

Review of the Palaearctic *Trathala* Species (Hymenoptera: Ichneumonidae: Cremastinae)

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ABSTRACT

The Palaearctic species of the genus *Trathala* Cameron are reviewed. Genus *Trathala* is the third largest group. This genus was described *Trathala striata* by Cameron for the first time in the world. One hundred one species of this genus have been recorded worldwide. *Trathala flavoorbitalis* Cameron and *Trathala hierochontica* (Schmiedeknecht) were recorded from Palaearctic. Here we report three species, *Trathala flavoorbitalis* Cameron, *Trathala hierochontica* (Schmiedeknecht) and *Trathala striata* Cameron, from Palaearctic region. Among them, *Trathala striata* Cameron is a newly recorded species for the first time from Palaearctic region and South Korea. Redescriptions of Palaearctic *Trathala* species with photographs and a key to the Palaearctic *Trathala* species are provided.

Keywords: *Trathala flavoorbitalis*, *Trathala hierochontica*, *Trathala striata*, taxonomy, South Korea

INTRODUCTION

The subfamily Cremastinae Förster (1869) is a moderately large subfamily in the family Ichneumonidae Latreille that contains about 776 described species in 36 genera from throughout the world (Yu et al., 2012). In the Eastern Palaearctic region there are 82 species, with seven species of three genera have been recorded from South Korea (Yu et al., 2012). Among them, genus *Trathala* Cameron (1899) is the third largest group. Since Cameron (1899) described *Trathala striata*, 101 species of this genus have been recorded worldwide. This genus can be distinguished from other genera of Cremastinae by the following characteristics: Ventral margins of the first tergite parallel and separate. Sternite visible for its entire length. Clasper of male genitalia simple, without a basal dorsal lobe; apex of male clasper round. Occipital carina complete above, or narrowly incomplete in which case its dorsal ends are not curved or only weakly down curved.

Materials used in this study were collected by sweeping and malaise trapping, after which they were deposited in the animal systematic laboratory of Yeungnam University (YNU, Gyeongsan, Korea). Specimens were examined using an AxioCam MRc5 camera attached to a stereo microscope

(Zeiss SteREO Discovery. V20; Carl Zeiss, Göttingen, Germany), processed using the AxioVision SE64 software (Carl Zeiss), and optimized with a Delta imaging system (i-solution, IMT i-Solution Inc., Vancouver, Canada).

Abbreviations are as follows: TD, type depository; TS, type species; DEI, Deutsches Entomologisches Institut, Schicklerstrasse 5, D-16225 Eberswalde, Germany; HOPE, Entomological Collection, University Museum, Oxford, England, OX1 3PW, United Kingdom; HU, Hokkaido University, Faculty of Agriculture, Entomological Institute, Sapporo, Japan; MZ, Musée Zoologique, Place Riponne, CH-1000 Lausanne, Switzerland; NHM, The Natural History Museum, Department of Entomology, Cromwell Road, London, England, SW7 5BD, United Kingdom; SEDIVY, Research Institute for Crop Protection, Ruzyně 507, CZ-16106 Praha, Czech Republic; USNM, U.S. National Museum of Natural History, Smithsonian Institute, Washington, D.C., 20560, U.S.A.; GW, Gangwon-do; GG, Gyeonggi-do; CB, Chungcheongbuk-do, CN, Chungcheongnam-do, GB, Gyeongsangbuk-do; GN, Gyeongsangnam-do; JB, Jeollabuk-do; JN, Jeollanam-do; JJ, Jeju-do.

Until now two species, *Trathala flavoorbitalis* Cameron and *Trathala hierochontica* (Schmiedeknecht), have been re-

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corded from Palaearctic. In this study, we report an unrecorded species, *Trathala striata* Cameron, for the first time from South Korea and Palaearctic region. We also provide redescriptions, photos and a key to the Palaearctic *Trathala* species.

SYSTEMATIC ACCOUNTS

Family Ichneumonidae Latreille, 1802

Subfamily Cremastinae Förster, 1869

Genus *Trathala* Cameron, 1899

Epicremastus Szépligeti, 1905: 1–68. TS: *Epicremastus concolor* Szépligeti.

Paurolexis Cameron, 1906: 274–288. TS: *Paurolexis flavus* Cameron.

Haristaeus Cameron, 1909: 419–450. TS: *Haristaeus nigrifrons* Cameron.

Key to the species of the genus *Trathala* from Palaearctic region

1. Head yellow, with a black band in the middle (Fig. 1B). Mesosoma black (Fig. 1D, G). Hind wing with more than seven distal hamuli. Length of ovipositor as long as metasoma, ovipositor strongly curved (Fig. 1A) *T. striata* Cameron, 1899
- Head yellow without black band (Fig. 2B, E). Mesosoma yellowish brown (Fig. 2A, D). Hind wing with less than six distal hamuli. Length of ovipositor shorter than metasoma, ovipositor straight (Fig. 2A, D) 2
2. Ocelli area and rear of vertex black (Fig. 2C). Antennal flagellomeres yellowish brown (Fig. 2A). Apex of hind tibia with dark brown band (Fig. 2A) *T. flavoorbitalis* (Cameron, 1907)
- Ocelli area blackish brown and rear of vertex yellowish brown (Fig. 2F). Antennal flagellomeres blackish brown with yellowish brown band in the middle of antennal flagellomeres (Fig. 2D). Apex of hind tibia without dark brown band (Fig. 2D) *T. hierochontica* (Schmiedeknecht, 1910)

¹*Trathala striata* Cameron, 1899 (Fig. 1)

Trathala striata Cameron, 1899: 1–220. Type: female; TD: HOPE.

Material examined. Korea: 4 females, GW: Donghae-si, Samhwa-dong, Mureung valley, 15 Jul–1 Aug 2005, Lee JW; 2 females, CB: Jecheon-si, Deokasan-myeon, Worak-ri, Deoksanmaepyo, 29 Jun–17 Jul 2006, Lee JW; 1 female, Danyang-gun, Cheongdong-ri, Sobaeksan, Bukbusa, 7 Jul–

2 Aug 2005, Lee JW; 1 female, Danyang-gun, Youngchunmyeon, Namcheon-ri, Namcheon valley, 28 Jul–13 Aug 2006, Lee JW.

Redescription. Female: Body length 16 mm, ovipositor 8.9 mm long.

Color. Body black. Face yellow with median black spot. Vertex black. Clypeus yellow with median brown spot. Mandible yellow except apical teeth brown. Temple black, but half of temple at margins of eyes yellow. Tegula yellow. Fore leg yellow, mid leg brown, except half of coxa black, hind coxa black, femur reddish brown, tibia and tarsus brown, apical part of all femora bright yellow. Terga 3–7 reddish brown except basal part of tergum 3 black.

Head: Face granulate and very densely punctate, central part rugosely punctate and convex. Clypeus convex, separated from face by transverse groove; apical margin of clypeus rounded. Frons with blunt projection, concave above the base of antennae, raised laterally and with transverse wrinkles, frons more densely punctate than face. Vertex evenly coarsely punctate. Occipital carina complete and connected hypostomal carina slightly distant from the base of the mandible. Ocelli small, the distance between eye and lateral ocellus 1.17 times longer than ocellus diameter. Mandible teeth with equal size. Malar space shorter than width of mandible basally, 0.82 times as long as basal width of mandible. Temple flat. Flagellum with 44 segments, first segment 3.3 times as long as wide.

Mesosoma: Epomia present. Pronotum rugosely punctate ventrally. Notaulus very strong, and with deep furrow, reaching over apical of tegula. Mesoscutum finely shagreened between points and densely punctate, the distance between points shorter than their diameter. Scutellum flat, lateral carina reaching half of scutellum; rear of scutellum with longitudinal wrinkle. Epicnemial carina complete. Sternaulus reaching half of mesopleuron width. Mesopleuron loosely punctate, the distance between points longer than their diameter. Speculum convex, partly glabrous, with transverse wrinkle ventrally. Propodeum long, all carinae present and strong; areola and petiolar area separated from transverse carina. Propodeum very rugosely coarsely punctate, propodeal spiracle small, at equal distance from lateral and pleural carina. Nervellus intercepted on lower third, discoidella absent. Hind wing with eight distal hamuli. Leg slender, mid trochanter 4 times as long as trochantellus in lateral view. Correlation between length of hind tarsal segments as 20 : 8 : 6 : 3 : 2. Tarsal claws pectinate.

Metasoma: Compressed. Second tergum long, its length similar to petiole length. Spiracle of petiole on distal third; spiracle of second tergum before middle. Terga convex

Korean name: ¹*줄무늬꼬마자루맴시벌 (신칭)

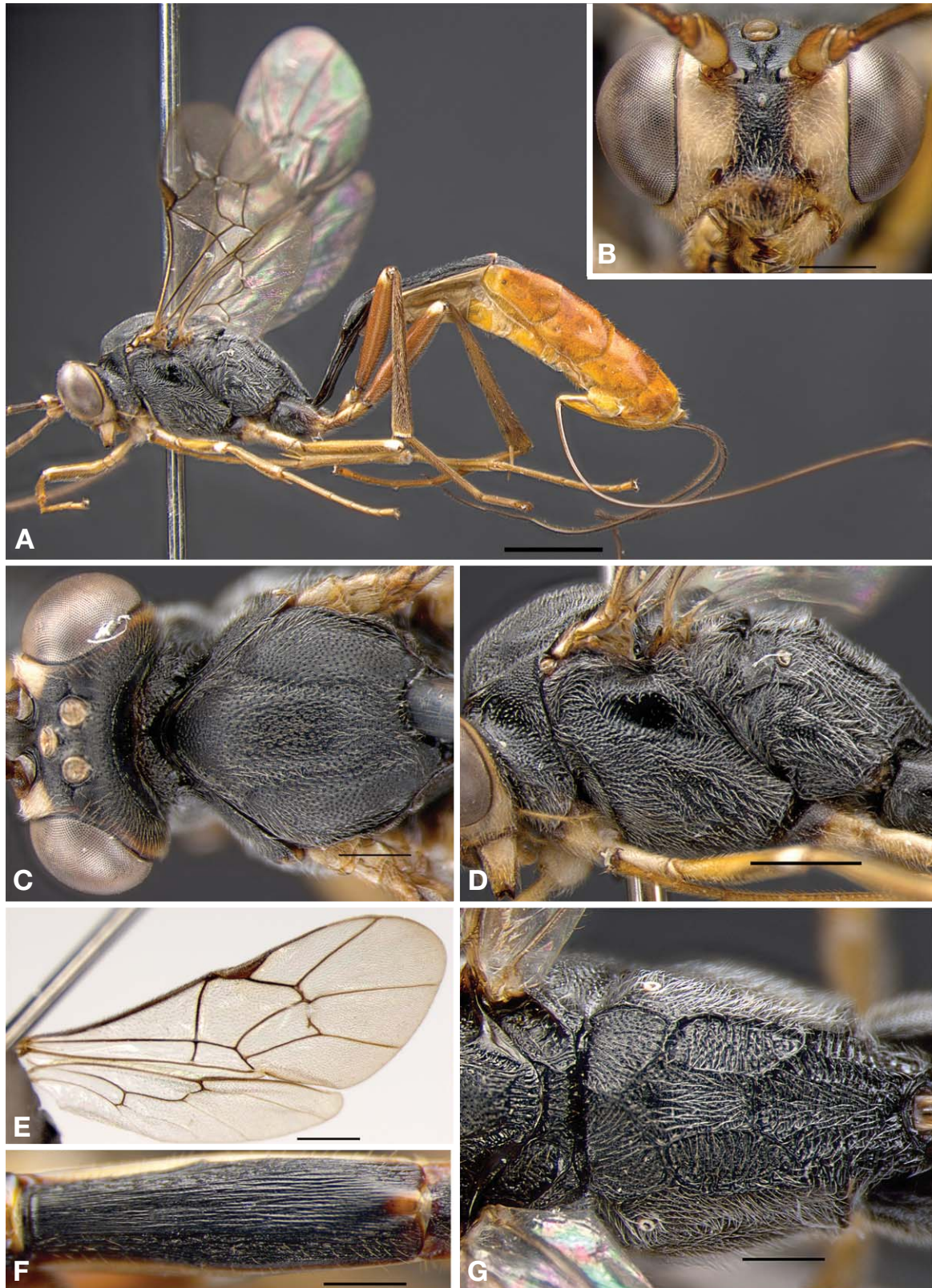


Fig. 1. *Trathala striata* Cameron, 1899. A, Habitus in lateral view; B, Head in frontal view; C, Mesoscutum in dorsal view; D, Mesopleurum in lateral view; E, Wings; F, 2nd tergite; G, Propodeum. Scale bars: A=2 mm, D, E=1 mm, B, C, F, G=0.5 mm.

roundish shaped. Ovipositor 2.7 times as long as hind tibia.

Distribution. Korea (new record), India.

Region. Palaearctic (new record), Oriental.

Remarks. The species is reported for the first time from South Korea and Palaearctic region.

¹**Trathala flavoorbitalis* (Cameron, 1907) (Fig. 2A–C)

Trathala flavoorbitalis Cameron, 1907: 584–595. Type: female; TD: NHM.

Cremastus hymeniae Viereck, 1911: 173–196. Type: female; TD: USNM.

Diaparsis coreanus Uchida, 1928: 177–297. Type: female; TD: HU.

Diaparsis kondonis Uchida, 1928: 177–297. Type: female; TD: HU.

Cremastus kigaonis Uchida, 1932: 133–222. Type: female; TD: DEL.

Material examined. Korea: 1 female, Seoul, Dongdaemun-gu, Cheongyangri-dong, M.T. I, 28 Jun–4 Jul 2005, Choi WL; 2 females, ditto, M.T. III, 26 Sep–4 Oct 2005, Choi WL; 1 female, Incheon-si, Bupyeong-gu, Cheongcheonl-dong, Incheon butterfly park, 30 Aug–1 Sep 2011; 1 female, ditto, 7–20 Jun 2011; 1 female, Ganghwa, Nakgasan, Maeul-ri, 22 Jun 1992, Lee JW; 1 female, GG: Yongin-si, Gwanggyosan, Alt. 256 m, 37° 19'51.5"N, 127° 02'36.9"E, (M.T.) IX, 8 Aug–5 Sep 2008, Lim JO; 3 females, Goyang-si, Deogyang-gu, Goyang-dong, 37° 42'33"N, 126° 53'39"E, Alt. 200 m (M.T.), 11–23 Jul 2007, Lim JO; 1 female, Kapyong-gun, Kwinok, 4 Sep 1999, Ryu SM; 2 females, Hwaseong-si, Taeon-eup, Annyeong-ri, Yongjusa (M.T.), III, 8–16 Aug 2005, Kwon YD; 1 female, ditto, 1–8 Aug 2005, Kwon YD; 1 female, ditto, 27 Aug–5 Sep, Kwon YD; 1 female, GW: Donghae-si, Samhwa-dong, Murung vally, 8–16 Oct 2005, Lee JW; 2 females, Chuncheon-si, Sanong-dong, 218-5, Gangwondoriphwanogwon, 30 Aug–12 Sep 2011; 1 females, ditto, 24 May–7 Jun 2011; 1 female, Sokcho-si, Gyo-dong, 11 Jun 1992; 1 female, Daegu-si, Dalseo-gu, Daegok-dong, Daegusumogwon, 35° 48'3.26"N, 128° 31'15.3"E, 11–18 Jul 2011; 1 male, Daegu-si, Daedeksan, 21 Jun 2002 (B.L.), Lee JW; 1 female, Daegu-si, Dalsung-gun, Hwawon-eup, 35° 48'10.67" N, 128° 29'52.98"E, 1 Jun 2008, Choo JY; 1 female, GB: Gyeongsan-si, Dae-dong, Yeungnam University (M.T.), 8–23 Jun 2006, Lee JW; 1 male, ditto, 27 May–2 Jun 2008, Lee JW; 1 female, ditto, 2–12 Jul 2007, Lee JW; 1 male, ditto, 12–21 Jul 2007, Lee JW; 1 female, ditto, 20 May 1988, Han JG; 1 female, ditto, 18 Jun–10 Jul 2008; 2 females, ditto, 23–30 Jun 2006, Lee JW; 1 female, ditto, 4–15 Jun 2007, Lee JW; 2 females, ditto, 8 Sep 1987, Lee JW; 1 female, ditto, 24

Aug 1988, Lee JW; 1 female, ditto, 3 Jul 1986, Lee JW; 1 female, ditto, 3 Jul 1989, Lee JW; 1 female, ditto, 35° 58'N, 128° 47'E, 25 Jun–2 Aug 2007, Lee JW; 1 female, ditto, 4–15 Jun 2007, Lee JW; 2 females, ditto, 23 Sep–8 Oct 2008; 1 female, Pohwang-si, Jungsan-ri, 7 Sep 2002, Shin IR; 1 female, ditto, Junkjang-myeon, Haok-ri, 24 Oct 2004, Shin IR; 6 females, Ulsan-si, Ok-dong, Ulsan park, 6 Jul–4 Aug 2011, Lee JW; 2 females, ditto, 4 Aug–9 Sep 2011; 1 female, Pohyonsan, 19 Sep 1998, Suh SJ; 1 female, Cheongdo-gun, Gakbuk-myeon, Namsan3-ri, 35° 41'N, 128° 35'E, 27 May–3 Jun 2007, Lee JW; 1 female, ditto, 3–13 Jun 2007, Lee JW; 3 females, ditto, 2 Sep–18 Nov 2012, Lee JW; 2 females, ditto, 5 Oct–2 Nov 2008; 1 female, Cheongsong-gun, Juwangsansan, 31 Jul 1983, Lee JW; 1 male, GN: Sacheon-gun, Gomyeong-myeon, Boncheon-ri, 29–30 Jun 1992; 1 female, Changryung-gun, Hyunchang-eup, 28 Jun 2001, Lee JW; 1 female, Jinju-si, Gajoa-dong, 29 Jul–4 Aug 1989, Park JS; 2 males, ditto, 4–11 Aug 1987; 1 female, Jinju-si, Ibanseong-myeon, Daechon-ri, Gyeongsanamdo Arb., 19–30 Sep 2011; 2 females, Gyejedae, Keumsan, 7 Sep 1997; 1 female, Hapcheon-gun, Jeokjung-myeon, Jukgo-ri, 35° 32'57"N, 128° 17' 35"E, 20 Jun 2007, Lee JW; 3 females, CN: Daejeon, Donggu, Daejeon University (M.T.), 15 Aug–30 Sep 2006, Lee JW; 1 female, ditto, 11 Jun–14 Jul 2007, Lee JW; 2 females, ditto, 8 Oct–30 Nov 2007, Lee JW; 3 females, ditto, 1–27 Sep 2006; 1 female, Taean-gun, Mangwonsan, 9 Jun 2007, Cho YH; 1 male, 12 females, Buyeo-gun, Gyuam-myeon, Sumok-ri (M.T.), 7–30 Sep 2005, Lee JW; 1 female, Seosansi, Haemi-myeon, Daegok-ri, 880, Hanseo University, 36° 41'30"N, 126° 34'50"E, 8–23 Jul 2009, Lee JW; 1 female, ditto, 18 Jul–14 Aug 2006; 1 female, ditto, 17–29 Sep 2009, Lee JW; 1 female, ditto, 10–29 Oct 2009, Lee JW; 1 female, Seosan-si, Unsan-myeon, Yeomi-ri, 36° 49'49.4"N, 126° 34' 23.4"E, 68 m, 21 Sep 2006, Lee HS; 1 female, Seosan-si, Seongyeon-myeon, Ilram-ri, 36° 48'71.9"N, 126° 25'85.2"E, 68 m, 24 Sep 2006, Lee HS; 1 male, 5 females, JB: Iksan-si, Wonkwang University (M.T.) 7–26 Sep 2005, Lee JW; 2 females, ditto, 26 Sep–13 Oct 2005; 1 male, Iksan-si, Sinyong-dong, Wonkwang University, 17–28 Aug 2006; 1 male, Buan-gun, Byeonsan, 9 Jul 1998 (B.L.), Chang YJ; 1 female, Gunsan-si, Gayado-ri, Sibidongpa-do, 9 Jun 2007, Cho YH; 1 male, ditto, 26 Jun 2007, Nam SH; 1 female, Wanju-gun, Dongsang-myeon, Daea-ri, Daea Arb., 6–17 Aug 2011; 1 female, Jeongeup-si, Naejang-dong, Naejangsan, Wonjeogam (M.T.), 35° 29'36.99"N, 126° 53'37.32"E, 28 Sep–11 Oct 2007, Lee JW; 1 female, JN: Yeungam-gun, Haksan-myeon, Mukdong-ri, Mukdong villiage, 31 Jul–18 Sep 2010, Kim JK; 1 female, Jangseong-gun, Jangseong-eup, 35° 18'06"N, 126° 48'46"E, 12 Jul 2007, Park SJ; 1 male, JJ, 6 Aug 1981,

Korean name: ¹*안경꼬마자루맴시벌

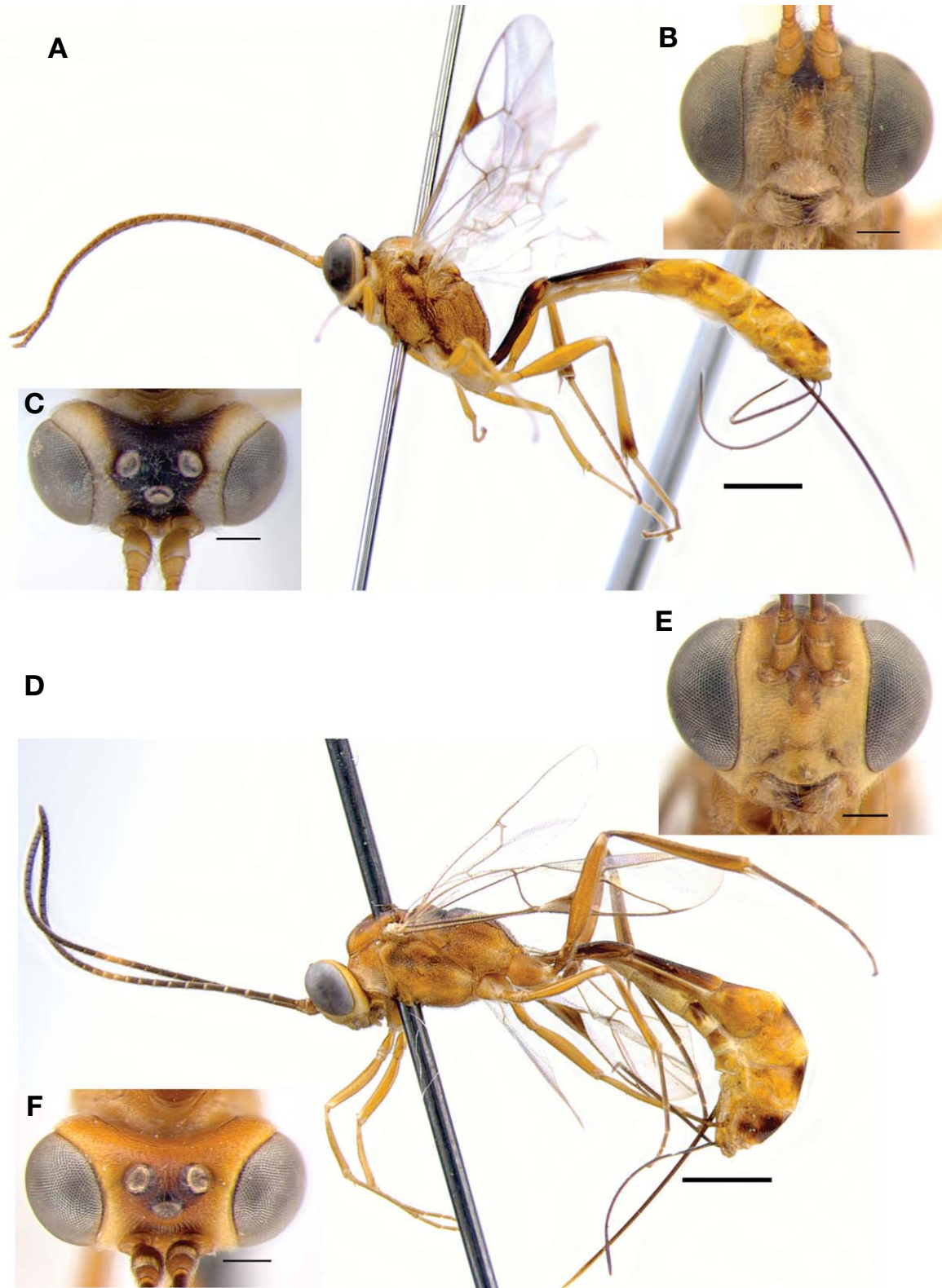


Fig. 2. A–C, *Trathala flavoorbitalis* (Cameron, 1907). A, Habitus in lateral view; B, Head in frontal view; C, Head in dorsal view; D–F, *Trathala hierochontica* (Schmiedeknecht, 1910). D, Habitus in lateral view; E, Head in frontal view; F, Head in dorsal view. Scale bars: A, D=1 mm, B, C, E, F=0.2 mm.

Park JS. Japan: 1 female, Hijiuchi, Shioya, Tochigi, Honshu, sweeping in paddy field, 28 Aug 2008, Tanaka K; 2 females, shimokuriyagawa, Morioka, Iwate, Honshu, 28 Aug 2008, Sakakibara M (T); 2 females, shimokuriyagawa, Morioka, Iwate, Honshu, 28 Aug 2008, Sakakibara M (C); 1 male, Ôno, Kinpô Kagoshima Prefecture Kyushu, 28 Jul 2008, T Yamaguchi leg.; 1 male, Shirakawa, Kinpô-chô Kagoshima Prefecture Kyushu, 25 Aug 2008; 1 female, Ôno, Kinpô Kagoshima Prefecture Kyushu, 25 Aug 2008; 1 female, Shirakawa, Kinpô-chô Kagoshima Prefecture Kyushu, 3 Jun 2008; 1 male, Shimokuriyagawa Morioka, Iwate, Honshu, 21 Sep 2009, M Sakakibara leg.

Redescription. Female: Body length 7.6 mm, ovipositor 2.7 mm long.

Color. Body yellowish brown. Face bright yellow to yellow. Antenna flagellomere yellowish brown. Vertex bright yellow to yellow, but ocelli area and behind vertex black. Scutellum yellow to dark brown. Propodeum yellow or yellow with blackish brown spot dorsally. Leg yellowish brown, except hind tibia with dark brown band apically. Petiole and second tergum black.

Head: Face granulate, closely punctate. Clypeus convex, weakly separated from face by transverse groove; apical margin of clypeus rounded. Frons without projection, but weakly concave above base of antennae, with transverse wrinkles; frons more densely punctate than face. Vertex evenly closely punctate. Occipital carina complete and connected hypostomal carina slightly distant from the base of the mandible. Ocelli small, the distance between eye and lateral ocellus as long as ocellus diameter. Mandible teeth with equal size. Malar space 0.67 times as long as basal width of mandible. Temple flat. Flagellum with 31–33 segments, first segment 5.5 times as long as wide.

Mesosoma: Epomia present and strongly curved. Pronotum finely punctate. Notaulus weak. Mesoscutum finely punctate. Scutellum flat, lateral carina reaching half of scutellum, rear of scutellum with longitudinal wrinkle. Epicnemial carina complete, sternaulus weak. Mesopleuron loosely coarsely punctate. Speculum convex, antero-ventral part of speculum with transverse carinae. Propodeum coarsely punctate; areola and petiolar area weakly separated by transverse carina. Propodeal spiracle round, closer pleural than lateral longitudinal carina. Nervulus basad to basal vein; areolet absent; second recurrent vein with one bulla, bulla length half of remaining vein length. Nervellus intercepted on lower fourth, discoidella absent. Hind wing with five distal hamuli. Leg slender; mid trochanter 3 times as long as trochantellus in lateral view. Correlation between length of hind tarsal segments as 13 : 6 : 4 : 2 : 2. Hind tibia with numerous short hairs apically. Tarsal claws pectinate.

Metasoma: Compressed. Petiole with lateral carina; post-

petiole and second tergum striate. Terga convex roundish shaped. Ovipositor straight, ovipositor sheath sigmoid. Ovipositor 1.8 times as long as hind tibia.

Distribution. Korea, Bangladesh, Canada, China, Fiji, Guam, India, Indonesia, Japan, Madagascar, Malaysia, Mariana Islands, Marshall Islands, Myanmar, Palau, Philippines, Russia (Khabarovsk, Primor'ye), Reunion, Singapore, Sri Lanka, Truk Islands, USA.

Region. Afrotropical, Australasian, Eastern Palaearctic, Nearctic, Oceanic, Oriental.

Remarks. The species has a variable color pattern.

***Trathala hierochontica* (Schmiedeknecht, 1910)
(Fig. 2D–F)**

Cremastus hierochonticus Schmiedeknecht, 1910: 1841–2080. Type: unknown; TD: unknown.

Trathala hierochontica europeator Aubert, 1964: 144–164. Type: male; TD: MZ.

Cremastus (Trathala) romanicus (Sedivy, 1965): 163–176. Type: female; TD: SEDIVY.

Material examined. Bulgaria 1 male and 1 female, Stara planina Mt., 8 Sep 1995, Kolarov J; 1 female, Plovdiv, apple garden, 29 Sep 1999, Kolarov J; 1 female, Provdiv, 18 Sep 1999, Kolarov J; 1 female, Provdiv, 9 Oct 1999, Kolarov J; 1 female, Plovdiv, 1 Nov 1999, Kolarov J. Turkey: 1 female, Elazig-Baskil, Hacimustafa, 4 Jun 2007; 1 female, Elazig-Baskil, Hacimustafa, 16 Jul 2007, Beyarslan A; 1 female, Elazig-Baskil, Canbeyler, 3 Jun 2007, Yurtcan M; 1 female, Malatia-Darende, 13 Jul 2007, Yurtcan M.

Redescription. Female: Body length 7.5 mm, ovipositor 2.9 mm long.

Color. Body yellowish brown. Face yellow; antenna flagellomere dark brown, with yellow band on 10–12 flagellomere. Vertex reddish brown. Scutellum yellow. Propodeum blackish brown dorsally. Stigma bright yellow. Petiole and second tergum dark brown.

Head: face densely punctate. Clypeus convex, separated from face by transverse groove; apical margin of clypeus rounded. Frons without projection, weakly concave above base of antennae, with transverse wrinkles, frons and vertex densely punctate more than face. Occipital carina complete and connected hypostomal carina. Ocellus small, the distance between eye and lateral ocellus 0.82 times longer than ocellus diameter. Mandible upper tooth longer than lower tooth. Malar space 1.18 times as long as basal width of mandible. Temple flat. Flagellum with 33 segments, with yellow band on 10–12 flagellomere; first segment 6.0 times as long as wide.

Mesosoma: epomia weak, pronotum coriaceous. Notaulus present; mesoscutum granulate and closely punctate. Scutel-

lum convex, coarsely punctate; lateral carina present. Epicnemial carina complete, sternaulus weak. Mesopleuron coarsely punctate; speculum weakly convex, with transverse wrinkle ventrally. Propodeum rugosely coarsely punctate; propodeal spiracle small, the distance between spiracle and pleural shorter than that between spiracle and lateral longitudinal carina. Areola and petiolar area not separated. Nervulus opposite basal vein; areolet absent. Nervellus not intercepted, discoidella absent; hind wing with four distal hamuli. Leg slender, correlation between length of hind tarsal segments as 17 : 8 : 6 : 2 : 2. Hind tibia with short strong spine, its apical part with short strong hair. Tarsal claws simple.

Metasoma: Compressed. Ovipositor 1.7 times as long as hind tibia.

Distribution. Bulgaria, Egypt, France, Iran, Israel, Morocco, Romania, Russia (Dagestanskaya oblast), Turkey.

Region. Eastern Palaearctic, Western Palaearctic.

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