

Review of the Asian wood-boring genus *Euxiphydria* (Hymenoptera, Symphyta, Xiphydriidae)

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Abstract

Five species of *Euxiphydria* are recognized, *E. leucopoda* Takeuchi, 1938, from Japan, *E. potanini* (Jakovlev, 1891) from Japan, Russia, Korea, and China, *E. pseudoruficeps* Okutani, 1966, from Taiwan, *E. vietnamensis*, **sp. n.** from Vietnam, and *E. shaanxiana*, **sp. n.**, from China. *Euxiphydria subtrifida* Maa, 1944, is considered a new synonym of *E. potanini*. A key and illustrations are given to distinguish the species.

Keywords

Woodborers, Palearctic, Oriental, *Hyperxiphia*

Introduction

Euxiphydria is an exclusively eastern Asian genus occurring from Japan and eastern Russia south to China, Vietnam, and Taiwan. Three species were listed by Smith (1978) and Taeger et al. (2010). Earlier keys to species by Gussakovskij (1935), Takeuchi (1938) and Maa (1944, 1949) included from two to four species in the genus. An ad-

ditional species was described from Taiwan by Okutani (1966). Here, we recognize five species, two of which are new, and give the first record for Vietnam, the southernmost record for the genus.

The only host record is *Acer mono* Maxim. (Aceraceae) for *E. potanini* (Jakovlev, 1891) (Krivolutskaya and Stroganova 1966, Stroganova 1968). We assume larvae of *Euxiphydria* live and feed in weakened or dying small branches and limbs as is typical for most xiphydriids.

Materials and methods

Material used in this study is deposited in the following: National Museum of Nature and Science, Tokyo, Japan (NSMT); National Museum of Natural History, Smithsonian Institution, Washington, D.C., USA (USNM); Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany (SDEI); Entomological Laboratory, Osaka Prefecture University, Sakai, Japan (OPU); Entomological Laboratory, Kyushu University, Fukuoka, Japan (KU); Hungarian Natural History Museum, Budapest (HNHM); Museum für Naturkunde, Humboldt-Universität zu Berlin, Germany (MNHU); collection of Pierre Tripotin, Mont Saint-Aignan, France (PT); Institute of Zoology, Chinese Academy of Sciences, Beijing, China (IZB).

Images were obtained using an EntoVision Imaging Suite that included a firewire JVC KY-75 3CCD digital camera mounted to a Leica M16 zoom lens via a Leica z-step microscope stand. Multiple focal planes were merged using Cartograph 5.6.0 (Microvision Instruments, France) software.

Results

Euxiphydria Semenov & Gussakovskij

<http://species-id.net/wiki/Euxiphydria>

Euxiphydria Semenov & Gussakovskij 1935: 117. Type species: *Xiphydria potanini* Jakovlev 1891, by original designation.

Diagnosis. Species are typically black with a contrastingly orange or mostly orange head (Figs 1, 13, 23, 30, 37). Antenna with 13–19 antennomeres, middle antennomeres dilated and compressed (Fig. 29). Head polished and shiny on upper genae and vertex to about level of lateral ocelli, variously sculptured on frons below lateral ocelli; in front view, inner margins of eyes parallel to slightly diverging below, lower interocular distance $1.4\text{--}1.7\times$ eye height (Figs 4, 18, 28, 34, 41); head from above with distance behind eyes about equal to (Figs 3, 40) or longer than eye length (Figs 17, 27, 33); area posterior to upper orbits in profile usually longer than eye length; both mandibles 4-dentate; maxillary palpus (Figs 20, 35) slender, with four palpomeres;

labial palpus (Figs 20, 35) with three palpomeres, first two palpomeres slender and third palpomere dilated, oval, with sensory pit. Forewing (Figs 1, 23, 36) with cell R closed, vein 2A+3A complete. Hind wing (Figs 1, 23, 36) with cell R closed, cells Rs and M present; anal cell present, petiole subequal to width of cell. Tarsal claws with long inner tooth near center of claw, about half length of outer tooth; claw of hind legs larger than those of fore- and midlegs. Tergite 10 posteriorly tubuliform, strongly protruding caudad.

Discussion. The above combination of characters will separate *Euxiphydria* from other xiphydriid genera. The only other genus with four maxillary palpomeres and three labial palpomeres is *Carinoxiphia* Wei (in Wei and Xiao 1999). In *Carinoxiphia*, the third labial palpomere is slender, the same width as the first two palpomeres, the radial cell of the forewing is open at its apex, the tarsal claws have a minute inner tooth, and the wings are hyaline. Other xiphydriid genera have a different palpomere formula, commonly with three or five maxillary palpomeres, have a slender third labial palpomere, are usually black with various white, yellow, or orange markings, the eyes are larger, commonly converging with the lower interocular distance equal to or shorter than the eye height, the head behind the eye in dorsal view is commonly strongly narrowing with the distance behind the eyes shorter than the eye length, the antennae various but commonly filiform, and the tarsal claws may be simple or with the inner tooth nearly as long as the outer tooth and close to the outer tooth.

Four species were described prior to 1938, *Xiphydria potanini* Jakovlev, 1891, *X. ruficeps* Mocsáry, 1909, *X. ruficeps* Matsumura, 1912, and *Xiphydria maidli* Zirngiebl, 1937. When describing the genus, Semenov and Gussakovskij (1935) recognized and separated two species, *E. potanini* and *E. ruficeps* (= *ruficeps* Matsumura), and Gussakovskij (1935) recognized and separated the same two species. Takeuchi (1938) treated two species from Japan, *E. ruficeps* (= *potanini*, *ruficeps* Matsumura, *akazui* Matsumura, and *maidli* Zirngiebl) and *E. leucopoda*, a second species described from Japan with a new form, which he called *Euxiphydria leucopoda* var. *nakanishii*. Maa (1944) keyed four species, his newly described *E. atriceps* and *E. subtrifida*, as well as *E. potanini* and *E. ruficeps*. Later, Maa (1949) transferred *E. leucopoda*, *E. nakanishii*, and *E. atriceps* to *Hyperxiphia* Maa, and recognized *E. potanini*, *E. ruficeps*, *E. subtrifida*, and *E. maidli*. He also proposed a new subfamily, Euxiphydriinae, including only *Euxiphydria*. The only subsequent species described was *E. pseudoruficeps* Okutani, 1966, from Taiwan. The catalogs by Smith (1978) and Taeger et al. (2010) have followed Takeuchi (1938) and Stroganova (1968) by regarding *E. potanini* as a variable species and including *X. ruficeps* Mocsáry, *X. ruficeps* Matsumura, *X. akazui*, and *X. maidli* as synonyms, and listing two other species, *E. subtrifida* Maa and *E. pseudoruficeps* as distinct species. Here, we recognize five species, the more common *E. potanini* with synonymy as given by Smith (1978) and Taeger et al. (2010), but also proposing *E. subtrifida* as a new synonym, placing *E. leucopoda* back into *Euxiphydria*, recognizing *E. pseudoruficeps* as a distinct species, and describing two new species, one from China and one from Vietnam.

Key to species

- 1 Legs entirely black; abdomen black (Figs 13, 24, 37) **2**
- Legs entirely white or black with basal third of hind tibia and hind basitarsomere white; abdomen with white spot laterally on eighth tergite (Figs 2, 30)..... **4**
- 2 Head orange with frons from about level of lateral ocelli to clypeus black (Figs 17, 18); frons densely rugose (Fig. 18); axilla and mesoscutellum reticulate (Fig. 15); wings black, paler toward apex (Fig. 16) **potanini (Jakovlev)**
- Head entirely orange (Figs 27, 28, 40, 41); frons with irregular carinae at least close to antennal toruli (Figs 28, 41); axilla and mesoscutellum with irregular longitudinal carinae (Figs 26, 39); wings almost hyaline to very slightly, uniformly infusate (Figs 23, 36) **3**
- 3 Head from above narrowing behind eyes, distance behind eyes equal to eye length (Fig. 40); sculpture on frons reticulate in front of ocelli with carinae close to antennal toruli (Fig. 41); carinae on mesepimeron short, irregular (Fig. 38)..... **shaanxiana sp. n.**
- Head from above gently curved behind eyes; distance behind eye much longer than eye length (Fig. 27); sculpture on frons consisting of more or less parallel carinae, without reticulations (Fig. 28); carinae on mesepimeron long, straight, almost parallel (Fig. 25)..... **pseudoruficeps Okutani**
- 4 Legs white, apical tarsomeres brownish (Fig. 2); frons reticulate (Fig. 4); head from above strongly narrowing behind eyes, distance behind eye less than eye length (Fig. 3); axilla and mesoscutellum with irregular, longitudinal carinae, smooth and shiny laterally and posteriorly (Fig. 5)..... **leucopoda Takeuchi**
- Legs black with basal third of hind tibia and hind basitarsomere white (Fig. 30); frons with almost parallel carinae (Fig. 34); head from above straight behind eyes, distance behind eye much longer than eye length (Fig. 33); axilla and mesoscutellum entirely sculptured, reticulate (Fig. 32)..... **vietnamensis sp. n.**

***Euxiphydria leucopoda* Takeuchi**

http://species-id.net/wiki/Euxiphydria_leucopoda

Figs 1–6

Euxiphydria leucopoda Takeuchi 1938: 183, fig. 2.

Hyperxiphia leucopoda: Maa 1949: 39.

Diagnosis. Length, 9.0–12.0 mm. Head orange, except medial black stripe on vertex extending anteriorly through ocelli and anterior to ocelli as an inverted V (Figs 3, 4). Antenna dark brown with scape and pedicel reddish; Thorax black with tegula, anteroventral quarter and narrow posterior margin of pronotum white (Figs 2, 5). Abdomen black with white spot laterally on eighth tergite (Fig. 1). Legs entirely white



Figures 1–6. *Euxiphydria leucopoda*, holotype **1** Dorsal view **2** Lateral view **3** Head, dorsal view **4** Head, front view **5** Thorax, dorsal view **6** Thorax, lateral view.

to yellow except apex of apical tarsomeres brownish (Fig. 2). Wings hyaline, veins and stigma black (Fig. 1). Antenna with 13 antennomeres; length of first four antennomeres as 1.0:0.4:0.8:0.5. Frons sculpture reticulate, especially around and anterior to ocelli (Figs 3, 4). Head from above strongly narrowing behind eyes, distance behind eye less than eye length (Fig. 3). Malar space between eye and antennal groove much narrower than groove. Axilla and mesoscutellum with irregular longitudinal carinae; lateral and posterior downturned areas smooth and shiny (Fig. 5). Hind basitarsomere slightly longer than length of remaining tarsomeres combined. Lengths of sheath and basal plate subequal. Male unknown.

Distribution. Japan: Honshu; Shikoku (Togashi 1974).

Specimens examined. Holotype. Female, labeled "19,VII,1920, Daisen, Takeuchi," "*Euxiphydria leucopoda* Takeuchi, Holotype" (OPU). Takeuchi (1938) stated July 15 in the original description but it appears to be "19" on the label. "Mt. Haku, 5/VIII.1968" (1 ♀, USNM, identified as *E. leucopoda* by Togashi).

Discussion. *Euxiphydria leucopoda* was transferred to *Hyperxiphia* by Maa (1949) without explanation, but it is actually an *Euxiphydria* as described by Takeuchi (1938). *Euxiphydria leucopoda* has three labial palpomeres with the third clavate and four maxillary palpomeres, as well as other characteristics of *Euxiphydria* except for the head which is short and narrowing behind the eyes in dorsal view. *Hyperxiphia* has three labial palpomeres of equal width and has five maxillary palpomeres. The holotype is a small specimen, about 9 mm long. The specimen from Mt. Haku is 12 mm long.

Takeuchi (1938) described a variety, *Euxiphydria leucopoda* var. *nakanishii*, which he stated to be similar in structure to the typical, but smaller, the hind basitarsomere distinctly shorter than the following tarsomeres together, and differing in color with the head entirely black except for pale yellow below the antennae. This is actually a different species and genus and was correctly placed in *Hyperxiphia* by Maa (1949). The holotype is at OPU and is labeled "8,VIII,1938, Daisen,Takeuchi," "*Euxiphydria leucopoda nakanishii* Tak., Holotype." It has not been illustrated; therefore, we provide Figs 7–12 for its recognition and comparison with *E. leucopoda*.

Euxiphydria potanini (Jakovlev)

http://species-id.net/wiki/Euxiphydria_potanini

Figs 13–22

Xiphydria Potanini Jakovlev 1891: 3, 15–16.

Euxiphydria potanini: Semenov & Gussakovskij 1935: 117.

Xiphydria ruficeps Mocsáry 1909: 39. Synonymy by Semenov 1921: 83.

Euxiphydria ruficeps: Semenov & Gussakovskij 1935: 117.

Xiphydria ruficeps Matsumura 1912: 210, pl. 54, fig. 22. Preoccupied by *Xiphydria ruficeps* Mocsáry, 1909. Synonymy by Takeuchi 1936: 54.

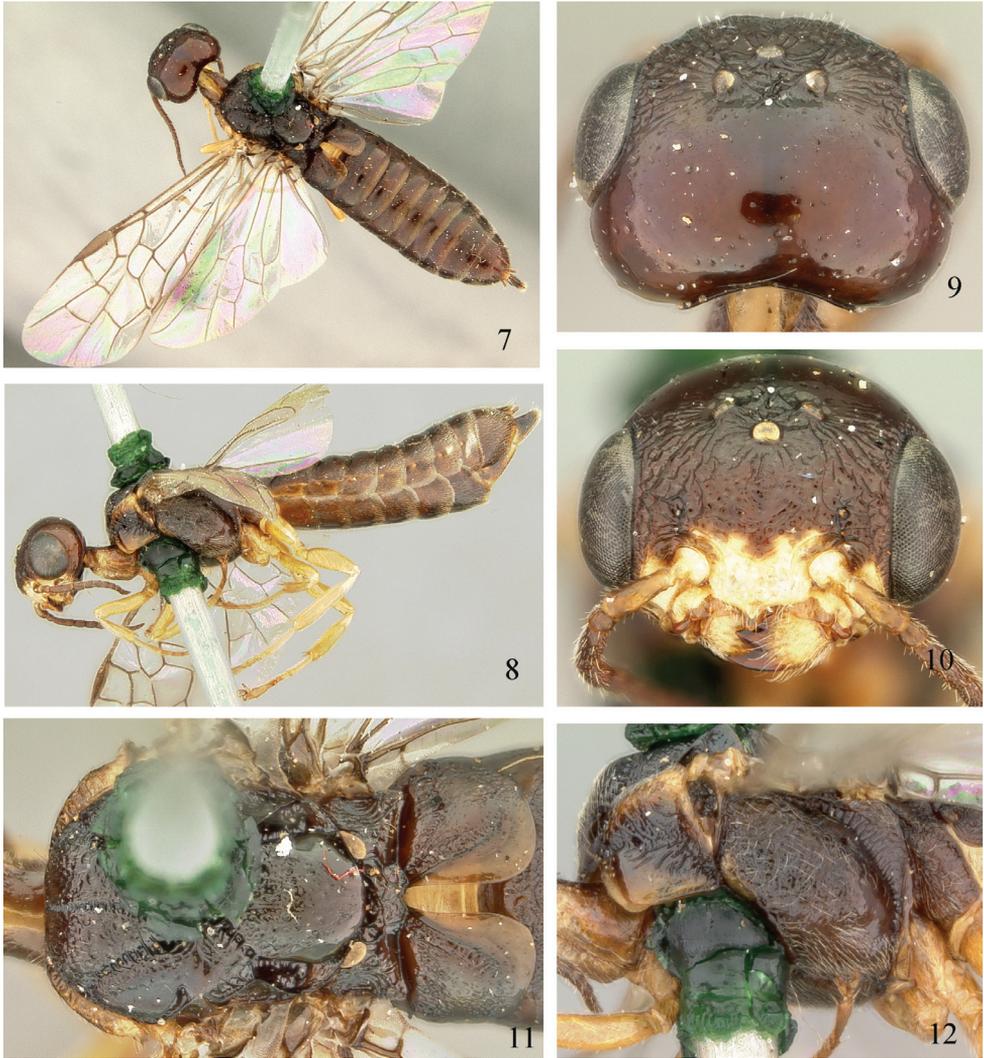
Xiphydria akazui Matsumura 1932: 31, 44, pl. 8, fig. 9. New name for *Xiphydria ruficeps* Matsumura (see below). Synonymy by Takeuchi 1936: 54.

Xiphydria Maidli Zirngiebl 1937: 342. Synonymy by Takeuchi 1938: 183.

Euxiphydria subtrifida Maa 1944: 33. new synonymy.

For other subsequent references, see Smith (1978).

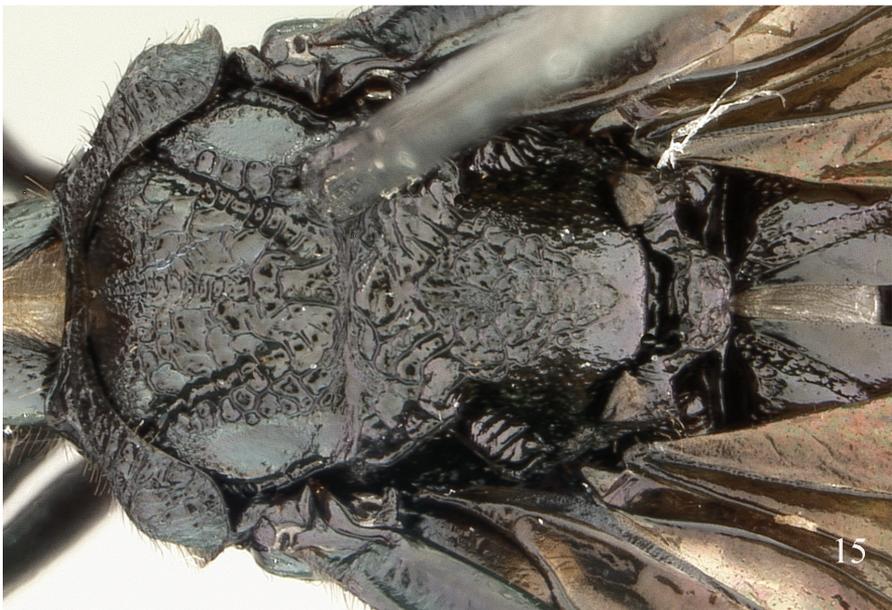
Diagnosis. Length, 10.0–20.0 mm. Black, head bright orange on genae and vertex behind ocelli (Figs 16–18). Wings darkly infuscate, more hyaline apical to stigma (Fig. 16). Frons densely rugose to reticulate, reticulations extending behind ocelli onto anterior part of vertex (Fig. 18) and onto lower half of genae (Fig. 19). Antenna with 13–16 antennomeres; length of first four antennomeres as 1.0:0.3:0.8:0.4.. Malar space between eye and antennal groove broad, equal to length of groove (Fig. 18). Head from



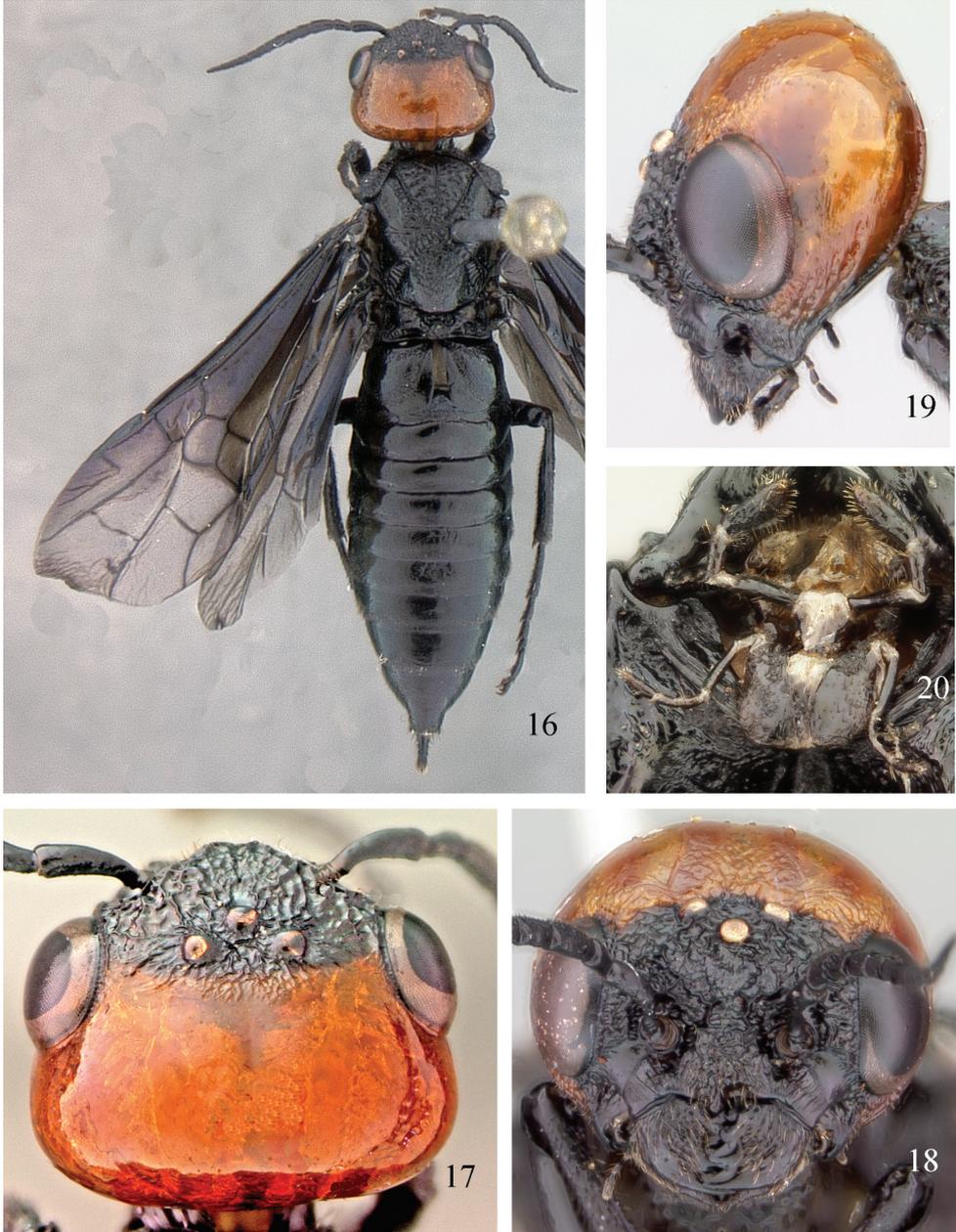
Figures 7–12. *Hyperxiphia nakanishii*, holotype **7** Dorsal view **8** Lateral view **9** Head, dorsal view **10** Head, front view **11** Thorax, dorsal view **12** Thorax, lateral view.

above slightly broadened behind eyes, distance behind eyes longer than eye length (Fig. 17). Axilla and mesoscutellum entirely densely, reticulately sculptured (Fig. 15). Mesepimeron with short, irregular carinae (Fig. 14). Hind basitarsomere shorter than length of remaining tarsomeres combined, as 0.7:1.0. Length of sheath slightly shorter than length of basal plate. Male similar to female; genitalia as in Figs 21, 22.

Types. *Xiphydria potanini* was described from a single female from “Chinae prov. Gan-ssu.” Semenov & Gussakovskij (1935) stated that the type is at the Institute of Zoology, Academy of Sciences, St. Petersburg, Russia.



Figures 13–15. *Euxiphydria potanini* 13 Lateral view 14 Thorax, lateral view 15 Thorax, dorsal view.



Figures 16–20. *Euxiphydria potanini* **16** Dorsal view **17** Head, dorsal view **18** Head, front view **19** Head, lateral view **20** Mouthparts (labial palpi above, maxillary palpi below).

Mocsáry (1909) described *Xiphydria ruficeps* from “Siberia orientalis: Ussuri (Kasakewitsch).” He did not state the number of specimens. Two females labeled as types are in the HNHM. One is labeled “Ussuri, Kasakewitsch, 1907, Korb,” “Typus 1909 *Xiphydria ruficeps* Mocs.,” “DEI – GISHym 10948” and the other “Ussuri,” “Typus



Figures 21–22. *Euxiphydria potanini*, male genitalia **21** Dorsal view **22** Ventral view.

1909 *Xiphydria ruficeps* Mocs., “DEI – GISHym 10949.” The specimen with “Kasakewitsch” on the label is here designated lectotype; the other specimen labeled only “Ussuri” is a paralectotype.

The lectotype of *Xiphydria ruficeps* Matsumura, described from “Hokkaido (Sapporo)” is at Hokkaido University, Sapporo, Japan. The number of specimens was not given by Matsumura, but the treatment of Matsumura’s xiphydriid types by Watanabe (1956) serves as a lectotype designation.

Xiphydria akazui first appeared in Matsumura (1932) wherein Matsumura cited it as “*Xiphydria akazui* (*X. ruficeps* Mats.)” in the Japanese section (p. 31), although only “*Xiphydria akazui*” was given in the English part of the book (p. 44). In the footnote on page 44, Matsumura mentioned “This may be a form of *X. ruficeps* Mocz [sic].” Matsumura may have recognized that his name *Xiphydria ruficeps* was preoccupied by *X. ruficeps* Mocsáry, and thus merely proposed a replacement name, *X. akazui*, for his species rather than intending to describe a new species. He did not specifically state that *X. akazui* was a new species or that it was a proposal of a new name, but he follows with a brief description. *Xiphydria akazui* is entered in the catalogs by Smith (1978) and Taeger et al. (2010) as a new species, not a replacement name. If regarded as a new species, the type specimen of *X. akazui*, may be the same specimen as the type of *X. ruficeps* Matsumura. Indications supporting that Matsumura (1932) proposed a new name and did not intend *X. akazui* to be a new species are that Watanabe (1956) did not give it in his list of Matsumura’s type specimens of Xiphydriidae. Matsumura always indicated that taxa were new when describing them, and there are no specimens of xiphydriids labeled *X. akazui* in Matsumura’s collection at the University of Hokkaido; there is only one specimen with a red label and Watanabe’s identification label of *X. ruficeps* (Ohara, pers. comm.).

Xiphydria maidli was described by Zirngiebl (1937) from “Ostsibirien (Ajetachka-Krasnaja bei Chabarowska).” The holotype is in the Naturhistorisches Museum, Vienna, Austria, and a paratype female from “Japan (Nopporo)” is in the Zoologische Staatssammlung, Munich, Germany. Blank (1996) regarded the two specimens as syntypes and unnecessarily designated a lectotype for this species. S. M. Blank (pers. comm.) pointed out that Zirngiebl stated “Typ” in the singular for the Siberian specimen, which therefore is the holotype. The other specimen from Japan would be a paratype.

In the introduction to his 1944 paper, Maa stated that the types of species “when not specially mentioned, are deposited in author’s collection.” Under type specimens for *Euxiphydria subtrifida*, he stated “Mao-Shan, Lungchien Hsien, SW, Chekiang, 3–5.vii.1939 (H. C. Yao), 5 males. Further paratopotypes in the collection of the Provincial Institute for Agricultural Improvement, Sungyang, Chekiang.” A holotype was not designated, and therefore the five males are considered syntypes. We assume they are in the “author’s collection,” since he stated that the additional specimens are in Chekiang. This was verified by the junior author, who made note that the syntypes are in the Taiwan Agricultural Research Institute Wufeng near Taichung (Shinohara 1988).

Distribution. CHINA: Heilongjiang and Tibet (Xiao et al. 1992); Henan (Wei et al. 2008); Fujian (Wei and Nie 2003, as *subtrifida*); Gansu (type locality, Jakovlev 1891); Hunan; Jilin (=Kirin); Zhejiang (=Chekiang, Maa 1944). JAPAN: Hokkaido, Honshu, Shikoku. NORTH KOREA: Mt. Geumgangsán. RUSSIA: Amur, Primorskii Krai, Sakhalin (Semenov and Gussakovkij 1935). SOUTH KOREA: Gangwon-do, Gyeonggi-do (Smith et al. 2011). Distributions and additional specific localities covering the countries listed are given in Matsumura (1927, 1930, 1931, 1932), Semenov and Gussakovskij (1935), Smith et al. (2011), Takeuchi (1937a, 1937b), Togashi (1973, 1974), Watanabe (1956), Wei et al. (2008), Xiao et al. (1992) and Yano (1917).

Specimens examined. CHINA: “Mandchourie, Prov.: Kirin, Kao-lin-tze,” “20. IV.40” (1 ♀, USNM, det by Maa 1948); “Manchukuo, Koolingtze, 13.7.40, Alin” (MNHU); Hunan, Mt. Yunshan, 1200 m, nr. Wugang, 4.V.2009, A. Shinohara (1 ♀, 5 ♂, NSMT, USNM), same except 10.V.2009 (4 ♂, NSMT), same except 5.V.2009 (1 ♂, NSMT). JAPAN: Ikutawara, Engaru, Hokkaido, 28. VII. 1981, T. Kinoshita (2 ♀, NSMT); same except 30. VII. 1982 (4 ♀, NSMT, USNM); Akkeshi, Kushiro, Hokkaido, 19. VII. 2002, A. Shinohara (1 ♀, NSMT); Horoka, Tokachi, Hokkaido, 25, VII. 1974, A. Watanabe (1 ♀, NSMT); Horoka—Mitsumata, Tokachi, Hokkaido, 20–21, VI. 1998, H. Hara (1 ♀, NSMT); Sounkyo, Kamikawa, Hokkaido, 18. VII. 1971, A. Shinohara (1 ♀, NSMT); same locality, 2. VII. 1984, R. Kano (1 ♀, NSMT); Arashiyama, Asahigawa, Hokkaido, 26. VII. 1987, H. Matsuura (1 ♀, NSMT); Ichinosawa, nr. Jozankei, Sapporo, Hokkaido, 26. VI. 1984, A. Shinohara (1 ♀, NSMT); Meguro—Chattsunai, Erimo, Hidaka, Hokkaido, 28. VII. 1984, M. Tomokuni (1 ♀, NSMT); Tashiro, Miyako, Iwate Pref., 15. VI. 1986, K. Emoto (1 ♀, NSMT); Akane-rindo, Yokote, Haranomachi, Fukushima Pref., 6. VI. 1980, T. Shimomura (1 ♀, NSMT); same locality, 8. VI. 1980, S. Tsuyuki (1 ♀, NSMT); same locality, 24. VI. 1984, S. Ohmomo (1 ♀, NSMT); Hodosan, Nagatoro, Saitama Pref., 18. VI.

1994, K. Emoto (1 ♀, NSMT); Kamiange, Mt. Jinbayama, Tokyo Met., 7. V. 1998, A. Shinohara (1 ♀, NSMT); Hikagezawa, Mt. Takaosan, Tokyo Met., 20. V. 1990, S. Ueno (1 ♀, NSMT); Nippara, Okutama, Tokyo Met., 24. V. 1964, T. Nakamura (1 ♀, NSMT); Aikawamachi, Kanagawa Pref., 16. VI. 1984, T. Kinoshita (2 ♀, NSMT); Miyagase, Sagami, Kanagawa Pref., 28.V. 1955, S. Asahina (1 ♀, NSMT); Mt. Daibosatsu, Yamanashi Pref., 27. VI. 1976, K. Mizuno (1 ♀, NSMT); Koganezawa, Otsuki, Yamanashi Pref., 26. V. 1974, K. Kimura (2 ♀, NSMT); Doisokoiso—Mitsuzawa, Shimobe, Minobumachi, Yamanashi Pref., 8. VI. 2005, S. Tsuyuki (1 ♀, NSMT); Azusayama, Kawakami, Nagano Pref., 5. VII. 1980, Y. Kurosawa (1 ♀, NSMT); Omi, Ohara, Sakyoku, Kyoto Pref., 16. VI. 1984, W. Suzuki (2 ♀, NSMT); “Aidake, Torigoe-Mura, Ishikawa Pref., 27.V.1973, I. Togashi (1 ♀, USNM, det by Togashi, 1974); “105, Col. Kumamoto, Ibukisan (Shiga), 22.VI.1980 (1 ♂, SDEI). NORTH KOREA: Mt. Kongo, [= Mt. Geumgangsán,], Chosen, July 28, 1924, Coll. Y. Kurisue (1 ♀, NSMT). RUSSIA: Ussuri, Kasakewitsch (types of *X. ruficeps*, HNHM); Szahalin, Csehovo-hegy, Z. Szklon, 15.VI.1995, Ermolenko (1 ♀, HNHM). SOUTH KOREA: Gyeonggi-do, Hakwanggyo-dong, Suwon, 8.VI.2009, A. Shinohara (1 ♀, NSMT); Gangwon-do, Odaesan, Pyeongchang-gun, Yeonggam-sa, alt. 800 m, 9.VI.2003, P. Tripotin (1 ♀, PT); Gangwon-do, Samcheok-si, Hegang-myeon, Gajeon-ri, N. 37 22', E128 33', 6 Malaise traps, 5–18-VI-2007, Tripotin rec. (1 ♀, PT).

Host. *Acer mono* Maxim. (Aceraceae) is the only recorded host for this species (Krivolutskaya and Stroganova 1966, Stroganova 1968).

Discussion. Although we do not have access to types of all species, we have examined a good number of specimens and can now give a better idea of variation and distribution of this species in Asia.

Two described species were placed in *Euxiphydria* by Semenov & Gussakovskij (1935) when they described the genus, *Xiphydria potanini*, known from a single specimen, and *X. ruficeps* Mocsáry recorded from the eastern coast of Russia (Ussuri and Vladivostok areas, Sakhalin), Japan, and China (Kirin, Manchuria). The two were kept separate by their size (*E. potanini* 10 mm and *E. ruficeps* 12–17 mm), different number of antennomeres (13 in *E. potanini*, 14 in *E. ruficeps*), shape of the radial cell in the forewing (more narrowly rounded in *E. potanini*), position of crossvein 1m-cu in the forewing (interstitial with 2r-m in *E. potanini*, meeting M apical to 2r-m in *E. ruficeps*), length vs. width of cell 1CU in the forewing (longer in *E. potanini*), wing color (less infuscated in *E. potanini*) and mesopleural sculpturation (denser in *E. potanini*). Gussakovskij (1935) retained these characters, separating the same two species. Takeuchi (1938) considered these characters variable and considered *X. potanini*, *X. ruficeps* Mocsáry, *X. ruficeps* Matsumura, *X. akazui*, and *X. maidli* (as a new synonym) synonymous. Maa (1944), however, retained *E. potanini* and *E. ruficeps* as distinct species and added another, *Euxiphydria subtrifida*. In 1949, Maa, being quite cautious, kept *E. potanini*, *E. ruficeps*, *E. subtrifida*, and *E. maidli* as separate species, even though he pointed out the variability of the characters used to separate them. He regarded it essential to see more material to resolve their systematic status. Watanabe (1956) also treated *E. potanini* and *E. ruficeps* Mocsáry as separate species;

E. potanini from China and Hokkaido (a new record), and *E. ruficeps* from Japan, Siberia, Manchuria, and Sakhalin. Subsequently, Stroganova (1968), Smith (1978) and Taeger et al (2010) have considered all as a single, variable species, accepting Takeuchi's (1938) classification.

We have not examined the holotype of *X. potanini* Jakovlev. Based on the description (Jakovlev 1891), especially the black and red color of the head and black legs, it cannot be the other species treated here. The description is sufficient to place *X. potanini* as the widespread species treated here.

We conclude that all species listed in the synonymy are conspecific and that characters previously used to separate them are variable, agreeing with Takeuchi (1938) and Maa's (1949) study of variation. Size does not mean much in xiphydriids where the same species can vary considerably in length. We have checked about 48 females and males, and they are 10–20 mm long. Number of antennomeres in multiarticulated species can vary. Of 30 specimens, 56 antennae were intact, and they have 13 antennomeres (13 antennae), 14 (34), 15 (7), and 16 (2). Of the 26 specimens with both antennae intact, five specimens have different number of antennomeres (13 and 14 in all cases) on each antenna. Watanabe (1956) also noted that number of antennomeres can vary from 13–15. The wing color and sculpture of the mesopleuron can vary slightly, the latter sometimes slightly denser in smaller individuals. Wing venation can vary in xiphydriids, as pointed out by Smith (2008), and shapes of the cells as pointed out by Semenov and Gussakovskij (1935) are rather vague.

Matsumura's species, *X. ruficeps* (and *X. akazui* if not considered a replacement name), is with little doubt synonymous with *E. potanini*. The descriptions are brief, but compare well with *E. potanini*, and the specimens are from Hokkaido and Honshu where nothing else can be confused with *X. potanini*.

Zirngiebl (1937) described *E. maidli* from eastern Siberia. There is nothing in this area that can be confused with *E. potanini*. Zirngiebl's description agrees with *E. potanini*, and comparison with images of the paratype (S. Schmidt, pers. comm.) confirmed its synonymy.

Euxiphydria subtrifida was described from males from Chekiang, China. Even Maa (1949) had reservations about its validity, stating that it was probably inseparable from *E. ruficeps*. Males we have seen of *E. potanini* from China agree with Maa's description, and we therefore propose its synonymy under *E. potanini*.

***Euxiphydria pseudoruficeps* Okutani**

http://species-id.net/wiki/Euxiphydria_pseudoruficeps

Figs 23–29

Euxiphydria pseudoruficeps Okutani 1966: 311, Figs 7, 8.

Diagnosis. Length, 11.5 mm. Black except head entirely orange (Fig. 24). Forewing uniformly lightly infuscated; hind wing somewhat paler on basal half (Fig. 23). An-



Figures 23–24. *Euxiphydria pseudoruficeps*, holotype **23** Dorsal view **24** Lateral view.

tenna (Fig. 29) with 14 or 15 antennomeres; length of first four antennomeres as 1.0:0.3:0.8:0.4. Sculpture on frons consisting of straight to irregular carinae, not reticulate (Fig. 28). Head from above gently rounded behind eyes, distance behind eyes much longer than eye length (Fig. 27). Malar space narrow between eye and antennal groove, much shorter than width of groove (Fig. 28). Axilla and mesoscutellum with



Figures 25–29. *Euxiphydria pseudoruficeps*, holotype **25** Thorax, lateral view **26** Thorax, dorsal view **27** Head, dorsal view **28** Head, front view **29** Antenna.

irregular longitudinal carinae, posterolateral and posterior sides smooth and shiny (Fig. 26). Mesepimeron with long, distinct, almost parallel carinae (Fig. 25). Hind basitarsomere subequal to length of remaining tarsomeres combined. Length of sheath slightly shorter than length of basal plate. Male unknown.

Specimens examined. Holotype. Female, labeled “[FORMOSA] Tattaka, 31.May.1965, T. Shirôzu” (KU). Okutani (1966) stated “31-v-1965, Sungkang, Formosa, T. Shirôzu leg.”. TAIWAN: “[Taiwan], Sungkang, 2000m, Nan-tou-Hsien, 19–25.iv.1987, C. C. Lo (1 ♀, NSMT).

Discussion. The two specimens examined are very similar, though the carinae on the frons and mesoscutellum of the holotype are somewhat more distinct than in the other specimen.

***Euxiphydria vietnamensis* Smith & Shinohara, sp. n.**

urn:lsid:zoobank.org:act:28E6D4CB-E05C-4B77-8527-6E52632DEF0A

http://species-id.net/wiki/Euxiphydria_vietnamensis

Figs 30–35

Holotype. Female, labeled “Deo O Quy Ho, 1750m, Sa Pa, Lao Cai Prov., Vietnam, 12–17.v.1995, A. Shinohara (NSMT).

Description. *Female.* Length, 14.0 mm.

Color. Head red; black on ocellar area and extending posteriorly to near occiput through center of postocellar area (Figs 33, 34). Abdomen black with white spot on side of eighth tergite (Fig. 30). Legs black with basal third of hind tibia and hind basitarsomere white (Fig. 30). Wings uniformly, lightly infuscated; hind wing somewhat more hyaline on basal half.

Head. Antenna with 19 antennomeres; length of first four antennomeres as 1.0:0.4:0.9:0.5. Frons with curved almost parallel carinae (Fig. 34). Upper half of gena and vertex from posterior margin of lateral ocelli smooth, shiny. Malar space between eye and antennal groove narrow, much less than width of groove (Fig. 34). Width of gena behind eyes about 1.4× eye width. Head from above straight behind eyes, distance behind eyes slightly longer than eye length (Fig. 33).

Thorax. Pronotum smooth and shiny anteroventrally, with irregular strong carinae dorsally and posteriorly (Fig. 31). Mesoscutal middle lobe and inner margins of lateral lobes reticulate; outer lateral lobes with large smooth, shiny area (Fig. 32). Axilla and mesoscutellum entirely sculptured, reticulate (Fig. 32), mesoscutellum separated from axillae by broad, shiny punctures. Mesepisternum mostly reticulate; mesepimeron anteriorly almost smooth, posteriorly with large oval punctures; metapleuron reticulate (Fig. 31). Metascutellum short, about 2× broader than long, reticulate, straight posteriorly (Fig. 32). Hind basitarsomere shorter than length of remaining tarsomeres combined, as 0.8:1.0.

Abdomen. Basal plates densely punctate anterolaterally, shiny and with few punctures on medial posterior portion (Fig. 32); rest of abdomen shiny, finely punctate. Length of sheath slightly shorter than length of basal plate.

Male. Unknown.

Etymology. Named for the country of collection.

Discussion. The white lateral spot on the eighth abdominal tergite, partly white hind tibia and hind basitarsomere, the curved, almost parallel carinae on the frons, the head in dorsal view long behind the eyes, and the completely sculptured axilla and mesoscutellum will distinguish *E. vietnamensis* from other *Euxiphydria* species. This is the southernmost record for the genus.



Figures 30–35. *Euxiphydria vietnamensis*, holotype **30** Lateral view **31** Thorax, lateral view **32** Thorax, dorsal view **33** Head, dorsal view **34** Head, front view **35** Mouthparts (labial palpus on right, maxillary palpus on left).

***Euxiphydria shaanxiana* Smith & Shinohara, sp. n.**

urn:lsid:zoobank.org:act:BCFA9E69-7F46-4C58-ABF2-DF8DD57F5F85

http://species-id.net/wiki/Euxiphydria_shaanxiana

Figs 36–41

Holotype. Female, labeled “[China: Shaanxi], Kaitianguan, 2000m, 34 00N 107 51E, Mt. Taibaishan, Qinling Mts., 27.v.2005, A. Shinohara” (1 ♀, IZB).

Paratype. “Shaanxi, Kaitianguan, 2000 m, 34 00N, 107 51E, Mt. Taibaishan, Qinling Mts., 5.VI.2007, A. Shinohara” (1 ♀, NSMT).

Description. *Female.* Length, 13 mm.

Color. Head red; thorax, abdomen, and legs black (Figs 36, 37). Wings uniformly hyaline (Figs 36).

Head. Antenna with 15 antennomeres; length of first four antennomeres as 1.0:0.4:0.9:0.4. Frons reticulate in front of ocelli and between ocelli and eyes, with irregular almost parallel carinae dorsal to and between antennae (Fig. 41). Upper half of gena and vertex from posterior margin of lateral ocelli smooth, shiny. Malar space between eye and antennal groove narrow, much less than width of groove (Fig. 41). Width of gena behind eyes about subequal to eye width. Head from above rounded and narrowing behind eyes, distance behind eyes about equal to eye length (Fig. 40).

Thorax. Pronotum smooth and shiny anteroventrally, reticulate to carinate dorsally and posteriorly (Fig. 38). Mesoscutal middle lobe and inner margins of lateral lobes finely punctate to reticulate; outer lateral lobes with large smooth, shiny area (Fig. 39). Axilla and mesoscutellum finely punctate with irregular longitudinal carinae (Fig. 39), mesoscutellum separated from axillae by narrow punctures, broad lateral downturned area shining with four or five transverse carinae (Fig. 39). Mesepisternum mostly reticulate; mesepimeron anteriorly almost smooth, posteriorly with fine transverse carinae; metapleuron finely reticulate (Fig. 38). Metascutellum about 2.5× broader than long, finely reticulate, rounded posteriorly (Fig. 39). Hind basitarsomere shorter than length of remaining tarsomeres combined, as 0.8:1.0.

Abdomen. Basal plates mostly smooth and shining, finely punctate anteriorly, (Fig. 39); rest of abdomen shiny, finely punctate. Length of sheath subequal to length of basal plate.

Male. Unknown.

Etymology. Named for the Chinese province in which it was collected.

Discussion. The red head and black thorax, abdomen, and legs are similar only to *E. potanini*. In *E. shaanxiana*, the head is entirely red, behind the eyes in dorsal view sharply rounded with the distance about equal to the eye length, the sculpture on the frons consists of irregular carinae, and the axillae and mesoscutellum are more finely sculptured with the posterior portion smooth and shiny.



Figures 36–37. *Euxiphydria shaanxiana*, holotype **36** Dorsal view **37** Lateral view.



Figures 38–41. *Euxiphydria shaanxiana*, holotype **38** Thorax, lateral view **39** Thorax, dorsal view **40** Head, dorsal view **41** Head, front view.

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Two new genera of Rogadinae (Insecta, Hymenoptera, Braconidae) from Thailand

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Abstract

Confusocentrus panturat **gen. n., sp. n.**, and *Quasimodorogas confusus* **gen. n., sp. n.**, both from Thailand, are described as new and illustrated. *Confusocentrus* has a long ovipositor, no division between face and clypeus, an enlarged and heavily sclerotized and sculptured syntergite with subsequent ones weakly sclerotized and retracted. It resembles an heavily sculptured *Clinocentrus* species except for the merged face and clypeus, and the lack of transverse sculpture on the 3rd tergite. *Quasimodorogas* has a claw with a pointed basal lobe and an highly humped mesosoma, short metasoma, and a basally very narrow 1st metasomal tergite thus showing affinities with the *Colastomion* subgroup of the Rogadini. In addition it has various unique features including no separation between the base of the hind tibial spurs (unlike in *Aleiodes* with comb, in which it is interrupted at level of inner spur) and metasoma with foveolate tergites 2–5.

Keywords

Rogadini, Clinocentrini, *Aleiodes*, parasitoid, new species, Malaise trap, *Kerevata*

Introduction

The Rogadinae fauna of the tropics is poorly understood. In recent years, the faunas of the New World, Africa and China have been reviewed at genus level (Achterberg

1991, Chen and He 1997, Shaw 1997), and several new genera erected (Achterberg 1989, 1995, Achterberg and Chen 1996; Belokobylskij 1999, Chen et al. 2004, Long and van Achterberg, 2008). Subsequently, a few genera have been sunk into synonymy with the enormous cosmopolitan genus *Aleiodes* Wesmael based on molecular data supported in part also by studies of the female venom apparatus and the nature of the mummified host and the wasps emergence from it (Zaldivar-Riverón et al. 2004, 2009, Quicke and Shaw 2005, Areekul Butcher and Quicke 2011).

The rogadoine fauna of SE Asia is virtually unknown at species level with probably 90% of species currently undescribed. The only exception being the distinctive genera of the Spinariini which have been revised by van Achterberg (2007). Examination of hundreds of specimens of Rogadinae collected by the TIGER project which involved Malaise trap sampling in 30 different parks and at 559 individual sites across Thailand over three years has revealed a large number of new species, especially of *Aleiodes*, and these will be described elsewhere. Among this material we have two rogadoine specimens that can not be satisfactorily placed in any currently recognised genus, and these are described and illustrated here prior to their inclusion in a global phylogenetic analysis of the group based on both morphological and molecular data. Preliminary molecular analyses confirm that neither genus is derived within representatives of other sampled genera.

Terminology follows van Achterberg (1988) repeated in Chen and He (1997). Sculptural terms follow Harris (1979). Types are deposited in the Queen Sirikit Botanic Garden insect collection in Chiang Mai (QSBG).

Systematics

Confusocentrus gen. n.

urn:lsid:zoobank.org:act:E14B66D7-6719-4403-B706-9EA023D974BA

<http://species-id.net/wiki/Confusocentrus>

Figs 1, 2

Type species. *Confusocentrus panturat* sp. n. by monotypy

Morphology. *Head.* Median flagellomeres longer than wide. Annelus without distinct circular oblique carina. Face and clypeus with no externally visible separation, both smooth and shiny. Hypoclypeal depression not strongly arched. Malar suture absent. Mandibles twisted so that only upper tooth visible in frontal view. Eyes moderately emarginated opposite antennal sockets. Head strongly narrowed behind eyes. Occipital carina complete and strong.

Mesosoma. Largely shiny. Pronotum moderately produced into a shelf, anterior margin strongly upcurved; antero-dorsally with a well-developed, posteriorly directed, 'V'-shaped carina. Notauli deep and crenulated. Mesoscutum with a deep longitudinal medial depression posteriorly between notauli. Prepectal carina strongly developed.

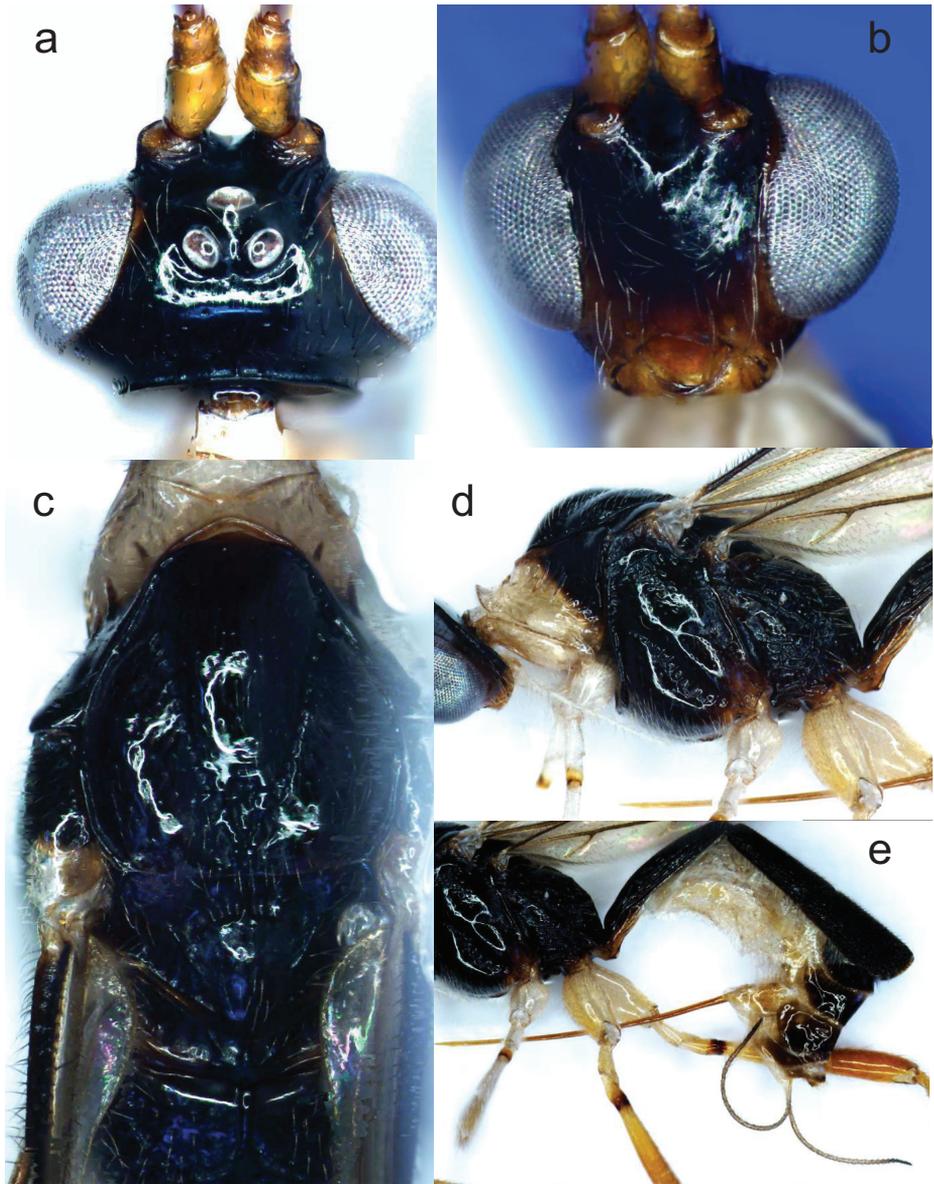


Figure 1. *Confusocentrus panturat* gen. n., sp. n., holotype, CellD® light micrographs. **A** Top of head **B** head, front view **C** thorax, dorsal view **D** mesosoma, lateral view **E** posterior mesosoma, metasoma and ovipositor, lateral view.

Precoxal suture deep, sigmoidal, crenulated. Propodeum with midlongitudinal carina on anterior third, otherwise with confused rugose sculpture.

Fore wing. Vein M+CU distinctly angled medially and thickened beyond angulation. Vein 1-CU1 and its junction with cu-a strongly thickened. Subbasal cell with a

narrow line of reduced setosity paralleling and close to distal segment of M+CU. Vein 1-SR almost absent. Vein r arising slightly beyond middle of pterostigma.

Hind wing. Veins M+CU and 1-M approximately the same length. Vein 2-SC+R longitudinal. Vein m-cu present, pigmented and reclivous. Vein SR indicated by a pigmented fold.

Legs. Claws simple. Apex of hind tibia with a well-developed comb of specialised adpressed setae both medially and ventrally between spurs.

Metasoma. Tergites 1 to 3 forming a narrow, heavily sculptured carapace, subsequent tergites weakly sclerotised and concealed. First metasomal tergite elongate, sub-basally narrowed; dorsal carinae uniting to form complete midlongitudinal carina. 2nd tergite with a small midbasal triangular area produced into a midlongitudinal carina that extends beyond middle of tergite. Ovipositor strongly exerted,

Etymology. Name in reference to the difficulty of the systematic placement of the new genus and an allusion to the great oriental philosopher Confucius and punned with *confusio* [Latin for “confusion”], in combination with part of the name of the apparently related genus *Clinocentrus*.

Notes. In the key to genera of Chinese Rogadinae (Chen and He, 1997), the only available key to taxa from the region, *Confusocentrus* will falter at couplet 2, because while it has hind wing vein cu-a and a long ovipositor, it does not have an areolate propodeum and the third tergite is strongly foveolate with no transverse sculpture, and has a well-developed lateral crease.

Placement of this genus within the Rogadinae is indicated by the midlongitudinal carina on the 1st and 2nd metasomal tergites (apomorphic). An affinity with the tribe Clinocentrini is tentative as, with the exception of the absence of a malar suture, the uniting characters are all likely to be symplesiomorphies, such as the relatively long ovipositor. *Confusocentrus* lacks the transverse curved sculpture on the 3rd metasomal tergite that characterises many *Clinocentrus* Haliday and *Tebennotoma* Enderlein, though this feature is not present in all species (Belokobylskij 1995, 2000); has fore wing vein CU1b present unlike *Tebennotoma*; has the dorsal carinae of tergite 1 uniting to form a midlongitudinal carina unlike *Artocella* van Achterberg. The clinocentrine genus *Kerevata* described by Belokobylskij (1999) from New Britain, also has the three basal metasomal tergites rather enlarged (but not forming a carapace to the same extent) and has the distal part of the fore wing subbasal cell modified with thickened veins but in this case the distal part of M+CU is curved, and vein cu-a is strongly thickened and curved, these together forming an oval expansion of the subbasal cell. *Kerevata* also differs from *Confusocentrus* gen. n. in having the hind wing vein 2-SC+R transverse, tergites 1–3 longitudinally striate and the annellus with an oblique, circular distal carina. All these other Clinocentrini have the clypeus well separated from the face.

Preliminary molecular analyses indicate a relationship with the Clinocentrini, but within this group there is little support for most relationships, and with the currently

available sequences, *Clinocentrus* as currently recognised, does not itself appear to be monophyletic.

***Confusocentrus panturat* sp. n.**

urn:lsid:zoobank.org:act:18C6DCC2-3E25-4DAA-AAE2-69657E54AE7E

http://species-id.net/wiki/Confusocentrus_panturat

Figs 1, 2

Material examined. Holotype female, Thailand, Surat Thani, Khao Sok N P., Klong Morg unit, 8°53.725'N, 98°39.025'E, 87 m, 2.xii.2008, coll. Pongphan, DNA voucher BCLDQ01571 (QSBG).

Morphology. Length of body 6.4 mm, of fore wing 4.5 mm and of ovipositor 2.3 mm.

Head. Antenna broken in only known specimen, minimally with 39 flagellomeres. First flagellomere $1.4 \times$ length of second, and $1.45 \times$ length of 3rd flagellomere. Face smooth and shiny with sparse setosity. Width of face: Height of eye: width of head = 1.0:1.35:2.3. Frons with 2 pairs of weak carinae paralleling margin of eye just behind antennal sockets. Shortest distance between posterior ocelli: transverse diameter of posterior ocellus: shortest distance from posterior ocellus and eye = 1.0:2.3:2.3.

Mesosoma. Dorsople deep and slit-like. Mesopleuron with deep, sigmoidal, rather narrow, crenulated precoxal suture; with crenulations along posterior edge of prepectal carina; with crenulated plural suture.

Fore wing. Length of veins r: 3-SR: SR1 = 1.0: 1.67:5.2. Vein m-cu approximately same length as vein 2-SR+M. Vein 1-CU1 0.5 times length of 2-CU1.

Hind wing. Without vein 1-1A. Vein M+CU 0.9 times length of 1-M (measured to junction with 2-M).

Legs. Lengths of fore femur: tibia: tarsus: basitarsus = 2.3: 2.75: 3.16: 1.0. Length of hind femur:tibia: tarsus = 1.5: 1.9 : 2.3: 1.0.

Metasoma. First tergite $2.1 \times$ longer than posteriorly wide, petiolate, narrowest part $0.37 \times$ width at widest part. Second and third tergites foveolate to foveolate-rugulose. Second tergite 1.13 times longer than maximally wide; 1.13 times longer medially than 3rd tergite. Third tergite with weak emargination postero-medially. Ovipositor sheaths approximately $0.85 \times$ length hind femur (excluding trochantellus).

Coloration. Head and body largely black: lower part of face brownish, pronotum and propleuron ivory white. Legs largely orange-brown with coxa and trochanter largely ivory white, trochantellus black. Winks clear to hyaline with dark brown-black venation and pterostigma.

Etymology. Panturat is the name of a mountain, a giant lying on his side, near the collection site of the holotype.

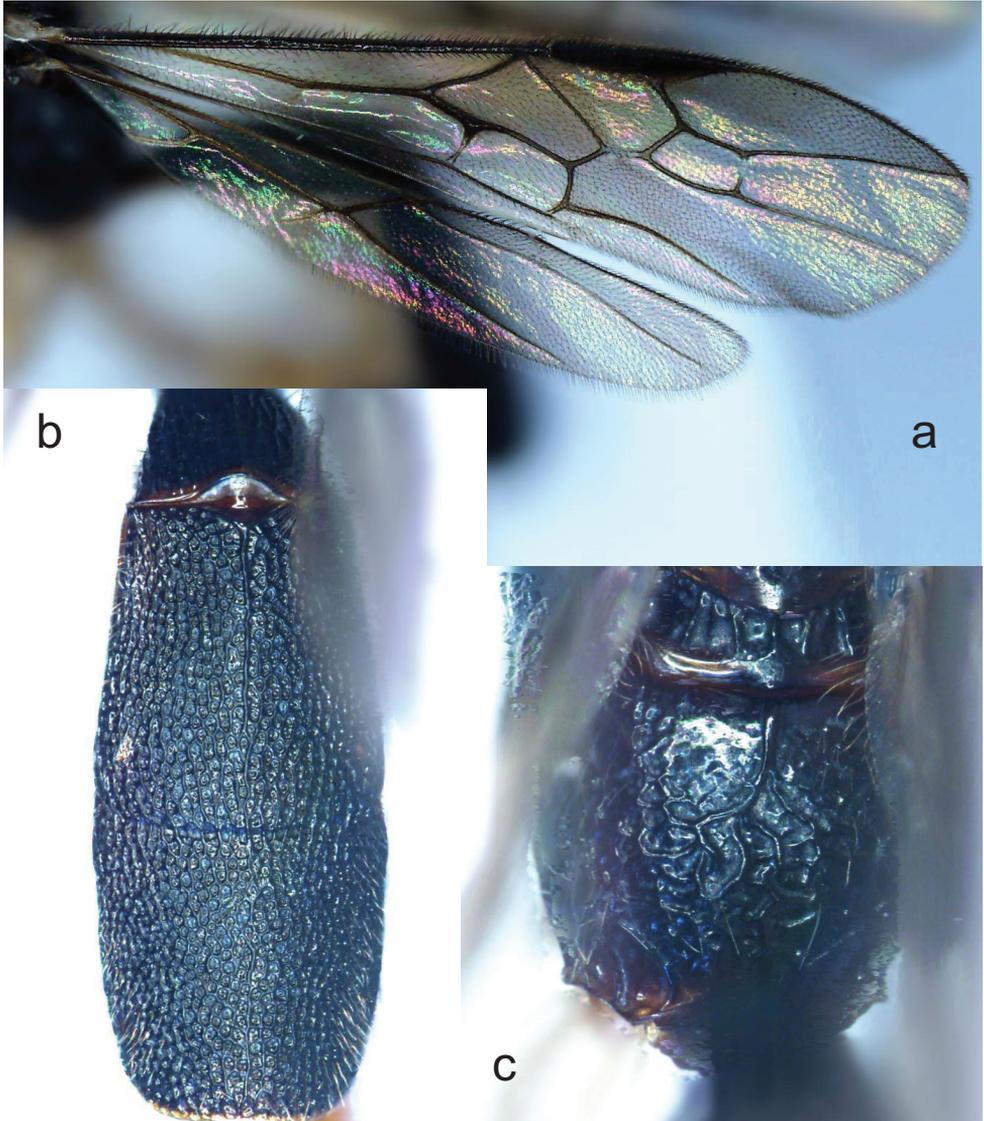


Figure 2. *Confusocentrus panturat* gen. n., sp. n., holotype, CellID® light micrographs **A** Wings **B** metasomal tergites 2 and 3, dorsal view **C** propodeum.

Quasimodorogas gen. n.

urn:lsid:zoobank.org:act:E3A546E6-B729-4883-A32E-4CFBC0DFD5F1

<http://species-id.net/wiki/Quasimodorogas>

Figs 3, 4

Type species. *Quasimodorogas confusus* sp. n. by monotypy

Morphology. *Head.* Antennae much longer than fore wing, with more than 50 flagellomeres. Terminal flagellomere strongly acuminate. Median flagellomeres longer than wide, with setae mostly longer than width of flagellomere. Malar suture deep. Face with fine transverse striation. Occipital carina complete. Labial and maxillary palps (of female) without swollen segments.

Mesosoma. Very short and tall, hardly longer than high; largely smooth and shiny. Pronotum not produced into a conspicuous neck. Mesoscutum with well-developed crenulate notauli. Middle lobe of mesoscutum with deep, crenulated longitudinal groove posteriorly. Propodeum with short midlongitudinal carina anteriorly.

Fore wing. Vein 1-M rather strongly curved and with a small basally directed knob near its junction with M+CU. Vein 1-SR+M nearly straight, slightly curving posteriorly. Vein m-cu weakly curved but not forming a continuous curve with vein 2-CU1. Basal cell largely glabrous on posterior half. 2nd submarginal cell long and narrow. Subbasal cell largely glabrous except at apex. Vein cu-a rather strongly curved. Vein CU1a well developed, tubular for more than half its length.

Hind wing. Vein 1-M distinctly bent just before apex. Vein m-cu absent. Vein SR1 not strongly widening distally, more or less parallel to anterior margin of wing. Vein 1r-m curved. Vein 1-1A distinct.

Legs. Claws with large pointed, pale coloured basal lobe. Hind tibia with large, apico-medial and apico-ventral comb of specialised adpressed setae; the ventral portion not divided by gap at level of inner spur. Hind tibial spurs setose and distinctly but not strongly curved.

Metasoma. Metasoma short, tergites 2 to 5 with strong sculpture. First tergite strongly narrowed subbasally; dorsal carinae uniting to form irregular but distinct mid-longitudinal carina. Tergite 2 with a small mid-anterior triangular area produced into a complete midlongitudinal carina. 2nd suture deep and crenulated. Tergites 2-5 with well-developed lateral crease. Hypopygium small, weakly sclerotized, weakly convex ventrally,

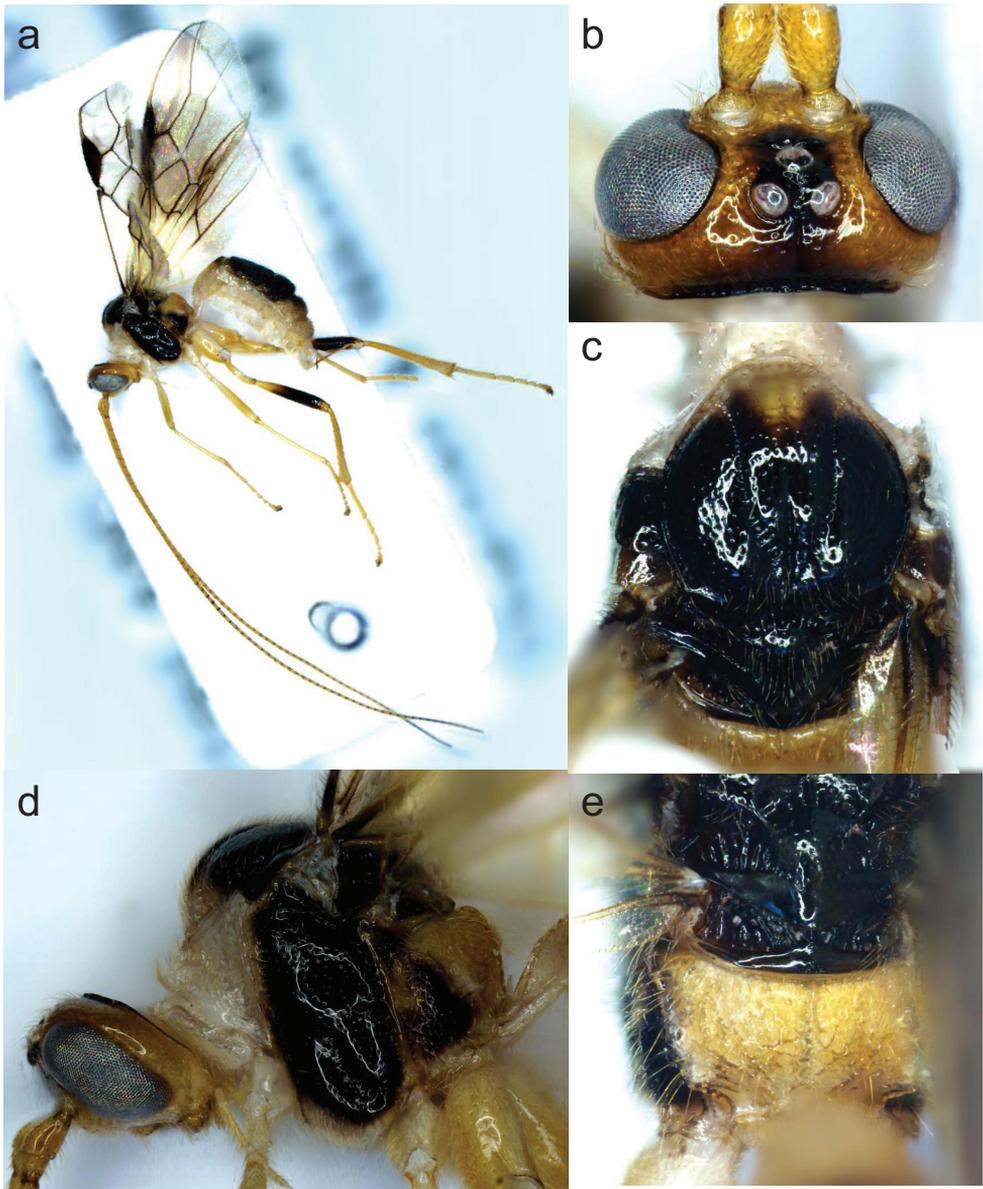


Figure 3. *Quasimodorogas confusus* sp. n. holotype, CellD® light micrographs **A** Habitus **B** top of head; **C** mesonotum and scutellum **D** head and mesosoma, lateral view **E** metanotum and propodeum.

Etymology. Named after the famous character in the novel *The Hunchback of Notre Dame* by Victor Hugo, and the generic name *Rogas*.

Notes. Within the Rogadinae s.s. those taxa with a large pointed basal lobe appear to belong to a monophyletic group, though not all members of that group have a claw with a pointed basal lobe. This group was referred to as the Rogadini by Zaldivar-Riverón et al. (2009) and in S. E. Asia comprises the genera *Canalirogas*

van Achterberg & Chen, *Colastomion* Baker, *Conspinarina* Schulz, *Cystomastocoides* van Achterberg, *Darnilia* van Achterberg, *Gyroneuronella* Baker, *Iporhogas* Granger, *Macrostomion* Szépligeti, *Megarogas* Szépligeti, *Rogas* Nees, *Rogasella* Chen & He, *Rogasodes* Baker, *Triraphis* Ruthe, *Troporogas* Cameron and *Trigonoplatnus* Cameron. Within this group, *Colastomion*, *Cystomastocoides*, *Macrostomion* and *Megarogas* have the first metasomal tergite rather elongate and strongly narrowed sub-basally, almost certainly an apomorphic state, associated with a long metasoma as a whole, and usually with a ventrally convex hypopygium. In addition, these genera have largely glabrous and strongly curved hind tibial spurs, as do the extralimital genera *Myocron* van Achterberg and *Cystomastax* Enderlein. *Quasimodorogas* gen. n. differs from all of these in having a short, stout body with the mesosoma less than 1.1 times longer than high, and with the hypopygium small and only weakly convex ventrally and the hind tibial spurs completely setose and not strongly curved. It is therefore possible that the anteriorly narrowed 1st metasomal tergite in the new genus represents a parallelism rather than synapomorphy. It differs from all other Asian Rogadinae, except *Confusocentrus* gen. n., in its strongly foveolate metasomal sculpture.

Preliminary molecular analyses suggest that *Quasimodorogas* gen. n. is relatively closely related to *Rogasella* Baker, *Rogasodes* Chen & He, *Gyroneuron* Kokujev, *Gyroneuronella* Baker, but is not nested within any of these genera.

***Quasimodorogas confusus* sp. n.**

urn:lsid:zoobank.org:act:A2A3F287-6E71-4000-9AF8-83FE06CC9DC9

http://species-id.net/wiki/Quasimodorogas_confusus

Figs 3,4

Material examined. Holotype female, Thailand, Nam Province, Doi Phu Kha N P, office 19°12.458'N, 101°4.866'E, 1359 m, 29.xi.2007, coll. Charoen & Nikom collection code T3259, DNA voucher BCLDQ01600 (QSBG).

Morphology. Length of body 5.5 mm, fore wing 6.0 mm, of antenna 12.0 mm and of ovipositor 1.1 mm.

Head. Antenna with 63 flagellomeres. Mesial flagellomeres approximately 3.7 × longer than wide. First flagellomere 1.3 × longer than both the 2nd and 3rd separately. Face with fine transverse striation angled upwards medially. Height of eye: width of face: width of head (across eyes) = 1.42: 1.0: 2.3. Frons, vertex and occiput shiny. Frons with depressions on either side just in front of anterior ocellus. Shortest distance between posterior ocelli: transverse diameter of posterior ocellus: shortest distance from posterior ocellus and eye = 1.0:2.0:2.0. Back of head with a distinct longitudinal groove running between occipital carina and posterior ocellus; with crenulation along whole of anterior edge of occipital carina.

Mesosoma. 1.05 × longer than tall. Scutellar sulcus with 5 strong carinae between the outer ones. Propodeum with distinct small medio-lateral tooth-like process.

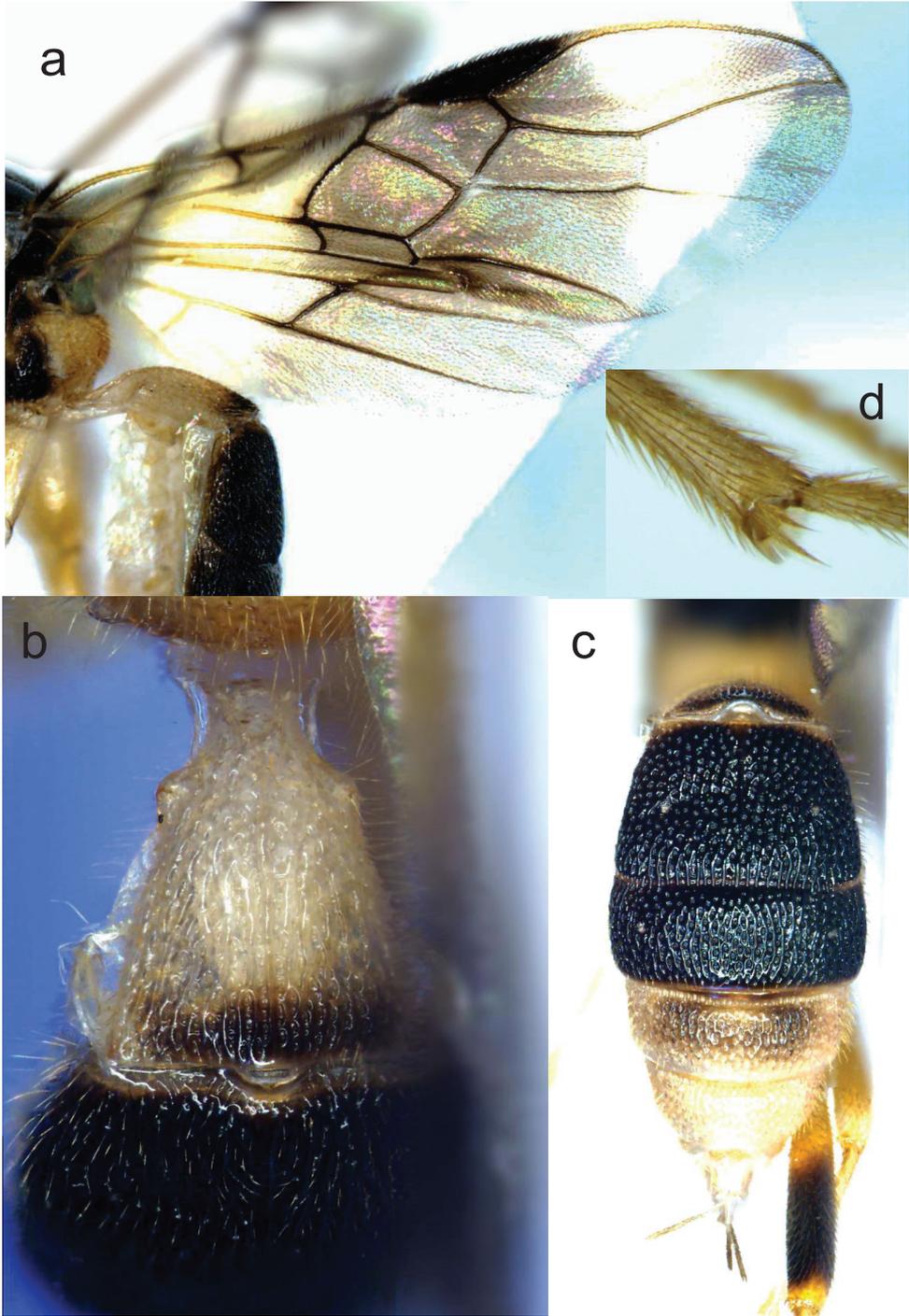


Figure 4. *Quasimodorogas confusus* sp. n. holotype, CellD® light micrographs **A** Wings and anterior metasoma, lateral view **B** 1st metasomal tergite, slightly postero-dorsal view **C** metasomal tergites 2–5, dorsal view **D** ventro-lateral view of apex of hind tibia showing specialised setal comb, and closely spaced spurs.

Fore wing. Lengths of veins r:3-SR:SR1 = 1.0:3.5:5.7. Vein 3-SR approximately $2.5 \times$ length of r-m. Vein cu-a strongly curved. Vein 2-CU1 approximately $5 \times$ length of 1-CU1, the latter distinctly thickened.

Legs. Lengths of fore femur : tibia: tarsus: basitarsus = 1.9: 2.0: 2.25: 1. Lengths of hind femur: tibia: tarsus = 1.0: 1.2: 1.25. Hind basitarsus equal in length to tarsal segments 2, 3 and 4 combined and approximately $10 \times$ longer than maximally deep.

Metasoma. Tergites 1–5 strongly foveolate. 1st tergite approximately $1.4 \times$ longer than maximally wide; $2.3 \times$ wider posteriorly than at its narrowest. Tergite 2 $1.5 \times$ wider than medially long; $1.4 \times$ longer than 3rd. 2nd suture weakly bisinuate, wide.

Coloration. Antennae yellow basally becoming dark apically, the pale segments narrowly spotted black at apex. Head brown yellow becoming black posterodorsally including stematicum and centre of frons. Mesosoma largely black, pronotum and anterior of mesoscutum white, propodeum brown yellow. Wings with a broad smokey transverse band and small smokey grey patch at apex; venation yellow in parts where membrane not pigmented, black where membrane is smokey, including whole of pterostigma. Legs yellow with white coxae, but with hind femur largely black. Metasoma largely white but posterior of tergite 1 narrowly, and all of tergites 2+3 black.

Etymology. Based on the confusing combination of characters.

Acknowledgements

We are grateful to Mike Sharkey (Hymenoptera Research Institute, University of Kentucky) for allowing us access to material collected by the TIGER project from which the 2 specimens described here came, and which was funded by NSF grant (DEB 0542864). The Animal Systematic Research Unit and Integrated Ecology Lab, Department of Biology, Faculty of Science, Chulalongkorn University kindly allowed use of their Cell^{AD}® imaging facility. This work was partly supported by BRT (R152126) and a Chulalongkorn University Centenary Academic Development Project grant to BAB.

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A new derived species group of *Aleiodes* parasitoid wasps (Hymenoptera, Braconidae, Rogadinae) from Asia with descriptions of three new species

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Abstract

Three new species of Asian *Aleiodes* are described and illustrated: *A. spurivena* **sp. n.** from Vietnam, Thailand, Nepal and India; *A. spurivenaduplus* **sp. n.** from Vietnam; *A. spurivenatriplus* from Western Malaysia. The first two of these are differentiated based on the bar-coding, 5' region of the cytochrome oxidase 1 gene. All three are morphologically extremely uniform and can be recognised from other *Aleiodes* species by the presence of a reclivous spur arising from fore wing vein 1–1A.

Keywords

Aleiodini, Oriental, cryptic species, colour variation

Introduction

During revision of the species of the rogadine braconid wasp genus *Aleiodes* Wesmael formerly classified in the genus *Hemigyron* (Areekul Butcher & Quicke, 2011), we encountered a number of superficially similar specimens from India, Nepal, Thailand, Vietnam and peninsular Malaysia, that represent an easily recognised, previously undescribed species group. The specimens are large and brightly coloured yellow and black. Specimens collectively show marked differences in colour pattern, but are morphologically very difficult to distinguish. We have obtained DNA sequence data for four of the specimens (all from Vietnam) that indicate the presence of two species differing only slightly in wing venation. Based on morphology alone, one of these appears to be widespread in mainland Asia. Here we describe this new species group to include these two species along with a third from Malaysia that displays slightly more derived wing venation and darker coloration. Based on limited collecting evidence, we suspect much of the colour variation is intraspecific.

Terminology follows van Achterberg (1996) repeated in Chen and He (1997). Sculptural terms follow Harris (1979). The following abbreviation is used: BMNH, Natural History Museum, London; RMNH, Naturalis Museum, Leiden, Netherlands.

Systematics

Diagnosis of *Aleiodes spurivena* sp. n. species group

Occipital carina complete. Propodeum with distinct medio-lateral angulations and with more or less complete mid-longitudinal carina. Fore wing vein 1-A with a posterior short to long spur; distal 0.7 or more of subbasal cell glabrous (except ventrally narrowly along anterior margin) and distally swollen but lacking sclerome; junction of veins M+CU, 1-CU1 and 1-M moderately to very strongly swollen; subdiscal cell evenly setose; 2nd submarginal cell short and trapezoidal. Hind wing with vein r present as an oblique sclerotized line running at least a third of width of marginal cell. Apex of hind tibia with well-developed comb of specialised flattened setae on medial and ventral faces. Claws with strong pecten of approximately 12 teeth nearly reaching base of claw. Male without median tergal gland pore on tergites 4–6.

Key to the species of the *A. spurivena* sp. n. group

- 1 Forewing veins M+CU and 1-CU1 strongly swollen at junction with 1-M, vein M+CU narrowed and distinctly sinuate before the swelling (Fig. 1a);

- hind femur beyond trochantellus and hind tibia entirely black
*A. spurivenatriplus* sp. n.
- Forewing veins M+CU and 1-CU1 weakly swollen at junction with 1-M, vein M+CU not distinctly sinuate before the swelling (Figs 1b,c); hind femur black with apex yellow, hind tibia yellow on at least basal third (Fig. 2) **2**
- 2 Fore wing vein 1-CU1 (measured between middles of its swollen junctions) less than $0.6 \times$ length of 2-CU1 (Fig. 1b); spur on fore wing vein 1-A tubular and reaching close to posterior margin of wing (Fig. 1b)...*A. spurivena* sp. n.
- Fore wing vein 1-CU1 (measured between middles of its swollen junctions) $0.9 \times$ length of 2-CU1 (Fig. 1c); spur on fore wing vein 1-A short, not reaching beyond middle of anal cell (Fig. 1c)*A. spurivenaduplus* sp. n.

***Aleiodes spurivena* Quicke & Butcher, sp. n.**

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http://species-id.net/wiki/Aleiodes_spurivena

Figs 1b, 2, 3

Holotype female. “VIETNAM, Vihn Phu Prov., Thung Cuu, 30 km S of Than Son, 10–16.XI.1999, 20.59 N 105.08 E, 300m R. de Jong at light VN 99-8 RMNH 2000”, “BCLDQ0003” (RMNH).

Paratypes. VIETNAM: 2 females, Vihn Phu Province, Thung Cuu, (DNA vouchers BF00928, BF00932) (RMNH). THAILAND: 2 females, S. Thailand, 7 km N of Ranong, Ch 9 TV relay stn., 25–29.xi.1991, 350–500m, I.J. Kitching & a. M. Cotton (BMNH); 1 female, Chiang Mai, Doi Suthap, 1440m, 1983 (BMNH). NEPAL: 1 female, Kathmandu, British Embassy, v.i.1984, 1350 m., M. G. Allen (BMNH). INDIA: 1 female, Assam, Nambour Forest Reserve, 29.xi.1997, Sinaer & Murzin (private collection); 1 male, United Provinces, Naini Tal., c. 500ft., 15.iv.1934, “at light”, J. A. Graham (BMNH).

Coloration. Bright ochreous yellow with black pattern of variable extent. Minimally with flagellum, stemmaticum, metasomal tergite 4, hind coxa largely, hind femur medially, hind tibia apically, and hind tarsus black. In darker specimens black or dark brown marks occur on lateral lobes of mesoscutum, mesopleuron, propodeum antero-laterally, and metasomal tergites 2–4. Wings pale yellow with yellow to brown yellow venation and with fore wing parastigma and apex of C+SC+R black.

Notes. The variation in coloration is quite large, however, we are inclined to think all the above specimens are conspecific because of the lack of any apparent morphological distinction, and because two of the most extreme extents of colour variation Fig. 3b versus Fig 3d, were collected at the same site and on the same occasion. The specimen from India most closely resembles the holotype except that it has metasomal tergite 4 brown yellow instead of black.

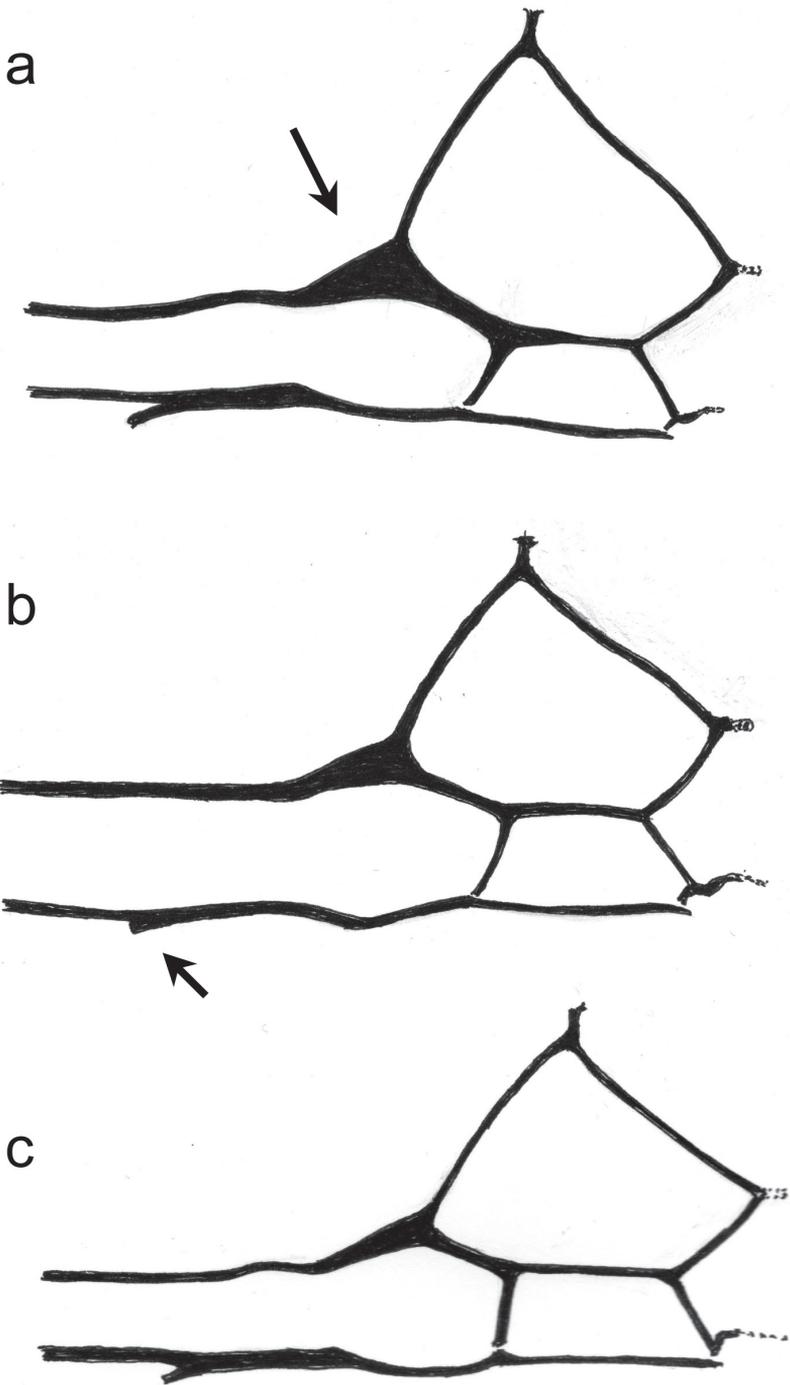


Figure 1. Features of fore wing venation of **a** *Aleiodes spurivenatriplus* sp. n. **b** *A. spurivena* sp. n. **c** *A. spurivenaduplus* sp. n.

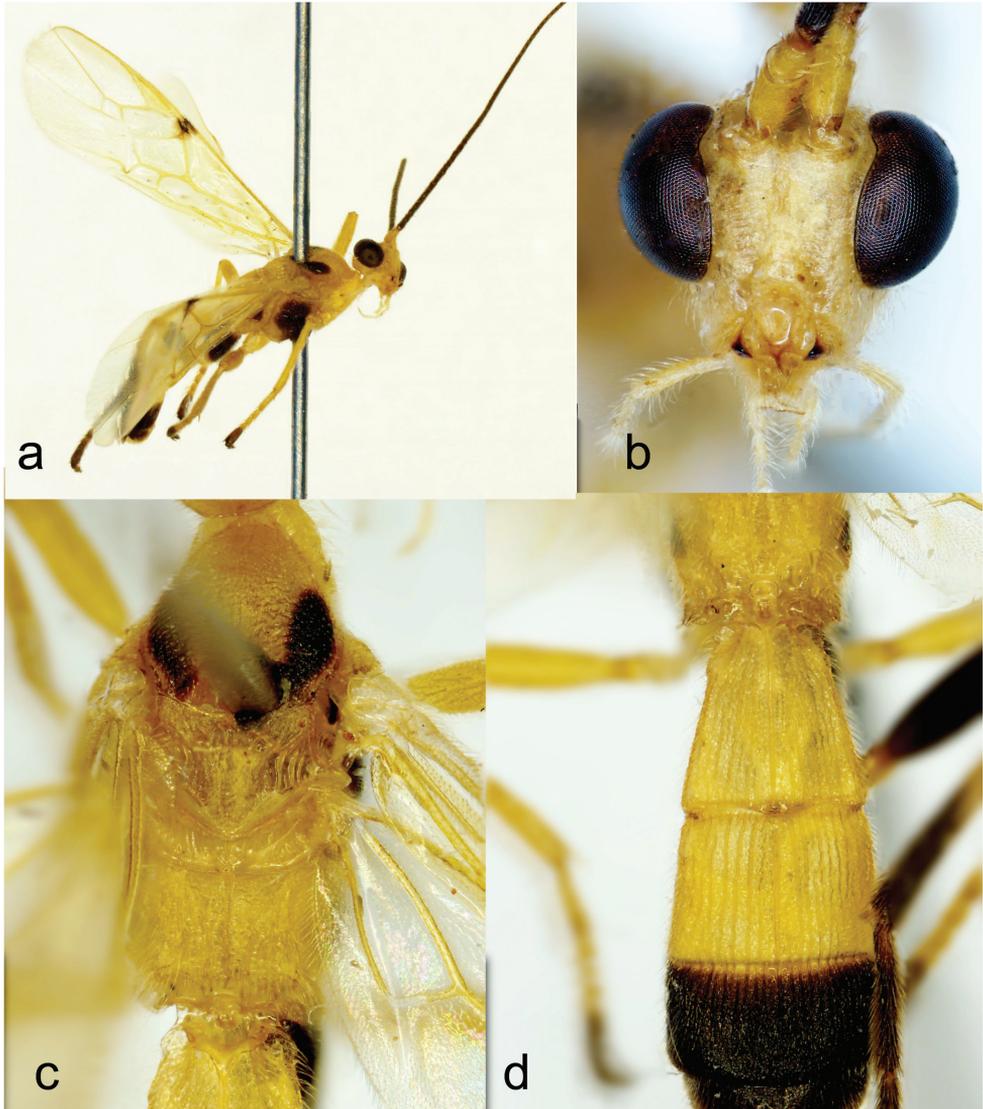


Figure 2. Cell[^]D montage images of holotype of *A. spurivena* sp. n. **a** habitus **b** face **c** mesosoma, dorsal view **d** metasoma.

***Aleiodes spurivenaduplus* Quicke & Butcher, sp. n.**

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http://species-id.net/wiki/Aleiodes_spurivenaduplus

Fig. 1c

Holotype female. “C. VIETNAM: Thua Thien Hué, Phong Dién N.R. nr base-camp, 50–100 m. 24.iii.2001. at light, C. v. Achterberg RMNH01”, “BCLDQ01315 [DNA voucher code]” (RMNH).

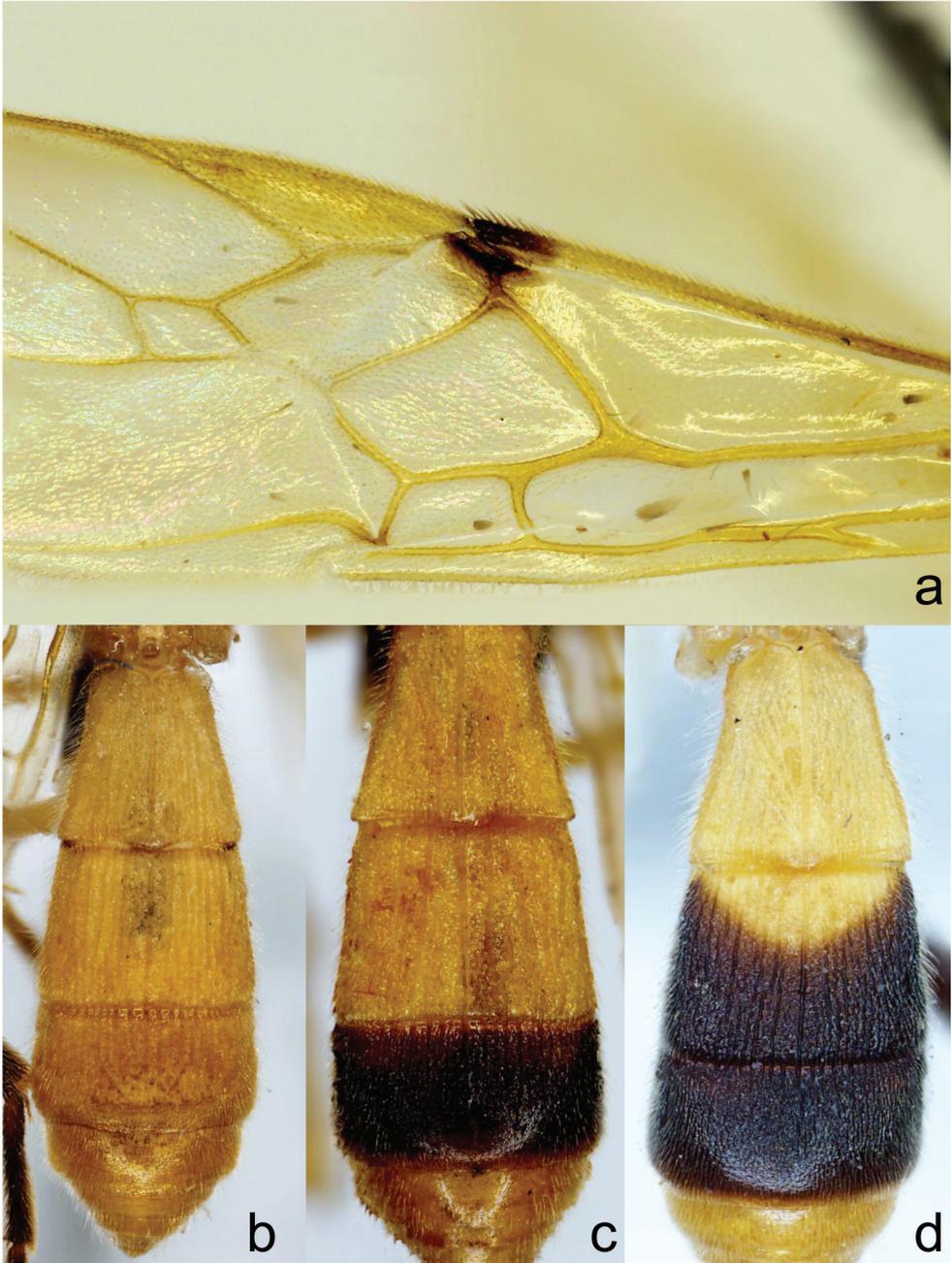


Figure 3. Cell[^]D montage images of paratype *A. spurivena* sp. n. specimens **a** detail of fore wing venation **b–d** showing variation in metasomal colour pattern **b** voucher BF00928 from Vietnam **c** specimen from India **d** voucher BF00932 from Vietnam.

Morphology. *Head.* Antenna with 54 flagellomeres.

Coloration. Bright ochreous yellow with flagellum, stemmaticum, metasomal tergite 4, hind coxa largely, hind femur medially, hind tibia apically, and hind tarsus black. In darker specimens black or dark brown marks occur on lateral lobes of mesoscutum, mesopleuron, propodeum antero-laterally, and metasomal tergites 2–4. Wings pale yellow with yellow to brown yellow venation and with fore wing parastigma and apex of C+SC+R black.

Notes. Differs from the three other sequenced Vietnamese specimens (*A. spurivena* sp. nov) for which CO1 sequences of more than 500 base pairs were obtained at 3 positions, each corresponding to a 3rd codon position (Table 1).

***Aleiodes spurivenatriplus* Quicke & Butcher, sp. n.**

urn:lsid:zoobank.org:act:766D5DBF-D67F-463A-81C8-F7F3DD334931

http://species-id.net/wiki/Aleiodes_spurivenatriplus

Figure 1a

Holotype female. “MALAY PENIN: Selangor, Bukit Kutu, 3500 ft 11.9.1929, H. M. Pendlebury”, “Ex F.M.S. Museum. B.M. 1955–354” (BMNH)

Coloration. Dark ochreous yellow [though coloration may have changed due to age of specimen] with black flagellum, stemmaticum, marks occur on lateral lobes of mesoscutum, mesopleuron, spot on metapleuron, metasomal tergite 2 except for triangular basal zone, tergites 3–4, hind leg except for trochanter and trochantellus. Wings pale yellow with yellow to brown yellow venation and with fore wing parastigma and apex of C+SC+R black.

Table 1. Differentiating cytochrome oxidase 1 bases for two new species. Positions are numbered according to position in the *Drosophila yakuba* sequence (Clary and Wolstenholme 1985).

	CO1 variable positions		
	1631	1827	1875
<i>A. spurivena</i> sp. n. (vouchers: BCLDQ00003, GenBank JF962592; BF00928, GenBank JF903065; BF00932, GenBank JF90306)	T	A	C
<i>A. spurivenaduplus</i> sp. n. (voucher/holotype: BCLDQ01315; GenBank HQ551252)	C	G	T

Acknowledgements

We are very grateful to Kees van Achterberg (Naturalis Museum, Leiden) for the load of interesting Vietnamese material he collected. The Animal Systematic Research Unit and Integrated Ecology Lab, Department of Biology, Faculty of Science, Chulalongkorn University kindly allowed use of their Cell[^]D[®] imaging facility. This work was partly supported by BRT (R152126) and a Chulalongkorn University Centenary Academic Development Project grant to BAB.

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A new genus of Agathidinae with the description of a new species parasitic on *Samea multiplicalis* (Guenée)

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† [urn:lsid:zoobank.org:author:77B8EC3A-442C-4A7A-AF85-A31C27E257F2](https://doi.org/urn:lsid:zoobank.org:author:77B8EC3A-442C-4A7A-AF85-A31C27E257F2)

‡ [urn:lsid:zoobank.org:author:15F166F7-1F9C-47E0-9614-9095E3E2226B](https://doi.org/urn:lsid:zoobank.org:author:15F166F7-1F9C-47E0-9614-9095E3E2226B)

§ [urn:lsid:zoobank.org:author:141EDF36-2FE4-4A75-AD6B-CC9EF6514B77](https://doi.org/urn:lsid:zoobank.org:author:141EDF36-2FE4-4A75-AD6B-CC9EF6514B77)

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[urn:lsid:zoobank.org:pub:E9DE1F07-45EE-4699-A119-FDB4934EB3EA](https://doi.org/urn:lsid:zoobank.org:pub:E9DE1F07-45EE-4699-A119-FDB4934EB3EA)

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Abstract

A new genus of Agathidinae (Hymenoptera, Braconidae), *Neothlipsis*, is proposed to include 10 species. Nine of these species were formerly included in the polyphyletic genus *Therophilus* Wesmäl 1837, formerly referred to as *Basus*. A new species, *Neothlipsis parysae*, parasitic on *Samea multiplicalis* (Guenée), is described. The ten described species transferred to *Neothlipsis* are: *Neothlipsis agathoides* **comb. n.** for *Basus agathoides* Newton & Sharkey 2000; *Neothlipsis agilis* **comb. n.** for *Basus agilis* Cresson, 1868; *Neothlipsis brevicauda* **comb. n.** for *Basus brevicaudus* Muesebeck, 1932; *Neothlipsis californica* **comb. n.** for *Basus californicus*, Muesebeck 1927; *Neothlipsis cincta* **comb. n.** for *Microdus cinctus* Cresson, 1873; *Neothlipsis coleophorae*, **comb. n.** for *Basus coleophorae* Rowher, 1915; *Neothlipsis discolor* **comb. n.** for *Microdus discolor* Cresson, 1873; *Neothlipsis nigricoxa* **comb. n.** for *Microdus nigricoxus* Provancher, 1886; *Neothlipsis petiolate* **comb. n.** for *Basus petiolatus* Muesebeck 1932; *Neothlipsis taeniiventris* **comb. n.** for *Microdus taeniiventris* Enderlein, 1920. Phylogenetic analyses support the sister relationship between the new genus and *Camptothlipsis*. The type material of the new species is deposited at the Hymenoptera Institute Collection at the University of Kentucky, the United States National Museum, the Florida State Collection of Arthropods, and the Louisiana State Arthropod Museum.

Keywords

parasitoid wasps, *Neothlipsis*, Lepidoptera, taxonomy, systematics

Introduction

The primary objective of this paper is to describe a new species of agathidine braconid parasitic on *Samea multiplicalis* (Guenée), which was discovered by the junior author, KAP. A secondary objective is to propose a new genus to include this species and nine others formerly included in the polyphyletic genus *Therophilus* Wesmael, 1837, referred to as *Bassus* Fabricius, 1804 in most recent publications (see Sharkey et al. 2006, 2009).

Methods

Regions D2-D3 of 28S rDNA were sequenced using the following primers: 28SD-2hymF 5' - AGAGAGAGTTCAAGAGTACGTG - 3' and 28SD3hymR 5' - TAGTTCACCATCTTTTCGGGTC - 3'. Sequences were edited using Geneious Pro v4.7.5 (Drummond et al. 2009) and aligned based on a secondary structure model for Ichneumonoidea developed by Yoder and Gillespie (2004) and Gillespie et al. (2005). Regions of expansion and contraction (REC), regions of slipped-strand compensation (RSC), and short regions of alignment ambiguity were further aligned/corrected by eye.

Phylogenetic trees were constructed using maximum parsimony (MP) and Bayesian analyses. Maximum parsimony analyses were performed using TNT (Goloboff et al., 2008). A traditional search with 5000 random addition sequences followed by branch-swapping, saving 5 trees per replication, was performed. Symmetric resampling (Goloboff et al., 2003) of the aligned sequences was carried out with TNT, using 1,000 replicates. The Bayesian analysis was performed using MrBayes v3.1.2 (Ronquist and Huelsenbeck 2003). Best-fitting DNA substitution models were determined using MrModeltest2.2 (Nylander 2004). The general time reversible model of evolution with a parameter for invariant sites and rate heterogeneity modeled under a gamma distribution (GTR+I+G) was determined as the best-fitting model.

Each Bayesian analysis consisted of two independent Bayesian MCMC runs initiated from different random starting trees. The analysis ran for 2,000,000 generations, reaching a topological similarity criterion of 0.005; trees were sampled every 200 generations. Twenty-five percent of the trees from each run were removed as burn-in upon topological convergence.

Abbreviations. Abbreviations used for institutions for where specimens are deposited are as follows:

- FSCA** Florida State Collection of Arthropods, Gainesville, Florida, USA.
- HIC** Hymenoptera Institute Collection, University of Kentucky, Department of Entomology, Lexington, Kentucky, USA.
- LSAM** Louisiana State Arthropod Museum, Baton Rouge, Louisiana, USA
- USNM** National Museum of Natural History, Smithsonian Institution, Washington DC, USA.

Taxonomy

Neothlipsis, gen. n.

urn:lsid:zoobank.org:act:6CC26EAF-0286-483A-BEA2-7ECA4572FDE5

<http://species-id.net/wiki/Neothlipsis>

Type species. *Microdus cinctus* Cresson, 1873, deposited in the Academy of Natural Sciences, Philadelphia, Type # 1718.1.

Description. **Head:** Lateral carina of frons lacking (Fig. 3b); gena rounded posteroventrally (Fig. 3a); interantennal space raised to converge on single point anteromedially; antennal depressions shallow (Fig. 3b); labial palp with four segments, third segment reduced; apical antennomere rounded. **Mesosoma:** Mesoscutum with sculptured notauli (Fig. 3b); posteroscutellar depression absent; median areola of metanotum surrounded by well defined carinae laterally and posteriorly; propodeum areolate rugose with granulate microsculpture (Figs. 2b, 3c, 4c); propleuron mildly convex to flat; metapleuron granulate (Fig. 3a); propodeal pseudosternite appearing as a narrow band separating hind coxal cavities from metasomal foramen. **Legs:** Fore tibial spur not elongate, fore tibia lacking pegs; tarsal claws simple or with a rounded basal lobe; midtibia with apical and subapical pegs; hind tibia with apical pegs. **Wings:** (Figs. 3d, 4d): Rs+Ma vein of fore wing incomplete and not tubular throughout; second submarginal cell of fore wing reduced and triangular or absent; fore wing 3RSb straight to slightly sinuate; hind wing crossveins r and r-m absent; hind wing Cub present as nebulous or spectral vein and sometimes as a short tubular stub. **Metasoma:** Median tergite 1 distinctly granulate and lacking pair of longitudinal carinae (Figs. 2b, 3c, 4c); median syntergum 2+3 weakly granulate to smooth, with transverse depression separating terga 2 and 3; ovipositor varying from length of metasoma to slightly longer than body.

Hosts and biology. A wide range of hosts is recorded, mostly in the Lepidopteran families Tortricidae, Crambidae, Pyralidae, and Coleophoridae.

Distribution. Widespread in the Nearctic and northern Neotropical regions.

Etymology. From the Greek, *neo* (new), and *thlipsis* (pressure or constriction). The name refers to the sistergroup relationship with the Old World genus *Camptothlipsis* and the fact that it is restricted to the New World. The genus is feminine.

Phylogenetic considerations. Members of the genus are very similar to those of *Camptothlipsis*. The only obvious differences are that a small second submarginal cell is present in most species of *Neothlipsis* and is the ground plan for the genus, whereas it is absent in all *Camptothlipsis*. Furthermore *Neothlipsis* is restricted to the New World and *Camptothlipsis* to the Old World.

The cladogram in Fig. 1 is produced from a subset of data from a much larger data set of 28S rDNA. We conducted analyses of numerous permutations of the data set with *Camptothlipsis* and *Neothlipsis* always obtained as sister groups. Figure 1 represents a semi-strict consensus tree of the Bayesian majority rule tree and the unique maximum parsimony tree. The trees did not contradict each other at any node; however, some branches were supported in one analysis and not the

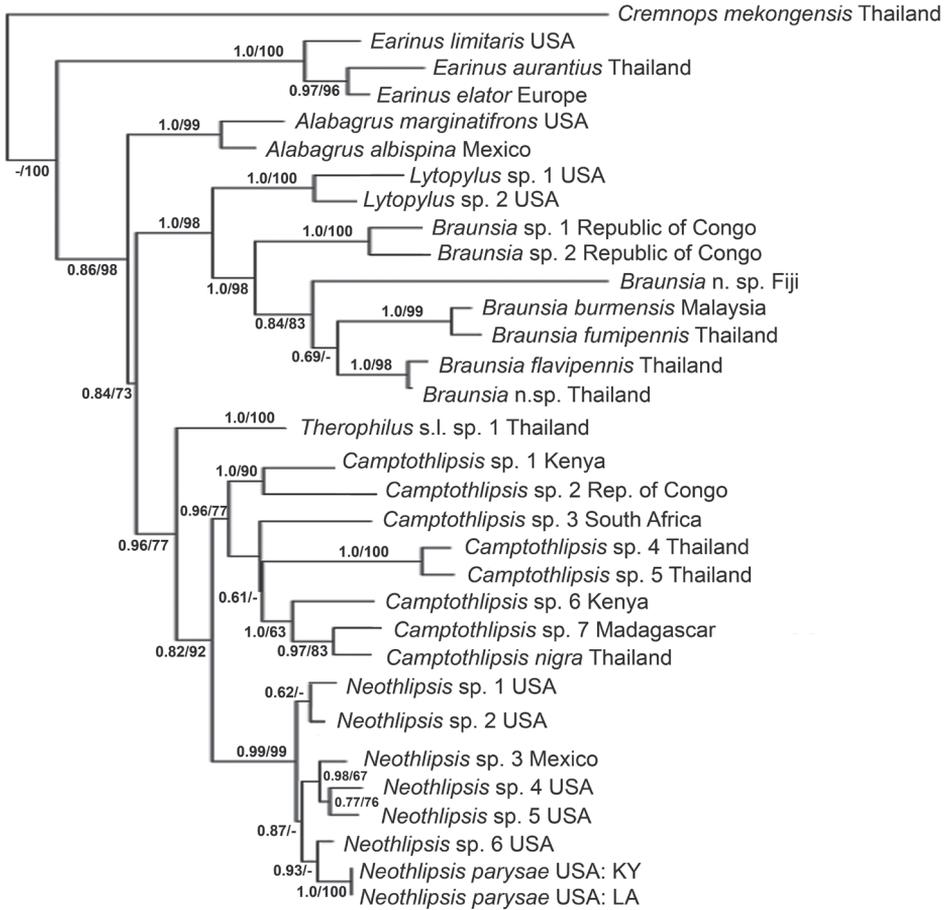


Figure 1. Semistrict consensus tree of two trees inferred from 28SrDNA sequence data aligned by secondary structure, one the majority rule tree using Bayesian methods and the other the unique tree produced using maximum parsimony. Bayesian analysis runtime = 2 million generations (25% burnin). Branch support: Bayesian posterior probabilities / symmetric resampling (1,000 replicates). (-) indicates branch support below 0.5 / 50.

other. The granulate sculpture of the first metasomal median tergite (T1) combined with the lack of lateral longitudinal carinae on T1 are apparent morphological synapomorphies supporting the relationship. *Neothlipsis parysae* and *N. agathoides* are unique amongst members of the genus in that their tarsal claws are simple, lacking a basal lobe. As indicated in Fig. 1, *N. parysae* is well nested within *Neothlipsis*. There are no obvious morphological synapomorphies for members of *Neothlipsis*. They share several synapomorphies with *Camptothlipsis*, e.g., presence of granulate sculpture on the first median metasomal tergite (Fig. 3c), lack of a pair of longitudinal carinae on first median metasomal tergite (Fig. 3c), and the reduced size of the second submarginal cell (Figs 3d and 4d). Since members of

Camptothlipsis are restricted to the Old World, those of *Neothlipsis* may be distinguished from other agathidines occurring in the New World using the three aforementioned character states.

Ten described species are here transferred to *Neothlipsis*, i.e., *Neothlipsis agathoides* **comb. n.** for *Bassus agathoides* Newton & Sharkey, 2000; *Neothlipsis agilis*, **comb. n.** for *Bassus agilis* Cresson, 1868; *Neothlipsis brevicauda* **comb. n.** for *Bassus brevicaudus* Muesebeck, 1932; *Neothlipsis californica* **comb. n.** for *Bassus californicus* Muesebeck, 1927; *Neothlipsis cincta* **comb. n.** for *Microdus cinctus* Cresson, 1873; *Neothlipsis coleophorae* **comb. n.** for *Bassus coleophorae* Rowher, 1915; *Neothlipsis discolor* **comb. n.** for *Microdus discolor* Cresson, 1873; *Neothlipsis nigricoxa* **comb. n.** for *Microdus nigricoxus* Provancher, 1886; *Neothlipsis petiolate* **comb. n.** for *Bassus petiolatus* Muesebeck, 1932; and *Neothlipsis taeniatiiventris* **comb. n.** for *Microdus taeniatiiventris* Enderlein, 1920. All holotypes of the species listed above have been examined by the senior author.

***Neothlipsis parysae* Sharkey, sp. n.**

urn:lsid:zoobank.org:act:9ED86EB7-BE7A-44D1-A1B4-2D47B89A1CDA

http://species-id.net/wiki/Neothlipsis_parysae

Figs. 2, 3

Diagnosis. Similar to *N. agathoides* (Newton and Sharkey, 2000) in that both species share the same host and both are unique amongst members of the genus in possessing simple tarsal claws. The two species can be differentiated as follows:

N. parysae: 1. Hind femur melanic in apical third (Fig. 2a). 2. Head always mostly melanic (Figs. 2a, 3a). 3. Ovipositor distinctly shorter than body (Fig. 2a). 4. Body length less than 3.6 mm. 5. Second submarginal cell of fore wing usually present (80%) (Fig. 3d).

N. agathoides. 1. Hind femur entirely pale or melanic in less than apical fifth (Fig. 4a, b). 2. Head color usually pale at least in ventral half (Fig. 4b), rarely mostly melanic (Fig. 4a). 3. Ovipositor as long as body (Fig. 4a, b). 4. Body length more than 3.6 mm. 5. Second submarginal cell of fore wing usually absent (95%) (Fig. 4d).

Description. Holotype female: Length: 3.4 mm (3.2–3.5 mm).

Color: (Figs. 2, 3). Flagellomeres (with antennae directed anteriorly) dark brown dorsally, fading to dark orange ventrally (ventrally ranging from entirely black to yellow, rarely flagellum pale in basal third); anterior orbit of eye black, the posterior orbit orange (ranging to entirely black); mouthparts pale yellow with black highlights, remainder of head black dorsally with orange patches laterally (ranging from entirely black to mostly orange with dark highlights); fore leg orange with tarsus darkened distally; middle leg orange with tibia darkened distally, tarsomeres mostly dark; hind coxa dark orange (ranging to nearly black, especially in males); hind femur dark orange (ranging to black with some orange, especially in males); basal black band present on hind tibia; hind tibia black in distal half, otherwise orange; wings hyaline; mesosoma black with orange tegula (ranging from black with black tegula to black with orange

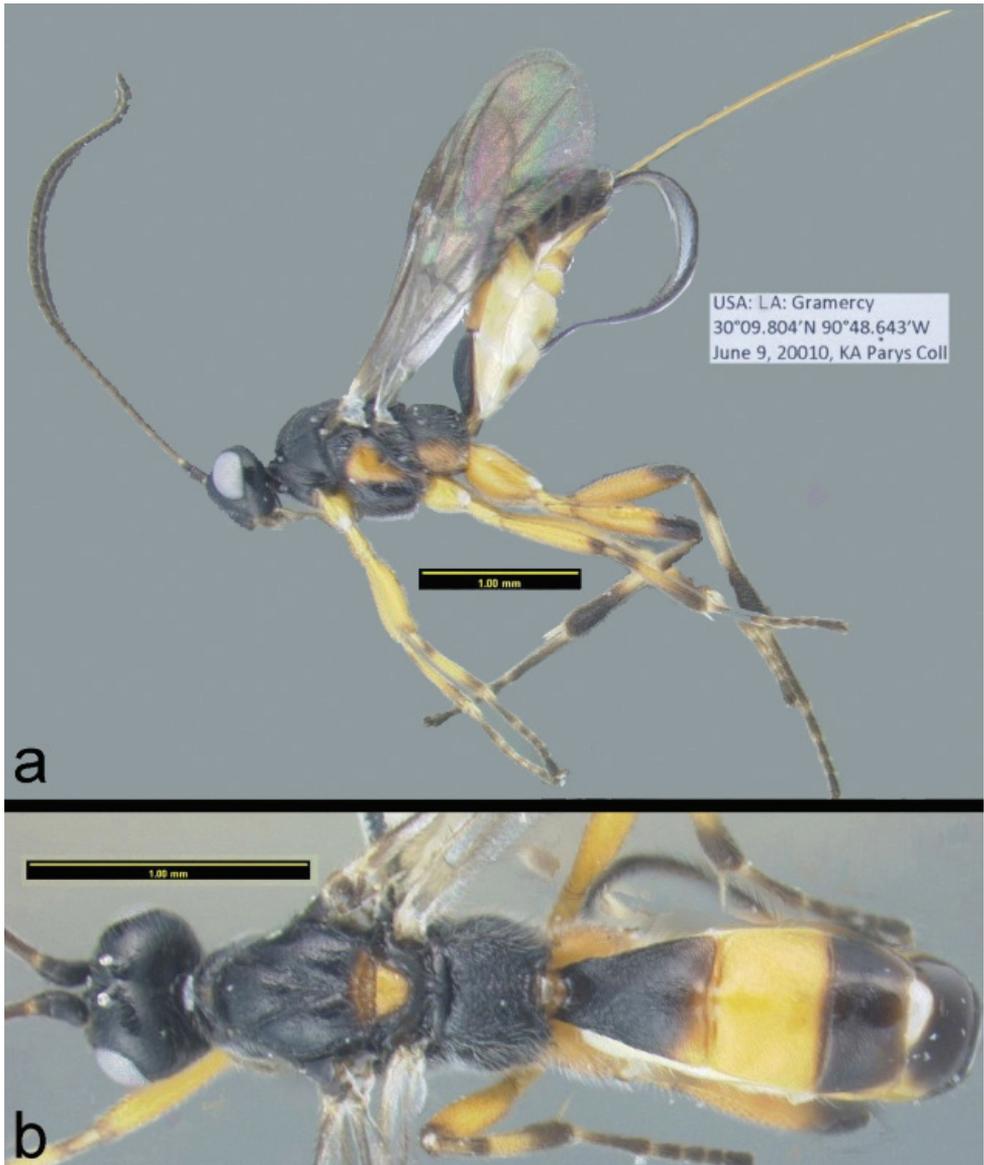


Figure 2. *Neothlipsis parysae* **a** Lateral habitus **b** Dorsal habitus.

highlights, often with an orange spot on the mesopleuron); metasoma pale yellow ventrally (ranging to dark orange); with tergum 1 entirely black, tergum 2 black in the posterior half and orange anteriorly (or black with only the anterior margin orange), tergum 3 black with orange posterior margin, remaining terga orange with dark highlights. **Head:** Number of flagellomeres = 26; ratio, distance between ocellus and compound eye to distance between lateral ocelli = 1.7; temple not bulging as viewed dorsally; ratio, malar space to eye height = 0.53. **Legs:** Midtibia with eight spines; hind

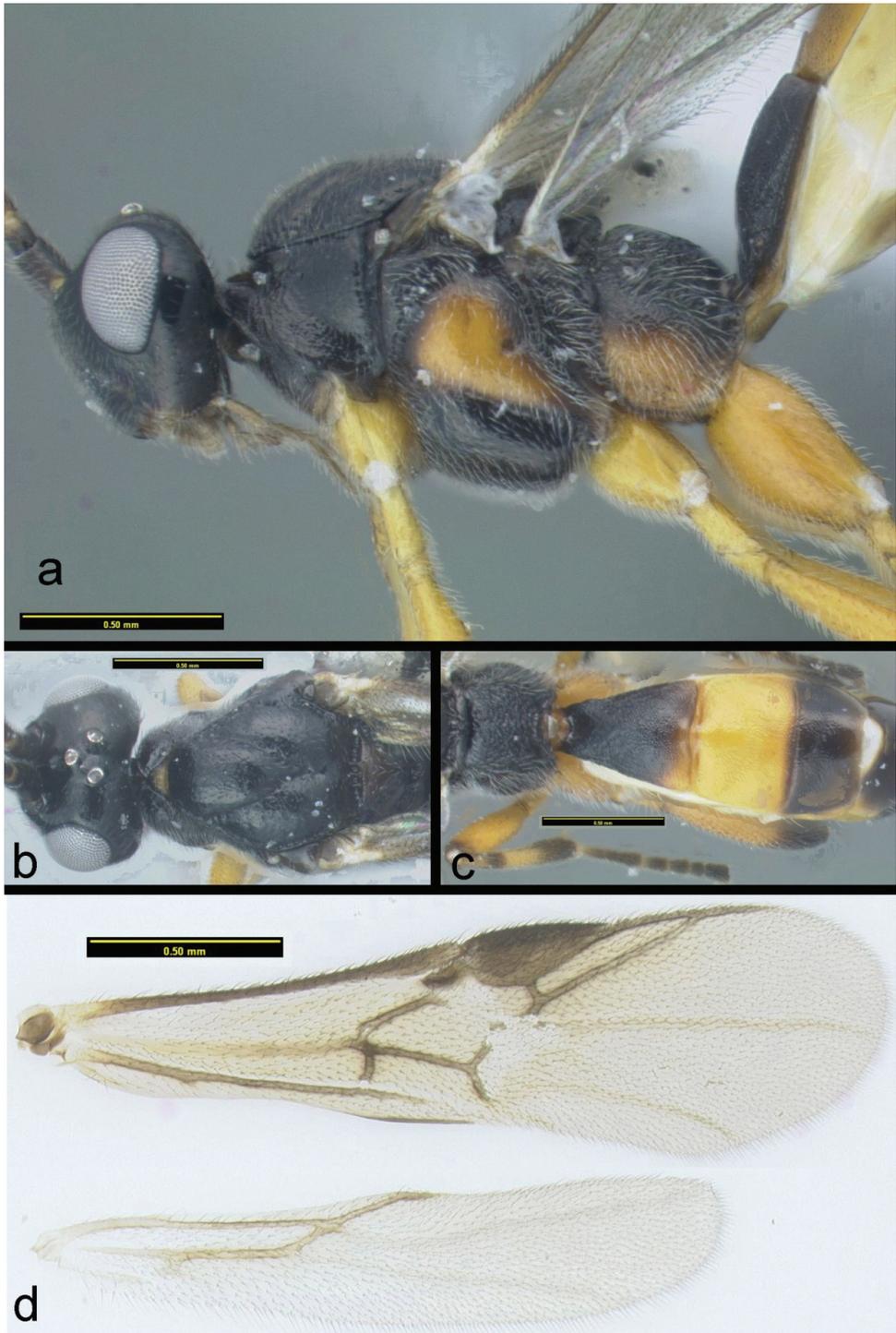


Figure 3. *Neothlipsis parysae* **a** Lateral head and mesosoma **b** Dorsal head and thorax **c** Dorsal propodeum and metasomal terga 1–3 **d** Wings.

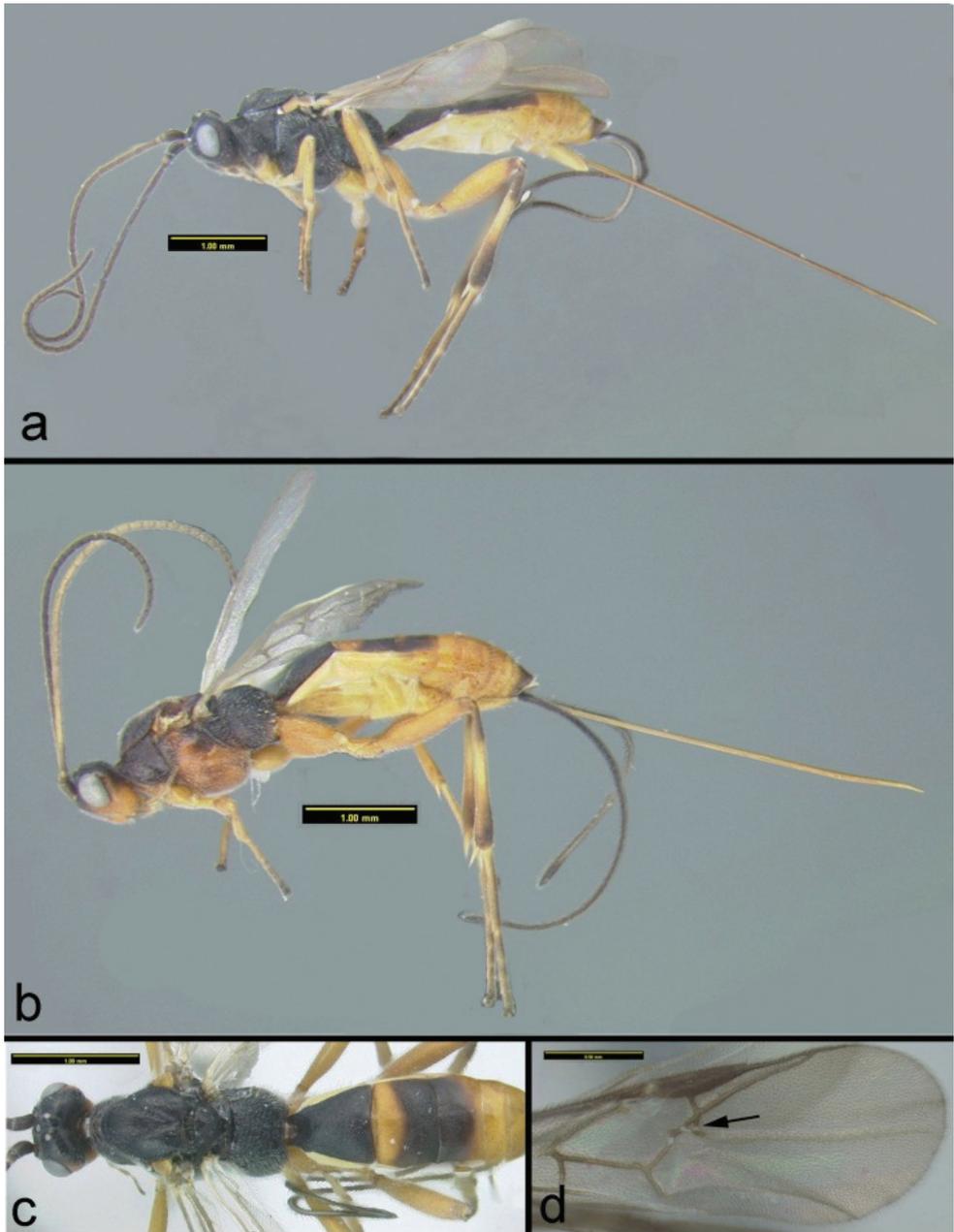


Figure 4. *Neothlipsis agathoides* **a** Lateral habitus of a melanic specimen **b** Lateral habitus of a pale specimen **c** Dorsal habitus **d** Fore wing, arrow pointing to second submarginal vein.

tibia with eight spines (6–10); tarsal claws simple, basal lobe absent. **Wings:** Second submarginal cell of fore wing absent (Fig. 3d) (or rarely very small). **Metasoma:** (Figs. 2b, 3c). Ratio, length of median tergum 1 to apical width of median tergum 1 = 1.13; median terga 1, 2, and 3 granulate; ovipositor slightly shorter than body.

Hosts and biology. *Samea multiplicalis* (Guenée) (Lepidoptera: Crambidae) occurs in the southeastern United States and south to Argentina (Knopf and Habeck 1976). Large populations of the adult moth are often found at lights in Louisiana and are one of the most common species observed (Landau and Prowell 1999). The larva is a natural control agent and generalist herbivore that feeds on a variety of aquatic plants including salvinia (*Salvinia minima* Baker, *S. molesta* Mitchell, and *S. auriculata* Aublet), water hyacinth (*Eichornia crassipes* (Mart.) Solms), waterlettuce (*Pistia stratiotes* L.), water fern (*Azolla caroliniana* Willd., and *Azolla pinnata* R. Brown) (Knopf and Habeck 1976, Sands and Kassulke 1984, Tewari and Johnson 2011).

Groups of approximately 50 *S. multiplicalis* larvae were collected by hand from mats of common salvinia (*Salvinia minima* Baker) at four field locations across southern Louisiana several times during 2006 and brought back to the lab (for a total of 13 sampling points). Individuals were reared individually in diet cups and provided with fresh vegetation until pupation. Parasitism rates of *N. parysae* varied between sites, ranging from 0% to 38% with an average parasitism rate of 9.9% for all larvae reared (S. Tewari, unpublished data). Several other hymenopteran parasitoids have been described from *S. multiplicalis* populations in Florida, but we have only reared *N. parysae*. First instar caterpillars of *S. multiplicalis* are attacked, and the parasitoid pre-pupa emerges from the last larval instar of the host (G.S. Wheeler, unpublished data). Individual wasps are frequently observed in Louisiana on aquatic vegetation during the late spring and early summer. Collections of insects associated with *S. minima* were taken from May to November 2009 in Gramercy, Louisiana, and individuals of *N. parysae* were most abundant from May to July but persisted in low numbers until September.

Etymology. The species is named after Katherine Parys in recognition of her discovery of the species.

Material examined. HOLOTYPE: Female, USA: Louisiana: Ascension Parish, 30°09.804N, 90°48.643W, swamp, 9.vi.2010 (HIC). PARATYPES: 88 males, 37 females, same locality data as holotype with dates from June to September of 2009 and June 2010. 10 females, Kentucky, Hopkins Co. Thomas Farm, 37°20.36N, 087°41.26W, Malaise trap, swamp, viii-ix.2010. Paratypes are deposited in the USNM (9 ♀, 15 ♂), FSCA (9 ♀, 15 ♂), LSAM (15 ♀, 39 ♂) and HIC (14 ♀, 19 ♂).

Neothlipsis parysae USA: KY, 13-29.viii.2010, HIC. GenBank accession number JF297971 and *Neothlipsis parysae* USA: LA, 9.vi.2009, HIC. GenBank accession number JF297972 (Fig. 1).

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The identity of *Scambus planatus* (Hartig, 1838) and *Scambus ventricosus* (Tschek, 1871) as seasonal forms of *Scambus calobatus* (Gravenhorst, 1829) in Europe (Hymenoptera, Ichneumonidae, Pimplinae, Ephialtini)

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Abstract

Through both natural and experimental rearings, supported by DNA sequence data (CO1, ITS2 and EF1 α) as well as examination of material in collections, it is shown that the European nominal taxa *Scambus planatus* and *Scambus ventricosus* comprise the spring-emerging generation of *Scambus calobatus*, the typical form of which occurs as adults in late summer and autumn. The “*planatus*” form is shown to be the teneral (unhardened) version of the “*ventricosus*” form. The following synonymies are proposed: *Scambus calobatus* (Gravenhorst, 1829) = *S. planatus* (Hartig, 1838), **syn. n.** = *S. ventricosus* (Tschek, 1871), **syn. n.** Molecular data point to incidental natural rearings of a further two species, represented by single specimens.

Keywords

Parasitoid, synonymy, *Quercus*, acorns, *Cydia*, *Curculio*, *Acrobasis*, *Microtypus*, *Janus*

Introduction

Scambus calobatus (Gravenhorst, 1829) and *Scambus planatus* (Hartig, 1838) are two rather distinctive nominal taxa in the European fauna of around 30 species in the genus

Scambus Hartig. The two have been recognised as closely related (Perkins 1943) and share various apparent features (cf. Fitton et al. 1988), including rather light brownish metasomal tergites, that set them apart from most others; but they differ rather sharply in that *S. planatus* has substantially broader temples (compare Figs 1 and 2), and also a shorter ovipositor than *S. calobatus* (ca 2.4–2.9 times as long as the hind tibia in *S. planatus*, as opposed to 2.9–3.7 in *S. calobatus*). In the following account the names *S. calobatus*, *S. planatus* and *S. ventricosus* (Tschek, 1871) are used in the sense of nominal taxa. Our interpretations follow authors who examined the relevant types: Perkins (1943) for *S. calobatus* and *S. planatus*, and Horstmann (2009) for *S. planatus* and *S. ventricosus*.

In the course of curating the large collection of Pimplinae in the National Museums of Scotland (NMS) it was noticed by the first author that British specimens determined as *S. planatus* all had spring dates (iii–v) of capture or emergence (especially from *Quercus* acorns collected the previous autumn, some harbouring larvae of the tortricid moth *Cydia*, probably *splendana* (Hübner), and others the curculionid beetle *Curculio*, probably *glandium* Marsham). In contrast, those determined as *S. calobatus* were either captured later in summer and autumn (vii–x) or reared around vii (especially from the phycitine pyralid moth *Acrobasis consociella* (Hübner), or from cocoons of its parasitoids, in spinnings among the foliage of *Quercus*). Despite the morphological differences, it seemed possible that the lack of information on a complete annual life cycle for either species might be explained by their being seasonal forms of a single entity—that is, the *calobatus* morph parasitizing hosts in acorns in autumn, from which adults of the *planatus* morph, with the powerful head musculature needed to chew out of acorns, emerge the following spring to attack hosts in leaf spinnings, from which the narrower-templed *calobatus* morph hatches in the same summer. When the apparent seasonality of the two forms in Britain was put to Klaus Horstmann he kindly examined material in some large German collections and informed us (in litt.) that the same was true there.

The view that only one species might be involved was reinforced by the collection of a morphometrically typical female *S. calobatus* walking among fallen acorns on 14.x.1999 (leg. M. T. Jennings, det. M. R. Shaw). Additionally, Bauer (2002) makes reference to seeing a female *S. calobatus* with its ovipositor in an acorn in the autumn (however, the specimen appears not to be in the Bauer collection: K. Horstmann, in litt.).

Because good numbers of both *S. planatus* (ex acorns) and *S. calobatus* (ex *Acrobasis*) could be obtained from woodland habitats in Kent (S. England), near the home of the second author, it was possible to embark upon testing the hypothesis that only one species was involved: firstly by rearing series of both nominal taxa from the same locations, and obtaining gene sequence data (organised by the third author); and secondly by rearing experiments, using spring-emerging *S. planatus* from acorns and experimental hosts such as *Acrobasis*, and then assessing the morphology of the resulting progeny. A chance capture of a free-flying spring female in a French locality provided an additional opportunity.

Part of the way through this process, the situation was made more complicated by Horstmann's (2009) raising of *Scambus ventricosus* (Tschek) from the synonymy of *S. planatus* (Hartig) that had been first proposed by Perkins (1943) and subsequently widely accepted. Horstmann (2009) cited as differences that *S. ventricosus* has a darker (mainly black) and less slender, more oval shaped metasoma with broader tergites than *S. planatus*, and also has a later flight period extending well into the summer (v-vii as against iii-v for *S. planatus*). According to Horstmann (2009) there are no host records for *S. ventricosus*, and the male is unknown.

Materials and methods

All rearings and other manipulations were done under approximately natural conditions of temperature and daylength (U.K.: Kent and Edinburgh).

In the period 1999–2009 much material of both *S. planatus* and *S. calobatus* was reared by the second author from a series of more or less proximate woods in Kent, England (OS map refs [site names]: TQ6666 [Luddesdown]; TQ6667 [Cobham]; TQ6865 [Halling Wood]; TQ6870 [Shorne]; TQ7174 [Lower Higham] and TQ7876 [Northward Hill]) and sent to the first author for determination. *Scambus planatus* emerged as a primary parasitoid of both *Cydia* and *Curculio* in spring (ca iv) from fallen acorns collected the previous autumn (ca x-xi) that had been kept over winter in an unheated shaded outhouse (cf. Shaw 1997). *Scambus calobatus* emerged from webs of *Acrobasis consociella* fairly soon after they were collected in about vi-vii, both as a primary parasitoid and as a pseudohyperparasitoid from cocoons of the braconid primary parasitoid *Microtypus wesmaelii* Ratzeburg. Adults were killed into ethanol (for removal of a leg for gene sequencing) or allowed to die of starvation; in both cases the specimens were then mounted for morphological examination.

For experimental rearings, four females of *S. planatus* that emerged in spring 2010 from acorns collected the previous autumn in the above woods were isolated and thereafter kept separate (allowing all progeny to be related back to its mother). Males that emerged from the same collections were introduced to the females and left with them for up to four days. Observation was not continuous, but two of the females were seen to mate. The adult females were then kept in corked 7.5 × 2.5 cm glass tubes and fed ad libitum on honey:water. They were also offered a range of wild-collected microlepidopteran larvae (mainly Tortricidae) that had been removed from their leaf rolls and folds on *Quercus* and *Crataegus*. Some of the larvae were purposely injured with a pin prior to being offered to the females, to encourage host-feeding. Some behavioural observations were made, but observation was sporadic. Approximately 20–25 days after their emergence, the females were each transferred to a closed clear plastic box (15 × 11 × 7 cm) and offered about 6–8 wild-collected *Quercus* spinnings containing larvae (1–4 per spinning) of *Acrobasis consociella*. In all cases the spinning was first partly opened to verify that all the caterpillars that were present were fully active (this ensured that no hosts already parasitized by *Scambus* were inadvertently

introduced: *Scambus* species permanently paralyse the host prior to oviposition). The spinnings, which were quickly re-closed by the intended hosts, were left with the females for variable lengths of time, some being removed after one day and others after 2–3 days. Some that still contained active larvae were returned to the same female subsequently. The host larvae were left in situ and the accumulated spinnings that had been offered to each female were retained separately in the plastic boxes, now opened and covered with fine netting, and kept in an unheated shaded outhouse. The spinnings were occasionally lightly sprayed with water. Parasitoid adults that resulted from these experimental exposures were killed into ethanol, as were the females at the end of the runs (by which time they were ca 30 and in one case over 40 days old), and, after removal of a leg for gene sequencing, mounted. These events are referred to below as the “Kent experiments”.

An additional, earlier, experiment involved a female caught on 28.v.2008 flying around *Quercus* in France near Chinon (Indre-et-Loire), that was from that date fed ad libitum on honey:water and continuously offered larvae of the tortricid *Acleris quercinana* (Zeller) in situ in their spinnings as potential hosts. Both the parent and her offspring were subsequently dealt with as above. This is referred to as the “Chinon experiment”.

Specimens from field and from experimental rearings were sequenced for the 5' bar-coding region of the mitochondrial cytochrome oxidase 1 gene following the protocols in Kuhlmann et al. (2007) or performed by the BarCodingLife project. Some field-reared specimens were additionally sequenced for the nuclear internal transcribed spacer 2 gene (ITS2) region and the nuclear elongation factor 1 α 5' intron (EF1 α), also following Kuhlmann et al. (2007). Sequences are available from Genbank (accession numbers JN243100–JN243134).

All *Scambus* specimens resulting from this study are deposited in the National Museums of Scotland, Edinburgh.

Results

In the Chinon experiment, the female behaved as a predator of several *Acleris quercinana* larvae, probing their leaf rolls vigorously with her ovipositor, mutilating the larvae and imbibing their fluid content, but she did successfully parasitize one (on or around 1.vi.2008) and an adult female *Scambus* resulted early in vii.2008 (during a period when it was not possible to check the box). The parent (which must have been mated) and her daughter had identical CO1 sequences (Genbank accession numbers JN243114 and JN243115; see Table 1), and the offspring was very clearly morphologically a normal *S. calobatus* (Fig. 1) while in head and ovipositor structure the parent was indistinguishable from *S. planatus* (Fig. 2). The specimens were shown to Klaus Horstmann, largely as a courtesy because of the interest and help he had given, but he determined the parent female as *Scambus ventricosus*, not *S. planatus*. This raised the possibility that *S. planatus* and *S. ventricosus*, at the time believed

Table 1. Specimen codes, parentage relations and GenBank DNA sequence accession details.

Specimen voucher code	Collection locality	Morpho-type	Sex and notes on parentage	Genbank CO1 accession number	Genbank ITS2 accession number	Genbank EF1 α accession number
Scambus20104 BCLDQ01664	UK, Kent, Northward Hill	<i>planatus</i> becoming <i>ventricosus</i>	female, parent of Scambus20105	JN243100	-	-
Scambus20105 BCLDQ01665	UK, Kent, Northward Hill	<i>calobatus</i>	male, son of Scambus20104	JN243116	-	-
Scambus20106 BCLDQ01666	UK, Kent, Halling Wood	<i>planatus</i> becoming <i>ventricosus</i>	female, parent of Scambus20107	JN243102	-	-
Scambus20107 BCLDQ01667	UK, Kent, Halling Wood	<i>calobatus</i>	male, son of Scambus20106	JN243101	-	-
Scambus20101 BCLDQ01661	UK, Kent, Northward Hill	<i>planatus</i> becoming <i>ventricosus</i>	female, parent of Scambus20103	JN243104	-	-
Scambus20103 BCLDQ01663	UK, Kent, Northward Hill	<i>calobatus</i>	male, son of Scambus20101	JN243103	-	-
MJ1950-I	UK, Kent, Northward Hill	<i>calobatus</i>	male, ex <i>Microtypus</i> <i>wesmaelii</i> cocoon in <i>Acrobasis consociella</i> retreat	JN243107	JN243119	JN243128
MJ1973E-G	UK, Kent, Northward Hill	<i>calobatus</i>	female, ex <i>Acrobasis</i> <i>consociella</i>	JN243108	JN243120	JN243129
MJ2047c-F	UK, Kent, Northward Hill	<i>planatus</i>	male, reared from fallen acorn	JN243109	JN243121	JN243130
MJ2047b-E	UK, Kent, Northward Hill	<i>planatus</i>	female, reared from fallen acorn	JN243110	JN243122	JN243131
MJ2047a-D	UK, Kent, Northward Hill	<i>planatus</i>	female, reared from fallen acorn	JN243111	JN243123	JN243132
MJ2041-C	UK, Kent, Cobham	<i>planatus</i>	female, reared from fallen acorn	JN243112	JN243124	JN243133
MJ2038-B	UK, Kent, Halling Wood	<i>planatus</i>	female, reared from fallen acorn	JN243113	JN243125	JN243134
BCLDQ0370	France, Chinon	<i>ventricosus</i>	wild caught female, parent of BCLDQ0371	JN243114	-	-
BCLDQ0371	France, Chinon	<i>calobatus</i>	female, daughter of BCLDQ0370	JN243115	-	-
MJ2073-A	UK, Kent, Lower Higham	[near to but not <i>planatus</i>]	female, ex <i>Janus</i> <i>femoratus</i> in oak twig gall	JN243105	JN243117	JN243126
MJ1970-K	UK, Kent, Northward Hill	<i>cf. inanis</i>	male, ex <i>Acrobasis</i> <i>consociella</i>	JN243106	JN243118	JN243127

to be species distinct from one another, both had (indistinguishable) late summer “*calobatus*” morphs. This necessitated the Kent experiments, using *S. planatus* female parents of known origin.



Figures 1, 2. Head, dorsal aspect, of *S. calobatus* morphs (female). 1, “*calobatus*”. 2, “*planatus/ventricosus*” (equivalent in this respect). The specimen in Fig. 1 is the offspring of that in Fig. 2, from the “Chinon experiment” (see text); respectively BCLDQ0371 and BCLDQ0370 in Table 1.

In the Kent experiments, all four females host-fed avidly and destructively on a succession of tortricid and possibly other microlepidopteran larvae for ca 20 days. The females were quickly attracted to the introduced larva and attacked it with their ovipositor or, more commonly, directly with their mandibles. When larvae that seemed too vigorous or large to be overcome were removed, injured with a pin, and returned, the female *Scambus* would also often imbibe the host’s fluid content completely. When the females were eventually offered *A. consociella* spinnings they actively searched for hosts and paralysed and oviposited onto *A. consociella* larvae freely. One spinning, when partly opened, revealed a paralysed larva with at least five white elongate *Scambus* eggs either attached or immediately adjacent to the host. However, it is likely that this was an unusual degree of superparasitism resulting from the limited availability of host larvae and excessive exposure time. Destructive host-feeding was also observed on some of the *A. consociella* larvae offered in situ. Parasitoid adults emerged 25–32 days after the females were first offered *A. consociella* hosts. The progeny obtained from the four females was respectively: 3 ♀, 9 ♂; 1 ♀, 8 ♂; 7 ♂; and 4 ♂. CO1 sequences for parent female and (one) male progeny were identical in all three cases for which sequences were obtained from both mother and son (Genbank accession numbers JN243100–JN243104 and JN243116; see Table 1) and all progeny of both sexes conformed in all morphological respects to *S. calobatus*.

DNA sequence data (CO1, ITS2 and EF1 α) were also obtained from wild-reared specimens from the Kent sites, comprising three individuals reared from *Acrobasis consociella*, five reared from fallen acorns and one reared from a gall of the cephid sawfly *Janus femoratus* (Curtis) in an oak twig (Table 1). The specimen (MJ2073-A) reared from the sawfly host and one small (runtish) male reared from *Acrobasis* (MJ1970-K) will be discussed briefly below. The other specimens, including those involved in the experimental rearings and whether representing *calobatus* or *planatus* morphologies, were all identical with respect to their CO1 genes and, for those individuals for which it was sequenced, their ITS2 genes were similarly identical. For EF1 α , there were 11

positions where single bases differed between individuals with no clear patterns in relation to their morphology. In addition, at the length-variable T-rich insertion the number of Ts in the run varied from eight to 12 between individuals, also showing no correlation with morphotype.

The two above-mentioned specimens MJ2073-A and MJ1970-K differed markedly from the *calobatus/planatus* above. In the CO1 gene fragment both differed in the same way from the *calobatus/planatus* ones at seven bases, differed in different ways at one further position, and individually differed from *calobatus/planatus* at another five and six base positions respectively. For ITS2, MJ1970-K and MJ2073-A differed from *calobatus/planatus* at six and one base respectively. For the alignable parts of the EF1 α region (420 out of 425 base pairs), MJ1970-K differed from the *calobatus/planatus* sequences at 10 positions, MJ2073-A at one position and both at a further two positions. At the T-rich insertion MJ1970-K had only six Ts whereas MJ2073-A had a run of 18 Ts and, in addition, MJ1970-K had a unique 10 base-pair insert towards the 3' end.

Discussion

The Kent experiments clearly showed that the nominal species *S. planatus* is just the spring-emerging morph of *S. calobatus*, but the earlier Chinon experiment that had also resulted in *S. calobatus* progeny, but from a *S. ventricosus* parent, remained at first sight puzzling. However, examination of the female parents from the Kent experiments, killed after their lengthy period of feeding to mature their eggs (and subsequent ovipositions), immediately resolved the paradox, because these parents now had fully black tergites that were also flatter (i.e. broader) (Figs 3, 4) and resulted in a more oval metasoma than the other *S. planatus* adults, which had similarly originated from acorns at the same sites but had been killed unfed soon after emerging (Figs 5, 6). The four aged females had thus become indistinguishable from *S. ventricosus*, and it was clear that the remaining supposed differences between this nominal species and *S. planatus* were all perfectly explained by this observation (i.e. the later flight time of *S. ventricosus*; for which there is no known host as all reared specimens would be in the *planatus* morph on emergence; nor known males as they are presumably too short-lived to attain the *ventricosus* state).

Obtaining the molecular data was embarked upon before the rearing experiments could be set up, but the molecular results are given for the sake of completeness; in the light of the experimental data they serve largely to remove any conceivable doubt that contaminants, in the form of already parasitized hosts, had been introduced.

In fact, it might have been deduced that the females of the *S. planatus* morph (and indeed *S. calobatus*) are teneral on emergence and far from able to parasitize hosts, from the state of their ovipositors. Freshly emerged individuals invariably have the ovipositor shaft almost white (only the tip darkened to brownish) (Fig. 7), and soft enough for it to curl and exfoliate into its component valves very easily. Moreover, their rather pale tergites are substantially rolled and not rigid. Although



Figures 3–6. Metasoma (3, 5) and 2nd metasomal tergite (4, 6), dorsal aspect, of *S. calobatus* morphs (female). **3, 4** “*ventricosus*” (one of the aged female parents after use in the “Kent experiments” (see text)). **5, 6** “*planatus*” (a specimen starved to death from emergence). In both cases reared from acorns at the Kent sites.

most ichneumonoids rest as adults for a period in their cocoon to emerge in a more or less fully mature state, this trait of teneral emergence is not uncommon in ephialtine Pimplinae (possibly associated with the lack of a strong cocoon, but in any case particularly easily detected in that group because of the often long ovipositors of the females), and the changing morphology with maturity that is seen in *S. calobatus* and its *planatus* morph should be noted as a hazard for taxonomists that may have a wider currency—as, indeed, has been discussed very clearly in relation to Ephialtini by Perkins (1943). Re-examination of the female *S. calobatus* found walking among fallen acorns on 14.x.1999 (see Introduction) revealed that it had a well-darkened ovipositor shaft and also mostly black tergites (deep chestnut at the sides), quite different from the individuals killed soon after being reared from *Acrobasis consociella*.

Conclusion

In the light of these findings we formally propose the following new synonymy of nominal taxa currently placed in *Scambus*: *Pimpla calobata* Gravenhorst, 1829 (senior name) = *Pimpla* (*Scambus*) *planata* Hartig, 1838, syn. n. = *Pimpla ventricosa* Tschek,



Figure 7. Ovipositor, dorsal aspect, of *S. calobatus* (“*planatus*” morph) killed within 2 days of egress from an acorn.

1871, syn. n. The informal name “form *planatus*” might still be useful as a label for the spring generation morphotype of *S. calobatus*.

There is no modern revision of *Scambus* and, because of the large divergence in ovipositor length, temple width, tergite width and even colour of the morphs of *S. calobatus*, it is not easy to give characters that will define the species as a whole. Thus, at least for now, it will be necessary to continue to determine the seasonal morphs separately, using existing keys. However, in the male sex the rather broad genital claspers that are partly covered with fine longitudinal striae is a consistent character that may not occur in other European species (K. Horstmann, pers. comm.).

Regarding the anomalous specimens, K. Horstmann (pers. comm.) confirms that, morphologically, the female specimen MJ2073-A differs sufficiently from the *planatus* morphotype (to which it comes closest) that he would regard it as a different, probably undescribed, species. The runtish male specimen MJ1970-K, with an even greater level of molecular difference, almost certainly represents a further species, perhaps *S. inanis* (Schrank) which is commonly reared in Britain from hosts in leaf rolls and leaf mines on deciduous trees (Shaw 2006), but whose males are sometimes morphologically hard to determine unequivocally (Horstmann 2005).

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Genus *Cryptopimpla* Taschenberg new to Sulawesi, Indonesia, with description of a new species (Hymenoptera, Ichneumonidae, Banchinae)

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Abstract

Cryptopimpla sulawesiensis sp. n. (Ichneumonidae: Banchinae: Atrophini) is described from the island of Sulawesi, Indonesia (Sundaland). This is the first known representative of the genus in Indonesia and is also the southernmost record of *Cryptopimpla* in the Oriental region. The presence of *Cryptopimpla* in Sulawesi, which belongs to Wallacea, indicates the potential distribution of *Cryptopimpla* in the Indochina Peninsula, Sundaland (other than Sulawesi Is.) and possibly Australia, where there have been no records of the genus.

Keywords

Atrophini, *Cryptopimpla sulawesiensis* sp. n., Gorontalo, Oriental region, taxonomy

Introduction

The genus *Cryptopimpla* Taschenberg is a relatively large taxon of the tribe Atrophini, subfamily Banchinae, family Ichneumonidae, containing 46 described species recorded worldwide except for the Australian, Oceanian (Notogaean realm) and Neotropical (Neogaean realm) regions, with greatest species richness in the temperate area (Yu et al. 2005; Sheng and Zheng 2005; Kuslitzky 2007). The genus seems to be poorly represented in tropical areas; e.g. there is only one species in the Ethiopian region (South Africa) (Morley 1916) and there are no known species in the Neotropical region. Although Chandra and Gupta (1977) and Sheng (2011) recognized 16 species of *Cryptopimpla* from tropical area of the Oriental region, only five of these were recorded from tropical areas, namely Myanmar and the Philippines, and the distributions of the remaining species were restricted to non-tropical areas such as north India, Ryukyu, Jiangxi Province and Taiwan. This may be due to inadequate collections in tropical areas. In fact, there have been no additional *Cryptopimpla* species recorded from tropical area of the Oriental region since Chandra and Gupta's (1977) monograph. Although Sundaland has no record of *Cryptopimpla* (Chandra and Gupta 1977), it is possible that they would potentially exist in mountainous regions as Chandra and Gupta (1977) stated that all the Oriental species of the genus recorded so far inhabit mountains. The ichneumonid fauna in 'tropical' mountainous regions more closely resembles that of temperate areas and species richness is also higher than in tropical lowlands (Gauld 1987).

In 2009 (January to March), one of us, KT, had an opportunity to investigate the ichneumonid fauna of the Tilongkabila mountains, Prov. Gorontalo, north Sulawesi, Indonesia. Amongst the specimens collected by the survey, a number of specimens of a *Cryptopimpla* species were found. It was concluded that the species is new to science; here we describe this species and record it as the first appearance of *Cryptopimpla* in the island of Sulawesi, Indonesia.

Materials and methods

The Tilongkabila mountains (mountain top; alt. 1510m; 0°35.18'N, 123°13.22'E) lie in Bogani Nani Warta Bone National Park and are covered by tropical primeval forest from the foot. Four Malaise traps were deployed every 300–400m altitude from 100m, at about 100, 500, 900 and 1200m, along the trail of the Tilongkabila mountains for about six weeks from the end of January 2009 to the beginning of March (rainy season). GPS data of the trapping points are indicated in the type specimen data. Malaise bottles were exchanged every two weeks. Net sweeping was also conducted along the trail and around the camp site as KT climbed.

Specimens used in this study were collected by both Malaise traps and sweep net. Observations of the specimens were made by stereomicroscope (OLYMPUS SZ60; LEICA M165-C), light microscope (OLYMPUS BX41) and video microscope (KEYENCE VHX-1000). Male terminalia were treated in 10% KOH at about 20°C for 24

hours, then washed in distilled water and observed in 70 % ethanol. Digital images were edited using Adobe Photoshop® CS3.

Morphological terminology mainly follows Gauld (1991). We referred to Snodgrass (1941) and Eady (1968) for male genitalia and microsculpture descriptions, respectively. The following abbreviations were used: minimum length of ocello-ocular line (OOL), minimum length of postocellar line (POL), maximum diameter of posterior lateral ocellus (OD), length of malar space (MSL), and character states of the holotype (HT). Ovipositor length is expressed as the length of the ovipositor sheaths (i.e. the length of the ovipositor beyond the hypopygium).

The specimens examined in this study are deposited in the National Institute for Agro-Environmental Sciences, Tsukuba city, Ibaragi (NIAES), the collection of Ehime University Museum (EUM) and the Natural History Museum, London (BMNH).

Taxonomy

Genus *Cryptopimpla* Taschenberg, 1863

<http://species-id.net/wiki/Cryptopimpla>

See Townes (1970) and Yu et al. (2005) for synonymy.

Diagnosis. *Cryptopimpla* can be distinguished from all other banchine genera by the following combination of characters: lower end of occipital carina joining hypostomal carina above base of mandible; apical 0.3–0.4 of flagellum tapered towards apex; epomia absent; lower half of mesopleuron weakly convex or flat; posterior transverse carina of propodeum complete, or sometimes partly weak; pleural carina present, sometimes weak; areolet present, its petiole short or absent; 2m-cu with two bullae or a single wide bulla; hind wing with distal abscissa of Cu1 much closer to 1A than to M; first metasomal tergite with glymma, its spiracle before the middle, its dorsal profile strongly convex before the spiracle; median dorsal carina on first metasomal tergite absent; ovipositor shorter than hind tibia, sometimes upcurved.

Remarks. Keys to species of *Cryptopimpla* have been published for the following regions: Oriental (Chandra and Gupta 1977), Russian Far East (Kuslitzky 2007), China (Sheng and Zheng 2005; Sheng 2011), Japan (Momoi 1970), Europe (Aubert 1978; Schwarz 2003 treating only species with black metasomal tergites) and the Nearctic (Townes and Townes 1978). All the described species with black metasomal tergites, except for the Afrotropical *C. rubrithorax* Morley, 1916, are included in these keys. Although the species collected from Sulawesi possesses a black metasoma, it could not be assigned to any described species by the keys or by comparison with the description of *C. rubrithorax*, and most described species are very unlikely to be found in Sulawesi. None of the described species would be expected to match this species from Sulawesi, considering differences in climate and geography, because most described species are distributed in the temperate or subtropical regions, especially in the northern hemisphere.

***Cryptopimpla sulawesiensis* Watanabe, Konishi & Takasuka, sp. n.**

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http://species-id.net/wiki/Cryptopimpla_sulawesiensis

Figs 1–12

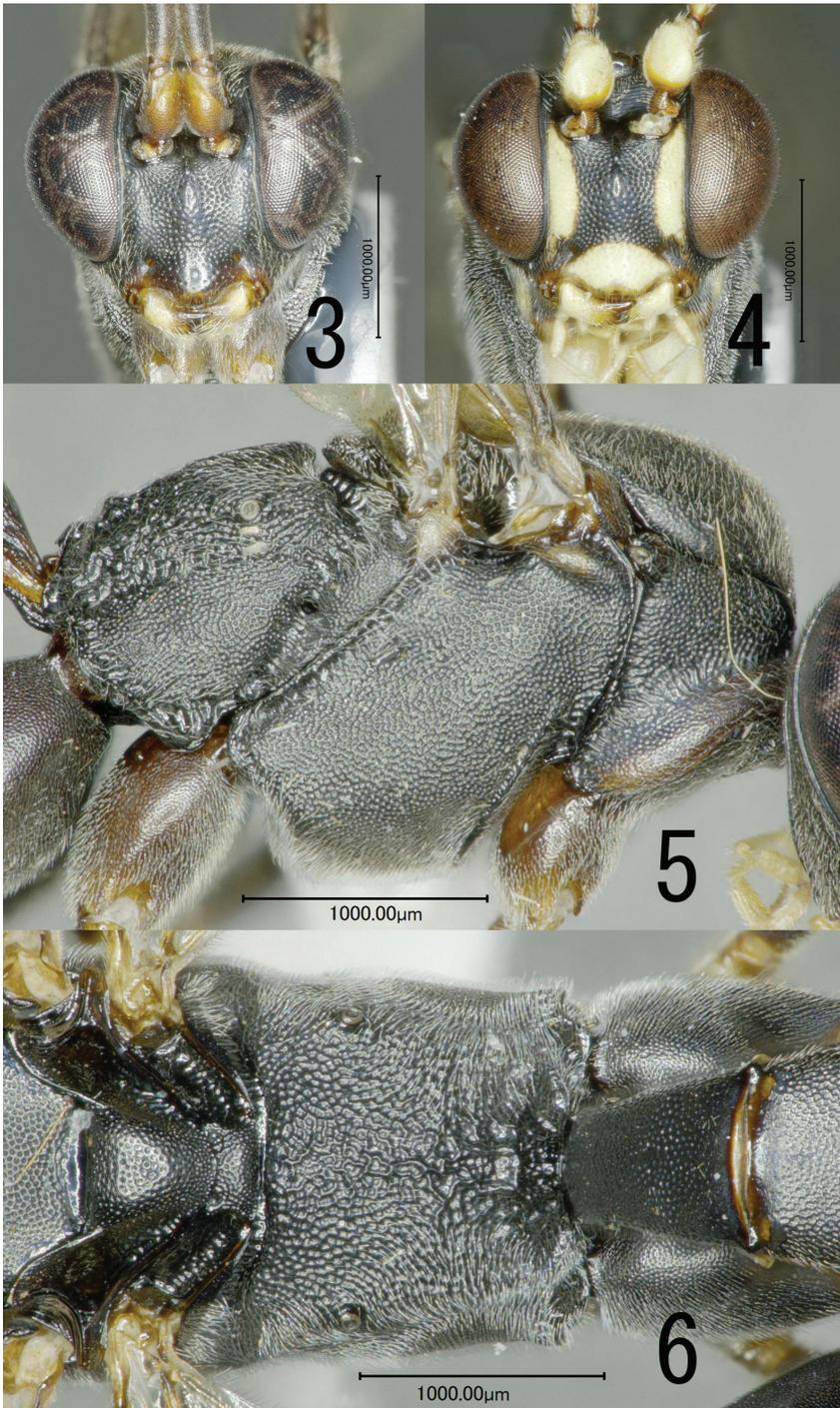
Diagnosis. *Cryptopimpla sulawesiensis* can be distinguished from all other known species by the following combination of characters: frons without horn or tubercle; malar space 0.9–1.0 times as long as basal width of mandible; antenna uniformly cylindrical, not moniliform, apical part slender; antenna with 40–44 flagellomeres; palpi whitish yellow; posterior transverse carina and pleural carina on propodeum weak, not distinctly defined; apical part of tarsal claws bent at right angle; hind femur short and robust; areolet pentagonal, receiving 2m-cu medially; metasomal tergite I 1.7–2.0 (female) or 2.0–2.2 (male) times as long as maximum width; base of metasomal tergite I marked yellow to brown; ovipositor sheath 0.5–0.6 times as long as hind tibia; mesosoma and metasoma in female largely black, without reddish parts or apical yellow bands on metasomal tergites.

Female (Figs 1, 3, 5, 6). Body 8.5–9.5 (HT: 8.6) mm long, fore wing 6.2–7.0 (HT: 6.4) mm long. Head polished, punctate, 0.6 times as long as wide in dorsal view; clypeus 0.5 times as long as wide, strongly convex in lateral view, punctures sparser than on face; face 0.8–1.0 (HT: 1.0) times as long as wide, median part with longitudinal ridge (Fig. 3); punctures on frons partly tend towards striation; malar space 1.0 times as long as basal width of mandible; basal portion of mandible convex; vertex and gena minutely and finely punctate; OOL/OD 1.0–1.1 (HT: 1.0); POL/OD 0.9–1.0 (HT: 1.1); antenna with 40–44 (HT: 40) flagellomeres; flagellomere I 3.0–3.8 (HT: 3.0) times as long as apical depth and 1.4–1.6 (HT: 1.6) times as long as flagellomere II.

Mesosoma matt, densely punctate (Figs 5, 6), distance between punctures shorter than puncture diameter, mesosoma 2.3–2.4 (HT: 2.3) times as long as width between tegulae; scutellum slightly more sparsely punctate than mesoscutum; lower half of mesopleuron slightly convex; upper end of epicnemial carina reaching lower 1/4 of pronotum; mesopleural suture straight, foveolate (Fig. 5); episternal scrobe small, slightly larger than propodeal spiracle (Fig. 5); propodeum punctate-reticulate with median portion reticulate rugose on anterior half, rugose on posterior half; posterior transverse carina present, interrupted by rugosity, pleural carina weak and other carinae absent (Fig. 6); border between propodeum and metapleuron indicated by furrow (Fig. 5); area posteroexterna short, about 1/4 total length of propodeum (Fig. 6); propodeal spiracle round (Fig. 5). Legs: hind femur 5.2–5.8 (HT: 5.7) times as long as deep; hind tibia 8.0 times as long as wide; hind tarsomere I 2.4–2.6 (HT: 2.6) times as long as hind tarsomere II and 2.0–2.1 (HT: 2.1) times as long as longer hind tibial spur, respectively; tarsal claws 1.2 times as long as arolium, pectinate, their apical part bent at right angle. Wings (Fig. 7): fore wing with Cu-a distad Rs+M by 0.5–0.8 (HT: 0.5) times length of Cu-a, with pentagonal areolet receiving 2m-cu medially; hind wing with distal abscissa of Cu1 much closer to 1A than to M, basal abscissa of Cu1 2.0 times as long as cu-a.



Figures 1, 2. Lateral habitus of *C. sulawesiensis* sp. n. **1** Female (holotype) **2** male (paratype).



Figures 3–6. *C. sulawesiensis* sp. n. **3** Head, frontal view, female (holotype) **4** head, frontal view, male (paratype) **5** mesosoma, lateral view, female (holotype) **6** propodeum, dorsal view, female (holotype). Scale bar: 1.0 mm.

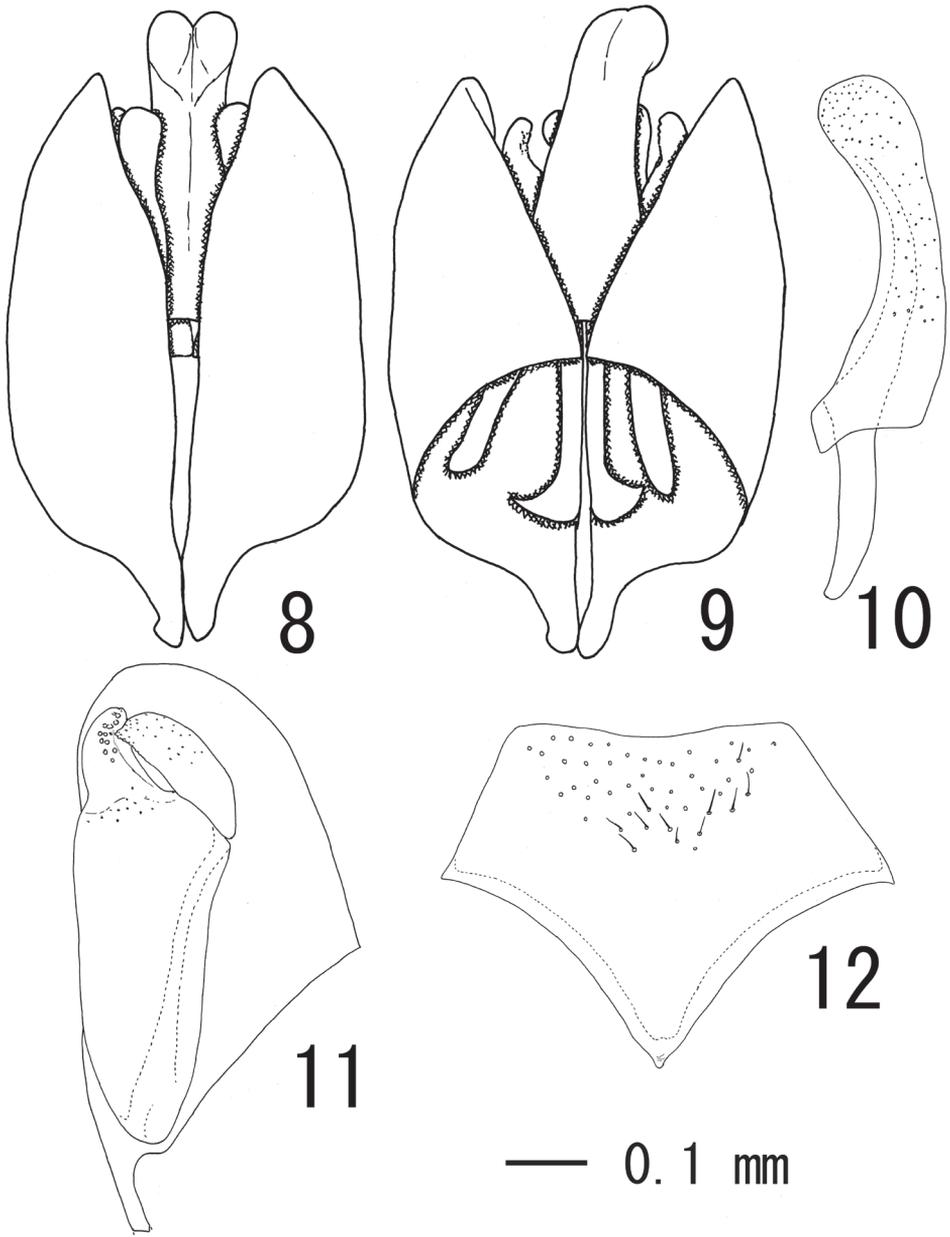


Figure 7. Fore and hind wings of *C. sulawesiensis* sp. n. (paratype).

Metasoma polished, punctate; tergite I 1.7–2.0 (HT: 1.7) times as long as maximum width, 1.3–1.5 (HT: 1.3) times as long as tergite II, densely punctate except for smooth basal part, narrow median longitudinal smooth line and posterior margin, punctures partly tend towards striation, each side of basal part weakly convex; tergites II and III punctate, punctures along anterior and posterior margins sparse and shallow, or partly absent; tergite IV and following tergites almost smooth; ovipositor 1.6–2.2 (HT: 1.6) mm, weakly up-curved, sheath 0.5–0.6 (HT: 0.6) times as long as hind tibia.

Coloration (Figs 1, 3, 5–7). Black; scape, pedicel, anterior part of clypeus, mandible base, fore and mid legs excluding black coxal base, apex of hind trochantellus, base of hind tibia, apices of hind tarsomeres I–IV, tibial spurs, tarsal claws excluding brown apex, base of metasomal tergite I and apical part of ovipositor sheath yellowish brown to brown; flagellomeres VIII–XVIII, posterior spot of tegula, basal sclerites of fore wing, posterior spot of metasomal tergite VI, and metasomal tergite VII white; palpi, and mandible excluding base and apex whitish yellow; ovipositor reddish brown; wings greyish hyaline.

Male (Figs 2, 4, 8–12). Similar to female, except following characters: body 7.2–9.7 mm long, fore wing 6.0–7.7 mm long; face slightly wider, 0.7–0.8 times as long as wide; malar space 0.9–1.0 times as long as basal width of mandible; OOL/OD 0.9–1.0; POL/OD 1.0–1.2; antenna with 44–46 flagellomeres; flagellomere I 4.3–5.0 times as long as apical width, 1.3 times as long as flagellomere II. Mesosoma 2.3–2.5 times as long as width between tegulae. Metasoma polished, punctate; tergite I 2.0–2.2 times as long as maximum width, 1.3–1.4 times as long as tergite II; hind tibia 8.0–8.4 times as long as wide; 7–9 distal hamuli.



Figures 8–12. Male terminalia of *C. sulawesiensis* sp. n. (paratype). **8** Genital capsule ventral view **9** ditto, dorsal view **10** aedeagus, lateral view **11** left paramere, inner aspect **12** subgenital plate, ventral view.

Male terminalia: subgenital plate pentagonal with median portion of apical margin weakly concave (Fig. 12); apex of paramere not projected beyond apex of aedeagus (Figs 8, 9), apical margin round (Fig. 11); aedeagus with basal apodeme about half as long as penis valve (Fig. 10).

Coloration markedly differs from female by presence of several yellowish markings (Figs 1–4). Body black; spots on scape and pedicel, mandible excluding brownish apex, clypeus, longitudinal stripe along facial orbit, palpi, collar, pair of anterolateral spots on mesoscutum, V-shaped marking on scutellum, tegula, subalar prominense, spots on posterodorsal corner of mesopleuron and metapleuron, basal sclerites of fore and hind wing, fore and mid coxae, trochanters, trochantelli, apex of hind trochanter and hind tarsomeres I–IV excluding black dorsal surface of tarsomere I whitish yellow; fore and mid legs except whitish yellow parts, base of hind coxa, hind trochanter excluding apex, hind femur excluding blackish base and apex, basal part of hind tibia yellowish to brownish red; flagellomeres XII–XIX, basal 1/3 and posterior margin of metasomal tergite I and posterior margin of metasomal tergite II white. Wings and tarsal claws similar to female. Brown areas on hind femur and tibia sometimes darker

Type series. Holotype: ♀, Mts. Tilongkabila, Bogani Nani Warta Bone National Park, Prov. Gorontalo, North Sulawesi, INDONESIA, 100m alt., 20.Feb.–3.Mar.2009, Keizo Takasuka leg. (Malaise trap, 0°33.10'N, 123°10.34'E) (EUM). Paratypes: same locality and collector as holotype, 2♂, 100–500m alt., 6–9.Feb.2009 (NIAES); 2♂, 500–800m alt., 6–9.Feb.2009 (BMNH); 1♀, 900m alt., 7–18.Feb.2009 (Malaise trap, 0°34.32'N, 123°11.41'E) (BMNH); 1♀, 1200m alt., 7–19.Feb.2009 (Malaise trap, 0°34.36'N, 123°11.58'E) (NIAES); 1♀, 500m alt., 19.Feb.–2.Mar.2009 (Malaise trap, 0°34.04'N, 123°11.15'E) (EUM); 2♂, 100–500m alt., 2.Mar.2009 (NIAES); 12♂1♀, 500–800m alt., 2.Mar.2009 (EUM).

Distribution. Indonesia (Sulawesi).

Etymology. The specific name is derived from Sulawesi, the type locality.

Biological note. Host unknown. Female wasps were, as a whole, caught in Malaise traps except for one individual caught by sweep net, whilst male wasps were caught exclusively by sweep net. On 2nd March, many male wasps were flying around one (unidentified) shrub growing between 500 and 800m.

Discussion

Cryptopimpla sulawesiensis sp. n. is the first representative of the genus known from Sulawesi and also from Indonesia (Sundaland), thus extending the southernmost distribution of the genus in the Oriental region. The presence of *Cryptopimpla* in Sulawesi, belonging to Wallacea, indicates a potential distribution of *Cryptopimpla* in the Indochina Peninsula, Sundaland (other than Sulawesi) and possibly Australia, where there has been no record of the genus. In fact, specimens of an undescribed species of the genus have been collected in southern Vietnam (deposited in Naturalis Museum Leiden, Gavin Broad, pers. comm.). Further finds are expected.

Chandra and Gupta (1977) monographed 13 species and Sheng (2011) newly added three species of Oriental *Cryptopimpla* from India, Myanmar (Burma), Jiangxi Province, Taiwan and the Philippines. Of these Oriental species, *C. sulawesiensis* sp. n. is most similar to *C. miltotibialis* Chandra and Gupta and *C. cristula* Chandra and

Gupta from India (males of both species unknown) in having the antenna with 40–44 flagellomeres, dense punctures on the mesosoma, a large, pentagonal areolet with 2m-cu at the middle, and the blackish metasoma, but *C. sulawesiensis* sp. n. can be distinguished from *C. miltotibialis* and *C. cristula* by the following points (characters of the two latter species in parentheses): metasomal tergite I somewhat shorter, 1.7–2.0 times as long as maximum width (more than 2.3 times as long as maximum width); hind femur short and robust, 5.2–5.8 times as long as maximum width (more than 6.7 times as long as maximum width); ovipositor shorter, its sheath 0.5–0.6 times as long as hind tibia (more than 0.68 times as long as maximum width); palpi whitish yellow (yellowish brown or black); metasomal tergites with some small yellowish, sometimes brownish areas (entirely black).

Chandra and Gupta (1977) stated that all the Oriental species of *Cryptopimpla* recorded so far inhabit mountains and *C. sulawesiensis* sp. n. also seems to prefer a mountainous environment as all specimens were caught along a trail in the Tilongkabila mountains. Gauld (1987) suggested that close relatives of temperate ichneumonid exist in 'tropical' mountains, where *Cryptopimpla*, which is clearly biased towards temperate areas, was actually discovered. However, we deployed four Malaise traps at various altitudes (100, 500, 900 and 1200m) in this study and females of *C. sulawesiensis* sp. n. were caught at all altitudes.

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