

Description of a new species and revised key to species of the *Enicospilus antefurcalis* species-group from Japan (Hymenoptera: Ichneumonidae: Ophioninae)

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Abstract. A new species of the genus *Enicospilus* Stephens, 1835, *E. kikuchii* sp. nov., which belongs to the ichneumonid subfamily Ophioninae, is described based on two specimens that were collected in Saitama Prefecture of Honshû and Kagoshima Prefecture of Kyûshû in Japan. *Enicospilus kikuchii* sp. nov. belongs to the *E. antefurcalis* species-group. A key to species of the group and additional couplets for the key to Indo-Papuan *Enicospilus* species are provided.

Key words. Hymenoptera, Ichneumonidae, crepuscular, nocturnal, ophionoid facies, taxonomy, Japan, Palearctic Region

Introduction

The genus *Enicospilus* Stephens, 1835, belonging to the tribe Enicospilini Townes, 1971 of the ichneumonid subfamily Ophioninae Shuckard, 1840 (TOWNES 1971, ROUSSE et al. 2016), comprises over 700 species that are distributed in all biogeographical regions, with the exception of the Arctic and Antarctic (e.g., YU et al. 2012, BROAD & SHAW 2016). A total of 39 *Enicospilus* species were previously recorded in Japan (SHIMIZU & MAETO 2016). These wasps are solitary koinobiont endoparasitoids of middle- to large-sized lepidopterous larvae (e.g., the families Lasiocampidae, Noctuidae, and Saturniidae) (e.g., GAULD & MITCHELL 1981, YU et al. 2012, BROAD & SHAW 2016), with high diversity in the tropics (GAULD & MITCHELL 1981, GAULD 1985). Adult wasps have long antennae, large ocelli, and orange-brown body, which are often referred to as having an “ophionoid facies” (GAULD & HUDDLESTON 1976), and these features are often shared with other nocturnal ichneumonoid wasps, such as many species of the genera *Netelia* Gray, 1860 (Tryphoninae), *Cidaphus* Förster, 1869 (Mesochoerinae), and the subfamily Xiphoselinae van Achterberg, 1979 (Braconidae). These wasps are frequently collected in light traps and are empirically considered crepuscular or nocturnal (e.g., GAULD & MITCHELL 1981, SHORT et al. 2006). However, their daily rhythms have not been quantitatively determined.

The *Enicospilus antefurcalis* species-group is characterized by several features, with the shape and number of sclerites of the fore wing fenestra, surface structure and shape of the mandible, and surface sculpture of the mesopleuron and metapleuron especially important. The group comprises 14 described species in the Old World (GAULD & MITCHELL 1981, GAULD 1982, Yu et al. 2012). The author recently had an opportunity to investigate the Japanese specimens belonging to this species-group, and identified a species that has not been described yet. Hence, a new species of the *E. antefurcalis* species-group is described here from Japan. In addition, the key to species of the group and additional couplets for the key to Indo-Papuan species of the genus, which was provided by GAULD & MITCHELL (1981), are provided.

Materials and methods

The holotype specimen was provided by Namiki Kikuchi and deposited in the National Institute for Agro-Environmental Sciences (NIAES), Tsukuba, Japan, and the paratype specimen was from the Kusigemati collection at the Laboratory of Systematic Entomology of Hokkaido University (SEHU), Sapporo, Japan.

A stereoscopic microscope (SMZ1500, Nikon, Tokyo, Japan) was used for morphological observation. Multi-focus photographs for figure 1 were taken using a single-lens reflex camera (D90, Nikon, Tokyo, Japan) fitted with a micro-lens (AF Micro-Nikkor 60 mm f/2.8D, Nikon, Tokyo, Japan) and a teleplus teleconverter (N-AFD $\times 2$ Teleplus MC7, Kenko, Tokyo, Japan), and were stacked using Zerene Stacker. Figures 6–9 were taken using a scanning electron microscope (SEM) (JSM-6010LV, JEOL, Tokyo, Japan). The specimen for SEM observation was not coated and was observed under high vacuum and an accelerating voltage of 10kV. All figures were edited in Adobe Photoshop© CS5.

The morphological terminology mainly follows GAULD & MITCHELL (1981) and GAULD (1991), and the terminology for surface microsculpture follows EADY (1968). The abbreviations and indices used in this paper mainly follow SHIMIZU & WATANABE (2015), SHIMIZU (2016), and SHIMIZU et al. (2016), as listed below.

Abbreviations and indices:

- AI Alar index of fore wing = length of 1m-cu between 2m-cu and bulla / length of 3rs-m.
- CI Cubital index of fore wing = length of Cu1 between 1m-cu and Cu1a / length of Cu1b.
- DI Discoidal index of fore wing = maximum vertical distance between Cu1a and 1m-cu / length of Cu1a between Cu1b and 2m-cu.
- DMI Dorsal metasomal index = length of dorsum of T2 / length of dorsum of T3.
- FI Frontal index of head = maximum diameter of the median ocellus / minimum distance between eyes.
- GOI Geno-orbital index of head = maximum breadth of eye in lateral profile / maximum breadth of gena in same line.
- ICI Intercubital index of fore wing = length of 3rs-m / length of M between 2m-cu and 3rs-m.
- NI Nervellar index of hind wing = length of Cu1 between M and cu-a / length of cu-a.
- PI Petiolar index of metasoma = distance between base of T1 and anterior margin of spiracle / distance between posterior margin of spiracle and apex of T1.
- RI Radial index of hind wing = length of Rs between R1 and 1r-m / length of 1r-m between Rs and M.
- S Metasomal sternite.
- SDI Second discoidal index of fore wing = length of Cu1a between Cu1b and 2m-cu / length of Cu1 between Rs+M and 1m-cu.
- T Metasomal tergite.

Taxonomy

Genus *Enicospilus* Stephens, 1835

Enicospilus Stephens, 1835: 126. Type species: *Ophion merdarius* Gravenhorst sensu Stephens (= *Ichneumon ramidulus* Linnaeus, 1758), by monotypy (STEPHENS 1845).

Henicospilus Agassiz, 1846: 138. Unjustified emendation.

Allocamptus Förster, 1869: 150. Type species: *Ophion undulatus* Gravenhorst, 1829, by subsequent designation (THOMSON 1888).

Dispilus Kriechbaumer, 1894: 309. Type species: *Ophion (Dispilus) natalensis* Kriechbaumer, 1894, by monotypy. *Pleuroneurophion* Ashmead, 1900: 86. Type species: *Pleuroneurophion hawaiiensis* Ashmead, 1900, by original designation.

Banchogastra Ashmead, 1900: 87. Type species: *Banchogastra niger* Ashmead, 1900, by original designation.

Pycnophion Ashmead, 1900: 87. Type species: *Pycnophion molokaiensis* Ashmead, 1900, by original designation.

Cymatoneura Kriechbaumer, 1901a: 22. Type species: *Ophion undulatus* Gravenhorst, 1829, by subsequent designation (VIERECK 1914).

Pterospilus Kriechbaumer, 1901b: 156. Type species: *Ophion (Enicospilus) dubius* Tosquinet, 1896, by subsequent designation (VIERECK 1914). Junior homonym of *Pterospilus* Rondani, 1856.

Trispilus Kriechbaumer, 1901b: 156. Type species: *Ophion (Enicospilus) trimaculatus* Tosquinet, 1896, by monotypy.

Abanchogastra Perkins, 1902: 141. Type species: *Abanchogastra debilis* Perkins, 1902, by monotypy.

Metophion Szépligeti, 1905: 28. Type species: *Metophion bicolor* Szépligeti, 1905, by subsequent designation (VIERECK 1914).

Ceratospilus Szépligeti, 1905: 28. Type species: *Ceratospilus biroi* Szépligeti, 1905, by monotypy.

Atoponeura Szépligeti, 1905: 34. Type species: *Atoponeura concolor* Szépligeti, 1905 (= *Enicospilus atoponeurus* Cushman, 1947), by monotypy.

Ophiomorpha Szépligeti, 1905: 34. Type species: *Ophion curvinervis* Cameron, 1886 (= *Enicospilus cameronii* Dalla Torre, 1901), by subsequent designation (HOOKER 1912). Junior homonym of *Ophiomorpha* Nilsson, 1836.

Cryptocamptus Brèthes, 1909: 230. Unnecessary replacement name for *Allocamptus* Förster, 1869.

Eremotyloides Perkins, 1915: 530. Type species: *Eremotyloides orbitalis* Ashmead, 1901, by monotypy.

Amesospilus Enderlein, 1918: 222. Type species: *Ophion unicallosus* Vollenhoven, 1878, by original designation.

Schizospilus Seyrig, 1935: 79. Type species: *Schizospilus divisus* Seyrig, 1935, by original designation.

Diagnosis. The genus is characterised and distinguishable from any other ophionine genera by the following combination of character states: mandible weakly to strongly tapered and more or less twisted (Figs 2, 3, 6); ocelli large, and sometimes adjacent or close to eyes (Figs 2–4); occipital carina usually complete; posterior transverse carina of mesosternum usually complete; discosubmarginal cell of fore wing with fenestra and often with sclerites (Fig. 5); ramellus of fore wing usually absent (Fig. 5); inner mesal surface of fore tibial spur without a membranous flange; and outer distal margin of mid and hind trochantelli simple, and usually without a decurved tooth.

Distribution. Afrotropical, Australasian, Nearctic, Neotropical, Oceanic, Oriental, and Palearctic Regions (YU et al. 2012).

Bionomics. Several lepidopterous families (e.g., Lasiocampidae, Noctuidae, and Notodontidae) are reported as hosts (e.g., GAULD & MITCHELL 1981, GAULD 1988, BROAD & SHAW 2016).

Remarks. According to GAULD (1985), the *Enicospilus* genus-group contains the following five subgroups: *Orientospilus* subgroup comprising three genera, *Ophiogastrella* subgroup comprising a single Neotropical genus, *Stauropoctonus* subgroup comprising two genera, *Leptophion* subgroup comprising three genera, and *Enicospilus* subgroup comprising five genera, including the genus *Enicospilus*.

Enicospilus antefurcalis species-group

Diagnosis. This group is characterized and distinguished from the other groups by the following combination of character states: interocellar area generally yellowish brown; outer surface of mandible with a diagonal hirsute groove between upper proximal corner and base of teeth (Figs 2, 3); mandible evenly narrowed (Figs 2, 3); mesopleuron more or less punctostriate or roughly and strongly striate (Fig. 6); metapleuron usually diagonally punctostriate to striate (Figs 6, 7); fenestra of fore wing usually with the central, distal, and proximal sclerites (Fig. 5); central sclerite of fenestra usually strongly pigmented and positioned in middle to distal part of fenestra and rarely completely lacking (Fig. 5); proximal sclerite of fenestra distinct and large (Fig. 5); Rs+2r straight to slightly sinuate (Fig. 5); and fore wing with ICI = 0.4–0.8, CI = 0.2–0.5, SDI = 1.1–1.5 (Fig. 5).

Differential diagnosis. The group considerably resembles the *E. ramidulus* species-group, and these groups share the following characteristics: interocellar area generally yellowish brown; outer surface of mandible with a diagonal hirsute groove between upper proximal corner and base of teeth (Figs 2, 3); proximal sclerite of fore wing distinct and large (Figs 2, 3); Rs+2r straight to slightly sinuate, not strongly sinuate or arcuate (Fig. 5). However, when focusing only on Japanese species of both of the *E. antefurcalis* and *E. ramidulus* species-groups, species of the *E. antefurcalis* species-group are distinguishable from the *E. ramidulus* species-group by the following combination of character states: characteristic mandible, i.e., mandible evenly narrowed and its profile usually moderately long (Figs 2, 3), but mandible proximally narrowed and distally parallel-sided or cylindrical, and its profile usually long and slender in the *E. ramidulus* species-group; at least part of the mesopleuron and/or metapleuron punctostriate to striate (Figs 6, 7), but mesopleuron and metapleuron regularly punctate, i.e., mesopleuron punctate to punctostriate and metapleuron usually punctate in the *E. ramidulus* species-group.

Remarks. Most of the species-groups of *Enicospilus*, including the *E. antefurcalis* species-group, were defined by Gauld (e.g., GAULD 1988, GAULD & MITCHELL 1981), but these species-groups are merely hypotheses that have not actually been phylogenetically tested; thus, there is no particular evidence that the *Enicospilus* species-groups are monophyletic, although they are often readily recognizable. Nevertheless, a comprehensive phylogenetic research is strongly necessary to reveal the relationships between species within the genus. The group previously comprised 14 described species: *E. aciculatus* (Taschenberg, 1875) and *E. melanocarpus* Cameron, 1905 from the Australasian, Eastern Palaearctic, Oceanic, and Oriental Regions; *E. antefurcalis* (Szépligeti, 1908), *E. bicoloratus* Cameron, 1912, *E. polemus* Gauld, 1982, and *E. watshami* Gauld, 1982 only from the Afrotropical Region; *E. laqueatus* (Enderlein, 1921) from the Afrotropical and Oriental Regions; *E. marathwadensis* Nikam, 1980 only from the Oriental Region; *E. ruscus* Gauld & Mitchell, 1978 from the Afrotropical and Oceanic Regions; *E. sauteri* (Enderlein, 1921) from the Eastern Palaearctic and Oriental Regions; *E. xaivus* Gauld & Mitchell, 1981, *E. xuthus* Gauld & Mitchell, 1981, and *E. ypsilon* Gauld & Mitchell, 1981 only from the Australasian Region; *E. kalveus* Gauld & Mitchell, 1981 only from Oceanic Region (GAULD & MITCHELL 1981, GAULD 1982, YU et al. 2012).

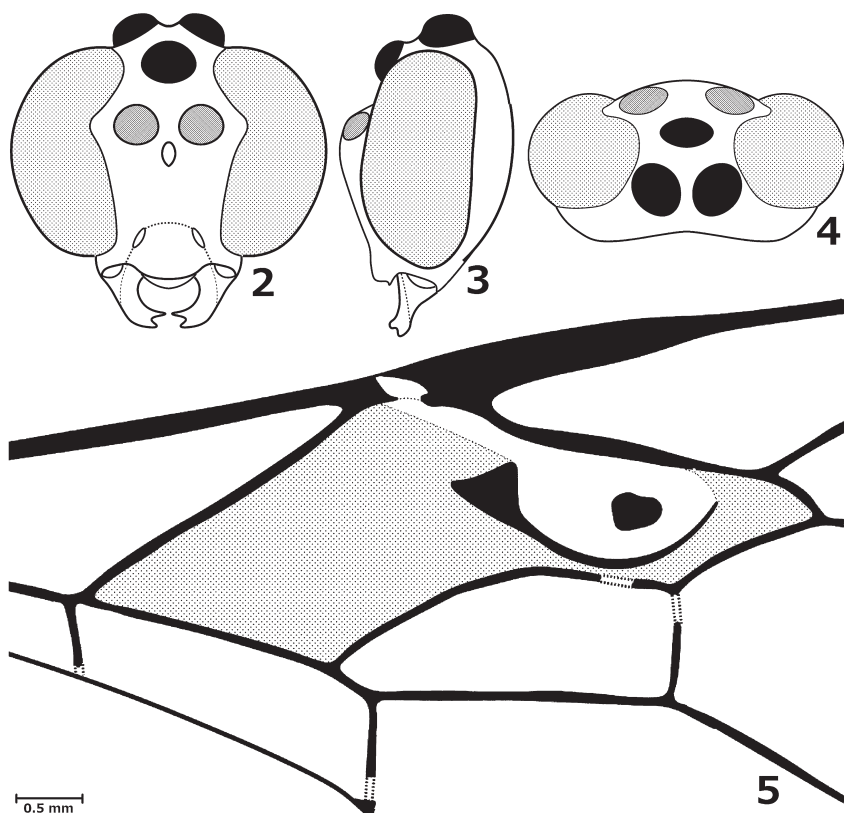
***Enicospilus kikuchii* sp. nov.**

[Japanese name: Kikuchi-hoshi-amebachi]

(Figs 1–9)

Type locality. Japan, Saitama Prefecture, Chichibu, Kawamata.**Type material.** HOLOTYPE: ♀, “JAPAN: Saitama Pref. / Chichibu / Kawamata / 28–30. VIII. 2012 / Namiki Kikuchi leg. // HOLOTYPE // [Ophioninae: Enicospilini] / *Enicospilus kikuchii* Shimizu, 2017 / Acta. Entomol. Mus. Natl. Pragae, 57: 183–194.” (NIAES). PARATYPE: 1 ♂, “Eboshi-dake / Kagoshima / 4. V. 1969 / K. Kusigemati leg. // PARATYPE // [Ophioninae: Enicospilini] / *Enicospilus kikuchii* Shimizu, 2017 / Acta. Entomol. Mus. Natl. Pragae, 57: 183–194.” (SEHU: Kusigemati Collection).**Diagnosis.** This species is characterized by the following combination of character states: darkened mesosoma, T1, T2, and T5–8 (Fig. 1); metapleuron roughly diagonally punctostri-gose (Fig. 6); and proximal sclerite of the discosubmarginal cell of the fore wing triangular and confluent with distal sclerite, and central sclerite suboval and positioned on distal part of fenestra (Fig. 5).**Differential diagnosis.** Within the *E. antefurcalis* species-group, this new species closely resembles *E. melanocarpus* in morphology, although distinct in colour, but they can be distinguished from each other by the following combination of characteristics: mesosoma, T1, T2, and T5–8 dark-brown to black in *E. kikuchii*, but usually most of body yellowish brown and T5–8 usually blackish in *E. melanocarpus*; and metapleuron roughly diagonally punctostri-gose in *E. kikuchii*, but uniformly punctate or finely diagonally punctostriate in *E. melanocarpus*. *Enicospilus kikuchii* also resembles *E. combustus* (Gravenhorst, 1829) and *E. nigropectus* Cameron, 1905, within the Palearctic Region, in its colour pattern. However, *E. combustus* and *E. nigropectus* do not belong to the *E. antefurcalis* species-group and are distinguishable

Fig. 1. Lateral habitus of *Enicospilus kikuchii* sp. nov. (holotype).

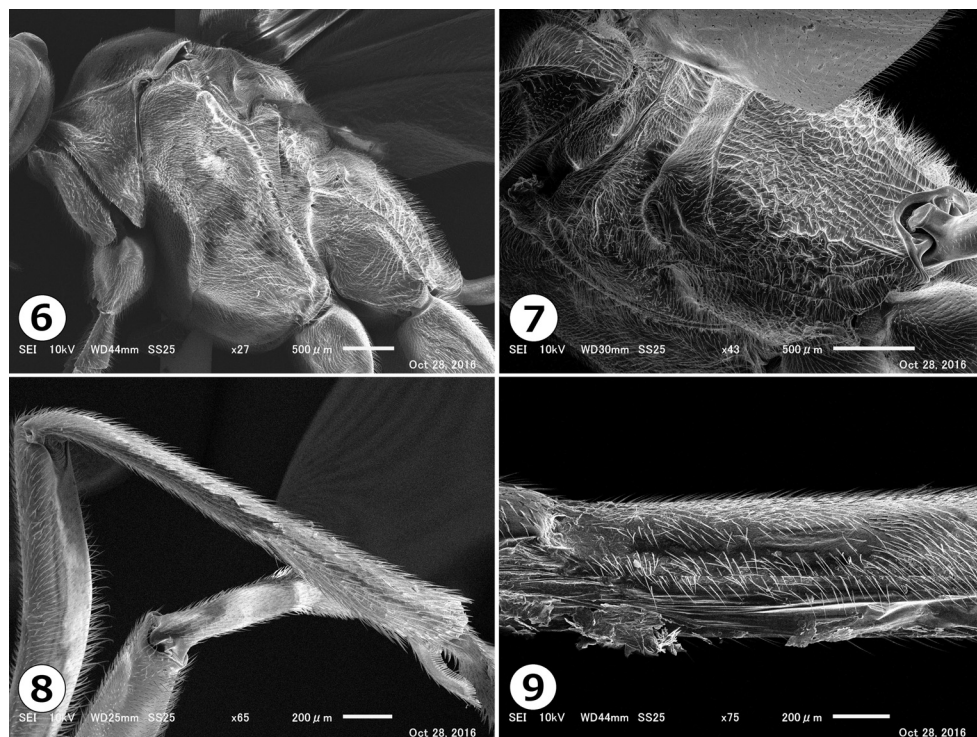


Figs 2–5. Partial views of *Enicospilus kikuchii* sp. nov. (holotype). 2–4 – head in frontal (2), lateral (3), and dorsal views (4); 5 – part of fore wing.

from *E. kikuchii* by the characteristics presented to the species-group already. Additionally, the latter species is easily distinguishable from any other species of the *E. antefurcalis* species-group using the key (see below).

Description. Female (holotype) (Figs 1–9). Body length ca. 20.5 mm.

Head (Figs 2–4) with FI = 0.6 (Fig. 2); GOI = 2.8 (Fig. 3). Lower face 0.8 times as wide as high (Fig. 2), weakly polished, entirely covered with punctures and setae. Clypeus 1.7 times as wide as high (Fig. 2), polished with punctures and setae, moderately convex in lateral profile (Fig. 3), its lower margin impressed (Fig. 2). Malar space 0.4 times as long as basal width of mandible (Figs 2, 3). Mandible evenly narrowed, its outer surface with a diagonal hirsute groove between upper proximal corner and base of teeth (Figs 2, 3). Upper tooth of mandible 1.5 times as long as lower one (Figs 2, 3). Frons, vertex and gena weakly polished with sparse setae. Posterior ocellus not contiguous to eye, but large and moderately close to eye (Figs 2–4). Antenna with 59 flagellomeres. First flagellomere 5.2 times as long as wide and 1.3 times as long as second flagellomere. 20th flagellomere 2.1 times as long as wide.



Figs 6–11. SEM images of *Enicospilus kikuchii* sp. nov. (holotype). 6 – mesosoma in lateral view; 7 – propodeum in dorso-lateral view; 8 – fore tibia in lateral view; 9 – anterior part of T2 in lateral view.

Mesosoma (Figs 6, 7) weakly polished, entirely covered with white setae. Postero-dorsal part of pronotum punctate with setae, antero-ventral part rugose to coriaceous, ventral 0.3 with dense long setae (Fig. 6). Mesoscutum 1.4 times as long as wide and evenly covered with fine dense punctures and setae, evenly rounded in lateral profile (Fig. 6). Notauli absent (Fig. 6). Scutellum moderately convex in lateral profile (Fig. 6), finely punctate with setae, transversely undulate, with lateral longitudinal carinae reaching its posterior margin (Figs 6, 7). Epicnemium densely punctate or pustulate (Fig. 6). Epicnemial carina inclined to anterior margin of mesopleuron, and its dorsal end not reaching anterior margin of mesopleuron (Fig. 6). Dorsal part of mesopleuron punctate to punctostriate, median part punctate to coriaceous, and ventral part strongly roughly strigose (Fig. 6). Submetapleural carina complete and entirely parallel-sided, not broadened anteriorly (Fig. 6). Metapleuron roughly diagonally punctostrigose (Fig. 6). Propodeum in lateral profile weakly evenly rounded (Fig. 6). Anterior transverse carina of propodeum complete, anterior area striate, spiracular area smooth and strongly polished, posterior area rather coarsely irregularly wrinkled to reticulate (Fig. 7). Propodeal spiracle elliptical, its outer margin joined to lateral longitudinal carina of propodeum by ridges (Figs 6, 7).

Wings (Fig. 5). Fore wing length ca. 13.0 mm with AI = 0.7; CI = 0.5; DI = 0.4; ICI = 0.4; SDI = 1.2 (Fig. 5). 1m-cu of fore wing evenly curved (Fig. 5). Rs+M and Rs+2r of fore wing almost straight (Fig. 5). Fenestra and sclerites of discosubmarginal cell of fore wing as in Fig. 5. Proximal sclerite triangular and confluent with distal sclerite (Fig. 5). Central sclerite suboval and positioned on distal part of fenestra (Fig. 5). Sclerites moderately to strongly pigmented (Fig. 5). Vein cu-a of fore wing proximal to Rs+M separated by 0.2 times its own length (Fig. 5). Postero-distal corner of second discal cell ca. 95°. Postero-distal corner of subbasal cell ca. 70°. Hind wing with RI = 2.2; NI = 1.3. Rs of hind wing straight. R1 of hind wing with 6 hamuli of uniform length.

Legs (Figs 1, 8). Distal 0.6 of outer surface of fore tibia with sparse short spines (Fig. 8). Hind coxa 1.7 times as long as wide. Hind trochanter 1.3 times as long as trochantellus in ventral view. Hind trochantelli simple. Hind femur 0.9 times as long as tibia. Hind basitarsus 1.7 times as long as second tarsomere. Fourth hind tarsomere 3.0 times as long as wide. Hind tarsal claw pectinate.

Metasoma (Figs 1, 9) weakly to moderately polished with setae, moderately long and slender, with PI = 3.1; DMI = 1.1. Thyridium moderately large, elliptical, and separated from anterior margin of tergite by 2.0 times length of its longest axis (Fig. 9). Ovipositor 0.8 times as long as T2, 0.5 times as long as hind tibia, straight (Fig. 1).

Colour (Fig. 1). Head entirely yellowish brown except dark brown to black apex of mandible and median part of frons. Mesosoma entirely dark brown to black except yellowish brown margin of pronotum, mesoscutum, mesopleuron, scutellum, metapleuron, propodeum, and entire anterior area of propodeum. Wing cells hyaline. Sclerites of wings yellowish brown, venation and setae dark brown to black. Legs yellowish brown except all coxae that are dark brown to black. T1–2, T5–8 and ovipositor sheath dark brown to black; T3–4, S2–4, and ovipositor yellowish brown.

Male. Very similar to female except for the following characters. Body length ca. 22.0 mm.

Head with GOI = 2.9. Apex of antennae incomplete. First flagellomere 5.0 times as long as wide. 20th flagellomere 2.2 times as long as wide.

Wings. Fore wing length ca. 13.0 mm with AI = 0.4; SDI = 1.1. Hind wing with RI = 2.0; NI = 1.2.

Legs. Hind basitarsus 1.8 times as long as second tarsomere.

Metasoma with PI = 2.9; DMI = 1.2.

Colour. Mesosoma entirely dark brown to black except reddish brown margin of pronotum, mesoscutum, mesopleuron, scutellum, metapleuron, propodeum, and entire anterior area of propodeum.

Bionomics. Unknown.

Etymology. The specific name is derived from the collector of the holotype specimen, Mr Namiki Kikuchi (Hokkaido University), who is one of the greatest young Japanese ichneumonologists.

Distribution. Japan: Honshû (Saitama Pref.) and Kyûshû (Kagoshima Pref.).

Remarks. Unfortunately, in this study, the author could only locate two type specimens. However, the specimens represent a distinct new species within the genus and the species-group. Moreover, it is easily distinguishable from any other Indo-Papuan *Enicospilus* species

based on the addition of the following couplets for the key to Indo-Papuan *Enicospilus* species by GAULD & MITCHELL (1981):

- 230 (229) Central sclerite positioned in middle of fenestra; distal side of proximal sclerite more or less forming a right angle with margin of distal sclerite; metapleuron punctate. Solomon Islands. *E. xaivus* Gauld & Mitchell, 1981
- Central sclerite positioned towards distal edge of fenestra (Fig. 5); distal side of proximal sclerite and margin of distal sclerite more or less forming an even curve (Fig. 5); metapleuron usually punctostriate (Fig. 6). 230a
- 230a (230) Usually most of body yellowish brown and T5–8 blackish, but rarely body entirely yellowish brown; metapleuron uniformly punctate or finely diagonally punctostriate. *E. melanocarpus* Cameron, 1905
- Mesosoma, coxae, T1–2, T5–8 dark-brown to black (Fig. 1); metapleuron roughly diagonally punctostriate (Fig. 6). *E. kikuchii* sp. nov.

The new species is also easily distinguished from any other species within the species-group using the key to species of the *E. antefurcalis* species-group, partially modified from GAULD & MITCHELL (1981) and GAULD (1982), as below:

Key to species of the *Enicospilus antefurcalis* species-group

- 1 Central sclerite completely absent. Oceanic. *E. kalveus* Gauld & Mitchell, 1981
- Central sclerite present (Fig. 5). 2
- 2 Proximal corner adjacent to Rs+2r of marginal cell with wide glabrous area. Central sclerite elongate linear-oval. Eastern Palearctic and Oriental. *E. sauteri* (Enderlein, 1921)
- Proximal corner of marginal cell entirely setose, without glabrous area. Central sclerite various, oval to circular (Fig. 5). 3
- 3 Proximal and distal sclerites separated, not confluent. 4
- Proximal and distal sclerites confluent (Fig. 5). 10
- 4 Lower face 0.9 times as wide as high. Clypeus wide and 1.9 times as wide as high. AI = 0.3. Australasian. *E. ypsilon* Gauld & Mitchell, 1981
- Lower face 0.7–0.8 times as wide as high. Clypeus normal and 1.5–1.8 times as wide as high. AI = 0.4–0.5. 5
- 5 ICI = 0.8. Distal sclerite weak. Fenestra rather small. Australasian. *E. xuthus* Gauld & Mitchell, 1981
- ICI = 0.4–0.6. Distal sclerite strong. Fenestra moderately large. 6
- 6 Central sclerite large, about 40% as wide as proximal sclerite and its minimum diameter larger than minimum distance between it and Rs+2r. Afrotropical and Oriental. 7
- Central sclerite of moderate size, less than 20% as wide as proximal sclerite and its minimum diameter smaller than minimum distance between it and Rs+2r. 8
- 7 Central sclerite weakly sclerotized and pigmented. Upper tooth of mandible 2.1–2.3 times as long as lower tooth. *E. aciculatus* (Taschenberg, 1875)

- Central sclerite moderately to strongly sclerotized and strongly pigmented. Upper tooth of mandible 1.3–1.4 times as long as lower tooth. *E. laqueatus* (Enderlein, 1921)
- 8 Posterior part of metasoma black. Distal 0.8 of outer surface of fore tibia with moderately dense spines. Afrotropical. *E. watshami* Gauld, 1982
- Posterior part of metasoma not black. Distal half of outer surface of fore tibia with sparse spines. 9
- 9 Central sclerite oval, its longer axis parallel to Rs+2r. Face yellowish-white except for central area. Mandibles with sparse setae. Afrotropical. *E. polemus* Gauld, 1982
- Central sclerite oval to suboval, its longer axis at right angle to Rs+2r. Face entirely orange-yellow. Mandibles with dense setae. Afrotropical and Oceanic.
..... *E. ruscus* Gauld & Mitchell, 1978
- 10 Central sclerite positioned in middle of fenestra. Corner formed by distal margin of proximal sclerite and proximal part of distal sclerite, more or less angulate. Australasian. *E. xaivus* Gauld & Mitchell, 1981
- Central sclerite positioned in distal part of fenestra (Fig. 5). Corner formed by distal margin of proximal sclerite and proximal part of distal sclerite, evenly curved (Fig. 5). 11
- 11 Mesosoma, coxae, T1, T2, T5–8 dark-brown to black (Fig. 5). Metapleuron roughly punctostriate (Fig. 6). Eastern Palaearctic. *E. kikuchii* sp. nov.
- Body entirely yellowish-brown or posterior part of metasoma blackish. Metapleuron uniformly punctate or finely punctostriate. 12
- 12 AI = 0.2–0.3, CI = 0.2–0.3. Distal sclerite weak. Central sclerite oval and large, its longer axis reclivous and parallel to M between 2m-cu and 3rs-m. Oriental.
..... *E. marathwadensis* Nikam, 1980
- AI = 0.3–1.1, CI = 0.3–0.6. Distal sclerite more or less strong. Central sclerite circular to oval, if oval more or less small and its longer axis inclivous, not parallel to M between 2m-cu and 3rs-m. 13
- 13 Mandible twisted 10–20°. Metapleuron punctostriate or punctate. Posterior part of metasoma usually black. Australasian, Eastern Palaearctic, Oceanic, and Oriental.
..... *E. melanocarpus* Cameron, 1905
- Mandible twisted 25°. Metapleuron closely punctate. Posterior part of metasoma black or yellowish brown. Afrotropical. 14
- 14 Posterior part of metasoma black. Central sclerite small, its maximum diameter smaller than minimum distance between it and Rs+2r. AI = 0.5–1.0.
..... *E. bicoloratus* Cameron, 1912
- Posterior part of metasoma yellowish-brown. Central sclerite moderately large, its maximum diameter larger than minimum distance between it and Rs+2r. AI = 0.3–0.5.
..... *E. antefurcalis* (Szépligeti, 1908)

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