J. Entomol. Res. Soc., 21(1): 109-114, 2019
Print ISSN:1302-0250
Research Article
Online ISSN:2651-3579

A New Record of the Non-Biting Midge Larvae *Heterotrissocladius marcidus* (Walker, 1856) (Diptera: Chironomidae) for Turkey with Notes on Their Ecology

Gürçay Kıvanç AKYILDIZ[1]* Recep BAKIR[2] Mustafa DURAN[3]

[1,2,3]Pamukkale University, Faculty of Arts and Sciences, Hydrobiology Laboratory, Denizli, TURKEY. e-mails: *gkakyildiz@gmail.com, bkrecep@gmail.com, mduran@pau.edu.tr
ORCID IDs: [1]0000-0001-9610-8443, [2]0000-0002-5069-7745, [3]0000-0003-3981-8830

ABSTRACT

Larvae of the chironomid genus *Heterotrissocladius* and its species *H. marcidus* are recorded in Turkey for the first time. The chironomid samples were collected from natural lake Nazlıgöl in Yedigöller National Park located in the northern part of Bolu Province. Within the scope of this study nine specimens of *H. marcidus* were identified.

Key words: Diptera, Orthocladiinae, taxonomy, limnofauna.

Akyıldız, G.K., Bakır, R., & Duran, M. (2019). A new record of the non-biting midge larvae Heterotrissocladius marcidus (Walker, 1856) (Diptera: Chironomidae) for Turkey with notes on their ecology. *Journal of the Entomological Research Society,* 21(1), 109-114.

INTRODUCTION

The chironomids are the most common and abundant insect group in both aquatic and terrestrial environments. Despite the growing effort of revealing the chironomid richness in Turkey (Özkan & Ahıska, 2017; Akyıldız, Taşdemir, & Ustaoğlu 2015; Bakır, Akyıldız & Duran, 2012; Taşdemir, 2010; Arslan, Ayık, & Şahin, 2010, Arslan, & Şahin, 2006), these efforts have not yet been completed. The Turkish chironomid fauna has been studied with almost 200 species in several running and still waters so far (Akyildiz, 2013; Bakır, 2012; Çağlar & İpekdal, 2004). *Heterotrissocladius* (Spärck, 1923), which has not been yet reported in Turkey, is a genus of non-biting midges in the subfamily Othocladiinae of the bloodworm family Chironomidae. So far the most comprehensive work has been done by Saether (Saether, 1975). It is known that larval *Heterotrissocladius* (Spärck, 1923) occurs in lakes (littoral to profundal), ponds, puddles, and in all sizes of flowing waters (Cranston et al, 1983). The genus is Holarctic, with up to 15 species. With this study, both a new record of the genus *Heterotrissocladius* (Spärck, 1923) has been reported for Turkey and a new contribution has been made to the ecological preferences of the new record species *H. marcidus* (Walker, 1856) from Turkey.

MATERIAL AND METHODS

Nine specimens were collected from lake Nazlıgöl (40.937748° N, 31.741877° E) which is one of the natural ponds of Yedigöller National Park located in the northern part of Bolu Province. The lake is located within the national park protection area. Chironomidae larvae were collected by using a hand net (500µm mesh size) in August 2014. The samples were preserved in 70% ethanol and sorted to morphotypes under the stereomicroscope. Species identification was performed by using a binocular microscope at high magnification (40x and 100x objectives). Larval stages of chironomids were decided to follow Schmid (1993). Euparal was used in the current study to obtain permanent slides. The required equipment and the mounting media are described in Epler (2001). The preparations are stored in the laboratory archives. Photograph images showing morphological characters were taken with using a camera and measurements and comparisons could be made. The software ImageJ (Schneider, Rasband & Eliceiri, 2012) was used to measure body parts. The identification up to the species level was done with the aid of the taxonomic keys of Saether (1975), Cranston et al, (1983), Klink & Moller-Pillot (2003) and some other taxonomic descriptions. In general the terminology follows Saether (1971, 1974).

RESULTS

In the following description the measurements are given as ranges followed by a mean value when four or more measurements have been taken, followed by a number in parentheses giving the number measured (n). The fourth instar larvae were taken into consideration for the measurements and proportions in the diagnosis. Antenna, labrum, mandible, mentum, maxilla and body are used in the description of the genus and the species (Fig. 1).

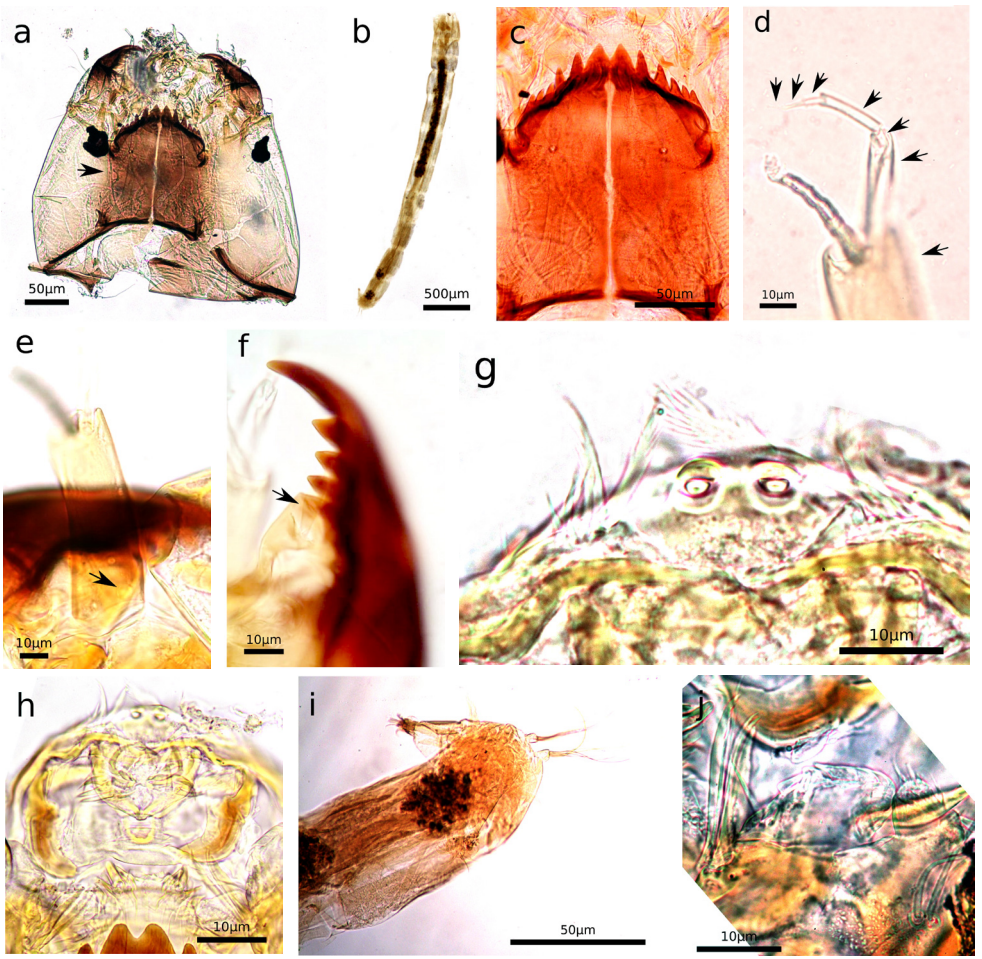

Fig. 1. *Heterotrissocladius marcidus* a. Head capsule, b. Thorax, abdomen c. Mentum, d. Antennal segments, e. Ring organ, f. Mandible, seta subdentalis, g. Labral lamella and SI, h. Labral lamella and premandibles, i. posterior parapods, anal setae, j. Maxillary palp.

Larva: The coloration of the body is yellowish brown and with brownish black submentum which is conspicuously darker than the surrounding areas of the head capsule. The head capsule width is about 430 µm (9). The mean body length of the larvae is measured as 6.20 mm (8). Procercus is well developed. Anal tubules are shorter than posterior parapods. Body setae are inconspicuous.

Antenna: Antenna with 7 segments. Segment lengths are not distributed in an hierarchical order. The third and the seventh segments should be considered in diagnosis. The third segment is the shortest segment, and the seventh segment is hair-like and vestigial. The ratio of the length of the basal antennal segment divided by the length of the combined apical segments (AR) is 1.18 (6). Basal antennal

segment 3.1 (6) times as long as wide. Ring organ placed in basal ¼ of the first segment. Blade is shorter than segment four and the length is 40µm (3) at the apex. Lauterborn organs are absent.

Labrum: Labral lamella is present and apically rounded. SI is in a plumose form. Horse shaped basal sclerite of ungula is well developed. Pecten epiharyngis is weakly sclerotised and consisting of 3 serrated scale-like spines. Chaetulae laterales are simple. Premandible is bifid, without a brush and 72µm (6) long and 16.5µm (6) wide.

Mandible: The coloration of the mandible is dark brown. Mandible is with 3 inner teeth. Apical tooth is relatively shorter than the combined width of inner teeth. The inner teeth are in the same order and size. The ratio of the length of the apical tooth divided by the length of the combined inner teeth is 0.95 (6). Seta interna is present with 6-7 plumose branches. Seta subdentalis is 18µm (6) relatively long, extending beyond the first inner tooth and several seta-like toothlets bearing at its basis.

Mentum: The colouration of the mentum is dark as it is in mandibles. Mentum is with two median teeth and it is extending beyond the apex of the first lateral tooth. The first and second lateral teeth distinctly longer than the outer three laterals. Median tooth width is about 20µm (8) and it is about twice as broad as first lateral tooth. Ventromental plate bulbous at the apex and protruding outside the line of teeth and its width is about 25µm (8). Beard is absent. Distance between two seta submenti is about 80µm (8).

Maxilla: Maxilla with broad anterior lacinial chaeta. Chaetulae of palpiger and 2 seta maxillaris are visible. Pecten galearis is present with distinct teeth. Maxillary palp is relatively short, the ratio of the length to the width is about 1.06 (6).

DISCUSSION AND CONCLUSION

H. marcidus (Walker, 1856) is a common species that can be considered as spreading in the Nearctic and Palearctic regions and its larvae are among the most common chironomids in alpine and subalpine lakes (Goffova, Bitusik, Ciamporova-Zatovicova, Bukvova, & Hamerlik, 2015; Mousavi & Amundsen, 2012; Lods-Crozet, Oertli, & Robinson, 2012; Saether, 1975). However, it had not been reported from Turkey before. Through this study, the larvae of chironomid genus *Heterotrissocladius* (Spärck, 1923) and its species *H. marcidus* (Walker, 1856) were identified and presented in Turkey for the first time. The measurements and the ratios are also given in the study. In addition, the region, where the larvae were identified, is very important for understanding the ecological preferences of the species. Lake Nazlıgöl is located between Bolu-Zonguldak provinces and between the forests of Western Black Sea. The highest elevation in the region is 1488 m a.s.l. and the lowest level is 465 m a.s.l., while Nazlıgöl is located at 878 m a.s.l. altitude in that region where the Black Sea climate dominates. The lake is fed only by the Black Creek, and various organic materials are carried by the falling rain and snow waters. Kazanci & Türkmen (2008) have reported that the water quality of this region is in I-II quality class and the lake is in the mesotrophic condition. Although not in terms of altitude,

considering the ecological characteristics of the habitat where *H. marcidus* (Walker, 1856) was found, it overlaps with the water quality and ecological characteristics of several studies (Moubayed-Breil, Ashe, & Langton, 2012; Rieradevall, Chave & Prat, 2007; Goffova et al, 2015) and it is known that food quality and quantity can be more important than the direct effect of temperature on larval growth (Anderson & Cummins, 1979). Therefore, we are able to say that the ecological preferences of this species such as nutrient and environmental conditions are more effective than the effects of altitude.

This study contributes to the Turkish limnofauna by introducing the new record genus *Heterotrissocladius* (Spärck, 1923) and the species *H. marcidus* (Walker, 1856). It is obvious that *H. marcidus* (Walker, 1856) can be widely collected in Turkey with more detailed field studies. It is also possible that the other *Heterotrissocladius* (Spärck, 1923) species are distributed in Turkey.

REFERENCES

Akyıldız, G. K. (2013). Türkiye'nin bazı göllerinde subfossil chironomidae-sıcaklık ilişkisi kullanılarak transfer fonksiyon modelinin geliştirilmesi. Pamukkale Üniversitesi Fen Bilimleri Enstitüsü, Doktora Tezi, 271.

Akyıldız, G., Taşdemir, A., & Ustaoğlu, M. (2015). *Paracladius alpicola* (Zetterstedt, 1850), A new Chironomid species for the Turkish limnofauna. *Journal of the Entomological Research Society, Journal of Entomological Research Society,* 17(3), 69-73.

Anderson, N.H. & Cumming, K.W. (1979). Influences of diet on the life histories of aquaitc insects. *Journal of the Biological Board of Canada*, 36(3), 335-342.

Arslan, N., Ayık, Ö., & Şahin, Y. (2010). Diversity and structure of Chironomidae (Diptera) limnofauna of lake Uluabat, a Ramsar site of Turkey, and their relation to environmental variables. *Turkish Journal of Fisheries and Aquatic Sciences*, 10(3), 315-322.

Arslan, N. & Şahin, Y. (2006). A preliminary study on the identification of the littoral Oligochaete (Annelida) and Chironomidae (Diptera) fauna of lake Kovada, a national park in Turkey. *Turkish Journal of Zoology*, 30(1), 67-72.

Bakır, R. (2012). Türkiye'nin bazı önemli göllerinde Chironomidae (Insecta: Diptera) faunasının araştırılması, Pamukkale Üniversitesi Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi, 159.

Bakır, R., Akyıldız, G.K., & Duran M. (2012). A new chironomid genus from Gerede (Bolu, Turkey); *Phaenopsectra* Kieffer, 1921 (Diptera, Chironomidae). *Journal of Entomological Research Society*, 14(1), 53-57.

Çağlar, S.S., İpdekdal, K. (2004). Revised Chironomidae checklist of Turkey. DOI: 10.13140/RG.2.1.1607.5288

Cranston, P.S., Oliver, D.R., & Saether, O.A. (1983). *The larvae of Orthocladiinae (Diptera: Chironomidae) of the Holarctic region - . Keys and diagnoses. In: Wiederholm, T. (ed.), Chironomidae of the Holarctic region. Keys and diagnoses.* Entomologica Scandinavica, 19, 149-291.

Epler, J.H. (2001). *Identification manual for the larval Chironomidae (Diptera) of north and south Carolina. A guide to the taxonomy of the midges of the Southeastern United States, Including Florida*. Special Publication SJ2001-SP13, North Carolina Department of Environment and Natural Resources, Raleigh, NC, and St. Johns River Water Management District, Palatka, FL., 526.

Goffova, K., Bitusik, P., Ciamporova-Zatovicova, Z., Bukvova, D., & Hamerlik, L. (2015). Seasonal dynamics and life cycle of Heterotrissocladius marcidus (Diptera: Chrionomidae) in high altitude lakes (High Tatra Mts, Slovakia), *Biologia*, 70(7), 943-947.

Kazancı, N. & Türkmen G. (2008). Using of Ephemeroptera species as indicators to determine the habitat properties of the streams in a protected area and the borders of that area, E.U. *Journal of Fisheries & Aquatic Sciences*, 25(4), 325-331.

Klink, A.G. & Moller-Pillot, H.K.M. (2003). *Chironomidae larvae. Key to the Higher Taxa and Species of the Lowlands of Northwestern Europe. World Biodiversity Database, CD-ROM Series*. Expert Center for Taxonomic Identification, University of Amsterdam.

Lods-Crozet B., Oertli B. & Robinson C.T. (2012). Long-term patterns of chironomid assemblages in a high elevation stream/lake network (Switzerland) Implications to global change. Fauna Norvegica 31, 71-85.

Moubayed-Breil, J., Ashe P., & Langton, H. (2012). *Stygocladius multisetosus* gen. nov., sp. nov., a rheophilic element inhabiting basaltic and karstic helocrenes in France and Algeria (Diptera: Chironomidae). *Fauna Norvegica*, 31, 175-182.

Mousavi, S.K. & Amundsen, P.A. (2012). Seasonal variations in the profundal Chironomidae (Diptera) assemblage of a subarctic lake. *Boreal Environmental Research,* 17, 102-112.

Özkan, N. & Ahıska S. (2017). A new larval record of *Demicryptochironomus* Lenz, 1941 (Diptera, Chironomidae) for the Turkish fauna. *Turkish Journal of Zoology*, 41, 181-184.

Rieradevall,M., Chave,s M.L., & Prat, N. (2007). High altitude chironomidae (Diptera) of Serra Da Estrela (Protugal): additions to the Portugese and Iberian peninsula fauna. *Graellsia*, 63(2), 273-278.

Saether, O.A. (1971). Notes on general morphology and terminology of the Chironomidae (Diptera). *Canadian Entomology*, 103, 1237-1260.

Saether, O.A. (1974). Morphology and terminology of female genitalia in Chironomidae (Diptera). *The Entomologisk Tidskrift*, 95, Suppl. 216-233.

Saether, O.A. (1975). Neartic and Palaearctic *Heterotrissocladius* (Diptera: Chironomidae). *Bulletin of the Fisheries Research Board of Canada*, 193, 1-67.

Schmid, P.E. (1993). *A key to the larval Chironomidae and their instars from Austrian Danube region streams and rivers with particular reference to a numerical taxonomic approach. Part I. Diamesinae, Prodiamesinae and Orthocladiinae*. Wasser und Abwasser, Suplementary, 3/93, 1-514.

Schneider, C.A., Rasband, W.S., & Eliceiri, K.W. (2012). NIH image to ImageJ: 25 years of image analysis. *Nature Methods*, 9(7), 671-675.

Taşdemir, A. (2010). *Clunio* Haliday, 1855: A new chironomid genus for Turkey (Diptera, Chironomidae). *Journal of Entomological Research Society*, 12(3), 39-43.

Received: January 23, 2018 *Accepted: January 23, 2019*