Turk J Zool
29 (2005) 269-274

Chironomidae Fauna (Diptera-Insecta) of Gümüldür Stream (İzmir)

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Received: 16.02.2004

Abstract: Samples were collected monthly from 10 different stations between April, 1993, and March, 1994, in order to determine the Chironomidae fauna of Gümüldür Stream in İzmir, Turkey. Ten species were found in the stream as determined from qualitative analyses of the samples. Of these, 5 species belong to the subfamily Orthocladiinae and the remaining 5 belong to the subfamily Chironominae. This is the first study reporting the existence of these species in Gümüldür Stream.

Key Words: Chironomidae, Tahtalı Dam Lake, Gümüldür Stream, İzmir

Gümüldür Deresi'nin (İzmir) Chironomidae (Diptera-Insecta) Faunası

Özet: Gümüldür Deresi'nin Chironomid faunasını belirlemek amacıyla, Nisan 1993 - Mart 1994 tarihleri arasında, aylık periyotlarla on değişik istasyondan örnekler toplanmıştır. Örneklerin kalitatif değerlendirilmesi sonucunda, Orthocladiinae ve Chironominae alt familyalarından beşer tür olmak üzere toplam on tür saptanmıştır. Bu türler, Gümüldür deresinden ilk olarak bildirilmektedir.

Anahtar Sözcükler: Chironomidae, Tahtalı Baraj Gölü, Gümüldür Deresi, İzmir.

Introduction

Larval Chironomidae species in freshwater are the most abundant and, geographically, the most widely distributed holometabolous insects. More than 10,000 species of Chironomidae are known to exist (Armitage, 1995).

The larval stage is the longest period of life-cycles of insects that belong to the family Chironomidae. It is possible to encounter Chironomidae larvae in almost all inland waters, including still waters. Due to the larvae's ability to adapt to extremes of temperature, pH, salinity, depth, flow velocity and productivity, they can be found in many different environments. They can live in the ice-covered parts of the highest mountains (e.g., in the Himalayas at elevations up to 5600 m and at temperatures as low as –16 °C) and in the deepest bodies of fresh water (e.g., in Lake Baikal at depths of more than 1000 m) (Armitage, 1995).

Larval and adult stages of Chironomidae are at the lower levels of the food-chain. Primarily, they are a source of food for other animal groups. Since they contain important nutrient elements in high proportions, especially proteins, and are easily digestible, they are an indispensable source of food for fish. Furthermore, as a result of their bioturbation capability, they prevent putrefaction on the floor and provide primary elements required for photosynthesis, thereby affecting the material cycle in a positive way (Şahin, 1984).

Many researchers consider Chironomidae an indicator of productivity of, particularly, lakes and other stagnant waters. Those who classify the productivity levels of lakes according to Chironomid larvae present propose that it is possible to gain information on the productivity and other characteristics of a lake from a knowledge of Chironomid species within the lake. Recent studies are in agreement with this proposal (Şahin, 1984).

The aim of this study was to determine the Chironomidae fauna of Gümüldür Stream, which feeds Tahtalı Dam Lake.

Materials and Methods

Gümüldür Stream, which is located in the Tahtalı Dam Lake basin, consists of many branches. The major

branches are Şaşal Stream (Murat Stream and Darı Stream), Tahtalı Stream, Sarısu Stream, and Oğlananası Stream emerging from the Oğlananası small lake. Gümüldür Stream rises from Nif Mountain, traverses 40 km and then drains into the Aegean Sea at the north of Kuşadası Bay. The flow rates in the branches supporting the stream decrease from July to October, while the rates usually increase in other months.

Chironomidae and water samples were collected monthly from 10 different stations between April, 1993, and March, 1994, in order to determine the Chironomidae fauna of Gümüldür Stream (Figure 1).

Temperature measurements were carried out using a thermometer with a sensitivity of 0.1 °C. pH was measured with a pH-meter (Hanna HI 8014). A conductometer (Hanna HI 8033) was used to measure the conductivity. Dissolved oxygen (using the Winkler method) and alkalinity were determined using the titration method in the field (Golterman, 1971).

Chironomidae samples were obtained by sifting mud samples collected with an Ekman–Birge grab (15 x 15 cm) and dip net with several mesh openings, and a fine sieve with a 0.5 mm mesh width. These samples were fixed in a 70% alcohol solution.

Studies by Cranston (1982), Şahin (1991) and Epler (1995) were utilised for taxonomical diagnosis of the samples.

Results

Water temperature of the stream ranged between 10.8 °C (December, 1993) and 25.9 °C (July, 1993). pH varied between 7.24 and 8.20, dissolved oxygen between 6.65 and 13.18 mg/l, alkalinity between 3.24 and 5.25 meq/l and conductivity between 402 and 756 µS. These measurements show that the water in the stream is slightly alkaline and occasionally medium hard. Balık et al. (1996) classified the water as first class.

From a qualitative evaluation of the Chironomidae samples, 10 species were determined. Of these 10 newly determined Chironomidae species, 5 belong to the subfamily Orthocladiinae, 4 belong to the tribe Chironomini of the subfamily Chironominae and 1 belongs to the tribe Tanytarsini of the subfamily Chironominae. Morphometric characteristics of the species are as follows:

Cardiocladius capucinus (Zetterstedt, 1850)

(Figure 2.1)

Segment of second antenna coalesced, basal segment straight. Mentum black, teeth coalesced with each other. Mentum more triangular.

Cricotopus (Cricotopus) bicinctus (Meigen, 1818)

(Figure 2.2)

Pecten epipharyngis of 3 setae, median mental tooth rounded, median and 2 lateral teeth lighter in colour.

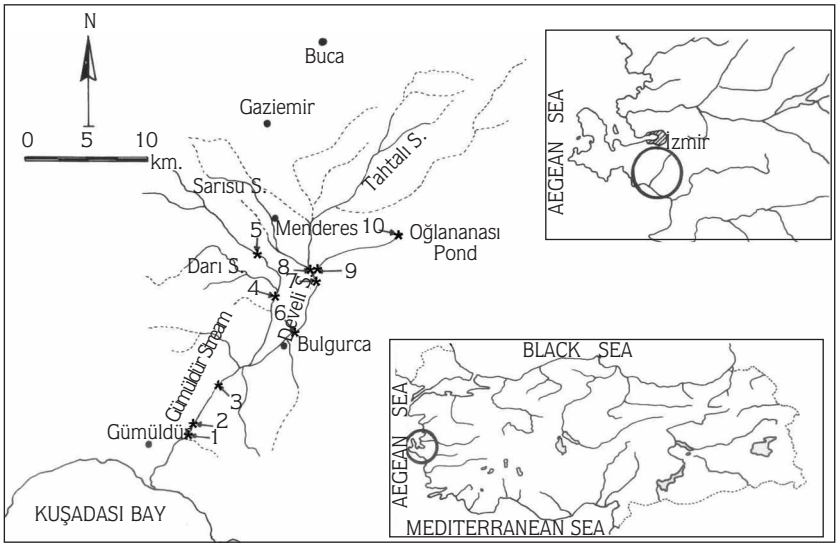

Figure 1. Gümüldür Stream and the stations from which the samples were collected (s: stream).

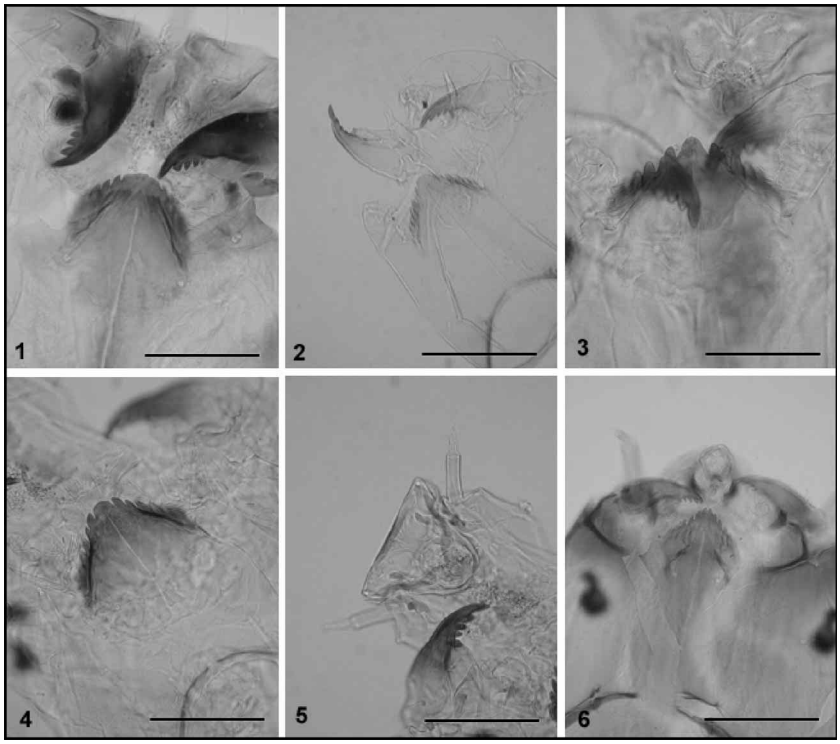

Figure 2. Pictures of determined taxa (1: *Cardiocladius capucinus*, mentum, 2: *Cricotopus bicinctus*, mentum, 3: *Halocladius fucicola*, mentum 4: *Paratrichocladius rufiventris*, mentum, 5: *Paratrichocladius rufiventris*, antenna, 6: *Eukiefferiella claripennis*, mentum). Scale bars indicate 100 µm.

Mentum median at least 3 times wider than first lateral teeth.

Halocladius fucicola (Edwards, 1926)

(Figure 2.3)

Premandible with at most 2 apical teeth and a weak brush. Second lateral mental teeth reduced and partially fused with the first laterals.

Paratrichocladius rufiventris (Meigen, 1830)

(Figures 2.4, 2.5)

Premandibular bifid, setal fringes simple. Mandible without inner seta, first lateral tooth not bifid. Mentum and mandible light to medium brown.

Eukiefferiella claripennis (Lundbeck, 1898)

(Figure 2.6)

Median mental teeth narrow, subequal to the first lateral teeth. Antenna with 4 segments.

Chironomus thummi (Kieffer, 1911)

(Figure 3.1)

Labial plate with 6 pairs of teeth, 3 median teeth present. Middle median teeth greater than the others and similarly first laterals greater than all teeth. Two pairs of gills exist in abdomen segment VIII and longer than hind legs.

Chironomus anthracinus (Zetterstedt, 1860)

(Figure 3.2)

Abdomen segment VII without process. Two pairs of ventral gills shorter than hind legs. Pecten epipharyngis with 12 teeth.

Polypedilum aberrans (Chernovskij, 1949)

(Figures 3.3 and 3.4)

Antenna consist of 5 segments, Lauterborn organs (LO) alternate (that is to say one of them on the second and the other one on the third segment of the antenna

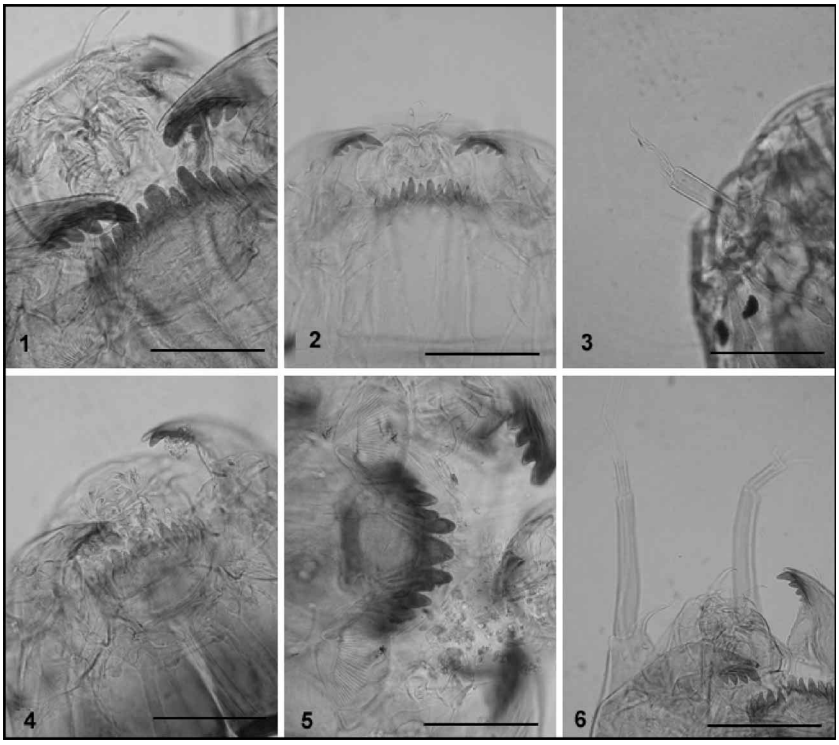

Figure 3. Pictures of determined taxa (1: *Chironomus thummi*, mentum 2: *Chironomus anthracinus*, mentum 3: *Polypedilum aberrans*, antenna, 4: *Polypedilum aberrans*, mentum, 5: *Dicrotendipes tritomus*, mentum 6: *Micropsectra curvicornis*, mentum). Scale bars indicate 100 µm.

opposite each other). There are 2 median teeth in the mentum.

Dicrotendipes tritomus (Kieffer, 1916)

(Figure 3.5)

Lateral margins of median tooth slightly notched; first and second lateral teeth touching; 6 pairs of lateral teeth, submental plates wide fan-shaped, basal segment not too long, grooves clear.

Micropsectra curvicornis (Chernovskij, 1949)

(Figure 3.6)

Pecten epipharyngis of 3 scales, premandibular bifid, ventromental plates close and touching each other. This species differs from the others in having a long curved process on basal segment of antenna.

As can be seen from Table 1, the highest number (8) of species was seen at station 9, a muddy-sandy habitat with well developed aquatic macrophytes. Following station 9 are station 1 with 6 species and station 3 with 5 species. Because their bottom structures were very hard, no Chironomid species were found at stations 7 or 8. Also note that the most widely seen species are *Chironomus anthracinus* and *Cricotopus bicinctus*.

Table 2 presents the distributions of the species with respect to months. There were no Chironomid species in August, September and November, 1993. The highest number of species was observed in December, 1993 (6). March, 1994, and May, 1993, followed with 5 species each.

Şahin (1987) reported *Cardiocladius capucinus* from the Küçük Menderes and Büyük Menderes rivers, *Cricotopus bicinctus* and *Micropsectra curvicornis* from the Küçük Menderes, Büyük Menderes and Gediz rivers, *Paratrichocladius rufiventris* and *Eukiefferiella claripennis* from the Büyük Menderes only, *Chironomus thummi, Chironomus anthracinus* and *Dicrotendipes tritomus* from both the Büyük Menderes and Gediz rivers and *Polypedilum aberrans* from the Küçük Menderes.

Table 1. Chironomid species of Gümüldür Stream identified from 10 stations.

Species	1	2	3	4	5	6	7	8	9	10
Cardiocladius capucinus (Zetterstedt, 1850)	+	-	-	-	+	-	-	-	-	+
Cricotopus bicinctus (Meigen, 1818)	+	+	+	+	-	+	-	-	+	-
Halocladius fucicola (Edwards, 1926)	+	-	+	-	-	-	-	-	+	-
Paratrichocladius rufiventris (Meigen, 1830)	-	+	+	-	+	-	-	-	+	-
Eukiefferiella claripennis (Lundbeck, 1898)	+	-	+	-	+	-	-	-	-	-
Chironomus thummi (Kieffer, 1911)	-	-	-	-	-	+	-	-	+	-
Chironomus anthracinus (Zetterstedt, 1860)	+	+	+	+	-	+	-	-	+	+
Polypedilum aberrans (Chernovskij, 1949)	-	-	-	-	-	+	-	-	+	-
Dicrotendipes tritomus (Kieffer, 1916)	-	-	-	+	-	-	-	-	+	-
Micropsectra curvicornis (Chernovskij, 1949)	+	-	-	-	-	-	-	-	+	-

Table 2. Distributions of Chironomid species of Gümüldür Stream with respect to time.

Species	Ap	Ma	Jun	Jul	Aug	Sep	Oct	No	Dec	Jan	Feb	M
Cardiocladius capucinus	+	-	-	-	-	-	+	-	-	-	-	-
Cricotopus bicinctus	+	+	+	-	-	-	-	-	+	-	+	+
Halocladius fucicola	-	+	-	-	-	-	-	-	-	-	-	-
Paratrichocladius rufiventris	+	+	-	-	-	-	-	-	+	+	+	+
Eukiefferiella claripennis	-	+	+	-	-	-	-	-	-	+	+	-
Chironomus thummi	-	-	-	-	-	-	-	-	+	-	-	+
Chironomus anthracinus	-	+	-	+	-	-	+	-	+	+	+	+
Polypedilum aberrans	-	-	-	-	-	-	-	-	+	-	-	-
Dicrotendipes tritomus	+	-	-	-	-	-	-	-	+	-	-	-
Micropsectra curvicornis	-	-	-	-	-	-	-	-	-	-	-	+

Balık et al. (1999) found *Halocladius fucicola* in Gediz River and Güzelhisar Stream and *Dicrotendipes tritomus* in Gediz River only.

Finally, the determined species have been reported from different localities in the Aegean region but not so far from Gümüldür Stream (Şahin, 1987; Balık et al., 1999). This study is the first to report the existence of these Chironomid species in Gümüldür Stream.

The sampling was performed during the construction of Tahtalı Dam Lake. The results of our work could provide some insight into how the ecosystem of Gümüldür Stream will change in the coming years.

Acknowledgement

We would like to thank the Ege University Research Fund (Project No. 1992/Fen/035) for its support.

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