

The genus *Ecphylus* Foerster (Hymenoptera, Braconidae, Doryctinae) in Japan

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The Japanese species of the genus *Ecphylus* Foerster, 1862 are reviewed. Three new species belonging to the subgenus *Sactopus* Ashmead, 1900, *E. (S.) conformis* sp. n., *E. (S.) konishii* sp. n. and *E. (S.) subtropicalis* sp. n., are described and illustrated. *Ecphylus (S.) hattori* Kono & Watanabe, 1935 is considered a valid species, distinctly separated from the Western Palaearctic *E. (S.) caudatus* Ruschka, 1916. A key to all Eastern Palaearctic species of *Ecphylus* is provided.

Key words: Ectoparasitoids, new species, key, fauna of Japan, braconid wasps

INTRODUCTION

The genus *Ecphylus* Foerster, 1862 contains a specialised and widespread group of idiobiont ectoparasitoid wasps that appear to attack exclusively the larvae of the small beetle. According to the recent molecular phylogenetic analysis for the subfamily Doryctinae (Zaldivar et al., 2008), the genus *Ecphylus* probably originated in the South America and subsequently dispersed and diversified in the Palaearctic and the Oriental regions via the Trans-Atlantic and/or the Trans-Beringian land-bridges. A taxonomic study of the species assigned to *Ecphylus* Foerster revealed the presence of two groups of species, which were designated as subgenera *Ecphylus* s. str. and *Sactopus* Ashmead, 1900 (Belokobylskij, 1993a).

The number of Palaearctic species of the nominotypical subgenus of *Ecphylus* is not exactly known. Six species belonging to this subgenus were described during all period of study of this genus in this region (Shenefelt & Marsh, 1976). However, the investigation of the biology and development of the Western Palaearctic species of *Ecphylus* by Russo (1938) had showed considerable variation of the main diagnostic characters of these species, especially in the wing venation and the ovipositor length. These results led the last author (Russo, 1938) to synonymise

most of the known species of this subgenus with the polymorphic *E. silesiacus* (Ratzeburg, 1848). This conclusion was supported by the present author after having examined a large and often reared material from different localities. Therefore I only recognise a single valid Palaearctic species for the subgenus *Ecphylus* s. str., *E. silesiacus*, also known from the Eastern Palaearctic (Belokobylskij, 1998). However, further molecular studies of these morphological forms may reveal the presence of several cryptic (sibling) species.

On the other hand, six species of subgenus *Sactopus* are known in the Palaearctic and Oriental regions (Belokobylskij, 1993a, 1993b). Of these, two species have been described from Vietnam (*E. alboapicalis* Belokobylskij, 1993 and *E. brevitergum* Belokobylskij, 1993), two species [*E. hattori* Kono & Watanabe, 1935 (stat. resurr.) and *E. arephini* Belokobylskij, 1993] were recorded in the eastern Palaearctic Region, whereas *E. caudatus* Ruschka, 1916 is exclusively known from the western Palaearctic Region. The species of the subgenus *Ecphylus* s. str. are not yet found in the fauna of Japan, but has been recorded from mainland Asia (Belokobylskij, 1998). Here, five species of *Ecphylus (Sactopus)* are recorded for the fauna of Japan and three are new for science.

Members of the genus *Ecpstylus* are ectoparasitoids mainly of larvae of bark-boring beetles (Scolytidae). More rarely species of this genus have also been reared from the coleopteran families Anobiidae, Bostrichidae, Cerambycidae and Lyctidae (Shenefelt & Marsh, 1976; Yu et al., 2005).

MATERIAL AND METHODS

The nomenclature of the wing venation, terminology of morphological features, measurement and sculpture follows Belokobylskij & Tobias (1998). The following abbreviations are used: for morphology, POL – postocellar line; OOL – ocular-ocellar line; Od – maximum diameter of lateral ocellus; for institutions, EIHU – Laboratory of Systematic Entomology, Faculty of Agriculture, Hokkaido University (Sapporo, Japan); MUNJ – Laboratory of Entomology, Faculty of Agriculture, Meiji University (Nagoya, Japan); NIAES – National Institute of Agro-Environmental Sciences (Tsukuba, Japan); ZISP – Zoological Institute, Russian Academy of Sciences (St. Petersburg, Russia).

TAXONOMIC PART

Genus *Ecpstylus* Foerster, 1862

Ecpstylus Foerster, 1862: 237 (type species: *Bracon silesiacus* Ratzeburg, 1848); Hedqvist, 1967: 66; Shenefelt & Marsh, 1976: 1344; Hedqvist, 1998: 45; Belokobylskij, 1993b: 38; 1998: 107; Yu et al., 2005.

Paraecpstylus Ashmead, 1900: 147 (type species: *P. websteri* Ashmead, 1900); Shenefelt & Marsh, 1976: 1345.

Sactopus Ashmead, 1900: 146 (type species: *S. schwarzii* Ashmead, 1900); Shenefelt & Marsh, 1976: 1345; Belokobylskij, 1993a: 87 (as subgenus of *Ecpstylus*), 1998: 107.

Sycosoter Picard & Lichtenstein, 1917: 285 (type species: *S. lavagnei* Picard et Lichtenstein, 1917); Shenefelt & Marsh, 1976: 1345.

Terenusa Marshall, 1885: 65 (type species: *Bracon silesiacus* Ratzeburg, 1848); Shenefelt & Marsh, 1976: 1345.

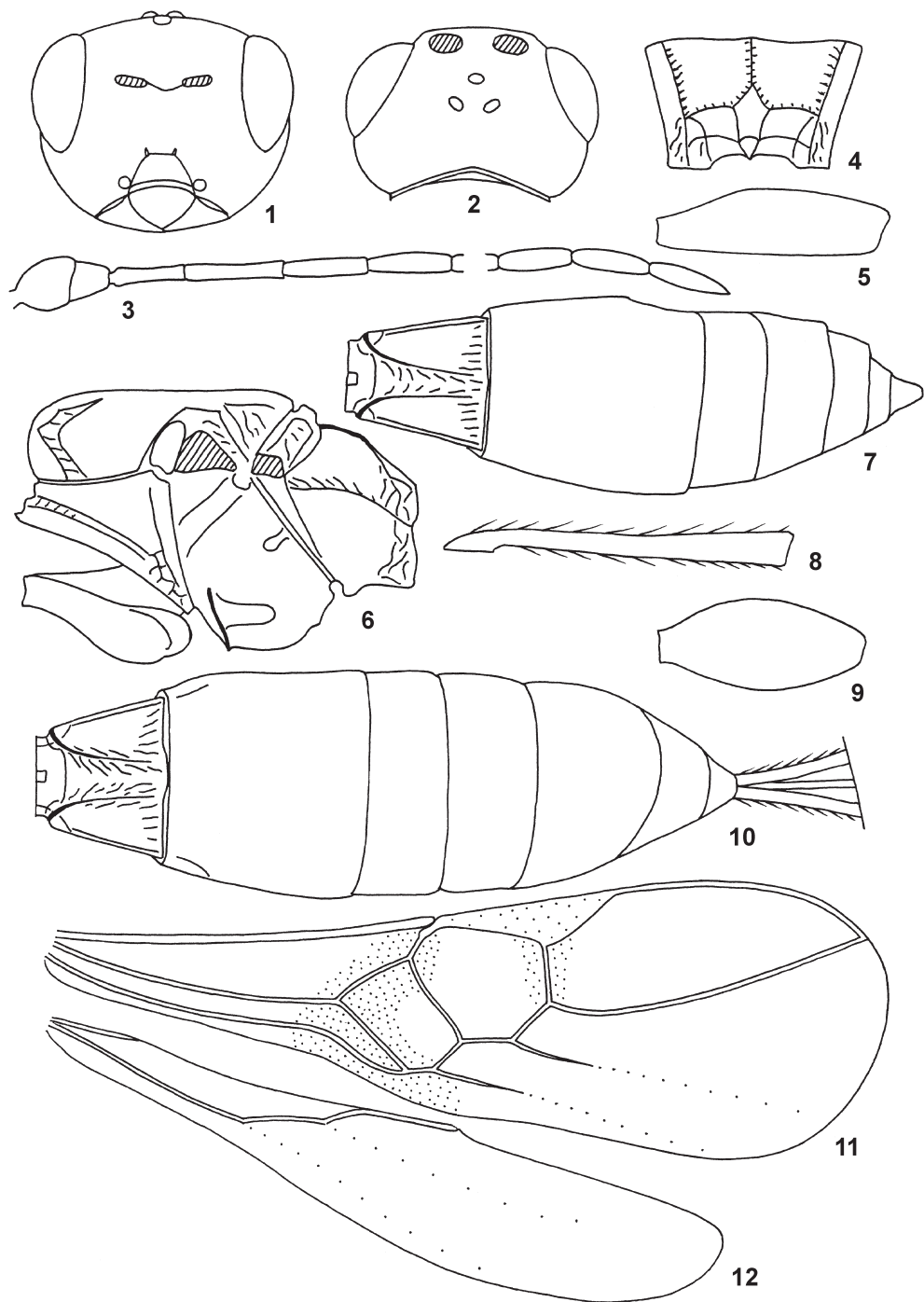
Type species: *Bracon silesiacus* Ratzeburg, 1848.

Distribution. Palaearctic, Nearctic, Oriental, Afrotropical, Neotropical and Australasian regions.

Key to the Eastern Palaearctic species

1. Notauli complete, present posteriorly. Second abscissa of costal vein of hind wing present. Hind femur of male not or weakly thickened. Metasoma of male not depressed, relatively short, curved down apically; its third and following tergites with distinct oblique inner lateral carinae. Apterous forms unknown. (Subgenus *Ecpstylus* Foerster). Body length 1.5-2.5 mm. – Russia (Far East, Siberia, Urals, European part), Kazakhstan, Central Asia, Caucasus, Central and West Europe. . . . ***E. (E.) silesiacus* (Ratzeburg)**
 - Notauli incomplete, absent or indistinct posteriorly (Figs 6, 19, 20, 29, 41). Second abscissa of costal vein of hind wing absent (Figs 12, 25, 35, 44). Hind femur of male often distinctly thickened (Fig. 9). Metasoma of male depressed, long or very long, not curved down apically; its tergites beginning from third one without oblique inner lateral carinae (Figs 7, 23). Apterous forms known. (Subgenus *Sactopus* Ashmead) 2
2. Mesosoma long, its length twice maximum height (Fig. 29). Brachial cell closed almost on level of recurrent vein (Fig. 34). First tergite as long as apical width (Fig. 31). Body length 1.5 mm. – Japan (Honshu) ***E. (S.) konishii* sp. n.**
 - Mesosoma short, its length 1.5-1.8 times maximum height (Figs 6, 19, 41). Brachial cell closed distinctly before level of recurrent vein (Figs 11, 24, 43). First tergite usually shorter than its apical width (Figs 10, 22, 42) 3
3. Vertex and frons more or less distinctly reticulate-coriaceous. Mesoscutum entirely densely granulate, without setae in female; scutellum finely or rather distinctly granulate-coriaceous. Propodeum almost entirely distinctly and densely granulate. Body length of female 1.1 mm, male 1.8 mm. – Japan (Ogasawara) ***E. (S.) hahajimus* Belokobylskij et Maeto**
 - Vertex and frons smooth (Figs 1, 2, 13, 14, 36, 37). Mesoscutum distinctly granulate-coriaceous anteriorly, finely coriaceous to

- smooth posteriorly, with sparse, rather short and semi-erect setae in female arranged almost in single line along notauli and marginally; scutellum smooth (Figs 6, 19, 41). Propodeum often almost entirely smooth or sometimes partly finely coriaceous in large medio-basal areas (Figs 4, 21) 4
4. Apical segment of antenna white or yellowish white, contrasting with previous dark segments. Metasoma of male short (Fig. 7) (unknown in *E. subtropicalis* sp. n.) 5
- Apical segment of antenna brown, same colour as previous segments. Metasoma of male strongly elongate (Fig. 23) 6
5. First radiomedial vein 0.5-0.55 times as long as second medial abscissa (Fig. 43). Mesoscutum (dorsal view) with rather small and not pointed anterolateral shoulders. Hind femur thick, its length 3.1-3.3 times maximum width (Fig. 39). Sternaulus long, running along anterior 0.7 of lower part of mesopleuron (Fig. 41). Body length of female 0.8-1.1 mm. – Japan (Ryukyu) *E. (S.) subtropicalis* sp. n.
- First radiomedial vein 0.8-1.5 times as long as second medial abscissa (Fig. 11). Mesoscutum (dorsal view) with distinct and pointed anterolateral shoulders. Hind femur slender, its length 3.6-4.0 times maximum width (Fig. 5). Sternaulus short, running along anterior 0.5 of lower part of mesopleuron (Fig. 6). Body length of female 1.2-1.8 mm, male 0.9-1.4 mm. – Japan (Honshu, Kyushu), Korea *E. (S.) conformis* sp. n.
6. Second abscissa of medial vein 2.2-2.5 times longer than first radiomedial vein. Prescutellar depression with 3 carinae. Metacarp 1.3-1.35 times longer than pterostigma. – Mesoscutum widely smooth in posterior 0.5-0.7. Ovipositor sheath 0.85-1.2 times as long as metasoma, 0.45-0.5 times as long as fore wing. Body length of female 1.2-1.5 mm, male 1.9-2.3 mm. – Russia (Primorskiy kray) *E. (S.) arephini* Belokobylskij
- Second abscissa of medial vein 0.3-0.5 times as long as first radiomedial vein (Fig. 24). Prescutellar depression with single median carinae. Metacarp 1.1-1.15 times longer than pterostigma (Fig. 24). Body length of female 1.4-1.7 mm, male 2.3 mm. – Japan (Hokkaido, Honshu, Kyushu); Korea, Russia (Primorskiy Kray) *E. (S.) hattori* Kono et Watanabe
- Ecphylus (Sactopus) conformis* sp. n.**
(Figs 1-12)
- Type material.* Holotype: female, “Japan: Aichi (900 m), Shitara, Uradani, (Beech forest), 20-26.VI.1994, K. Yamagishi; YPT” (NIAES).
- Paratypes. **Japan.** 4 females, 1 male, “Japan: Aichi (900 m), Shitara, Uradani, (Beech forest), T. Kanbe; MT or EmT”, 1-7 & 15-21.VIII.1994 (NIAES, ZISP); 4 females, 3 males, “Japan: Aichi (900 m), Shitara, Uradani, (Beech forest), K. Yamagishi”, MT, APT-L or PT-G, 4-10 & 11-17.VII, 28.VIII-4.IX, 5-11 & 12-18.IX.1994 (NIAES, ZISP); 1 female, 1 male, “Japan: Aichi, Toyota, Sanage, (Evergreen frst), Mizue Kiyota; MT”, 5-11 & 19-25.VIII.2002 (MUNJ); 2 females, 1 male, “Japan: Aichi, Okazaki, Hatanasi (cypress), 24.VIII.2000, M. Hayakawa: YPT” (MUNJ, ZISP); 1 male, “Japan: Aichi, Mt. Sanage, 9-15.X.1992, K. Shima; Em. Tr. Decid. forest” (MUNJ); 1 female, “Japan: Gifu, Kani, Katabira, 1-7.V. 2004, K. Ito (MT) (9)” (MUNJ); 1 female, “Mikura-Jima, May 18, 1969, Coll. S. Katsuya et H. Yuasa” (NIAES); 1 female, “Japan: Kyushu, Is. Yaku-shima, Shiratani, 600 m, 9.VIII-2.IX.2000, T. Murata; MT (K. Nojima)” (MUNJ); 2 females, 5 males, “Japan: Kyushu, Is. Yaku-shima, Miyanoura (Rv or Mt), T. Murata; MT (A. Hanai)”, 3-20.IV, 21.IV-12.V, 13-31.V and 21.VI-11.VII.1999 (MUNJ, ZISP). **Korea.** 1 female, “Korea, Chonnam, Yochon, Nammyon, Yondo, 21. VII. 1993, Deok-Seo Ku” (ZISP).
- Description.* Female. Body length 1.2-1.8 mm; fore wing length 1.0-1.7 mm.
- Head width 1.45-1.7 times its median length, 1.2-1.3 times width of mesoscutum. Head behind eyes (dorsal view) distinctly and convex-roundly narrowed; transverse diameter of eye 1.5-1.7 (rarely 1.4) times length of temple. Ocelli small, arranged in triangle with base 1.1-1.2 times its sides; POL 0.8-1.1 times Od, 0.25-0.35 times OOL. Eye glabrous, 1.2 times as high as broad. Malar space height 0.45-0.5 times height of eye, 0.9-1.0 times basal width of mandible. Face width 1.15-1.25 times height of eye and 1.4-1.6 times height of face and clypeus combined. Malar suture absent. Hypoclypeal depression round, its width 0.6-0.7 times distance from edge of depression to eye, 0.3-0.35 times width of face. Occipital carina ventrally not joined with hypostom-



Figs 1-12. *Ecphylus (Sactopus) conformis* sp. n. 1, head, front view; 2, head, dorsal view; 3, basal and apical segments of antenna; 4, propodeum, dorsal view; 5, hind femur of female; 6, mesosoma, lateral view; 7, metasoma of male, dorsal view; 8, hind tibia; 9, hind femur of male; 10, metasoma of female, dorsal view; 11, fore wing; 12, hind wing.

al carina being obliterated distinctly above base of mandible. Head below eyes (front view) distinctly and roundly narrowed.

Antennae slender, more or less filiform, 14-16-segmented, 1.0-1.2 times as long as body. Scape 1.1-1.2 times longer than its maximum width, 1.4 times longer than pedicel. First flagellar segment 4.5-5.5 times longer than its apical width, 0.7-0.8 times as long as second segment. Penultimate segment 4.0-5.0 times longer than wide, 1.0-1.1 times as long as first segment, 0.8-1.0 times as long as apical segment; the latter more or less pointed apically.

Mesosoma. Length 1.6-1.8 times its height. Pronotum (dorsal view) with anterior margin straight and with pointed antero-lateral corners. Pronotal carina distinct, distances from carina to both sides of pronotum subequal. Mesoscutum (lateral view) highly and almost perpendicularly elevated above pronotum. Notauli anteriorly deep, wide, densely crenulate, dorsally absent in posterior 0.6-0.7. Mesoscutum (dorsal view) 1.1-1.2 times as wide as long, weakly rounded anteriorly, with distinct and pointed anterolateral shoulders. Prescutellar depression more or less deep, short, with distinct median carina, smooth or almost smooth, 0.2-0.3 times as long as weakly convex scutellum. Scutellum usually with more or less distinct medio-anterior pit. Sternaulus more or less deep, rather narrow, straight, smooth, running along anterior 0.5 of lower part of mesopleuron. Subalar depression rather deep, wide, smooth. Metanotum (lateral view) with short, wide and obtuse dorsal tooth. Metapleural lobe rather short, wide, rounded apically.

Wings. Fore wing 3.0-3.5 times its maximum width. Radial cell wide, weakly shortened, 2.8-3.3 times longer than wide. Metacarp 1.2-1.3 times longer than pterostigma. Pterostigma rather wide, more or less narrowed in basal half. Radial vein arising from posterior 0.4-0.45 of pterostigma, its first abscissa 1.1-1.3 times longer than maximum width of pterostigma. Second radial abscissa more or less distinctly curved, 5.5-6.5 times

longer than first abscissa, 6.0-6.8 times longer than first radiomedial vein. First radiomedial vein 0.8-1.5 times as long as first radial abscissa, 0.8-1.5 times as long as second medial abscissa, 1.2-1.5 times longer than recurrent vein. First medial abscissa weakly or very weakly S-shaped. Discoidal cell 1.6-2.0 times longer than wide. Second (posterior) abscissa of basal vein 3.5-4.0 times longer than first (anterior) abscissa. Mediocubital vein evenly curved. Brachial cell closed distinctly before level of recurrent vein. Hind wing 5.0-6.0 times longer than wide. Second costal abscissa absent.

Legs. Hind femur without dorsal protuberance, its length 3.6-4.0 times maximum width. Hind tarsus 0.9-1.0 times as long as hind tibia. Hind basitarsus 0.75-0.85 times combined length of second to fifth segments. Second segment of hind tarsus 0.3-0.4 times as long as basitarsus, 0.85-1.0 times as long as fifth segment (without pretarsus).

Metasoma 0.8-1.2 times as long as head and mesosoma combined. First tergite with distinct dorsope and very small spiracular tubercles, more or less evenly and linearly widened from base to apex. Maximum width of first tergite 1.7-2.0 times its basal width; its length 0.7-0.8 (very rarely 0.9) times apical width, 1.3-1.4 times length of propodeum. Second suture very fine and weakly curved. Median length of second tergite 0.5-0.65 times its basal width, 1.0-1.1 times length of third tergite. Combined length of second and third tergites 0.8-1.2 times basal width of second tergite and 0.7-0.9 times their maximum width. Ovipositor sheath 0.6-0.85 times as long as metasoma, 1.2-1.5 times longer than hind tibia, 1.1-1.3 times longer than mesosoma, 0.4-0.45 times as long as fore wing.

Sculpture and pubescence. Head smooth. Mesoscutum rather distinctly granulate-reticulate, with fine and dense transverse striation anteriorly, finely coriaceous to smooth in posterior 0.4-0.5. Scutellum smooth. Mesopleuron smooth. Propodeum smooth in anterior 0.3-0.5, finely or sometimes distinctly rugulose along carinae and in poste-

rior half, with distinctly delineated wide or narrow and more or less short areola, with basal carina in anterior 0.4-0.5, with distinct curved or straight transverse carinae from areola to sides of propodeum. Hind coxa and femur smooth. First tergite with distinct, convergent posteriorly and almost complete dorsal carinae, with coarse lateral carinae, laterally widely or narrowly and very finely rugulose or sometimes smooth, with short or (in large specimens) long striation in posterior 0.4-0.8, medially between basal carinae rugulose. Remaining tergites smooth. Mesoscutum with sparse, short and semi-erect setae arranged almost in single line along notauli and marginally. Hind tibia dorsally with short, mostly sparse and semi-erect pale setae; length of these setae about 0.5 times maximum width of hind tibia.

Colour. Head and mesosoma dark reddish brown or reddish brown, sometimes light reddish brown, usually pro- and metapleuron reddish brown, light reddish brown or yellow, propodeum yellowish brown or yellow. Metasoma yellowish brown or brownish yellow, first tergite mostly yellow, second tergite sometimes brown. Antenna brown or dark reddish brown to black, four basal segments yellow or pale yellow, apical segment pale yellow. Palpi pale yellow. Legs yellow, distally faintly infusate. Ovipositor sheath brown. Fore wing almost hyaline, more or less distinctly infusate medially across discoidal cell and sometimes below pterostigma. Pterostigma pale brown, pale yellow in basal 0.4.

Male. Body length 0.9-1.4 mm; fore wing length 0.7-1.3 mm. Head width 1.3-1.5 times its median length. Head behind eyes (dorsal view) roundly narrowed; transverse diameter of eye 1.2-1.4 times length of temple, rarely (in smallest specimens) almost equal to it. Malar space height 0.4-0.5 times height of eye. Antennae 11-14-segmented, its basal four to six segments yellow; sometimes two apical segments whitish. Length of mesosoma 1.5-1.6 times its height. Mesoscutum (dorsal view) 1.1-1.25 times as wide as long. Basal carina situated in anterior

or 0.3-0.4 of propodeum. Hind femur brown or dark brown, very thick, its length 2.0-2.3 times maximum width. Metasoma of normal shape, not or weakly elongated posteriorly, its posterior segment not transformed. First tergite laterally widely or very widely smooth basally and with short striation apically, its length 0.9-1.15 times apical width. Second suture absent. Otherwise similar to female.

Distribution. Japan (Honshu, Kyushu), Korea.

Diagnosis. This new species is similar to *E. hattori* Kono et Watanabe (Kono & Watanabe, 1935), but differs in having the head transverse, the temple and the first flagellar segment short, the anterior abscissa of basal vein short, the areola of propodeum short and wide, and the apical segment of antenna white. *Ecphylus conformis* sp. n. is similar to Vietnamese *E. brevitergum* Belokobylskij (Belokobylskij, 1993b), but differs in having the only single white apical segments of antenna, the mesoscutum almost smooth posteriorly, the second medial abscissa long, the ocelli less small and situated not in equilateral triangle, and the body at least partly. Accordingly to key of the North American species of *Ecphylus* by Marsh (1965), this new species is similar to *E. bicolor* Rohwer, 1913, but distinctly differs in having the malar space long, the notauli absent posteriorly, the basal carina of propodeum long, and the apical segment of antenna pale.

***Ecphylus (Sactopus) hahajimus*
Belokobylskij & Maeto, 2008**

Ecphylus (Sactopus) hahajimus Belokobylskij & Maeto, 2008: 149.

Examined material. **Japan.** **Ogasawara:** 1 female (holotype), 1 male (paratype), "Japan: Ogasawara Is., Hahajima I., Minamizaki, 21.VII.1998, H. Makihara" (NIAES); 1 female (paratype), "Japan: Ogasawara Is., Hahajima I., Kuwanokiyama, 1.VII.2005, S. Sugiura" (ZISP).

Distribution. Japan (Ogasawara).

Diagnosis. This species is similar to Eastern Palaearctic *E. hattori* Kono et Watanabe (Kono & Watanabe, 1935), but differs in

having the malar space long, the first flagellar segment short, the metacarp and the first radiomedial vein long, the pterostigma narrow, the ovipositor sheath short, the vertex, frons, mesoscutum, scutellum and propodeum densely granulate, and the mesoscutum of female without setae. *Ecphylylus hahajimus* differs from *E. arephini* Belokobylskij described from the south of the Russian Far East (Belokobylskij, 1993a) in having the vertex, mesoscutum entirely, mesopleuron and the most part of the propodeum densely and distinctly granulate, the mesosoma short, the second abscissa of medial vein and the ovipositor short, and the hind femur thick. New species is also related with Vietnamese *E. brevitergum* Belokobylskij (Belokobylskij, 1993b), but differs in having the hypoclypeal depression small, the occipital carina joined ventrally with hypostomal carina, the basal flagellar segments of antenna thick, the notauli absent on the most dorsal part of mesoscutum, the second abscissa of medial vein long, the ovipositor long, the head and mesosoma widely granulate, and the body dark.

Ecphylylus (Sactopus) hattori

Kono & Watanabe, 1935, stat. resurr.

(Figs 13-25)

Ecphylylus hattori Kono & Watanabe, 1935: 68; Watanabe, 1937: 41; 1948: 96; Yasumatsu & Watanabe, 1964: 66; Hedqvist, 1967: 68 (as synonym of *E. caudatus* Ruschka); Shenefelt & Marsh, 1976: 1346; Belokobylskij, 1987: 83.

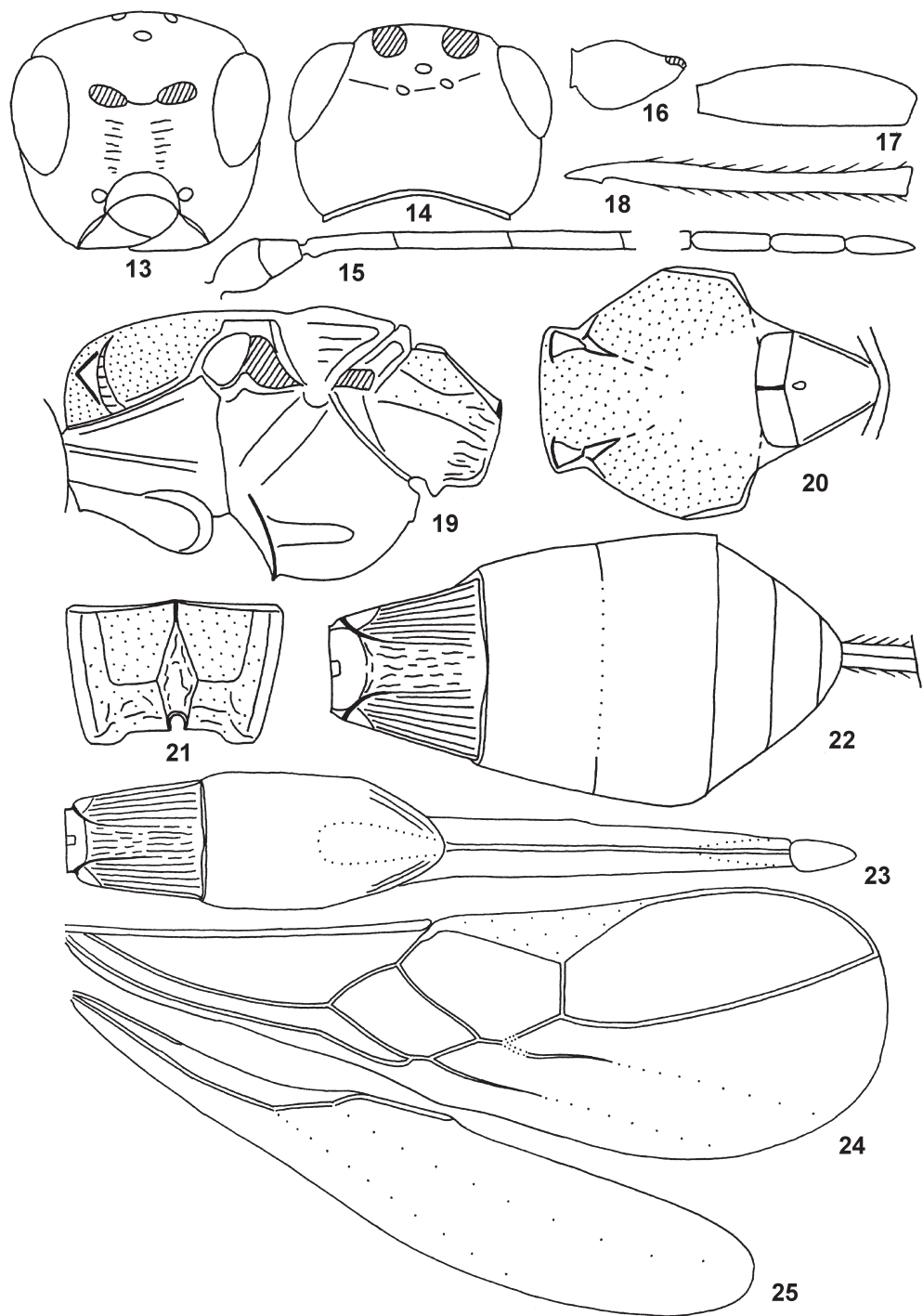
Examined material. Japan. Hokkaido: 1 female (holotype), "Hokkaido, H. Kono, Jozankei, 20/VI 1935", "Wirt *Cryphalus piceus* Eggers", "Abies sachalinensis", "*Ecphylylus f# hattori* Kono et Watanabe, Type" (red) (EIHU); 1 female (paratype), "Hokkaido, H. Kono, Jozankei, VI-VII 1935", "Wirt *Cryphalus piceus* Eggers", "Paratype" (rose), "*Ecphylylus f# hattori* Kono et Watanabe" (EIHU); 1 male (only metasoma kept) (paratype), "Hokkaido, H. Kono, Jozankei, VI-VII 1935", "Wirt *Cryphalus piceus* Eggers", "Paratype" (rose), "*Ecphylylus m# hattori* Kono et Watanabe" (EIHU); 1 male (without metasoma) (paratype), "Hokkaido, H. Kono, Jozankei, 25/VII 1935", "Wirt *Cryphalus piceus* Eggers", "Al-

lotype" (yellow), "*Ecphylylus m# hattori* Kono et Watanabe, Type" (red) (EIHU); 1 female, "Nopporo, Ebetsu City, Hokkaido, 14. vi. 1980, K. Maeto leg." (NIAES). **Honshu:** 1 female, "VII. 4, 1955, Fuchu, Tokyo, A. Habu" (NIAES); 1 female, same label, but 10.VIII.1955 (NIAES); 1 female, "Japan: Honshu, Ibaraki, Tsukuba, 20-27. IX.1999, S. Belokobylskij & K. Konishi (M.T.)" (ZISP); 1 female, same label, but 27.IX-5.X.1999 (ZISP); 10 females, 10 males, "Nippon, I. Sato, Hyogo, Yamazaki-cho, VII-VIII 1941", "Host *Cryphalus fulvus* Nijima", "*Ecphylylus f# hattori* Kono et Watanabe, Det. C. Watanabe. 1943" (EIHU); 5 females, 4 males, "[Japan], Mihama, Mie-ken, IV-V-67, H. Watashi", "Host *Cryphalus fulvus* Nijima" (EIHU). **Kyushu:** 1 female, "Japan: Kyushu, Is. Yaku-shima, Miyanoura (Mt), 18.X-30.XI.1999, T. Murata; MT, (S. Miyashita) (MUNJ). **Russia:** 1 female, Primorskiy kray, 30 km SE of Ussuriysk, Ussuriysk Nature Reserve, forest, 10-11.VI.1993 (S. Belokobylskij) (ZISP).

Description. Female. Body length 1.4-1.7 mm; fore wing length 1.4-1.7 mm.

Head width 1.3-1.5 times its median length, 1.1-1.2 times width of mesoscutum. Head behind eyes (dorsal view) almost parallel-sided in anterior 0.3-0.5 and roundly narrowed in posterior 0.5-0.7; transverse diameter of eye 1.2-1.4 times length of temple. Ocelli small, arranged in triangle with base 1.1-1.3 times its sides; POL 1.4-1.7 times Od, 0.4-0.5 times OOL. Eye glabrous, 1.2-1.3 times as high as broad. Malar space height 0.4-0.5 times height of eye, 0.8-1.0 times basal width of mandible. Face width 1.1-1.2 times height of eye and 1.4-1.5 times height of face and clypeus combined. Malar suture absent. Hypoclypeal depression round, its width 0.6-0.7 times distance from edge of depression to eye, 0.35-0.4 times width of face. Occipital carina ventrally not joined with hypostomal carina being obliterated shortly upper base of mandible or (rarely) joined with hypostomal carina. Head below eyes (front view) rather distinctly and roundly narrowed.

Antennae slender basally and thick apically, 13-16-segmented, 1.1-1.2 times as long as body. Scape 1.1-1.3 times longer than its maximum width, 1.4-1.7 times longer than



Figs 13-25. *Ecphylus (Sactopus) hattori* Kono et Watanabe. **13**, head, front view; **14**, head, dorsal view; **15**, basal and apical segments of antenna; **16**, hind coxa; **17**, hind femur; **18**, hind tibia; **19**, mesosoma, lateral view; **20**, mesonotum; **21**, propodeum, dorsal view; **22**, metasoma of female, dorsal view; **23**, metasoma of male, dorsal view; **24**, fore wing; **25**, hind wing.

pedicel. First flagellar segment 4.8-5.5 times longer than its apical width, 0.8-0.85 times as long as second segment. Penultimate segment 3.5-4.5 times longer than wide, 0.75-0.9 times as long as first segment, 0.9-1.0 times as long as apical segment; the latter more or less pointed apically.

Mesosoma. Length 1.6-1.8 times its height. Pronotum (dorsal view) with its anterior margin more or less concave and with distinct antero-lateral corners. Pronotal carina rather distinct, distances from carina to both sides of pronotum subequal. Mesoscutum (lateral view) highly and roundly elevated above pronotum. Notauli anteriorly deep, wide, sparsely or sometimes densely crenulate, almost smooth posteriorly, dorsally absent or almost absent in posterior 0.6-0.8. Mesoscutum (dorsal view) 1.1-1.2 times as wide as long, almost straight or weakly rounded anteriorly, with more or less distinct and pointed or nearly pointed anterolateral shoulders. Prescutellar depression deep and rather long, with distinct median carina, smooth, 0.25-0.3 times as long as convex scutellum. Scutellum usually with more or less distinct medio-anterior pit. Sternaulus shallow or more or less deep, rather wide, almost straight or weakly curved, smooth, running along anterior 0.5-0.6 of lower part of mesopleuron. Subalar depression rather deep, wide, smooth. Metanotum (lateral view) with short and obtuse dorsal tooth. Metapleural lobe rather short, wide, rounded apically.

Wings. Fore wing 3.0-3.4 times its maximum width. Radial cell wide, weakly shortened, 3.0-3.3 times longer than wide. Metacarp 1.1-1.15 times longer than pterostigma. Pterostigma rather wide. Radial vein arising from anterior 0.4-0.45 of pterostigma, its first abscissa 1.0-1.2 times as long as maximum width of pterostigma. Second radial abscissa distinctly curved, 6.0-6.7 times longer than first abscissa, 4.0-5.2 times longer than first radiomedial vein. First radiomedial vein 1.15-1.5 times longer than first radial abscissa, 1.8-3.0 times longer than second medial abscissa, 1.2-1.7 times longer

than recurrent vein. First medial abscissa weakly S-shaped. Discoidal cell 1.9-2.4 times longer than wide. Second (posterior) abscissa of basal vein 1.5-2.0 times longer than first (anterior) abscissa. Mediocubital vein evenly and distinctly curved. Brachial cell closed rather distinctly before level of recurrent vein. Hind wing 5.4-6.4 times longer than wide. Second costal abscissa absent.

Legs. Hind femur without dorsal protuberance, its length 3.3-3.9 times maximum width. Hind tarsus 0.8-0.85 times as long as hind tibia. Hind basitarsus 0.7-0.75 times combined length of second-fifth segments. Second segment of hind tarsus 0.4-0.45 times as long as basitarsus, almost as long as fifth segment (without pretarsus).

Metasoma 0.75-0.9 times as long as head and mesosoma combined. First tergite with distinct dorsope and indistinct spiracular tubercles, evenly and linearly widened from base to apex. Maximum width of first tergite 1.7-1.8 times its basal width; its length 0.75-0.9 times apical width, 1.1-1.3 times length of propodeum. Second suture very fine and straight. Median length of second tergite 0.5-0.6 times its basal width, 1.0-1.3 times length of third tergite. Combined length of second and third tergites 0.9-1.2 times basal width of second tergite and 0.6-0.9 times their maximum width. Ovipositor sheath 1.0-1.35 times as long as metasoma, 1.4-1.5 times longer than hind tibia, 1.3-1.5 times longer than mesosoma, 0.5-0.55 times as long as fore wing.

Sculpture and pubescence. Head smooth, face finely or very finely rugulose medially. Mesoscutum rather distinctly granulate anteriorly, finely granulate-coriaceous or coriaceous to smooth posteriorly on dorsal surface. Scutellum smooth. Mesopleuron smooth. Propodeum finely granulate-coriaceous to smooth, almost entirely smooth or very finely coriaceous partly in large medio-basal areas, sometimes densely rugulose-reticulate in posterior 0.4, with distinctly delineated narrow areola and with basal carina in anterior 0.3. Hind coxa and femur

smooth. First tergite with more or less distinct, convergent posteriorly and almost complete dorsal carinae, distinctly densely striate, rugose in medio-basal or medial half. Other tergites smooth. Mesoscutum with sparse, rather short and semi-erect setae arranged almost in single row along notauli and marginally. Hind tibia dorsally with rather short, sparse, semi-erect pale setae; length of these setae about 0.5 times maximum width of hind tibia.

Colour. Body reddish brown to dark reddish brown; head ventrally, lower part of prothorax mostly, propodeum, metapleuron and first metasomal tergite or all metasoma paler, sometimes brownish yellow. Antenna dark reddish brown to black, four-fifth basal segments yellow. Palpi yellow or pale yellow. Legs entirely yellow or brownish yellow. Ovipositor sheath black. Fore wing almost hyaline, with fine or very fine infuscation along basal vein and first radial abscissa. Pterostigma yellowish brown or yellow, usually faintly paler in basal 0.4.

Male. Body length 2.3 mm; fore wing length 1.5 mm. Transverse diameter of eye 1.2 times length of temple. Antennae 0.7 times as long as body. Hind femur strongly thickened, its length 2.4 times maximum width. Metasoma strongly elongated, distinctly narrowed in posterior half, 1.7 times longer than head and mesosoma combined. Length of first tergite 1.1-1.15 times its apical width, 1.4 times length of propodeum. Second suture indistinct. Combined length of second and third tergites 1.7 times basal width of second tergite and 1.6 times their maximum width. Narrow posterior part of metasoma 1.3 times longer than wide anterior part. Otherwise similar to female.

Host. *Cryphalus piceus* Eggers, *C. fulvus* Nijima (Scolytidae).

Distribution. Japan (Hokkaido, Honshu, Kyushu); Russia (Primorskiy kray), Korea, China (Taiwan) (Belokobylskij, 1996, 1998, as *E. caudatus*).

Diagnosis. The Eastern Palaearctic *E. hattori* Kono et Watanabe was synonymised with European *E. caudatus* Ruschka by

Hedqvist (1967). Our study of the type and additional material of *E. hattori* and their comparison with material of *E. caudatus* showed that there are two separate valid species. *Ecphyllus hattori* distinctly differs from *E. caudatus* in having the ovipositor sheath long, the first metasomal tergite less wide apically, the head less transverse, the face narrow, the anterior margin of pronotum concave, the mesosoma and the second medial abscissa long. The differences between *E. hattori* and *E. arephini* Belokobylskij are given in the key.

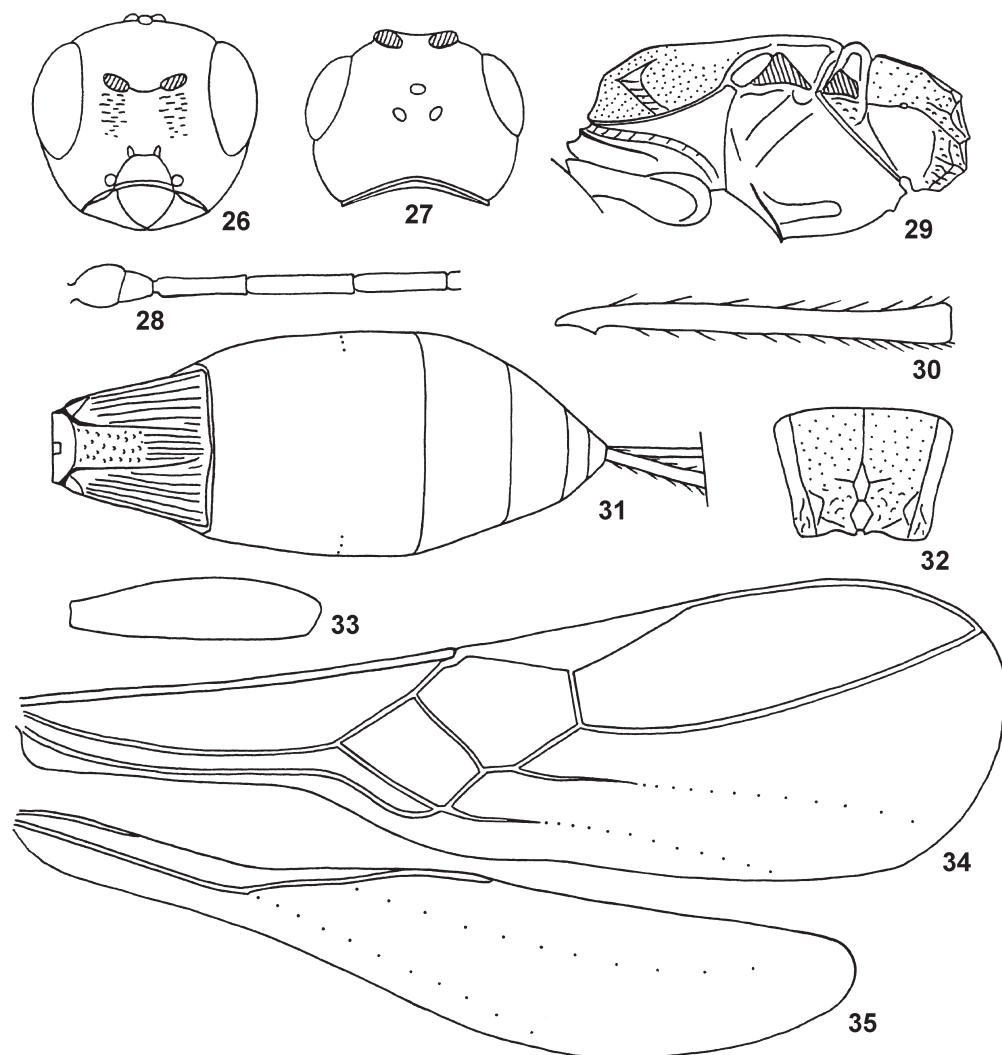
***Ecphyllus (Sactopus) konishii* sp. n.**
(Figs 26-35)

Type material. Holotype: female, "VI. 1, 1983, Mt. Hyonosen, Sekinomiya-cho, Hyogo Pref., K. Konishi" (NIAES).

Description. Female. Body length 1.5 mm; fore wing length 1.5 mm.

Head width 1.45 times its median length, 1.15 times width of mesoscutum. Head behind eyes (dorsal view) weakly convex anteriorly and roundly narrowed posteriorly; transverse diameter of eye 1.25 times length of temple. Ocelli medium-sized, arranged in almost equilateral triangle; POL 1.3 times Od, 0.3 times OOL. Eye glabrous, 1.2 times as high as broad. Malar space height 0.4 times height of eye, 0.7 times basal width of mandible. Face width 1.15 times height of eye and 1.3 times height of face and clypeus combined. Malar suture absent. Hypoclypeal depression round, its width 0.8 times distance from edge of depression to eye, 0.4 times width of face. Occipital carina ventrally not joined with hypostomal carina being obliterated upper base of mandible. Head below eyes (front view) distinctly and roundly narrowed.

Antennae slender basally and weakly thickened towards apex, more than 11-segmented (apical segments missing). Scape 1.2 times longer than its maximum width, 1.7 times longer than pedicel. First flagellar segment 5.5 times longer than its apical width, 0.85 times as long as second segment.



Figs 26-35. *Ecphylus (Sactopus) konishii* sp. n. **26**, head, front view; **27**, head, dorsal view; **28**, five basal segments of antenna; **29**, mesosoma, lateral view; **30**, hind tibia; **31**, metasoma, dorsal view; **32**, propodeum, dorsal view; **33**, hind femur; **34**, fore wing; **35**, hind wing.

Subapical segment 4.0 times longer than wide.

Mesosoma. Length twice its height. Pronotum (dorsal view) with anterior margin weakly concave and with distinct obtuse antero-lateral corners. Pronotal carina high, distances from carina to both sides of pronotum subequal. Mesoscutum (lateral view) highly and roundly elevated above pronotum. Notauli anteriorly deep, wide,

crenulate, dorsally absent or almost absent in posterior 0.5. Mesoscutum (dorsal view) 1.15 times as wide as long, weakly rounded anteriorly, with distinct and nearly pointed antero-lateral shoulders. Prescutellar depression deep and rather long, with distinct median carina, almost smooth, 0.3 times as long as convex scutellum. Sternaulus rather deep, more or less wide, straight, smooth, running along anterior 0.5 of lower part

of mesopleuron. Subalar depression shallow, wide and smooth. Metanotum (lateral view) with very short and obtuse dorsal tooth. Metapleural lobe short and narrow.

Wings. Fore wing 3.5 times its maximum width. Radial cell wide, not shortened, 3.3 times longer than wide. Metacarp 1.15 times longer than pterostigma. Pterostigma narrow, without constriction in basal half. Radial vein arising almost from middle of pterostigma, its first abscissa perpendicular to pterostigma, 1.3 times longer than maximum width of pterostigma. Second radial abscissa distinctly curved basally and almost straight apically, 7.0 times longer than first abscissa, 5.3 times longer than first radiomedial vein. First radiomedial vein 1.3 times longer than first radial abscissa, 2.5 times longer than second medial abscissa, 1.3 times longer than recurrent vein. First medial abscissa weakly S-shaped. Discoidal cell 1.8 times longer than wide. Second (posterior) abscissa of basal vein 2.4 times longer than first (anterior) abscissa. Mediocubital vein evenly and distinctly curved. Brachial cell closed on the level of recurrent vein. Hind wing 5.7 times longer than wide. Second costal abscissa absent.

Legs. Hind femur without dorsal protuberance, its length 3.7 times maximum width. Hind tarsus 0.9 times as long as hind tibia. Hind basitarsus 0.8 times combined length of second-fifth segments. Second segment of hind tarsus 0.35 times as long as basitarsus, 1.2 times longer than fifth segment (without pretarsus).

Metasoma almost as long as head and mesosoma combined. First tergite with distinct dorsope and indistinct spiracular tubercles in basal 0.3, evenly and linearly widened from base to apex. Maximum width of first tergite twice its basal width; its length equal to apical width, 1.4 times length of propodeum. Second suture almost indistinct. Combined length of second and third tergites 1.2 times basal width of second tergite and 0.9 times their maximum width. Ovipositor sheath 0.75 times as long as metasoma, 1.2 times longer than hind

tibia, as long as mesosoma, 0.4 times as long as fore wing.

Sculpture and pubescence. Head smooth, face below finely striate. Mesoscutum distinctly and densely areolate-granulate with fine transverse striation anteriorly, finely coriaceous to smooth posteriorly on dorsal surface. Scutellum smooth. Mesopleuron smooth. Propodeum finely coriaceous to smooth in anterior half, densely rugulose-reticulate in posterior half, with distinctly delineated narrow areola, with basal carina in anterior 0.5 of propodeum. Hind coxa and femur smooth. First tergite with more or less distinct, convergent posteriorly and almost complete dorsal carinae, densely striate laterally, rugose and with transverse striation medially. Remaining tergites smooth. Mesoscutum with sparse, short and semi-erect setae arranged in very narrow stripe along notauli and marginally. Hind tibia dorsally with short, sparse, and semi-erect pale setae; length of setae on dorsal surface of hind tibia about 0.5 times maximum width of hind tibia.

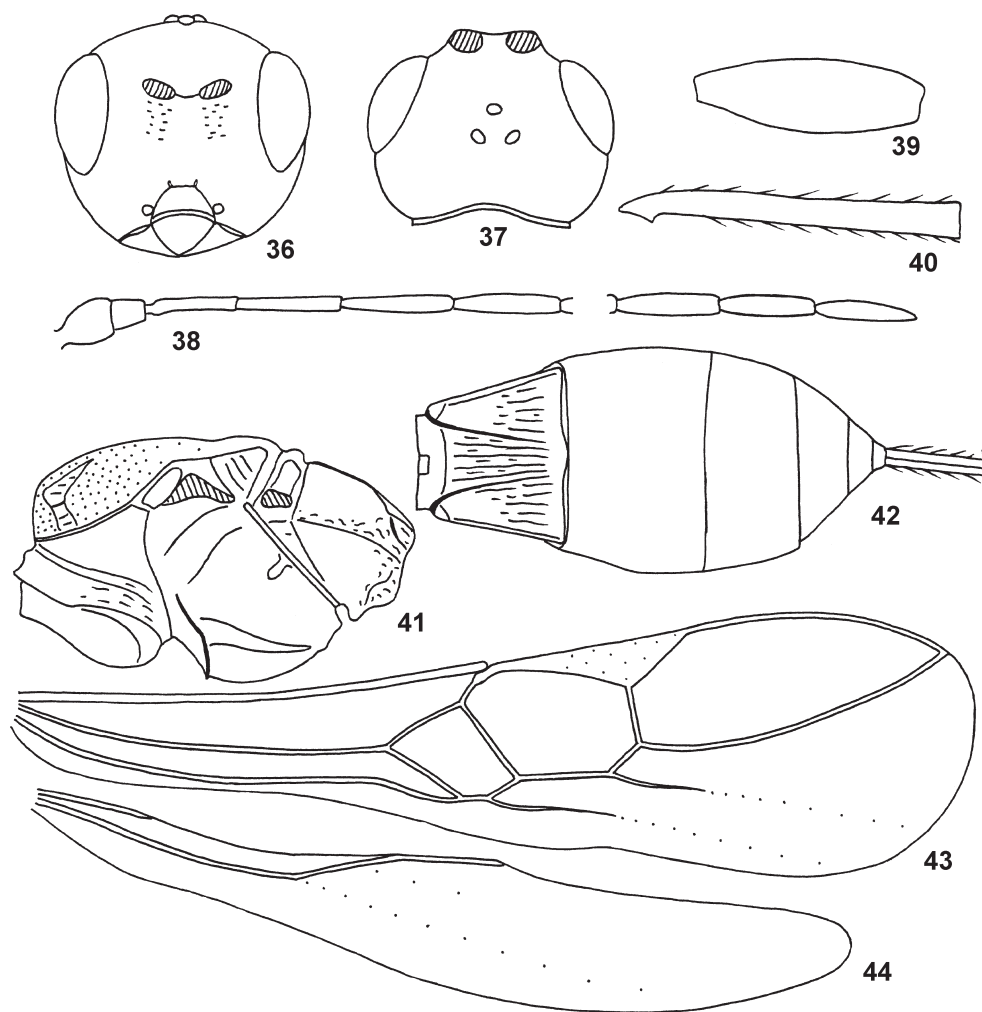
Colour. Body reddish brown, head dark reddish brown, propleuron light reddish brown, propodeum and first metasomal tergite yellow. Antenna dark reddish brown to dark brown, four basal segments yellow. Palpi pale yellow. Legs entirely yellow. Ovipositor sheath dark brown, pale basally. Fore wing entirely almost hyaline. Pterostigma greyish yellow.

Male unknown.

Distribution. Japan (Honshu).

Diagnosis. This new species is similar to *E. hattori* Kono et Watanabe, but differs in having the ocellar triangle equilateral, the occipital carina obliterated ventrally and not joined with hypostomal carina, the mesosoma and first metasomal tergite long, the brachial cell closed on the level of recurrent vein, and the ovipositor sheath relatively short.

Etymology. This species is named in honor of Dr. K. Konishi, the well-known Japanese hymenopterist and collector of the holotype.



Figs 36-44. *Ecphylus (Sactopus) subtropicalis* sp. n. **36**, head, front view; **37**, head, dorsal view; **38**, basal and apical segments of antenna; **39**, hind femur; **40**, hind tibia; **41**, mesosoma, lateral view; **42**, metasoma, dorsal view; **43**, fore wing; **44**, hind wing.

***Ecphylus (Sactopus) subtropicalis* sp. n.**
(Figs 36-44)

Type material. *Holotype*: female, "Shiramizu, Ishigaki-jima Is., Okinawa Pref., 1-3.vii. 1993, K. Konishi" (NIAES).

Paratype. Female, "Mt. Banna-dake, Ishigaki-jima Is., Okinawa Pref., 24-30.vi. 1993, Malaise Trap, K. Ohara" (ZISP).

Description. Female. Body length 0.8-1.1 mm; fore wing length 0.8-1.1 mm.

Head width 1.4-1.5 times its median length, 1.35 times width of mesoscutum. Head behind eyes (dorsal view) roundly narrowed; transverse diameter of eye 1.2-1.4 times length of temple. Ocelli small, arranged in almost equilateral triangle; POL almost equal to Od, 0.25 times OOL. Eye glabrous, 1.15-1.2 times as high as broad. Malar space height 0.55 times height of eye, 0.9 times basal width of mandible. Face

width 1.3 times height of eye and 1.4 times height of face and clypeus combined. Malar suture absent. Hypoclypeal depression round, its width 0.8-0.9 times distance from edge of depression to eye, 0.4-0.45 times width of face. Occipital carina ventrally not joined with hypostomal carina being obliterated at short distance near upper base of mandible. Head below eyes (front view) distinctly and roundly narrowed.

Antennae slender, very weakly claviform, 10-13-segmented, 1.1-1.2 times longer than body. Scape 1.2 times longer than its maximum width, 1.3-1.5 times longer than pedicel. First flagellar segment 5.5-6.0 times longer than its apical width, 0.7-0.8 times as long as second segment. Penultimate segment 4.0-6.0 times longer than wide, 1.0-1.5 times as long as first segment, as long as apical segment; the latter more or less pointed apically.

Mesosoma. Length 1.55-1.6 times its height. Pronotum (dorsal view) with its anterior margin almost straight and with small pointed antero-lateral corners. Pronotal carina distinct, distances from carina to both sides of pronotum subequal. Mesoscutum (lateral view) highly and roundly elevated above pronotum. Notauli anteriorly deep, wide, crenulate, dorsally absent in posterior 0.5-0.6. Mesoscutum (dorsal view) 1.1-1.2 times as wide as long, rounded anteriorly, with indistinct and not pointed anterolateral shoulders. Prescutellar depression deep and rather long, with distinct median carina, finely rugulose, 0.3 times as long as convex scutellum. Scutellum usually with very small medio-anterior pit. Sternaulus shallow, rather narrow, more or less straight, smooth, running along anterior 0.7 of lower part of mesopleuron. Subalar depression rather deep, wide, smooth. Metanotum (lateral view) with short, wide and obtuse dorsal tooth. Metapleural lobe short, wide, rounded apically.

Wings. Length of fore wing 3.3-3.6 times its maximum width. Radial cell wide, weakly shortened, 3.0-3.1 times longer than wide. Metacarp 1.3-1.4 times longer than

pterostigma. Pterostigma rather narrow, distinctly narrowed in basal half. Radial vein arising from posterior 0.4 of pterostigma, its first abscissa 1.2-1.3 times longer than maximum width of pterostigma. Second radial abscissa more or less distinctly curved, 5.5-6.2 times longer than first abscissa, 6.0-7.5 times longer than first radiomedial vein. First radiomedial vein 0.8-1.0 times as long as first radial abscissa, 0.5-0.55 times as long as second medial abscissa, 1.0-1.7 times as long as recurrent vein. First medial abscissa almost straight. Discoidal cell 1.6-1.8 times longer than wide. Second (posterior) abscissa of basal vein 2.0-2.5 times longer than first (anterior) abscissa. Mediocubital vein evenly curved. Brachial cell closed distinctly before level of recurrent vein. Hind wing 6.3 times longer than wide. Second costal abscissa absent.

Legs. Hind femur without dorsal protuberance, its length 3.1-3.3 times maximum width. Hind tarsus 0.9 times as long as hind tibia. Hind basitarsus 0.7 times combined length of second-fifth segments. Second segment of hind tarsus 0.4 times as long as basitarsus, 0.8 times as long as fifth segment (without pretarsus).

Metasoma 0.8 times as long as head and mesosoma combined. First tergite with distinct dorsope and without spiracular tubercles, evenly and linearly widened from base to apex. Maximum width of first tergite 1.6 times its basal width; its length 0.8 times apical width, 1.1-1.2 times length of propodeum. Second suture indistinct. Combined length of second and third tergites 0.8-1.0 times basal width of second tergite and 0.7-0.9 times their maximum width. Ovipositor sheath 0.8-0.9 times as long as metasoma, 1.1-1.2 times longer than hind tibia, almost as long as mesosoma, 0.4 times as long as fore wing.

Sculpture and pubescence. Head smooth. Mesoscutum distinctly and densely granulate-reticulate, very finely coriaceous to smooth in posterior 0.3. Scutellum smooth. Mesopleuron smooth. Propodeum smooth in anterior 0.5, finely reticulate or rugulose

along carinae, finely reticulate-rugulose in posterior half, with distinctly delineated, narrow and short areola, with basal carina in anterior 0.4, with more or less distinct and straight transverse carinae from areola to sides of propodeum. Hind coxa and femur smooth. First tergite with distinct, convergent posteriorly and complete dorsal carinae, with coarse lateral carinae, laterally widely smooth in basal 0.7, with short striation in apical 0.3, rugulose medially between basal carinae. Remaining tergites smooth. Mesoscutum with sparse, short and erect setae arranged in single row along notauli and marginally. Hind tibia dorsally with short, sparse, semi-erect pale setae; length of these setae about 0.5 times maximum width of hind tibia.

Colour. Body brownish yellow or yellow, most parts of meso- and metapleuron reddish brown; sometimes (in paratype) body reddish brown or light reddish brown, metasoma in basal half yellow or pale yellow. Antenna medially widely dark brown or brown, four basal segments yellow, single apical segment contrastingly white. Palpi pale yellow. Legs yellow, sometimes pale yellow basally. Ovipositor sheath almost black, brown or pale brown basally. Fore wing almost hyaline, with infusate stripes medially cross discoidal cell and faintly below pterostigma. Pterostigma pale brown, paler basally.

Male. Unknown

Distribution. Japan (Ryukyu).

Diagnosis. This new species is very similar to *E. conformis* sp. n., but differs in having the second medial abscissa of fore wing long, the mesoscutum with rather small and not pointed anterolateral shoulders, the hind femur thick, the sternaulus long, and the body mainly pale colour. *Ecphyllus subtropicalis* sp. n. is similar to Vietnamese *E. brevitergum* Belokobylskij (Belokobylskij, 1993b), but differs in having the single white apical segment of antenna, the mesoscutum almost smooth posteriorly, the second medial abscissa very long, the ocelli larger small and arranged not in equilateral triangle, and the body partly dark.

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