

Review of the species of *Pseudovolucella* Shiraki, 1930 (Diptera: Syrphidae)

Menno Reemer & Heikki Hippa

The species of the genus *Pseudovolucella* Shiraki, 1930 are reviewed. *Pseudovolucella sinepollex* sp. n. is described from Burma and Vietnam. The females of *P. apiformis* De Meijere, 1919 and *P. apimima* Hull, 1941 are described for the first time. Lectotypes and paralectotypes are designated for *P. malayana* Curran, 1928 and *P. mimica* Shiraki, 1930. *Sericomyia erystaloides* Brunetti, 1913 and *S. himalayensis* Brunetti, 1907 are transferred to *Pseudovolucella*. The male genitalia are figured and a key to the species is given. The genus contains ten described species, excluding one taxon of uncertain status. Its distribution ranges from the Himalaya and its eastern offshoots to the Sunda region, the Russian Far East and Japan. All species seem to be mountain species.

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Introduction

Pseudovolucella Shiraki, 1930 is a genus of fairly large (11–18 mm) and broadly built hoverflies, with a more or less bee-like appearance. When Shiraki described the genus in 1930 he included three species. Curran (1931) quickly added two more, and Hull (1941, 1944) added another two species. Coe (1964) was the last author to describe a new species in the genus. So, in total eight species of *Pseudovolucella* have been known so far. All but one, an East-Palaearctic species, occur in the Oriental region. Coe (1964) provided a key to all seven Oriental species, but for some species he only had the opportunity to study the descriptions, which in many cases are not illustrated. Therefore it was unclear if the key contained good characters. A series of unidentified *Pseudovolucella* specimens from Burma and Vietnam could not be identified satisfactorily using this key. Besides, some species which had originally been described in the genus *Sericomyia* Meigen, 1803 actually appeared to belong in *Pseudovolucella*, judging from the figures in Brunetti (1908, 1923). Moreover, the key did not take into account the intraspecific sexual dimorphism in colouration

which occurs in some of the species. These findings prompted us to review the species of *Pseudovolucella*, in order to provide clarity in their identification.

Material and methods

Specimens from the following collections have been examined:

- BMNH The Natural History Museum, London, Great Britain
- CAS California Academy of Sciences, San Francisco, U.S.A.
- ITLJ Laboratory of Insect Systematics, National Institute of Agro-Environmental Sciences, Kannondai, Tsukuba, Ibaraki Pref., Japan
- JTS John T. Smit, Utrecht, the Netherlands
- MCZ Museum of Comparative Zoology, Harvard University, Cambridge Massachusetts, U.S.A.
- NHRS Swedish Museum of Natural History, Stockholm, Sweden
- RMNH Nationaal Natuurhistorisch Museum, Naturalis, Leiden, the Netherlands
- ZMAN Zoölogisch Museum Amsterdam, the Netherlands

Unfortunately, we did not have the opportunity to study the types of *Sericomyia cristalooides* Brunetti, 1913 and *S. himalayensis* Brunetti, 1907, which are kept in the collection of the Zoological Survey of India (ZSI) in Calcutta.

Male genitalia have been dissected, macerated in a cold 10% KOH solution for approximately 12 hours and stored in glycerol. The drawings have been made with the aid of photographs produced by Analysis Extended Focal Imaging Software, using an Olympus motorised stereozoom microscope SZX12.

Terminology of external morphology is based on Speight (1987).

Pseudovolucella Shiraki

Pseudovolucella Shiraki, 1930: 39. Type-species: *Pseudovolucella mimica* Shiraki, 1930 (by original designation).

Diagnosis

Generic characters are given by Shiraki (1930) and Hull (1949), who emphasize the relatively flattened head (dorsal and lateral view) and the swollen hind femur. As to the shape of the head, we found this to be a very constant character within the genus. As to the swollen hind femur, this may not always be a clear character compared with certain species of other genera, like *Arctophila* Schiner, 1860. We felt the need to search for additional generic characters and found the following, which distinguish *Pseudovolucella* from other Sericomiyini (for group-defining characters see Hull 1949).

Face very wide and of characteristic shape: at least half width of head occupied by face at its widest level, eye margins strongly oblique but straight (Fig. 1, 2). Orbital strips about as wide as height of 3rd antennal segment (Fig. 3) (much narrower in *Arctophila* and *Sericomyia*). Facial knob in lateral view clearly below ventral margin of eye (Fig. 3). Radial-median cross-vein (rm) of wing located proximally to middle of discal cell (Fig. 4). Apical vein (tm) of posterior wing cell recurrent apically, posterior cell with obtuse or rectangular apex (Fig. 4, 5). Vein R4+5 more or less straight, not sinuate (Fig. 4, 5). Male: sternite 3 obviously shorter than sternite 4 (these sternites about as long in *Arctophila* and *Sericomyia*). Male: hind femur swollen, often with apicoventral knob (Figs 39–47).

Classification

The genus *Pseudovolucella* is related to the genera *Arctophila* Schiner, 1860, *Conosyrphus* Frey, 1915, *Pararctophila* Hervé-Bazin, 1914, *Pyritis* Hunter, 1897 and *Sericomyia* Meigen, 1803. Shared characters are given by e.g. Hull (1949). Several earlier

authors classified these genera in a separate subfamily, which was called both(!) Arctophilinae and Cinxinae by Sack (1928, 1932), and Sericomiyinae by Hull (1949) and Coe (1964). Nowadays it is usual to consider the group as a tribe (Sericomiyini Rondani, 1845) within the subfamily Milesiinae Rondani, 1845 (Knutson et al. 1975, Peck 1988). Although the subfamily Milesiinae probably is polyphyletic (Ståhls et al. 2003), we see no reason to question the supposed common ancestry of the genera within the Sericomiyini.

Based on the description by Curran (1929), it could not be excluded that *Sericomyia completa* Curran, 1929 from Taiwan belongs to *Pseudovolucella*. It seemed unlikely that Curran (1931) would have overlooked his “own” species while writing a key to *Pseudovolucella* species only two years after the description of *S. completa*. To be sure, pictures of the holotype of *S. completa*, a male in the CAS collection, have been examined. These pictures made clear that *S. completa* is no *Pseudovolucella*, because it lacks the characters of the head and wing venation described as diagnostic for *Pseudovolucella* in this paper.

Infrageneric relationships and biogeography

Pseudovolucella is restricted to mountainous areas in South- and Southeast-Asia and the Far Eastern Palaearctic (Fig. 22). The species of *Pseudovolucella* are very similar in external morphological characters. In several species the only external characters are found in colouration of hairs, tergites or legs. Most of these external characters provide insufficient basis for the determination of infrageneric relationships. The best method for a phylogenetic assessment would be a comparison of DNA-sequences, but some characters of the male genitalia suggest relationships between species. For instance, there are obvious similarities in the male genitalia of the four species known from the Sunda-region: *P. apiformis*, *P. apimima*, *P. fasciata* and *P. malayana* (Figs 23, 24, 26, 28). In these species the right surstylus has a long, “thumb-like” inner lobe and the shape of the left surstylus is similar in all four species. In the hypandrium in dorsal view the median part is rather wide in all four species, when compared with *P. decipiens*, *P. hingstoni*, *P. mimica* and *P. sinopollex*. These strong similarities suggest that the species of this “Sunda-group” share a common ancestor from which they have diverged quite recently. Possibly this common ancestor has colonized the Sunda region from Indochina during the last ice age, when sea levels had dropped and the Sunda islands, including Peninsular Malaysia, became temporarily connected by land bridges. After the sea levels rose again, about 10.000 years ago, the islands became isolated from

each other and different species developed on each of them.

The relationships between the remaining five species are much less clear. The male genitalia are distinctly different from each other. The most aberrant species is *P. ochracea*. Although in habitus it is very similar to *P. decipiens*, the male genitalia are quite different. Besides, it is the only species of *Pseudovolucella* in which the length of the hind tibia is about 3/4 of the length of the hind femur, whereas in all other species the tibia is much shorter.

Biology

No notes on habitat or behaviour of *Pseudovolucella* species have been published, probably because none of the authors who described the species have actually collected the specimens themselves. The label data indicate that *Pseudovolucella* species are very much mountain species, since all specimens have been found at high altitudes. The label of the female paratype of *P. hingstoni* reads "damp evergreen forest". The specimens of *P. mimica* and *P. sinepollex* from Burma have been collected in montane cloudforest, containing swampy areas and streams, judging from the notes published by Malaise (1945). At least some of the species (e.g. *P. decipiens*) seem to have a long flight period.

Key to the species of *Pseudovolucella*

Note that the females of *P. himalayensis*, *P. malayana* and *P. ochracea* are not yet known and therefore are not included in the key. We have indicated in which couplets the females of these species will presumably key out. *Pseudovolucella eristoloides* Brunetti is not included at all, because of its uncertain status and because no characters are known to separate it from *P. mimica*.

1. Males (eyes touching on top of the head) 2
 - Females (eyes separated) 11
2. Tergite 4 entirely black (Figs 10, 11, 21) 3
 - Tergite 4 orange brown or dark with a yellow or orange fascia (Figs 6–9, 12–20) 4
3. Hind femur with a small apicoventral knob (Fig. 41). Hind tibia only a little longer than half the length of hind femur (as in Fig. 39). Posterior margin of tergites 2 and 3 with white hair fringes (Fig. 48). Genitalia as in Fig. 25 *P. decipiens*
 - Hind femur without apicoventral knob (Fig. 46). Hind tibia about ¾ of the length of hind femur (Fig. 46). Posterior margins of tergites 2 and 3 only with black hairs. Genitalia as in Fig. 30 *P. ochracea*
4. Hind femur with medioventral knob (Fig. 43) *P. hingstoni*
 - Hind femur without medioventral knob 5
5. Tergites uniformly reddish brown, without fasciae (Fig. 20). Genitalia as in Fig. 28 *P. malayana*
 - Tergites dark or pale brown, with at least on tergite 2 orange or reddish brown fasciae (Figs 6, 8, 12, 16, 18). Genitalia different 6
6. Tergites reddish brown, with not strongly contrasting pale fasciae (Figs 6, 8) 7
 - Tergites blackish brown with strongly contrasting pale fasciae (Figs 12, 16, 18) 8
7. Hairs on pregenital segments and posterior half of tergite 4 yellow. Hind femur ventrally straight in basal part, then somewhat concave to apicoventral knob (Fig. 39). Genitalia as in Figs 23, 32–34. Sumatra *P. apiformis*
 - Hairs on pregenital segments and posterior half of tergite 4 black. Hind femur ventrally more or less straight from base to apicoventral knob (Fig. 40). Genitalia as in Fig. 24: inner lobe of right surstylus narrower than in *P. apiformis*. Java *P. apimima*
8. Fore femur entirely orange *P. fasciata*
 - Fore femur partly dark 9
9. Tergite 2 orange except for black fascia along posterior margin (figs. in Brunetti 1907, 1923) *P. himalayensis*
 - Tergite 2 with two orange fasciae, separated by a black fascia (but may medially be connected), and a black fascia along the posterior margin (Figs 16, 18) 10
10. Posterior margins of tergites with fringes of pale hairs (often most obvious on tergite 4) (Fig. 49). Hind femur stronger swollen than in *P. sinepollex*, ventrally more or less straight between base and apicoventral knob (Fig. 45). Apex of posterior wing cell clearly obtuse (Fig. 4) *P. mimica*
 - Posterior borders of tergites without fringes of pale hairs. Hind femur swollen less strong than in *P. mimica*, ventrally somewhat concave (Fig. 47). Apex of posterior wing cell more or less rectangular (Fig. 5) *P. sinepollex*
11. Tergite 4 entirely black (Figs 10, 11, 21) *P. decipiens*
 - [Probably the unknown female of *P. ochracea* will also key out here. For possible characters see differences in males (couplet 3).]
 - Tergite 4 orange brown or dark with yellow or orange fascia (figs. 6–9, 12–20) 12
12. Tergite 5 with orange brown pale fascia on the anterior half or entirely orange brown 13
 - Tergite 5 entirely (brownish) black 15

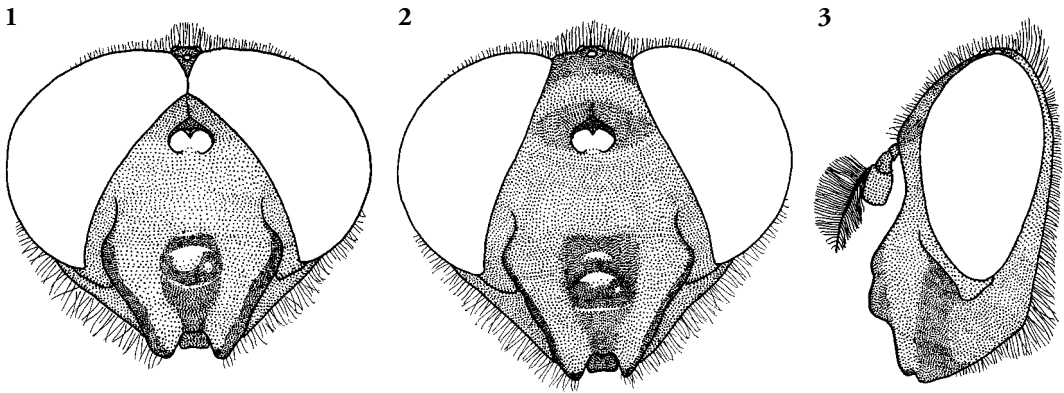


Fig 1–3. *Pseudovolucella apiformis* De Meijere. – 1, Head of male, frontal; 2, Head of female, frontal; 3, Head of female, lateral.

13. Tergites 3 and 4 only with black hairs, also on the pale fasciae *P. fasciata*
 [Additional characters: no fringes of pale hairs along posterior margins of tergites, posterior part of tergite 5 black.]
- Tergites 3 and 4 with yellow hairs on the pale fasciae. 14
 [Probably the unknown female of *P. malayana* will also key out in this couplet.]
14. Tergite 5 entirely orange brown. Posterior margin of tergites without fringes of pale hairs. Hairs on posterior coxae mostly black *P. apiformis*
- Tergite 5 orange brown only anteriorly, black posteriorly. Posterior margin of tergite 2 (possibly also other tergites) with a fringe of pale hairs (as *P. mimica* in Fig. 49). Hairs on posterior coxae all yellow *P. apimima*
15. Coxae entirely black. Femora almost entirely black or blackish brown, at most pale coloured on apical part *P. hingstoni*
- Coxae brownish to orange. Femora orange at least on posterior part of on basal half 16
16. Posterior margins of tergites with fringes of pale hairs (often most obvious on tergite 4) (Fig. 49). Apex of posterior wing cell clearly obtuse (Fig. 4) *P. mimica*
- Posterior borders of tergite without fringes of pale hairs. Apex of posterior wing cell more or less rectangular (Fig. 5) *P. sinepollex*

The species of *Pseudovolucella*

Pseudovolucella apiformis (De Meijere)

Figs 1–3, 6, 7, 23, 32–34, 39

Arctophila apiformis De Meijere, 1919: 27. Holotype ♂: Indonesia (Sumatra): “66.24”, “Edw. Jacobson, Piek v. [Peak of] Kurintji, Sum.8.1915”, “*Arctophila apiformis* de Meijere, 1919, ZMAN type DIPT.0949.1” (ZMAN) [examined]. Type listed by De Jong (2000: 28).

Sericomyia crassipes Edwards, 1919: 44; Syntypes, 2♂, Indonesia (Sumatra): 1♂, “Syntype”, “*Sericomyia crassipes* Edw. Type”, “Sumatra, Korinchi Peak, 7300 ft., May 1914”; 1♂, “Syntype”, “Sumatra, Korinchi Peak, 7300 ft., May 1914”, “Ex F.M.S. Museum B.M. 1955–354”, “*Sericomyia crassipes* Edw.”. (BMNH) [examined]. (Synonymised by Shiraki 1930)

Pseudovolucella apiformis; Shiraki, 1930: 40.

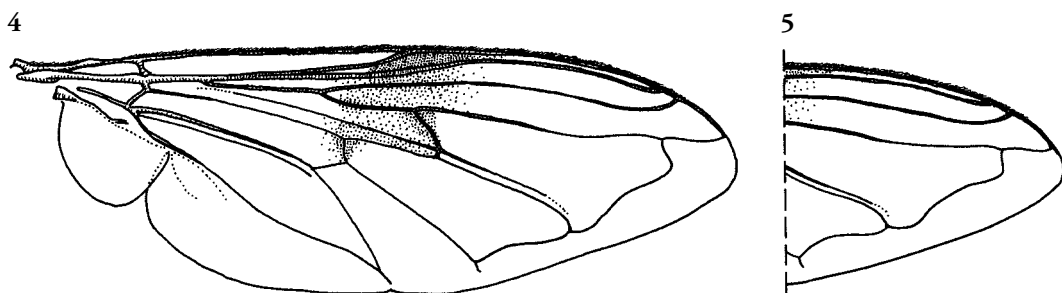
Synonymy

Study of the holotype of *P. apiformis* and the syntypes of *P. crassipes* revealed that *P. crassipes* has all characters which are considered to be diagnostic for *P. apiformis* (as described below), which confirms the synonymy of these names as proposed by Shiraki (1930).

Diagnosis

Body length: 14–16 mm.

Male. Tergites reddish brown with paler orange brown, weakly contrasting fasciae (Fig. 6) (similar to *P. apimima*). No fringes of pale hairs along posterior margins of tergites. Hairs on tergites and pregenital segments entirely yellow, a character shared with *P. himalayensis* and *P. malayana*, from which it can be separated by the abdominal colour pattern and the largely blackish brown anterior femora. In anterior



Figs 4–5. Wing of *Pseudovolucella* species. – 4, *P. mimica* Shiraki; 5, *P. sinepollex* sp. n. (apex).

view, hind femur ventrally straight in the basal part, then somewhat concave in the part proximal to the apicoventral knob (Fig. 39, compare with *P. apimima* in Fig. 40). Genitalia as in Figs 23, 32–34.

Female (Fig. 7). Abdominal colour pattern more contrasting, dark parts darker than in male. No fringes of pale hairs along posterior margins of tergites. Tergite 5 entirely pale coloured, while in other species (except possibly *P. malayana*) at least the posterior half is blackish brown. Legs entirely orange brown, hind legs somewhat darker. Hairs on posterior coxae mostly black.

In order to prevent possible confusion with the yet unknown female of *P. malayana*, a description of the female is given below.

Description of female

Based on one specimen (see Material examined).

Head. (Fig. 2, 3). Eyes bare, separated over distance of about $\frac{1}{6}$ of total head width. Face yellowish brown, with wide, darker median stripe and laterally also with darker stripes. Yellow parts and lateral dark parts with thin yellow pollinosity. Frons, orbital strips and face immediately below antennae with denser yellow pollinosity. Frons and ocellar triangle with dark hairs. Vertex and postocular orbits with yellow hairs (longest at top of head). Median part of face, including facial knob, bare. Lateral parts of face, genae, orbital strips and oral margins with yellow hairs, with patch of black hairs laterally on upper part of face. Lunula orange brown. Ocellar triangle with frontal angle of approximately 60° .

Antenna: dark brown, 3rd segment 1.3–1.5 times as long as wide. Arista pale brown, about 2.5 times as long as 3rd antennal segment, strongly plumose, with longest hairs longer than length of 3rd antennal segment.

Thorax. Mesoscutum greyish black, entirely covered with yellow hairs and with thin greyish pollinosity, which is a little denser along the transverse

mesonotal suture and in median part on anterior half. Postpronotal sclerites, postalar calli and scutellum yellow and entirely with yellow hairs.

Pleura mostly greyish black, narrowly orange along sutures, covered with grey pollinosity, except on posterior parts of meropleuron. Pleura mostly with long yellow hairs, except on proepimeron, mesanepisternum 1, middle part of katepimeron, meropleuron, barrette and posterior part of mesepimeron. Metasternum with yellow hairs.

Legs. Anterior coxae orange brown, dark grey pollinose and with yellow hairs. Middle coxa orange brown, with black hairs. Posterior coxae orange brown, grey pollinose with mostly black and some yellow hairs.

All femora and tibiae orange brown, femora somewhat darker than tibiae and posterior legs somewhat darker than anterior and middle legs. Legs almost entirely with yellow hairs, middle femora also with some black, bristly hairs towards apex, posterior femora and tibiae also with short black hairs. Tarsi orange brown (anterior and middle) to brown (posterior), with darker last two tarsomeres. Wing clear, with brown blotch posterior to stigma; entirely covered with microtrichiae. Calypterae and halteres orange brown; calypterae covered with short yellow hairs and with long yellow hair fringes along margins.

Abdomen (Fig. 7). Tergite 1 orange with blackish brown lateral corners, with yellow hairs. Tergite 2 blackish brown with narrowly orange anterior margin and transverse, slightly curved orange fascia on anterior half, which medially narrowly joins the orange anterior margin; covered with yellow hairs on anterior half (on orange parts) and with short black hairs on posterior (black) half. Tergite 3 blackish brown with transverse, slightly curved orange fascia on anterior half, with short yellow hairs on orange parts and short black hairs on black parts. Tergite 4 with same colour pattern as tergite 3, but dark

6



7



8



9



10



11

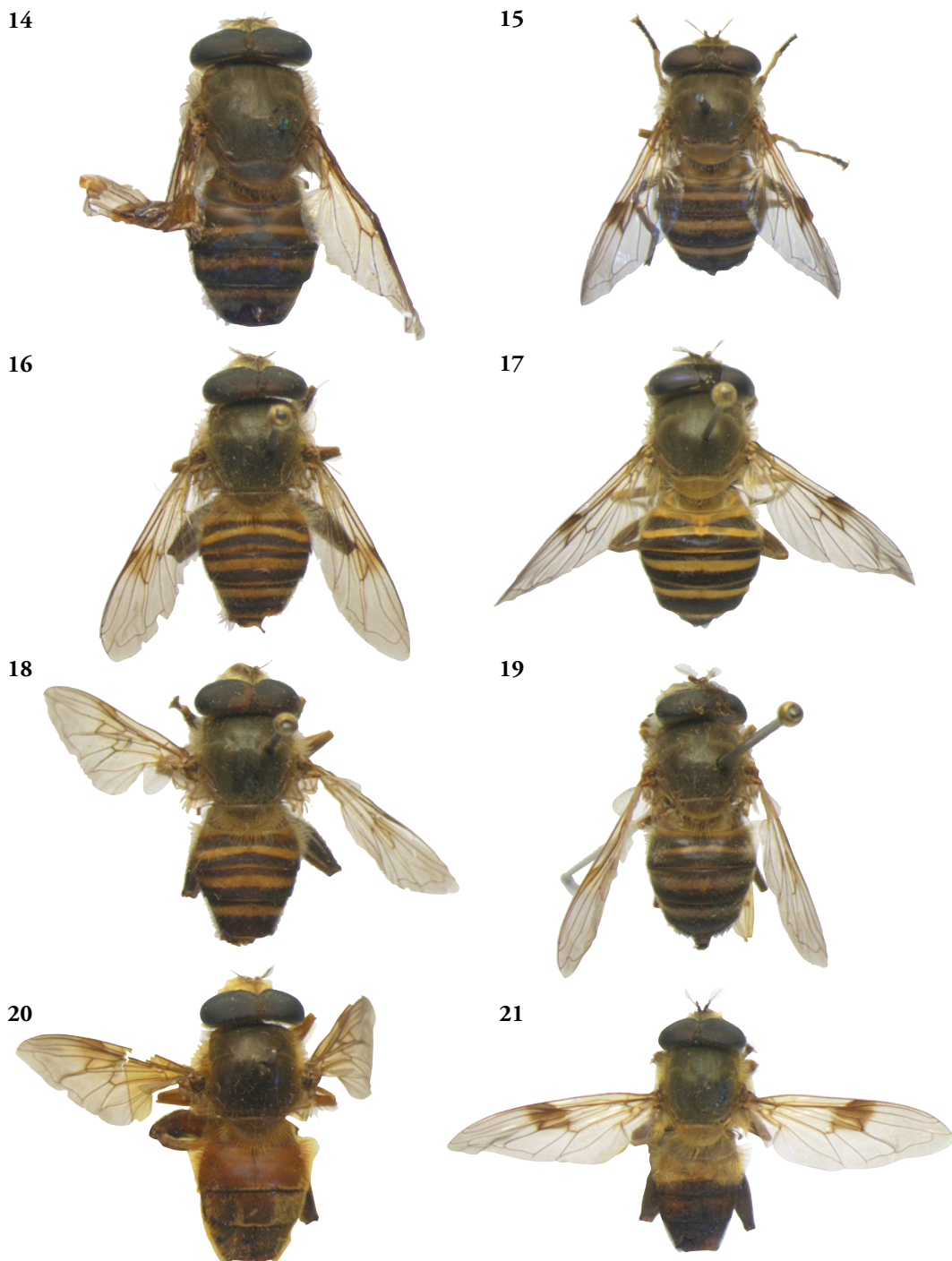


12



13





Figs 6–21. Habitus of *Pseudovolucella* species. – 6, *P. apiformis*, male (holotype); 7, *P. apiformis*, female (RMNH); 8, *P. apimima*, male (holotype); 9, *P. apimima*, female (RMNH); 10, *P. decipiens*, male; 11, *P. decipiens*, female (JTS); 12, *P. fasciata*, male (holotype); 13, *P. fasciata*, female (paratype); 14, *P. hingstoni*, male (holotype); 15, *P. hingstoni*, female (paratype); 16, *P. mimica*, male (RMNH); 17, *P. mimica*, female (RMNH); 18, *P. sinopollex*, male (RMNH); 19, *P. sinopollex*, female (RMNH); 20, *P. malayana*, male (lectotype); 21, *P. ochracea*, male (holotype).

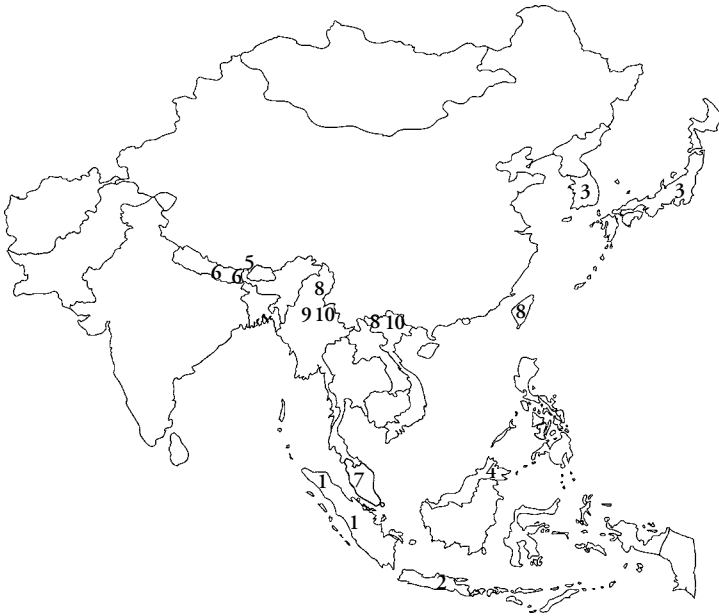


Fig. 22. Distribution of known records of *Pseudovolucella* species. – 1, *P. apiformis*; 2, *P. apimima*; 3, *P. decipiens*; 4, *P. fasciata*; 5, *P. himalayensis*; 6, *P. hingstoni*; 7, *P. malayana*; 8, *P. mimica*; 9, *P. ochracea*; 10, *P. sinepollex*.

posterior half slightly paler in colour, and with some black hairs in middle part of the orange fascia. Tergite 5 entirely orange brown, only posterior margin a little darker; entirely covered with short black hairs. Sternite 1 orange anteriorly, blackish posteriorly, with long yellow hairs. Sternites 2 and 3 blackish brown, with long yellow and short black hairs. Sternites 4 and 5 orange brown. Sternite 4 with long yellow and short black hairs, sternite 5 only with short black hairs.

Distribution

Pseudovolucella apiformis seems to be restricted to the mountain range along the western coast of Sumatra. The specimens have been collected between 2190 and 3500 m in the months February and May.

Material examined. Indonesia: Sumatra: Atjeh, Mt. Leuser, Ngl Lemboek, 3000 m, ii-1937, A. Hoogerwerf, 2♂ (RMNH); Atjeh, Mt. Leuser, 3300–3500 m, ii.1937, A. Hoogerwerf, 4♂ 1♀ (RMNH); Gun. Teleman 1917, E. Jacobson, 1♂ (ZMAN).

Pseudovolucella apimima Hull

Figs 8, 9, 24, 40

Pseudovolucella apimima Hull, 1941: 154. Holotype ♂: Indonesia (Java): “Tjibodas, Mt. Gede, Java, [19]09”, “Altitude 7800 ft.”, “Bryant & Palmer Coll.”, “M.C.Z. type 22235”, “*Pseudovolucella mimica* F.M.H. Hull” (MCZ). [examined]

Holotype labels

The holotype carries the somewhat confusing label “*Pseudovolucella mimica* F.M.H. Hull”, written in what seems to be Hull’s hand. This type had been registered under this name in the type database of the MCZ. However, *P. mimica* was described by Shiraki, and Hull never described a species under this name, while he did describe *P. apimima*. Besides, the data on the label are the same as those mentioned in the original description by Hull (1941). The names *apimima* and *mimica* are quite similar, so it seems likely that the person who wrote the label (probably Hull himself) mixed the two names up by accident.

Diagnosis

Body length: 13–14 mm.

Male. Tergites reddish brown with paler orange brown, weakly contrasting fasciae (Fig. 8) (similar to *P. apiformis*). Hairs on posterior half of tergite 4 and on pregenital segments black. With fringe of pale hairs along posterior margin of tergite 2. In anterior view, hind femora ventrally straight from base to just before apicoventral knob (Fig. 40), compare to *P. apiformis* in Fig. 39). Male genitalia as in Fig. 24.

Female (Fig. 9). Tergites black and pale fasciae contrasting stronger than in male. With fringe of pale hairs along posterior margin of tergite 2 (possibly also on other tergites). Hairs on pale fasciae of all tergites yellow, while hairs on dark parts of tergites black. Tergite 5 orange brown on anterior part and black on posterior part. All hairs on posterior coxae yellow.

In order to prevent possible confusion with the yet unknown female of *P. malayana*, a description of the female is given below.

Description of female

Based on one specimen (see Material examined).

Head. Eyes bare, separated over distance of about $\frac{1}{6}$ of total head width. Face yellowish brown, with wide, darker median stripe which leaves centre of facial knob yellowish, and laterally also with darker stripes. Yellow parts and lateral dark parts with thin yellow pollinosity. Frons, orbital strips and face immediately below antennae with denser yellow pollinosity. Frons and ocellar triangle with dark hairs. Vertex and postocular orbits with yellow hairs (longest at top of head). Median part of face, including facial knob, bare. Lateral parts of face, genae, orbital strips and mouth edges with yellow hairs, with patch of black hairs laterally on upper part of face. Lunula blackish brown. Ocellar triangle with frontal angle of approximately 60° .

Antenna: dark brown, 3rd segment 1.3–1.5 times as long as wide. Arista pale brown, about 2.5 times as long as 3rd antennal segment, strongly plumose, with longest hairs longer than length of 3rd antennal segment.

Thorax. Mesoscutum greyish black, entirely covered with yellow hairs and with thin greyish pollinosity. Postpronotal sclerites, postalar calli and scutellum yellow and entirely with yellow hairs.

Pleura mostly greyish black, narrowly orange along sutures, covered with grey pollinosity, except on posterior parts of meropleuron. Pleura mostly with long yellow hairs, except on proepimeron, mesepimeron 1, middle part of katepimeron, meropleuron, barrette and posterior part of mesepimeron. Metasternum with yellow hairs.

Legs. Anterior coxae orange brown, grey pollinose and with yellow hairs. (Middle coxae not visible in studied specimen). Posterior coxae orange brown, grey pollinose with yellow hairs. All femora orange brown, anterior and mid tibiae orange brown, posterior tibiae blackish brown. Legs almost entirely with yellow hairs, posterior femora and tibiae also with some black, bristly hairs towards apex, posterior femora and tibiae also with short black hairs. Tarsi orange brown (anterior and middle) to blackish brown (posterior), with darker last two tarsomeres. Wing clear, with brownish blotch posterior to stigma; entirely covered with microtrichia. Calypterae and halteres orange brown; calypterae covered with short yellow hairs and with long yellow hair fringes along margins. **Abdomen** (Fig. 9). Tergite 1 orange, with yellow hairs. Tergite 2 blackish brown with narrowly orange anterior margin and transverse, slightly curved orange

fascia on anterior half; covered with yellow hairs on most of surface and with short black hairs on posterior third; with fringe of pale hairs along posterior margin. Tergite 3 and 4 blackish brown with transverse, slightly curved orange fascia on anterior half, with short yellow hairs on orange parts and short black hairs on black parts. Tergite 5 orange brown anteriorly, blackish posteriorly; entirely covered with short black hairs. Sternite 1 orange with yellow hairs. (Other sternites missing in studied specimen).

Distribution

All four known specimens have been collected in mountainous areas on Java, at altitudes around 2400 m. The exact date is known of only one specimen, which was found on June 29.

Material examined. Indonesia: Java: Gedeh Tjibodas, Lebaksaät, 2400 m, 29.vi.1937, M.A. Lieftinck, 1♂ (RMNH); Blume, ex. col. Van der Wulp, 1♂ 1♀ (RMNH).

Pseudovolucella decipiens (Hervé-Bazin)

Figs 10, 11, 25, 41, 48

Arctophila decipiens Hervé-Bazin, 1914: 410. Holotype ♀: Japan, Kumanotaïra, near Karuizawa (MNHNP) [not examined].

Arctophila jozana Matsumura, 1916: 205; Shiraki, 1930: 43.

Synonymy

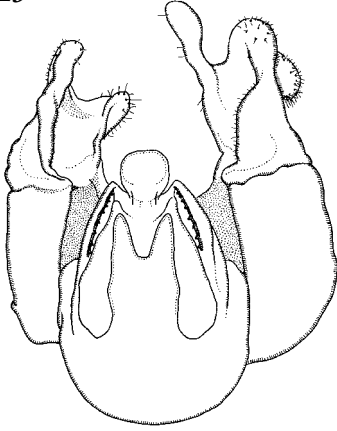
Shiraki (1930) considered *Arctophila jozana* Matsumura, 1916 as a junior synonym of *P. decipiens*. This synonymy has been ignored by Peck (1988), but this seems more likely to be the result of overlooking Shiraki's opinion than of a new consideration of the case. We see no reason to reconsider this synonymy.

Diagnosis

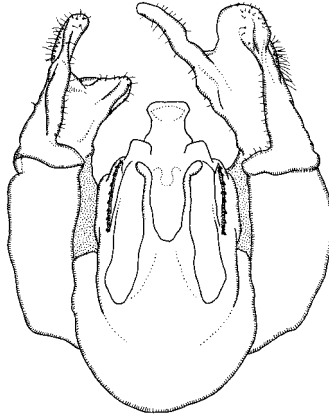
Body length: 14–18 mm.

Tergite 4 entirely black, a character only shared with *P. ochracea* (Fig. 10, 11). Tergite 2 with extensive yellow markings, tergite 3 sometimes with vague, narrow, medially interrupted fascia, which is always much narrower than the pale markings on tergite 2. Male can be distinguished from *P. ochracea* by presence of (not very pronounced) apicoventral knob on hind femur (Fig. 41), as well as by white hair fringes along posterior margins of tergites 2 and 3 (Fig. 48). Characters for separating females of these two species cannot be given, because the female of *P. ochracea* is unknown. Possibly, the character of the hair fringes along the posterior margins of the tergites also applies to the females.

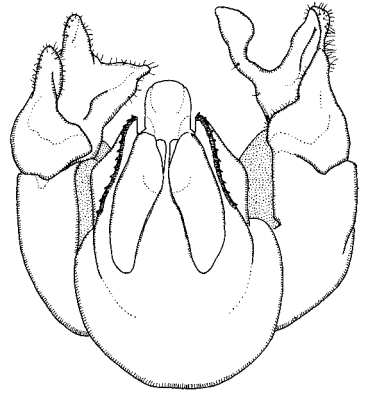
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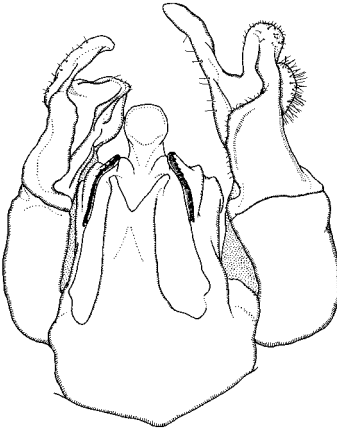
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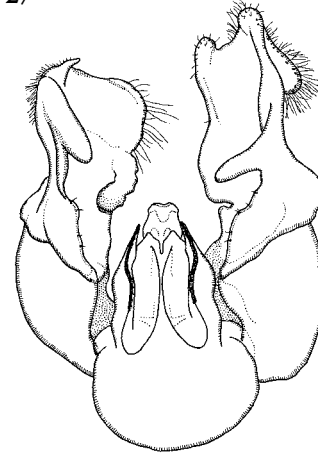
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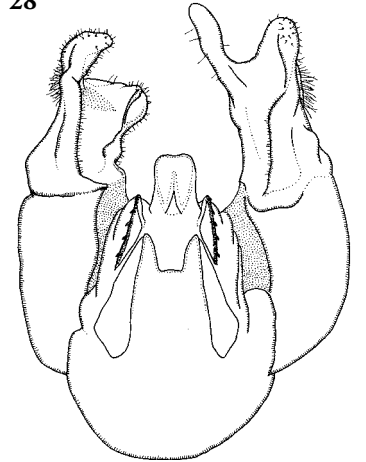
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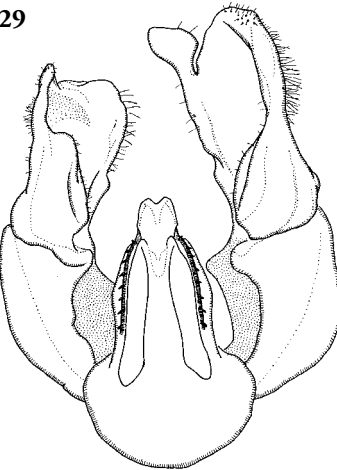
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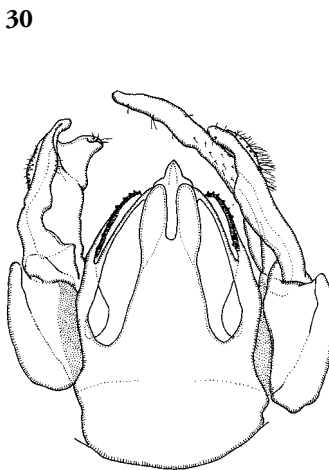
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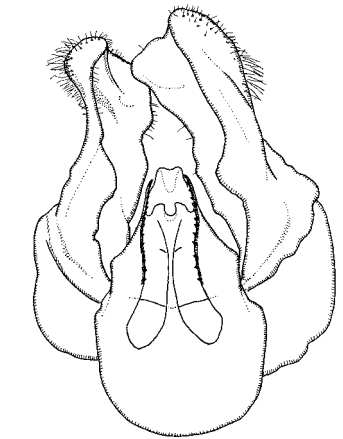
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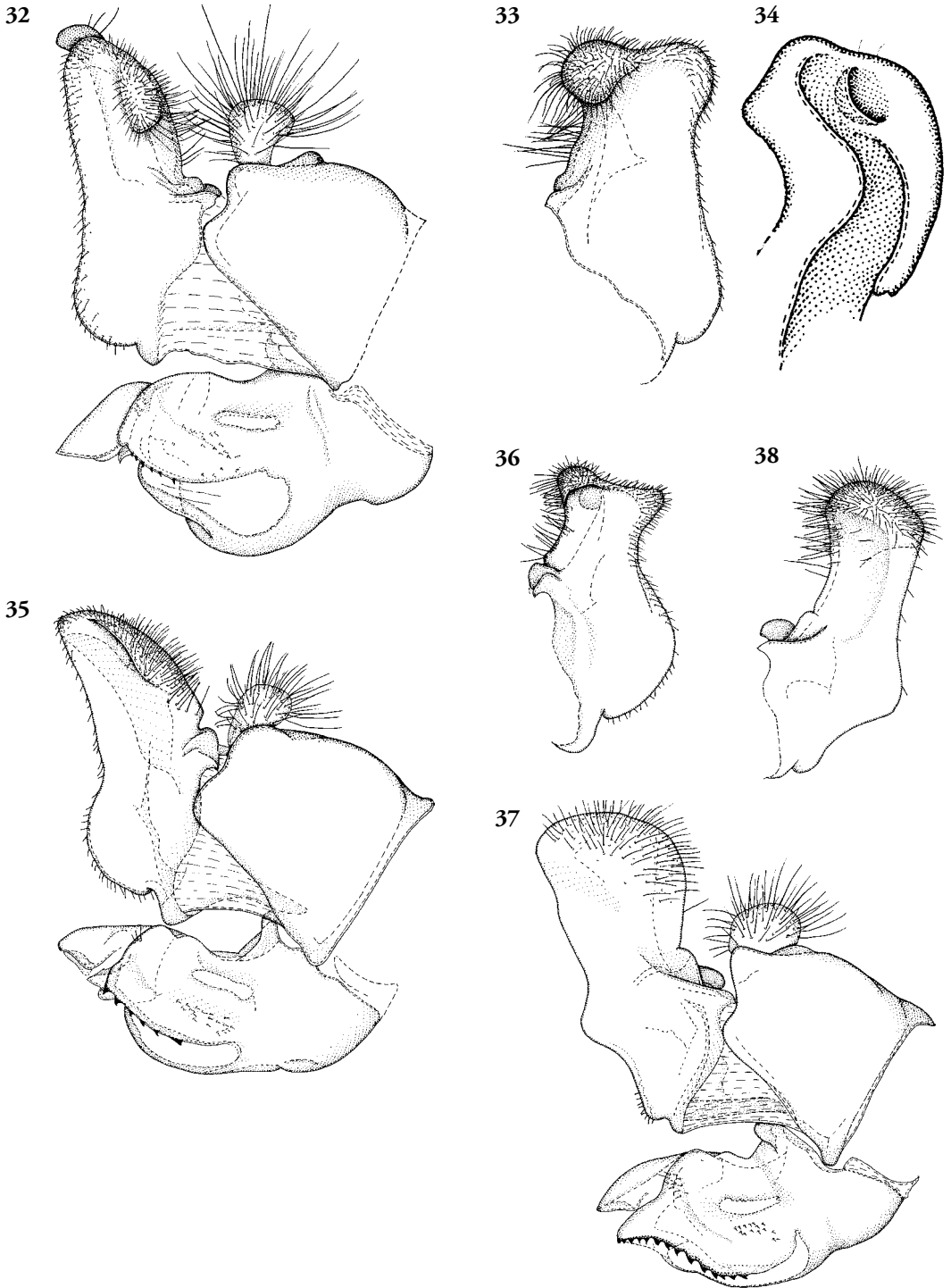
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31



Figs 23–31. Male genitalia of *Pseudovolucella* species in ventral view. – 23, *P. apiformis*; 24, *P. apimima*; 25, *P. decipiens*; 26, *P. fasciata*; 27, *P. hingstoni*; 28, *P. malayana*; 29, *P. mimica*; 30, *P. ochracea*; 31, *P. sinepollex*.



Figs 32–38. Male genitalia of *Pseudovolucella* species in lateral view. – 32, *P. apiformis*, from right; 33, *P. apiformis*, outer side of left surstylus; 34, *P. apiformis*, inner side of left surstylus; 35, *P. mimica*, from right; 36, *P. mimica*, outer side of left surstylus; 37, *P. sinepollex*, from right; 38, *P. sinepollex*, outer side of left surstylus.

Distribution

This is the only known non-Oriental species of *Pseudovolucella*. Its distribution is East-Palaearctic, ranging from southern Sakhalin and the southern Kuril Islands in the Russian Far East to Japan and Korea. In Japan *P. decipiens* has been found in September and October (Shiraki 1930, studied specimens). In South-Korea the species has been found from May to September, without any clear peaks in abundance (Han & Choi 2001).

Material examined. **Japan:** Ibaraki Pref., Mito-City, 12.x.2005, K. Ichige, 1♂ & 1♀, (coll. J.T. Smit); **Korea:** Gangwon-do, Jeongseon, Nam-myeon, Mt. Mindungsan, from Yupyong-ri to 1119 m. peak, 6.x.2001, H.-Y. Han et al., 1♂ (coll. J.T. Smit).

Pseudovolucella fasciata Curran

Figs 12, 13, 26, 42

Pseudovolucella fasciata Curran, 1931: 369. Holotype ♂: **Malaysia (Sabah):** "Holotype", "*Pseudovolucella fasciata* Curran Type", "B.N. Borneo, Mt. Kinabalu, Lumu Lumu, 5500 ft., April 12th 1929", "Pres. by Fed. Malay States Museum, B.M. 1934-74" (BMNH) [examined].

Diagnosis

Body length: 13–15 mm.

Tergites blackish brown, with clearly contrasting orange brown fasciae. Posterior margins of all tergites (except tergite 1) entirely dark and lacking fringes of pale hairs. Fore- and middle legs and coxae entirely orange.

Male. Hind femora with apicoventral, but without medioventral knob, somewhat concave in anterior view (Fig. 42). Tergites 2–4 covered with yellow hairs on pale fasciae, and black hairs on dark parts. Genitalia as in Fig. 42.

Female. Tergite 2 with yellow hairs on the pale fascia, while tergites 3, 4 and 5 entirely covered with black hairs. Tergite 5 with orange-brown fascia on anterior half; posterior half blackish brown.

Distribution

All known specimens have been collected on Mount Kinabalu on Malaysian Borneo, at altitudes ranging from 1500 to 2100 m.

A female from Java

A female collected by Blume on Java (RMNH) is very similar to the female paratype of *P. fasciata*. Unfortunately this specimen is not in very good condition

and not all characters can be assessed reliably, so it seems better to wait with recording *P. fasciata* from Java until more material (preferably males) becomes available for study.

Material examined. **Paratypes: Malaysia (Sabah): Borneo:** Mt. Kinabalu, Marei Parei, 5000 ft., 2.v.1929, ex. F.M.S. Museum, B.M. 1955–354, 1♂ (BMNH); Mt. Kinabalu, Kamborangah, 7000 ft., 28.iii.1929, ex. F.M.S. Museum, B.M. 1955–354, 1♀ (BMNH).

Curran (1931) mentions approximately 20 additional paratypes from the same locations, including a female "allotype", which are kept in the collection of the BMNH (pers. comm. N. Wyatt). These specimens have not been studied.

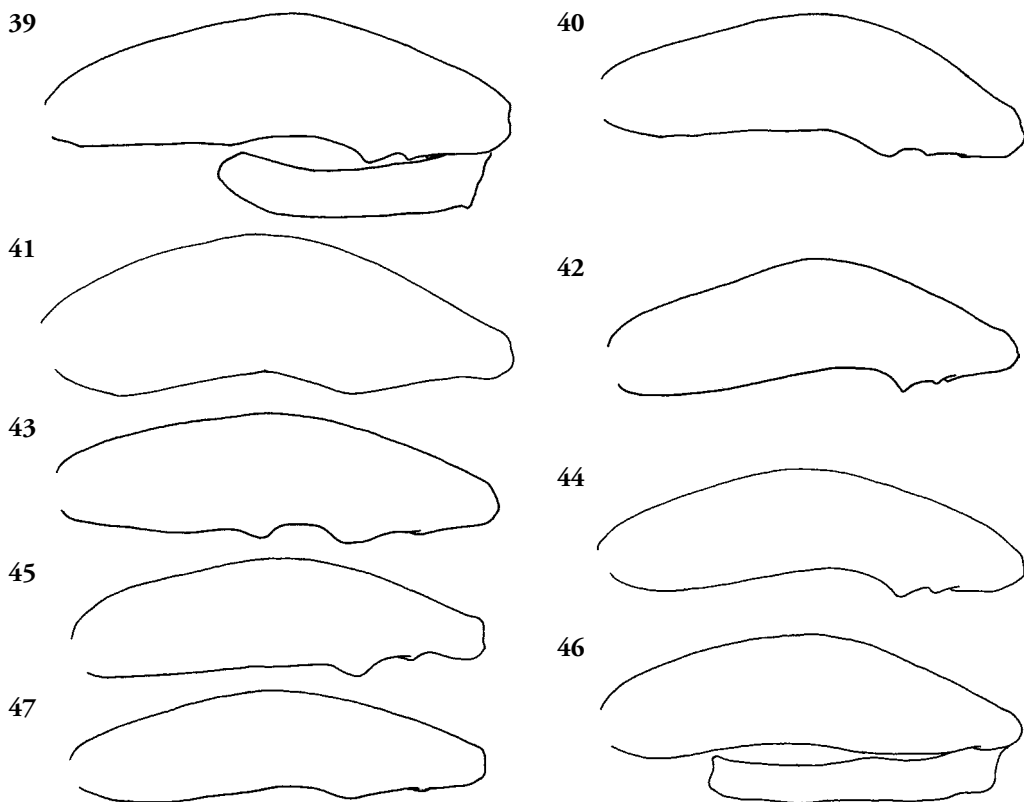
Pseudovolucella himalayensis (Brunetti) comb. n.

Sericomyia himalayensis Brunetti, 1907: plate xiii, figs. 6–8. Holotype: **India, Sikkim (ZSI)** [not examined].
Sericomyia himalayensis; Brunetti, 1908: 89; 1923: 292.

Taxonomy

The figures and description of *Sericomyia himalayensis* in Brunetti (1907, 1908, 1923) clearly indicate that this species should be regarded as a *Pseudovolucella* species. Some of the described and figured characters also indicate that it is probably not synonymous with another species. Most notable are the largely yellow tergite 2, with a black posterior margin but without black markings on the anterior half, and the entirely yellow pubescent abdomen, including the long hairs on the pregenital segments.

Some of the information provided by Brunetti (1907, 1908, 1923) is confusing. On the one hand he states that the "central bump on snout [is] barely perceptible", while on his drawing in dorsal view it is clearly visible. There is also a puzzling difference in the drawings of the habitus as printed in the 1907 publication and the one from 1923. Both figures seem to be based on exactly the same drawing as far as the black lines are considered, but in the 1923 version (which is a little less in quality of print) other shades of grey seem to have been applied. In the 1907 version there is only a dark blotch on the wing antero-medially (posterior to the pterostigma), while in the 1923 the entire anterior part of the wing has been drawn grey. The 1907 version, however, appears to be more truthful, since the description says: "Wings pale grey, a dark brown moderately broad band from beyond the tip of the costal cell, reaching from the fore border to the upper part of the discal cell and the lower transverse vein".



Figs 39–47. Male hind femora of *Pseudovolucella* species in frontal view. – 39, *P. apiformis*; 40, *P. apimima*; 41, *P. decipiens*; 42, *P. fasciata*; 43, *P. hingstoni*; 44, *P. malayana*; 45, *P. mimica*; 46, *P. ochracea*; 47, *P. sinepollex*.

Diagnosis

Body length: 12 mm.

Only male known. Tergite 2 largely yellow except for posterior 1/3. Tergites 3 and 4 with yellow fasciae. Abdomen entirely yellow pubescent (a character shared with *P. apiformis* and *P. malayana*), long hairs on pregenital segments also yellow. Hind femur with apicoventral knob.

Distribution

Only known from Sikkim, a region in the Indian part of the eastern Himalaya.

Pseudovolucella hingstoni Coe

Figs 14, 15, 27, 43

Pseudovolucella hingstoni Coe, 1964: 270. Holotype ♂: India: “Holotype”, “Type, male”, “Sikkim: Phadam Chen, 9000 ft., 30-iii-1924, Maj. R.W.G. Hingston”, “Everest Exp. Brit. Mus. 1924–386”, “*Pseudovolucella hingstoni* Coe, 1963, type” (BMNH) [examined].

Diagnosis

Body length: 14–15 mm.

Both sexes. Tergites blackish brown with narrow, pale orange fasciae (Fig. 14, 15). Posterior parts of tergites and pregenital segments with black hairs. Posterior margins of tergites without fringes of pale hairs. All coxae and femora black (although femora paler apically).

Male. Hind femur with medioventral knob (Fig. 43). Genitalia as in Fig. 27.

Distribution

All three known specimens have been collected in the eastern Himalaya (Nepal and India), at altitudes ranging from 2700 to 3100 m.

Material examined. Paratype: Nepal: Taplejung Distr., damp evergreen oak forest above Sangu, c. 9200”, 2–26. xi.1961, Brit. Mus. East Nepal Exp. 1961–62, R.L. Coe Coll., B.M. 1962–177, 1 ♀ (BMNH); Nepal: Solukhum Goyom, above Sete N27°34” E86°27”, 3100m, 10.v.1997, M. Hauser, 1 ♀ (coll. M. Hauser, compared with female paratype by Claus Claussen and M. Hauser; pers comm. C. Claussen).

Pseudovolucella malayana (Curran)

Figs 20, 28, 44

Pararctophila malayana Curran, 1928: 286. Lectotype ♂ (here designated): **Malaysia (Peninsular)**: "Syntype", "Type *Pararctophila malayana* Curran", "Malay Penin: Pahang, F.M.S., Gunong Tahan 7186", Dec. 13th 1921", "Ex. F.M.S. Museum, B.M. 1955–354 (leg. H.M. Pendlebury)" (BMNH) [examined].

Lectotype designation

Although one of the syntypes carries a red label stating "Type *Pararctophila malayana* Curran" and the other syntypes carry yellow or white labels stating "paratype", no designation of a holotype has been published by Curran (1928), nor has a lectotype been designated later. This means that so far, all four specimens had the status of syntypes. To assure the stability of this taxon, a lectotype is designated here. The specimen labelled as "type" has been chosen for this purpose.

Diagnosis

Body length: 15–16 mm.

Male. Unique in unicolourous orange brown tergites, sometimes with narrow line along posterior margins somewhat darker and sometimes with barely perceptible notion of paler fascia on 2nd tergite (Fig. 20). Tergites and pregenital segments entirely covered with yellow hairs, a character shared with *P. apiformis* and *P. himalayensis*, from which it can be separated by the absence of fasciae on the abdomen and the entirely orange anterior femora.

Note on female. The female is unknown. Because *Pseudovolucella* females of some species tend to be somewhat darker in colouration, it is conceivable that the female of *P. malayana* has a more contrasting abdominal colour pattern than the male. So any female specimens from Peninsular Malaysia with a colour pattern reminiscent of that of *P. apiformis* or *P. apimima* should be examined as possible females of *P. malayana*.

Distribution

All four known specimens have been collected in the Cameron Highlands, Peninsular Malaysia. The altitudes given on the labels indicate that the specimens have been found between 1440 and 2130 m asl.

Material examined. Paralectotypes: **Malaysia:** Pahang Gunong Tahan, 6500–7100", 14.xii.1921, Ex. F.M.S. Museum, B.M. 1955–354, H.M. Pendlebury, 1♂ (BMNH); same data but 16.xii.1921, 1♂ (BMNH); Camerons Highlands, Tanah Rata, 4800 ft, 14.iii.1925, H.M. Pendlebury, Brit. Mus. 1926–56 1♂ (BMNH).

Pseudovolucella mimica Shiraki

Figs 4, 16, 17, 29, 35, 36, 45, 49

Pseudovolucella mimica Shiraki, 1930: 40. Lectotype ♂ (here designated): **Taiwan**: "Asahi, 13 V, Karenko [?], 1919, Col. T. Shiraki", "*Pseudovolucella mimica* n.sp.; Det. T. Shiraki", "Type" (ITLJ) [examined].

Lectotype designation

The male syntype of Shiraki is here designated as lectotype, which makes the female a paralectotype. A male lectotype is desirable to avoid future confusion with the strongly similar *P. sinepollex*, which can most reliably be recognized by the male genitalia.

Diagnosis

Body length: 13–14 mm.

Both male and female have strongly contrasting orange fasciae on the black tergites 2, 3 and 4 (Figs 16, 17). In the male there is no medioventral knob on the posterior femur (Fig. 45), the anterior and middle tibiae and femora are partly dark and the hairs on the postalar calli are all yellow.

Pseudovolucella mimica can be distinguished from *P. sinepollex* by the male genitalia (Figs 29, 35, 36), the presence of fringes of pale hairs along the posterior margins of the tergites, the clearly obtuse apex of the posterior wing cell (somewhat variable) and the slightly more swollen posterior femora of the male (Fig. 45).

Distribution

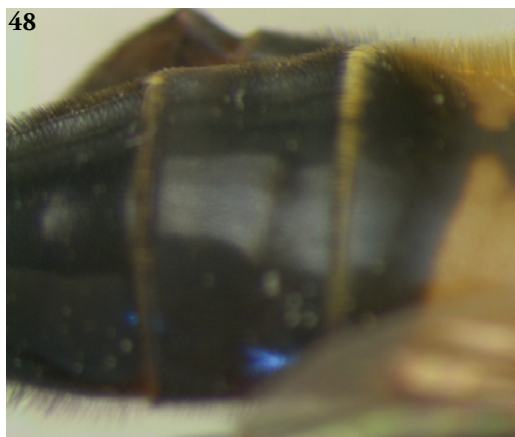
Known from northern Burma, northern Vietnam and Taiwan. It has been found in mountainous areas at altitudes from 1900 to 2100 m.

Material examined. Paralectotype: **Taiwan:** Tamaru (Rato), 1.ix.1923, T. Shiraki (ITLJ). **Burma:** all specimens collected at Mt. Kambaiti by R. Malaise at 7000 ft.: 27.iv.1934, 1♂ 1♀ (NHRS); 12.v.1934, 1♂ (RMNH); 14.v.1934, 1♂ (RMNH); 1.vi.1934, 1♂ (RMNH); 9.vi.1934, 1♀ (RMNH); [without date] 1♂ (NHRS). **Vietnam:** NW-Vietnam, Tonkin, Hoang Lien N.R., 15 km W Sa Pa, c. 1900 m., 15–21.x.1999, Malaise traps, C. van Achterberg, 1♂ 4♀ (RMNH).

Pseudovolucella ochracea Hull

Figs 21, 30, 46

Pseudovolucella ochracea Hull, 1944: 32. Holotype ♂: **Burma:** "Holotype", "Burma, Lt.-Col. Bingham, B.M. 1896 281", "Holotype *Pseudovolucella ochracea* Hull" (BMNH) [examined].



Figs 48–49. Tergites of *Pseudovolucella* species in dorsolateral view. – 48, *P. decipiens*, male; 49, *P. mimica*, female.

Diagnosis

Body length: 14 mm.

Tergite 4 entirely black, a character only shared with *P. decipiens* (Fig. 21). Tergite 2 with extensive yellow markings, tergite 3 with vague, narrow, medially interrupted fascia, which possibly lacks in some specimens (as it does in *P. decipiens*). Male can be distinguished from *P. decipiens* by absence of apicoven-tral knob on hind femur (Fig. 46) and absence of white hair fringes along posterior margins of tergites 2 and 3. The female is unknown. The character of the hair fringes along the posterior margins of the tergites may also apply to the females.

Pseudovolucella sinepollex sp. n.

Figs 18, 19, 31, 37, 38, 47

Type material. Holotype ♂: “N.E. Burma, Kambaiti, 7000 ft., 12/5.1934, Malaise”, “Riksmuseum Stockholm”, “Museum Leiden, collectie Van Doesburg, rec. 1973”, “*Sericomyia eristaloides* Brun., det. v. Doesburg” (RMNH).

Paratypes: Burma: same locality and leg. as holotype: 31.iii.1934, 1 ♀ (NHRS); 6800 ft, 7.iv.1934, 1 ♂ 2 ♀ (NHRS); 15.iv.1934, 2 ♂ 2 ♀ (NHRS); 19.iv.1934, 1 ♂ 1 ♀ (RMNH); 23.iv.1934, 1 ♀ (RMNH); 25.iv.1934, 1 ♂ (NHRS); 30.iv.1934, 2 ♂ 2 ♀ (BMNH); 5.v.1934, 1 ♂ (BMNH); 9.v.1934, 1 ♀ (BMNH); 12.v.1934, 1 ♀ (RMNH); 14.v.1934, 1 ♂ (RMNH); [without date] 1 ♀ (NHRS).

Vietnam: NW-Vietnam, Tonkin, Hoang Lien N.R., 15 km W Sa Pa, 1900 m., 15–21.x.1999, Malaise traps, C. van Achterberg 1 ♀ (RMNH).

Diagnosis

Body length: 11–13 mm.

Male and female with strongly contrasting orange fasciae on otherwise black tergites 2, 3 and 4 (Fig. 18, 19). Male without medioventral knob on hind femur (Fig. 47). Fore and middle tibiae and femora partly dark and hairs on postalar calli all yellow.

Distinguished from *P. mimica* by male genitalia (Fig. 31, 37, 38), absence of fringes of pale hairs along posterior margins of tergites, more or less rectangular apex of posterior wing cell (somewhat variable) and slightly less swollen hind femur of male (Fig. 47).

Description of male

Head. Eyes bare, contiguous over distance of about height of ocellar triangle (dorsal view). Face yellowish brown, with wide, darker median stripe and laterally also with darker stripes. Yellow parts and lateral dark parts with thin yellow pollinosity. Frons, orbital strips and face immediately below antennae with denser yellow pollinosity. Frons and ocellar triangle with long black hairs. Vertex and postocular orbits with yellow hairs (longest at top of head). Median part of face, including facial knob, bare. Lateral parts of face, genae, orbital strips and mouth edges with yellow hairs, with patch of black hairs laterally on upper part of face. Lunula orange brown to black. Ocellar triangle with frontal angle of approximately 50°.

Antenna: first and second segments dark brown, third segment orange brown, 1.3–1.5 times as long as wide. Arista orange, about 2.5 times as long as 3rd antennal segment, strongly plumose, with longest hairs longer than length of 3rd antennal segment.

Thorax. Mesoscutum greyish black, entirely covered with yellow hairs and with greyish pollinosity, which is a little denser along transverse mesonotal suture and in median part on anterior half, where vaguely two greyish stripes can be distinguished when light falls on it from the right angle. Postpronotal sclerites, postalar calli and scutellum yellow and entirely with yellow hairs.

Pleura mostly greyish black, narrowly orange along sutures, covered with grey pollinosity, except on posterior parts of mesepimeron, barrette and meropleuron. Pleura mostly with long yellow hairs, except on proepimeron, mesanepisternum 1, middle part of katepimeron, meropleuron, barrette and posterior part of mesepimeron. Metasternum with yellow hairs.

Legs. Anterior coxae black, grey pollinose and with yellow hairs. Middle coxa black or orange, with yellow hairs. Posterior coxae black or orange, with mostly yellow and some black hairs. Anterior and middle femora orange brown to black, most pale near the apex, largely covered with yellow hairs, which are longest posteriorly and ventrally. Middle femora also with some black, bristly hairs towards apex. Hind femur swollen, slightly curved and with apicoventral knob (Fig. 47); blackish, but orange basally and (narrowly) apically; mostly with long yellow hairs, ventrally also with black hairs. Tibiae orange-brown to dark brown, darker on apical half, middle tibia sometimes entirely orange; entirely with yellow hairs. Anterior and posterior tarsae entirely brown to black; middle tarsae orange to orange brown, last two tarsomeres blackish.

Wing clear, in some specimens with brown blotch posterior to stigma; entirely covered with microtrichia, except for apical part of first and basal part of second costal cell, basal part of first basal cell and a narrow strip along the posterior margin of anal cell. Calypterae and halteres orange brown; calypterae covered with short yellow hairs and with long yellow hair fringes along margins.

Abdomen. (Fig. 18) Tergite 1 orange, with yellow hairs. Tergite 2 blackish brown with anterior margin narrowly orange, anterolateral corners more broadly orange; with transverse orange fascia in middle and sometimes with posterior margin narrowly orange; covered with yellow hairs on anterior 2/3 (longest at anterolateral corners) and with short black hairs on posterior 1/3. Tergites 3 and 4 with same colour pattern, fasciae of more or less equal width; entirely with short black hairs, only some yellow hairs laterally on tergite 4. No posterior fringes of pale hairs present. Sternites from entirely yellow to blackish, with yellow hairs. Sternite 4 about 1.5 times as long as sternite 3. Pregenital segments with long black hairs. Genitalia as in Figs 31, 37, 38.

Description of female (Fig. 19)

Differing from male as follows.

Head. Eyes separated over distance of about 1/6 of total head width. Frons pollinated, with narrow transverse fascia of denser pollination. Hairs on frons dark brown, entirely yellow on rest of head. Ocellar triangle with frontal angle of approximately 60°.

Legs. Posterior femora not swollen and without apicoventral knob.

Abdomen. Hairs on tergites shorter and with yellow hairs on orange fasciae of tergites 3 and 4.

Etymology

The name *sinepollex* (Latin) means "without a thumb". This name was chosen because in the male of this species the right surstylus (Fig. 31, 37) lacks the "thumb-like" lobe which is present in most other species of *Pseudovolucella*.

Distribution

All known specimens have been found in northern, mountainous areas of Burma and Vietnam, at altitudes ranging from 1900 to 2100 m. The specimens from Burma were found from 31 March till 14 May, the Vietnamese specimen has been collected between 15 and 21 October.

Species of uncertain status

Pseudovolucella eristaloides (Brunetti) comb. n.

Sericomyia eristaloides Brunetti, 1913: 167. Holotype ♀: northwestern India, between Renging and Rotung, 2200 ft, 20.xi.1911 (ZSI) [not examined].

Sericomyia eristaloides; Brunetti, 1923: 292.

Taxonomy

Brunetti's description, based on one female, strongly indicates that it is a *Pseudovolucella* species. All characters in the description apply also to *P. mimica*, while no differences between these taxa can be derived from it. Until the type can be studied, the question whether *P. eristaloides* and *P. mimica* are names for the same species has to remain unanswered.

Distribution

The type specimen has been collected in northwestern India at an altitude of 2200 ft (= 660 m.) (Brunetti 1923).

Acknowledgements

The following persons should be thanked for their help with the examination of specimens from their collections or the collections they are responsible for: Kees van Achterberg (RMNH), Ben Brugge (ZMAN), Anthea Carmichael and Charles E. Griswold (CAS), Philip Perkins (MCZ), John Smit (Utrecht), Nigel Wyatt (BMNH), Koji Yasuda (ITLJ). We also thank Claus Claussen (Flensburg) for providing us with information on a specimen of *P. hingstoni* from the collection of Martin Hauser.

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Book review

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This is a small number in comparison with similarly sized European countries (where there are at least as many beetles), let alone tropical areas, but for a desert country that was almost unknown before, not a bad result.

The book is a heavy volume, and considering this, opens relatively easy and the binding seems strong enough to carry the weight. Where possible, species are illustrated in colour photographs, or in the case of Olmi's (some Hymenoptera) and Rücker's contributions (some Coleoptera) by very nice watercolours. The photographs are generally good, but some are reproduced a bit on the dark side. All accounts are set up in a similar way: a short introduction, material and methods, systematic account and references. Understandably with so many authors and little time, there are some differences in the treatments. Some authors list all species known from the UAE, others only give the number of species known. Many authors place the result in the context of the knowledge of the Arabian Peninsula, several don't.

Unfortunately only few authors give a scale on the illustrations. In some chapters there are keys to the UAE species, in many not.

The editor starts the book after an introduction, with a review of the collecting methods and the localities, illustrated with beautiful habitat photographs.

This book is a must for entomologists working in this part of the world, and is strongly advised to others as example for similar projects. The almost ridiculously low price should not prevent you from buying the book. Van Harten and all authors are to be congratulated for this splendid volume!

Reference

Harten, A. van, 2005. The insects of the United Arab Emirates: a checklist of published records. – Dar Al Ummah, Abu Dhabi. 86 pp.

Erik J. van Nieuwerkerken
