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New records of six species of the subfamily Pimplinae Wesmael (Hymenoptera: Ichneumonidae) from Korea

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The subfamily Pimplinae is one of the largest groups of the family Ichneumonidae, currently 1,737 species in 77 genera worldwide. In Korea, 120 species in 33 genera have been recorded. The South Korean species of the subfamily Pimplinae Wesmael, 1845 (Hymenoptera: Ichneumonidae) are the focus of this study. Here, six species are newly added in the South Korean fauna: *Aravenator kamijoi* Momoi, *Chablisea varicolor* Liu, He & Chen, *Clistopyga arctica* Kusigemati, *Liotryphon cydiae* (Perkins), *L. strobilellae* (Linnaeus), and *Zaglyptus semirufus marginatus* Kasparyan. Of these new taxa, two genera (*Aravenato* and, *Chablisea*) belonging to the tribe Ephialtini are also newly recorded from South Korea. We present a key to species of South Korean *Clistopyga*, *Liotryphon*, and *Zaglyptus*, diagnosis, photographs, and distribution. As a result of this study, the Korean fauna of Pimplinae is now known to consist of 126 species in 35 genera. All Pimplinae specimens are kept in the collections of the Geolim Entomological Institute (GEI), Daegu, South Korea.

Keywords: *Aravenato*r, *Chablisea*, *Clistopyga*, Ephialtini, Key, *Liotryphon*, Taxonomy, *Zaglyptus*

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Introduction

The subfamily Pimplinae is one of the largest groups of the family Ichneumonidae, currently 1,737 species in 77 genera worldwide, 297 of which inhabit the Eastern Palaearctic region: 259 species have been recorded from China, 187 from Russia, and 134 from Japan (Yu *et al*., 2016). In Korea 120 species in 33 genera have been recorded (Lee *et al*., 2018; Song *et al*., 2018a; 2018b; 2020; Choi *et al*., 2019; Choi et Lee, 2019). The Pimplinae group is mainly idiobiont, koinobiont, endo- and ectoparasitiods of Coleoptera, Lepidoptera, Hymenoptera, and Araneae species (Eberhard, 2010). Oviposition generally occurs in the adults, larvae, nymphs, prepupae, pupae, and adults (Humble, 2006). In this study, we report six species of Pimplinae for the first time from Korea. Of these taxa, two genera (*Aravenator* and *Chablisea*) belonging to the tribes Ephialtini are also newly recorded from South Korea. We provide keys to Korean species of three genera, as well as photographs of habitus and diagnoses of newly recorded species. As a result of this study, the Korean fauna of Pimplinae is now known to consist of 126 species in 35 genera.

Materials and Methods

Materials used in this study were collected by sweeping and Malaise trapping, after which specimens were deposited in the animal systematic laboratory of the Geolim Entomological Institute (GEI, Daegu, Korea). Specimens were examined using an AxioCam MRc5 camera attached to a stereo microscope (Zeiss SteREO Discovery. V20; Carl Zeiss, Göttingen, Germany), processed using Axio Vision SE64 software (Carl Zeiss), and optimized with a Delta imaging system (i-solution; IMT i-Solution Inc., Vancouver, Canada). The distributional data primarily follow Yu *et al*. (2016). The species diagnoses are based on Korean specimens. Abbreviations for collections are as follows: HU: Hokkaido University, Faculty of Agriculture, Entomological Institute, Sapporo, Japan; MOMOI: Kobe University, Faculty of Agriculture, Entomological Laboratory, Kobe, Japan. (S. Momoi collection.); NHM: The Natural History Museum, Department of Entomology, Cromwell Road, London, England, United Kingdom; ZJUH: the Parasitic Hymenoptera Collection of Zhejiang University, Hangzhou, China. Abbreviations of South Korean provinces

and indices used in the paper as follows: CB, Chungcheongbuk-do; GB, Gyeongsangbuk-do; GG, Gyeonggi-do; GN, Gyeongsangnam-do; JB, Jeollabuk-do; JN, Jeollanamk-do; TD: Type depository; TL: Type locality.

Results

Family Ichneumonidae Latreille, 1802 맵시벌과
Subfamily Pimplinae Wesmael, 1845 납작맵시벌아과
Genus *Aravenator* Momoi, 1973
붉은배납작맵시벌속(신칭)

Aravenator Momoi, 1973: 225. Type species: *Aravenator kamijoi* Momoi.

1. *Aravenator kamijoi* Momoi, 1973 (Fig. 1A, B)
붉은배납작맵시벌(신칭)

Aravenator kamijoi Momoi, 1973: 225. Type: ♀; TL: Japan; TD: Momoi.

Diagnosis. Body black except tergites and legs. Antennae brown. Face black, clypeus, mandible dark brown to yellowish brown. Face about 0.9 times as long as wide. Malar space about 0.8 times as long as the width of the mandible base. Mesoscutum densely hairs. Propodeum with two distinct longitudinal carinae, petiolar area distinct. First tergite about 1.1−1.2 times as long as wide. Nervellus in the middle broken, weakly inclivous. Discoidella weak but present.

Material examined. GB: 1♀, Ulgin-gun, Buryeong valley, 10.v.1991, OS Kwon; 1♀, Cheongdo-gun, Gakbuk-myeon, Namsan3-ri, 7.vi−12.vii.2009, JW Lee; GG: 1♀, Korea University Imeopsiheomjang, 1.viii.1987.

Distribution. Korea (new record), Japan, Mongolia.

Remark. This geuns is recorded for the first time from Korea.

Genus *Chablisea* Gauld & Dubois, 2006
흰띠납작맵시벌속(신칭)

Chablisea Gauld & Dubois, 2006: 544. Type species: *Chablisea imbiba* Gauld & Dubois.

2. *Chablisea varicolor* Liu, He & Chen, 2009 (Fig. 1C, D) 홍가슴흰띠납작맵시벌(신칭)

Chablisea varicolor Liu, He & Chen, 2009: 1167. Type: ♀; TL: China; TD: ZJUH.

Diagnosis. Body black. Antennae blackish brown with ventral sides of scape and pedicel yellowish white. Face, frontal orbit near antennal sockets, clypeus, mandible whitish yellow. Mesopleuron and metapleuron reddish brown to orange brown. Propodeum black. Fore and middle legs yellowish brown, coxae and trochanters light brown. Hind coxae yellowish brown, femora reddish brown, tibiae yellowish white with subbasal 0.2 and apical 0.3 black. Upper margin of face weakly concave between antennal sockets. Malar space very narrow, about 0.16 times basal width of mandible. Median longitudinal carina of propodeum present. Face 1.9−2.2 times as high as wide. First tergite elongate, 1.25−1.7 times longer than apical width.

Material examined. GB: 1♂, Geonju-si, Hyeongok-myeon, Namsan-ri, M.T., 25.viii−2.ix.2005, JT Mun; 1♀, Hapcheon-gun, Gaya-myeon, Hwangsan-ri, San124-3, 4.vi.2014, JW Lee; Daejeon: 1♀, Dong-gu, Daejeon Univ., M.T., 1.vii−22.vii.2006, JW Lee.

Distribution. Korea (new record), China.

Remark. This geuns is recorded for the first time from Korea.

Genus *Clistopyga* Gravenhorst, 1829
굽은꼬리납작맵시벌속

Pimpla (*Clistopyga*) Gravenhorst, 1829: 132. Type species: *Ichneumon incitator* Fabricius.

Hymenomacropyga Uchida, 1941: 116. Type species: *Hymenomacropyga latifrontalis* Uchida.

Ichneumonoglypta Blanchard, 1941: 9. Type species: *Ichneumonoglypta lopezrichinii* Blanchard.

Key to species of South Korean *Clistopyga* (modified from Song *et al.*, 2018b)

1. Inner orbits of frons and basal part of vertex with yellow longitudinal marks. Hind femur entirely reddish brown to yellowish brown. Hind tibia black, except white marks on basal and median part ····· 2
– Inner orbits of frons and basal part of vertex mainly black, except yellow circular marks of vertex on female. Hind femur and hind tibia reddish brown, except apical part black ····· *C. sziladyi*
2. Metasoma black. All tergites entirely black, without marks. Nervulus of fore wing weekly antefiircal. Nervellus of hind wing intercepted by discoidella at lower area ····· *C. incitator incitator*
– Metasoma dark brown, apical margin of all tergites black marks. Nervulus of fore wing opposite. Nervellus of hind wing intercepted by discoidella at middle ····· ····· *C. arctica*

3. *Clistopyga arctica* Kusigemati, 1985 (Fig. 1E, F)
검은띠굽은꼬리납작맵시벌(신칭)

Clistopyga arctica Kusigemati, 1985: 191. Type: ♀; TL: Japan; TD: HU.

Diagnosis. Body black, with whitish brown to reddish black marks on head. Metasoma dark brown, apical margin of all tergites black marks. Mesoscutum mostly black. Mesopleurum and legs dark brown to brown.

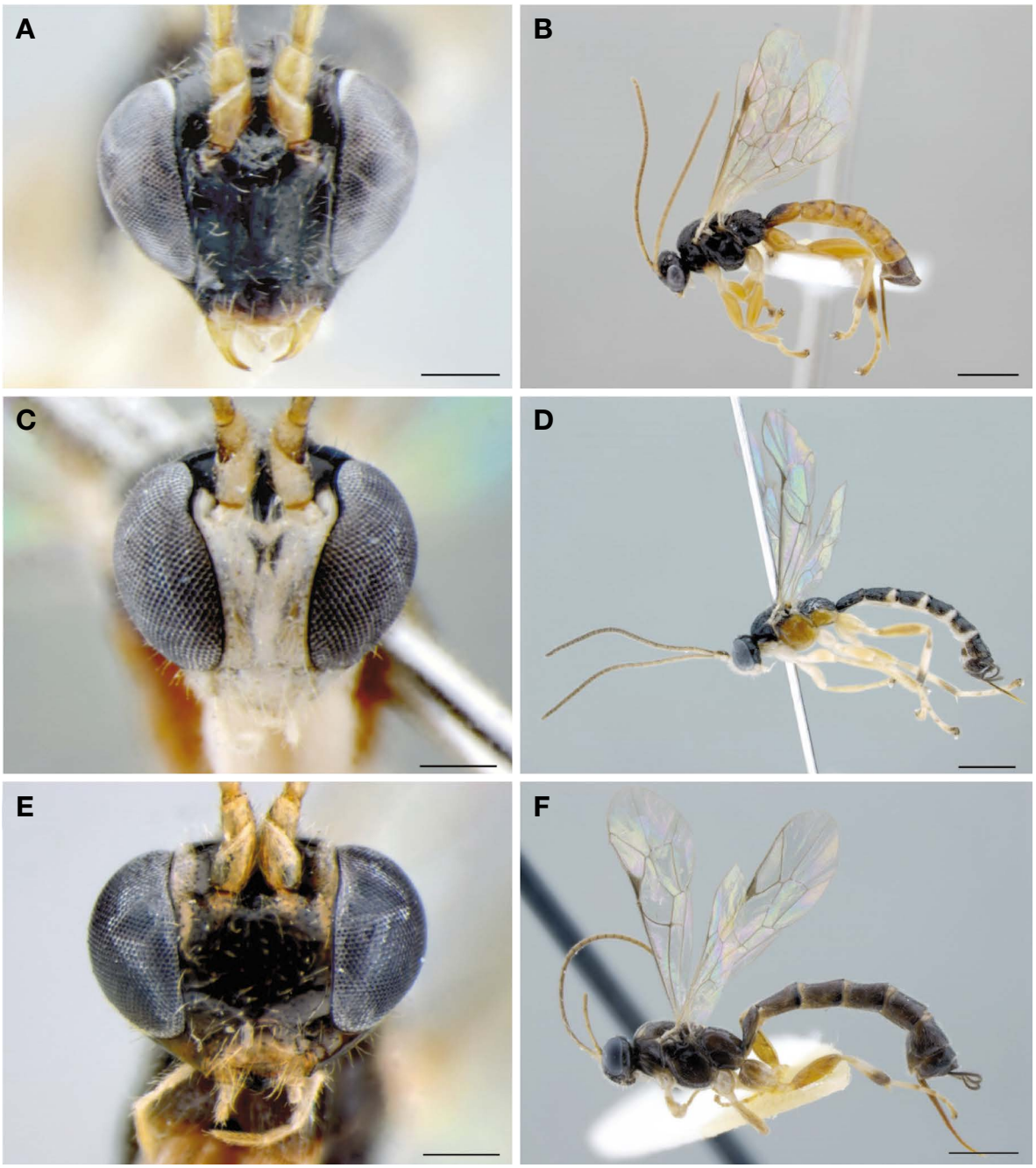

Fig. 1. A, B: *Aravenator kamijoi* Momoi.; C, D: *Chablisea varicolor* Liu, He & Chen; E, F: *Clistopyga arctica* Kusigemati. A, C, E, Head in frontal view (Scale bars = 0.2 mm); B, D, F, Habitus in lateral view (Scale bars = 2 mm).

Flagellum brown. Hind femur entirely reddish brown to yellowish brown. Hind tibia black, except white marks on basal and median part. Upper margin of face weakly concave between antennal sockets. Metasomal tergites with yellow marks subapically. Malar space narrow, about 0.9 times basal width of mandible. Median longitudinal carina of propodeum present. Face 1.1 times as high as wide, entirely light yellow; first tergite elongate, 1.0 times as long as wide at apex. Nervulus of fore wing opposite. Nervellus of hind wing intercepted by discoidella at middle.

Material examined. CB: 1♀, Boeun-gun, Sogrisan-myeon, Sannae-ri, 209, Beopjusa, 5.v–31.viii.2011, JC Jeong.

Distribution. Korea (new record), China.

Genus *Liotryphon* Ashmead, 1900
작은용골납작맵시벌속

Liogaster Kriechbaumer, 1890: 297. Type species: *Liogaster longulus* Kriechbaumer.

Liotryphon Ashmead, 1900: 368. New name for primary homonym *Liogaster* Kriechbaumer.

Apistes Seyrig, 1927: 221. Type species: *Apistes perversus* Seyrig.

Apistephialtes Seyrig, 1928: 380. New name for primary homonym *Apistes* Seyrig.

Neoephialtes Constantineanu & Pisica, 1970: 1. Type species: *Neoephialtes foveolatus* Constantineanu & Pisica.

Key to species of South Korean *Liotryphon*

1. Hind coxa entirely reddish brown to yellowish brown. Fore wing with nervulus postfurcal ····· 2
– Hind coxa entirely reddish black. Fore wing with nervulus interstitial ····· *L. strobilellae*
2. Propodeum with strongly rugose punctures and long hairs. Hind coxa and femur reddish brown ····· *L. cydiae*
– Propodeum with finely and closely punctures long hairs. Hind coxa and femur yellowish brown ····· 3
3. Hind femur entirely reddish brown. Second tergite as long as first one ····· *L. ascaniae*
– Apical area of hind femur black. Second tergite approximately 2.0 times as long as first one ····· *L. laspeyresiae*

4. *Liotryphon cydiae* (Perkins, 1942) (Fig. 2A, B)
주름작은용골납작맵시벌(신칭)

Ephialtes cydiae Perkins, 1942: 172. Type: ♀, TL: France, TD: NHM.

Diagnosis. Body black, except legs. Flagellum blackish brown, Face black. Hind leg reddish brown, except tibia and tarsus blackish brown. Propodeum with strongly rugose punctures and long hairs. Hind coxa and femur reddish brown. Metasoma black. Face distinctly convex on median area. Fore wing with nervulus postfurcal. First tergite as long as apical wide, 0.8 times as long as second tergite. Ovipositor less than 4.0 times as long as hind tibia.
Material examined. GB: 1♀, Cheongdo-gun, Unmunmyeon, Mt. Unmunsan, 25.iv–5.v.2009, JW Lee; 2♀♀, Yeongcheon-si, Sinnyeong-myeon, Chisan-ri, San141-4, 12.vi–14.vii.2014, JW Lee.
Distribution. Korea (new record), Bulgaria, Czechoslovakia, Yugoslavia, France, Germany and Poland.

5. *Liotryphon strobilellae* (Linnaeus, 1758) (Fig. 2C, D)
붉은작은용골납작맵시벌(신칭)

Ichneumon strobilellæ Linnaeus, 1758: 564. Type: ♀, TL: lost.

Diagnosis. Body, hind coxa, and trochanter black. Trochantellus brown, femur dark brown. Body rather slender. Face distinctly convex. First tergite 0.8 time as long as apical wide. Tergite 2 with obvious, impressed oblique furrows cutting off anterolateral corners. Nervulus of fore wing interstitial. Mesopleurum with groove anteriorly, traceable only as a weakly sculptured line. First tergite 0.8 time as long as apical wide, as long as second tergite. Ovipositor at least 5.0 times as long as hind tibia. Ovipositor with upper valve simply tapered at apex.
Material examined. GB: 1♂, Gumi-si, Mt. Geumosan, 5.v.1987, JW Lee; CB: 1♀, Danyang-gun, Mt. Sobaeksan, 23.iv.1997, MJ Chung.
Distribution. Korea (new record), Belarus, Belgium, Bulgaria, Croatia, Czech Republic, Czechoslovakia, Finland, France, Germany, Italy, Kazakhstan, Latvia, Norway, Poland, Romania, Russia, Sweden, Switzerland, Ukraine, United Kingdom.

Genus *Zaglyptus* Förster, 1869 이와타납작맵시벌속

Zaglyptus Forster, 1869: 166. Type species: *Polysphincta varipes* Gravenhorst.

Key to species of South Korean *Zaglyptus* (modified from Choi & Lee, 2019)

1. Mesosoma entirely black. Mesoscutum elongate, with weak notauli. Metasomal tergites 1–5 reddish yellow; tergites 3–5 each with a pair of weak lateral punctate swellings ····· *Z. iwatai*
– Mesosoma yellowish brown to reddish yellow. Mesoscutum stout, with strong notauli. Metasomal tergites generally dark brown to black; tergites 3–5 each with a pair of lateral impunctate swellings ····· 2
2. Ovipositor with strong teeth in the dorsal part of the tip. Propodeal spiracle round, touching the pleural carina ····· *Z. semirufus semirufus*
– Ovipositor smooth. Propodeal spiracle round, not touching pleural carina ····· 3
3. Mesosoma yellow, reddish yellow to black, generally black; lateral lobes of mesoscutum, mesopleuron and metapleuron reddish yellow. Antenna with 24 flagellomeres. Propodeum reddish yellow in dorsal view ····· *Z. multicolor*
– Mesosoma entirely black, lateral lobes of mesoscutum, mesopleuron and metapleuron black. Propodeum black in dorsal view ····· *Z. semirufus marginatus*

6. *Zaglyptus semirufus marginatus* Kasparyan, 1981 (Fig. 2E, F)
테두리꼬마납작맵시벌(신칭)

Zaglyptus semirufus marginatus Kasparyan, 1981: 108. Type: ♀, TL: Russia, TD: unknown.

Diagnosis. Face black except clypeus and antennal socket. Mesosoma entirely black, lateral lobes of mesoscutum,

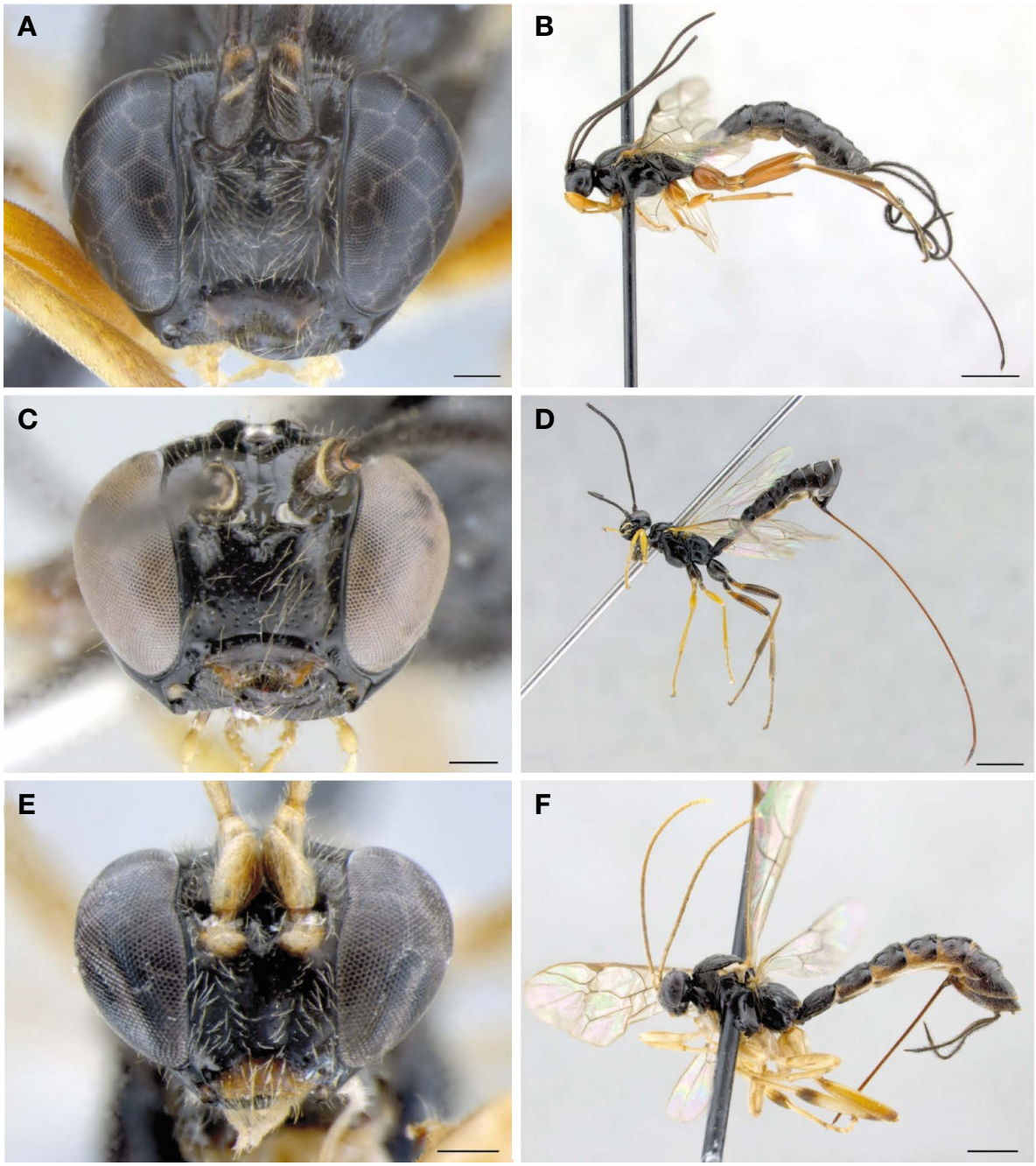

Fig. 2. A, B: *Liotryphon cydiae* (Perkins); C, D: *Liotryphon strobilellae* (Linnaeus); E, F: *Zaglyptus semirufus marginatus* Kasparyan; A, C, E, Head in frontal view (Scale bars = 0.2 mm); B, D, F, Habitus in lateral view (Scale bars = 2 mm).

mesopleuron, and metapleuron black. Propodeum black in dorsal view. Metasomal tergites generally dark reddish brown to black. Mesoscutum stout, with strong notauli. Propodeal spiracle round, not touching pleural carina. Tergites 3−5 each with a pair of lateral impunctate swellings. Ovipositor smooth, Ovipositor less than 2.5 times as long as hind tibia.

Material examined. GN: 1♀, Hamyang-gun, Macheon-myeon, Doekjeon-ri, Baekmudong, 14.vii−11.x.2011; 1♀, Hapcheon-gun, Gaya-myeon, Chiin-ri, Mt. Gayasan, 26.v.2016; 1♀, Sancheong-gun, Sicheon-myeon, Jungsan-ri, Sunduryu, 18.vii−12.x.2011; JN: 1♀, Gurye-gun, Masan-myeon, Hwangjeon-ri, Hwangjeon velly, 15.vii−18.x.2011; 1♀, Gugripgongwon, Mt. Jirisan, 25.viii−13.x.2011; CB: 1♀, Boeun-gun, Songrisan-myeon, Sanae-ri, Mt. Songrisan, 22.vi−5.vii.2007.

Distribution. Korea (new record), Russia.

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