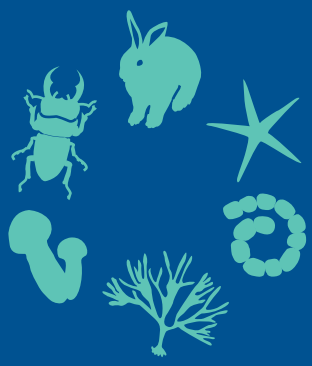
Insect Fauna of Korea

Volume 9, Number 4

Phylinae

Arthropoda: Insecta: Hemiptera: Miridae: Phylinae



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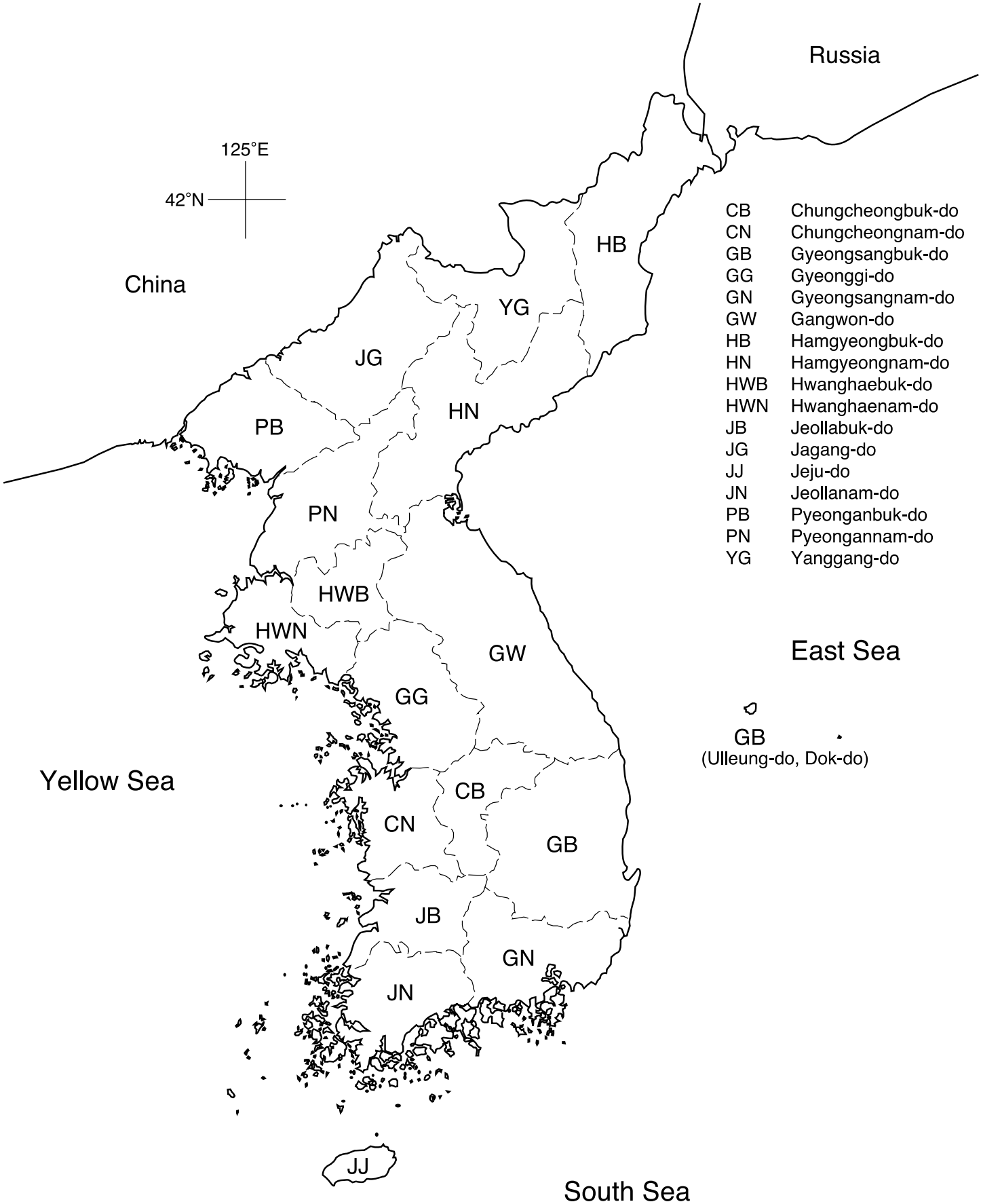
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HWB Hwanghaebuk-do
HWN Hwanghaenam-do
JB Jeollabuk-do
JG Jagang-do
JJ Jeju-do
JN Jeollanam-do
PB Pyeonganbuk-do
PN Pyeongannam-do
YG Yanggang-do
East Sea
GB
(Ulleung-do, Dok-do)
Yellow Sea
South Sea

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2018

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Arthropoda: Insecta: Hemiptera: Miridae: Phylinae

Seunghwan Lee, Ram Keshari Duwal, Min Suk Oh and Sora Kim

Seoul National University

The Flora and Fauna of Korea logo was designed to represent six major target groups of the project including vertebrates, invertebrates, insects, algae, fungi, and bacteria.

PREFACE

Biological resources include all organisms and their genetic characteristics. Utilization and conservation of these resources have the capacity to improve human life and to enhance the world we live in. It is therefore imperative that the practical and potential value of these organisms is conserved and used wisely. The first step towards this goal is to document our diversity and to study it in detail. Biological resources increase the competitiveness of a nation through their use as fundamental resources for making highly valued products, such as new lines of medicines, new materials, and new drugs. Since the Nagoya Protocol was adopted in 2010 and entered into force during the 12th Conference of the Parties of the Convention on Biological Diversity (CBD) in 2014, it has been expected that competition for biological resources will become more intensive under the rapidly changing circumstance on access to and sharing of genetic resources (ABS). To cope with a new international paradigm on issues related to biological resources, the Ministry of the Environment of Korea enacted a law entitled 'An act on access and benefit sharing of genetic resources' on August 17, 2017.

Each nation in the world is investigating and clearing information of native species within its territory in order to secure its sovereignty rights over biological resources. The National Institute of Biological Resources (NIBR) of the Ministry of Environment has published the 'Flora and Fauna of Korea' since 2009 to manage biological resources in comprehensive ways and to enhance national competitiveness by building up the foundation for the sovereignty over biological resources. Professional research groups, consisting of professors and other taxonomic experts, have systematically examined 15,154 species of vascular plants, animals and other organisms over the past 10 years and have published their findings in 184 volumes in Korean and 189 volumes in English, and two volumes of worldwide monographs covering 216 species of invertebrates. This year, 14 volumes of the Flora and Fauna of Korea in both Korean and English versions including 391 species of invertebrates and insects are additionally published. Flora and Fauna of Korea are the first professional records to describe all the species of the nation in a comprehensive way, and they would contribute to level up the taxonomic capacity.

The NIBR will continue to publish flora and fauna of Korea that will contribute conservation and application of biological resources for successful implementation of the ABS protocol. Finally, I would like to express my sincere appreciation to authors who spared no effort to publish *the Flora and Fauna of Korea*.

President
National Institute of Biological Resources

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Kasumiphylus kyushuensis (Linnavuori, 1961)

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Compsidolon (*Chamaeliops*) *elaegnicola* Yasunaga, 2001

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Europiella gilva (Kulik, 1965)
Europiella kiritshenkoi Kulik, 1975
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Subgenus *Teratoscopus* Fieber, 1861
Phylus (*Teratoscopus*) *coryloides* Josifov and Kerzhner, 1972
Phylus (*Teratoscopus*) *miyamotoi* Yasunaga, 1999
Genus *Plagiognathus* Fieber, 1858
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Psallus (*Callopsallus*) *clarus* Kerzhner, 1988
Psallus (*Callopsallus*) *injensis* Duwal, 2015
Psallus (*Callopsallus*) *roseoguttatus* Yasunaga and Vinokurov, 2000

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Subgenus *Mesopsallus* Wagner, 1970

Psallus (*Mesopsallus*) *samdzijonicus* Josifov, 1983

Subgenus *Phylidea* Reuter, 1899

Psallus (*Phylidea*) *castaneae* Josifov, 1983

Psallus (*Phylidea*) *cinnabarinus* Kerzhner, 1979

Psallus (*Phylidea*) *flavescens* Kerzhner, 1988

Psallus (*Phylidea*) *ernesti* Duwal et al., 2012

Psallus (*Phylidea*) *kerzhneri* Josifov, 1992

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Psallus (*Phylidea*) *ulmi* Kerzhner and Josifov, 1966

Psallus (*Phylidea*) *yongdaeri* Duwal, 2015

Subgenus *Pityopsallus* Wagner, 1952

Psallus (*Pityopsallus*) *kimi* Josifov, 1983

Psallus (*Pityopsallus*) *luridus* Reuter, 1878

Psallus (*Pityopsallus*) *vittatus* (Fieber, 1861)

Subgenus *Psallus* Fieber, 1858

Psallus (*Psallus*) *amoenus* Josifov, 1983

Psallus (*Psallus*) *bagjonicus* Josifov, 1983

Psallus (*Psallus*) *cheongtaensis* Duwal et al., 2012

Psallus (*Psallus*) *koreanus* Josifov, 1983

Psallus (*Psallus*) *sanguinarius* Kerzhner and Josifov, 1999

Tribe Pilophorini Douglas and Scott, 1876

Genus *Pherolepis* Kulik, 1968

Pherolepis amplus Kulik, 1968

Pherolepis fasciatus (Kerzhner, 1970)

Pherolepis kiritshenkoi (Kerzhner, 1970)

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Pilophorus clavatus (Linnaeus, 1767)

Pilophorus erraticus Linnavuori, 1962

Pilophorus koreanus Josifov, 1978

Pilophorus lucidus Linnavuori, 1962

Pilophorus miyamotoi Linnavuori, 1961

Pilophorus niger Poppius, 1914

Pilophorus okamotoi Miyamoto and Lee, 1966

Pilophorus pseudoperplexus Josifov, 1987

Pilophorus setulosus Horváth, 1905

Pilophorus typicus (Distant, 1909)

Tribe Semiini Knight, 1923

Genus *Tytthus* Fieber, 1864

Tytthus chinensis (Stål, 1859)

INTRODUCTION

Subfamily Phylinae is the second largest group of the family Miridae belonging to infraorder Cimicomorpha (Fig. 1). They are inhabited in wide range of circumstances like weeds, grasslands, shrubs, cultivated lands, and over reaching tall trees, etc. These tiny bugs abundantly aggregated on newly growing leaves, flowers, seedlings often causing serious damage on host plant. However, some were observed predating on Coleopteran or lepidopteran larvae (Wheeler, 2001; Duwal et al., 2012). Therefore, several studies indicated that members of this subfamily favor mixed feeding habit (Schuh, 1974, 1984; Yasunaga, 1999, 2001a, 2001b; Yasunaga and Vinokurov, 2000; Wheeler, 2001, etc.).

Beside the complexity in classification of family Miridae, Reuter (1905, 1910) figures out the outline mainly based on pretarsal structures which are later on considered as a basic character (Knight, 1941; Carvalho and Leston, 1952; Leston, 1959; Odhiambo, 1961; Schuh, 1974, 1976; Cobben, 1978). This concept was given a refined priority after the comprehensive studies of female (Slater, 1950) and male genitalia (Kelton, 1959), testis follicle numbers (Leston, 1961) and a reevaluation of pretarsal structures (Schuh, 1976). The higher classification proposed by Carvalho (1952) was rearranged by Schuh (1995) in which several placements were re-organized: Isometopinae was transferred into Miridae (Carayon, 1958; Slater

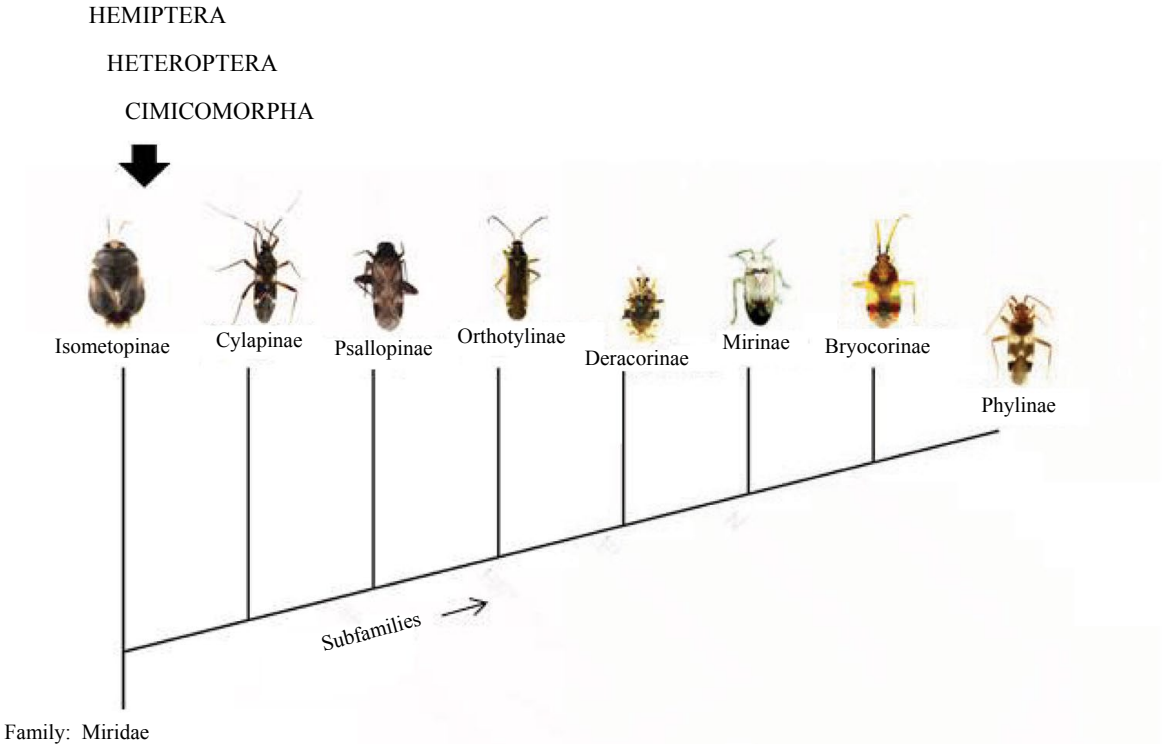

Fig. 1. Taxonomic position of the subfamily Phylinae (Douglas and Scott, 1865).

and Schuh, 1969), tribe Pilophorini was placed under subfamily Phylinae (Schuh, 1974), Psallopinae was erected as separate subfamily and reorganization of tribes in family Bryocorinae and Orthotylinae. Recently, Schuh and Menard (2013) updated the classification of Phylinae which recognized nine tribes, Cremnorrhii, Decomiini, Exaeretini, Hallodapini, Leucophoropterini, Nasocorini, Phylini, Pilophorini and Semiini.

Phyline bugs are distributed worldwide, presenting about 2,700 species of 300 genera (http://research.amnh.org/pbi/bugs/phylinae.html, 2012; Schuh and Menard, 2013). Majority are from Palaearctic, Nearctic and Afrotropical Regions (Cassis and Schuh, 2012). Among them, about 1,100 species of 164 genera are reported from Palaearctic Regions (Kerzhner and Josifov, 1999).

Since the first report of two species, *Tyttus chinensis* (Stål) and *Hallodapus funestratus* Linnavuori (now junior synonym of *H. centrimaculatus* (Poppius)) by Miyamoto and Lee in 1966, 90 species have been recorded from Korean Peninsula to date: *Psallus* (*Psallus*) *cheongtaensis* Duwal, Yasunaga, Jung and Lee, *P. ernsti* Duwal, Yasunaga, Jung and Lee, and *P. suwonanus* Duwal, Yasunaga, Jung and Lee, *P.* (*Calopsallus*) *injensis* Duwal, *P.* (*Hylopsallus*) *taehwana* Duwal and *P.* (*Phylidea*) *yongdaeri* Duwal, *Moissonia kalopani* Duwal and Lee and *M. yasunagai* Duwal and Lee, *Orthophylus yongmuni* Duwal and Lee were new to science from 2010 to 2015, followed by *Plagiognathus chrysanthemi* (Wolff), *Psallus cinnabarinus* Kerzhner, *P.* (*Phylidea*) *flavescens* Kerzhner, *P.* (*Ph.*) *loginovae* Kerzhner, *P.* (*Calopsallus*) *roseoguttatus* Yasunaga and Vinokurov, *Campylomma chinense* Schuh (now junior synonym of *C. livida* (Reuter), *C. miyamotoi* Yasunaga, *Europiella artemisiae* (Becker), *E. kiritshenkoi* Kulik, *E. miyamotoi* (Kerzhner), *Pherolepis kiritshenkoi* (Kerzhner), *Hallodapus centrimaculatus* (Poppius), *Moissonia befui* Yasunaga, *Atractotomoidea castanea* Yasunaga, *Monosynamma bohemanni* (Fallén), *Pseudophylus stundjuki* (Kulik). Moreover, Genus *Parapsallus* resurrected and *Plagiognathus vitellinus* (Scholtz) reclassified as *Parapsallus vitellinus* (Scholtz) (Duwal et al., 2013b), *Hallodapus fenestratus* Linnavuori, 1961 is synonymized to *Hallodapus centrimaculatus* (Poppius, 1914), *Europiella lividellus* (Kerzhner) moved to new genus, *Europiellomorpha*, and *Europiella albipennis* (Fallen, 1829) is removed from the Korean list (Duwal et al., 2010, 2012, 2013a, 2014a, 2014b, 2014c; Duwal and Lee, 2011, 2015). Recently, three species, *Harpocera josifovi* Kim and Jung, *Cleotomiris josifovi* Konstantinov and Simov, *Phylus* (*Teratoscopus*) *miyamotoi* Yasunaga, were newly reported, total 90 species were discovered in Korean Peninsula (Konstantinov and Simov, 2014; Duwal et al., 2016; Kim and Jung, 2016).

The aim of this work is to review of the Korean Phylinae according to the latest revised classification by Schuh and Menard (2013). Diagnosis, description and illustration based on external and internal morphological characters for all known species have been provided with biological and distributional information. Taxonomic key for species and higher taxa level are also provided.

MATERIALS AND METHODS

About one thousand and five hundred specimens were examined which were collected between 2008 to 2011, mostly from all provinces of South Korea (Gyeonggi-do (GG), Gangwon-do (GW), Chungcheongbuk-do (CB), Chungcheongnam-do (CN), Jeollabuk-do (JB), Jeollanam-do (JN), Gyeongsanbuk-do (GB), Gyeongsangnam-do (GN), Jeju-do (JJ), Seoul (SO) and several Islands) and North Korea (Chagang-do (CG) Hamgyeongbuk-do (HB) Hamgyeongnam-do (HN) Hwanghaebuk-do (HWB) Hwanghaenam-do (HWN) Pyeonganbuk-do (PB) Pyeongannam-do (PN) Yanggang-do (YG)). Materials are preserved in the Biosystematics Laboratory, Seoul National University, South Korea (SNU). Additional materials from the following research institutes (ex. NAAS) and personal collections (ex. E. Heiss collection) were also examined.

For examination of male and female genitalia, pygophore (male) or the whole abdomen (female) is carefully cut off from the body. Each of the cut segments were separately boiled in 10% KOH solution for 30 min (male) and 2−2.5 hours (females) at 70°C temperature to soften the segment as well as to clear the extraneous materials. After boiling, each softened abdominal segments were washed and dissected in distilled water with the help of fine sharp forceps. From the male abdomen/mostly pygophore, the genital structure, endosoma is carefully pulled out and also parameres and phallotheca are separated and transferred into a glass slide with a drop of glycerin for examination. Similary, for the female genital segment after removing external integuments and wastes, anterior and posterior paired valvifers were carefully separated. Therefore, when separated base of dorsal and ventral sides of first valvifer, bursa copulatrix (dorsal labial plate) and vestibules, and the base of dorsal side of second valvifer, the sclerites in posterior wall were transferred into a glass slide with a drop of glycerin, and were examined under the fine microscope for illustration and/or study and after the observation, finally observed genital structures were preserved into a microvial with a glycerin for further re-examination.

Habitus photographs in figures were prepared using a camera model: “14.2 color mosaic” taken through the objective of a Leica DE/S8 APO microscope. All genitalic illustrations were prepared using a Leica DE/DM 4000B microscope.

All measurements are in millimeters. The terminology of the genitalia mainly follows Cassis (2008) for male, and for female, Davis (1955), Schuh (2006), Schuh and Wu (2009), Wyniger (2006), and Yasunaga and Schwartz (2007). Only selected references are cited in the synonymic list of the known taxa because comprehensive catalogues are now available (Wheeler and Henry, 1992; Schuh, 1995; Kerzhner and Josifov, 1999). All taxa in this study are arranged according to the latest revised classification of Phylinae by Schuh and Menard (2013).

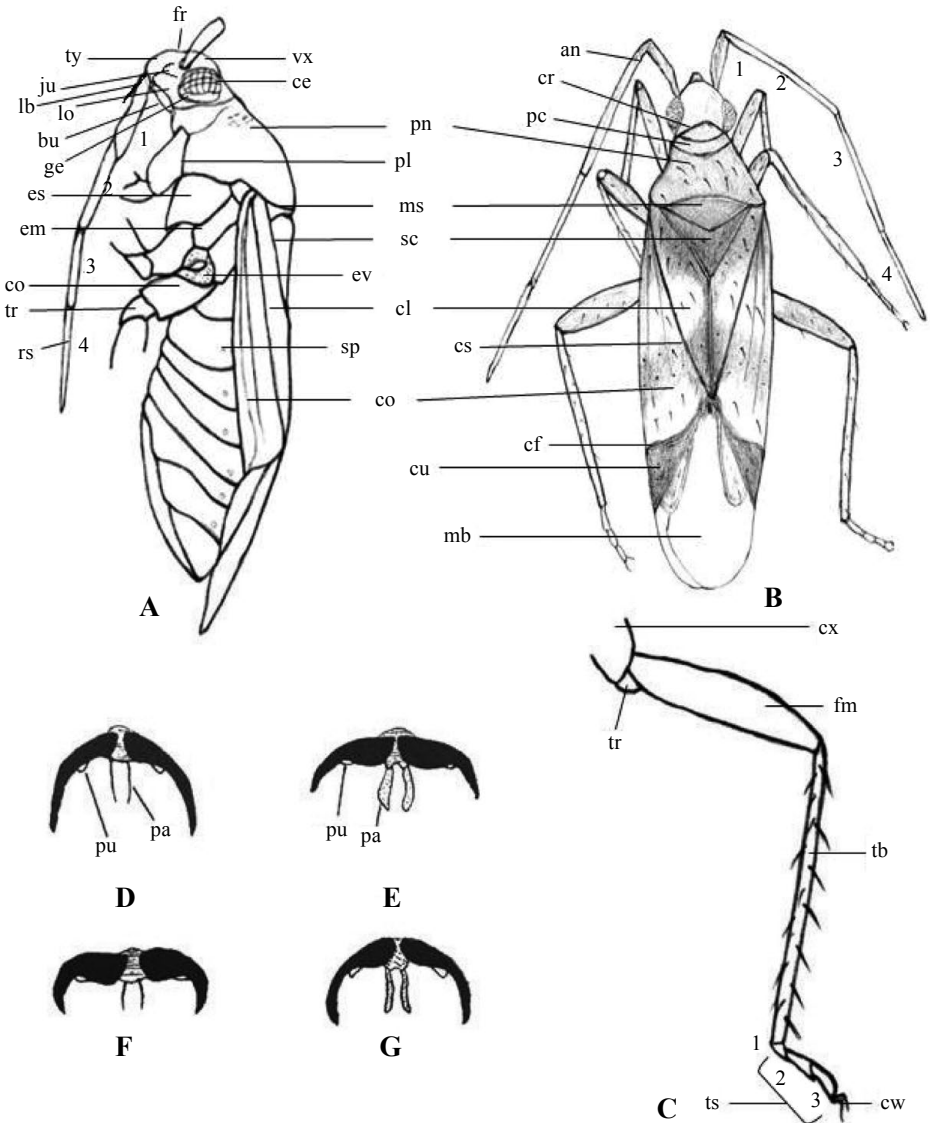

Fig. 2-1. General morphology of Phylinae. A−C. *Hallodapus albofasciatus*. D. *Atractotomus morio*. E. *Brachyarthrum limitatum*. F. *Psallus pullus*. G. *Moissonia punctata*. A. Lateral view. B. Dorsal view. C. Leg. D−G. Pretarsal structures. Abbreviations: an: antenna, bu: buccula, ce: compound eye, cf: cuneal fracture, cl: clavus, co: corium, cr: carina, cs: claval suture, cu: cuneus, cw: claw, cx: coxa, em: epimeron, es: episternum, ev: evaporative area, fm: femur, fr: frons, ge: gena, ju: jugum, lb: labrum, lo: lorum (= maxillary plate), mb: membrane, mm: mesoscutum, pa: parempodia, pc: pronotal collar, pl: propleuron, pn: pronotum, pu: pulvilli; rs: rostrum, sc: scutellum, sp: spiracle, tb: tibia, ts: tarsus, ty: tylus, vx: vertex.

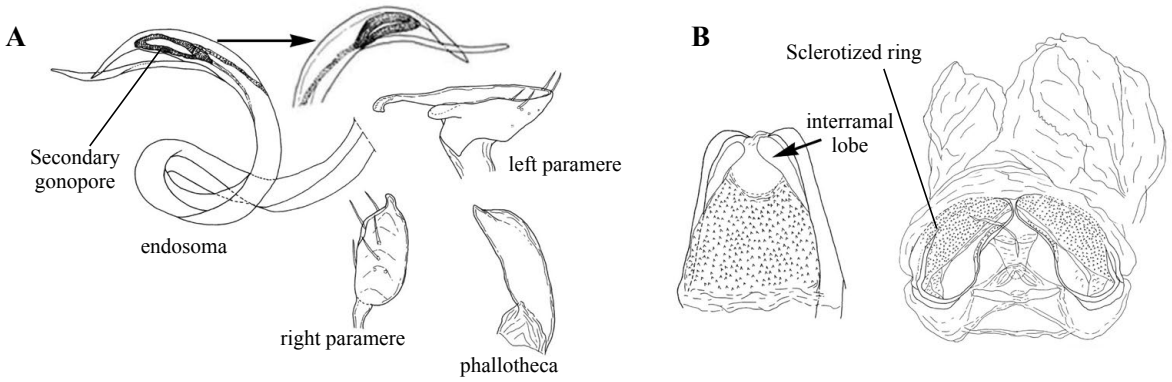

Fig. 2-2. General morphology of Phylinae. A: Male genitalia. B: Female genitalia.

TAXONOMIC NOTES

Class Insecta Linnaeus, 1758

Order Hemiptera Linnaeus, 1758

Suborder Heteroptera Latreille, 1810

Infraorder Cimicomorpha Leston, 1954

Family Miridae Hahn, 1831

Subfamily Phylinae Douglas and Scott, 1865

Type genus: *Phylus* Hahn, 1831.

In general, these tiny bugs are nearly 2−5 mm in length, variously shaped (females are wider than males), dark to beautifully colored, pronotum without collar except members of tribe Hallodapini which bears distinct neck like upturned collar, ocelli absent, pretarsal segments variously shaped, slender hair like to thick tumoid structures. The general morphological structure of the phyline bugs are given in Figures 2-1, 2-2. Male genitalia, endosoma usually sclerotized, simple, slender, S-, or J- or C-shaped with or without secondary gonopores, right and left parameres distinctly assymetical, left paramere large in structure and variously modified depending on genus and species, right paramere simple, leaf-like with variously modified apex, and female genitalia, bursa copulatrix with differently shaped small, or medium, or large sclerotized ring, and posterior wall with or without specific semisclerotized structures.

Species: Over 2700 (90 in Korea)
Distribution: Worldwide.
Korea: Countrywide.

Keys to Korean tribes of subfamily Phylinae

1. Collar flattened or weakly developed ····· Hallodapini
− Collar absent ····· 2
2. Pulvilli distinctly large ····· 3
− Pulvilli moderate or small ····· 4
3. Body relatively large; anterior angles of pronotum carinate; clypeus weakly or strongly projecting ····· Cremnorrhini
− Body small to medium size; hemelytron semitransparent, with distinctly contrasting spots on apices of corium and cuneus ····· Decomiini
4. Parempodia re-curved, either capitate or fleshy; vestiture with elongate and lanceolate setae distributed dense or into patches ····· Pilophorini
− Parempodia setiform; vestiture with or without lanceolate setae but not distributed dense or into patches ····· 5
5. Endosoma relatively small; secondary gonopore weakly developed ····· 6
− Endosoma large; secondary gonopore well developed ····· 7
6. Antennal segment II significantly thick; scent gland relatively large; eyes not parallel to the anterior margin of pronotum ····· Leucophoropterini
− Antennal segment II slender; scent gland small; eyes parallel to the anterior margin of pronotum ···· Semiini
7. Endosoma often with serration; secondary gonopore large and twisted ····· Exaeretini
− Endosoma without serration; endosoma slender, S-shaped with distinct straps or phylinae type with complex apex; secondary gonopore medially or subapically located ····· Phylini

Tribe Cremnorrhini Reuter, 1883

The members of tribe Cremnorrhini are usually distinguished by following characters; postocular region elongated, frons and clypeus rather distinct; dorsal coloration diverse, pale to entirely black; pretarsal pulvilli elongated; sexual dimorphism moderate to distinctly occur.

The Cremnorrhini, consisting of approximately two hundred and seventy seven species in fifty genera worldwide, and most of species distributes at Nearctic and Palaearctic region (Schuh and Menard, 2013; Schuh and Schwartz, 2016). Recently, Schuh and Schwartz (2016) newly described eighty two species from Australia.

Key to genera of Korean Cremnorrhini

1. Antennal segment I, II distinctly thick; sexual dimorphism prominent ····· *Harpocera*
− Antennal segment I rather thick, segment II slender; sexual dimorphism not prominent ····· *Macrotylus*

Genus *Harpocera* Curtis, 1838

Type species: *Harpocera burmeisteri* Curtis, 1838; original designation.

Harpocera Curtis, 1838: 709; Schuh, 1995: 322; Kerzhner, 1988b: 786; Kerzhner and Josifov, 1999: 351; Kwon et al., 2001: 172; Vinokurov, 2006: 83.

Diagnosis: Recognized by large sized body, longer than 5 mm; distinctly pale median strip on dorsum; stout antennae with cylindrical segment I and hatched shaped segment II (in male) or simple elongated (in female); usually short rostrum exceeding apex of procoxae; anteriorly narrow thorax extended broad posteriorly, and calli different in color than surrounding regions; and elongated, flat hind femora.

Distribution: Mediterranean region, Palaearctic region.

Remarks: This genus consists of seven described species, inhabiting various species of oak trees (Schuh, 1995; Kerzhner and Josifov, 1999; Vinkurov, 2006). Vinokurov (2006) recently clarify the status of three Palaearctic species of *Harpocera*: *H. choii*, *H. koreana* and *H. orientalis* with their descriptions and male genital structures from Far eastern Russia. In this study three species of *Harpocera* and *H. josifovi* are found in Korea.

Clear sexual dimorphism is found in this genus, male somewhat dark and stout bodied and females are orange red or brighter colored than males and have simple and slender antennal segments.

Key to species of Korean *Harpocera*

1. Antennal segments in both sexes black, distinctly swollen at apex; head yellowish brown, with genae, lora, stripes on frons, lateral side of vertex black; dorsum darker with mesial and lateral margin of pronotum pale (Plate 1) ····· *H. choii*
− Body not longer than 5.8 mm, pronotum dark brown anteriorly ····· 2
2. Ratio of length of antennal segment I/segment II near 2.2; In males, all antennal segments black and stout, segment II thickened apically, and body dark brown or black; clypeus dark brown, fore and hind femur with long setae ····· *H. josifovi*
− Ratio of length of antennal segment I/segment II near 1.6−1.7; In males, all antennal segments black and stout, segment II thickened apically, and body dark brown or black; clypeus yellowish brown, fore and hind femur with short setae ····· *H. koreana*

1. ***Harpocera choii*** Josifov, 1977 (Plate 1; Table 1)

Harpocera choii: Josifov, 1977: 50; 1992: 115; Kerzhner, 1988a: 841; Schuh, 1995: 322; Kerzhner and Josifov, 1999: 352; Anufriev et al., 2001: 119−120; Kwon et al., 2001: 172; Vinokurov, 2006.

Female. Large, elongated. Generally shining brown body. Head, and anterior pronotum brown tinged with orange color; posterior pronotum, mesoscutum and scutellum darker; hemelytron dark brown with base of cuneus pale. Antennae entirely black. Labium pale with dark apex. Legs usually pale with distal half of metafemora orange red and tibia with minute pigment like spots. Dorsum entirely furnished with simple dark setae and lanceolate setae. Head smooth; pronotum partly shagreen; labium slightly surpass apex of procoxae.

Host plant: *Quercus* sp. (Fagaceae) (Josifov, 1977).

Biology: The biology is unknown in Korea.

Distribution: Korea, Russia (Duwal et al., 2016).

Distribution in Korea: North Korea: HB, PB, PN, South Korea: CB, GG (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, CB: 1♀ (Salmi, Cheongju, 8.v.1997, H.M. Jung, det. by T. Yasunaga, 1999). GG: 1♀ (Gunnae, Musan, Paju, 21.vii.2008, S. Jung).

Remarks: Male is not observed. See Vinokurov, 2006: 83. Female genitalia not observed due to teneral form.

2. ***Harpocera josifovi*** Kim and Jung, 2016 (Plate 1; 10A−E; Table 1)

Harpocera josifovi Kim and Jung, 2016: 307.

Recognized by large and elongated body. Antennae dark brown in male, second antennal segment 2.2 times as long as first antennal segment; vertex without distinct pale spot; frons with an indistinct yellow line medially; scutellum dark brown without vertical line; apex of scutellum with pale brown spot; hindfemur dark brown in apical half, posterior margin of hindfemur with long setae; abdomen with pale brown stripes ventrally; hypophysis of right elongated; endosomal sclerite somewhat thick, apical process short. For more detail description and figure for genital structure, see Kim and Jung (2016).

Host plant: Unknown.

Biology: The biology is unknown in Korea. Attracted by light.

Distribution: Korea.

Distribution in Korea: South Korea: GW (Kim and Jung, 2016).

Material examined: South Korea, GW: 11♂ (Ganpyeong, Jinbu, Pyeongchang, 28.v.2015, on light trap, J.G. Kim).

Remarks: This species attract to light in Spring, but biology is unknown. Female is not observed. For more information, see Kim and Jung, 2016: 307.

3. *Harpocera koreana* Josifov, 1977 (Plate 1; 10F−J; Table 1)

Harpocera koreana: Josifov, 1992: 115; Schuh, 1995: 322; Kerzhner and Josifov, 1999: 352; Kwon et al., 2001: 172; Vinokurov, 2006.

Male. large, elongated. Generally brown body. Head, anterior pronotum, mesoscutum and scutellum black with a pale posterior margin of pronotum; a median pale stripe extended from head to thoracic regions and mesoscutum laterally with pale areas; hemelytron brown; cuneus dark brown with pale base. Antennae entirely shining black. Labium pale with dark apex. All legs pale, with distal half of metafemora darker; distal parts of all femora and all tibiae spotted. Dorsum furnished with uniformly distributed simple dark setae and lanceolate pale setae; pronotum, mesoscutum, scutellum and hemelytron shagreen. Antennae stout, segment II thickened apically; labium slightly surpass the apex of procoxa. Endosoma: S-shaped; apex short; and secondary gonopore small and subapically located.

Female. Sexual dimorphism found in this group. Body and dorsum orange red with pale median strip extended from head to scutellum. Antenna pale and segment II with minute spots. Labium pale with dark apex. Legs pale, femora with darker apices; and all tibiae with dark minute spots. Sclerotized rings asymmetrical; oval with narrow anterior region and wide base.

Host plant: *Quercus aliena* Blume (Fagaceae) (Josifov, 1977).

Biology: As the specimens were collected on light, biology is unknown in Korea.

Distribution: Korea, Russia.

Distribution in Korea: North Korea: HWB, South Korea: GG, GW, JB (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, GG: 1♂ (Anyang, 8.v.1990, J.W. Kim); 1♀ (NAAS, Suwon, 8.v.2001, G.M. Kwon); 1♂, 1♀ (Baekhak, Yeoncheon, 20.v.2008, S. Jung). GW: 4♂ (Mt. Jumbongsan. Jindong, Girin, Inje, 24.v.2011, on light trap, S. Jung). JB: 3♀ (Samgong, Seolcheon, Muju, 19.v.2007, J.W. Seong).

Genus *Macrotylus* Fieber, 1858

Type species: *Macrotylus luniger* Fieber, 1858; subsequent monotypy.

Macrotylus Fieber, 1858: 325; Schuh, 1995: 334; Kerzhner, 1988b: 788; Kerzhner and Joisfov, 1999: 360; Kwon et al., 2001: 334.

Diagnosis: Generally recognized by elongated body, parallel laterally, variously colored dorsum from blackish, or brownish, or reddish, or yellowish, with or without dark spots, or with distinct marginal lines on the hemelytron; usually with whitish large spot near cuneus.

Distribution: Ethiopian region, Holarctic region.

Remarks: *Macrotylus* is a large group comprises of nearly seventy species, distributed widely in a Holarctic region. Two species has been reported from the northern Korean Peninsula (Kwon et al., 2001), however, there is no evidence of existence in Southern part during the field survey from 2008−2011.

Key to species of Korean *Macrotylus*

1. Body blackish green; head, calli and legs black; membrane gray with pale vein. Male genitalia (Plate 11A−D): Endosoma simple, S-shaped; secondary gonopore mesially located; right paramere flat and with blunt apex. Female genitalia (Plate 11E): Sclerotized rings asymmetrical, oval and thick rimmed····· ·····*M. cruciatus*

− Antennal segment I with longitudinal black stripe, hemelytron yellowish with black margins on clavus and corium; membrane pale with black stripe between white spots; all femora with black stripe on both anterior and posterior margins, fore and meso tibiae and entire hind tibiae black (for detail, see Kerzhner, 1988b)·····*M. mundulus*

Subgenus *Alloeonycha* Reuter, 1904

Alloeonycha Reuter, 1904: 8 (as gen. nov.; downgraded to subgenus by Wagner, 1969: 302).

4. *Macrotylus* (*Alloeonycha*) *mundulus* (Stål, 1858)

Leptomerocoris mundulus Stål, 1858: 188.

Macrotylus mundulus: Kerzhner, 1988b: 841; Schuh, 1995: 338; Kerzhner and Josifov, 1999: 362; Anufriev et al., 2001: 119; Kwon et al., 2001: 173.

Male. Body large, laterally parallel. Generally yellowish; head, pronotum, mesoscutum and scutellum completely yellow; hemelytron pale with dark margins and veins, cuneus white; membrane pale brownish with large white spot beneath the cuneus and a dark longitudinal margin across the spot. Antennae dark, segment I pale with black longitudinal line, base and sub-apical region of segment II black, segment III and IV brown. All coxae and trochanters pale; metafemora pale with black anterior and posterior margin; metatibia black. Dorsum furnished with uniformly distributed semierect pale brown setae. Head projecting anteriorly, small eyes, and wide vertex.

Host plant: *Potentilla tanacetifolia* (Rosaceae) (Kerzhner, 1988b).

Biology: Its known host plant is *Potentilla tanacetifolia* (Rosaceae).

Distribution: Korea, China, Mongolia, Russia.

Distribution in Korea: North Korea: YG (Kwon et al., 2001).

Material examined: None.

Remarks: This species was reported from the North Korea (Kwon et al., 2001) and was not observed in South Korea.

Subgenus *Macrotylus* Reuter, 1904

Macrotylus Fieber, 1858: 225 (as gen. nov.; as subgenus by Wagner 1869: 303).

5. *Macrotylus* (*Macritylus*) *cruciatus* (Sahlberg, 1848) (Plate 1; 11A−E)

Lopus cruciatus Sahlberg, 1848: 89

Macrotylus cruciatus: Kerzhner, 1988b: 841; Schuh, 1995: 335; Kerzhner and Josifov, 1999: 364; Anufriev et al., 2001: 119; Kwon et al., 2001: 173.

Male. Body huge, laterally parallel. Generally dirty coloration, greenish or bluish; head fuscous; pronotum greenish; mesoscutum, and scutellum pale yellowish with dark anterior margins; hemelytron dirty greenish with remarkable pale veins and margins. Venter fuscous. Antenna entirely black, or segment I and base of segment II back, and remaining dark brown. Labium black. All legs fuscous. Dorsum furnished with uniformly distributed semierect black setae. Head projecting anteriorly; labium reaching apex of metacoxae; dorsum completely shagreened, except mesoscutum and scutellum smooth and shining. Endosoma: Shape simple, S-like, not twisted; secondary gonopore medially located.

Female. Similar in color and texture as male. Sclerotized rings asymmetrical, thick rimmed, nearly oval

with one end narrow and another broad or somewhat circular.

Host plant: *Geranium sylvaticum* L. (Geraniaceae) (Kerzhner, 1988b).

Biology: The biology is unknown.

Distribution: Korea, Finland, Georgia, Kazakhstan, Mongolia, Russia, Siberia.

Distribution in Korea: North Korea: CG, HB (Duwal et al., 2016).

Material examined: North Korea: YG: 1♂ (Sinsa (in label: Jangkangdo, Sinsodong), 1400 m, 17.vii.1974, M. Josifov, det. by M. Josifov); 1♀ (Samjiyeon (in label: Samdzijôn), 13−19.vii.1974, M. Josifov, det. by M. Josifov).

Tribe Decomiini Schuh and Menard, 2013

The members of tribe Decomiini are usually distinguished by following characters; rather small and oval or parallel sided bodies; hemelytron transparent or colored; dorsum covered with short, appressed, more or less ordered setae; pulvilli large in some genus (ex. *Decomia*).

The Decomiini, consisting of approximately seventy six species in six genera worldwide, and most of species distributes at Oriental region (Schuh and Menard, 2013). The type genus *Decomia* Poppius was originally described from Taiwan (Poppius, 1915). Schuh and Menard (2013) newly recognized this taxa as an independent tribe.

Genus *Rubrocuneocoris* Schuh, 1984

Type species: *Rubrocuneocoris acuminatus* Schuh, 1984; original designation.

Rubrocuneocoris Schuh, 1984: 11, 424; 1995: 427; Yasunaga, 2001b: 117; 2001a: 179; Duwal et al., 2010a: 38.

Diagnosis: Recognized by small body; simple, brownish vestiture on the dorsum; two pairs of distinct red spots on embolium and cuneus; enlarged metafemora; medially coiled vesica with attenuated apical process.

Distribution: Korea, Japan, Nepal, Pacific Islands.

Remarks: This genus represented with six species from Eastern Palaearctic, Pacific and Oriental regions. Josifov (1987, 1992) and Kerzhner (1988a) observed the following species from North Korea, were found in southern part.

6. *Rubrocuneocoris quercicola* Josifov, 1987 (Plate 1; 11F−H; Table 1)

Rubrocuneocoris quercicola: Josifov, 1987: 121−122; 1992a: 116; Kerzhner, 1988b: 856; Schuh, 1995: 427; Kerzhner and Josifov, 1999: 420; Anufriev et al., 2001: 135−136; Kwon et al., 2001: 181.

Male. Body small, elongated. Generally brownish; head dark brown with pale vertex, tylus and ventral parts of head red; pronotum brown; mesoscutum and scutellum pale brown; hemelytron pale brown, with red lateral margins, apices of corium and cuneus with red spot, membrane grayish. Venter red. Antennae, base of segment I pale and apical large part red, segment II pale brown with slightly darker apex, segment III and IV darker. Labium, segment I and II pale, segment III and IV brown. All coxae and trochanters pale; metafemora brown tinged with red; metatibia pale with small brown spots at the base of brown spine. Dorsum uniformly distributed with semierect pale brown setae. Head: Convex, projecting anteriorly; antennal segment II cylindrical, labium reaching apex of metacoxae. Endosoma: Shape broad, twisted, with serrated margins subapically. Left paramere: Body large, thick posterior process thumb-like. Right paramere: Elongated, hammer-like.

Host plant: *Quercus aliena* Blume, *Q. dentata* Thunb. (Fagaceae) (Josifov, 1987; Kerzhner, 1988b, respt.).

Biology: The biology is unknown in Korea, as the specimen was collected in light.

Distribution: Korea, Russia.

Distribution in Korea: North Korea: PN, South Korea: GG, JN (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, GG: 1♂ (Mt. Yongmunsan, Yangpyeong, on light trap, 24.vi.2009, R.K. Duwal and S. Jung). JN: 1♂ (Gurye, 9.viii.1996, J.Y. Choi, det. by T. Yasunaga).

Remarks: Female is not observed.

Tribe Exaeretini Puton, 1875

The members of tribe Exaeretini are usually distinguished by following characters; labium long, reaches over metacoxa; hemelytron usually with dark or sericeous setae; claw of pretarsus elongated, pulvilli very small or absent; endosoma highly curved, mostly S-shaped; secondary gonopore distinctly large and twisted.

The Exaeretini, consisting of approximately two hundred and thirty eight species in twenty four genera worldwide, and most of species distributes at Palaearctic region (Schuh and Menard, 2013). The type genus *Exaeretus* Fieber (Now synonymized to *Camptotylus* Fieber) was originally described from Europe (Fieber, 1864). This taxa originally considered as subtribe level, but Schuh and Menard (2013) upgraded it to tribe subsequently.

Genus *Moissonia* Reuter, 1894

Type species: *Agalliastes punctatus* Fieber, 1861; monotypy.

Moissonia Reuter, 1894: 148.

Ellenia Reuter: Schuh, 1984: 366.

Moissonia Reuter: Schuh, 1995: 353; Kerzhner and Josifov, 1999: 372; Yasunaga, 1999: 195; 2001a: 166; 2010: 75; Duwal et al., 2010b: 26; Duwal and Lee, 2011: 48.

Diagnosis: Generally recognized by pale or green coloration, small and oval body; weakly concave head, sub-hyaline to hyaline hemelytron; ventral longitudinal keel on male genital capsule, and the single apical process of endosoma furnished with a series of notches subtending secondary gonopore. For detailed descriptions see Schuh (1984).

Distribution: Korea, Japan, Nepal, Old World tropics and subtropics.

Remarks: The genus *Moissonia* is one of the morphologically confusing group, comprising of nearly forty two described species (Schuh, 1995; Kerzhner and Josifov, 1999; Yasunaga, 1999, 2010; Duwal et al., 2010b; Duwal and Lee, 2011) and widely distributed in tropical, subtropical and temperate regions. Most of these are inhabited in flowering trees and creepers, though few of them also observed on Asteraceous herbs, e.g. *Bidens* sp. (Duwal et al., 2010b).

Key to species of Korean *Moissonia*

1. Spots on pronotum sparsely distributed; pro- and mesocoxae, trochanters and femora pale; larger basal region of metafemora pale and towards the apex brownish (in some apical half brown). Male genitalia (Plate 12A−D): Apex of endosoma, short and stout (Plate 12A); right paramere with spiral outer margin subapically. Female genitalia (Plate 12E): Sclerotized rings thick rimmed and nearly quadrate ..... *M. kalopani*

− Spots on pronotum medium or densely distributed; pro- and mesocoxae, trochanters and femora darker (brown, or grayish i.e. similar to that of metafemora) 2

2. Metafemora dark brown. Male genitalia: Apex of endosoma with apical elongated process (Yasunaga, 1999: 191). Female genitalia (Plate 12K): Sclerotized rings thick rimmed and as in figure ..... *M. befui*

− Metafemora entirely grayish (except in some brown tinged with red apically). Male genitalia (Plate 12F−I): Apex of endosoma with short, slender and curved apical process; right paramere with triangular protuberance on inner apical margin (Plate 12F). Female genitalia (Plate 12J): Sclerotized rings thin rimmed as in figure ..... *M. yasunagai*

7. *Moissonia befui* Yasunaga, 1999 (Plate 2; 12K; Table 1)

Moissonia befui Yasunaga, 1999: 196; 2001b: 166.

Female. Body small, oval. Generally pale green; head, pronotum, mesoscutum, and scutellum shining, greenish yellow, with dark spots, mesoscutum and scutellum usually widely darkened mesally; hemelytron hyaline, with 3 pairs of spots at apices of corium, embolium and inner mesial parts of cuneus; membrane brownish hyaline. Ventrally, thoracic region unicolorously brownish and abdomen green. Antennae pale brown, segment I with two discontinuous dark rings, base and apex of segment II black, and segment III and IV dark brown. All femora brown with dark spots apically; metatibia pale with dark spots at the base of black spine. Dorsum furnished with semierect dark setae and silvery, short, reclining setae. Head projecting anteriorly, convex; labium reaching apex of mesocoxae. Sclerotized rings thick rimmed, dorsal labiate plate with somewhat sclerotized vertically U-shaped structure in middle, furnished with minute spines and laterally attached with membranes.

Host plant: Unknown.

Biology: In Korea, this species emerged at late spring and was collected on an unknown wild flowering creeper.

Distribution: Korea, Japan.

Distribution in Korea: South Korea: GB.

Material examined: South Korea, GB: 1♀ (Is. Ulleungdo, 8.viii.2010; R.K. Duwal).

Remarks: Male is not observed. For more information, see Yasunaga, 1999: 196.

8. *Moissonia kalopani* Duwal and Lee, 2011 (Plate 2; 12A−E; Table 1)

Moissonia kalopani Duwal and Lee, 2011: 50.

Male. Body small, oval. Dorsum generally greenish yellow, shiny; mesoscutum and scutellum brown or dark brown with yellow lateral margins and middle of first one; head, pronotum, mesoscutum and scutellum provided with moderately scattered dark brown spots; hemelytron hyaline, apices of clavus and exocorium, inner mesial margin of cuneus with distinct dark brown spots, inner base and apex of cuneus with obscure spots, membrane pale and shagreen. Ventral side of body generally pale (or in some specimens somewhat tinged with orange) and abdomen green. Antenna blackish brown, segment I yellowish brown, with brown rings on base and apex ventrally, segment II yellowish brown except base and apical 1/3 dark brown, and extreme base and apex pale, and segment III and IV dark brown except extreme base and apex of the seg-

ment III pale. Labium pale with dark apex. All legs pale, except metafemora gradually brownish towards apex (or in few specimens apical half completely brown); all tibia with black spots. Dorsum furnished with uniformly distributed simple black, sub erect setae and sericeous setae; ventrally covered with shining pale pubescences. Head projecting ventrally; labium short, reaching apex of mesocoxae; pronotum convex, lateral margins curved; labium as long as metafemora. Endosoma: U-shaped, apical process short and stout, 4−5 notches subtending secondary gonopore. Phallotheca: Attenuated and slender on apical half region. Right paramere: With winding outer margin sub-apically.

Female. Not significantly different from male in color and vestiture, except slightly wider abdomen. Sclerotized rings thick rimmed and nearly quadrate; and dorsal labiate plate with semi-sclerotized, inverted U-shaped structure, and at middle region embedded with transparent membrane.

Host plant: *Kalopanax septemlobus* (Thunb. Ex. Murray) (Araliaceae).

Biology: Specimens were collected from inflorescences of *Kalopanax septemlobus* (Thunb. Ex. Murray) (Araliaceae).

Distribution: Korea.

Distribution in Korea: South Korea: CN, GG (Duwal et al., 2016).

Material examined: South Korea, GG: 9♂, 3♀ (SNU Arboretum, Suwon, 20.viii.2009, on *Kalopanax septemlobus* (Thunb. Ex. Murray) (Araliaceae), R.K. Duwal and S. Jung); 1♂ (Mt. Yongmunsan, Yangpyeong, 10.viii.2009, on light trap, same collectors).

9. *Moissonia yasunagai* Duwal and Lee, 2011 (Plate 2; 12F−J; Table 1)

Moissonia yasunagai Duwal and Lee, 2011: 52.

Male. Body small, oval. Generally greenish yellow, and shiny; head and pronotum greenish yellow, mesoscutum and scutellum brown or dark brown with yellow lateral margins and medial region of first one, and head, pronotum, mesoscutum and scutellum provided with numerous dark brown spots; hemelytron hyaline, apices of clavus and exocorium, inner mesial margin of cuneus with distinct dark brown spots, inner base and apex of cuneus with obscure spots, membrane pale and shagreen. Ventral side of the body grayish (or brownish) and abdomen green. Antenna blackish brown, segment I yellowish brown, with brown rings on base and apex ventrally, segment II yellowish brown except base and apical one quarter dark brown and extreme base and apex pale, and segment III and IV dark brown with pale extreme base and apex of segment III. Labium pale brown with dark apex. All coxae and trochanters grayish (or brownish); larger basal part of pro- and mesofemora grayish and apex pale, metafemora entirely grayish (or brown tinged with red apically); all tibia pale with black spots. Dorsum furnished with uniformly distributed simple black, sub-erect

setae and sericeous setae; ventrally with shining pale pubescences. Head projecting ventrally; labium short, reaching apex of mesocoxae; pronotum convex, lateral margins curved. Endosoma: U-shaped, apical process short, slender and curved, 5−6 notches subtending secondary gonopore. Right paramere: With small, triangular protuberances at inner margin apically.

Female. Not significantly different from male in color and vestiture except slightly wider abdomen. Sclerotized rings comparatively thin rimmed and posteriorly oval; and dorsal labiate plate with semi-sclerotized, inverted U-shaped structure at middle.

Host plant: *Kalopanax septemlobus* (Thunb. Ex. Murray) (Araliaceae).

Biology: Specimens were collected on *Kalopanax septemlobus* (Thunb. Ex. Murray).

Distribution: Korea.

Distribution in Korea: South Korea: GG (Duwal et al., 2016).

Material examined: South Korea, GG: 1♂, 6♀ (SNU Arboretum, Suwon, 20.viii.2009, on *Kalopanax septemlobus* (Thunb. Ex. Murray) (Araliaceae), R.K. Duwal and S. Jung).

Tribe Hallodapini Van Duzee, 1916

The members of tribe Hallodapini are usually distinguished by dark coloration with contrasting pale (or white) maculae on hemelytron; pronotum with well developed flattened collar; eyes either contiguous with the anterior margin of pronotum or distinctly removed from the posterior margin of vertex (located anteriorly); pronotum always constricted anteriorly; hemelytron either straight or sinuate laterally; abdomen narrow or constricted basally; parempodia hair-like and parallel; endosoma usually very long, S-shaped, or partially or completely coiled; gonopore usually developed or occasionally indistinct; left paramere always broad; right paramere comparatively small and leaf-like; phallotheca L- or C-shaped with tapering or broad apex.

The Hallodapini, consisting of approximately two hundred and seventy species in forty nine genera (Schuh, 1995; Wyniger, 2006) worldwide, and in Palaearctic region eighty seven species in twnety genera (Kerzhner and Josifov, 1999). The habit and habitat of hallodapini are mysterious, however considered as ground dwelling. Females are often brachypterus and rarely macropterous.

Key to genera of Korean Hallodapini

1. Frons with pointed process; dorsum bare or with hardly visible, scattered, flattened and appressed shining setae ····· *Acrorrhinium*
− Frons without pointed process, dorsum clothed with uniformly distributed setae ····· 2
2. Eyes located anterior than the posterior margin of head; clypeus not separated from frons; abdomen usually constricted at base; hemelytron sinuate (in macropterous forms) ····· *Systellonotus*

− Eyes contiguous with posterior margin of head ····· 3

3. Pronotum rather matte; pale spot widely distributes on hemelytra and clavus ····· *Hallodapus*

− Pronotum rather glabrous; Pale spot on clavus, just behind apex of scutellum ····· *Cleotomiris*

Genus *Acrorrhinium* Noualhier, 1895

Type species: *Acrorrhinium conspersus* Noualhier, 1895; monotypy.

Acrorrhinium Noualhier, 1895: 175; Schuh, 1974: 66; 1984: 103; 1995: 213; Kerzhner and Josifov, 1999: 286; Yasunaga, 2001a: 152; Kwon et al., 2001: 166.

Diagnosis: Recognized by elongated body, nearly parallel sided; yellow or deep brown coloration, either mottled or with contrasting maculae on hemelytron; rounded head; protuberant eyes far from anterior margin of pronotum; strongly convex frons spiniform; long antenna, more or less sub-equal to the body length; flattened collar of pronotum; clear demarcation line between anterior and posterior pronotum; hump-like structure on scutellum; shining serious setae short and sparsely distributed; and hair-like parempodia.

Distribution: Afrotropical region, Australian region, Holarctic region, Oriental region.

Remarks: The genus *Acrorrhinium*, is described with twenty eight species in the world and two in the Palaearctic region (Schuh, 1995; Kerzhner and Josifov, 1999; Zhang and Liu, 2010). These are widely distributed in the tropical and subtropical climatic conditions therefore, large number were reported from Oriental region. The biology for most species is unknown because all described species were collected on light trap, except few like *A. inexpectatum* was reported on bark and branches of *Quercus* and other deciduous trees (Kerzhner, 1988c).

The genus is easily distinguished from other genera of Hallodapini by spiniform frons.

10. *Acrorrhinium inexpectatum* (Josifov, 1978) (Plate 3; 13A−D; 43; Table 1)

Cinnamus inexpectatus Josifov, 1978: 279.

Acrorrhinium inexpectatum Kerzhner, 1988c: 839; Schuh, 1995: 214; Kerzhner and Josifov, 1999: 286; Yasunaga, 2001a: 152; Anufriev et al., 2001: 117; Kwon et al., 2001: 166; Zhang and Liu, 2010: 31.

Male. Body large, elongated. Generally dark brown colored; dorsum dark brown, dull with small or larger pale speckles. Anterior region of head dark and posterior region pale; tylus black and shining; genae and gula pale with red margins. Hemelytron blackish brown, or usually dull with posterior margin of corium pale and entirely distributed with small and larger speckles; cuneus blackish and without speckles; mem-

brane dark. Ventral body dark and shining. All antennae dark brown, dull bases and apices of segment I and II pale; segment I with two pale spots at the base of spine. Labium entirely dark. Legs dull; procoxa dark, meso and metacoxa pale; femora dull with pale spots subapically on posterior margin, and tarsus pale. Dorsum furnished with scattered minute, flattened shining, setae. Head: Anterior region of the head with a spine-like structure; calli distinct with median demarcation line; larger region of mesoscutum visible dorsally; median region of scutellum somewhat raised; antennal segments comparatively longer, length of segment I more or less equal to the width of head across the eyes; vertex narrow; labium surpass the apex of metacoxae; dorsum completely shagreen. Endosoma: Very long, twisted, apical processes joined with membranous structure, furnished with minute spines; secondary gonopore located subapically. Phallotheca: Broad, flattened and with blunt apex. Left paramere: Body large. Right paramere: Small, bulb-like, apically terminates into elongated finger-like structure.

Host plant: *Quercus* spp. (Fagaceae).

Biology: Though this species was reported from *Quercus* (Kerzhner, 1988c), any kind of biology is known in Korea since these were collected in light trap.

Distribution: Korea, China, Russia.

Distribution in Korea: North Korea: PN, South Korea: GB, GW (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, GB: 1♂ (Mt. Palgongsan, Namsan, Bugye, Gunwi, 27.vii.1998, D.S. Ku). GW: 1♂ (Jeungsan, Samcheok, 8.viii.2011, on light trap, E.S. Kim).

Remarks: Female is not observed.

Genus *Cleotomiris* Schuh, 1984

Type species: *Cleotomiris schneirlai* Schuh, 1984.

Cleotomiris Schuh, 1984: 81; Schuh, 1995: 8; Kerzhner and Josifov, 1999: 277; Konstantinov and Simov, 2014: 66.

Diagnosis: Recognized by small to moderate size, ant memetic appearance; dorsum reddish brown to blackish; anterior margin of the pronotum broad, collar-like shape; the transverse white fascia on the clavus just behind apex of scutellum; pretarsal parempodia slightly fleshy, convergent apically; endosoma basally short, apex slightly membranous; secondary gonopore distinctly large.

Distribution: Eastern Palaearctic, Oriental region.

Remarks: This small genus consisting of five species, and mainly distributed at Oriental region. Their biology not well known, only host information of *C. josifovi* had reported by Konstantinov and Simov (2014). Some of them were attracted to light.

11. *Cleotomiris josifovi* Konstantinov and Simov, 2014

Cleotomiris josifovi Konstantinov and Simov, 2014: 66.

Recognized by moderate sized body, around 3.8−4.0; clavus with small and elongate oval, transverse ivory fascia near apex of scutellum; corium brownish, without pale spots; apical half of hind femur and basal 3/4 of hind tibia tinged with red; pronotal collar shorter than width of antennal segment II at base; male genital capsule without ventral spine or additional process; endosoma elongated and near J-shaped; with short apical process and serrate process near secondary gonopore; left paramere with elongated, thin process apically; phallotheca distinctly serrate; sclerotized rings large and apically converged, cover large part of dorsal labiate plate. For more detail description and figure for genital structure, see Konstantinov and Simov, 2014.

Host plant: *Ulmus* sp. (Ulmaceae) (Konstantinov and Simov, 2014).

Biology: The host plant is *Ulmus* sp. (Ulmaceae), but breeding host is unknown.

Distribution: Korea.

Distribution in Korea: North Korea: PN (Konstantinov and Simov, 2014).

Material examined: None.

Remarks: Specimen is not observed. For more information, see Konstantinov and Simov, 2014: 66.

Genus *Hallodapus* Fieber, 1858

Type species: *Capsus coryzoides* Herrich-Schäffer, 1839; monotypy.

Hallodapus Fieber, 1858: 307; Schuh, 1974: 91; 1984: 117; 1995: 223; Kerzhner and Josifov, 1999: 290; Yasunaga, 2001a: 152; Kwon et al., 2001: 166; Wyniger, 2006: 236.

Diagnosis: Recognized by small to medium sized body; basically brown coloration with contrasting white maculae on clavus and corium, flattened collar of the pronotum; a stridulatory device on the inner surface of the metafemora; setiform parempodia; and elongated thread like endosoma with developed subapical secondary gonopore.

Distribution: Afrotropical region, Australian region, Holarctic region, Oriental region.

Remarks: The genus *Hallodapus* is widely distributed in tropics and subtropics however few are described from Holarctic region. It consists of forty seven species described in the world, and three are recorded from the Korean Peninsula (Schuh, 1995; Kerzhner and Josifov, 1999). Most of the authors described these were collected from meadows and grasslands, macropterous forms are easily attracted to the light.

Key to species of Korean *Hallodapus*

1. Pronotum comparatively smooth; head, pronotum and all appendages orange yellow; antennal segment I tinged with red and ventrally provided with a white stripe; hemelytron brown with two white maculae: anterior one entirely across the hemelytron posterior to the scutellum and posterior one adjacent to the cuneal fracture (Plate 3) ····· *H. linnavuorii*
− Specimens with somewhat darker coloration; pronotum with irregular wrinkles; femora and dorsum reddish brown or more darker, anterior fascia or maculae various ····· 2
2. Major part of hemelytron dull, anterior fascia developed into narrow stripe and not continues across the clavus; antennal segment I white with reddish ring at the base and apex (Plate 3) ····· *H. pumilus*
− Base of clavus blackish brown, corium brown; anterior macula developed widely, extending from apex of scutellum to the subapical region of clavus; base of antennal segment I dark brown and apex with red ring (Plate 3) ····· *H. centrimaculatus*

12. *Hallodapus centrimaculatus* (Poppius, 1914) (Plate 3; 13E−H; Table 1)

Tyraquellus centrimaculatus Poppius, 1914: 167.

Hallodapus fenestratus: Linnavuori, 1961: 165; Schuh, 1984: 124; 1995: 224; Kerzhner and Josifov, 1999: 291; Yasunaga, 2001b: 153; Anufriev et al., 2001: 117; Kwon et al., 2001: 166.

Male. Medium sized, elongated oval. Generally dark brown body. Head and pronotum dark brown and dull. Hemelytron brown with two macula: one large on clavus posterior to the scutellum, and another on the corium quadrate and adjacent to the cuneal fracture; cuneus deep red. Venter dark brown. Antennae pale; basal half of segment I brown and apical margin with red ring, and segment III and IV tinged with red. Labium shining brown with darker apex. Procoxa brown; meso- and metacoxa and all trochanters pale; metafemora blackish brown and somewhat tinged red at margins, except extreme bases; metatibia entirely pale. Dorsum furnished with scattered semierect or erect brown setae; head and pronotum completely shagreen. Head: Head with a median sulcus; length of antennal segment I longer than vertex width; labium reaching apex of metacoxae. Endosoma: S-like, two apical processes supporting each other; secondary gonopore subapically located. Phallotheca: Narrow with pointed apex. Left paramere: Body large with outgrowth protuberances. Right paramere: Small, leaf-like.

Host plant: Unknown.

Biology: The observed specimen in this study was collected during random sweeping on various shrubs, so the specific host is unable to determine.

Distribution: Korea, Japan, Java, Russia, Taiwan.

Distribution in Korea: South Korea: CB (Duwal et al., 2016).

Material examined: South Korea, CB: 1♂ (Cheongju, 7.vii.2009, S. Jung).

Remarks: *Hallodapus centrimaculatus* is usually described as Oriental species which is morphologically very similar with the *H. fenestratus*, described from the Palaearctic region (Linnavuori, 1961). The description and figure of hemelytron provided by the Linnavuori (1961) resembles the *centrimaculatus* but he didn't provide characteristic genital structure in his study. Consequently, when we examined the male genitalia of collected specimen it was found similar with the *centrimaculatus* as described in Schuh, 1984. Therefore, here *H. fenestratus* is synonymised to *H. centrimaculatus*. Female is not observed.

13. *Hallodapus linnavuorii* Miyamoto, 1966 (Plate 3; 14A−D; Table 1)

Hallodapus linnavuorii: Miyamoto, 1966: 433; Schuh, 1984: 127; 1995: 225; Kerzhner, 1988c: 839; Kerzhner and Josifov, 1999: 292; Yasunaga, 2001a: 153; Anufriev et al., 2001: 117; Kwon et al., 2001: 167.

Male. Body medium sized, elongated oval. Generally orange brown body. Head, pronotum and mesoscutum shining, orange brown; and scutellum dark brown. Hemelytron brown with wide pale macula at middle and apex of corium; and cuneus deep red. All antennal segments pale, segment I reddish with white longitudinal stripe on ventral region. Labium pale brown with dark apex. Legs pale; pro- and base of mesocoxae brown; metafemora pale apically tinged with red; and metatibia pale. Dorsum furnished with scattered semi-erect or erect pale brown setae; and head and pronotum partly shagreen. Head: Length of antennal segment I nearly equal to the width of vertex; labium reaching apex of metacoxae. Endosoma: S-like, basal and apical curve deep, U-shaped, curved, apical process with a wide chitinized membrane. Phallotheca: Broad with blunt apex.

Host plant: Unknown.

Biology: The representative specimen is collected on light trap, so any kind of biology is unknown in Korea.

Distribution: Korea, Japan, Russia.

Distribution in Korea: South Korea: JJ, JN (Duwal et al., 2016).

Material examined: South Korea, JJ: 1♂ (Seonheul, Jocheon, Jeju, 26.viii.1997, D.S. Ku). JN: 1♂ (Mt. Bangjangsan, Jangseong, 24.vi.2010, on light trap, R.K. Duwal).

Remarks: Female is not observed.

14. *Hallodapus pumilus* Horváth, 1901 (Plate 3; 14E, F; Table 1)

Allodapus pumilis Horváth, 1901: 268

Hallodapus pumilus: Kerzhner, 1988c: 839; Schuh, 1995: 226; Kerzhner and Josifov, 1999: 292; Anufriev et al., 2001: 117; Kwon et al., 2001: 167.

Female. Medium sized, elongated. Generally brown body. Head, pronotum, mesoscutum and scutellum brown with lateral margins of later two black. Hemelytron brown with two maculae; anterior one narrow posterior to the scutellum and posterior one wide quadrate adjacent to the cuneal fracture; cuneus deep red; membrane grayish with white areas beneath the cuneus. Venter shining brown. Antennae brown; segment I pale with red rings on base and apex; base of segment II pale which gradient darker towards the apex; and segment III and IV tinged with red. Labium shining brown; and segment I and II tinged with red. Legs, pro- and base of mesocoxae brown; remaining parts of coxae and trochanters pale; metafemora shining brown; metatibia pale with red stripe on the basal half region dorsally. Dorsum furnished with scattered semierect or erect brown setae; and head and pronotum shagreen. Head: labium reaching apex of metacoxae. Bursa copulatrix, Sclerotized rings asymmetrical, thin rimmed; dorsal labiate plate with chitinized structures laterally and centrally and furnished with minute spinules. Posterior wall with chitinized densely spinulus structure.

Host plant: Grass lands of *Leymus mollis* (Kerzhner, 1988a).

Biology: The representative specimen in this study was crawling around the sand near the damp where rotten logs were discarded.

Distribution: Korea, Mongolia, Russia, Siberia.

Distribution in Korea: South Korea: CB (Duwal et al., 2016).

Material examined: South Korea, CB: 1♀ (Mt. Sobaeksan, Damyang, 25−26.v.2009, R.K. Duwal and S. Jung).

Remarks: Male is not observed.

Genus *Systellonotus* Fieber, 1858

Type species: *Cimex triguttatus* Linnaeus, 1767; monotypy.

Systellonotus Fieber, 1858: 326; Linnavuori, 1972: 40; Kerzhner, 1988c: 840; Schuh, 1995: 235; Kerzhner and Josifov, 1999: 297; Yasunaga, 2001a: 154; Kwon et al., 2001: 167.

Diagnosis: Recognized by elongated body, nearly parallel sided or distinctly sinuate hemelytron, dark coloration of dorsum with contrasting white or pale transverse fascia usually two in number, constricted head

behind the eyes seems like a short neck, eyes removed from anterior margin of pronotum, elongated antennae, flattened collar, and hair-like parempodia.

Distribution: Holarctic region.

Remarks: The genus *Sytellonotus* is a small group comprises with approximately twenty described species (Schuh, 1995). Members of this genus inhabits in cold climatic conditions rather than tropical and subtropical region, except few exceptional cases of occurrence in South Africa: *S. brincki* (Schuh, 1974). In Korea it is represented with only one species.

Though the habits of *Systellonotus* are unknown, it is believed that they probably live in meadows or grasslands.

15. *Systellonotus malaisei* Lindberg, 1934 (Plate 3; 14G−K; Table 1)

Systellonotus malaisei: Lindberg, 1934: 20; Kerzhner, 1988c: 840; Schuh, 1995: 236; Kerzhner and Josifov, 1995: 298; Yasunaga, 2001a: 154; Anufriev et al., 2001: 118; Kwon et al., 2001: 167.

Male. Body medium sized, elongated, and laterally sinuous. Generally brown body. Head and pronotum shining dark brown; mesoscutum and scutellum shining black. Hemelytron brown with two transversed fascia: anterior one continuous to middle of clavus and another one adjacent to the cuneal fracture; cuneus reddish black. Venter blackish brown. Antennae brown; segment I and bases of segment II and III pale, segment II dark brown towards the apex. Labium pale brown with dark apex. Pro- and mesocoxa brown, metacoxae and all trochanters pale; metafemora and base of tibia brown and tinged with red. Dorsum furnished with scattered semierect or erect brown setae. Head: Eyes smaller, vertex wider; labium reaching apex of mesocoxae. Endosoma: U-like, apical process with several coiled structure.

Host plant: Unknown.

Biology: Kerzhner (1988b) reported this species from meadows. The representative specimens in this study were collected by random sweeping on shrubs and herbs, therefore unable to find specific host.

Distribution: Korea, Japan, Russia.

Distribution in Korea: North Korea: PB, YG, South Korea: CB, CN (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, CB: 1♂ (Wanjang, Gaeun, Mungyeong, 31.v.2008, S.W. Park). CN: 1♂ (Bongsan, Jochiwon, Yeongi, 7.vi.2008, S.W. Park).

Remarks: Female is not observed.

Tribe Leucophoropterini Schuh, 1974

Members of tribe Leucophoropterini are usually recognized by dark coloration, often with contrasting pale hemelytron maculae; eyes contiguous with anterior margin of pronotum; carinate pronotum (instead of collar); scutellum flat; hemelytron straight or weakly or strongly sinuate laterally; abdomen narrow; parempodia hair-like, rarely fleshy; endosoma usually S-shaped, strongly or partially twisted, often U- or J-shaped; secondary gonopore poorly developed or obscure.

Schuh (1974) defined this tribe probably evolved in temperate and subtropical regions due to wide spread of population in New Guinea, New Ireland, Solomon Islands, Borneo and Philippine. It has been reported about one hundred and fourteen species in twenty genera worldwide and ten species in two genus from Palaearctic region (Schuh, 1995; Kerzhner and Josifov, 1999; Yasunaga, 2001; Duwal et al., 2016).

Key to genera of Korean Leucophoropterini

1. Apical half of femora red, metafemur widely tinged with red ····· *Pseudophylus*
− Femora without reddish tinge, metafemur widely fuscous ····· *Sejanus*

Genus *Sejanus* Distant, 1910

Type species: *Sejanus funereus* Distant, 1910; monotypy.

Sejanus Distant, 1910: 20; Schuh, 1984: 150; 1995: 244; Kerzhner and Josifov, 1999: 422; Yasunaga, 2001a: 181; Kwon et al., 2001: 184.

Diagnosis: Recognized by completely black or castaneous black body and dorsum; thick antennal segment II, somewhat punctate hemelytron; usually ivory spots on the base of cuneus; dorsum often covered with semierect, soft brown setae; C- or J-shaped endosoma without apical spines and obscurely developed secondary gonopore.

Distribution: Australian region, Oriental region, Palaearctic region.

Remarks: Members of the genus *Sejanus* are considered to be host specific. Australian species are regarded as herbivorous (Cassis and Gross, 1995) however most of the species were reported as effective predators feeding on dipteran and lepidopteran larvae, mites, psyllids, etc. (Wheeler, 2001). Hitherto, fifty species described from world, and nine species in Palaearctic region (Schuh, 1995; Kerzhner and Josifov, 1999; Yasunaga, 2001). In Korea represented with one species.

16. *Sejanus potanini* (Reuter, 1906) (Plate 2; 15A−E; Table 1)

Sthenarus potanini Reuter, 1906: 77.

Sejanus potanini: Kerzhner, 1988: 76; Schuh, 1995: 246; Kerzhner and Josifov, 1999: 423; Yasunaga, 2001b: 121; Anufriev et al., 2001: 130; Kwon et al., 2001: 184.

Male. Body small, oval. Generally black colored. Entire body dorsally and ventrally shining black. Antennae pale with larger apical region of segment II black. Labium, segment I and IV dark and remaining pale. Legs, all coxae and trochanters and femora black except pale apices of femora; metatibia pale with rows of dark brown spines. Dorsum uniformly distributed with semierect pale brown soft setae. Head: Labium reaching apex of mesocoxae, length nearly equal the width of pronotum; antennal segment III and IV shorter, sum of two segments shorter than segment II; antennal segment II clavate. Endosoma: Shape simple, J-like; secondary gonopore obscure.

Female. Similar in color and texture to the male. Genitalia, Sclerotized rings asymmetrical, smaller and thin rimmed. Posterior wall with chitinized, minutely spinulus structures on either lateral side.

Host plant: *Salix* sp. (Kerzhner, 1988a).

Biology: Yasunaga (2001) observed Japanese *S. potanini* feeding on animal food in laboratory test. In Korea, no specific host is detected for this species as these were collected by random sweeping on herbs.

Distribution: Korea, China, Japan, Russia.

Distribution in Korea: North Korea: HWB, South Korea: CN, GG, GN (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, CN: 3♀ (Is. Nanjido, Seokmun, Dangjin, 18.viii.2009, R.K. Duwal and S. Jung). GG: 1♂ (Gunnae, Musan, Paju, 21.vii.2008, S. Jung); 1♀ (Mangwol, Hajeom, Ganghwa, Incheon, 1.vii.2008, R.K. Duwal and S. Jung). GN: 1♀ (Geoje Arboretum, Geoje, 25−27.viii.2008, R.K. Duwal and S. Jung).

Genus *Pseudophylus* Yasunaga, 1999

Type species: *Phylus stundjuki*, 1973: 183.

Pseudophylus Yasunaga, 1999: 183; 2001a: 178.

Diagnosis: Recognized by elongated or sub-oval body; uniformly distributed dark, sub erect setae on dorsum; short head, narrow vertex; short antennal segment II; short rostrum, reaching apex of mesocoxa; and simple and broad endosoma nearly J-shaped (Plate 20A) and secondary gonopore located subapically.

Distribution: Palaearctic region.

Remarks: Kulik (1973) described the type species of this genus as *Phylus stundjuki* due to similar morphological appearance. Subsequently, Yasunaga (1999) erect *Pseudophylus* to accommodate the species showing differences like, small size, short head and antennal segment II, and shape of endosoma.

17. *Pseudophylus stundjuki* (Kulik, 1973) (Plate 2; 15F−J; 44; Table 1)

Heterocordylus flavipes: Notibe, 1906, junior secondary homonym of *Cimex flavipes* Scopoli, 1763; Miyamoto and Yasunaga, 1989: 163.

Phylus stundjuki: Kulik, 1973: 22; Schuh, 1995: 390; Yasunaga et al., 1996: 93.

Pseudophylus stundjuki Yasunaga 1999: 183; 2001a: 179.

Male. Body medium sized, elongated, laterally somewhat parallel. Generally black; dorsum entirely black; hemelytron entirely black, and membrane gray. Venter shining black. Antennal segment I dirty yellow, segment II black, segment III and IV pale brown. Labium brown, segment I and IV dark. All coxae pale with black bases and trochanters whitish; base of metafemora pale and apical half red; metatibia pale brown; tarsus pale brown with dark apex. Dorsum uniformly distributed with semierect simple pale setae; vertex, pronotum, mesoscutum, scutellum shagreen. Head: Small, projecting anteriorly, convex; labium short, reaching apex of mesocoxae. Endosoma: Shape J-like, with simple process; secondary gonopore apically located. Phallotheca: Narrow, tapers towards the apex. Right paramere: Elongated, leaf-like, margins irregular.

Female. Similar in color and texture, except broad and flat abdomen. Bursa copulatrix comparatively small and delicate; sclerotized rings asymmetrical, small and elongate oval.

Host plant: *Pyrus ussuriensis* Maxim. Var. (Rosaceae).

Biology: Yasunaga (1999) cited this species as a serious pest on apples and additionally listed other hosts, *Pyrus ussuriensis*, *Malus sieboldi* (Rosaceae), *Maackia amurensis* (Leguminosae) and *Artemisia* sp. (Compositae). In this current study, large numbers of specimens were collected from a individual of *Pyrus ussuriensis* Maxim. (Rosaceae) which was found seriously damaged. The field survey suggests that, they have one generation per year in Korea.

Distribution: Korea, Japan, Russia.

Distribution in Korea: North Korea: PN, YG, South Korea: GG (Kwon et al., 2001; Duwal et al., 2016).

Material examined: North Korea, PB: 1♂ (Bosôk, 1000 m, 1.vi.1974, M. Josifov). PN: 1♀ (Mt. Daeseongsan, Pyeongyang (in label: Tesong-san, Bei Phjongjang), 1.vi.1987, M. Josifov). South Korea, GG: 46♂, 50♀ (SNU Arboretum, Suwon, 20.v.2009, on *Pyrus ussuriensis* Maxim. Var. (Rosaceae), R.K. Duwal).

Tribe Nasocorini Reuter, 1883

The members of tribe Nasocorini are usually distinguished by following characters; vertex flat; dorsum with sericeous or serrated, scalelike setae or dark and erect setae; metafemora more or less short and wide; dorsal margin of metafumur with row of spicules; ventral surface of pretarsal claw often covered with pulvilli structure; gonopore rather sclerotized.

The Nasocorini, consisting of approximately four hundred and sixty one species in fifty nine genera worldwide, and most of species distributes at Palaearctic and Nearctic region (Schuh and Menard, 2013). The type genus *Nasocoris* Reuter was originally described from Trukistan (Reuter, 1879).

Key to genera of Korean Nasocorini

1. Antennal segment II thick, swollen, clavate ····· *Atractotomus*
− Antennal segment II slender, cylindrical, or filliform ····· 2
2. Dorsum reddish brown and uniformly distributed with black spots; body small, tiny sized ····· *Atractotomoidea*
− Dorsum without spots; hind femora without marginal longitudinal stripe ····· 3
3. Antennal segment II shorter than width of head ····· 4
− Antennal segment II longer than width of head ····· 5
4. Body and dorsum black, shining, antennal segment I without large black spot ····· *Chlamydatus*
− Usually body and dorsum pale greenish, antennal segment I with larger black spot ····· *Campylomma*
5. Body or dorsum brownish or black ····· 6
− Dorsum pale green, apex of scutellum and clavus black; membrane with distinct smoky pattern ····· *Atomoscelis*
6. Dorsum entirely black with pale areas on head, pronotum, mesoscutum and bases of corium and cuneus (in some specimens, dorsum entirely black except pale areas on head and mesoscutum) ····· *Monosynamma*
− Head, pronotum, mesoscutum, scutellum, cuneus and legs dark brown (or sometimes reddish brown); hemelytron brown; antennal segment I and segment II brown, segment I tinged with red···· *Kasumiphylus*

Genus *Atomoscelis* Reuter, 1875

Type species: *Agalliastes onustus* Fieber, 1861; subsequent designation.
Atomoscelis Reuter, 1875: 100; Schuh, 1995: 261; Kerzhner and Josifov, 1999: 309.

Diagnosis: Recognized by tiny body, pale or pale green texture; a large black spot on the antennal seg-

ment I; dark apices of scutum and clavus; smoky membrane; pale hind femora with distinct large black or dark brown spots, and rows of black or dark brown spots on hind tibia.

Distribution: Holarctic region.

Remarks: *Atomoscelis* is a small, morphologically delicate genus with eight described species from Holarctic region and tropical Africa. Josifov (1979) reported *A. asiatica* from the northern part of the Korean Peninsula, but there is no evidence of these bugs in South Korea during field survey from 2008−2011. The current species found was collected at Eastern part of China, around the wet land.

18. *Atomoscelis asiatica* (Josifov, 1979) (Plate 3; 16A−E; Table 1)

Kerzhneriola asiatica Josifov, 1979: 216, 217.

Atomoscelis asiatica: Kerzhner, 1988b: 856−857; Schuh, 1995: 261; Kerzhner and Josifov, 1999: 309; Anufriev et al., 2001: 136; Kwon et al., 2001: 168.

Male. Body small, oval. Generally pale tinged with green; head greenish with pale yellowish vertex, fore head with dark vertical line, tylus dorsally brownish, and laterally and apically green; pronotum green with yellow calli; mesoscutum yellow; and scutellum greenish with dark apex; hemelytron, clavus pale with black apex, corium entirely pale, membrane with smoky pattern, laterally dark and apically darker. Venter greenish. Antennal segment I pale with large black spot and with a pair of black spine, segment II dirty yellow with dark extreme base, and segment III and IV pale brown tinged with green. Labium, segment I green, segment II pale, segment III and IV brown with dark apices. All coxae and trochanters pale; metafemora pale with large dark spots on the distal half; metatibia pale with large black spots at the base of black spine; and tarsus brown with darker apices. Dorsum furnished with uniformly distributed semierect dark brown and pale setae. Head: Projecting anteriorly, convex; labium reaching apex of metacoxae. Endosoma: Shape simple, S-like, with two apical processes; secondary gonopore subapically located. Left paramere: Body large. Right paramere: Broad, elongated oval, leaf-like, margins irregular.

Female. Similar in color and texture. Genitalia: Asymmetrical sclerotized rings somewhat triangular shaped, and with curved margins.

Host plant: *Artemisia* sp. (Asteraceae) (Josifov, 1979).

Biology: The representative species is collected on the Asteraceous plant in South-eastern wet land of Tianjin, China. Both adults and nymphs were aggregated in large number.

Distribution: Korea, China, Russia, Tadzhikistan.

Distribution in Korea: North Korea: PN (Kwon et al., 2001).

Material examined: None.

Remarks: This species was reported in Korea from northern part which was not found at southern region during survey.

Genus *Atractotomus* Fieber, 1858

Type species: *Capsus magnicornis* Fallén, 1807; monotypy.

Atractotomous Fieber, 1858: 317; Schuh, 1995: 263; Kerzhner, 1988b: 848; Kerzhner and Josifov, 1999: 310; Yasunaga 2001a: 155; Anufriev et al., 2001: 127; Kwon et al., 2001: 168.

Diagnosis: Recognized by medium sized, oval elongated body about 4.0 mm in length; clavate or fusiform antennal segment II, short antennal segment III and IV; densely distributed silvery scales on dorsum; simple, strongly twisted endosoma, with apical or subapical gonopore followed by minute sclerites (Stonedahl, 1990).

Distribution: Holarctic region.

Remarks: Stonedahl (1990) described this genus as a Holarctic fauna inhabiting widely on various hosts: *Quercus*, *Salix*, etc. or polyphagous. This genus reported with nearly forty eight species (Schuh, 1995) in the world. Though some species of this genera are serious pest of economic plants e.g., apple, pear, few are considered as predatory group as they were found feeding on aphids, eggs of different insects, honeydew, lepidoptera, mites, psyllids, etc (Wheeler, 2001).

19. *Atractotomus morio* Sahlberg, 1883 (Fig. 2-1D; Plate 3; 16K; Table 1)

Atractomomus morio: Sahlberg, 1883: 94−95; Kerzhner, 1988b: 849; Schuh, 1995: 267; Kerzhner and Josifov, 1999: 312; Yasunaga, 2001a: 155; Anufriev et al., 2001: 127; Kwon et al., 2001: 168.

Female. Body large, elongated. Generally black; completely black dorsum, with posterior margin of the vertex pale brown; membrane gray. Antennal segment I and II black, segment III and IV pale brown. Labium shining black. Legs black, with dark brown trochanters. Head with semierect pale brown setae; pronotum uniformly distributed with soft appressed brown setae; mesoscutum, scutellum and hemelytron with both soft appressed brown setae and shining flat scale-like setae; pronotum shagreened. Head: Projecting anteriorly, convex; antennal segment II short, fusiform, segment III and IV short; labium reaching apex of metacoxae; callus region somewhat raised. Sclerotized rings elongate oval, with broad posterior margin.

Host plant: *Picea* sp. (Pinaceae) (Kerzhner, 1988b; Stonedahl, 1990; Josifov, 1992).

Biology: Any kind of biology is unknown in Korea, since the specimen is without host label.

Distribution: Korea, Finland, Russia, Sweden.

Distribution in Korea: North Korea: YG, South Korea: GW (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, GW: 2♀ (Sambong natural forest, Hongcheon, 26.vi.2003, J.W. Seong).

Remarks: Male is not observed. Stonedahl (1990) provided Male description, SEM pictures of metafemur, paramere and illustrations of antennae and endosoma.

Genus *Atractotomoidea* Yasunaga, 1999

Type species: *Atractotomoidea castanea*, original designation.

Atractotomoidea Yasunaga, 1999: 190; 2001a: 154; 2010: 51; Duwal et al., 2010b: 7; Duwal and Lee, 2011: 47.

Diagnosis: Generally recognized by chestnut brown, tiny body; uniformly distributed minute dark spots on dorsal surface furnished with simple, pale and sub-erect pubescence; antennal segment III as long as segment VI; hooked process of left paramere; mesial coiled endosoma bifurcate apically. For detail, see Yasunaga (1999).

Distribution: Korea, Japan, Nepal, Thailand.

Remarks: This species is described with only five species from tropics, subtropics and temperate regions of Asia, i.e., Japan, Korea, Nepal and Thailand, where these were inhabited on various host plants and were also presumed as predators (Yasunaga, 1999, 2010; Duwal et al., 2010b).

20. *Atractotomoidea castanea* Yasunaga, 1999 (Plate 3; 16F−J; Table 1)

Atractotomoidea castanea Yasunaga, 1999: 190−191; Yasunaga, 2001: 155; Duwal and Lee, 2011: 47.

Male. Body tiny, oval. Generally brown; head, pronotum, mesoscutum, and scutellum dark brown (sometimes tinged red); hemelytron entirely brown with uniformly distributed convex spots; membrane gray. Venter castaneous. Antennal segment I castaneous, apical half of segment II, segment III and IV black. Labium either pale or pale tinged with red. All coxae castaneous; trochanters pale tinged with red; metafemora castaneous; basal half of metatibia reddish which degraed to pale towards the distal region. Dorsum entirely furnished with semierect simple pale setae, and pronotum only with soft appressed pubescence. Head: Con-

vex, projecting anteriorly; antennal segment II cylindrical; labium reaching apex of metacoxae. Endosoma: Shape S-like, medially twisted, apical region C-shaped and bifurcated into two processes subapically; secondary gonopore located subapically. Phallotheca: narrow, apically similar in size with base. Left paramere: Body broad, anterior process elongated with hook-like curved apex. Right paramere: Body elongated, apically developed short finger-like protuberance.

Female. Not sexually dimorphic, color and texture similar to male. Bursa copulatrix with asymmetrical sclerotized rings and concave chitinized plates.

Host plant: *Rhododendron* spp. (Ericaceae), *Quercus mongolica* (Fagaceae), *Chamaecyparis obtuse* (Cupressaceae), *Abies sachalinensis* (Pinaceae), *Cephalotaxus harringtonia* (Cephalotaxaceae) (Yasunaga, 1999), and *Wisteria floribunda* (Fabaceae) (Duwal et al., 2011).

Biology: Large number of nymphs and adults were collected on the host *Wisteria floribunda*, at the time of fruiting season.

Distribution: Korea, Japan.

Distribution in Korea: South Korea: GG (Duwal et al., 2016).

Material examined: South Korea, GG: 35♂, 16♀ (SNU Gwanak Arboretum, Anyang, 9.vii.2008, on *Wisteria floribunda* (Willd.) DC. (Fabaceae), R.K. Duwal and S. Jung).

Genus *Campylomma* Reuter, 1878

Type species: *Campylomma nigronasuta* Reuter, 1878; subsequent designation.

Campylomma Reuter, 1878: 52; Kerzhner, 1988b: 788; Schuh, 1995: 278; Kerzhner and Josifov, 1999: 318; Yasunaga, 2001a: 156; 2001c: 113; 2010: 57; Duwal et al., 2010a: 10; Kwon et al., 2001: 168.

Diagnosis: Generally recognized by small shiny, ovoid body; usually short antennal segment II, length shorter than width of head; row of tiny dark spines on distal half of the dorsal surface of metafemur; S-shaped endosoma with short and compact apical blades.

Distribution: Cosmopolitan.

Remarks: This genus is one of the largest groups in tribe Nasocorini, including nearly about one hundred and forty described species (Schuh, 1995, 2001; Yasunaga, 2001a; Duwal et al., 2010a). These tiny bugs show various feeding habits, Malipati (1992) described *Campylomma liebknechti* as generalist feeder, whereas Duwal et al. (2010b) observed *C. livida* feeding on animal food (unidentified aphid), but large number of these are recognized for serious pest. During the field survey only two species of *Campylomma* are found commonly occurred in Korea, *Campylomma livida* in *Artemisia* (Asteraceae) and *C. miyamotoi* in

Albizia julibrissin Durazz (Fabaceae) while other two species, *C. annulicornis* and *C. lividicornis* (Kerzhner and Josifov, 1999; Kwon et al., 2001) were not observed during the field investigation, but possibly exist as they were found in neighboring countries Japan and China.

Key to species of Korean *Campylomma*

1. Genital capsule with short thumb-like process (Plate 17F). Male genitalia (Plate 17G−I): Endosoma S-shaped, with elongated curved apical processes embaded with membranes and furnished with minute spinules (Plate 17I). Female genitalia (Plate 17J): Bursa copulatrix laterally furnished with minute spinules on either lateral side at anterior region of sclerotized rings; sclerotized rings nearly symmetrical and rectangular····· *C. livida*

− Male genital capsule without thumb-like process ····· 2

2. Antennal segment II thick and entirely black (in male), and only extreme base black (in female) (Plate 3). Male genitalia (Plate 17A−D): Endosoma of male genitalia with moderately short and curved apical processes (Plate 17A). Female genitalia (Plate 17E): Sclerotized rings elongated oval, narrow towards the apex····· *C. annulicornis*

− Antennal segment II pale in both male and female except dark extreme base····· 3

3. Dorsum pale green or yellow, labium shorter, not exceeding apex of mesocoxa. Male genitalia (Plate 18E−G): Endosoma with short and stout apical processes (Plate 18F). Female genitalia (Plate 18H): Sclerotized rings thick, oval anteriorly and posterior margin straight ····· *C. miyamotoi*

− Dorsum dirty yellow or orange often darkened. Male genitalia (Plate 18A−C): Endosoma with distinct apical processes (Plate 18A). Female genitalia (Plate 18D) Sclerotized rings asymmetrical, elongated, broad and anteriorly oval····· *C. lividicornis*

21. *Campylomma annulicornis* (Signoret, 1865) (Plate 3; 17A−E; Table 1)

Capsus coerulescens Scholtz, 1846: 54.
Litocoris annulicornis Signoret, 1865: 126.
Campylomma viridula Jakovlev, 1880: 143.
Campylomma annulicornis: Kerzhner, 1988b: 857; Linnavuori, 1993: 268; Schuh, 1995: 277; Kerzhner and Josifov, 1999: 319; Yasunaga, 2001a: 156; Anufriev et al., 2001: 135; Kwon et al., 2001: 168−169.

Male. Body small, oval. Generally pale greenish; head, pronotum, and mesoscutum, yellowish (or greenish), and scutellum and hemelytron pale or pale greenish; membrane resembles the color of elytra. Venter greenish. Antennal segment I pale with large black spot ventrally, segment II entirely black, segment III and

IV brownish. Labium pale with dark brown apex. All coxae and trochanters pale; metafemora pale or greenish and tinged with yellow; metatibia pale with dark spots at the base and the spots obscure towards the distal end. Dorsum entirely furnished with simple soft pale and dark setae. Head: Convex, projecting anteriorly; antennal segment II tumuid, cylindrical, and nearly equal to the length of pronotum; labium reaching apex of mesocoxae. Endosoma: Shape S-like, complex apex with 3 short and elongated processes. Phallotheca: Narrow, slightly bend and tapered towards the apex.

Female. Similar in color and texture as male, except the antennal segment II pale with black base. Bursa copulatrix with nearly symmetrical sclerotized rings; the sclerotized rings small, thin rimmed and elongated.

Host plant: *Salix* sp. (Saliaceae) (Kerzhner, 1988b).

Biology: Unknown.

Distribution: Korea, Britain, China, European continent, Iraq, Russia, Uzbekistan.

Distribution in Korea: North Korea: PB, South Korea: GG (Kwon et al., 2001; Duwal et al., 2016).

Material examined: None.

Remarks: This species was only reported from the North Korea, but recently reported by Duwal et al. (2013) in Southern part.

22. *Campylomma livida* Reuter, 1885 (Plate 3; 17F−J; Table 1)

Campylomma livida Reuter, 1885: 199; Schuh, 1995: 280; Kerzhner and Josifov, 1999: 321; Yasunaga, 2001a: 157; Yasunaga et al., 2015: 59.

Campylomma chinensis Schuh, 1984: 269; Schuh, 1995: 278; Kerzhner and Josifov, 1999: 320; Yasunaga, 2001a: 157; Duwal et al., 2014b: 391.

Male. Body small, oval. Generally greenish brown; head brownish, pronotum greenish, mesoscutum, scutellum and entire hemelytron yellowish brown. Venter pale yellowish (or brown). Antennae pale (greenish or brownish), segment I and base of segment II dark, except the apex of segment I pale. Labium shining, pale with brown apex of segment IV. All coxae and trochanters pale; metafemora pale, tinged with yellow or dirty brown; tibia pale with large black spots at the base, obscure towards the apex. Dorsum entirely furnished with soft pale setae, and simple brown setae. Head: Convex, projecting anteriorly; antennal segment II cylindrical, nearly equal the width of head; vertex width equal the length of antennal segment IV; labium reaching apex of metacoxae; abdomen with a small thumb-like protuberance at the base of pygophore. Endosoma: Shape S-like, apical sclerotized processes embedded with membranous structure and margin furnished with minute spinules. Phallotheca: Narrow, tapered towards the apex.

Female. Similar in color and texture as male. Sclerotized ring of the bursa copulatrix symmetrical, some-

what rectangular, thick rimmed, and the bursa copulatrix with minute spinules on either lateral side.

Host plant: *Artemisia* spp. (Asteraceae).

Biology: In Korea, *Campylomma livida* is distributed in Southern region including Jeju Island where large number of adults and nymphs were collected together by sweeping on *Artemisia*.

Distribution: Korea, China, Japan, Taiwan.

Distribution in Korea: South Korea: GN, JJ (Duwal et al., 2016).

Material examined: South Korea, GN: 1♀ (Geoje Arboretum, Geoje, 25−27.viii.2008, R.K. Duwal and S. Jung); 3♂, 7♀ (Is. Jisimdo, Irun, Geoje, 28−29.viii.2008, on *Artemisia* spp. (Asteraceae), R.K. Duwal and S. Jung). JJ: 5♂, 2♀ (Kimryung, Gujwa, 19.ix.1996, S.B. Ahn); 46♂, 42♀ (Seogwipo, 30−31.x.2009, on *Artemisia* spp. (Asteraceae), R.K. Duwal).

23. *Campylomma lividicornis* Reuter, 1912 (Plate 3; 18A−D; Table 1)

Campylomma lividicornis: Reuter, 1912: 65; Schuh, 1984: 284−285; 1995: 281; Kerzhner and Josifov, 1999: 321; Kwon et al., 2001: 169; Duwal et al., 2010b: 14.

Male. Body small, oval. Generally greenish or yellowish; dorsum entirely yellowish or greenish, posterior margin of vertex pale. Antennae pale or yellowish, segment I with dark spot ventrally, segment II with black ring. Labium pale with dark brown apex. Venter greenish yellow. Legs pale, coxae pale tinged with yellow, metafemora yellowish. Dorsum entirely furnished with soft pale setae, and simple brown setae. Head: Convex, projecting anteriorly; antennal segment II cylindrical; labium nearly reaching apex of metacoxae. Endosoma: Shape S-like, with elongated apical processes. Right paramere: Body elongated, oval.

Female. Similar in color and texture. Sclerotized rings elongated, oval and posterior margin somewhat straight.

Host plant: *Chrysanthemum* spp., *Artemisia* spp. (Asteraceae), *Lantana camara* (Verbenaceae) and *Sambucus adnata* (Sambucaceae) (Duwal et al., 2010b).

Biology: Known host plant is *Chrysanthemum* spp., *Artemisia* spp. (Asteraceae) and also observed on *Lantana camara* (Verbenaceae) and *Sambucus adnata* (Sambucaceae).

Distribution: Korea, Caroline Is., India, Japan, Marshall Is., Nepal, New Guinea, Philippine Is., Wake Is.

Distribution in Korea: South Korea: GB, GN (Kwon et al., 2001).

Material examined: None.

Remarks: This species was reported in Korea from northern part and was not found at southern region during the survey.

24. *Campylomma miyamotoi* Yasunaga, 2001 (Plate 3; 18E−H; Table 1)

Campylomma miyamotoi Yasunaga, 2001b: 116; 2001a: 158.

Male. Body small, oval. Generally pale greenish or brownish; dorsum completely pale green. Venter greenish. Antennae pale, segment I with large black spot ventrally, segment II with black extreme base. Labium pale with dark apex. Legs pale; coxae somewhat greenish; metafemora yellowish bright. Dorsum entirely furnished densely distributed simple brown pale setae, and soft pale setae. Head: Antennal segment II cylindrical, equal the width of head; vertex width equal the length of antennal segment IV; labium reaching apex of mesocoxae. Endosoma: Shape S-like, apical processes short.

Female. Similar in color and texture as male. sclerotized rings more or less symmetrical, comparatively small, oval, and thick rimmed.

Host plant: *Albizzia julibrissin* Durazz. (Fabaceae) (Yasunaga, 2001b).

Biology: In Korea, this species is collected in the same host defined by Yasunaga (2001c), and abundantly found during flowering time.

Distribution: Korea, Japan.

Distribution in Korea: South Korea: CN (Duwal et al., 2016).

Material examined: South Korea, CN: 4♂, 7♀ (Is. Wonsando, Ocheon, Boryeong, 5.viii.2008, on *Albizia julibrissin* Durazz. (Fabaceae), R.K. Duwal).

Genus *Chlamydatus* Curtis, 1833

Type species: *Chlamydatus marginatus* Curtis, 1833; monotypy.

Chlamydatus Crutis, 1833: 198; Schuh, 1995: 288; Kerzhner, 1988b: 788; wheeler and Henry, 1992: 156; Kerzhner and Josifov, 1999: 325; Kwon et al., 2001: 169; Schuh and Schwartz, 2005: 12.

Diagnosis: Generally recognized by small, elongate oval body; submacropterous with shortened membrane, just covering abdomen, or brachypterous; usually dark brown or black coloration; large eyes; antennal segment II not longer than width across hemelytron; vestiture of dorsum comprises of simple dark setae and somewhat flattened golden or silvery soft setae. For detail description, see Schuh and Schwartz, 2005.

Distribution: Holarctic region.

Remarks: This genus is described as a Holarctic group (Linnavuori, 1998) and comprises of thirty two species (Schuh, 1995; Kerzhner and Schuh, 2001; Schuh and Schwartz, 2005). Various hosts are report-

ed: Asteraceae, Lamiaceae, Polemoniaceae, Fabaceae, Ranunculaceae and Rosaceae (Schuh and Schwartz, 2005). In Korea two species are reported from the northern part (Kwon et al., 2001).

Key to species of Korean *Chlamydatus*

1. Body black, posterior margin of head pale, femora black with yellow apices, spots on tibia small. Male genitalia: Endosoma twisted medially, with whip-like process apically (for detail see Kerzhner, 1978: 44) ..... *Ch. pulicarius*

− Body black, posterior margin of head black, femora black with yellow apices, spots on tibia larger. Male genitalia: Endosoma twisted medially, with short apical process (for detail, see Kerzhner, 1964: 999)..... *Ch. pullus*

Subgenus *Euattus* Kerzhner, 1962

Attus Hahn, 1832: 116 (as gen. nov.; as subgenus by Wagner, 1952: 200).
Euattus Kerzhner, 1962: 150 (as subgenus of *Chlamydatus*). New name for *Attus* Hahn, 1832.

25. *Chlamydatus* (*Euattus*) *pulicarius* (Fallén, 1807)

Lygaeus pulicarius Fallén, 1807: 95.
Chlamydatus pulicarius pseudopulla Stichel, 1956: 350.
Chlamydatus pulicarius: Carvalho, 1958: 33; Schuh, 1995: 291; Kerzhner, 1988b: 855; Wheeler and Henry, 1992: 156; Kerzhner and Josifov, 1999: 326; Anufriev et al., 2001: 134; Kwon et al., 2001: 169; Schuh and Schwartz, 2005: 43.

Moderate sized oval body; usually black dorsum and ventral side of body with pale posterior margin of vertex; pale or dark antennae and legs, usually with pale tibiae; wrinkled posterior pronotum; simple tubular endosoma elongated and curved, with an apical process; secondary gonopore medially located. For detail description and figures see Schuh and Schwartz, 2005: 42.

Host plant: Fabaceae (Kerzhner, 1964), *Artemisia* sp., *Hieracium* sp. (Asteraceae), *Stellaria longifolia* (Caryophyllaceae), *Lathyrus* sp., *Vicia* sp. (Fabaceae), *Ranunculus* sp. (Ranunculaceae), and *Potentilla argentea* (Rosaceae) (Schuh and Schwartz, 2005).

Biology: Fabaceae (Kerzhner, 1964), *Artemisia* sp., *Hieracium* sp. (Asteraceae), *Stellaria longifolia*

(Caryophyllaceae), *Lathyrus* sp., *Vicia* sp. (Fabaceae), *Ranunculus* sp. (Ranunculaceae), and *Potentilla argentea* (Rosaceae) (Schuh and Schwartz, 2005) are known as host.

Distribution: Korea, Azerbaijan, China, European continent, Georgia, Kazakhstan, Mongolia, Russia.

Distribution in Korea: North Korea: YG (Kwon et al., 2001).

Material examined: None.

Remarks: This species in Korea was reported from northern region (Josifov, 1992) and is unable to be collected or observed in Sourthern region.

26. *Chlamydatus* (*Euattus*) *pullus* (Reuter, 1870)

Agalliastes pullus Reuter, 1870: 324.

Chlamydatus pullus: Stichel, 1956: 351; Schuh, 1995: 292; Kerzhner, 1988b: 855; Wheeler and Henry, 1992: 156; Kerzhner and Josifov, 1999: 326; Anufriev et al., 2001: 134; Kwon et al., 2001: 169; Schuh and Schwartz, 2005: 47.

Recognized by small oval body, blackish brown dorsum and venter, females sub-macroptery or brachyptery, dark antennae and legs always with pale tibiae.

Host plant: *Artemisia* sp. (Asteraceae), *Lupinus* sp. (Fabaceae), *Rosa* sp. (Rosaceae) and *Salix* sp. (Saliaceae) (Kelton, 1965).

Biology: *Artemisia* sp. (Asteraceae), *Lupinus* sp. (Fabaceae), *Rosa* sp. (Rosaceae) and *Salix* sp. (Saliaceae) are known as host.

Distribution: Korea, Azerbaijan, China, European continent, Georgia, Iran, Kazakhstan, Mongolia, N. America, Pakistan, Russia, Uzbekistan.

Distribution in Korea: North Korea: YG (Kwon et al., 2001).

Material examined: None.

Remarks: In Korea, this species was reported from northern region (Josifov, 1992) and was unable to be collected or observed in Southern region. For more information about description and genital structure, see Schuh and Schwartz, 2005: 47.

Genus *Kasumiphylus* Schwartz and Stonedahl, 2004

Type species: *Psallus kyushuensis* Linnavuori, 1961.

Phoenicocoris Yasunaga, 1999: 191.
Kasumiphylus Schwartz and Stonedahl, 2004: 42.

Diagnosis: Recognized by elongated, oval body; generally brown dorsum with somewhat paler hemelytron, dorsum entirely covered with brown to black simple reclining setae and silvery setae. For detail descriptions see Yasunaga, 1999 (as *Phoenicocoris*) and Schwartz and Stonedahl, 2004.

Distribution: Palaearctic region.

Remarks: Schwartz and Stonedahl (2004) described *Kasumiphylus* as new genus, which was previously placed under *Phoenicocoris*, and is represented with only two species. *Kasumiphylus kyushuensis* was widely distributed on *Pinus densiflora* and *P. koraiensis* (Pinaceae) from late June to early September in Korea during the field survey.

27. *Kasumiphylus kyushuensis* (Linnavuori, 1961) (Plate 3; 19A−E; Table 1)

Psallus kyushuensis Linnavuori, 1961: 168.
Phoenicocoris kyushuensis: Kerzhner 1988a: 850; Schuh, 1995: 374; Kerzhner and Josifov, 1999: 387; Yasunaga, 1999: 192; 2001a: 168.
Kasumiphylus kyushuensis Schwartz and Stonedahl, 2004: 44.

Male. Body small, elongated. Generally brown; head brown with anterior region castaneous; pronotum blackish; mesoscutum and anterior margin of scutellum brown tinged with red; hemelytron, clavus either uniformly brown or with darker base, corium uniformly brown, membrane pale brown. Venter red, or castaneous. Antennal segment I pale tinged with red, segment II pale brown, segment III and IV black. Labium pale with brown apex. All coxae and trochanters pale; metafemora brown tinged with red; metatibia pale with small brown spots at the base of pale brown spine. Dorsum uniformly distributed with both semierect simple black setae and flat shining pale setae; head and pronotum shagreen. Head: Convex, projecting anteriorly; labium slightly surpass the apex of metacoxae. Endosoma: Shape S-like, with complicated apex; secondary gonopore subapically located, infolded with membrane. Phallotheca: Narrow, curved and tapered towards the apex. Left paramere: Body large, anterior process thick and flat. Right paramere: Elongated, leaf-like.

Female. Similar in color and texture. Sclerotized rings asymmetrical, thin rimmed, and more or less triangular.

Host plant: *Pinus densiflora* Siebold and Zuccarini (Japan), *P. koraiensis* Siebold and Zuccarini (Korea), *P. densiflora* var. funebris (Russia) (Schwartz and Stonedahl, 2004).

Biology: The individuals of *Kasumiphylus kyushuensis* are aggregated in new branches or buds of the Pine trees.

Distribution: Korea, Japan, Russia.

Distribution in Korea: South Korea: GB, GG, GN, GW (Duwal et al., 2016).

Material examined: South Korea, GB: 1♂ (Mt. Jirisan, Sicheon, Sancheong, 26.viii.1999, on *Pinus densiflora* Siebold and Zucc. (Pinaceae), S.H. Lee). GG: 1♀ (NAAS, Suwon, 24.vii.1997). GN: 1♂, 1♀ (Geoje Arboretum, 25−27.viii.2008, on *Pinus* sp., R.K. Duwal). GW: 1♀ (Sambong Natural forest, Hongcheon, 26.vi.2003, J.W. Seong).

Genus *Monosynamma* Scott, 1864

Type species: *Monosynamma scotti* Scott, 1864; monotypy (= *Phytocoris bohemanni* Fallén, 1829).

Monosynamma Scott, 1864: 159; Kerzhner, 1988b: 789; Schuh, 1995: 357; Kerzhner and Josifov, 1999: 374; Yasunaga, 2001b: 166.

Diagnosis: Generally recognized by black, elongated, sub-oval body, and black or fuscous or brown dorsum; pale inner margins of eyes, and base of vertex; broad pronotum; black or dark brown or brown femora with pale apices, pale or pale brown tibiae with dark brown spots; hemelytron furnished with uniformly distributed simple, pale brown setae; simple S-shaped endosoma with elongated apical processes.

Distribution: Holarctic region.

Remarks: Species of this genus are described as willow inhabitants and widely distributed to Holarctic region (Wheeler and Henry, 1992).

28. *Monosynamma bohemanni* (Fallén, 1826) (Plate 4; 19F−K; Table 1)

Phytocoris bohemanni Fallén, 1829: 106.

Monosynamma scotti Scott, 1864: 160.

Monosynamma bohemanni: Hobertandt 1956: 7; Kerzhner, 1988b: 851; Wheeler and Henry, 1992: 168; Schuh, 1995: 357; Kerzhner and Josifov 1999: 374; Yasunaga, 2001a: 166; Anufriev et al., 2001: 119; Duwal and Lee, 2011: 53.

Male. Body medium sized, elongated oval. Generally black; head shining black, except inner margins of eye and posterior margin of vertex pale; pronotum, mesoscutum, and scutellum black, mesoscutellum laterally brown; hemelytron, either entirely black or with pale areas (in the specimens with pale regions: inner

margin of clavus, base of corium, and base of cuneus pale); membrane grayish. Venter shining black. Antennal segment I and II with pale apices, segment III and IV dirty pale. Labium shining, segment I black, segment II and III and base of IV pale. Basal larger region of all coxae black; trochanters pale; metafemora black except the pale apices, metatibia pale with rows of small black spots. Dorsum uniformly distributed with appressed simple soft pale setae; pronotum, mesoscutum, and scutellum shagreen. Head: Convex, projecting anteriorly; labium reaching apex of metacoxae; calli somewhat raised than the surface of pronotum. Endosoma: Shape S-like, slightly twisted, with two apical processes; secondary gonopore subapically located. Phallotheca: Narrow, elongated and curved. Right paramere: Small oval and leaf-like.

Female. Not sexually dimorphic, color and texture similar to male except more flat and large in size. Bursa copulatrix with very large, symmetrical sclerotized rings; membranous and sclerotized structures observed on dorsal labiate plate furnished with numerous spinules. Posterior wall with distinct inter-ramal lobe, laterally and centrally provided with semi sclerotized plate, furnished with numerous minute spinules.

Host plant: *Salix* spp. (Salicaceae).

Biology: Large numbers of adults and nymphs were collected on *Salix* sp. (Salicaceae) along a small river bank. They were aggregated in some branches in shade with large number of ants.

Distribution: Korea, Azerbaijan, European continent, Kazakhstan, Japan, Mongolia, N. America, Russia.

Distribution in Korea: South Korea: GW (Duwal et al., 2016).

Material examined: South Korea, GW: 30♂, 68♀ (Munmak, Wonju, 1.vi.2009, on *Salix* sp. (Salicaceae), R.K. Duwal and S. Jung).

Tribe Phylini Douglas and Scott, 1865

Members of tribe Phylini are variously sized (2−5 mm) and colored; pronotum without flattened collar, but anterior margin usually carinate; vestiture variable; females occasionally brachypterous; parempodia hair-like and parallel, or fleshy, uniform in diameter and weakly convergent apically; endosoma usually S- or J- or C-shaped, weakly or strongly twisted; secondary gonopore located mesially or subapically; and posterior wall of female genitalia simple membranous, or furnished with simple chitinized wall or spinulus chitinized wall.

The tribe Phylini is the largest group in subfamily Phylinae, which comprises of approximately nine hundred species in one hundred and fifty one genera in the world (Schuh and Menard, 2013). These phyline bugs are widely distributed in every kind of habitat from tropical, subtropical to the cold temperate meadows. However, most species are restricted due to specific climatic ecozones.

Key to genera of Korean Phylini

1. Tibiae without spots ····· 2
− Tibiae usually with spots ····· 4
2. Dorsum uniformly black, or greenish or bluish black, or yellowish with contrast colored margins ····· 3
− Pronotum, mesoscutum, scutellum, clavus and endocorium brown; head, exocorium, cuneus and all appendages faintly orange yellow ····· *Orthophylus*
3. Legs darker, antennal segment II partly or completely darker. Base and apex of antennal segment II, base of all tibiae black, dorsum uniformly black and shining ····· *Orthonotus*
− All legs whitish pale, antennal segment I brown or black ····· *Phylus*
4. Dorsum pale, densely distributed with brown spots; body medium sized ····· *Compsidolon*
− Dorsum without spots ····· 5
5. Hind femora with elongated longitudinal marginal stripe ····· *Plagiognathus*
− Hind femora without marginal longitudinal stripe ····· 6
6. Body medium sized, variously colored, except green; endosoma with complex apex ····· *Psallus*
− Body greenish or tinged with green, or black or brown; endosoma with simple apex ····· 7
7. Dorsum uniformly orange brown or dark blackish brown, head and pronotum without pale areas; base of antennal segment I, basal 1/2 or 2/3 of segment II black ····· *Parapsallus*
− Body and dorsum usually pale greenish except few species e.g., *Europiella artemisiae*, dark brown or black; membrane without smoky pattern ····· 8
8. Hind femora with distinct number of spots arranged in anterior and posterior margins · *Europiellomorpha*
− Hind femora with various spots dense or sparse ····· *Europiella*

Genus *Compsidolon* Reuter, 1899

Type species: *Compsidolon elegantulum* Reuter, 1899; monotypy.

Compsidolon Reuter, 1899: 147; Schuh, 1995: 294; Kerzhner, 1988b: 787; Yasunaga, 1999: 188; 2001a: 159; Kerzhner and Josifov, 1999: 328; Kwon et al., 2001: 170.

Diagnosis: Generally recognized by pale, elongated body; pale dorsum distributed with dense or scattered spots; S-shaped endosoma with elongated apical process and peculiar protuberance like structure apically or subapically; asymmetrical sclerotized rings of female genitalia. For detail description see Yasunaga, 1999.

Distribution: Ethiopian region, Palaearctic region.

Remarks: This species comprises of about sixty species (Schuh, 1995; Yasunaga, 1999), distributed in Palaearctic and Ethiopian regions and two species were reported from the Korean Peninsula (Kerzhner and Jo-

sifov, 1999; Cho et al., 2009). Species of *Compsidolon* are variously sized.

Key to species of Korean *Compsidolon*

1. Body larger, yellowish white dorsum slightly tinged with green, and densely distributed with dark, small spots except on calli and cuneus with sparsely arranged spots (Plate 4). Male genitalia: Endosoma with hook-like structure subapically (for detail see Yasunaga, 1999: 188) ····· *C. elaegnicola*
− Body small, pale dorsum with densely distributed dark, small spots (Plate 4). Male genitalia (Plate 18I−K, M): Endosoma with hook-like structure apically. Female genitalia (Plate 18L): Sclerotized rings elongated, oval, with narrow anterior region····· *C. salicellum*

Subgenus *Chamaeliops* Wagner, 1967

Chamaeliops Wagner 1967: 23 (as subgenus of *Compsidolon*). New name for *Chamaepsallus* Wagner, 1965: 117.

29. *Compsidolon* (*Chamaeliops*) *elaegnicola* Yasunaga, 2001 (Plate 4; Table 1)

Compsidolon elaegnicola Yasunaga, 1999: 188−190; 2001a: 159.

Male. Body large, parallel laterally. Generally pale; dorsum entirely pale, tinged with yellow and provided with brown spots; head with pale brown markings on frontal region; membrane pale brown. Venter pale and shining. Antennae pale or pale brown, and segment III and IV dark. Labium brown. All legs pale; all femora ventrally with densely distributed brown spots on distal half region and scattered towards the base; and metatibia with rows of brown spots at the base of dark brown spine. Dorsum furnished with semierect dark brown and appressed flat, pale serious setae. Head projecting anteriorly; vertex wide, nearly equal in length to the antennal segment IV; labium reaching apex of mesocoxae; calli somewhat raised than the surface; head, and pronotum partly shagreened.

Female. Similar in color and texture.

Host plant: *Elaeagnus umbellate* Thunb. (Elaeagnaceae) (Yasunaga, 1999).

Biology: This species was collected on random sweeping on herbs within preserved area of National Park in Korea. Therefore, specific host is unknown in Korea.

Distribution: Korea, Japan.

Distribution in Korea: South Korea: CB (Duwal et al., 2016).

Material examined: South Korea, CB: 1♀ (Mt. Sobaeksan, Danyang, 25−26.v.2009, R.K. Duwal and S. Jung).

Remarks: Female genitalia is not observed due to transparent forms.

Subgenus *Coniortodes* Wagner, 1952

Coniortodes Wagner, 1952b: 172 (as subgenus of *Psallus* transferred to subgenus *Compsidolon* by Wagner 1965: 117).

30. *Compsidolon* (*Coniortodes*) *salicellum* (Herrich-Schäffer, 1841) (Plate 4; 18I−M; 45; Table 1)

Capsus salicellus Herrich-Schäffer, 1841: 47.

Psallus salicellus Carvalho 1958: 130.

Compsidolon salicellum: Wagner and Weber, 1964: 489; Schuh, 1995: 298; Kerzhner, 1988b: 850; Kerzhner and Josifov, 1999: 334; Yasunaga, 1999: 188; 2001a: 159; Anufriev et al., 2001: 128; Kwon et al., 2001: 170.

Male. Body medium sized, parallel laterally. Generally yellowish or pale brown; dorsum usually yellowish or pale brown with bright pale areas at central region of vertex, anterior margin of pronotum; head, pronotum, mesoscutum and scutellum with very few scattered spots; hemelytron, densely distributed with dark spots except the base and cuneus without spots, membrane grayish, and bears a distinct dark area beneath the cuneus. Venter pale or tinged with brown. Antennae pale, segment I, III and IV somewhat darker. Labium pale with brown apex. All legs pale; distal half of metafemora fuscous, and ventrally provided with small spots; and metatibia with large dark brown spots at the base of black spine. Dorsum furnished with semierect pale brown setae and appressed, flat, serious setae. Head projecting anteriorly, convex; width of vertex nearly equal to the length of the antennal segment I; length of antennal segment II, width of hemelytron, and length of metafemora nearly equal; labium surpass apex of metacoxae. Endosoma: Shape simple, S-like, broad, medially partly twisted, apical process elongated with hook-like structure apically. Phallotheca: Narrow.

Female. Similar in color and texture as male. Bursa copulatrix bears semi-sclerotized structures at posterior region; sclerotized rings asymmetrical, elongated, narrow towards anterior region, thick rimmed, and with irregular margins.

Host plant: *Juglans mandschurica* Maxim. (Juglandaceae), and also collected on *Artemisia* spp. (Asteraceae), *Rubus* spp. (Rosaceae) and *Salix* sp. (Salicaceae) (Yasunaga, 1999).

Biology: As all specimens in Korea were collected in light trap, biology is unknown.

Distribution: Korea, Azerbaijan, European continent, Japan, N. America, Russia.

Distribution in Korea: North Korea: PN, South Korea: GG, GW (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, GG: 3♂, 1♀ (Mt. Yongmunsan, Yangpyeong, 11.vi.−10.viii.2009, on light trap, R.K. Duwal and S. Jung).

Genus *Europiella* Reuter, 1909

Type species: *Agalliastes stigmosus* Uhler, 1893; subsequent designation.

Europiella Reuter, 1909: 83; Schuh et al., 1995: 379; Schuh, 1995: 312; Kerzhner and Josifov, 1999: 343; Yasunaga, 2001a: 162; Duwal et al., 2010b: 21; Kwon et al., 2001: 170.

Diagnosis: Recognized by completely black or green or pale coloration, oval or elongated oval body, small to medium sized 2−4.5 mm; simple dark and sericeous setae on dorsum; distinctly distributed spots on metafemora; medially twisted or sub-twisted endosoma with two apical processes, and subapically located secondary gonopore; bursa copulatrix of female gnitalia semitransparent with or without minute spicules; sclerotized rings asymmetrical, thin rimmed. For detail description, see Schuh, Lindskog and Kerzhner (1995).

Distribution: Holarctic region, Nepal.

Remarks: This genus represented as a Holarctic fauna (Schuh, Lindskog and Kerzhner, 1995). However, few species were described from Oriental region e.g., Nepal, where these were observed at temperate to sub-boreal regions above 1000 m (Duwal et al., 2010b). Most of species in this group are associated with Asteraceae (Yasunaga, 2001b; Schuh, 2004). Among the five species of *Europiella* in Korea, two species; *E. artemisiae* and *E. kirishenkoi* were commonly occurring and were collected from various species of *Artemisia*.

Key to species of Korean *Europiella*

1. Antennal segment II with dark wide basal region (1/3−2/3) ····· 2
− Antennal segment II with extreme base darker or entirely pale ····· 3
2. Body small, darker; dorsum brown, or greenish brown, or black; head, pronotum and mesoscutellum darker except pale spots, a pair of spots at inner side of eyes, anterior corner of pronotum and mesoscutellum; antennal segment I darker. Male genitalia (Plate 20A−D): Endosoma with two unequal apical pro-

cesses, short process curved backwards of the long one (Plate 20A). Female genitalia (Plate 20E): Sclerotized rings basally straight and oval towards the apex ····· *E. artemisiae*

− Body large, uniformly pale green texture, basal 1/3 of antennal segment II black or dark, segment I with large dark spot; hind femora with distinct black spots. Male genitalia (Plate 20F−I): Endosoma twisted medially, and apical processes curved inwardly to C-Shaped structure (Plate 20F). Female genitalia (Plate 20J): Sclerotized rings oval ····· *E. kiritshenkoi*

3. Body medium sized dorsum often brownish green, hind femora entirely with numerous small and few large spots apically. Male genitalia (Plate 20K−N): Endosoma with leaf-like broad structure arise medially, apical processes broad and curved (Plate 20L). Female genitalia (Plate 20O): Sclerotized rings distinctly asymmetrical and ovoid····· *E. miyamotoi*

− Body medium sized, hind femora with aggregated minute spots arranged in rows ····· 4

4. Body pale green, hind femora with large and small black spots distally arranged randomly which is followed by two rows of aggregated minute spots subapically. Female genitalia (Plate 21H): Sclerotized rings oval, with wide posterior region and narrow anterior region ····· *E. gilva*

− Body pale brown, cuneus darker than corium, hind femora with aggregated minute spots ventrally and few distinct spots subapically on dorsal side. Female genitalia (Plate 21F, G) Sclerotized ring narrow, ovoid apically, and straight posterior margin····· *E. livida*

31. *Europiella artemisiae* (Becker, 1864) (Plate 4; 20A−E; 46; Table 1)

Capsus artemisiae Becker, 1864: 487.

Plagiognathus solani Matsumura, 1917: 432.

Plagiognathus albipennis antennaria Stichel, 1934: 282.

Europiella artemisiae: Schuh et al., 1995: 385; Schuh, 1995: 313; 2001: 251; Yasunaga, 2001a: 162; Kerzhner and Josifov, 1999: 344.

Male. Body small, oval. Variously colored (brown, dark brown or black); dorsum entirely brown, or dark brown or black; a pair of pale spots on inner lateral side of eyes and lateral margins of mesoscutellum pale; hemelytron, apical 1/3 of clavus, inner margins of corium darker, base of cuneus pale; membrane gray. Venter dark brown or black. Antennae darker, segment I and segment II (entirely or, 1/2−1/3 from base) black. Labium shiny and dark. Fore and middle legs paler than hind legs. Dorsum furnished with semierect simple dark and soft pale setae, and appressed flat serious setae. Head projecting anteriorly, convex; labium reaching apex of metacoxae. Endosoma: Shape S-like, slightly twisted medially, and provided with two apical processes, short process somewhat curved backward.

Female. Similar in color and texture as male. Bursa copulatrix somewhat rectangular, central large part

occupied with semi-sclerotized plates furnished with minute spines; sclerotized rings apically asymmetrical, oval and straight posterior margin.

Host plant: *Artemisia absinthium* L. and *A. vulgaris* L. (Asteraceae) (Wagner, 1975b).

Biology: *Europiella artemisiae* is the most common, predominantly distributed species in the Korea, breeding on *Artemisia* spp., and abundantly emerge from early spring to late autumn. It is assumed that Kwon et al. (2001) might misidentified *E. artemisiae* with *E. albipennis* because recent survey (2008−2009) shows no evidence of *E. albipennis* in Korea.

Distribution: Korea, Azerbaijan, China, European continent, Georgia, Japan, Kazakhstan, N. America, Russia, Uzbekistan.

Distribution in Korea: South Korea: CB, CN, GB, GG, GN, GW, JJ, JN (Duwal et al., 2016).

Material examined: North Korea, HB: 3♂, 1♀ (Jikha, Cheongjin (label data: Dzikha, 16 km, Südl. Chongdzin), 31.viii.1970, M. Josifov). South Korea, CB: 4♂, 3♀ (Hyeon, Annae, Okcheon, 30.vii.2005, on light trap, S.H. Lee). CN: 1♂, 1♀ (Is. Wonsando, Ocheon, Boryeong, 5.viii.2009, R.K. Duwal); 3♂, 4♀ (Dangjin, 9.x.2008, R.K. Duwal and S. Jung); 3♂, 1♀ (Is. Nanjido, Seongmun, Dangjin, 18.viii.2009, R.K. Duwal and S. Jung); 1♂ (Seongsang, Myeoncheon, Dangjin, 12.x.2006, S.H. Lee); 2♂, 3♀ (Anho, Unsan, Seosan, 31.viii.2006, S.H. Lee); 2♂ (Nae, Iwon, Taean, 31.viii.2006); 10♂, 5♀ (Yonggung, Sinam, Yesan, 3.vii.2006, J.W. Seong); 1♂, 1♀ (Sudeoksa temple, Sacheon, Deoksan, Yesan, 11.vii.1991, collector unknown). GG: (Gwanak Arboretum, Anyang, 9.vii.2008, on light trap, R.K. Duwal and S. Jung); 1♂, 3♀ (Mt. Manhyeongsan, Icheon, 1.vii.2008, R.K. Duwal and S. Jung); 2♂ (Mt. Yongmunsan, Yangpyeong-gun, 11.vi.2009, on light trap, R.K. Duwal and S. Jung); 2♂ (same data as above, on light trap, 18.viii.2009); 1♂, 3♀ (Mangwol, Hajeom, Ganghwa, Incheon, 1.vii.2008, R.K. Duwal and S. Jung); 1♂, 1♀ (Mt. Yumyeongsan, Gapyeong-gun, 14.vi.1997, S.B. Ahn); 1♂ (Gwansan, Deokyang, Goyang, 19.vii.2008, S.W. Park); 2♂, 1♀ (Samheung, Yangdo, Ganghwa, Incheon, 10.vi.2007, J.W. Seong); 1♀ (Mt. Taehwasan, Sangrim, Docheok, Gwanju, 25.ix.2003, Jung and Chansik); 1♂ (NAAS, Suwon, 25.vii.1997, J.Y. Choi); 2♂ (Sewol, Gangsang, Yangpyeong, 30.vi.2008, R.K. Duwal and S. Jung). GB: 1♀ (Seokdong, Andong, 6.vi.2008, J.O. Lim); 1♀ (Ingye, Yean, Andong, 6.vi.2008, J.O. Lim); 1♂ (Buljeonsa temple, Buljeong, Mungyeong, 9.viii.2007, J.W. Seong); 1♂ (Jeongjok, Cheonggi, Yeongyang, 7.vi.2008, J.O. Lim). GN: 1♂ (Geoje Arboretum, Geoje-si, 25−27.viii.2008, on *Artemisia* sp., R.K. Duwal and S. Jung); 7♂, 1♀ (Is. Jisimdo, Irun, Geoje, 28−29.viii.2008, on *Artemisia*, R.K. Duwal and S. Jung). GW: 1♀ (Yeongokchaen, Songnim, Myeongju, Gangneung, 27.v.1993, D.S. Gu); 4♂, 4♀ (Sambong Natural forest, Hongcheon, 27.vi.2003, J.W. Seong); 2♀ (Changchon, Nae, Hongcheon, 5.vii.2007, Y.J. Lee); 4♂, 4♀ (Munmak, Wonju, 1.v.2009, R.K. Duwal and S. Jung); 6♂, 2♀ (same data as above, 27.v.2009); 4♂, 6♀ (Hoenggye, Daegwanryeiong, Pyeongchang, 11.viii.2006, J.W. Seong); 1♂ (Dongsan, Jinbu, Pyeongchang-gun, 30.vii.2007, J.W. Seong); 1♀ (Mt. Hambaeksan, Taebaek, 14.ix.1999, G.S. Lee); 1♂ (Naedoek, Sangdong, Yeongwol, 24.v.2001, J.Y. Choi). JJ: 3♂ (Eosungsaeng, Mt. Headongsan, Jeju, 27.viii.1997, S.B. Ahn); 1♂ (Gimnyeong, Gujwa, Jeju,

27.viii.1997, S.B. Ahn); 2♀ (Eoeum, Aewol, Jeju, 14.v.2003); 24♂, 12♀ (Jeju, 12−15.v.2008, on *Artemisia* sp., T. Yasunaga, R.K. Duwal and S. Jung); 1♀ (Andeok, Seogwipo, 15.v.2003, J.W. Seong). JN: 2♂, 1♀ (Mt. Chusan, Okryeong, Gwangyang, 16−19.vi.2008, R.K. Duwal and S. Jung); 1♀ (Suman, Hwasun, 12.ix.1996, M.L. Lee).

32. *Europiella gilva* (Kulik, 1965) (Plate 4; 21H; Table 1)

Plagiognathus gilvus: Kulik, 1965: 155; Kerzhner, 1988b: 855.
Europiella gilva: Schuh et al., 1995: 390; Kerzhner and Josifov, 1999: 345; Kwon et al., 2001: 171.

Female. Body medium sized, elongated oval. Generally pale greenish; dorsum entirely pale; membrane pale with dark areas on either sides beneath the cuneus. Venter greenish. Antennae pale, segment III and IV darker. Labium pale with dark apex. All legs pale; metafemora ventrally with two rows of spots, not continuous to the base, and densely scattered apically; and metatibia with small brown spots at the base of black spine. Dorsum furnished semierect dark setae and soft pale setae, and appressed flat serious setae. Head projecting anteriorly, convex; labium reaching apex of metacoxae; head, pronotum, mesoscutum and scutellum partly shagreened. Bursa copulatrix with semi-sclerotized areas on posterior regions beneath the sclerotized rings, the sclerotized rings somewhat oval shaped, broad circles and thin rimmed.

Host plant: *Rabdosia excisa* (Maxim.) H. Hara (Lamiaceae) (Kerzhner, 1988b).

Biology: In Korea, *Europiella gilva* is recognized with few female specimens on light trap, so that biology is unknown.

Distribution: Korea, Russia.

Distribution in Korea: South Korea: GW, GN, JN (Duwal et al., 2016).

Material examined: South Korea, GW: 5♀ (Sambong Natural forest, Hongcheon, 25.vi.2003, on light trap, J.W. Seong). JN: 1♀ (Jangseong, on light trap, R.K. Duwal). GN: 1♀ (Is. Jisimdo, Irun, Geoje, 28−29. viii.2008, R.K. Duwal and S. Jung).

Remarks: Male is not observed. See Kerzhner 1979: 51 for description and figures of male genitalia.

33. *Europiella kiritshenkoi* Kulik, 1975 (Plate 4; 20F−J; Table 1)

Plagiognathus kiritshenkoi: Kulik, 1975: 587; Kerzhner, 1988b: 855.
Europiella kiritshenkoi: Schuh et al., 1995: 390; Schuh, 1995: 513; Kerzhner and Josifov, 1999: 345.

Male. Body comparatively large, more or less parallel laterally. Generally greenish; head, pronotum, mesoscutum and scutellum green (or in some specimens tinged with yellow); hemelytron entirely pale; membrane grayish. Venter entirely green (or in some specimen abdomen tinged with yellow). Antennae brownish, segment I ventrally with large black spot, one-half or one-third of segment II black. Labium pale, segment I greenish, apex of segment IV darker. Procoxa pale, and meso- and metacoxae greenish; trochanters pale yellow; metafemora yellowish with two rows of spots on either lateral margins ventrally; metatibia pale with large black spots. Dorsum furnished with semierect simple dark setae, soft pale setae and appressed flat serious setae. Head projecting anteriorly, convex; labium nearly reaching apex of mesocoxae; head, pronotum, mesoscutum and scutellum partly shagreened. Endosoma: Shape S-like, completely twisted medially, apical processes curved, short process curved like upwardly. Phallotheca: Broad, short and apically narrow. Right paramere: Broad, elongated, nearly parallel laterally and margins not uniform.

Female. Similar in color and texture as male. Bursa copulatrix with centrally located semi-sclerotized plates, and sclerotized rings somewhat oval shaped.

Host plant: *Artemisia vulgaris* L. (Asteraceae) (Kulik, 1975).

Biology: Large number of *Europiella kiritshenkoi* were aggregated on *Artemisia* under the bridge along the river and were also attracted to the light.

Distribution: Korea, China, Russia.

Distribution in Korea: South Korea: GG, GW (Duwal et al., 2016).

Material examined: South Korea, GG: 1♀ (Yangpyeong, 11.vi.2009, on light trap, same collectors). GW: 49♂, 42♀ (Munmak, Wonju, 27.v.2009, on *Artemisia* sp. R.K. Duwal and S. Jung).

34. *Europiella livida* (Reuter, 1906) (Plate 4; 21F, G)

Plagiognathus lividus: Reuter, 1906: 73; Kerzhner, 1988b: 855.

Europiella livida: Schuh et al., 1995: 390; Schuh, 1995: 316; Kerzhner and Josifov, 1999: 346; Kwon et al., 2001: 171.

Female. Body small, oval. Generally pale greenish; dorsum entirely pale; membrane grayish. Venter greenish. Antennae pale, segment III and IV somewhat darker. Labium pale with dark apex. All legs pale; metafemora ventrally with two rows of small aggregated spots and dorsally with few spots in three rows, and metatibia with black base. Dorsum furnished with semierect dark setae and soft pale setae, and appressed flat serious setae. Head projecting anteriorly, convex, labium nearly reaching apex of metacoxae. Bursa copulatrix delicate, sclerotized rings somewhat elongate oval, and thin rimmed.

Host plant: *Artemisia gigantea* Kitamura (Asteraceae) (Kerzhner, 1988b).

Biology: The biology is unknown as the specimen was collected on light.

Distribution: Korea, China, Russia.

Distribution in Korea: North Korea: PB, South Korea: GG (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, GG: 1♀ (Sewol, Kangsang, Yangpyeong, 22.viii.2011, R.K. Duwal).

Remarks: Male is not observed. For more information, see Kerzhner 1979: 53.

35. *Europiella miyamotoi* (Kerzhner, 1988) (Plate 4; 20K−O; Table 1)

Plagiognathus miyamotoi Kerzhner 1988b: 64.

Europiella miyamotoi: Schuh et al., 1995: 391; Schuh, 1995: 316; Kerzhner and Josifov, 1999: 346; Yasunaga, 2001a: 164.

Male. Body relatively large and parallel laterally. Generally pale yellowish; dorsum entirely yellowish pale; membrane grayish. Venter greenish yellow. Antennae pale, segment III and IV slightly darker. Labium pale, shining with dark apex. All legs pale; metafemora provided with small, scattered spots on distal region ventrally and dorsally with few minute spots subapically; and metatibia with large spots at the base of black spine. Dorsum furnished with semierect, simple dark and soft pale setae, and appressed flat sericeous setae. Head projecting anteriorly, convex; labium reaching apex of the mesocoxae; head, pronotum, mesoscutum and scutellum shagreened. Endosoma: Shape S-like, with two broad and sub-equal apical processes, from the basal curving area, a membranous slender leafy structure arises. Phallotheca: large, basally broad and narrow towards apex. Left paramere: Body large. Right paramere: Broad, elongated and margin not uniform.

Female. Similar in color and texture as male. Bursa copulatrix with semi sclerotized plates, and sclerotized rings asymmetrical, elongated oval.

Host plant: *Artemisia gigantea* Kitamura (Asteraceae) (Kerzhner, 1988a).

Biology: The single specimen observed was confirmed after comparing with reference specimens (Japanese specimens from Yasunaga). Though the label data inform that, it was collected on *Boehmeria nivea* (L.) Gaudich (Utricaceae), the specific breeding host is unknown.

Distribution: Korea, Japan, Russia.

Distribution in Korea: South Korea: GB (Duwal et al., 2016).

Material examined: South Korea, GB: 1♀ (Eulseong, 24.v.2000, on *Boehmeria nivea* (L.) Gaudich (Urticaceae), S.H. Lee).

Genus *Europiellomorpha* Duwal, 2014

Type species: *Europiella lividellus* (Kerzhner, 1979).

Europiella Reuter: Schuh et al., 1995: 379.

Plagiognathus Fieber: Schuh, 2004: 55.

Europiellomorpha Duwal, 2014a: 391.

Diagnosis: Generally distinguished by small, and oval body, usually greenish coloration, entirely pale antennal segments and legs; ventrally few large black spots on metafemur, arranged one on anterior and three on posterior margin; long labium reaching apex of metacoxa.

Distribution: Korea, China, Russia.

Remarks: As *Europiella*, a tiny representative species of *Euplagiognathus*, are inhabited in various species of *Artemisiae* (Asteraceae). The external morphology are extremely closely related with *Europiella*, however, the saw-like serrated edge of the endosoma is regarded as an autapomorphic character.

36. *Europiellomorpha lividellus* (Kerzhner, 1979) (Plate 4; 21A−E; Table 1)

Plagiognathus lividellus: Kerzhner 1979: 51; 1988a: 855.

Europiella lividella: Schuh et al., 1995: 391; Schuh, 1995: 316; Kerzhner and Josifov, 1999: 346; Yasunaga, 2001: 162; Kwon et al., 2001: 172.

Plagiognathus lividellus: Schuh, 2004.

Male. Body small, oval. Generally greenish; head, pronotum, mesoscutum and scutellum green, tinged with yellow; hemelytron pale. Venter greenish. Antennae pale brown, segment I and base of segment II tinged with green. Labium pale, segment I tinged with green, and apex of segment IV brown. All legs pale; metafemora ventrally with one large dark spot on anterior margin and three large dark spots on posterior margin; and tarsal segment III dark. Dorsum furnished with appressed, flat serious setae, semierect simple dark setae and soft pale setae. Head projecting anteriorly, convex; labium reaching apex of metacoxae. Endosoma: Shape S-like, partly twisted medially, unequal apical processes bind with membrane and sawlike projections present at the edge of one process (seems like serrated edge) Phallotheca: Simple, attenuated towards apex, with blunt end. Left paramere: Simple, anterior process elongated, somewhat curved, and posterior process short and thumb-like. Right paramere: Simple, leafy with narrow apex.

Female. Similar in color and texture as males. Bursa copulatrix trapezoidal and centrally with semi-sclerotized plates, sclerotized rings asymmetrical, somewhat triangular and lateral margins curved.

Host plant: *Artemisia gigantea* Kitamura (Asteraceae) (Kerzhner, 1978).

Biology: The specimens were collected from the different kinds of Asteraceous plant on random sweeping as well as in light trap, so specific breeding host is unknown.

Distribution: Korea, China, Russia.

Distribution in Korea: South Korea: GG, GW, JN (Duwal et al., 2016).

Material examined: South Korea, GG: 1♀ (Sewol, Kangsang, Yangpyeong, 30.vi.2008, R.K. Duwal and S. Jung); 1♂, 1♀ (Mt. Yongmunsan, Yangpyeong, on light trap, 24.vi.2009, same collectors). GN: 2♂, 2♀ (Mt. Jungsan, Sincheon, Sancheong, 29.vi.2010 R.K. Duwal); 1♂, 2♀ (same data as above, on light trap). GW: 1♂ (Mt. Hambaeksan, Taebaek, 14.ix.1999, on Tobaceae and *Artemisia princeps*, G.S. Lee, det. by T. Yasunaga). JN: 1♀ (Danyang, 27.vii.20, R.K. Duwal); 1♂, 1♀ (Mt. Bangjangsan, Jangseong, 24.vi.2010, on light trap, R.K. Duwal).

Genus *Orthonotus* Stephens, 1829

Type species: *Capsus rufifrons* Fallén, 1807; subsequent designation.

Orthonotus Stephens, 1829: 344; Kerzhner, 1988b: 787; Schuh, 1995: 367; Kerzhner and Josifov, 1999: 381; Yasunaga, 2001b: 167; Kwon et al., 2001: 173.

Diagnosis: Recognized by black elongated (macropterous), or ovoid (barcheopterous) body (Josifov, 1964, 1968); mostly with shining black dorsum except some species with pale base or pale entire cuneus (Fallén, 1807; Reuter, 1878; Josifov, 1964; Kerzhner, 1988b); slender antennal segments longer like in Orthotylinae, legs without dark spots and peculiar apex of endosoma, furnished with either few or numerous spinules. For detail description see Kerzhner, 1988b.

Distribution: Holarctic region.

Remarks: This Holarctic genus inhabits on various herbs and oak trees (Reuter, 1878; Kerzhner, 1988b) and described as polyphagous. In Korea one species, *Orthonotus bicoloriceps* was collected on *Quercus* sp. and surrounding herbs.

37. *Orthonotus bicoloriceps* Kerzhner, 1988 (Plate 3; 22K−O; Table 1)

Orthonotus bicoloripes: Kerzhner, 1988a: 62; 1988a: 849; Schuh, 1995: 368; Kerzhner and Josifov, 1999: 381; Yasunaga, 2001b: 167; Anufriev et al., 2001: 127; Kwon et al., 2001: 173.

Male. Body medium sized, elongated oval. Dorsum entirely black or dark brown. In dark brown speci-

mens: head brown, tylus black; pronotum, mesoscutum, scutellum, clavus and cuneus brown, tinged with red, corium brown with lateral sides darker; membrane gray. Venter black (in black specimen) or black tinged with red (in brown specimen). Antennal segment I, base and apex of segment II black, and remaining part regions dirty yellow or pale. Labium shining, segment I, base of segment II pale black tinged with red, segment III and IV pale except apex of segment IV dark. All coxae black, tinged with red; trochanters castaneous; all femora black with pale apices; metatibia pale with black base. Head and thoracic regions dorsally with semierect simple pale setae and flat shining setae; and hemelytron covered with flat shining setae and simple black setae; dorsum entirely shagreen. Head: Convex, projecting anteriorly; antennal segment II cylindrical and relatively longer; labium reaching apex of metacoxae; femora slender. Endosoma: Shape boat-like, with blunt apex; secondary gonopore subapically located. Phallotheca: Broad, curved, and tapers towards the apex. Left paramere: Body large, anterior processes short. Right paramere: Elongated, one margin straight and another slightly splayed out and apex tapered.

Female. Similar in color and texture, except broad abdomen. Bursa copulatrix with semi-sclerotized plate furnished with spinules; sclerotized rings symmetrical, narrow with broad margins.

Host plant: *Quercus* sp. Thunb. (Fagaceae).

Biology: During this study individuals of *Orthonotus bicoloriceps* were collected on *Quercus* sp. and surrounding herbs, and many of them were attracted to light.

Distribution: Korea, Japan, Russia.

Distribution in Korea: South Korea: GW, GG (Duwal et al., 2016).

Material examined: South Korea, GG: 3♂ (Cheonhyeon, Hanam, N 37°31′33″ E 127°14′01″, alt. 79 m, 3.vi.2007, S.W. Park); 8♀ (Namhansansung, Gwangju, 27.vi.2008, on *Quercus* sp. (Fagaceae), R.K. Duwal and S. Jung); 1♂ (Gapyeong, 11.vi.2009, R.K. Duwal); 1♂ (Mt. Yongmunsan, Yangpyeong, 11.vi.2009, on light trap, R.K. Duwal and S. Jung); 1♂ (Dangsan, Songhae, Ganghwa, 10.vi.2007, J.W. Seong). GW: 2♂, 4♀ (Sambong Natural forest, Hongcheon, 26.vi.2003, J.W. Seong).

Genus *Orthophylus* Duwal and Lee, 2011

Type species: *Orthophylus yongmuni* Duwal and Lee, 2011.
Orthophylus Duwal and Lee, 2011: 55.

Diagnosis: Generally recognized by elongated, parallel sided, uniformly pale body; pale yellowish brown dorsum furnished with uniformly distributed silvery setae and simple dark setae; elongated, long antenna (reminiscent of some orthotyline species); slender and yellow legs; Z-shaped curved endosoma, with two

unequal processes supported by membranes, secondary gonopore located between two processes.

Distribution: Korea.

Remarks: The new genus is morphologically very similar to Orthotylinae as well as phyline genus, *Phylus* Hahn, from which it is distinguished by the simple, sclerotized, Z-shaped endosoma with two unequal apical processes which are supported by membranes.

38. *Orthophylus yongmuni* Duwal and Lee, 2011 (Plate 3; 22G−J; Table 1)

Orthophylus yongmuni Duwal and Lee, 2011: 55.

Male. Generally medium sized, slender, parallel sided. Body yellow, shiny; posterior pronotum, mesoscutum, scutellum and hemelytron pale brown except lateral sides of pronotum, exocorium and cuneus yellow, and base of the cuneus pale; membrane grayish. Ventral side of body pale and abdomen yellowish green. All antennal segments yellow, segment I with a pair of pale brown elongated spine dorsally. Labium pale brown, with dark apex. All coxae, trochanters, femora and tibiae yellow, without any spots, tibiae furnished with pale brown spines. Head distributed with pale brown erect and white semierect shining setae; dorsum covered with uniformly distributed simple dark, sub-erect setae and pale setae; ventrally furnished with shining pale pubescences. Head narrow, elongated, projecting ventrally; vertex narrow, eyes large; labium short, slightly surpass apex of mesocoxae; antennal segment II as long as metafemora. Pronotum anteriorly narrow and posteriorly broad (more or less flask shaped), width of pronotum twice as long as mesial pronotal length. Endosoma: Z-shaped, with two unequal processes, short process reaching or slightly surpassing bending point of elongated process; secondary gonopore lies between processes, a tube-like structure developed at base of gonopore. Phallotheca: Slender and attenuated towards apex. Left paramere: With a short posterior process, anterior process thick and broad. Right paramere: Narrow at base, middle region gradually wider and subapically triangular with a finger-like protuberance apically.

Host plant: Unknown.

Biology: The biology is unknown for this new species as it was collected at light.

Distribution: Korea.

Distribution in Korea: South Korea: GG, GW (Duwal et al., 2016).

Material examined: South Korea, GG: 1♂ (Mt. Yongmunsan, Yangpyeong, 24.vi.2009, on light trap, R.K. Duwal and S. Jung).

Remarks: Female not examined.

Genus *Parapsallus* Wagner, 1952

Type species: *Capsus vitellinus* Scholtz, 1847; original designation.

Psallus Parapsallus Wagner, 1952: 173.

Parapsallus: Carvalho, 1958: 112; Schuh, 1995: 371; Kerzhner, 1988b: 789; Kerzhner and Josifov, 1999: 385; Yasunaga, 2001a: 168; Kwon et al., 173.

Diagnosis: Recognized by orange brown or black shagreened body; brown antennal segments and rostrum; arrangements of rows of spots on femora; and Z-shaped endosoma with distinctly unequal apical processes. For detail description see Henry and Wheeler, 1973.

Distribution: Holarctic region.

Remarks: *Parapsallus* represented by only one species is believed to inhabit conifer trees (Henry and Wheeler, 1973).

39. *Parapsallus vitellinus* (Scholtz, 1847) (Plate 4; 22A−F; Table 1)

Capsus vitellinus Scholtz, 1847: 130.

Psallus vitellinus: Carvalho, 1958: 134.

Parapsallus vitellinus: Kerzhner, 1988b: 852; Schuh, 1995: 371; Kerzhner and Josifov, 1999: 385; Yasunaga, 2001a: 168; Anufriev et al., 2001: 130; Kwon et al., 2001: 174.

Plagiognathus vitellinus: Schuh, 2001: 243.

Male. Body medium sized, elongated. Dorsum generally brown, or dark brown, or blackish; head brown; in fuscous specimens: pronotum, mesoscutellum, scutum and clavus black, and in brown specimens: pronotum, mesoscutum, scutellum and clavus dark brown except the anterior margin of pronotum black; hemelytron, corium entirely brown or dark brown, membrane gray. Venter, sternum and pleuron brown or dark brown, abdomen blackish brown. Antennae variously colored, either entirely brown with extreme base darker, or segment I and base of segment II black. Labium shining pale except dark apex. All coxae fuscous (in black specimens) and pale yellow (in brown specimens); trochanters pale; metafemora brown or fuscous with rows of black spots; metatibia brown or pale brown with black spots and base either with or without large black spot. Dorsum furnished with semierect brown setae; dorsum shagreen. Head: Convex, projecting anteriorly, labium reaching apex of metacoxae. Endosoma: Shape S-like, medially slightly twisted; secondary gonopore locate at the middle on apical half of endosoma. Phallotheca: Basally broad, subapically narrow and tapered towards the apex. Left paramere: Body large, anterior process with hooked apex. Right paramere: Elongated, broad width and margins irregular.

Female. Similar in color and texture. Bursa copulatrix with numerous spinules on upper wall; Sclerotized rings asymmetrical, thin rimmed and with broad width. Posterior wall with distinctly shaped semisclerotized structures with numerous spinules.

Host plant: *Abies* spp. (Pinaceae) (Kerzhner, 1988b).

Biology: All specimens in this study were collected in light trap, so the biology is unknown in Korea.

Distribution: Korea, European continent, Japan, N. America, Russia.

Distribution in Korea: South Korea: GG, GW, JN (Duwal et al., 2016).

Material examined: South Korea, GG: 1♂ (Mt. Yongmunsan, Yangpyeong, 11.vi.2009, on light trap, R.K. Duwal and S. Jung). GW: 6♂, 7♀ (Sambong Natural forest, Hongcheon, 26.vi.2003, J.W. Seong); 1♂ (Mt. Dutasan, Donghae, 16.v.2001, on light trap). JN: 1♀ (Mt. Bangjangsan, Jangseong, 24.vi.2010, on light trap, R.K. Duwal).

Remarks: Schuh (2001) defined this species under *Plagiognathus vitellinus*, which is here again transferred to *Parapsallus vitellinus* because of several reasons: 1) apex of endosoma and position of secondary gonopore different than in *Plagiognathus*; 2) posterior wall with distinct chitinized structure nearly developed as K-structure as in Orthotylinae.

Genus *Phylus* Hahn, 1831

Type species: *Phylus pallipes* Hahn, 1831; monotypy.

Phylus Hahn, 1831: 26; Schuh, 1995: 376; Kerzhner, 1988b: 788; Kerzhner and Josifov, 1999: 389; Yasunaga, 1999: 182; 2001a: 169; Kwon et al., 2001: 174.

Diagnosis: Recognized by elongated, laterally parallel sided, black body; shining, black dorsum; brown or black antennal segment I, entirely black segment II, pale segment III and IV; pale legs except apex of tarsus dark; delicate, S-shaped endosoma.

Distribution: Palaearctic region.

Remarks: This genus comprises of nine species described from world (Schuh, 1995). Though, Kerzhner and Josifov, 1999 listed two species from Korea, only *Phylus coryloides* found to exist in southern and central Korea during the survey from 2008−2010. We were unable to observe any of specimens of *Ph. nigricapsus* in this study.

Key to the species of Korean *Phylus*

1. Pronotum wide, antennal segment I entirely black and apical process of male genital structure thick and

with short secondary process (For detail, see Kerzhner, 1988b) ····· *Ph. nigriscapus*

− Antennal segment I brown with dark extreme base or entirely blackish brown; Endosoma S-shaped with two apical processes ····· 2

2. Antennal segment I brown with dark extreme base. Male genitalia (Plate 24F−I): Endosoma S-shaped with two apical processes and subapically twisted, basal part curved like boat shape (Plate 24F); Female genitalia (Plate 24J): Sclerotized rings asymmetrical and very small····· *Ph. coryloides*

− Antennal segment I blackish brown, rarely entirely yellowish brown; Endosoma S-shaped with two apical process and medially twisted; secondary gonopore surrounding with membranous structure (For detail, see Yasunaga, 1999)····· *Ph. miyamotoi*

Subgenus *Phylus* Hahn, 1831

Phylus Hahn, 1831: 26 (as gen. nov.; as subgenus by Wagner and Weber, 1964: 503).

40. *Phylus* (*Phylus*) *nigriscapus* Kerzhner, 1988

Phylus nigriscapsus: Kerzhner, 1988a: 56; 1988a: 843; Schuh, 1995: 377; Kerzhner and Josifov, 1999: 389; Anufriev et al., 2001: 121; Kwon et al., 2001: 174.

Male. Large, elongated; laterally parallel. Dorsum and Venter completely shining black. Antennae; segment I and II completely black; and segment III and IV pale or brownish. Legs completely pale. Dorsum furnished with simple dark setae and short but flattened lanceolate setae; head, pronotum, mesoscutum and scutellum partly shagreen.: Endosoma: Boat shaped, apically extended with a single elongated process furnished with a short sickle-like secondary process.

Host plant: *Quercus dentata* Thunb. (Fagaceae) (Kerzhner, 1988b).

Biology: Its known host is *Quercus dentata* Thunb. (Fagaceae).

Distribution: Korea, Russia.

Distribution in Korea: North Korea: PN (Kwon et al., 2001).

Material examined: None.

Remarks: This species was reported in Korea from northern part and was not found at southern region during the survey. For detail description and male genital structures, see Kerzhner, 1988a: 56.

Subgenus *Teratoscopus* Fieber, 1861

Teratoscopus Fieber, 1861: 315 (as gen. nov.; downgraded to subgenus by Reuter, 1875b: 97).

41. *Phylus* (*Teratoscopus*) *coryloides* Josifov and Kerzhner, 1972 (Plate 4; 24F−J; 47; Table 1)

Phylus (*Teratoscopus*) *coryloides* Josifov and Kerzhner, 1972: 173; Kerzhner, 1988b: 843; Schuh, 1995: 377; Kerzhner and Josifov, 1999: 390; Anufriev et al., 2001: 121; Kwon et al., 2001: 175.

Male. Large, elongated; laterally parallel. Dorsum and Venter completely shining black. Antennae; segment I dirty brown; segment II entirely black; and segment III and IV pale. Labium pale with dark apex. All legs pale. Dorsum furnished with simple dark setae and short but flattened lanceolate setae. Head, pronotum, mesoscutum and scutellum partly shagreen; labium reaching apex of mesocoxae. Endosoma: Boat shaped, apical curve inverted U-shaped, furnished with a membrane at middle region; Secondary gonopore large and medially located.

Female. Similar color and texture to male. Sclerotized rings assymetrical and very small.

Host plant: *Corylus* sp. (Betulaceae) (Josifov and Kerzhner).

Biology: In Korea, individuals of *Phylus coryloides* were collected from, *Corylus heterophylla* (Betulaceae) and light traps, but breeding host is unknown.

Distribution: Korea, China, Japan, Russia.

Distribution in Korea: North Korea: HN, PN, South Korea: GG, GW (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, GG: 4♂, 4♀ (Baeknyeongsu, Mt. Gwanggyosan, Suwon, 23.v.2003, on *Corylus heterophylla* Fisch. Ex. Trautv. (Betulaceae), J.W. Seong); 1♂ (Palhyeong, Onam, Namyangju, 26.v.2006, on light trap, J.W. Seong). GW: 1♀ (Mt. Dutasan, Donghae, 16.v.2001, on light trap, members of NAAS).

42. *Phylus* (*Teratoscopus*) *miyamotoi* Yasunaga, 1999 (Plate 4)

Phylus miyamotoi Yasunaga, 1999: 182.

Male. Large, elongated; laterally parallel. Dorsum and Venter completely shining black. Vertex slightly

pale; antennal segment I and segment II almost black; segment III and IV pale yellow. Labium pale with dark apex. All legs and coxae pale; tibial spines and tarsus pale brown; Dorsum uniformly covered with a simple, silky, reclining pubescence. Head, pronotum, mesoscutum partly shagreen; scutellum rather rugose; labium reaching apex of mesocoxae. Hemelytra fuscous, minutely punctate; membrane smoky gray, brownish. Endosoma S-shaped, apex shallowly bifurcate, furnished with a membrane at middle region; secondary gonopore large and medially located, encircled by membrane.

Female. Similar color and texture to male. Antennal segment I and II partly darkened, not entirely blackish.

Host plant: *Quercus mongolica* (Yasunaga, 1999)

Biology: This species was collected from *Quercus mongolica* and other deciduous trees, and light trap.

Distribution: Korea, China, Japan (Duwal et al., 2016).

Distribution in Korea: South Korea: GW (Duwal et al., 2016).

Material examined: South Korea, GW: 1♂, 1♀ (Yongdae Natural Recreation Center, Mt. Maebongsan, Yongdae, Buk, Inje, on light trap, 19.vi.2013, R.K. Duwal).

Remarks: This species was previously regarded as *P. coryloides*, but erected as new species based on male genitalia structure by Yasunaga (1999). Male genitalia of *P. coryli* rather similar as this species.

Genus *Plagiognathus* Fieber, 1858

Type species: *Lygaeus arbustorum* Fabricius, 1784; subsequent designation.

Plagiognathus Fieber, 1858: 320; Kerzhner, 1988b: 787; Schuh, 1995: 380; Kerzhner and Josifov, 1999: 391; Yasunaga, 1999: 184; 2001a: 168; Kwon et al., 2001: 177; Duwal et al., 2010a: 325.

Diagnosis: Generally recognized by elongate body, pale, green, brown to black coloration; uniformly distributed dark simple setae on dorsum; partial or complete stripe dorsally on metafemur at anterior or posterior margins or both, and ventrally with distinct large spots and clavate pretarsal segments; sclerotized vesica, S-shaped, weakly twisted medially, and bifurcated into two distinct unequal processes apically, secondary gonopore located medially or sub-apically; sclerotized rings of female genitalia assymetrical, distinctly shaped (circular, or oval or elongate oval, etc.) in each examined species.

Distribution: Holarctic region.

Remarks: Members of this group are mostly associated with *Artemisia* spp. (Asteraceae). However, some species were also collected from plants like *Brassica campestris* L. (Brassicaceae), *Humulus* sp. (Cannabaceae), *Raphanus sativus* L. (Brassicaceae) and *Galium spurium* L. (Rubiaceae), etc. During this study, two species, *P. amurensis* Reuter, 1883 and *P. yomogi* Miyamoto, 1969, were found more common than other two species *P. chrysanthemi* (Wolff, 1778) and *P. collaris* (Matsumura, 1911).

Key to species of Korean *Plagiognathus*

1. Dorsal surface uniformly pale green, comparatively larger; arrangements of spots and stripes on hind femur dorsally and ventrally; vesica of male genitalia much curved at apical half region, bifurcated processes tumid, secondary gonopore positioned lower to the bifurcation point, and sclerotized ring of female genitalia, nearly circular (Plate 24E) ····· *P. chrysanthemi*
− Dorsal surface either black or variable in color; vesica of male genitalia bifurcated more or less at same level as the base of the secondary gonopore ····· 2
2. Dorsal surface entirely dark ····· 3
− Wide variation in color, body pale or brownish or blackish (Plate 5); cuneus paler at base and apex; extreme base of meso- and metacoxa black; metafemur dorsally with short stripe apically on posterior margin and ventrally with irregular large spots; vesica of male genitalia with short processes, longer one slightly curved inward apically (Plate 23A); and sclerotized ring of female genitalia elongated, oval and anteriorly pointed (Plate 23E) ····· *P. amurensis*
3. Comparatively small, 2.91−3.16 mm, hemelytron shiny black; basal half of mesocoxa and entire metacoxa black; and metafemur with stripes dorsally on anterior and posterior both margins at apical half region and ventrally with rows of large spots; vesica of male genitalia bifurcated at 1/3 from the apex, both the processes are slender, apically not curved (Plate 23K); wall of female genitalia comparatively smaller, sclerotized ring oval, anteriorly extended into a thumb-like outgrowth (Plate 23N) ····· *P. yomogi*
− Comparatively larger, 3.91−4.93 mm, dorsum uniformly black shiny; rostrum black except extreme base; basal half of all coxa dark; and metafemur with stripes dorsally on anterior and posterior both margins, stripe on anterior margin basally and at sub-apical region, and with few large and small black spots ventrally; vesica of male genitalia with flat base on the processes, which tapers towards the apex and shorter process curved like S-shape (Plate 23F), and sclerotized ring of female genitalia elongated and oval (Plate 23I) ····· *P. collaris*

43. *Plagiognathus amurensis* Reuter, 1883 (Plate 5; 23A−E; 48; Table 1)

Plagiognathus amurensis: Reuter, 1883: 454; Kerzhner, 1988b: 853; Schuh, 1995: 381; 2001: 246 (note, fig.); Kerzhner and Josifov, 1999: 391; Yasunaga, 2001a: 169; Anufriev et al., 2001: 130; Kwon et al., 2001: 176; Duwal et al., 2010a: 326.

Male. Body elongate, ovoid. Variously colored from pale, brownish to blackish; vertex, gena and lora pale; pronotum near to anterior margin, scutellum with black or dark patches medially at anterior margin (in brownish or pale individuals); hemelytron blackish or brownish or pale; base and apex of cuneus pale. Ven-

tral side of body black. Antennae, segments I and II dark, except for the extreme apices, segments III and IV largely pale. Labium, except extreme base of segment I and apex of segment IV, dark. Legs yellow; procoxa and large part of mesocoxa pale apically, base of meso- and metacoxa dark; metafemur with short longitudinal black stripe dorsally at apical 1/3 of the posterior margin, and ventrally with irregular large dark spots. Dorsum furnished with uniformly distributed dark simple setae. Head projecting ventrally; and reaching apex of the metacoxa; length of labium nearly subequal to the length of femur; length of antennal segment II subequal to the width of pronotum. Endosoma: Apical bifurcation of vesica comparatively short, both of the processes are somewhat uniform in width but unequal in length, and with pointed endings, short process curved backward while long process slightly curved inward; secondary gonopore subapically located just beneath the starting point of the bifurcation.

Female. Very similar to male in coloration; body 3.08−3.84 mm in lengths slightly oval, and pronotum 1.05−1.37 mm wide. Sclerotized ring more or less oval shaped, narrow anteriorly.

Host plant: *Artemisia vulgaris* L. (Asteraceae) (Kerzhner, 1988b; Schuh, 2001).

Biology: Due to wide color variations of the dorsum from black or brown to pale, this species is very hard to distinguish by its dorsal color pattern, but mostly pale labium, darkened bases of meso- and metacoxa, and spots and short stripe on posterior margin dorsally on the metafemur are important distinguishing characters. According to the collection data blackish individuals dominated during July.

Our survey indicated that this species is widely spread in various plants like *Humulus japonicus* Seib. (Cannabaceae), *Brassica campestris* L. (Brassicaceae), *Chenopodium album* L. (Amaranthaceae), *Galium spurium* L. (Rubiaceae), and *Artemisia* spp. (Asteraceae). Also it is frequently attracted to light and Malaise traps.

Distribution: Korea, China, Russia, Uganda.

Distribution in Korea: South Korea: CB, CN, GB, GG, GN, GW, JJ, JN (Duwal et al., 2016).

Material examined: South Korea, CB: 12♀ (Jungsan, Cheongju, 12.vii.2004, on *Humulus japonicus* Sieb. and Zucc., J.W. Sung). CN: 1♂ (Agriculture centre, Cheonan, 9.v.2003, J.W. Seong); 4♂, 3♀ (Cheongra, Boryeong, 10.x.2003, on *Humulus japonicus* Sieb. and Zucc., J.W. Seong); 5♂, 7♀ (same locality as above, 21.x.2007, on *Galium spurium* L., S. Jung); 1♂, 5♀ (Jeongjuk, Geunhong, 31.viii.2006, S. Lee); 20♂, 35♀ (Sinam, Yesan, 12.vi.2007, on *Brassica campestris* L., S. Jung); 3♂, 6♀ (Deoksan, Yesan, 4.vi.2007, on *Chenopodium album* var. *centrorubrum* (Amaranthaceae), J.W. Seong); 2♂, 3♀ (Is. Nanji-do, 18.viii.2009, *Artemisia* spp., R.K. Duwal and S. Jung). GB: 15♂, 6♀ (Waryong, Andong, 6.vi.2008, on Malaise trap, J.O. Lim); 1♂ (Cheonggi, Yeongyang, 7.vi.2008, on Malaise trap, J.O. Lim). GG: 1♂ (Suwon, 22.vi.1987, C.J. Kim); 1♂, 1♀ (same locality as above, 9.vii.1988, C.H. Jung); 1♀ (same locality as above, 21.ix.2001, C.H. Jung); 1♀ (same locality as above, 25.vi.2009, on light trap, R.K. Duwal); 1♂ (Gwangju, 25.Iiv.1992, C.M. Park); 1♂ (Gwacheon, 22.ix.2000, H.G. Kwang); 1♀ (Yongin, 16.ix.2000, M.S. Kim); 1♀ (Yeoncheon, 3.x.2000, S. Lee and S.W. Park); 1♀ (Gyoha, Paju, 6.vi.2003, J.W. Seong); 4♂, 1♀ (Se-

wol, Kangsang, Yangpyeong, 1.vii.2008, on *Artemisia* sp., S. Jung and R.K. Duwal); 1♂ (Mt. Yongmunsan, Yangpyeong, 11.vi.2009, on light trap, R.K. Duwal and S. Jung); 1♂, 1♀ (Mt. Mangwolsan, Icheon, 1.vi.2008, on *Artemisia* sp., S. Jung and R.K. Duwal); 1♂ (same locality as above, 1.vii.2008). GN: 1♀ (Hapcheon, 10.x.2000, T.H. Kim). JJ: 1♂ (Aewol, Bukjeju, Eoeum, 14.v.2003, J.W. Seong). GW: 1♂ (Yangyang, 26.v.2003, on *Raphanus sativus* L., J.W. Seong); 12♂, 16♀ (Hongcheon, 30.vii.2007, on light trap, S. Jung); 25♂, 38♀ (Donghae, 11.xii.2007, on light trap, S. Jung); 2♂, 8♀ (Munmak, Wonju, 27.v.2009, R.K. Duwal and S. Jung); 20♂, 14♀ (same locality as above, 1.vi.2009, on light trap). JN: 1♂ (Gurye, 4.viii.1996, M.A. Kim); 1♂, 1♀ (Nogodan, Gurye, 29−30.vii.1996, M. Kim); 4♂ (Chusan, Gwangyang, 16−19.vi.2008, S. Jung and R.K. Duwal).

44. *Plagiognathus chrysanthemi* (Wolff, 1778) (Plate 5; 24A−E; Table 1)

Cimex femorepunctatus Goeze, 1778: 266.

Miris chrysanthemi Wolff, 1804: 157.

Plagiognathus chrysanthemi: Miyamoto, 1969: 88; Kerzhner, 1988b: 854; Schuh, 1995: 383; 2001: 59; Kerzhner and Josifov, 1999: 393; Yasunaga, 1999: 184; 2001a: 170; Anufriev et al., 2001: 130; Duwal et al., 2010a: 330.

Male. Body slender, elongated. Body and dorsum completely pale green, Clypeus with black apex. Antenna pale brown; segment I with black ring at the base and apex, and segment II black basally. Legs pale; coxa entirely pale, metafemora dorsally with short subapical stripe on posterior margin and ventrally with a row of large dark spots on upper margin followed by aggregation of small spots in another row. Dorsum with uniformly distributed black setae. Endosoma: Apex of vesica divided into two unequal processes, both of the processes are tumuid, short one develops as a branch from the longer one, secondary gonopore medially located.

Female. Very similar to male in coloration, slightly smaller, body length 3.17−3.60 in length, and width across pronotum 1.04−1.90. Antennal segment II darkened on basal half. Sclerotized ring distinct, nearly rounded.

Host plant: Asteraceae (Leston, 1961).

Biology: *Plagiognathus chrysanthemi* is the only green species found in Korea, so it can be easily distinguished from other species of this genus occurring in this territory. But, unfortunately only few specimens have been collected through light trap, so its biology is still unknown.

Distribution: Korea, Canada, Europe, Iraq, Japan, Mongolia, N. America, Russia.

Distribution in Korea: South Korea: GG (Duwal et al., 2016).

Material examined: South Korea, GG: 2♀ (NAAS, Suwon, 5−8.vi.1997, on light trap).

45. *Plagiognathus collaris* (Mastsumura, 1911) (Plate 5; 23F−I; Table 1)

Plagiognathus arbustorum Reuter, 1906: 75.

Chlamydatus collaris Matsumura, 1911: 40.

Plagiognathus collaris: Miyamoto, 1969: 86; Kerzhner, 1988b: 853; Kerzhner and Josifov, 1999: 393; Schuh, 1995: 384; 2001: 246; Yasunaga, 1999: 185; 2001a: 170; Anufriev et al., 2001: 30; Kwon et al., 2001: 176; Duwal et al., 2010a: 330.

Male. Body elongated in length. Body and dorsum uniformly shining fuscous. Antennae black, segment III black basally and gradually pale towards the apex. Labium black except the extreme bases and apices of segments II and III pale. Legs pale; all coxa black on basal half; metafemur with thick black stripe dorsally on anterior and posterior margins, stripe on anterior margin at base to apex, and ventrally with rows of large, black spots. Dorsum furnished with dark simple setae. Length of femur equal to the width across the hemelytron. Endosoma: Apex of the vesica largely bifurcated into two apical process, both of the processes are slightly curved inward, shorter process curved like S-shape, secondary gonopore medially located.

Female. No significant difference with male. Sclerotized rings oval, and joined together by a distinct, concave membrane.

Host plant: *Filipendula* sp., *Rosa* sp. (Rosaceae), *Geranium* sp. (Geraniaceae), Apiaceae (Schuh, 2001).

Biology: This species was reported by Kerzhner and Josifov (1999) from northern part of Korea, but the locality and the host plant were not clarified. Also, examined individuals were collected in light trap, and Malaise traps, so the host is unknown.

Distribution: Korea, China, Japan, Russia.

Distribution in Korea: North Korea: PB, PN, South Korea: GB, GW (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, GB: 2♂ (Mungyeong, 9.viii.2007, on light trap, S. Jung). GW: 2♂, 1♀ (Mt. Gariwangsan, 1.vii.2009, on Malaise trap, J.O. Lim).

46. *Plagiognathus yomogi* Miyamoto, 1969 (Plate 5; 23J−N; Table 1)

Plagiognathus yomogi Miyamoto, 1969: 88; Kerzhner, 1988b: 853; Schuh, 1995: 392; 2001: 249; Kerzhner and Josifov, 1999: 395; Yasunaga, 1999: 187; 2001a: 171; Anufriev et al., 2001: 130; Kwon et al., 2001:

177; Duwal et al., 2010a: 330.

Male. Body elongated, comparatively small size. Body and dorsum uniformly shining and black with slightly brownish posterior margin of vertex. Antenna dark, except extreme apex of segment II, and segment III−IV pale. Labium pale, segment I, extreme base of segment II and apex of segment IV fuscous. Legs pale; procoxa and the base of mesocoxa pale, and metacoxa entirely black; metafemur dorsally with distinct black stripe at apical half of anterior and posterior margins, and ventrally with rows of large spots. Dorsum furnished with uniformly distributed dark setae. Labium reaching apex of metacoxa. Endosoma: Apical portion of vesica divided by short bifurcation into two unequal processes, one short and broad while another slender and elongated, and secondary gonopore positioned sub-apically.

Female. Very similar to male, body length 2.89−3.23 mm, and pronotum 1.06−1.16 mm wide. Genital structures are comparatively smaller than other species, sclerotized ring oval and extremely pointed (finger-like outgrowth) anteriorly.

Host plant: *Artemisia rubripes* Nakai (Asteraceae) (Kerzhner, 1988b), *Artemisia* spp. (Yasunaga, 1999; Schuh, 2001).

Biology: This species is recorded by Kerzhner and Josifov (1999) but the locality data and the host plant were not clarified. During this study specimens were collected on *Artemisia* spp. (Asteraceae) and surrounding bushes; and were also attracted to light.

Distribution: Korea, China, Japan, Russia.

Distribution in Korea: South Korea: GG, GW (Duwal et al., 2016).

Material examined: South Korea, GG: 8♂, 4♀ (Sewol, Kangsang, Yangpyeong, 30.vi.2008, on *Artemisia* sp., S. Jung and R.K. Duwal); 1♀ (same locality as above, 24.vi.2009, on light trap S. Jung and R.K. Duwal); 4♂, 2♀ (same locality as above, 16.vii.2009, S. Jung and R.K. Duwal); 1♂ (same locality as above, 27.vii.2009, S. Jung and R.K. Duwal); 6♀ (same locality as above, 10.viii.2009, S. Jung and R.K. Duwal); 3♂, 1♀ (Mt. Mangwolsan, Icheon, 1.vii.2008, on light trap, S. Jung and R.K. Duwal); 3♂, 7♀ (Icheon, 12.vi.2007, on *Artemisia* spp., S. Jung); 4♂, 1♀ (Namhansansung, 27.vii.2008, on *Artemisia* sp., S. Jung and R.K. Duwal). GW: 4♂, 2♀ (Hongcheon, 26.vi.2003, on *Sorbaria sorbifolia* var. *stellipila* (Rosaceae), J.W. Sung); 5♂, 4♀ (Mt. Chiaksan, 11.vi.1988, C.H. Jung); 2♂, 1♀ (Munmak, Wonju, 1.vi.2009, on *Artemisia* spp., R.K. Duwal and S. Jung); 1♂ (Mt. Gariwangsan, Pyeongchang, 1.vii.2009, on Malaise trap, J.O. Lim).

Remarks: It is distinguished from *P. amurensis* by its shiny black dorsum, distinct dark spots on the metafemora, and the structure of the male genitalia.

Genus *Psallus* Fieber, 1858

Type species: *Lygaeus sanguineus* Fabricius, 1794 (= *Cimex haematodes* Gmelin, 1790), subsequent designation by Reuter, 1888: 412).

Psallus Fieber, 1858: 321; Schuh, 1995; Kerzhner and Josifov, 1999: 399; Yasunaga and Vinokurov, 2000: 653; Yasunaga, 2001a: 171; Kwon et al., 2001: 177; Duwal et al., 2012: 604.

Diagnosis: Male. Body varying in color from uniformly yellow, orange, red, pale or dark brown to black, sometimes variously spotted or mottled, rarely tinged with green; body shape oval to elongate oval with length from 2.9 to 5.5 mm; dorsal surface with uniformly distributed, simple setae and with silvery scale-like setae that often easily abraded; dorsal surface of head, pronotum, scutellum, and hemelytron weakly shagreen; metafemora incrassate and tumid; endosoma C- or J-shaped, with a complex apical section; secondary gonopore located medially or sub-apically.

Female. Generally similar to male, but body usually shorter, more oval and sometimes paler in coloration. Bursa copulatrix variable in size; dorsal labiate plate mostly furnished with clusters of spinules laterally and with variously membranous folding; sclerotized rings distinct with diverse shape being small or large, oval, elongate oval or circular.

Distribution: Thailand, Holarctic region.

Biology: Most members of *Psallus* are associated with broadleaf host plants. A few species were reported as a serious pests, e.g., *P. ambiguus*, caused stony pit in pears (Taksdal, 1983) and nymphs of the same species were also observed feeding on animal food (Wheeler, 2001). All members of this genus are frequently attracted to light.

Remarks: The genus *Psallus* (Miridae: Phylinae: Phylini) is a large Holarctic genus, comprising approximately one hundred and forty four species (Schuh, 2003), most of which were recorded from temperate and cold temperate climatic zones, except for *P.* (*P.*) *buddha* Yasunaga, that was recently described from Thailand but considered as a relic of Palaearctic element (Yasunaga, 2010). In eastern Asia, forty four species of *Psallus* have been reported (Kerzhner and Josifov, 1999; Yasunaga and Vinokurov, 2000), and the regional faunas have been documented from the Russian Far East (Kerzhner and Josifov, 1966; Kerzhner, 1978, 1979, 1988a; Vinokurov, 1998), continental China (Zheng and Li, 1990), the northern Korean Peninsula (Josifov, 1983, 1992), and Japan (Muramoto, 1973; Yasunaga and Vinokurov, 2000).

Seven of eight subgenera (except subgenus *Subpsallus*) exist in the Korean Peninsula with total of twenty six species. And most of the members are common to the fauna of neighboring countries China, Japan and the Far East Russia.

Key to subgenera *Psallus* in Korea

1. Endosoma lacking lateral processes ····· 2
− Endosoma with one or two or several lateral processes ····· 3
2. Endosoma simple, tubular without spinulus or serrated structures ····· *Mesopsallus*
− Endosoma with wide base tapering towards the apex, and apical process with serreted lateral margin ····· *Pityopsallus*
3. Apex of endosoma broader with single apical process ····· 4
− Apex of endosoma narrow with two or more apical processes ····· 5
4. Apex of the secondary gonopore continuous with the spinulus semisclerotized membrane ···· *Apocremnus*
− Apex of endosoma blunt with spinulus semisclerotized membranes ····· *Calopsallus*
5. Base or subapical region of apical process with semisclerotized spinulus structure ····· *Hallopsallus*
− Semisclerotized spinulus structure arises separately from the main apical process ····· 6
6. Apical process seems continuous process from the base ····· *Phylidea*
− Apical process seems separately appear from the apical disc of endosoma ····· *Psallus*

Key to species of Korean *Psallus*

1. Antennal segment II pale, yellow, or brown ····· 2
− Antennal segment II entirely fuscous or black, either base or apex or both black ····· 23
2. Antennal segment I pale or with dark base ····· 3
− Antennal segment I entirely black or fuscous with pale extreme apex ····· 24
3. Dorsum variously colored, without speckles ····· 8
− Dorsum pale, with red or orange speckles ····· 4
4. Head without brown spots; anterior pronotum with numerous brown or orange red spots (Plate 7). Male genitalia (Plate 32B−D): Endosoma C-shaped, secondary elongated process extends through the blunt apex; right paramere with tooth-like out growth near apex. Female genitalia (Plate 32E): Dorsal labiate plate with rectangular membranous folding posteriorly and furnished with numerous spines around sclerotized rings ····· *P. amoenus*
− Head and pronotum with brown spots ····· 5
5. Mesoscutum and scutellum densely distributed with brown spots but without speckles; cuneus with a few speckles or speckles only at base (Plate 5). Male genitalia (Plate 28A−D): Endosoma C-shaped, body of apex blunt with numerous spinules, and subapical elongated secondary process short; right paramere apically extending to an elongated protuberance. Female genitalia (Plate 28E): Sclerotized rings very small, lateral oviducts posteriorly supported by bowl shaped membranous folding, cluster of spinules at dorsal labiate plate located far from sclerotized rings ····· *P. clarus*
− Mesoscutum and scutellum only with red or orange speckles ····· 6

6. Femora pale ventrally, with numerous small spots at distal half and dorsally with few spots subapically (Plate 6). Male genitalia (Plate 28F−I): Endosoma J-shaped, broad, apex of main body with several short and blunt processes, with spinose margins, inner process somewhat elongated and with only one spine apically. Female genitalia (Plate 28J): Sclerotized rings ovate but posterior margin straight, lateral oviduct seems supported by membranous folds ····· *P. tesongsanicus*

− Metafemora pale, apically tinged with red, ventrally with densely distributed spots, dorsally with a few subapical spots ····· 7

7. Large and small spots on metafemora fused, not extending to base Male genitalia (Plate 27F−H): Endosoma C-shaped, apex broad and furnished with spinules, elongated secondary process perpendicular to position of primary process and also furnished with tooth-like spines at curved inner margin. Female genitalia (Plate 27I): Sclerotized rings comparatively small, lateral oviducts positioned within roughly heart shaped folding, posterior portion of dorsal labiate plates wide and furnished with spinules laterally ····· *P. roseoguttatus*

− Spots on metafemora irregular on apical half and extending to base in rows. Male genitalia (Plate 35A−C): Endosoma C-shaped; apex broad and complex furnished with numerous spinules, outer margin of apical process with a teeth-like spine, a curved finger-like process facing toward the apex; and secondary gonopore subapical in position between apical and sub-apical processes ····· *P. injensis*

8. Dorsum dark, brown or black or castaneous ····· 9

− Dorsum pale or with various bright colors ····· 11

9. Tibial spots at bases of tibial spines obscure or small ····· 10

− Tibial spots at bases of tibial spines large ····· 17

10. Dorsum fuscous brown or black; in brownish individuals head, pronotum and scutellum blackish shagreened; femora fuscous with rows of dark brown spots at distal half region, tibia pale brown with small obscure spots at base of black spines (Plate 7). Male genitalia (Plate 33E−H): Endosoma S-shaped, apex extends to form elongated process furnished with toothed spinules on outer margin; Female genitalia (Plate 33I): Structures are very delicate, with a socket-like membranous folding ····· *P. vittatus*

− Dorsum brown; head, pronotum, mesoscutum and scutellum dark brown or fuscous; femora pale brown, ventrally with dark brown spots on apical half region, tibiae with small brown spots at the base of brown spines (Plate 7). Male genitalia (Plate 33A−D): Endosoma S-shaped, apex extends to form elongated process, furnished with spinules on basal half on outer margin, and a membrane reaching half the length of endosoma, with serrated lateral margin ····· *P. luridus*

11. Body red or orange or orange red ····· 12

− Body uniformly pale (or somewhat pale yellowish), genital segment with a pair of protuberances (Plate 8). Male genitalia (Plate 34E−I): Endosoma C-shaped, apex with a pair of small ear-like secondary processes laterally and an elongated flat apical process medially ····· *P. cheongtaensis*

12. Body uniformly orange (Plate 6). Male genitalia (Plate 31F−H): Endosoma J-shaped, sclerotized elon-

gated process from apex slightly curved inward, membranous outgrowth with few spinules basally, secondary gonopore located apically. Female genitalia (Plate 31I): Sclerotized rings small, oval, somewhat straight posteriorly and pointed anteriorly, membranous folding furnished with dense spinules laterally on dorsal labiate plate ····· *P. flavescens*

– Body other than orange colored ····· 13

13. Hemelytron deeply red ····· 14

– Corium contrasting in being brownish red ····· 15

14. Head, pronotum, mesoscutum, scutellum castaneous; femora with apical 2/3 red and with few spots at anterior margin (Plate 6). Male genitalia (Plate 31A–D): Endosoma J-shaped, margin of apex provided with spinules, and a short apical outgrowth. Female genitalia (Plate 31E): Sclerotized ring small, oval with pointed anteriorly, membranous folding on dorsal labiate plate medially invaginated ····· *P. cinnabarinus*

– Head with pale vertex; pronotum, mesoscutum, scutellum and the base of hemelytron blackish, and shiny (dark red specimen, male) or orange red except callus dark (faintly red, female) (Plate 8); hind femora with black spots at entire anterior margin ····· *P. koreanus*

15. Anterior margin of pronotum or callus with a large black spot; vertex and base of cuneus pale; corium and femora red (dark red specimens), or posterior part of pronotum, apex of scutellum, base of corium pale with larger posterior part dirty dark tinged with red, and femora pale (pale specimens) (Plate 7), femora provided with two rows of spots proximally, which distally merged into irregular spots ··· *P. ulmi*

– Pronotum without dark spot on calli, or entirely reddish brown, or pale orange ····· 16

16. Body pale, dorsum pale tinged with orange yellow or pale brown, head yellow to dark brown; apex of clavus slightly darkened, metafemur arranged with distinct large and small spots at distal half, membrane brownish (Plate 7) ····· *P. kimi*

– Dorsum chestnut red (male) or red (female), head darker (male) and ocher (female) with dark brown or black tylus, cuneus red, and metafemora with two rows of spots (Plate 8) ····· *P. sanguinarius*

17. Genital segment with tuft of stiff hairs laterally. Male genitalia (Plate 29A–D): Endosoma J-shaped, apex extended to elongated process, with membranous folding furnished with spinules at base. Female genitalia (Plate 29E): Sclerotized rings broad and somewhat subrectangular, dorsal labiate plate somewhat sclerotized, membranous folding between sclerotized rings ····· *P. tonnaichanus*

– Genital segment without a tuft of stiff hairs ····· 18

18. All femora black or blakish brown, with pale (or tinged with red) apices ····· 19

– All femora castaneous, with pale or reddish apices ····· 20

19. Metafemora black, apically tinged with red except for pale apex of fore femur; Male genitalia (Plate 30A–D): Endosoma J-shaped, subapically extended membranous folding provided with numerous spinules. Female genitalia (Plate 30E): Sclerotized ring elongated, width narrow, membranous folding located centrally ····· *P. castaneae*

– Metafemora entirely black (in black specimens) or blackish brown (dark brown specimens). Male genitalia (Plate 35D–G): Endosoma C-shaped with several short or long lateral processes, membranous structure at the base of apical processes furnished with spinules; and secondary gonopore subapical in position ····· *P. yongdaeri*

20. Labium reaching apex of mesocoxa; base of femora black, 1/2 or 3/4 from apex reddish provided with black spots. Male genitalia (Plate 29F–H): Endosoma C-shaped, short apical process provided with cluster of spinules sub-apically. Female genitalia (Plate 29I): Sclerotized rings elongated oval, posterior portion of dorsal labiate plate with inverted V-shaped membranous folding ····· *P. suwonanus*

– Labium reaching metacoxae or at least exceeding mesocoxae ····· 21

21. Body small, about 2.9–3.0 mm; spots on metatibiae castaneous (Plate 6). Male genitalia (Plate 30G–J): Endosoma nearly S-shaped, apical margin completely surrounded by spinules, and elongate curved process extending across the secondary gonopore. Female genitalia (Plate 30K): Sclerotized rings small, ovate, somewhat pointed anteriorly ····· *P. ernesti*

– Body medium sized, more than 3.0, spots on tibia brown or dark brown at the base of black spines ···· 22

22. Coxae dark brown, trochanters pale. Male genitalia (Josifov, 1992: 116): Endosoma C-shaped, apical process short with broad base and slender apex ····· *P. kerzhneri*

– Coxae black, trochanters dark brown to blackish. Male genitalia (Plate 32F–I): Endosoma J-shaped, apically ending as leaf-like structure. Female genitalia (Plate 32J): Sclerotized rings are strongly asymmetrical ····· *P. loginovae*

23. All antennal segments black. Male genitalia (Plate 27A–D): Endosoma S-shaped, apical region membranous with numerous clusters of spinules, and apical process is short and slender. Female genitalia (Plate 27E): Sclerotized rings distinct, membranous folding at posterior portion of dorsal labiate plate vase shaped ····· *P. michaili*

– Antennal segment II either base or apex black or dark ····· 24

24. Antennal segment I black ····· 25

– Antennal segment I fuscous except for pale extreme apex. Male genitalia (Plate 36A–D): Endosoma, J-shaped with broad apex provided with several short or long lateral processes, and a bunch of spinules at base of apical process; and secondary gonopore nearly mesial in position ····· *P. taehwana*

25. Dorsum blackish (male), or brownish (female); head, pronotum, and scutellum black, in female provided with pale medial stripe extended from frons to pronotum, enlarged as a spot at each medial region, scutellum with 3 pale spots and apex of scutellum pale; metafemora pale with chain of spots joining each other, tibia with large castaneous spots at base of pale spines. Male genitalia (Plate 34A–C): Endosoma roughly S-shaped, extending outgrowth process appears as a horny spine together with other large spines arising from apex. Female genitalia (Plate 34D): Sclerotized ring small, oval, broad posteriorly and narrow anteriorly, posterior portion of dorsal labiate plate with membranous folding supported lateral sclerotized ring ····· *P. bagjonicus*

− Head, pronotum and scutellum without spots, femur castaneous or black ····· 26

26. Largest Korean species 4.8−5.5, vertex and inner margin of eyes pale, head and pronotum black, hemelytron and legs fuscous (Plate 6). Male genitalia (Josifov, 1983: 200): Endosoma S-shaped, with simple apex. Female genitalia (Plate 30F): Sclerotized rings elongate oval, with apex extending like a protuberance and reaching spinules on dorsal lateral plates laterally ····· *P. samdzijonicus*

− Size smaller than 4.0, vertex pale or black, if pale only at central margin, femora black or castaneous and tibiae pale ····· 27

27. Ostiolar peritreme grayish or pale ····· 28

− Ostiolar peritreme black ····· 29

28. Cuneus castaneous red with pale base, tibiae pale tinged with red and provided with small castaneous spots (Plate 5). Male genitalia (Plate 26E−G): Endosoma S-shaped, laterally furnished with spinules subapically, and elongated outgrowth process slender and slightly curved opposite of spinules *P. betuleti*

− Cuneus black (or castaneous), apically tinged with dark red, tibiae pale with large castaneous red spots. Male genitalia (Plate 25C−F): Endosoma C-shaped, simple apex without spinules, apical process short and slender. Female genitalia (Plate 25G): dorsal labiate plate with series of spinules laterally; posterior portion of dorsal labiate plate with numerous folds of membranes; sclerotized rings elongated, tapered anteriorly ····· *P. ater*

29. Fore and meso femora apically pale, tibiae with small brown spots. Male genitalia (Plate 25A, B): Endosoma S-shaped, membranous folding arises from apex of secondary gonopore furnished with several spinules subapically ····· *P. aethiops*

− Femora entirely black and shiny, tibiae with large castaneous black spots. Male genitalia (Plate 26A−D): Endosoma C-shaped, membranous folding arising from apex of secondary gonopore, furnished with densely distributed spinules laterally and sparsely distributed few spinules medially ····· *P. atratus*

Subgenus *Apocremnus* Fieber, 1858

Apocremnus Fieber, 1858: 320 (as genus; downgraded by Reuter, 1875a: 175).

The genus *Apocremnus* Fieber was downgraded to subgenus *Psallus* by Reuter (1895, 1878) and comprises with fifteen described species (Kerzhner and Josifov, 1999; Yasunaga and Vinokurov, 2000).

Species of this subgenus are mostly distinguished by darker body coloration, pale or dark appendages; C- or S-shaped endosoma bearing a membranous structure arise from either mesial or apex of the secondary gonopore and furnished with minute spinules. For detail description, see Wagner (1975a).

47. *Psallus* (*Apocremnus*) *aethiops* (Zetterstedt, 1838) (Plate 25A, B)

Phytocoris aethiops Zetterstedt, 1838: 274.
Psallus (*A.*) *aethiops* (Zetterstedt, 1838).
Phytocoris aethiops Zetterstedt, 1838: 274.
Capsus intermedius R.F. Sahlberg, 1848: 116 (syn. Reuter, 1878: 176).
Psallus aethiops flavicolor Lindberg, 1921: 50.
Psallus aethiops: Kulik, 1965: 62; Kerzhner, 1973: 91; 1988a: 845; Schwartz and Kelton, 1990: 945; Wheeler and Henry, 1992: 180; Schuh, 1995: 399; Kerzhner and Josifov, 1999: 400; Anufriev et al., 2001: 124; Kwon et al., 2001: 177; Duwal et al., 2012: 607.

Male. Body elongate oval.: Dorsum entirely black and shining. Venter black and shining. Antennal segments black except middle region of segment II dark brown. Labium entirely black. Coxae black, trochanters dark brown; all femora black except the apex of pro- and mesofemora pale; tibiae pale with dark bases and apices with rows of spots at base of black spines. Dorsum furnished with simple brown setae and with sericeous setae; head, pronotum, mesoscutum and scutellum slightly shagreened. Head: convex; labium reaching apex of metacoxae. Endosoma: Shape J-like; apex clear and wide with spinules membrane subapically above the secondary gonopore; a elongated apical processes arise at the blunt apex tapers from base to apex; secondary gonopore positioned subapically.

Host plant: *Salix* sp. (Salicaceae).

Biology: Kerzhner (1988a) documented the host plant of this species as willow and also the specimen observed in this study was collected by Yasunaga, on *Salix* sp. (Saliaceae).

Distribution: Korea, Canada, China, Europe, N. America, Russia.

Distribution in Korea: North Korea: YG (Kwon et al., 2001).

Material examined: None.

Remarks: This species was reported in Korea from northern part and was not found at southern region during the survey.

48. *Psallus* (*Apocremnus*) *ater* Josifov, 1983 (Plate 5; 25C−G; 49; Table 1)

Psallus (*Apocremnus*) *ater* Josifov, 1983: 198; 1992: 116; Schuh, 1995: 401; Kerzhner and Josifov, 1999: 401; Kwon et al., 2001: 177; Duwal et al., 2012: 608.

Male. Body elongate oval. Head, pronotum, mesoscutum and scutellum black except the posterior margin

of vertex, mesoscutum laterally pale; hemelytron black or blackish, clavus blackish red or entirely black, endocorium basally or entirely black, exocorium brownish, cuneus castaneous; and membrane blackish brown. Venter dark brown or black with pale pro- and epimeron. Antennae, segment I black, segment II dark brown or brown except the extreme base and apex, and segment III and IV pale. Labium black and shining. Coxae black; trochanters brown; metafemora reddish black or black; tibiae pale or dirty yellow with large castaneous or brown spots at base of black spines. Dorsum furnished with simple black setae and with sericeous setae; dorsum shagreened. Head: Length nearly equal to the length of antennal segment III; interocular space wide, equal to the length of segment IV; labium slightly surpassing apex of metacoxae. Endosoma: Shape J-like with blunt apex and slender elongated processes extending through apex; secondary gonopore positioned at about 1/3 from the apex. Left paramere: Body broad, anterior process short and slender and posterior process flat. Right paramere: Body elongate, with short protuberance apically.

Female. Bursa copulatrix large in size; dorsal labiate plate with series of spinules laterally and with numerous membranous folds anteriorly; sclerotized rings elongated, tapered anteriorly.

Host plant: *Crataegus* sp., *Prunus* sp. (Rosaceae) (Josifov, 1983).

Biology: Josifov (1983) documented the host plant as *Crataegus* sp., *Prunus* sp. (Rosaceae), whereas in Korea it was observed on a branch of *Quercus*, then reared in the laboratory during the late winter of 2010. The emerged nymph was given an animal diet, either lepidopteran or coleopteran larvae. It was very active undergoing rapid growth, and within a week the adult emerged and lived for more than a week. The adult was also observed feeding on decayed plant and animal matter.

Distribution: Korea, China.

Distribution in Korea: North Korea: HWB, PN, South Korea: GG, GW, JN (Kwon et al., 2001; Duwal et al., 2016).

Material examined: North Korea, HWB: 2♂ (Bakyeon, 20 km N. Gaeseong (in label: Bagjon, 20 km N Kaesong), 21−23.v.1975, M. Josifov, determined by M. Josifov). South Korea, GG: 1♂ (Gwanak Arboretum, Anyang, 6.v.2009, R.K. Duwal); 2♂ (Gunnae, Musan, Paju, 21.v.2008, on *Acer ginnala* Maxim. (Aceraceae), S. Jung); 2♂ (Mt. Taehwasan, Gwangju, 2−20.v.2008, Malaise trap, J.O. Lim); 2♂ (Mt. Yongmunsan, Yangpyeong, 24.vi.2009, light trap, R.K. Duwal and S. Jung); 9♂, 4♀ (same collection data as above except for date, 24.vi.2010). GW: 3♂ (Mt. Dutasan, Donghae, 16.v.2001, light trap). JN: 5♂, 1♀ (Mt. Bangjangsan, Jangseong, 24.vi.2010, light trap, R.K. Duwal).

49. *Psallus* (*Apocremnus*) *atratus* Josifov, 1983 (Plate 5; 26A−D; Table 1)

Psallus (*Apocremnus*) *atratus* Josifov, 1983: 197; 1992a: 116; Kerzhner, 1988b: 845; Schuh, 1995: 401; Kerzhner and Josifov, 1999: 401; Anufriev et al., 2001: 124; Kwon et al., 2001: 178; Duwal et al., 2012: 611.

Male. Body medium sized, elongated. Generally black, shiny; dorsum entirely black with dark brown exocorium; hemelytron, membrane grayish black. Venter shining black. Antennal segment I, base and apex of segment II black, and segment III and IV brown. Labium dark brown. All coxae and femora black, ventrally with shining black aggregated spots; metatibiae reddish with black spots at the base of black spines. Dorsum furnished with simple black setae and uniformly distributed sericeous setae. Head: Projecting anteriorly; labium surpassing apex of metacoxae. Endosoma: Shape more or less J-like, primary endosomal process with enlarged blunt apex, and furnished with few short secondary processes, elongated process arise from apex short, slender and tapering towards the apex; secondary gonopore followed with membranous structure ornamented with small and large spicules. Phallotheca: Simple, tapered towards the apex and finger-like apex. Left paramere: Body relatively short, anterior process elongated and slender, posterior process short and broad (more or less triangular). Right paramere: Body elongate, elongated leaf-like, and apex with finger-like process.

Host plant: *Crataegus* sp., *Pyrus ussuriensis* Maxim. var. (Rosaceae) (Josifov, 1983; Kerzhner, 1988b, respt.), *Prunus* sp.

Biology: This species was reported by Josifov (1983) on *Crataegus* sp. (Rosaceae). Likewise two individuals in this study were observed on a branch of *Prunus* sp. (Rosaceae). The branch was collected during early spring for observation when the temperature was still cold in Korea. The emerged nymphs developed to adults and lived for about 10−15 days before dying.

Distribution: Korea, Russia.

Distribution in Korea: North Korea: HWB, PB, South Korea: GG (Duwal et al., 2016; Kwon et al., 2001).

Material examined: South Korea, GG: 1♂, 1♀ (rearing branch from Yangpyeong, 20.iv.2009, *Prunus* sp. (Rosaceae), R.K. Duwal).

50. *Psallus* (*Apocremnus*) *betuleti* (Fallén, 1826) (Plate 5; 26E−G)

Cimex cruentus Müller, 1776: 108.

Phytocoris betuleti Fallén 1826: 15.

Psallus betuleti: Zaitzeva, 1968: 866; Wheeler and Henry, 1992: 185; Schwartz and Kelton, 1990: 946; Schuh, 1995: 401; Kerzhner and Josifov, 1999: 401; Anufriev et al., 2001: 125; Kwon et al., 2001: 178; Rieger, and Rabitsch, 2006: 163; Duwal et al., 2012: 612.

Male. Body elongated, nearly parallel sided. Generally dorsum shiny, reddish black; head, pronotum, mesoscutum, scutellum and black; hemelytron, clavus black, corium black tinged with red, cuneus deep red,

membrane grayish brown. Venter shining dark brown. Antennal segment I black and segment II−IV blackish brown. Labium, segment I−III shining dark brown. All coxae dark brown; all femora blackish brown tinged with red and with red apices; metatibiae reddish brown, with obscure dark spots. Dorsum furnished with simple black setae and uniformly distributed sericeous setae. Head: convex; labium, reaching apex of metacoxae. Endosoma: Shape more or less S-like, with serrated margin subapically followed by secondary gonopore, apex followed with elongated secondary process; secondary gonopore located subapically. Phallotheca: Broad and nearly parallel. Left paramere: Body large, anterior process slender and slightly curved downwards, posterior process broad, short, with thumb-like apex.

Host plant: *Betula* spp., *Alnus* spp. (Betulaceae) (Kerzhner, 1978; Henry and Wheeler, 1979), *Epilobium* spp. (Onagraceae), *Rhododendron* (Ericaceae) (Schwartz and Kelton, 1990).

Biology: This species is reported from various host plants; *Betula* spp. (Betulaceae) (Henry and Wheeler, 1979), *Alnus* spp. (Betulaceae) (Kerzhner, 1978), *Epilobium* (Onagraceae), and *Rhododendron* (Ericaceae) (Schwartz and Kelton, 1990). Also, Yasunaga collected it on *Alnus* sp. (Betulaceae).

Distribution: Korea, Canada, China, Europe, Russia.

Distribution in Korea: North Korea: YG (Kwon et al., 2001).

Material examined: None.

Remarks: This species was reported in Korea from northern part and was not found at southern region during the survey.

51. *Psallus* (*Apocremnus*) *michaili* Kerzhner and Schuh, 1995 (Plate 5; 27A−E; Table 1)

Psallus Apocremnus niger Josifov, 1992b: 113; 1992a: 116.

Psallus michaili: Kerzhner and Schuh, 1995: 4; Schuh, 1995: 409; Kerzhner and Josifov, 1999: 402; Anufriev et al., 2001; Kwon et al., 2001: 178; Duwal et al., 2012: 613.

Male. Body elongated. Generally shiny black; head, pronotum, mesoscutum and scutellum and entire hemelytron black, except membrane brown. Venter shining black. All antennal segments black. Labium shining castaneous black. All coxae and trochanters pale yellow; metafemora shining black; metatibiae dirty yellow to dark brown, with black or castaneous. Dorsum furnished with simple black setae and uniformly distributed sericeous setae. Head: convex; labium reaching apex of metacoxae. Endosoma: Shape more or less J-like, with broad membranous apex, furnished with numerous bundles of spicules, apical secondary process short and slender; secondary gonopore located medially. Phallotheca: Simple, somewhat triangular with pointed apex. Left paramere: Body small, anterior slender process uniform in position to the body, pos-

terior process triangular with thumb-like apex. Right paramere: Body elongate, leaf-like, tapering towards the apex.

Female. Bursa copulatrix large, seminal depository wide, dorsal labiate plate with a few spinules laterally, posterior portion of dorsal labiate plate with vase shaped membranous folding, sclerotized rings distinctly elongated and broad.

Host plant: *Acer ginnala* (Aceraceae), (Josifov, 1992), and Fagaceae.

Biology: Josifov (1992) documented the host plant of this species as *Acer ginnala* (Aceraceae) in North Korea, whereas in South Korea it is collected on oak trees (Fagaceae).

Distribution: Korea.

Distribution in Korea: North Korea: HWB, South Korea: GG (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, GG: 2♂, 2♀ (Panmunjom, 21.v.2008, *Quercus* sp. (Fagaceae), S. Jung).

Subgenus *Calopsallus* Yasunaga, 2000

Callopsallus Yasunaga and Vinokurov, 2000: 656.

The subgenus *Callopsallus* is introduced by Yasunaga and Vinokurov (2000) with description of a new species, *Psallus* (*Callopsallus*) *roseoguttatus* from Japan and three reported East Asian species, *P. clarus* Kerzhner, 1988, *P. tesongsanicus* Josifov, 1983, and *P. guttatus* Zheng and Li, 1900 are placed under the same subgenus due to their similarity in morphological texture and structure of endosoma.

Members of this subgenus are similar in general appearance to the subgenus *Psallus*. However, these bears specific characteristics like, head, pronotum, mesoscutum and scutellum with numerous, small, dark spots; frons with several rows of punctures laterally; pygophore with paired bundles of stiff setae; endosoma broad with very complex apex bearing clusters of spinules; bursa copulatrix with small, oval sclerotized rings, centrally with semi-sclerotized and membranous structures. For detail description, see Yasunaga and Vinokurov, 2000.

52. *Psallus* (*Calopsallus*) *clarus* Kerzhner, 1988 (Plate 5; 28A−E; 50; Table 1)

Psallus (*Psallus*) *clarus*: Kerzhner, 1988a: 61; 1988b: 845; Schuh, 1995: 403; Kerzhner and Josifov, 1999: 412; Anufriev et al., 2001: 123; Kwon et al., 2001: 182.

Psallus (*Callopsallus*) *clarus*: Yasunaga and Vinokurov, 2000: 662; Duwal et al., 2012: 615.

Male. Body medium sized, elongated. Generally pale with red speckles; head pale with brown spots; pronotum with few red or orange speckles together with brown spots; mesoscutum and scutellum with brown spots; hemelytron, clavus and corium uniformly distributed with red speckles, cuneus pale and provided with few speckles at the base, membrane pale brown. Venter white (dark specimens with dark brown thoracic region). All antennal segments pale with brown basal ring on segment I. Labium pale with dark brown apex. All coxae and trochanters white; metafemora pale with irregular large and small spots ventrally; metatibia pale with small dark brown spots at the base of black spine. Dorsum furnished with simple pale brown setae and uniformly distributed sericeous setae. Head: convex; labium reaching apex of metacoxae. Endosoma: Shape C-like, primary endosomal process broad and flat with very short apical secondary processes, attached with a spiculus membrane; secondary gonopore located subapically. Phallotheca: Simple, base broad, from middle distinctly tapers towards apex. Left paramere: Body large, anterior process elongated slender, posterior process thumb-like. Right paramere: Body elongate, leaf-like, apex with finger-like process.

Female. Bursa copulatrix large, lateral oviducts posteriorly supported by bowl shaped membranous folding, dorsal labiate plate with clusters of spinules laterally, sclerotized rings very small, more or less rounded.

Host plant: *Quercus dentata* Thunb. (Fagaceae) (Kerzhner, 1988b), *Kalopanax septemlobus* (Thunb. ex Murray) (Araliaceae) in Korea.

Biology: Kerzhner (1988a) documented the host plant of this species as *Quercus dentata* (Fagaceae). The breeding host is unknown in Korea however, they were observed on *Kalopanax septemlobus* (Thunb. ex Murray) (Araliaceae) in northern region of South Korea.

Distribution: Korea, China, Russia.

Distribution in Korea: North Korea: HWB, PN, South Korea: CB, CN, GG, JN (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, CB: 1♀ (Cheongju, 17.v.1997, I.H. Lee). CN: 2♂ (Heukam, Ipjang, Cheonan, 13.v.2006, S.W. Park). GG: 1♀ (Icheon, 21.v.2008 S. Jung); 1♀ (Palya, Jinjeop, Namyangju, 26.v.2006, J.W. Seong); 1♂ (Yangji, Onam, Namyangju, 24.v.2006, T.M. Han); 12♂, 3♀ (Sucheong, Osan, 20.v.1998, light trap, H.K. Lee); 1♂ (Osan, 24.v.2000, light trap); 1♂ (Suwon, 10−11.v.1997, light trap); 1♂, 1♀ (SNU Arboretum, Suwon, 20.v.2009, on *Kalopanax septemlobus* (Thunb. ex Murray) (Araliaceae), R.K. Duwal); 1♀ (Mt. Yongmunsan, Yangpyeong, 24.vi.2010, light trap, R.K. Duwal and S. Jung). JN: 57♀ (Mt. Bangjangsan, Jangseong, 24.vi.2010, light trap, R.K. Duwal). SO: 1♀ (Shilim, Gwanak, Seoul, 9.v.2006, light trap, J.W. Seong).

53. *Psallus* (*Calopsallus*) *injensis* Duwal, 2015 (Plate 5; 35A−C; 36H; Table 1)

Psallus (*Callopsallus*) *injensis* Duwal, 2015: 588.

Male. Body elongate. Dorsum entirely pale yellow with variously distributed irregular orange (or orange-red) speckles. Head with scattered orange speckles and brown spots, and transverse brown stripes on head discontinuous at the center forming a pale longitudinal median line; tylus pale with yellowish-brown or reddish lateral margins; antennal segments pale except the sub-basal region of segment I with brown ring and a pair of small brown spots at bases of brown spine; labium entirely pale yellow with brown apex on segment IV. Pronotum pale with scattered orange speckles and brown spots, mesoscutum and scutellum with dense orange-red speckles except at the corners. Hemelytron pale, clavus arranged with sparse orange speckles; endocorium and exocorium with dense orange speckles, cuneus orange-yellow with base and outer margin white and inner margin with discontinuous red colored patches; membrane pale grayish and dull with dark spots at inner and outer margin of cells near the apical region of cuneus. Venter, grayish brown with pale yellow lateral margin of abdominal segments, ostiolar peritreme pale. All legs pale (or somewhat pale brownish), coxae pale with somewhat darker base, trochanters pale, metafemora with densely distributed irregular brown spots arranged in rows towards the base and extreme apex without any spots; tibiae pale with rows of small brown spots at bases of dark brown spines. Abdomen pale yellow. Dorsum furnished with simple dark brown semi-erect setae and moderately flattened sericeous appressed setae; head, pronotum, mesoscutum and scutellum polished. Antennal segment I half the length of tarsus, segment II subequal to basal width of the pronotum, segment III subequal to the width of head across eyes, and segment IV subequal to the width of vertex; interocular space wide; labium reaching apex of metacoxae. Thorax more or less trapezoid with postero-lateral margins semicurved. Hemelytron sub-parallel, somewhat fattened at the level of apex of scutellum and cuneal fracture distinct. Endosoma C-shaped; apex broad and complex with numerous spinules, outer margin of apical process with a tooth-like spine, a curved finger-like process facing towards the apex; and secondary gonopore placed subapically between apical and sub-apical processes. Left paramere body short, anterior process slender and elongated, posterior thumb-like process short and elongated. Phallotheca broad, tapered at sub-apical region with blunt apex.

Host plant: Unknown.

Biology: As a single male specimen was collected at a light trap, biology or host association is unknown.

Distribution: Korea.

Distribution in Korea: South Korea: GW (Duwal and Lee, 2015).

Material examined: South Korea, GW: 1♂ (Yongdae Natural Recreation Center, Mt. Maebongsan, Yongdae, Buk, Inje, on light trap, 19.vi.2013, R.K. Duwal).

Remarks: This species is placed in the subgenus *Calopsallus*, based upon the overall appearance of its endosoma being similar to those of congeners, like broad, complex apex bearing dense spinulus structures. This species can be easily separated from other members by pattern of spots on metafemora. Male genital structure, endosoma is very similar to *P. roseoguttatus* but could be differentiated due to dentate spine of endosoma on outer lateral margin of apical process and upturned curved subapical process.

54. *Psallus* (*Calopsallus*) *rogeoguttatus* Yasunaga and Vinokurov, 2000 (Plate 5; 27F−I; Table 1)

Psallus (*Calopsallus*) *roseoguttatus* Yasunaga and Vinokurov, 2000: 662; Yasunaga, 2001b: 172; Duwal et al., 2012: 617.

Male. Body medium sized, elongated oval. Generally pale with widely distributed red (or orange) spots,; head and pronotum with mixed pale brown patches and brown spots, mesoscutum and scutellum with red spots, hemelytron, clavus, corium and cuneus with red spots, membrane pale brown or brown. Venter white or orange with numerous red spots. Antennal segments pale except extreme basal ring on segment I. Labium pale with dark brown apex. All coxae and trochanters pale; metafemora pale, ventrally distributed with small and large brown spots, and dorsally with few apical spots; tibiae pale, with small brown spots. Dorsum furnished with simple brown setae and uniformly distributed sericeous setae. Head: convex; labium reaching apex of metacoxae. Endosoma: Shape more or less C-like, primary endosomal process apically broad and furnished with several rows of spicules, apical secondary process somewhat curved and with spicules at base; secondary gonopore located subapically beneath secondary apical process. Phallotheca: Simple, broad basally and subapically tapers. Left paramere: Body small, anterior process slender and somewhat curved, posterior process thumb-like.

Female. Bursa copulatrix large, anterior portion of dorsal labiate plates wide and furnished with spinules nearby margin, lateral oviducts positioned within roughly in heart shaped membranous fold supported by an additional leaf-like membranous folding baso-laterally, sclerotized rings comparatively small, and oval.

Host plant: *Quercus serrata* (Fagaceae) (Yasunaga and Vinokurov, 2000).

Biology: *Psallus roseoguttatus* is very closely similar to *P. clarus* but in careful observation, they can be discriminate by arrangements of brown spots on dorsum and spots on femora.

Yasunaga and Vinokurov (2000) confirmed the breeding host as *Quercus serrata* (Fagaceae), but in Korea hosts are unknown as all specimens were collected at light.

Distribution: Korea, Japan.

Distribution in Korea: South Korea: GW (Duwal et al., 2016).

Material examined: South Korea, GW: 2♀ (Mt. Dutasan, Donghae, 16.v.2001, light trap).

55. *Psallus* (*Calopsallus*) *tesongsanicus* Josifov, 1983 (Plate 6; 28F−J; Table 1)

Psallus (*Psallus*) *tesongsanicus* Josifov, 1983: 207; 1992a: 116; Schuh, 1995: 416; Kerzhner and Josifov, 1999: 418; Kwon et al., 2001: 183.

Psallus (*Callopsallus*) *tesongsanicus*: Yasunaga and Vinokurov, 2000: 662; Duwal et al., 2012.

Male. Body elongated. Generally pale or orange yellow with red speckles; head with both brown spots and red speckles; pronotum with uniformly distributed red speckles and brown spots only on anterior pronotum; mesoscutum only with red speckles and scutellum only with red speckles (sometimes with few brown spots); hemelytron, clavus, corium, and cuneus pale (or tinged with orange color) and distributed with speckles; and membrane pale brown. Venter pale with densely distributed red spots. Antennae entirely pale. Labium yellowish, segment III and IV brown. All coxae and trochanters white; metafemora pale with dense irregularly scattered spots; hind-tibia pale, with small dark brown spots at the base of black spine. Dorsum furnished with simple pale brown setae and uniformly distributed sericeous setae. Head: convex; labium reaching apex of metacoxae. Endosoma: Shape C-like, primary endosomal process broad and apically with numerous membranous structures furnished with spicules; secondary gonopore located subapically. Phallotheca: Simple, margin not uniform and apically tapered. Left paramere: Body large, anterior and posterior process slender. Right paramere: Body elongate, lateral margins not uniform and apically developed protuberance.

Female. Bursa copulatrix large, dorsal labiate plate invaginate at middle and furnished with a few spinules laterally, sclerotized rings ovate but posterior margin straight; lateral oviduct supported by membranous folding arising from the dorsal labiate plate.

Host plant: *Quercus dentata* Thunb. (Fagaceae) (Josifov, 1983).

Biology: Josifov (1983) reported this species on *Quercus dentata* (Fagaceae) in North Korea.

Distribution: Korea.

Distribution in Korea: North Korea: HWB, PN, South Korea: GG (Kwon et al., 2001; Duwal et al., 2016).

Material examined: North Korea: PN: 2♂ (Mt. Yongaksan, Pyeongyang (in label: Bei Phiongjang, Rjonggang, Mt. Rjongak), 31.v.1987, M. Josifov, determined by M. Josifov). South Korea, GG: 1♀ (Mt. Yongmunsan, Yangpyeong, 11.iv.2009, light trap, R.K. Duwal and S. Jung).

Subgenus *Hylopsallus* Wagner, 1952

Hylopsallus Wagner, 1952b: 173, 176.

The subgenus *Hyalopsallus* is a Holarctic group consists of fifteen documented species (Kerzhner and Josifov, 1999; Yasunaga and Vinokurov, 2000; Duwal et al., 2012).

Members of this subgenus are usually with dark body color, pale antennae and dark base on segment I,

endosoma C-shaped, short and widened with cluster of spinules at the base of apical process. For detail description see Wagner (1952).

56. *Psallus* (*Hylopsallus*) *suwonanus* Duwal et al., 2012 (Plate 6; 29F−I; Table 1)

Psallus (*H.*) *suwonanus* Duwal et al., 2012: 620.

Male. Body elongate oval. Head, pronotum, mesoscutum and scutellum black; hemelytron black or blackish red, endocorium black or dark brown, exocorium castaneous or deep red, cuneus castaneous or deep red; membrane brown, with gray apical margin. Venter, thoracic region black, abdomen black or dark brown except last abdominal segment castaneous. Antennal segments pale except the extreme base of segment I dark. Labium, segment I, basal half of segment II, apical half of segment IV blackish brown, remaining parts pale. Coxae black, trochanters castaneous; metafemora at basal 1/3 or 1/2 black, larger apical part red with rows of large black spots; tibiae pale with rows of large castaneous spots at base of black spines. Dorsum furnished with simple black setae and with sericeous setae; head, pronotum, mesoscutum and scutellum slightly shagreened. Head: Length short comparative to body size; interocular space wide; labium slightly surpassing or reaching apex of mesocoxae. Endosoma: shape C-like; a few long and short secondary processes; elongated processes extending through apex, furnished with a bunch of spinules; secondary gonopore positioned at about 1/4 from the apex. Left paramere: Body short, anterior process more or less angulated, posterior process short and flat. Right paramere: Body elongate, tapered from base to apex, apex with short finger-like process.

Female. Not significantly different from male in color and vestiture. Bursa copulatrix of moderate size, dorsal labiate plate furnished with spinules laterally; sclerotized rings large, somewhat irregular; folded membranes arise from anterior and posterior portions of dorsal labiate plate supporting lateral oviducts.

Host plant: *Rhamnus davurica* Pallas (Rhamnaceae).

Biology: The primary host plant is *Rhamnus davurica* Pallas (Rhamnaceae), a few individuals were also collected from *Pyrus ussuriensis* var. (Rosaceae) which was planted next to *Rhamnus*. These are emerged from the middle to the end of May. The tree was seriously damaged but as they were collected together with large number of plant hoppers whose secretion made the tree very sticky, it is difficult to assume whether this species is a predator or a pest.

Distribution: Korea.

Distribution in Korea: South Korea: GG (Duwal et al., 2016).

Material examined: South Korea, GG: 14♂, 30♀ (SNU Arboretum, Suwon, 20.v.2009, on *Rhamnus davurica* Pallas (Rhamnaceae, R.K. Duwal); 1♀ (same data, *Pyrus ussuriensis* (Rosaceae), R.K. Duwal).

57. *Psallus* (*Hylopsallus*) *taehwana* Duwal, 2015 (Plate 6; 36A−D, F, I; Table 1)

Psallus (*Hylopsallus*) *taehwana* Duwal, 2015: 590.

Male. Body small and oval. Head black except for posterior margin of vertex pale; antennal segment I dark brown or grayish with pale extreme apex, segment II and III entirely pale yellow and segment IV slightly darker; labium brown with darker apex. Pronotum black except for dark brown or blackish brown mesoscutum and scutellum. Hemelytron dark brown or entirely black with lateral margin of exo-corium red and cuneus castaneous black (in dark brown or blackish specimens) or brown tinged with red (in brown specimens), with pale base and apex, membrane grayish brown with pale and brown pattern at base and pale spot near apex of cuneus. Venter, blackish brown or black, ostiolar peritreme anteriorly grayish and posteriorly pale. All legs darker, coxae dark brown or black with pale extreme apices; metafemora blackish brown or brown with black irregular spots sub-apically arranged in two rows towards base; tibiae pale (sometimes tinged with red in brown specimens) with large dark brown or brown spots at base of black spines; tarsus pale with dark apex. Abdomen dark brown or blackish in color. Head, pronotum, mesoscutum and scutellum dull (or shagreened), with uniformly distributed pale simple reclining setae and moderately flattened sericeous appressed setae; hemelytron comparatively polished with uniformly distributed black semi-erect setae, reclining pale setae and appressed sericeous setae. Head width across eyes sub-equal to mesal length of pronotum, length of antennal segment II equal to combined length of segments III and IV and/or half the length of metatibiae; antennal segment II thick relative to other segments; interocular space wide; labium reaching apex of metacoxae. Thorax trapezoid, with distinctly curved postero-lateral margin and sinuate posterior margin. Abdomen small and triangular. Endosoma J-shaped, with broad apex furnished with several short or long lateral processes, and a bunch of spinules at base of apical process; and secondary gonopore nearly mesal in position. Left paramere body short, anterior process slender and elongated, and posterior process short and blunt. Right paramere simple leaf-like with sub-apical short apical protuberance. Phallotheca narrow, apex with hook-like sub-apical process.

Female. Similar to color and texture as males, only having slightly larger body width. Sclerotized rings oval, anteriorly tapering to form a pointed structure, and posteriorly broad and rounded.

Host plant: *Morus* sp. (Moraceae) (Duwal and Lee, 2015).

Biology: Type specimens of *Psallus taehwana* was collected on light trap, but several paratypes were observed on *Morus* sp. (Moraceae) which is confirmed as a host plant for this species as several nymphs and teneral specimens aggregated on it.

Distribution: Korea.

Distribution in Korea: South Korea: GG (Duwal and Lee, 2015).

Material examined: South Korea, GG: 2♂, 2♀ (Seoul National University Experimental Forest, Mt.

Taehwasan, Sanglim, Docheok, Gwangju, on light trap, 15−17.vi.2013, R.K. Duwal); 6♂, 6♀ (Mt. Cheonmasan, Hwado, Namyangju, on *Morus* sp., 9.v.2014, R.K. Duwal).

Remarks: This species is placed in the subgenus *Hylopsallus*, based upon the overall appearance of its endosoma being similar to those of congener's, like having short and stout lateral processes and spinulus on membrane either at base or middle of the apical process. This species is morphologically close to *Psallus tonnaichanus* in color and vestiture but can be easily separated from *P. tonnaichanus* by the largely fuscous antennal segment II, absence of tuft of stiff setae on either side of genital segment and different structures of apical processes of endosoma.

58. *Psallus* (*Hylopsallus*) *tonnaichanus* Muramoto, 1973 (Plate 6; 29A−E; Table 1)

Psallus tonnaichanus Muramoto, 1973: 2897.
Psallus (*Phylidea*) *dryos* Kerzhner 1979: 47.
Psallus tonnaichanus dolerus Kerzhner 1988a: 74.
Psallus tonnaichanus dolerus Josifov, 1992b: 117.
Psallus (*Hylopsallus*) *tonnaichanus* Yasunaga and Vinokurov, 2000: 656; Yasunaga, 2001b; Anufriev et al., 2001: 125; Kwon et al., 2001: 179; Duwal et al., 2012: 622.

Male. Body small, oval. Generally black tinged with red (but some specimens were found reddish); head, pronotum, mesoscutum and scutellum black, or brown or dark brown; hemelytron, clavus dark brown or brown, endocorium dark brown or brown, exocorium reddish brown or deep red, membrane brown. Venter dark brown or black. Antennal segments pale except extreme base of segment I dark. Labium, segment I, base of segment II, apices of segment III and IV shining dark brown. All coxae and trochanters black; metafemora dark brown or black with pale apices, and two rows of aggregated shining black, small spots ventrally; metatibiae pale, with large dark brown spots at the base of black spines. Dorsum furnished with simple brown setae and with uniformly distributed sericeous setae. Head: Convex; labium exceeding apex of metacoxae. Abdomen: Pygophore with a pair of tuft stiff hairs at either lateral side. Endosoma: Shape J-like, primary endosomal process flat and broad; elongated, short secondary process extended apically, the base of secondary process with a bunch of spicules; secondary gonopore located somewhat medially. Phallotheca: Simple, angulated subapically, apex triangular. Left paramere: Body small, anterior elongated process curved, posterior thumb-like broad process curved upward. Right paramere: Body elongate, leaf-like with pointed apex.

Female. Bursa copulatrix of moderate size, dorsal labiate plate somewhat sclerotized, membranous folding centrally located between sclerotized rings, sclerotized rings broad and elongate, somewhat oval elongate.

Host plant: *Quercus* spp. (Fagaceae) (Kerzhner, 1988a; Yasunaga and Vinokurov, 2000).

Biology: Kerzhner (1988a) reported this species on *Quercus* sp. (Fagaceae), which was confirmed as a breeding host by Yasunaga and Vinokurov (2000). However, the later author also observed it on flowers of *Hydrangea* sp. (Hydrangeaceae), *Syringa reticulate* (Blume) (Oleaceae).

Distribution: Korea, China, Japan, Russia.

Distribution in Korea: North Korea: HWB, HWN, PN, South Korea: GG, GW, JJ (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, GG: 1♂ (Mt. Yongmunsan, Yangpyeong, 11.vi.2009, light trap, R.K. Duwal and S. Jung); 2♀ (same data except for host, *Quercus* sp. (Fagaceae); 5♀ (same data except for date, 24.vi.2009); 1♂ (Mt. Taehwasan, Yongin, 2−20.vi.2008, Malaise trap, J.O. Lim). GW: 1♂ (Hongcheon, 26.vi.2003, J.W. Seong). JJ: 4♂ (Ungto-fall, Jeju, 12−15.v.2008, T. Yasunaga, R.K. Duwal and S. Jung).

Subgenus *Mesopsallus* Wagner, 1970

Mesopsallus Wagner, 1970: 302.

The subgenus *Mesopsallus* comprises four species (Kerzhner and Josifov, 1999; Rizzotti, 2000), of which two species, *P. samdzijonicus* and *P. holomelas* are reported in East Asia.

Members of this genus are comparatively large elongated sized, with simple and slender endosoma (different than *Psallus* type). For detail description see Wagner, 1970.

59. *Psallus* (*Mesopsallus*) *samdzijonicus* Josifov, 1983 (Plate 6; 30F)

Psallus (*Mesopsallus*) *samdzijonicus* Josifov, 1983: 200; 1992a: 116; Schuh, 1995: 415; Kerzhner and Josifov, 1999: 405; Kwon et al., 2001; Duwal et al., 2012: 623.

Male. Body large, elongated, laterally nearly parallel. Generally black; head black except vertex and inner margins of eyes pale; pronotum, mesoscutum and scutellum black; hemelytron black or dark brownish black, membrane dark brown. Venter blackish brown. Antennal segment I and II black, and segment III and IV pale. Labium dark brown. All coxae blackish brown with pale apices; all femora blackish brown with shining brown spots; metatibiae dark brown with brown spines. Dorsum furnished with simple pale brown setae and uniformly distributed sericeous setae. Head: Projecting anteriorly; reaching apex of metacoxae. Endosoma: Shape more or less S-like, simple and slender apex; secondary gonopore located subapically. Phallotheca: Simple, basally broad, and tapers towards apex. Left paramere: Body large, both processes

slender and slightly curved. Right paramere: Body short, not uniform, apex with finger-like protuberance.

Female. Similar in shape and texture as male except antennal segment II−IV pale. Bursa copulatrix of moderate size, seminal depository wide, centrally occupied by wide folding of membrane, sclerotized rings elongate oval, anterior apex extending like a protuberance reaching lateral spinules.

Host plant: *Sorbus amurensis* Koehne (Rosaceae) (Josifov, 1983).

Biology: Josifov (1983) reported this species on *Sorbus amurensis* (Rosaceae) in North Korea.

Distribution: Korea.

Distribution in Korea: North Korea: YG (Kwon et al., 2001).

Material examined: North Korea: YG: 1♂, 1♀ (Samjiyeon (in label: Jongkang-do, Samdzijon), 13−19. vii.1974, on *Sorbus amurensis* Koehne (Rosaceae), M. Josifov, determined by M. Josifov).

Subgenus *Phylidea* Reuter, 1899

Phylidea Reuter, 1899: 149 (as genus; downgraded by Seidenstücker, 1962: 130).

Subgenus *Phylidea* is widely distributed in Holarctic region and comprises of about twenty nine described species (Kerzhner and Josifov, 1999; Yasunaga and Josifov, 2000; and Duwal et al., 2012).

Members of this subgenus are defined by variously colored body (bright or dark), smooth or speckled dorsum, broad and short endosoma with series of spinules located subapically or apically. For detail description see Seidenstücker, 1962.

60. *Psallus* (*Phylidea*) *castaneae* Josifov, 1983 (Plate 6; 30A−E; 51; Table 1)

Psallus (*Phylidea*) *castaneae* Josifov, 1983: 202; 1992a: 116; Schuh, 1995: 402; Kerzhner and Josifov, 1999: 405; Yasunaga and Vinokurov, 2000: 656; Yasunaga, 2001a: 173; Kwon et al., 2001: 180; Duwal et al., 2012: 624.

Male. Body small, oval. Generally dark brown to black body; head, pronotum, mesoscutum and scutellum black; hemelytron, clavus and endocorium black, exocorium castaneous black, membrane black. Venter shining black. Antennal segments pale except base of segment I dark. Labium, segment I, basal half of segment II, and apex of segment IV dark. All coxae shining black; trochanters dark brown; all femora black except the apex of fore femora pale, the metafemora with shining black aggregated spots on basal half; metatibia pale with reddish base, and large castaneous spots at the base of black spine. Dorsum furnished

with simple pale brown setae and uniformly distributed sericeous setae. Head: convex; reaching apex of metacoxae. Endosoma: Shape C-like, primary endosomal process with a few long and short secondary processes, apex of primary process extended to apical process, a membranous extension subapically with numerous spicules; secondary gonopore located subapically. Phallotheca: Simple, angulated, apex triangular. Left paramere: Body large, anterior process slender and elongated, posterior process short and blunt. Right paramere: Body elongate, margins not uniform, and leaf-like.

Female. Bursa copulatrix moderate size, membranous fold of dorsal labiate plate protrude medially as an inverted U-shaped curve, with central membranous folding wide, extended from anterior to posterior portion of dorsal labiate plate, sclerotized ring elongate, with narrow width.

Host plant: *Castanea* sp. (Fagaceae) (Josifov, 1983), *Quercus serrata* (Yasunaga and Vinokurov, 2000).

Biology: This species is associated with the fagaceous plants, *Castanea* (Josifov, 1983) and *Quercus serrata* (Yasunaga and Vinokurov, 2000). However, the host is unknown in Korea as most of the specimens were collected in light.

Distribution: Korea, China, Japan.

Distribution in Korea: North Korea: PN, South Korea: CN, GG, GN, GW, JN (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, CN: 1♂ (Okgye, Deoksan, Yesan, 4.vi.2007, light trap, J.W. Seong). GG: 1♀ (Gwanak Arboretum, Anyang, 1.vi.2006, light trap, J.W. Seong); 1♂ (NAAS, Suwon, 5−8.vi.1997, light trap); 2♂ (SNU Arboretum, Suwon, 20.v.2009, R.K. Duwal); 1♀ (Suwon, 25.vi.2009, light trap, R.K. Duwal and S. Jung); 1♂, 2♀ (Mt. Yongmunsan, Yangpyeong, 11.vi.2009, light trap, R.K. Duwal and S. Jung); 2♂, 3♀ (same data except for date, 24.vi.2009). GN: 2♀ (Sicheon, Sancheong, 5−6.vi.1997, S.B. Ann). GW: 2♂, 5♀ (Mt. Dutasan, Donghae, 16.v.2001, light trap); 1♂ (Munmak, Wonju, 1.vi.2009, R.K. Duwal and S. Jung). JN: 2♂ (Mt. Chusan, Gwangyang, 16−19.vi.2008, R.K. Duwal and S. Jung); 1♀ (Mt. Jogyesan, Seungju, Suncheon, 24.vi.1997, S.B. Ann); 20♂, 21♀ (Mt. Bangjangsan, Jangseong, 24.vi.2010, light trap, R.K. Duwal).

61. *Psallus* (*Phylidea*) *cinnabarinus* Kerzhner, 1979 (Plate 6; 31A−E; Table 1)

Psallus (*Phylidea*) *cinnabarinus* Kerzhner, 1979: 44; Kerzhner, 1988b: 847; Schuh, 1995: 403; Kerzhner and Josifov, 1999: 405; Yasunaga and Vinokurov, 2000: 656; Yasunaga, 2001a: 174; Anufriev et al., 2001: 126; Duwal et al., 2012: 627.

Male. Body small, oval. Generally deep shining red; head reddish brown; pronotum reddish black; mesoscutum and scutellum deep red or somewhat tinged black; hemelytron, clavus, corium and cuneus deep

red, membrane dark brown. Venter deep red. All antennal segments pale. Labium pale yellow with brown apex. All coxae and trochanters pale; fore- and meso femora orange yellow or pale, metafemora reddish, with few large spots on anterior and posterior margin ventrally; tibiae pale with castaneous spots at the base of black spines. Dorsum furnished with simple pale brown setae and uniformly distributed sericeous setae. Head: convex; labium reaching apex of metacoxae. Endosoma: Shape more or less J-like, primary endosomal process with broad apex and widely serrated apical margin reaches base of apical process; secondary gonopore wide and subapical. Phallotheca: Simple, broad base attenuated towards apex. Left paramere: Body small, anterior process short, apex looks like broken. Right paramere: Body elongate, leaf-like.

Female. Bursa copulatrix large, with wide seminal depository, membranous folding divided into two halves medially at dorsal labiate plate, and furnished with scattered spinules laterally, sclerotized ring small oval with pointed anteriorly.

Host plant: *Ulmus propinqua*, *U. japonica* (Ulmaceae) (Kerzhner, 1978; Yasunaga and Vinokurov, 2000).

Biology: Associated with the elm trees (Ulmaceae), *Ulmus propinqua* (Kerzhner, 1978) and *U. japonica* (Yasunaga and Vinokurov, 2000). However, in Korea the host is unknown as all individuals were collected in light.

Distribution: Korea, Japan, Russia.

Distribution in Korea: South Korea: GG, GW (Duwal et al., 2016).

Material examined: South Korea, GG: 1♂ (Mt. Yumyeongsan, Gapyeong, 14.vi.1997, J.B. Ann); 3♂ (Mt. Yongmunsan, Yangpyeong, 11.v.2009, light trap, R.K. Duwal and S. Jung). GW: 2♂ (Hongcheon, 25−26. vi.2003, light trap, J.W. Seong).

62. *Psallus* (*Phylidea*) *flavescens* Kerzhner, 1988 (Plate 6; 31F−I; Table 1)

Psallus (*Phylidea*) *flavescens*: Kerzhner, 1988a: 60; 1988b: 847; Schuh, 1995: 405; Kerzhner and Josifov, 1999: 406; Yasunaga and Vinokurov, 2000: 656; Yasunaga, 2001a: 174; Anufriev et al., 2001: 126; Duwal et al., 2012: 627.

Male. Body medium sized, elongated oval. Generally shining orange color; dorsum completely orange tinged with brown on head and pronotum, and exocorium and base and apex of cuneus pale. Venter pale yellow. All antennal segments pale except the extreme base brown. Labium pale with segment I, base of segment II and apex brown. All coxae and trochanters pale; all femora pale yellow, metafemora with two rows of dark brown spots that scattered irregularly subapically; metatibiae pale, with brown spots. Dorsum furnished with simple pale setae and uniformly distributed sericeous setae. Head: convex; labium reaching apex of metacoxae. Endosoma: Shape more or less C-like, primary endosomal with wide apex, base of the

apex with sclerotized secondary process and membranous process; secondary gonopore located apically. Phallotheca: Simple, more than basal half broad and tapered towards apex. Left paramere: Body large, anterior process elongated.

Female. Bursa copulatrix of moderate size, seminal depositories wide, membranous folding furnished with dense spinules laterally on dorsal labiate plate, sclerotized rings small, oval but base somewhat straight and wide, and apex pointed.

Host plant: *Tilia japonica* (Tiliaceae) (Yasunaga and Vinokurov, 2000).

Biology: In the Korean Peninsula the host plant is unknown, as all specimens were collected in light.

Distribution: Korea, China, Japan, Russia.

Distribution in Korea: South Korea: GW (Duwal et al., 2016).

Material examined: South Korea, GW: 2♂, 4♀ (Hongcheon, 25−26.vi.2003, light trap, J.W. Seong and S. Jung).

63. *Psallus* (*Phylidea*) *ernesti* Duwal et al., 2012 (Plate 6; 30G−K; Table 1)

Psallus (*Ph.*) *ernesti* Duwal et al., 2012: 627.

Male. Body small, oval. Generally reddish to reddish black, shiny; head, pronotum, mesoscutum and scutellum black; hemelytron, clavus black or base and apex black, corium blackish or castaneous black, membrane black. Venter unicolorously black. Antennal segment I pale with reddish tinged and extreme base dark, segment II pale, and segment III and IV brown. Labium, segment I−III castaneous, and segment IV pale except extreme base. All coxae and trochanters castaneous; hind femora black, with reddish apex, aggregation of black spots at the anterior margin ventrally; hind tibia pale, with castaneous spots at the base of black spines. Dorsum furnished with simple black setae and uniformly distributed sericeous setae. Head: Projecting anteriorly; labium short, reaching apex of mesocoxae. Endosoma: Shape more or less S-like, primary endosomal process with a few long and short secondary processes, elongated process extended across secondary gonopore slightly curved inward; secondary gonopore located subapically beneath a row of spinules. Phallotheca: Simple, not angulated, apex pointed. Left paramere: Body relatively short, anterior process short, posterior process short, apex blunt and hanging on shoulder at base. Right paramere: Body elongate, more or less parallel sided, apex with finger-like process.

Female. Not significantly different from male in color and vestiture, only the abdomen slightly wider. Bursa copulatrix comparatively small, dorsal labiate plate furnished with spinules laterally; sclerotized rings small, ovate with somewhat narrow apex; the membranous folding on posterior of dorsal labiate plate supporting lateral oviducts at centre.

Host plant: Unknown.

Biology: The host plant is unknown for this species.

Distribution: Korea.

Distribution in Korea: North Korea: HWB, PN (Duwal et al., 2012).

Material examined: North Korea, HWB: 1♂ (Bakyeon, 20 km N. Gaeseong (in label: Bagjon, 20 km N Kaesong), 29.v.1987, M. Josifov, determined by M. Josifov). PN: 1♂ (Mt. Daeseongsan, Pyeongyang (in label: Bei Phjongjan, Mt. Tesong), 7.vi.1987, M. Josifov); 1♂ (same data except for date, 29.v.1975, M. Josifov); 2♀ (same data except date, 1.vi.1987, M. Josifov); 2♂ (same data except date, 7.vi.1987, M. Josifov); 2♀ (Mt. Yongaksan, Pyeongyang (in label: Phjongjang, Rjonggang, Mt. Rjongak), 31.v.1987, M. Josifov).

64. *Psallus* (*Phylidea*) *kerzhneri* Josifov, 1992 (Plate 7; 32A)

Psallus (*Phylidea*) *kerzhneri*: Josifov, 1992b: 115; 1992a: 116; Schuh, 1995: 408; Kerzhner and Josifov, 1999: 406; Kwon et al., 2001: 180; Duwal et al., 2012: 628.

Male. Body medium sized, elongated oval. Generally shining reddish black body; head black with pale vertex; pronotum, mesoscutum and scutellum black, somewhat tinged with red; hemelytron, wide basal part of clavus black, base of corium red, remaining parts black, cuneus castaneous; membrane black. Venter shining, dark brown tinged with red. All antennal segments pale except extreme base of segment I dark brown. Labium reddish brown with dark apices of segment I and IV, and base of segment II dark. All coxae shining dark brown and tinged with red; trochanters pale (sometimes tinged with red); all femora dark brown tinged with red except pale apex and ventrally with irregular black spots; metatibia pale with large brown spots at the base of black spine. Dorsum furnished with simple pale brown setae and with uniformly distributed sericeous setae. Head: Projecting anteriorly; labium not exceeding apex of metacoxae. Endosoma: Shape C-like, primary endosomal process with a few long and short secondary processes, apical secondary process short and curved and spinulus membrane at the apex of secondary gonopore; secondary gonopore located subapically. Phallotheca: Simple, angulated subapically, apex pointed. Left paramere: Body large, anterior process very slender. Right paramere: Body elongate, leaf-like, margin not uniform.

Female. Bursa copulatrix simple; sclerotized rings asymmetrical, large, elongated and laterally furnished with minute spinules.

Host plant: *Quercus dentata* Thunb. (Fagaceae) (Josifov, 1992).

Biology: The species is not observed in South Korea, so biology is unknown.

Distribution: Korea.

Distribution in Korea: North Korea: HWB, PN (Kwon et al., 2001).

Material examined: North Korea, HWB: 2♀ (Bakyeon, 20 km N. Gaeseong (in label: Bagjon, 20 km N Kaesong), 29.v.1987, M. Josifov, determined by M. Josifov).

65. *Psallus* (*Phylidea*) *loginovae* Kerzhner, 1988 (Plate 7; 32F−J; Table 1)

Psallus (*Phylidea*) *loginovae* Kerzhner, 1988a: 59; 1988b: 847; Schuh, 1995: 408; Kerzhner and Josifov, 1999: 406; Anufriev et al., 2001: 125; Duwal et al., 2012: 628.

Male. Body small, elongated oval. Generally reddish or brownish black (teneral ones entirely pale brown); head black with posterior margin of vertex pale; pronotum entirely black; mesoscutum black except lateral margins pale; scutellum black or brown or reddish brown; hemelytron, clavus dark brown or brown, base of endocorium brown and towards the posterior black or dark, exocorium castaneous, cuneus deep red tinged with black, membrane black. Venter dark brown, or black, or reddish brown. All antennal segments pale with dark base. Labium reddish brown, segment I, base of segment II and apex of segment IV dark. All coxae and trochanters black or dark brown; metafemora black with pale apices and tinged with red; metatibia pale, with castaneous or dark brown spots at the base of black spine. Dorsum furnished with simple pale brown setae and uniformly distributed sericeous setae. Head: convex; labium exceeding apex of metacoxae. Endosoma: Shape more or less J-like, primary endosomal process tapers subapically and continued with secondary apical process, and with a long and short processes; secondary gonopore located medially. Phallotheca: Simple, angulated, nearly triangular. Left paramere: anterior process slender and curved, posterior process leaf-like. Right paramere: Body elongate, margins not uniform, apex extend as protuberance.

Female. Bursa copulatrix moderate sized, dorsal labiate plate furnished with few scattered spinules, sclerotized rings are strongly asymmetrical.

Host plant: *Acer ginnala* Maxim. (Aceraceae).

Biology: Kerzhner (1988a) documented the host plant of this species as *Acer ginnala* (Aceraceae), which is confirmed as breeding host in this study, as large numbers of nymphs were observed together. These species appears at the end of May to early June in Korea. When collecting, we found that it was associated with a large number of plant hoppers, whose secretions made the tree completely sticky.

Distribution: Korea, Russia.

Distribution in Korea: South Korea: CB, GG, GW (Duwal et al., 2016).

Material examined: South Korea, CB: 18♂, 17♀ (Mt. Sobaeksan, Danyang, 25−26.v.2009, *Acer* sp. (Aceraceae), R.K. Duwal and S. Jung). GG: 3♂, 5♀ (Panmunjom, 20.v.2008, S. Jung). GW: 1♂ (Munmak, Wonju, 1.vi.2009, on *Acer ginnala* Maxim. (Aceraceae), R.K. Duwal and S. Jung).

66. *Psallus* (*Phylidea*) *ulmi* Kerzhner and Josifov, 1966 (Plate 7)

Psallus (*Phylidea*) *ulmi*: Kerzhner and Josifov, 1966: 627; Kerzhner, 1988b: 847; Schuh, 1995: 416; Kerzhner and Josifov, 1999: 408; Yasunaga and Vinokurov, 2000: 657; Yasunaga, 2001a; Anufriev et al., 2001: 126; Kwon et al., 2001: 180; Duwal et al., 2012: 628.

Male. Body small, elongated oval. General coloration deep red, red or brown; head reddish or brownish with pale vertex; pronotum deep red or brown with black calli, mesoscutum and scutellum red or brown; hemelytron uniformly red (in red specimens), or base brown and darker towards the apex (in brown specimens), cuneus deep red with pale base, membrane brown. Venter resembles the dorsum color. All antennal segments pale with dark ring on the base of segment I and segment IV tinged with red. Metafemora resemble the body color, with pale apex; metatibia pale with small red spots. Dorsum furnished with simple pale brown setae and uniformly distributed sericeous setae. Head: convex; labium, reaching apex of metacoxae. Endosoma: Shape C-like, primary endosomal process with blunt apex; secondary gonopore apically positioned. Left paramere: Body small and simple, posterior process nearly triangular. Right paramere: Body elongate, more or less parallel, apex with finger-like protuberance.

Host plant: *Ulmus pumila* L., *U. japonica* Rehder (Ulmaceae) (Kerzhner and Josifov, 1966; Yasunaga and Vinokurov, 2000 respt.).

Biology: This species is associated with elm (Ulmaceae) (Yasunaga and Vinokurov, 2000) but in South Korea, specimen collection was unavailable.

Distribution: Korea, China, Japan, Mongolia, Russia.

Distribution in Korea: North Korea: PN (Kwon et al., 2001).

Material examined: None.

Remarks: This species was reported in Korea from northern part and was not found at southern region during the survey.

67. *Psallus* (*Phylidea*) *yongdaeri* Duwal, 2015 (Plate 7; 35D−G; 36E, J; Table 1)

Psallus (*Phylidea*) *yongdaeri* Duwal, 2015: 591.

Male. Body small and oval. Head black except for grayish posterior margin of vertex; antennal segments pale with extreme base of segment I dark and furnished with a pair of brown spine-like setae, and segment IV slightly darker; labium brown with darker base. Pronotum, mesoscutum and scutellum black except for brown lateral and posterior corners of the mesoscutum and the scutellum; hemelytron blackish brown on

large posterior region (on dark brown specimen) or margin of endo- and exocorium dark brown (in black specimens), membrane dark gray. Venter black or dark brown, ostiolar peritreme black. Coxae and trochanters black; pro- and mesofemora darker with pale apices; metafemora black (in black specimens) or dark brown (in dark brown specimens) and without darker spots; tibiae pale, basal half of pro- and mesotibiae with large castaneous spots at bases of black spines and entire metatibiae with large brown spots at bases of black spines. Abdomen black or dark brown in color. Head, pronotum, mesoscutum and scutellum dull (or shagreened) with uniformly distributed pale simple reclining setae and moderately flattened sericeous appressed setae; hemelytron somewhat polished, with uniformly distributed black semi-erect setae and sericeous appressed setae. Head width across eyes sub-equal to mesal length of pronotum, vertex width sub-equal to length of tarsus; antennal segment II comparatively short and thick; interocular space wide; labium reaching apex of metacoxae. Thorax slightly convex, with semi-circular postero-lateral margin. Endosoma C-shaped with several short or long lateral processes, membranous structure at base of apical processes furnished with spinules; and secondary gonopore subapical in position. Left paramere body short, anterior process slender and elongated, and posterior process short and blunt. Right paramere simple, apically leaf-like, tapering with short outgrowth. Phallotheca narrow, with hooked sub-apical process.

Female. Similar to color and texture as males, only having slightly larger body width. Sclerotized rings somewhat broad, anteriorly oval and posteriorly un-curved or flattened margin.

Host plant: Unknown.

Biology: A few specimens were collected on unidentified Ulmaceae tree during spring flowering season in South Korea. In addition, some specimens were collected in light trap and also on *Artemisia* sp. under the tree where siblings were collected. However, we are not sure of host plant, as we were unable to observe any nymphs during the collection time.

Distribution: Korea.

Distribution in Korea: South Korea: GW (Duwal and Lee, 2015).

Material examined: South Korea, GW: 6♂, 2♀ (Yongdae Natural Recreation Center, Mt. Maebongsan, Yongdae, Buk, Inje, on Ulmaceae, 20.vi.2013, R.K. Duwal); 1♀ (same data as above, on *Artemisia* sp.); 1♂, 1♀ (same data as above, on light trap, 19.vi.2013).

Remarks: This species is placed in the subgenus *Phylidea*, based upon the overall appearance of its endosoma being similar to those of congeners, like unique serrated spinules on the lateral margin of the apical region. *Psallus yongdaeri* is morphologically close to *Psallus castaneae* in color and vestiture but can be easily separated by the distinct basal ring on antennal segment I, longer apical process of endosoma, and arrangements of lateral processes.

Subgenus *Pityopsallus* Wagner, 1952

Pityopsallus Wagner, 1952b: 173.

The subgenus *Pityopsallus* is a Holarctic group, comprises seventeen reported species (Kerzhner and Josifov, 1999; Yasunaga and Vinokurov, 2000). East Asian *Pityopsallus* was broadly revised by Vinokurov (1998) with nine species and confirmed as conifer inhabitant.

Members of this subgenus are recognized by dark dorsum, pale or brownish antennae, segment II as long as width of pronotum, labium surpassing apex of metacoxae (except in vittatus), pygophore with keel, apical process of endosoma elongated bearing teeth-like spines laterally. For detail description, see Wagner, 1952.

68. *Psallus* (*Pityopsallus*) *kimi* Josifov, 1983 (Plate 7)

Psallus (*Pityopsallus*) *lapponicus kimi* Josifov, 1983: 210; 1992a: 116.
Psallus (*Pityopsallus*) *salicicola* Schwartz and Kelton, 1990: 941.
Psallus Pityopsallus kimi: Vinokurov, 1998: 285; Schuh, 1999: 408; Kerzhner and Josifov, 1999: 409; Kwon et al., 2001: 181; Duwal et al., 2012: 629.

Male. Body medium sized, elongated, laterally parallel. Generally dorsum entirely brownish, with posterior margin of vertex, lateral margins of pronotum and mesoscutellum pale (in dark specimens), or entirely orange yellow (in pale specimens); hemelytron brown or dark, cuneus pale, membrane brown. Venter resembles dorsum color. Antennal segment I and II dirty yellow, segment III and IV darker. Labium brown with dark apex. All coxae and trochanters yellowish; metafemora yellowish or brownish, with dark brown fused spots distally; metatibia yellowish or brownish. Dorsum furnished with simple pale brown setae and uniformly distributed sericeous setae. Head: convex; labium reaching apex of metacoxae. Endosoma: Shape more or less S-like, apical secondary process with serrated margin and secondary gonopore apically positioned. Left paramere: Body broad, anterior and posterior process slender and curved. Right paramere: Body elongate, lateral margins parallel, and apically developed a protuberance.

Host plant: *Salix* spp. (Salicaceae) (Josifov, 1983).

Biology: This species is reported on *Salix* spp. (Salicaceae) by Josifov (1983) in North Korea whereas Yasunaga collected it on conifer trees around the Far East Russia.

Psallus kimi and its sister species *P. lapponicus*, are easily confused, the former had synonymised with later species. Vinokurov (1998) declared *kimi* and *lapponicus* to be distinct species based on the length of labium, in *P. lapponicus*, it reaches or surpasses middle of the abdomen while in *P. kimi* it reaches up to or slightly surpasses the metacoxae.

Distribution: Korea, Canada, Russia, N. America.

Distribution in Korea: North Korea: YG (Kwon et al., 2001).

Material examined: None.

Remarks: This species was reported in Korea from northern part and was not found at southern region during the survey. For detail information and figures, see Josifov, 1983 and Vinokurov, 1998.

69. *Psallus* (*Pityopsallus*) *luridus* Reuter, 1878 (Plate 7; 33A−D)

Psallus luridus Reuter, 1878: 133.

Psallus Pityopsallus luridus: Kerzhner, 1978: 44; 1988a: 848; Schuh, 1995: 408; Kerzhner and Josifov, 1999: 409; Anufriev et al., 2001: 127; Kwon et al., 2001: 181; Duwal et al., 2012: 629.

Male. Body medium sized, elongated. Generally brown coloration; hemelytron and membrane brown. Venter uniformly brown. All antennal segments brown. Labium brown with darker apex. All coxae brown; trochanters whitish; metafemora pale brown with dark brown spots sub-apically; metatibia pale brown with dark brown spots at the base of brown spine. Dorsum furnished with simple pale brown setae and uniformly distributed shining setae. Head: Projecting anteriorly; labium exceeding apex of metacoxae. Endosoma: Shape more or less S-like, primary endosomal process extended apically, secondary apical process with serrated margin, a membrane extend between apex to nearly middle of shaft; secondary gonopore apically positioned. Phallotheca: Simple, angulated, triangular. Left paramere: Body broad, anterior and posterior process curved. Right paramere: Body elongate, leaf-like, margins not uniform.

Host plant: *Larix* sp. (Pinaceae) (Kerzhner, 1978).

Biology: This species is associated with *Larix* sp. (Pinaceae) (Kerzhner, 1978).

Distribution: Korea, China, European continent, Russia.

Distribution in Korea: North Korea: PB, YG (Kwon et al., 2001).

Material examined: North Korea, PB: 1♀ (Boseok-ri (in label: Bosok-ri), 1000 m, 20.vii.1974, on *Larix* sp. (Pinaceae), M. Josifov, determined by M. Josifov). YG: 1♂ (Samjiyeon (in label: Jongkang-do, Samdzijon), 13−19.vii.1974, on Larix sp. (Pinaceae), M. Josifov, determined by M. Josifov).

70. *Psallus* (*Pityopsallus*) *vittatus* (Fieber, 1861) (Plate 7; 33E−I)

Agalliastes vittatus Fieber, 1861: 312; Kerzhner, 1996: 278.

Sthenarus roseri decolor Gredler, 1874: 557.

Psallus vittatus: Reuter, 1909: 75; Kerzhner, 1988b: 847; Schuh, 1995: 418; Kerzhner and Josifov, 1999: 410; Yasunaga, 2001a: 176; Anufriev et al., 2001: 127; Kwon et al., 2001: 181; Duwal et al., 2012: 629.

Male. Body medium sized, elongated. Generally brown to blackish brown coloration; head, pronotum, mesoscutum and scutellum black (or blackish dark brown); hemelytron, clavus and corium brown or dark brown, cuneus somewhat paler, membrane pale brown. Venter dark brown. All antennal segments brownish except segment I pale. Labium brown with dark apex. All coxae and trochanters brown; metafemora brown with pale apex and ventrally with rows of black spots; metatibia pale brown, with dark brown spots at the base of black spines. Dorsum furnished with simple black and pale brown setae and uniformly distributed sericeous setae. Head: convex; labium short, reaching (or slightly exceeding) apex of metacoxae. Endosoma: Shape more or less S-like, primary endosomal process extended to apical secondary process, marginal spicules medially loacted; secondary gonopore apically positioned. Phallotheca: Simple, margins slightly curved. Left paramere: Body large, anterior process relatively elongated and slender than posterior short process. Right paramere: Body elongate, somewhat curved, leaf-like with apical protuberance.

Female. Bursa copulatrix small, structures are very delicate, membranous folding a socket-like; sclerotized rings very delicate or obscure.

Host plant: *Larix* sp. (Pinaceae) (Kerzhner, 1978).

Biology: Kerzhner (1978) documented the host plant of this species as *Larix* sp. (Pinaceae). Likewise specimens examined for this study were collected by Josifov and Yasunaga from larch, *Larix* sp.

Distribution: Korea, China, Europe, Russia.

Distribution in Korea: North Korea: PN (Kwon et al., 2001).

Material examined: North Korea, PN: 3♂ (Mt. Daeseongsan, Pyeongyang (in label: Bei Phjongjan, Mt. Taesong), 7.vi.1987, on *Larix* sp. (Pinaceae), M. Josifov, determined by M. Josifov).

Subgenus *Psallus* Fieber, 1858

Psallus Fieber, 1958: 321.

The subgenus *Psallus* is a large Holarctic group comprises of around fifty six species (Kerzhner and Josifov, 1999; Yasunaga and Josifov, 2000; Duwal et al., 2012).

Members of this subgenus are variously colored (bright, or dark, or pale), short and sclerotized endosoma, with few or numerous denticle-like spines at the apex. For detail description see Wagner, 1952.

71. *Psallus* (*Psallus*) *amoenus* Josifov, 1983 (Plate 7; 32B−E)

Psallus (*Psallus*) *amoenus* Josifov, 1983: 208; 1992a: 116; Kerzhner, 1988b: 844−845; Schuh, 1995: 400; Kerzhner and Josifov, 1999: 411; Anufriev et al., 2001: 123; Kwon et al., 2001: 181; Duwal et al., 2012: 630.

Male. Body medium sized, elongated oval. Generally orange yellow tinged with red; dorsum completely orange red with red speckles and base of cuneus pale, membrane brown. Venter yellow with red speckles. All antennal segments pale with basal brown ring on segment I. Labium pale yellow with dark apex. All coxae and trochanters whitish; metafemora pale tinged with red, ventrally with large dark brown spots and dorsally with few sub-apical spots; metatibiae with pale, with small dark brown spots at the base of black spines. Dorsum furnished with simple pale brown setae and uniformly distributed sericeous setae. Head: convex; labium reaching apex of metacoxae. Endosoma: Shape J-like, primary endosomal process with uniform breath from middle to apex, apical secondary process slender and slightly curved; secondary gonopore located subapically. Phallotheca: Simple, slender. Left paramere: Body large with very short posterior process. Right paramere: Body elongate, with flat apex.

Female. Bursa copulatrix large sized, dorsal labiate plate furnished with numerous spinules, and rectangular membranous folding anteriorly, Sclerotized rings wide and asymmetrical.

Host plant: *Quercus dentata* Thunb. (Fagaceae) (Josifov, 1983).

Biology: Josifov (1983) documented the host plant of this species as *Quercus dentata* Thunb. (Fagaceae).

Distribution: Korea, Russia.

Distribution in Korea: North Korea: HWB, PN (Kwon et al., 2001).

Material examined: North Korea, PN: 1♂, 1♀ (Mt. Daeseongsan, Pyeongyang (in label: Bei Phjongjan, Mt. Tesong), 1.v−1.vi.1987, on *Quercus dentata* Thunb. (Fagaceae), M. Josifov, determined by M. Josifov).

72. *Psallus* (*Psallus*) *bagjonicus* Josifov, 1983 (Plate 7; 34A−D; Table 1)

Psallus (*Psallus*) *bagjonicus* Josifov, 1983: 205; 1992a: 116; Schuh, 1995: 401; Kerzhner and Josifov, 1999: 412; Yasunaga and Vinokurov, 2000: 659; Yasunaga, 2001a: 176; Kwon et al., 2001: 182; Duwal et al., 2012: 630.

Male. Body medium sized, elongated oval. Generally brownish black; head, pronotum, mesoscutum and scutellum black; hemelytron, base of clavus brown and apex black, corium black with the apex of exocorium deep red, cuneus deep red, membrane black. Venter dark brown, tinged with red. Antennal segment I and

base of segment II dark and others pale brown. Labium shining dark brown except segment I castaneous. All coxae and trochanters brown; metafemora dirty yellow with numerous large black spots attached together giving blackish or castaneous pattern; metatibia pale, with large castaneous spots at the base of pale spines. Dorsum furnished with simple brown setae and uniformly distributed sericeous setae. Head: convex; labium reaching apex of metacoxae. Endosoma: Shape C-like, primary endosomal process with hammer-like apex furnished with small and large spines; secondary gonopore located apically. Phallotheca: Simple, broad base and narrow apex. Left paramere: Body small, anterior process short and slender.

Female. Body somewhat mere flat than male, similar in texture as male except lateral side of mesoscutum and apex scutellum pale; hemelytron somewhat brownish. Bursa copulatrix of moderate size, dorsal labiate plate with a few scattered spinules and posterior region with somewhat rectangular membrane curved medially; sclerotized rings small, oval with broad base and slightly narrow apex.

Host plant: *Quercus aliena* Blume (Fagaceae) (Josifov, 1983), *Q. serrata* Murray., *Q. acutissima* Carruth. (Yasunaga and Vinokurov, 2000).

Biology: This species is associated with oaks (Fagaceae), *Quercus aliena* Blume (Josifov, 1983) in North Korea, and *Q. serrata* Murray. and *Q. acutissima* Carruth. (Yasunaga and Vinokurov, 2000) in Japan. However, the host is unknown in South Korea, as all specimens were collected in light and Malaise traps.

Distribution: Korea, Japan.

Distribution in Korea: North Korea: HWB, PN, South Korea: GG (Kwon et al., 2001).

Material examined: South Korea, GG: 1♀ (Mt. Taehwasan, Gwangju, 2−20.v.2008, Malaise trap, J.O. Lim); 2♀ (Sucheong, Osan, 20.vi.1998, light trap, H.K. Lee); 1♀ (NAAS, Suwon, 10−11.v.1997, light trap).

73. *Psallus* (*Psallus*) *cheongtaensis* Duwal et al., 2012 (Plate 8; 34E−I; Table 1)

Psallus (*Psallus*) *cheongtaensis* Duwal et al., 2012: 630.

Male. Body elongate oval. Body uniformly pale dorsally and ventrally (or somewhat pale yellowish dry specimen). Antennal segments pale except segments III and IV pale brown. Labium, segment I and II pale, segment III brown and segment IV dark brown distally. Legs pale; metafemora ventrally with a row of spot at anterior margin, few scattered fused spots at the base and numerous irregular spots on distal half region; tibiae pale with rows of large brown spots at base of black spines, membrane grayish. Dorsum furnished with uniformly distributed simple black semierect setae and sericeous setae. Head: Length short comparative to body size; interocular space wide; labium slightly surpassing apex of the mesocoxae. Endosoma: Shape C-like; apex with a pair of ear-like secondary processes arising from either lateral side, and medially developed elongated flat process; secondary gonopore large and positioned subapically. Left paramere:

Body large, both anterior and posterior process flat. Right paramere: Body elongate, subapically furnished with notch like outgrowth and apex tapered to form a short finger-like process.

Host plant: Unknown.

Biology: The biology is unknown.

Distribution: Korea.

Distribution in Korea: South Korea: GW (Duwal et al., 2016).

Material examined: South Korea, GW: 1♂ (Mt. Cheongtaesan, Dunnae, Hoengseong, 20−21.vii.2000, H.G. Goh).

Remarks: Female is not observed.

74. *Psallus* (*Psallus*) *koreanus* Josifov, 1983 (Plate 8; Table 1)

Psallus (*Psallus*) *koreanus* Josifov, 1983: 209.

Psallus koreanus: Kerzhner, 1988b: 847; Josifov, 1992: 116; Schuh, 1995: 408; Kerzhner and Josifov, 1999: 415; Anufriev et al., 2001: 126; Kwon et al., 2001: 182; Duwal et al., 2012: 631.

Male. Body medium sized, elongated oval. Generally reddish; head brown or dark brown with pale vertex; pronotum reddish black (if red, calli black in color); mesoscutum and scutellum red tinged with black; hemelytron, clavus and corium red somewhat tinged with black, membrane dark brown. Venter resembles the dorsum. All antennal segments pale. Labium brown with dark apex. Metafemora red with few large black spots ventrally; Metatibia pale with castaneous spots. Dorsum furnished with simple pale brown setae and uniformly distributed sericeous setae. Head: convex; labium reaching apex of metacoxae. Endosoma: Shape C-like, primary endosomal process narrow at middle and expanded at apex, apical secondary process leaf-like; secondary gonopore located subapically. Phallotheca: Simple. Left paramere: Body large, anterior process very slender. Right paramere: Body elongate, margins not uniform, apex developed as a protuberance.

Host plant: *Crataegus* sp., *Prunus* sp., *Sorbus amurensis* (Rosaceae) (Josifov, 1983).

Biology: This species was reported by Josifov (1983) on various rosaceous trees like, e.g., *Crataegus* sp., *Prunus* sp., and *Sorbus amurensis*, and also observed on *Picea* sp. (Pinaceae).

Distribution: Korea, Russia.

Distribution in Korea: North Korea: HWB (Kwon et al., 2001).

Material examined: North Korea, HWB: 1♂, 2♀ (Gaeseong, 20 km N. Bakyeon (in label: Bagjon, 20 km N Kaesong), 21−23.v.1975, M. Josifov, determined by M. Josifov).

75. *Psallus* (*Psallus*) *sanguinarius* Kerzhner and Josifov, 1999 (Plate 8; 36G)

Psallus (*Psallus*) *sanguinolentus* Kerzhner and Josifov, 1983: 209 (junior primary homonym of *Psallus graminicola* f. *sanguinolenta* Stichel, 1956); 1992a: 116; Schuh, 1995: 415.

Psallus sanguinarius Kerzhner and Josifov, 1999: 417; Kwon et al., 2001: 183; Duwal et al., 2012: 631.

Male. Body elongated. Generally brownish tinged with red; head dirty yellow with dark marking; pronotum and mesoscutum brownish red; hemelytron brownish, tinged with red; cuneus deep red. Dorsum furnished with simple pale brown setae and with uniformly distributed sericeous setae. Endosoma: Shape more or less J-like, primary endosomal process medially narrow and apically broad with broad apical secondary process; secondary gonopore located subapically. Phallotheca: Simple, angulated. Left paramere: Body broad with curved anterior process. Right paramere: Body elongate, lateral margins not uniform.

Host plant: *Sorbus amurensis* Koehne (Rosaceae), *Picea* sp. (Pinaceae) (Josifov, 1983).

Biology: Josifov (1983) reported this species on *Sorbus amurensis* (Rosaceae) and on *Picea* (Pinaceae) in North Korea. We were unable to observe any specimens for this study.

Distribution: Korea.

Distribution in Korea: North Korea: YG (Kwon et al., 2001).

Material examined: None.

Remarks: This species was reported in Korea from northern part and was not found at southern region during the survey. For detail information and figures, see Josifov, 1983.

Tribe Pilophorini Douglas and Scott, 1876

Members of this tribe are elongated, medium to robust sized; usually ant memetic, head concave behind; posterior margin of vertex usually carinate; pronotum broad and flat, sometimes constricted medially separating anterior and posterior pronotum or with highly modified tubercles; hemelytron always with scale setae, often aggregated into rows or scattered; parempodia fleshy, recurved and convergent apically; endosoma simply U-, or C- or incomplete S-shaped without secondary gonopore; phallotheca parallel laterally and slightly bend apicly; left paramere distinctly large and splayed out; right paramere large, broad apex with finger-like small or elongated process; female genitalia with evaginated structure along the posterior margin, or often distinctly spinulus chitinized structures (very similar with K-structure in Ortholylinae).

The Pilophorini is strongly ant memic, and comprises of one hundred and seventy species in twelve genera described in the world (Schuh, 1995), and forty seven species in seven genera in Palaearctic region (Kerzhner and Josifov, 1999). Carvalho (1958) considered this as Cosmopolitan group except in Antractica.

Some of the members are considered predatory however in absence of animal food they can consume plant material as other mirids do.

Key to genera of Korean Pilophorini

1. Base of abdomen constricted; hemelytron sinuous laterally, and provided with two rows of scale setae on hemelytron either continuous or discontinuous; scutellum with two or three bunches of scale setae ····· ····· *Pilophorus*
− Base of abdomen not constricted; hemelytron parallel or somewhat ovate laterally, and scale setae if present scattered in hemelytron; scutellum without scale setae ····· *Pherolepis*

Genus *Pherolepis* Kulik, 1968

Type species: *Pherolepis atrans* Kulik, 1968; original designation.

Pherolepis Kulik, 1968: 140; Schuh, 1995: 457; Kerzhner and Josifov, 1999: 279; Yasunaga, 2001a: 148; Anufriev et al., 2001: 114; Kwon et al., 2001.

Diagnosis: Recognized by medium sized, ovate body; completely shining black; transversed wrinkles on head, pronotum and scutellum; covered with pale soft vestiture of the head and pronotum and their unequal arrangements; arrangements of scale setae on hemelytron; colorations of appendages; and variously modified male and female genital structures.

Distribution: East Asia.

Remarks: The genus *Pherolepis* is a small group with seven described species (Kerzhner and Josifov, 1999; Zhang and Liu, 2009). Though Kerzhner (1970) synonymized this genus with *Hypseloecus*, Schuh (1989) reinstated into its original status according to structures of vestiture.

Key to species of Korean *Pherolepis*

1. Dorsum furnished with extremely short setae; head, pronotum and base of hemelytron bare; scales on hemelytron aggregated forming a band, extending anteriorly beyond the apex of scutellum and posteriorly at the level of middle of commissure; length of antennal segment II greater than or equal to width of head····· *P. fasciatus*
− Pronotum with short setae; entire hemelytron except membranes covered with long pale setae and silvery setae; antennal segment II shorter than width of head····· 2
2. Setae on pronotum very short; legs, antennal segment I and base of segment II dirty yellowish brown; scutellum mesally and basally with dense pubescence than on lateral margins (Plate 8)····· *P. amplus*

− Setae on pronotum longer; legs, antennal segment I and base of segment II red; scutellum with uniformly distributed pubescence (Plate 8) ····· *P. kiritshenkoi*

76. *Pherolepis amplus* Kulik, 1968 (Plate 8; 37A−F; Table 1)

Pherolepis amplus Kulik, 1968: 142.

Hypseloecus amplus Kerzhner, 1970: 638; 1988a: 836.

Pherolepis amplus: Schuh 1995: 275; Kerzhner and Josifov, 1999: 457; Anufriev et al., 2001: 115; Kwon et al., 2001: 162.

Male. Medium sized, elongated oval. Generally black body. Dorsum blackish brown or black. Head, pronotum, mesoscutum and scutellum shining black. Hemelytron either completely brown or black; cuneus tinged with red. Venter shininig black. Antennae brown with dark brown apices. Labium shining, dark brown. All coxa and trochanters pale; metafemora dirty yellow; metatibia pale. Head and anterior region of pronotum with uniformly distributed soft appressed setae, which scattered on posterior region of pronotum. Hemelytron covered with densely distributed flattened appressed scale like setae and soft setae. Head: Head and anterior region of pronotum smooth; posterior region of pronotum and hemelytron completely shagreen; vertex wide; labium reaching apex of metacoxae. Endosoma: C-like, spine on the shaft of the endosoma bears two outgrowths anteriorly and posteriorly.

Female. Similar to color and texture as males but abdomen more wider than in males. Sclerotized rings asymmetrical, narrow anteriorly and wide posterior region; dorsal labiate plate chitinized with spinulus structures. Posterior wall with chitinized structures furnished with spinulus.

Host plant: *Salix* sp. (Salicaceae).

Biology: The individuals of *Pherolepis amplus* were collected from willow trees around the ponds in natural conservation area in Osan. Recent article of Zhang and Liu (2009) reported this species as predatory.

Distribution: Korea, China, Russia.

Distribution in Korea: North Korea: PN, South Korea: GG (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, GG: 1♂, 2♀ (Gunnae, Musan, Paju, 21−25.vii.2008, S. Jung); 3♀ (Mulhyanggi Arboretum, Sucheong, Osan, 22.viii.2011, on *Salix* (Salicaceae), R.K. Duwal).

77. *Pherolepis fasciatus* (Kerzhner, 1970)

Hypseloecus fasciatus Kerzhner, 1970: 639; 1988a: 837.

Pherolepis fasciatus: Schuh, 1995; Kerzhner and Josifov, 1999; Yasunaga, 2001a: 147; Anufriev et al., 2001: 115; Kwon et al., 2001: 162.

Male. Medium sized, elongated oval. Generally black body. Dorsum and Venter shining black. Antennae; segment I and basal half of segment II pale brown, apex and remaining segment darker. Legs usually pale brown with dark rings at the base of tibiae. Dorsum completely furnished with very short and soft setae; hemelytron at middle region covered with flattened scale setae extending at the region form apex of scutellum and sub-apex of the clavus.

Host plant: *Ulmus japonica* (Ulmaceae) (Kerzhner, 1988b).

Biology: Though this species is said to be reported from Korea (Northern region), in this study, I am not able to observe the specimen from southern region.

Distribution: Korea, Japan, Russia.

Distribution in Korea: North Korea: PN (Kwon et al., 2001).

Material examined: None.

Remarks: This species was reported in Korea from northern part and was not found at southern region during the survey. For detail description and male genital structures, see Kerzhner, 1970.

78. *Pherolepis kiritshenkoi* (Kerzhner, 1970) (Plate 8; 37G−L; Table 1)

Hypseloecus kiritshenkoi Kerzhner, 1970: 638; 1988a: 837.

Pherolepis kiritshenkoi: Schuh, 1995: 458; Kerzhner and Josifov, 1999: 280; Yasunaga, 2001a: 148; Anufriev et al., 2001: 115.

Male. Medium sized, elongated oval. Generally black body. Head, pronotum, mesoscutum and scutellum shining black. Hemelytron dark brown or black. Venter shining black. Antennae brown; segment I and basal half of segment II tinged with red towards apex black, and segment III and IV darker. Labium brown, segment I and II tinged with red. All coxae and trochanters pale; all femora red except the bases and apices pale; anterior half of metatibia red and remaining distal region and extreme base pale. Head and pronotum uniformly distributed with soft setae; hemelytron densely covered with flattened appressed scale setae and soft pale setae. Head: Pronotum partly shagreen; hemelytron shagreen; vertex comparatively wide, nearly half the length of antennal segment II; labium reaching apex of metacoxae. Endosoma: Spine on the shaft of the endosoma with a branch.

Female. Similar in color and texture as male. Sclerotized rings asymmetrical, narrow anteriorly and margins irregular; dorsal labiate plate with chitinized spinulus structures. Posterior wall with chitinized spinulus

structures.

Host plant: *Salix rorida* (Salicaceae) (Kerzhner, 1970).

Biology: The host plant and other information in Korea are unknown.

Distribution: Korea, Russia.

Distribution in Korea: South Korea: GG (Duwal et al., 2016).

Material examined: South Korea, GG: 2♂, 1♀ (Gunnae, Musan, Paju, 21−25.vii.2008, S. Jung).

Genus *Pilophorus* Hahn, 1826

Type species: *Cimex clavatus* Linnaeus, 1767; designation under the plenary powers.

Pilophorus Hahn, 1826: 23; Schuh, 1984: 49; 1989: 10; 1995: 458; Kerzhner, 1988b: 786; Kerzhner and Josifov, 1999: 280; Yasunaga, 2001a: 148; Anufriev et al., 2001: 115; Kwon et al., 2001: 162; Duwal and Yasunaga, 2008: 32.

Diagnosis: Recognized by small to medium sized body; shining or dull dorsum with variously arranged scale setae on hemelytron, among the three bunches of scale setae on scutellum, lateral two bunches very distinct while apical one either distinct or obscure; the anterior row of scale setae always arise at the level of the apex of scutellum; posterior row of scale setae often variously arranged, either continuous or discontinuous, and the scales at the base of cuneus present or absent, if present veriously arranged, only at inner base as spot, or extended at inner 1/3, or 1/2 or entire base; and various structure of spine on the shaft.

Distribution: Holarctic region, Southeast Asia.

Remarks: The members of *Pilophrous* are strongly ant memic, comprises of one hundred and seven described species in the world (Schuh, 1995; Duwal et al., 2008), and thirty one species in Palaearctic region (Kerzhner and Josifov, 1999). These are considered as oligophagous (Schuh, 1974). Some species are found feeding on aphids as well as small arthropods like, mites, scales, psyllids, and various depteras, their eggs and nymph (Schuh, 1974; Wheeler, 2001).

Key to species of Korean *Pilophorus*

1. Posterior band of silvery setae discontinuous ····· 2
− Posterior band of silvery setae continuous ····· 3
2. Band of silvery setae distinctly anterior than posterior band of setae on corium; band of setae at the base of cuneus extending on inner half region, all coxae pale except distally red procoxae (Plate 9) ····· *P. clavatus*

− Posterior band of silvery setae interrupted on endocorium; posterior-lateral sides of pronotum notched; cuneus without silvery setae (Plate 9) ····· *P. lucidus*

3. Scutellum with three patches of silvery setae on each corner, the one at the apex of scutellum thick; labium reaching apex of metacoxae, all legs dark brown (Plate 9) ····· *P. miyamotoi*

− Scutellum with two, or three patches of silvery setae on each corner but the one at apex of scutellum thin, or obscure; labium either reaching metacoxa or shorter, coxae usually pale ····· 4

4. Body small and slender, uniformly dark; base of shining cuneus without silvery setae; fore femora pale (Plate 9) ····· *P. typicus*

− Body dull; cuneus with complete or incomplete row of silvery setae ····· 5

5. Base if cuneus with incomplete band of silvery setae ····· 6

− Base of cuneus with complete band of silvery setae ····· 7

6. Band of silvery setae at the inner corner of the cuneus as a spot; labium reaching apex of metacoxa; legs dark brown (Plate 9) ····· *P. niger*

− Band of silvery setae extended on inner corner (about 1/3 of cuneus); labium exceeding apex of procoxa; fore- and mesofemora pale (Plate 8) ····· *P. choii*

7. Antennal segment II clavate ····· 8

− Antennal segment II not clavate ····· 10

8. All coxae pale except the apex of fore-coxa tinged red ····· *P. setulosus*

− Coxae with brownish base or apices ····· 9

9. Distal region of procoxa, basal region of meso- and metacoxa brownish; shaft of endosoma with short median spine which is furnished with small protuberance near to apex (Plate 9) ····· *P. erraticus*

− Metacoxa entirely pale; shaft of endosoma with a median spine; inner body of the left paramere around the posterior process provided with chitinous membranous fold (Plate 9) ····· *P. koreanus*

10. Antennal segment II, two or three times longer than segment III, apex of segment III darker; base of segment IV narrowly pale ····· *P. pseudoperplexus*

− Antennal segment II twice as long as segment III, half of the segment III and entire segment IV black ····· *P. okamotoi*

79. *Pilophorus choii* Josifov, 1978 (Plate 8; 38A−E; Table 1)

Pilophorus choii Josifov, 1978: 285; Kerzhner, 1988b: 838; Schuh, 1995: 460; 1990: 165; Kerzhner and Josifov, 1999: 281; Anufriev et al., 2001: 116; Kwon et al., 2001: 163.

Male. Medium sized, elongated. Generally black body. Dorsum entirely black; cuneus castaneous. Venter black or castaneous black. Antennae black or castaneous black except the bases and apices of segment III

and IV pale. Labium shining dark brown. Pro- and mesocoxae, and trochanters pale; metafemora and tibia castaneous except the extreme base of tibia pale. Dorsum furnished with scattered soft pale setae; hemelytron covered with flattened scale setae; rows or aggregation of scale setae on scutellum and hemelytron; scutellum with two bunch of scales on either later side and few scales on posterior corner; and corium with two rows of scale setae, one on anterior region at the level of posterior corner of the scutellum and other posteriorly on subapical region of clavus and continuous; row of scale setae at the base of cuneus extended on inner 1/4 region. Antennal segment III subequal to the antennal segment IV and sum of two segments shorter than antennal segment I; labium surpass the apex of the procoxae; lateral margins of pronotum sinuous. Endosoma: C-like, a median spine on the shaft of the endosoma short and small.

Host plant: *Quercus* sp. (Fagaceae) (Josifov, 1978); *Q. dentate* (Kerzhner, 1988b).

Biology: The biology is unknown as the specimen was collected in light.

Distribution: Korea, Russia.

Distribution in Korea: North Korea: HB, South Korea: GG (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, GG: 1♂ (Mt. Youngmunsan, Yangpyeong, 16.vii.2009, on light trap, R.K. Duwal and S. Jung).

Remarks: Female is not observed.

80. *Pilophorus clavatus* (Linnaeus, 1767) (Plate 9; 38F−L; Table 1)

Pilophorus clavatus: Carvalho, 1958: 144; Kelton, 1959: 67; Schuh and Schwartz, 1988a: 164; Wheeler and Henry, 1992: 195; Schuh, 1995: 460; Kerzhner, 1988b: 837; Kerzhner and Josifov, 1999: 281; Anufriev et al., 2001: 115; Kwon et al., 2001: 163.

Male. Medium sized, elongated. Generally castaneosus or dark brown body. Head, pronotum, mesoscutum and scutellum dull black. Hemelytron brown or dark brown. Venter shining black or castaneous. Antennae, segment I brown with pale extreme base, basal larger region of segment II brown tinged with red while towards the apex black or castaneous; extreme bases of segment III and IV pale and remaining dark. Labium shining, dark brown. All coxae pale except the extreme bases of meso and metacoxae dark; distal half of metafemora and entire tibia castaneous. Dorsum entirely furnished with pale soft setae; hemelytron covered with uniformly distributed flattened appressed scale setae; rows or aggregation of scale setae on scutellum and hemelytron: scutellum with two bunch on either later side and few scales on posterior corner; and corium with two rows of scale setae, one on anterior region at the level of posterior corner of the scutellum and other posteriorly on subapical region of clavus and discontinuous; the scales on the clavus positioned anteriorly than the rows on the corium; row of scale setae at the base of cuneus extended on inner 1/2 region. Dor-

sum usually partly or completely shagreen; length of antennal segment II nearly similar with the length of labium and metafemora; labium reaching apex of metacoxae. Endosoma: C-like, a median spine on the shaft of the endosoma distinctly branch near by the base.

Female. Similar in color and texture as male. Sclerotized rings elongated oval with flat posterior region, thin rimmed; dorsal labiate plate with chitinized spinulus structures.

Host plant: *Cornus* sp. (Cornaceae), *Quercus* sp. (Fagaceae) (Schuh and Schwartz, 1988a); *Alnus* sp., *Betula* sp. (Betulaceae), *Populus* sp., and *Salix* sp. (Saliaceae) (Wheeler and Henry, 1992).

Biology: The specimens of *Pilophorus clavatus* were collected on willow trees along the river side under the bridge.

Distribution: Korea, Holarctic region.

Distribution in Korea: South Korea: GG (Duwal et al., 2016).

Material examined: South Korea, GW: 3♀ (Munmak, Wonju, 1.vi.2009, on Salix, R.K. Duwal and S. Jung); 1♂ (same data as above, on light trap).

81. *Pilophorus erraticus* Linnavuori, 1962 (Plate 9; 39A−F; Table 1)

Pilophorus erraticus Linnavuori, 1962: 170; Schuh, 1984: 59.

Pilophorus alni Josifov, 1987: 117.

Pilophorus erracticus: Kerzhner, 1988b: 838; 1993: 100; Schuh, 1995: 462; Kerzhner and Josifov, 1999: 282; Yasunaga, 2001a: 148; Anufriev et al., 2001: 116; Kwon et al., 2001: 163.

Male. Medium sized, elongated. Generally shining castaneous black body. Head, pronotum, mesoscutum and scutellum black and dull, except the scutellum shining. Hemelytron brown or dark brown with darker exocorium posteriorly. Venter shining castaneous black. Antennae; segment I, basal half of segment III and extreme base of segment IV pale; basal half of segment II reddish and distal half black. Labium shining, brown with darker apex. Base of procoxa, apex of mesocoxa and entire metacoxa, and all trochanters pale; metafemora brown; metatibia entirely red. Dorsum entirely furnished with pale soft setae; hemelytron covered with uniformly distributed flattened appressed scale setae; rows or aggregation of scale setae on scutellum and hemelytron: scutellum with two bunch on either later side and few scales on posterior corner; corium with two rows of scale setae, one on anterior region at the level of posterior corner of the scutellum and other posteriorly on subapical region of clavus and continuous; a row of scale setae at the base of cuneus extended on inner 3/4 region. Head: Dorsum entirely shagreen, antennal segment III and IV subequal in length; labium reaching apex of metacoxae. Endosoma: C-like, a short median spine with a small outgrowth at middle.

Female. Similar in color and texture as male. Sclerotized rings elongated oval with wide posterior region; dorsal labiate plate with chitinized spinulus structures.

Host plant: *Alnus* sp. (Betulaceae) (Josifov, 1987; Kerzhner, 1988b).

Biology: The biological information in Korea is unknown.

Distribution: Korea, Japan, Russia.

Distribution in Korea: North Korea: PN, South Korea: GG (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, GG: 8♂, 4♀ (Gunnae, Musan, Paju, 21−25.vii.2008, S. Jung); 1♀ (Mt. Yongmunsan, Yangpyeong, 16.vii.2009, on light trap, R.K. Duwal and S. Jung).

82. *Pilophorus koreanus* Josifov, 1978 (Plate 9; 39G−L; Table 1)

Pilophours koreanus Josifov, 1978: 283; Schuh, 1995: 464; Kerzhner, 1988b: Kerzhner and Josifov, 1999: 282; Kwon et al., 2001: 163.

Male. Medium sized, elongated. Generally dark brown body. Head, anterior pronotum, mesoscutum and scutellum dark brown, and posterior pronotum black. Hemelytron brown or dark brown; exocorium posteriorly darker. Venter castaneous except basal few abdominal segments pale. Antennae; segment I, basal half of segment III and extreme base of segment IV pale, and segment II reddish brown with black apex. Labium shining, brown. Base of procoxa, apex of mesocoxa and entire metacoxa, and all trochanters pale; metafemora dirty brown and tinged with red; base of metatibia red. Dorsum entirely furnished with pale soft setae; hemelytron covered with uniformly distributed flattened appressed scale setae; rows or aggregation of scale setae on scutellum and hemelytron. scutellum with two bunch on either later side; corium with two rows of scale setae, one on anterior region at the level of posterior corner of the scutellum and other posteriorly on subapical region of clavus and continuous; row of scale setae at the base of cuneus extended entirely. Head: Head, pronotum, mesoscutum and scutellum shagreen; antennal segment III and IV subequal in length; labium reaching apex of mesocoxae. Endosoma: C-like, a median spine at the shaft of the endosoma with a thumb-like branch.

Female. Not different in color and texture but abdomen more wide than in males. Sclerotized rings elongated, anterior region tapers to form a pointed end and posterior region oval and flat; dorsal labiate plate with chitinized spinulus structures.

Host plant: *Acer barbinerve* (Aceraceae), *Salix* sp. (Salicaceae), *Ulmus manshurica* (Ulmaceae) (Josifov, 1978).

Biology: Reported host plant is *Acer barbinerve* (Aceraceae), *Salix* sp. (Salicaceae) and *Ulmus manshurica* (Ulmaceae).

Distribution: Korea, China.

Distribution in Korea: North Korea: PN, South Korea: GG (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, GG: 1♂, 2♀ (Musan, Gunnae, Paju, 21−25.vii.2008, S. Jung); 2♂, 4♀ (same data as above except date, 21−25.vii.2008, S. Jung).

Remarks: *Pilophorus koreanus* is very similar in color and texture to the *P. erraticus*, it can be separable from later one by comparatively small size, dull dorsum and brownish head and anterior pronotum.

83. *Pilophorus lucidus* Linnavuori, 1962 (Plate 9; 40A−G; Table 1)

Pilophorus lucidus Linnavuori, 1962: 171; Schuh, 1984: 65; 1990: 164; 1995: 464; Kerzhner, 1988b: 837; Kerzhner and Josifov, 1999: 282; Yasunaga, 2001a: 149; Anufriev et al., 2001: 115; Kwon et al., 2001: 164.

Male. Medium sized, elongated. Generally castaneous or dark brown body. Head, pronotum, mesoscutum and scutellum shining black. Hemelytron brown anteriorly and black (or dark) posteriorly. Venter castaneous. Antennae; segment I pale tinged with red dorsally; segment II castaneous; basal half of segment III and extreme base of segment IV pale. Labium dirty brown except base and apex. Base of Procoxa, apex of mesocoxa and entire metacoxa, and all trochanters pale; metafemora and tibia castaneous with pale base on tibia. Dorsum entirely furnished with pale soft setae; hemelytron covered with uniformly distributed flattened appressed scale setae; rows or aggregation of scale setae on scutellum and hemelytron: scutellum with two bunch on either later side and posterior corner; corium with two rows of scale setae, one on anterior region at the level of posterior corner of the scutellum and other posteriorly on subapical region of clavus and discontinuous at endocorium; cuneus without aggregation of scale setae. Head: Dorsum partly shagreen; postero-lateral sides of pronotum notched labium reaching apex of metacoxae. Endosoma: C-like, a median spine at the shaft of the endosoma distinctly bifurcated from the middle.

Female. Not different in color and texture but abdomen wider than in males. Sclerotized rings oval and thin rimmed; dorsal labiate plate with chitinized spinulus structures.

Host plant: *Quercus* sp. (Fagaceae).

Biology: Though few specimens were collected in *Quercus* sp., the breeding host is unknown in Korea.

Distribution: Korea, China, Japan, Russia.

Distribution in Korea: North Korea: PN, South Korea: GG (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, GG: 2♂ (Mt. Taehwasan, Gwangju, 5−19.vii.2007, J.O. Lim); 2♂

(Icheon, 1.viii.2008, on *Quercus* (Fagaceae), R.K. Duwal and S. Jung); 1♂, 1♀ (Gunnae, Paju, 21−25. vii.2008, S. Jung); 1♀ (Mt. Yongmunsan, Yangpyeong, 11.vi.2009, R.K. Duwal).

84. *Pilophorus miyamotoi* Linnavuori, 1961 (Plate 10; 40H, I; 52; Table 1)

Pilophorus miyamotoi Linnavuori, 1961: 165; Schuh, 1984: 65; 1990: 164; 1995: 465; Kerzhner, 1988b: 837; Kerzhner and Josifov, 1999: 282; Yasunaga, 2001a: 149; Anufriev et al., 2001: 115; Kwon et al., 2001: 164.

Female. Medium sized, elongated. Generally dark brown or black body. Head, pronotum, mesoscutum and scutellum shining black. Hemelytron dark brown, clavus and exocorium darker. Venter shining dark brown, or black. Antennae dirty yellow except distal half of segment II castanesous. Labium shining, brown. Coxae dark with pale extreme apex of mesocoxa and distal half of metacoxa; all trochanters brown; metafemora and tibia dark brown or castaneous. Dorsum entirely furnished with pale soft setae and simple black semi-erect setae; hemelytron covered with uniformly distributed flattened appressed scale setae; rows or aggregation of scale setae on scutellum and hemelytron. scutellum with three bunch on each corner and; corium with two rows of scale setae, one on anterior region at the level of posterior corner of the scutellum and other posteriorly on subapical region of clavus and continuous; cuneus with aggregation of scale setae on inner 2/3 region. Head, pronotum, mesoscutum and scutellum partly shagreen; length of antennal segment II nearly equal to the width of the pronotum; antennal segment II distinctly clavate; vertex wide; labium reaching apex of mesocoxae. Sclerotized ring elongated oval, thin rimmed; dorsal labiate plate chitinized and anteriorly spinulus.

Host plant: *Pinus densiflora* (Pinaceae) (Kerzhner, 1988b); *Salix* sp. (Saliaceae).

Biology: The representative specimens were collected on willow (Saliaceae) in Korea, but the breeding host is unknown.

Distribution: Korea, Japan, Russia.

Distribution in Korea: South Korea: JJ (Duwal et al., 2016).

Material examined: South Korea, JJ: 2♀ (Mt. Songaksan, Namwon, Seogwipo, 27−28.ix.2006, on *Salix*, J.W. Seong).

Remarks: Male is not observed.

85. *Pilophorus niger* Poppius, 1914 (Plate 9; 41A−G; Table 1)

Pilophorus niger Poppius, 1914: 247; Carvalho, 1958: 147; Linnavuori, 1961: 167; Schuh, 1984: 65; 1990: 165; 1995: 465; Kerzhner, 1988b: 838; Kerzhner and Josifov, 1999: 283; Yasunaga, 2001a: 149; Anufriev et al., 2001: 116; Kwon et al., 2001: 164.

Male. Medium sized, elongated. Generally black. Dorsum and ventral completely shining black. Antennae; segment I dirty brown; segment II castaneous with black apex; segment III and IV pale with dark apices. Labium shining black. All coxa black except apex of metacoxa pale; metafemora and tibia entirely castaneous black. Dorsum entirely furnished with pale soft setae and simple black semierect setae; hemelytron covered with uniformly distributed golden flattened appressed scale setae; rows or aggregation of scale setae on scutellum and hemelytron: scutellum with two bunch on either lateral side and; corium with two rows of scale setae, one on anterior region at the level of posterior corner of the scutellum and other posteriorly on subapical region of clavus and continuous; base of cuneus with aggregation of scale setae as a spot at inner corner. Head, pronotum, and scutellum partly shargreen; mesoscutellum smooth; labium reaching apex of mesocoxae. Endosoma: C-like, a median spine on the shaft of the endosoma.

Female. Similar in color and texture as males. Sclerotized rings elongated oval, anteriorly produce a small protuberance; dorsal labiate plate chitinized and anteriorly with spinulus structures.

Host plant: Unknown.

Biology: The biology is unknown in Korea.

Distribution: Korea, China, Japan, Mongolia, Russia.

Distribution in Korea: North Korea: YG, South Korea: GG (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, GG: 1♂ (SNU Arboretum, Suwon, 25.vi.2009, on light trap, R.K. Duwal and S. Jung); 1♂ (Mt. Yongmunsan, Yangpyeong-gun, on light trap, 24.vi.2009, R.K. Duwal and S. Jung); 1♂ (same data as above, 16.vii.2009; 1♀ (Gunnae, Musan, Paju, 21−25.vii.2008, S. Jung).

86. *Pilophorus okamotoi* Miyamoto and Lee, 1966

Pilophorus okamotoi Miyamotoi and Lee, 1966: 379; Schuh, 1984: 66; 1995: 465; Kerzhner, 1988b: 838; Kerzhner and Josifov, 1999: 283; Yasunaga, 2001a: 149; Anufriev et al., 2001: 116; Kwon et al., 2001: 164.

Male. Medium sized, elongated. Generally dark brown body. Head, pronotum, mesoscutum and scutellum shining dark brown. Hemelytron dirty yellow with dark apices of corium and clavus. Venter shining dark

brown. Antennae; segment I yellowish, segment II orange with apical 1/3 black, and basal half of segment III pale and remaining apical region, and entire segment IV dark. Labium brownish. Legs brownish, with all coxae and trochanters pale yellow. Rows or aggregation of scale setae on scutellum and hemelytron. scutellum with three bunch on either lateral side and; corium with two rows of scale setae, one on anterior region at the level of posterior corner of the scutellum and other posteriorly on subapical region of clavus and continuous; base of cuneus with aggregation of scale setae on inner 1/2 region.

Host plant: Unknown.

Biology: Unknown.

Distribution: Korea, Japan, Russia.

Distribution in Korea: North Korea: PN, South Korea: JJ (Kwon et al., 2001; Duwal et al., 2016).

Material examined: None.

Remarks: This species is well described by Miyamoto and Lee (1966) from Jeju Island. But were not collected during the survey and also unable to observe any type specimen. For detail description and male genital structures see Miyamoto and Lee, 1966.

87. *Pilophorus pseudoperplexus* Josifov, 1987

Pilophorus pseudoperplexus Josifov, 1987: 118; Kerzhner, 1988b: 838.

Pilophorus oculatus Kerzhner, 1988a: 53.

Pilophorus pseudoperplexus: Schuh, 1995: 466; Kerzhner and Josifov, 1999: 283; Yasunaga, 2001a: 150; Anufriev et al., 2001: 116; Kwon et al., 2001: 165.

Male. Medium sized, elongated. Generally dark brown body. Head and pronotum dull, black. Hemelytron brown, with darker clavus and whole posterior corium beneath the posterior row of scale setae. Venter dark brown. Antennae brown with dark base of segmet I and apices of segment II and III and larger part of segment IV except base. Legs uniformly brown. Rows or aggregation of scale setae on scutellum and hemelytron. scutellum with two bunch on either lateral side, and one on apex indistinct; corium with two rows of scale setae, one on anterior region at the level of posterior corner of the scutellum and other posteriorly on subapical region of clavus and continuous; base of cuneus with aggregation of scale setae on entire length.

Host plant: *Acer* sp. (Aceraceae); *Fraxinus rhynchophylla* (Oleaceae); *Phellodendron amurense* (Rutaceae), *Quercus mongolica* (Fagaceae) (Kerzhner, 1988b).

Biology: Though this species is described by Josifov (1987) from Northern region. Biology is unknown.

Distribution: Korea, Japan, Russia.

Distribution in Korea: North Korea: PN (Kwon et al., 2001).

Material examined: None.

Remarks: This species was reported in Korea from northern part and was not found at southern region during the survey. For detail descriptions and male genital structures see Josifov 1987: 118; or Kerzhner, 1988b: 838.

88. *Pilophorus setulosus* Horváth, 1905 (Plate 9; 41H−M; Table 1)

Pilophorus setulosus: Linnavuori, 1962: 169; Schuh, 1984: 67; 1995: 467; Kerzhner, 1988b: 838; Kerzhner and Josifov, 1999: 283; Yasunaga, 2001a: 150; Anufriev et al., 2001: 116; Kwon et al., 2001: 165.

Male. Medium sized, elongated oval. Generally dark brown body. Head and pronotum dark brown and dull. Hemelytron brown; mesial region of clavus, and apex of endocorium pale; cuneus deep red. Venter dark brown. Antennae pale; basal half of segment I brown and apical margin with red ring, and segment III and IV tinged with red. Labium shining, brown with darker apex. Procoxa brown; meso- and metacoxa and all trochanters pale; metafemora blackish brown and somewhat tinged red at margins, except extreme base; metatibia entirely pale. Dorsum entirely furnished with pale soft setae and simple black semierect setae; hemelytron covered with uniformly distributed golden flattened appressed scale setae; rows or aggregation of scale setae on scutellum and hemelytron: scutellum with three bunch on each corner and; corium with two rows of scale setae, one on anterior region at the level of posterior corner of the scutellum and other posteriorly on subapical region of clavus and continuous; base of cuneus with aggregation of scale setae at inner 2/3 region. Head and pronotum partly shagreen; labium reaching apex of mesocoxae. Endosoma: C-like, shaft with a median spine.

Female. Similar in color and texture as males. Sclerotized rings elongated oval, posteriorly wider than anterior region; dorsal labiate plate chitinized.

Host plant: *Salix* sp. (Salicaceae) (Kerzhner, 1988b).

Biology: This species was unable to be collected during the survey from Southern region.

Distribution: Korea, China, Japan, Russia.

Distribution in Korea: North Korea: PN (Kwon et al., 2001).

Material examined: None.

89. *Pilophorus typicus* (Distant, 1909) (Plate 9; 42A−E; Table 1)

Thaumaturgus typicus Distant, 1909: 519.

Pilophorus pullulus Poppius, 1914: 238; Carvalho, 1958: 148.

Pilophorus typicus: Linnavuori, 1962: 172; Schuh, 1984: 71; 1990: 164; 1995: 468; Kerzhner, 1999: 284; Yasunaga, 2001a: 150; Kwon et al., 2001: 165.

Male. small, elongated. Generally shining black body. Dorsum and Venter completely shining black. Antennae; segment I pale; segment II entirely black; and basal half of segment III pale and remaining distal half and segment IV darker. Labium castaneous. Procoxa and extreme base of mesocoxa pale; metafemora castaneous black except pale base and apex; and tibia black except pale extreme base and distal region. Dorsum entirely furnished with pale soft setae and simple black semierect setae; anterior region of hemelytron covered with uniformly distributed golden flattened appressed scale setae lined by posterior margin of aggregated scale setae; rows or aggregation of scale setae on scutellum and hemelytron: scutellum with two bunch on either later side and; corium with two rows of scale setae, one on anterior region at the level of posterior corner of the scutellum and other posteriorly on subapical region of clavus and continuous; base of cuneus without aggregation of scale setae. Head and pronotum partly shagreen; labium reaching apex of mesocoxae. Endosoma: J-like, a median spine without branch.

Female. Similar in color and texture as males. Sclerotized rings assymetrical and oval; dorsal labiate plate chitinized.

Host plant: *Artemisia* sp. (Asteraceae).

Biology: *Pilophorus typicus* is highly populated and most common species among the genus. They are usually aggregated with large number of ants, mostly in *Artemisia* plants. The occurring host plant usually bears aphids but it is hard to assume that they are predatory without any proof of observation.

Distribution: Korea, China, Japan, Taiwan.

Distribution in Korea: South Korea: CB, CN, GB, GN (Duwal et al., 2016).

Material examined: South Korea, CB: 1♂ (Sudae, Nami, Cheongwon, 7.vi.2008, S.W. Park); 1♂ (Deokam, Naesu, Cheongwon, 22.vi.2008, S.W. Park); 5♂ (Guksa, Oksan, Cheongwon, 4.x.2008, S.W. Park); 2♂, 2♀ (Jeokeum, Naebuk, 27.ix.2008, S.W. Park). CN: 1♀ (Baekja, Susin, Cheonan, 5.x.2008, S.W. Park). GB: (Mt. Palgongsan, 12.viii.2008, R.K. Duwal and S. Jung). GN: 2♂, 2♀ (Geoje Arboretum, Geoje, 25−27.viii.2008, R.K. Duwal and S. Jung); 1♀ (Is. Jisimdo, Geoje, 28−29.viii.2008, R.K. Duwal and S. Jung). JN: 2♂ (Mt. Chusan, Gwangyang, 16−19.vi.2008, R.K. Duwal and S. Jung).

Tribe Semiini Knight, 1923

The members of tribe Semiini are usually distinguished by following characters; Compound eye and anterior margin of the pronotum parallel; scent gland rather small; have two types of endosomal structure, elongate and tubular, without distinctly developed secondary gonopore or endosoma relatevely broad, medially T-shaped, with distinctly developed secondary gonopore and lateral structure.

The Semiini, consisting of approximately one hundred and eighty five species in thirty three genera worldwide, and shows high diversity in Australia and New Zealand (Schuh and Menard, 2013). The type genus *Exocarpocoris* Weirauch was originally described from Australia (Weirauch, 2007).

Genus *Tytthus* Fieber, 1864

Type species: *Capsus geminus* Flor, 1860; Subsequent designation.

Tytthus Fieber, 1896: 82; Schuh, 1974: 135; 1995: 247; Kerzhner and Josifov, 1999: 441; Yasunaga, 2001b: 182.

Diagnosis: Recognized by small, parallel sided body; often with pale spots on head; inverted vase shaped pronotum, entirely or partially black or dark brown; slender and narrow femora; narrow abdomen (male) with more or less triangular pygophore; simple endosoma curved like C-, or S-, or U-shape, with weaky developed or obscure secondary gonopore.

Distribution: Holarctic region, Oriental region.

Remarks: The genus comprises of about twenty species in the world and six in Palaearctic region (Schuh, 1995; Kerzhner, 1999). Members of this species are usually considered as predatory, feeding on eggs, and homopterans pest of rice and also some species are used as effective biological control agent of sugarcane (Wheeler, 2001).

90. *Tytthus chinensis* (Stål, 1859) (Plate 9; 42F−J; Table 1)

Capsus chinensis Stål, 1859: 258.

Tytthus chinensis Schuh, 1984: 187; 1995: 248; Kerzhner and Josifov, 1999: 441; Yasunaga, 2001b: 182.

Tytthus koreanus Josifov and Kerzhner, 1972: 171; Schuh, 1995: 249; Kerzhner and Josifov, 1999: 441; Kwon et al., 2001: 184; Henry, 2012: 25.

Male. Body small, parallel. Generally pale appearance; head black with pale spots on inner lateral sides

of eyes; pronotum either entirely black, or anterior region pale variously, mesoscutum, and scutellum black; hemelytron entirely pale, and tinged with pale brown, membrane pale brown. Venter, sternum black, abdominal segments laterally castaneous. Antennae entirely black except base and apex of segment I pale. Labium pale with dark brown apex. All coxae and trochanters pale with extreme bases of coxae brown or grayish; all femora pale or faintly tinged with red; metatibia pale with black base and furnished with brown spines and spots absent. Dorsum furnished with uniformly distributed pale brown setae. Head: Projecting anteriorly, convex; head, pronotum, mesoscutum and scutellum shagreen; labium surpass apex of mesocoxae. Endosoma: Shape C-like in opposite side, apex blunt and curved inward; secondary gonopore obscure. Phallotheca: Narrow, tapers towards apex. Left paramere: Body small, anterior process wide, subapically splayed out and apex blunt and somewhat beakshaped. Right paramere: Tiny, oval, margin of apex curved.

Female. Similar in color and texture as male. Sclerotized rings asymmetrical, narrow, nearly triangular and thin rimmed.

Host plant: Unknown.

Biology: Since *T. chinensis* are abundantly collected in light trap around the paddy field, it is assumed that these bugs probably reside on rice field.

Distribution: Korea, Cambodia, China, Japan, Russia, Taiwan.

Distribution in Korea: North Korea: HB, PN, South Korea: CB, GB, GW (Kwon et al., 2001; Duwal et al., 2016).

Material examined: South Korea, CN: 1♀ (Is. Wonsando, Ocheon, Boryeong, 5.viii.2008, on light trap, R.K. Duwal). GB: 5♂, 17♀ (Is. Ulleungdo, 8.viii.2010, on light trap, R.K. Duwal).

Remarks: According to Henry (2012), Palaearctic *Tytthus koreanus* was synonymized to *T. chinensis* based on the male genital structures.

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PLATES

PLATES

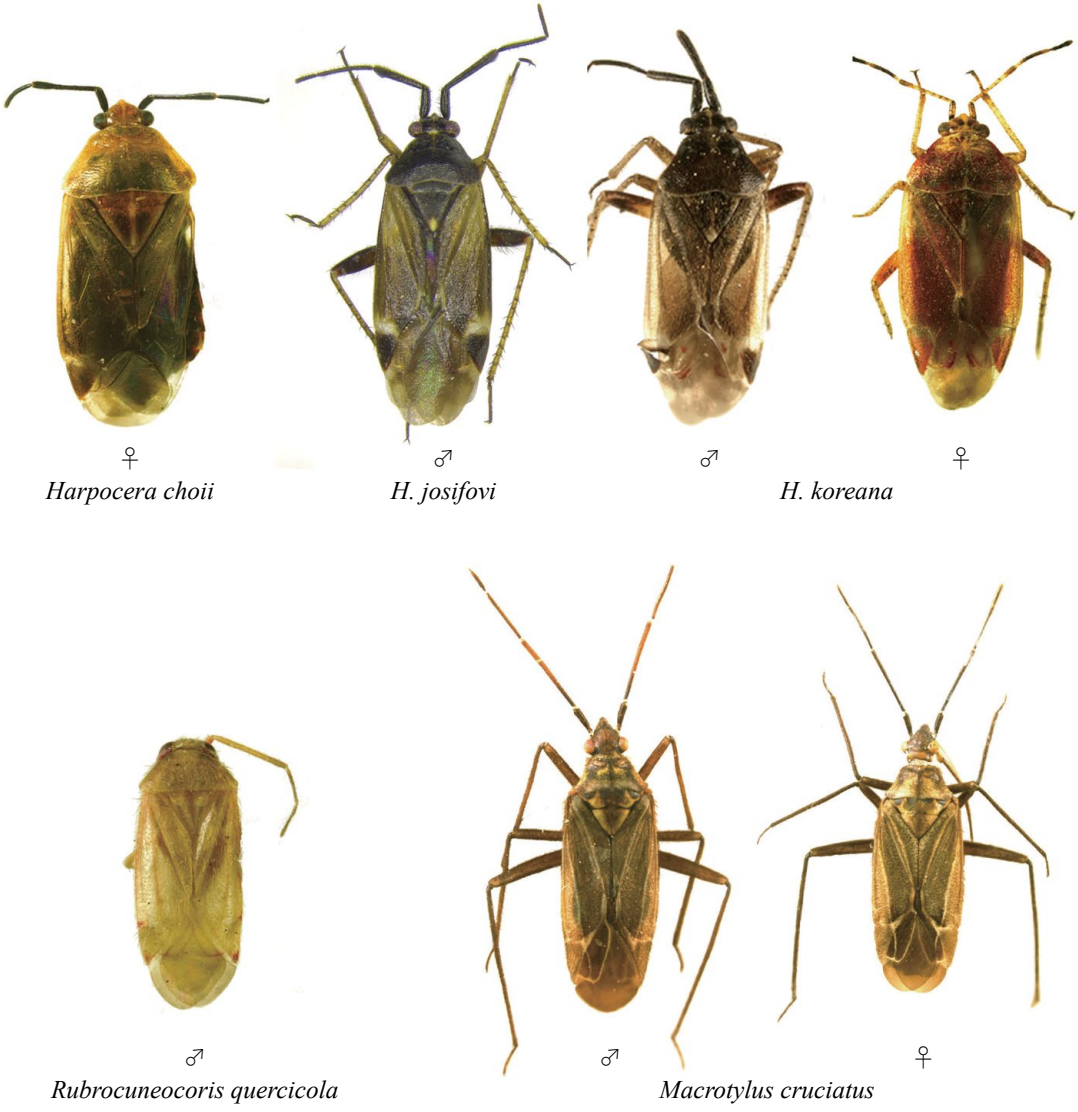

Plate 1. Dorsal habitus of Korean Phylinae 1.

♂ *Moissonia befui*

♀ *M. kalopani*

♂ *M. yasunagai*

♂ *Sejanus potanini*

♂ ♀ *Pseudophylus stundjuki*

Plate 2. Dorsal habitus of Korean Phylinae 2.

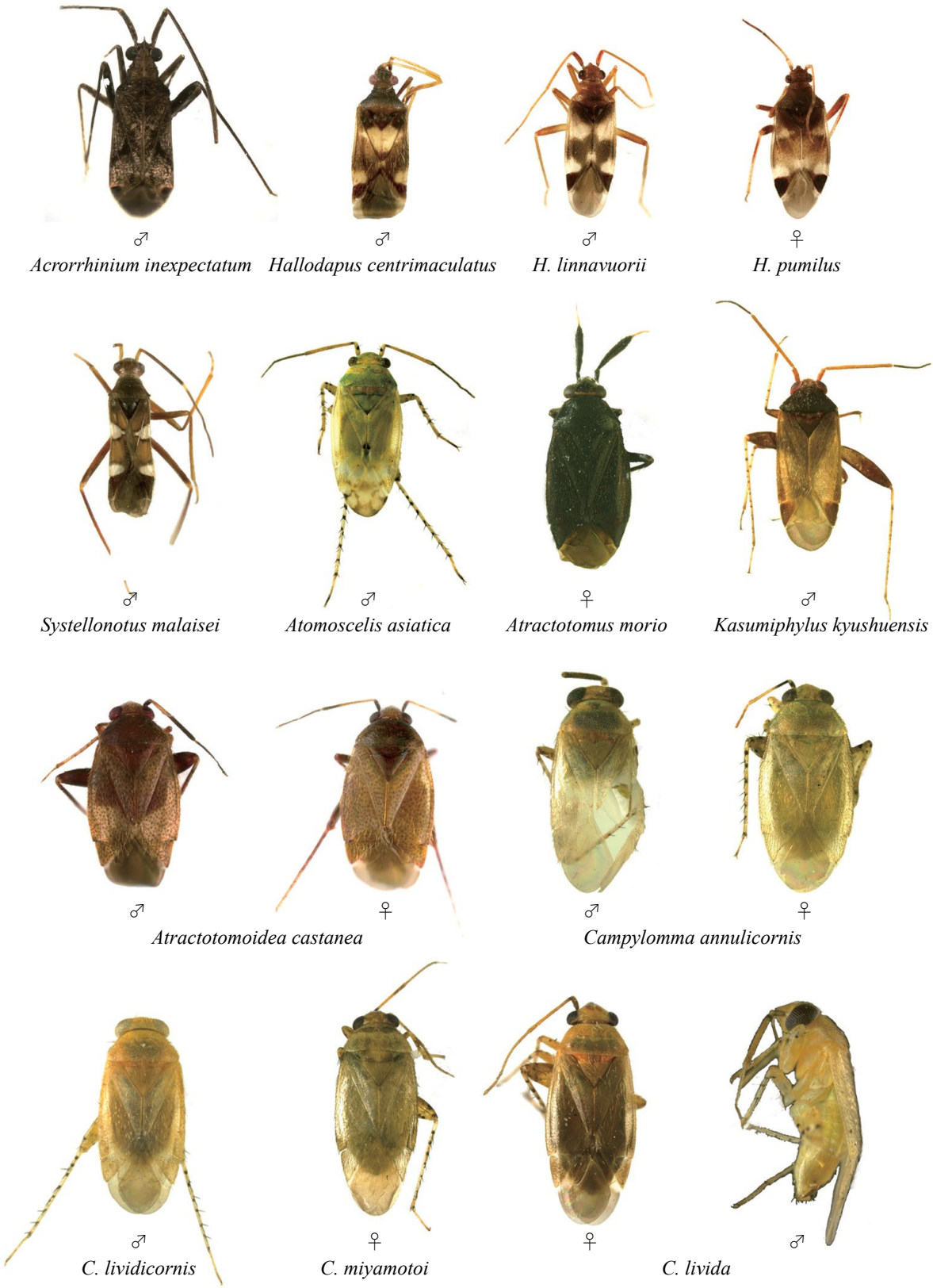

Plate 3. Dorsal habitus of Korean Phylinae 3.

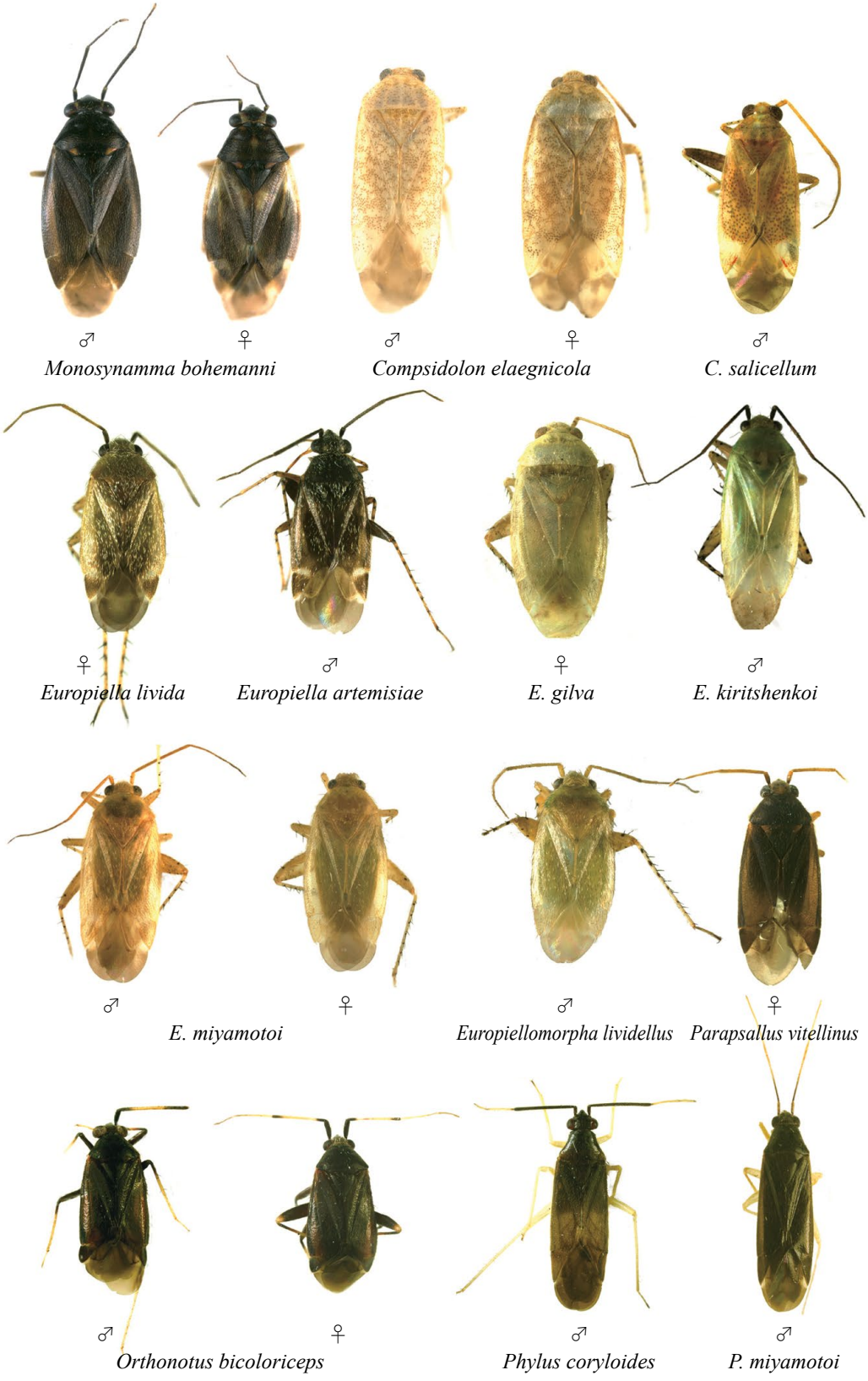

Plate 4. Dorsal habitus of Korean Phylinae 4.

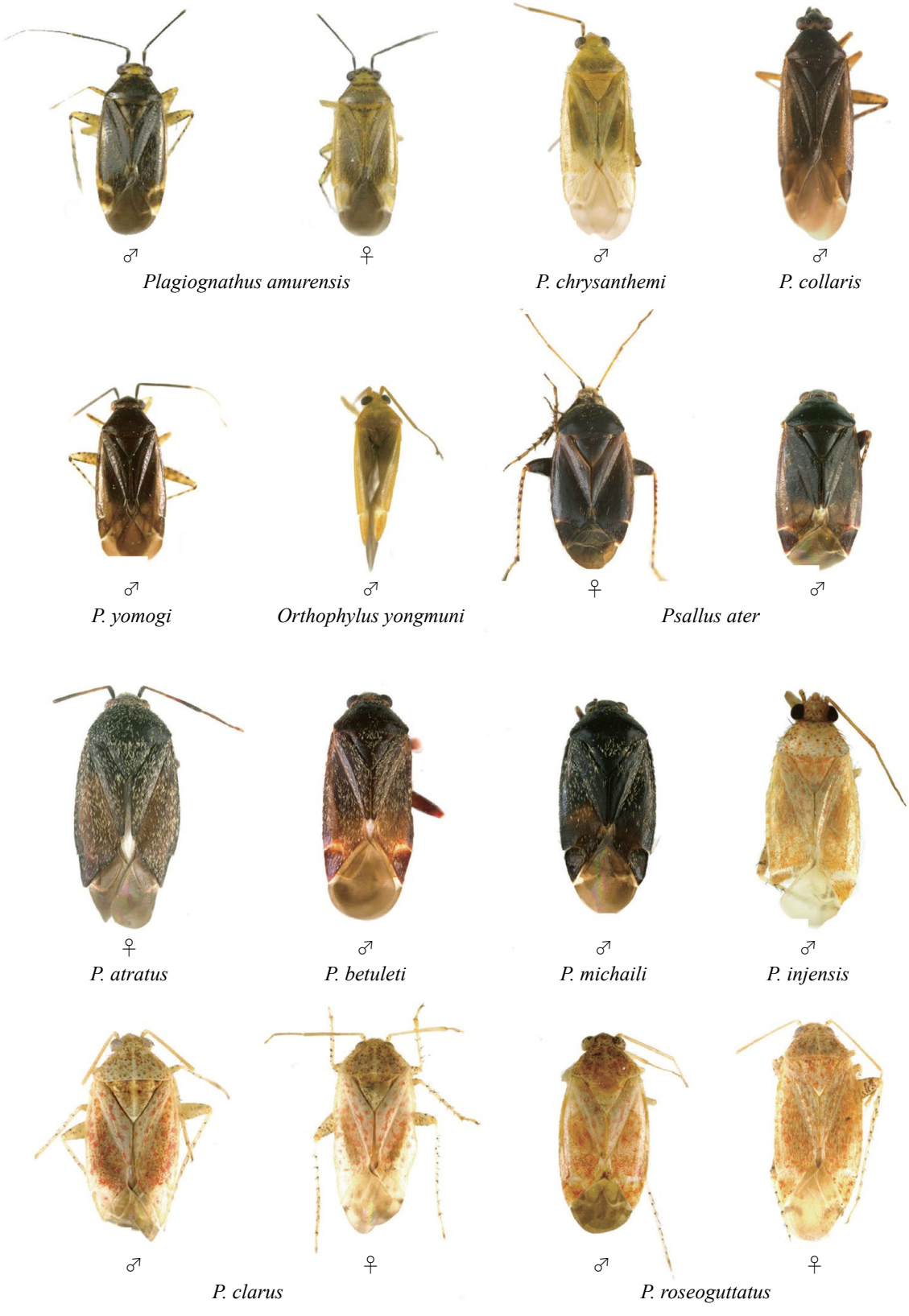

Plate 5. Dorsal habitus of Korean Phylinae 5.

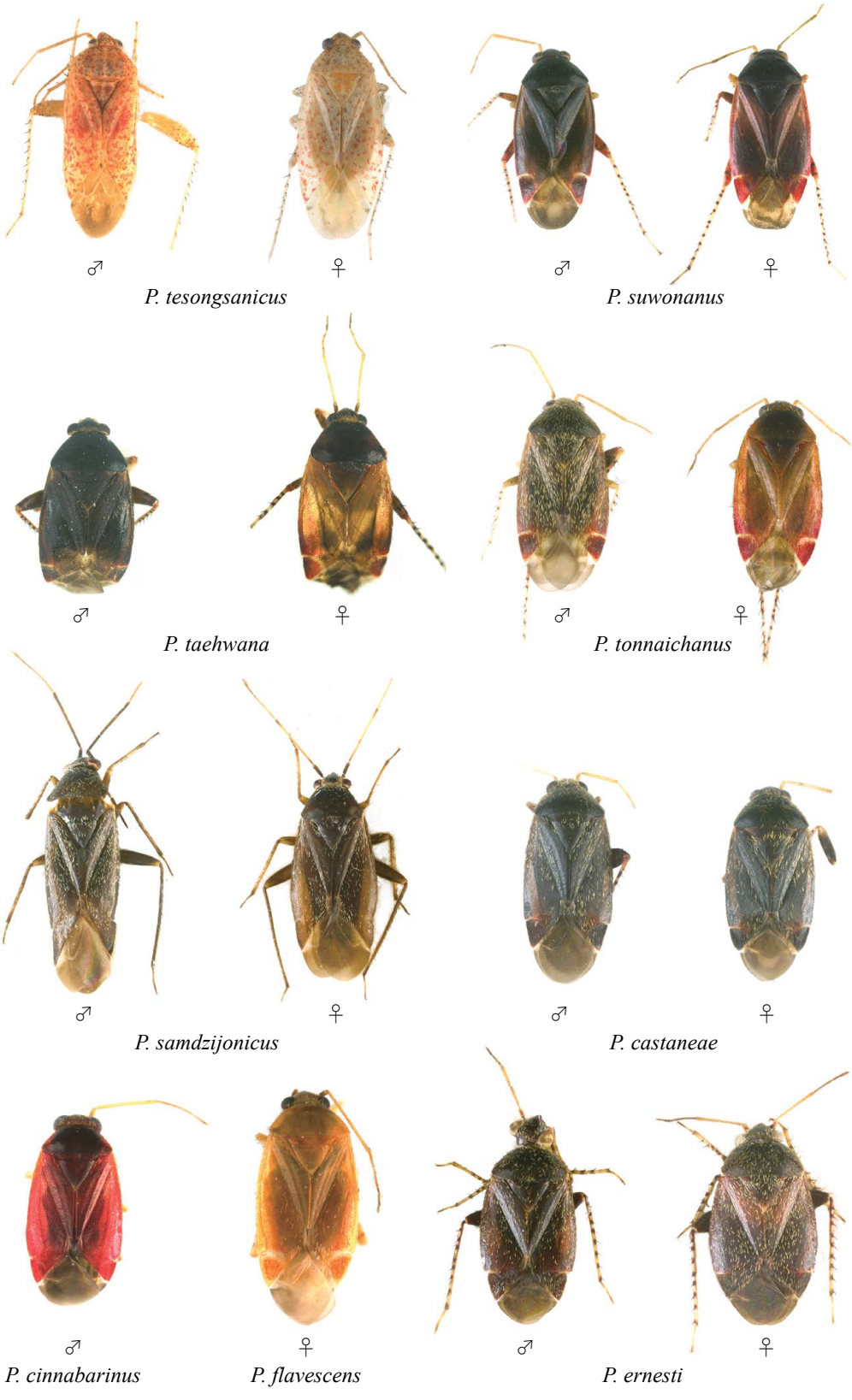

Plate 6. Dorsal habitus of Korean Phylinae 6.

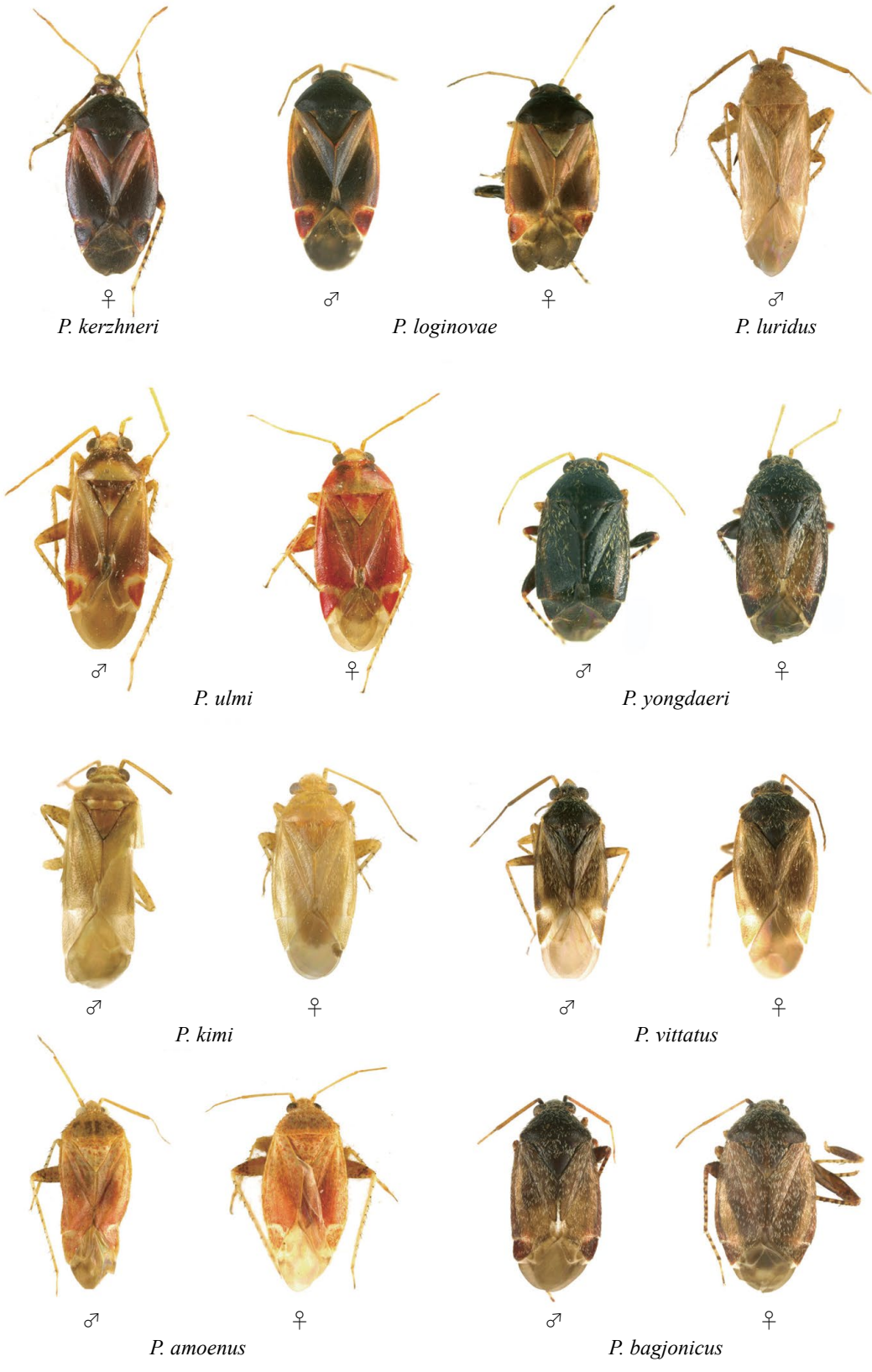

Plate 7. Dorsal habitus of Korean Phylinae 7.

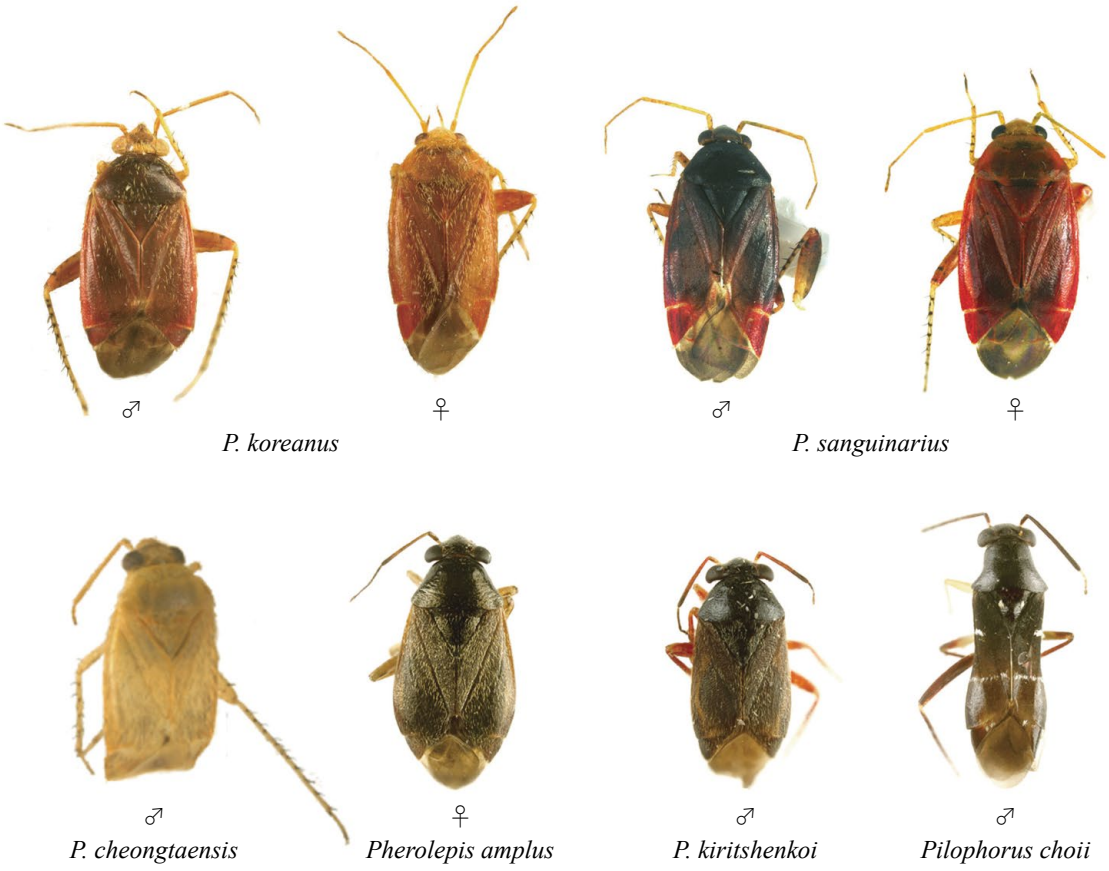

Plate 8. Dorsal habitus of Korean Phylinae 8.

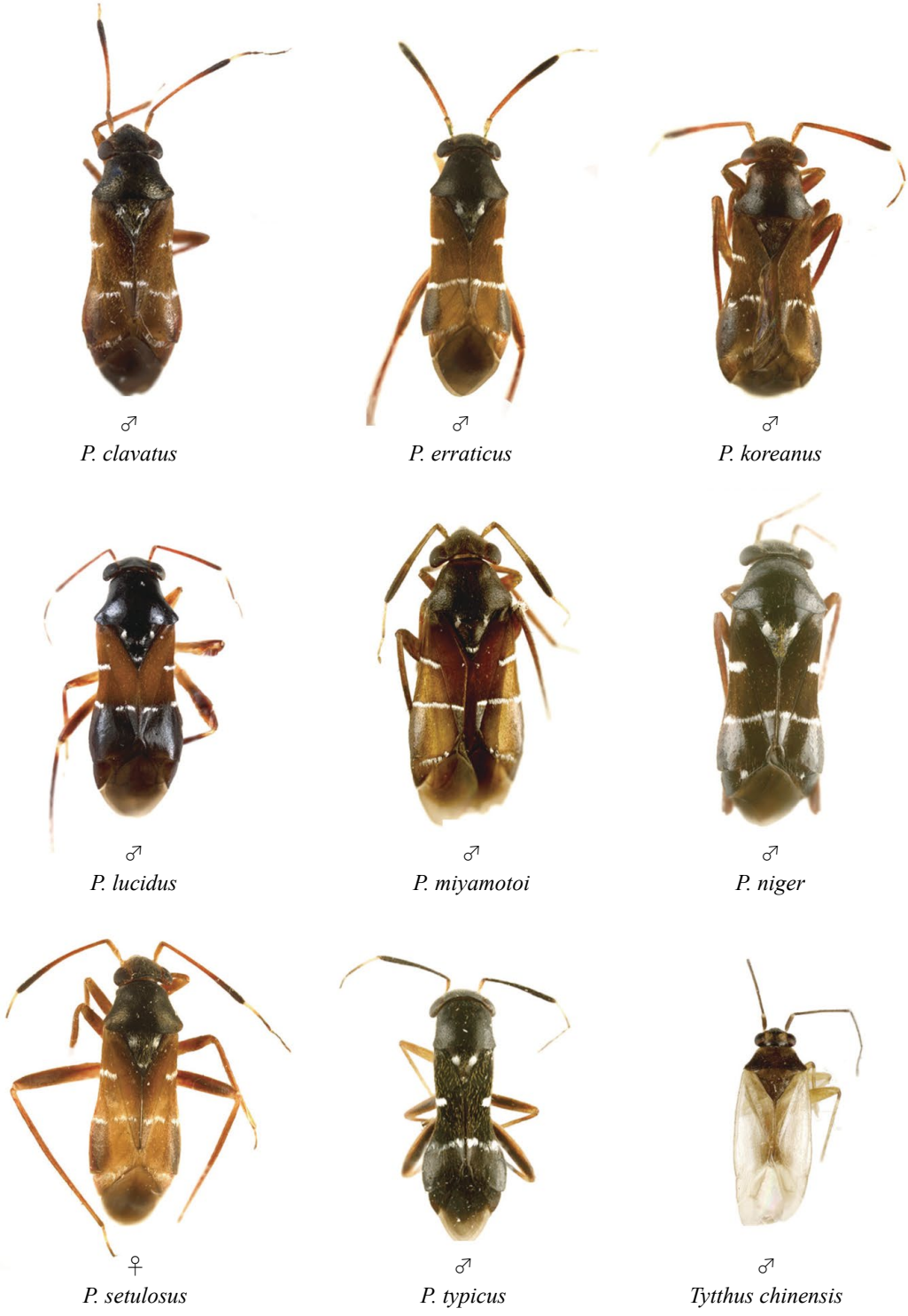

Plate 9. Dorsal habitus of Korean Phylinae 9.

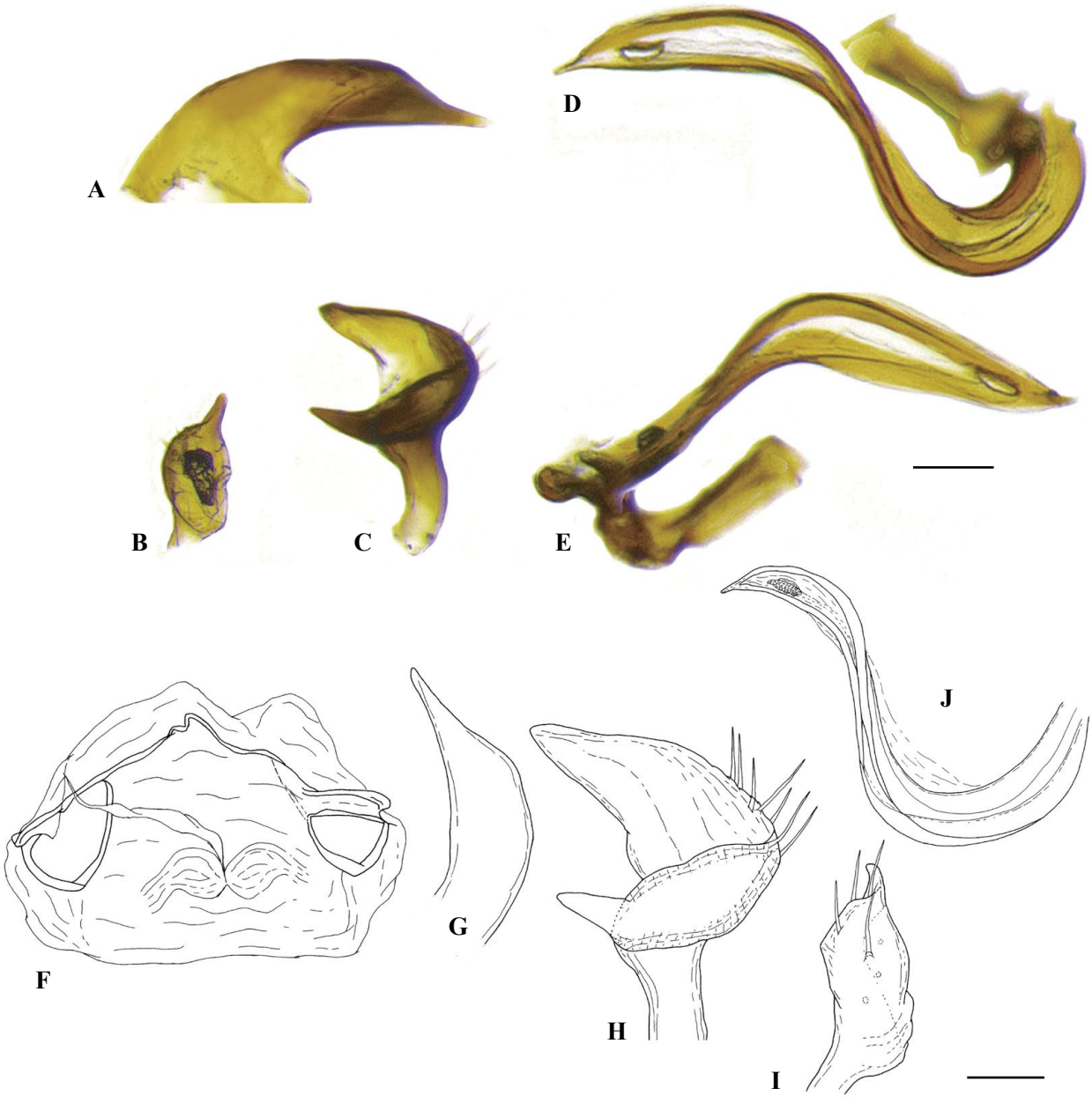

Plate 10. Genital structure of tribe Cremnorrhini: A−E. *Harpocera josifovi*. F−J. *Harpocera koreana*. A−E, G−J. Male genitalia. F. Female genitalia. D, E, J. Endosoma. C, H. Left paramere. B, I. Right paramere. A, G. Phallotheca. F. Bursa copulatrix. Scale bars: 0.1 mm.

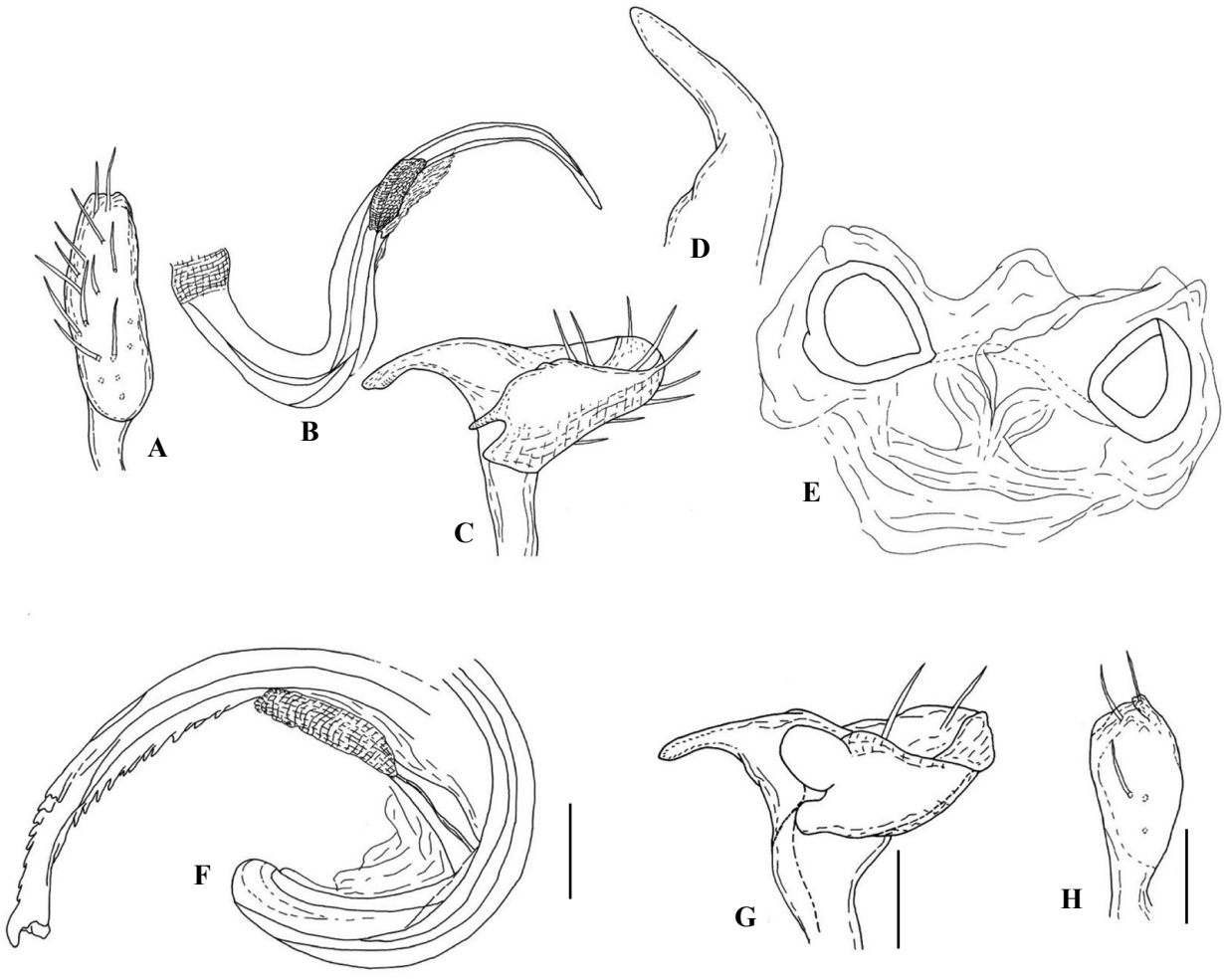

Plate 11. Genital structure of tribe Cremnorrhini and Decomiini: A−E. *Macrotylus cruciatus*. F−H. *Rubrocuneocoris quercicola*. A−D, F−H. Male genitalia. E. Female genitalia. B, F. Endosoma. C, G. Left paramere. A, H. Right paramere. D. Phallotheca. E. Bursa copulatrix. Scale bars: 0.1 mm.

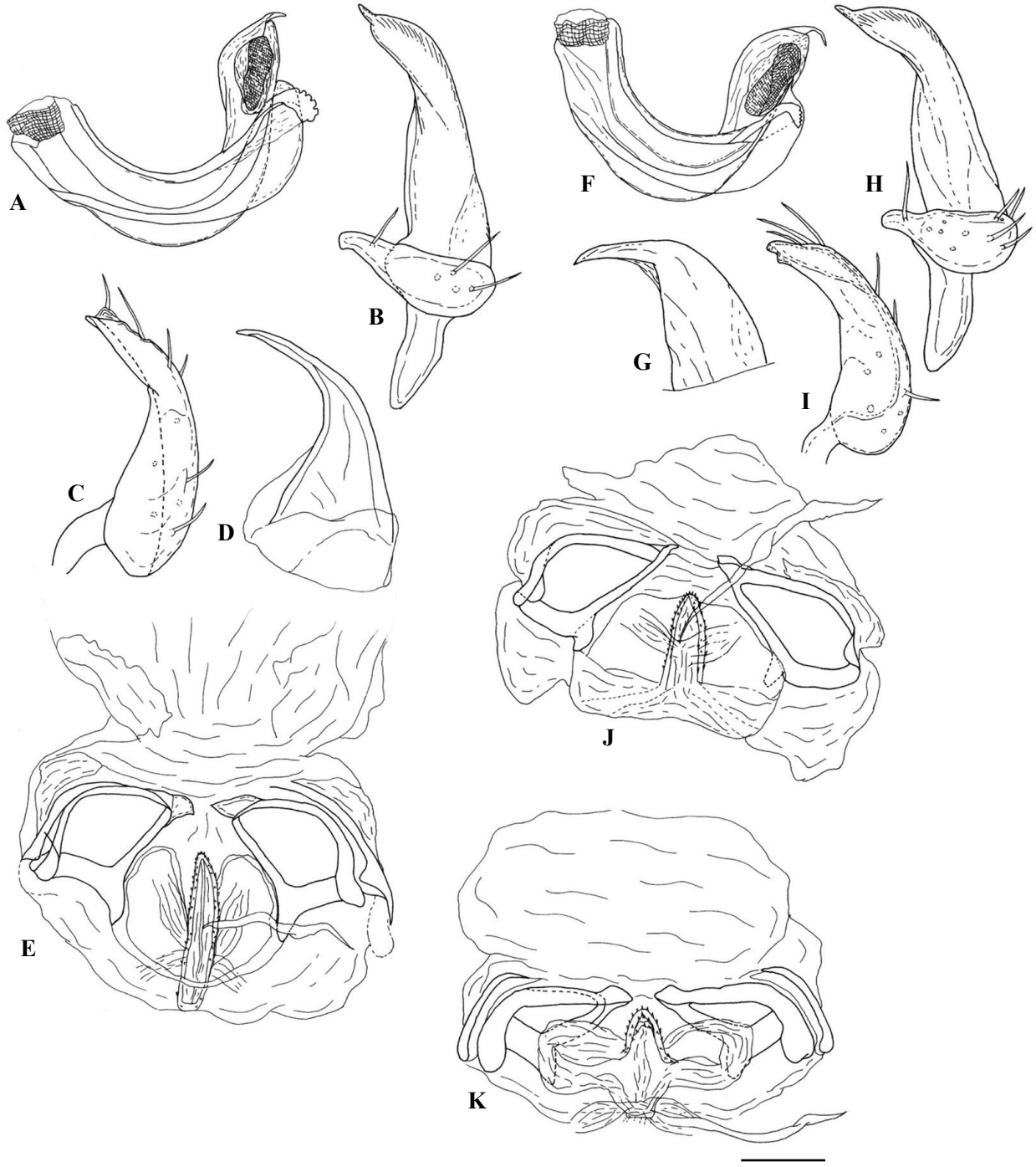

Plate 12. Genital structure of tribe Exaeretini: A−E. *Moissonia kalopani*. F−J. *M. yasunagai*. K. *M. befui*. A−D, F−I. Male genitalia. E, J, K. Female genitalia. A, F. Endosoma. B, H. Left paramere. C, I. Right paramere. D, G. Phallotheca. E, J, K. Bursa copulatrix. Scale bar: 0.1 mm.

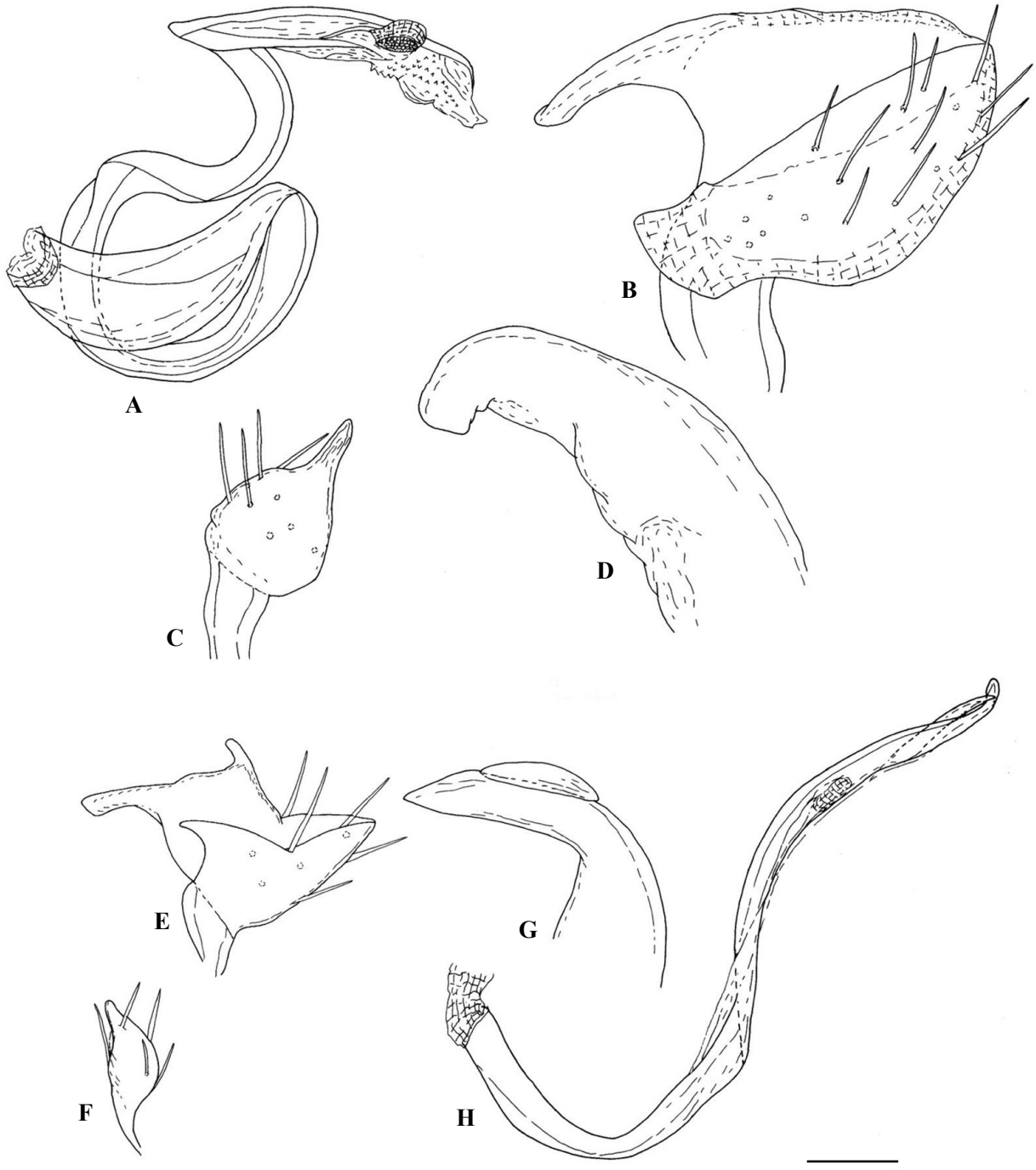

Plate 13. Genital structure of tribe Hallodapini. A−D. *Acrorrhinium inexpectatum*. E−H. *Hallodapus centrimaculatus*. A, H. Endosoma. B, E. Left paramere. C, F. Right paramere. D, G. Phallotheca. Scale bar: 0.1 mm.

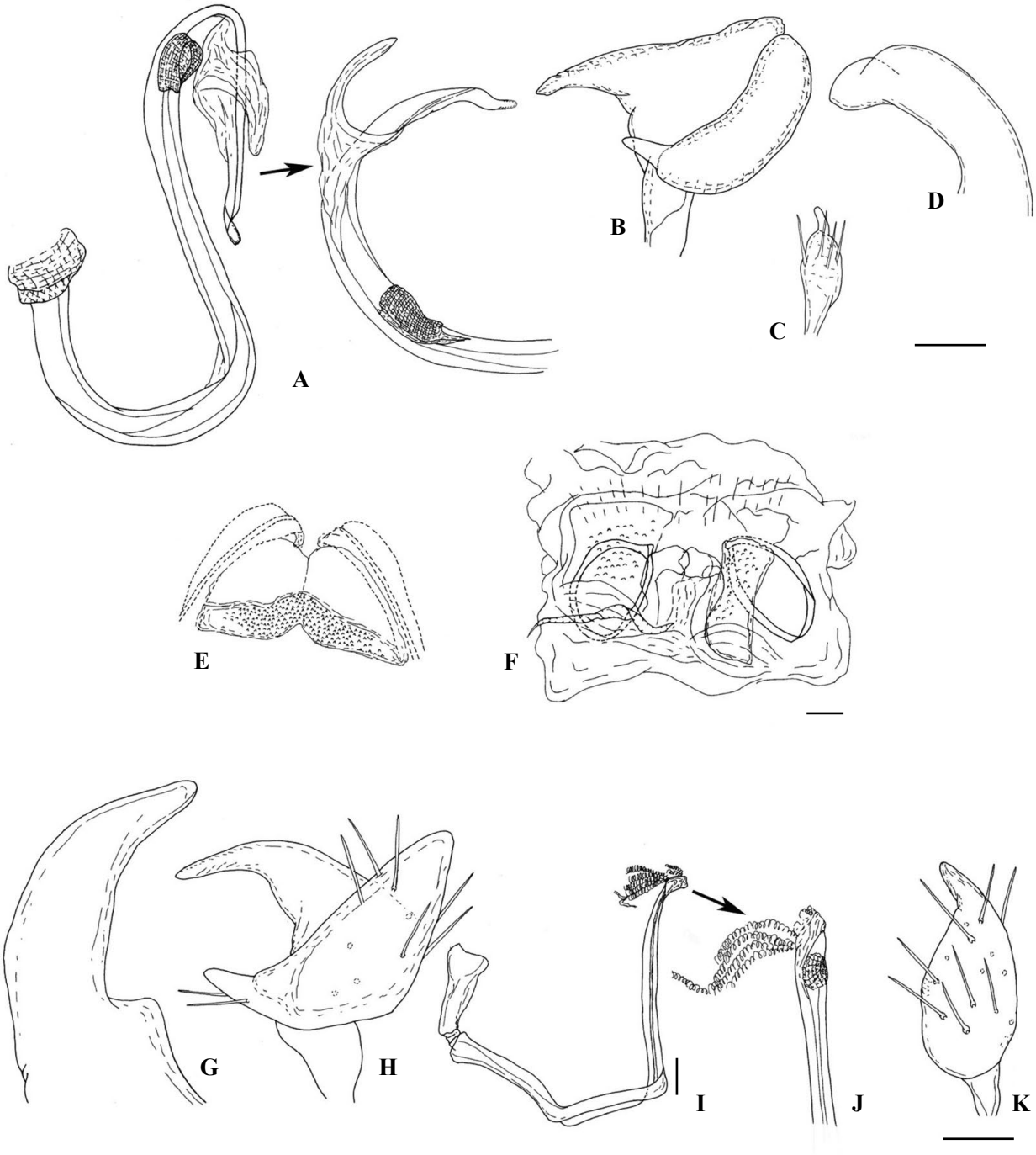

Plate 14. Genital structure of tribe Hallodapini. A−D. *Hallodapus linnavuorii*. E, F. *H. pumilus*. G−K. *Systellonotus malaisei*. A−D, G−K. Male genitalia. E, F. Female genitalia. A, I, J. Endosoma. B, H. Left paramere. C, K. Right paramere. D, G. Phallotheca. E. Posterior wall. F. Bursa copulatrix (Dorsal labiate plate). Scale bars: 0.1 mm.

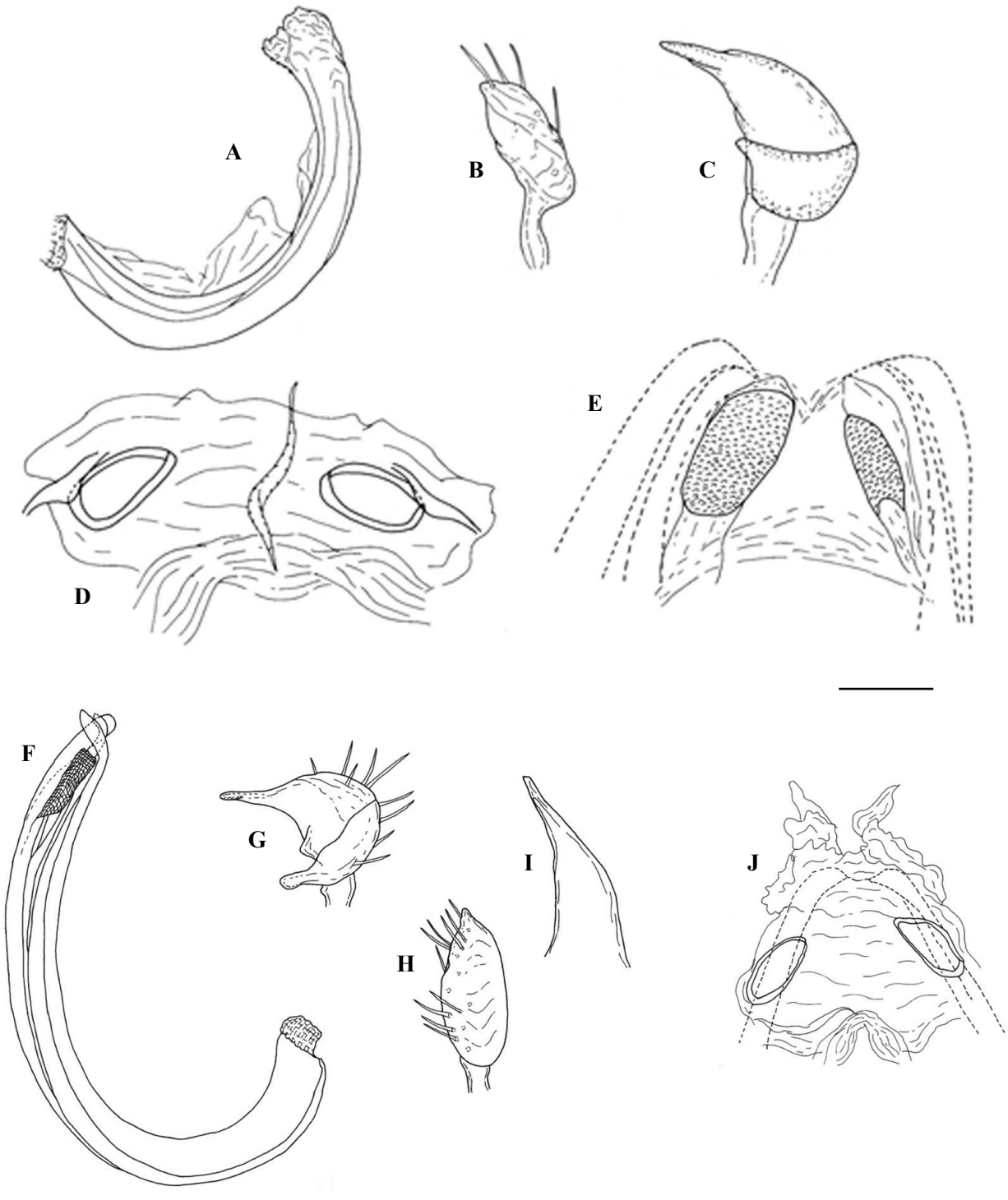

Plate 15. Genital structure of tribe Leucophoropterini. A−E. *Sejanus potanini*. F−J. *Pseudophylus stundjuki*. A−C, F−I. Male genitalia. D, E, J. Female genitalia. A, F. Endosoma. C, G. Left paramere. B, H. Right paramere. I. Phallotheca. E. Posterior wall. D, J. Bursa copulatrix (Dorsal labiate plate). Scale bar: 0.1 mm.

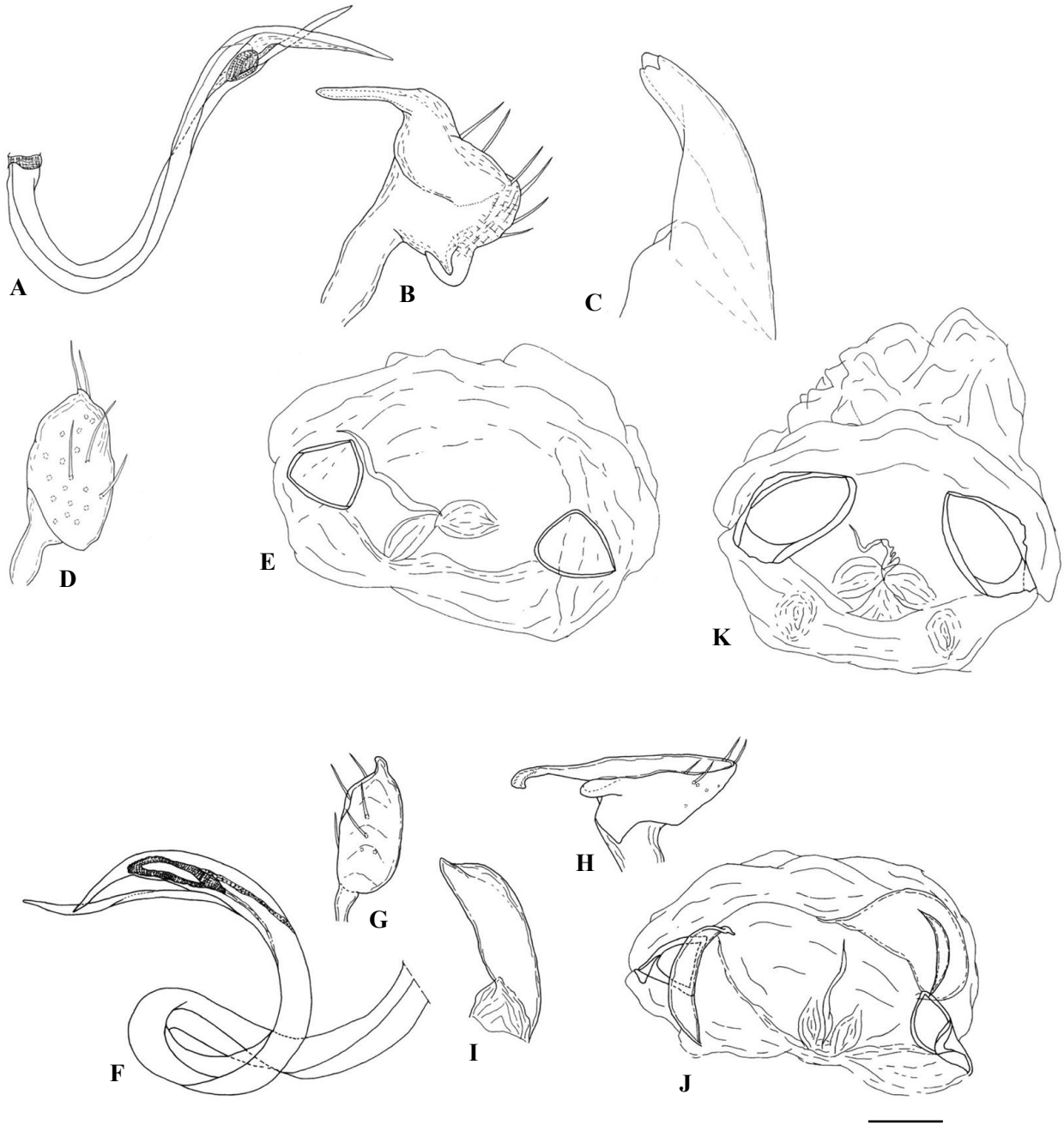

Plate 16. Genital structure of Nasocorini. A−E. *Atomoscelis asiatica*. F−J. *Atractotomoidea castanea*. K. *Atractotomus morio*. A, F. Endosoma. B, H. Left paramere. D, G. Right paramere. C, I. Phallotheca. E, J, K. Bursa copulatrix. Scale bar: 0.1 mm.

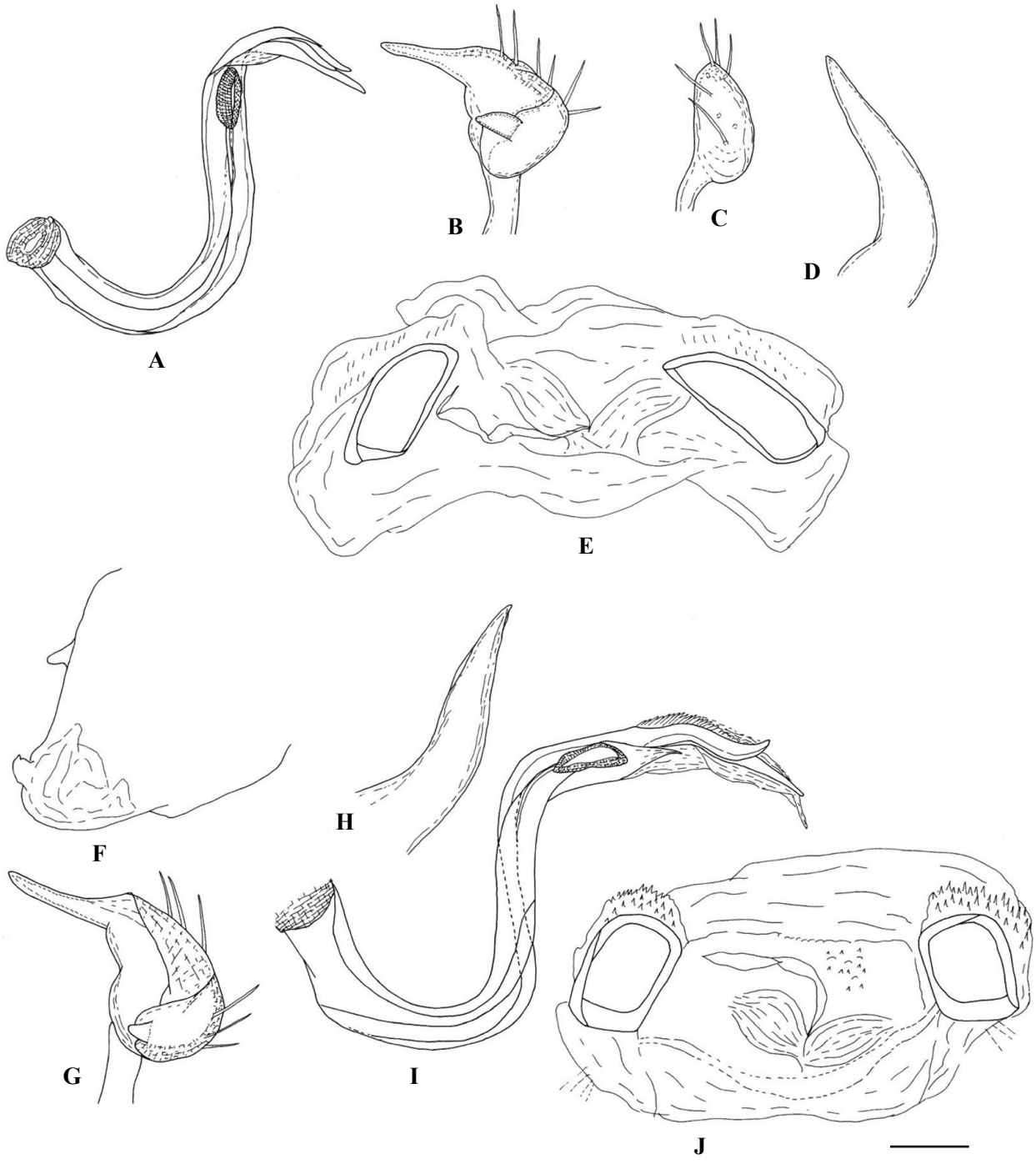

Plate 17. Genital structure of Nasocorini. A−E. *Campylomma annulicornis*. F−J. *C. livida*. A, I. Endosoma. B, G. Left paramere. C. Right paramere. D, H. Phallotheca. F. Pygophore. E, J. Bursa copulatrix. Scale bar: 0.1 mm.

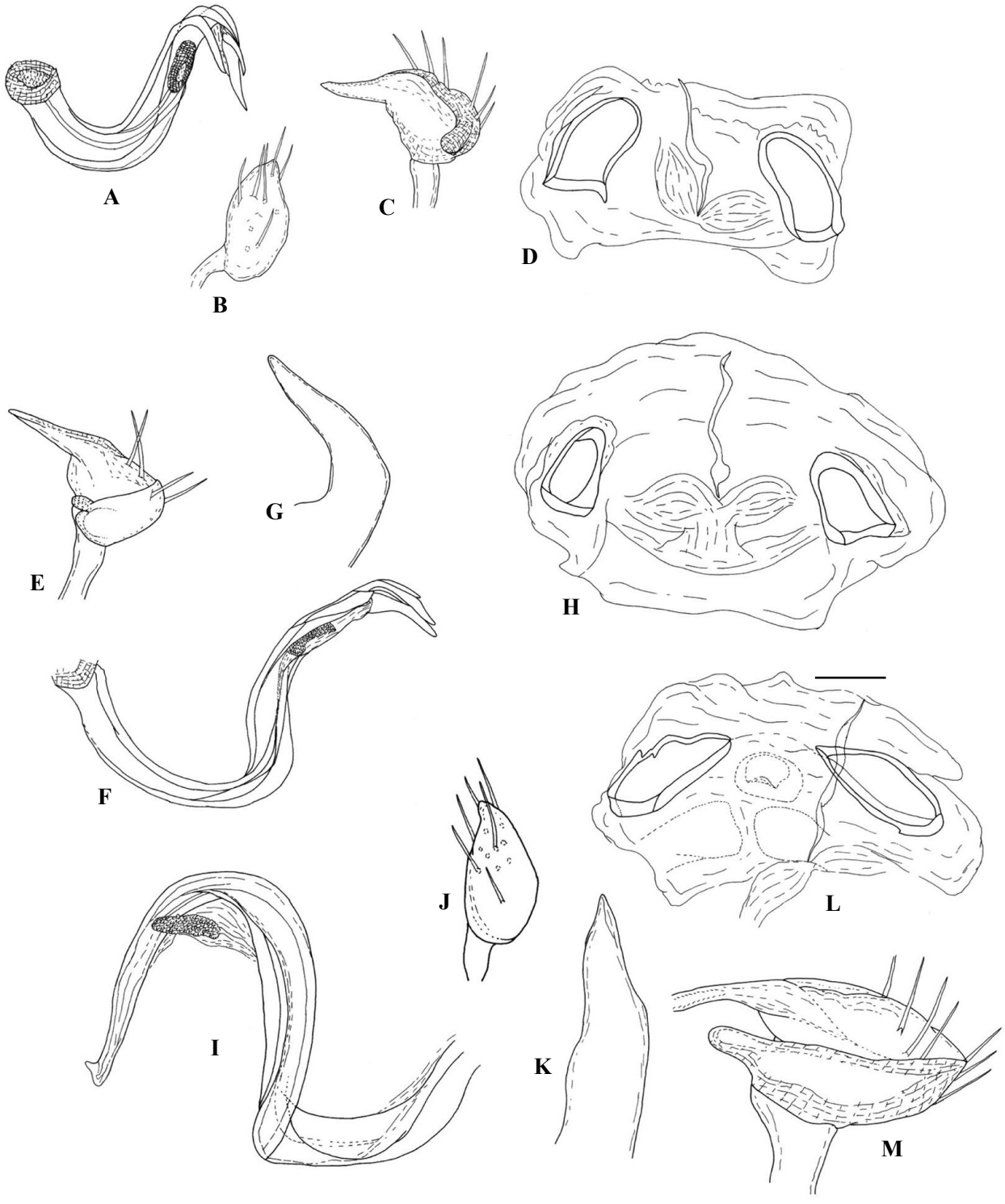

Plate 18. Genital structure of Nasocorini and Phylini. A−D. *Campylomma lividicornis*. E−H. *C. miyamotoi*. I−M. *Compsidolon salicellum*. A, F, I. Endosoma. C, E, M. Left paramere. B, J. Right paramere. G, K. Phallotheca. D, H, L. Bursa copulatrix. Scale bar: 0.1 mm.

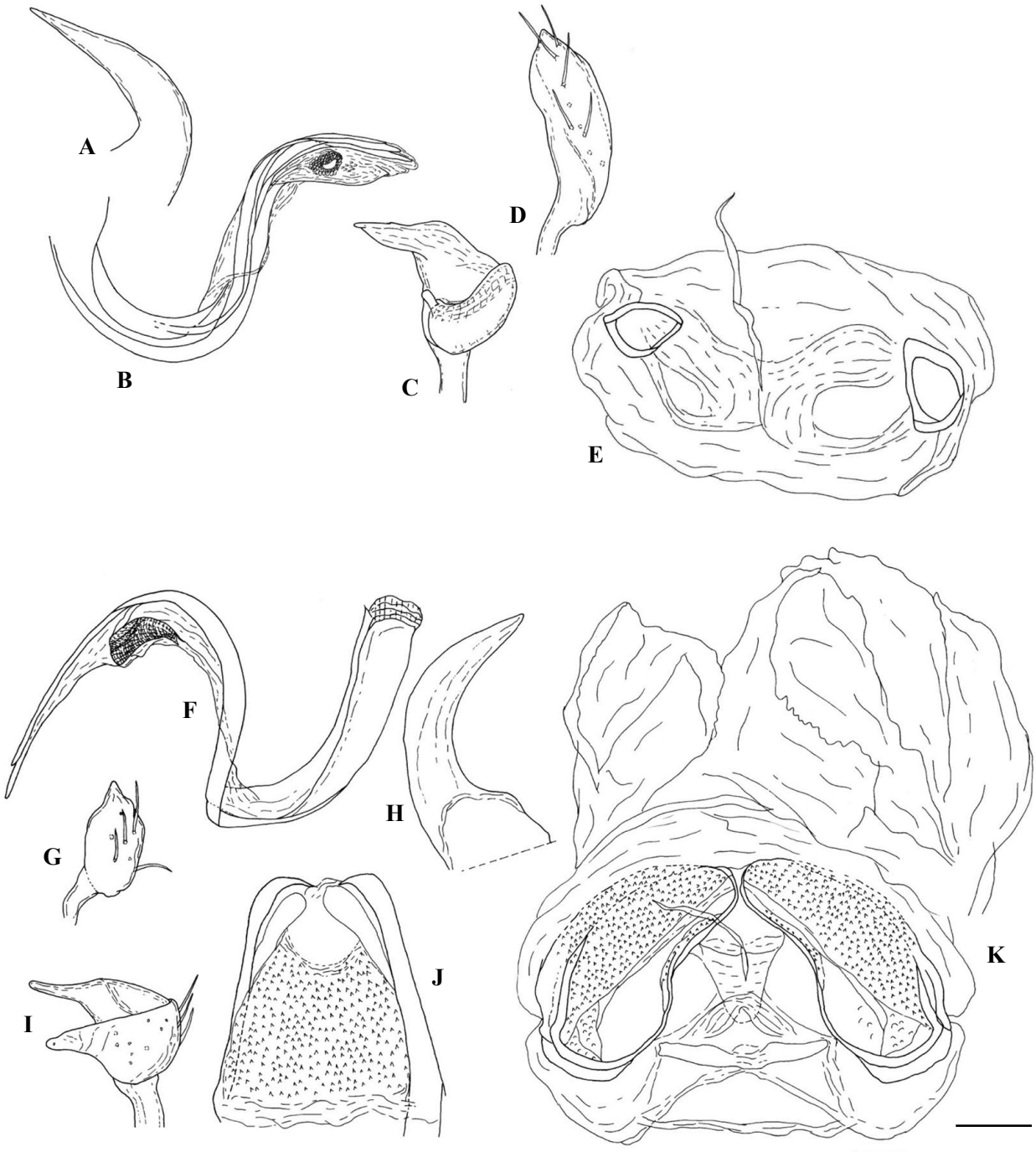

Plate 19. Genital structure of Nasocorini. A−E. *Kasumiphylus kyushuensis*. F−K. *Monosynamma bohemanni*. B, F. Endosoma. C, I. Left paramere. D, G. Right paramere. A, H. Phallotheca. E, K. Bursa copulatrix. J. Posterior wall. Scale bar: 0.1 mm.

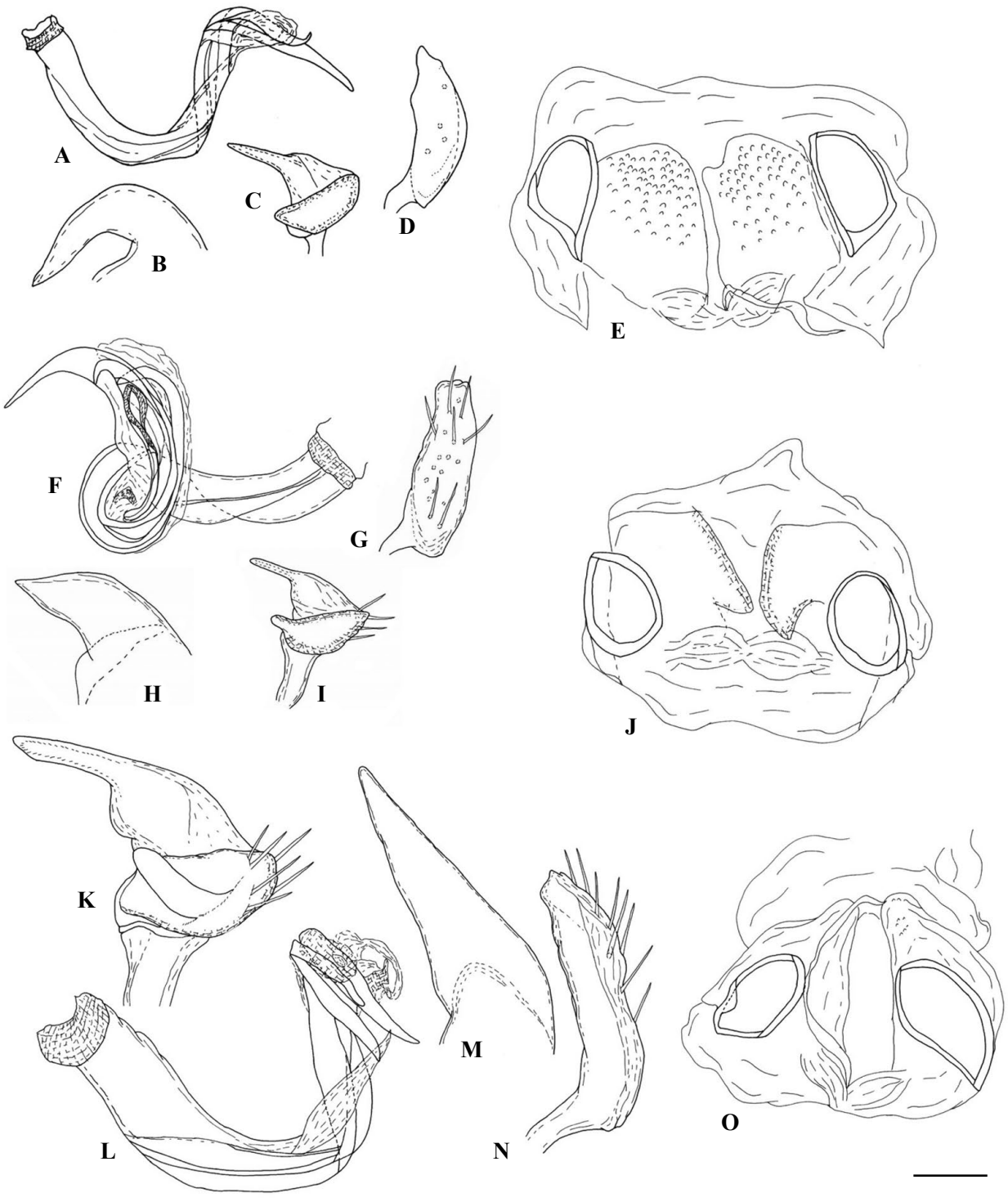

Plate 20. Genital structure of Phylini. A−E. *Europiella artemisiae*. F−J. *E. kiritshenkoi*. K−O. *E. miyamotoi*. A, F, L. Endosoma. C, I, K. Left paramere. D, G, N. Right paramere. B, H, M. Phallotheca. E, J, O. Bursa copulatrix. Scale bar: 0.1 mm.

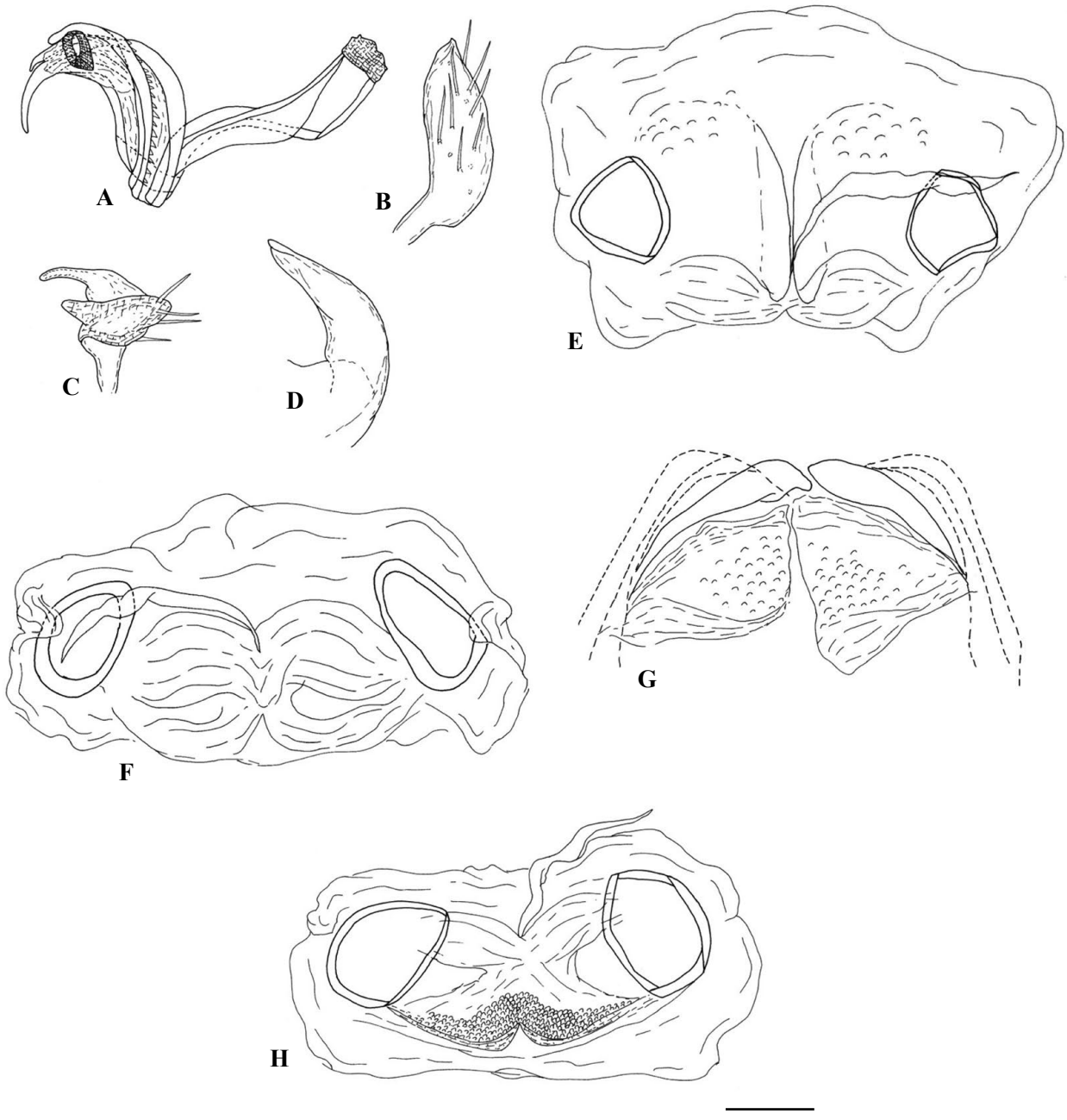

Plate 21. Genital structure of Phylini. A−E. *Europiellomorpha lividellus*. F, G. *Europiella livida*. H. *E. gilva*. A. Endosoma. C. Left paramere. B. Right paramere. D. Phallotheca. E, F, H. Bursa copulatrix. G. Posterior wall. Scale bar: 0.1 mm.

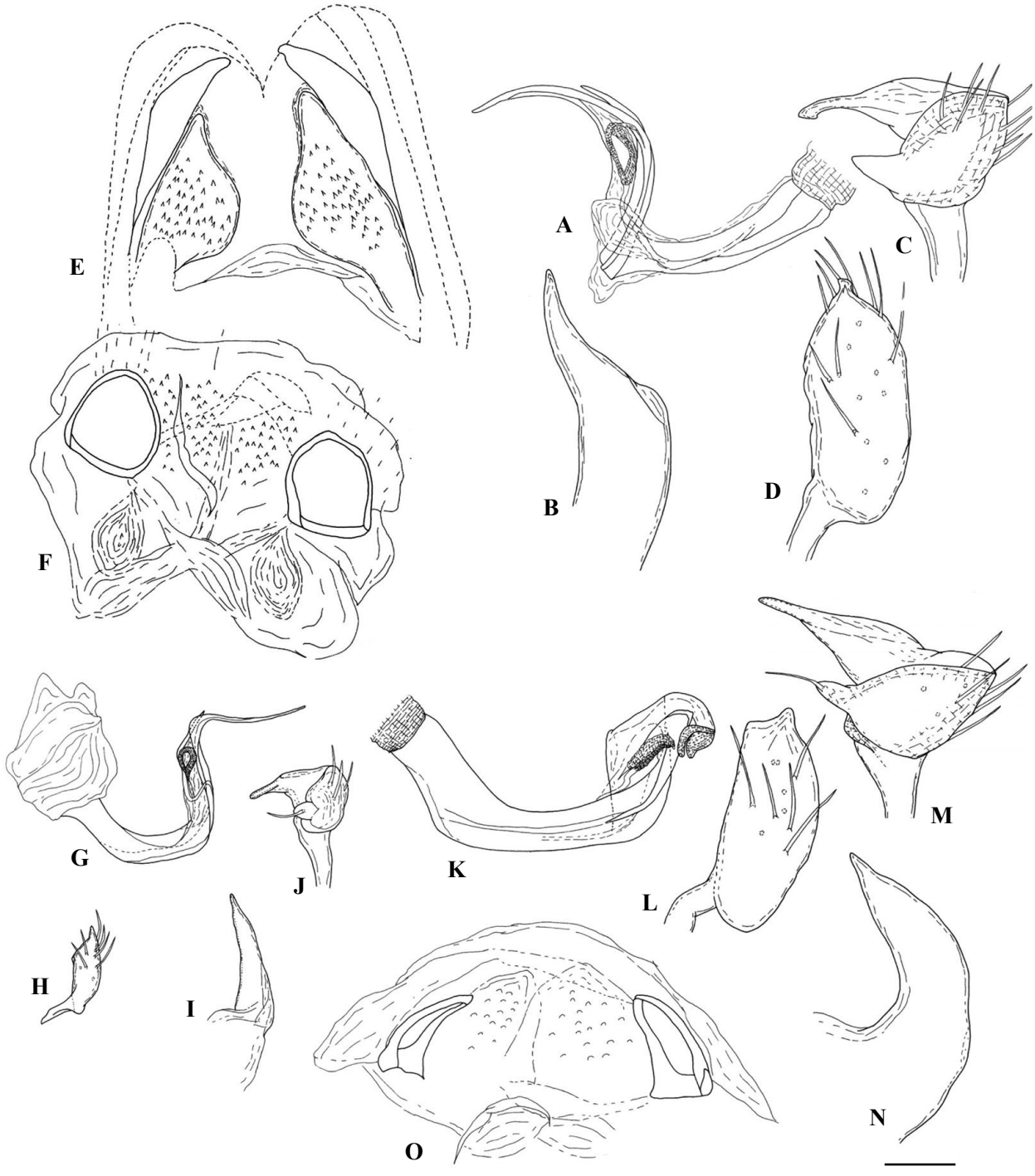

Plate 22. Genital structure of Phylini. A−F. *Parapsallus vitellinus*. G−J. *Orthophylus yongmuni*. K−O. *Orthonotus bicoloriceps*. A, G, K. Endosoma. C, J, M. Left paramere. D, H, L. Right paramere. B, I, N. Phallotheca. E. Posterior wall. F, O. Bursa copulatrix. Scale bar: 0.1 mm.

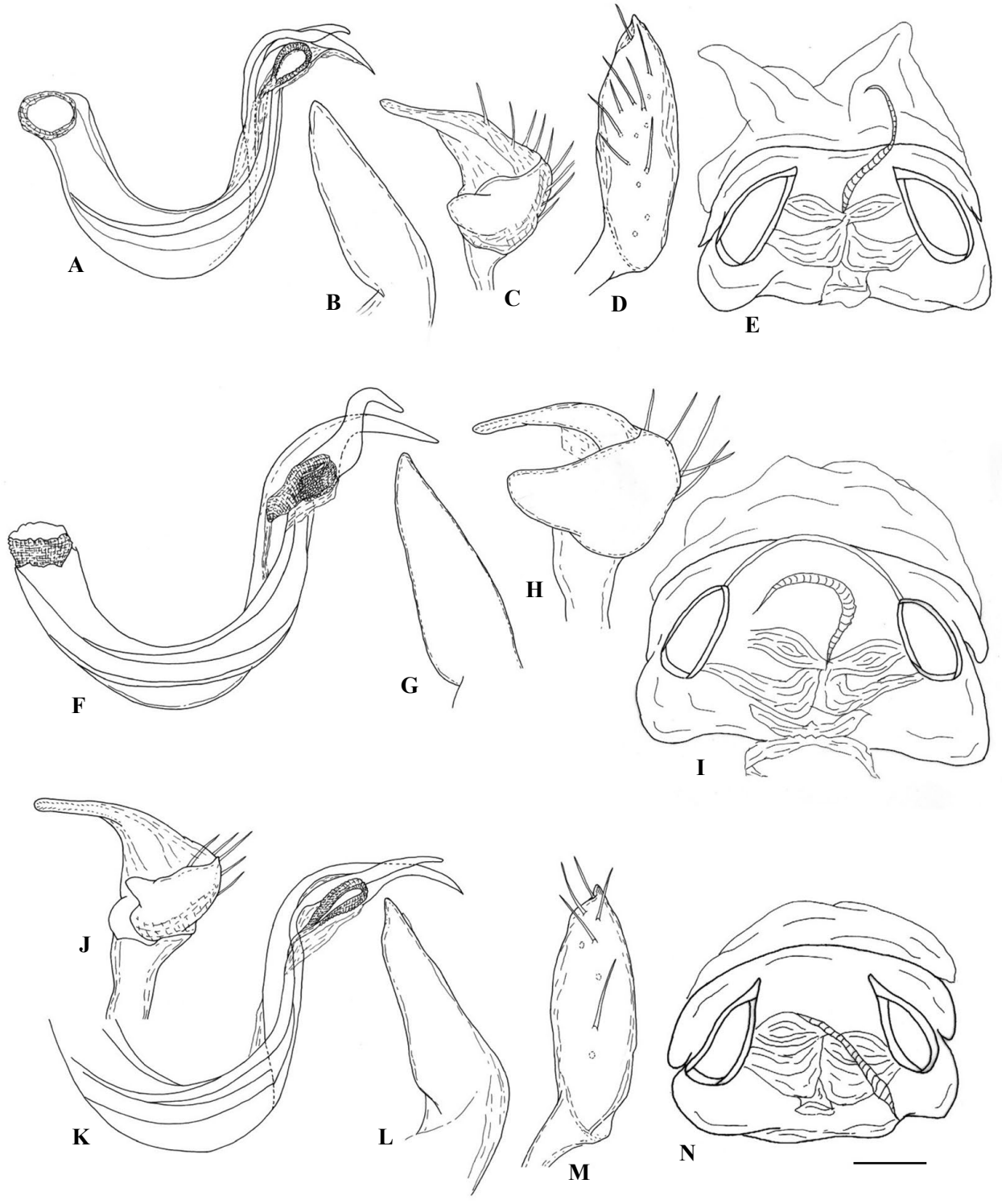

Plate 23. Genital structure of Phylini. A−E. *Plagiognathus amurensis*. F−I. *P. collaris*. J−N. *P. yomogi*. A, F, K. Endosoma. C, H, J. Left paramere. D, M. Right paramere. B, G, L. Phallotheca. E, I, N. Bursa copulatrix. Scale bar: 0.1 mm.

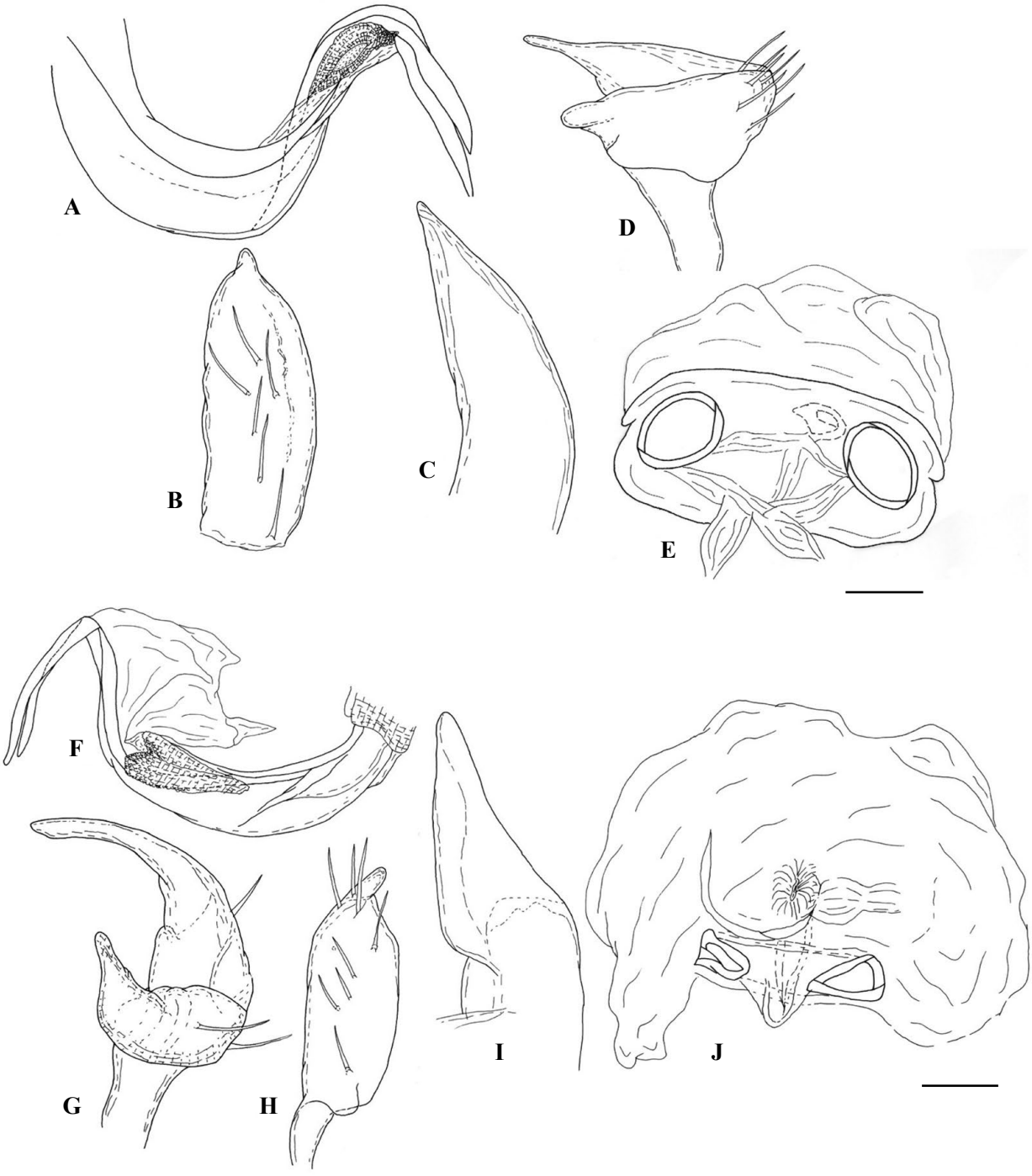

Plate 24. Genital structure of Phylini. A−E. *Plagiognathus chrysanthemi*. F−J. *Phylus coryloides*. A, F. Endosoma. D, G. Left paramere. B, H. Right paramere. C, I. Phallotheca. E, J. Bursa copulatrix. Scale bars: 0.1 mm.

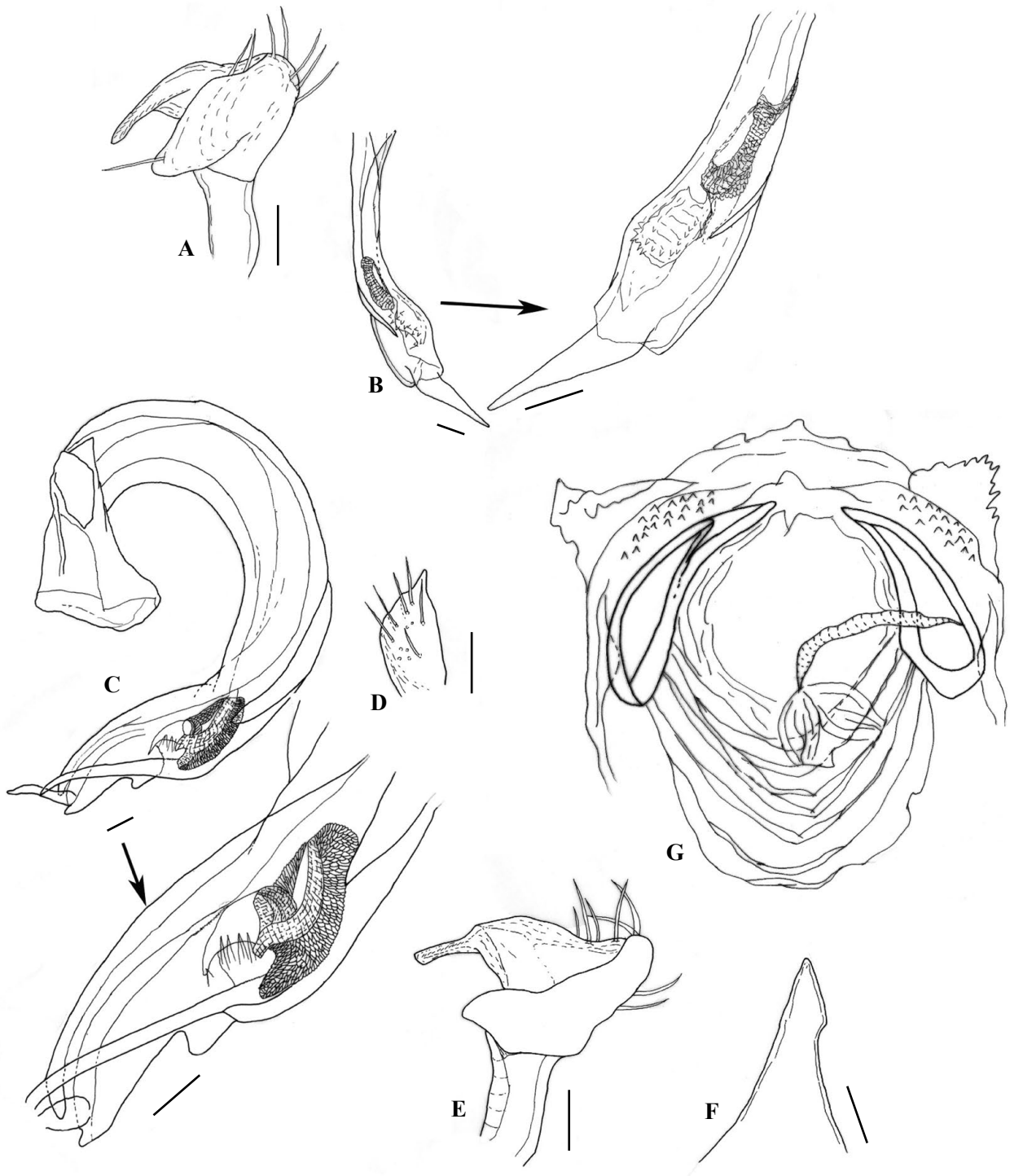

Plate 25. Genital structure of Phylini. A, B. *Psallus aethiops*. C−G. *P. ater*. A, E. Left paramere. B, C. Endosoma. D. Right paramere. F. Phallotheca. G. Bursa copulatrix. Scale bars: 0.1 mm.

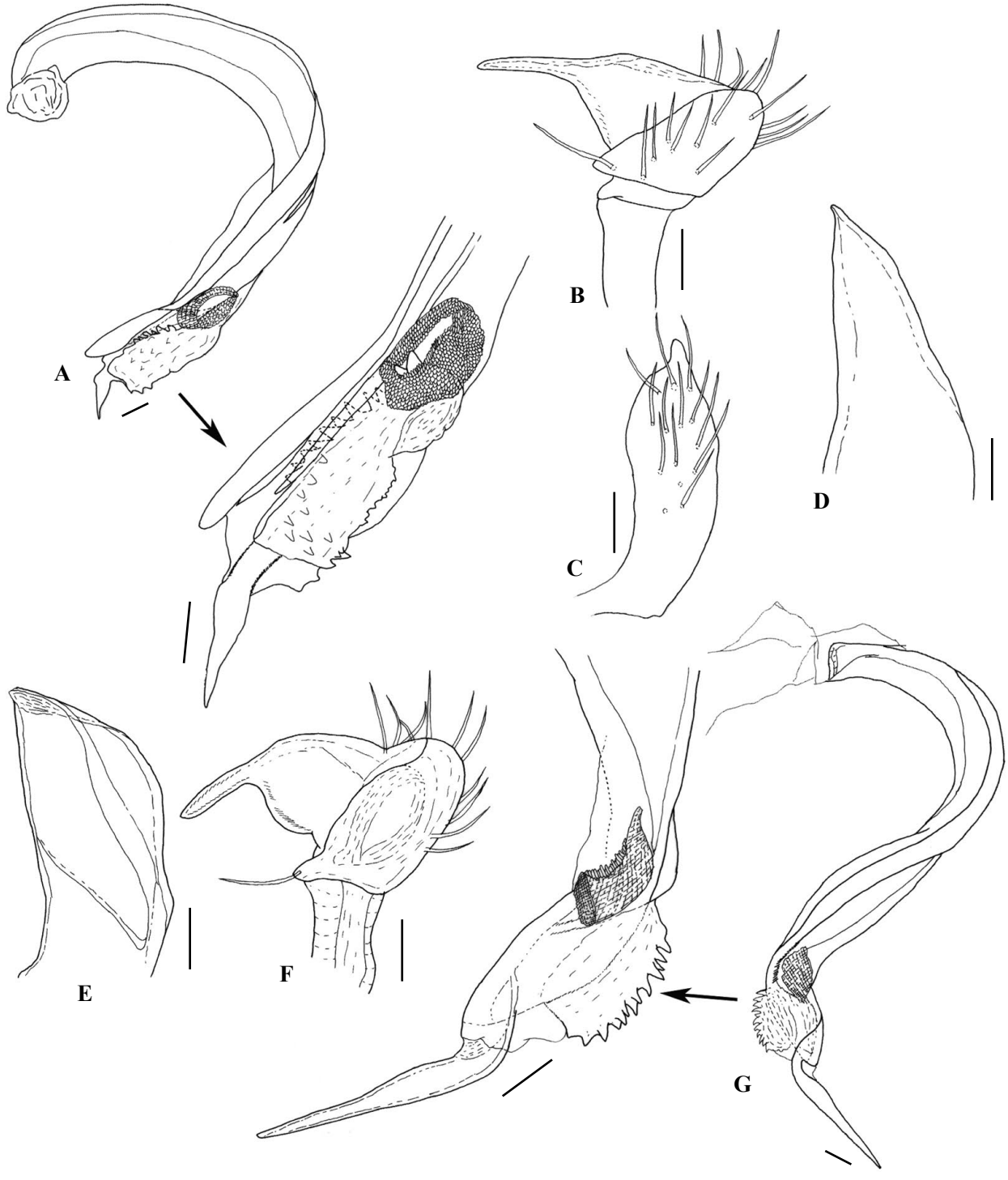

Plate 26. Genital structure of Phylini. A−D. *Psallus atratus*. E−G. *P. betuleti*. A, G. Endosoma. B, F. Left paramere. C. Right paramere. D, E. Phallotheca. Scale bars: 0.1 mm.

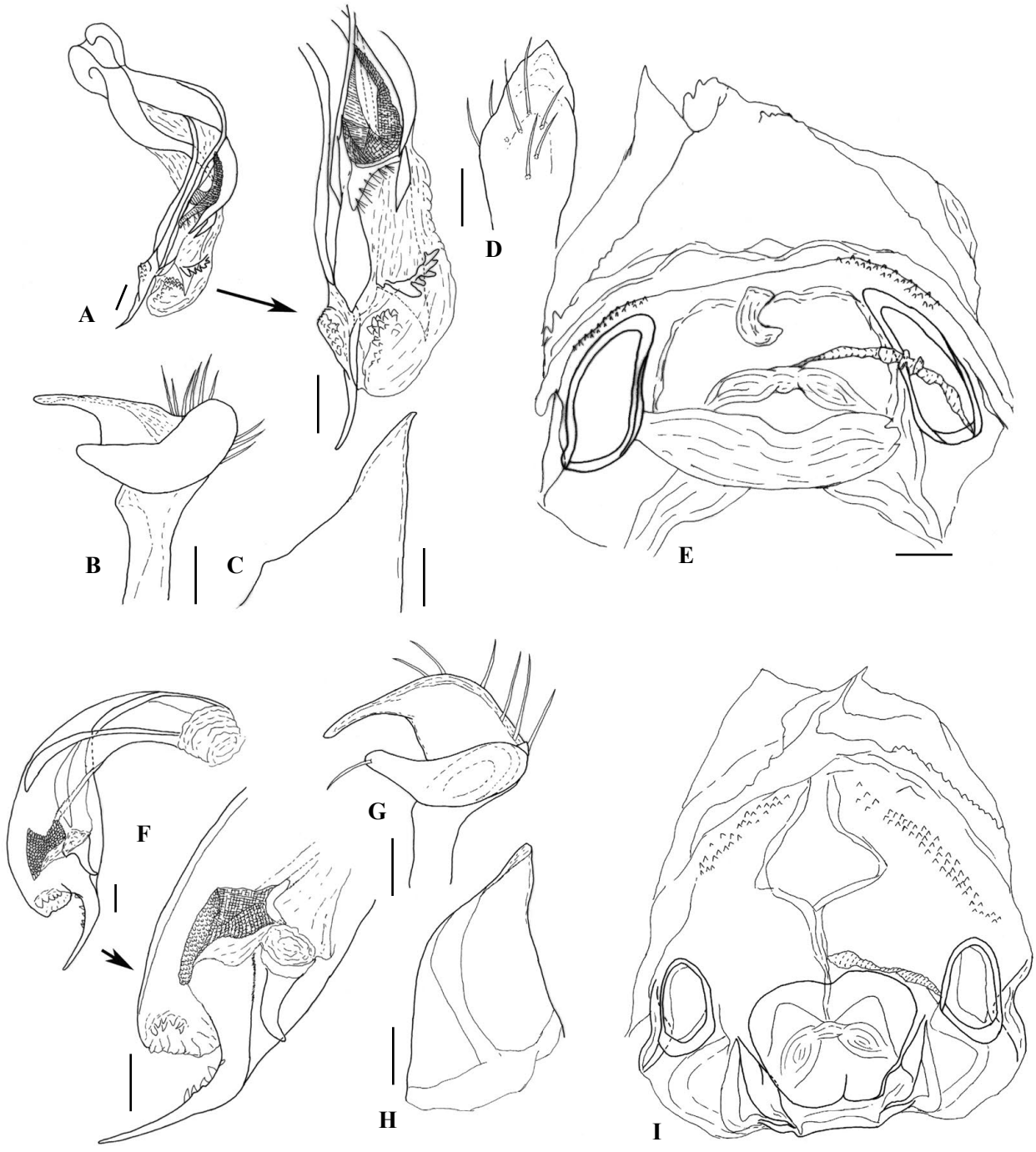

Plate 27. Genital structure of Phylini. A−E. *Psallus michaili.* F−I. *P. roseoguttatus*. A, F. Endosoma. B, G. Left paramere. D. Right paramere. C, H. Phallotheca. E, I. Bursa copulatrix. Scale bars: 0.1 mm.

Plate 28. Genital structure of Phylini. A−E. *Psallus clarus*. F−J. *P. tesongsanicus*. A, G. Endosoma. C, I. Left paramere. B, H. Right paramere. D, F. Phallotheca. E, J. Bursa copulatrix. Scale bars: 0.1 mm.

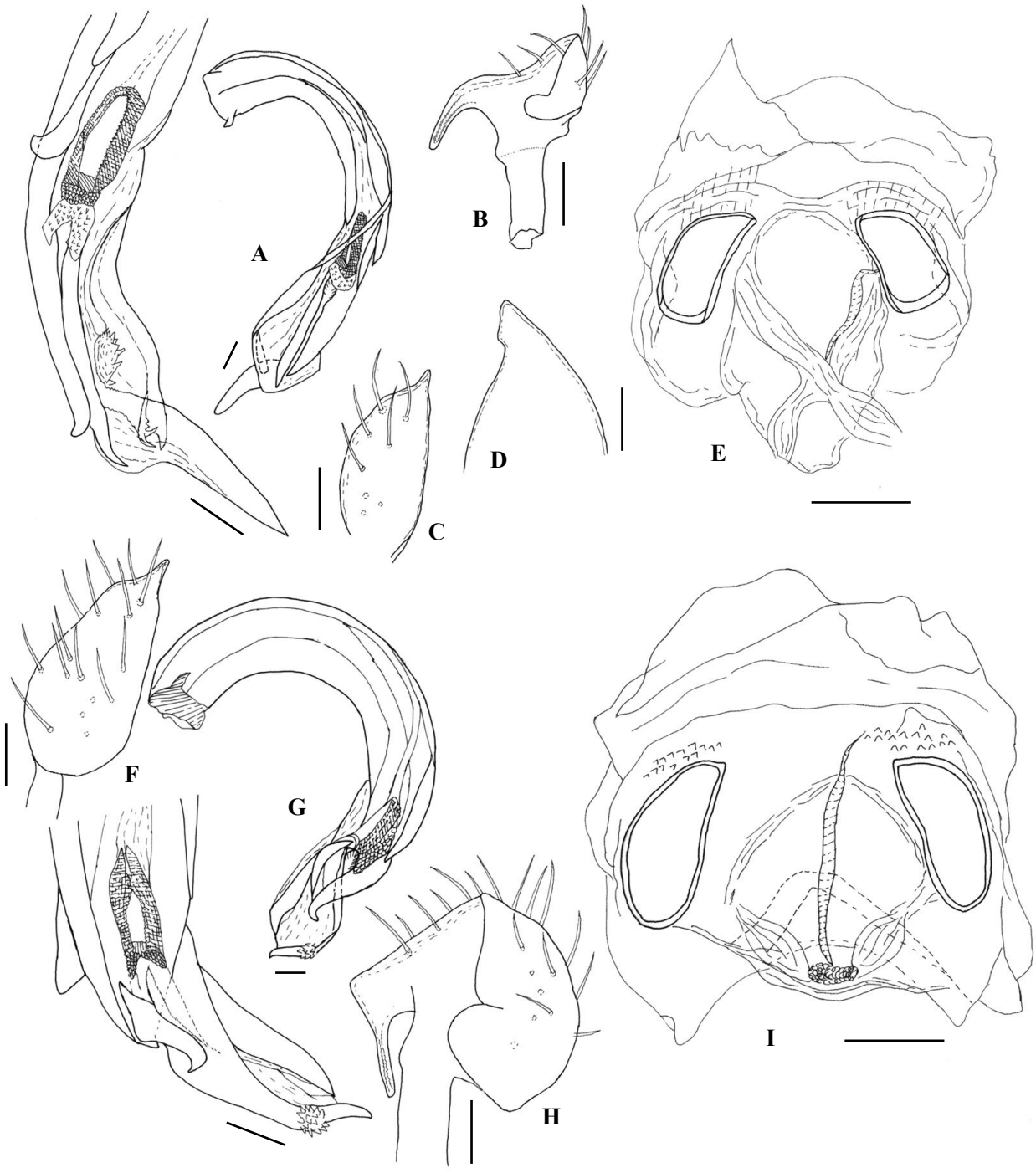

Plate 29. Genital structure of Phylini. A−E. *Psallus tonnaichanus*. F−I. *P. suwonanus*. A, G. Endosoma. B, H. Left paramere. C, F. Right paramere. D. Phallotheca. E, I. Bursa copulatrix. Scale bars: 0.1 mm.

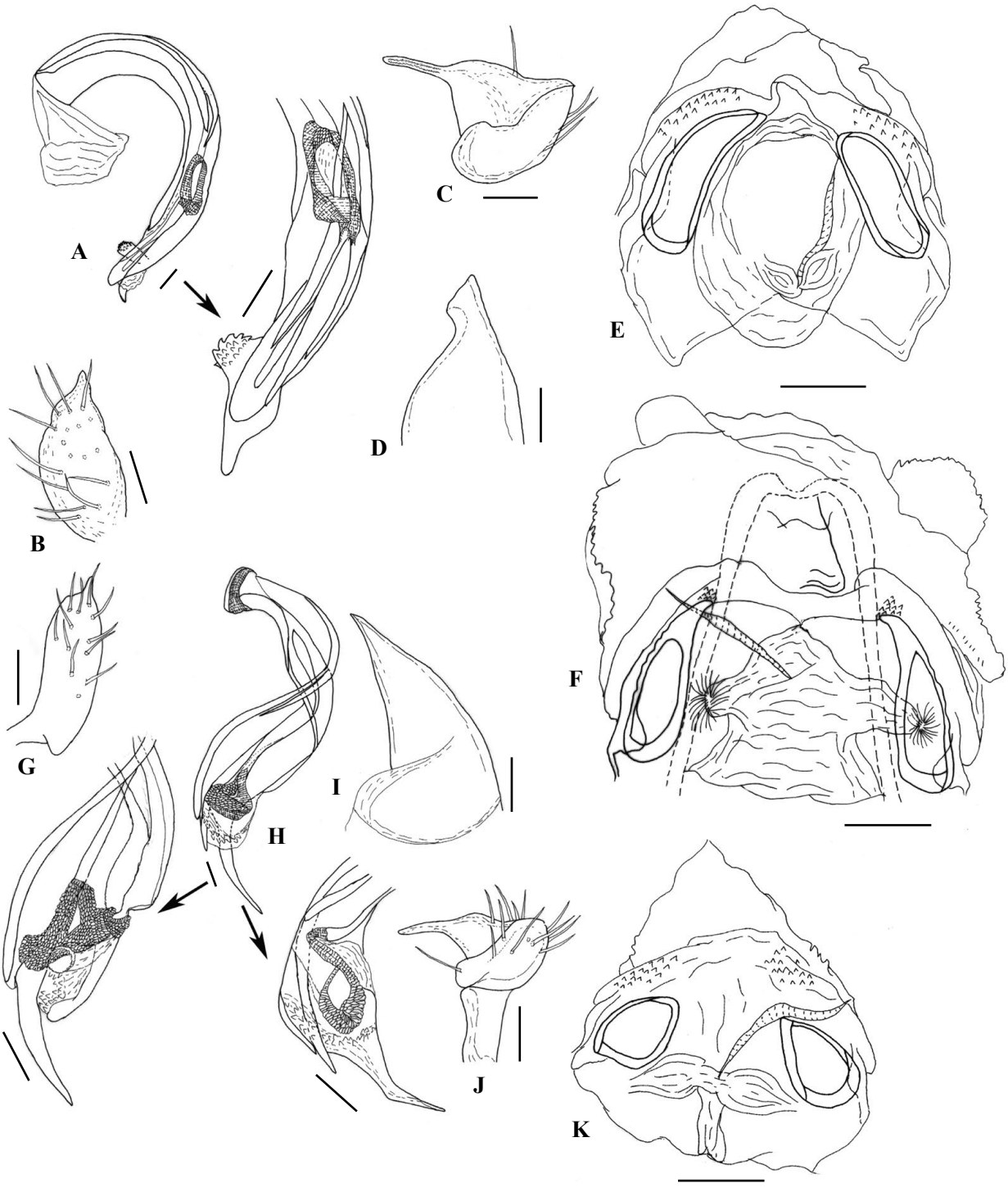

Plate 30. Genital structure of Phylini. A−E. *Psallus castaneae*. F. *P. samdzijonicus*. G−K. *P. ernesti*. A, H. Endosoma. C, J. Left paramere. B, G. Right paramere. D, I. Phallotheca. E, F, K. Bursa copulatrix. Scale bars: 0.1 mm.

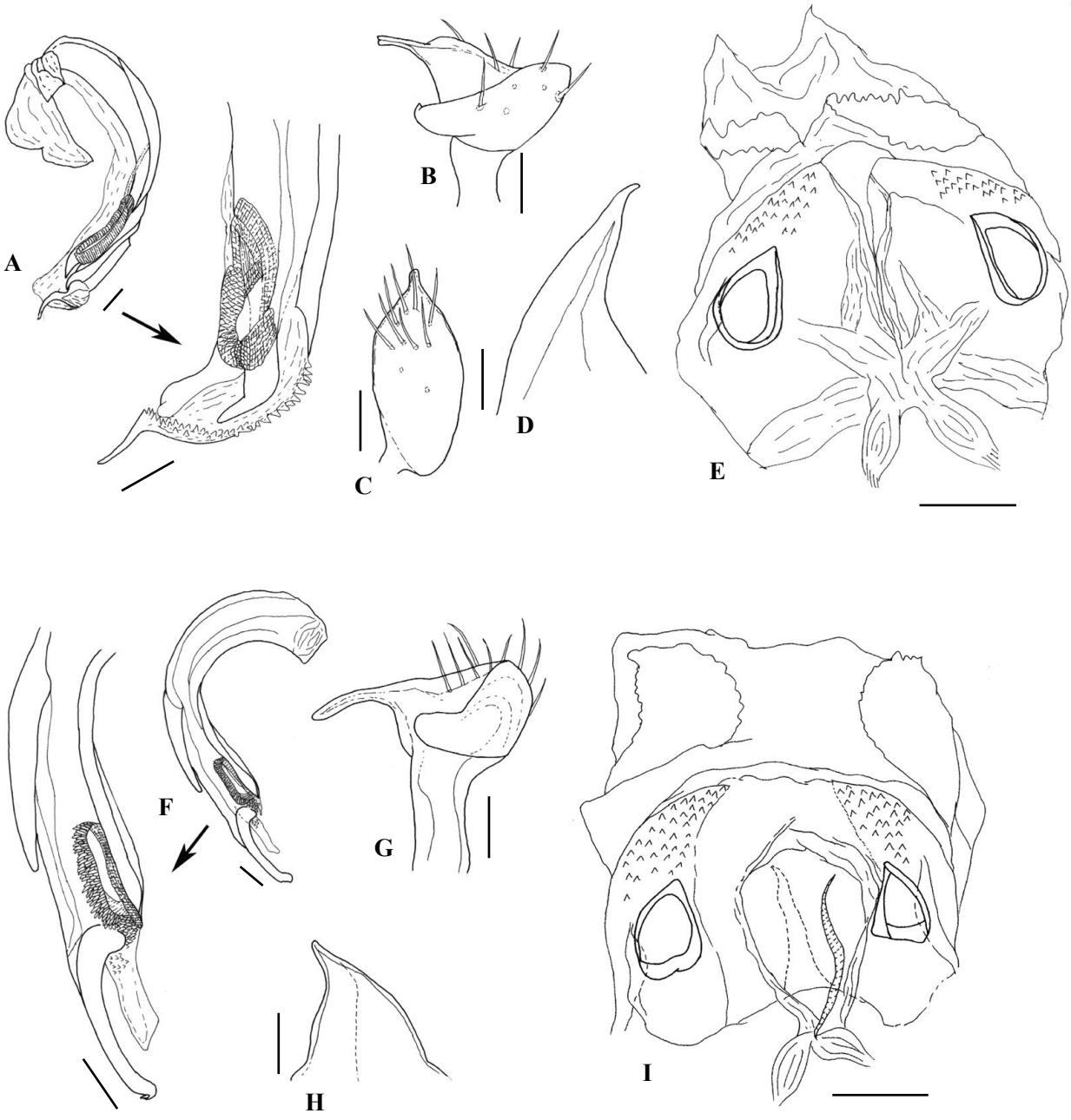

Plate 31. Genital structure of Phylini. A−E. *Psallus cinnabarinus*. F−I. *P. flavescens*. A, F. Endosoma. B, G. Left paramere. C. Right paramere. D, H. Phallotheca. E, I. Bursa copulatrix. Scale bars: 0.1 mm.

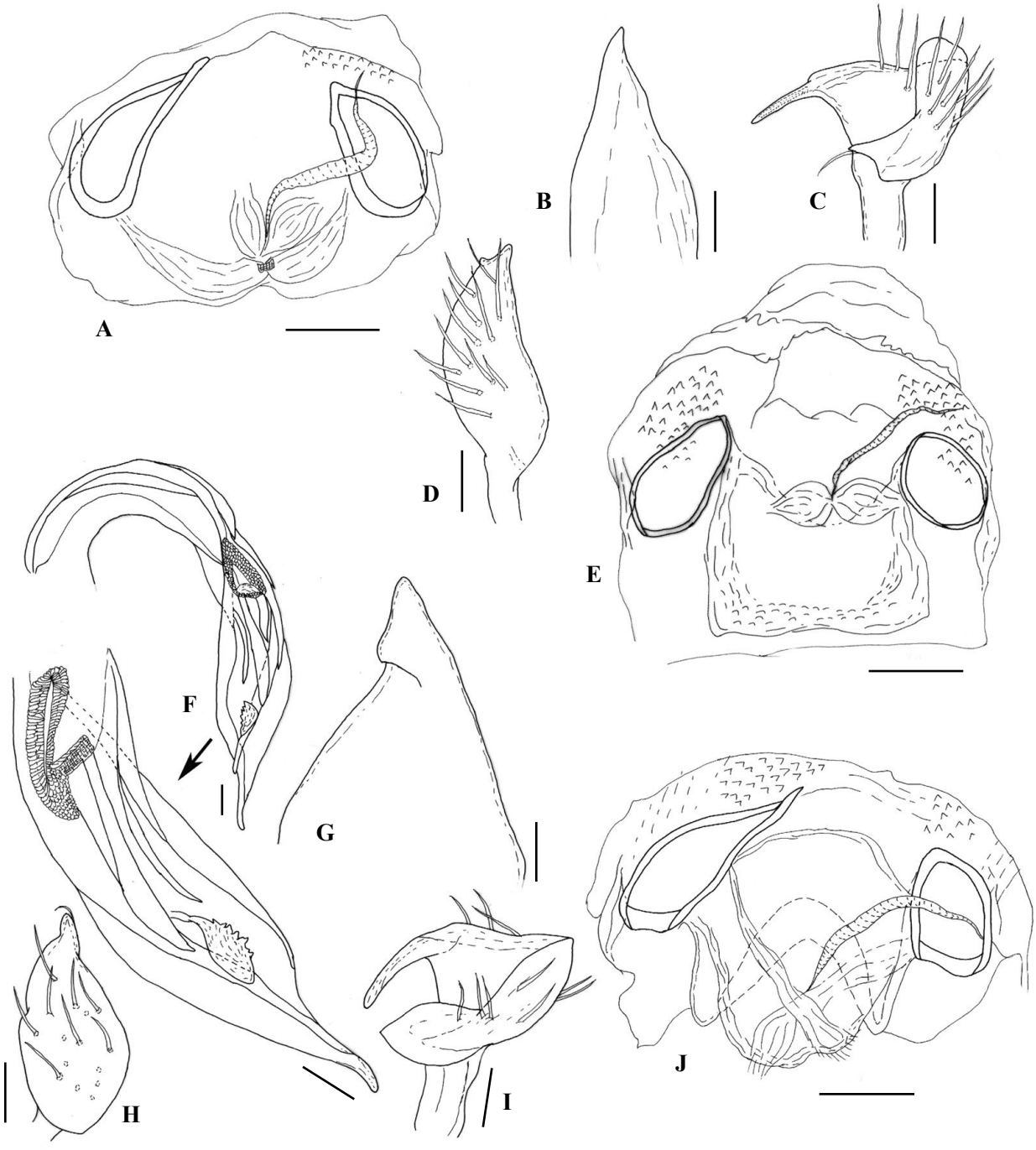

Plate 32. Genital structure of Phylini. A. *Psallus kerzhneri.* B−E. *P. amoenus*. F−J. *P. loginovae.* F. Endosoma. C, I. Left paramere. D, H. Right paramere. B, G. Phallotheca. A, E, J. Bursa copulatrix. Scale bars: 0.1 mm.

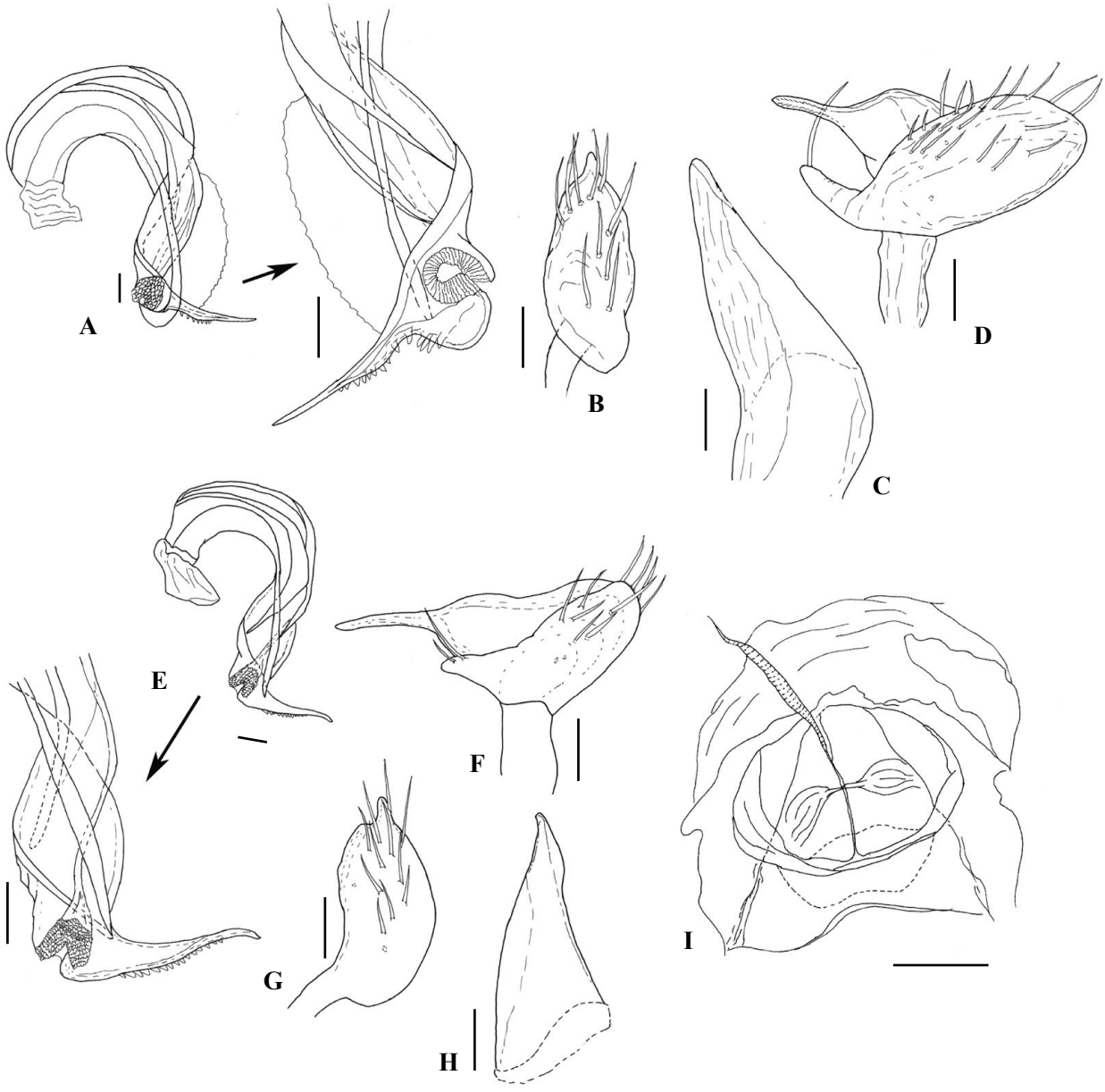

Plate 33. Genital structure of Phylini. A−D. *Psallus luridus*. E−I. *P. vittatus*. A, E. Endosoma. D, F. Left paramere. B, G. Right paramere. C, H. Phallotheca. I. Bursa copulatrix. Scale bars: 0.1 mm.

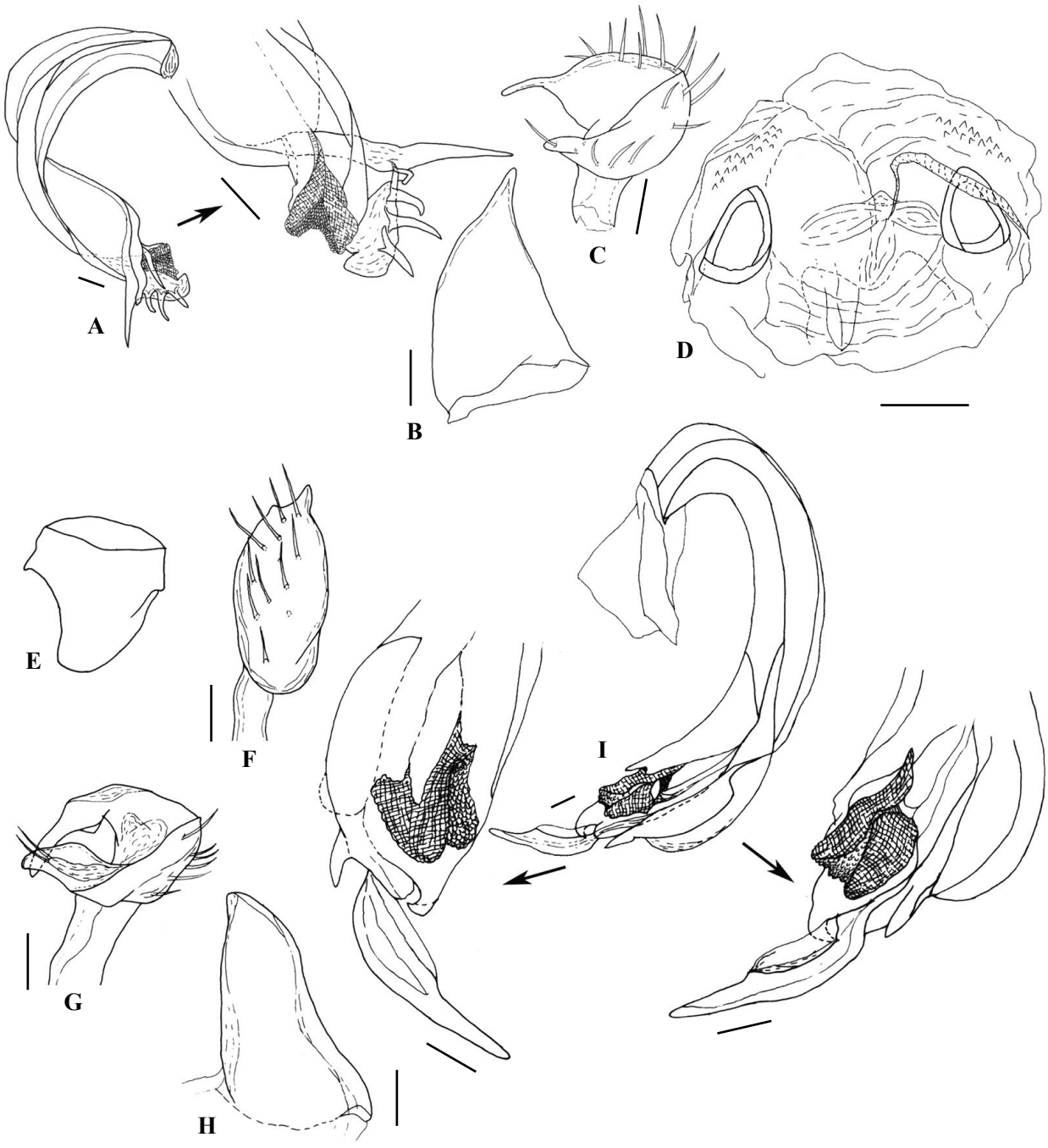

Plate 34. Genital structure of Phylini. A−D. *Psallus bagjonicus*. E−I. *P. cheongtaensis*. A, I. Endosoma. C, G. Left paramere. F. Right paramere. B, H. Phallotheca. E. Pygophore. D. Bursa copulatrix. Scale bars: 0.1 mm.

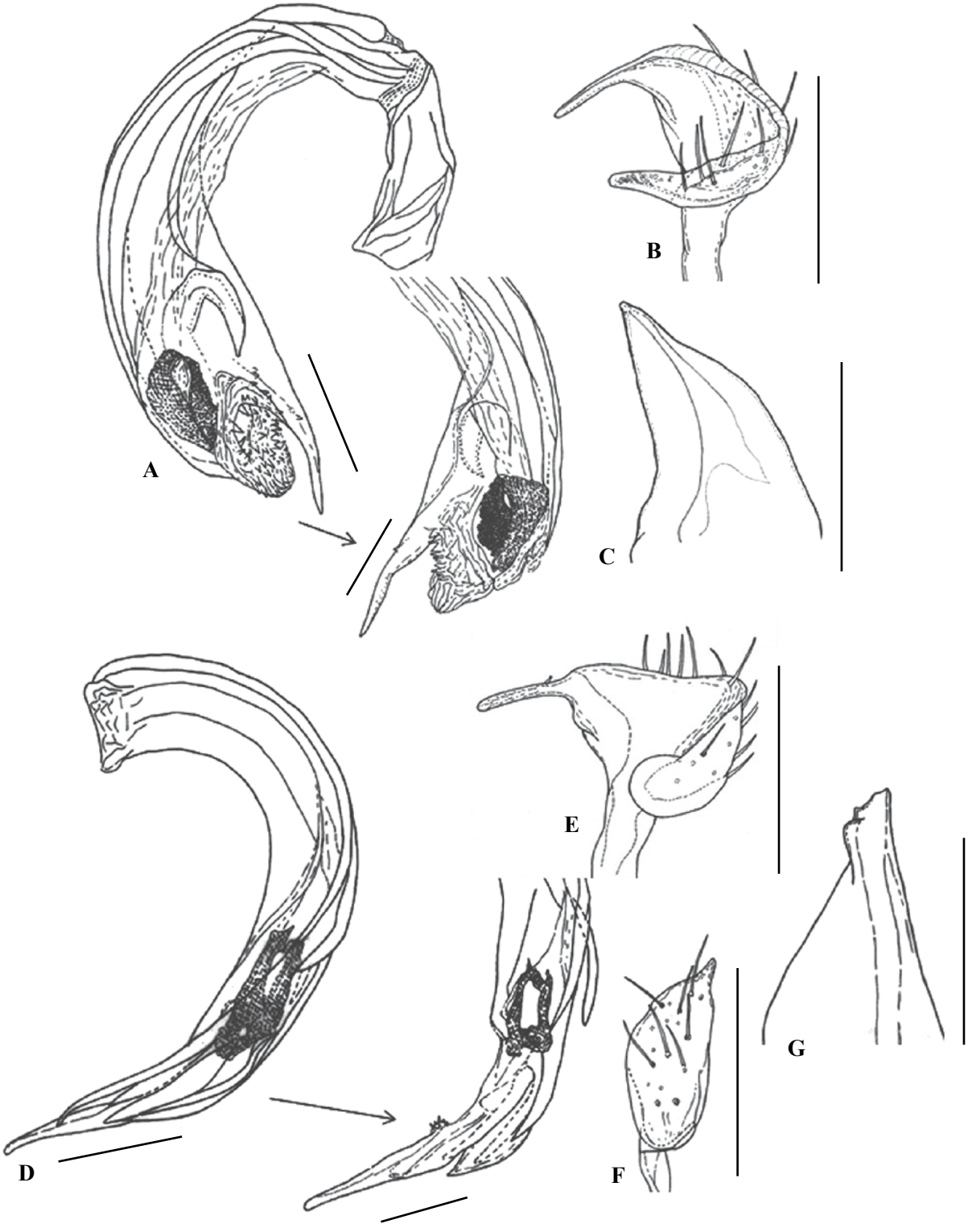

Plate 35. Genital structure of Phylini. A−C. *Psallus injensis*. D−G. *P. yongdaeri.* A, D. Endosoma. B, E. Left paramere. F. Right paramere. C, G. Phallotheca. Scale bars: 0.05 mm.

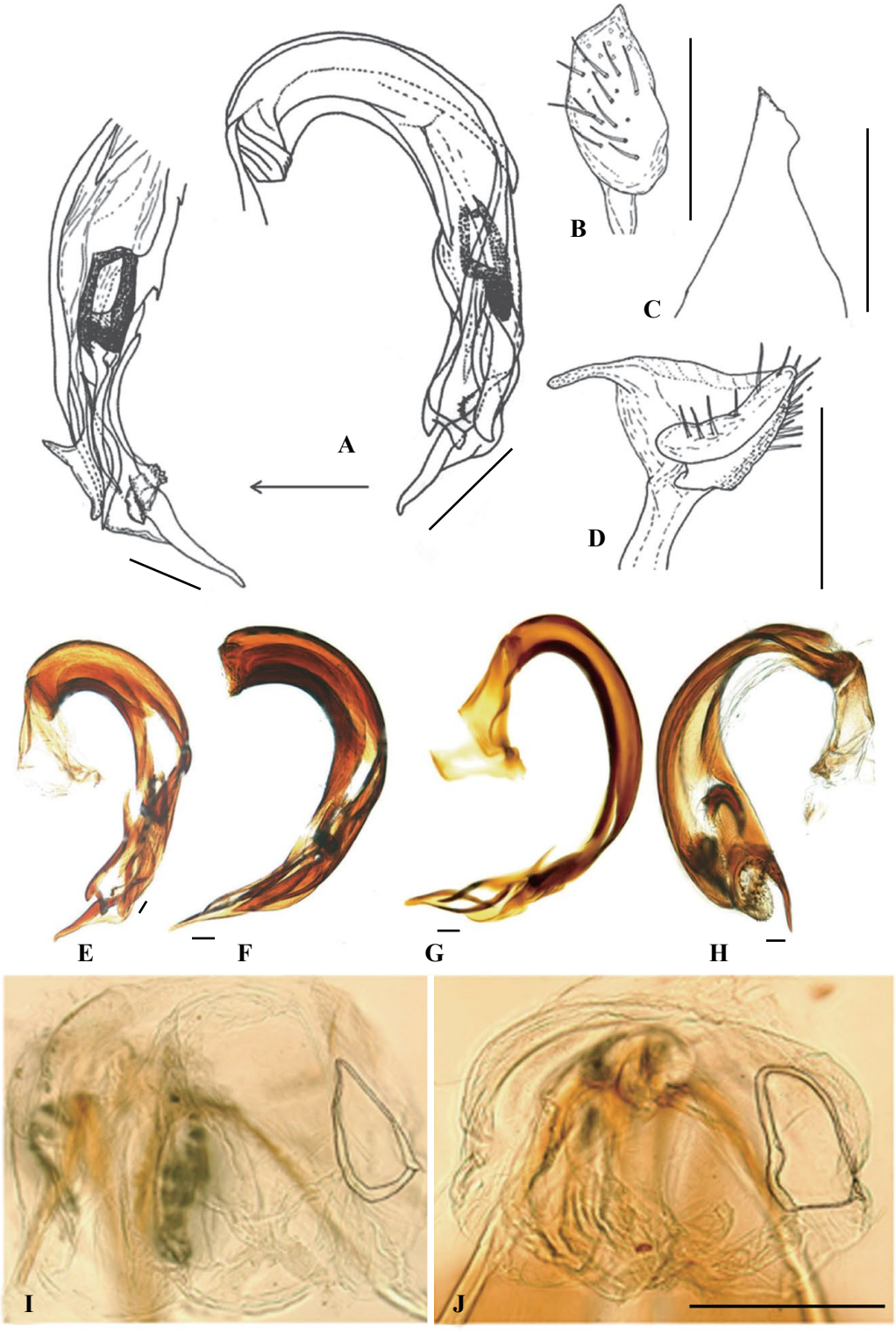

Plate 36. Genital structure of Phylini. A−D, F, I. *Psallus taehwana*. E, J. *P. yongdaeri.* G. *P. sanguinarius.* H. *P. injensis.* A, E−H. Endosoma. D. Left paramere. B. Right paramere. C. Phallotheca. I, J. Bursa copulatrix. Scale bars: 0.05 mm.

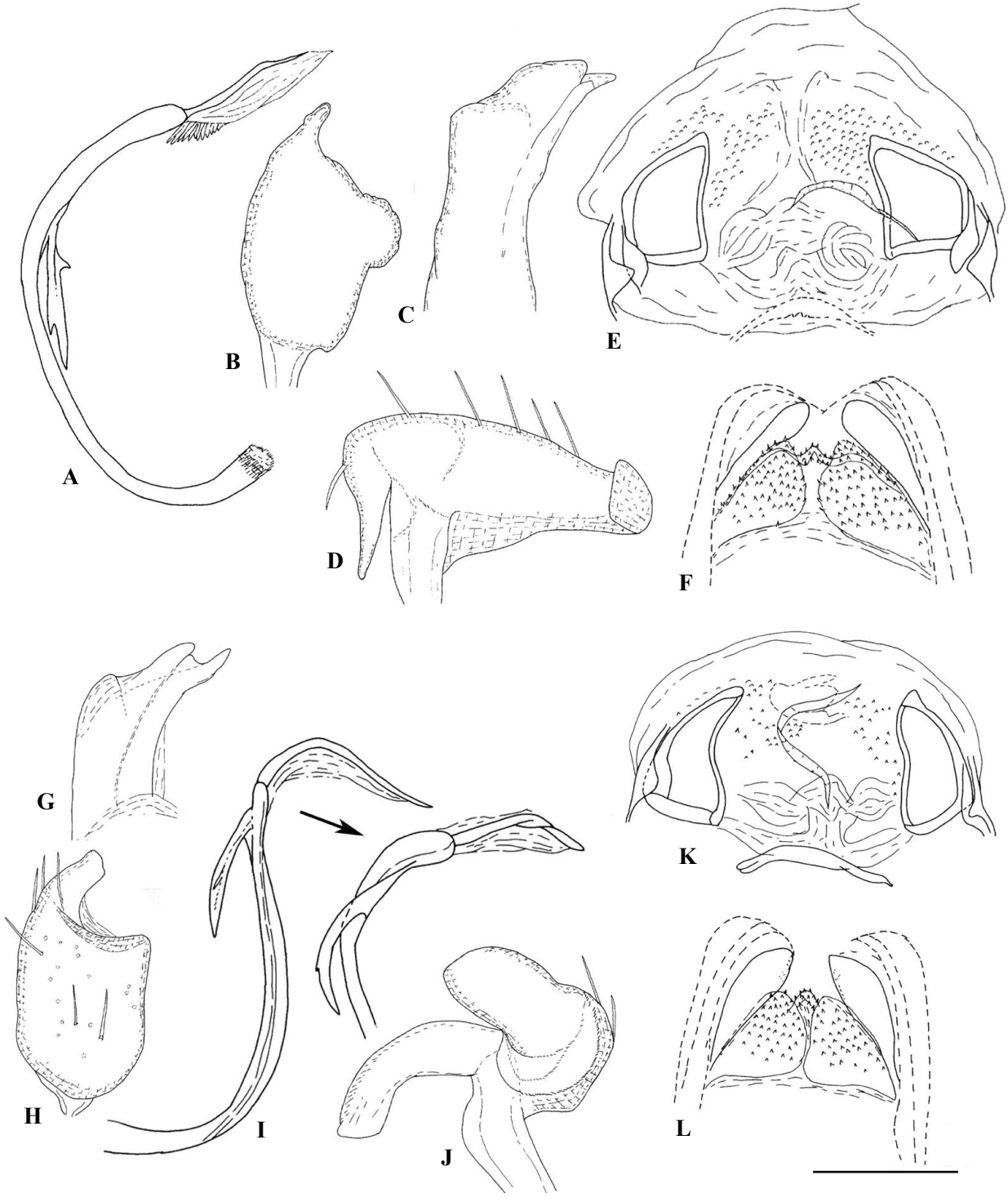

Plate 37. Genital structure of Pilophorini. A−F. *Pherolepis amplus*. G−L. *P. kiritshenkoi*. A−D, G−J. Male genital structure. E, F, K−L. Female genital structure. A, I. Endosoma. D, J. Left paramere. B, H. Right paramere. C, G. Phallotheca. E, K. Bursa copulatrix. F, L. Posterior wall. Scale bar: 0.1 mm.

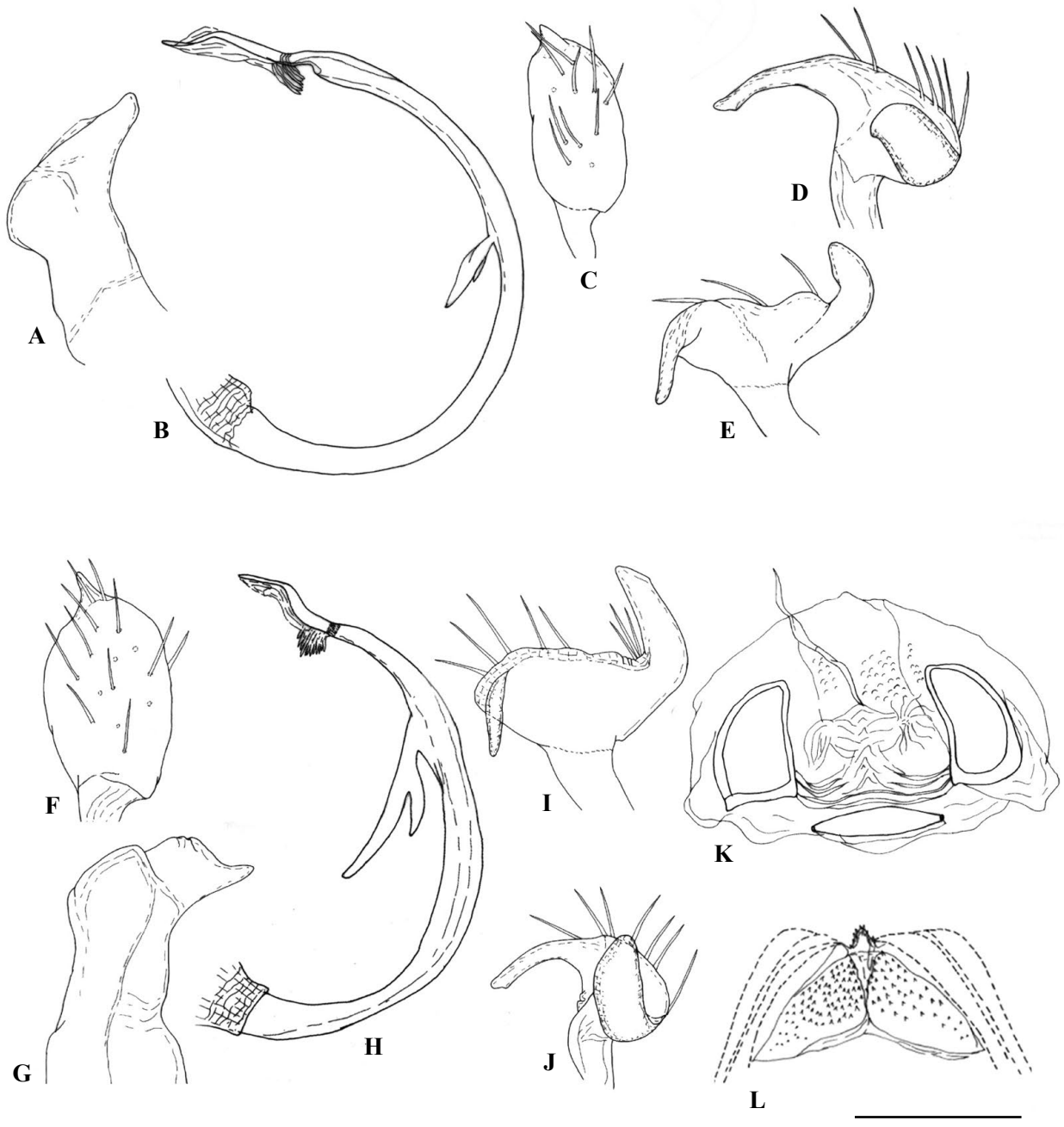

Plate 38. Genital structure of Pilophorini. A−E. *Pilophorus choii.* F−L. *P. clavatus*. A−E, F−J. Male genital structure. K, L. Female genital structure. B, H. Endosoma. D, E, I, J. Left paramere. C, F. Right paramere. A, G. Phallotheca. K. Bursa copulatrix. L. Posterior wall. Scale bar: 0.1 mm.

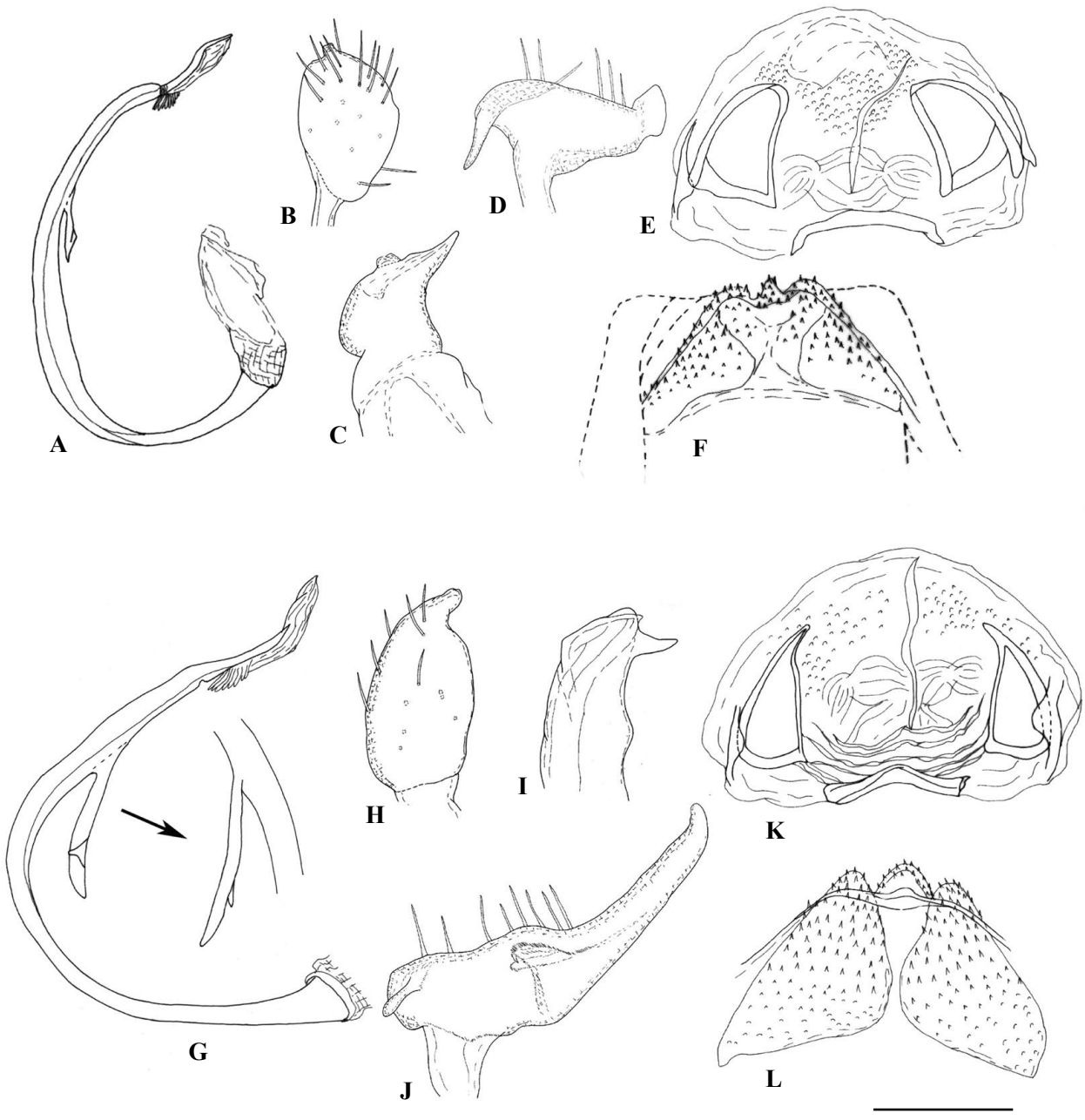

Plate 39. Genital structure of Pilophorini. A−F. *Pilophorus erraticus.* G−L. *P. koreanus.* A, G. Endosoma. D, J. Left paramere. B, H. Right paramere. C, I. Phallotheca. E, K. Bursa copulatrix. F, L. Posterior wall. Scale bar: 0.1 mm.

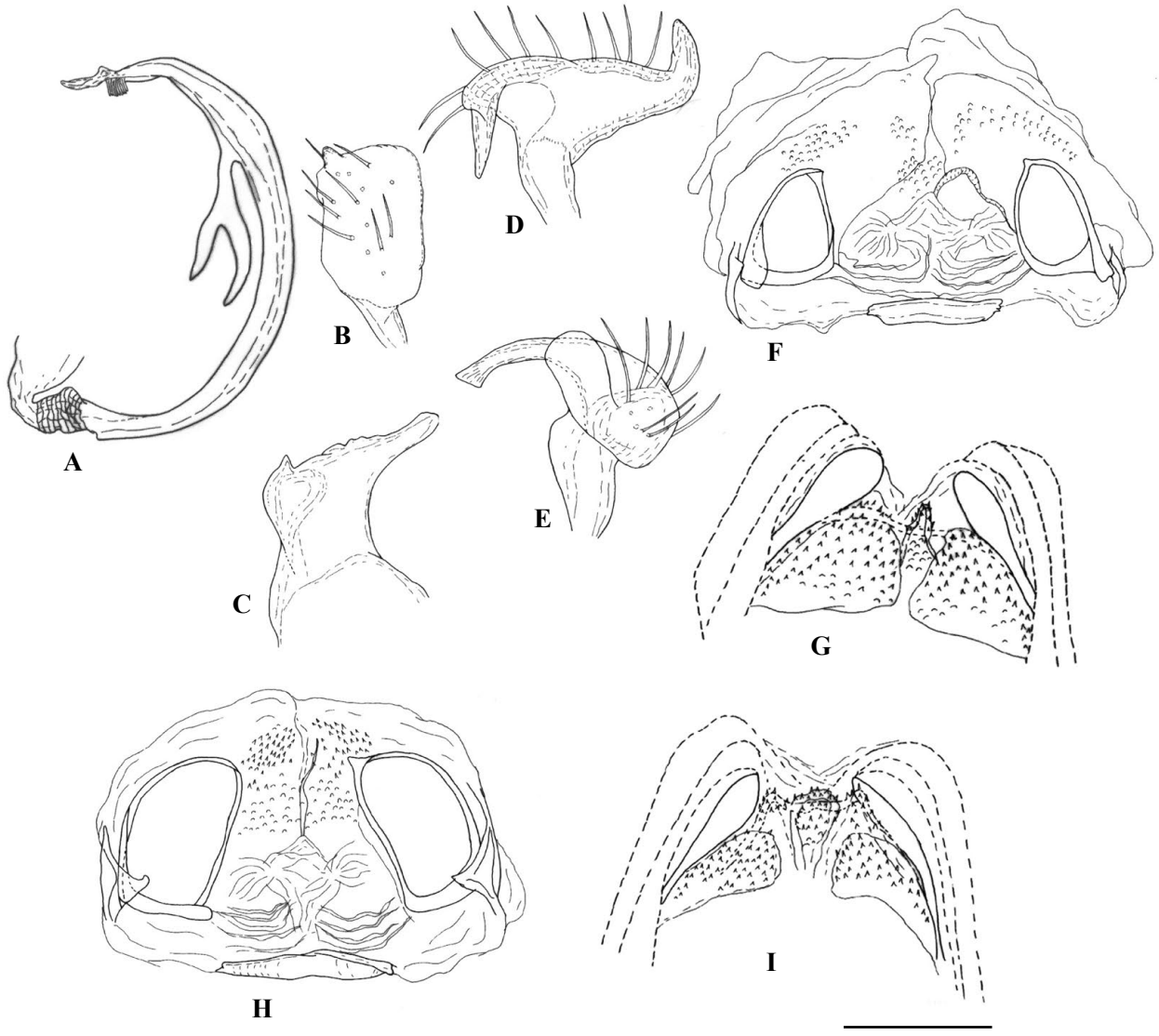

Plate 40. Genital structure of Pilophorini. A−G. *Pilophorus lucidus*. H, I. *P. miyamotoi.* A. Endosoma. D, E. Left paramere. B. Rigtht paramere. C. Phallotheca. F, H. Bursa copulatrix. G, I. Posterior wall. Scale bar: 0.1 mm.

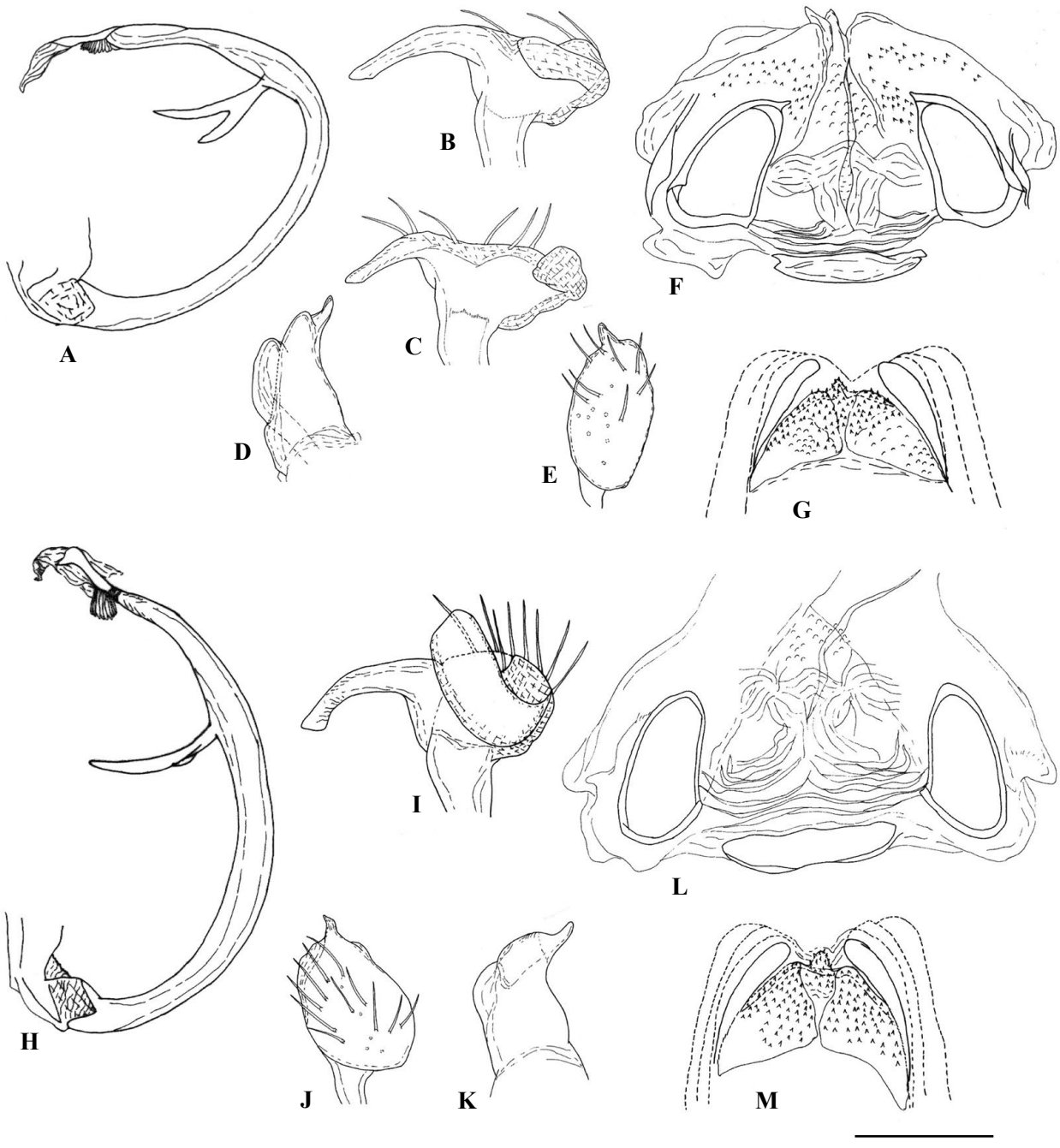

Plate 41. Genital structure of Pilophorini. A−G. *Pilophorus niger*. H−M. *P. setulosus*. A, H. Endosoma. B, C, I. Left paramere. E, J. Right paramere. D, K. Phallotheca. F, L. Bursa copulatrix. G, M. Posterior wall. Scale bar: 0.1 mm.

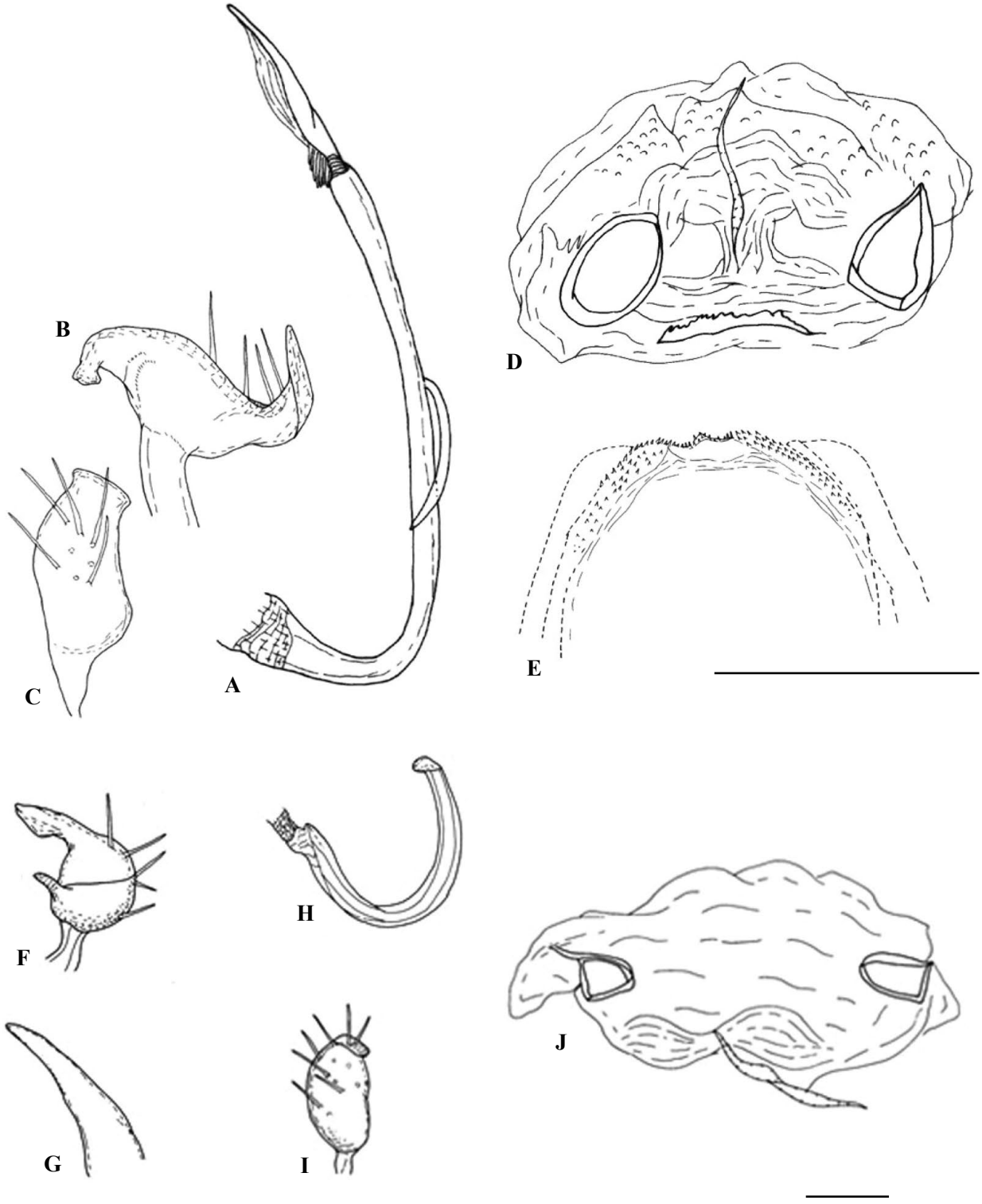

Plate 42. Genital structure of Pilophorini and Semiini. A−E. *Pilophorus typicus*. F−J. *Tytthus chinensis*. A, H. Endosoma. B, F. Left paramere. C, I. Right paramere. D, J. Bursa copulatrix. E. Posterior wall. G. Phallotheca. Scale bars: 0.1 mm.

Plate 43−50. Living individual images of Phylinae species from Korea 1. 43: *Acrorrhinium inexpectatum.* 44: *Pseudophylus stundjuki.* 45: *Compsidolon* (*Coniortodes*) *salicellum.* 46: *Europiella artemisiae.* 47: *Phylus* (*Teratoscopus*) *coryloides*. 48: *Plagiognathus amurensis*. 49: *Psallus* (*Apocremnus*) *ater.* 50: *Psallus* (*Callopsallus*) *clarus.*

Plate 51−52. Living individual images of Phylinae species from Korea 2. 51: *Psallus* (*Phylidea*) *castaneae.* 52: *Pilophorus miyamotoi*.

TABLE

Table 1. Measurements of Phylinae from the Korean Peninsula

		Length											Width			
		Total body	Head	Labium	Pronotum	Antenna				Hind leg			Head	Vertex	Pronotum	Hemelytra
						Seg. I	Seg. II	Seg. III	Seg. IV	Femur	Tibia	Tarsus				
Acrorrhinium inexpectatum																
M (N = 2)	**Mean**	**4.67**	**0.79**	**2.5**	**0.82**	**0.93**	**2.38**	**1.55**	**0.92**	**1.96**	**3.15**	**0.43**	**0.94**	**0.33**	**1.34**	**1.52**
	SD	0.26	0.05	0.01	0.04	0.04	0.02	0.01	0.02	0.01	0.2	0.03	0.01	0.02	0.01	0.03
	Min	4.45	0.75	2.49	0.79	0.9	2.36	1.55	0.9	1.95	3.01	0.41	0.94	0.32	0.316	1.33
	Max	4.86	0.82	2.5	0.85	0.95	2.39	1.55	0.93	1.97	3.29	0.46	0.95	0.34	1.35	1.55
Hallodapus centrimaculatus																
M (N = 1)	**Mean**	**2.65**	**0.44**	**1.2**	**0.34**	**0.27**	**0.92**	**0.76**		**0.97**	**1.42**	**0.38**	**0.5**	**0.21**	**0.74**	**0.86**
H. linnavuorii																
M (N = 2)	**Mean**	**3.04**	**0.54**	**1.34**	**0.41**	**0.35**	**0.97**	**0.93**	**0.58**	**1.03**	**1.41**	**0.37**	**0.56**	**0.33**	**0.86**	**1.02**
	SD	0.2	0.07	0.03	0.04	0.04	0.04	0.05	0.02	0.04	0.04	0.04	0.01	0.04	0.08	0.04
	Min	2.9	0.49	1.32	0.38	0.32	0.95	0.9	0.56	1	1.38	0.35	0.55	0.29	0.81	0.99
	Max	3.19	0.59	1.37	0.44	0.37	0.99	0.96	0.59	1.05	1.44	0.4	0.57	0.36	0.92	1.05
H. pumilus																
F (N = 1)	**Mean**	**3.45**	**0.54**	**1.24**	**0.63**	**0.27**	**0.87**	**0.61**	**0.43**	**1.08**	**1.49**	**0.38**	**0.62**	**0.37**	**1.1**	**1.37**
Systellonotus malaisei																
M (N = 2)	**Mean**	**3.68**	**0.64**	**1.5**	**0.66**	**0.4**	**1.41**	**1.15**	**0.69**	**1.48**	**2.39**	**0.59**	**0.74**	**0.39**	**0.98**	**1.01**
	SD	0.11	0.05	0.01	0.04	0.03	0.03	0.09	0.12	0.1	0.09	0.01	0.01	0.01	0.02	0.01
	Min	3.61	0.61	1.49	0.64	0.38	1.39	1.09	0.6	1.4	2.33	0.58	0.73	0.38	0.97	1
	Max	3.76	0.68	1.5	0.69	0.43	1.44	1.21	0.77	1.55	2.45	0.6	0.74	0.4	1	1.02
Sejanus potanini																
M (N = 1)	**Mean**	**2.53**	**0.45**	**0.92**	**0.43**	**0.17**	**0.78**	**0.4**	**0.26**	**0.89**	**1.29**	**0.4**	**0.68**	**0.27**	**0.95**	**1.22**
F (N = 4)	**Mean**	**2.53**	**0.47**	**0.96**	**0.47**	**0.18**	**0.74**	**0.39**	**0.26**	**0.9**	**1.32**	**0.35**	**0.69**	**0.34**	**1.01**	**1.28**
	SD	0.17	0.02	0.03	0.01	0.01	0.04	0.02	0.02	0.04	0.09	0.03	0.01	0.03	0.08	0.12
	Min	2.31	0.46	0.92	0.46	0.18	0.7	0.37	0.24	0.85	1.24	0.33	0.68	0.3	0.91	1.15
	Max	2.68	0.5	0.99	0.48	0.19	0.79	0.41	0.28	0.95	1.42	0.38	0.71	0.37	1.1	1.42

Table 1. Continued.

		Length											Width			
		Total body	Head	Labium	Pronotum	Antenna				Hind leg			Head	Vertex	Pronotum	Hemelytra
						Seg. I	Seg. II	Seg. III	Seg. IV	Femur	Tibia	Tarsus				
Tytthus chinensis																
M (N = 4)	**Mean**	**2.52**	**0.41**	**0.91**	**0.31**	**0.27**	**0.86**	**0.49**	**0.44**	**0.86**	**1.37**	**0.44**	**0.59**	**0.31**	**0.8**	**0.88**
	SD	0.13	0.05	0.03	0.03	0.01	0.04	0.04	0.05	0.05	0.04	0.03	0.01	0.02	0.02	0.04
	Min	2.38	0.36	0.88	0.29	0.26	0.8	0.43	0.37	0.82	1.35	0.42	0.58	0.28	0.78	0.83
	Max	2.66	0.46	0.93	0.35	0.28	0.9	0.52	0.49	0.89	1.4	0.47	0.6	0.32	0.83	0.93
F (N = 5)	**Mean**	**3.21**	**0.45**	**0.98**	**0.35**	**0.28**	**0.88**	**0.57**	**0.5**	**1.08**	**1.52**	**0.44**	**0.66**	**0.33**	**0.96**	**1.14**
	SD	0.43	0.03	0.05	0.02	0.04	0.04	0.03	0.04	0.04	0.07	0.02	0.02	0.02	0.06	0.07
	Min	2.91	0.42	0.93	0.33	0.23	0.82	0.52	0.45	1.04	1.45	0.42	0.64	0.31	0.88	1.08
	Max	3.96	0.9	1.05	0.38	0.32	0.93	0.61	0.53	1.12	1.63	0.46	0.69	0.36	1.03	1.24
Atomoscelis asiatica																
M (N = 5)	**Mean**	**2.59**	**0.47**	**0.72**	**0.37**	**0.25**	**0.8**	**0.51**	**0.42**	**0.95**	**1.47**	**0.42**	**0.66**	**0.35**	**0.89**	**1.1**
	SD	0.1	0.04	0.01	0.02	0.02	0.04	0.03	0.02	0.02	0.04	0.03	0.01	0.04	0.03	0.07
	Min	2.5	0.43	0.7	0.34	0.22	0.74	0.48	0.39	0.92	1.41	0.4	0.64	0.31	0.87	1.04
	Max	2.76	0.52	0.74	0.4	0.26	0.86	0.54	0.45	0.98	1.5	0.47	0.67	0.38	0.93	1.21
F (N = 3)	**Mean**	**2.52**	**0.47**	**0.75**	**0.36**	**0.23**	**0.75**	**0.52**	**0.45**	**0.96**	**1.48**	**0.44**	**0.66**	**0.38**	**0.91**	**1.24**
	SD	0.06	0.01	0.03	0.01	0.02	0.01	0.03	0.02	0.07	0.07	0.02	0.01	0.02	0.07	0.08
	Min	2.46	0.46	0.72	0.35	0.22	0.737	0.5	0.43	0.91	1.41	0.42	0.65	0.36	0.86	1.16
	Max	2.59	0.48	0.77	0.36	0.25	0.76	0.55	0.46	1.04	1.56	0.46	0.68	0.4	0.99	1.33
Atractotomus morio																
F (N = 2)	**Mean**	**4.03**	**0.68**	**1.62**	**0.73**	**0.33**	**1.38**	**0.47**	**0.39**	**1.49**	**2.04**	**0.64**	**0.93**	**0.42**	**1.42**	**1.8**
	SD	0.22	0.02	0.08	0.06	0.02	0.05	0.01	0.02	0.07	0.05	0.03	0	0.01	0.09	0.01
	Min	3.87	0.67	1.57	0.69	0.31	1.35	0.47	0.37	1.44	2.01	0.62	0.93	0.42	1.35	1.8
	Max	4.19	0.7	1.67	0.77	0.35	1.42	0.48	0.4	1.54	2.08	0.66	0.93	0.43	1.49	1.81
Atractotomoidea castanea																
M (N = 5)	**Mean**	**2.48**	**0.34**	**1.04**	**0.44**	**0.18**	**0.78**	**0.38**	**0.28**	**0.88**	**1.35**	**0.33**	**0.6**	**0.3**	**0.94**	**1.23**
	SD	0.073	0.04	0.06	0.01	0.02	0.03	0.02	0.02	0.04	0.03	0.01	0.02	0.02	0.02	0.04
	Min	2.41	0.29	0.99	0.43	0.15	0.76	0.34	0.26	0.84	1.31	0.32	0.59	0.28	0.91	1.17
	Max	2.58	0.4	1.14	0.46	0.19	0.83	0.39	0.3	0.95	1.38	0.35	0.63	0.33	0.97	1.27
F (N = 5)	**Mean**	**2.54**	**1.13**	**1.18**	**0.44**	**0.18**	**0.76**	**0.37**	**0.35**	**0.92**	**1.43**	**0.36**	**0.59**	**0.32**	**0.96**	**1.3**
	SD	0.21	1.72	0.08	0.04	0.011	0.01	0.03	0.04	0.02	0.03	0.03	0.02	0.01	0.02	0.02

Table 1. Continued.

		Length											Width			
		Total body	Head	Labium	Pronotum	Antenna				Hind leg			Head	Vertex	Pronotum	Hemelytra
						Seg. I	Seg. II	Seg. III	Seg. IV	Femur	Tibia	Tarsus				
	Min	2.26	0.34	1.11	0.4	0.17	0.74	0.33	0.29	0.91	1.4	0.32	0.58	0.3	0.92	1.28
	Max	2.71	0.42	1.28	0.5	0.19	0.78	0.39	0.38	0.95	1.47	0.39	0.61	0.33	0.97	1.33
Campylomma annulicornis																
M (N = 1)	**Mean**	**2.67**	**0.43**	**0.99**	**0.46**	**0.2**	**0.59**			**0.84**	**1.32**	**0.37**	**0.76**	**0.28**	**0.91**	**1.23**
F (N = 3)	**Mean**	**2.68**	**0.45**	**0.95**	**0.5**	**0.17**	**0.58**	**0.32**	**0.22**	**0.88**	**1.29**	**0.38**	**0.68**	**0.32**	**1.01**	**1.22**
	SD	0.09	0.05	0.05	0.02	0.02	0.04	0.02	0.01	0.06	0.09	0.02	0.01	0.001	0.02	0.04
	Min	2.58	0.41	0.89	0.48	0.15	0.53	0.31	0.22	0.82	1.19	0.36	0.67	0.32	0.99	1.19
	Max	2.74	0.5	0.98	0.52	0.18	0.6	0.34	0.22	0.94	1.35	0.4	0.69	0.33	1.03	1.26
C. livida																
M (N = 5)	**Mean**	**2.5**	**0.38**	**0.95**	**0.4**	**0.12**	**0.58**	**0.39**	**0.26**	**0.8**	**1.2**	**0.35**	**0.63**	**0.25**	**0.9**	**1.04**
	SD	0.12	0.05	0.03	0.02	0.02	0.01	0.01	0.02	0.04	0.07	0.04	0.02	0.02	0.05	0.07
	Min	2.35	0.29	0.9	0.37	0.1	0.58	0.38	0.23	0.77	1.12	0.28	0.61	0.23	0.83	0.94
	Max	2.63	0.41	0.98	0.42	0.15	0.6	0.41	0.29	0.86	1.27	0.39	0.66	0.28	0.95	1.12
F (N = 5)	**Mean**	**2.43**	**0.37**	**0.99**	**0.39**	**0.13**	**0.56**	**0.37**	**0.25**	**0.79**	**1.18**	**0.33**	**0.62**	**0.29**	**0.91**	**1.11**
	SD	0.07	0.02	0.04	0.02	0.02	0.05	0.03	0.02	0.03	0.05	0.02	0.01	0.01	0.03	0.06
	Min	2.33	0.35	0.95	0.38	0.1	0.51	0.34	0.21	0.75	1.11	0.31	0.61	0.28	0.88	1.04
	Max	2.53	0.4	1.05	0.41	0.16	0.65	0.41	0.28	0.84	1.22	0.36	0.64	0.3	0.96	1.15
C. lividicornis																
M (N = 4)	**Mean**	**2.38**	**0.37**	**0.93**	**0.43**	**0.14**	**0.55**			**0.79**	**1.22**	**0.37**	**0.67**	**0.24**	**0.9**	**1.04**
	SD	0.15	0.02	0.04	0.02	0.01	0.04			0.02	0.05	0.05	0.02	0.01	0.04	0.07
	Min	2.23	0.35	0.9	0.41	0.13	0.52			0.78	1.17	0.32	0.65	0.23	0.86	0.98
	Max	2.51	0.38	0.98	0.45	0.14	0.6			0.83	1.29	0.44	0.7	0.26	0.96	1.11
F (N = 1)	**Mean**	**2.35**	**0.37**	**0.92**	**0.44**					**0.85**			**0.62**	**0.29**	**0.92**	**1.04**
C. miyamotoi																
M (N = 2)	**Mean**	**2.31**	**0.35**	**0.7**	**0.39**	**0.12**	**0.65**	**0.35**	**0.26**	**0.66**	**1.15**	**0.35**	**0.6**	**0.24**	**0.86**	**0.97**
	SD	0.36	0.02	0.01	0.02	0	0.01	0.01	0	0.01	0.09	0	0.07	0.04	0.03	0.05
	Min	2.05	0.33	0.69	0.37	0.12	0.64	0.35	0.26	0.66	1.09	0.34	0.55	0.21	0.84	0.94
	Max	2.56	0.364	0.71	0.4	0.12	0.65	0.36	0.26	0.67	1.21	0.35	0.65	0.27	0.89	1.01
F (N = 4)	**Mean**	**2.41**	**0.35**	**0.7**	**0.41**	**0.12**	**0.48**	**0.32**	**0.26**	**0.68**	**0.85**	**0.34**	**0.57**	**0.28**	**0.89**	**1.01**
	SD	0.09	0.03	0.04	0.05	0.01	0.04	0.01	0.02	0.03	0.05	0.03	0.01	0.02	0.07	0.05

Table 1. Continued.

		Length											Width			
		Total body	Head	Labium	Pronotum	Antenna				Hind leg			Head	Vertex	Pronotum	Hemelytra
						Seg. I	Seg. II	Seg. III	Seg. IV	Femur	Tibia	Tarsus				
	Min	2.29	0.33	0.64	0.35	0.11	0.43	0.31	0.24	0.65	0.17	0.32	0.56	0.26	0.84	0.94
	Max	2.5	0.38	0.74	0.47	0.14	0.5	0.33	0.28	0.7	1.12	0.37	0.59	0.3	0.99	1.04
Compsidolon elaegnicola																
F (N = 1)	**Mean**	**4.47**	**0.59**	**1.21**	**0.71**	**0.27**	**1.36**	**1.1**	**0.49**				**0.92**	**0.46**	**1.63**	**1.95**
C. salicellum																
M (N = 3)	**Mean**	**3.26**	**0.55**	**1.43**	**0.43**	**0.25**	**1.24**	**0.84**	**0.57**	**1.27**	**1.96**	**0.51**	**0.67**	**0.25**	**0.99**	**1.24**
	SD	0.14	0.01	0.05	0.02	0.01	0.03	0.05	0.01	0.07	0.09	0.03	0.01	0	0.02	0.06
	Min	3.13	0.54	1.39	0.41	0.24	1.2	0.78	0.56	1.19	1.87	0.49	0.66	0.25	0.98	1.19
	Max	3.41	0.55	1.49	0.46	0.26	1.26	0.88	0.58	1.33	2.06	0.54	0.68	0.25	1.01	1.32
F (N = 1)	**Mean**	**3.36**	**0.55**	**1.44**	**0.47**	**0.29**	**1.09**	**0.69**	**0.49**	**1.27**	**1.97**	**0.43**	**0.63**	**0.32**	**1.07**	**1.16**
Europiella artemisiae																
M (N = 5)	**Mean**	**2.96**	**0.44**	**1.09**	**0.43**	**0.25**	**0.86**	**0.63**	**0.39**	**0.97**	**1.53**	**0.46**	**0.68**	**0.32**	**0.93**	**1.18**
	SD	0.18	0.04	0.07	0.02	0.01	0.08	0.03	0.02	0.08	0.08	0.04	0.02	0.03	0.05	0.06
	Min	2.69	0.39	1.01	0.41	0.23	0.77	0.59	0.37	0.88	1.44	0.43	0.65	0.29	0.88	1.1
	Max	3.19	0.5	1.19	0.45	0.26	0.95	0.66	0.41	1.09	1.63	0.53	0.7	0.35	1.01	1.24
F (N = 5)	**Mean**	**2.86**	**0.45**	**1.1**	**0.45**	**0.23**	**0.77**	**0.55**	**0.37**	**1.02**	**1.49**	**0.42**	**0.66**	**0.37**	**0.97**	**1.23**
	SD	0.16	0.04	0.06	0.02	0.02	0.03	0.04	0.03	0.06	0.06	0.03	0.03	0.02	0.05	0.06
	Min	2.68	0.4	1	0.43	0.21	0.73	0.48	0.33	0.93	1.42	0.39	0.62	0.34	0.92	1.16
	Max	3.08	0.5	1.17	0.48	0.25	0.8	0.58	0.42	1.09	1.57	0.46	0.7	0.4	1.03	1.29
E. gilva																
F (N = 5)	**Mean**	**3.69**	**0.52**	**1.44**	**0.63**	**0.26**	**0.96**	**0.58**	**0.37**	**1.25**	**1.92**	**0.46**	**0.803**	**0.42**	**1.33**	**1.68**
	SD	0.14	0.07	0.03	0.03	0.02	0.02	0.04	0.03	0.04	0.05	0.04	0.02	0.04	0.05	0.06
	Min	3.55	0.44	1.4	0.57	0.22	0.92	0.52	0.34	1.22	1.86	0.42	0.77	0.38	0.57	1.26
	Max	3.86	0.66	1.49	0.65	0.28	0.97	0.62	0.41	1.32	1.99	0.51	0.83	0.48	1.4	1.74
E. kiritshenkoi																
M (N = 5)	**Mean**	**4.39**	**0.62**	**1.14**	**0.63**	**0.35**	**1.54**	**1.09**	**0.55**	**1.57**	**2.49**	**0.64**	**0.86**	**0.47**	**1.29**	**1.62**
	SD	0.24	0.03	0.08	0.03	0.01	0.09	0.08	0.05	0.05	0.07	0.05	0.02	0.02	0.02	0.07
	Min	4.04	0.57	1.06	0.6	0.33	1.45	1.1	0.49	1.5	2.44	0.56	0.84	0.46	1.25	1.55
	Max	4.67	0.65	1.26	0.66	0.36	1.65	1.17	0.6	1.62	2.58	0.71	0.89	0.5	1.31	1.71

Table 1. Continued.

		Length											Width			
		Total body	Head	Labium	Pronotum	Antenna				Hind leg			Head	Vertex	Pronotum	Hemelytra
						Seg. I	Seg. II	Seg. III	Seg. IV	Femur	Tibia	Tarsus				
F (N = 5)	**Mean**	**4.53**	**0.63**	**1.25**	**0.62**	**0.36**	**1.49**	**1.07**	**0.59**	**1.56**	**2.37**	**0.65**	**0.87**	**0.49**	**1.37**	**1.7**
	SD	0.08	0.03	0.03	0.04	0.04	0.04	0.07	0.03	0.03	0.12	0.02	0.02	0.06	0.04	0.04
	Min	4.43	0.59	1.21	0.55	0.31	1.46	0.98	0.57	1.54	2.23	0.61	0.86	0.42	1.32	1.64
	Max	4.62	0.66	1.28	0.65	0.4	1.56	1.15	0.64	1.62	2.53	0.68	0.91	0.54	1.43	1.73
Europiellomorpha lividellus																
M (N = 2)	**Mean**	**3.13**	**0.46**	**1.2**	**0.48**	**0.25**	**0.95**	**0.63**	**0.45**	**1.09**	**1.71**	**0.42**	**0.7**	**0.33**	**1.05**	**1.27**
	SD	0.07	0.05	0.07	0.02	0.01	0.02	0	0.03	0.09	0.02	0.08	0.02	0.02	0.02	0.07
	Min	3.08	0.43	1.15	0.46	0.25	0.93	0.63	0.43	1.02	1.7	0.37	0.68	0.32	1.04	1.22
	Max	3.17	0.5	1.25	0.49	0.26	0.97	0.63	0.47	1.15	1.73	0.48	0.72	0.35	1.06	1.32
F (N = 2)	**Mean**	**3.18**	**0.49**	**1.29**	**0.47**	**0.27**	**0.91**	**0.6**	**0.44**	**1.11**	**1.17**	**0.45**	**0.7**	**0.39**	**1.03**	**1.37**
	SD	0.03	0.02	0.05	0.02	0	0	0.01	0.01	0.02	0.09	0.01	0.03	0.03	0.02	0
	Min	3.16	0.48	1.26	0.46	0.27	0.91	0.59	0.43	1.03	1.59	0.45	0.68	0.37	1.02	1.37
	Max	3.2	0.5	1.32	0.49	0.27	0.91	0.6	0.44	1.2	1.72	0.46	0.72	0.41	1.05	1.37
E. miyamotoi																
F (N = 1)	**Mean**	**4.53**	**0.57**	**1.45**	**0.74**	**0.33**	**1.38**	**0.95**	**0.69**	**1.86**	**2.52**	**0.62**	**0.87**	**0.45**	**1.33**	**1.82**
Harpocera choii																
F (N = 1)	**Mean**	**5.2**	**0.62**	**1.21**	**1.15**	**0.4**	**1.16**	**0.82**	**0.61**	**2.02**	**2.92**	**0.71**	**1**	**0.58**	**2.28**	**2.49**
H. josifovi																
M (N = 4)	**Mean**	**5.46**	**–**	**1.10**	**0.79**	**0.54**	**1.10**	**0.95**	**0.63**	**1.56**	**2.89**	**0.73**	**0.94**	**0.46**	**1.71**	**1.97**
	Min	5.71	–	1.05	0.78	0.53	1.08	0.94	0.60	1.41	2.79	0.68	0.91	0.42	1.71	1.94
	Max	5.11	–	1.15	0.80	0.54	1.12	0.96	0.65	1.70	2.98	0.77	0.96	0.50	1.72	2.00
H. koreana																
M (N = 1)	**Mean**	**5.84**	**0.71**	**1.04**	**0.95**	**0.49**	**0.96**	**0.88**	**0.68**	**1.85**	**2.56**	**0.59**	**0.97**	**0.51**	**1.77**	**1.87**
F (N = 2)	**Mean**	**5.42**	**0.68**	**1.03**	**1.03**	**0.31**	**1.08**	**0.68**	**0.43**	**1.68**	**2.46**	**0.59**	**0.95**	**0.59**	**1.42**	**2.31**
	SD	0.18	0.05	0.01	0.08	0.06	0.03	0.03	0.06	0	0.07	0.02	0.02	0.09	0.98	0.08
	Min	5.29	0.65	1.02	0.98	0.26	1.06	0.67	0.39	1.68	2.41	0.57	0.93	0.52	0.73	2.25
	Max	5.55	0.71	1.04	1.09	0.35	1.11	0.7	0.48	1.68	2.51	0.6	0.97	0.65	2.11	2.37
Kasumiphylus kyushuensis																
M (N = 2)	**Mean**	**3.04**	**0.49**	**1.3**	**0.49**	**0.28**	**1.2**	**0.72**	**0.56**	**1.28**	**1.92**	**0.54**	**0.71**	**0.22**	**1.06**	**1.19**

Table 1. Continued.

		Length											Width			
		Total body	Head	Labium	Pronotum	Antenna				Hind leg			Head	Vertex	Pronotum	Hemelytra
						Seg. I	Seg. II	Seg. III	Seg. IV	Femur	Tibia	Tarsus				
	SD	0.2	0.06	0	0.01	0.02	0	0.03	0	0.01	0.11	0.01	0.05	0	0.01	0.01
	Min	2.9	0.45	1.3	0.49	0.27	1.2	0.7	0.56	1.28	1.84	0.53	0.68	0.22	1.05	1.19
	Max	3.18	0.53	1.3	0.5	0.29	1.2	0.74	0.56	1.28	1.99	0.55	0.75	0.22	1.07	1.2
F (N = 5)	**Mean**	**3.13**	**0.49**	**1.36**	**0.5**	**0.28**	**1.06**	**0.73**	**0.51**	**1.23**	**1.85**	**0.47**	**0.71**	**0.28**	**1.02**	**1.28**
	SD	0.14	0.02	0.06	0.02	0.02	0.06	0.04	0.02	0.02	0.07	0.02	0.02	0.02	0.02	0.04
	Min	2.91	0.46	1.3	0.46	0.26	1	0.7	0.49	1.21	1.77	0.43	0.68	0.24	1	1.24
	Max	3.29	0.52	1.45	0.52	0.295	1.104	0.75	0.52	1.26	1.95	0.49	0.73	0.29	1.04	1.33
Moissonia befui																
F (N = 1)	**Mean**	**3.2**	**0.53**	**1.11**	**0.56**	**0.22**	**0.81**	**0.53**	**0.41**	**1.05**	**1.56**	**0.35**	**0.79**	**0.39**	**1.26**	**1.42**
M. kalopani																
M (N = 5)	**Mean**	**3.2**	**0.51**	**0.98**	**0.54**	**0.2**	**0.87**	**0.52**	**0.37**	**1**	**1.45**	**0.39**	**0.76**	**0.38**	**1.16**	**1.35**
	SD	0.09	0.03	0.05	0.02	0.02	0.02	0.05	0.03	0.07	0.22	0.01	0.01	0.01	0.01	0.09
	Min	3.08	0.49	0.93	0.52	0.18	0.86	0.45	0.34	0.9	1.05	0.37	0.74	0.36	1.15	1.21
	Max	3.33	0.57	1.04	0.57	0.22	0.9	0.55	0.39	1.06	1.57	0.41	0.78	0.4	1.19	1.42
F (N = 3)	**Mean**	**3.07**	**0.51**	**0.98**	**0.59**	**0.2**	**0.81**	**0.49**	**0.35**	**1.06**	**1.62**	**0.39**	**0.81**	**0.41**	**1.32**	**1.45**
	SD	0.06	0.03	0.02	0.02	0.01	0.02	0.03	0.04	0.01	0.04	0.02	0.02	0.01	0	0.02
	Min	3.03	0.48	0.96	0.57	0.19	0.79	0.48	0.32	1.05	1.58	0.36	0.79	0.4	1.31	1.44
	Max	3.11	0.55	0.99	0.61	0.22	0.83	0.51	0.37	1.06	1.66	0.4	0.83	0.42	1.32	1.46
M. yasunagai																
M (N = 1)	**Mean**	**3.07**	**0.5**	**0.94**	**0.5**	**0.2**	**0.85**	**0.55**	**0.37**	**1.02**	**1.54**	**0.37**	**0.74**	**0.36**	**1.16**	**1.34**
F (N = 5)	**Mean**	**3.32**	**0.51**	**1.03**	**0.57**	**0.21**	**0.83**	**0.52**	**0.44**	**1.06**	**1.6**	**0.41**	**0.78**	**0.39**	**1.28**	**1.49**
	SD	0.1	0.03	0.04	0.02	0.01	0.03	0.02	0.01	0.04	0.04	0.01	0.01	0.02	0.03	0.02
	Min	3.17	0.47	0.97	0.55	0.19	0.79	0.5	0.43	0.99	1.56	0.4	0.77	0.37	1.26	1.46
	Max	3.42	0.53	1.07	0.59	0.22	0.87	0.55	0.45	1.09	1.65	0.42	0.8	0.42	1.33	1.51
Monosynamma bohemanni																
M (N = 5)	**Mean**	**3.7**	**0.63**	**1.37**	**0.65**	**0.27**	**0.94**	**0.5**	**0.39**	**1.23**	**1.76**	**0.49**	**0.86**	**0.46**	**1.25**	**1.64**
	SD	0.11	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.05	0.04	0.01	0.01	0.03	0.03
	Min	3.58	0.6	1.36	0.62	0.24	0.92	0.49	0.37	1.21	1.71	0.45	0.85	0.46	1.21	1.6
	Max	3.84	0.66	1.39	0.66	0.29	0.97	0.53	0.41	1.25	1.83	0.54	0.87	0.48	1.28	1.68
F (N = 3)	**Mean**	**3.98**	**0.65**	**1.38**	**0.68**	**0.25**	**0.9**	**0.52**	**0.42**	**1.27**	**1.96**	**0.53**	**0.88**	**0.49**	**1.35**	**1.79**

Table 1. Continued.

		Length											Width			
		Total body	Head	Labium	Pronotum	Antenna				Hind leg			Head	Vertex	Pronotum	Hemelytra
						Seg. I	Seg. II	Seg. III	Seg. IV	Femur	Tibia	Tarsus				
	SD	0.23	0.04	0.02	0.04	0.02	0.04	0.02	0.01	0.06	0.06	0.02	0.02	0.01	0.04	0.08
	Min	3.68	0.61	1.36	0.65	0.23	0.85	0.5	0.4	1.2	1.8	0.52	0.86	0.47	1.28	1.66
	Max	4.32	0.7	1.41	0.75	0.28	0.96	0.54	0.43	1.35	2.02	0.56	0.91	0.51	1.4	1.88
Orthonotus bicoloriceps																
M (N = 5)	**Mean**	**3.77**	**0.56**	**1.4**	**0.6**	**0.38**	**1.48**	**0.95**	**0.58**	**1.49**	**2.24**	**0.53**	**0.76**	**0.26**	**1.15**	**1.49**
	SD	0.2	0.02	0.01	0.04	0.03	0.07	0.05	0.03	0.07	0.19	0.03	0.02	0.04	0.05	0.04
	Min	3.45	0.54	1.39	0.55	0.35	1.39	0.9	0.55	1.4	2.02	0.5	0.73	0.24	1.08	1.41
	Max	3.95	0.58	1.41	0.65	0.41	1.57	0.99	0.6	1.56	2.48	0.55	0.79	0.34	0.23	1.53
F (N = 3)	**Mean**	**3.38**	**0.55**	**1.38**	**0.62**	**0.43**	**1.2**	**0.83**	**0.57**	**1.36**	**2.08**	**0.51**	**0.74**	**0.31**	**1.2**	**1.63**
	SD	0.09	0.06	0.04	0.04	0.01	0.03	0.03	0.03	0.02	0.07	0.01	0.02	0.02	0.05	0.05
	Min	3.27	0.48	1.35	0.57	0.42	1.17	0.8	0.54	1.34	1.98	0.5	0.71	0.28	1.14	1.56
	Max	3.5	0.62	1.44	0.64	0.44	1.24	0.86	0.62	1.39	2.14	0.52	0.77	0.32	1.25	1.69
Orthophylus yongmuni																
M (N = 1)	**Mean**	**4.66**	**0.5**	**1.01**	**0.6**	**0.31**	**1.67**			**1.31**	**1.61**	**0.53**	**0.78**	**0.28**	**1.23**	**1.47**
Parapsallus vitellinus																
M (N = 3)	**Mean**	**3.44**	**0.43**	**1.08**	**0.51**	**0.22**	**0.93**	**0.58**	**0.38**	**1.18**	**1.61**	**0.47**	**0.68**	**0.3**	**1.1**	**1.3**
	SD	0.02	0.06	0.06	0.02	0.01	0.02	0.01	0.02	0.07	0.09	0.05	0.01	0.02	0.01	0.02
	Min	3.41	0.36	1.02	0.49	0.22	0.9	0.57	0.36	1.1	1.52	0.41	0.67	0.29	1.09	1.28
	Max	3.45	0.47	1.12	0.52	0.23	0.95	0.59	0.39	1.23	1.7	0.5	0.7	0.32	1.11	1.32
F (N = 4)	**Mean**	**3.37**	**0.47**	**1.03**	**0.51**	**0.23**	**0.95**	**0.59**	**0.37**	**1.09**	**1.62**	**0.5**	**0.69**	**0.34**	**1.09**	**1.44**
	SD	0.1	0.01	0.04	0.01	0.03	0.08	0.04	0.01	0.08	0.07	0.02	0.02	0.02	0.06	0.07
	Min	3.26	0.45	0.98	0.49	0.19	0.86	0.54	0.36	1.02	1.56	0.48	0.66	0.3	1.06	1.38
	Max	3.45	0.48	1.08	0.52	0.27	1.04	0.63	0.38	1.18	1.69	0.52	0.71	0.35	1.18	1.54
Phylus coryloides																
M (N = 4)	**Mean**	**4.67**	**0.57**	**1.59**	**0.67**	**0.29**	**1.42**	**0.72**	**0.44**	**1.35**	**2.06**	**0.45**	**0.77**	**0.38**	**1.14**	**1.36**
	SD	0.39	0.01	0.02	0.04	0.02	0.07	0.04	0.02	0.07	0.11	0.01	0.03	0.03	0.08	0.12
	Min	4.22	0.56	1.57	0.65	0.26	1.36	0.67	0.42	1.29	1.98	0.45	0.74	0.33	1.08	1.24
	Max	5.01	0.57	1.62	0.72	0.32	1.53	0.75	0.46	1.43	2.14	0.46	0.81	0.41	1.26	1.48
F (N = 3)	**Mean**	**4.39**	**0.58**	**1.57**	**0.7**	**0.26**	**1.23**	**0.69**	**0.4**	**1.23**	**2.05**	**0.48**	**0.76**	**0.42**	**1.15**	**1.31**

Table 1. Continued.

		Length											Width			
		Total body	Head	Labium	Pronotum	Antenna				Hind leg			Head	Vertex	Pronotum	Hemelytra
						Seg. I	Seg. II	Seg. III	Seg. IV	Femur	Tibia	Tarsus				
	SD	0.34	0.05	0.01	0.03	0.01	0.03	0.07	0.01	0.02	0.05	0.02	0.03	0.03	0.04	0.03
	Min	4.14	0.53	1.55	0.66	0.25	1.2	0.62	0.39	1.21	1.99	0.45	0.74	0.39	1.12	1.28
	Max	4.78	0.62	1.58	0.72	0.27	1.25	0.76	0.42	1.25	2.08	0.49	0.79	0.44	1.2	1.33
Pseudophylus stundjuki																
M (N = 5)	**Mean**	**3.63**	**0.54**	**1.07**	**0.61**	**0.26**	**1.11**	**0.54**	**0.39**	**1.09**	**1.67**	**0.43**	**0.79**	**0.31**	**1.12**	**1.36**
	SD	0.06	0.02	0.01	0.01	0.01	0.05	0.02	0.02	0.06	0.03	0.02	0.02	0.01	0.03	0.05
	Min	3.59	0.51	1.06	0.6	0.24	1.07	0.52	0.37	1.02	1.64	0.39	0.72	0.29	1.08	1.31
	Max	3.74	0.57	1.08	0.62	0.28	1.2	0.56	0.41	1.16	1.72	0.44	0.78	0.32	1.16	1.4
F (N = 5)	**Mean**	**3.2**	**0.52**	**1.03**	**0.59**	**0.21**	**0.78**	**0.46**	**1**	**1.01**	**1.41**	**0.39**	**0.69**	**0.35**	**1.1**	**1.44**
	SD	0.06	0.05	0.04	0.02	0.02	0.03	0.02	1.46	0.03	0.04	0.01	0.03	0.02	0.02	0.02
	Min	3.12	0.48	0.98	0.57	0.2	0.75	0.43	0.32	0.96	1.38	0.37	0.67	0.32	1.08	1.42
	Max	3.25	0.59	1.1	0.61	0.24	0.8	0.48	3.62	1.055	1.48	0.41	0.75	0.36	1.12	1.47
Plagiognathus amurensis																
M (N = 10)	**Mean**	**3.33**	**0.45**	**1.12**	**0.52**	**0.29**	**1.04**	**0.71**	**0.45**	**1.12**	**1.9**	**0.41**	**0.71**	**0.38**	**1.07**	**1.32**
	SD	0.24	0.05	0.13	0.06	0.03	0.12	0.08	0.06	0.11	0.18	0.03	0.03	0.02	0.08	0.11
	Min	3.07	0.38	1.01	0.46	0.24	0.88	0.59	0.39	1.02	1.71	0.41	0.68	0.36	0.96	1.15
	Max	3.83	0.57	1.44	0.67	0.33	1.33	0.87	0.61	1.35	2.2	0.5	0.76	0.44	1.23	1.55
F (N = 10)	**Mean**	**3.4**	**0.49**	**1.25**	**0.55**	**0.29**	**0.96**	**0.66**	**0.41**	**1.21**	**1.86**	**0.46**	**0.73**	**0.42**	**1.17**	**1.52**
	SD	0.29	0.03	0.09	0.06	0.03	0.09	0.05	0.05	0.08	0.15	0.03	0.02	0.02	0.1	0.17
	Min	3.05	0.45	1.11	0.47	0.26	0.87	0.55	0.34	1.05	1.65	0.42	0.72	0.4	1.05	1.33
	Max	3.84	0.53	1.38	0.63	0.35	1.1	0.73	0.5	1.33	2.11	0.5	0.77	0.47	1.37	1.8
P. chrysanthemi																
M (N = 2)	**Mean**	**4.25**	**0.47**		**0.59**	**0.26**	**1.15**	**0.87**	**0.44**	**1.43**	**1.56**	**0.53**	**0.78**	**0.33**	**1.21**	**1.55**
	SD	0.12	0.01		0.02	0.01	0.11	0.02	0.02	0.01	0.43	0.09	0.03	0.03	0.01	0.06
	Min	4.17	0.46		0.57	0.25	1.08	0.86	0.42	1.43	1.26	0.47	0.76	0.31	1.2	1.52
	Max	4.34	0.48		0.6	0.28	1.23	0.89	0.45	1.44	1.86	0.6	0.8	0.35	1.22	1.59
F (N = 2)	**Mean**	**3.38**	**0.43**		**0.49**	**0.26**	**0.93**			**1.22**	**1.62**	**0.56**	**0.68**	**0.37**	**1.11**	**1.44**
	SD	0.3	0.02		0.07	0	0.05			0.12	0.18	0.05	0.04	0.03	0.11	0.05
	Min	3.17	0.41		0.45	0.26	0.9			1.14	1.49	0.53	0.65	0.34	1.04	1.41
	Max	3.6	45		0.54	0.26	0.97			1.3	1.75	0.59	0.71	0.39	1.19	1.48

Table 1. Continued.

		Length											Width			
		Total body	Head	Labium	Pronotum	Antenna				Hind leg			Head	Vertex	Pronotum	Hemelytra
						Seg. I	Seg. II	Seg. III	Seg. IV	Femur	Tibia	Tarsus				
P. collaris																
M (N = 3)	**Mean**	**4.29**	**0.55**	**1.54**	**0.65**	**0.28**	**1.18**	**0.82**	**0.42**	**1.5**	**2.25**	**0.58**	**0.8**	**0.39**	**1.27**	**1.5**
	SD	0.45	0.01	0.09	0.09	0.03	0.13	0.06	0.03	0.07	0.16	0.04	0.05	0.04	0.09	0.3
	Min	3.92	0.54	1.46	0.56	0.24	1.1	0.76	0.39	1.45	2.14	0.55	0.76	0.35	1.19	1.16
	Max	4.79	0.55	1.65	0.74	0.31	1.34	0.88	0.44	1.54	2.36	0.6	0.85	0.42	1.37	1.71
F (N = 3)	**Mean**	**4.3**	**0.56**	**1.54**	**0.64**	**0.3**	**1.18**	**0.78**	**0.42**	**1.52**	**2.36**	**0.59**	**0.79**	**0.41**	**1.32**	**1.56**
	SD	0.48	0.11	0.15	0.11	0.04	0.06	0.07	0.08	0.1	0.27	0.08	0.04	0.02	0.13	0.32
	Min	3.91	0.44	1.38	0.52	0.25	1.13	0.73	0.36	1.45	2.17	0.54	0.74	0.38	1.22	1.3
	Max	4.84	0.64	1.67	0.75	0.34	1.24	0.84	0.48	1.59	2.55	0.65	0.83	0.43	1.47	1.92
P. yomogi																
M (N = 4)	**Mean**	**3.06**	**0.36**	**1.15**	**0.52**	**0.27**	**0.94**	**0.71**	**0.45**	**1.12**	**1.82**	**0.44**	**0.64**	**0.34**	**1.03**	**1.4**
	SD	0.11	0.03	0.07	0.02	0.01	0.05	0.03	0.07	0.1	0.03	0.02	0	0.02	0.03	0.14
	Min	2.91	0.33	1.08	0.49	0.27	0.88	0.69	0.41	1.04	1.79	0.41	0.64	0.32	0.99	1.31
	Max	3.16	0.41	1.22	0.54	0.3	1.01	0.76	0.56	1.23	1.85	0.46	0.65	0.37	1.08	1.6
F (N = 3)	**Mean**	**3.05**	**0.43**	**1.18**	**0.53**	**0.27**	**0.91**	**0.66**	**0.41**	**1.82**	**0.41**	**0.4**	**0.67**	**0.38**	**1.1**	**1.47**
	SD	0.17	0.03	0.04	0.01	0	0.02	0.08	0.01	0.1	0.03	0.01	0.01	0.01	0.06	0.05
	Min	2.89	0.39	1.15	0.52	0.27	0.88	0.6	0.4	1.74	0.39	0.4	0.66	0.37	1.06	1.43
	Max	3.23	0.45	1.22	0.54	0.27	0.94	0.75	0.41	1.93	0.44	0.41	0.68	0.39	1.16	1.52
Psallus ater																
M (N = 5)	**Mean**	**3.47**	**0.55**	**1.39**	**0.71**	**0.21**	**1.04**	**0.57**	**0.37**	**1.27**	**2.1**	**0.52**	**0.79**	**0.37**	**1.38**	**1.7**
	SD	0.027	0.07	0.08	0.03	0.03	0.09	0.01	0.03	0.13	0.13	0.05	0.03	0.03	0.07	0.1
	Min	3.21	0.44	1.26	0.65	0.17	0.89	0.55	0.34	1.09	1.92	0.45	0.75	0.35	1.26	1.58
	Max	3.86	0.61	1.48	0.74	0.25	1.12	0.58	0.4	1.41	2.24	0.55	0.83	0.41	1.48	1.82
P. atratus																
F (N = 1)	**Mean**	**4.39**	**0.68**	**1.61**	**0.84**	**0.2**	**1.16**	**0.6**	**0.36**	**1.45**	**2.14**	**0.58**	**0.89**	**0.45**	**1.61**	**1.99**
P. bagjonicus																
M (N = 1)	**Mean**	**3.52**	**0.56**		**0.68**	**0.2**	**1.07**	**0.45**	**0.28**	**1.08**	**1.7**		**0.83**	**0.37**	**1.31**	**1.52**
F (N = 5)	**Mean**	**3.3**	**0.56**	**1.23**	**0.67**	**0.19**	**0.89**	**0.38**	**0.24**	**1.09**	**1.68**	**0.39**	**0.76**	**0.39**	**1.36**	**1.75**

Table 1. Continued.

		Length											Width			
		Total body	Head	Labium	Pronotum	Antenna				Hind leg			Head	Vertex	Pronotum	Hemelytra
						Seg. I	Seg. II	Seg. III	Seg. IV	Femur	Tibia	Tarsus				
	SD	0.24	0.04	0.04	0.02	0.04	0.04	0	0.0002	0.02	0.02	0.05	0.02	0.01	0.04	0.08
	Min	3.01	0.51	1.2	0.66	0.13	0.84	0.38	0.24	1.07	1.66	0.34	0.73	0.38	1.31	1.64
	Max	3.63	0.61	1.27	0.7	0.21	0.93	0.38	0.25	1.12	1.2	0.45	0.8	0.41	1.41	1.82
P. castneae																
M (N = 5)	**Mean**	**3.16**	**0.55**	**1.14**	**0.66**	**0.21**	**0.88**	**0.47**	**0.32**	**1.1**	**1.76**	**0.45**	**0.77**	**0.36**	**1.32**	**1.59**
	SD	0.16	0.03	0.03	0.02	0.01	0.04	0.02	0.01	0.03	0.07	0.03	0.02	0.02	0.05	0.02
	Min	2.99	0.5	1.11	0.63	0.2	0.83	0.44	0.3	1.06	0.16	0.41	0.07	0.34	1.26	1.57
	Max	3.37	0.57	1.18	0.7	0.24	0.93	0.49	0.33	1.14	1.81	0.5	0.79	0.39	1.37	1.62
F (N = 5)	**Mean**	**3.21**	**0.52**	**1.25**	**0.66**	**0.36**	**0.89**	**0.53**	**0.31**	**1.13**	**1.69**	**0.46**	**0.74**	**0.39**	**1.32**	**1.6**
	SD	0.13	0.03	0.1	0.02	0.45	0.05	0.02	0.03	0.04	0.02	0.02	0.01	0.01	0.04	0.04
	Min	3.1	0.49	1.11	0.63	0.14	0.82	0.51	0.25	1.09	1.67	0.43	0.72	0.39	1.29	1.54
	Max	3.42	0.57	1.36	0.69	1.17	0.95	0.56	0.33	1.19	1.73	0.48	0.76	0.41	1.37	1.63
P. cheongtaensis																
M (N = 1)	**Mean**	**3.4**	**0.48**	**1.44**	**0.66**	**0.21**	**1.01**	**0.46**	**0.37**	**1.25**	**1.8**	**0.46**	**0.85**	**0.37**	**1.27**	**1.55**
P. cinnabarinus																
M (N = 5)	**Mean**	**3.06**	**0.52**	**1.19**	**0.6**	**0.21**	**1.07**	**0.64**	**0.36**	**1.14**	**1.91**	**0.41**	**0.78**	**0.32**	**1.14**	**1.44**
	SD	0.08	0.04	0.1	0.05	0.02	0.05	0.04	0.02	0.06	0.07	0.03	0.02	0.01	0.05	0.05
	Min	2.99	0.48	1.11	0.52	0.2	1	0.59	0.33	1.04	1.84	0.39	0.75	0.31	1.08	1.38
	Max	3.19	0.58	1.3	0.64	0.24	1.13	0.71	0.38	1.22	2.02	0.45	0.81	0.35	1.22	1.49
F (N = 1)	**Mean**	**3.54**	**0.53**	**1.31**	**0.68**	**0.22**	**1.11**	**0.65**	**0.38**	**1.13**	**2.01**	**0.45**	**0.77**	**0.46**	**1.21**	**1.67**
P. clarus																
M (N = 5)	**Mean**	**3.99**	**0.62**	**1.48**	**0.73**	**0.29**	**1.23**	**0.59**	**0.29**	**1.37**	**2.21**	**0.44**	**0.87**	**0.34**	**1.52**	**1.8**
	SD	0.16	0.02	0.06	0.02	0.01	0.04	0.04	0.01	0.06	0.09	0.02	0.01	0.02	0.02	0.1
	Min	3.79	0.6	1.41	0.7	0.27	1.17	0.55	0.28	1.27	2.15	0.42	0.85	0.32	1.5	1.67
	Max	4.17	0.65	1.57	0.75	0.31	1.27	0.63	0.3	1.42	2.37	0.48	0.89	0.36	1.55	1.96
F (N = 5)	**Mean**	**4.29**	**0.66**	**1.52**	**0.72**	**0.23**	**1.2**	**0.59**	**0.33**	**1.47**	**2.2**	**0.46**	**0.88**	**0.4**	**1.55**	**1.82**
	SD	0.27	0.04	0.06	0.05	0.006	0.05	0.03	0.009	0.1	0.09	0.04	0.03	0.02	0.05	0.1
	Min	3.94	0.6	1.46	0.68	0.22	1.15	0.56	0.32	1.29	2.08	0.41	0.84	0.37	1.51	1.7
	Max	4.57	0.69	1.59	0.8	0.24	1.28	0.62	0.34	1.53	2.3	0.49	0.93	0.43	1.64	1.91

Table 1. Continued.

		Length											Width			
		Total body	Head	Labium	Pronotum	Antenna				Hind leg			Head	Vertex	Pronotum	Hemelytra
						Seg. I	Seg. II	Seg. III	Seg. IV	Femur	Tibia	Tarsus				
P. flavescens																
M (N = 2)	**Mean**	**3.4**	**0.5**	**1.07**	**0.56**	**0.24**	**1.08**	**0.51**	**0.37**	**1.26**	**2.01**	**0.52**	**0.75**	**0.32**	**1.15**	**1.42**
	SD	0.03	0.02	0.05	0.01	0.01	0.11	0.11	0.01	0.02	0.02	0.02	0.01	0.002	0.07	0.05
	Min	3.39	0.48	1.03	0.55	0.23	1	0.43	0.36	1.25	2	0.5	0.74	0.32	1.1	1.39
	Max	3.42	0.51	1.1	0.57	0.24	1.16	0.6	0.38	1.27	2.03	0.53	0.76	0.32	1.2	1.46
M (N = 4)	**Mean**	**3.35**	**0.56**	**1.42**	**0.54**	**0.22**	**1.1**	**0.57**	**0.38**	**1.2**	**1.99**	**0.41**	**0.71**	**0.36**	**1.18**	**1.53**
	SD	0.23	0.02	0.38	0.05	0.03	0.01	0.01	0.03	0.07	0.03	0.07	0.02	0.01	0.04	0.62
	Min	3.13	0.54	1.2	0.51	0.18	1.08	0.56	0.36	1.13	1.97	0.37	0.7	0.35	1.13	1.46
	Max	3.66	0.59	1.99	0.61	0.24	1.11	0.57	0.4	1.28	2.01	0.46	0.74	0.37	1.23	1.59
P. ernesti																
M (N = 4)	**Mean**	**2.91**	**0.49**	**1.2**	**0.59**	**0.16**	**0.72**	**0.39**	**0.29**	**0.71**	**1.32**	**0.33**	**0.74**	**0.37**	**1.21**	**1.48**
	SD	0.32	0.03	0.02	0.03	0.03	0.04	0.02	0.03	0.06	0.03	0.01	0.01	0.01	0.02	0.09
	Min	2.61	0.45	1.18	0.55	0.13	0.7	0.37	0.25	0.67	1.29	0.32	0.72	0.36	1.18	1.38
	Max	3.22	0.53	1.22	0.62	0.18	0.74	0.42	0.31	0.76	1.34	0.34	0.76	0.39	1.22	1.55
F (N = 5)	**Mean**	**3**	**0.5**	**1.3**	**0.6**	**0.34**	**0.68**	**0.36**	**0.28**	**0.62**	**1.39**	**0.39**	**0.74**	**0.37**	**1.2**	**1.51**
	SD	0.08	0.04	0.08	0.04	0.45	0.06	0.03	0.01	0.07	0.07	0.04	0.03	0.03	0.05	0.12
	Min	2.93	0.43	1.22	0.55	0.13	0.61	0.32	0.26	0.56	1.3	0.32	0.7	0.33	1.14	1.4
	Max	3.12	0.55	1.38	0.66	0.16	0.76	0.41	0.3	0.69	1.48	0.42	0.79	0.42	1.28	1.72
P. longinovae																
M (N = 6)	**Mean**	**3.36**	**0.56**	**1.29**	**0.7**	**0.22**	**0.93**	**0.55**	**0.32**	**1.22**	**1.88**	**0.48**	**0.78**	**0.39**	**1.38**	**1.64**
	SD	0.26	0.03	0.08	0.02	0.04	0.04	0.02	0.03	0.06	0.06	0.05	0.01	0.02	0.03	0.03
	Min	3.02	0.53	1.2	0.67	0.17	0.86	0.52	0.3	1.12	1.79	0.4	0.77	0.37	1.35	1.61
	Max	3.77	0.61	1.41	0.73	0.27	0.99	0.58	0.37	1.28	1.94	0.54	0.79	0.41	1.44	1.7
F (N = 6)	**Mean**	**3.38**	**0.57**	**1.43**	**0.74**	**0.19**	**0.99**	**0.59**	**0.34**	**1.26**	**1.91**	**0.52**	**0.76**	**0.4**	**1.41**	**1.71**
	SD	0.27	0.02	0.01	0.04	0.02	0.34	0.03	0.02	0.05	0.06	0.02	0.02	0.01	0.06	0.06
	Min	2.98	0.53	1.42	0.68	0.16	0.94	0.55	0.31	1.19	1.84	0.5	0.73	0.39	1.32	1.62
	Max	3.75	0.61	1.44	0.79	0.21	1.03	0.64	0.37	1.34	2.02	0.54	0.78	0.43	1.47	1.79
P. michaili																
M (N = 2)	**Mean**	**4.05**	**0.54**	**1.29**	**0.76**	**0.21**	**1.02**			**1.33**	**2.03**	**0.48**	**0.83**	**0.34**	**1.5**	**1.84**

Table 1. Continued.

		Length											Width			
		Total body	Head	Labium	Pronotum	Antenna				Hind leg			Head	Vertex	Pronotum	Hemelytra
						Seg. I	Seg. II	Seg. III	Seg. IV	Femur	Tibia	Tarsus				
	SD	0.08	0.03	0.01	0.01	0.02	0.07			0.04	0.02	0.01	0.01	0.02	0.02	0.06
	Min	0.82	0.52	1.29	0.75	0.2	0.97			1.31	2.01	0.05	0.82	0.32	1.48	1.79
	Max	0.84	0.56	1.3	0.77	0.22	1.07			1.36	2.04	0.08	0.84	0.35	1.51	1.88
F (N = 2)	**Mean**	**3.7**	**0.55**	**1.33**	**0.76**	**0.21**	**0.98**	**0.45**	**0.28**	**1.34**	**2.02**	**0.45**	**0.86**	**0.41**	**1.53**	**1.84**
	SD	0.14	0.01	0.04	0.01	0.01	0.08	0.03	0.01	0.03	0.1	0.07	0.01	0.01	0.04	0.02
	Min	3.6	0.54	1.3	0.75	0.21	0.92	0.43	0.27	1.32	1.96	0.4	0.85	0.41	1.5	1.82
	Max	3.8	0.55	1.35	0.77	0.22	1.04	0.47	0.29	1.37	2.09	0.5	0.87	0.42	1.55	1.85
P. injensis																
M (N = 1)	**Mean**	**4.08**			**0.59**	**0.22**	**1.14**	**0.72**	**0.35**	**1.24**	**2.04**	**0.45**	**0.79**	**0.37**	**1.19**	**1.53**
P. taehwana																
M (N = 5)	**Mean**	**3.37**			**0.80**	**0.24**	**1.04**	**0.56**	**0.35**	**1.39**	**2.03**	**0.54**	**0.82**	**0.43**	**1.45**	**1.8**
	Min	3.22			0.75	0.21	1.00	0.52	0.31	1.34	1.97	0.52	0.79	0.40	1.37	1.77
	Max	3.51			0.84	0.27	1.07	0.59	0.39	1.43	2.09	0.55	0.85	0.45	1.52	1.82
F (N = 5)	**Mean**	**3.57**			**0.81**	**0.24**	**0.92**	**0.57**	**0.34**	**1.39**	**1.96**	**0.53**	**0.82**	**0.41**	**1.45**	**1.81**
	Min	3.46			0.74	0.20	0.86	0.51	0.32	1.33	1.90	0.49	0.77	0.40	1.37	1.75
	Max	3.68			0.87	0.21	0.98	0.63	0.36	1.44	2.02	0.57	0.86	0.42	1.52	1.86
P. yongdaeri																
M (N = 5)	**Mean**	**3.09**			**0.69**	**0.22**	**0.87**	**0.52**	**0.35**	**1.12**	**1.76**	**0.46**	**0.75**	**0.40**	**1.29**	**1.60**
	Min	2.09			0.64	0.21	0.83	0.50	0.32	1.05	1.71	0.41	0.72	0.37	1.24	1.53
	Max	3.20			0.73	0.23	0.90	0.54	0.38	1.19	1.80	0.51	0.77	0.43	1.34	1.66
F (N = 4)	**Mean**	**3.15**			**0.67**	**0.22**	**0.87**	**0.50**	**0.33**	**1.15**	**1.70**	**0.44**	**0.77**	**0.39**	**1.32**	**1.63**
	Min	3.06			0.63	0.20	0.82	0.46	0.31	1.12	1.65	0.42	0.74	0.37	1.30	1.58
	Max	3.23			0.71	0.23	0.91	0.54	0.35	1.18	1.74	0.46	0.79	0.40	1.33	1.68
P. suwonanus																
M (N = 6)	**Mean**	**3.57**	**0.49**	**1.14**	**0.68**	**0.2**	**0.94**	**0.54**	**0.34**	**1.25**	**1.79**	**0.55**	**0.83**	**0.36**	**1.36**	**1.61**
	SD	0.25	0.05	0.04	0.02	0.01	0.05	0.04	0.02	0.05	0.05	0.04	0.02	0.004	0.02	0.05
	Min	0.35	0.41	1.1	0.64	0.18	0.88	0.51	0.32	1.21	1.71	0.5	0.81	0.36	1.34	1.53
	Max	4.01	0.53	1.19	0.71	0.22	0.99	0.6	0.38	1.34	1.87	0.59	0.86	0.37	1.39	1.68
F (N = 6)	**Mean**	**3.68**	**0.57**	**1.15**	**0.71**	**0.2**	**0.96**	**0.53**	**0.34**	**1.31**	**1.88**	**0.54**	**0.84**	**0.39**	**1.41**	**1.75**

Table 1. Continued.

		Length										Width			
		Total body	Head	Labium	Pronotum	Antenna				Hind leg			Head	Vertex	Pronotum	Hemelytra
						Seg. I	Seg. II	Seg. III	Seg. IV	Femur	Tibia	Tarsus				
	SD	0.23	0.04	0.02	0.03	0.01	0.02	0.02	0.03	0.03	0.05	0.03	0.01	0.01	0.03	0.07
	Min	3.35	0.51	1.13	0.67	0.18	0.93	0.51	0.31	1.28	1.8	0.5	0.82	0.37	1.37	1.68
	Max	4.02	0.62	1.2	0.76	0.22	0.99	0.55	0.38	1.34	1.94	0.57	0.86	0.41	1.45	1.87
P. roseoguttatus																
F (N = 2)	**Mean**	**3.98**	**0.62**	**1.53**	**0.67**	**0.24**	**1.22**	**0.69**	**0.53**	**1.43**	**2.21**		**0.78**	**0.41**	**1.41**	**1.82**
	SD	0.01	0.02	0.04	0.08	0	0.16	0.03	0.15	0.06	0.01		0.03	0.02	0.11	0.13
	Min	3.98	0.61	1.5	0.61	0.23	1.11	0.67	0.42	1.39	2.2		0.76	0.4	1.32	1.73
	Max	3.99	0.64	1.56	0.73	0.24	1.33	0.71	0.63	1.47	2.21		0.8	0.43	1.49	1.91
P. tesongsanicus																
F (N = 1)	**Mean**	**4.15**	**0.59**	**1.64**	**0.63**	**0.2**	**1.12**	**0.61**		**1.33**	**2.02**	**0.49**	**0.79**	**0.4**	**1.29**	**1.68**
P. tonnaichanus																
M (N = 5)	**Mean**	**3.1**	**0.53**	**1.21**	**0.61**	**0.21**	**0.94**	**0.53**	**0.36**	**1.13**	**1.78**	**0.49**	**0.74**	**0.36**	**1.21**	**1.51**
	SD	0.3	0.03	0.06	0.04	0.01	0.06	0.03	0.02	0.06	0.09	0.03	0.04	0.02	0.08	0.15
	Min	2.7	0.48	1.15	0.57	0.19	0.88	0.48	0.34	1.08	1.68	0.46	0.69	0.33	1.1	1.32
	Max	3.44	0.55	1.27	0.65	0.23	1.03	0.58	0.38	1.23	1.9	0.53	0.79	0.38	1.3	1.68
F (N = 5)	**Mean**	**3**	**0.52**	**1.25**	**0.59**	**0.19**	**0.92**	**0.49**	**0.31**	**1.14**	**1.71**	**0.51**	**0.75**	**0.38**	**1.18**	**1.44**
	SD	0.18	0.08	0.02	0.04	0.01	0.05	0.04	0.02	0.07	0.05	0.04	0.02	0.02	0.07	0.06
	Min	2.69	0.41	1.23	0.52	0.18	0.87	0.44	0.3	1.04	1.63	0.47	0.71	0.36	1.06	1.33
	Max	3.14	0.59	1.26	0.63	0.2	1.01	0.53	0.33	1.2	1.74	0.56	0.76	0.41	1.23	1.49
Rubrocuneocoris quercicola																
M (N = 1)	**Mean**	**2.69**	**0.46**	**1.2**	**0.45**	**0.25**	**0.87**	**0.39**	**0.33**	**0.88**	**1.3**	**0.37**	**0.64**	**0.26**	**1.01**	**1.11**
Pherolepis amplus																
M (N = 1)	**Mean**	**3.6**	**0.62**	**1.53**	**0.77**	**0.24**	**0.93**	**0.4**		**1.15**	**1.68**	**0.34**	**1.02**	**0.44**	**1.3**	**1.58**
F (N = 4)	**Mean**	**3.87**	**0.74**	**1.51**	**0.79**	**0.27**	**0.93**	**0.45**	**0.4**	**1.17**	**1.72**	**0.4**	**1.05**	**0.59**	**1.41**	**1.77**
	SD	0.22	0.04	0.04	0.05	0.02	0.02	0.04	0.03	0.05	0.08	0.05	0.01	0.17	0.04	0.11
	Min	3.62	0.7	1.46	0.73	0.24	0.91	0.41	0.36	1.1	1.65	0.37	1.04	0.49	1.37	1.66
	Max	4.08	0.78	1.55	0.84	0.3	0.95	0.51	0.41	1.21	1.83	0.45	1.05	0.84	1.44	1.91
P. kiritshenkoi																
M (N = 2)	**Mean**	**3.65**	**0.65**	**1.44**	**0.74**	**0.23**	**0.94**	**0.34**	**0.45**	**1.05**	**1.59**	**0.45**	**1.1**	**0.52**	**1.36**	**1.57**

Table 1. Continued.

		Length										Width			
		Total body	Head	Labium	Pronotum	Antenna				Hind leg			Head	Vertex	Pronotum	Hemelytra
						Seg. I	Seg. II	Seg. III	Seg. IV	Femur	Tibia	Tarsus				
	SD	0.02	0.06	0.06	0.05	0.01	0	0.04		0.11	0.03	0.06	0.03	0.05	0.03	0
	Min	3.64	0.62	1.8	0.71	0.22	0.93	0.31	0.45	0.97	1.57	0.4	1.08	0.48	1.33	1.57
	Max	3.66	0.69	1.48	0.78	0.24	0.94	0.37	0.45	1.12	1.61	0.49	1.12	0.55	1.38	1.57
F (N = 1)	**Mean**	**3.8**	**0.71**		**0.75**	**0.22**	**0.92**			**1.05**	**1.61**	**0.42**	**1.11**	**0.57**	**1.44**	**1.65**
Pilophorus choii																
M (N = 1)	**Mean**	**4.07**	**0.73**	**1.24**	**0.81**	**0.29**	**1.14**	**0.48**	**0.46**	**1.35**	**2.07**	**0.4**	**0.73**	**0.39**	**1.2**	**1.13**
P. clavatus																
M (N = 1)	**Mean**	**4.37**	**0.63**	**1.46**	**0.77**	**0.36**	**1.43**	**0.61**		**1.41**	**2.26**	**0.41**	**1.01**	**0.49**	**1.31**	**1.45**
F (N = 3)	**Mean**	**3.19**	**0.66**	**1.36**	**0.8**	**0.31**	**1.3**	**0.53**	**0.47**	**1.32**	**2.23**	**0.43**	**0.98**	**0.51**	**1.22**	**1.36**
	SD	0.12	0.09	0.03	0.13	0.01	0.05	0.02	0.02	0.11	0.04	0.01	0.01	0.02	0.03	0.01
	Min	3.77	0.59	1.36	0.72	0.3	1.25	0.51	0.45	1.26	2.2	0.43	0.98	0.5	1.19	1.35
	Max	3.98	0.75	1.4	0.95	0.31	1.36	0.55	0.48	1.44	2.28	0.44	0.99	0.54	1.26	1.37
P. erraticus																
M (N = 4)	**Mean**	**4.17**	**0.75**	**1.4**	**0.84**	**0.29**	**1.41**	**0.52**	**0.51**	**1.46**	**2.35**	**0.44**	**0.97**	**0.49**	**1.22**	**1.27**
	SD	0.18	0.05	0.05	0.03	0.02	0.04	0.03	0.07	0.1	0.05	0.04	0.02	0.02	0.05	0.08
	Min	3.92	0.7	1.35	0.81	0.27	1.377	0.5	0.43	1.33	2.3	0.41	0.96	0.46	1.15	1.15
	Max	4.32	0.8	1.46	0.88	0.31	1.47	0.57	0.6	1.57	2.39	0.49	0.99	0.5	1.27	1.35
F (N = 4)	**Mean**	**4.06**	**0.82**	**1.42**	**0.89**	**0.31**	**1.57**	**0.52**	**0.49**	**1.52**	**2.44**	**0.44**	**1.02**	**0.54**	**1.21**	**1.28**
	SD	0.16	0.05	0.05	0.04	0.06	0.03	0.04	0.04	0.08	0.02	0.02	0.02	0.02	0.03	0.01
	Min	3.85	0.75	1.36	0.86	0.29	1.51	0.49	0.46	1.45	2.32	1.42	1	0.51	1.18	1.27
	Max	4.21	0.85	1.49	0.94	0.32	1.64	0.56	0.52	1.54	2.51	0.45	1.04	0.56	1.24	1.3
P. koreanus																
M (N = 3)	**Mean**	**3.56**	**0.7**	**1.17**	**0.76**	**0.26**	**1.2**	**0.45**	**0.42**	**1.19**	**1.79**	**0.4**	**0.91**	**0.45**	**1.1**	**1.17**
	SD	0.12	0.02	0.05	0.02	0.01	0.5	0.03	0.05	0.06	0.09	0.04	0.02	0.02	0.02	0.04
	Min	3.43	0.68	1.11	0.74	0.26	1.16	0.43	0.38	1.12	1.68	0.35	0.89	0.43	1.08	1.12
	Max	3.68	0.71	1.21	0.77	0.27	1.25	0.48	0.48	1.24	1.85	0.43	0.93	0.46	1.11	1.21
F (N = 3)	**Mean**	**3.65**	**0.72**	**1.22**	**0.79**	**0.26**	**1.26**	**0.48**	**0.39**	**1.25**	**1.91**	**0.4**	**0.91**	**0.47**	**1.14**	**1.17**
	SD	0.05	0.02	0.02	0.04	0.02	0.03	0.05	0.03	0.05	0.09	0.02	0.03	0.01	0.05	0.07
	Min	3.59	0.7	1.2	0.75	0.25	1.22	0.43	0.36	1.2	1.81	0.38	0.89	0.47	1.09	1.11
	Max	3.69	0.74	1.24	0.822	0.28	1.28	0.53	0.41	1.29	1.98	0.42	0.94	0.48	1.19	1.25

Table 1. Continued.

		Length											Width			
		Total body	Head	Labium	Pronotum	Antenna				Hind leg			Head	Vertex	Pronotum	Hemelytra
						Seg. I	Seg. II	Seg. III	Seg. IV	Femur	Tibia	Tarsus				
P. lucidus																
M (N = 2)	**Mean**	**3.34**	**0.57**	**1.17**	**0.73**	**0.21**	**0.88**	**0.38**	**0.42**	**1.02**	**1.65**	**0.34**	**0.84**	**0.38**	**1.11**	**1.06**
	SD	0.06	0.07	0.01	0.06	0.01	0.04	0	0.02	0.04	0.01	0.01	0.03	0.03	0.05	0.14
	Min	3.3	0.52	1.17	0.68	0.2	0.85	0.37	0.4	1	1.64	0.34	0.82	0.36	1.08	0.96
	Max	3.38	0.62	1.18	0.77	0.21	0.91	0.38	0.44	1.05	1.66	0.34	0.85	0.4	1.15	1.16
F (N = 2)	**Mean**	**3.68**	**0.61**	**1.18**	**0.79**	**0.2**	**0.94**	**0.38**	**0.4**	**1.17**	**1.77**	**0.37**	**0.88**	**0.41**	**1.22**	**1.21**
	SD	0.2	0.09	0.01	0.07	0	0.07	0.05	0.03	0.04	0.03	0.04	0.08	0.03	0.01	0.11
	Min	3.54	0.55	1.17	0.75	0.2	0.89	0.34	0.38	1.15	1.75	0.35	0.82	0.39	1.21	1.13
	Max	3.82	0.67	1.19	0.84	0.2	0.98	0.42	0.42	1.2	1.79	0.4	0.93	0.43	1.23	1.29
P. niger																
M (N = 3)	**Mean**	**4.44**	**0.88**	**1.72**	**0.92**	**0.34**	**1.79**	**0.73**	**0.54**	**1.74**	**2.77**	**0.53**	**1.08**	**0.52**	**1.39**	**1.47**
	SD	0.36	0.02	0.07	0.03	0.02	0.09	0.02	0.03	0.03	0.1	0.02	0.03	0.03	0.05	0.08
	Min	4.16	0.89	1.64	0.89	0.31	1.7	0.71	0.51	1.71	2.69	0.51	1.05	0.49	1.35	1.42
	Max	4.85	0.9	1.76	0.95	0.36	1.88	0.74	0.56	1.77	2.88	0.55	1.11	0.54	1.46	1.56
F (N = 2)	**Mean**	**4.46**	**0.9**	**1.75**	**0.91**	**0.38**	**1.64**	**0.71**	**0.57**	**1.74**	**2.58**	**0.51**	**1.1**	**0.54**	**1.36**	**1.56**
	SD	0.03	0.02	0.02	0.08	0.06	0.03	0.01	0.02	0.01	0.16	0.04	0.01	0.05	0	0.02
	Min	4.44	0.89	1.74	0.85	0.34	1.62	0.7	0.55	1.73	2.47	0.48	1.09	0.5	1.36	1.55
	Max	4.47	0.92	1.76	0.96	0.43	1.67	0.71	0.58	1.74	2.7	0.54	1.11	0.58	1.36	1.57
P. miyamotoi																
F (N = 2)	**Mean**	**4.27**	**0.84**	**1.46**	**0.81**	**0.31**	**1.4**	**0.52**	**0.47**	**1.5**	**2.09**	**0.52**	**1.18**	**0.61**	**1.41**	**1.75**
	SD	0.4	0.02	0.4	0.03	0.05	0.03	0.01	0.02	0.1	0.14	0.01	0.05	0	0.02	0.19
	Min	3.99	0.82	1.18	0.79	0.28	1.38	0.51	0.45	1.43	1.99	0.51	1.15	0.61	1.4	1.61
	Max	4.56	0.85	1.74	0.83	0.34	1.42	0.53	0.48	1.56	2.19	0.52	1.21	0.62	1.43	1.88
P. setulosus																
M (N = 2)	**Mean**	**4.6**	**0.69**	**1.64**	**0.84**	**0.35**	**1.66**	**0.66**	**0.51**	**1.6**	**2.52**	**0.51**	**1.05**	**0.5**	**1.42**	**1.52**
	SD	0.35	0.07	0.02	0.02	0.05	0.07	0.02	0.02	0.08	0.1	0	0.01	0.01	0.01	0
	Min	4.35	0.65	1.62	0.82	0.31	1.61	0.64	0.5	1.55	2.45	0.51	1.04	0.5	1.41	1.52
	Max	4.84	0.74	1.65	0.86	0.39	1.7	0.67	0.53	1.66	2.59	0.51	1.06	0.5	1.43	1.52
F (N = 1)	**Mean**	**4.49**	**0.67**	**1.61**	**0.88**	**0.38**	**1.69**	**0.66**	**0.57**	**1.6**	**2.59**	**0.49**	**1.04**	**0.53**	**1.39**	**1.46**

Table 1. Continued.

		Length											Width			
		Total body	Head	Labium	Pronotum	Antenna				Hind leg			Head	Vertex	Pronotum	Hemelytra
						Seg. I	Seg. II	Seg. III	Seg. IV	Femur	Tibia	Tarsus				
P. typicus																
M (N = 5)	**Mean**	**2.93**	**0.7**	**1**	**0.66**	**0.19**	**0.91**	**0.44**	**0.48**	**0.98**	**1.71**	**0.41**	**0.79**	**0.45**	**0.86**	**0.84**
	SD	0.12	0.06	0.02	0.06	0.01	0.05	0.02	0.03	0.05	0.08	0.04	0.02	0.01	0.06	0.05
	Min	2.81	0.62	0.94	0.64	0.18	0.84	0.41	0.44	0.92	1.65	0.37	0.77	0.43	0.76	0.77
	Max	3.11	0.78	1.11	0.68	0.21	0.99	0.45	0.52	1.05	1.83	0.46	0.82	0.46	0.91	0.9
F (N = 5)	**Mean**	**3**	**0.72**	**1.03**	**0.64**	**0.18**	**0.88**	**0.44**	**0.51**	**1.02**	**1.8**	**0.44**	**0.83**	**0.48**	**0.77**	**0.89**
	SD	0.09	0.04	0.08	0.03	0.03	0.03	0.03	0.03	0.05	0.04	0.02	0.05	0.01	0.03	0.03
	Min	2.86	0.66	0.93	0.61	0.16	0.83	0.4	0.47	0.94	1.74	0.42	0.75	0.46	0.74	0.86
	Max	3.08	0.76	1.1	0.69	0.22	0.91	0.47	0.55	1.06	1.84	0.46	0.86	0.5	0.81	0.93

**Note*. M = Male, F = Female, N = Number of specimens measured, and SD = Standard deviation.

**Those specimens which were newly described, or species collected during the field survey in South Korea were measured.

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