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THE GENUS *ENTOMACIS* FOERSTER, 1856 (HYMENOPTERA, DIAPRIIDAE) IN THE EASTERN PALAEARCTIC

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Eleven species of the genus *Entomacis* Foerster from Japan, South Korea and China are reviewed. Five new species are described and illustrated: *E. leptos* sp. n. (South Korea, Japan), *E. alticeps* sp. n. (Japan), *E. leptocera* sp. n. (South Korea, Japan), *E. laticeps* sp. n. (Japan), *E. canonica* sp. n. (Japan, China). *Entomacis kasparyani* Chemyreva, *E. graeffei* Kieffer and *E. platyptera* (Haliday) are newly recorded from South Korea, Japan and China, *E. curticerca* Chemyreva from South Korea and Japan, *E. penelope* Nixon and *E. perplexa* (Haliday) from Japan.

KEY WORDS: Hymenoptera, Diapriidae, *Entomacis*, new species, new records, key, Japan, China, South Korea.

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Из Японии, Южной Кореи и Китая приводится 11 видов рода *Entomacis* Foerster. Описаны пять новых видов: *E. leptos* sp. n. (Южная Корея, Япония), *E. alticeps* sp. n. (Япония), *E. leptocera* sp. n. (Южная Корея, Япония), *E. laticeps* sp. n. (Япония), *E. canonica* sp. n. (Япония, Китай). *Entomacis kasparyani* Chemyreva, *E. graeffei* Kieffer и *E. platyptera* (Haliday) впервые указываются для

Южной Кореи, Японии и Китая, *E. curticerca* Chemyreva для Южной Кореи и Японии, *E. penelope* Nixon и *E. perplexa* (Haliday) для Японии.

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INTRODUCTION

Well over 200 species of *Entomacis* are estimated to exist worldwide (Yoder, 2004), but now only 51 species are described in this genus, 9 of which are record in the Palaearctic Region (Johnson, 1992; Notton, 2004; HOL; Chemyreva, 2014). European species of *Entomacis* were recently revised (Macek, 2000), however this genus is poorly investigated in the Eastern Palaearctic. Before present study, six species of *Entomacis*, *E. perplexa* (Haliday), *E. penelope* Nixon, *E. graeffei* Kieffer, *E. platyptera* (Haliday), *E. kasparyani* Chemyreva and *E. curticerca* Chemyreva, were only recorded in the fauna of the Russian Far East (Chemyreva, 2014). The known hosts of *Entomacis* species are the members of different families of Diptera and mainly Ceratopogonidae and Thaumaleidae (Macek, 2000; Sinclair, 2000; Masner & Garcia, 2002).

The large Eastern Palaearctic material (330 specimens) from the Canadian National Collection of Insects (Ottawa, Canada) was studied during preparation of this paper. Five new species are described below as well as species previously recorded in the Russian Far East are found in Japan, South Korea and China. The genus can be easily recognized using the generic key of Nixon (1980) and diagnosis of Macek (2000). For generic synonymy see Johnson (1992) and Macek (2000).

MATERIAL AND METHODS

Material for this study was collected in South Korea, Japan and China using yellow pan traps, Malaise traps and by net sweeping. Type material of the new species is deposited in the Canadian National Insects Collection (Ottawa, Canada, CNCI), some paratypes are kept in the collection of the Zoological Institute RAS (St. Petersburg, Russia; ZISP). The morphological terminology and abbreviations are used following Masner & Garcia (2002), Yoder (2004) and Hymenoptera Anatomy Ontology Portal (<http://portal.hymao.org/>). All measurements follow Yoder (2004), measurements of venation are showed on Fig. 4. Description only first species is full, the following descriptions of species showed only characters differing from the first description. In the descriptions the following abbreviations are used: A1–A13 – antennomeres; T, S – metasomal terga and sterna respectively, LOL – lateral-ocellar length, OOL – ocello-ocular line, POL – postocellar line. All photographs were obtained using a Canon EOS 60D camera with a 68 mm lens. Montage of the image layers was prepared by using Zerene Stacker.

TAXONOMY

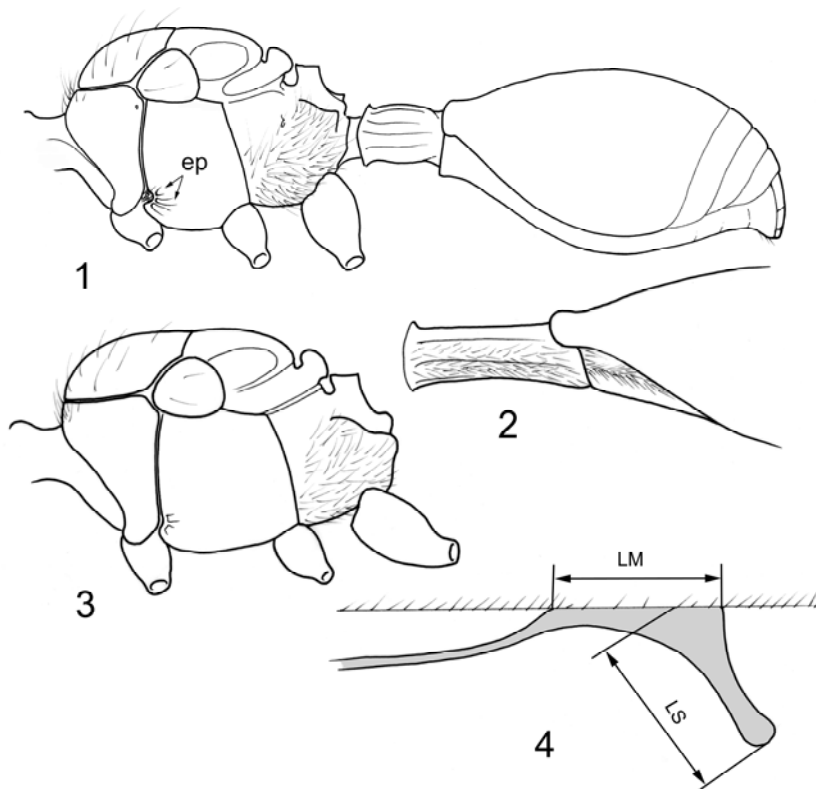
Genus *Entomacis* Foerster, 1856

Type species: *Diapria (Glyphidopris) platyptera* Haliday, 1857, by subsequent designation of Muesebeck & Walkley, 1951: 673.

Key to the Eastern Palaearctic species of *Entomacis*

1. Upper mesonotal suture setose; propodeum setose dorsally. At least three apical clavomeres of female with MGS sensilla on ventral side 2
 - Upper mesonotal suture bare; propodeum bare dorsally. MGS sensilla present only on A13 or absent on all clavomeres 9
2. Costa tubular. Notauli absent 3
 - Costa absent or nebulous. Notauli present, complete or incomplete 7
3. Head, face, all mesoscutum (Fig. 9) or only its anterior part covered with dense recumbent setae. Base of metasoma on Fig. 1 4
 - Head, face and mesoscutum covered with scattered protruding setae; base of metasoma on Fig. 2 6
4. Mesoscutum covered with recumbent setae entirely. T3–T5 of female fused together. In female, connection between clavomeres situated medially
..... *E. kaspariani* Chemyreva
 - Mesoscutum covered with recumbent setae in anterior part only. T3–T5 of female not fused together. In female, connection between clavomeres situated in dorsal part (Figs 14, 19) 5
5. Blade of median propodeal keel very high (Fig. 15). Female A13 as wide as A12. Body reddish brown, A11–A13 dark brown, A1–A10 yellowish brown (Fig. 19) *E. alticeps* sp. n.
 - Blade of median propodeal keel moderately high (Fig. 11). Female A13 wider than A12. Body dark, A3–A13 brown, gradually darkened apically (Fig. 14) ...
..... *E. leptos* sp. n.
6. All segments of female antenna elongate in dorsal view (Fig. 21); A3 1.5 × as long as A2. Body yellowish red *E. leptocera* sp. n.
 - A10–A12 of female subquadrate in dorsal view; A3 equal or weakly shorter than A2. Body dark *E. penelope* Nixon
7. Distal margin of fore wings deeply emarginate. Malar sulcus absent
..... *E. platyptera* (Haliday)
 - Distal margin of forewings truncate, rounded or arcuate (Figs 21, 29, 30). Malar sulcus present and complete 8
8. Head distinctly broader than mesosoma. Epicnemial pit deep. S2 lateral grooves present. Plical process moderately projecting *E. laticeps* sp. n.
 - Head as broad as mesosoma. Epicnemial pit absent. S2 lateral grooves absent. Plical process not developed *E. canonica* sp. n.

9. Notauli complete throughout. Propodeum in dorsal view elongated. A13 of male longer than A12 *E. graeffei* Kieffer
- Notauli incomplete, reduced anteriorly. Propodeum in dorsal view transverse or sometimes subquadrate. A13 of male shorter than A12 10
10. Length of head in lateral view $0.67\text{--}0.77 \times$ its height, with weakly prominent antennal shelf. Epicnemial pit of female with straight or weakly arcuated anterior margin (Fig. 3); setae absent between anterior margin of epicnemial pit and posterior margin of pronotum (Fig. 3). Male A5–A13 shortened
 *E. curticerca* Chemyreva
- Length of head in lateral view $0.86\text{--}0.88 \times$ its height, with distinctly prominent antennal shelf. Epicnemial pit of female with arcuate anterior margin (Fig. 1); setae present between anterior margin of epicnemial pit and posterior margin of pronotum (Fig. 1). Male A5–A13 distinctly elongate *E. perplexa* (Haliday)



Figs 1–4. Morphological structures of *Entomacis* species. 1 – *E. perplexa*, mesosoma and metasoma (ep – epicnemial pit); 2 – *E. alticeps* **sp. n.**, anterior part of metasoma; 3 – mesosoma (schematic); 4 – venation of fore wing (schematic) (LM – length of marginal vein, LS – length of stigmal vein).

***Entomacis curticerca* Chemyreva, 2014**

Fig. 7

MATERIAL EXAMINED. **South Korea:** Gyeongsangnam-do, Jirisan, Hamyang-gun, Macheon-myon, Samjeong-li, 700 m, 35°20.55'N, 127°38.21'E, 25.VIII–14.IX 2002, 1 ♀, 1 ♂, P. Tripotin; Gangwon-do, Chuncheon, Nam-myeon, Hudong-li, 6–1.VII 2003, 31.VII–16.VIII 2003, 6 ♀, P. Tripotin; Chungcheongbuk-do, Sangchon-myeon, Dunjeon-li, near Doma Pass, 500 m, 2–26.V 2006, 1 ♀, P. Tripotin. **Japan:** Hokkaido, Horoka, 800 m, 5.VII 1989, 1 ♀, M. Sharkey; Hokkaido, Mt. Shari, Konpoku Pass, 43°45'N, 144°45'E, 16–18.VIII 1996, 1 ♀, L. Masner; Gumma, Matsuida, env., 800–1000 m, 1–2.IX 1996, 2 ♀, 1 ♂, L. Masner; Gumma, Matsuida, Myogi Lake 2–3.IX 1996, 500 m, 3 ♀, L. Masner; Honshu, Ibaraki Preference, Tsuchiura swamp, 21.IX 1989, 2 ♂, M. Sharkey; Iwate Preference, Kawai, Yoshibeza, 39°35'N, 141°32'E, 750 m, 24–26.VIII 1996, 1 ♀, L. Masner; Miyazaki, Kitago, Inohea, creek, 31°43'N, 131°23'E, 21–23.IX 1996, 2 ♀, 2 ♂, L. Masner; Miyazaki, Yoshinp, 31°57'N, 131°20'E, 20–22.IX 1996, 2 ♀, L. Masner; Kyushu, Fukuoka, Mt. Niko, 700 m, 9–10.V 1989, VIII–IX 1989, 1 ♀, 1 ♂, M. Sharkey; Aichi Preference, Douzuki, Obara, 15–29.VII 1990, 6–12.IX 1990, 4 ♀, 3 ♂, K. Yamagishi; Aichi Preference, Narai, Toyota, 30.VII–7.VIII 1990, 2 ♀, Yamagishi; Inagishi, Tokyo, 28.VII 1980, 1 ♀, 5 ♂, C. Yoshimoto; Kibune, Kyoto, 6.VIII 1980, 1 ♂, C. Yoshimoto.

VARIATION. Body length 1.1–1.7 mm. Colour of body usually dark brown but sometimes petiole and propodeum paler than remaining body. Head of male broader than mesosoma or as broad as mesosoma. Male A8–A12 subquadrate to weakly elongated. Male A3 and A4 equal each other or A3 distinctly shorter than A4. Rare notauli present as a few very small points or only as one point at posterior margin of mesoscutum. Matt mesopleural spot pale brown and distinct, but some specimens with weakly visible this spot and same colouration as mesopleuron. Ratios of length to width of antennal segments variable: A9–A12 or only A10–A12 subquadrate.

DISTRIBUTION. Russia (Primorskii krai, Amurskaya oblast), South Korea (Gyeongsangnam-do, Gangwon-do; Chungcheongbuk-do), Japan (Hokkaido, Honshu, Kyushu).

***Entomacis graeffei* Kieffer, 1909**

MATERIAL EXAMINED. **South Korea:** Gyeongsangnam-do, Jirisan, Hamyang-gun, Macheon-myon, Samjeong-li, 700 m, 35°20.55'N, 127°38.21'E, 25.VIII–14.IX 2002, 1 ♀, 1 ♂, P. Tripotin; Gangwon-do, Odaesan, Dongsan-li, near Woljeongsa 19.VII–18.VIII 2003, 1 ♀, 1 ♂, P. Tripotin. **Japan:** Hokkaido, Furano Exp. Forest, 500 m, 43°15'N, 142°20'E, 900 m, 9–10.VIII 1996, 3 ♀, 1 ♂, L. Masner; Hokkaido, Hidaka Mts. above Pyo Tan Riv., 12–14.VIII 1996, 2 ♀, 1 ♂, L. Masner; Hokkaido, Mt. Shari, Konpoku Pass, 43°45'N, 144°45'E, 16–18.VIII 1996, 1 ♀, 1 ♂, L. Masner; Hokkaido, Kiyosato, Riv. Shari, 43°40'N, 144°00'E, 16–18.VIII 1996, 1 ♀, L. Masner; Hokkaido, Horoka, 800 m, 5.VII 1989, 5 ♀, M. Sharkey; Aichi, Shitara, Ubarani, 23–29.V 1994, 6–19.VI 1994, 23.VI–3.VII 1994, 11–31.VII 1994, 12 ♀,

3 ♂, K. Yamagishi; Gumma Prefecture, Takamine Table Land, 1950 m, 19.VII 1980, 12 ♀, A. & Z. Smetana; Shikoku, Ishizuchi Mt. National Park, 1400 m, 11–18.VIII 1980, 1 ♀, 5 ♂, A. & Z. Smetana; Gumma, Matsuida, env., 800–1000 m, 1–2.IX 1996, 1 ♀, 1 ♂, L. Masner; Miyazaki, Kitago, Inohea, creek, 31°43'N, 131°23'E, 21–23.IX 1996, 2 ♀, 2 ♂, L. Masner; Iwate Prefecture, Kawai, Aionzawa, 39°35'N, 141°32'E, 600–750 m, 24–26.VIII.1996, 3 ♀, 3 ♂, L. Masner. **China:** Sichuan, Emei Shan, 1947 m, 29°33.605'N, 103°20.633'E, sifting, 27.VI 2009 and 2310 m, 29°32.932'N, 103°20.466' E, sifting, 27.V 2011, 2 ♀, V. Grebennikov.

VARIATION. Body length 1.2–1.7 mm. Colour of body black to yellowish brown, but head darker than remaining body, petiole and propodeum conspicuously paler. A13 only, A12–A13, A11–A13 or A10–A13 of female clava subquadrate, all remaining antennomeres elongate; some specimens with all antennomeres elongate. S2 lateral grooves deep or shallow.

DISTRIBUTION. United Kingdom, Sweden, Czech Republic, Austria, Italy, Russia (European part, Western and Eastern Siberia, Far East), South Korea (Gyeongnam-do, Gangwon-do), Japan (Hokkaido, Honshu, Shikoku), China (Sichuan).

***Entomacis penelope* Nixon, 1980**

Entomacis penelopa: Chemyreva, 2014: 197.

MATERIAL EXAMINED. **Japan:** Hokkaido, Mt. Shari, Konpoku Pass, 43°45'N, 144°45'E, 16–18.VIII 1996, 1 ♀, 1 ♂, L. Masner; Hokkaido, Sapporo, 24–29.VII 1988, 1 ♀, K. Maeto; Sapporo, Jozankei, 29.VIII–12.X 1989, 1 ♀, M. Sharkey; Aichi, Shitara, Ubarani, 18–24.VII 1994, 1 ♂, K. Yamagishi; Iwate Prefecture, Kawai, Inohae, 31°37'N, 141°31'E, 500 m, and 31°35'N, 141°29'E, 600 m, 25.VIII 1996, 2 ♀, L. Masner; Inagishi, Tokyo, 28.VII 1980, 1 ♀, 1 ♂, C. Yoshimoto; Shikoku, Ishizuchi Mt. National Park, 1400 m, 11–18.VIII 1980, 2 ♀, 1 ♂, S. & J. Peck.

VARIATION. Body length 1.2–1.3 mm. Colour of body pale brown to black, sometimes petiole and propodeum faintly paler than remaining body. Antennae with variable length of antennal segments.

DISTRIBUTION. Ireland, Czech Republic, Austria, Russia (European part, Eastern Siberia, Far East), Japan (Hokkaido, Honshu, Shikoku).

***Entomacis perplexa* (Haliday, 1857)**

Fig. 6

MATERIAL EXAMINED. **Japan:** Hokkaido, Furano Exp.Forest, 500 m, 43°15'N, 142°20'E, 9–10.VIII 1996, 900 m, 1 ♂, L. Masner; Hokkaido, Horoka, 800 m, 5.VII 1989, 16 ♀, 1 ♂, M. Sharkey; Hokkaido, Mt. Shari, Konpoku Pass, 43°45'N, 144°45'E, 16–18.VIII 1996, 6 ♀, 2 ♂, L. Masner; Hokkaido, Hidaka Mts. below Pyo Tan, 500 m, 14.VIII 1996, 2 ♀, L. Masner; Hokkaido, Nukabira, 600 m, 5.VII 1989, 6 ♀, M. Sharkey; Hokkaido, Kamikawa, 4.VII 1989, 2 ♀, M. Sharkey; Inagishi, Tokyo, 28.VII 1980, 1 ♀, C. Yoshimoto; Aichi, Toyone, 1300 m, Mt. Chausu, 16.VII

1992, 5 ♀, 1 ♂, K. Yamagishi; Kyushu, Fukuoka, Mt. Niko, 700 m, 9–10.V.1989, 2 ♀, M. Sharkey; Honshu, Iwate, Iwaizumi, Hitsutori, 770m, 11–17.VIII.1991, 3 ♀, A. Smetana; Iwate, Mt. Hayachine, 500 m, 21.VI.1989, 2 ♀, M. Sharkey; Ibaraki Prefecture, Mt. Tsukuba, 800 m, 14–25.VII.1989, 1 ♂, M. Sharkey.



Figs 5–9. Morphological characters and variations of *Entomacis* species. (♀). 5, 8, 9 – *E. kasparyani*, antennae, dorsal views; body, lateral view: 6 – *E. perplexa*; 7 – *E. curticerca*.

VARIATION. Body colour from black to pale brown; in brown specimens petiole, base of metasoma and propodeum distinctly paler than remaining body or the same colour as remaining body; in dark specimens matt mesopleural spots pale brown; in pale brown specimens matt spots mainly the same colour as mesopleuron. Antenna brown to yellow. Antennomeres of female from elongated to subsquare; ratios of length to width of antennal segments variable. All antennomeres of male elongated and with various length of segments. Head in dorsal view weakly narrower to weakly wider than mesosoma. Notauli expressed as short basal grooves to rare complete developed. Dorsal area of propodeum transverse to subsquare. Median propodeal keel simple, rare bifurcate. Plical process projecting to scarcely developed. Upper plicae parallel each other or convergent anteriorly. Petiole in lateral view cylindrical or curved, with different ratios of width to length (0.55–0.73). T2 lateral grooves deep or shallow.

DISTRIBUTION. Germany, Czech Republic, Slovakia, Austria, Hungary, Poland, Moldova, Russia (European part, North Caucasus, Urals, Western and Eastern Siberia, Far East), Japan (Hokkaido, Honshu, Kyushu); USA, Canada.

***Entomacis platyptera* (Haliday, 1857)**

MATERIAL EXAMINED. **South Korea:** Gangwon-do, Chuncheon, Nam-myeon, Hudong-li, 31.VII–16.VIII 2003, 5.IX–20.X 2003, 4 ♀, P. Tripotin; Odaesan, Dongsan-li, near Woljeongsa 19.VII–18.VIII 2003, 1 ♂, P. Tripotin; Gyeongsangnam-do, Jirisan Hamyang-gun, Macheon-myeon, Samjeong-li, 700 m 1–15.VI 2003, 2 ♀, P. Tripotin; Chungcheongbuk-do, Sangchon-myeon, Dunjeon-li, near Doma Pass, 500 m, 2–26.V 2006, 6 ♀, P. Tripotin. **Japan:** Hokkaido, Furano Exp. Forest, 500 m, 43°15'N, 142°20'E, 9–10.VIII 1996, 900 m, 6 ♀, L. Masner; Hokkaido, Mt. Shari, Konpoku Pass, 43°45'N, 144°45'E, 16–18.VIII 1996, 14 ♀, 3♂, L. Masner; Hokkaido, Hidaka Mts. below Pyo Tan, 500 m, 14.VIII 1996, 2 ♀, L. Masner; Inagishi, Tokyo, 28.VII 1980, 4 ♀, C. Yoshimoto; Kibune, Kyoto, 6.VIII 1980, 10 ♀, 3 ♂C. Yoshimoto; Iwate, Kawai, Yoshibezawa, 1050 m, 12–17.VIII 1991, 1 ♀, A. Smetana; Iwate Preference, Iwaizumi, Hitsutori, 800 m, 11–17.VIII 1991, 2 ♀, A. Smetana; Aichi Preference, Narai, Toyota, 23–29.VII 1990, 1 ♀, 1 ♂, Yamagishi; Aichi, Shitara, Ubarani, Beech forest, 6–12.VI 1994, 18–24.VII 1994, 1 ♀, 1 ♂, K. Yamagishi. **China:** Sichuan, Ganggashan, 3000–3200 m 6–9.VII 1996, 1 ♀, A. Smetana.

VARIATION. Body length 0.9–1.5 mm. Body from pale brown to dark brown. Ratio of length of antennae to length of body 0.9–0.8. Anterior scutellar pit sculptured at bottom or smooth. Petiole length 1.0–1.6 × in female and 1.7–2.2 × in male longer than its width. Female and male fore wing 2.7–4.0 × longer than its width.

DISTRIBUTION. Ireland, United Kingdom, Sweden, Finland, Poland, Czech Republic, Austria, Russia (European part, Western and Eastern Siberia, Far East), South Korea (Gangwon-do, Gyeongsangnam-do, Chungcheongbuk-do), Japan (Hokkaido, Honshu), China (Sichuan).

***Entomacis kasparyani* Chemyreva, 2014**

Figs 5, 8–9

MATERIAL EXAMINED. **South Korea:** Gangwon-do, Chuncheon, Nammyeon, Hudong-li, 31.VII–16.VIII 2003, 5.IX–20.X 2003, 2 ♂, P. Tripotin; Odaesan, Dongsan-li, near Woljeongsa 19.VII–18.VIII 2003, 1 ♂, P. Tripotin. **Japan:** Hokkaido, Furano Exp. Forest, 500 m, 43°15'N, 142°20'E, 9.VIII 1996, 6 ♀, 1 ♂, L. Masner; Hokkaido, Mt. Shari, Konpoku Pass, 43°45'N, 144°45'E, 16–18.VIII 1996, 1 ♀, L. Masner; Shikoku, Ishizuchi Mt. National Park Omogo Valley, 700 m, 21.VIII 1980, 3 ♀, 3 ♂; Aichi, Shitara, Ubarani, Beech forest, 6–12.VI 1994 and Ubarani, 900 m, 29.VI–3.VII 1994, 5 ♀, K. Yamagishi; Ibaraki Prefecture, Tsukuba, 2–26.X 1989 and Mt. Tsukuba, 800 m, 10.VII–2.X 1989, 5 ♀, M. Sharkey; Gumma, Matsuida, env., 800–1000 m, 1–2.IX 1996, 1 ♂, L. Masner; Aichi, Inabu, 1100 m, Mennoki Pass, 15–17.VII 1992, 1 ♀, T. Kanade; Okinawa, Yona, Rhykyu Univ., Res. Station, V 1999, 1 ♂, B. Sinclair. **China:** Sichuan, Emei Shan, 1850 m, 29°33.909'N, 103°21.405'E, sifting, 4.VII 2009 and 1463 m, 29°34.46'N, 103°22.04' E, sifting, 27.V 2011, 2 ♀, V. Grebennikov; Sichuan, Emei Shan, 3000 m, 17–19.VII 1996, 1 ♀, A. Smetana; Western Hubei, Daba Shan, crk. valley, 8 km NW Muyuping, 1540 m, 31°29'N, 110°22'E, 18–22.VII 2001, 1 ♂, A. Smetana; Western Hubei Daba Shan, pass E of Mt. Da Shennongjia, 12 km NW Muyuping, 31°30'N, 110°21'E, 2050 m, 19–22.VII 2001, 1 ♀, A. Smetana.

VARIATION. Body length 1.1–1.4 mm. Mesosoma and metasoma colour from dark brown to yellowish brown. Venation from pale brown to yellow. Female anten-nae pale brown (Figs 8, 9) to yellow (Figs 5). A10–A12 small and A10=A11 (Figs 8, 9) to moderately large gradually increased (Fig. 5); A12 distinctly narrower than A13 (Fig. 9) or as wide as A13. Suture between T3–T5 invisible to distinct.

DISTRIBUTION. Russia (Primorskii kai), South Korea (Gangwon-do), Japan (Hokkaido, Honshu, Shikoku, Okinawa), China (Sichuan, Hubei).

***Entomacis leptos* Chemyreva, sp. n.**

Figs 10–14

TYPE MATERIAL. Holotype: ♀ (CNCI) labelled “JAPAN, Nara, Shimoichi, Nui, creek, 34°18'30"N, 135°49'E, L. Masner”. **PARATYPES.** **South Korea:** Gangwan-do, Odaesan, Dongsan-li, near Woljeongsa 19.VII–18.VIII 2003, 6 ♂, P. Tripotin. **Japan:** Hokkaido, Furano Exp. Forest, 43°15'N, 142°20'E, 400 m, 9–10.VIII 1996, 3 ♂, L. Masner; Miyazaki, Kitago, Inohea, creek, 31°43'N, 131°23'E, 21–23.IX 1996, 5 ♀, 2 ♂, L. Masner; Niigata, Kokuzo, creek, 38°17'N, 139°29'E, 50 m, 28–30.VIII 1996, 3 ♀, 2 ♂, L. Masner; same locality as holotype, 3 ♀, 1 ♂, L. Masner; Kyushu, Kumamoto Prefecture, Nakamichi-bashi, Izumi-mura, 400 m, 25–26.VIII 1997, 1 ♂, B. Sinclair; Gimma, Matsuida, Myogi Lake, 2–3.IX 1996, 1 ♂, L. Masner. **China:** N-Yunnan Dali Bai Nat. Aut. Prefecture 1km W from Dali, 2170 m, 25°41.9'N, 100°08.4'E, 1–3.IX 2003, 1 ♀, A. Smetana. All paratypes in CNCI.



Figs 10–14. *Entomacis leptos* sp. n. (10 – ♂, 11–14 – ♀); 10, 14 – antenna, lateral view; 11 – body, lateral view; 12 – face, frontal view; 13 – body, dorsal view.

DESCRIPTION. Holotype. Female. Body length 1.6 mm; fore wing length 1.6 mm; antenna length 1.1 mm.

Colour. Body dark brown; palpi, legs and A1–A2 yellowish brown; A3–A13 brown, gradually darkened apically.

Head in dorsal view transverse (21:15), as wide as mesosoma, antennal shelf weakly developed. Head covered with numerous semi-recumbent setae, in lateral

view higher than long (18:15). Face smooth and pubescent. Tentorial pit very small. Malar sulcus absent. Clypeus weakly convex, circular, smooth and pubescent. Epistomal sulcus indistinct, visible only laterally. Labrum narrow, with row of setae. Ratio of distance between pleurostomal folds to width of head 13:28. Mandible short, bidentate, teeth equal sizes. Eye large, as high as half of head, oval (13:9), with a few short setae; height of eye/malar area 13:10. Ocelli large; LOL equal to width of anterior ocellus; POL much shorter than OOL (4:8). Occipital flange absent. Postgena without cushion of setae.

Antennomeres without tiloids, covered with long setae. Scape cylindrical, smooth, with dense semi-recumbent setae. A13 flattened on ventral side, A10–A13 with MGS brush. In lateral view, connection between clavomeres situated dorsally of median line (Fig. 14). Ratios of length to width of antennomeres in dorsal view: 22:3; 7:3; 6:2; 6:2; 5:2; 5:2; 5:2; 6:2.5; 6:3; 6:3.5; 5.5:4; 5:5; 9:6.

Mesosoma. In dorsal view mesosoma longer than wide (22:15); in lateral view distinctly longer than high (22:13). Neck bare and smooth. Pronotum smooth, with sparse setae medially on dorsal side. Propleuron and mesopleuron on ventral side covered with dense silver pubescence. Mesopleuron smooth and bare. Matt mesopleural spot large and distinct. Acetabular carina distinctly visible. Epicnemial pit and setae between anterior margin of epicnemial pit and posterior margin of pronotum absent. Mesoscutum wider than long (23:20), covered with numerous setae which dense anteriorly, without notauli; humeral sulcus deep and long (Fig. 13). Anterior scutellar pit transverse (5:3). Lateral scutellar pits absent. Axilla posteriorly, axillar depression and lateral margins of scutellar disk setose. Posterior scutellar pits small and deep. Metascutellum narrow, smooth, pubescent, with median keel much projecting, lateral keel absent. Mesopleural suture entire setose. Propodeum smooth, poorly setose, convex dorsally. Area between upper plicae on dorsal side of propodeum wider than median length (11:9). Median propodeal keel complete, evenly projected, its blade medium of height (Fig. 11). Upper and lower plicae weakly projected, plical process reduced.

Wing. Apex of fore wing rounded. Costa and submarginal vein tubular, pigmented. Distal RS, distal M and distal CU absent, M+CU absent, basal vein and 1CU nebulous. Marginal vein longer than wide (8:3), as long as stigmal vein. Ratio of width to length of fore wing 2:6.

Metasoma. Petiole in dorsal view longer than its median width (15:8), cylindrical, with longitudinal groove and dense short setae on ventral and lateral sides. Apex of metasoma rounded. T2 smooth and bare, T2 notch distinct, T2 lateral grooves absent. Base T2 and S2 on Fig. 1. T3–T5 circular, short, bare and smooth; apical tergite elongate, slightly curved down, with few setae. S2 without lateral and medial grooves, with short setose line.

VARIATION. Paratypes very similar to each other. Body length 1.7–1.8 mm.

MALE. Body length 1.3–1.8 mm. Antenna longer than body. A4 with emargination and keel reaching from half to 2/3 of segment length (Fig. 10). Ratios of length to width of antennal segments: 20:3; 8:3; 9:2; 13:3; 12:2.5; 12:2.5; 12:2.5; 12:2; 11:2; 11:2; 11:2; 10:2; 11:2.

DIAGNOSIS. *Entomacis leptos* **sp. n.** is related to *E. kasparyani*, but differs from it by the following complex of characters: female A1–A2 yellowish brown, A3–A13 brown, gradually darkened apically (female A1–A13 entirely pale brown or yellow in *E. kasparyani*); A10–A13 with MGS brush (without MGS brush in *E. kasparyani*); mesoscutum with numerous setae at anterior margin only (mesoscutum pubescent entirely in *E. kasparyani*); dorsal side of pronotum between upper plicae wider than median length (11:9) (shorter than median length in *E. kasparyani*); median propodeal keel projected, its blade medium height (median keel low in *E. kasparyani*); T2 notch distinct (absent in *E. kasparyani*).

DISTRIBUTION. Japan (Hokkaido, Honshu, Kyushu), South Korea (Gangwand-do).

ETYMOLOGY. Derived from Greek *leptos* (slender).

***Entomacis alticeps* Chemyreva, sp. n.**

Figs 15–19

TYPE MATERIAL. Holotype: ♀ (CNCI) labelled “JAPAN, Aichi Preference, Mt. Sanage-yama, 9–15.V 1989, A. Takano”. PARATYPES. **Japan:** Aichi Preference, Narai, Toyota, 23–29.VII 1990, 1 ♀, 1 ♂, Yamagishi; Kyushu, Fukuoka, Mt. Niko, 700 m, 9–10.V 1989, VIII–IX 1989, 1 ♀, 1 ♂, M. Sharkey; Iwate, Kawai, Yoshibezawa, 39°37'N, 141°31'E, 500 m, 25.VIII 1996, 1 ♀, L. Masner. All paratypes in CNCI.

DESCRIPTION. Holotype. Female. Body length 1.8 mm; fore wing length 1.7 mm; antenna length 1.3 mm.

Colour. Mesosoma and metasoma reddish; head and A11–A13 dark brown; palpi, legs, mandibles and A1–A10 yellowish brown.

Head in dorsal view transverse (28:25), weakly wider than mesosoma (28:25), antennal shelf weakly developed. Head in lateral view wider than long (30:25), covered with numerous setae. Face smooth and pubescent (Fig. 16). Tentorial pit large. Ratio of distance between pleurostoma folds to width of head 11:25. Mandibles short, bidentate, teeth equal sizes (Fig. 16). Eye large, oval (14:10), with few short setae, eye height/head height 14:30. Ratio of height of eye to malar area 12:10. Ocelli large; LOL equal to width of anterior ocellus; POL much shorter than OOL (3:8). Occipital flange narrow.

Antennomeres without tiloids covered with long setae. A10–A13 weakly flattened on ventral side, with MGS brush. Connection between clavomeres situated dorsally of median line (Fig. 19). Ratios of length to width of antennomeres in dorsal view: 23:4; 10:3.5; 9:3; 7:3; 6:3; 6:3; 7:3.5; 7:4; 7:4; 7:4.5; 7:5; 10:5.

Mesosoma in dorsal view longer than wide (48:25), in lateral view longer than high (48:32). Matt mesopleural spot without distinct edge, indistinct. Mesoscutum wider than long (20:18). Anterior scutellar pit transverse (7:5). Axillar depression and lateral margin of scutellar disk setose. Area between upper plicae on dorsal side of pronotum longer than distance between upper plicae (10:8) (Fig. 17). Median propodeal keel complete, evenly projected, its blade high (Fig. 15). Upper and lower plicae visibly projected, plical process reduced.



Figs 15–19. *Entomacis alticeps* sp. n. (15–17, 19 – ♀, 18 – ♂); 15 – body, lateral view; 16 – face, frontal view; 17 – body, dorsal view; 18, 19 – antenna, lateral views.

Wing. Apex of forewing rounded. Costa and submarginal vein tubular. Basal vein and 1CU absent. Marginal vein longer than wide (6:1.5), longer than stigmal vein (6:5). Ratio of width to length of wing 7:18.

Metasoma. Petiole in dorsal view longer than its median width (15:6). Apical tergite short, not curved down, with few setae.

MALE. Antenna longer than length of body. A4 with emargination and keel reaching half of segments length (Fig. 18). Ratios of length to width of antennal segments: 20:3; 11:3; 12:2.5; 15:4; 14:3; 15:3; 15:3; 14:3; 14:3; 13:3; 13:3; 13:3; 13:3.

VARIATION. Specimens similar to each other. Length of body 1.5–1.7 mm.

DIAGNOSIS. *Entomacis alticeps* **sp. n.** is related to *E. leptos* **sp. n.**, but differs by complex of following characters: mesosoma and metasoma reddish (dark brown in *E. leptos*); female A11–A13 dark brown, A1–A10 yellowish brown (female A1–A2 yellowish brown, A3–A13 brown, gradually darkened apically in *E. leptos*); area between upper plicae on dorsal side of pronotum longer than distance between upper plicae (Fig. 17) (shorter than distance between upper plicae in *E. leptos*); median propodeal keel with very high blade (the blade medium height in *E. leptos*); upper and lower plicae visibly projected (upper and lower plica weakly projected in *E. leptos*).

DISTRIBUTION. Japan (Honshu, Kyushu).

ETYMOLOGY. Derived from Latin *altum* (high) and *caput* (head) because head high in frontal view.

Entomacis leptocera Chemyreva, **sp. n.**

Figs 20–24

TYPE MATERIAL. Holotype: ♀ (CNCI) labelled “JAPAN. Ryu-Kyu [Ryukyu], Ishigaki Is., 17.XI 1996, K. Takahashi”. PARATYPES. **South Korea:** Chungcheongnam-do, Keumsan, Posok-sa [Boseoksa], 29.IX–13.X 2002, 1 ♀, P. Tripotin (CNCI). **Japan:** Ryukyu, Ishigaki-jima, 19–21.X 1999, 1 ♀, S. Belokobylskij (ZISP); Inagishi, Tokyo, 28.VII 1980, 10 ♀, 4 ♂, C. Yoshimoto (CNCI); Miyazaki, Kitago, Inohea, creek, 31°43'N, 131°23'E, 21.IX 1996, 3 ♀, L. Masner (CNCI); Ibaraki Prefecture, Tsukuba, Expo Site, 5–11.VIII 1989 and Tsukuba, marsh, 29.VIII–6.IX 1989, 2 ♀, M. Sharkey (CNCI); same locality as holotype, 2 ♀ (CNCI); Kyushu, Mt. Tachibana, Fokuoka, 19–25.VIII 1979, 1 ♂, K. Yamagishi (CNCI).

DESCRIPTION. Holotype. Female. Body length 1.4 mm; fore wing length 1.5 mm; antenna length 1.6 mm.

Colour. Body pale brown; palpi, legs, tegula and A1–A2 yellowish brown; A3–A13 pale brown.

Head in dorsal view transverse (17:14), as wide as mesosoma. Head in lateral view wider than long (17:14), covered with few setae. Face smooth, with few scattered setae (Fig. 20). Tentorial pit distinct. Clypeus weakly convex, circular, smooth and bare. Ratio of distance between pleurostoma folds to width of head 10:26. Eye not large, oval (11:9), higher than malar area (11:9); head height/eyes height 30:11. Ocelli small, LOL twice as wide as anterior ocellus. POL much shorter than OOL (5:10). Occipital flange narrow.

Antennomeres without tiloids covered with scattered long setae. Scape broadened apically, narrow medially, curved and smooth, with few setae. A13 convex on ventral side, A11–A13 with MGS brush. Connection between clavomeres A9–A13 in lateral view situated dorsally of median line (Fig. 22). Ratios of length to width of antennomeres in dorsal view: 25:3.5; 8:3; 13:2; 11:2; 11:2.5; 10:3; 9:3; 9:3; 8:3; 7:3; 7:3; 7:3.5; 10:3.5.



Figs 20–24. *Entomacis leptocera* sp. n. (20–23 – ♀; 24 – ♂); 20 – face; 21 – body, lateral view; 22 – antenna, lateral view; 23 – body, dorsal view; 24 – antenna, dorsal view.

Mesosoma in dorsal view longer than wide (23:16), in lateral view distinctly longer than high (23:18). Pronotum smooth, with few setae medially on dorsal side. Matt mesopleural spot small, located directly above hind coxa near margin of mesopleuron. Mesoscutum wider than long (22:15), with few setae, without notauli, humeral sulcus deep and long. Anterior scutellar pit transverse (7:5). Axillar depression weakly pubescent. Posterior scutellar pits small and not deep. Metascutellum narrow, smooth, pubescent, with medial keel moderately projecting and lateral keel low. Entire propodeum setose, convex dorsally. Area between upper plicae on dorsal side of pronotum longer than distance between upper plicae (10:6) (Fig. 23). Median propodeal keel complete, evenly projected, its blade moderately high.

Wing. Apex of fore wing weakly arcuate. Costa and submarginal vein tubular, depigmented, fused in apical third (Fig. 21). Basal vein and 1CU nebulous. Beginning of marginal vein indistinct. Stigmal vein $5 \times$ as long as its apical width. Ratio of width to length of wing 2:6.

Metasoma. Petiole in dorsal view longer than its median width (14:6), cylindrical, with longitudinal groove and few long scattered setae on ventral and lateral sides. Apex of metasoma rounded. T2 smooth and bare, T2 notch and T2 lateral grooves absent. Base T2 and S2 on Fig. 2. T3–T5 circular, short, bare and smooth; apical tergite very small, with few setae. S2 without lateral grooves, with setose line.

VARIATION. Body length 1.1–1.6 mm. Antennae longer than length of body to weakly shorter. Body from pale brown to yellow. Plical process reduced to moderately projected. T5–T7 entirely covered with dense setigerous punctures to partly shiny. Connection between clavomeres A9–A13 in lateral view situated dorsally of median line or between A10–A13 only.

MALE. Body length 1.1–1.2 mm. Antenna longer than length of body. A4 with emargination and keel reaching to $2/3$ of segments length (Fig. 24). Ratios of length to width of antennal segments: 16:4; 6:3; 15:2; 12:3; 12:2.5; 12:3; 11:2.5; 11:2; 10:2; 9:2; 9:2; 7:2; 9:2.

DIAGNOSIS. *Entomacis leptocera* sp. n. is related to *E. penelope*, but differs by complex of following characters: antennae very long (Fig. 21), as long as whole body (distinctly shorter than whole body in *E. penelope*); all segments of female antenna elongate in dorsal view (A10–A12 of female subquadrate in dorsal view in *E. penelope*), apex of fore wing arcuate (rounded in *E. penelope*); costa and submarginal vein depigmented and fused in apical third (pigmented and not fused in apical third in *E. penelope*); T2 median notch absent (present in *E. penelope*).

DISTRIBUTION. Japan (Honshu, Kyushu, Ishigaki-jima), South Korea (Chungcheongnam-do).

ETYMOLOGY. Derived from Greek *lepti* (thin) *cerna* (horn) because antennae long and slender.

Entomacis laticeps Chemyreva, sp. n.

Figs 25–29

TYPE MATERIAL. Holotype: ♀ (CNCI) labelled “JAPAN. Okinawa, Yona, Ryukyu Univ. Res Station, V 1999, B. Sinclair”. PARATYPES. **Japan:** Kyushu, Miyazaki, Kitago, Inohea, creek, 31°43'N, 131°23'E, 21.IX 1996, 1 ♀, 1 ♂, L. Masner (CNCI).

DESCRIPTION. Holotype. Female. Body length 1.4 mm; fore wing length 1.4 mm; antenna length 1.2 mm.

Colour. Body bark brown; palpi, legs, venation, mandible and A1 yellowish brown; tegula and A3–A13 pale brown.



Figs 25–29. *Entomacis laticeps* sp. n. (25–26, 28–29 – ♀; 27 – ♂); 25 – face; 26 – body, lateral view; 27, 28 – antenna, lateral view; 29 – body, dorsal view.

Head in dorsal view transverse (18:13), wider than mesosoma (18:15). Head in lateral view wider than long (16:13), covered with scattered setae. Face smooth, with few setae. Tentorial pit large (Fig. 25). Malar sulcus narrow, complete and shallow. Clypeus strongly convex, semicircular, smooth and bare; epistomal sulcus distinct. Ratio of distance between pleurostoma folds to width of head 8:29. Mandibles moderately long, bidentate, strongly overlapping, with teeth equal sizes (Fig. 25). Eyes large, as high as half of head height, higher than malar area (14:7), oval (14:10) and bare. Ocellar small, LOL equal to 1.5 of anterior ocellus width. POL much shorter than OOL (4:8). Occipital flange very narrow.

Antenna. Antennomeres without tiloids, covered with long setae. Scape cylindrical weakly broadened, smooth and curved, with few setae. A13 convex on ventral side, A9–A13 with weakly developed MGS brush. Connection between clavomeres A9–A13 in lateral view situated dorsally of median line (Fig. 28). Ratios of length to width of antennomeres in dorsal view: 16:3; 8:3; 8:1.5; 8:2; 8:2.5; 7:2.5; 7:2.5; 6.5:2.5; 6:2.5; 6:2.5; 5.5:2.5; 5.5:2.5; 9:2.5.

Mesosoma in dorsal view longer than wide (22:15), in lateral view distinctly longer than high (22:16). Neck bare, with longitudinal grooves. Propleuron and mesopleuron on ventral side covered with moderately dense pubescence. Meso-pleural spot small, indistinct, located directly above hind coxa. Epicnemial pit large and deep, without pilosity. Mesoscutum wider than long (23:14), with few long setae and complete notauli (Fig. 29). Anterior scutellar pit transverse (7:5), sculptured at bottom. Axillar depression poorly setose. Metascutellum narrow, dense pubescent, with medial and lateral keels low. Entire propodeum setose, convex dorsally. Dorsal side of pronotum between upper plicae wider than its median length (9:5).

Wing. Apex of fore wing arcuate (Fig. 29). Costa absent. Submarginal vein tubular and pigmented. Basal vein and 1CU absent. Marginal vein longer than wide (6:2) and longer than length of stigmal vein (6:5). Ratio of width to length of wing 5:13.

Metasoma. Petiole in dorsal view longer than its median width (10:6), cylindrical, with longitudinal groove and several long setae laterally. Apex of metasoma rounded. Base T2 and S2 on Fig. 2. Apical tergite pointed, not curved down, with long setae.

MALE. Body length 1.4 mm. Antenna longer than length of body. A4 with emargination and keel reaching to 2/3 of segments length. Ratios of length to width of antennal segments: 16:3; 8:3; 10:2; 10:2.5; 10:2.5; 10:2.5; 10:2.5; 9:2.5; 9:2.5; 9:2.5; 9:2.5; 8:2; 10:2 (Fig. 27).

DIAGNOSIS. *Entomacis laticeps* **sp. n.** is related to *E. platyptera*, but differs from it by complex of following characters: A1 yellowish brown and A3–A13 pale brown (A1–A5 yellowish brown and A6–A13 gradually darkened apically in *E. platyptera*); malar sulcus narrow, complete and shallow (malar sulcus absent in *E. platyptera*); apex of fore wing weakly arcuate (deeply emarginate in *E. platyptera*).

DISTRIBUTION. Japan (Kyushu, Okinawa).

ETYMOLOGY. Derived from Latin *latus* (wide) and *caput* (head), because the head distinctly wider than mesosoma.

***Entomacis canonica* Chemyreva, sp. n.**

Figs 30–32

TYPE MATERIAL. Holotype: ♀ (CNCI) labelled “JAPAN. Oita, Shonai, Oike, 25.IX 1996, L. Masner, s.s. J-62”. PARATYPES. **Japan:** Aichi Prefecture, Douzuki, Obara, 15–22.VII 1990, 6–12.IX 1990, 2♂, K. Yamagishi (CNCI). **China:** Yunnan, Daciang Shan, 25°41'N, 100°07'E, 2750 m, 17–22.VI 2005, 1 ♂, A. Smetana (CNCI); Western Hudei, Daba Shan, valley, 25°41'N, 100°07'E, 1540 m, 18–22.VII 2001, 1 ♂, A. Smetana (CNCI).

DESCRIPTION. Holotype. Male. Body length 1.7 mm; fore wing length 1.5 mm; antenna length 1.4 mm.

Colour. Body bark brown; palpi, legs, mandible and A1–A3 yellowish brown; tegula, venation and A4–A13 pale brown.

Head in dorsal view transverse (18:15), as wide as mesosoma (18:15). Head in lateral view wider than long (18:15), covered with scattered setae. Face smooth, with few setae. Tentorial pits large (Fig. 32). Malar sulcus narrow, complete and shallow. Clypeus strongly convex, semicircular, smooth and bare; epistomal sulcus distinct. Labrum narrow, with few setae. Ratio of distance between pleurostoma folds to width of head 6:18. Mandibles moderately long, bidentate, strongly overlapping, with teeth equal sizes (Fig. 32). Ratio of height of eye to height of head 7:18, oval (7:6), bare. Ratio of height of eye to malar area 7:6. Ocellar small, LOL as long as twice wide of anterior ocellus; POL much shorter than OOL (5:8). Occipital flange very narrow.

Antennae. Scape cylindrical, smooth and weakly curved with few setae. A13 compressed, A4–A12 with long protruding setae and broadened medially (Fig. 32). Connection between clavomeres strongly medially. Ratios of length to width of antennomeres in dorsal view: 29:3; 8:3; 7:2; 7:2.5; 8:2.5; 8:3; 8:3.5; 8:3.5; 8:4; 8:4; 7:4; 7:4; 10:2.5.

Mesosoma in dorsal view longer than wide (22:15), in lateral view distinctly longer than high (22:16). Neck bare, with longitudinal grooves. Propleuron and mesopleuron on ventral side covered with moderately dense pubescence. Matt mesopleural spot distinct, not large. Epicnemial pit absent, only small keel along anterior margin developed. Mesoscutum wider than long (16:10), with few long setae and complete notauli. Anterior scutellar pit transverse (10:6), sculptured at bottom. Axilla and axillary depression with long setae. Posterior scutellar pits deep and large. Metascutellum narrow, poorly pubescent, with medial keel strongly projecting, lateral keel low. Entire propodeum densely setose, convex dorsally (Fig. 31). Dorsal side of pronotum between upper plicae wider than median length (11:8). Median propodeal keel complete, evenly projected, its blade moderately high. Upper plica, lower plica and plical process moderately projected.

Wing. Apex of fore wing truncate (Fig. 30). Costa absent. Submarginal vein tubular, pigmented. Basal vein and 1CU absent. Marginal vein longer than wide (6:2), as long as stigmal vein. Ratio width to length of wing 5:14.



Figs 30–32. *Entomacis canonica* sp. n. (♂). 30 – body, lateral view; 31 – body, dorsal view; 32 – face and antennae.

Metasoma. Petiole in dorsal view longer than its median width (13:8), cylindrical, with longitudinal groove and several long setae laterally only. Apex of metasoma rounded. Base T2 and S2 as in Fig. 2. T3–T5 circular, bare and smooth; apical tergite pointed, not curved down, with long setae. S2 with lateral and without medial grooves, with short setose line.

VARIATION. Length of body 1.2–1.6 mm. Antennae brown to yellow. A13 narrower than A12 to as wide as A12. Sometimes upper mesonotal suture asetose.

FEMALE. Unknown.

DIAGNOSIS. *Entomacis canonica* **sp. n.** is related to *E. laticeps* **sp. n.**, but differs by complex of following characters: male A4–A12 with long protruding setae and broadened medially (male A4–A12 cylindrical, strongly elongate and entirely setose in *E. laticeps*); connection between clavomeres situated medially (Fig. 32) (connection situated weakly upper middle in *E. laticeps*); epicnemial pit absent (large and deep in *E. laticeps*); posterior scutellar pits deep and large (shallow and small in *E. laticeps*); apex of fore wing rounded (arcuately concave in *E. laticeps*).

DISTRIBUTION. Japan (Honshu, Kyushu), China (Yunnan, Hubei).

ETYMOLOGY. Derived from Greek *canonicós* (usual).

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