TÜBİTAK

Turkish Journal of Zoology

http://journals.tubitak.gov.tr/zoology/

Short Communication

Turk J Zool
(2018) 42: 113-117
© TÜBİTAK
doi:10.3906/zoo-1705-56

Cryptochetidae (Diptera): first record of the family from Turkey

László PAPP[1], Miroslav BARTÁK[2,*], Štěpán KUBÍK[2], Hasan S. CİVELEK[3]

[1]Beremend u. 43, Budapest, Hungary
[2]Department of Zoology and Fisheries, Faculty of Agrobiology, Food, and Natural Resources, Czech University of Life Sciences, Prague, Czech Republic
[3]Department of Biology, Faculty of Science, Muğla Sıtkı Koçman University, Muğla, Turkey

Received: 17.06.2017 • **Accepted/Published Online:** 28.10.2017 • **Final Version:** 10.01.2018

Abstract: The first record of the family Cryptochetidae is given from Turkey. *Cryptochetum grandicorne* and *C. jorgepastori* were found in Turkey. Four original figures are presented.

Key words: Diptera, *Cryptochetum*, taxonomy, Turkey, Palearctic Region

The species of the small family Cryptochetidae are little known (McAlpine, 1987; Pitkin, 1989; Nartshuk, 2000). Most of its representatives are know from the Old World tropics as 30 described species in the genus *Cryptochetum* have been described from the Old World (the relegation of the genus *Librella* McAlpine, 1976 to Cryptochetidae is rather questionable).

Cryptochetidae is a family of the higher flies, ptilinal suture and lunule present (being a family of Muscomorpha); eye very large and pubescent (consequently gena very narrow); ocelli present, first flagellomere large, arista not developed; proboscis and palpus short; scutellum large, convex, scutellar setae mostly not developed but scutellar surface short setose; greater ampulla not developed, lower calypter very small; coxae of fore and mid legs not widely separated; tarsal claws simple, legs without characteristic setae.

Good characterizations for the family were given by Hennig (1937), McAlpine (1987), and Nartshuk (2000). McAlpine (1989) classified them as a family of the superfamily Carnoidea, which we think is correct (see also Griffiths, 1972).

The larvae of cryptochetids are parasitoids (endoparasitic) of various scale insects of the subfamily Monophelebinae (Coccidae: Margarodidae) (Thorpe, 1930, 1934, 1941a, 1941b; Menon, 1950; Foote and Arnaud, 1958; Mendel et al., 1998, etc.), both as solitary and gregarious parasites. Larvae of some species are well known (Hennig, 1937; Cahadia, 1984, etc.).

In the Palearctic Region the following six species are known (Nartshuk, 1984, 2000):

Cryptochetum buccatum Hendel, 1933
Cryptochetum grandicorne Rondani, 1875
Cryptochetum jorgepastori (Cadahia, 1984)
Cryptochetum mineuri Séguy, 1953
Cryptochetum smaragdinum Séguy, 1948
Cryptochetum turanicum Nartshuk, 1979

The emergence of another widely distributed and frequently introduced species, *Cryptochetum* (*Lestophonus*) *iceryae* (Williston, 1888), introduced also to the New World (McAlpine, 1987), should be taken into consideration when working on cryptochetid material from the Palearctic region. We do not list here *Cryptochetum* species from China and Japan; rather, we refer to the book chapter of Yang and Yang (1998: 97) and to the paper of Yuqiang and Yang (2015).

Together with the species of *Cryptochetum ghanii* Steyskal, 1971 (p. 48), which was omitted from the catalog, and including the recently described species, a total of 30+ species have been described hitherto.

The cryptochetids are mostly seldom collected; Foote and Arnaud (1958) witnessed one of the few exceptions. Twenty specimens are preserved in the Collection of the Czech University of Life Sciences, Prague (Czech Republic, below CULSP), including the specimens from Turkey in the present paper. Ninety-seven cryptochetid specimens are preserved in the Diptera Collection, Hungarian Natural History Museum (Budapest) (below HNHM).

Cryptochetum grandicorne Rondani, 1875

Known from its type locality (vicinity of Parma, Italy), some other localities in Italy (Süss, 1984), from France,

* Correspondence: bartak@af.czu.cz

Crete, and Algeria (Hennig, 1937, etc.). Its records from Japan and Taiwan are based on misidentifications.

Material studied: 1 male (HNHM, glued on a small card with an almost illegible label, which was transcribed by the first author in about 1980): "*Cryptochaetum grandicorne* Rond. parasite de *Guerinia serratulae*, Europe, Afrique". We simply do not know anything about the origin of the specimen. We may presume that it was captured and labeled prior to the description of *C. buccatum* Hendel, 1933, so we felt prompted to corroborate its species identity and listed this record herewith. Another 1 male (CULSP, abdomen with genitalia prepared and kept in a plastic microvial with glycerol): Turkey mer. Nur Dağlari Mts. 30 km E Osmaniye Hasanbeyli 1200 m, B. Mocek, 5.5.1996. New for the fauna of Turkey.

The excellent figures on male genitalia by Süss (1984: figs. 4 and 5) fixed the status of this species correctly. The genitalia of our specimen from Turkey are the same in details as Süss's from Italy.

Cryptochetum jorgepastori Cahadia, 1984

It was described from Spain (as *Cryptochaetum*), type locality Punta Umbria (Huelva), and found also at Cabrils, Barcelona (Carles-Tolrá, 1992), known from Andorra (Carles-Tolrá and Pujade-Villar, 2003), and from Israel (Mendel et al., 2008).

Material studied: 7 males (6 males in CULSP, 1 male in the HNHM): Turkey, Muğla, University Campus, 710 m, MT, 37°09′39″N, 28°22′20″E, Barták, Kubík, xi–iii.2013; 1 male (CULSP): ibid., Muğla, Univ. Campus, 720 m, MT, 2015, 37°09′42″N, 28°22′13″E, 26.vi–3.iii; 1 female (CULSP): Muğla, 700 m, Univ. Campus, Malaise tr. 37°09′42″N, 28°22′21″E, O. Dursun, v. 2013. New for the fauna of Turkey.

The genitalia of our specimen from Turkey are obviously the same as given in the original description but those figures are poor. In order to facilitate a safer and quicker identification, we made four figures of the male genitalia from the present material.

Body characteristics as in *C. grandicorne*, except for those mentioned in the key. Male genitalia with epandrium strongly narrowed dorsally (Figure 1), epandrium actually consists of two halves, dorsally connected only by membrane (Figure 2). Surstyli short, symmetrical, quadratic with some medium-long apical setae. Hypandrium (Figure 3) broad L-shaped in profile, its ventral part with small elliptic white spots (they are without emerging setulae). Pre- and postgonites partly fused to hypandrium (Figure 3). Phallus very thin, curved along a broad arch, apex sharp. Basiphallus compact. No phallic guide (*x* of Süss, 1984: figs. 4 and 5) discernible. Phallapodeme broad, oval in dorsal view (Figure 4), circular with rather thin walls. Female piecing ovipositor (sternite 8, see McAlpine, 1987) long, very thin, apex sharp.

A key for the identification of *Cryptochetum* Rondani species from Turkey

1. Male epandrium broad also dorsally, surstyli asymmetrical (Süss, 1984: figs. 4 and 5). Male cercus much shorter than the height of epandrium-surstylar complex. Inner genitalia with distinct phallic guide (Süss, 1984: fig. 4), phallic apodeme narrow. .... *C. grandicorne* Rondani, 1875

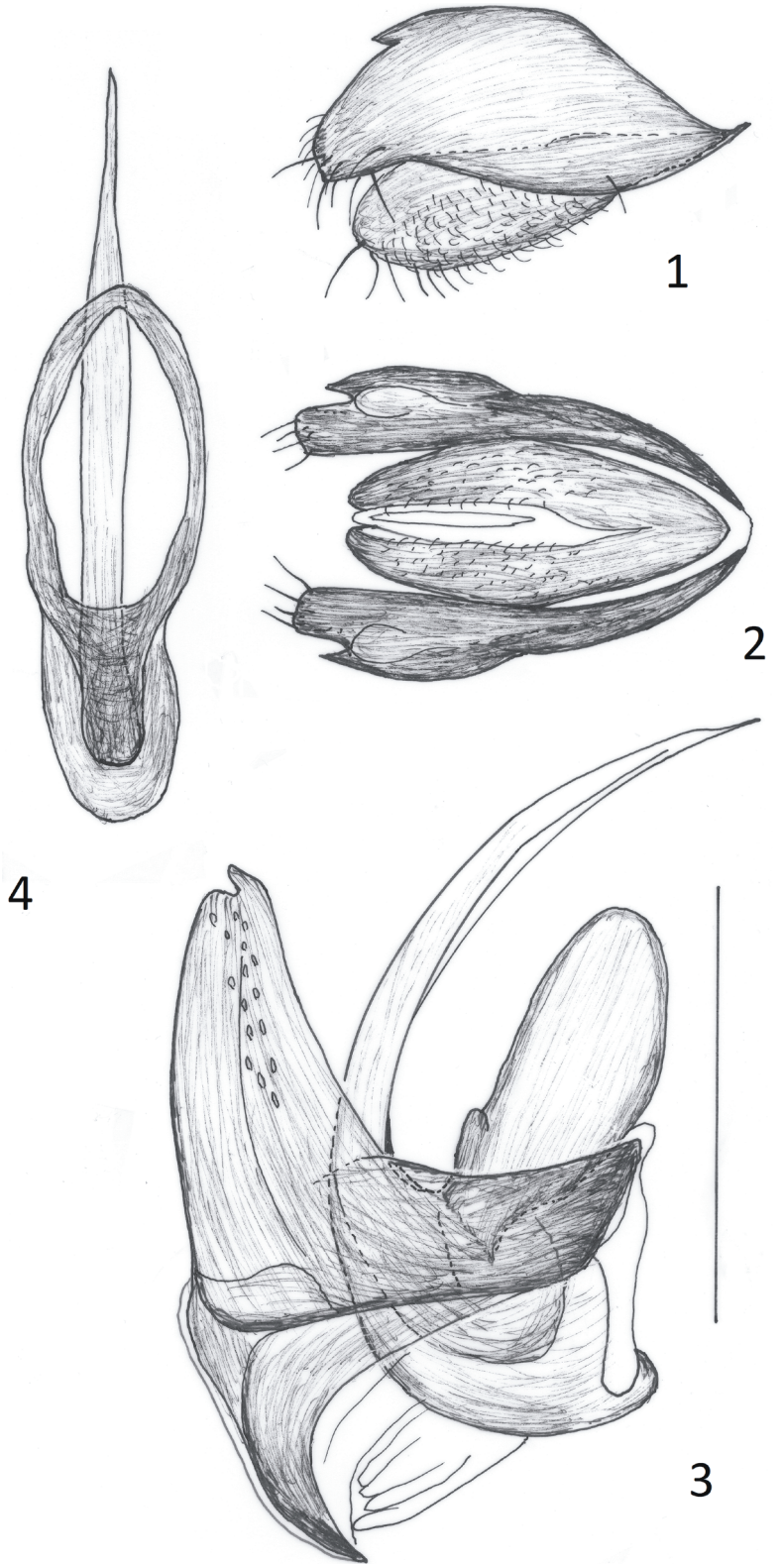
- Male epandrium strongly narrowed dorsally, surstyli symmetrical (Figures 1 and 2). Male cercus almost as high as epandrium-surstylar complex. Inner genitalia (Figure 3) without a phallic guide, phallic apodeme broad (Figure 4). ..... *C. jorgepastori* Cahadia, 1984

The Dipteran fauna of Turkey remains still unsatisfactorily explored. Altogether 2992 Diptera species, belonging to 963 genera and 72 families, were listed by Koçak and Kemal (2013). Species of Cryptochetidae family have actual or potential importance in biological control of scale insect pests (Mendel and Blumberg, 1991; Bennett, 1993; Mendel et. al., 1998). First records of the family Cryptochetidae from Turkey are given. Two species of the family are first recorded from Turkey.

Cryptochetum buccatum Hendel, 1933 has been known from Germany from its type locality (Carolinenhof bei Grünau, nr. Berlin), from some localities of Spain (Carles-Tolrá, 1990, 1992, 1993), and from Andorra (Carles-Tolrá and Pujade-Villar, 2003). It is expected to occur also in Turkey. This species may be differentiated from the two above ones by the first flagellomere three times as long as broad (see Hennig, 1937: figs. 96, 98) and the second costal section on wing three times as long as fourth section (see Hennig, 1937: fig. 99). On the contrary, in two species hitherto known from Turkey, the first flagellomere is only slightly more than twice longer than broad (Cahadia, 1984: figs. 4d, 5) and the second costal section at most twice as long as fourth section (Hennig, 1937: fig. 100; Cahadia, 1984: fig. 6).

Several species of the Cryptochetidae belong to that minority of the Diptera for which the life-habits are rather well known. Contrarily, the cryptochetids are seldom collected. In the otherwise rich collection of the HNHM there are only 97 cryptochetid specimens. For instance, we found only four specimens among the 15,000 specimens collected in Thailand. There may be numerous undescribed species, particularly from the Oriental and Afrotropical regions.

Application of Malaise traps seems to be a good method for their collection but this method also does not yield many specimens. The best known cryptochetid fauna in Europe is that of Spain's, but we think the above three species must occur also in some other European countries.



Figures 1–4. *Cryptochetum jorgepastori* Cahadia, male genitalia. 1 = Epandrium, cercus, and surstylus, left lateral view; 2 = epandrium, cerci, and surstyli, caudal view; 3 = inner genitalia, lateral view; 4 = phallus and phallapodeme, dorsal view. Scale bar: 0.2 mm for Figures 1 and 2, 0.1 mm for Figures 3 and 4.

Acknowledgments
This paper was supported by an S grant of MSMT (Ministry of Education, Sports and Youth, Czech Republic). We are grateful to Dr Ashley Kirk-Spriggs (South Africa) for advice and information on Cryptochetidae and for sending us the unpublished MS for the Afrotropical Manual. Our thanks are extended to Mr Zoltán Soltész (Hungarian Natural History Museum) for editing figures. We are grateful to the two reviewers for their considerable help and advice.

References

Bennett FD (1993). Do introduced parasitoids replace native ones? Fla Entomol 76: 54-63.

Cadahia D (1984). El interés biológico del género *Cryptochaetum* Rond. Diptera, Cryptochaetidae y descripción de una nueva especie. Boletín del Servicio de plagas forestales 10: 159-184 (in Spanish).

Carles-Tolrá M (1990). Contribúción al estudio de los Diptera, Cyclorhapha, Acalyptratae (Insecta) de Espaňa peninsular. PhD, University of Barcelona, Barcelona, Spain.

Carles-Tolrá M (1992). New and interesting records of Diptera Acalyptrata from Spain. Part I: Acartophthalmidae, Opomyzidae, Anthomyzidae, Asteiidae, Carnidae, Tethinidae, Milichiidae and Cryptochetidae. Bulletin & Annales de la Société entomologique de Belgique 128: 343-353.

Carles-Tolrá M (1993). Algunas especies de dípteros nuevas o interesantes para Espaňa peninsular (Diptera, Acalyptratae). Boletín de la Asociación española de Entomología 17: 9-18 (in Spanish).

Carles-Tolrá M, Pujade-Villar J (2003). Citas nuevas de dipteros para la Peninsula Ibérica y Andorra (Diptera: Orthorrhapha y Cyclorrhapha). Boletín de la Asociación española de Entomología 32: 169-177 (in Spanish).

Foote RH, Arnaud PH (1958). Notes on the taxonomy and habits of Cryptochaetum nipponense (Tokunaga) in Japan (Diptera: Cryptochaetidae). P Entomol Soc Wash 60: 241-245.

Griffiths GCD (1972). The Phylogenetic Classification of Diptera Cyclorrhapha with Special Reference to the Structure of the Male Postabdomen. The Hague, the Netherlands: Dr. W. Junk N.V.

Hendel F (1933). Über das Auftreten der in Schildlausen parasitisch lebenden Dipteren-Gattung Cryptochaetum in Deutschland. Z Pflanzenk Pflanzen 43: 241-245 (in German).

Hennig W (1937). 60a. Milichiidae and Carnidae. In: Lindner E, editor. Die Fliegen der palaearktischen Region, Vol. 6(1). Stuttgart, Germany: Schweizerbart'sche, pp. 1-91.

Koçak AÖ, Kemal M (2013). Diptera of Turkey. Priamus Suppl 28: 1-411.

McAlpine DK (1976). A new genus of flies possibly referable to Cryptochetidae (Diptera, Schizophora). Australian Entomological Magazine 3: 45-56.

McAlpine JF (1987). 100. Cryptochetidae. In: McAlpine JF, editor. Manual of Nearctic Diptera. Volume 2. Ottawa, Canada: Research Branch, Agriculture Canada, pp. 1069-1072.

McAlpine JF (1989). 116. Phylogeny and classification of the Muscomorpha. In: McAlpine JF, editor. Manual of Nearctic Diptera. Volume 3. Ottawa, Canada: Research Branch, Agriculture Canada, pp. 1397-1518.

McAlpine JF, Thompson FC (2011). 90. Cryptochetidae (cryptochetid flies). In: Brown BV, Borkent A, Cumming JM, Wood DM, Woodley NE, Zumbado MA, editors. Manual of Central American Diptera. Volume 2. Ottawa, Canada: NRC Research Press, pp. 1121-1123.

Mendel Z, Assael F, Zeidan S, Zehavi A (1998). Classical biological control of Palaeococcus fuscipennis (Burmeister) (Homoptera: Margarodidae) in Israel. Biol Control 12: 151-157.

Mendel Z, Blumberg D (1991). Colonization trials with *Cryptochetum iceryae* and *Rodolia iceryae* for improved biological control of *Icerya purchasi* in Israel. Biol Control 1: 68-74.

Menon MGR (1950). A review of our knowledge of the genus *Cryptochaetum* Rondani, an interesting group of dipterous scale-parasites. Indian Journal of Entomology 11: 1-8.

Nartshuk EP (1984). Family Cryptochetidae. In: Soós Á, Papp L, editors. Catalogue of Palaearctic Diptera. Clusiidae—Chloropidae. Volume 10. Budapest, Hungary: Akadémiai Kiadó, pp. 67-68.

Nartshuk EP (2000). A.8. Family Cryptochetidae. In: Papp L, Darvas B, editors. Contributions to a Manual of Palaearctic Diptera (With Special Reference to Flies of Economic Importance). Appendix. Budapest, Hungary: Science Herald, pp. 345-353.

Pitkin BR (1989). 101. Family Cryptochetidae. In: Evenhuis NL, editors. Catalog of the Diptera of the Australasian and Oceanian Regions. Honolulu, HI, USA: Bishop Museum Press, p. 666.

Pont AC, Xue WQ (2007). The publication data of "Flies of China". Studia Dipterologica 14: 159-160.

Rondani C (1875). Species italicae ordinis Dipterorum (Muscaria Rndn.) collectae et observatae a prof. Camillo Rondani. Bolletino della Società italiano 7: 166-191.

Steyskal GC (1971). The subgenus *Tritolestes* Ghesquière of the genus *Cryptochetum* Rondani with a new species from Pakistan (Diptera: Cryptochetidae). P Entomol Soc Wash 73: 48-51.

Süss L (1984). Cryptochaetidae e Odiniidae nella collezione M. Bezzi al Museo Civico di Storia Naturale di Milano. Atti della Società italiano di science naturali, e del Museo civico di storia natural di Milano 125: 3-10.

Thorpe WH (1930). The biology, post-embryonic development, and economic importance of *Cryptochaetum iceryae* (Diptera, Agromyzidae) parasitic on *Icerya purchasi* (Coccidae, Monophlebini). P Zool Soc Lond 1930: 929-971.

Thorpe WH (1934). The biology and development of *Cryptochaetum grandicorne* (Diptera), an internal parasite of *Guerinia serratulae* (Coccidae). Q J Microsc Sci 77: 273-304.

Thorpe WH (1941a). A description of six new species of the genus *Cryptochaetum* (Diptera - Agromyzidae) from East Africa and East Indies; together with a key to adults and larvae of all known species. Parasitology 33: 131-148.

Thorpe WH (1941b). The biology of Cryptochaetum (Diptera) and *Eupelmus* (Hymenoptera) parasites of *Aspidoproctus* (Coccidae) in East Africa. Parasitology 33: 149-168.

Yang CK, Yang CQ (1998). Cryptochetidae. In: Xue WQ, Chao CM, editors. Flies of China. Vol. 1 ("1996"). Shenyang, China: Liaoning Science and Technology Press, pp. 224-233.

Yuqiang Xi, Yang D (2015). Three new species of *Cryptochetum* Rondani from China (Diptera, Cryptochetidae). T Am Entomol Soc 141: 80-89.