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Freshwater Ostracoda (Crustacea) of Diyarbakır Province, including a new report for Turkey

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Abstract: During the summer (July-August) of 2007, a total of 23 freshwater ostracods belonging to 14 genera were collected from 50 out of 90 different bodies of water in Diyarbakır. Of these 23 finds, *Herpetocypris intermedia* is a new report for Turkish ostracod fauna. In addition, 11 species (*Ilyocypris decipiens*, *I. inermis*, *Eucypris virens*, *Herpetocypris brevicaudata*, *Psychrodromus fontinalis*, *Isocypris beauchampi*, *Potamocypris similis*, *P. unicaudata*, *P. arcuata*, *Limnocythere stationis*, and *L. inopinata*) are reported from this city for the first time. The geographical distribution of some species is extended into the eastern parts of Turkey. Our results also suggest that species with cosmopolitan characteristics tend to have a wide distribution within a variety of habitats.

Key words: Ostracoda, new report, *Herpetocypris intermedia*, distribution, Diyarbakır, Turkey

Diyarbakır bölgesinin tatlısu Ostrakotları (Crustacea) ve Türkiye için bir yeni kayıt

Özet: Diyarbakır'daki 90 farklı sulak alandan 50 tanesinden 2007 yaz süresince (Temmuz-Ağustos) toplanan ostrakot türleri incelenmiş ve 14 cinse ait toplam 23 tatlı su ostrakot türü tespit edilmiştir. *Herpetocypris intermedia* Türkiye ostrakot faunası için yeni kayıt olarak rapor edilmiştir. Bunun yanında, 11 tür ise (*Ilyocypris decipiens, I. inermis, Eucypris virens, Herpetocypris brevicaudata, Psychrodromus fontinalis, Isocypris beauchampi, Potamocypris similis, P. unicaudata, P. arcuata, Limnocythere stationis, L. inopinata*) Diyarbakır için yeni kayıttır. Bazı türlerin coğrafik dağılımı Türkiye'nin doğu kesimlerine kadar genişletilmiştir. Sonuçlar kozmopolit karaktere sahip türlerin farklı habitatlardaki dağılımının da geniş olduğunu önermektedir.

Anahtar sözcükler: Ostrakot, yeni kayıt, *Herpetocypris intermedia*, dağılım, Diyarbakır, Türkiye

Introduction

Ostracods are known to be useful organisms for a number of purposes. They can be used in both ecological and evolutionary studies to determine water quality, to describe habitat type, to reconstruct past natural history, and to estimate species richness (Carbonel et al., 1988; Külköylüoğlu, 2003). Despite their usefulness, however, most of the attention to freshwater ostracods within a limited sampling area has been given to certain locations in the western,

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northern, and southwestern regions of Turkey. With the exception of one earlier report from a specific location (Gülen et al., 1996), almost nothing is known about ostracod distribution and ecology in the province of Diyarbakır. This is the first extensive study to estimate the distribution of freshwater ostracod species in Diyarbakır.

Materials and methods

The material was collected from 50 out of 90 different aquatic bodies (ditches, springs, creeks, river, lakes, dams, ponds, troughs, etc.) visited randomly in 2007, between 12 July and 23 August (Figure 1). Geographical data (altitude and coordinates) were recorded with a geographical positioning system (Garmin-GPS 45) unit. Samples were taken with a phytoplankton hand net (mesh size of 200 µm) from shallow waters not exceeding 100 cm in depth. At each site, we collected about 200 g of sediment, which was fixed in 70% ethanol in situ. This material was brought to the laboratory, where it was filtered using 4 standard sieves (1.5, 1.0, 0.5, and 0.25 mm) and fixed in 70% ethanol again. During the species identification, we used both soft body parts and carapaces, following the systematic key (Meisch 2000) and the descriptions provided by Broodbakker and Danielopol (1982). Materials were deposited in the Limnology Laboratory of the Department of Biology, Abant İzzet Baysal University, Bolu.

Results and discussion

A total of 23 freshwater ostracods and 3 unidentified individuals were collected from Diyarbakır (Table). One of these, *Herpetocypris intermedia*, is a new report for Turkey. A further 11 species (*Ilyocypris decipiens*, *I. inermis*, *Eucypris virens*, *Herpetocypris brevicaudata*, *Psychrodromus fontinalis*, *Isocypris beauchampi*, *Potamocypris similis*, *P. unicaudata*, *P. arcuata*, *Limnocythere stationis*, and *L. inopinata*) are new reports for the area. The most frequently occurring species (*H. incongruens*, *I. bradyi*, *E. virens*, *P. zenkeri*, and *C. neglecta*) are also known to have cosmopolitan characteristics, found in wide ranges of geographic area within a variety of habitats. Including these new reports, the confirmed ostracod fauna of Diyarbakır consists of about 30 living species, but the actual number is believed to be much higher. General estimates are difficult due to a lack of studies on this area.

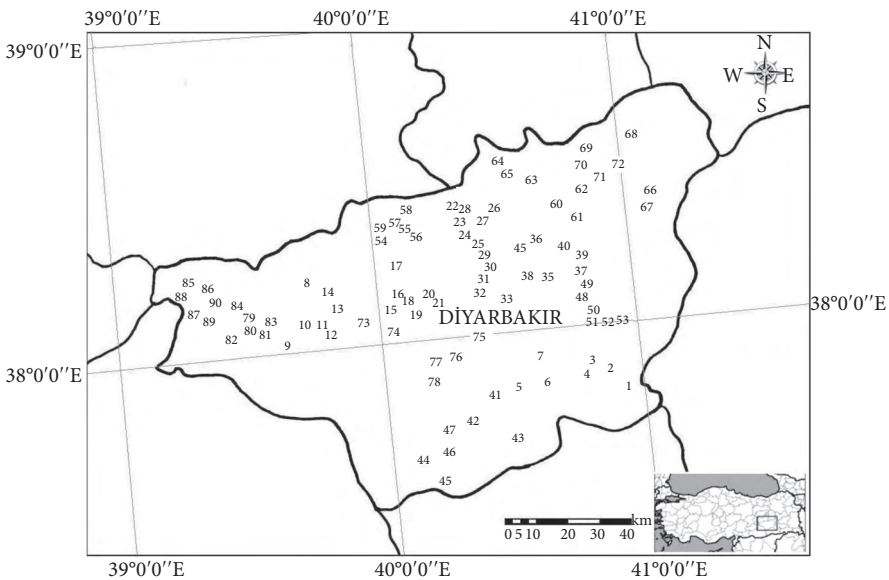


Figure 1. Location map of the 90 sampling sites visited in Diyarbakır.

Table 1. The name of 90 sampling sites in Diyarbakır along with information on the geographic location of each (longitude, latitude, altitude) and codes of 23 taxa with 3 unknowns. Abbreviations: Dst - *Darwinula stevensoni*, CN - *Candona neglecta*, CA - *C.* cf. *angulata*, ID - *Ilyocypris decipiens*, IB - *I. bradyi*, II - *I. inermis*, IM - *I.* cf. *monstrifica*, EV - *Eucypris virens*, PZ - *Prionocypris zenkeri*, Tr - *Trajancypris* sp., HB - *Herpetocypris brevicaudata*, Hint - *H. intermedia*, Pfo - *Psychrodromus fontinalis*, HI - *Heterocypris incongruens*, Ibea - *Isocypris beauchampi*, CV - *Cypridopsis vidua*, PS - *Potamocypris similis*, PU - *P. unicaudata*, Pva - *P. variegata*, Par - *P. arcuata*, PP - *Potamocypris* sp., Zo - *Zonocypris* sp., LS - *Limnocythere stationis*, LI - *L. inopinata*, Pre - *Paralimnocythere relicta.* Alt. - altitude (m), Sp. Code - species code. Bold letters indicate subfossil forms.

Sta. No.	District	Sta. Name	Longitude	Latitude	Alt.	Sp. Code
1	Bismil	Pınarbaşı Pond	37°48′857″E	40°59′270″N	530	**IM**
2	Bismil	Salat Stream	37°51′752″E	40°52′501″N	532	
3	Bismil	Dipsiz Lake (Lake Kız)	37°51′810″E	40°48′657″N	556	
4	Bismil	Tuz Lake	37°52′148″E	40°50′974″N	545	
5	Bismil	Kani Creek	37°49′354″E	40°31′462″N	568	
6	Bismil	Tigris River	37°50′419″E	40°39′539″N	536	PS
7	Bismil	Kenberli Pond	37°53′644″E	40°38′434″N	648	
8	Ergani	Boğaz Stream	38°12′921″E	39°44′498″N	808	PS,
9	Ergani	Çakartaş Pond	38°02′045″E	39°39′659″N	800	ID, **Tr**
10	Ergani	Akçakale Stream	38°05′438″E	39°43′240″N	776	
11	Ergani	Kabasakal Stream	38°04′445″E	39°48′886″N	763	
12	Ergani	Köprüköyü Creek	38°03′662″E	39°50′395″N	757	**Dst**, ID, CV
13	Ergani	Bereketli Stream	38°07′499″E	39°49′998″N	760	HI
14	Ergani	Yüksel Pond	38°10′681″E	39°49′220″N	784	ID, CV
15	Eğil	Oyalı Creek	38°07′967″E	40°01′765″N	817	HI
16	Eğil	Small water ditch	38°08′940″E	40°04′718″N	781	HB
17	Eğil	Aşağı Ziyaret Fountain	38°15′220″E	40°05′714″N	716	
18	Eğil	Baysu Creek	38°08′069″E	40°06′229″N	715	
19	Eğil	Irrigation canal	38°06′616″E	40°08′268″N	655	
20	Eğil	Small water pond	38°08′727″E	40°11′986″N	715	HI
21	Eğil	Gölcük Pond	38°07′960″E	40°13′560″N	703	IB
22	Hani	Gölcük Pond	38°24′290″E	40°23′540″N	908	HI
23	Hani	Çerkez Suyu	38°23′144″E	40°24′357″N	832	CN, II, EV, Zo
24	Hani	Koki Stream	38°21′308″E	40°25′715″N	792	IB, II
25	Hani	Soylu Stream	38°18′193″E	40°26′662″N	728	IB, EV, Hint, HI, PU
26	Hani	Seren Stream	38°24′276″E	40°30′300″N	863	
27	Hani	Aka Creek	38°22′756″E	40°28′635″N	796	IB
28	Hani	Dımıştad Creek	38°23′872″E	40°24′821″N	852	HI
29	Kocaköy	Ambar Stream	38°17′163″E	40°27′634″N	714	IB, PZ, PS, HI
30	Kocaköy	Eyüpler Pond	38°14′971″E	40°29′675″N	758	
31	Kocaköy	Şerifoğulları Creek	38°13′452″E	40°28′828″N	720	Pva, HI
32	Kocaköy	Bozyer Pond	38°12′074″E	40°27′987″N	717	Par, HI
33	Kocaköy	Hüseynik Pond	38°10′556″E	40°30′504″N	746	
34	Kocaköy	Arkbaşı Stream	38°16′319″E	40°33′771″N	772	II, PZ, Pva
35	Hazro	Düzevler Pond	38°09′708″E	40°44′309″N	806	
36	Hazro	Kırıkkaşık Pond	38°16′588″E	40°41′306″N	781	
37	Hazro	Ağartı Stream	38°09′249″E	40°48′954″N	722	II
38	Hazro	Uzunark Stream	38°10′570″E	40°39′026″N	755	II
39	Hazro	Gölcük	38°12′145″E	40°49′643″N	792	IB, II, PZ, HI
40	Hazro	Evincik Creek	38°13′214″E	40°46′683″N	881	PZ, HI
41	Çınar	Tigris River coast	37°48′780″E	40°26′207″N	604	
42	Çınar	Beşpınar Pond	37°45′953″E	40°20′685″N	665	

Table 1. (Continued).

Sta. No.	District	Sta. Name	Longitude	Latitude	Alt.	Sp. Code
43	Çınar	Göksu Dam Lake	37°40′947″E	40°26′505″N	694	
44	Çınar	Danışır Pond	37°38′071″E	40°08′403″N	863	II, EV, Ibea, Par, LI, HI
45	Çınar	Künreş Pond	37°33′837″E	40°11′792″N	915	**Tr**
46	Çınar	Bayırkonak Stream	37°39′074″E	40°13′252″N	903	HI
47	Çınar	Höyükdibi Stream	37°43′921″E	40°15′460″N	730	
48	Silvan	Gölcük Pond	38°06′793″E	40°48′814″N	732	HB, Hint
49	Silvan	Darköprü Stream	38°08′123″E	40°49′129″N	689	HI
50	Silvan	Şanlı Pond	38°02′444″E	40°51′118″N	686	
51	Silvan	Irrigation canal	38°01′092″E	40°54′010″N	638	HI
52	Silvan	Sulak creeks	38°01′113″E	40°55′226″N	643	
53	Silvan	Pir Hasan Stream	37°59′910″E	40°58′456″N	620	Pva, LS
54	Dicle	Kral Kızı Dam Lake	38°19′749″E	40°02′222″N	715	Pre
55	Dicle	Dipni Stream	38°21′961″E	40°10′872″N	713	
56	Dicle	Dicle Dam Lake	38°20′556″E	40°13′655″N	716	
57	Dicle	Gelincik Creek	38°23′566″E	40°07′983″N	779	
58	Dicle	Dipni Stream	38°24′421″E	40°10′973″N	725	
59	Dicle	Small water pool	38°21′758″E	40°02′302″N	940	**CA**, HI
60	Lice	Kuru Stream	38°24′723″E	40°45′489″N	849	
61	Lice	Çayır Stream	38°23′002″E	40°47′390″N	825	
62	Lice	Kıyı Creek	38°25′605″E	40°49′859″N	788	
63	Lice	Nergizi Creek	38°27′399″E	40°40′579″N	954	IB, HI
64	Lice	Bırkleyn Stream	38°31′675″E	40°32′618″N	903	LI, Pva
65	Lice	Tuzocağı Creek	38°30′189″E	40°32′384″N	996	II, HB, Pfo
66	Kulp	Uzunova Dam Lake	38°23′149″E	41°06′590″N	947	ID
67	Kulp	Tulat Stream	38°21′315″E	41°60′92″N	905	IB, HI
68	Kulp	Kulp Stream	38°31′695″E	41°03′502″N	827	
69	Kulp	Sıkri Creek	38°31′260″E	40°54′679″N	1095	Par
70	Kulp	Dalik Stream	38°28′680″E	40°54′519″N	834	
71	Kulp	Özbek Pond	38°27′727″E	40°56′094″N	899	
72	Kulp	Şakirhan Stream	38°28′759″E	40°58′811″N	821	
73	Merkez	Devegeçidi Dam Lake	38°04′278″E	39°58′311″N	779	
74	Merkez	Devegeçidi Stream	38°03′222″E	40°04′182″N	700	
75	Merkez	Yeşilköy Stream	37°59′488″E	40°22′974″N	645	
76	Merkez	Kabaklı Pond	37°55′692″E	40°17′679″N	720	ID, HI
77	Merkez	Tigris River	37°55′197″E	40°14′957″N	594	
78	Merkez	Tigris River	37°53′293″E	40°13′714″N	579	
79	Çermik	Kırkgöz Spring	38°08′217″E	39°28′775″N	754	IB, EV, Pfo, Zo
80	Çermik	Small water ditches	38°06′754″E	39°29′421″N	762	EV
81	Çermik	Small water ditches	38°05′949″E	39°31′944″N	825	IB, HI
82	Çermik	Affan Creek	38°05′081″E	39°26′819″N	713	HI
83	Çermik	Halilan Pond	38°06′632″E	39°34′685″N	760	**Tr**
84	Çermik	Sinek Stream	38°09′630″E	39°27′596″N	662	
85	Çüngüş	Gölcük Pond	38°14′340″E	39°17′043″N	972	CN, II
86	Çüngüş	Sokullu Creek	38°14′119″E	39°19′563″N	964	CN, II
87	Çüngüş	Çüngüş Stream	38°11′492″E	39°16′437″N	957	
88	Çüngüş	Small water ditches	38°12′590″E	39°15′079″N	1025	
89	Çüngüş	Small water ditches	38°10′703″E	39°18′791″N	1013	**EV**, HI
90	Çüngüş	Çır Creek	38°12′449″E	39°20′796″N	1009	CN, II, HI, PP

The only previous study of ostracods from Diyarbakır was done by Gülen et al. in 1996, when they reported 15 species from Kabaklı Spring on the campus of Dicle University. The findings of this group included *Darwinula stevensoni*, *Candona neglecta*, *Cypria opthalmica*, *Ilyocypris bradyi*, *Cypris pubera*, *Eucypris lilljeborgi*, *E. pigra*, *E. virens*, *Trajancypris clavata*, *Prionocypris zenkeri*, *Herpetocypris chevreuxi*, *H. reptans*, *Heterocypris incongruens*, *H. salina*, and *Cypridopsis vidua*. Although our own results included 5 species in common with those of Gülen et al. (1996), we did not find 10 of the species that they mentioned and meanwhile report more than 15 other species in this study.

Herpetocypris intermedia is already known in different parts of Europe (Britain, France, Switzerland, Hungary, northern Italy, Portugal, Spain) as well as Algeria, where it mostly prefers stagnant bottoms of bodies of water such as rivers, streams, ditches, and pools (Gonzalez-Mozo et al. 1996; Meisch, 2000). We collected it from 2 stations (St. 25, Soylu creek with 2 females; St. 48, Gölcük with 16 females) (Figure 2) where the water temperature (20.9-26 °C), dissolved oxygen (8.88-7.38 mg/L), and pH (8.42-7.84) values were relatively high and site elevation was 728 and 732 m, respectively. Both stations are characterized by shallow, stable waters. Thus, our findings correspond with those of earlier reports detailing the habitat preferences of the species (Meisch, 2000).

By reporting the presence of the species in Diyarbakır, its geographical distribution in Turkey is extended into the far eastern part of the country.

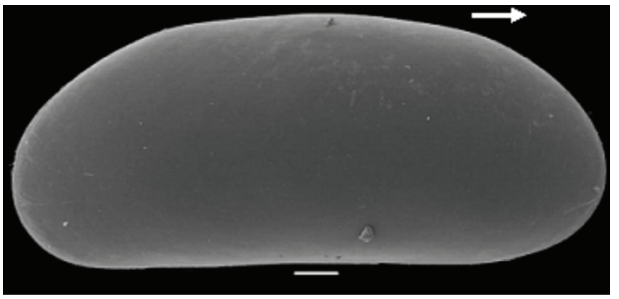


Figure 2. *Herpetocypris intermedia*: female external view of right valve. Scale bar: 100 μm.

With this new report, the number of freshwater ostracods found in Turkey reaches more than 125 species. It is anticipated, however, that this number is still far from comprehensive since more than 30 of Turkey's 81 provinces are currently without any record of living ostracods.

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