Oligotrophic	Metasaline
52	Eregli Sazligi(marshes)	Konya	998	7000	Mesotrophic	Freshwater
53	Hotamis Sazligi (marshes)	Konya	1000	5000	Mesotrophic	Freshwater
54	Sugla Golu (lake)	Konya	1095	16500	Mesotrophic	Freshwater
55	Sariot Golu (lake)	Konya	1550	35	Mesotrophic	Freshwater
56	Beysehir Golu (lake)	Konya, Afyon	1123	73000	Mesotrophic	Freshwater
57	Çavuscu Golu (lake)	Konya	1026	1200	Mesotrophic	Freshwater
58	Aksehir Golu (lake)	Konya	990	36100	Eutrophic	Brackish
59	Eber Golu (lake)	Konya, Afyon	995	17500	Eutrophic	Freshwater
60	Karamik Golu (lake))	Afyon	1002	4500	Mesotrophic	Freshwater
61	Mecidiye Lagunu (lagoon)	Edirne	0	350	Mesotrophic	Brackish
62	Vakif (Lagunu (lagoon)	Edirne	0	200	Mesotrophic	Brackish
63	Tuz Golu (lake)	Ankara, Konya, Aksaray	905	190000	Mesotrophic	Hypersaline

RESULTS

Fifty-two species of ostracods inhabited 62 wetlands in the present survey. In the following listings, taxonomic and systematic nomenclature largely follow Meisch[8].

Phylum or sub-phylum: Crustacea Pennant (1777)
Class: Ostracoda Latreille (1806)
Sub-class: Podocopa G.W. Müller (1984)
Order: Podocopida Sars (1866)
Suborder: Podocopina Sars (1866)
Superfamily: Darwinuloidea Brady and Norman (1889)
Family: Darwinulidae Brady and Norman (1889)
1) *Darwinula stevensoni* (Brady and Robertson, 1870)
Distribution in wetlands: 2, 3, 4, 5, 17, 28, 29, 30, 33, 37, 43, 44, 46, 49, 53, 56, 57, 59, 60.
Superfamily: Cypridoidea Baird (1845)
Family: Candonidae Kaufmann (1900)
Subfamily: Candoninae Kaufmann (1900)
2) *Candona angulata* G.W. Müller (1900)
Distribution in wetlands: 8, 17, 26, 28, 37, 38, 46, 47, 53, 54, 56, 58.
3) *Candona candida* O.F. Müller (1776)
Distribution in wetlands: 39
4) *Candona neglecta* Sars (1887)
Distribution in wetlands: 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 14, 15, 21, 23, 24, 25, 26, 27, 30, 31, 32, 33, 34, 36, 37, 38, 39, 40, 41, 45, 46, 47, 49, 52, 53, 54, 55, 56, 57, 58, 59, 60.
5) *Candona weltneri* Hartwig (1899)
Distribution in wetlands: 56
6) *Fabaeformiscandona fabaeformis* (Fischer, 1851)
Distribution in wetlands: 1, 2, 5, 12, 20, 36, 37, 39, 43, 44, 46, 47, 52, 53, 54, 56, 57, 59, 60.
7) *Pseudocandona compressa* (Koch, 1838)
Distribution in wetlands: 39, 52, 56, 58, 60.
8) *Pseudocandona marchica* (Hartwig, 1899)
Distribution in wetlands: 1, 3, 4, 5, 17, 20, 25, 26, 28, 32, 33, 36, 37, 39, 46, 49, 52, 54, 56, 58, 59, 60.
9) *Candonopsis kingsleii* (Brady and Robertson, 1870)
Distribution in wetlands: 1, 5.
Subfamily: Cyclocypridinae Kaufmann (1900)
10) *Physocypria kraepelini* G.W. Müller (1934)
Distribution in wetlands: 3, 5, 9, 28, 30.
11) *Cypria ophtalmica* (Jurine, 1820)
Distribution in wetlands: 1, 2, 3, 4, 5, 6, 7, 17, 28, 29, 30, 31, 32, 33, 39, 46, 47, 48, 56, 57, 58, 60.
12) *Cyclocypris ovum* (Jurine, 1820)
Distribution in wetlands: 29, 39, 54, 60.
Family: Notodromadidae Kaufmann (1900)
Subfamily: Notodromadinae Kaufmann (1900)
13) *Notodromas monacha* (O.F. Müller, 1776)
Distribution in wetlands: 1, 28, 39, 56, 58, 60.
Family: Ilyocyprididae Kaufmann (1900)
14) *Ilyocypris biplicata* (Koch, 1838)
Distribution in wetlands: 1, 8, 12, 20, 23, 26, 28, 30.
15) *Ilyocypris bradyi* Sars (1890)
Distribution in wetlands: 1, 2, 5, 6, 7, 8, 12, 14, 15, 17, 24, 25, 27, 28, 30, 31, 32, 33, 34, 35, 36, 37, 39, 40, 41, 42, 43, 44, 46,48, 49, 55, 56, 58, 59, 60.
16) *Ilyocypris decipiens* Masi (1905)
Distribution in wetlands: 6, 7, 17, 21, 32, 33, 35, 38, 46, 52, 56, 59, 60.
17) *Ilyocypris divisa* Klie (1926)
Distribution in wetlands: 21, 27, 31, 32, 33, 56, 59, 60.
18) *Ilyocypris monstrifica* (Norman, 1862)
Distribution in wetlands: 12, 23, 27, 33, 54, 56, 58, 59, 60.
Subfamily: Cypridinae Baird (1845)
19) *Cypris bispinosa* Lucas (1849)
Distribution in wetlands: 21, 26, 28.
20) *Cypris pubera* O.F. Müller (1776)
Distribution in wetlands: 8, 12, 14, 22, 23, 25, 26, 28, 30, 32, 33, 35, 36, 39, 55, 56, 57, 58, 59, 60.
Subfamily: Dolerocypridinae Triebel (1961)
21) *Dolerocypris fasciata* (O.F. Müller, 1776)
Distribution in wetlands: 30, 39, 59.
22) *Dolerocypris sinensis* Sars (1903)
Distribution in wetlands: 21, 59.
Subfamily: Eucypridinae Bronshtein (1947)
23) *Eucypris inflata* (Sars, 1903)
Distribution in wetlands: 8, 20, 24, 28, 30, 34, 35, 40, 41, 43, 44, 45, 50, 52.
24) *Eucypris lilljeborgi* (G.W. Müller, 1900)
Distribution in wetlands: 54, 55, 56.
25) *Eucypris virens* (Jurine, 1820)
Distribution in wetlands: 1, 6, 7, 19, 20, 23, 26, 27, 28, 30, 40, 41, 55, 60.
26) *Trajancypris clavata* (Baird, 1838)
Distribution in wetlands: 14, 30, 40, 41, 55, 60.
27) *Prionocypris zenkeri* (Chyzer and Toth, 1858)
Distribution in wetlands: 8, 14, 25, 28, 29, 30, 31, 32, 33, 34, 35, 37, 39, 40, 54, 55, 56, 57, 58, 59, 60.
28) *Tonnacypris lutaria* (Koch, 1838)
Distribution in wetlands: 1, 9, 28, 54, 55, 56.
Subfamily: Herpetocypridinae Kaufmann (1900)
29) *Herpetocypris chevreuxi* (Sars, 1896)
Distribution in wetlands: 6, 7, 23, 28, 30, 31,32, 34, 35, 36, 37, 46, 56, 57, 58, 59, 60.
30) *Psychrodromus olivaceus* (Brady and Norman, 1889)
Distribution in wetlands: 23, 26, 28, 32, 33, 33, 35, 38, 39, 54, 55, 56, 58, 59, 60.
Subfamily: Cyprinotinae Bronshtein (1947)
31) *Heterocypris incongruens* (Ramdohr, 1808)
Distribution in wetlands: 3, 6, 7, 9, 12, 14, 15, 20, 23, 26, 27, 28, 30, 31, 32, 33, 34, 35, 37, 39, 40, 41, 42, 44, 46, 52, 55, 56, 57, 58, 59, 60.

32) *Heterocypris rotundata* Bronshtein (1928)
Distribution in wetlands: 8, 23, 26, 28, 30, 56, 57, 59.
33) *Heterocypris salina* (Brady, 1868)
Distribution in wetlands: 2, 6, 7, 8, 10, 11, 13, 14, 16, 17, 18, 19, 20, 24, 26, 27, 28, 30, 31, 32, 34, 35, 37, 38, 40, 41, 42, 43, 44, 46, 50, 51, 52, 53, 56, 57, 58, 59, 60, 62.
Subfamily: Cypridopsinae Kaufmann (1900)
34) *Cypridopsis hartwigi* G.W. Müller (1900)
Distribution in wetlands: 17, 20, 28, 56.
35) *Cypridopsis vidua* (O.F. Müller, 1776)
Distribution in wetlands: 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 14, 15, 21, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 40, 41, 45, 46, 47, 49, 52, 53, 54, 56, 57, 58, 59, 60.
36) *Plesiocypridopsis newtoni* (Brady and Robertson, 1870)
Distribution in wetlands: 28, 30, 35, 56, 57.
37) *Potamocypris arcuata* (Sars, 1903)
Distribution in wetlands: 37, 54.
38) *Potamocypris steuri* Klie (1935)
Distribution in wetlands: 13, 16, 17.
39) *Potamocypris unicaudata* Schäfer (1943)
Distribution in wetlands: 60
40) *Potamocypris villosa* (Jurine, 1820)
Distribution in wetlands: 12, 22, 23, 35, 54, 56.
41) *Potamocypris variegata* (Brady and Norman, 1889)
Distribution in wetlands: 28, 29, 30.
42) *Potamocypris zschokkei* (Kaufmann, 1900)
Distribution in wetlands: 28, 55, 56.
43) *Sarscypridopsis aculeata* (Costa, 1847)
Distribution in wetlands: 6, 7, 19.
Subfamily: Cyprettinae Hartmann (1963)
44) *Cypretta dubiosa* (Daday; 1900)
Distribution in wetlands: 60
Superfamily: Cytheroidea Baird (1850)
Family: Limnocytheridae Sars (1925)
Subfamily: Limnocytherinae Sars (1925)
45) *Limnocythere inopinata* (Baird, 1843)
Distribution in wetlands: 3, 5, 8, 27, 28, 29, 34, 35, 38, 42, 43, 44, 45, 52, 53, 57, 58, 59, 63.
46) *Paralimnocythere psammophila* (Flossner, 1965)
Distribution in wetlands: 1, 5, 23.
Family: Cytherideidae Sars (1925)
Subfamily: Cytherideinae Sars (1925)
47) *Cyprideis torosa* (Jones, 1850)
Distribution in wetlands: 2, 6, 7, 10, 11, 13, 16, 17, 18, 19, 20, 46, 61, 62.
Family: Leptocytheridae Hanai (1957)
48) *Leptocythere histriana* Caraion (1964)
Distribution in wetlands: 13, 16, 17, 61, 62.
Family: Loxoconchidae Sars (1925)
49) *Loxoconcha elliptica* Brady (1868)
Distribution in wetlands: 13, 16, 17, 61, 62.
50) *Loxoconcha immodulata* Stephanitys (1962)
Distribution in wetlands: 3, 5.
Family: Paradoxostomatidae Brady and Norman (1889)
51) *Cythreois fischeri* (Sars, 1866)
Distribution in wetlands: 13, 17, 18.
Family: Hemicytheridae Puri (1953)
Subfamily: Hemicytherinae Puri (1953)
52) *Tyrrhenocythere donetziensis* (Dubowsky, 1926)
Distribution in wetlands: 3, 5,46, 47, 49.

DISCUSSION

Fifty-two species of Ostracoda were found as a result of the examination of the materials that were collected from 63 localities including lakes, marshes and lagoons in Turkey. The most common ostracod species within the 62 wetlands was the *Candona neglecta* (43 wetlands) followed by *Heterocypris salina* (40 wetlands). Also, the richest wetland for ostracod species within the 62 wetlands was Lake Beysehir (30 species) followed by Karamik (26 species).

Study results show that morphological, geographical, physical and chemical features of wetlands were effected distributions (absence or presence) of ostracod species in wetlands. Salinity, eutrophication, altitude, pH, macrophyte density, existing of different habitats in same wetland, dissolved oxygen, deep and surface area of wetlands, ionic composition of water, temperature, hydraulical regime of wetlands, climate, predators, food competition are some major factors on distribution of ostracod species. Ostracoda fauna of 63 wetlands is similar with Palaearctic and Holarctic region and especially with circum-Mediterranean zone. Six ostracod species of 52 ostracod species are cosmopolitan. Now a days, ecological balances of some wetlands (Eregli Sazligi, Hotamis Marshes, Lake Aksehir) have caused extensive damaged by faulty policies of Water Hydraulic Works (DSI) and Minister of Agriculture.

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