

## Species records of Ephemeroptera (Insecta) nymphs in the Gediz River basin with a new record for the Turkish fauna: *Labiobaetis atrebatinus* Eaton, 1870

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**Abstract:** In this study, 3801 Ephemeroptera specimens were collected and identified from the Gediz River basin (Kütahya, Manisa, Uşak, and İzmir provinces) during 2011–2012. Twenty-three taxa belonging to 14 genera from 5 families were determined. All identified species from Uşak, Manisa, and İzmir and the 4 identified species from Kütahya are new records for the mentioned provinces. Moreover, *Labiobaetis atrebatinus* Eaton, 1870 is a new record for the Turkish Ephemeroptera fauna. As a result of this study, the number of the identified Ephemeroptera species from Turkey has increased to 147.

**Key words:** *Labiobaetis atrebatinus*, Ephemeroptera, Gediz River basin, new record, Turkey

### 1. Introduction

Species belonging to the Ephemeroptera order are known as the oldest and most primitive winged insects, having existed since the time of the Carboniferous and Permian. They show a hemimetabolous development and spend most of their life in fresh waters as nymphs (Brittain and Sartori, 2003).

Ephemeroptera nymphs play a very important role in the aquatic food chain, especially in secondary production, since a large majority of them are herbivores, feeding on detritus or algae, and they are present in almost all kinds of fresh waters throughout the year (Zelinka, 1984; Brittain and Sartori, 2003). However, they are very sensitive to water pollution and therefore have been used as bioindicator organisms in several biotic indexes and methods (Elliott et al., 1988; Moog et al., 1997). Since Ephemeroptera is known as one of the oldest insect orders and the species have some limitations on their distribution such as having a short life span, weak flight ability in the adult stage, and a fully aquatic nymphal stage, they are one of the most important groups used in zoogeographical studies (Brittain, 1982; Kazancı, 2001a, 2001b).

The Gediz River basin has an important location due to its very close geographical position to a migration route between Europe and Anatolia since the glacial age. Therefore, the aim of this study is to determine the Ephemeroptera fauna of the Gediz River basin and contribute to the knowledge of the Ephemeroptera fauna of Turkey.

### 2. Materials and methods

A total of 3801 Ephemeroptera nymph specimens were collected from different parts and habitats of the Gediz River basin by sieves (pore size 1, 1.4, and 2 mm) and hand net between July 2011 and October 2012 (Figure 1). Specimens were preserved in 70% ethanol solution and examined with a Leica DM LS2 trinocular microscope and a Leica MZ 12.5 trinocular stereomicroscope. All of the specimens were preserved in the Zoological Museum of Anadolu University (AUZM), Eskişehir.

The specimens were identified according to the keys and descriptions from the works of Bauernfeind (1994, 1995), Bauernfeind and Soldán (2012), Belfiore (1983), Belfiore and Buffagni (1994), Belfiore et al. (2000), Bogoescu (1958), Eaton (1883–1888), Elliott et al. (1988), Grandi (1960), Harker (1989), Haybach (1999), Keffermüller and Sowa (1984), Kluge (1988, 1994, 1997), Landa (1969), Malzacher (1984), Müller-Liebenau (1969), Sauter (1992), Türkmen and Kazancı (2013), Ujhelyi (1959), Webb and McCafferty (2008), and Zurwerra et al. (1986).

Coordinate values (latitude/longitude) and elevation information for sampling localities are given in the Table.

The locality numbers of the collected samples are given in parentheses in the results section right after the number of examined individuals.

### 3. Results

**Family:** Baetidae

**Genus:** *Alainites* Waltz & McCafferty, 1994

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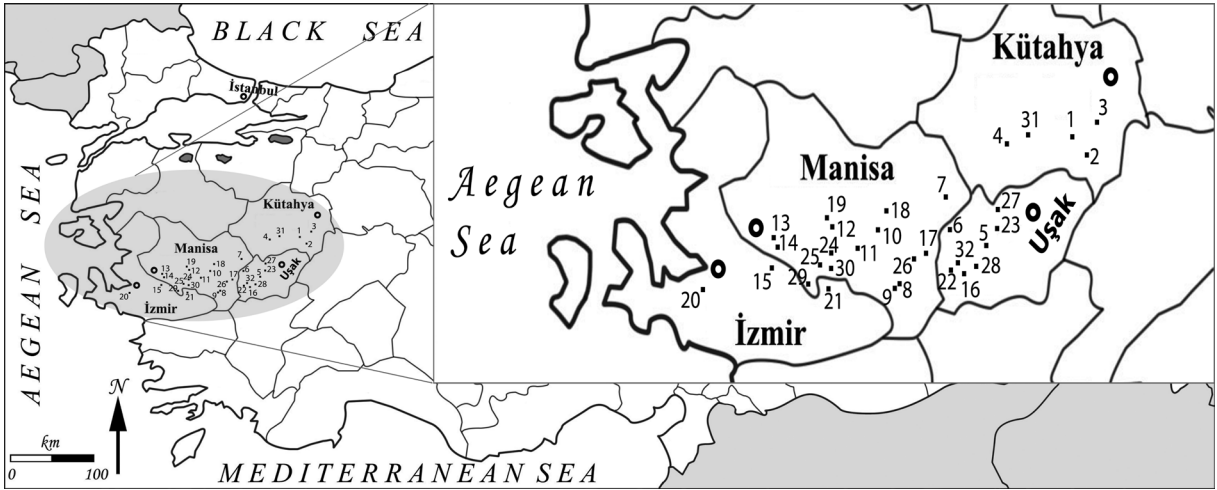


Figure 1. The map of the sampling localities.

Table. Geographical information of sampling localities.

Locality no.	Locality	Province	Latitude/ Longitude	Elevation (m)
1	Gediz–Altıntaş road 12 km	Kütahya	N: 38.57.26 E: 29.30.39	798
2	Gediz–Muratdağı road, Karaağaç village	Kütahya	N: 38.56.17 E: 29.33.37	1206
3	Gediz–Altıntaş road, Murat mountain turnoff	Kütahya	N: 38.58.38 E: 29.34.22	926
4	Gediz–Uşak road, Aksaklar village	Kütahya	N: 38.56.40 E: 29.20.15	691
5	Gediz–Uşak road, 25 km before Uşak	Uşak	N: 38.45.21 E: 29.11.51	582
6	Güre–Selendi road, Çatalbayır village	Uşak	N: 38.39.39 E: 28.51.17	512
7	Selendi, Selendi stream	Manisa	N: 38.44.40 E: 28.52.35	437
8	Kula–Alaşehir road, 5 km	Manisa	N: 38.31.10 E: 28.36.35	697
9	Kula–Alaşehir road, 10 km	Manisa	N: 38.30.42 E: 28.35.38	714
10	Salihli–Demirci road, Borlu bridge	Manisa	N: 38.45.09 E: 28.28.47	235
11	Salihli Hydroelectric Power Plant	Manisa	N: 38.36.15 E: 28.17.18	182
12	Gölmarmara–Akhisar road 3 km	Manisa	N: 38.44.25 E: 27.55.39	113
13	Osmancalı–Manisa road, 5 km, Avdal village	Manisa	N: 38.43.26 E: 27.16.45	133

**Table.** (Continued).

Locality no.	Locality	Province	Latitude/ Longitude	Elevation (m)
14	Osmançalı-Üçpınar road 8 km	Manisa	N: 38.42.26 E: 27.16.56	89
15	Muradiye-Menemen road 5 km	İzmir	N: 38.38.53 E: 27.16.42	25
16	Güre-Selendi road, Yeniköy	Uşak	N: 38.39.40 E: 29.01.19	487
17	Güre-Kula road, Gediz I bridge	Manisa	N: 38.36.06 E: 28.48.49	413
18	Köprübaşı-Demirci road, Yeniköy	Manisa	N: 38.48.38 E: 28.30.47	275
19	Gölmarmara-Akhisar road 8 km	Manisa	N: 38.46.06 E: 27.54.38	102
20	Menemen-Aliğa road, Gediz river	İzmir	N: 38.39.36 E: 27.01.38	22
21	İzmir-Ahmetli road, Ahmetli stream	İzmir	N: 38.30.52 E: 27.56.24	80
22	Kula-Uşak road, Ulucak village	Uşak	N: 38.37.42 E: 28.56.32	456
23	Salihli-Uşak road Azmak II bridge	Uşak	N: 38.46.41 E: 29.12.42	593
24	Salihli-Gölmarmara road 4 km	Manisa	N: 38.31.07 E: 28.08.08	88
25	Ahmetli-Salihli road Ödemiş turnoff	Manisa	N: 38.28.58 E: 28.03.49	116
26	Kula-Uşak road 10 km	Manisa	N: 38.35.07 E: 28.46.05	412
27	Gediz-Uşak road, 20 km before Uşak Derbent village	Uşak	N: 38.51.21 E: 29.16.34	623
28	Uşak-Güre	Uşak	N: 38.39.08 E: 29.09.04	554
29	Turgutlu-Ahmetli road Karacaali bridge	Manisa	N: 38.29.05 E: 27.48.46	125
30	Ahmetli-Salihli road Kurşunlu bridge	Manisa	N: 38.28.41 E: 28.06.28	141
31	Gediz-Yenikent road (before 10 km)	Kütahya	N: 38.57.40 E: 29.22.24	660
32	Selendi-Güre road Gediz II bridge	Uşak	N: 38.38.09 E: 28.57.18	475
33	Murat Mountain	Kütahya	N: 38.56.55 E: 29.37.5	1546

***Alainites muticus* Linnaeus, 1758**

Material examined: 04.07.2011, 1 nymph; 15.08.2011, 24 nymphs; 22.05.2012, 29 nymphs; 19.06.2012, 41 nymphs; 25.07.2012, 5 nymphs (1); 15.08.2011, 2 nymphs; 22.05.2012, 26 nymphs; 25.07.2012, 2 nymphs (2); 15.08.2011, 4 nymphs; 19.06.2012, 8 nymphs (3); 16.08.2011, 2 nymphs (11); 24.05.2012, 20 nymphs (13); 24.05.2012, 7 nymphs (14).

**Genus: *Baetis* Leach, 1815*****Baetis buceratus* Eaton, 1870**

Material examined: 15.08.2011, 1 nymph (3); 19.06.2012, 114 nymphs (4); 25.07.2012, 37 nymphs (5); 23.05.2012, 35 nymphs (7); 20.06.2012, 18 nymphs (10); 20.06.2012, 19 nymphs (11); 06.07.2011, 16 nymphs; 23.05.2012, 53 nymphs; 20.06.2012, 3 nymphs (12); 16.08.2011, 2 nymphs; 23.05.2012, 90 nymphs; 20.06.2012, 77 nymphs; 25.07.2012, 1 nymph (17); 20.06.2012, 13 nymphs (18); 23.05.2012, 1 nymph (19); 24.05.2012, 1 nymph (20); 17.08.2011, 64 nymphs; 21.06.2012, 13 nymphs (21); 17.08.2011, 18 nymphs; 19.06.2012, 11 nymphs (22); 23.05.2012, 27 nymphs; 19.06.2012, 80 nymphs (23); 24.05.2012, 1 nymph (24); 24.05.2012, 107 nymphs, 21.06.2012, 46 nymphs (25); 24.05.2012, 47 nymphs, 20.06.2012, 28 nymphs (26); 19.06.2012, 63 nymphs (27); 23.05.2012, 40 nymphs; 19.06.2012, 40 nymphs (28); 21.06.2012, 33 nymphs (29); 21.06.2012, 14 nymphs (30); 21.06.2012, 36 nymphs (31); 21.06.2012, 32 nymphs (32).

***Baetis fuscatus* Linnaeus, 1761**

Material examined: 20.06.2012, 7 nymphs (10); 23.05.2012, 16 nymphs; 20.06.2012, 1 nymph (12); 24.05.2012, 4 nymphs (15); 20.06.2012, 3 nymphs (18); 21.06.2012, 6 nymphs (21); 24.05.2012, 44 nymphs (25); 20.06.2012, 15 nymphs (26).

***Baetis lutheri* Müller-Liebenau, 1967**

Material examined: 15.08.2011, 6 nymphs; 22.05.2012, 5 nymphs; 19.06.2012, 4 nymphs; 25.07.2012, 3 nymphs (1); 15.08.2011, 4 nymphs (3); 23.05.2012, 1 nymph (7); 16.08.2011, 5 nymphs; 20.06.2012, 13 nymphs (17); 21.06.2012, 10 nymphs (31); 21.06.2012, 3 nymphs (32).

***Baetis rhodani* Pictet, 1843**

Material examined: 04.07.2011, 3 nymphs; 15.08.2011, 18 nymphs; 22.05.2012, 14 nymphs; 19.06.2012, 29 nymphs; 25.07.2012, 23 nymphs (1); 15.08.2011, 1 nymph; 22.05.2012, 11 nymphs; 25.07.2012, 6 nymphs (2); 15.08.2011, 17 nymphs; 19.06.2012, 5 nymphs (3); 19.06.2012, 48 nymphs (4); 23.05.2012, 48 nymphs (8); 06.07.2011, 3 nymphs; 16.08.2011, 94 nymphs; 24.05.2012, 48 nymphs; 20.06.2012, 79 nymphs (11); 24.05.2012, 57 nymphs (13); 24.05.2012, 87 nymphs (14); 24.05.2012, 4 nymphs (15); 23.05.2012, 2 nymphs (17); 17.08.2011, 19 nymphs (20); 23.05.2012, 10 nymphs (23); 24.05.2012,

32 nymphs; 21.06.2012, 12 nymphs (25); 24.05.2012, 3 nymphs (26); 21.06.2012, 25 nymphs (30); 21.06.2012, 15 nymphs (31); 15.08.2011, 17 nymphs (33).

***Baetis vernus* Curtis, 1834**

Material examined: 15.08.2011, 6 nymphs; 25.07.2012, 2 nymphs; 17.10.2012, 16 nymphs (1); 23.05.2012, 3 nymphs (3); 19.06.2012, 23 nymphs (4); 23.05.2012, 44 nymphs (6); 19.06.2012, 24 nymphs (7); 23.05.2012, 43 nymphs (8); 20.06.2012, 4 nymphs (9); 16.08.2011, 103 nymphs; 06.07.2011, 7 nymphs; 24.05.2012, 14 nymphs (11); 20.06.2012, 3 nymphs (12); 24.05.2012, 8 nymphs (14); 15.08.2011, 96 nymphs (16); 23.05.2012, 36 nymphs; 20.06.2012, 17 nymphs (17); 16.08.2011, 3 nymphs; 23.05.2012, 3 nymphs (19); 17.08.2011, 12 nymphs (20); 21.06.2012, 2 nymphs (21); 19.06.2012, 5 nymphs (23); 21.06.2012, 7 nymphs (25); 24.05.2012, 16 nymphs (26); 19.06.2012, 4 nymphs (27); 23.05.2012, 5 nymphs; 19.06.2012, 18 nymphs (28); 21.06.2012, 5 nymphs (29); 21.06.2012, 12 nymphs (30); 21.06.2012, 6 nymphs (31); 21.06.2012, 9 nymphs (32).

**Genus: *Labiobaetis* Novikova & Kluge, 1987*****Labiobaetis atrebatinus* Eaton, 1870**

Material examined: 20.06.2012, 3 nymphs (12); 16.08.2011, 5 nymphs (17); 21.06.2012, 3 nymphs (32).

\* New record for the Turkish fauna.

**Genus: *Nigrobaetis* Novikova & Kluge, 1987*****Nigrobaetis niger* Linnaeus, 1761**

Material examined: 06.07.2011, 2 nymphs (12).

**Genus: *Centroptilum* Eaton, 1869*****Centroptilum luteolum* Müller, 1776**

Material examined: 15.08.2011, 2 nymphs (1); 15.08.2011, 3 nymphs; 25.07.2012, 1 nymph (2); 24.05.2012, 3 nymphs (13); 24.05.2012, 4 nymphs; 20.06.2012, 6 nymphs (14).

**Genus: *Cloeon* Leach, 1815*****Cloeon dipterum* Linnaeus, 1761**

Material examined: 20.06.2012, 7 nymphs (8); 20.06.2012, 6 nymphs (9); 26.07.2012, 28 nymphs (10); 16.08.2011, 3 nymphs (11); 20.06.2012, 6 nymphs (13); 20.06.2012, 30 nymphs (14); 24.05.2012, 4 nymphs (15); 17.08.2011, 24 nymphs (21); 23.05.2012, 1 nymph (23).

***Cloeon simile* Eaton, 1870**

Material examined: 20.06.2012, 12 nymphs (13).

**Genus: *Procloeon* Bengtsson, 1915*****Procloeon pennulatum* Eaton, 1870**

Material examined: 23.05.2012, 2 nymphs (7); 20.06.2012, 4 nymphs (12); 16.08.2011, 7 nymphs; 23.05.2012, 2 nymphs; 25.07.2012, 1 nymph (17); 16.08.2011, 3 nymphs (18).

**Family: Heptageniidae****Genus: *Ecdyonurus* Eaton, 1868*****Ecdyonurus dispar* Curtis, 1834**

Material examined: 24.05.2012, 30 nymphs (13); 24.05.2012, 31 nymphs (14).

***Ecdyonurus helveticus* Eaton, 1883**

Material examined: 04.07.2011, 1 nymph; 15.08.2011, 10 nymphs; 25.07.2012, 9 nymphs; 17.10.2012, 9 nymphs (1).

**Genus: *Electrogena* Zurwerra & Tomka, 1985*****Electrogena antalyensis* Kazancı & Braasch, 1986**

Material examined: 23.05.2012, 22 nymphs (8); 20.06.2012, 1 nymph (9).

***Electrogena* sp.**

Material examined: 15.08.2011, 19 nymphs; 22.05.2012, 25 nymphs; 25.07.2012, 7 nymphs (2); 15.08.2011, 15 nymphs (33).

**Genus: *Epeorus* Eaton, 1881*****Epeorus* sp.**

Material examined: 04.07.2011, 2 nymphs; 15.08.2011, 2 nymphs; 19.06.2012, 10 nymphs; 25.07.2012, 17 nymphs (1); 15.08.2011, 37 nymphs (3).

**Genus: *Rhithrogena* Eaton, 1881*****Rhithrogena semicolorata* Curtis, 1834**

Material examined: 22.05.2012, 33 nymphs; 19.06.2012, 9 nymphs (1).

**Family: Ephemerellidae****Genus: *Serratella* Edmunds, 1959*****Serratella ignita* Poda, 1761**

Material examined: 04.07.2011, 2 nymphs; 15.08.2011, 18 nymphs; 22.05.2012, 8 nymphs; 19.06.2012, 13 nymphs; 25.07.2012, 2 nymphs (1); 15.08.2011, 1 nymph; 19.06.2012, 4 nymphs (3); 23.05.2012, 1 nymph (12); 24.05.2012, 19 nymphs (13); 24.05.2012, 23 nymphs (14); 23.05.2012, 6 nymphs (17); 19.06.2012, 1 nymph (23); 21.06.2012, 3 nymphs (25); 21.06.2012, 4 nymphs (31).

**Family: Caenidae****Genus: *Caenis* Stephens, 1835*****Caenis horaria* Linnaeus, 1758**

Material examined: 17.08.2011, 7 nymphs (20).

***Caenis macrura* Stephens, 1835**

Material examined: 15.08.2011, 2 nymphs; 25.07.2012, 1 nymph (2); 25.07.2012, 11 nymphs (5); 05.07.2011, 19 nymphs; 15.08.2011, 10 nymphs; 23.05.2012, 34 nymphs; 19.06.2012, 4 nymphs (7); 20.06.2012, 6 nymphs (9); 20.06.2012, 29 nymphs; 26.07.2012, 6 nymphs (10); 23.05.2012, 7 nymphs; 20.06.2012, 4 nymphs (12); 20.06.2012, 21 nymphs (13); 20.06.2012, 8 nymphs (14); 24.05.2012, 1 nymph (15); 15.08.2011, 7 nymphs (16); 16.08.2011, 17 nymphs; 23.05.2012, 27 nymphs; 20.06.2012, 14 nymphs; 25.07.2012, 14 nymphs (17); 20.06.2012, 4 nymphs (18); 17.08.2011, 42 nymphs (21); 17.08.2011, 29 nymphs; 19.06.2012, 7 nymphs (22); 19.06.2012, 5 nymphs (23); 24.05.2012, 20 nymphs (24); 24.05.2012, 2 nymphs (25); 20.06.2012, 5 nymphs (26); 19.06.2012, 1 nymph (27); 23.05.2012, 28 nymphs (28); 21.06.2012, 3 nymphs (29); 21.06.2012, 18 nymphs (32).

**Family: Leptophlebiidae****Genus: *Habrophlebia* Eaton, 1881*****Habrophlebia lauta* McLachlan, 1884**

Material examined: 25.07.2012, 1 nymph (2); 15.08.2011, 1 nymph (3); 24.05.2012, 1 nymph (14).

**Genus: *Paraleptophlebia* Lestage, 1917*****Paraleptophlebia wernerii* Ulmer, 1920**

Material examined: 22.05.2012, 18 nymphs; 19.06.2012, 8 nymphs (1); 25.07.2012, 1 nymph (2); 19.06.2012, 4 nymphs (3).

**4. Discussion**

In this study, a total of 21 Ephemeroptera taxa at the species level and two at the genus level (*Electrogena* sp. and *Epeorus* sp.) were identified from the Gediz River basin. Of the determined species, *L. atrebatinus* is a new record for the Turkish Ephemeroptera fauna. According to Türkmen and Kazancı (2013), the Ephemeroptera fauna of Turkey consists of 146 species and 5 subspecies belonging to 34 genera from 14 families. With *L. atrebatinus* determined as a new record in this study, the number of total Ephemeroptera species of Turkey has increased to 147.

To date, there has not been any report about the Ephemeroptera order from Uşak and Manisa provinces. Two species from İzmir Province and 35 species from Kütahya Province have already been reported from the order Ephemeroptera. Distribution of the reported species according to genera is as follows: 1 Alaines, 7 Baetis, 2 Caenis, 1 Centroptilum, 1 Cloeon, 2 Ecdyonurus, 2 Electrogena, 1 Epeorus, 3 Ephemera, 1 Oligoneuriella, 1 Paraleptophlebia, 1 Potamanthus, 1 Proclaeon, 1 Serratella, and 1 Siphonurus (Puthz, 1972; Tanatmış, 1995, 2000, 2002; Kazancı, 2001b; Türkmen and Kazancı, 2013).

In this study, the identified species from Manisa (*C. luteolum*, *P. pennulatum*, *C. dipterum*, *C. simile*, *A. muticus*, *B. buceratus*, *B. fuscatus*, *B. lutheri*, *B. rhodani*, *B. vernus*, *L. atrebatinus*, *N. niger*, *E. dispar*, *E. antalyensis*, *S. ignita*, *C. macrura*, *H. lauta*), Uşak (*C. dipterum*, *B. buceratus*, *B. lutheri*, *B. rhodani*, *B. vernus*, *L. atrebatinus*, *S. ignita*, *C. macrura*), İzmir (*C. dipterum*, *B. buceratus*, *B. fuscatus*, *B. rhodani*, *B. vernus*, *C. horaria*, *C. macrura*), and Kütahya (*B. lutheri*, *E. helveticus*, *R. semicolorata*, *P. wernerii*) provinces were recorded for the first time in these provinces within the research area.

Several authors have reported that *Baetis* and *Caenis* are the most tolerant genera of Ephemeroptera order to organic pollution (Bargos et al., 1990; Timm, 1997; Menetrey et al., 2008; Grandjean et al., 2011). Of all 3801 specimens, the most abundant species were *B. buceratus* (31.1%), *B. rhodani* (19.2%), *B. vernus* (14.6%), and *C. macrura* (10.7%). Sample numbers of these 4 species form 75.6% of total samples (Figure 2). Thus, we considered that these species probably have suitable habitat conditions in the study area and high ecological tolerance.

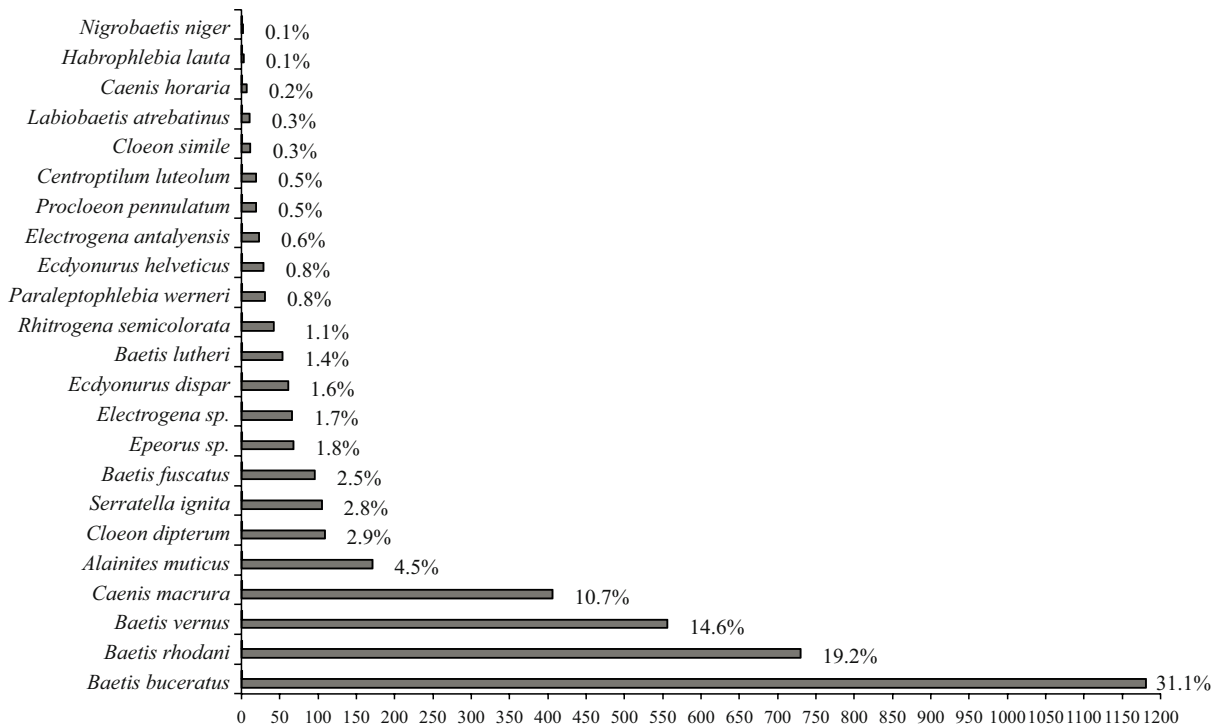


Figure 2. The numbers and percentages of collected specimens.

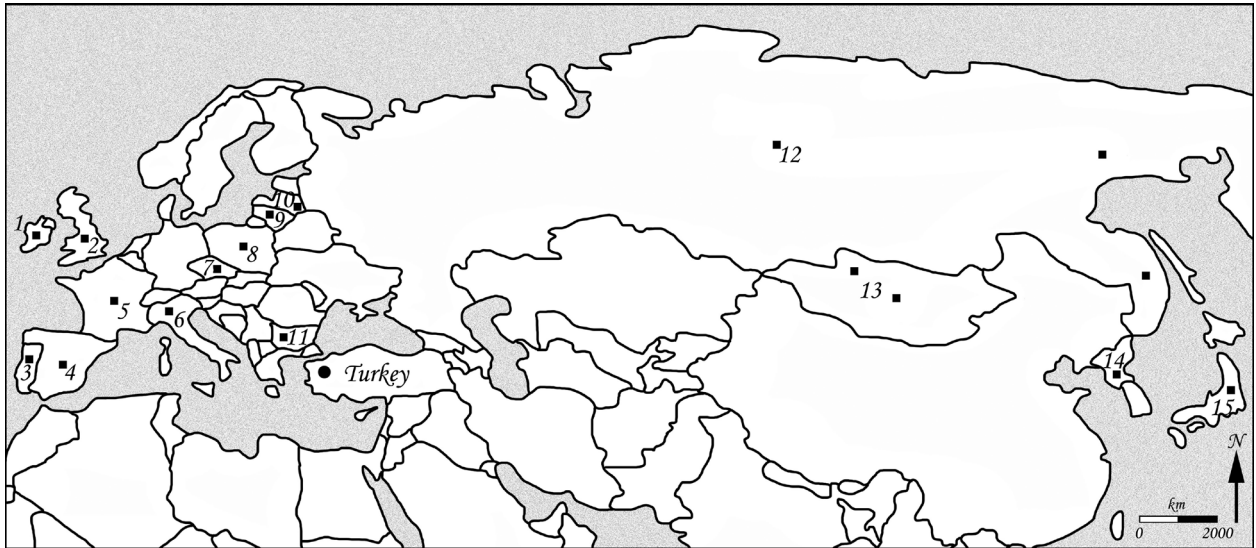
About 1.8 million years ago, when the ice age began, faunal elements of central and northern Europe migrated south towards Anatolia. Today's Aegean Sea at that time was inland, and a large freshwater river named Aegeopotamuos served as a bridge between Europe and Asia through an inland lake system. This freshwater bridge allowed faunal elements belonging to Europe and Asia to migrate to and distribute within Anatolia (Kosswig, 1955; Kazancı, 1991; Demirsoy, 2002). The Gediz River was also a tributary of Aegeopotamuos, and played an important role in the distribution of freshwater species between Europe and Anatolia.

The species determined in this study area, *A. muticus*, *B. buceratus*, *B. fuscatus*, *B. rhodani*, *B. vernus*, *C. luteolum*, *C. dipterum*, *C. simile*, *C. horaria*, *C. macrura*, *E. dispar*, *R. semicolorata*, *E. ignita*, *H. lauta*, and *P. weneri* have been reported in both the Balkans and Caucasia; on the other hand, *B. lutheri*, *N. niger*, *P. pennulatum*, and *E. helveticus* have distribution in some parts of middle and southern Europe and Caucasia (Puthz, 1978; Bauernfeind and Soldán, 2012; <http://www.insecta.bio.spbu.ru/#Ephemeroptera>). This fact suggests that these species spread into Anatolia from Macedonia–Thrace and the Iran–Caspian refugium, especially during the glacial ages.

*E. antalyensis* has been reported only from Turkey and Kos Island (Greece), which is very close to the shores of our country (Kazancı and Braasch, 1986; Belfiore et al.,

2000; Bauernfeind and Soldán, 2012). It could mean that this species originated from Anatolia and spread with tributaries of the Aegeopotamuos River, which was connected with an inland lake system in Anatolia in the past.

*L. atrebatinus*, which was determined in our study and given as a new record for the Turkish fauna, has been reported from some parts of Europe (England, Spain, Poland, Italy, Lithuania, Portugal, Latvia, France, Ireland, Bulgaria, Czech Republic) and east Asia (Japan, Korea, Mongolia, Russia) prior to this study (Eaton, 1870; Navas, 1925; Takahashi, 1929; Mikulski, 1936; Grandi, 1948; Kazlauskas, 1959; Alba-Tercedor, 1983; Bae and Soldán, 1997; Poppels, 2001; Jacob, 2003; Soldán et al., 2009; Tiunova, 2009; Bauernfeind and Soldán, 2012). Despite these reports, according to Bauernfeind and Soldán (2012), some old data may be incorrect because of misidentification. However, Bauernfeind and Soldán (2012) have suggested that because there are no reliable data available on the distribution of this species in central Siberia or central Asia, the distribution area might be disjunctive between the western and eastern Palaearctic subareas. "According to Jacob (2003), considered to represent an expansive West Palaearctic (Jacob, 2003) or Atlantomediterranean (Haybach and Jacob, 2010) faunistic element, findings from East Europe have yet to be revised." (Bauernfeind and Soldán, 2012).



**Figure 3.** Distribution map of *L. atrebatinus* (1. Ireland, 2. Britain, 3. Portugal, 4. Spain, 5. France, 6. Italy, 7. Czech Republic, 8. Poland, 9. Lithuania, 10. Latvia, 11. Bulgaria, 12. Russia, 13. Mongolia, 14. Korea (North), 15. Japan).

Based on these studies, it can be seen that there is a gap in the transition zone between the eastern and western Palearctic regions in terms of its distribution area. However, a small part of this gap is partially completed by determining this species in Turkey (Figure 3). However, more detailed studies should be performed in the transitional zone to be able to conclude that this species shows a wide distribution in the Palearctic region.

Some morphological characters of the specimens given in our study at the genus level (*Epeorus* sp. and *Electrogena* sp.) show differences from the characters specified in

current identification keys. However, the current literature is insufficient to clarify whether these specimens are variations of closely related species or a new species/subspecies.

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