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New Record of *Arctodiaptomus (Mesodiaptomus) toni* Brehm, 1937 (Copepoda, Calanoida, Diaptomidae) From İnland Water of Turkey.

Ahmet BOZKURT[1*]

[1] Iskenderun Technical University, Marine Sciences and Technology Faculty, 31200, Iskenderun, Hatay, Turkey

ABSTRACT

In eastern region of Turkey, copepod fauna of 31 localities was investigated and 23 species were identified from 4 families. Aygır Lake is the richest with 7 species in terms of the number of copepod species, followed by the Kuyucuk Lake and the Akcakale Peninsula with 6 species. No copepods were found at stations 2, 5, 8, 9, 10, 19, 20, 22, 23, 24 for reasons of human settlements, water quality parameters and environmental factors. The Calanoid copepod, *Arctodiaptomus (M) toni* which was found in two stations (Lavaş Lake and Putka Gölbaşı Lake) is new record for the inland waters of Turkey. Both habitats of the species are similar to each other in terms of altitude and lake structure, and similar to Elburz, where the species was first found.

Keywords: Copepoda, distribution, new record, *Arctodiaptomus*

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**** CORRESPONDING AUTHOR***

ahmet.bozkurt@iste.edu.tr
Phone : +90 326 6141693 (3405)

Türkiye İç Sularından *Arctodiaptomus (Mesodiaptomus) toni* Brehm, 1937 (Copepoda, Calanoida, Diaptomidae)'nin Yeni Kaydı.

Öz: Türkiye'nin doğu bölgesinde, 31 lokalitenin kopepod faunası araştırılmış ve 4 familyadan 23 tür tespit edilmiştir. Aygır Gölü, kopepod türü sayısı bakımından 7 tür ile en zengin olduğu belirlenirken, bunu 6 türle Kuyucuk Gölü ve Akçakale Yarımadası izlemektedir. 2, 5, 8, 9, 10, 19, 20, 22, 23, 24 numaralı istasyonlarda insan yerleşimleri, su kalitesi parametreleri ve çevresel faktörler nedeniyle kopepoda rastlanmamıştır. İki istasyonda (Lavaş Gölü ve Putka Gölbaşı Gölü) bulunan kalanoid kopepod, *Arctodiaptomus* (*M*) *toni*, Türkiye iç sularında yeni kayıttır. Türün her iki habitatı da rakım ve göl yapısı açısından birbirine benzer ve türün ilk bulunduğu Elburz'a da benzerdir.

Anahtar kelimeler: Kopepoda, dağılım, yeni kayıt, *Arctodiaptomus*

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Introduction

Zooplankton represents an important community to transfer matter and energy between producers and consumers in food webs, thus shaping the pelagic ecosystem. Copepods make up a major portion of the biomass and productivity of the freshwater ecosystems (Williamson and Reid 2001).

Copepods are typically little crustaceans that show wide geographic distribution in virtually all aquatic habitats (Boxshall and Halsey 2004). In point of abundance, copepods are the dominant group in the ocean and continental waters of the zooplankton community. Approximately 13.000 species of copepods are known, and 2.800 of them live in fresh water (Boxshall and Defaye 2008).

Some free-living copepods feed directly on phytoplankton, catching cells individually. Some of the larger species are predators of their smaller relatives. Many benthic copepods eat organic detritus or the bacteria that grow in it, and their mouth parts are adapted for scraping and biting.

Planktonic copepods are important to global ecology and the carbon cycle. They are usually the dominant members of the zooplankton, and are major food organisms for small fish and other crustaceans in aquatic environment.

Some scientists say they form the largest animal biomass on earth (Dürbaum and Künnemann 1997).

Many planktonic copepods feed near the surface at night, then sink (by changing oils into more dense fats) into deeper water during the day to avoid visual predators. Their moulted exoskeletons, faecal pellets, and respiration at depth all bring carbon to the deep lake and sea.

In general, adult calanoid copepods are the largest members of the freshwater Copepoda, ranging in length from 1 to 5 mm. They are commonly found in permanent water bodies where they are primarily planktonic, although some species are associated with plants and sediments and others may be found in temporary ponds and wetlands (Dussart and Defaye 2001). Calanoids play an important role in aquatic food webs, particularly in more oligotrophic systems, as either primary consumers or predators in aquatic ecosystem. They are also an important source of food for larval, juvenile, and many adult fish species and some crustaceans.

Diaptomid copepods are a major group of planktonic microcrustaceans, belonging to the successful and widespread freshwater family of Diaptomidae, which contains over 400 species in about 50 genera (Dussart and Defaye 1983). Approximately 60 species of the genus *Arctodiaptomus* live in inland waters.

The Diaptomids are found in a variety of habitats ranging from freshwater lakes and ponds, to streams or rivers, occasionally in ditches, and some euryhaline species are found in either brackish, salt- or freshwater (Williamson 1991).

Until today, more than 400 zooplankton studies have been carried out inland waters of Turkey and approximately 40 of them were made in the eastern part of Turkey. As a result of these studies, approximately 150 copepod taxa were determined (Ustaoğlu 2015) and one species (*Arctodiaptomus burduricus* Kiefer, 1939) is endemic to Lake Burdur in Turkey.

In the Eastern part of Turkey 9 species from Cyclopoida [*Acanthocyclops robustus* (Sars, 1863), *Cyclops strenuus* Fischer, 1851, *C. Vicinus* Uljanin, 1875, *Diacyclops bicuspidatus* (Claus, 1857), *Eucyclops serrulatus* (Fischer, 1851), *Ergasilus sieboldi* Nordmann 1832), *Macrocyclops albidus* (Jurine, 1820), *Megacyclops viridis* (Jurine, 1820), *Thermocyclops crassus* (Fischer, 1853), *T. dybowskii* (Lande, 1890)], 5 species from Calanoida [*Acanthodiaptomus denticornis* (Wierzejski, 1887), *Arctodiaptomus byzantinus* Mann, 1940, *A. osmanus* Kiefer, 1974, *A. spinosus* (Daday, 1891), *Eurytemora velox* (Lilljeborg, 1853), *Sinodiaptomus sarsi* (Rylov, 1923)], and 1 species from Harpacticoida [*Nitokra hibernica* (Brady, 1880)] totally 17 species were reported (Bulut and Saler 2014; Bekleyen and Taş 2008; Saler and Alış 2014).

In this study we present new record of Diaptomidae for inland waters of Turkey, to provide a better understanding of the geographical distribution of these organisms, as well as to offer information for future biogeographic and evolutionary studies. *Arctodiaptomus (M) toni* has been recorded from only in the Elburz mountains, Iran. We provided descriptions and illustrations of both sexes in order to provide a basis for future comparisons. In the studies to date, there is a lack of information as male individuals of *A. (M) toni* have not been described in detail. In this study, the deficiencies were corrected. In addition, this species can be added to the current list of Copepoda fauna of Turkey.

Materials and Methods

Copepod samplings were made from 31 different freshwater lakes, ponds and streams seasonally between January and November 2015 (Figure 1, Table 1). Samples were taken with plankton net of 60 μm mesh size with vertical and horizontal hauls. Vertical hauls were made 8-10 times from the bottom to the surface, and horizontal hauls were taken from the surface for about 20 minutes.

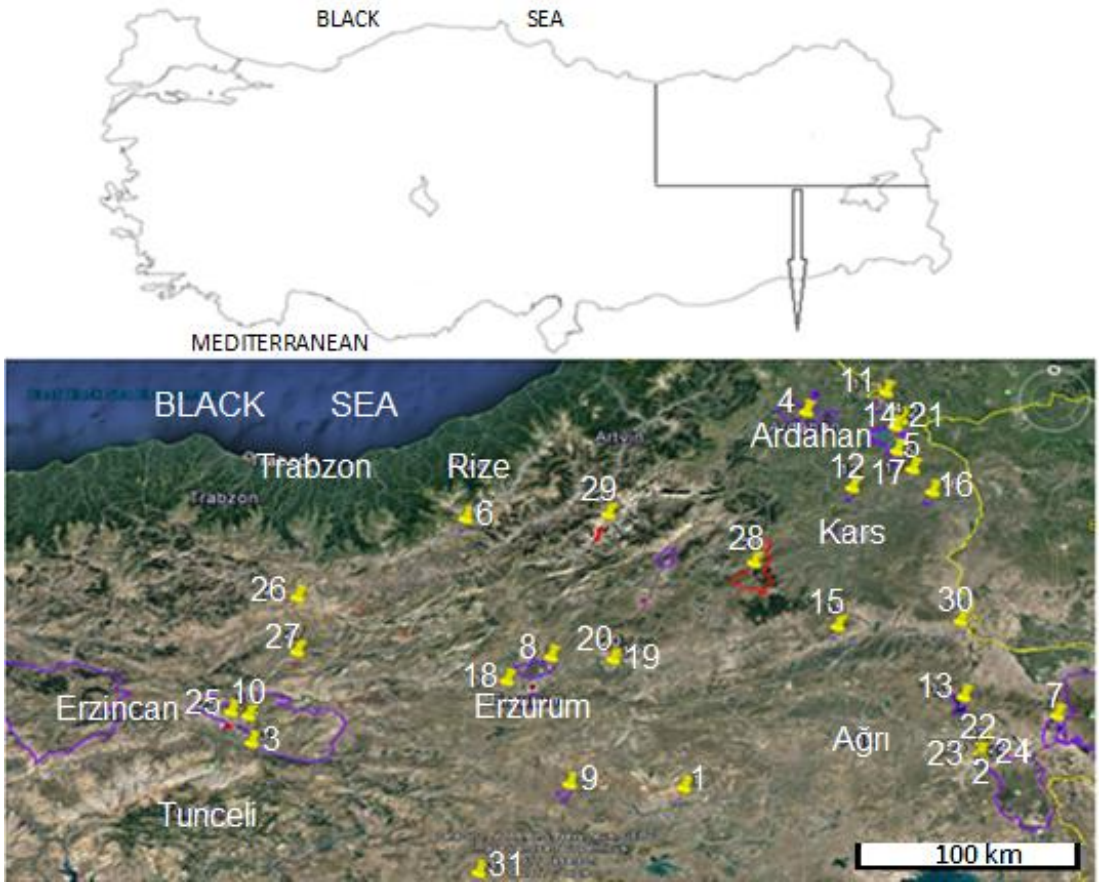

Figure 1. Sampling points

Collected specimens were preserved in 4% buffered formaldehyde in the study area. After the samples were brought to the laboratory (during 3-4 days), the formaldehyde water mixture was filtered from the collector and the samples were preserved in 90% methyl alcohol and stored in the plankton laboratory of the Marine Sciences and Technology Faculty, Iskenderun Technical University. Specimens were examined in a distilled water and glycerol mixture. Drawings and measurements (with ocular micrometer) were made using an Olympus microscope with drawing-tube. The species were identified with the aid of Borutsky (1964), Dussart (1969), Damian-Georgescu (1970), Kiefer and Fryer (1978) and Reddy (1994).

Table 1. Copepod sampling stations and coordinates

St.	Localities	Sampling coordinates	Sampling date (2015)	depth (m)	surface area (ha)	Altitude (m)	type
1	Burnaz and Binpınar Village Dams (Erzurum)	39° 20′ 38.26″N 42° 01′ 08.73″E	18 May, 29 Jul., 15 Sep.	7	4.18	1572	pond, permanent
2	Diyadin Basalt Canyon (Ağrı)	39° 32′ 17.58″N 43° 39′ 59.37″E	26 May, 23 Jul., 13 Sep.	-	-	1890	stream, permanent,
3	Girlevik waterfall (Erzincan)	39° 34′ 48.69″N 39° 43′ 44.03″E	20 May, 1 Aug., 13 Sep	-	-	1390	river, permanent
4	Putka - Gölbaşı Lake (Ardahan)	41° 07′ 48.94″N 42° 46′ 03.46″E	22 May, 29 Jul., 12 Sep.	1.6	37.09	1921	marsh, permanent
5	Tubulğu trees (Kars)	40° 50′ 54.86″N 43° 20′ 53.66″E	21 May, 28 Jul., 16 Sep.	-	-	1683	river, permanent
6	Yedigöller (Erzurum)	40° 38′ 40.36″N 40° 53′ 31.48″E	18 May, 30 Jul., 15 Sep.	16.8	10.2	3041	lake, permanent
7	Doğubeyazıt Marshes (Ağrı)	39° 39′ 32.43″N 44° 04′ 22.93″E	20 May, 23 Jul., 15 Sep.	0.92	4.42	1523	marsh, temporary

Table 1. Continued

8	Erzurum Swamps (Erzurum)	39° 59/ 29.51//N 41° 20/ 59.98//E	18 May, 23 Jul., 15 Sep.	0.30	74.74	1759	marsh, temporary
9	Erzurum Geological Formations (Erzurum)	39° 23/ 45.52//N 41° 26/ 52.83//E	18 May, 25 Jul., 16 Sep.	4.7	3.37	2714	marsh, temporary
10	Keşiş Mountains (Erzincan)	39° 42/ 30.63//N 39° 42/ 44.79//E	20 May	-	-	1494	stream, temporary
11	Aktaş Lake (Ardahan)	41° 13/ 03.44//N 43° 12/ 56.89//E	21 May, 28 Jul., 16 Sep.	10	5847	1800	lake, permanent
12	Aygır Lake (Kars)	40° 45/ 53.04//N 43° 00/ 21.15//E	21 May, 28 Jul., 16 Sep.	65	294100	2300	lake, permanent
13	Balık Lake (Ağrı)	39° 45/ 34.07//N 43° 34/ 22.08//E	26 May, 23 Jul., 13 Sep.	37	3000	2254	lake, permanent
14	Çıldır Lake (Ardahan)	41° 03/ 07.19//N 43° 15/ 34.78//E	21 May, 28 Jul., 16 Sep.	42	12300	1963	lake, permanent
15	Deniz Lake (Kars)	40° 06/ 37.55//N 42° 54/ 04.44//E	23 May, 17 Jul., 16 Sep.	25	109.37	1905	lake, permanent
16	Kuyucuk Lake (Kars)	40° 44/ 14.45//N 43° 27/ 04.18//E	21 May, 28 Jul., 16 Sep.	13	197	1627	lake, permanent
17	Lavaş Lake (Kars)	40° 56/ 05.88//N 43° 15/ 48.11//E	21 May, 28 Jul., 15 Sep.	19	104	1979	lake, permanent
18	Balıklıgöl Lake (Erzurum)	39° 52/ 08.01//N 41° 06/ 33.38//E	18 May, 29 Jul., 14 Sep.	2	0.029	1822	pond, permanent
19	Büyük Çermik Stream (Erzurum)	39° 58/ 32.52//N 41° 40/ 48.69//E	18 May, 29 Jul., 15 Sep.	-	-	1658	stream, permanent
20	Küçük Çermik Stream (Erzurum)	39° 58/ 32.05//N 41° 41/ 03.19//E	18 May, 29 Jul., 15 Sep.	-	-	1658	stream, permanent
21	Akçakale Peninsula (Ardahan)	41° 05/ 08.70//N 43° 17/ 38.16//E	21 May, 28 Jul., 16 Sep.	2	0.021	1977	lake, permanent
22	Diyadin Davud Thermal (Ağrı)	39° 29/ 30.58//N 43° 39/ 06.81//E	26 May, 23 Jul., 13 Sep.	-	-	1973	stream (thermal), permanent
23	Diyadin Bridge Thermal (Ağrı)	39° 29/ 04.45//N 43° 38/ 56.05//E	26 May, 23 Jul., 13 Sep.	-	-	1934	stream (thermal), permanent
24	Diyadin Snaky Thermal (Ağrı)	39° 28/ 35.41//N 43° 39/ 21.64//E	26 May, 23 Jul., 13 Sep.	-	-	1955	stream (thermal), permanent
25	Ekşisu (Erzincan)	39° 43/ 57.51//N 39° 36/ 56.47//E	20 May, 1 Aug., 13 Sep.	1.5	395.44	1152	marsh, permanent
26	Kırkpınar SnakyThermal (Bayburt)	40° 16/ 25.00//N 39° 58/ 27.06//E	26 May, 31 Jul., 16 Sep.	-	-	1623	stream, permanent
27	Otlukbeli Lake (Erzincan)	40° 00/ 42.79//N 39° 58/ 36.43//E	31 Jul., 13 Sep.	18	0.65	1855	lake, permanent
28	Sarıkamış Forests (Kars)	40° 25/ 11.18//N 42° 27/ 12.93//E	21 May, 27 Jul., 16 Sep.	-	-	2305	stream, permanent
29	Tortum Waterfall (Erzurum)	40° 39/ 41.80//N 41° 40/ 06.66//E	18 May, 29 Jul., 15 Sep.	-	-	1020	river, permanent
30	Aras River Bird Paradise (Iğdır)	40° 07/ 02.57//N 43° 34/ 46.31//E	20 May, 27 Jul., 13 Sep.	1.60	1.56	978	marsh, temporary
31	Floating Island (Bingöl)	38° 57/ 30.19//N 40° 56/ 25.57//E	25 May, 24 Jul.	50	0.06	1358	lake, permanent

Results

We identified 23 taxa, of which 15 belonged to the family Cyclopidae, 4 species to the Canthocamptidae, 3 species to the Diaptomidae and one species to the Ameiridae. List of the species with the locality information are shown in Table 2.

Eucyclops serrulatus occurred most frequently (13 sites) followed by *Arctodiaptomus acutilobatus* (8 sites) and *Cyclops* sp. (6 sites).

Table 2. Species and distribution areas

COPEPODA	Localities
Cyclopidae	
Acanthocyclops robustus (Sars, 1863)	6, 16, 17
Cyclops sp.	11, 12, 14, 18, 21, 29
Cyclops furcifer Claus, 1857	12
Cyclops bohater Kozminski, 1933	31
Cyclops vicinus Uljanin, 1875	31
Diacyclops bicuspidatus (Claus, 1857)	16, 17
Diacyclops bisetosus (Rehberg, 1880)	16
Diacyclops sp.	4, 16, 26
Eucyclops serrulatus (Fischer, 1851)	3, 6, 7, 12, 14, 15, 16, 17, 21, 25, 26, 27, 30
Eucyclops sp.	12, 25
Macrocyclops albidus (Jurine, 1820)	1, 12, 25
Megacyclops viridis (Jurine, 1820)	4, 7, 16, 26, 27
Microcyclops rubellus (Lilljeborg, 1901)	28
Paracyclops fimbriatus (Fischer, 1853)	25
Tropocyclops prasinus (Fischer, 1860)	12, 18, 26, 29
Diaptomidae	
Acanthodiaptomus denticornis (Wierzejski, 1887)	4, 14, 21
Arctodiaptomus acutilobatus (Sars, 1903)	6, 11, 12, 14, 15, 17, 21, 29
Arctodiaptomus (M.) toni Brehm, 1937	4, 17
Canthocamptidae	
Attheyella crassa (Sars,1863)	3, 15, 21, 25
Bryocamptus minutus (Claus, 1863)	14, 15, 21
Bryocamptus zschokkei (Schmeil, 1893)	13, 28
Canthocamptus staphylinus (Jurine, 1820)	12
Ameiridae	
Nitokra hibernica (Brady, 1880)	29

On the other hand, *Cyclops furcifer*, *C. bohater*, *C. vicinus*, *Diacyclops bisetosus*, *Microcyclops rubellus*, *Paracyclops fimbriatus*, *Canthocamptus staphylinus* and *Nitokra hibernica* were found in only one location.

The most species were identified in Aygır Lake (12th station) (8 species), followed by Kuyucuk Lake (16st station) and Akçakale Peninsula (21th station) with 6 species, and Çıldır Lake (14th station) with 5 species.

Copepod species has never been found in Diyadin Basalt Canyon (2th station), Tubulğu Trees Stream (5th station), Erzurum Swamps (8th station), Erzurum Geological Formations Lakes (9th station), Keşiş Mountains Lakes (10th station), Big Çermik Stream (19th station), Little Çermik Stream (20th station), Diyadin Davud Thermal (22th station), Diyadin Bridge Thermal (23th station) and Diyadin Snaky Thermal (24th station).

***Arctodiaptomus* (*Mesodiaptomus*) *toni* Brehm, 1937**

Putka - Gölbaşı Lake (Ardahan), 41° 07/ 48.94//N, 42° 46/ 03.46//E, 1921 m a.s.l., surface area 37.09 ha, max. depth 1.6 m, sampling dates 22 May 2015, 29 Jul. 2015, 12 Sep. 2015.

Lavaş Lake (Kars), 40° 56/ 05.88//N 43° 15/ 48.11//E, 1980 m a.s.l., surface area 104 ha, max. depth 19-20 m, sampling dates 28 Jul. 2015, 21 May 2015, 15 Sep. 2015.

Female: Body length (including caudal seta) was measured in nine specimens and ranged 2.23 mm and 2.74 mm, with an average of 2.57 mm; Pedigers 4 and 5 (Figs 2A, B) incompletely fused with suture visible laterally. Lateral wings of fifth pediger fairly large, only slightly elongate and asymmetrical (Fig. 2A), left wing longer than right one, both bearing 2 strong and 2 small spinules (Figs 2B, C, G, J); as that is typical of this species, fourth pediger with a lobe on right side (Figs. 2H, C). Rostrum bifid, with paired rostral spines, about 35 μm in length (Fig. 2D).

Genital somite asymmetrical and not dilated; both lateral spines of the somite minute; left spine directed distally (Fig. 2H). Second urosomite dilated at right distal corner. Caudal rami symmetrical, slender, and almost two times longer than wide, densely hairy on inner margin and with 3-4 hair-like setae on outer margin (Fig. 2F). Caudal setae symmetrical, medium-sized, already in length and biserially plumose, all plumose and more slender than rest; anterolateral accessory seta absent (Fig. 2F). Colouration light orange. Second endopodal article of leg 2 bearing hyaline lappet (Schmeil's organ).

Antennules reaching the end of caudal rami, aesthetascs directed postero-laterally. Antennules symmetrical, each 25-segmented; segmentation pattern and armature formula as follows: segment 1, 1 seta + aesthetasc (ae); segment 2, 3 seta + ae; segment 3, 1 seta + ae; segment 4, 1 seta; segment 5, 1 seta + ae; segment 6, 1 seta; segment 7, 1 seta + ae; segment 8, 2 setae; segment 9, 2 setae + ae; segment 10, 1 seta; segment 11, 2 setae; segment 12, 2 setae + ae; segment 13, 2 setae; segment 14, 1 seta + ae; segment 15, 1 seta; segment 16, 1 seta+ ae; segments 17 and 18, 1 seta each; segment 19, 1 seta+ ae; segments 20 and 21, 1 seta each; segments 22 to 24, 2 setae each; segment 25, 5 setae + ae. Seta of first segment of antennule about 40 μm long, extending to midlength of segment 13 (Fig. 2K).

Leg 5: First exopodite-segment elongate, being approximately 2-3 times as long as wide. Terminal claw long, slim and slightly folded at its end. Inner top spine on third exopodite-segment very strong and reaching beyond mid-inner margin of terminal claw. Endopodite indistinctly two segmented. Reaching somewhat beyond mid-inner edge of first exopodite-segment; apex round and armed apically only with hairs (Fig. 2E).

Male: Body length (including caudal seta) was measured in six specimens and ranged 2.05 mm and 2.36 mm, with an average of 2.20 mm; Lateral wings of fifth pediger narrow and asymmetrical, left wing shorter than right, both bearing 2 slight spinules (Figs. 3A, B). Rostrum slightly longer than in female, bifid (Fig. 3G), with paired medium-sized rostral spines, about 40 μm in length. Left antennule composed of 25 segments, armature as in female. Right antennule geniculated, consisting of 22 segments. Geniculation between segments 18 and 19. Segments 8, 10, 11, 12, 13, 14 with spinous each; Spine on segment 14 strong and long (arrow f); spinous on segments 8, 10 and 11 small (arrow a, b, c); spinous on segment 13 very large (Fig. 3D, arrow e). Male right antenule segmentation pattern and armature formula as follows: segment 1, 1 seta + aesthetasc (ae); segment 2, 3 setae +ae; segment 3, 1 seta + ae; segment 4, 1 seta; segment 5, 1 seta+ae; segment 6, 1 seta; segment 7, 1 seta; segment 8, 1 seta+1 spine; segment 9, 1 seta + ae; segment 10, 1 seta+1 spine; segment 11, 1 seta+1 spine; segment 12, 1 seta+1 spine +ae; segment 13, 1 seta+1 spine + ae; segment 14, 2 setae+1 spine+ ae; segment 15, 2 setae+1 spine+ae; segment 16, 2 setae+ae; segment 17, 1 seta; segment 18, 0; segment 19, 1 seta+1 spine; segment 20, 2 seta; segment 21, 2 seta; segment 22, 5 seta+ae. Segments 17 and 18 with hyaline process on dorsal margin (Fig. 3D). The two setae on the lateral margin on segment 20 absent (Fig. 3D, arrow a, b). Genital somite asymmetrical and with fine sensory seta on right side. Caudal rami symmetrical, slender, and almost two times longer than wide, densely hairy on inner margin and with 2-3 hair-like setae on outer margin (Fig. 3C). Caudal setae symmetrical and biserially plumose, anterolateral accessory seta absent (Fig. 3C). Second endopodal article of leg 2 bearing hyaline lappet such as female (Schmeil's organ).

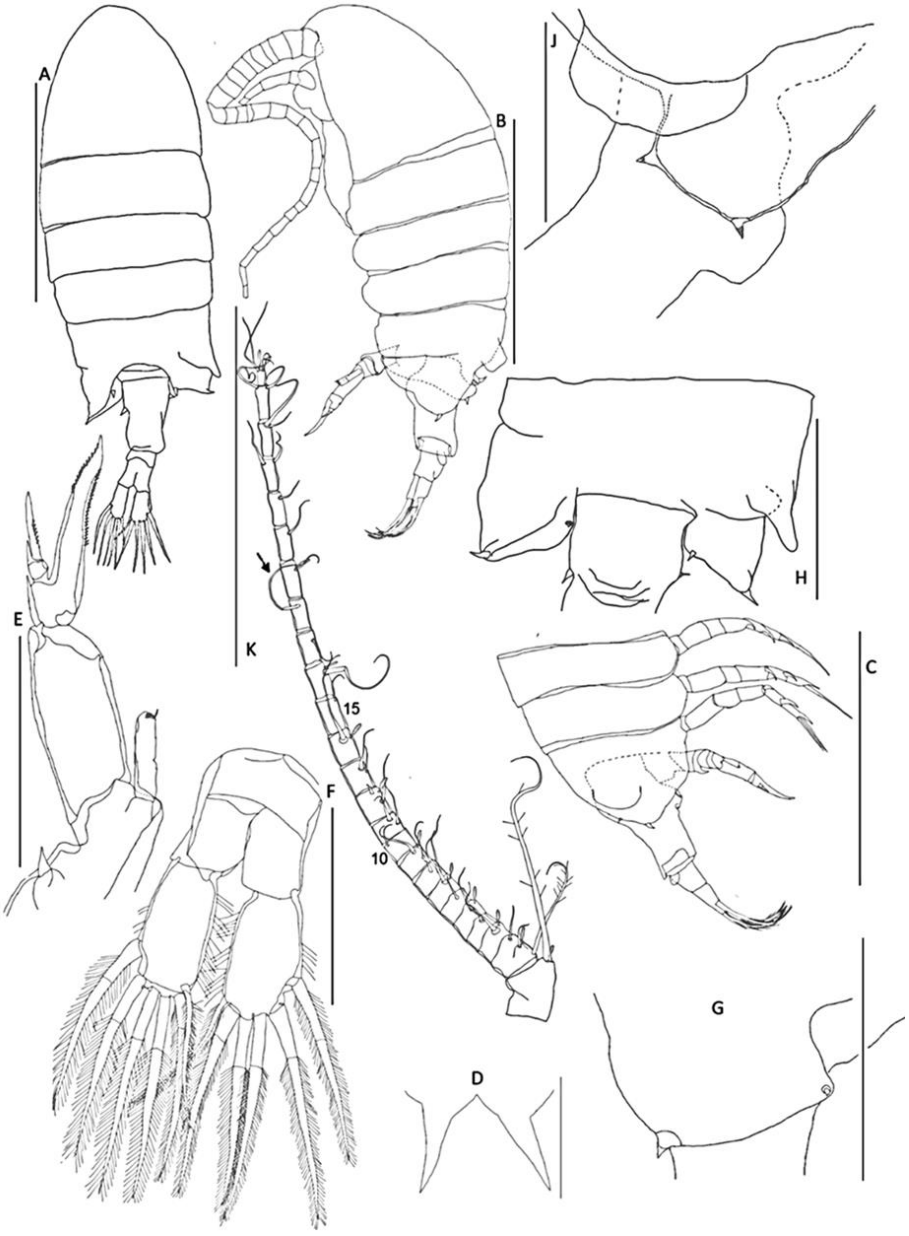

Figure 2. *Arctodiaptomus (M.) toni* Female. A) Habitus, dorsal; B) habitus, lateral; C) pediger 2-5 and urosome, lateral; D) rostrum; E) fifth leg; F) caudal rami and anal somite, dorsal; G) wing of pediger 5, left; H) wings of pediger 4 and 5; I) wing of pediger 5, right; K) antennule. Scale bars: A, B, C, K 1000 μm; D 50 μm; E, F 200 μm; G, H, I 250 μm.

Right leg 5: Coxal spine small. Basipodite long and thick, hyaline membrane on inner edge small ear-like, and sensory seta present on outer distal corner (Fig. 3F). Exopodite 1 narrow and very short, small hyaline process not close base of lateral spine shown in Fig 3F outer distal corner produced into moderate spinous process. Small hyaline process of right first exopodite segment not close base of lateral spine. The second exopodite segment of the right P5 elongate. Lateral spine quite proximal in position, slender, bent and longer than the segment. Endopodite short, slender, somewhat bent and armed apically only with hairs. Terminal claw long, curved, slender, finely denticulate, with recurved tip.

Basipodite of left P5 with rounded ear-like hyaline membrane on inner edge. Exopodite 2-segmented, with medium-sized first segment, and short, almost round, second segment, both lined with hairy cushions on inner side. Second segment ending in 2 projections of different length (internal longer): external, blunt, finger-like projection, lined with 1 inner row of small spines and internal, more pointed projection, lined with 1 rows of small spines, tapering distally (Fig. 3F). Endopodite 1-segmented, with minute hyaline membrane at inner distal corner

slightly tapering, apically ornamented with oblique hairs.

According to Borutsky et al. (1991), this species is similar to *A. lobulifer* in the texture of fourth and fifth pedigers and the genital double somite and in the armature of legs 5. The females differ in the delated right side of urosome somite 2 and in the presence of a small cuticular outgrowth in the proximal part of the basis of the right leg 5 and in the undilated proximal part of the inner apical process of second exopodite-segment of left leg 5. (Reddy 1994).

Occurrence. Freshwater species, the valley Taler at an altitude of 2100 m in the Elburz mountains, Iran and the Lavaş Lake (Kars) and Putka - Gölbaşı Lake (Ardahan) at an altitude of 1980 m, 1921 m respectively in Eastern Turkey (Table 2).

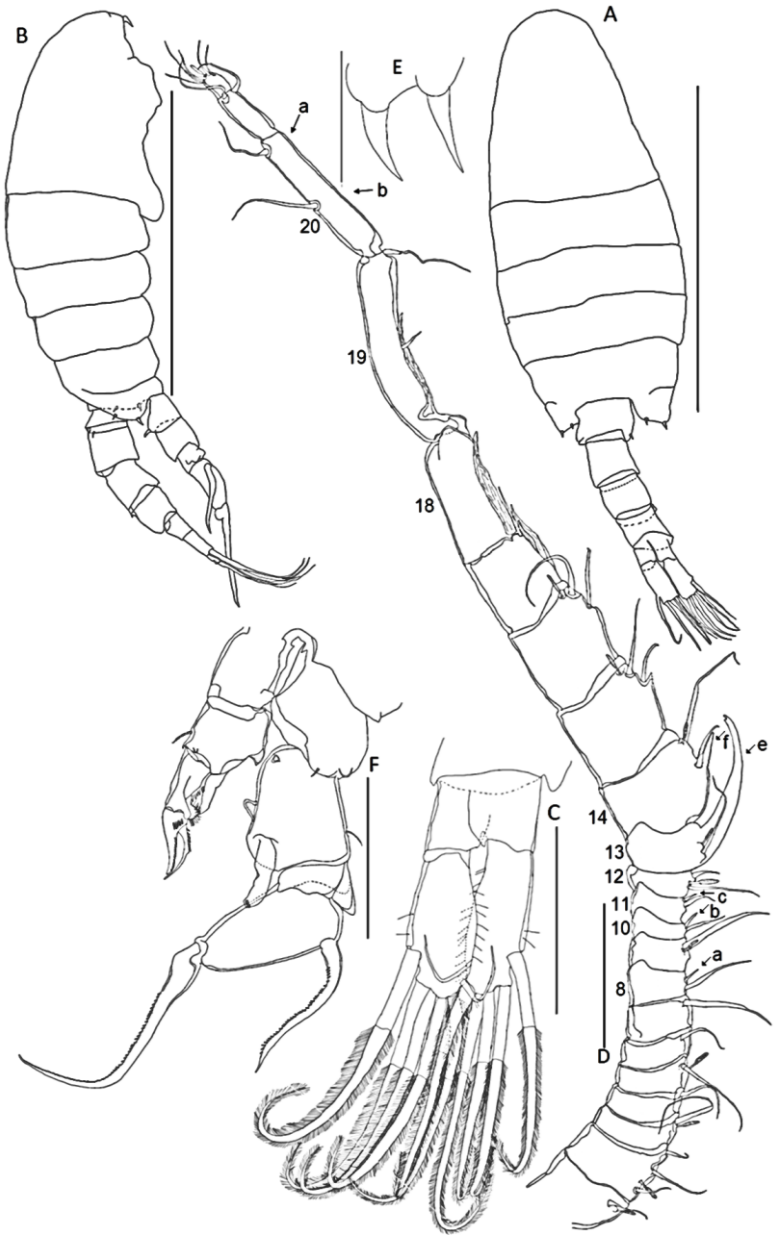

Figure 3. *Arctodiaptomus (M.) toni*, male. A) Habitus, dorsal; B) habitus, lateral; C) caudal rami and anal somite, dorsal; D) right antennule; E) rostrum; F), fifth leg, posterior. Scale bars: A, B 1000 μm; C, D, F 200 μm; E 50 μm.

Discussion

The Turkish copepod fauna is rich in Calanoida, especially in the genus *Arctodiaptomus*. Among the species of the genus *Arctodiaptomus*, *A. belgrati* Mann, 1940, *A. byzantinus* Mann, 1940, *A. osmanus* Kiefer, 1974, *A. pectinicornis* (Wierzejski, 1887), *A. similis* (Baird, 1859), *A. spectabilis* Mann, 1940, *A. stephanidesi bulgaricus* (Kiefer, 1971), *A. wierzejskii* (Richard, 1888), *A.* (*Rhabdodiaptomus*) *acutilobatus* (Sars, 1903), *A. (Rh.) alpinus* (Imhof, 1885), *A. (Rh.) bacillifer* (Koelbel, 1885), *A.* (*Rh.*) *bacillifer propior* Kiefer, 1952, *A. (Rh.) burduricus* Kiefer, 1939, *A. (Rh.) centetes* (Brehm, 1938), *A. (Rh.) niethammeri* (Mann, 1940), *A. (Rh.) salinus* (Daday, 1885), *A. (Rh.) spinosus* (Daday, 1891) are widely spread in Turkey (Ustaoğlu 2004, 2015). With *A. toni*, the species number of *Arctodiaptomus* increased to 18 in Turkey.

Some copepods we found in this study (*Cyclops vicinus*, *C. furcifer*, *Diacyclops bicuspidatus*, *D. bisetosus*, *Eucyclops serrulatus*, *Macrocyclops albidus*, *Microcyclops rubellus*, *Paracyclops fimbriatus*, *Tropocyclops prasinus*, *Acanthodiaptomus denticornis*, *Attheyella crassa*, *Bryocamptus minutus*, *B. zschokkei*, *Canthocamptus stuphylinus*, *Nitokra hibernica*) are widespread (Einsle 1963; Strayer 1985; Särkkä 1987; Maier 1990; Kurashov and Gorichenskiy 1992; Einsle 1996; Karaytug 1999; Ramdani et al. 2001; Lesko et al. 2003; Alekseev et al. 2006; Dussart and Defaye 2006), and Taxonomic revisions by Mirabdullayev and Defaye, 2002, 2004 and Hołyńska and Dimante-Deimantovica, 2016 showed that: *Cyclops bohate*r likely is a boreomontane European species; and *Acanthocyclops robustus* is likely restricted to northern Europe (many previous records of *A. robustus* in Europe and Asia in fact refer to *A. trajani* Mirabdullayev and Defaye 2002). *Megacyclops viridis* lives in water bodies of all sizes, temporary ponds and in the littoral and sublittoral regions of lakes. It has a scattered and relatively limited distribution and occurs from sea level to 1396 m a.s.l. On the other hand, all species in the study were found in many studies in Turkey (Ustaoğlu 2004, 2015).

In the study, copepod was not found in some wetlands. Since detailed zooplankton study was not performed before, we cannot discuss why there is no copepod. These regions are; Erzurum Marshes (8th station) are fed by underground seepage water. The fact that the water is generally dark in color and the high amount of suspended solids suggest that the organic matter content is high. Erzurum Geological Formations Lakes (9th station) is in a volcanic area, consisting of temporary ponds, Keşiş Mountains Lakes (10th station) is a small dam, built for irrigation purposes, and there are small settlements around it and agricultural activities are carried out. Although everything seems to be normal for the existence of copepod, it is quite difficult to interpret why the copepod does not exist in stations 8, 9, 10. The domestic wastes of the nearby settlements are discharged to both of Diyadin Basalt Canyon (2nd station) and Tubulğu Trees Stream (5th station). Little Çermik Stream (20th station), Big Çermik Stream (19th station), Diyadin Davud Thermal (22th station), Diyadin Bridge Thermal (23th station) and Diyadin Snaky Thermal (24th station) consist of hot spring water (39-45 °C). The content of domestic wastes and thermal waters are generally not suitable for the survival of planktonic organisms since they contain abundant organic matter and high bicarbonate, chloride, sulphate, calcium, and carbon dioxide gas. The characteristics of stations 2, 5, 19, 20, 22, 23, 24 partly explain why there were no copepods here.

Reddy (1994) reported that *A. toni* was first found in the swamp fed by rain water in the Elburz mountains at an altitude of 2100 m in Iran. Where the species is located in our country; Putka - Gölbaşı Lake (1921 m a.s.l) is covered with dense reeds and dystrophic lake. It is a semi-swamp lake with a small lake pit and its waters are yellow brown. Lavaş Lake (1980 m a.s.l) is composed of cold and clean water fed by spring waters and small rivers. Especially in summer, when the lake waters are low, there are marshes formed by large meadows around it. The lake is covered with reeds and plants, and has a mesotrophic character. It is seen that there are important similarities between the place where the species was first found and the places where it was located in Turkey.

In view of all this, it can be said that *Arctodiaptomus* (*M*) *toni* prefers high altitude, plant marsh environments as a habitat.

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