A taxonomic review of the genus *Exochus* Gravenhorst (Hymenoptera: Ichneumonidae: Metopiinae) from South Korea with descriptions of ten new species

Jin-Kyung Choi\(^a\), Janko Kolarov\(^b\) and Jong-Wook Lee\(^a\)

\(^a\)Department of Life Sciences, Yeungnam University, Gyeongsan, South Korea; \(^b\)Faculty of Pedagogy, University of Plovdiv, Plovdiv, Bulgaria

**ABSTRACT**

The South Korean species of the genus *Exochus* are revised. Ten new species, *Exochus acostulatus* Lee & Choi, sp. nov., *Exochus adentatus* Lee & Choi, sp. nov., *Exochus areolaris* Lee & Choi, sp. nov., *Exochus carinalis* Lee & Choi, sp. nov., *Exochus dentisternum* Lee & Choi, sp. nov., *Exochus depressus* Lee & Choi, sp. nov., *Exochus nigritulus* Lee & Choi sp. nov., *Exochus occipitalis* Lee & Choi, sp. nov., *Exochus orbitalis* Lee & Choi, sp. nov. and *Exochus propodealis* Lee & Choi, sp. nov., are described. Also, 21 species of this genus are reviewed and newly recorded from South Korea, with diagnoses provided. A key to the South Korean species of *Exochus* and illustrations of external characters are provided.

http://zoobank.org/urn:lsid:zoobank.org:pub:B28700A7-9CA7-4AE7-9816-9C8F4CD46160

**ARTICLE HISTORY**

Received 15 November 2015
Accepted 24 May 2016
Online 7 July 2016

**KEYWORDS**
Exochus; key; new species; taxonomy

**Introduction**

Metopiinae Förster, 1869 is a medium-sized ichneumonid subfamily comprising 24 genera and over 830 described species worldwide. Among them, genus *Exochus* is the largest group of Metopiinae. It is a cosmopolitan genus comprising approximately 280 described species (Yu et al. 2012).

This subfamily is easily distinguished from other ichneumonids by the following characters: clypeus not separated from face by groove (except in *Metopius*), dorsal margin of face produced into triangular process extending between bases of antennae, division between trochantellus and femur of fore and mid legs often obsolete or absent, ovipositor short, not extending beyond metasomal apex. The species of the subfamily Metopiinae are koinobiont endoparasitoids in lepidopterous larvae and the usual hosts are among the pyraloids and tortricoids. The parasitoids emerge from the host pupa (Baltazar 1964).

The first reports of Korean Metopiinae were made by Uchida (1930). Since then many taxonomists have studied Korean Metopiinae, including Uchida (1955), Kim (1955), Townes et al. (1961), Townes et al. (1965), Momoi (1966), Lee and Cha (2000), Cha and Lee (2000), Cha et al. (2000), Tolkanitz (2007) and Choi et al. (2014). The first records of Korean *Exochus* were by Choi et al. (2014). Four species, *Exochus kusigematii* Tolkanitz, 2007, *Exochus
semilividus Vollenhoven, 1875, *Exochus suborbitalis* Schmiedeknecht, 1924, and *Exochus thomsoni* Schmiedeknecht, 1924, have been reported from South Korea (Choi et al. 2014).

In this study ten new species, *Exochus acostulatus* Lee & Choi, sp. nov., *Exochus adentatus* Lee & Choi, sp. nov., *Exochus areolaris* Lee & Choi, sp. nov., *Exochus carinalis* Lee & Choi, sp. nov., *Exochus dentisternum* Lee & Choi, sp. nov., *Exochus depressus* Lee & Choi, sp. nov., *Exochus nigritulus* Lee & Choi sp. nov., *Exochus occipitalis* Lee & Choi, sp. nov., *Exochus orbitalis* Lee & Choi, sp. nov. and *Exochus propodealis* Lee & Choi, sp. nov., are described. We also report 21 species newly recorded for the South Korean fauna, *Exochus alpinus* (Zetterstedt, 1838), *Exochus antis* Tolkanitz, 2003, *Exochus consimilis* Holmgren, 1858, *Exochus frontellus* Holmgren, 1858, *Exochus gratus* Tolkanitz, 2003, *Exochus lineifrons* Thomson, 1887, *Exochus selenanae* Tolkanitz, 1999, *Exochus argutus* Tolkanitz, 1993, *Exochus britannicus* Morley, 1911, *Exochus destitutus* Tolkanitz, 2003, *Exochus flavomarginatus* Holmgren, 1856, *Exochus gravipes* (Gravenhorst, 1820), *Exochus guttatus* Tolkanitz, 1999, *Exochus lictor* Haliday, 1838, *Exochus mitratus* Gravenhorst, 1829, *Exochus momoi* Tolkanitz, 2007, *Exochus nigrifaciatus* Momoi, Kusigemati & Nakanishi, 1968, *Exochus velatus* Tolkanitz, 2003, *Exochus ventralis* Holmgren, 1858, *Exochus vexator* Tolkanitz, 1993, and *Exochus villoso* Tolkanitz, 2003, and propose a key to the South Korean *Exochus* with photographs.

**Material and methods**

Materials used in this study were collected by sweep and Malaise traps, after which they were deposited in the Animal Systematic Laboratory of Yeungnam University (YNU, Gyeongsan, South Korea). Specimens were examined using an AxioCam MRc5 camera attached to a stereomicroscope (Zeiss SteREO Discovery. V20; Carl Zeiss, Göttingen, Germany), processed using AxioVision SE64 software (Carl Zeiss), and optimized with a Delta imaging system (i-solution, IMT i-Solution Inc. Vancouver, Canada). The terminology for morphological features mostly follows that of Gauld et al. (2002). Distributional data mainly follow Yu et al. (2012).

Abbreviations are used as follows: HU, Hokkaido University, Faculty of Agriculture, Entomological Institute, Sapporo, Japan; IZU, Instytut Zoologiczny Universytetu, Poland. (Gravenhorst collection); KU, Kyushu University, Entomological Laboratory, Fukuoka, Kyushu, Japan. (A. Nakanishi collection); NHM, The Natural History Museum, London, UK; NMI, National Museum of Ireland, Dublin, Ireland; NR, Naturhistoriska Riksmuseet, Sektionen för Entomologi, Stockholm, Sweden; SIZ, Schmalhausen Institute of Zoology, Ukraine; ZI, Zoologiska Institutionen, Sweden; ZIN, Zoological Institute, Academy of Sciences, St Petersburg, Russia; GW, Gangwon-do; GG, Gyeonggi-do; CB, Chungcheongbuk-do; CN, Chungcheonnam-do; GB, Gyeongsangbuk-do; GN, Gyeongsangnam-do; JB, Jeollabuk-do; JN, Jeollanam-do.

**Systematics**

Family **ICHNEUMONIDAE** Latreille, 1802  
Subfamily **METOPIINAE** Förster, 1869  
Genus *Exochus* Gravenhorst, 1829

*Exochus* Gravenhorst, 1829: 328. Type species: *Ichneumon gravipes* Gravenhorst  
*Amesolytus* Förster, 1869: 161. Type species: *Amesolytus ferrugineus* Ashmead  
*Mima* Davis, 1897: 206. Type species: *Mima washingtonensis* Davis
Xanthexochus Morley, 1913: 292. Type species: Xanthexochus scutellatus Morley

Diagnosis. Face strongly convex; upper margin of face produced triangularly between bases of antennal sockets. Malar space usually about 0.5 times as long as basal width of mandible. Mandible tapered toward apex, lower tooth much smaller than upper tooth. Forewing without areolet. Propodeum usually almost completely areolated. Legs stout. Mid and hind tibiae with two spurs, anterior spur shorter than posterior.

Exochus acostulatus Lee & Choi sp. nov.
(Figures 1a, 3a, 6a)

Specimens examined
Holotype: female, type depository: YNU; (South Korea) GW, Donghae-si, Samhwa-dong, Mureung valley (M.T.), 31 May–15 June 2005, leg. J.W. Lee; Paratype: type depository: YNU; 1 female, (South Korea) GB, Uljin-gun, Sangsa-ri, 24 May 1989, J.G. Kim.

Description
Female. Forewing 4.3 mm, body about 5.8 mm long.

Colour. Black. Upper margin of face, two spots between top of eyes and lateral ocelli, a spot on front half of tegula and palpi yellowish; legs orange reddish, tibiae basally orange yellow; flagellum brown ventrally.

Head. Rather transverse and narrowed behind eyes. Temple shorter than transverse diameter of eye (13 : 20). Ocelli small, its diameter 0.7 times distance between lateral ocellus and eye. Frons smooth, with deep V-shaped groove behind base of antennae. Antenna with 30 flagellomeres. First flagellomere 2.0 times as long as wide. Apical half of flagellum with transverse segments. Face almost square, coarsely and densely punctate, distance between punctures less than their diameter. Clypeus not separated from face, weakly concave. Mandible tapered apically. Upper tooth much longer than lower tooth. Malar space 0.75 times as long as basal width of mandible. Occipital carina present only laterally, hypostomal carina rather strong, almost lamelliform.

Mesosoma. Epomia strong, notaulus short but deep. Mesopleuron moderately coarsely and densely punctate, distance between punctures longer than their diameter. Pro- and metapleuron smooth and lustrous, without punctures or setae. Epicnemial carina reaching subtegular ridge. Vein Rs originating from apical half of pterostigma. Vein Rs+M rather strongly curved. Vein Cu-a postfurcal of about 0.3 of its length. Vein cu-a of hindwing weakly inclivous, intercepted in lower third, vein 3Cu not pigmented, but distinct. Hindwing with eight distal hamuli. Legs moderately stout, hind femur 2.4 times as long as wide. Ratio between length of hind tarsal segments 30 : 12 : 10 : 7 : 13. Front spur of mid tibia less than half length of hind spur. Tarsal claws simple. Propodeum without costula. Area basalis not separated from area superomedia by carina. Combined area basalis and superomedia parallel. Area dentipara bare, with some setae in hind outer angle. Propodeal spiracle 2.0 times as long as wide, closer to pleural, than to lateral longitudinal carina.
Metasoma. With fine punctures, more distinct on basal tergites. Median longitudinal carinae extending 0.6 length of tergite 1. Epipleuron of tergite 3 wedge-shaped, basal two-thirds of edge straight. Ovipositor sheath not surpassing tip of metasoma.

Male. Unknown.
**Etymology**
From the absence of the costula on the propodeum.

**Distribution**
South Korea.

**Remarks**
The species is close to *Exochus convergens* Kusigemati, 1971, but differs by its longer malar space, the presence of the occipital carina laterally, yellow spots between the tops of the eyes and lateral ocelli, longer flagellum, bare area dentipara of propodeum, elongate propodeal spiracles, weakly inclivous vein cu-a of hindwing, and in coloration.

*Exochus adentatus* Lee & Choi sp. nov.
(Figures 1b, 3b, 6b)

**Specimens examined**
Holotype: female, type depository: YNU; (South Korea) GW, Wonju-si, Baegun-mycon, Baegunsan, 11 May–12 June 2007, leg. J.W. Lee; Paratype: type depository: YNU; 1 female, JN, Gurye-gun, Gurye-eup, Nogodan, Jirisan National park (M.T.), 2 June–10 October 2001, leg. J.C. Jeong.

**Description**

**Female.** Forewing 6.7 mm, body 8.1 mm long.

**Colour.** Black. Scape and pedicel from below, face, clypeus, malar space, mandible, palpi, whole frontal orbita widely, greater part of outer orbita, a spot on middle of frons, upper margin of pronotum widely, tegula, subtegular edge, a spot on middle of mesoscutum, scutellum and postscutellum entirely, a longitudinal stripe below subtegular edge and legs, except basal two-thirds of hind coxa yellow; flagellum from below and apical light brown.

**Head.** Strongly narrowed behind eyes. Frons moderately concave behind base of antennae. Diameter of ocellus 1.1 times as long as distance between top of eye and lateral ocellus. Antenna with 26–27 flagellomeres. First flagellomere 2.2 times as long as wide, flagellomeres of apical half of antenna square. Temple a little longer than transverse diameter of eye (16 : 15), widened down. Occipital carina weakly developed only laterally, hypostomal carina weak. Face strongly convex transversally (Figure 3b), 1.8 times as wide as high in frontal view. Anterior tentorial pits distinct. Clypeus with straight apical edge. Malar space with shallow furrow, 0.43 times as long as basal width of mandible. Lower tooth of mandible indistinct.

**Mesosoma.** Depressed, 2.1 times as long as high in lateral view. Epomia moderately strong, notaulus presented as small fossa on front 0.2 of mesoscutum. Scutellum flat. Mesopleuron swollen in front half, sternaulus indistinct. Prepectal carina not reaching subtegular edge, obsolescent on upper third of mesopleuron. Hind part of mesosternum not projected back as teeth. Metapleuron shiny with only some setae on hind lower corner. Vein Rs originating from middle of pterostigma. Vein Rs+M strongly curved. Vein Cu-a strongly postfurcal as 0.6 of its
length. Hindwing with seven distal hamuli. Vein cu-a of hindwing inclivous, interrupted in lower 0.25, vein 3Cu distinct. Legs strongly stout. Fore femur 1.8 times, hind femur 1.9 times as long as wide. Ratio between length of hind tarsal segments 23 : 11 : 8 : 6 : 12. Tarsal claws simple. Front spur of mid tibia 0.4 times as long as hind spur. Propodeum with costula weakly developed. Lateromedian longitudinal carinae parallel (Figure 6b). Area dentipara with only a few setae. Area basalis confluent with area superomedia. Propodeal spiracle 2.0 times as long as wide, situated in equal distance between pleural and lateral longitudinal carina. Fore third of justacoxal carina widened and projected as a tooth.

**Metasoma.** Median longitudinal carinae of tergite 1 extending on 0.4 of tergite length. Metasomal tergites sparsely punctured. Tergite 2 0.75 times as long as wide apically. Epipleuron of tergite 3 semicircular, the basal three-quarters of the edge moderately convex. Ovipositor sheath no longer than apical depth of metasoma. Ovipositor gradually pointed to apex.

**Male.** Unknown.

**Etymology**
From indistinct lower tooth of mandible.

**Distribution**
South Korea.

**Remarks**
The species is close to *Exochus firmus* Kusigemati, 1971, but differs by its larger body, indistinct lower tooth of mandible, wider face, strongly curved vein Rs+M in forewing and colour pattern.

**Exochus areolaris** Lee & Choi sp. nov.
(Figures 1c, 3c, 6c)

**Specimens examined**
Holotype: female, type depository: YNU; (South Korea) Seoul, Noweon-gu, Sangve4-dong, Mt Surak, altitude 230 m, 18 July–24 August 2007, leg. J.O. Lim; Paratypes: type depository: YNU. 1 female, GG, Namyangju-si, Songchoan, Mt Ungilsan (M.T.) S.N.U., altitude 99 m, 5–18 September 2009, leg. J.O. Lim; 1 female, GG, Anyang-si, Manan-gu, Gwanak, 5–19 July 2007, J.O. Lim; 1 female, CN, Buyeo-gun, Gyuam-myeon, Sumok-ri, 27 June–12 July 2005, J.W. Lee; 1 female, JN, Naju-si, Dado-myeon, Pungsan-ri, 9–30 September 2005, S.B. Yu.

**Description**
**Female.** Forewing 4.3 mm, body about 5.1 mm long.

**Colour.** Black. Scape from below, face and clypeus entirely, mandible, palpi, malar space, temple widely, frons except space between ocelli, upper third of pronotum, two spots on
the notauli, a large spot behind middle of mesoscutum, scutellum and postscutellum, tegula, subtegular ridge, large longitudinal spot below it, upper 0.25 of metapleuron, pleural area of propodeum, area dentipara of propodeum and legs, except base of hind coxa and trochanter bright yellow; hind tarsal segments red orange; flagellum from below light brown.

**Head.** Strongly narrowed behind eyes. Antenna with 24 flagellomeres, short. First flagellomere only 1.5 times as long as wide, most segments transverse. Frons concave above antennal sockets, prominent in the middle as a process, with longitudinal carina from tip of the process to median ocellus. The distance from the frons process to interantennal process 0.5 times as long as ocellus diameter. The distance between lateral ocellus and eye 1.2 times as long as lateral ocellus diameter. Temple shorter than transverse diameter of eye (13 : 17). Occipital carina developed dorsally and laterally, absent below lower level of eye. Hypostomal carina well developed. Face square, not separated from clypeus, very densely and coarsely punctured, the distance between points much shorter than their diameter. Clypeus apically not punctured. Front tentorial pits distinct. Malar space as long as basal width of mandible. Lower tooth of mandible shorter than upper tooth.

**Mesosoma.** Epomia present, notaulus deep and long, extending to middle of mesoscutum, scutellum flat. Prepectal carina reaching subtegular ridge. Mesopleuron strongly convex below subtegular ridge. Sternaulus weak on front third of mesopleuron. Body covered with silver hairs, metapleuron and lower two-thirds of propodeum without setae, lustrous. Radial *RS* vein originated from middle of pterostigma. Vein *Rs+M* strongly curved. Vein *Cu-a* postfurcal as about 0.5 of its length. Hindwing with seven distal hamuli. Vein *Cu-a* of hindwing distinctly inclivous, intercepted in lower third, vein *Cu1* of hindwing faint. Legs very stout, hind femur 1.9 times as long as wide. Front spur of mid tibia 0.5 times as long as hind spur. Ratio between hind tarsal segments as 22 : 11 : 9 : 7 : 13. Tarsal claws simple. Propodeum with transverse area superomedia (Figure 6c). The carina separated area basalis and area superomedia interrupted in the middle. Apical transverse carina developed between area petiolaris and lateral/pleural area but absent between area superomedia and area petiolaris. Costula absent. Propodeal spiracle 2.0 times as long as wide, situated at equal distance from both lateral longitudinal and pleural carinae. Justacoxal carina very strong, prominent in front as a powerful blunt tooth.

**Metasoma.** Densely and finely punctate. Median longitudinal carinae extending on basal 0.45 of tergite 1. Tergite 2 0.8 times as long as wide apically. Epipleuron of tergite 3 wedge-shaped, basal half of the edge straight. Ovipositor sheath not surpassing tip of metasoma.

**Male.** Unknown.

**Etymology**
From transverse area superomedia (=areola) of propodeum.

**Distribution**
South Korea.
Remarks
The species is close to *Exochus pictus* Holmgren, 1858 and *Exochus rufgaster* Kusigemati, 1971, but differs by its developed above occipital carina, short flagellum and reduced number of flagellomeres, shorter first flagellomere, transverse area superomedia of propodeum, not developed costula, longer forespur of mid tibia, very stout legs and colour pattern.

*Exochus carinalis* Lee & Choi sp. nov.
(Figures 1d, 3d, 6d)

Specimens examined
Holotype: female, type depository: YNU; (South Korea) GB, Gyeongsan-si, Dae-dong, Yeungnam Univ., 18 May 1989, E.A. Hong; Paratype: type depository: YNU; (Korea) 1 male, GB, Gyeongsan-si, Dae-dong, Yeungnam Univ., 31 May 1988, J.H. Kwon.

Description
Female. Forewing 6.3 mm, body 7.6 mm. long.

Colour. Black. Upper third of face, scape from below, couple of triangle spots between top of eyes and lateral ocelli, front half of tegula, basal half of mandible, palpi, fore and mid legs, hind coxa and trochanter from below, hind tibia basally and laterally and basal 1–4 tarsal segments yellow; fore and mid femur from behind and hind femur red orange; hind half of tegula and hind tibia apically infuscate; flagellum from below brown.

Head. Distinctly narrowed behind eyes. Frons concave behind antennal sockets, with tubercle in front of middle ocellus against interantennal process. Antenna with 36 flagellomeres. First flagellomere 2.2 times as long as wide, all segments elongated. Ocellus large, its diameter 1.1 times as long as distance between eye and lateral ocellus. Temple almost as long as transverse diameter of eye. Clypeus not separated from face. Front tentorial pits not visible. Combined face and clypeus almost square. Occipital carina entirely absent. Hypostomal carina high, lamelliform. Malar space 0.7 times as long as basal width of mandible. Lower tooth of mandible visible only as a trace. Face very coarsely punctate, the distance between points much shorter than their diameter. Clypeus more sparsely punctate. Frons with moderately coarsely punctate, temple more finely punctate.

Mesosoma. Epomia weak, notauleus shallow. Prepectal carina reaching subtegular ridge. Mesopleuron strongly convex, sternauleus not developed. Radial vein originated from middle of pterostigma. Vein Rs+M moderate strongly curved. Vein Cu-a interstitial. Hindwings with eight distal hamuli. Vein cu-a of hindwing weakly inclivous, intercepted in lower 0.2, vein Cu1 of hindwing faint. Legs moderately stout, hind femur 2.3 times as long as wide. Ratio between length of hind tarsal segments as 35 : 20 : 15 : 12 : 22. Front spur of mid tibia 0.55 times as long as hind spur. Tarsal claws simple. Propodeum fully areolated with very strong carinae. Area basalis separated from area superomedia by carina. Costula present, originated from front 0.2 of area superomedia. Area dentipara with few long setae on its hind outer angle. Justacoxal carina widened in front as a lamella. Metapleuron with setae on lower half. Propodeal spiracle almost 2.7 times as long as wide, touching pleural carina.
**Metasoma.** Median longitudinal carinae strong, extending little behind middle of tergite 1. Tergite 2 0.6 times as long as wide apically. Epipleuron of tergite 3 wedge-shaped, the basal three-quarters of edge slightly concave. Metasomal tergites with fine punctures basally.

**Male.** Corresponds well with female.

**Etymology**
From fully carinated propodeum.

**Distribution**
South Korea.

**Remarks**
The species is close to *Exochus nigrifaciatus* Momoi, Kusigemati & Nakanishi, 1968, but differs by its smaller number of flagellomeres, longer first flagellomere, area basalis separated from area superomedia by carina, shorter second metasomal tergite, longer hind femur, body size and coloration of the body.

**Exochus dentisternum** Lee & Choi sp. nov.  
(Figures 1e, 3e, 6e)

**Specimens examined**
Holotype: male, type depository: YNU; (South Korea) GW, Hongcheon-gun, Bukbang, Gwangwon Prov. Environment Research Park, 15–30 May 2012, leg. S.J. Jang.

**Description**

**Male.** Forewing 3.5 mm, body 4.5 mm long.

**Colour.** Black. Upper half of face, scape from below, a couple of lateral spots on clypeus, mandible, palpi, tegula, tip of scutellum, apex of femora, base of tibiae and tarsal segments except last one yellow; legs reddish; flagellum from below light brown.

**Head.** Moderately narrowed behind eyes. Frons weakly concave behind base of antennae. Antenna with 23 flagellomeres. First flagellomere 2.5 times as long as wide, second flagellomere square. All other flagellomeres elongated. Diameter of ocellus as long as distance between eye and lateral ocellus. Temple 0.7 times as long as transverse diameter of eye. Occipital carina present only laterally. Face rather strongly convex longitudinally (Figure 3e). Front tentorial pits not visible. Combined face and clypeus 1.2 times as high as wide, coarsely and densely punctate, the distance between points shorter than their diameter. Malar space with not deep furrow, 0.62 times as long as basal width of mandible. Apical margin of clypeus straight. Lower tooth of mandible much shorter than upper tooth, but distinct.

**Mesosoma.** 1.6 times as long as high in lateral view. Epomia moderately strong, notaulus present as a small pit on front part of mesoscutum. Scutellum and
mesopleuron rather swollen. Prepectal carina reaching subtegular ridge. Hind margin of mesosternum projected backward as a couple of teeth. Sternaulus distinct on front third of mesopleuron without any setae. Radial vein of forewing originated from middle of pterostigma. Vein Rs+M gradually curved. Vein Cu-a postfurcal as 0.5 of its length. Hindwing with five distal hamuli. Vein cu-a of hindwing intercepted in lower 0.25, vein Cu1 of hindwing faint. Propodeum fully areolated. Area basalis confluent with area superomedia. Combined area superomedia and area basalis convergent in front (Figure 6e). Area dentipara with few long setae on hind outer corner. Propodeal spiracle 2.0 times as long as wide, situated a little closer to pleural than to lateral longitudinal carina. Front half of justacoxal carina widened as a lamella. Legs moderately stout, hind femur 2.2 times as long as wide, ratio between length of hind tarsal segments as 22 : 10 : 8 : 5 : 10. Front spur of hind tibia 0.5 times as long as hind spur.

**Metasoma.** Median longitudinal carinae of tergite 1 extending to 0.6 of its length. Tergite 2 0.7 times as long as wide apically. Metasomal tergites moderately coarsely and densely punctate, the distance between points longer than their diameter. Epipleuron of tergite 3 semicircular, the basal three-quarters of edge moderately strongly curved.

**Female.** Unknown.

**Etymology**
From mesosternum projected backward as couple of teeth.

**Distribution**
South Korea.

**Remarks**
The species is close to *Exochus bicoloripes* Kusigemati, 1971, but differs by its longer malar space, lower number of flagellar segments, presence of costula, elongated propodeal spiracle, metanotum without any setae and coloration of the body.

*Exochus depressus* Lee & Choi sp. nov. (Figures 1f, 3f, 6f)

**Specimens examined**
Holotype: female, type depository: YNU; (South Korea) GG, Namyangju-si, Choan-myeon, Songchon-ri, Mt Ungilsan (M.T.), altitude 134 m, 1–26 May 2009, leg., J.O. Lim.

**Description**
**Female.** Forewing 3.3 mm, body 4.8 mm long.

**Colour.** Black. Antenna from below, interantennal process, two spots laterally of antennal base, two spots between top of eyes and lateral ocelli, palpi, front half of tegula, hind upper corner of pronotum, subtegular ridge, femora apically, tibiae except base and
apex, tarsal segments except last one of hind legs and subgenital plate apically yellow; femora reddish.

**Head.** Roundly narrowed behind. Frons V-shaped concave behind antennal sockets, ocellar area convex. Interantennal process long, extending above base of antennae. Antenna with 24 flagellomeres, short. First flagellomere 1.8 times as long as wide, the reminder flagellomeres transverse. Occipital carina not developed. Hypostomal carina not high. Face strongly convex tranversely (Figure 3f). Temple shorter than transverse diameter of eye (13 : 16), not narrowed down. Front tentorial pits not indicated. Combined face and clypeus square. Apical ridge of clypeus weakly arched, in the middle third almost truncate. Malar space with shallow furrow, 0.6 times as long as basal width of mandible. Lower tooth of mandible much shorter than upper tooth.

**Mesosoma.** Depressed, 2 times as long as high in lateral view (Figure 1f). Epomia present, notaulus short but deep, extending on front 0.2 of mesocutum length. Scutellum flat. Mesopleuron strongly swollen below subtegular ridge, sternaulus not developed. Prepectal carina almost reaching subtegular ridge. Hind middle part of mesosternum projected as a couple of teeth each lateral of mesosternal suture. Metapleuron smooth and lustrous, with some setae in hind lower corner. Radial vein of forewing originated a little before middle of pterostigma. Vein Cu-a postfurcal as 0.5 of its length. Hindwing with six distal hamuli. Vein cu-a of hindwing inclivous, intercepted on its 0.25. Legs stout. Hind femur 2.1 times as long as wide. Ratio between length of hind tarsal segments as 19 : 9 : 7 : 5 : 11. Front spur of mid tibia 2 times shorter than hind spur. Tarsal claws simple. Propodeum without costula. Area superomedia weakly convergent basally. Area basalis not separated from area superomedia by carina (Figure 6f). Area dentipara haired basally and with some setae laterally. Propodeal spiracle 2.0 times as long as wide, closer to pleural than to lateral longitudinal carina.

**Metasoma.** Tergite 1 with short median longitudinal carinae, not reaching its middle. Tergite 2 0.85 times as long as wide apically, with transverse depression basally. Epipleuron of tergite 3 semicircular with basal three-quarters of edge strongly convex. Ovipositor not surpassing tip of metasoma, gradually tapered to apex.

**Male.** Unknown.

**Etymology**
From strongly depressed mesosoma.

**Distribution**
South Korea.
**Remarks**
The species is close to *Exochus latifasciatus* Kusigemati, 1971, but differs by body size, longer face, shorter antenna and first flagellomere, smaller number of flagellomeres, entirely absent costula and coloration of the body.

*Exochus nigritulus* Lee & Choi sp. nov.
(Figures 2a, 3g, 6g)

**Specimens examined**
Holotype: female, type depository: YNU; (South Korea) GN Hadong-gun, Hwagae-myeon, Beumwang-ri, Jirisan, Chilbulam, 20 May 1989, J.G. Kim.

**Description**
**Female.** Forewing 3.8 mm, body length 5.0 mm long.

**Colour.** Body including space between lateral ocellus and eye black; legs orange-reddish, hind femur apically, hind tibia basally and hind tarsal segments apically weakly

*Figure 2.* Habitus of holotype in lateral view. (a) *Exochus nigritulus* Lee & Choi, sp. nov.; (b) *Exochus occipitalis* Lee & Choi, sp. nov.; (c) *Exochus orbitalis* Lee & Choi, sp. nov.; (d) *Exochus propodealis* Lee & Choi, sp. nov. Scale bar = 1 mm.
darkened; hind tibia yellow on the middle, more intensively darkened apically; flagellum from below and tegula brown.

**Head.** Transverse, moderately narrowed behind eye. Antenna with 29 flagellomeres, first flagellomere 2.5 times as long as wide, apical segments except last one square. Frons polished, with sparse and fine punctures. Diameter of ocellus as long as distance between lateral ocellus and eye. Occipital carina weak, absent from above and from below. Temple weakly shorter than transverse diameter of eye (15 : 17). Face moderately convex transversally, coarsely and densely punctured, the distance between punctures shorter than their diameter. Clypeus not separated from the face, with straight apical edge. Mandible tapered to apex, lower tooth much shorter than upper tooth. Malar space 0.62 times as long as basal width of mandible.

**Mesosoma.** 1.8 times as long as high in lateral view. Notaulus short but deep. Scutellum rather flat. Prepectal carina reach subtegular ridge. Pronotum and metapleuron smooth and bright, without setae or punctures. Vein *Rs* originating weakly from middle of pterostigma. Vein *Cu-a* postfurcal about half of its length. Vein *cu-a* of hindwing inclivous, intercepted in lower 0.25, vein *Cu1* of hindwing faint. Hindwing with six distal hamuli. Legs moderately stout, hind femur 2.4 times as long as wide. Correlation between hind tarsal segments as 26 : 12 : 10 : 8 : 11. Front spur of middle tibia much shorter than hind spur. Tarsal claws simple. Propodeum without area superomedia. Area externa with hair; area superomedia and dentipara sparse hair. Area superomedia not separated from area basalis with carina, glabrous. Combined area superomedia and area basalis tapered from costula to base (Figure 6g). Area superomedia weakly wider than area dentipara. Area dentipara with long setae on hind outer angle. Propodeal spiracle 2.0 times as long as wide, closer to pleural carina than to lateral longitudinal carina.

**Metasoma.** Rather coarsely punctured on tergite 1, more finely punctured apically. Median dorsal carinae of tergite 1 reach its middle. Epipleuron on tergite 3 semicircular, basal three-quarters of mesal edge being strongly convex. Ovipositor sheath scarcely exposed behind tip of metasoma.

**Etymology**
The specific name is derived from black area (absence of yellow spots) between eye and lateral ocellus.

**Distribution**
South Korea.

**Remarks**
The species is similar to *Exochus kusigemati*ii Tolkienitz (= *E. erythropus* Kusigemati 1971), but it differs by the following characters: smaller number of flagellar segments, straight apical margin of clypeus, absence of yellow spots on the top of eyes, more slender hind femur and coloration of the body.
Exochus occipitalis Lee & Choi sp. nov.
(Figures 2b, 3h, 6h)

Specimens examined
Holotype: female, type depository: YNU; (South Korea) GW, Hongcheon-gun, Bukbong, Environment Research Park, 15–29 June 2009, leg. S.J. Jang.

Description
Female. Forewing 3.6 mm, body 4.3 mm long.

Colour. Black. Upper 0.25 of face, a couple small spots between top of eye and lateral ocelli, palpi, tegula, femora apically, tibiae basally and tarsal segments yellow; flagellum from below, mandible and legs reddish.

Head. Roundly narrowed behind eyes. Frons concave in lower third, with longitudinal carina in concave part. Diameter of ocellus almost as long as distance between eye and lateral ocellus. Antenna with 24 flagellomeres. First flagellomere 2.25 times as long as wide, all segments elongated. Temple shorter than transverse diameter of eye. Face rather strongly convex longitudinally (Figure 3h). Combined face and clypeus 1.3 times as high as wide. Malar space with distinct furrow, almost as long as basal width of mandible. Occipital carina entirely absent.

Mesosoma. 1.6 times as long as high in lateral view. Epomia developed, notaulus deep, extending on front third of mesoscutum. Scutellum and mesopleuron moderately swollen. Prepectal carina strong, reaching subtegular ridge. Sternaulus weak and short. Metapleuron smooth and shining, without any setae. Justacoxal carina lamelliform, almost not widened in front. Vein Rs in forewing originated from middle of pterostigma. Vein Rs+M regularly curved. Vein Cu-a postfurcal at 0.5 of its length. Hindwing with five distal hamuli. Vein cu-a of hindwing intercepted in its lower 0.3, vein Cu1 of hindwing indistinct. Legs moderately stout, hind femur 2.4 times as long as wide. Ratio between length of hind tarsal segments as 25 : 11 : 9 : 6 : 10. Tarsal claws simple. Spurs of middle tibia long, front spur 0.5 times as long as hind one. Propodeum fully areolated, costula present (Figure 6h). Area basalis not separated from area superomedia by carina. Area dentipara haired in greater part. Propodeal spiracle 2.0 times as long as wide, much closer to pleural than to lateral longitudinal carina.

Metasoma. Tergite 1 with short median longitudinal carinae, extending on its basal 0.4. Tergite 2 0.75 times as long as wide. Epipleuron of tergite 3 semicircular, the basal three-quarters of edge strongly convex. Ovipositor sheath as long as apical depth of metasoma.

Male. Unknown.

Etymology
From entirely absent occipital carina.
**Distribution**

South Korea.

**Remarks**

The species is close to *Exochus ventralis* Holmgren, 1858, but differs by not widened flagellum and elongated flagellomeres, not widened backward metasoma, more slender legs and coloration of the body.

*Exochus orbitalis* Lee & Choi sp. nov.

(Figures 2c, 3i,6i)

**Specimens examined**

Holotype: female, type depository: YNU; (South Korea) CB, Dangyang-gun, Danyang-eup, Cheondong-ri, Mt Sobeak birobong, 22 May 1987 (M.T.), leg. J.W. Lee.

**Description**

**Female.** Forewing 3.5 mm, body 4.4 mm long.

**Colour.** Black. Interantennal process, two spots laterally of antennae base, two spots between top of eyes and lateral ocelli, palpi, a spot on front half of tegula, unclear spot before base of hind tibia and basal half of last tarsal segment of hind leg yellow; hind part of tegula, flagellum from below and apically brown; legs reddish, coxae basally and hind tibia except base infuscate.

**Head.** Transverse, distinctly narrowed behind eyes. Frons smooth and concave above antennal sockets. Antenna with 25 flagellomeres. First flagellomere as seen from above curved outside, thin in the base, widened apically, 2.0 times as long as apical width, all flagellomeres elongated. Ocellus small, its diameter 0.8 times as long as distance between eye and lateral ocellus. Temple 0.7 times as long as transverse diameter of eye. Occipital carina absent dorsally. Inner face orbitae convergent down. Clypeus not separated from face, with straight apical ridge. Front tentorial pits not visible. Combined face and clypeus square. Malar space with distinct furrow, 0.75 times as long as basal width of mandible. Face moderately coarsely and densely punctate, clypeus with more sparse and larger points.

**Mesosoma.** Epomia present, notaulus moderately deep, extending on front 0.25 of mesoscutum. Prepectal carina reaching subtugal ridge. Mesopleuron moderately convex below subtugal ridge, sternaulus not indicated. Metapleuron smooth and shiny, without setae. Radial vein originated from middle of pterostigma. Vein *Rs+M* rather strongly curved. Vein *Cu-a* inclivous, postfurcal at about 0.5 of its length. Parallel vein connected postnervulus below middle. Hindwing with six distal hamuli. Vein *cu-a* of hindwing almost vertical, intercepted in lower third, vein *Cu1* of hindwing faint. Legs stout, hind femur 2.1 times as long as wide. Ratio between length of hind tarsal segments as 22 : 11 : 10 : 6 : 10. Front spur of mid-tibia 0.5 times as long as hind spur. Tarsal claws simple. Propodeum fully areolated, area basalis not separated from area superomedia by carina (Figure 6i). Lateromedian longitudinal carinae
subparallel, weakly convergent from costula to base of propodeum. Area superomedial narrower from area dentipara, the last with some setae on hind outer angle. Propodeal spiracle almost 2.0 times as long as wide, closer to pleural than to lateral longitudinal carina.

**Metasoma.** Median longitudinal carinae reaching middle of tergite 1. Tergite 2 0.9 times as long as wide apically. Metasomal tergites moderately densely and finely punctured, the distance between points longer than their diameter. Epipleuron of tergite 3 wedge-shaped with straight edge.

**Male.** Unknown.

**Etymology**
From face orbits ventrally convergent.

**Distribution**
South Korea.

**Remarks**
The species is close to *Exochus convergens* Kusigemati, 1971, but differs by its clypeus with straight apical margin, longer malar space, presence of occipital carina laterally, number of flagellomeres, shorter first flagellomere, presence of costula, shorter hind femur and coloration of the body.

*Exochus propodealis* Lee & Choi sp. nov.
(Figures 2d, 3j, 6j)

**Specimens examined**
Holotype: female, type depository: YNU; (South Korea) GW, Hongcheon-gun, Bukbong, Environment Research Park, 15–30 May 2012, leg. S.J. Jang.

**Description**
**Female.** Forewing 4.8 mm, body 6.6 mm long.

**Colour.** Black. Flagellum from below yellow orange; couple small spots between top of eyes and lateral ocelli, palpi, narrow transverse stripe in upper part of face and front half of tegula yellow; legs red orange, coxae, trochanters and metasomal tergites apically dark brown.

**Head.** Distinctly narrowed behind eyes. Frons V-shaped concave above base of antennal sockets. Antenna with 29 flagellomeres. First flagellomere 2.2 times as long as wide, the segments on apical two-thirds of flagellum transverse. Occipital carina present only laterally. Hypostomal carina moderately high. Face moderately strongly convex. Front tentorial pits not indicated. Clypeus with apical ridge weakly concave in the middle. Combined face and clypeus 1.1 times as wide as high in frontal view, densely and
coarsely punctate, the distance between points shorter than their diameter. Malar space without furrow, 0.6 times as long as basal width of mandible. Lower tooth of mandible much shorter than upper tooth, but well visible.

**Mesosoma.** 1.7 times as long as high in lateral view. Epomia weak, notauli indicated only as small pits. Mesopleuron moderately swollen below subtegular ridge. Prepectal carina reaching subtegular ridge. Hind part of mesosternum projected as a pair teeth along mesosternal suture. Metapleuron smooth and lustrous with some setae on hind corner. Front half of justacoxal carina widened and projected in front as a tooth. Radial vein originated a little behind middle of pterostigma. Vein $Rs+M$ strongly curved. Vein $Cu-a$ weakly postfurcal at about 0.3 of its length. Parallel vein connected with postnervulus in its lower third. Hindwing with seven distal hamuli. Vein $cu-a$ of hindwing almost vertical, vein $Cu1$ of hindwing distinct. Legs moderately stout, hind femur 2.3 times as long as wide. Ratio between length of hind tarsal segments as 27 : 12 : 8 : 7 : 14. Front tibial spur of mid legs 0.5 times as short as hind spur. Tarsal claws simple. Propodeum without costula (Figure 6j). Apical transverse carina in the middle and lateromedian longitudinal carinae limiting area superomedia laterally obsolete. Apical and lateral part of area dentipara haired. Propodeal spiracle 2.0 times as long as wide, closer to pleural than to lateral longitudinal carina.

**Metasoma.** Median longitudinal carinae on tergite 1 extending on its basal 0.4. Glymma deep. Second tergite concave in the base, 0.8 times as long as wide apically. Epipleuron of tergite 3 semicircular, the basal three-quarters of edge being regularly convex. Ovipositor shorter than apical depth of metasoma.

**Male.** Unknown.

**Etymology**
From propodeum with obsolete lateromedian longitudinal carinae and middle part of apical transverse carina.

**Distribution**
South Korea.

**Remarks**
The species is close to *Exochus bicoloripes* Kusigemati, 1971, but differs by smaller size of the body, lower number of flagellomeres, longer first flagellomere, obsolescent lateromedian longitudinal carinae and middle part of apical transverse carina, strongly curved vein $Rs+M$ and coloration of the body.

*Exochus alpinus* Zetterstedt, 1838
(Figures 3k, 6k)

*Bassus alpinus* Zetterstedt, 1838: 358–408. Type: female; Type depository: ZI.
**Specimens examined**

(South Korea) 1 female, GB, Gyeongsan-si, Daehak-ro, Yeungnam Univ., 30 August–25 October 2013, J.W. Lee; 1 female, GB, Kyeongju-si, Hyeongok-myeon, Namsa-ri, 18–25 August 2005, J.T. Mun.

*Figure 3.* Head in frontal view. (a) *Exochus acostulatus* Lee & Choi, sp. nov.; (b) *Exochus adentatus* Lee & Choi, sp. nov.; (c) *Exochus areolaris* Lee & Choi, sp. nov.; (d) *Exochus carinalis* Lee & Choi, sp. nov.; (e) *Exochus dentisternum* Lee & Choi, sp. nov.; (f) *Exochus depressus* Lee & Choi, sp. nov.; (g) *Exochus nigritulus* Lee & Choi, sp. nov.; (h) *Exochus occipitalis* Lee & Choi, sp. nov.; (i) *Exochus orbitalis* Lee & Choi, sp. nov.; (j) *Exochus propodealis* Lee & Choi, sp. nov.; (k) *Exochus alpinus*; (l) *Exochus antis*. Scale bar = 0.2 mm.
Diagnosis
Female. Forewing 5.5 mm, body 6.0 mm long.
Face, mandible and malar space yellow (Figure 3k). Vertex with large triangular yellow marks. Yellow triangular marks and yellow inner orbits confluent. Antenna with 28 flagello-
meres; antenna ventrally yellowish brown and dorsally dark blackish brown. Mesosoma black. Upper corner of pronotum and upper margin of mesopleuron yellow. Scutellum flat and mostly black, posterior margin yellow. Propodeum with lateromedian longitudinal carinae and costula; area basalis and area superomedia not separated by carina (Figure 6k). Fore and mid legs yellow. Hind coxa reddish yellow, hind leg yellow, hind tibia with black band apically. Forewing vein cu-a distad of Rs+M. 2rs-m shorter than abscissa of M between 2rs-m and 2 m-cu. Vein cu-a of forewing intercepted at lower third, vein Cu1 of hindwing present. Area between median longitudinal carinae of tergite 1 glabrous. Median area of tergite 2 glabrous. Epipleuron of third metasomal tergite semicircular.

Distribution
South Korea (new record), Finland, Germany, Hungary, Kazakhstan, the Netherlands, Norway, Poland, Russia, Slovakia, Sweden, Ukraine, United Kingdom.

Exochus antis Tolkanitz, 2003
(Figures 3l, 6l)

Exochus antis Tolkanitz, 2003: 1075–1085. Type: female; Type depository: ZIN.

Specimens examined
(South Korea) 1 female, GB, Cheongdo-gun, Unmun-myeon, Haksodaepokpo, 12 May–8 June 2013, J.W. Lee.

Diagnosis
Female. Forewing 4.0 mm, body 5.0 mm long.
Face and malar space black. Line of angular projection between antennal sockets yellow (Figure 3l). Mandible yellow. Vertex with small yellow spots. Yellow spots of on the vertex and yellow inner orbits not confluent. Antenna with 31 flagello-
eres; antenna blackish brown. Mesosoma black. Scutellum flat and black. Propodeum with lateromedian long-
itudinal carinae, without costula; area basalis and area superomedia not separated by carina (Figure 6l). All legs yellow to reddish brown. Vein Cu-a of forewing distad of vein Rs+M. Vein 2rs-m as long as vein between 2rs-m and 2 m-cu. Vein cu-a of hindwing intercepted at lower part, vein Cu1 of hindwing vestigial. Area between median longitudinal carinae of tergite 1 glabrous. Median area of tergite 2 glabrous. Epipleuron of third tergite wedge-shaped.

Distribution
South Korea (new record), Russia.

Exochus argutus Tolkanitz, 1993
(Figures 4a, 7a)

Exochus argutus Tolkanitz, 1993: 106–120. Type: male; Type depository: SIz.
Specimens examined
(South Korea) 1 male, GN Gajisan, 28 June 1989, J.G. Kim.

Diagnosis
Male. Body length 9.0 mm. Antenna with 38 flagellomeres.
Head strongly convex, upper face with projection (Figure 4a); between antennal sockets with vertical ridge; dorsal margin of eyes with triangular yellow spots. Malar space black. Pronotum glabrous except sub-upper area, strongly sunken; epomia absent. Scutellum and postscutellum black. Propodeum with area superomedia (Figure 7a); area externa with hair; area superomedia and area dentipara with sparse hairs; spiracle of propodeum oval; metapleuron glabrous. Vein cu-a of hindwing intercepted at lower 0.3, with vein Cu1. Tergite 1 with distinct dorsal longitudinal carina, reach central area of tergite 1, weak up-curve in basal area, median area of tergite 1 without hair. Tergite 3 with epipleuron wedge-shaped, the basal part straight or weakly convex.

**Distribution**
South Korea (new record), Belarus, Mongolia, Russia, Ukraine.

*Exochus britannicus* Morley, 1911
(Figures 4b, 7b)

*Exochus britannicus* Morley, 1911: 1–344. Type: male; Type depository: NHM.

**Specimens examined**
(South Korea) 1 male, GW Inje-gun, Bangdaesan, Maehwa-dong, 26 June 1996, J.W. Lee; 1 male, GG Eljeongbu-si, Sanghowon, 11 June 1998, C.Y. Yoon.

**Diagnosis**
*Male.* Body length 8.0–8.5 mm. Antenna with 39 flagellomeres. Head strongly convex, upper face with long projection and recurved; between antennal sockets with vertical ridge; dorsal margin of eyes with triangular yellow spots; margin between antennal sockets and eye yellow. Malar space yellow (Figure 4b). Pronotum sunken and glabrous except sub-upper area; epomia absent. Scutellum and postscutellum yellow. Propodeum without area superomedia, area basalis and area superomedia not separated from carina (Figure 7b); area externa sparsely punctate with hairs; area superomedia and area dentipara glabrous; spiracle of propodeum oval, not connected pleural carina; metapleuron with sparse hairs. Vein cu-a of hindwing intercepted at lower 0.3, with vein Cu1. Tergite 1 with distinct dorsal longitudinal carinae, reach central area of tergite 1, upcurved in basal area; between dorsal longitudinal carinae glabrous. Tergite 3 with epipleuron semicircular.

**Distribution**
South Korea (new record), Hungary, Kazakhstan, Moldova, Poland, Romania, Russia, Turkey, Turkmenistan, Ukraine, United Kingdom.

*Exochus consimilis* Holmgren, 1858
(Figures 4c, 7c)

*Exochus consimilis* Holmgren, 1858: 305–394. Type: unknown; Type depository: unknown. *Exochus parvispina* Thomson, 1887: 193–218. Type: unknown; Type depository: ZI.
Exochus decoloratus Schmiedeknecht, 1924: 103–112. Type: unknown; Type depository: Germany.

Exochus subalpinus Schmiedeknecht, 1924: 103–112. Type: unknown; Type depository: Germany.

Specimens examined
(South Korea) 2 males, GW, Goseong-gun, Ganseong-eup, Heyangro-bong, 13 May 1992, S.M. Ryu; 1 male, CB, Danyang-gun, Danyang-eup, Cheongdong-ri, Cheongdong valley, 19–30 April 2007, J.W. Lee.

Diagnosis
Male. Forewing 4.5 mm, body 6.5 mm long. Face, mandible and malar space black. Line of angular apophysis between antennal sockets yellow (Figure 4c). Vertex with small yellow spots. Antenna with 29 flagellomeres; ventral part of antenna yellowish brown and dorsal part of antenna dark blackish brown. Mesosoma black. Scutellum convex and black. Propodeum with lateromedian longitudinal carinae and costula (Figure 7c); area basalis and area superomedia separated by carina. All coxae black. Legs reddish brown to brown. Vein Cu-a of forewing distad of vein Rs+M. Vein 2rs-m as long as vein between 2rs-m and 2m-cu. Vein cu-a of hindwing intercepted at the middle, vein Cu1 of hindwing vestigial. Area between median longitudinal carinae of tegrite 1 glabrous. Tergite 2 finely punctate. Epipleuron of third tegrite wedge-shaped.

Distribution
South Korea (new record), Austria, Belarus, Belgium, Bulgaria, Czech Republic, Finland, France, Georgia, Germany, Greenland, Hungary, Kazakhstan, Latvia, Lithuania, Moldova, Mongolia, the Netherlands, Norway, Poland, Romania, Russia, Spain, Sweden, Tunisia, Turkey, Ukraine, United Kingdom.

Exochus destitutus Tolkanitz, 2003
(Figures 4d, 7d)

Exochus destitutus Tolkanitz, 2003: 1211–1214. Type: female; Type depository: ZI.

Specimens examined
(South Korea) 1 male, GW Inje-gun, Bangdaesan, Maehwa-dong, 26 June 1996, J.W. Lee; 1 male, GG Eljeongbu-si, Sanghowon, 11 June 1998, C.Y. Yoon.

Diagnosis
Male. Body length 4.0–4.8 mm. Antenna with 21 flagellomeres. Head convex, upper face with long projection; between antennal sockets without vertical ridge; dorsal margin of eyes with triangular yellow spots connected to margin between antennal socket and eye. Face, mandible and malar space yellow (Figure 4d). Pronotum weakly sunken and glabrous except sub-upper area; epomia absent. Scutellum and postscutellum yellow. Propodeum smooth without area superomedia, lateromedian longitudinal carinae incomplete and apical transverse carina absent; area
externa with hairs and area dentipara glabrous (Figure 7d); spiracle of propodeum small and oval, not connected to pleural carina; metapleuron glabrous. Vein \(cu-a\) of hindwing intercepted at lower 0.3, without vein \(Cu1\). Tergite 1 with very weak dorsal longitudinal carina, not reaching central area of tergite 1, dorsal longitudinal carinae almost parallel; median area of tergite 1 and median longitudinal area of tergite 2 without hair; tergite 3 with epipleuron semicircular.

**Distribution**
South Korea (new record), Russia.

*Exochus flavomarginatus* Holmgren, 1856
(Figures 4e, 7e)

*Exochus flavomarginatus* Holmgren, 1856: 75. Type: male, lost.

**Specimens examined**
(South Korea) 1 male, GB Gyongsan-si, Yeungnam Univ., 22 May 1990, J.R. Lee; 1 male, GN Mylyang-si, Cheonhwangsan Sajapyeong, 23 June 1989, J.K. Kim; 1 male, GN Hapcheon-gun, Haeinsa, 15 May 1987.

**Diagnosis**
**Male.** Body length 5.0–7.5 mm. antenna with 36 flagellomeres. Head strongly convex, upper face with long projection and recurved; between antennal sockets with vertical ridge; dorsal margin of eyes with small triangular yellow spots. Malar space black (Figure 4e). Pronotum weak sunken. Scutellum and postscutellum black, partly dark brown. Propodeum with area superomedia but sometimes indistinct (Figure 7e); area externa with hair; area superomedia and area dentipara without hair; spiracle of propodeum oval, not connected pleural carina; metapleuron glabrous. Vein \(cu-a\) of hindwing intercepted at lower 0.3, with vein \(Cu1\) of hindwing trace. Tergite 1 with dorsal longitudinal carina, reach over at central area of tergite 1, upcurved in basal area; between dorsal longitudinal carinae without hair. Tergite 3 with epipleuron wedge-shaped, the basal part not convex.

**Distribution**
South Korea (new record), Austria, Azerbaijan, Belgium, Czech Republic, Finland, France, Georgia, Germany, Hungary, Ireland, Italy, Japan, Lithuania, Moldova, Mongolia, the Netherlands, Norway, Poland, Romania, Russia, Spain, Sweden, Turkey, Ukraine, United Kingdom.

*Exochus frontellus* Holmgren, 1858
(Figures 4f, 7f)

*Exochus frontellus* Holmgren, 1858: 305–394. Type: unknown; Type depository: unknown. *Exochus shimamatsensis* Kusigemati, 1971: 205–298. Type: female; Type depository: HU.
**Specimens examined**
(South Korea) 1 female, GG, Anyang-si, Naman-gu, Gwanak, 5–19 July 2007, J.O. Lim; 1 female, GB, Andong-si, Imdong-myeon, Gocheon-ri, Aegisan, 16 August 1997, J.W. Lee; 1 female, CB, Cheongwon-si, Miwon-myeon, Miwon-ri, 9–16 September 2008, J.H. Han.

**Diagnosis**

**Female.** Forewing 3.5 mm, body 4.5 mm long.
Face, mandible and malar space yellow (Figure 4f). Vertex with large triangular yellow marks. Yellow triangular marks and yellow inner orbits confluent. Antenna with 21 flagellomeres; ventral part of antenna yellowish brown and dorsal part of antenna dark blackish brown. Mesosoma black. Upper margin of pronotum and mesopleuron yellow. Scutellum flat and black. Propodeum with lateromedian longitudinal carinae and costula; area basalis and area superomedia separated by carina (Figure 7f). Legs yellow except hind coxa reddish brown. Vein Cu-a of forewing distad of vein Rs+M. Vein 2rs-m shorter than vein between 2rs-m and 2 m-cu. Vein cu-a of hindwing intercepted at lower part, vein Cu1 of hindwing vestigial. Area between median longitudinal carinae of tergite 1 glabrous. Tergite 2 finely punctate. Epipleuron of third metasomal tergite semicircular.

**Distribution**
South Korea (new record), Austria, Germany, Hungary, Japan, Romania, Russia, Sweden, Ukraine, United Kingdom.

**Exochus gratus** Tolkanitz, 2003
(Figures 4g, 7g)

*Exochus gratus* Tolkanitz, 2003: 1075–1085. Type: female; Type depository: ZIN.

**Specimens examined**
(South Korea) 1 male, GB, Cheongdo-gun, Unmun-myeon, Unmunsan U2, 30 May–16 June 2009, J.W. Lee.

**Diagnosis**

**Male.** Forewing 3.0 mm, body 3.5 mm long.
Face dark brown and upper part of face yellow (Figure 4g). Mandible yellow and malar space dark brown. Vertex with small circular yellow spots. Antenna with 20 flagellomeres; antenna dark blackish brown. Mesosoma black. Upper margin of pronotum dark brown. Scutellum almost flat and black. Propodeum without costula and lateromedian longitudinal carinae incomplete (Figure 7g); area basalis and area superomedia not separated by carina. Fore and mid legs brown to dark reddish brown. Hind leg reddish brown to dark brown, tibia with black band apically. Vein Cu-a of forewing distad of vein Rs+M. Vein 2rs-m as long as vein between 2rs-m and 2 m-cu. Vein cu-a of hindwing intercepted at lower part, vein Cu1 of hindwing vestigial. Area between median longitudinal carinae of tergite 1 glabrous, median longitudinal carinae short. Tergite 2 sparsely punctate. Epipleuron of third metasomal tergite semicircular.
Distribution
South Korea (new record), Russia.

Exochus gravipes Gravenhorst, 1820
(Figures 4h, 7h)

Ichneumon gravipes Gravenhorst, 1820: 384.
Exochus gravipes (Gravenhorst, 1829): 351. Lectotype: female; Type depository: IZU.

Specimens examined
(South Korea) 1 female, GN Gajisan, 25 June 1989, J.K. Kim; 1 female, JB Jirisan Sundeuryu, 10 June 1989, J.K. Kim.

Diagnosis
Female. Body length 9.0–10.0 mm. Antenna with 39 flagellomeres. Head strongly convex, upper face with long projection and recurved; between antennal sockets with vertical ridge; dorsal margin of eyes with small triangular yellow spots. Malar space black (Figure 4h). Pronotum sunken and glabrous. Scutellum and postscutellum black. Propodeum without area superomedia (Figure 7h), basal transverse carina incomplete; area externa with hairs; area dentipara with hairs apically; spiracle of propodeum ellipse, not connected to pleural carina; upper area of metapleuron glabrous. Vein cu-a of hindwing intercepted at lower 0.25, with distinct vein Cu1. Tergite 1 with short dorsal longitudinal carina, not reaching central area of tergite 1, almost parallel; between dorsal longitudinal carinae glabrous. Tergite 3 with epipleuron wedge-shaped, the basal part not convex.

Distribution
South Korea (new record), Austria, Belarus, Belgium, Bulgaria, Canada, China, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Iran, Ireland, Italy, Latvia, Lithuania, the Netherlands, Norway, Poland, Romania, Russia, Spain, Sweden, Switzerland, Turkey, U.S.A., Ukraine, United Kingdom, Yugoslavia.

Exochus guttatus Tolkanitz, 1999
(Figures 4i, 7i)

Exochus guttatus Tolkanitz, 1999: 191–201. Type: male; Type depository: ZIN.

Specimens examined
[South Korea] 1 male, GB Youngyang-gun, Subi-myeon, Yeonhwasa (Eulryeonsan), 26 July 2001, J.S. Jeon.

Diagnosis
Male. Body length 7.1 mm. Antenna with 31 flagellomeres. Head weak convex, upper face with long projection and recurved; between antennal sockets without vertical ridge; dorsal margin of eyes with triangular yellow spots, connected to margin between antennal socket and eye. Antennal scape, clypeus, mandible and malar space yellow (Figure 4i). Pronotum strongly sunken and glabrous.
Scutellum and postscutellum yellow (Figure 7i). Propodeum without area superomedia, basal transverse carina incomplete; area externa sparsely punctate with hairs; area dentipara without hair; spiracle of propodeum oval, not connected pleural carina; metapleuron glabrous. Vein cu-a of hindwing intercepted at lower 0.1, with vein Cu1 of hindwing trace. Tergite 1 with dorsal longitudinal carina, reach over at central area of tergite 1, upcurved in basal area; between dorsal longitudinal carinae without hair. Median area of tergites 1–3 glabrous; tergite 3 with epipleuron semicircular.

**Distribution**
South Korea (new record), Moldova, Russia.

**Exochus lictor** Haliday, 1838  
(Figures 4j, 7j)

*Exochus lictor* Haliday, 1838: 112–121. Type: female; Type depository: NMI.  
*Exochus decoratus* Holmgren 1873: 55–78. Type: lost.  
*Exochus pectoralis* Haliday 1838: 112–121. Type: male; Type depository: NMI.

**Specimens examined**
(South Korea) 5 males, GG Cheonggyesan, 4 July 1989, J.K. Kim; 1 male, ditto, 4 June 1989, J.K. Kim; 1 male, GG Annyang-si, Manan-gu, Gwanak, 37°25′14″ N, 127°57′01″ E, 5–19 July 2007, J.O. Lim; 1 male, GG Anyang-si, Manan-gu, Gwanaksan, 26 June–4 July 2007, J.O. Lim; 1 female, GW Wonju-si, Heungeom-myeon, Maeji-ri, Yeonse Univ., Wonju campus, 37°16′53″ N, 127°54′02″ E, 21–30 October 2009, H.Y. Han; 1 male, GW Taebaeksan, 13 August 1989, J.K. Kim; 1 female, GW Mt Baegun, Wonju-si, Panbu-myeon, 9 June–5 July 2011, J.W. Lee; 1 male, GB Cheongsong-gun Kekwangsan, 25 May 1989, J.K Kim; 1 female, GN Yeongju-si, Punggi-eup, Jungnyeong 99site, 12 June–23 July 2008, K.B. Kim; 1 male, JB Jirisan, Bamsagol, 6 June 1983; 5 males, JN Gohung-gun, Jeomam-myeon, Pallyeongsan (M.T.), 24 May–11 July 2012, J.C. Jeong.

**Diagnosis**

**Female.** Body length 5.5–7.5 mm. Antenna with 27 flagellomeres.  
Head convex, upper face with short projection; between antennal sockets with weak vertical ridge; dorsal margin of eyes with large triangular yellow spots, connected to margin between antennal socket and eye. Upper face and malar space yellow (Figure 4j).  
Epomia distinct. Scutellum and postscutellum yellow. Propodeum without area superomedia, area basalis and area superomedia not separated from carina (Figure 7j); area externa with sparse hairs; area superomedia and area dentipara glabrous; spiracle of propodeum oval, connected to lateral longitudinal carina; metapleuron glabrous. Vein cu-a of hindwing intercepted at lower 0.25, with vein Cu1. Tergite 1 with narrow dorsal longitudinal carina, reach central area of tergite 1, up-curved in basal area; median longitudinal area of tergite 1 and tergite 2 without hair. Tergite 3 with epipleuron semicircular.
**Distribution**
South Korea (new record), Azerbaijan, Belarus, Belgium, Bulgaria, Canada, Czech Republic, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Latvia, Lithuania, the Netherlands, Poland, Romania, Russia, Spain, Turkey, U.S.A., Ukraine, United Kingdom.

*Exochus lineifrons* Thomson, 1887  
*(Figures 4k, 7k)*

*Exochus lineifrons* Thomson, 1887: 193–218. Type: unknown; Type depository: ZI.

**Specimens examined**
(South Korea) 1 female, CN, Seosan-si, Haemi-myeon, Daegok-ri, Hanseo Univ., 7 May 2013, J.G. Kim; 1 female, JN, Jeongeup-si, Jangseong-gun, Bukha-myeon, Namohanggol, 22 June 2005, J.G. Han.

**Diagnosis**  
**Female.** Forewing 4.5 mm, body 5.0 mm long. Lower face black and upper face yellow *(Figure 4k)*. Yellow triangular marks and yellow inner orbits confluent. Mandible and malar space yellow. Antenna with 32 flagellomeres; antenna dark blackish brown. Mesosoma black. Upper margin of pronotum yellow. Scutellum weak convex and black and yellow. Propodeum with lateromedian longitudinal carinae and costula *(Figure 7k)*; area basalis and area superomedia not separated by carina. Fore and mid legs yellow. Hind coxa dark reddish brown, hind femur and tibia brown, tibia with yellow line in dorsal view, tarsus yellow. Vein *Cu-a* of forewing distad of vein *Rs+M*. Vein 2*rs-m* as long as vein between 2*rs-m* and 2*m-cu*. Vein *cu-a* of hindwing intercepted at lower part, vein *Cu1* of hindwing vestigial. Area between median longitudinal carinae of tergite 1 glabrous. Median line of tergite 2 glabrous. Epipleuron of third metasomal tergite semicircular.

**Distribution**
South Korea (new record), Finland, Georgia, Germany, Hungary, Moldova, Poland, Sweden, Turkey, Ukraine.

*Exochus mitratus* Gravenhorst, 1829  
*(Figures 4l, 7l)*

*Exochus mitratus* Gravenhorst, 1829: 350.  
*Exochus affinis* Holmgren 1858: 305–394.  
*Exochus australis* Thomson 1894: 2137. Lectotype: female; Type depository: ZIN.  
*Exochus pseudaffinis* Strobl 1903: 3–100. Type: male.  
*Exochus paradoxus* Schmiedeknecht 1924: 103–112.  
*Exochus punctifer* Schmiedeknecht 1924: 103–112. Type: female.

**Specimens examined**
(South Korea) 1 male, GB Gyongsan-si, Yeungnam Univ., 4 May 1988, J.H. Kwon; 1 male, ditto, 29 April 1989, K.J. Hwang.
**Diagnosis**

**Male.** Body length 8.5 mm. Antenna with 29 flagellomeres. Head broad and convex, upper face with long projection and very strongly recurved (Figure 4l); between antennal sockets without vertical ridge; dorsal margin of eyes with round small spots. Malar space black. Pronotum sunken. Scutellum and postscutellum black. Propodeum with area superomedia incomplete (Figure 7l); area externa and area dentipara with moderate hairs; spiracle of propodeum oval; metapleuron glabrous except lower area. Vein cu-a of hindwing intercepted at lower 0.25, with vein Cu1. Tergite 1 with short dorsal longitudinal carina, reach central area of tergite 1, up-curved in basal area; between dorsal longitudinal carinae without hair. Tergite 3 with epipleuron semicircular.

**Distribution**

South Korea (new record), Austria, Azerbaijan, Belgium, Bulgaria, Canada, Canary Islands, China, Czech Republic, Finland, France, Georgia, Germany, Hungary, Iran, Ireland, Italy, Japan, Kazakhstan, Latvia, Lithuania, Malta, Moldova, Mongolia, the Netherlands, Norway, Poland, Portugal, Romania, Russia, Spain, Sweden, Tunisia, Turkey, USA, Ukraine, United Kingdom, Yugoslavia.

*Exochus momoi* Tolkanitz, 2007

(Figures 5a, h)

*Exochus momoi* Tolkanitz, 2007: 343.

*Exochus affinis* Momoi and Kusigemati, 1970: 414. Type: male; Type depository: HU.

**Specimens examined**

(South Korea) 2 males, Seoul Korea Univ., Imyeupsi, SukwoanD, 1 August 1987, ICH.; 3 males, JB Namwon-si, Sannae-myeon, Baemsagol, 35°21′55″ N, 127°34′58″ E, 31 July 1992; 7 males, GB Gunwi-gun, Bugye-myeon, Dongsan-ri, Odoam (M.T.), 36°01′29″ N, 128°41′31″ E, 21 July–10 August 2015, J.W. Lee.

**Diagnosis**

**Male.** Body length 5.0–6.0 mm. Antenna with 39 flagellomeres. Head convex, upper face with long projection and recurved; between antennal sockets without vertical ridge; apical margin of clypeus concave; dorsal margin of eyes with triangular yellow spots, connected to margin between antennal socket and eye. Face, clypeus and malar space yellow (Figure 5a). Scutellum and postscutellum yellow. Propodeum without area superomedia, basal transverse carina incomplete (Figure 5h); area externa with sparse hairs; area dentipara glabrous; spiracle of propodeum ellipse, metapleuron glabrous. Vein cu-a of hindwing intercepted at lower 0.1, with vein Cu1 trace. Tergite 1 with dorsal longitudinal carinae, reach over at central area of tergite 1, almost parallel; between dorsal longitudinal carinae without hair. Tergite 3 with epipleuron wedge-shaped, the basal part not convex.

**Distribution**

South Korea (new record), Japan, Russia.
Figure 5. Head in frontal view. (a) *Exochus momoi*; (b) *Exochus nigrifaciatus*; (c) *Exochus selenanae*; (d) *Exochus velatus*; (e) *Exochus ventralis*; (f) *Exochus vexator*; (g) *Exochus villosus*; (h) *Exochus momoi*; (i) *Exochus nigrifaciatus*; (j) *Exochus selenanae*; (k) *Exochus velatus*; (l) *Exochus ventralis*; (m) *Exochus vexator*; (n) *Exochus villosus*. Scale bar = 0.2 mm.
Figure 6. Propodeum in dorsal view. (a) *Exochus acostulatus* Lee & Choi, sp. nov.; (b) *Exochus adentatus* Lee & Choi, sp. nov.; (c) *Exochus areolaris* Lee & Choi, sp. nov.; (d) *Exochus carinalis* Lee & Choi, sp. nov.; (e) *Exochus dentisternum* Lee & Choi, sp. nov.; (f) *Exochus depressus* Lee & Choi, sp. nov.; (g) *Exochus nigritulus* Lee & Choi, sp. nov.; (h) *Exochus occipitalis* Lee & Choi, sp. nov.; (i) *Exochus orbitalis* Lee & Choi, sp. nov.; (j) *Exochus propodealis* Lee & Choi, sp. nov.; (k) *Exochus alpinus*; (l) *Exochusantis*. Scale bar = 0.2 mm.
**Exochus nigrifaciatus** Momoi, Kusigemati & Nakanishi, 1968
(Figures 5b, i)

*Exochus nigrifaciatus* Momoi, Kusigemati & Nakanishi, 1968: 211. Type: female; Type depository: KU.
Specimens examined
(South Korea) 1 female 1 male, GB Gyongsan-si, Yeungnam Univ., 13 September 1988, J.K. Kim, 1 male, Woljeongsa, 30 July 1981, Y.J. Cheon.

Diagnosis
Female. Body length 9.0 mm. Antenna with 40 flagellomeres. Head strongly convex, upper face with short projection; between antennal sockets without vertical ridge; dorsal margin of eyes with small triangular yellow spots. Face, clypeus and malar space black (Figure 5b). Pronotum strongly sunken. Scutellum and postscutellum black. Propodeum without area superomedia (Figure 5i); area externa with hairs; area dentipara with sparse hairs partly; spiracle of propodeum ellipse; lower area of metapleuron partly sparse hair. Vein cu-a of hindwing intercepted at lower 0.2, with vein Cu1 trace. Tergite 1 with broad dorsal longitudinal carina, reach central area of tergite 1, up-curved in basal area; between dorsal longitudinal carinae without hair. Tergite 3 with epipleuron wedge-shaped, the basal part not convex.

Distribution
South Korea (new record), Japan, Russia.

Exochus selenanae Tolkanitz, 1999
(Figures 5c, j)

Exochus selenanae Tolkanitz, 1999: 191–201. Type: female: Type depository: SIZ.

Specimens examined
(South Korea) 1 female, GW, Donghae-si, Sanhwa-dong, Mureung valley (M.T.), 21–30 May 2005, J.W. Lee; 1 female, GB, Cheongdo-gun, Unmun-myeon, Unmunsan U2, 23 June 2008, J.W. Lee; 1 female, GB, Yeongju-si, Punggi-eup, Jungyeong 99 site, 12 June–23 July 2008, K.B. Kim.

Diagnosis
Female. Forewing 4.5 mm, body 4.5 mm long. Face, mandible and malar space yellow (Figure 5c). Vertex with yellow large triangular marks. Antenna with 23 flagellomeres; ventral part of antenna yellowish brown and dorsal part of antenna dark blackish brown. Mesosoma black. Upper corner of pronotum yellow. Scutellum almost flat and black. Propodeum with lateromedian longitudinal carinae and costula; area basalis and area superomedia not separated by carina (Figure 5j). Fore and mid legs yellow to brown. Hind leg yellow to brown except coxa dark blackish brown; hind tibia with black band apically. Vein Cu-a of forewing distad of vein Rs+M. Vein 2rs-m shorter than vein between 2rs-m and 2 m-cu. Vein cu-a of hindwing intercepted at lower part, vein Cu1 absent. Area between median longitudinal carinae of tergite 1 glabrous. Median line of tergite 2 glabrous. Epipleuron of third tergite wedge-shaped.

Distribution
South Korea (new record), Moldova, Russia, Ukraine.
**Exochus velatus** Tolkanitz, 2003
(Figures 5d, k)

*Exochus velatus* Tolkanitz, 2003: 1075–1085. Type: female; Type depository: ZIN.

**Specimens examined**
(South Korea) 1 male, GG Cheonggyesan, 4 June 1989, J.K. Kim; 1 male, GB Jinryaong, Geumgok, 5 July 1981, J.K. Kim.

**Diagnosis**

**Male.** Body length 5.0–5.5 mm. Antenna with 24 flagellomeres.
Head strongly convex, upper face with short and broad projection; between antennal sockets without vertical ridge; dorsal margin of eyes with large triangular yellow spots. Face, clypeus and malar space yellow (Figure 5d). Scutellum and postscutellum dark brown to black. Propodeum with incomplete area superomedia (Figure 5k); area externa with hairs; area dentipara with sparse hairs partly; spiracle of propodeum oval, connected pleural carina; metapleuron glabrous. Vein \(cu-a\) of hindwing intercepted at lower 0.2, without vein \(Cu1\). Tergite 1 with broad dorsal longitudinal carina, reach over at central area of tergite 1, up-curved in basal area; median longitudinal area of tergites 1 and 2 without hair. Tergite 3 with epipleuron semicircular.

**Distribution**
South Korea (new record), Russia.

---

**Exochus ventralis** Holmgren, 1858
(Figures 5e, l)

*Exochus ventralis* Holmgren, 1858: 305–394. Lectotype: female; Type depository: NR.

**Specimens examined**
(South Korea) 1 male, GG Ganghwa-do, Hwado, Manisan, Heungwang-ri, 24 September 1994, H.S. Won; 1 male, GN Jinju-si, Gajoa-dong, 9 June 1987, J.K. Kim; 1 female, ditto, 20 June 1989, J.K. Kim.

**Diagnosis**

**Male.** Body length 7.0–7.5 mm. Antenna with 34 flagellomeres.
Head strongly convex, upper face with long projection and recurved; between antennal sockets with vertical ridge; dorsal margin of eyes with triangular yellow spots. Face black except margin of projection. Malar space black (Figure 5e). Pronotum sunken. Scutellum and postscutellum black. Propodeum without area superomedia (Figure 5l); area externa with hairs; area dentipara without hair; spiracle of propodeum ellipse; metapleuron glabrous. Vein \(cu-a\) of hindwing intercepted at lower 0.3, with vein \(Cu1\). Tergite 1 with short and broad dorsal longitudinal carina, not reaching central area of tergite 1, almost parallel; median longitudinal area of tergites 1 and 2 without hair. Tergite 3 with epipleuron semicircular.
**Distribution**
South Korea (new record), Austria, Belgium, France, Poland, Romania, Russia, Sweden, Ukraine.

*Exochus vexator* Tolkanitz, 1993
(Figures 5f, m)

*Exochus vexator* Tolkanitz, 1993: 92–105. Type: female; Type depository: SIZ.

**Specimens examined**
(South Korea) 1 female, JB Jirisan National Park, Nogodan, 15 May 1983, K.O.H; 1 female, ditto, 22 July 1989, J.K. Kim.

**Diagnosis**
**Female.** Body length 6.0 mm. Antenna with 36 flagellomeres. Head convex, upper face with projection and recurved; between antennal sockets without vertical ridge; dorsal margin of eyes with triangular yellow spots. Upper face and mandible yellow, lower face and malar space black (Figure 5f). Scutellum and postscutellum yellow. Propodeum without area superomedia (Figure 5m); area externa with hair; area superomedia and area dentipara without hair; spiracle of propodeum oval; metapleuron glabrous. Vein *cu-a* of hindwing intercepted at lower 0.25, with vein *Cu1*. Tergite 1 with dorsal longitudinal carina, reach central area of tergite 1, up-curved in basal area; between dorsal longitudinal carinae without hair. Tergite 3 with epipleuron wedge-shaped, the basal part not convex.

**Distribution**
South Korea (new record), Azerbaijan, Hungary, Moldova, Russia, Ukraine.

*Exochus villosus* Tolkanitz, 2003
(Figures 5g, n)

*Exochus villosus* Tolkanitz, 2003: 1075–1085. Type: female; Type depository: ZI.

**Specimens examined**
(South Korea) 1 female, GW, Hongcheon-gun, Hongcheon-eup, Jangjeonpyeong1-ri, Geomdungae village (M.T.), 37°39' N, 127°52' E, 1–20 June 2007, J.W. Lee; 1 female, GW, Hongcheon-gun, Bukbang, Environment Research Park, 35°45'15.6" N, 127°51'1.7" E, 29 June–16 July 2012, S.J. Jang.

**Diagnosis**
**Female.** Forewing 4.0 mm, body 4.0 mm long. Face, mandible and malar space yellow (Figure 5g). Vertex without yellow spot. Antenna with 23 flagellomeres; ventral part of antenna yellowish brown and dorsal part of antenna dark blackish brown. Mesosoma black. Scutellum convex and black. Propodeum with lateromedian longitudinal carinae, without costula (Figure 5n); area basalis and area superomedia not separated by carina. Fore and mid legs yellow except basal part of coxae dark reddish brown.
Hind leg yellow except coxa dark blackish brown. Vein Cu-a of forewing distad of vein Rs+M. Vein 2rs-m shorter than vein between 2rs-m and 2 m-cu. Vein cu-a of hindwing intercepted at lower part, vein Cu1 absent. Area between median longitudinal carinae of tergite 1 glabrous. Tergite 2 finely punctate. Epipleuron of third tergite wedge-shaped.

**Distribution**
South Korea (new record), Russia.

**Key to species of the genus Exochus from South Korea**

1. Epipleuron of third tergite wedge-shaped, basal three-quarters of the edge straight or weakly convex (Figure 8a). ........................................................................................................................................ 2
- Epipleuron of third tergite semicircular, basal three-quarters of the edge strongly convex (Figure 8b). ........................................................................................................................................ 16

2. Vertex without yellow marks. Face and mandible yellow (Figure 5g) ................................................................. E. villosus Tolkanitz
- Vertex with triangular or other yellow marks at top of eyes (Figure 8f), or yellow triangular marks confluent with yellow inner orbits. Face and mandible yellow to black. ........................................................................................................................................ 3

3. Mesosoma mostly yellow, with three black stripes on mesoscutum. Tergites 1–4 with brown band basally, tergites 5–7 brown. ...................... E. momoii Tolkanitz
- Mesosoma mostly black. Metasoma black. ................................................................................................................................. 4

4. Yellow triangular marks and yellow inner orbits confluent (Figure 8d). Notaulus deep and distinct. Mesoscutum with square yellow mark, with spots at the anteriorly. Scutellum and postscutellum completely yellow. Propodeum with transverse area superomedia. ......................... E. areolalis Lee & Choi sp. nov.
- Yellow triangular marks and yellow inner orbits not confluent (Figure 8e). Notaulus absent or present but black. Mesoscutum black. Scutellum and postscutellum black or yellow. Propodeum with or without area superomedia, if present as wide as long or longer than width. ............................................................................................................................... 5

5. Antenna with fewer than 23 flagellomeres. Face and mandible completely yellow.. ......................................................................................... E. selenanae Tolkanitz
- Antenna with more than 23 flagellomeres. Face and mandible black and yellow (at least clypeus black). ........................................................................................................................................ 6

6. Inner margins of eyes ventrally convergent. Antenna with fewer than 25 flagellomeres. .................................................... E. orbitalis Lee & Choi sp. nov.
- Inner margins of eyes subparallel. Antenna with more than 29 flagellomeres. .............. 7

7. Antennal scape, scutellum and postscutellum partly yellowish brown. Hind tibia yellow with apical black band. ................................. E. vexator Tolkanitz
- Antennal scape almost dark brown. Scutellum and postscutellum completely black. Hind tibia yellow to brown without black band apically. ......................................................................................... 8

8. Forewing vein cu-a opposite rs+m. (Figure 8g). ................................................................................................................... 9
Figure 8. Morphological characters. (a) Third epipleuron of *Exochus nigrifaciatus*; (b) third epipleuron of *Exochus ventralis*; (c) Projection of mesosternum in *Exochus dentisternum*; (d) Frons of *Exochus areolalis*; (e) Frons of *Exochus alpinus*; (f) Frons of *Exochus fravomarginatus*; (g) Vein Cu-a of *Exochus fravomarginatus*; (h) Vein Cu-a of *Exochus consimilis*; (i) Mandible of *Exochus adentatus*; (j) Mandible of *Exochus guttatus*; (k) Interantennal process of *Exochus mitratus*; (l) Interantennal process of *Exochus propodealis*; (m) Mesoscutum of *Exochus depressus*; (n) Mesoscutum of *Exochus gratus*. Scale bars: (a–f), (i–n) = 0.2 mm; (g, h) = 0.5 mm.
- Forewing vein cu-a distad distad of Rs+M. (Figure 8h). ............................................. 13

9. Body length less than 6 mm. Vertex with small yellow spot at apex of inner orbit (spot circular, of similar size to ocellus) ........................................... E. kusigemati Tolkani
- Body length more than 6 mm. Vertex with triangular yellow marks on apex of eyes orbit. ........................................................................................................................................ 10

10. Area superomedia and area basalis separated by transverse carina (Figure 7a). Face yellow and black (at least inter-antennal projection yellow). ........................................ 11
- Area superomedia and area basalis not separated by transverse carina (Figure 7h). Face black. ........................................................................................................................................ 12

11. Pronotum matt and sparsely punctate. Basal transverse carina of propodeum medially incomplete (Figure 7e). .................... E. flavomarginatus Holmgren
- Pronotum glabrous. Basal transverse carina of propodeum complete (Figure 7a). Face black and angular projection between antennal sockets yellow (Figure 4a). ......................................................... E. argutus Tolkani

12. Frons flat, not concave, between antennal sockets without longitudinal ridge. ............................................................... E. nigrifaciatus Momoi, Kusigemati & Nakanishi
- Frons convex, between antennal sockets with longitudinal ridge. ........................................................................................................... E. gravipes (Gravenhorst)

13. Body longer than 8 mm. Antenna with more than 36 flagellomeres. Propodeum with full areolation (Figure 6d). ..................... E. carinalis Lee & Choi sp. nov.
- Body shorter than 7 mm. Antenna with fewer than 32 flagellomeres. Propodeum without full areolation (at least area basalis and area superomedia not separated by carina) .................................................................................................... 14

14. Vein cu-a of hindwing almost not intercepted, vein Cu1 vestigial. Tergite 1 with strong lateral carina and strong angle basally in lateral view. .. E. antis Tolkani
- Vein cu-a of hindwing intercepted lower 0.3, vein Cu1 present. Tergite 1 with weak lateral carina and round in lateral view. ........................................................................................................ 15

15. All coxae black. Propodeum with costula; area petiolaris setose and area poster- exterina depressed. ...................................................... E. consimilis Holmgren
- All coxae reddish brown. Propodeum without costula; area petiolaris hairless and area posteroexterna not depressed. .................... E. acostulatus Lee & Choi sp. nov.

16. Vertex black, without yellow triangular spots; face, malar space and antennal scape black in frontal view. .................................................... E. nigritulus Lee & Choi sp. nov.
- Vertex black, with yellow triangular spots or with yellow continuous from inner orbit to vertex; face, malar space and antennal scape yellow and black in frontal view ................................................................................................. 17

17. Yellow triangular marks and yellow inner orbits confluent. Upper margin of pro- notum with yellow line .................................................................................................................. 18
- Yellow triangular marks and yellow inner orbits not confluent. Pronotum completely black or with yellow spot on upper right corner. ........................................ 24
18. Area superomedia and area basalis of propodeum separated by transverse carina, area superomedia longer than wide. Vein Cu1 of hindwing absent. .............................................................. E. frontellus Holmgren
- Area superomedia and area basalis of propodeum not separated by transverse carina. Vein Cu1 of hindwing present or vestigial. .......................................................... 19

19. Lower tooth of mandible indistinct (Figure 8i). Mesopleuron with yellow lines. ..........
- Lower tooth of mandible distinct (Figure 8j). Mesopleuron with yellow spot, sometimes with thin yellow line on upper margin of mesopleuron. ................................................. 20

20. Antenna with fewer than 23 flagellomeres. Body shorter than 4 mm. Propodeum without apical transverse carina. ................................................................. E. destitutus Tolkanitz
- Antenna with more than 30 flagellomeres. Body longer than 5 mm. Propodeum with apical transverse carina. ........................................................................................................ 21

21. Clypeus black. Mesopleuron completely black. Area superomedia and area dentipara rectangular, longer than wide in dorsal view. ................................................. 22
- Clypeus yellow. Mesopleuron black with yellow spot on anterior part. Area superomedia and area dentipara square or wider than long in dorsal view. ............. 23

22. Fore and mid coxae of same colour. Median longitudinal areas of tergites 1–2 glabrous, width of median longitudinal area of tergite 1 as wide as median longitudinal area of tergite 2 ......................................................... E. lineifrons Thomson
- Fore coxa darker than mid coxa. Median longitudinal areas of tergites 1–2 glabrous, width of median longitudinal area of tergite 1 wider than median longitudinal area of tergite 2. ......................................................... E. semilividus Vollenhoven

23. Upper face pale yellow and lower face black (Figure 4j). All legs yellow without black bands. Vein cu-a of hindwing intercepted at lower 0.25, vein Cu1 present. Body length 5.5–6 mm. ................................................................. E. lictor Haliday
- Face mostly yellow with blackish brown shield mark on central part of face (Figure 4i). Legs yellow, hind tibia with black bands basally and apically. Vein cu-a of hindwing intercepted at lower 0.1, vein Cu1 absent. Body length 7–7.5 mm. .. ................................................................. E. guttatus Tolkanitz

24. Interantennal process of upper face very strong (recurved projection, almost reaching frons) (Figure 8k). Metasoma coarsely, densely punctate and matt. ......................... E. mitratus Gravenhorst
- Interantennal process of upper face not so strong (projection not reaching frons) (Figure 8l). Metasoma sparsely punctate and polished. ..................................................... 25

25. Propodeal carinae almost absent, apical transverse carina weak (Figure 6j) ......................................................... E. propodealis Lee & Choi sp. nov.
- Propodeal carinae present, at least apical transverse carina distinct. .......... 26

26. Costula of propodeum absent. All coxae dark blackish brown to black. ............... 27
- Cotula of propodeum present. All coxae reddish brown. ........................................ 28
27. Frons and area of ocelli strongly convex. Mesoscutum strongly depressed and notaulus deep (Figure 8m). Vein 2rs-m shorter than vein between 2rs-m and 2 m-cu. Antenna with 24 flagellomeres .............. **E. depressus Lee & Choi sp. nov.**
- Frons weakly convex and area of ocelli flat. Mesoscutum not depressed, convex in lateral view (Figure 8n). Vein 2rs-m as long as vein between 2rs-m and 2 m-cu. Antenna with 20 flagellomeres. .............................................................. **E. gratus Tolkanitz**

28. Face and clypeus completely yellow. ................................................................. 29
- Face mostly black, projection with yellow marks partly; clypeus black. .............. 30

29. Metasoma finely punctate. Scutellum and postscutellum partly yellow. Antenna with 28 flagellomeres. Body length 6 mm. ......................... **E. alpinus (Zetterstedt)**
- Metasoma coarsely punctate. Scutellum and postscutellum black. Antenna with 23 flagellomeres. Body length 5 mm. .................................................. **E. velatus Tolkanitz**

30. Occipital carina absent. ........................................... **E. occipitalis Lee & Choi sp. nov.**
- Occipital carina complete. ................................................................................. 31

31. Mesosternum projecting backward as a couple of teeth (Figure 8c). Antenna with 24 flagellomeres ............................................. **E. dentisternum Lee & Choi sp. nov.**
- Mesosternum without projections. Antenna with more than 32 flagellomeres 32

32. Face mostly black, malar space black. Scutellum and postscutellum black. Lateral carinae of area superomedia subparallel. Antenna with 34 flagellomeres. .............. .......................................................................................................................... **E. ventralis Holmgren**
- Face black with yellow marks, malar space yellow. Scutellum and postscutellum yellow. Lateral carinae of area superomedia posteriorly convergent. Antenna with more than 38 flagellomeres. ................................................................................................. 33

33. Body sparsely pilose and polished. Epicnemium of mesosoma with yellow spot. Metasoma dark reddish brown with brown apical line and polished. Hindwing with seven distal hamuli. ............................................................... **E. britannicus Morley**
- Body densely pilose. Epicnemium of mesosoma without yellow spot. Metasoma black. Hindwing with eight distal hamuli. ................................................................. 34

34. Median longitudinal carinae of tergite 1 reaching middle of tergite. Area between longitudinal carinae of tergite 1 matt; tergite 1 with scattered punctures. ................................................................. **E. suborbitalis Schmiedeknecht**
- Median longitudinal carinae of tergite 1 not reaching middle of tergite. Area between longitudinal carinae glabrous. ........................................ **E. thomsoni Schmiedeknecht**

**Acknowledgements**

We are deeply grateful to anonymous reviewers for reviewing this manuscript.

**Disclosure statement**

No potential conflict of interest was reported by the authors.
Funding

This work was supported by the 2015 Yeungnam University Research Grant and a grant from the National Institute of Biological Resources (NIBR), funded by the Ministry of Environment (MOE) of the Republic of Korea [grant numbers NIBR201601203 and NIBR201601207].

References

Baltazar CR. 1964. The genera of parasitic Hymenoptera in the Philippines, Part 2. Pac Insects. 6:15–67.
Cha JY, Kim JG, Lee JW. 2000. New records of the genera Hypsicera Latreille and Acerataspis Uchida (Hymenoptera, Ichneumonidae, Metopiinae) from Korea. Insecta Koreana. 17:277–285.
Cha JY, Lee JW. 2000. A taxonomic review of the genus Colpotrochia Holmgren (Hymenoptera, Ichneumonidae, Metopiinae) in Korea. Insecta Koreana. 17:221–228.
Choi J-K, Lee S-B, Lee J-W. 2014. New Records of the Genus Exochus (Hymenoptera: ichneumonidae: Metopiinae) from Korea, China and Mongolia. Anim Systematics, Evol Divers. 30:225–229.
Davis GC. 1897. A review of the Ichneumonid subfamily Tryphoninae. Trans Am Entomol Soc. 24:193–348.
Förster A. 1869. Synopsis der Familien und Gattungen der Ichneumonen. Verhandlungen Des Naturhistorischen Vereins Der Preussischen Rheinlande Und Westfalens. 25:135–221.
Gauld ID, Sithole R, Gómez JU, Godoy C. 2002. The Ichneumonidae of Costa Rica. 4. Memoirs Am Entomol Inst. 66:768.
Gravenhorst JLC. 1820. Monographia Ichneumonum Pedemontanae Regionis. Memorie Della Reale Academia Dell Scienze Di Torino. 24:275–388.
Gravenhorst JLC. 1829. Ichneumonologia Europaea. Pars II. Breslau: Vratislaviae; p. 989.
Haliday AH. 1838. Descriptions of new British insects, indicated in Mr. Curtis’s Guide. Ann Nat Hist. 2:112–121.
Holmgren AE. 1856. Entomologiska anteckningar under en resa i södra Sverige år 1854. Kongliga Svenska Vetenskapsakademiens Handlingar. 75:1–104.
Holmgren AE. 1858. Försök till uppställning och beskrifning af de i sverige funna Tryphonider (Monographia Tryphonidum Sueciae). Kongliga Svenska Vetenskapsakademiens Handlingar. N. F.1:305–394.
Holmgren AE. 1873. Dispositio methodica Exochorum Sacndinaviae. Öfversigt af Kongliga Vetenskaps-Akademiens Förhandlingar. 30:55–78.
Kim CW. 1955. [A study on the Ichneumon-flies in Korea.] (in Korean with German summary). Commemoration These 15th Anniv. Korea University. p. 423–498.
Kusigemati K. 1971. Taxonomic studies on the subfamiliy Metopiinae of Japan (Hymenoptera: ichneumonidae). Memoirs of the Faculty of Agric, Kagoshima Univ. 8:205–298.
Latreille PA. 1802. Histoire naturelle, générale et particulière, des Crustacés et des Insectes; p. 468. (Ichneumonidae pp. 318–327). Paris: Tome troisième.
Lee JW, Cha JY. 2000. Illustrated catalogue of Ichneumonidae in Korea. (1. Anomalinae, Eucerotinae, Mesochorinae, Metopiinae, Ophioninae, Paxyllumatinae, Tryphoninae). In: Park KT, editor. Insects of Korea Series 6. Korea: Korea Research Institute of Bioscience and Biotechnology & Center for Insect Systematics; Insects of Korea [6], p. 276.
Momoi S. 1966. The Ichneumon-flies of the genus Colpotrochia occurring in Japan and adjacent areas (Hymenoptera: ichneumonidae). Mushi. 40:13–27.
Momoi S, Kusigemati K. 1970. Metopiinae (Hymenoptera: ichneumonidae) of the Ryukyu Archipelago. Pac Insects. 12:401–415.
Momoi S, Kusigemati K, Nakanishi A. 1968. Ichneumonidae (Hymenoptera) collected in paddy fields of the Orient, with descriptions of new species, Part 2. Subfamilies Porizontinae, Metopiinae and Diplazonitiae. Mushi. 41:201–214.
Morley C. 1911. Ichneumonologia Britannica, iv. The Ichneumons of Great Britain. Tryphoninae. London: H. & W. Brown; p. 344.
Morley C. 1913. The fauna of British India including Ceylon and Burma, Hymenoptera. Vol. 3. Ichneumonidae. London: British Museum; 531.

Schmiedeknecht O. 1924. A short summary of the section Tryphonides prosopi (Ichneumonidae). Entomologist’s Mon Mag. 60:103–112.

Strobl G. 1903. Ichneumoniden Steiermarks (und der Nachbarländer). Drescher A, editor. Graz (Austria): Mitteilungen Natur wissenschaftlichen Vereines für Steiermark; p. 3–100.

Thomson CG. 1887. Hymenopterologische Beiträge. Deutsche Entomologische Zeitschrift. 31:193–218.

Thomson CG. 1894. Ll. Anmärkningar öfver Ichneumoner särskildt med hänsyn till några af A.E. Holmgrens typer. Opusc Entomol. Lund. XIX:2080–2137.

Tolkanitz VI. 1993. New Palearctic species of the genus Exochus (Hymenoptera, Ichneumonidae, Metopiinae). Zoologicheskii Zh. 72:92–105.

Tolkanitz VI. 1999. [New and little-known Palearctic species of the genus Exochus (Hymenoptera, Ichneumonidae, Metopiinae).] (in Russian with English summary). Zoologicheskii Zh. 78:191–201.

Tolkanitz VI. 2003. New species of the genus Exochus (Hymenoptera, Ichneumonidae, Metopiinae) from the Russian Far East. Report 1. Zoologicheskii Zh. 82:1075–1085.

Tolkanitz VI. 2007. Ichneumon flies of the genus Exochus Gravenhorst (Hymenoptera: ichneumonidae: metopiinae) of the fauna of Palearctic region. Russ Entomol J. 16:339–358.

Townes HK, Momoi S, Townes M. 1965. A catalogue and reclassification of the eastern Palearctic Ichneumonidae. Memoirs Am Entomol Inst. 5:661.

Townes HK, Townes M, Gupta VK. 1961. A catalogue and reclassification of the Indo-Australian Ichneumonidae. Memoirs Am Entomol Inst. 1:522.

Uchida T. 1930. Vierter Beitrag zur Ichneumoniden-Fauna Japans. J Fac Agric, Hokkaido Univ. 25:243–298.

Uchida T. 1955. Die von Dr.K. Tsuneki in Korea gesammelten Ichneumoniden. J Fac Agric, Hokkaido Univ. 50:95–133.

Vollenhoven SC,SV. 1875. Pinacographia. Illustrations of more than 1000 species of northwest European Ichneumonidae sensu Linnaeano. ’s Gravenhage: M. Nijhoff; p. 68.

Yu DS, Van Achterberg C, Horstmann K. 2012. Taxapad 2012, Ichneumonoidea 2011. Database on flash-drive. Ottawa, Ontario, Canada. Available from: www.taxapad.com

Zetterstedt JW. 1838. Insecta Lapponica. Sectio secunda. Hymenoptera. Lipsiae. p. 358–408.