

# Taxonomic Study of the Genus *Scolobates* (Hymenoptera: Ichneumonidae: Ctenopelmatinae) from Korea

Jong-Wook Lee, Kyong-In Suh\*, Jin-Kyung Choi and Chul-Heun Kim

Department of Biology, Yeungnam University, Gyeongsan, Korea

## ABSTRACT

Korean species of the genus *Scolobates* are reviewed. Three species, *Scolobates nigriabdominalis* (Uchida, 1952), *S. ruficeps* (Uchida, 1932), and *S. testaceus* (Morley, 1913) are newly included in Korean fauna. A revised key to the species, redescriptions and photographs of all Korean species are provided.

**Key words:** Parasitoids, *Scolobates longicornis*, *Scolobates nigriabdominalis*, *Scolobates ruficeps*, *Scolobates testaceus*, Ctenopelmatinae, South Korea

## INTRODUCTION

The genus *Scolobates* Gravenhorst, 1829 is a small size genus belonging to the tribe Scolobatini of the subfamily Ctenopelmatinae. According to Yu and Horstman (1997), all species of *Scolobates* are endoparasitoids of Argidae (Hymenoptera), Cimbicidae (Hymenoptera), and Sphingidae (Lepidoptera). The genus contains 12 already described species, which are mainly distributed in the palearctic, Nearctic, and Oriental Regions. One species, *Scolobates longicornis*, has been recorded from South Korea. After reviewing the Korean specimens and type materials from Copenhagen University (Denmark) and Hokkaido University (Japan) collections, we found three species, *Scolobates nigriabdominalis* Uchida, *S. ruficeps* Uchida, and *S. testaceus* Morley, which are newly assigned to Korean fauna. In this study, we provide a key to species of Korean *Scolobates*, improved redescriptions and photographs of key characters of all Korean *Scolobates*.

## MATERIALS AND METHODS

The specimens used in this study were mostly deposited in the Yeungnam University (Gyeongsan, South Korea) except some loaned type and voucher specimens from other collections. Images used in this study were obtained with a Zeiss Stemi SV 11 Apo stereomicroscope and Zeiss AxioCam MRc5 digital camera system and optimized with an *i*-delta imaging system (Image and Microscope Technology). The following abbreviations are used for various

indices and museums in which type materials and loaned species are located: (HU)Hokkaido University, Faculty of Agriculture, Entomological Institute, Sapporo, Japan; (YULEE)Lee's collections, Department of Biology, Yeungnam University, Gyeongsan, Korea; (IZU)Instytut Zoologiczny Uniwersytetu, Sienkiewicza 21, Wrocław, Poland. (Gravenhorst collection.); (NHM)The Natural History Museum, Department of Entomology, Cromwell Road, London, England, SW7 5BD, United Kingdom; CB, Chungcheongbuk-do; GW, Gangwon-do; GB, Gyeongsangbuk-do; GN, Gyeongsangnam-do; JB, Jeollabuk-do; TL, Type Locality; TD, Type depository; TS, Type Species.

## TAXONOMIC ACCOUNTS

Family Ichneumonidae Latreille, 1802  
Subfamily Ctenopelmatinae Förster, 1869  
Tribe Scolobatini Schmiedeknecht, 1911  
Genus *Scolobates* Gravenhorst, 1829

*Scolobates* Gravenhorst, 1829: 357. TS: *Scolobates crassitarsus* Gravenhorst (= *auriculatus* Fabricius. Designated by Westwood, 1840).

*Aglyphus* Giraud, 1872: 375. TS: *Aglyphus nigripennis*  
*Parabraconia* Schmiedeknecht, 1914: 2803. TS: *Parabraconia nigripennis*.

**Diagnosis.** Body entirely polished, sparsely punctated. Head large; clypeus usually not separated from face by a groove or separated and with a strong median apical point; eye small; mandible teeth of subequal length, stout; antennae filiform; occipital carina present only on lower of temple or entirely absent. Mesoscutum notauli absent; propodeum short, weakly convex, without carina except for apical traces of the median longitudinal carina. Tarsal claws

\*To whom correspondence should be addressed

Tel: 82-53-810-2376, Fax: 82-53-810-4618  
E-mail: flower@ynu.ac.kr

on the legs usually strongly pectinate. Fore wing areolet absent, hind wing brachiella vein present and moderately long. Basal part of abdomen strongly depressed, the apical part compressed; tergite I with a small shallow glymma at its base but otherwise smooth and without carina, thyridium absent.

**Key to the species of the genus *Scolobates* from Korea**

1. Head ventrally strongly tapering in anterior view, face black (Fig. 2-B). ..... *S. nigriabdominalis* Uchida  
 – Head oblong or only medially weakly tapering in anterior view, face yellow. .... 2
2. Clypeus separated from face by a groove (Fig. 2-C), basal vein basal to nervulus vein of fore wing (Fig. 1-G). Posterior margin of tergites with yellow. ....  
 ..... *S. ruficeps* Uchida  
 – Clypeus not separated from face by a groove, basal vein distal to nervulus vein of fore wing. Posterior margin of tergites without yellow. .... 3
3. Hind basitarsus expanded (Fig. 2-I). Scutellum strongly convex in lateral view. .... *S. longicornis* Gravenhorst  
 – Hind basitarsus not expanded. Scutellum weakly flat in lateral view. .... *S. testaceus* Morley

**1. *Scolobates longicornis* Gravenhorst, 1829**

*Scolobates longicornis* Gravenhorst, 1829: 359 Type: female, TD: IZU Russia; Uchida: 1955.

*Specimens examined.* [Denmark] DK.NWZIPG68, Audelo Plaundage 4.Nov.1986, Jan Martin des 3 female.

*Redescription.* Head oblong in anterior view and 1.27 × as wide as height; face finely closely punctated; vertex slightly punctate; occipital carina incomplete; temple convex with very fine punctures; clypeus small, apical margin with one tooth, separated from the face; mandibles short and stout, moderately narrow, with two teeth; inner margin of eyes parallel; maximum wide of eye 0.59 × as wide as length; ocelli small, inter lateral ocellar distance 0.92 × as wide as maximum diameter of lateral ocellus, distance between lateral ocellus and compound eye 1.79 × as wide as maximum diameter of lateral ocellus. Antenna with 38-43 segments, longer than 2.0 × of the abdomen length, first segment 1.47 × as long as the second, second segment as long as the fifth, apex of scape oblique, scape 6.67 × as long as the pedicel. Pronotum of thorax basal carina distinct, apical carina strong; epomia absent; mesoscutum finely punctated, 0.79 × as wide as the length in dorsal view; notauli absent; mesopleuron finely closely punctate; mesopleural suture form indentations; prepectal carina slightly present; postpectal carina and sternaulus absent; scutellum slightly punctate and convex; propodeum very short, basal transverse

carina of propodeum strong and complete, longitudinal carina present, the apical transverse carina and median longitudinal carina absent; spiracles oval. Fore legs femur 0.28 × as wide as length; hind legs very long; trochantellus longer than apical wide in dorsal view; hind tibia spinose, with two spurs, 1.71 × as long as basitarsus; hind bisitarsus expanded. Fore wing length 10.8 mm; areolet absent; intercubitus only one, basal to second recurrent vein; nervulus opposite of basal vein; cubitus vein between first intercubitus and second recurrent vein a little present; intercubitus joining cubitus vein between intercubitus and second recurrent vein at about 133°. Hind wing discoidella complete, obliquely curved; nervellus complete; with 8 distal hamuli.

*Color.* Face, clypeus, malar space, mandible, palpi, scutellum, postscutellum, propodeum, pronotum, thorax, fore legs, and mid legs yellow; stripe of mesoscutum, hind legs, and abdomen brown; vertex, the middle of thorax, ventral part of thorax, basal part of propodeum and scutellum, and lateral part of hind coxa black.

*Distribution.* Korea, Estonia, Finland, Germany, Latvia, Poland, Russia, Sweden.

*Host records.* *Cimbex lutea* (see Rudow, 1917) (Hymenoptera: Cimbicidae), *Smerinthus ocellatus* (see Rårl, 1911) (Lepidoptera: Sphingidae).

**2. *Scolobates nigriabdominalis* Uchida, 1952**

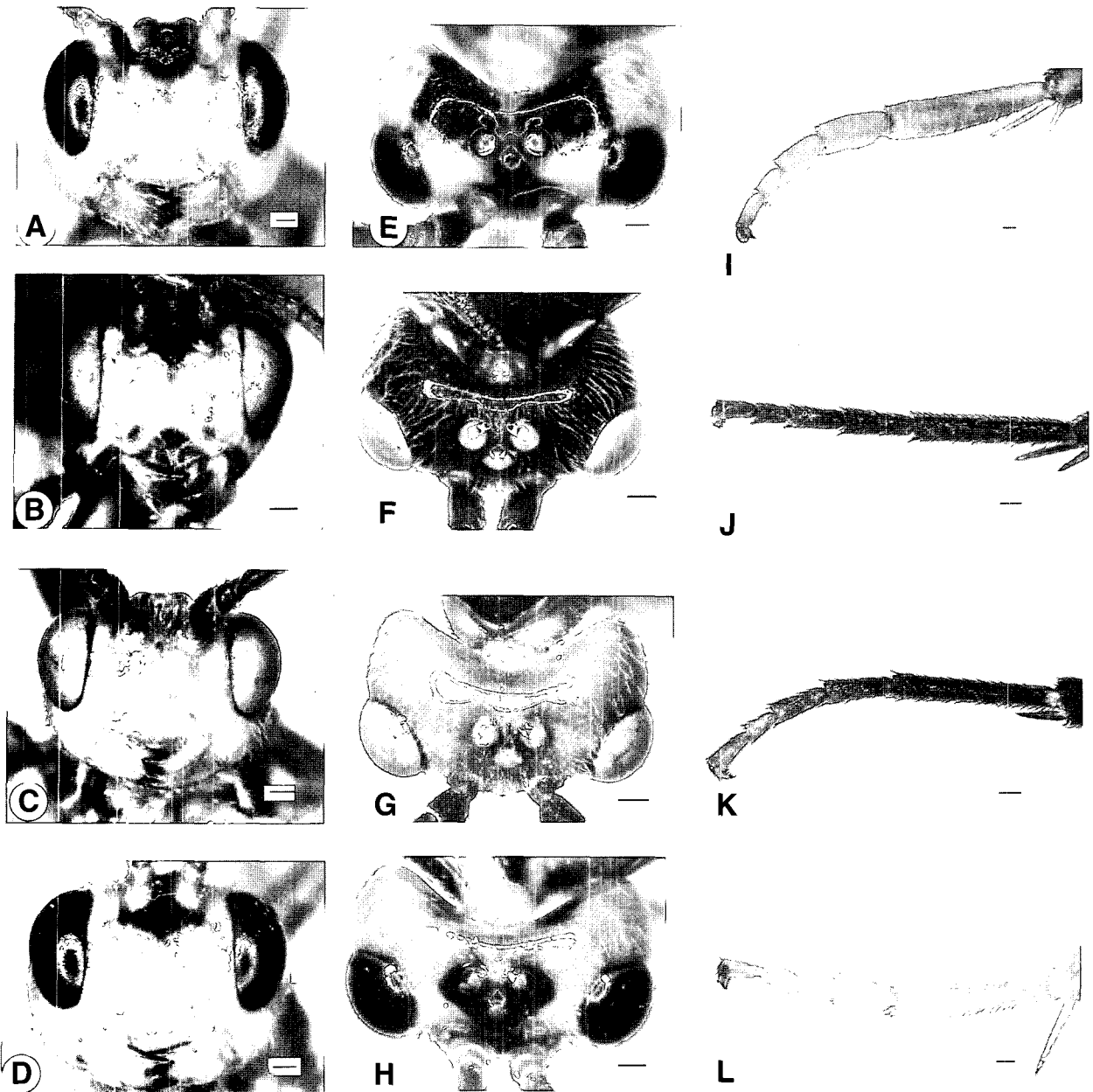
*Scolobates nigriabdominalis* Uchida, 1952: 24 Type: female, TL: Japan-Main islands, TD: HU.

*Scolobates auriculatus* var. *nigriabdominalis* Uchida, 1952: 24; Iwata: 1958; Iwata: 1960.

*Specimens examined.* < Holotype > [Japan] 1 female, Mitake Hyogo, (原記刊 1967. Kusig.) 29.VI.1951 K. Iwata [Korea] < CB > Mt. Sobaek, cheondong-ri, Danyang-gun, Korea (M.T.), 7.VII.-2.VIII.2005, 1 female; Mt. Sobaek, cheondong-ri, Danyang-gun, Korea (M.T.), 2.VIII.-14.IX.2005, 1 female.

*Redescription.* Head ventrally strongly tapering in anterior view; face sparsely punctated; occipital carina present only on lower of temple; temple broad, very finely sparsely punctated; clypeus not separated from face by a groove, slightly convex in lateral view, with a strong median apical point; mandible stout, moderately narrow, upper tooth a little broader than lower tooth; malar space about 0.49 × as long as the basal mandibular width; eye small; inner margin of eyes parallel; ocelli small; inter lateral ocellar distance 0.62 × as wide as maximum diameter of lateral ocellus; distance between lateral ocellus and compound eye 1.48 × as wide as maximum diameter of lateral ocellus. Antennae filiform, 37-38 segments, longer than abdomen, first segment 1.59 × as long as the second segment. Pronotum of





**Fig. 2.** A-D; Head in frontal view: A, *S. longicornis*; B, *S. nigriabdonimalis*; C, *S. ruficeps*; D, *S. testaceus*. E-H; Head in dorsal view: E, *S. longicornis*; F, *S. nigriabdonimalis*; G, *S. ruficeps*; H, *S. testaceus*. I-L; Tarsus of Hind leg: I, *S. longicornis*; J, *S. nigriabdonimalis*; K, *S. ruficeps*; L, *S. testaceus*. Scale bars=0.2 mm (A-L).

lateral view and lateral carina absent; postscutellum broader than longer; propodeum very short with basal transverse carina, apical transverse carina and longitudinal carina, median longitudinal carina absent; spiracle oval. Fore wing length 7.77 mm; areolet absent; intercubitus only one and basal to second recurrent vein, joining cubitus vein between intercubitus and second recurrent vein at about 125°; nervellus basal to basal vein. Hind wing discoidella obliquely

curved; nervellus complete, with 7 distal hamuli.

**Color.** Body entirely black except followings; triangular area of ocelli, malar space, thorax and thorax black; head, clypeus and scape dark brown; mandible and antenna brown; all the orbits yellow; palpi pale flavous; tegula, fore tibia and fore tarsus yellowish brown.

**Distribution.** Korea, Japan.

**Host records.** Unknown.

### 3. *Scolobates ruficeps* Uchida, 1932

*Scolobates ruficeps* Uchida, 1932: 166 Type: female, TL: Japan-Main islands, TD: HU.

*Specimens examined.* <Holotype> [Japan] 1 female, Kyoto, 20.X.1928, Takeuchi.

[Korea] <GW> Sambong-ri hongcheon-gun, 24.V.1996, T.H. Kim and S.I. Jung, 1 female; <GB> Yeongnam Univ. Gyeongsan-si, 21.VI.1994, W.J. Shin, 2 females; Yeongnam Univ. Gyeongsan-si, 21.V.1986, T.S. Nam, 1?; <GN> Mt. Geum, Namhae-gun, 24.V.2004, 1 female; Seongsan, 10.VII.1989, J.Y. Cha, 1 female.

*Redescription.* Head oblong in anterior view; face sparsely punctated; occipital carina present only on lower of temple; occiput strongly concave; temple broad and very finely sparsely punctated; clypeus separated from face by a groove, slightly convex in lateral view with a strong median apical point; mandible stout, weakly narrow, lower tooth broader than upper tooth, upper tooth shorter than lower tooth; eye small; inner margin of eyes parallel; ocelli small; inter lateral ocellar distance  $0.64\times$  as wide as maximum diameter of lateral ocellus; distance between lateral ocellus and compound eye  $1.36\times$  as wide as maximum diameter of lateral ocellus. Antennae filiform, 30-33 segments, longer than abdomen, first segment  $1.33\times$  as long as the second segment. Pronotum of thorax loosely sparsely punctated; epomia absent; mesoscutum loosely punctated; notauli absent; mesopleural fovea present; mesopleural suture indentations; prepectal carina present; postpectal carina, sternaulus and lateral carina of scutellum absent; postscutellum broader than longer; propodeum very short, basal transverse carina, apical transverse carina and longitudinal carina present, median longitudinal carina absent; spiracle oval. Fore wing length 6.60 mm; areolet absent, intercubitus only one, basal to second recurrent vein, longer than cubitus vein between intercubitus and second recurrent vein, intercubitus joining cubitus vein between intercubitus and second recurrent vein at about  $124^\circ$ , radius vein strongly curved; nervulus basal to basal vein; hind wing discoidella obliquely curved, nervellus complete, with 7 distal hamuli.

*Color.* Body entirely black except followings; tegula dark brown; head, clypeus, malar space, mandible, palpi, all the orbits, pronotum, fore leg, mid tibia and tarsus yellow; vertex and upper half of temple yellowish brown.

*Distribution.* Korea, China, Japan.

*Host records.* Unknown.

### 4. *Scolobates testaceus* Morley, 1913

*Scolobates testaceus* Morley, C. 1913: 339 Type: female, TL : India, TD : NHM; Uchida: 1953; Iwata: 1958; Iwata: 1960.

*Specimens examined.* [Taiwan] Taihorin Formosa 7.XII.1911, H. Sauter, 1 male; [Korea] <GW> Mt. Bangdae, Maehwa-dong, Inje-gun, 26.VI.1996, J.W. Lee, 1 female; Yeonse Univ., maeji-ri, Wonju-si, 15.V.1998, H.J. Kim, 1 male; jeonggeum-ri, Gamcheon-myeon, Hongseong-gun, 20.VIII.2002, D.S. Choi, 1 male; <GB> Mt. Juwang, Cheongsong-gun, 31.VII.1983, J.W. Lee, 1 female; Mt. Baegun, odo-ri, Jecheon-si, 2.VII.1996, H.Y. Han & H.W. Byun, 1 male; <JB> Dapgok-ri, Ssangam-dong, Jeongeup-si, 18.VI.2004, M.K. Yun, 1 male.

*Redescription.* Head oblong in anterior view; face sparsely punctated; occipital carina present only on lower of temple; occiput strongly concave; temple broad and very finely sparsely punctated; clypeus not separated from face by a groove, slightly concave in lateral view, with a strong median apical point; mandible stout, weakly narrow, lower tooth as broad as upper tooth; inner margin of eyes parallel; ocelli small; inter lateral ocellar distance  $0.52\times$  as wide as maximum diameter of lateral ocellus; distance between lateral ocellus and compound eye  $1.26\times$  as wide as maximum diameter of lateral ocellus. Antennae filiform, 39-42 segments, longer than abdomen, first segment  $2.0\times$  as long as the second segment. Pronotum of thorax loosely sparsely punctated; epomia absent; mesoscutum loosely punctate; notauli absent; prepectal carina present; postpectal carina, sternaulus and scutellum lateral carina absent; postscutellum broader than longer; propodeum very short and basal transverse carina present; apical transverse carina and longitudinal carina present, median longitudinal carina absent; spiracle oval. Fore wing length 8.19 mm; areolet absent, intercubitus only one, basal to second recurrent vein; nervulus opposite of basal vein; cubitus vein between intercubitus and second recurrent vein  $0.72\times$  as long as intercubitus; intercubitus joining cubitus vein between intercubitus and second recurrent vein at about  $140^\circ$ ; hind wing discoidella complete; nervellus complete; with 8 distal hamuli.

*Color.* Body entirely yellow except followings; vertex brown; tegula yellowish brown; triangle area of ocelli reddish brown; hind trochanter and femur dark brown; pronotum, thorax, abdomen with black markings; hind coxa black.

*Distribution.* Korea, China, Japan, Taiwan, India.

*Host records.* Unknown.

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## REFERENCES

- Föster, A., 1869. Synopsis der Familien und Gattungen der Ichneumoniden. Verhandlungen des Naturhistorischen Vereins der Preussischen Rheinlande und Westfalens., 25 (1868): 135-221.
- Giraud, J., 1872. III. Description d'Hyménoptères nouveaux avec l'indication des moeurs de la plupart d'entre eux et Recarques sur quelques espèces déjà connues. Miscellanées Hyménoptérologiques. Annales de la Société Entomologique de rance, (5)1(1871): 375-419.
- Gravenhorst, J.L.C., 1829. Ichneumonologia Europaea. Pars II. Vratislaviae, pp. 1-989.
- Iwata, K., 1958. Ovarian eggs of 233 species of the Japanese Ichneumonidae (Hymenoptera). Acta Hymenopterologia, 1: 63-74.
- Iwata, K., 1960. The comparative anatomy of the ovary in Hymenoptera, Part V. Ichneumonidae. Acta Hymenopterologia, 1: 115-169.
- Latreille, P.A., 1802. Histoire naturelle, générale et particulière, des Crustacés et des Insectes. Tome Troisième Paris. pp. 1-468 (Ichneumonidae pp. 318-327).
- Morley, C., 1913. The fauna of British India including Ceylon and Burma, Hymenoptera, Vol. 3. Ichneumonidae, London, British Museum, pp. 1-531.
- Rârl, M., 1911. Liste neuerdings beschriebener oder gezogener Parasiten und ihrer Wirte. Societas Entomologica. Stuttgart, 26: 30-35.
- Rudow, F., 1917. Ichneumoniden und ihre Wirte. Entomologische Zeitschrift, 31: 66-67.
- Schmiedeknecht, O., 1911. Opuscula Ichneumonologica. IV. Band. (Fasc. XXVII-XXIX.) Ophioninae. Blankenburg in Tharingen, pp. 2081-2271.
- Schmiedeknecht, O., 1914. Opuscula Ichneumonologica. V. Band. (Fasc. XXXVI-XXXVII.) Tryphoninae. Blankenburg in Tharingen, pp. 2803-2962.
- Uchida, T., 1932. Beitræge zur Kenntnis der japanischen Ichneumoniden. Insecta Matsumurana, 6: 145-168.
- Uchida, T., 1952. Einige neue oder wenig bekannte Ichneumonidenarten aus Japan. Insecta Matsumurana, 18(1-2): 18-24.
- Uchida, T., 1953. Die Ichneumoniden (Hymenoptera). Die Insektenfauna aus dem Berg Ishizuchi und dem Tal Omogo. Transactions of the Shikoku Entomological Society, 3: 126-134.
- Uchida, T., 1955. Die von Dr.K. Tsuneki in Korea gesammelten Ichneumoniden. Journal of the Faculty of Agriculture, Hokkaido University, 50: 95-133.
- Westwood, J.O., 1840. Introduction to the modern classification of insects. Vol. II. Synopsis of the genera of British insects. London, pp. 1-587.
- Yu, D.S. and K. Horstmann, 1997. A catalogue of world Ichneumonidae (Hymenoptera). Vol. 58. Memoirs of the American Entomological Institute, pp. 1-1558.

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