

A systematic revision of the genus *Gonia* Meigen (Diptera: Tachinidae) in Korea

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The genus *Gonia* (Diptera: Tachinidae) is revised for the Korean species. We recognize four previously known species (*G. chinensis*, *G. divisa*, *G. foersteri*, and *G. klapperichi*), three newly recorded species in Korea (*G. distinguenda*, *G. olgae*, and *G. ussuriensis*) and a species new to science (*G. nigricoma* Lee and Han, **sp. nov.**). We here provide a key, descriptions, photographs and illustrations. We also inferred the phylogenetic relationships of the representative Palaearctic species using cladistic method.

Keywords: Diptera; Tachinidae; Goniini; *Gonia*; Korea; revision

Introduction

Meigen (1803) erected the genus *Gonia*, and Sabrosky and Arnaud (1965) subsequently designated the type species *Gonia bimaculata* Wiedemann. The *Gonia* species are morphologically homogenous, and, thus, easy to recognize as a genus but difficult to differentiate to individual species (Mesnil 1956).

The genus *Gonia* is currently placed in the tribe Goniini, because it shares the following characteristics with other members of the tribe (Crosskey 1976): (1) frons and facial regions exceptionally wide; (2) parafrontal very much wider than the interfrontal area; (3) ocellar setae very strong and reclinate; (4) outer vertical setae strong; and (5) antennae conspicuously longer in males than in females. Goniini may also be characterized by their completely incubated microtype eggs that hatch, only after having been swallowed, inside the host's mesenteron (Wood 1987). So far as is known, they are parasites of macrolepidoptera, principally of Noctuidae (Herting 1960; Crosskey 1976). Tschorsnig (1985) divided the Goniini into four groups based on their male genitalic structures, and, according to this classification, *Gonia* belongs to the *Gonia* group along with *Onychogonia*, *Pseudogonia*, and *Spallanzania*. These genera share the following characteristics (Tschorsnig 1985): (1) hypandrial arms characteristically fused like a bridge; (2) surstylus very short; and (3) intermedium very small.

This genus includes over 60 world species, among which 25 are from the Palaearctic Region. As a result of the taxonomic revision of Korean *Gonia* species, we here recognize four previously known species (*G. chinensis*, *G. divisa*, *G. foersteri*, and *G. klapperichi*), three newly recorded species in Korea (*G. distinguenda*, *G. olgae*, and *G. ussuriensis*) and a species new to science. We here

provide a key, descriptions, photographs and illustrations. We also inferred the phylogenetic relationships of the representative Palaearctic species including all the Korean species using cladistic method.

Materials and methods

Terminology and morphological interpretations follow the glossary of Merz and Haenni (2000), but those of male terminalia follow Sinclair (2000). In addition, we used the following nine ratios modified from Han and Norrbom (2005): eye ratio (shortest eye diameter/longest eye diameter); frons-head ratio (narrowest width of frons in dorsal view/width of head); gena-eye ratio (genal height/longest eye diameter; genal height is the distance between the ventral eye margin and the ventral genal margin anterior to the genal seta); flagellomere 1-pedicle ratio (length of flagellomere 1/length of pedicle); arista-antenna ratio (length of arista/length of antenna excluding arista); vein R_{4+5} ratio (distance along vein R_{4+5} between crossvein R-M and vein R_{4+5} apex/distance between crossvein R-M and basal node of vein R_{4+5}); vein M ratio (distance along vein M between crossveins R-M and DM-Cu/distance between crossveins R-M and BM-Cu); subcosta-costa ratio (length of pterostigma/length of costal cell, both measured along vein C); wing-thorax ratio (wing length/thorax length).

Consecutive digital images in different focal planes (usually 10 or more shots per specimen) were taken with a digital camera (Panasonic DMC FZ50) and the images were Z-stacked using Helicon Focus[®] software (Helicon Soft, Ltd.). All the Korean specimens used in this study are deposited in the Division of Biological Science and Technology, Yonsei University, Wonju

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Campus, Korea (YSUW). Acronyms of the other institutions mentioned in this paper are as follows: Biosystematics Laboratory, Graduate School of Social and Cultural Studies, Kyushu University, Fukuoka, Japan (BLKU); Natural History Museum, Department of Entomology, London, England (BMNH); Canadian National Collection of Insects, Agriculture and Agri-Food Canada, Ottawa, Ontario, Canada (CNC); Entomological Institute, Faculty of Agriculture, Hokkaido University, Sapporo, Hokkaido 060, Japan (HUS); Muséum National d'Histoire Naturelle, National Collection of Insects, Paris, France (MNHN); Musée de Zoologie Lausanne, Lausanne, Switzerland (MZLS); United States National Museum of Natural History, United States National Entomological Collection, Washington, DC, USA (USNM); Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany (ZFMK); Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia (ZIN); and Zoological Museum of Moscow University, Moscow, Russia (ZMUM). The following are the provincial abbreviations used in the material examined sections: Chungcheongbuk-do (CB); Chungcheongnam-do (CN); Gangwon-do (GW); Gyeonggi-do (GG); Gyeongsangbuk-do (GB); Gyeongsangnam-do (GN); Jeju-do (JJ); and Jeollanam-do (JN).

We used PAUP* (version 4.0b10; Swofford 2001) software to construct a cladogram of *Gonia*. The cladogram (Figure 7) is produced with Winclada (version 1.00.08; Nixon 2002). The methods for the cladistic analysis are explained in the appropriate section.

Genus *Gonia* Meigen

- Salmacia* Meigen, 1800: 38 (Name suppressed by ICZN, 1963, Opinion 678; type species: *Musca capitata* De Geer, 1776; subsequently designated by Coquillett, 1910: 602); Rohdendorf, 1927: 91 (key to Palaearctic species); Mesnil, 1956: 517 (redescription, in key to Palaearctic genera).
- Gonia* Meigen, 1803: 280 (type species: *Gonia bimaculata* Wiedemann, 1819; subsequently designated by Sabrosky and Arnaud, 1965: 1075); van Emden, 1954: 75 (key to British species); Tschorsnig and Herting, 1994: 47 (key to Central Europe species).
- Reaumuria* Robineau-Desvoidy, 1830: 79 (type species: *Musca capitata* De Geer, 1776; subsequently designated by Robineau-Desvoidy, 1863: 733).
- Redia* Robineau-Desvoidy, 1830: 74 (type species: *Redia vicina* Robineau-Desvoidy, 1830 (= *Gonia atra* Meigen, 1826); subsequently designated by Coquillett, 1910: 600); Mesnil, 1956: 542 (redescription).

- Pissemya* Robineau-Desvoidy, 1851: 318 (type species: *Gonia atra* Meigen, 1826, by monotypy).
- Cystogonia* Townsend, 1915a: 21 (type species: *Gonia turgida* Coquillett, 1897).
- Knabia* Townsend, 1915b: 286 (type species: *Knabia hirsuta* Townsend, 1915 (= *Gonia frontosa* Say, 1829)).
- Cnephalogonia* Townsend, 1916: 178 (type species: *Gonia distincta* Smith, 1915).
- Turanogonia* Rohdendorf, 1924: 228 (type species: *Turanogonia smirnovi* Rohdendorf, 1924 (= *Gonia chinensis* Wiedemann, 1824), by monotypy); Mesnil, 1956: 530 (redescription, key to Palaearctic species).
- Asiogonia* Rohdendorf, 1928: 98 (type species: *Asiogonia asiatica* Rohdendorf, 1928, by monotypy).
- Chrysocerogonia* Rohdendorf, 1928: 98 (as subgenus of *Salmacia* Meigen, 1800; type species: *Salmacia (Chrysocerogonia) ussuriensis* Rohdendorf, 1928, by monotypy).
- Eremogonia* Rohdendorf, 1928: 98 (as subgenus of *Salmacia* Meigen, 1800; type species: *Salmacia (Eremogonia) desertorum* Rohdendorf, 1928, by monotypy); Mesnil, 1956: 544 (redescription).
- Gonioclea* Villeneuve, 1929: 100 (type species: *Gonioclea apicalis* Villeneuve, 1929 (= *Salmacia (Eremogonia) desertorum* Rohdendorf, 1928); subsequently designated by Townsend, 1936: 174).
- Setigonia* Brooks, 1944: 221 (type species: *Gonia setigera* Tothill, 1924).
- Fuscigonia* Brooks, 1944: 223 (type species: *Gonia fuscicollis* Tothill, 1924).

Diagnosis. The combination of the following characteristics separate the genus *Gonia* from most other genera of the tribe Goniini (modified from Tothill, 1924): (1) wide frons (over half of head width); (2) reclinate ocellar setae; (3) orbital setae present in both sexes; (4) male flagellomere 1 about 1.5–2 times as long as that of female; and (5) most species with yellow brown tegula and basicosta. This genus closely resembles the other three genera of the *Gonia* group, but can be separated from *Pseudogonia* and *Spallanzania* by the above character 3, and also from *Onychogonia* by the character 5.

Key to the Korean species of the genus *Gonia* Meigen

1. Frons almost without any pruinosity; pruinosity on tergite 5 weak or absent 2
- Frons clearly with yellow brown to golden pruinosity; tergite 5 with heavy pruinosity 3
2. Parafacialia narrower than shortest eye diameter (Figure 2D,H); tergite 1 + 2 with median marginal setae in both sexes (Figure 2B,F); tergite 3 and 4 with erect setulae only in male (Figure 2A) *G. divisa*

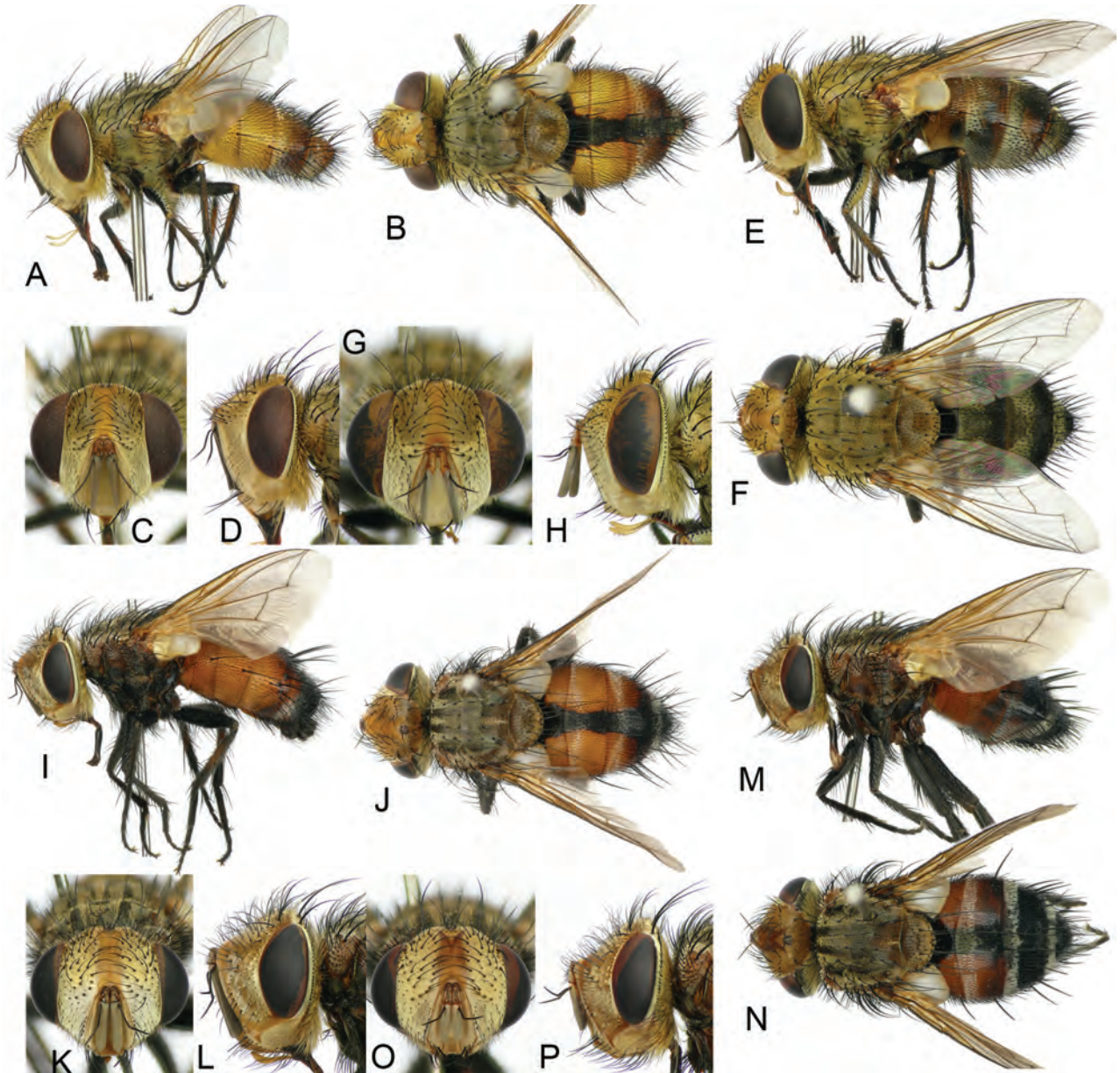


Figure 1. *Gonia chinensis* Wiedemann (A–H); A–D, male; E–H, female. *G. distinguenda* Herting (I–P); I–L, male; M–P, female.

- Parafacialia wider than shortest eye diameter (Figure 2L,P); tergite 1 + 2 with median marginal setae only in male (Figure 2J); tergite 3 and 4 with prone setulae in both sexes (Figure 2 I,M).....*G. foersteri*
- 3. Haltere entirely yellow brown; thorax, legs, and venter of abdomen with black and yellow brown to golden setulae mixed; postocular setae extended from upper eye margin and ended slightly before lower eye margin 4
- Haltere with stem yellow brown and knob dark brown; thorax, legs, and venter of abdomen only

- with black setulae; postocular setae extended from upper eye margin and ended slightly beyond lower eye margin..... 5
- 4. Femora black (Figure 1A,E); vertex with black setulae (Figure 1B,F); frontal vitta with black setulae (Figure 1C,G); scutum almost entirely with black setulae except for narrow lateral and posterior margin with yellow brown setulae (Figure 1B,F)..... *G. chinensis*
- Femora yellow brown (Figure 3A,E); vertex with black and yellow brown setulae mixed (Figure 3B,F); frontal vitta with golden setulae (Figure 3C,G);

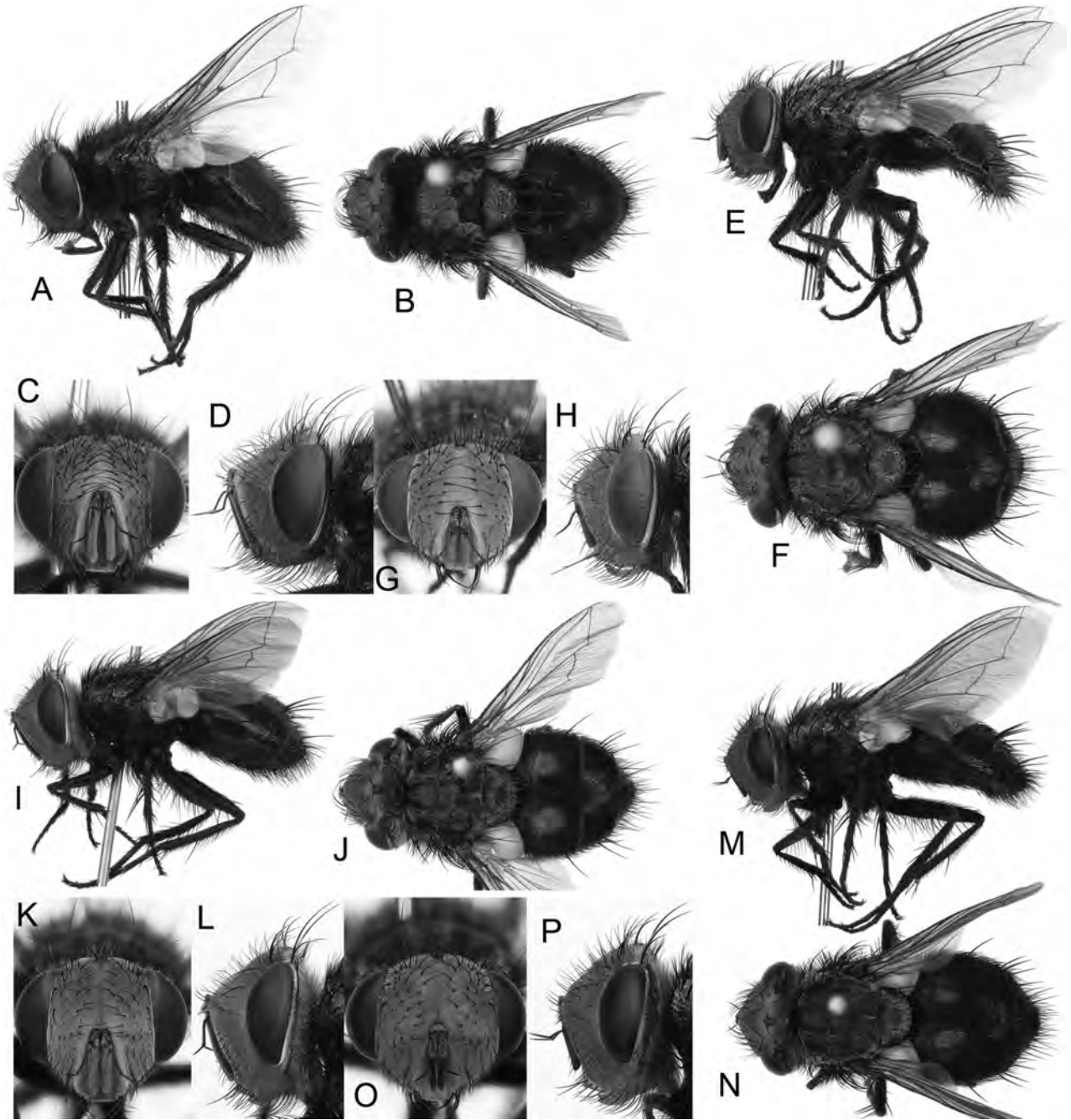


Figure 2. *Gonia divisa* Meigen (A–H); A–D, male; E–H, female. *G. foersteri* Meigen (I–P); I–L, male; M–P, female.

scutum almost entirely with yellow brown setulae except for narrow anterior margin with black setulae (Figure 3B,F) *G. klapperichi*

5. Abdomen yellow brown to orange brown with black longitudinal band 6

- Abdomen almost entirely dark brown to black 7

6. Flagellomere 1 orange brown (Figure 4K,O); parafacialia wider than shortest eye diameter

(Figure 4L,P); postocular setulae apically bent forward only in male (Figure 4L); tergite 1+2 with median marginal setae in both sexes (Figure 4J,N); tergite 3 and 4 with erect setulae only in male (Figure 4I) *G. ussuriensis*

- Flagellomere 1 dark brown (Figure 1K,O); parafacialia narrower than shortest eye diameter (Figure 1L,P); postocular setulae apically straight in both sexes (Figure 1L,P); tergite

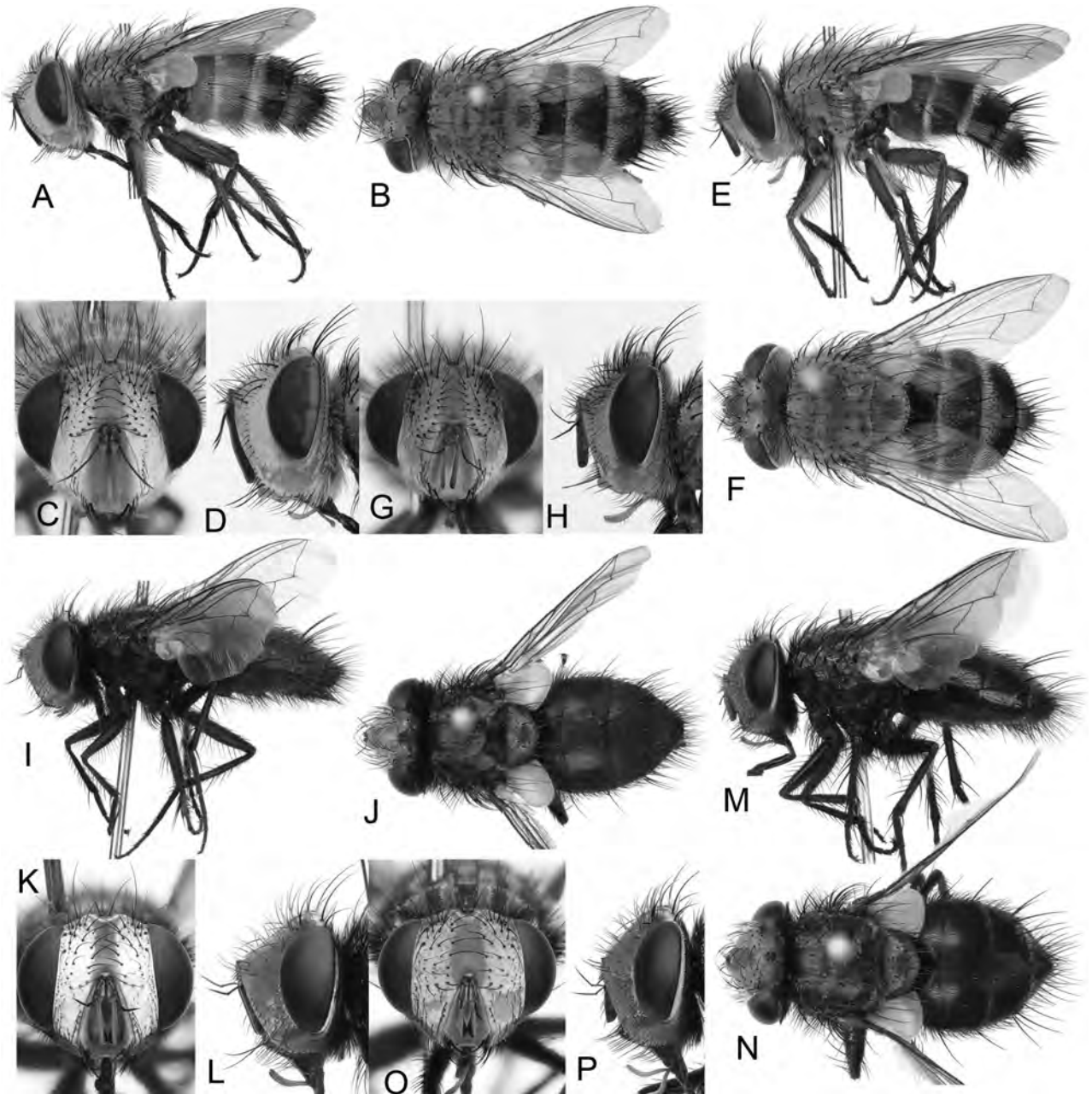


Figure 3. *Gonia klapperichi* (Mesnil) (A–H); A–D, male; E–H, female. *G. nigricoma* Lee and Han **sp. nov.** (I–P); I–L, male; M–P, female.

1 + 2 with median marginal setae only in male (Figure 1J); tergite 3 and 4 with prone setulae in both sexes (Figure 1I,M) *G. distinguenda*
 7. Occipital setulae yellow brown (Figure 4D,H); tergite 1 + 2 with median marginal setae only in male (Figure 4B) *G. olgae*
 - Occipital setulae dark brown to black (Figure 3 L,P); tergite 1 + 2 with median marginal setae in both sexes (Figure 3J,N) *G. nigricoma*, **sp. nov.**

Description of Korean *Gonia*. Body yellow brown to black in ground color with some dark brown to black areas; some areas covered with ivory white to golden pruinosity; setae black; setulae yellow brown to black. Head yellow brown in ground color with black setae and setulae (some golden setulae mixed in *G. klapperichi*); largely covered with ivory white to golden pruinosity especially on frons and parafacilia (without pruinosity in *G. divisa* and *G. foersteri*); medial vertical setae strong, reclinate; lateral vertical setae strong, latero-clinate;

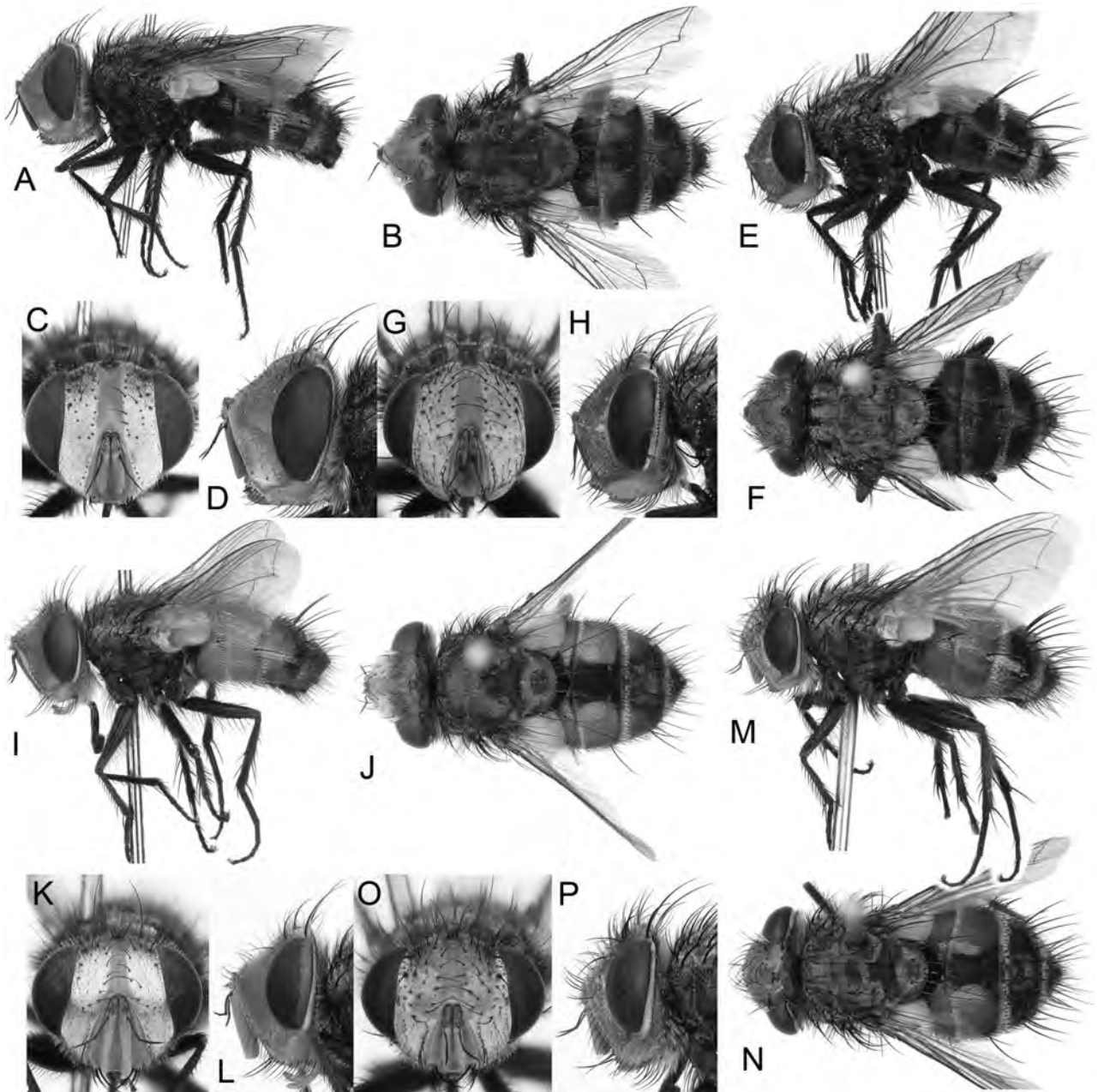


Figure 4. *Gonia olgae* (Rohdendorf) (A–H); A–D, male; E–H, female. *G. ussuriensis* (Rohdendorf) (I–P); I–L, male; M–P, female.

strong ocellar setae reclinate, divergent; eye bare; ocellar triangle dark brown; lunule bare; antennal scape with short setulae; pedicel partially with yellow brown pruinosity, dorsally with short setulae and single seta at least twice as long as nearby setulae; flagellomere 1 with yellow brown pruinosity; arista dark brown, bare; face more or less flat; vibrissa well developed, cruciate; genal dilation well developed; occiput densely with relatively long, yellow brown setulae (dark brown to black in *G. nigricoma*); mouthparts with slightly clavate, yellow brown palpus; prementum dark brown; labella

dark brown with long black and golden setulae. Thorax dark brown in ground color with yellow brown pruinosity; setae and setulae black (some yellow brown setulae mixed in *G. chinensis* and *G. klapperichi*); scutum with 3 + 3 acrostichal, 3 + 4 dorsocentral, 1 + 3 intraalar, two posthumeral, one presutural, three supraalar, two strong postalar setae; presutural scutum with four narrow dark brown longitudinal vittae; median vittae straight; lateral vittae triangular shape, about 0.3 × as long as median vittae; postsutural scutum with four dark brown longitudinal vittae; median vittae short,

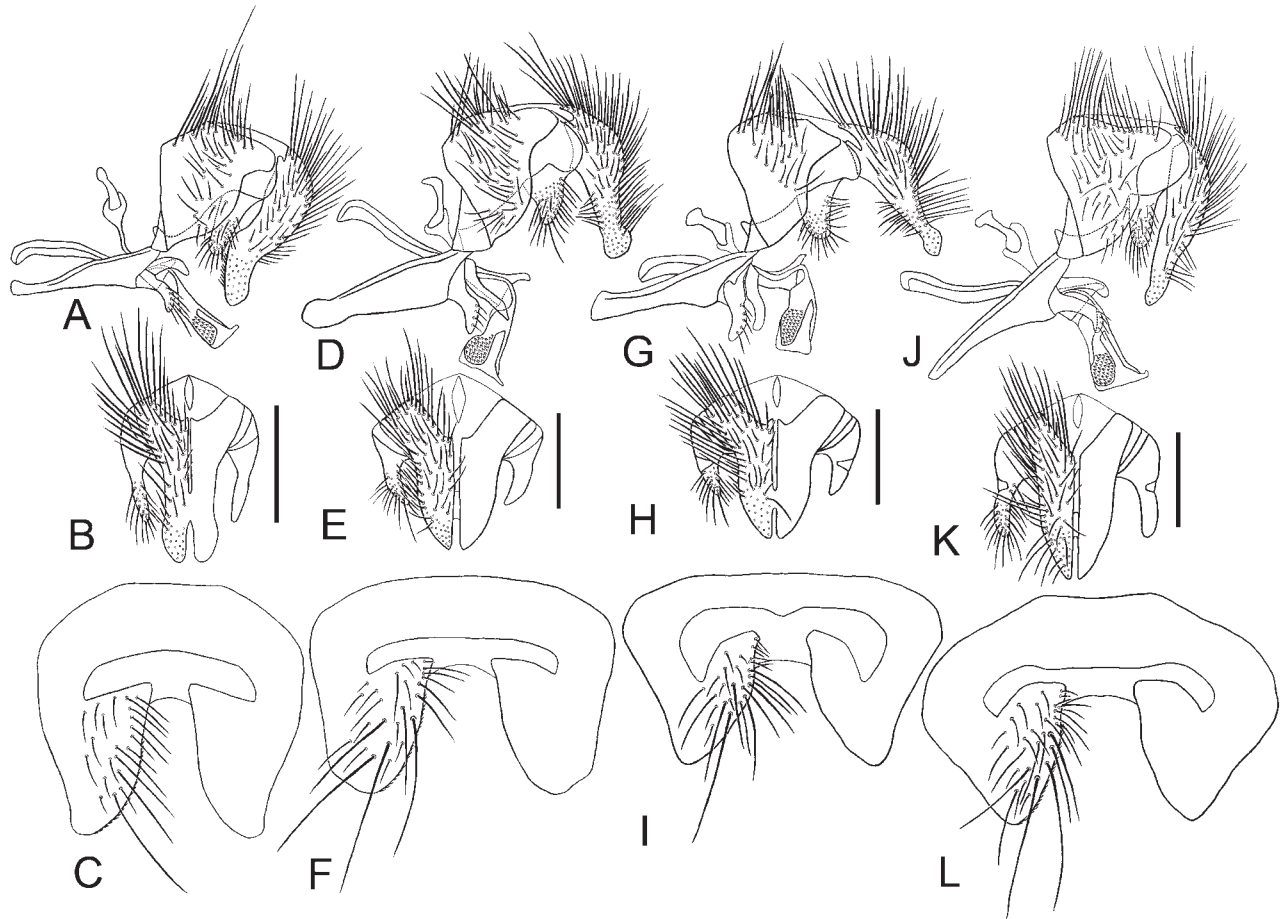


Figure 5. Male genitalia (lateral and caudal views) and sternite 5. A–C, *Gonia chinensis* Wiedemann; D–F, *G. distinguenda* Herting; G–I, *G. divisa* Meigen; J–L, *G. foersteri* Meigen. Scale bars = 0.5 mm.

connected with median presutural vittae; lateral vittae about twice as long as median vittae with anterior and posterior tips sharply pointed; postpronotal lobe yellow brown with three strong setae; notopleuron with two strong and one weak (about half as long as others) setae; postalar callus yellow brown; proepisternum with single seta; proepimeron with single seta; katepisternum with four setae; anepimeron with one long and one short setae; katepimeron, katatergite, anatergite bare; subscutellum well developed. Legs yellow brown to black; setae and setulae black (some yellow brown to golden setulae mixed in *G. chinensis* and *G. klapperichi*); fore coxa anteriorly with two rows of strong setulae; fore femur with regular rows of long dorsal, posterodorsal, posteroventral setulae; fore tibia with regular rows of anterodorsal, posterodorsal setulae, medially with two posterior discal setae; midcoxa with a row of strong anterodorsal setulae; midfemur with regular rows of anteroventral, posteroventral setulae, posterior apically with 3–4 setulae; midtibia with regular rows of anterodorsal, posterodorsal setulae, with two posterior discal and two ventral discal setae; hind coxa with a

row of strong anterodorsal setulae; hind tibia with regular rows of anterodorsal, posterodorsal setulae and 2–5 ventral setae. Wing hyaline with veins yellow brown; tegula yellow brown with strong black setulae; basicosta yellow brown, bare; costal spine 3–4× as long as costal setulae; crossvein DM-Cu oblique; calypters ivory white, bare. Abdomen yellow brown to black with ivory white to yellow brown pruinosity except for tergite 1 + 2. Male genitalia yellow brown to dark brown, with yellow brown to brown setulose; sternite 5 with strong brown and weak yellow brown setulae, posteriorly with deep median cleft at least $0.6 \times$ sternite length, lateral lobe with dense row of short yellow brown setulae along mesal margin; epandrium dorsally with strong setulae; cercus basally with long, dense setulae; surstylus apically, laterally setulose; apical part of pregonite with several setulae; epiphallus apically pointed; ventral surface of distiphallus covered with fine spinules. Female genitalia yellow brown to dark brown, with yellow brown to black setulose; cercus rectangular shape, posterior apically round in lateral view; subanal plate triangular in ventral view.

Gonia chinensis Wiedemann
(Figure 1A–H, Figure 5A–C)

Gonia chinensis Wiedemann, 1824: 47 (type-locality: China, Hopei, T'ien-ching; neotype ♀ by designation of Crosskey, 1967: 106 (BMNH)); Crosskey, 1965: 644 (type information); Ôhara, 1989: 864 (in Japanese checklist); Shima, 1990: 21 (taxonomy); Fan, 1992: 746 (in key to Chinese species); Sun et al., 1992: 1194 (redescription); Herting and Dely-Draskovits, 1993: 258 (in Palearctic catalog); ESK and KSAE, 1994: 309 (in Korean checklist); Chao, 1996: 1944 (Chinese distribution); Park, 1998: 91 (in Gangwon-do list); Han et al., 1999: 149 (in Mts. Seondalsan and Eoraesan list); Shima, 1999: 82, 85–88 (host records); Han et al., 2004: 129 (in Mt. Gyemyeongsan list); O'hara et al., 2009: 109 (in Chinese catalog).

Gonia fuscipes Matsumura, 1905: 108 (type-locality: Japan; syntype 2♂ (HUS)); Matsumura, 1931: 385 (redescription); Hokuryukan, 1932: 11 (redescription); Doi, 1938: 5 (in Korean checklist); Hokuryukan, 1956: 1714 (redescription); ZSK, 1968: 186 (in Korean checklist); Kim, 1980: 313 (Korean distribution); Schaefer and Shima, 1981: 371 (host record); Shima, 1990: 21 (taxonomy).

Gonia himalensis Tothill, 1918: 52 (type-locality: India, Uttar Pradesh, Dehra Dun; lectotype ♀ by designation of Crosskey, 1976: 270 (BMNH)).

Gonia indica Walker, 1853: 305 (type-locality: 'East Indies'; holotype ♂ (BMNH)).

Gonia rufitibialis Macquart, 1851: 151 (type-locality: India, Pondicherry; holotype ♀ (MNHN)).

Salmacia (? *Turanogonia*) *pruinosa* Villeneuve, 1933: 198 (type-locality: North Vietnam, Tonkin; lectotype ♂ by designation of Crosskey, 1976: 274 (CNC)).

Turanogonia smirnovi Rohdendorf, 1924: 228 (type-locality: Uzbekistan, Ak-Tash, 50 km southeast of Tashkent [as "Tashkent"]; holotype ♂ (ZMUM)); Mesnil, 1956: 530 (redescription); Chao, 1978: 210 (redescription).

Turanogonia chinensis: Crosskey, 1976: 134, 245 (in Oriental catalog); Schaefer and Shima, 1981: 371 (host record); Chao and Shi, 1982: 275 (Chinese distribution).

Diagnosis. This species can be distinguished from the congeners by the following combination of characteristics: (1) haltere yellow brown; (2) thorax, legs, and venter of abdomen with black and yellow brown to golden setulae mixed; (3) scutum almost entirely with black setulae except for narrow lateral and posterior

margin with yellow brown setulae; and (4) femora black.

Redescription of male. Body yellow brown to dark brown in ground color with some dark brown to black areas; some areas covered with yellow brown to golden pruinosity; setulae yellow brown to black; body length 10.2–12.7 mm; wing length 6.4–8.2 mm. Head yellow brown in ground color, largely covered with golden pruinosity especially on frons and parafacilia; eye ratio 0.46–0.51; frons-head ratio 0.50–0.55; gena-eye ratio 0.21–0.27; flagellomere 1-pedicle ratio 6.09–7.45; arista-antenna ratio 0.51–0.65; medial vertical setae 0.63–0.69 × as long as longest diameter of eye; lateral vertical setae 0.68–0.75 × as long as medial vertical setae; ocellar setae 0.56–0.60 × as long as medial vertical setae; postocellar setae 0.33–0.40 × as long as medial vertical setae; paraverticilar setae 0.75–0.83 × as long as postocellar setae; vertex with black setulae; fronto-orbital plate with black setulae; two strong proclinate orbital setae; four strong reclinate orbital setae; frontal vitta with black convergent setulae; 7–8 frontal setae above level of arista sockets; flagellomere 1 dark brown; anterior parafacilia with a row of 4–5 strong proclinate setae; posterior parafacilia covered with black (about half as long as anterior parafacial setae) and golden setulae at about lower 1/3; 2–4 strong supravibrissal setae; 2–4 strong subvibrissal setae; gena with 4–6 genal setae and dense golden setulae; postocular setae extended from upper eye margin to slightly before lower eye margin; occiput densely with relatively long, yellow brown setulae; maxillary palpus with short black and long golden ventral setulae. Thorax dark brown in ground color with yellow brown pruinosity; prosternum laterally with a pair of black and several golden setulae; postpronotal lobe with black and yellow brown setulae mixed; notopleuron with yellow brown setulae; postalar callus with single black and golden setulae; proepisternum black setulose; proepimeron with relatively long black and yellow brown setulae mixed; anepisternum with posterior vertical row of 6–7 strong setae, densely with black and yellow brown setulae mixed; katepisternum with yellow brown setulae and ventrally with strong black setulae; anepimeron densely with yellow brown setulae; meron with posterior vertical row of 7–9 setae, sparsely with yellow brown setulae; scutellum yellow brown, almost entirely with black setulae except lateral golden setulae; with basal setae parallel to divergent, lateral setae parallel to divergent, subapical setae parallel, apical setae divergent, and discal setae parallel. Legs black except for yellow brown tibia, with yellow brown pruinosity except for tibia and tarsus; fore coxa ventrally with golden setulae; fore femur posteriorly with golden setulae; midcoxa with golden setulae; midfemur anteriorly with 2–3 mesal setae, posteriorly

with golden setulae; hind coxa with golden setulae; hind femur with regular rows of anteroventral and posteroventral setulae, posteriorly with golden setulae; hind tibia with 3–4 ventral setae. Wing hyaline with brownish tinge; wing-thorax ratio 1.67–1.69; vein R_{4+5} ratio 2.81–3.23; vein M ratio 1.17–1.32; subcostal-costal ratio 0.67–0.76; base of R_{4+5} with 4–6 black setulae; haltere yellow brown. Abdomen yellow brown in ground color with some black areas, mostly with black setulae except for golden setulae on ventral surface of tergite 1+2; tergite 1+2 with middorsal depression black, with strong median marginal and lateral marginal setae; tergite 3 anteriorly with yellow brown pruinosity, with black median longitudinal band, with median marginal and lateral marginal setae; tergite 4 moderately pruinose with black median band, with a row of strong marginal setae; tergite 5 heavily pruinose with median black band, with discal setae and a row of strong marginal setae. Genitalia yellow brown with yellow brown to brown setulae; sternite 5 posteriorly with deep median cleft 0.6 × sternite length; epandrium dorsally with strong brown and weak yellow brown setulae; cercus with long, dense brown setulae; apex of cercus blunt in posterior view; surstylus about 0.4 × cercus length, apically, laterally yellow brown setulose; apical part of pregonite anteriorly bent, with several yellow brown setulae; apical part of postgonite ventrally bent; epiphallus apically pointed.

Female. Similar to males except for the following non-genitalic characters: medial vertical setae 0.63–0.73 × longest diameter of eye; lateral vertical setae 0.68–0.75 × as long as medial vertical setae; ocellar setae 0.53–0.59 × as long as medial vertical setae; postocellar setae 0.32–0.34 × as long as medial vertical setae; paraverticilar setae 0.66–0.83 × as long as postocellar setae. Lengths and ratios: body 9.65–13.10 mm long; wing 6.3–8.5 mm long; eye ratio 0.48–0.53; frons-head ratio 0.55–0.58; gena-eye ratio 0.21–0.27; flagellomere 1-pedicel ratio 3.00–3.75; arista-antenna ratio 0.57–0.64; wing-thorax ratio 1.66–1.83; vein R_{4+5} ratio 2.86–3.10; vein M ratio 1.14–1.36; subcostal-costal ratio 0.65–0.82.

Material examined. We have examined over 180 Korean specimens collected between May and October with highest peak in June: CB: 13♂, 15♀; GB: 9♂, 2♀; GG: 10♂, 2♀; GW: 105♂, 29♀. CHINA: 1♀, Swatow (N Baranov Coll. 1960, USNM). JAPAN: 1♂, Hokkaido, Eniwa, 3-VII-1961, S Takano (USNM).

Distribution. Palaearctic: China, Japan (Hokkaido, Honshu, Shikoku, Kyushu), Korea, Kyrgyzstan, Taiwan, Tajikistan, Turkmenistan, Uzbekistan. Oriental: India, Malaysia (?L. Sunda Is.), Nepal, Pakistan, Philippines, Vietnam.

Host. Shima (1999) listed the following hosts: *Malacosoma neustria* (Linnaeus) of Lasiocampidae; *Agrotis*

ippsilon (Hufnagel), *Mamestra brassicae* (Linnaeus), *Pseudaletia separata* (Walker) and *Xestia c-nigrum* (Linnaeus) of Noctuidae.

Gonia distinguenda Herting

(Figure 1I–P, Figure 5D–F)

Gonia distinguenda Herting, 1963: 106 (type-locality: Grengiols, Wallis, Switzerland; holotype ♂ (MZLS)); Herting and Dely-Draskovits, 1993: 258 (in Palaearctic catalog); Tschorsnig and Herting, 1994: 90 (in key to Central Europe species); Tschorsnig et al., 1997: 15 (in Iberian Peninsula checklist).

Diagnosis. This species can be distinguished from the congeners by the following combination of characteristics: (1) postocular setulae apically straight in both sexes; (2) presutural scutum with each median vitta 0.7 × as wide as space between two median vittae; (3) tergite 1 + 2 with median marginal setae only in males; and (4) tergite 3 and 4 with prone setulae in both sexes.

Redescription of male. Body yellow brown to dark brown in ground color with some dark brown to black areas; some areas covered with yellow brown to golden pruinosity; setulae yellow brown to black; body length 14.5–15.7 mm; wing length 13.3–14.0 mm. Head yellow brown in ground color, largely covered with golden pruinosity especially on frons and parafacialia; eye ratio 0.51–0.53; frons-head ratio 0.64–0.66; gena-eye ratio 0.35–0.43; flagellomere 1-pedicel ratio 5.13–5.63; arista-antenna ratio 0.64–0.67; medial vertical setae 0.7–0.8 × as long as longest diameter of eye; lateral vertical setae 0.67–0.75 × as long as medial vertical setae; ocellar setae 0.55–0.58 × as long as medial vertical setae; postocellar setae 0.27–0.48 × as long as medial vertical setae; paraverticilar setae 0.73–0.90 × as long as postocellar setae; vertex with black setulae; fronto-orbital plate with black setulae; two strong proclinate orbital setae; four strong reclinate orbital setae; frontal vitta with black convergent setulae; 10–13 frontal setae above level of aristal sockets; flagellomere 1 dark brown; anterior parafacialia with a row of 4–5 strong proclinate setae; posterior parafacialia covered with black setulae (about half as long as anterior parafacial setae); two strong supravibrissal setae; 4–5 strong subvibrissal setae; gena with 5–7 genal setae and dense black setulae; postocular setae extended from upper eye margin to slightly beyond lower eye margin; occiput densely with relatively long, yellow brown setulae; maxillary palpus with short black setulae. Thorax dark brown in ground color with yellow brown pruinosity; prosternum laterally with black setulae; postpronotal lobe black setulose; notopleuron black setulose; postalar callus black setulose; proepisternum black setulose; proepimeron black setulose; anepisternum with posterior vertical row

of 6–8 strong setae, densely with long black setulae; katepisternum black setulose; anepimeron black setulose; meron with posterior vertical row of 9–10 setae, sparsely with black setulae; scutellum yellow brown with black setulae; with basal setae parallel, lateral setae parallel, subapical setae parallel to slightly divergent, apical setae divergent, and discal setae parallel. Legs black except for yellow brown tibia, with yellow brown pruinosity except for tibia and tarsus; fore coxa black setulose; fore femur black setulose; midcoxa black setulose; midfemur anteriorly with 4–6 mesal setae; hind coxa black setulose; hind femur with regular rows of anterodorsal, anteroventral and posteroventral setulae; hind tibia with 2–3 ventral setae. Wing hyaline with brownish tinge; wing-thorax ratio 2.57–2.66; vein R_{4+5} ratio 2.37–3.16; vein M ratio 1.07–1.35; subcostal-costal ratio 0.72–0.77; base of R_{4+5} with 8–10 black setulae; haltere with stem yellow brown and knob dark brown. Abdomen yellow brown in ground color with some black areas, with black setulae; tergite 1 + 2 with middorsal depression black, with strong median marginal and lateral marginal setae; tergite 3 anteriorly with yellow brown pruinosity, with black median longitudinal band slightly widened posteriorly, with median marginal and lateral marginal setae; tergite 4 moderately pruinose, with black median band slightly widened posteriorly or widened to lateral margins, with a row of strong marginal setae; tergite 5 almost entirely black, heavily pruinose, with a row of strong marginal setae. Genitalia yellow brown with yellow brown to brown setulae; sternite 5 posteriorly with deep median cleft $0.6 \times$ sternite length; epandrium dorsally with strong brown and weak yellow brown setulae; cercus with long, dense brown setulae; apex of cercus pointed in posterior view; surstylus about $0.4 \times$ cercus length, apically, laterally yellow brown setulose; apical part of pregonite anteriorly bent, with several yellow brown setulae postgonite apically pointed; epiphallus apically blunt.

Female. Similar to males except for the following non-genitalic characters: medial vertical setae $0.72\text{--}0.78 \times$ longest diameter of eye; lateral vertical setae $0.70\text{--}0.76 \times$ as long as medial vertical setae; ocellar setae $0.56\text{--}0.64 \times$ as long as medial vertical setae; postocellar setae $0.25\text{--}0.30 \times$ as long as medial vertical setae; paraverticlar setae $0.69\text{--}0.90 \times$ as long as postocellar setae. Lengths and ratios: body 15.04 mm long; wing 13.6–13.9 mm long; eye ratio 0.45–0.50; frons-head ratio 0.69–0.72; gena-eye ratio 0.34–0.38; flagellomere 1-pedicel ratio 2.57–3.00; arista-antenna ratio 0.61–0.64; wing-thorax ratio 2.34–2.52; vein R_{4+5} ratio 2.57–2.66; vein M ratio 1.11–1.14; subcostal-costal ratio 0.74–0.75.

Material examined. KOREA: GG: 1 ♀, Yongin-si, 21-V-1989, GM Choi; GW: 1 ♂, Wonju-si, Heungeop-myeon, Maeji-ri, Yonsei Univ. Campus, 3-V-2006, HW Byun;

1 ♂, ditto, 4-V-2006, HW Byun et al.; 1 ♂, 1 ♀, ditto, 15-V-2006, HW Byun; 1 ♂, ditto, 30-IV-2008, SW Suk. SWITZERLAND: 1 ♂, Wallis Mörel-Bitsch, 16-V-1963 (det. Mesnil, 1969, CNC). FRANCE: Val de Elo (Pyrénées Orientales), R Benoist, 1922 (det. Mesnil, 1969, CNC).

Distribution. France, Germany, Hungary, Italy, Korea, Switzerland.

Remarks. To date, this species has been only known from Europe. After comparing the above Korean specimens with the European representatives, we found no significant differences between them against their conspecificity. Additional collecting efforts may fill this unusual distribution gap for this species.

Gonia divisa Meigen

(Figure 2A–H, Figure 5G–I)

Gonia divisa Meigen, 1826: 4 (type-locality: Austria; type(s), unspecified sex (?MNHN, species not mentioned by Herting 1972 and type(s) possibly lost); van Emden, 1954: 75 (in key to British species); Herting, 1960: 103 (host record); Mesnil and Pschorn-Walcher, 1968: 157 (in Japanese preliminary checklist); Richter, 1971: 336 (in Caucasus list); Elasser, 1977: 67 (in Austria list); Draber, 1981: 155 (in Warsaw and Mazovia list); Ôhara, 1989: 864 (in Japanese checklist); Herting and Dely-Draskovits, 1993: 259 (in Palaearctic catalog); Belshaw, 1993: 86 (host record); ESK and KSAE, 1994: 309 (in Korean checklist); Tschorsnig and Herting, 1994: 90 (in key to Central Europe species); Chao, 1996: 1944 (Chinese distribution); Richter, 1996: 907 (in Crimea list); Ziegler and Shima, 1996: 409 (in Ussuri list); Tschorsnig and Brechtel, 1999: 135 (in Bienwald list); Tschorsnig and Bartak, 2001: 500 (in Bilina and Duchcov); O'hara et al., 2009: 109 (in Chinese catalogue).

Rhedia bombylans Robineau-Desvoidy, 1830: 76 (type-locality: France, Bondy nr Paris).

Rhedia picea Matsumura, 1905: 76 (type-locality: Japan).

Salmacia divisa: Rohdendorf, 1927: 92 (in key to Palaearctic species); Rohdendorf, 1928: 100 (in key to Palaearctic species); Mesnil, 1956: 524 (redescription).

Gonia picea: Matsumura, 1931: 385 (redescription); Doi, 1938: 5 (in Korean checklist).

Diagnosis. This species can be distinguished from the congeners by the following combination of characteristics: (1) frons almost without pruinosity; (2) pruinosity on tergite 5 weak or absent; (3) parafacialia narrower than shortest eye diameter; (4) tergite 1 + 2 with median

marginal setae in both sexes; and (5) tergite 3 and 4 with erect setulae only in male.

Redescription of male. Body yellow brown to dark brown in ground color with some dark brown to black areas; some areas covered with yellow brown pruinosity; setulae yellow brown to black; body length 12.3–14.1 mm; wing length 8.4–10.1 mm. Head yellow brown without any pruinosity; eye ratio 0.47–0.50; frons-head ratio 0.55–0.57; gena-eye ratio 0.22–0.30; flagellomere 1-pedicel ratio 4.38–5.83; arista-antenna ratio 0.59–0.64; medial vertical setae 0.58–0.81 × as long as longest diameter of eye; lateral vertical setae 0.65–0.75 × as long as medial vertical setae; ocellar setae 0.58–0.68 × as long as medial vertical setae; postocellar setae 0.34–0.47 × as long as medial vertical setae; paraverticlar setae 0.60–0.93 × as long as postocellar setae; vertex with black setulae; fronto-orbital plate with black setulae; two strong proclinate orbital setae; 2–3 strong reclinate orbital setae; frontal vitta with black convergent setulae; 8–9 frontal setae above level of arista sockets; flagellomere 1 dark brown; anterior parafacialia with a row of 6–7 strong proclinate setae; posterior parafacialia covered with black setulae (about 0.75 × as long as anterior parafacial setae); 4–5 strong supravibrissal setae; 4–6 strong subvibrissal setae; gena with 7–8 genal setae and dense black setulae; postocular setae extended from upper eye margin to slightly beyond lower eye margin; occiput densely with relatively long, yellow brown setulae; maxillary palpus with short black setulae. Thorax dark brown in ground color with yellow brown pruinosity; prosternum laterally with black setulae; postpronotal lobe black setulose; notopleuron black setulose; postalar callus black setulose; proepisternum black setulose; proepimeron black setulose; anepisternum with posterior vertical row of seven strong setae, densely with long black setulae; katapisternum black setulose; anepimeron black setulose; meron with posterior vertical row of 8–11 setae, sparsely with black setulae; scutellum yellow brown with black setulae; with basal setae parallel, lateral setae parallel to slightly divergent, subapical setae parallel to convergent, apical setae convergent to divergent, and discal setae parallel to divergent. Legs black with black setulae; fore coxa black setulose; fore femur black setulose; midcoxa black setulose; midfemur anteriorly with two mesal setae; hind coxa black setulose; hind femur with regular rows of anterodorsal, anterior, anteroventral and posteroventral setulae; hind tibia with 2–4 ventral setae. Wing hyaline with brownish tinge; wing-thorax ratio 1.98–2.15; vein R_{4+5} ratio 2.65–3.73; vein M ratio 1.10–1.34; subcostal-costal ratio 0.72–0.86; base of R_{4+5} with 6–10 black setulae; haltere with stem yellow brown and knob dark brown. Abdomen almost entirely black with some yellow brown areas, with black setulae; tergite 1 + 2 laterally with yellow brown area, with

strong median marginal and lateral marginal setae; tergite 3 laterally with yellow brown area, with median and lateral marginal setae; tergite 4 laterally with yellow brown area, with a row of strong marginal setae; tergite 5 with a row of strong marginal setae. Genitalia yellow brown to dark brown, with yellow brown to brown setulae; sternite 5 posteriorly with deep median cleft 0.7 × sternite length; epandrium dorsally with strong brown and weak yellow brown setulae; cercus with long, dense brown setulae; apex of cercus pointed in posterior view; surstylus about 0.4 × cercus length, apically, laterally yellow brown setulose; apical part of pregonite anteriorly bent, with several yellow brown setulae; apical part of postgonite anteriorly bent; epiphallus apically pointed.

Female. Similar to males except for the following non-genitalic characters: medial vertical setae 0.71–0.75 × longest diameter of eye; lateral vertical setae 0.72 × as long as medial vertical setae; ocellar setae 0.60–0.61 × as long as medial vertical setae; postocellar setae 0.36–0.44 × as long as medial vertical setae. Lengths and ratios: body 11.8–12.7 mm long; wing 8.9–9.6 mm long; eye ratio 0.43–0.46; frons-head ratio 0.63; gena-eye ratio 0.26–0.29; flagellomere 1-pedicel ratio 2.20–2.75; arista-antenna ratio 0.61–0.67; wing-thorax ratio 2.12–2.13; vein R_{4+5} ratio 3.03–3.04; vein M ratio 1.16–1.22; subcostal-costal ratio 0.8–0.86.

Material examined. We have examined over 30 Korean specimens collected between April and May with the largest number in May: CB: 2♂; GB: 2♂; GG: 2♂, 1♀; GW: 26♂, 1♀. CROATIA: 1♂, Zagreb, 13-IV-1931 (N Baranov Coll. 1960, USNM). GERMANY: 1♂, Haard b. Haltern, 24-IV-1962, Herting (det. Herting, BLKU). JAPAN: 1♂, Hokkaido, Sapporo, 28-IV-1924, S Takano (N Baranov Coll. 1960, USNM). SWITZERLAND: 1♀, Tessin Arcegnò, 23-IV-1972, Herting (det. Herting, BLKU); 1♂, Helv. TI 350 m, Biasca-Loderio, 15-III-1994, B Merz (det. Tschorsnig, 1995); 1♂, ditto, 23-III-1996, B Merz.

Distribution. China, Croatia, England, France, Germany, Hungary, Japan, Korea, Russia, Sweden, Switzerland.

Remarks. This is a widely distributed species from Europe to Korea and Japan. Korean specimens have almost entirely black abdomens while European specimens, so far as we examined, have yellow brown abdomens with a black longitudinal band. However, according to Mesnil's (1956) description, some European specimens have entirely black abdomens. Therefore, we consider that the darker abdomen in Korean specimens merely represents local variation in this species.

Host. Herting (1960) reported their host species *Euxoa nigricans* (Linnaeus) of Noctuidae. Belshaw (1993)

referred to their host species *Agrotis segetum* (Denis and Schiffermüller) of Noctuidae.

***Gonia foersteri* Meigen**

(Figure 2I–P, Figure 5J–L)

Gonia foersteri Meigen, 1838: 246 (type-locality: Stolberg, near Aachen, Germany; type(s), unspecified sex (?MNHN, species not mentioned by Herting 1972 and type(s) possibly lost); van Emden, 1954: 75 (in key to British species); Hokuryukan, 1956: 1714 (redescription); Kugler, 1963: 26 (in Israel checklist); ZSK, 1968: 186 (in Korean checklist); Kugler, 1979: 49 (in Israel checklist); Herting and Dely-Draskovits, 1993: 259 (in Palaearctic catalog); Tschorsnig and Herting, 1994: 90 (in key to Central Europe species).

Salmacia foersteri: Rohdendorf, 1927: 94 (in key to Palaearctic species); Mesnil, 1956: 525 (redescription); Kim, 1971: 1003 (redescription); Kim, 1980: 313 (Korean distribution); Park et al., 1993: 214 (in Mt. Jirisan list)

Diagnosis. This species can be distinguished from the congeners by the following combination of characteristics: (1) frons almost without any pruinosity; (2) pruinosity on tergite 5 weak or absent; (3) parafacialia wider than shortest eye diameter; (4) abdominal tergites black; (5) tergite 1 + 2 with median marginal setae only in male; and (6) tergite 3 and 4 with prone setulae in both sexes.

Redescription of male. Body yellow brown to dark brown in ground color with some yellow brown areas; some areas covered with ivory white to yellow brown pruinosity; setulae yellow brown to black; body length 14.6–15.2 mm; wing length 13.9–14.3 mm. Head yellow brown without any pruinosity; eye ratio 0.43–0.47; frons-head ratio 0.59–0.65; gena-eye ratio 0.27–0.33; flagellomere 1-pedicel ratio 4.05–4.67; arista-antenna ratio 0.59–0.64; medial vertical setae $0.60\text{--}0.66 \times$ as long as longest diameter of eye; lateral vertical setae $0.74\text{--}0.76 \times$ as long as medial vertical setae; ocellar setae $0.66\text{--}0.71 \times$ as long as medial vertical setae; postocellar setae $0.35\text{--}0.50 \times$ as long as medial vertical setae; paraverticilar setae $0.44\text{--}0.76 \times$ as long as postocellar setae; vertex with black setulae; fronto-orbital plate with black setulae; 2–3 strong proclinate orbital setae; 3–4 strong reclinate orbital setae; frontal vitta with black convergent setulae; 7–11 frontal setae above level of arista sockets; flagellomere 1 dark brown; anterior parafacialia with a row of 5–8 strong proclinate setae; posterior parafacialia covered with black setulae (about $0.6 \times$ as long as anterior parafacial setae); 3–5 strong supravibrissal setae; 4–5 strong subvibrissal setae; gena with 6–8 genal setae and dense black setulae; postocular

setae extended from upper eye margin to slightly beyond lower eye margin; occiput densely with relatively long, yellow brown setulae; maxillary palpus with black setulae. Thorax dark brown in ground color with yellow brown pruinosity; prosternum laterally with black setulae; postpronotal lobe black setulose; notopleuron black setulose; postalar callus black setulose; proepisternum black setulose; proepimeron black setulose; anepisternum with posterior vertical row of 7–9 strong setae, densely with long black setulae; katepisternum black setulose; meron with posterior vertical row of 9–13 setae, sparsely with black setulae; scutellum yellow brown with black setulae; with basal setae parallel, lateral setae parallel to slightly divergent, subapical setae parallel, apical setae divergent, and discal setae parallel. Legs black with yellow brown pruinosity; fore coxa black setulose; fore femur black setulose; midcoxa black setulose; midfemur anteriorly with 5–7 mesal setae; hind coxa black setulose; hind femur with regular rows of anterodorsal, anterior, anteroventral and posteroventral setulae; hind tibia with 2–3 ventral setae. Wing hyaline with brownish tinge; wing-thorax ratio 2.66–2.86; vein R_{4+5} ratio 2.94–3.62; vein M ratio 1.32–1.69; subcostal-costal ratio 0.73–0.86; base of R_{4+5} with 5–10 black setulae; haltere with stem yellow brown and knob dark brown. Abdomen almost entirely black with some yellow brown areas, with black setulae; tergite 1 + 2 laterally with yellow brown area, with strong median marginal and lateral marginal setae; tergite 3 laterally with yellow brown area, anteriorly with weak ivory white pruinosity, with median marginal and lateral marginal setae; tergite 4 laterally with yellow brown area, anteriorly with weak ivory white pruinosity, with a row of strong marginal setae; tergite 5 anteriorly with weak ivory white pruinosity, with a row of strong marginal setae. Genitalia yellow brown to dark brown, with yellow brown to brown setulae; sternite 5 posteriorly with deep median cleft $0.6 \times$ sternite length; epandrium dorsally with strong brown and weak yellow brown setulae; cercus with long, dense brown setulae; apex of cercus pointed in posterior view; surstylus about $0.3 \times$ cercus length, apically, laterally yellow brown setulose; apical part of pregonite anteriorly bent, with several yellow brown setulae; apical part of postgonite ventrally bent; epiphallus apically blunt.

Female. Similar to males except for the following non-genital characters: medial vertical setae $0.67\text{--}0.72 \times$ longest diameter of eye; lateral vertical setae $0.69\text{--}0.76 \times$ as long as medial vertical setae; ocellar setae $0.64\text{--}0.69 \times$ as long as medial vertical setae; postocellar setae $0.26\text{--}0.51 \times$ as long as medial vertical setae; paraverticilar setae $0.64\text{--}0.81 \times$ as long as postocellar setae. Lengths and ratios: body 15.4–16.7 mm long; wing 13.9–15.3 mm long; eye ratio 0.39–0.43; frons-head ratio 0.67–0.69; gena-eye ratio 0.32–0.38;

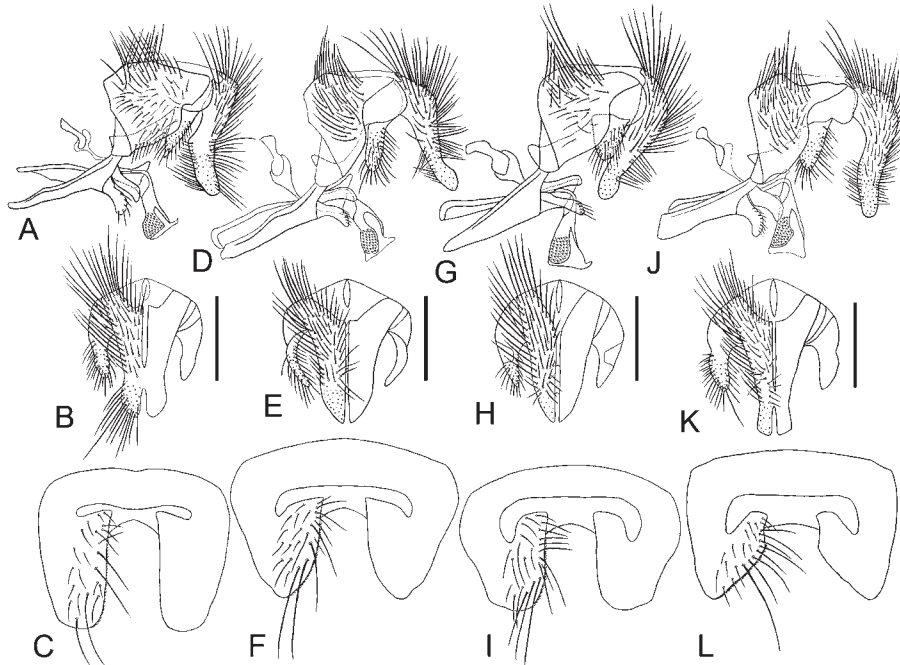


Figure 6. Male genitalia (lateral and caudal views) and sternite 5. A–C, *Gonia klapperichi* (Mesnil); D–F, *G. nigricoma* Lee and Han *sp. nov.*; G–I, *G. olgae* (Rohdendorf); J–L, *G. ussuriensis* (Rohdendorf). Scale bars = 0.5 mm.

flagellomere 1-pedicel ratio 2.08–2.71; arista-antenna ratio 0.60–0.66; wing-thorax ratio 2.51–2.68; vein R_{4+5} ratio 2.86–3.60; vein M ratio 1.33–1.59; subcostal-costal ratio 0.70–0.83.

Material examined. We have examined over 200 Korean specimens collected between March and May with the highest peak in April: GW: 145♂, 68♀; JJ: 1♀. AUSTRIA: 1♀, ‘Manharisberg, Nied. Osterr.’, A. Slebeck (CNC).

Distribution. Austria, Czechoslovakia, Germany, Greece, Israel, Italy, Japan, Korea, Ukraine.

Remarks. This species shows disjunct distribution in Korea and Japan while all other records are from Europe, where this species is rarely found (Mesnil 1956). This is one of the most common *Gonia* species in Korea.

Gonia klapperichi (Mesnil)
(Figure 3A–H, Figure 6A–C)

Turanogonia klapperichi Mesnil, 1956: 532 (type-locality: China, Fujian, Kwangtseh; holotype ♂ (ZFMAK)); Crosskey, 1976: 245 (in Oriental catalog).

Gonia klapperichi: Fan, 1992: 745 (in key to Chinese species); Chao, 1996: 1944 (Chinese distribution); Han et al., 2004: 129 (in Mt. Gyemyongsan list); O’hara et al., 2009: 109 (in Chinese catalogue).

Diagnosis. This species can be distinguished from the congeners by the following combination of characteristics: (1) haltere entirely yellow brown; (2) thorax, legs, and venter of abdomen with black and yellow brown to golden setulae mixed; (3) vertex with black and yellow brown setulae mixed; (4) frontal vitta with golden setulae; (5) scutum almost entirely with yellow brown setulae except for narrow anterior margin with black setulae; and (6) femora yellow brown.

Redescription of male. Body yellow brown to dark brown in ground color with some dark brown to black areas; some areas covered with yellow brown to golden pruinosity; setulae yellow brown to black; body length 9.7–13.7 mm; wing length 6.9–8.6 mm. Head yellow brown in ground color, largely covered with golden pruinosity especially on frons and parafacia; eye ratio 0.44–0.51; frons-head ratio 0.53–0.55; gena-eye ratio 0.26–0.32; flagellomere 1-pedicel ratio 5.17–7.45; arista-antenna ratio 0.57–0.64; medial vertical setae $0.65\text{--}0.74 \times$ as long as longest diameter of eye; lateral vertical setae $0.62\text{--}0.78 \times$ as long as medial vertical setae; ocellar setae $0.53\text{--}0.63 \times$ as long as medial vertical setae; postocellar setae $0.31\text{--}0.40 \times$ as long as medial vertical setae; paraverticilar setae $0.7\text{--}0.9 \times$ as long as postocellar setae; vertex with black and yellow brown setulae mixed; fronto-orbital plate with black and yellow brown setulae mixed; 2–4 strong proclinate orbital setae; 4–5 strong reclinate orbital setae; frontal vitta with golden convergent setulae; 7–9 frontal setae above level of aristal sockets; flagellomere 1 dark

brown; anterior parafacialia with a row of 4–6 strong proclinate setae; posterior parafacialia covered with black (about half as long as anterior parafacial setae) and golden setulae; 2–5 strong supravibrissal setae; 2–4 strong subvibrissal setae; gena with 4–7 genal setae and dense golden setulae; postocular setae extended from upper eye margin to slightly before lower eye margin; occiput densely with relatively long, yellow brown setulae; maxillary palpus with short black and long golden ventral setulae. Thorax dark brown in ground color with yellow brown pruinosity; prosternum laterally with a pair of black and several golden setulae; postpronotal lobe with black and yellow brown setulae mixed; notopleuron with yellow brown setulae; postalar callus with single black and golden setulae; proepisternum with black and yellow brown setulae mixed; proepimeron with black and yellow brown setulae mixed; anepisternum with posterior vertical row of 6–7 strong setae, densely with black and golden setulae mixed; katapisternum with yellow brown setulae and ventrally with strong black setulae; anepimeron densely with yellow brown setulae; meron with posterior vertical row of 5–9 setae, sparsely with yellow brown setulae; scutellum yellow brown, almost entirely with golden setulae except for median black setulae; with basal setae parallel to divergent, lateral setae parallel to divergent, subapical setae parallel to cruciate, apical setae parallel to divergent, and discal setae parallel. Legs yellow brown except for dark brown coxa and black tarsus, with yellow brown pruinosity except for tibia and tarsus; fore coxa ventrally with golden setulae; fore femur with apical half anteriorly darkened, posteriorly with golden setulae; midcoxa with golden setulae; midfemur with apical half anteriorly darkened, anteriorly with 2–5 mesal setae, posteriorly with golden setulae; hind coxa with golden setulae; hind femur with regular rows of anterodorsal, anteroventral and posteroventral setulae, with golden setulae; hind tibia with 3–5 ventral setae. Wing hyaline with brownish tinge; wing-thorax ratio 1.69–1.89; vein R_{4+5} ratio 2.89–3.44; vein M ratio 1.18–1.27; subcostal-costal ratio 0.71–0.83; base of R_{4+5} with 4–6 black setulae; haltere yellow brown. Abdomen yellow brown in ground color with some black areas, with black and golden setulae mixed, relatively long golden setulae on ventral surface of tergites; tergite 1+2 with middorsal depression black, with strong median marginal and lateral marginal setae; tergite 3 anteriorly with golden pruinosity, with black median longitudinal band, with median marginal and lateral marginal setae; tergite 4 moderately pruinose, with black median band widened to lateral margins, with a row of strong marginal setae; tergite 5 almost entirely black, heavily pruinose, with discal setae and a row of strong marginal setae. Genitalia yellow brown to dark brown, with yellow

brown to brown setulae; sternite 5 posteriorly with deep median cleft $0.7 \times$ sternite length; epandrium dorsally with strong brown and weak yellow brown setulae; cercus with long, dense brown setulae; apex of cercus blunt in posterior view; surstylus about $0.4 \times$ cercus length, apically, laterally yellow brown setulose; apical part of pregonite anteriorly bent, with several yellow brown setulae; apical part of postgonite ventrally bent; epiphallus apically pointed.

Female. Similar to males except for the following non-genitalic characters: medial vertical setae $0.61–0.75 \times$ longest diameter of eye; lateral vertical setae $0.70–0.73 \times$ as long as medial vertical setae; ocellar setae $0.55–0.61 \times$ as long as medial vertical setae; postocellar setae $0.25–0.32 \times$ as long as medial vertical setae; paraverticilar setae $0.68–0.90 \times$ as long as postocellar setae. Lengths and ratios: body 12.2–14.4 mm long; wing 8.2–9.9 mm long; eye ratio 0.46–0.51; frons-head ratio 0.56–0.60; gena-eye ratio 0.26–0.37; flagellomere 1-pedicel ratio 3.28–3.38; arista-antenna ratio 0.64–0.72; wing-thorax ratio 1.74–1.91; vein R_{4+5} ratio 2.71–3.11; vein M ratio 1.12–1.24; subcostal-costal ratio 0.75–0.85.

Material examined. We have examined over 160 Korean specimens collected between May and October with two peaks in June and September: CB: 12♂, 2♀; GB: 32♂; GG: 44♂; GN: 1♂; GW: 62♂, 15♀.

Distribution. Palaearctic: China (Fujian, Guangdong, Guangxi Zhuangzu, Guizhou, Liaoning, Qinghai, Sichuan, Shaanxi, Xizang, Yunnan, Zhejiang), Korea. Oriental: India (West Bengal), Myanmar.

Gonia nigricoma Lee and Han, sp. nov.

(Figure 3I–P, Figure 6D–F)

Type materials. HOLOTYPE ♂: KOREA, GW, Wonju-si, Heungeop-myeon, Maeji-ri, Yonsei Univ. Campus, 25-III-2004, HS Lee. PARATYPES: 1♂, ditto, 1-IV-1996, HW Byun; 1♀, ditto, 18-IV-1996, HW Byun; 2♂, ditto, 25-III-1997, HW Byun & DS Choi; 1♂, ditto, 28-III-1997, HW Byun & DS Choi; 1♀, ditto, 1-IV-1997, HW Byun; 1♀, ditto, 20-III-2002, HS Lee & MH Lim; 1♀, ditto, 1-IV-2003, DS Choi et al.; 1♀, ditto, 20-III-2004, HS Lee; 1♂, ditto, 25-III-2004, HS Lee; 2♂, 2♀, ditto, 26-III-2004, HS Lee; 1♂, 2♀, ditto, 27-III-2004, OY Lim; 2♀, ditto, 31-III-2004, HS Lee; 1♀, ditto, 1-IV-2004, HS Lee; 1♀, ditto, 5-IV-2004, HS Lee; 1♀, ditto, 8-IV-2004, DW Kim; 1♀, ditto, 8-IV-2004, HS Lee; 1♀, ditto, 10-IV-2004, HW Byun & HS Lee; 1♂, ditto, 29-III-2005, DS Choi; 7♂, 1♀, ditto, 30-III-2005, DS Choi et al.; 3♂, ditto, 31-III-2005, DS Choi & HW Byun; 2♂, 1♀, ditto, 4-IV-2005, DS Choi & S Hwang; 3♀, ditto, 5-IV-2005, DS Choi; 1♀, ditto, 14-IV-2005, HS Lee; 1♂, ditto, 21-III-2006,

DJ Cha; 1 ♂, ditto, 24-III-2006, DJ Cha; 1 ♀, ditto, 18-III-2007, SW Suk; 1 ♂, ditto, 23-III-2007, JM Jung; 1 ♂, ditto, 25-III-2007, JS Lim; 1 ♀, ditto, 11-IV-2008, JM Jung; 1 ♂, ditto, 19-III-2009, DJ Cha; 1 ♂, ditto, 20-III-2009, SW Suk et al. The above type series are deposited in YSUW.

Diagnosis. This species can be distinguished from the congeners by the following combination of characteristics: (1) occipital setulae dark brown to black; (2) abdominal tergite black, moderately with ivory white pruinosity; and (3) tergite 1+2 with median marginal setae in both sexes. This species is the only Korean species with dark brown to black occipital setulae.

Description of male. Body yellow brown to dark brown in ground color with some yellow brown areas; some areas covered with ivory white to golden pruinosity; setulae yellow brown to black; body length 12.7–13.3 mm; wing length 11.6–12.3 mm. Head yellow brown in ground color, largely covered with golden pruinosity especially on frons and parafacilia; eye ratio 0.43–0.47; frons-head ratio 0.54–0.57; gena-eye ratio 0.24–0.30; flagellomere 1-pedicel ratio 3.33–3.81; arista-antenna ratio 0.62–0.72; medial vertical setae 0.58–0.70 × as long as longest diameter of eye; lateral vertical setae 0.71–0.73 × as long as medial vertical setae; ocellar setae 0.63–0.72 × as long as medial vertical setae; postocellar setae 0.39–0.48 × as long as medial vertical setae; paraverticlar setae 0.53–0.85 × as long as postocellar setae; vertex with black setulae; fronto-orbital plate with black setulae; 1–2 strong proclinate orbital setae; 2–3 strong reclinate orbital setae; frontal vitta with black convergent setulae; 7–9 frontal setae above level of arista sockets; flagellomere 1 dark brown; anterior parafacilia with a row of 5–7 strong proclinate setae; posterior parafacilia covered with black setulae (about 0.7 × as long as anterior parafacial setae); 3–5 strong supravibrissal setae; 5–6 strong subvibrissal setae; gena with 6–7 genal setae and dense black setulae; postocular setae extended from upper eye margin to slightly beyond lower eye margin; occiput densely with relatively long, dark brown to black setulae; maxillary palpus with black setulae. Thorax dark brown in ground color with yellow brown pruinosity; prosternum laterally with black setulae; postpronotal lobe black setulose; notopleuron black setulose; postalar callus black setulose; proepisternum black setulose; proepimeron black setulose; anepisternum with posterior vertical row of 8–10 strong setae, densely with long black setulae; katepisternum black setulose; meron with posterior vertical row of 11–12 setae, sparsely with black setulae; scutellum yellow brown with black setulae; with basal setae parallel, lateral setae parallel, subapical setae parallel to divergent, apical setae parallel to divergent, and discal setae parallel. Legs black with yellow brown pruinosity; fore coxa black setulose; fore femur black

setulose; midcoxa black setulose; midfemur anteriorly with 5–6 mesal setae; hind coxa black setulose; hind femur with regular rows of anterodorsal, anterior, anteroventral and posteroventral setulae; hind tibia with 3–5 ventral setae. Wing hyaline with brownish tinge; wing-thorax ratio 2.54–2.61; vein R_{4+5} ratio 2.97–3.58; vein M ratio 1.26–1.45; subcostal-costal ratio 0.65–0.74; base of R_{4+5} with 5–9 black setulae; haltere with stem yellow brown and knob dark brown. Abdomen almost entirely black with some yellow brown areas, with black setulae; tergite 1+2 with strong median marginal and lateral marginal setae; tergite 3 laterally with yellow brown area, anteriorly with ivory white pruinosity, with median marginal and lateral marginal setae; tergite 4 laterally with yellow brown area, anteriorly with ivory white pruinosity, with a row of strong marginal setae; tergite 5 heavily pruinose, with a row of strong marginal setae. Genitalia yellow brown to dark brown, with yellow brown to brown setulae; sternite 5 posteriorly with deep median cleft 0.6 × sternite length; epandrium dorsally with strong brown and weak yellow brown setulae; cercus with long, dense brown setulae; apex of cercus pointed in posterior view; surstylus about 0.4 × cercus length, apically, laterally yellow brown setulose; apical part of pregonite anteriorly bent, with several yellow brown setulae; apical part of postgonite ventrally bent; epiphallus apically blunt.

Female. Similar to males except for the following non-genital characters: medial vertical setae 0.62–0.69 × longest diameter of eye; lateral vertical setae 0.69–0.76 × as long as medial vertical setae; ocellar setae 0.63–0.70 × as long as medial vertical setae; postocellar setae 0.31–0.38 × as long as medial vertical setae; paraverticlar setae 0.50–0.64 × as long as postocellar setae. Lengths and ratios: body 12.7–14.0 mm long; wing 11.9–13.3 mm long; eye ratio 0.41–0.47; frons-head ratio 0.63–0.67; gena-eye ratio 0.28–0.35; flagellomere 1-pedicel ratio 1.95–2.74; arista-antenna ratio 0.58–0.64; wing-thorax ratio 2.52–2.80; vein R_{4+5} ratio 3.28–3.78; vein M ratio 1.31–1.53; subcostal-costal ratio 0.62–0.74.

Distribution. Korea.

Etymology. The specific epithet is derived from the Latin 'niger' meaning black and 'coma' meaning hair, referring to the black occipital setulae.

Remarks. This new species characteristically possesses black occipital setulae. The only other *Gonia* species with such setulae is *G. aterrima* Tschorsnig from Morocco. *Gonia aterrima* can be easily separated from the new species by the following characteristics: (1) head with very weak pruinosity; (2) tegula and basicosta black (unusual characteristics in *Gonia*); and (3) abdomen without any pruinosity.

Gonia olgae (Rohdendorf)
(Figure 4A–H, Figure 6G–I)

Salmacia olgae Rohdendorf, 1927: 94 (type-localities: Tashkent, Uzbekistan; holotype ♂, ZIN?); Kugler, 1979: 49 (in Israel checklist); Herting, 1980: 4 (taxonomy).

Gonia olgae: Mesnil and Pschorn-Walcher, 1968: 157 (in Japanese preliminary checklist); Tschorsnig, 1992: 28 (in Iberian Peninsula and Mallorca checklist); Herting and Dely-Draskovits, 1993: 259 (in Palaearctic catalog); Tschorsnig et al., 1997: 15 (in Iberian Peninsula checklist).

Diagnosis. This species can be distinguished from the congeners by the following combination of characteristics: (1) abdominal tergite dark brown to black, heavily with ivory white pruinosity; (2) tergite 1+2 to 4 laterally with reddish brown area; (3) tergite 1+2 with median marginal setae only in male; (4) tergite 3 and 4 with prone setulae in both sexes; and (5) tergite 5 with sparsely setulae before marginal setae.

Redescription of male. Body yellow brown to dark brown in ground color with some yellow brown areas; some areas covered with ivory white to golden pruinosity; setulae yellow brown to black; body length 11.4–12.9 mm; wing length 8.2–8.5 mm. Head yellow brown in ground color, largely covered with golden pruinosity especially on frons and parafacilia; eye ratio 0.46–0.53; frons-head ratio 0.55–0.62; gena-eye ratio 0.25–0.34; flagellomere 1-pedicel ratio 3.11–4.00; arista-antenna ratio 0.58–0.61; medial vertical setae 0.56–0.66 × as long as longest diameter of eye; lateral vertical setae 0.63–0.80 × as long as medial vertical setae; ocellar setae 0.63–0.65 × as long as medial vertical setae; postocellar setae 0.36–0.46 × as long as medial vertical setae; paraverticilar setae 0.57–0.75 × as long as postocellar setae; vertex with black setulae; fronto-orbital plate with black setulae; two strong proclinate orbital setae; three strong reclinate orbital setae; frontal vitta with black convergent setulae; 7–9 frontal setae above level of arisal sockets; flagellomere 1 dark brown; anterior parafacialia with a row of 4–6 strong proclinate setae; posterior parafacialia covered with black setulae (about 0.6 × as long as anterior parafacial setae); two strong supravibrissal setae; 5 strong subvibrissal setae; gena with 6–7 genal setae and dense black setulae; postocular setae extended from upper eye margin to slightly beyond lower eye margin; occiput densely with relatively long, yellow brown setule; maxillary palpus with black setulae. Thorax dark brown in ground color with yellow brown pruinosity; prosternum laterally with black setulae; postpronotal lobe black setulose; notopleuron black setulose; postalar callus black setulose; proepisternum

black setulose; proepimeron black setulose; anepisternum with posterior vertical row of eight strong setae, densely with long black setulae; katepisternum black setulose; meron with posterior vertical row of eight setae, sparsely with black setulae; scutellum yellow brown with black setulae; with basal setae parallel, lateral setae divergent, subapical setae parallel, apical setae divergent, and discal setae parallel. Legs black with yellow brown pruinosity; fore coxa black setulose; fore femur black setulose; midcoxa black setulose; midfemur anteriorly with five mesal setae; hind coxa black setulose; hind femur with regular rows of anterodorsal, anterior, anteroventral and posteroventral setulae; hind tibia with three ventral setae. Wing hyaline with brownish tinge; wing-thorax ratio 1.79–1.98; vein R_{4+5} ratio 3.04–3.35; vein M ratio 1.31–1.38; subcostal-costal ratio 0.62; base of R_{4+5} with 5–7 black setulae; haltere with stem yellow brown and knob dark brown. Abdomen almost entirely black with some yellow brown areas, with black setulae; tergite 1+2 laterally with yellow brown area, with strong median marginal and lateral marginal setae; tergite 3 laterally with yellow brown area, anteriorly with ivory white pruinosity, with median marginal and lateral marginal setae; tergite 4 laterally with yellow brown area, anteriorly with ivory white pruinosity, with a row of strong marginal setae; tergite 5 heavily pruinose, with a row of strong marginal setae. Genitalia yellow brown to dark brown, with yellow brown to brown setulae; sternite 5 posteriorly with deep median cleft 0.7 × sternite length; epandrium dorsally with strong brown and weak yellow brown setulae; cercus with long, dense brown setulae; apex of cercus pointed in posterior view; surstylus about 0.4 × cercus length, apically, laterally yellow brown setulose; pregonite apically with several yellow brown setulae; epiphallus apically pointed.

Female. Similar to males except for the following non-genitalic characters: medial vertical setae 0.69–0.82 × longest diameter of eye; lateral vertical setae 0.64–0.73 × as long as medial vertical setae; ocellar setae 0.59–0.67 × as long as medial vertical setae; postocellar setae 0.19–0.35 × as long as medial vertical setae; paraverticilar setae 0.62–0.75 × as long as postocellar setae. Lengths and ratios: body 11.4–12.7 mm long; wing 8.3–9.2 mm long; eye ratio 0.46–0.49; frons-head ratio 0.64–0.68; gena-eye ratio 0.31–0.38; flagellomere 1-pedicel ratio 1.91–2.22; arista-antenna ratio 0.63–0.68; wing-thorax ratio 1.90–2.02; vein R_{4+5} ratio 3.17–3.87; vein M ratio 1.37–1.72; subcostal-costal ratio 0.64–0.68.

Material examined. KOREA: 1 ♂, 1 ♀, Jeongseon-gun, Nam-myeon, Yupyeong-ri, Mt. Mindungsan 1,119m peak, 14-V-2006, HY Han et al.; 2 ♀, ditto, 26-V-2007, HY Han et al.; 1 ♂, 1 ♀, ditto, 27-V-2009, HS Lee et al.

SPAIN: 1 ♂, Villaviciosa, (det. Mesnil, 1969, CNC).
 GERMANY: 1 ♀, Berlin W, (det. Mesnil, 1969, CNC).
Distribution. Germany, Japan, Korea, Spain, Turkey, Uzbekistan.

Gonia ussuriensis (Rohdendorf)
 (Figure 4I–P, Figure 6J–L)

Salmacia (Chrysocerogonia) ussuriensis Rohdendorf, 1928: 99 (type-localities: Russia, Primorskiy Kray, Yakovlevka [as ‘Jakovlevka’] and Steklyannaya [as ‘Stekljanucha’]; about 9 km ENE of Shkotovo, V.A. Richter, pers. comm.; syntypes, five males (one in ZIN, four in ZMUM); Mesnil, 1956: 522 (redescription).

Gonia ussuriensis: Ôhara, 1989: 864 (in Japanese checklist); Herting and Dely-Draskovits, 1993: 260 (in Palaearctic catalog); Chao, 1996: 1949 (Chinese distribution); Ziegler and Shima, 1996: 409 (in Ussuri list); O’hara et al., 2009: 110 (in Chinese catalogue).

Diagnosis. This species can be distinguished from the congeners by the following combination of characteristics: (1) flagellomere 1 orange brown; (2) abdominal tergite yellow brown with posteriorly widened black longitudinal band; (3) tergite 1+2 with median marginal setae in both sexes; and (4) tergite 3 and 4 with erect setulae only in male.

Redescription of male. Body yellow brown to dark brown in ground color with some yellow brown to black areas; some areas covered with yellow brown to golden pruinosity; setulae yellow brown to black; body length 8.85–13.40 mm; wing length 6.1–8.6 mm. Head yellow brown in ground color, largely covered with golden pruinosity especially on frons and parafacilia; eye ratio 0.44–0.50; frons-head ratio 0.55–0.57; gena-eye ratio 0.22–0.33; flagellomere 1-pedicel ratio 5.50–7.75; arista-antenna ratio 0.58–0.64; medial vertical setae 0.6–0.7 × as long as longest diameter of eye; lateral vertical setae 0.61–0.75 × as long as medial vertical setae; ocellar setae 0.60–0.66 × as long as medial vertical setae; postocellar setae 0.38–0.63 × as long as medial vertical setae; paraverticilar setae 0.50–0.66 × as long as postocellar setae; vertex with black setulae; fronto-orbital plate with black setulae; 1–2 strong proclinate orbital setae; 3–4 strong reclinate orbital setae; frontal vitta with black convergent setulae; 6–8 frontal setae above level of arista sockets; flagellomere 1 orange brown; anterior parafacilia with a row of 4–8 strong proclinate setae; posterior parafacilia covered with black setulae (about third as long as anterior parafacial setae); 2–5 strong supravibrissal setae; 3–5 strong subvibrissal setae; gena with 5–6 genal setae and dense black setulae; postocular

Table 1. Character and character states used in the cladistic analysis of *Gonia*.

1. Pruinosity on frons: (0) absent, (1) yellow brown to gold, (2) whitish gray.
2. Male flagellomere 1–pedicel ratio: (0) less than 5, (1) greater than 5.
3. Female flagellomere 1–pedicel ratio: (0) less than 3, (1) greater than 3.
4. Parafacial width: (0) smaller than shortest eye diameter, (1) greater than shortest eye diameter.
5. Apex of postocular setulae in male: (0) straight, (1) bent forward.
6. Color of occipital setulae: (0) whitish, (1) yellow brown, (2) black.
7. Width of median vitta: (0) less than 0.3 × space between two median vittae, (1) greater than 0.7 × space between two median vittae.
8. Color of haltere: (0) stem yellow brown and knob dark brown, (1) entirely yellow brown.
9. Longitudinal band on preabdominal tergites: (0) absent, (1) present.
10. Median marginal setae on tergite 1+2: (0) present in both sexes, (1) present only in male, (2) absent in both sexes.
11. Setulae on tergite 3 and 4 in male: (0) prone, (1) erect.
12. Pruinosity on tergite 5: (0) slight or missing altogether, (1) heavy.
13. Discal setae on tergite 5: (0) absent, (1) present.
14. Setulae on tergite 5: (0) dense, (1) sparse.
15. Ventral surface of abdominal tergites: (0) with only black setulae, (1) with golden and black setulae mixed.

setae extended from upper eye margin to slightly beyond lower eye margin; occiput densely with relatively long, yellow brown setulae; maxillary palpus with

Table 2. Character state distribution of characters used in the cladistic analysis of *Gonia*. ? = uncertain state.

Taxa/Characters	0	0	0	0	0	0	0	0	1	1	1	1	1	1	
	1	2	3	4	5	6	7	8	9	9	1	2	3	4	5
<i>Gonia atra</i>	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0
<i>Gonia bimaculata</i>	1	?	0	1	?	1	1	0	1	?	?	1	0	1	0
<i>Gonia capitata</i>	1	?	0	0	?	1	0	0	1	?	?	1	0	1	0
<i>Gonia chinensis</i>	1	1	1	0	0	1	0	1	1	0	1	1	1	1	1
<i>Gonia distinguenda</i>	1	1	0	0	0	1	1	0	1	0	1	0	1	0	1
<i>Gonia divisa</i>	0	1	0	0	1	1	0	0	1	0	1	0	0	0	0
<i>Gonia foersteri</i>	0	0	0	1	1	1	0	0	0	1	0	0	0	0	0
<i>Gonia klapperichi</i>	1	1	1	0	0	1	0	1	1	0	1	1	1	0	1
<i>Gonia nigricoma</i>	1	0	0	1	1	2	1	0	0	0	0	1	0	1	0
<i>Gonia olgae</i>	1	0	0	1	1	1	1	0	0	1	0	1	0	1	0
<i>Gonia ornata</i>	1	0	0	1	1	1	1	0	1	0	0	1	0	1	0
<i>Gonia picea</i>	1	0	?	0	1	1	0	0	0	?	1	1	0	0	0
<i>Gonia quadrisetosa</i>	1	0	0	1	1	1	1	0	1	0	1	1	0	1	0
<i>Gonia ussuriensis</i>	1	1	1	1	1	1	0	0	1	0	1	1	0	1	0
<i>Gonia vacua</i>	1	0	0	0	1	1	0	0	1	0	1	0	1	0	1
<i>Onychogonia flaviceps</i>	1	0	0	0	1	0	0	0	0	0	1	1	1	1	0
<i>Pseudogonia rufifrons</i>	2	0	0	0	0	0	0	0	0	0	0	0	1	1	1

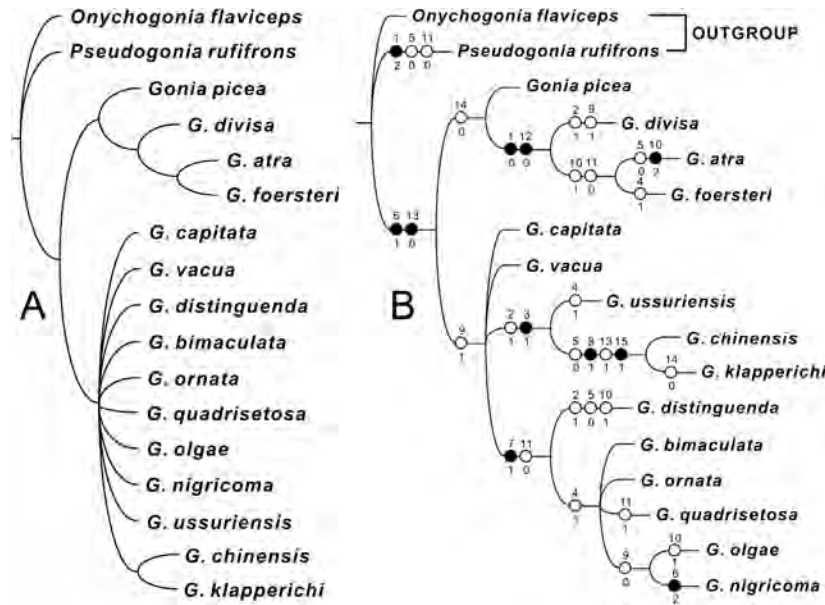


Figure 7. Cladograms of *Gonia*. A, strict consensus tree of 196 most parsimonious (MP) trees based on equally weighted characters (statistics for each MP tree: tree length = 34; consistency index = 0.5294; homoplasy index = 0.4706; retention index = 0.6735; rescaled consistency index = 0.3565); B, strict consensus tree of 46 MP trees found after successive weighting. All character state changes are plotted using fast optimization (Winclada software). Solid circles, forward changes without homoplasy; open circles, changes with homoplasy.

black setulae. Thorax dark brown in ground color with yellow brown pruinosity; prosternum laterally with black setulae; postpronotal lobe black setulose; notopleuron black setulose; postalar callus black setulose; proepisternum black setulose; proepimeron black setulose; anepisternum with posterior vertical row of 6–8 strong setae, densely with long black setulae; katepisternum black setulose; meron with posterior vertical row of 7–11 setae, sparsely with black setulae; scutellum yellow brown with black setulae; with basal setae parallel, lateral setae slightly divergent, subapical setae parallel to slightly divergent, apical setae divergent, and discal setae parallel. Legs black except for yellow brown tibia, with yellow brown pruinosity except for tibia and tarsus; fore coxa black setulose; fore femur black setulose; midcoxa black setulose; midfemur anteriorly with 4–6 mesal setae; hind coxa black setulose; hind femur with regular rows of anterodorsal, anteroventral and posteroventral setulae; hind tibia with 2–3 ventral setae. Wing hyaline with brownish tinge; wing-thorax ratio 1.79–1.96; vein R_{4+5} ratio 2.98–4.10; vein M ratio 1.32–1.55; subcostal-costal ratio 0.68–0.76; base of R_{4+5} with 7–10 black setulae; haltere with stem yellow brown and knob dark brown. Abdomen yellow brown in ground color with some black areas, with black setulae; tergite 1+2 with middorsal depression black, with strong median marginal and lateral marginal setae; tergite 3 anteriorly with yellow brown pruinosity, with black median

longitudinal band, with median marginal and lateral marginal setae; tergite 4 moderately pruinose, with black median band slightly widened posteriorly or widened to lateral margins, with a row of strong marginal setae; tergite 5 almost entirely black, heavily pruinose, with a row of strong marginal setae. Genitalia yellow brown to dark brown, with yellow brown to brown setulae; sternite 5 posteriorly with deep median cleft $0.6 \times$ sternite length; epandrium dorsally with strong brown and weak yellow brown setulae; cercus with long, dense brown setulae; apex of cercus blunt in posterior view; surstylus about $0.4 \times$ cercus length, apically, laterally yellow brown setulose; apical part of pregonite anteriorly bent, with several yellow brown setulae; apical part of postgonite anteriorly bent; epiphallus apically blunt.

Female. Similar to males except for the following non-genitalic characters: medial vertical setae $0.69\text{--}0.82 \times$ longest diameter of eye; lateral vertical setae $0.61\text{--}0.72 \times$ as long as medial vertical setae; ocellar setae $0.58\text{--}0.66 \times$ as long as medial vertical setae; postocellar setae $0.32\text{--}0.53 \times$ as long as medial vertical setae; paraverticlar setae $0.63\text{--}0.83 \times$ as long as postocellar setae. Lengths and ratios: body 10.6–12.6 mm long; wing 7.6–9.4 mm long; eye ratio 0.42–0.46; frons-head ratio 0.62–0.66; gena-eye ratio 0.24–0.37; flagellomere 1-pedicel ratio 2.59–3.12; arista-antenna ratio 0.52–0.60; wing-thorax ratio 1.91–2.00; vein R_{4+5}

ratio 2.98–3.58; vein M ratio 1.17–1.43; subcostal-sostal ratio 0.74–0.81.

Material examined. We have examined over 300 Korean specimens collected between March and June with the largest number in April and May: CB: 1♂; CN: 1♀; GB: 1♂; GG: 27♂, 16♀; GW: 168♂, 101♀; JJ: 1♀; JN: 2♂. JAPAN: 1♂, Kyushu, Fukuoka, Minamikoen, 6-IV-1979, H Shima (det. H Shima, 2009, BLKU); 1♀, Kyushu, Fukuoka, Aburayama, 16-IV-1987, H Shima (det. H Shima, 2009, BLKU).

Distribution. China (Heilongjiang, Shanghai), Japan (Honshu, Shikoku, Kyushu), Korea, Russian Far East.

Phylogenetic relationships

Goniini is a large tribe including over 500 species and 120 genera worldwide. Because of the large number of their species and uniformity, this tribe is considered to be one of the most difficult groups of the Tachinidae (Tschorsnig 1985). The type genus *Gonia* currently includes over 60 world species, and can be easily distinguished by the combination of five morphological characteristics (see 'Diagnosis' of the genus). Because of their morphological homogeneity, the genus *Gonia* may turn out to be a monophyletic group but such study requires a comprehensive analysis of many genera and species. Therefore, in the present study based on a limited number of Palaearctic species, we made a cladistic analysis under the assumption that the genus *Gonia* is actually a monophyletic group.

We have tried to obtain as many Palaearctic species as possible to investigate the phylogenetic positions of Korean species. As a result, we analyzed 15 out of 26 currently known Palaearctic species. The selection of *Onychogonia* and *Pseudogonia* as outgroups is based on Tschorsnig (1985).

We conducted a cladistic analysis using PAUP software (Swofford 2001). We considered all 15 selected characters unordered and equally likely for both forward and backward changes (Tables 1 and 2). A branch-and-bound search recovered 196 most parsimonious trees. The strict consensus is poorly resolved (Figure 7A), and therefore we reweighted the characters based on maximum value of rescaled consistency indices. The successive weighting recovered 46 most parsimonious trees, whose strict consensus tree is shown in Figure 7B. The successive weighting procedure placed the same weights on characters 1, 3, 6–8, 12 and 15, downweighted on characters 2, 4–5, 9, 11, 13 and 14, and no weights on character 10. All character state changes for these consensus trees are plotted using the fast optimization option of Winclada (Nixon 2002).

The genus *Gonia* is supported by the following two unambiguous synapomorphies: Char. 6, occipital setulae yellow brown; and Char. 13, tergite 5 without discal setulae. Within *Gonia*, we recognized two clades each supported by a single synapomorphy with reversal(s) on shallower branch(es). Within the first clade, a monophyly of *G. divisa*, *G. atra* and *G. foersteri* seems to be robustly supported by two unambiguous synapomorphies: Char. 1, pruinosity on frons absent; Char. 12, pruinosity on tergite 5 slight or missing altogether. These two synapomorphies appear unique within *Gonia* as far as we are aware.

The second clade including 11 species is very poorly resolved except for the sister group relationship between *G. chinensis* and *G. klapperichi*. They are supported by four synapomorphies including the following two unambiguous ones: Char. 8, halter entirely yellow brown; Char. 15, ventral surface of abdominal tergites with golden and black setulae mixed. As far as we know, these characteristics are unique within *Gonia*.

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