G.U. Journal of Science
19(1): 57-67 (2006)

GUJS
www.gujs.org

The Larval Chironomidae (Diptera) Fauna of Bozcaada (Tenedos)

Nurcan ÖZKAN

Trakya University, Education Faculty, Primary Education Department, 22030 Edirne, TURKEY

Received:05.08.2004 Accepted:19.10.2005

ABSTRACT

In this study, Chironomidae (Diptera) larvae, which were collected from 6 localities were evaluated taxonomically at the end of the field work in Bozcaada on 14-15/08/1999, 28/02/2001 and 24/05/2002. The two species (*Macropelopia nebulosa* (Mg.) and *Telmatopelopia nemorum* (G.)) belong to the two genus from the subfamily of Tanypodinae of Chironomidae, the four species (*Cricotopus sylvestris* (Fabr.), *C. intersectus* (Staeg.), *Halocladius fucicola* P (Edw.) and *Paratrichocladius rufiventris* (Mg.)) belong to the three genus from the subfamily of Orthocladiinae and the eight species belong to four genus from the subfamily of Chironominae (*Chironomus salinarius* K., *C. thummi* K., *C. anthracinus* (Zett.), *C. viridicollis* K., *Einfeldia pagana* (Mg.), *Polypedilum aberrans* Tsch., *P. convictum* (Walk.), *Micropsectra praecox* (Mg.). Totally fourteen species have been determined and recognition keys have been given. All these species are new records for Bozcaada. Also, the species of *Chironomus salinarius* K. is the new record for the fauna of Chironomidae in Turkey.

Key Words: *Diptera, Chironomidae, Limnofauna, Bozcaada (Tenedos), Turkey*

1. INTRODUCTION

The adult Chironomids that live their larval and pupa periods completely in the aquatic area are not aquatic [1]. Some types of Chironomidae larva which are the most important food source of many freshwater fish that feed from the base, have the importance of being the sign for biological productivity [2, 3, 4, 5 and 6] Many research has showed the fact that Chironomidae larvae are consumed by the demersal fishes, they contain important nutritious elements like protein in high levels and they are digested easily and quickly by the fishes [7, 8 and 9].

In this study, it has been aimed to contribute to Turkey's Chironomidae fauna by the identification of the samples of Bozcaada's larval fauna, as Bozcaada is poor in terms of water source and there is a decrease in water source by various factors.

1.1. Definition of the Study Area

The research area is located in the North Aegean Sea, 20 km southwest of Dardanelles, in the front part of the Biga peninsula and a little bit far South of Gökçeada Island. Bozcaada Island, which is separated from the main land by a low channel of 6 km width, is on the Anatolian continental shelf. It is also the extension of the Anatolian continent with its geological and geomorphologic structure. Bozcaada Island is the third biggest island of Turkey with its 36.09 km square area coming after Gökçeada Island and Marmara Island. It covers 11km in the northwest-southeast 6.5 km in the north-south direction. Nearly 18.500 square meters of the island –which has a flat surface except for the highest part, Göztepe, with 192 meters height- is composed of grape fields. It is under the effect of the Mediterranean and continental climate [10, 11, 12, 13, 14 and 15]. The island is poor in terms of the running waters, however, there are some streams named Kocamış, Balcılar, Çanel, Hacımahmut, Kulkutoğlu, İçmece, Sulubahçe, Yanakut, Habbelipınar and Tuzburnu that get stronger with the winter rain [16].

2. MATERIAL AND METHOD

The samples of mud were collected from the base of six different locations (pool, water basin, stream, water source) that are 1-15 meters above the sea level by using special scoops in the field work in Bozcaada between

Corresponding author, e-mail: nurcanozkan@trakya.edu.tr

14-15/08/1999, 28/02/2001 and 24/05/2002 (Figure 1). The samples of mud taken were cleaned in pans whose meshes are in different sizes and the larvae collected were put into 250 ml plastic bottles of containing 70% alcohol. The collected samples' types were also identified in the laboratory with the help of a binocular and light microscope. In this process the studies of Chernovski [17], Moller Pillot [18, 19], Fittkau and Roback [20], Şahin [7, 8, 9, 21, 22 and 23], Şahin et al. [24], Kırgız [25], Özkan [26], Epler [27], Akıl et al [28] and Sever [29] were found to be most beneficial.

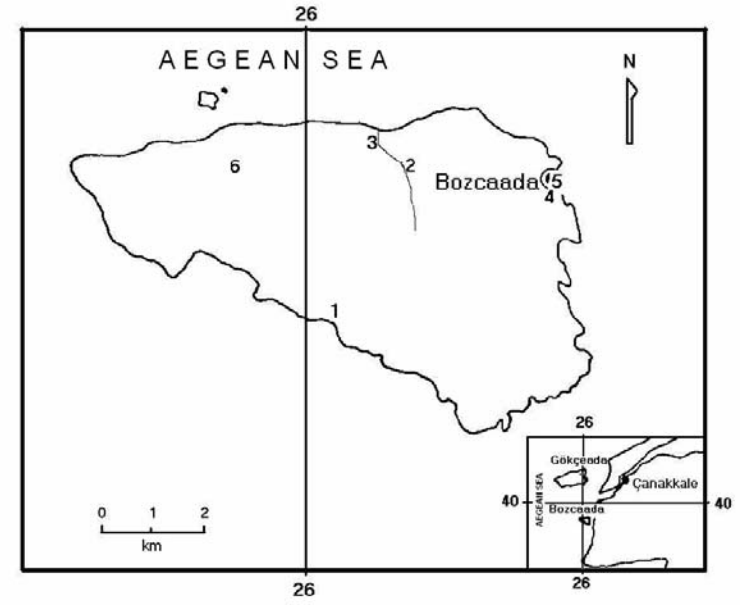


Figure 1. The localities and the habitats of the samples taken from Bozcaada: 1 Ayazma (water resource, pool and water basin), 2-Aral farm (stream and water basin), 3-Meadow (stream), 4-Center (water basin), 5-Center (pool), 6-Savanna (water basin)

3. RESULTS

As a result of the field work in Bozcaada on 14-15/08/1999, 28/02/2001, 9 genus and 14 species belonging to 3 subfamilies of Chironomidae family were identified. All the species identified are new for Bozcaada, however *Chironomus salinarius* K. type is a new record for Turkey (Figure 1, Table 1).

Table1. The subfamily and species list of Chrionomidae family identified in Bozcaada with their habitats.

Subfamily	Genus	Species	Habitat
Tanypodinae	*Macropelopia* Th.,	*Macropelopia nebulosa* (Mg.)	Stream
	Telmatopelopia Fittk.	*Telmatopelopia nemorum* (G.)	Pool
Orthocladiinae	*Cricotopus* v.d. Wulp.	*Cricotopus sylvestris* (Fabr.)	Pool, stream
	Halocladius Hirv.	*C. intersectus* (Staeg.)	Pool
	Paratrichocladius Hirv.	*Halocladius fucicola* P (Edw.)	Stream
		Paratrichocladius rufiventris (Mg.)	Stream
Chironominae	*Chironomus* Mg.	***Chironomus salinarius* K. (*)**	Stream
	Einfeldia K.	*C. thummi* K.	Fountain basin, pool, stream, water resource
	Polypedilum K.	*C. anthracinus* Zett.	Pool, fountain basin, stream
	Micropsectra K.	*C. viridicollis* v.d.Wulp,	Fountain basin, pool, stream
		Einfeldia pagana (Mg.)	Fountain basin
		Polypedilum aberrans Chern.	Fountain basin, pool
		Polypedilum convictum (Walk.)	Stream
		Micropsectra praecox (K.).	Stream
Total	9 genus	14 species	

(*): A new species for Turkey

Genus: *Macropelopia* Th., 1916
Species: *Macropelopia nebulosa* (Mg., 1804)
Habitat: On a sandy base with clean water which is rich of organic material
Localities that they are found in the work field: 3
Date of collection: 24/05/2002
Number of Samples: 1

Genus: *Telmatopelopia* Fittk., 1962
Species: *Telmatopelopia nemorum* (G., 1921)
Habitat: Sandy base in the stagnant water.
Localities that they are found in the work field: 1
Date of collection: 18/08/1999
Number of Samples: 1

Genus: *Cricotopus* v.d. Wulp., 1874
Species: *Cricotopus sylvestris* (Fabr., 1794)
Habitat: Mostly among the algae in the clean and stagnant water
Localities that they are found in the work field: 5, 3
Date of collection: 21/07/2001, 24/05/2002
Number of Samples: 22, 2
Species: *Cricotopus intersectus* (Staeg., 1839)
Habitat: Among the algae in the stagnant water.
Localities that they are found in the work field: 5
Date of collection: 21/07/2001
Number of Samples: 2

Genus: *Halocladius* Hirv., 1973
Species: *Halocladius fucicola* P (Edw., 1926)
Habitat: Among the plants in a slow stream, clean water
Localities that they are found in the work field: 3
Date of Collection: 24/05/2002
Number of Samples: 5

Genus: *Paratrichocladius* Hirv., 1973
Species: *Paratrichocladius rufiventris* (Mg., 1830)
Habitat: Among the plants in a slow stream, clean water
Localities that they are found in the work field: 3
Date of Collection: 24/05/2002
Number of Samples: 6

Genus: *Chironomus* Mg., 1803
Species: *Chironomus salinarius* K., 1915
Habitat: On the thin sand of clean and slow stream water
Localities that they are found in the work field: 3
Date of Collection: 24/05/2002
Number of Samples: 3
Species: *Chironomus thummi* K., 1911
Habitat: Mostly on the muddy base of stagnant water
Localities that they are found in the work field: 1-6
Date of Collection: 14/08/1999, 28/02/2001, 21/07/2001, 24/05/2002
Number of Samples: 205, 21, 111, 5, 5, 37, 1, 1
Species: *Chironomus anthracinus* Zett., 1860
Habitat: Mostly on the muddy base of stagnant water
Localities that they are found in the work field: 1-5
Date of Collection: 14/08/1999, 21/07/2001, 24/05/2002
Number of Samples: 4, 1, 2, 9, 6, 8
Species: *Chironomus viridicollis* v.d.Wulp, 1877
Habitat: In the mud of the stagnant water
Localities that they are found in the work field: 1, 2, 4, 5
Date of Collection: 14/08/1999, 21/07/2001, 24/05/2002
Number of Samples: 24, 23, 13, 3, 2

Genus: *Einfeldia* K., 1924
Species: *Einfeldia pagana* (Mg., 1838)
Habitat: On the muddy base of water with lower stream
Localities that they are found in the work field: 1, 2
Date of Collection: 14/08/1999
Number of Samples: 2, 10

Genus: *Polypedilum* K., 1912
Species: *Polypedilum aberrans* Chern., 1949
Habitat: In the mud of ditch and lower stream water
Localities that they are found in the work field: 2, 5
Date of Collection: 14/08/1999, 21/07/2001
Number of Samples: 31, 1
Species: *Polypedilum convictum* (Walk., 1856)
Habitat: In the stagnant and slower stream water where there is organic and algae base
Localities that they are found in the work field: 2
Date of Collection: 24/05/2002
Number of Samples: 30

Genus: *Micropsectra* K., 1909
Species: *Micropsectra praecox* (K., 1900).
Habitat: In the stagnant and slower stream water where there is organic and algae base
Localities that they are found in the work field: 2
Date of Collection: 24/05/2002
Number of Samples: 1

3.1. The Species Identification Keys of Bozcaada Chironomidae Larvae:

1 [4] Developed glossa and paraglossa (Figure 2). The antenna can be taken into the head (retractile) (Figure 3).
Subfamily Tanypodinae

2 [3] Abdominal segments are wide and near them there is either a little or a lot of hair in the shape of tassels. The height of anal gills is two times more than their width (Figure 4). The head capsule is circular and there are 8 couples of teeth on mentum. All the teeth are almost equal in size (Figure 5). 5 teeth of glossa are in the shape of a concave that is not deep (Figure 2).
Macropelopia Th.
Macropelopia nebulosa (Mg.)

3 [2] Segments of abdomen are relatively narrow and there is no hair near them. The length of their anal gills is three times longer than their width (Figure 6). The capsule of the head is long with no teeth on mentum**.** 5 teeth of glossa are in the form of a straight line (Figure 7).
Telmatopelopia Fittk.
Telmatopelopia nemorum (G.)

4 [1] Glossa and paraglossa are not developed. Antennas are not retractile.

5 [12] Paralabium plates are mostly not developed, if they are developed there are no grooves on them.
Subfamily Orthocladiinae

6 [9] There are fringes of hair on the edges of the back parts of abdomen (Figure 8).
Cricotopus v.d. Wulp

7 [8] The Mentum middle teeth are, at most, 1.5 times wider than the I. lateral teeth and the tip points of the lateral teeth are sharp (Figure 9). The last tooth located in the front is not so long (Figure 10).
Cricotopus sylvestris (Fabr.)

8 [7] The Mentum middle teeth are, at most 2 times wider than the I.lateral tooth and the tip point of lateral teeth are stubby (Figure11). The last tooth located in the front is longer than the others (Figure 12).
Cricotopus intersectus (Staeg.)

9 [6] Hair eaves are simple and composed of single hairs (Figure 13).

10 [11] There are interior mandible seta (Figure14). Mentum I. lateral tooth is like a fork (Figure 15).
Halocladius Hirv.
Halocladius fucicola P (Edw.)

11 [10] There are not interior mandible seta (Figure 16). Mentum I. lateral tooth is not like fork (Figure 17).
Paratrichocladius Hirv.
Paratrichocladius rufiventris (Mg.)

12 [5] Paralabium plates are always highly developed and they have grooves (Figure 18).
Subfamily Chironominae

13 [26] Antennas come out either directly from the head capsule or antenna pedestal whose length and width are less. Paralabium plates are wide and in the form of a fan (Figure 18).
Tribus Chironomini

14 [23] There are 1-2 couple of ventral gills on the VIII. ventral abdominal segment. There is one tooth on the mentum.

15 [22] There are two couples of ventral gills on the ventral of the VIII. abdominal segment.
Chironomus Mg.

16 [17] Ventral gills are completely atrophied.
Chironomus salinarius K.

17 [16] Ventral gills are not atrophied.

18 [19] Ventral gills are longer than the back feet (Figure 19).
C. thummi K.

19 [18] Ventral gills are shorter than the back feet (Figure 20).

20 [21] Epipharynx scallop has 12 teeth (Figure 21).
C. anthracinus (Zett.)

21 [20] Epipharynx scallop has 16 teeth (Figure 22).
C. viridicollis K.

22 [15] There are a couple of gills on the ventral of the VIII. abdominal segment (Figure23).
Einfeldia K.
Einfeldia pagana (Mg.)

23 [14] There are no ventral gills on the ventral of VIII. abdominal segment. There is a couple of teeth on the mentum (Figure 24)
Polypedilum K.

24 [25] Antennas have 6 joints. One of the Lauterborn organs is on the second antenna joint and the other one is on the third one and they are opposite each other (alternate) (Figure 25).
Polypedilum aberrans Tsch.

25 [24] Antennas have 5 joints. Lauterborn organs are on the second antenna joint and they are opposite each other (Figure 26).
Polypedilum convictum (Walk.)

26 [13] Antennas come out from antenna pedestals whose length and width are more than them (Figure 27). Paralabium plates are narrow, long and so close to each other that they can touch each other (Figure 28).
Tribus Tanytarsini
Micropsectra K.
Micropsectra praecox Mg.

4. DISCUSSION

As a result of this study, 14 species were identified belonging to Tanypodinae, Orthocladiinae, and Chironominae subfamilies of Chironomidae family in Bozcaada. As there has been no research made about Bozcaada Chironomidae larvae before, all the species identified are new records for Bozcaada. Furthermore the species *Chironomus salinarius* K. is a new record for the fauna of Chironomidae in Turkey (Table 1).

Among the species collected from 6 different localities, 14.3 % belong to the subfamily of Tanypodinae, 28.5% belong to the subfamily of Orthocladiinae and 57.2% are from the subfamily of Chironominae (Figure 29). Chironominae larvae are generally located in stagnant water. As the localities of the samples taken, except for one, are from generally stagnant water, this could be accepted as the reason for the abundance of the species belonging to the subfamily of Chironominae [14, 17, 30 and 31].

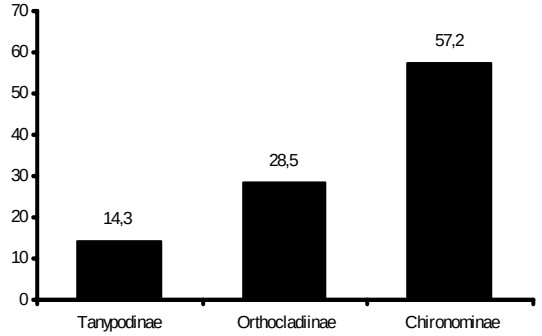


Figure 2. The percentage distribution of species identified in Bozcaada according to their subfamilies.

Species of Orthocladiinae were found in two different localities: in the low-stream and stagnant-water. The members of that subfamily can be found in small houses or in a free shape in rivers almost all around the world, on the other hand some of them are found either on moistured sand or in the sea [32, 33, 34 and 35]. The fact that the samples of Orthocladiinae are found in the same area, one of whom is a river and the other is the stagnant-water in 2 different stations and also the fact that they are not existent in other localities support the records. The types of *Cricotopus intersectus* (Staeg.) and *Cricotopus sylvestris* (Fabr.) belonging to Orthocladiinae subfamily which was found in stagnant-water localities are thought to be found in their forms of allocton. These species were generally found in the algae of the clean water in the work field.

Among the 14 species found in the work field, *Chironomus thummi* K. was found in all localities and *C. anthracinus* (Zett.) and *C. viridicollis* K. were found in five localities. Species of *Macropelopia nebulosa* (Mg.), *Telmatopelopia nemorum* (G.), *Cricotopus intersectus* (Staeg.), *Halocladius fucicola* P (Edw.), *Paratrichocladius rufiventris* (Mg.), *Chironomus salinarius* K., *Polypedilum convictum* (Walk.), *Micropsectra praecox* Mg were found in one locality (Figure 1).

Chironomus thummi K. which was found in high amounts in the research area was mostly found in the low-stream and stagnant-water, in the muddy base and among the fallen leaves and the algae. Localities that the samples were collected, except for two localities, have similar qualities with each other. Despite the fact that samples taken from low-stream water, sand, and the base covered with algae and reeds have more variety of

species, the amount of organisms in the same locality are less. On the other hand, localities where there is mud on the base and whose water is relatively dirty have less amount of species but have more organisms.

There was less amounts of the species *Chironomus salinarius* K. found in the water resource 50 km away from the clear water sea with thin sand which has herbal waste and reeds. The existence of species whose habitat is typically salty water [18] was identified because the level of water had decreased in summer but the water resource was affected by the sea as the location is so close to sea-water. Therefore *Chironomus salinarius* K. is allocton form for Bozcaada.

Chironomus salinarius K. was only found in Bozcaada, on the other hand the species of *Cricotopus sylvestris* (Fabr.) and *Cricotopus intersectus* (Staeg.) were found in the Marmara region and Bozcaada [26, 36, 37 and 38]. These species today are scattered all around in Europe [39, 40]. In the palearctic area, when there was a land in the place of The Aegean sea, some parts of the Egeopotamus river which had been separated from the ice lake in Central Asia, built a fresh-water bridge from west Anatolia to Europe.

Movement ability of invertebrate living organisms is restricted. For this reason, they could reach The Anatolian diagonal with streams between west and east. Then groups showed a different development. Restriction of their distribution in Turkey can be explained with this hypothesis [41]. Chironomid species identified in Bozcaada were also found by other researchers, mainly by Şahin, [7, 8, 22 and 23] in the various internal waters of Turkey.

As a result, although it is mentioned that there are streams which get strength by winter rain in Bozcaada, which is the smallest city of Çanakkale, in their water course, we could not encounter water that samples could be taken from. In addition, the fountain basin and the water around them that had existed before have disappeared because these areas were covered by cement and the waste water was connected to drainage. Therefore small water areas formed by those fountains have disappeared recently. As a result of these, the area has become so poor of water resources, there is a decrease in the sample collection areas in terms of hydrobiology. This study has been done as there was a need for revealing Chironomiade fauna of Bozcaada as these areas are disappearing day by day.

REFERENCES

[1]. Wetzel, R. G., "Limnoloji", ***W. B. Saunders Company Philadelphia,*** London-Toronto, 743 p (1975).

[2]. Kırgız, T. ve Soylu, E., "Apolyont ve Manyas Göllerinde Su Ürünleri Prodüksiyonunu Etkileyen Dip Fauna Elementlerinin Yıllık Görünüm ve Yayılışları", ***Tubitak V. Bilim Kong. Tebl.,*** Ankara, 387-393 (1975).

[3]. Kırgız, T., "Seyhan Baraj Gölü Chironomidae (Diptera) Larvaları Üzerinde Morfolojik ve Ekolojik Bir Çalışma", ***Doğa TU Zool. Derg.,*** C. 12, S. 3, 245 – 255 (1988).

[4]. Şen, D. Ve Özdemir, Y., "Haringet Çayı Chironomidae (Diptera) Larvalarının Mevsimsel Dağılımları". ***Ege Üniv. Su Ürün. Derg.,*** Ege Üniv. Basımevi, Bornova-İzmir, Cilt 7, Sayı 25-26-27-28,60-64 s (1990).

[5]. Özdemir, Y. ve Şen, D., "Keban Baraj Gölü Ova Bölgesinde Bulunan *Procladius (Holotaypus) sp.* Ve *Chironomus halophilus* Larvalarının mevsimsel dağılımları", ***Ege Üniv. Su Ürün. Derg.*** Ege Üniv. Basımevi, Bornova-İzmir, Cilt 8, Sayı 29-30, 60-65 s (1991).

[6]. Kubilay, A. ve Timur, G., "Eğridir Gölü Köprü Avlağı Chironomidae Larvaları ve Bu Larvaların Mevsimsel ve Zonlara Göre Dağılımı Üzerine Bir Araştırma", ***XI. Ulusal Biyoloji Kongresi,*** Elazığ 1992, 155-165 (1992).

[7]. Şahin, Y., "Doğu ve Güneydoğu Anadolu Bölgeleri Akarsu ve Göllerindeki, Chironomidae (Diptera) Larvalarının Teşhisi ve Dağılışları", ***Anadolu Üniv. Yay.*** No: 57, Fen Ed. Fak. Yay. No: 2, Eskişehir (1984).

[8]. Şahin, Y., "Eğridir Gölü Chironomidae (Diptera) Larvaları ve Yayılışları", ***Doğa TU Zool. Derg.***, C. 11, S. 1, 60 – 66 (1987).

[9]. Şahin, Y., "Marmara, Ege ve Sakarya Sistemi Akarsuları Chironomidae (Diptera) Larvaları ve Yayılışları", ***Doğa TU Zool. Derg.,*** C. 11, S. 3, 179 – 188 (1987a).

[10] Kalafatçıoğlu, A., "Ezine Civarının ve Bozcaada'nın Jeolojisi. Kalker ve Serpantinlerinin Yaşı", ***MTA Enst. Derg.,*** Ankara, 60:60-69 (1963).

[11]. Seçmen, Ö. ve Leblebici, E., "Gökçeada ve Bozcaada Adalarının Vejetasyonu ve Florası. II-Flora", ***Bitki,*** 5:271-368 (1978).

[12]. Atalay, İ., "Türkiye Jeomorfolojisine Giriş", ***Ege Üniv. Sosyal Bilimler Fak. Yay.,*** 9:1-284 (1982).

[13]. Hocaoğlu, M. Ş., "Bozcaada'nın Jeomorfolojisi", ***Çanakkale Eğitim Yüksek Okulu Araştırma Dergisi,*** 1:109-142 (1988).

[14]. Özkan, B., "Gökçeada ve Bozcaada Adalarının Kemiricileri", Doktora Tezi, ***Trakya Üniversitesi, Fen Bilimleri Enstitüsü,*** Edirne, 1-150 (1995).

[15]. Özkan, B., "Gökçeada ve Bozcaada Adalarının Kemirici Faunası (Rodentia: Mammalia)", ***Doğa, Tr. J. of. Zoology,*** 23, Ek Sayı 1, 133-147 (1999).

[16]. http://www.bozcaada.org, (24.07.2004).

[17]. Chernovskii, A., "Identification of Larvae of the Midge Family Tendipedidae. Fauna USSR, 31", (***Trans. from Russian by Natl. Lending Library for Sci. Tech.*** Boston), 1–279 (1961).

[18]. Moller Pillot, H. K. M., "De Larven der Nederlandse Chironomidae (Diptera)", ***Leiden***, I – 1 – IX. 2. 7 (1978 - 1979).

[19]. Moller Pillot, H. K. M., "De Larven der Nederlandse Chironomidae (Diptera) (Orthocladiinae sensu lato)", ***Leiden***, S: 1 – 164 (1984).

[20]. Fittkau, E. J. and Roback, S. S., "The Larvae of Tanypodinae (Diptera: Chironomidae) of the Holarctic Region (Keys and diagnoses)", ***Ent. Scand.*** Suppl. 19: 33 – 110. Lund, Sweden (1983).

[21]. Şahin, Y., "Elazığ ve Kısmen Çevre İllerinin Chironomidae (Diptera) Limnofaunasının Tespiti ve Taksonomik İncelenmesi", ***Fırat Üniv. Vetr. Fak. Derg.,*** Cilt V, No: 1 (1980).

[22]. Şahin, Y., "Burdur, Beyşehir ve Salda Gölleri Chironomidae (Diptera) Larvaları ve Yayılışları", ***Doğa TU Biyoloji Derg.,*** C. 11, S. 2, 59 – 70 (1987b).

[23]. Şahin, Y., "Türkiye Chironomidae Potamofaunası", ***Tübitak*** – Proje No: TBAG –869 (ve VHAG – 347, TABG – 669, TBAG – 792), 1 – 88 (1991).

[24]. Şahin, Y., Tanatmış, M. ve Küçük, A., "Gökçeada Faunası. Kısım I. Chironomidae Larvaları", ***Anadolu Üniv., Fen Ed. Fak Derg.,*** Eskişehir. 1:1-15 (1988).

[25]. Kırgız, T., "Gala Gölü Chironomidae (Diptera) Larvaları Üzerinde Bir Ön Çalışma", ***IX. Ulusal Biyoloji Kongresi Bildiri Özetler,. Cumhuriyet Üniv. Fen Ed. Fak. Biyoloji Böl., 221 – 23 Eylül, S. 11,*** Sivas 1988 (1988a).

[26]. Özkan, N., "Edirne Bölgesi Chironomidae (Diptera) Limnofaunasının Tespiti ve Taksonomik İncelenmesi", Yüksek Lisans Tezi, ***Trakya Üniversitesi, Fen Bilimleri Enstitüsü,*** Edirne, 1-80 (1991).

[27]. Epler, J. H., "Identification Manual for the Larval Chironomidae (Diptera) of Florida". ***FL Dept. Environ. Reg.,*** Orlando, FL. 317 pp (1995).

[28]. Akıl, A., Ayvaz ve Şen, D., "Cip Baraj Gölü (Elazığ) Chironomidae (Diptera) Larvaları ve Yayılışları", ***Doğa Tr. J. of Zoology***, 20, 3: 51-58, (1996).

[29]. Sever, F., "Tekirdağ İli Chironomidae (Diptera) Limnofaunasının Tespiti ve Taksonomik İncelenmesi", ***Yüksek Lisans Tezi, Trakya Üniversitesi, Fen Bilimleri Enstitüsü,*** Edirne, 1 – 49 (1997).

[30]. Kırgız, T., "Gala Gölü Bentik Faunası", ***Anadolu Üniv. Fen Ed. Fak. Derg.,*** C. 1, S. 2, 67 – 87 (1989).

[31]. Kavaz, E., "Tunca Nehri Bentik Makroomurgasız Faunası", Yüksek Lisans Tezi, ***Trakya Üniversitesi. Fen Bilimleri Enstitüsü,*** Edirne, 1 – 38 (1997).

[32]. Sublette, J.E., "Chironomid Midges of California. I. Chironomidae, exclusive of Tanytarsini (Clopsectrini)", ***Proce of the U.S. Nat. Mus.*** Vol. 112 N. 35, 197-226 (1960).

[33]. Sublette, J.E., "Chironomid Midges of California. II. Tanypodinae, Podonominae and Diamesinae", ***Proce of the U.S. Nat. Mus.*** Vol. 115 N. 3481, 85-135 (1964).

[34]. Sublette, J.E. and Sublette, M. F., "Family Chironomidae. A Catalog of the Diptera of the Oriental Region, Suborder Nematocera", Vol. 1, 5: 389-422 (1973).

[35]. Polatdemir, N. ve Şahin, Y., "Eskişehir ve Çevresi Durgunsu Sistemleri Chironomidae (Diptera) Larvaları", ***Tr. J. of Zoology,*** 212: 315 – 319 (1997).

[36]. Özkan, N., "Meriç ve Ergene Nehirleriyle Bazı Kollarında Chironomidae (Diptera) Larvalarının Dinamiği", Doktora Tezi, ***Trakya Üniversitesi, Fen Bilimleri Enstitüsü,*** Edirne, 1-143 (1998).

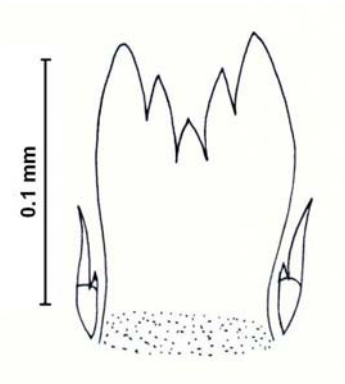
[37]. Özkan, N., "Trakya Bölgesi (Kırklareli, İstanbul ve Çanakkale) Chironomid (Chironomidae; Diptera) Türlerinin Tespiti", ***Trakya Üniversitesi Bilimsel Araştırmalar Projeleri -*** TÜBAP – 320, 17+65 sayfa (2003).

[38]. Özkan, N. ve Kırgız, T., "Edirne Bölgesi Chironomidae (Diptera) Larvaları ve Yayılışları", ***Doğa Tr. Jr. of Zoology,*** 19: 51 – 58 (1995).

[39]. Fittkau, E. J., et al. "Chironomidae, in illies, J. (ed) – Limnofauna Europeae", Stuttgart 346 – 381, (1967).

[40]. Fittkau, E. J. und Reiss. F., "Chironomidae, Limnofauna Europaea, Illies", ***J. Gustav Fischer Verlag***. Stuttgart. 404 – 440 (1978).

[41]. Demirsoy, A., "Genel ve Türkiye Zoocoğrafyası", ***Meteksan A.Ş.,*** P.K. 105, 06572 Maltepe – Ankara, 387-410 (1999).



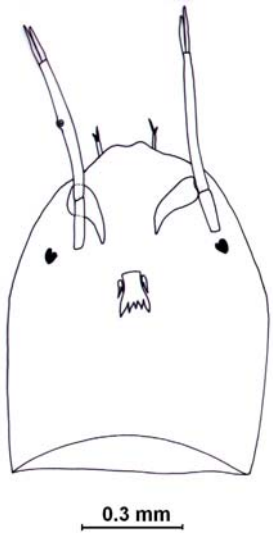
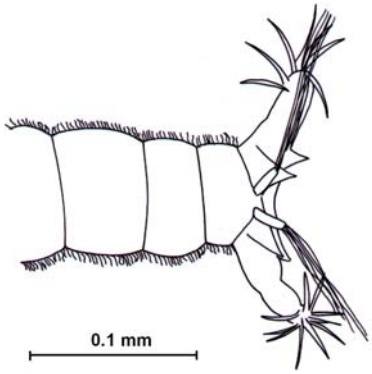


Figure 2. *Macropelopia nebulosa* (Mg**.)** (Glossa and paraglossa). **Figure 3.** *Macropelopia nebulosa* (Mg.) (the head capsule).



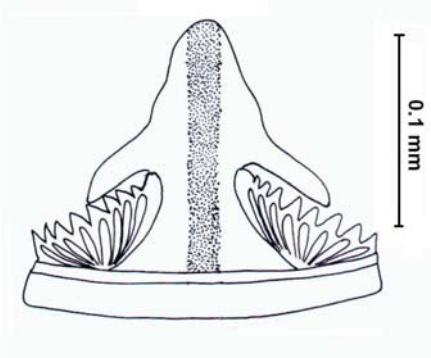


Figure 4.*Macropelopia nebulosa* (Mg.) (Last abdominal segments). **Figure 5.** *Macropelopia nebulosa* (Mg**.)** (Mentum)

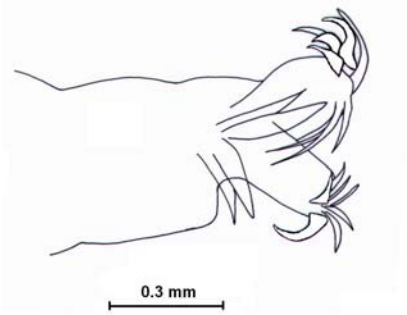


Figure 6. *Telmatopelopia nemorum* (G.) (Last abdominal segments).

Corresponding author, e-mail: nurcanozkan@trakya.edu.tr

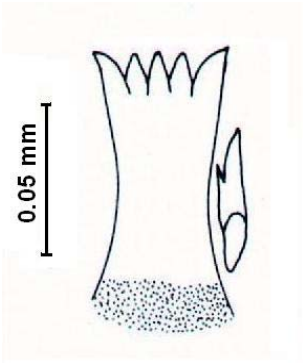


Figure 7. *Telmatopelopia nemorum*(G.) (Glossa and paraglossa).

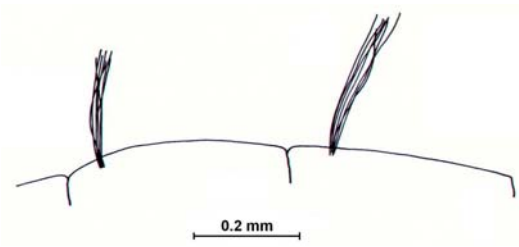


Figure 8. *Cricotopus sylvestris* (Fabr.) (Abdominal segments)**.**

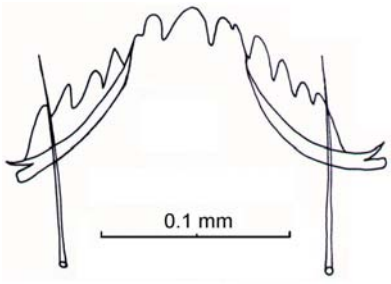


Figure 9. *Cricotopus sylvestris* (Fabr.) (Mentum)

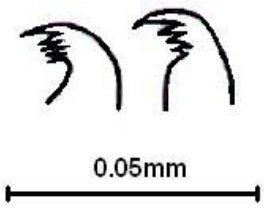


Figure 10. *Cricotopus sylvestris* (Fabr.) (Anterior foot claws**).**

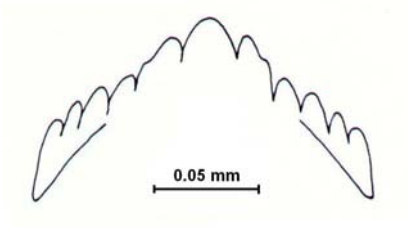


Figure 11. *Cricotopus intersectus* (Staeg.) (Mentum).

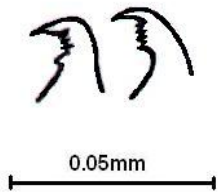


Figure 12. *Cricotopus intersectus* (Staeg.) (Anterior foot claws).

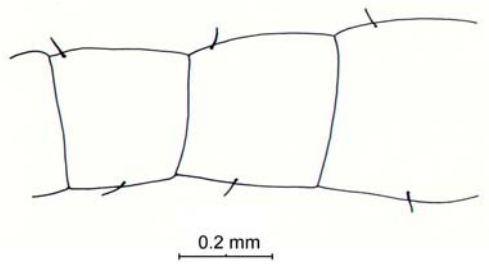
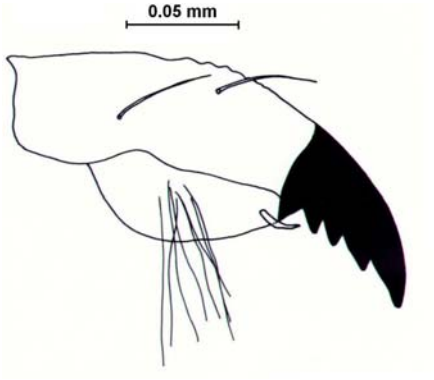


Figure 13. *Halocladius fucicola* P (Edw.) (Abdominal segments).



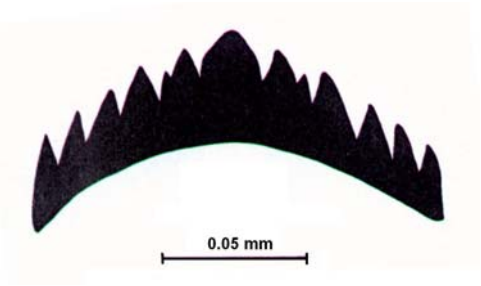


Figure 14. *Halocladius fucicola* P (Edw.) (Mandible). **Figure 15.** *Halocladius fucicola* P (Edw.) (Mentum).

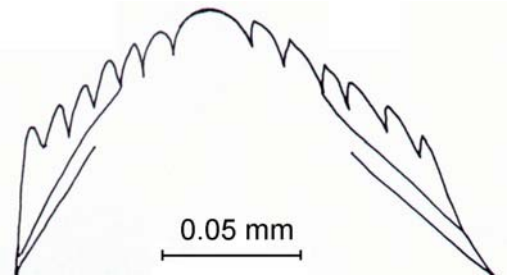


Figure 16. *Paratrichocladius rufiventris*(Mg.) (Mandible). **Figure17.** *Paratrichocladius rufiventris*(Mg.) (Mentum).

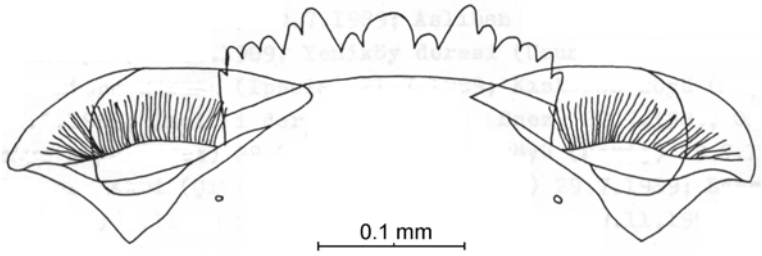


Figure 18. *Chironomus anthracinus* (Zett.) (Mentum).

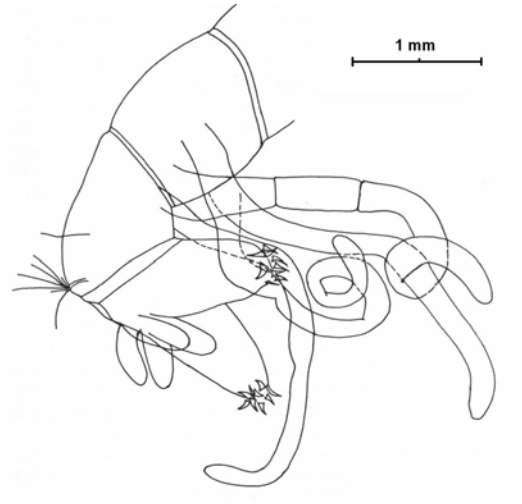


Figure 19. *Chironomus thummi* K**.** (Last abdominal segments).

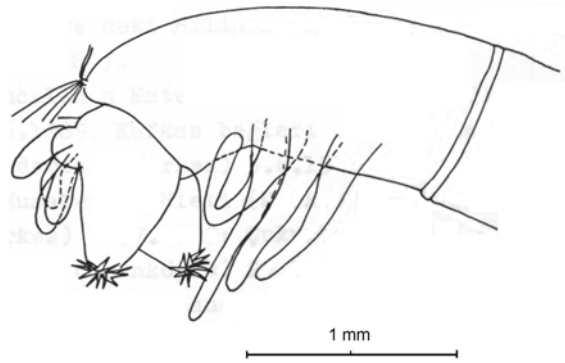


Figure 20. *Chironomus anthracinus* (Zett.) (Last abdominal segments).

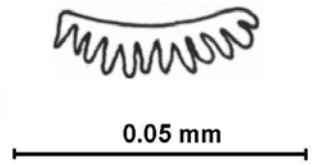


Figure 21. *Chironomus anthracinus* (Zett.) (Epipharynx scallop).

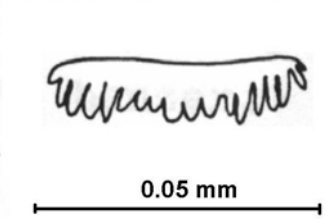


Figure 22. *Chironomus viridicollis* K. (Epipharynx scallop).

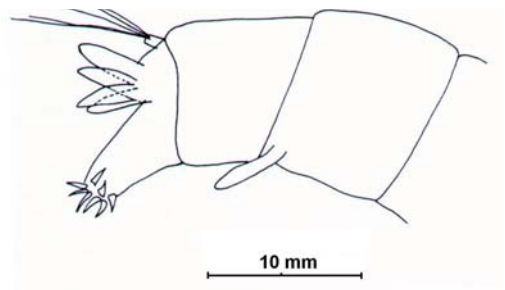


Figure 23. *Einfeldia pagana* (Mg.) (Last abdominal segments).

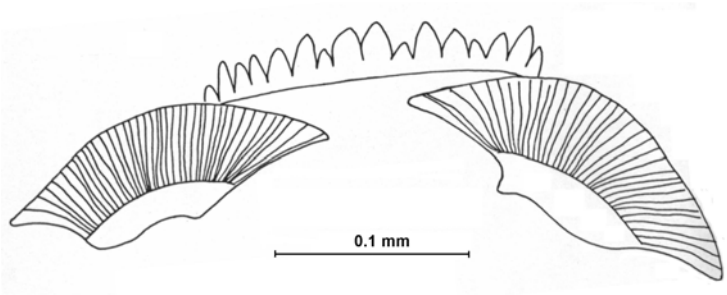


Figure 24. *Polypedilun convictum* (Walk.) (Mentum).

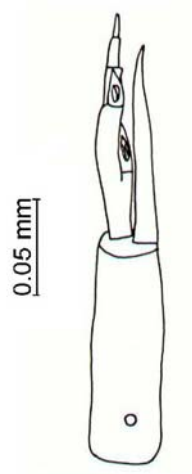


Figure 25. *Polypedilum aberrans* Tsch. (Antenna).

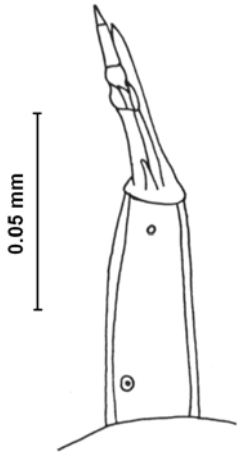


Figure 26. *Polypedilum convictum* (Walk) (Antenna).

Figure 27. *Micropsectra praecox* Mg. (Antenna).

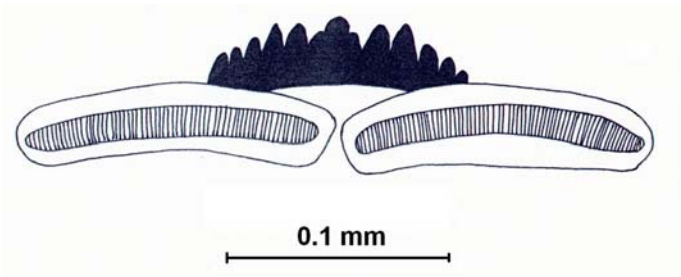


Figure 28. *Micropsectra praecox* Mg**.** (Mentum).