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Research Article

A contribution to the knowledge of the Orgilini-fauna (Hymenoptera, Braconidae, Orgilinae) of Türkiye with the description of a new species

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Abstract

The specimens of Orgilini were collected from six provinces of Turkey using light traps and sweeping nets. One species of the genus *Microtypus* Ratzeburg, 1848; *Microtypus wesmaelii* Ratzeburg, 1848; and three species of the genus *Orgilus* Haliday, 1833, were recorded, viz., *Orgilus (Orgilus) obscurator* (Nees, 1812); *O. (O.) parvipennis* Thomson, 1895, and *O. (O.) pimpinellae* Niezabitowski, 1910. Additionally, a new species, Beyarslan & Çulcu **sp. n.,** is identified in this study. The new species is described and illustrated.

Keywords: Braconidae, Türkiye, new species, Orgilini, microlepidoptera
ZooBank: urn:lsid:zoobank.org:pub:DCE5E4E6-E20E-476B-844E-9AE1231233E2

Introduction

Members of the small subfamily Orgilinae Foerster, 1863 (Hymenoptera: Braconidae) are comparatively rarely collected, and little is known about their biology. As far as known, all species are solitary koinobiont endoparasitoids, mainly in concealed lepidopteran larvae (Shaw & Huddleston, 1991). The subfamily is subdivided into three tribes: Antestrigini van Achterberg, 1987 (neotropical), Mimagathidini Enderlein, 1905 (neotropical, including Central America and the southern U.S.A., Afrotropical, Indo-Australian, Northeastern Palaearctic), and Orgilini Ashmead, 1900 (cosmopolitan) (van Achterberg et al., 2017; Yu et al., 2016). *Orgilini* Ashmead, 1900, is a small tribe that consists mainly of 8 genera with 265 valid species, all of which occur in the 237 countries of the Afrotropical, Australasian, Nearctic, Neotropical, Oceanic, Oriental, and Palaearctic regions (Braet & Quicke, 2004; Yu et al., 2016). The species of Orgilini contain species attacking the 191 species of lepidopterans, especially microlepidopteran larvae, with a partly endophytic way of life, especially those with leaf-mining or tunnelling early instar larvae. The knowledge of Orgilinae in Türkiye is limited. The first information about Orgilinae from Türkiye was given by Achterberg (1985), who described a new genus, *Kerorgilus*. The first detailed faunistic study of the Orgilinae fauna was conducted by Beyarslan (1996, 2011, 2015). He reported a total of 19 species, two of which were described as new species (*Orgilus (Orgilus) dilleri* Beyarslan, 1996, and *O. (O.) elazigensis* Beyarslan, 2011). Beyarslan et al. (2013) reported two species, and Beyarslan and Çetin

Erdoğan (2011) recorded 10 species, including *O. (O.) radialiformis* Beyarslan, which has been identified as a new species. Güçlü and Özbek (2015) conducted a study in the Northeast Anatolian Region of Türkiye and a total of 15 Orgilinae species were determined. These four species were collected from different localities in Türkiye as a new record, and a new species has also been described.

In this study, four nominal species and one new species were described belonging to the genera *Microtypus* and *Orgilus*. By the way, a new species of *Orgilus (Orgilus) tonguchi* **sp. n.** is described in the present paper and compared with some species of the genus.

Materials and Methods

Specimens of Orgilini were collected from different habitats in the provinces of Bitlis, Elazığ, Erzincan, Erzurum, İzmit, Malatya, and Nevşehir in Türkiye using light traps and sweeping nets. The obtained adult specimens were then pinned and properly labelled. Relevant literature was used for taxonomical examination of the material (Belokobylskij, 1998; Beyarslan, 1996, 2015; Braet & Tignon, 1998; Taeger, 1989; Tobias, 1986; van Achterberg, 1985, 1987). General distributions and the known host species of the species of Orgilini are given according to Yu et al., 2016). In addition to the locality (Figure 1), the altitude of the locality, collection date, sex, number of specimens, and collectors of each species are given. In the text, the host plants of host species are shown in brackets. The examined specimens are kept in the collection of the Department of Biology, Trakya University, Edirne/Türkiye. Holotype deposited in Trakya University Faculty of Science Museum (TRUFSM). Illustrations were taken using a Leica M 205 C microscope and Leica 1C80 HL camera, a stereomicroscope equipped with a Sony™ digital camera. A series of 4–5 captured images were then merged into a single in-focus image using the image-stacking software Combine ZP 1.0.

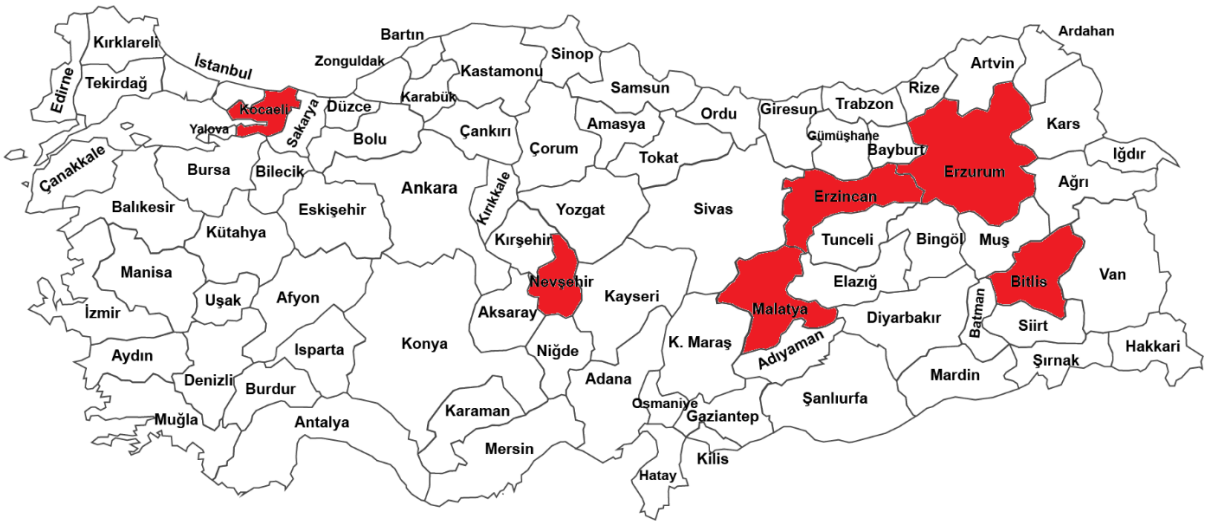


Figure 1. Sampling provinces in Turkey (Bitlis, Erzincan, Erzurum, İzmit, Malatya, and Nevşehir)

Results and Discussion

One specimen belonging to genus *Acanthocepola* was caught by commercial bottom trawl in Petuaghat fish landing. Based on morphological characters and diagnostic the specimens were identified as *Acanthocepola limbata*.

Orgilini samples obtained from six provinces of Türkiye were evaluated, and *Orgilus (Orgilus) obscurator* (Nees, 1812); *O. (O.) parvipennis* Thomson, 1895; *O. (O.) pimpinellae* Niezabitowski, 1910; *O. (O.) tonguchi* Beyarslan & Çulcu **sp. n.;** and *Microtypus wesmaelii* Ratzeburg, 1848, were identified.

Taxonomy

Subfamily Orgilinae Ashmead, 1900

Genus: *Microtypus* Ratzeburg, 1848

***Microtypus wesmaelii* Ratzeburg, 1848**

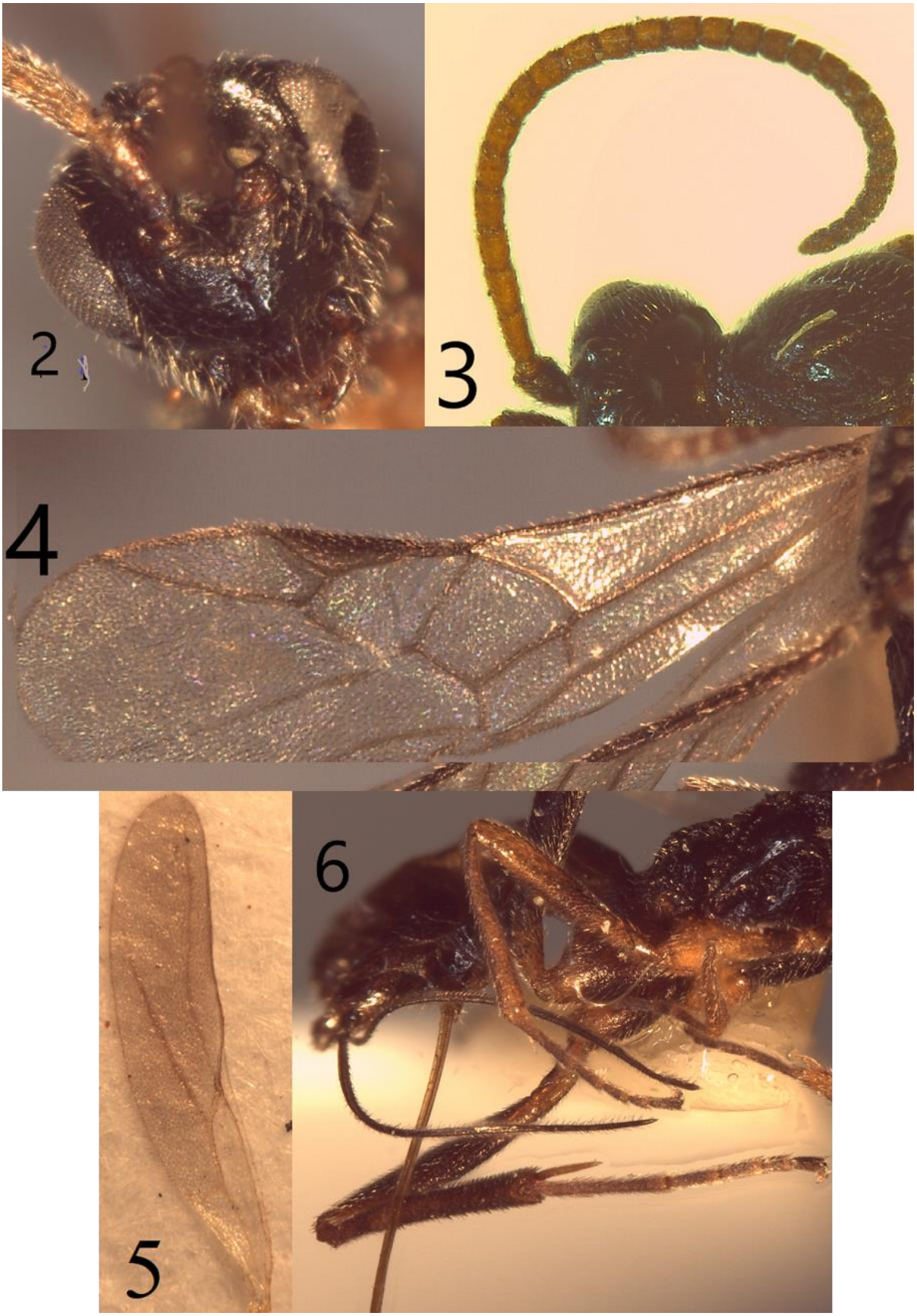
Synonym: *Microtypus dioryctriae*.

Material examined: Erzurum, Inanmiş, 2117 m, 13.9.2012, 1♂, Leg. A. Beyarslan.
Host: Lepidoptera. Crambidae: *Loxostege sticticalis* (Linnaeus, 1761). **Gelechiidae:** *Coleotechnites atrupictellus* (Dietz, 1900). **Pyralidae:** *Acrobasis betulella* Hulst, 1890 [*Quercus cerris*]; *A. comptoniella* Hulst, 1890; *A. consociella* (hubner 1813); *A. sodalella* Zeller, 1848; *A. sylviella* Ely, 1908. *Conobathra tumidana* (Denis & Schiffermüller, 1775). *Dioryctria auranticella* (Grote, 1883) [*Pinus attenuata*]. *Loxostege sticticalis* (Linnaeus, 1761). *Pococera asperatella* (Clemens, 1860). **Tortricidae:** *Grapholita molesta* (Busck, 1916). **Yponomeutidae:** *Zelleria haimbachi* Busck, 1915. **Hymenoptera: Cynipidae:** *Biorhiza pallida* (Olivier, 1791).
Zoogeographic region: Nearctic, Palaearctic region.
Distribution: Bulgaria, Canada, China, Czech Republic, Czechoslovakia, Germany, Hungary, Iran, Italy, Netherlands, Russia, Slovakia, Türkiye, U.S.A., United Kingdom.
Five species of Orgilini were identified within *Microtypus* and *Orgilus* genera (Hym., Braconidae, Orgilinae) from the material collected from new localities in Türkiye. Among these species, *Orgilus (Orgilus) tonguchi* Beyarslan & Çulcu **sp. n** is new records. The most common species in Türkiye appeared to be *O.(O.) obscrator* and *O. (O). pimpinellae* which were recorded from different provinces of Türkiye (Beyarslan, 1996; Beyarslan and Çetin Erdoğan, 2011; Beyarslan et al., 2013; Güçlü and Özbek, 2015). The distribution of the species according to zoogeographical regions (Yu et al., 2016) is as follows: The species *O. (O.) obscurator* (Nees, 1812), *O. (O.) pimpinellae,* and *O. (O.) tonguchi* **sp. n.** from the Palaearctic, *Microtypus wesmaelii,* and *O. (O.) obscurator from the* Nearctic and Palaearctic. The Orgilini tribe contains species that attack microlepidopteran larvae with a partly endophytic way of life, especially those with leaf-mining or tunnelling early instars. Therefore, *O. (O.) obscurator* has been introduced into the following countries for biological control of plant pest microlepidopteran species: Canada, Canada-Ontario, Chile, U.S.A., U.S.A.-Connecticut, U.S.A.-Massachusetts, U.S.A.-Michigan, U.S.A.-New Jersey, U.S.A.-New York This species can be used for the biological control of the same pests in Türkiye.

Genus *Orgilus* Haliday, 1833
Subgenus *Orgilus* s.str.
***Orgilus (Orgilus) obscurator* (Nees, 1812) (syn. *annulator*)**
Microdus annulator Nees, 1812
Orgilus (Orgilus) obscurator: Tobias, 1986.
Material examined: Erzincan, Refahiye, 1581 m, 22.08.2008, 1♂, Leg. A. Beyarslan.
Host. Lepidoptera. Crambidae: *Loxostege sticticalis* (Linnaeus, 1761). **Coleophoridae**: *Coleophora alcyonipennella* (Kollar, 1832); *C. discordella* Zeller, 1849; *C. niveicostella* Zeller, 1839; *C. paripennella* Zeller, 1839. **Elachistidae:** *Agonopterix conterminella* (Zeller, 1839); *A. kaekeritziana* (Linnaeus, 1767). *Aproaerema anthyllidella* (Hübner, 1813). **Gelechiidae**: *Dichomeris juniperella* (Linnaeus, 1761). *Exoteleia dodecella* (Linnaeus, 1758). *Recurvaria nanella* ([Denis & Schiffermüller], 1775). *R. nanella* ([Denis & Schiffermüller], 1775) [*Malus domestica*]. *Scrobipalpa acuminatella* (Sircom, 1850); *S. ocellatella* (Boyd, 1858). **Lasiocampidae**: *Dendrolimus pini* (Linnaeus, 1758) [*Pinus nigra, Pinus sylvestris*]. **Momphidae**. *Mompha epilobiella* (Denis & Schiffermüller, 1776); *Mompha miscella* (Denis & Schiffermüller, 1775). **Psychidae**: *Phalacropterix graslinella* (Boisduval, 1852). **Scythrididae**: *Scythris picaepennis* (Haworth, 1828). **Tortricidae:** *Epinotia cruciana* (Linnaeus, 1761). *Gypsonoma aceriana* (Duponchel, 1843). *Lathronympha strigana* (Fabricius, 1775). *Rhyacionia buoliana* (Denis & Schiffermuller 1775)] [*Pinus mugo, Pinus nigra, Pinus resinosa, Pinus sylvestris*]; *R. pinicolana* Doubleday 1850; *R. resinella* (Linnaeus 1758); *R. pinivorana* (Lienig & Zeller, 1846). *Stictea mygindiana* (Denis & Schiffermüller, 1775). *Tortrix viridana* (Linnaeus, 1758) [*Quercus pedunculata*]. **Yponomeutidae:** *Yponomeuta evonymella* (Linnaeus, 1758).
Zoogeographic region: Nearctic, Neotropical, Palaearctic.
Distribution: Albania, Armenia, Austria, Azerbaijan, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Finland, France, Germany, Hungary, Iran, Ireland, Italy, Kazakhstan, Latvia, Lithuania, Macedonia, Moldova, Mongolia, Netherlands, Norway, Poland, Russia, Slovakia, Slovenia, Sweden, Switzerland, Türkiye, U.S.A., Ukraine, United Kingdom, former Yugoslavia. **Introduced into** Canada, Canada-Ontario, Chile, U.S.A., U.S.A.-Connecticut, U.S.A.-Massachusetts, U.S.A.-Michigan, U.S.A.-New Jersey, U.S.A.-New York, for biological control of plant pest species.

***Orgilus (Orgilus) parvipennis* Thomson, 1895**
Orgilus parvipennis Thomson, 1895
Orgilus (Orgilus) parvipennis: Tobias, 1976.
Synonym: *Aptesis macroptera, Orgilus curtipennis, Orgilus micropterus*.
Material examined: Izmit, Sapanca, Kurtköy, 43 m, 27.6.2001, 1♂, Leg. A. Beyarslan
Host: Lepidoptera: Pieridae: *Aporia crataegi* (Linnaeus, 1758). **Tortricidae:** *Ancylis comptana* Frolich, 1828. [*Fragaria x ananassa*].
Zoogeographic region: Palaearctic.
Distribution: Austria, Czech Republic, Finland, France, Germany, Hungary, Kazakhstan, Norway, Poland, Slovakia, Sweden, Switzerland, United Kingdom.

***Orgilus (Orgilus) pimpinellae* Niezabitowski, 1910**
Orgilus pimpinellae Niezabitowski, 1910
Orgilus (Orgilus) pimpinellae: Tobias, 1976.
Material examined: Bitlis, Tatvan, Kuşlu mezra, 1790 m, 13.6.2015, 2♂♂, Leg. A. Beyarslan. Bitlis, Adilcevaz, Kültür Parkı, 1650 m, 01.07.8.2017, 2♀♀, 1♂, Leg. R. Çolak. Bitlis, Ağaçlıköyü, 1270 m, 14.10.2018, 1♀, Leg. A. Beyarslan. Bitlis, Rahva Üçyol, 1891 m, 12.08.2019, 1♀, 1♂, Leg. A. Beyarslan.
Host. Lepidoptera. Acrolepiidae: *Digitivalva arnicella* (Heyden, 1863). **Coleophoridae:** *Coleophora spiraeella* Rebel, 1916. **Elaschitidae:** *Agonopterix bipunctosa* (Curtis, 1850) [*Centaurea* sp.], *Depressaria pimpinellae* Zeller, 1839 [*Pimpinella major*]. **Gelechiidae:** *Anacampsis populella* (Clerck, 1759, *A. temerella* (Lienig & Zeller, 1846). *Argolamprotes micella* (Denis & Schiffermüller, 1775). *Athrips pruinosella* (Lienig & Zeller, 1846) [*Salix repens, Vaccinium uliginosum*]. *Caryocolum tricolorella* (Haworth, 1812), *Coleophora discordella* Zeller, 1849. *Dichomeris juniperella* (Linnaeus, 1761). *Phthorimaea operculella* (Zeller, 1873). *Scrobipalpa ocellatella* (Boyd, 1858). *Tinea nanella* Denis & Schiffermüller, 1775. **Momphidae:** *Mompha miscella* ([Denis & Schiffermüller], 1775).
Zoogeographic region: Palaearctic.
Distribution: Afghanistan, Austria, Bulgaria, Czech Republic, Germany, Greece, Hungary, Iran, Ireland, Italy, Kazakhstan, Korea, Lithuania, Moldova, Mongolia, Norway, Poland, Romania, Russia, Slovakia, Switzerland, Türkiye, Ukraine, United Kingdom, Uzbekistan, former Yugoslavia.
***Orgilus (Orgilus) tonguchi* Beyarslan & Çulcu sp. n.** (Figs. 2—6)
Description. Female (holotype). Length of body 4.75 mm, antennae 3.75 mm, forewing 2.75 mm, hindwing 2.00 mm, hind leg 4.00 mm, mesosoma 1.25 mm, metasoma 1.37 mm, ovipositor sheath 1.75 mm (Figure 2). Head. Transverse, ratios of width: length: height of head = 70: 40: 70 (Figs 3, 4). Antenna with 28 segments, first flagellomere 2.5 times longer than its width and almost as long as second flagellomere (20:18), penultimate antennal segment as long as its width (Figure 3). Malar space 0.6 times as long as longitudinal diameter of eye. longitudinal diameter of eye 1.3 times longer than its transverse diameter; ratios of height of clypeus: inter-tentorial distance: tenterio-ocular distance = 10: 25: 10; length of maxillary palp 0.75 times height of head; width of face as long as its height, face microsculptured, shiny and with sparce white setae; height of eye: width of face: width of head= 30 : 50 : 81; vertex, frons smooth and glabrous with some white setae; length of eye 1.5 times as long as temple in dorsal view; ratios of OOL: OD : POL = 12 : 6 : 15; mandible smooth; temple smooth, shiny; length of malar space 3.0 times as long as basal width of mandible and 0.75 times as long as longitudinal diameter of eye.
Mesosoma (Figure 6). Mesosoma approximately 1.6 times longer than height; pronotum and propleuron, smooth; mesoscutum smooth, glabrous, with silvery setae; notauli distinctly developed; scutellar sulcus smooth, scutellum compressed, smooth and shiny; flange of metapleuron distinctly developed; metanotum smooth, shiny; surface of propodeum scultured and with sparse silvery setae laterally. Fore wing (Figure 4). Pterostigma almost triangular, length of pterostigma 4.8 times its maximum width, vein 1- SR+M slightly straicht and 1.5 times as long as length of m-cu; vein cu-a antefurcal; ratio of r: SR1+3-SR: 2-SR: 2-SR+M: 1-SR+M = 10: 70: 26: 10: 32; CUlb absent, radios of 3-CU1: m-cu: 2-SR+M: =10: 21: 10; Hind wing (Figure 5). Ratios of cu-a: M+Cu: 1-M: 1r-m: 2-SC+R: SC+R1= 16: 50: 32: 13: 15: 10; apex of SC+R1with a row (5) of bristles.



Figures 2–6. *Orgilus (Orgilus) tonguchi* Beyarslan & Çulcu sp. n. 2—head in frontal view, 3—antenna, 4— fore wing, 5— hind wing, 6-hind leg.

Legs (Figure 6). Hind coxa and femur sculptured, with long, whitish setae; femur weakly compressed; ratios of femur: tibia: basitarsus of hind leg = 45: 66: 30; length of femur, tibia and basitarsus of hind leg

3.7, 5.9 and 8.25 times their maximum width, respectively; length of hind tibial spurs 0.38 and 0.5 times hind basitarsus; femur, tibia and tarsus densely setose.

Metasoma. Length of first tergite 1.14 times as long as its apical width and sculptured; Second tergite basally sculptured, medial length of second tergite 1.5 times as long as its basal width and 4.25 times as long as medial length of third tergite; suture between 2nd and 3rd metasomal tergites deep and straight; apical part of second tergite and remaining tergites smooth. Ovipositor sheath 1.16 times as long as metasomal length.

Colour. Head and mesosoma black; only mandibula, palpis labialis, palpis maxillaries, legs and metasoma maroon, hind coxae darckened; antennae yellow –red; wing membrane light yellow; pterostigma brown and veins yellow. Male similar to female.

Material examined.

Holotype: TRUFSM 0008. Female—Nevşehir, Acıgöl, Karapınar, (38°33'224"N, 34°13'108"E), 1301m., 17.09.2019, 1♀. Leg. M. Çulcu.

Allotype: Erzurum, Aşkale (Anatolian steppe province with forest ruins, bush form, on high mountain meadows), 1643 m, 18.08.2013, 1♂. Leg. A. Beyarslan.

Etymology: The name of this species is dedicated to İsmail Hakkı Tonguç, who established the Village Institutes (Köy Enstütüleri) Educational Model, which is unique to Türkiye. Thanks to this system, enlightenment began in Türkiye. The first author had the opportunity to get an education in a primitive society.

Diagnosis. *Orgilus (Orgilus) tonguchi* Beyarslan & Çulcu **sp. n.** is related to *O. (O.) nitidus* Marshall, 1898. The two species are separated by the combination of the following characters:

1(2). Head dorsally and sides of mesothorax smooth, lustrous. Head and mesosoma black. Antennae yellow–red and 28-segmented. Ovipositor almost 0.36 times as long as body. Length of body 4.75 mm. (Figures 2-6).....***O. (Orgilus) tonguchi* Beyarslan & Çulcu sp. n.**

2(1). Head dorsally and sides of mesothorax punctate, lustrous; Antennae black and 32-segmented. Ovipositor slightly shorter than body. Length of body 4.5 mm .....***O. (O.) nitidus* Marshall, 1898**

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Data Availability Statement: The data underlying this article will be shared upon reasonable request to the corresponding author.

Conflicts of Interest: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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