



A taxonomic revision of the genus *Asiobaccha* Virolvitsh (Diptera: Syrphidae)

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ABSTRACT

The flower fly genus *Asiobaccha* Virolvitsh is revised and 10 new species are described: *A. aea* Mengual & Thompson, *A. albipeza* Mengual, *A. aquila* Thompson & Mengual, *A. doesburgi* Mengual, *A. marissae* Mengual, *A. maculosa* Mengual & Thompson, *A. notofasciata* Thompson & Mengual, *A. samoensis* Mengual, *A. selsi* Mengual and *A. taronja* Mengual. Moreover, lectotypes are designated for *Baccha semifumosa* Meijere, *Baccha luteolimbata* Meijere, *Asiobaccha nubilipennis* (Austen), *A. praefica* (Bezzi), *A. virtuosa* (Curran) and *A. sauteri* (Kertész), and a neotype for *A. lorae* (Meijere) is also designated. New synonyms are proposed: *Baccha schistaceifrons* Meijere and *Baccha semifumosa* Meijer are synonymised under *Asiobaccha bicolor* (Austen); *Baccha luteolimbata* Meijere is a junior synonym of *Asiobaccha tinctiventris* (Meijere); *Baccha flavipes* Doesburg is a junior synonym of *Asiobaccha tripartita* (Walker); *Baccha gigas* Curran is a junior synonym of *Asiobaccha virtuosa* Curran; and the syntypes of *Baccha sulica* Austen are synonymised under *Asiobaccha bicolor* (Austen) and *Asiobaccha tripartita*. Diagnoses, illustrations, synonymies and distributional data are given for all described species. Descriptions of new species as well as an identification key to all known species are also provided.

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Asiobaccha; flower flies; hoverflies; identification key; new species

Introduction

From the beginning, the concept of the genus *Baccha* Fabricius, 1805 (Diptera: Syrphidae) has been confusing and complex. Originally, Fabricius (1805) established *Baccha* for a diverse group of flies, including species of three different families. Among them, he included four syrphids: *Syrphus cylindricus* Fabricius, 1781; *Syrphus clavatus* Fabricius, 1794; *Syrphus elongatus* Fabricius, 1775; and *Baccha adspersa* Fabricius, 1805. Currently, only one of those species remains in the genus, *Baccha elongata* (Fabricius, 1775).

Many species described originally as *Baccha* currently belong to other syrphid genera – as many as 10 different genera (Thompson 2013). Curran (1928) established a new subgenus of *Baccha* for those species with a pilose postpronotum, *Allobaccha* Curran, 1928, and indicated that this new subgenus was not present in the New World.

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Since Peck's work (1988), this taxon is considered a valid genus, and this is supported by recent molecular analyses (Mengual et al. 2008, 2012; Mengual 2015). Later, Hull (1949a, 1949b) divided the genus *Baccha* into several groups, most of them only found in the Neotropical Region.

Asiobaccha was proposed by Violoitsh (1976) as a subgenus of *Baccha* for *Baccha nubilipennis* Austen, 1893. He used the postmetacoxal bridge to separate the two subgenera as follows: *Asiobaccha* species have an incomplete postmetacoxal bridge, presenting a membrane behind metacoxae and sternite 1 reduced, while *Baccha* has a well-sclerotised postmetacoxal bridge, which means that the metaepisterna are elongated behind the metacoxae and connected medially. Since Violoitsh (1976), *Asiobaccha* species have been listed as *Baccha*, as a subgenus of *Allobaccha* or as *Allobaccha*, or as a subgenus of *Episyrphus* Matsumura & Adachi, 1917. During the same period, *Allobaccha* has been considered a subgenus of *Baccha* or a valid genus (see Mengual 2015).

Since Thompson and Vockeroth (1989), *Asiobaccha* has been considered a subgenus of *Episyrphus*. Based on the difficulty to separate *Baccha*, *Asiobaccha* and *Allobaccha*, Ichige (2009) showed his doubts about placing *Asiobaccha nubilipennis* under *Episyrphus* but also pointed out that the genitalia of *A. nubilipennis* are very different from those of other Bacchini taxa. Recently, molecular studies using three markers, the mitochondrial protein-coding gene cytochrome c oxidase subunit I (COI) gene and the nuclear rRNA 18S and 28S genes (Mengual 2015), resolved that *Allobaccha*, *Baccha* and *Asiobaccha* are not related phylogenetically, and recovered a clade with *Asiobaccha* together with *Episyrphus* and *Meliscaeva* Frey, 1946.

The aim of this study was to revise the genus *Asiobaccha*, as well as to provide an identification key for all known species of this genus. The total number of *Asiobaccha* species now is 19, with 10 new species here described. In addition, lectotypes for *Baccha semifumosa* de Meijere, 1929, *Baccha luteolimbata* de Meijere, 1924, *Asiobaccha nubilipennis* (Austen, 1893), *Asiobaccha virtuosa* (Curran, 1928), *Asiobaccha praeifica* (Bezzi, 1928) and *Asiobaccha sauteri* (Kertész, 1913) are designated, and a neotype for *Asiobaccha loriae* (de Meijere, 1908) is also designated. New synonyms are proposed: *Baccha schistaceifrons* de Meijere, 1929 and *Baccha semifumosa* are junior synonyms of *Asiobaccha bicolor* (Austen, 1893); *Baccha luteolimbata* is synonymised under *Asiobaccha tinctiventris* (De Meijere, 1924); *Baccha flavipes* Doesburg, 1959 is a junior synonym of *Asiobaccha tripartita* (Walker, 1861); *Baccha gigas* Curran, 1931 is a junior synonym of *Asiobaccha virtuosa*; and the syntypes of *Baccha sulica* Austen, 1893 are synonymised under *Asiobaccha bicolor* (Austen, 1893) and *Asiobaccha tripartita*.

Materials and methods

Differential diagnoses, synonymies and distributions are given for all species included in the study. An asterisk (*) in the distribution statement refers to records from the literature or from *Systema Dipterorum* (Thompson 2013). New species are described in full, with terminology following Thompson (1999) and Mengual (2012). The abbreviations used for collections follow the standard of the *Systema Dipterorum* (Thompson 2013), and their equivalents are given below:

AMNH: American Museum of Natural History, New York, USA.

AMS: Australian Museum, Sydney, Australia.

BME: R.M. Bohart Museum of Entomology, University of California, Davis, USA.

BMNH: The Natural History Museum, London, United Kingdom.

BPBM: Bernice P. Bishop Museum, Honolulu, USA.

CSCA: California State Collection of Arthropods, Sacramento, USA.

CNC: Canadian National Collection of Insects, Ottawa, Canada.

HNHM: Hungarian Natural History Museum, Budapest, Hungary.

INHS: Illinois Natural History Survey, Champaign, USA.

IRSNB: Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium.

MSNG: Museo Civico di Storia Naturale 'Giacomo Doria', Genova, Italy.

MZB: Museum Zoologicum Bogoriense, Bogor, Indonesia.

MZH: Finnish Museum of Natural History, Helsinki, Finland.

NMB: Naturhistorisches Museum, Basel, Switzerland.

RMNH: Naturalis Biodiversity Centre, Leiden, the Netherlands.

QM: Queensland Museum, South Brisbane, Australia.

USNM: National Museum of Natural History, Washington DC, USA.

ZFMK: Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany.

ZMUC: University of Copenhagen, Zoological Museum, Copenhagen, Denmark.

In the description of type labels, the contents of each label are enclosed in single quotation marks (' '), italics denote handwriting, and the individual lines of data are separated by a double forward slash (/). In the material examined section, the use of ellipses follows standard English practice and merely indicates that the missing information is the same as that in the preceding record. At the end of each record, between square brackets ([]) and separated by commas, the number of specimens and sex, the holding institution, and the unique identifier or number are given.

Google Earth® was used to get the geographic coordinates of the type localities listed in this work. For a few localities in the two Indonesian provinces of New Guinea, the available gazetteer from The Papua Insects Foundation was used to provide the exact location or details (<http://www.papua-insects.nl/gazetteer/gazetteer.htm>).

All measurements are in millimetres and were taken using a reticule in a Leica® M165 C microscope. Photographs were composed using the software Zerene Stacker® 1.04 (Richland, Washington, USA), based on images of pinned specimens taken with a Canon EOS 7D® mounted on a P-51 Cam-Lift (Dun Inc., VA, USA) and with the help of Adobe Lightroom® (version 5.6). Body length was measured from the anterior oral margin to the posterior end of the abdomen, in lateral view. Wing length was measured from the wing tip to the basicosta.

Taxonomy

Genus *Asiobaccha* Violovitsh, 1976

Type species *Baccha nubilipennis* Austen, 1893

Differential diagnosis

Medium to large species, slender with petiolate abdomen. Face straight with a distinct tubercle; oral opening elongated; antenna short, shorter than face, with

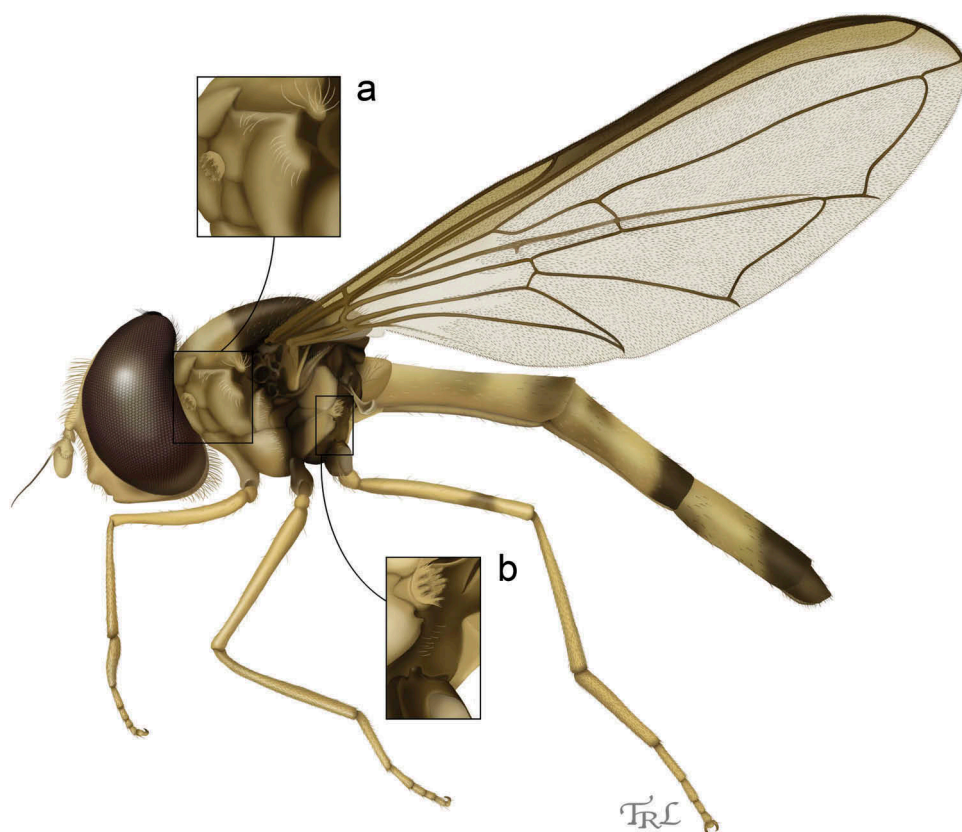


Figure 1. *Asiobaccha marissae* Mengual sp. nov., lateral view. (a) Detail of the pilose posterior anepisternum; (b) detail of the pilose metaepisternum ventrad to spiracle.

basoflagellomere longer than broad (Figure 1); antennal pits distinctly separated; eye bare; male holoptic; ocellar triangle narrow. Scutum with or without mesonotal fringe; postpronotum bare; scutellum with or without subscutellar fringe, without bristles. Proepimeron bare; anterior anepisternum pilose on posterodorsal part or dosomedially; metasternum bare; metaepisternum pilose ventrad to spiracle; postmetacoxal bridge incomplete (Figure 1). Wing with or without alula, with black minute sclerotised dots on posterior wing margin; usually extensively microtrichose, never completely bare. Abdomen petiolate, unmarginated; male genitalia small (except in *Asiobaccha taronja* sp. nov.) with a segmented aedeagus.

Geographical distribution

Asiobaccha species are distributed in the Oriental, Australian and Oceanian Zoogeographic Regions, extending into the Sino-Japanese Region *sensu* Holt et al. (2013). The species with the largest distribution is *Asiobaccha nubilipennis*, which occurs from Sri Lanka and India northwards to China and Japan, and south to Indonesia (Sumatra, Java, Sulawesi). However, the genus *Asiobaccha* is present farther south to Australia and New Caledonia, and eastwards to Fiji, Tonga, Tuvalu and Samoa, including



Figure 2. World distribution of *Asiobaccha* Violovitsh. The limit shown is only an approximation defined by collecting points for specimens examined and literature records.

New Guinea and Solomon Islands (Figure 2). The highest diversity of the genus occurs in two classic biogeographical designations, Wallacea and Melanesia.

Natural history

Although nothing has been published about the biology of the adults, the author assumes that imagoes of *Asiobaccha* feed on pollen and nectar like many other syrphid adults, a fact corroborated by field observations (J. Skevington and A. Young, personal comments).

Very little is known about the immature stages of *Asiobaccha*. Muraleedharan and Radhakrishnan (1986) reported larvae of *A. nubilipennis* feeding on *Aphis* (*Toxoptera aurantii* Boyer de Fonscolombe, 1841 (Hemiptera: Aphididae) in tea plantations in Anamallai Hills, India. Additionally, Radhakrishnan and Muraleedharan (1993) gave more details of the immature biology of *A. nubilipennis*, such as aphid consumption and larval stages duration, reared from *A. aurantii* from southern India. In New South Wales (Australia), Carver et al. (2003) found a second-instar larva of *Asiobaccha notofasciata* sp. nov. feeding on *Aphis* (*Aphis clerodendri* Matsumura, 1917 (Hemiptera: Aphididae) in a pseudogall of *Clerodendrum tomentosum* (Vent.) R.Br.

Systematics

Violovitsh (1976) and Curran (1928) described *Asiobaccha* and *Allobaccha* as subgenera of *Baccha* respectively, but only *Baccha sensu stricto* belongs to the tribe Bacchini (Mengual et al. 2008; Mengual 2015). Based on recent molecular analyses

(Mengual 2015), the aforementioned three taxa are not related phylogenetically as suggested earlier and *Asiobaccha* and *Allobaccha* are related with other Syrphini genera (Vockeroth 1969; Thompson and Rotheray 1998; Ichige 2009). Each of these three taxa belongs to a separate evolutionary lineage within Syrphinae, and *Asiobaccha* is close to *Episyrphus* and *Meliscaeva*. Mengual (2015) recognised *Asiobaccha* as a valid genus based on morphological characters and the molecular analyses performed.

Remarks

A total of 19 species are recognised in this revisionary work, with 10 species new to science described here. There are species with more morphological affinities to others that may form species groups, for example *A. albipeza* sp. nov., *A. selsi* sp. nov., *A. praefica* and *A. samoensis* sp. nov. with black abdomens; species related to *A. nubilipennis* with a mesonotal fringe, such as *A. aea* sp. nov., *A. virtuosa*, *A. doesburgi* sp. nov., *A. aquila* sp. nov. and *A. bimaculata* (Keiser, 1952); or species with the same abdominal pattern and without mesonotal fringe, such as *A. lorae*, *A. tripartita* and *A. bicolor*. None of these groupings deserves a supraspecific category. On the other hand, male genitalia among *Asiobaccha* species show subtle differences, except for *A. taronja* with very large male genitalia and modified sterna (Figure 13a–d).

Asiobaccha aea Mengual & Thompson sp. nov. (Figure 3a, b, e)

Description

Male: Head. Face with distinct round facial tubercle, yellow with some brown lateral areas, black pilose, white-silver pollinose laterally and shiny (bare) medially on tubercle; gena yellow-brown (Figure 3e); lunule dark, yellow basally; frons slightly protruded forward, black, black pilose, brown pollinose laterally and dorsally, shiny basomedially; vertical triangle narrow, black; antenna yellow, black pilose; arista brown, bare; eye bare; occiput black, white-silver pollinose, yellow pilose on ventral 3/4 and dark pilose on dorsal 1/4.

Thorax. Scutum black, dark pilose, brown pollinose; mesonotal fringe well defined on anterior part of scutum, with yellow-golden pile; postpronotum black, bare, brown pollinose; postalar callus lighter, tawny; scutellum yellow (tawny), brown pilose, sub-scutellar fringe absent (Figure 3a, b). Pleuron black, except posterior anepisternum lighter posteriorly as well as katepisternum dorsally and anepimeron, yellow-brown (tawny) pilose, anterior anepisternum with pile on anterodorsal quarter; densely golden pollinose on lighter areas; metaepisternum pilose ventrad to spiracle; metasternum bare; calypter small, reduced, yellow; plumula almost absent, pale; halter pedicel yellow, capitulum dark; posterior spiracular fringes yellow. **Wing:** entirely microtrichose except posterior margin of alula bare, mostly infuscated, brown with apical margin (beyond vein M2) hyaline. **Legs:** pro- and mesoleg entirely yellow except dark coxae; metaleg with dark coxae and trochanter; yellow metafemur with an almost imperceptible brown annulus; metatibia dark brown, lighter basally; metatarsus pale (white-yellow), except metabasitarsomere black on basal 2/3 or more.

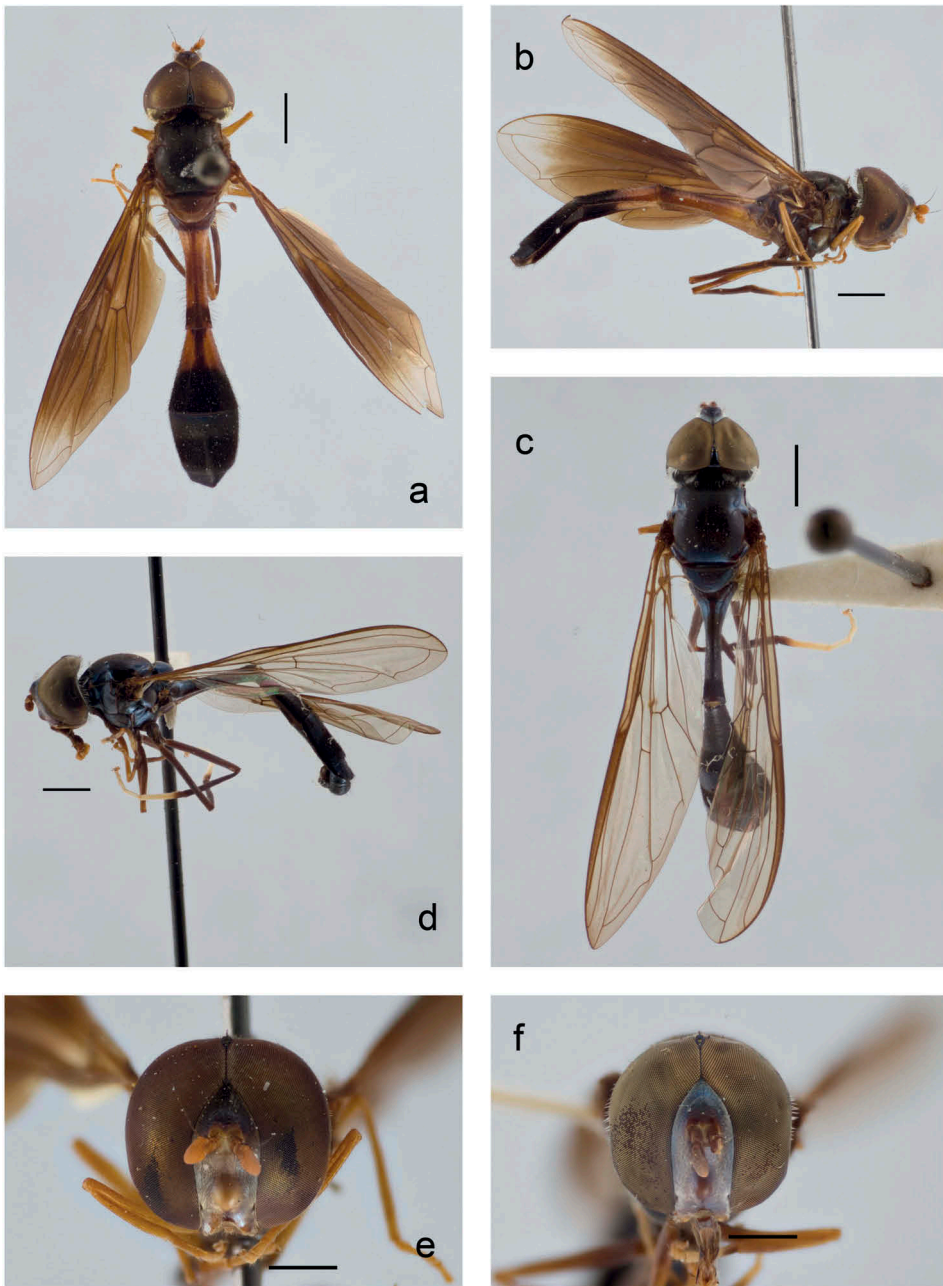


Figure 3. *Asciobaccha aea* Mengual & Thompson sp. nov. a–b, e, holotype ♂. (a) Dorsal view; (b) lateral view; (e) frontal view. *Asciobaccha albipeza* Mengual sp. nov. c–d, f, holotype ♂. (c) Dorsal view; (d) lateral view; (f) frontal view. Scale bars: a–d = 2 mm; e, f = 1 mm.

Abdomen. Petiolate, unmarginated, mostly black pilose. Tergum 1 black, yellow pilose laterally; tergum 2 tawny, yellowish, darker on posterior 1/4–1/5; tergum 3 black with two lateral, square yellow maculae on anterior half of the tergum, reaching anterior and

lateral margins; terga 4 and 5 entirely black (Figure 3a, b). Sterna 1 and 2 yellow; sternum 3 yellow on anterior 1/2, black on posterior 1/2; the remainder of sterna black.

Female. Similar to male except for normal sexual dimorphism and as follows: face yellow pilose ventrally, frons grey pollinose, and scutellum yellow pilose.

Length ($N = 1$). Body, 15.1 mm; wing, 12.5 mm.

Geographical distribution

Species known from Solomon Islands.

Etymology

The name *aea* is an arbitrary combination of letters and is to be treated as feminine.

Differential diagnosis

Species with a mesonotal fringe well developed, broad alula and wing entirely microtrichose, which is dark brown even basally with hyaline apical tip. This new species is similar in overall appearance to *A. bicolor* or *A. loriae*, but *A. aea* has an entire microtrichose wing and a mesonotal collar. It can be distinguished from *A. nubilipennis* and morphologically close species by the wing microtrichia.

Type locality

Solomon Islands: Malaita Province, Malaita Island, Su'u, 9°04'47"S, 161°09'58"E.

Material examined

Type material. *Holotype*, male, deposited in the Canadian National Collection (Ottawa, Canada) and labelled: 'Solomon Islands // Malaita Is // Su'u // 16.viii.1934 // H.T.Pagden' [green] 'Frank M.Hull // Collection // C.N.C.1981', 'HOLOTYPE // *Asiobaccha* // *aea* // *des. X. Mengual 2014*' [red] (specimen photographed). *Paratypes*: SOLOMON ISLANDS: Guadalcanal Prov., Honiara, December 1975, N.L.H. Krauss [1♀, BPBM]; Guadalcanal Prov., Tenaru R, January 1945, G.E. Bohart [1♀, USNM, USNMMENT 00890778].

Remarks

The female specimen in the USNM was identified as *Episyrphus* 74–28 Thompson, in litt.

***Asiobaccha albipeza* Mengual sp. nov.**

(Figure 3c, d, f)

Description

Male: Head. Face flat with distinct facial tubercle, tawny (yellow-brown), white pilose, white pollinose laterally and shiny (bare) medially on tubercle; gena yellow-brown (Figure 3f); lunule dark; frons slightly protruded forward, black, black pilose, pale pollinose laterally and dorsally, shiny basomedially; vertical triangle narrow, isosceles, black; antenna yellow-brown, black pilose; arista brown, bare; eye bare; occiput black, white-silver pollinose, yellow pilose on ventral 3/4 and dark pilose on dorsal 1/4.

Thorax. Scutum black with bluish iridescence, medially brown pollinose, with short and scarce black pile; mesonotal fringe well-defined on anterior part of scutum, with white pile; postpronotum black, bare, white pollinose; notopleuron black, white pollinose; scutellum black, black pilose, subscutellar fringe absent (Figure 3c, d). Pleuron black, pale pilose, anterior anepisternum with pale pile on anterodorsal quarter; densely pale pollinose on posterior anepisternum, dorsal katapisternum and katatergum; metaepisternum pilose ventrad to spiracle; metasternum bare; calypter small, reduced, yellow; plumula almost absent, pale; halter brown; posterior spiracular fringes yellow. *Wing:* alula narrow, slightly broader than costal cell apically, triangular, bare with some microtrichia anteroapically. Wing membrane hyaline, stigma brown and costal cell brownish; extensively microtrichose, except cell R bare posterobasally before RS furcation, cell BM bare on basal 3/4, and cell CuP and anal lobe bare on basal 1/3. *Legs:* entirely brown except tarsi; pro- and mesotarsi white-yellow except basotarsomere brown on basal 1/2, metatarsus white-yellow except basotarsomere dark on basal 1/5 or less.

Abdomen. Petiolate, unmarginated, black with bluish iridescence, mainly black pilose except tergum 1 pale pilose, with a black pollinose pattern as follows: terga 2–4 with a black pollinose fascia on posterior margin, tergum 2 also with a narrow basal fascia and a medial, small macula of black pollinosity (Figure 3c, d); sterna 2–4 black with bluish iridescence with a black pollinose fascia on posterior margin; male genitalia black.

Female. Similar to male except for normal sexual dimorphism and as follows: frons black, shiny, with white pollinosity on eye margin until half-way between antennal insertion and anterior ocellus; ocellar triangle black, shiny.

Variation. Some paler specimens have pro- and mesofemora yellowish on apical 1/2 and pro- and mesotibiae yellowish on basal 1/2. Other specimens may have a darker face.

Length ($N = 4$). Body, 12.5–15.2 (14.2) mm; wing, 11.0–13.0 (12.5) mm.

Geographical distribution

Species known from Solomon Islands archipelago, including Bougainville Island.

Etymology

The specific epithet is derived from the Latin *albus* meaning white (Brown 1956, p. 77) and the Greek *peza* meaning foot (Brown 1956, p. 343), and it refers to the white metatarsi. Species epithet is to be treated as adjective.

Differential diagnosis

Species with the alula narrower than cell BM, and with the abdomen and the scutellum dark, without pale markings. It can be distinguished from *A. praefica* and *A. samoensis* by the narrow alula and the white metatarsus.

Type locality

Solomon Islands: Guadalcanal Province, Gold Ridge-Suta, Mount Chaunapaho (= Jonapau), 1100 m, 9°38'S, 160°06'E.

Material examined

Type material. *Holotype*, male, deposited in the Bernice P. Bishop Museum (Honolulu, Hawaii, USA) and labelled: 'SOLOMON IS. // Guadalcanal: Gold // Ridge-Suta // (Jonapau) 1100 m. // VI-26-1956', 'J. L. Gressitt // Collector', 'HOLOTYPE // *Asiobaccha* // *albipeza* // des. X. Mengual 2014' [red] (specimen photographed). *Paratypes*: PAPUA NEW GUINEA: Bougainville Prov., Kokure, 690 m, 8 June 1956, E.J. Ford, Jr. [1♀, BPBM]; ... Togerao, 600 m, 15–21 April 1968, Malaise trap, R. Straatman [1♀, ZFMK, ZFMKDIP 00011907]. SOLOMON ISLANDS: Isabel Prov., Molao, 30 June 1960, C.W. O'Brien [1♂, BPBM]; Makira-Ulawa Prov., Makira (= San Cristóbal), Napagiwae, 19 August 1960, C.W. O'Brien [1♀, BPBM]; Guadalcanal Prov., Suta, 500–1200 m, 27 June 1956, J. L. Gressitt [1♂, ZFMK, ZFMKDIP 00011904].

Asiobaccha aquila Thompson & Mengual sp. nov. (Figure 4a, b, e)

Description

Male: Head. Face with distinct facial tubercle, dark brown becoming orangish-yellow medially, densely silver pollinose, yellow pilose ventrally and black pilose dorsally (Figure 4e); gena dark brown to black with oral margin paler; lunule yellow, yellow also between antennal bases; frons protruded forward, black with anterior M-shaped yellow macula, black pilose, golden-brownish pollinose posteriorly, shiny black medially; vertical triangle narrow, isosceles (more than four times as long as broad), with the ocelli on the anterior half, black, black pilose; antenna orangish-yellow, black pilose; arista dark brown, bare; eye bare, holoptic; occiput black, grey-silver pollinose, yellowish-white pilose on ventral 2/3 and black pilose on dorsal 1/3.

Thorax. Scutum black, scarcely brown pollinose, yellow pilose; mesonotal fringe or collar well-defined on anterior part of scutum, with pale pile; postpronotum dark, bare; notopleuron black, densely yellowish-white pollinose, yellow pilose; postalar callus lighter in background colour; scutellum black, yellow pilose, with brown pollinose fascia on anterior margin, subscutellar fringe almost absent (Figure 4a, b). Pleuron mostly black, except posterior anepisternum lighter in background colour on posterior half, katapisternum with dorsal macula lighter in background colour, both areas densely yellowish-white pollinose; katatergum also whitish pollinose; anterior anepisternum yellow pilose on posterodorsal quarter, posterior anepisternum and meron yellow pilose, dorsal and ventral katapisternal pile patches broadly separated, metaepisternum yellow pilose ventrad to spiracle; metasternum bare; calypter dark yellow; plumula yellow; halter brown; posterior spiracular fringes yellow. **Wing:** membrane dark, infuscated, except basally and apically; stigma brown; extensively microtrichose, except cell R bare basal to vein RS, cell BM bare on basal 1/2, and cell CuP and anal lobe bare basally. Alula present, broader than costal cell, bare with microtrichia on anteroapical quarter. **Legs:** coxae and trochanters black, pro- and mesoleg yellow, yellow pilose; metafemur yellow but somewhat dark apically, metatibia and metatarsus black.

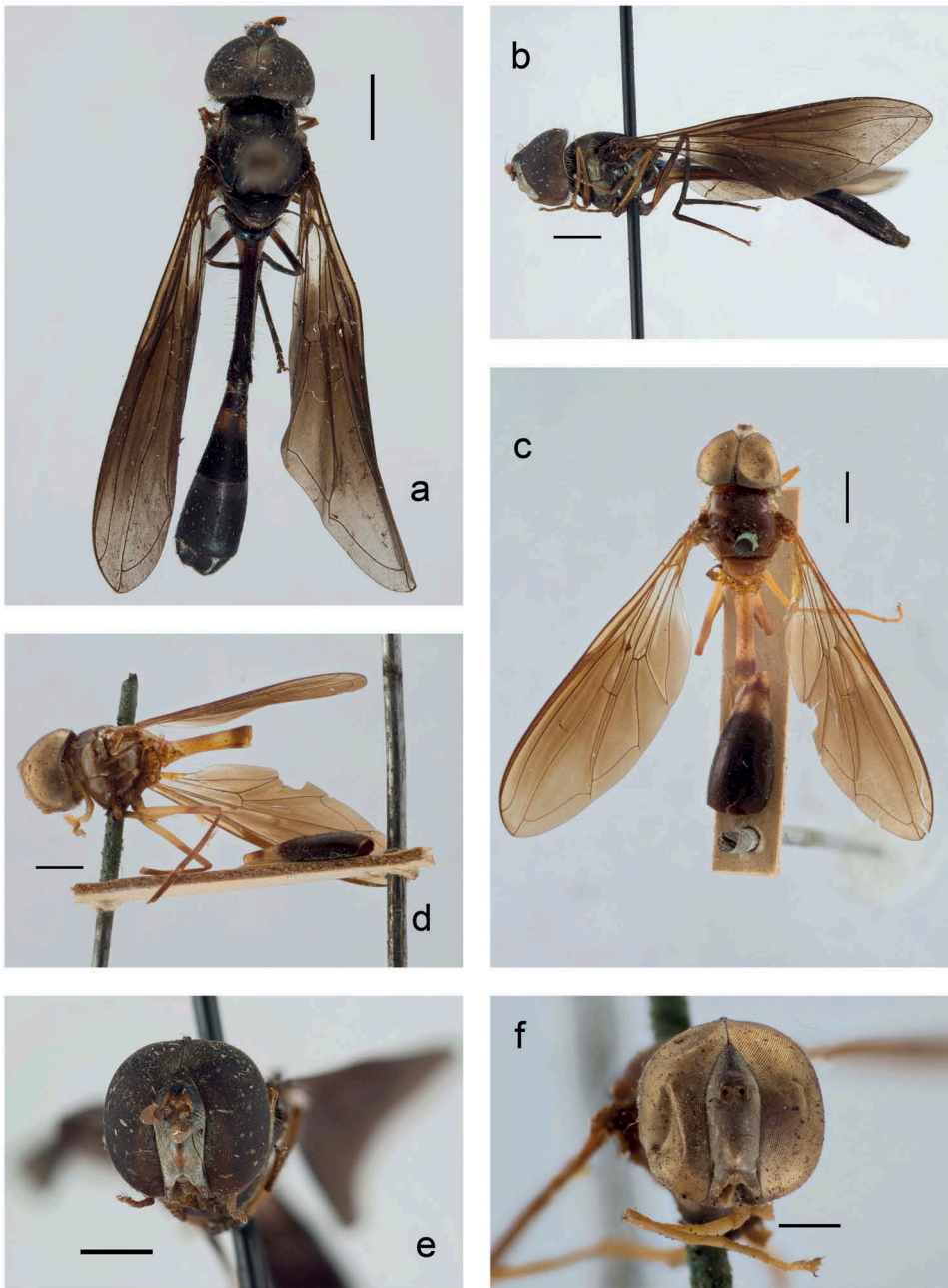


Figure 4. *Asciobaccha aquila* Thompson & Mengual sp. nov. a–b, e, holotype ♂. (a) dorsal view; (b) lateral view; (e) frontal view. *Asciobaccha bicolor* (Austen). c–d, f, holotype ♂. (c) Dorsal view; (d) lateral view; (f) frontal view. Scale bars: a–d = 2 mm; e, f = 1 mm.

Abdomen. Petiolate, unmargined. Dorsum mainly black, yellowish-white pilose on terga 1 and 2, black pilose on the remainder; tergum 1 black; tergum 2 with two basolateral yellow maculae and lateral margins lighter; tergum 3 with two medial yellow subtriangular maculae on anterior half; terga 4 and 5 black (Figure 4a, b); male genitalia black.

Female. Similar to male except for normal sexual dimorphism and as follows: face white pilose; frons black, with bluish iridescence medially, with anterior M-shaped yellow macula; frons white pilose, white pollinose.

Variation. Colouration of the metafemur is variable; some specimens have metafemur dark on apical 2/3 and other specimens have it mostly yellow.

Length ($N = 4$). Body, 11.0–16.0 (13.9) mm; wing, 9.5–13.0 (11.3) mm.

Geographical distribution

Species known from the Philippines.

Etymology

The specific epithet is derived from the Latin *aquilus* meaning dark coloured, blackish (Brown 1956, p. 148). Species epithet is to be treated as adjective.

Differential diagnosis

Species with a broad alula, mostly bare, with terga 1 and 4 black, mesonotal fringe present and an infuscated wing. Similar to *A. bimaculata* and *A. nubilipennis*, but *A. aquila* has the metatarsus entirely dark and the scutellum black. The face is bright yellow for most *A. bimaculata* and *A. nubilipennis*, but it is a bit darker in *A. aquila*.

Type locality

Philippines: Luzon Island, Cordillera Administrative Region, Ifugao Province, Liwo, 8 km East from Mayoyao, 1000–1300 m, 16°58'N, 121°13'E.

Material examined

Type material. *Holotype*, male, deposited in the Bernice P. Bishop Museum (Honolulu, Hawaii, USA) and labelled: 'PHILIPPINES // Ifugao Prov., Liwo // 8 km E Mayoyao, 1000- // 1300 m, 25.V.1967', 'H.M. Torrevillas // Collector // BISHOP MUSEUM', '*Episyrphus* // sp. 74–26 // Det. // FCThompson 74', 'USNMENT // 00890779' [barcode] 'HOLOTYPE // *Asiobaccha* // *aquila* // des. X. Mengual 2014' [red] (specimen photographed). *Paratypes*: PHILIPPINES: Ifugao Prov., Liwo, 8 km east from Mayoyao, 1000–1300 m, H.M. Torrevillas [1♂, ZFMK, USNMENT 00890797]; ..., Mayoyao, 1000–1500 m, 6 July 1966, H.M. Torrevillas [1♀, BPBM]; Mindanao Island, Bukidnon Prov., Mt. Katanglad,, 1250 m, 4–9 December 1959, L.W. Quate [1♂, USNM, USNMENT 00890773]; Luzon Island, Camarines Sur Prov., Mt. Isarog, Pili, 600–800 m, 10 April 1965, H. M. Torrevillas [1♂, BPBM, USNMENT 00890811]; Luzon Island, Bataan Prov., Limay, R.C.M. McGregor [1♀, USNM, USNMENT 00891196]; Negros Oriental Prov., Mt. Talinas, 900 m, 29 June 1958, H.E. Milliron [1♀, BPBM, USNMENT 00890782]; Laguna Prov., Los Baños, March 1917, F.X. Williams [1♀, USNM, USNMENT 00890765]; Nueva Vizcaya Prov., Santa Fe, Imugan, 30–31 May 1987, C.K. Starr [1♀, USNM, USNMENT 00890810; 1♀, ZFMK, USNMENT 00890786].

Remarks

Some specimens were identified as *Episyrphus* 74–26 Thompson, in litt.

***Asiobaccha bicolor* (Austen, 1893) comb. nov.**
(Figures 4c, d, f, 14c)

Baccha bicolor Austen, 1893: 137. Holotype: ♂, BMNH. Type locality: Indonesia: Misool Island. van der Wulp 1896: 121; Kertész 1910: 157; Edwards 1915: 409.

Baccha purpuricola of Walker 1864: 212 (in part).

Baccha sulica Austen, 1893: 144 (in part). Syn. nov. van der Wulp 1896: 121; Kertész 1910: 157.

Baccha semifumosa de Meijere, 1929: 384. Syn. nov.

Baccha schistaceifrons de Meijere, 1929: 385. Syn. nov.

Baccha (*Allobaccha*) *bicolor* of Knutson et al. 1975: 321.

Baccha (*Allobaccha*) *sulica* of Knutson et al. 1975: 323 (in part).

Allobaccha schistaceifrons of Thompson and Vockeroth 1989: 441; de Jong 2000: 191.

Allobaccha semifumosa of Thompson and Vockeroth 1989: 441; de Jong 2000: 193.

Episyrphus (*Asiobaccha*) *bicolor* of Thompson and Vockeroth 1989: 443.

Episyrphus (*Asiobaccha*) *sulica* of Thompson and Vockeroth 1989: 443 (in part).

Differential diagnosis

Species with a yellow face (Figure 4f), alula bare, narrower than costal cell, wing partly bare basally (Figure 14c), and without a mesonotal fringe. The abdominal pattern is identical to another two species with tergum 4 entirely black, *A. loriae* and *A. tripartita*, but differs by the wing microtrichia as stated in the key. *Asiobaccha bicolor* and *A. tripartita* differ from *A. loriae* by having the wing bare basally, easy to distinguish because both have always cell CuP and anal lobe partly bare basally (Figure 14c, d); sometimes *A. loriae* specimens may have very small bare areas in cell BM but cell CuP and anal lobe are always microtrichose (Figure 4c, d). On the other hand, *A. tripartita* has a more extensive microtrichia and the bare basal areas of the wing are on basal 1/3–1/2 cell BM only (Figure 14d).

Variation. Wing microtrichia is a bit variable in this species, as well as in the close *A. tripartita*. The bare area of cells BM and R vary between basal 1/2 to basal 3/4 or more for cell BM, and basal 1/3 to basal 1/2 for cell R. Furthermore, a few specimens have costal cell bare very basally. The specimen from New Ireland has the scutum entirely orange. Wing colouration varies from very dark to almost hyaline.

Length (*N* = 4). Body, 10.0–16.0 (13.5) mm; wing, 9.0–14.0 (12.1) mm.

Geographical distribution

Moluccas (Maluku and North Maluku Provinces, Indonesia), New Guinea Island, New Ireland Island, and Australia.

Genetics

The BOLD Process IDs for the DNA barcodes (5'–COI) for this species are: SYRAU037-15 (specimen CNC371757), SYROC420-15 (specimen CNC384959), SYROC450-15 (specimen CNC385002), and SYRAU038-15 (specimen CNC373577).

Type locality

Indonesia: West Papua Province, Raja Ampat Regency, Misool Island (Mysol), between 01°40' and 02°04'S, and between 129°43' and 130°26'E.

Material examined

Type material. *Holotype*, male, deposited in The Natural History Museum, formerly British Museum (Natural History) (London, United Kingdom) and labelled: 'Holo- // type' [round, red margin] 'Type' [round, red margin] 'Baccha // bicolor // Aust.' [on the reverse of previous label, handwritten] 'W.' [round, handwritten] 'Mysol. // Wallace.' 'Baccha // bicolor // Aust. // Type.' [on the reverse of previous label, handwritten] 'HOLOTYPE // Asiobaccha // bicolor // (Austen) // det. X. Mengual 2014' [red] (specimen photographed).

Type material of *Baccha sulica* Austen, 1893. *Syntype*, female, deposited in The Natural History Museum (London, UK) and labelled: 'SYN- // TYPE' [round, blue margin] 'Type' [round, red margin] 'Baccha // sulica // Aust. // Type' [on the reverse of previous label, handwritten] 'Sul' [handwritten, round] 'Sula l. // Wallace', 'Baccha // sulica // Aust. // Type' [on the reverse of previous label, handwritten] 'Sulica' [handwritten].

Type material of *Baccha schistaceifrons* de Meijere, 1929. *Holotype*, female, deposited in the Naturalis Biodiversity Center (Leiden, The Netherlands) and labelled: 'Buru 1921 // Station 9 // leg.L.J.Toxopeus // 26.V', 'Baccha // schistaceifrons // det. de Meijere. // Type', 'Baccha // schistaceifrons // de Meijere, 1929 // ZMAN type DIPT.1045.1' [red].

Type material of *Baccha semifumosa* de Meijere, 1929. *Lectotype*, female, deposited in the Naturalis Biodiversity Center (Leiden, The Netherlands) and labelled: 'Buru 1921 // Station 6 // leg.L.J.Toxopeus', 'Baccha // semifumosa // det. de Meijere. // Type', 'Baccha // semifumosa // de Meijere, 1929 // ZMAN type DIPT.1048.1' [red] 'LECTOTYPE // Baccha // semifumosa // des. X. Mengual 2014' [red]. This specimen is here designated as lectotype to fix and ensure the universal and consistent interpretation of the name. *Paralectotype*, female, deposited in the Naturalis Biodiversity Center (Leiden, The Netherlands) and labelled: 'Buru 1921 // Station 17 // leg.L.J.Toxopeus // 21/22.X', 'Baccha // semifumosa // de Meijere, 1929 // ZMAN type DIPT.1048.2' [red] 'PARALECTOTYPE // Baccha // semifumosa // des. X. Mengual 2014' [yellow]. This specimen is here designated as paralectotype.

Nontype material. INDONESIA: North Maluku Prov., Taliabu Island, near Tubang, 40 m, Malaise trap 20, 9–20 March 1995, C.v. Achterberg, Y. Yasir [1♂, RMNH; 1♀, ZFMK, ZFMKDIP 00011906]; ..., Mangole Island, 2 km W Mandafuhl Camp, 70 m, Malaise trap 19, 7–24 March 1995, C.v. Achterberg, Y. Yasir [1♀, RMNH]; ..., Mangole Island, 450 m, 13 October–2 November 1993, C.v. Achterberg [1♀, ZFMK, ZFMKDIP 00011903]; ..., West Obi, Obi Lake, 160–260 m, July–November 1953, A.M.R. Wegner [1♀, RMNH]; ..., Bacan Island (Batjan), June–July 1953, A.M.R. Wegner [1♀, RMNH; 1♂, ZFMK, ZFMKDIP 00011905]; ..., Morotai Island, Bernstein [1♀, RMNH]; ..., Halmahera Island, Jailolo district, Kampung Pasir Putih, 0°53'N, 127°41'E, 1–14 February 1981, A.C. Messer and P.M. Taylor [1♂, USNM, USNMMENT 00891192]; Maluku Prov., Ambon, October 1949, M.A. Lieftinck [1♂, RMNH]; Papua Prov., Star Range, Sibil, 1260 m, 04°54'S, 140°40'E, 17 April

1959 [1♂, ZFMK, ZFMKDIP 00011908]; ..., Swart Valley, Karubaka, 1300 m, 03°35'S, 138°30'E, 7 November 1958, J.L. Gressitt [1♀, BPBM]; ..., Lower Mist Camp, 1500 m, 03°30'S, 139°05'E, 28 January 1939, L.J. Toxopeus [1♀, RMNH]. PAPUA NEW GUINEA: Central Prov., Bujacori (Bujkori), August 1890, L. Loria [1♀, MSNG]; ..., Owen Stanley Range, Goilala, Loloipa, 1–15 February 1958, W.W. Brandt [1♀, BPBM]; Morobe Prov., Huon Peninsula, Finschhafen, 80 m, 16 April 1963, J. Sedlacek [1♂, BPBM]; ..., Wau, 6–14 March 1974, H. Hippa, P.T. Lehtinen [1♀, MZH]; New Ireland Prov., Schleinitz Mts., Lelet Plateau, October 1959, W.W. Brandt [1♀, BPBM]. AUSTRALIA: Queensland, Mackay, 94 – 61, G. Turner [1♂, BMNH]; ..., Cry. Cascades, 29 December 1964, C.F. Ashby [1♀, USNM]; ..., McIlwraith Range, 30 km NE of Coen, Leo Creek Road, ca. 500 m, 29 June–4 July 1976, G. B. and S.R. Monteith [1♂, USNM]; ..., 15 km NNW Cairns, 15 December 1991, M.E. Irwin, D.W. Webb, Malaise trap set across gravel stream bed [1♀, INHS]; ..., National Park, Cape Tribulation area, 15°07'03.44"S, 145°04'37.02"E, 5 December 2014, J.H., A.M. and A.W. Skevington [1♂, CNC, CNC 385019]; ..., Little Crystal Creek, near Paluma, 329 m, 8 December 1971, D.K. McAlpine, D.P. Sands, and G.A. Holloway [1♀, AMS, AMK 405063]; ..., Wooroonooran National Park, trail near Henrietta Creek Campground, 392 m, 17°35'57.02"S, 145°45'11.02"E, 17 December 2014, J.H., A.M. and A.W. Skevington [1♀, CNC, CNC 384924]; ..., Summit of Mount Sorrow, 472 m, 16°04'35.62"S, 145°26'24.87"E, 14 December 2014, J.H. Skevington [4♂, CNC, CNC 371757, 371758, 371756, 384959]; ..., 6 December 2014, ... [5♂, CNC, CNC 373577, 371558, 373803, 373804, 385002; 1♂, ZFMK, CNC 373805]; ..., Brisbane, Ashgrove, 6 May 1890, C. Wild [1♂, QM, QM_REG_NO_T 221488]; ..., Brisbane, 6 February 1890, C. Wild [1♂, QM, QM_REG_NO_T 221489]; ..., Cooloola, 17–28 August 1970, E.C. Dahms [1♀, QM, QM_REG_NO_T 221475]; ..., Mason Creek, Spencer Property, 20 m, 16°04'60"S, 148°28'00"E, 16 November 1998, C.J. Burwell [1♀, QM, QM_REG_NO_T 221490]; ..., National Park (Lamington), 19 March 1929 [1♀, QM, QM_REG_NO_T 221486]; ..., Peachester, 8 February 1973, E.C. Dahms [1♂, QM, QM_REG_NO_T 221487]; ..., West Claudie River, 5 December 1985, D. Yeates [1♀, QM, QM_REG_NO_T 220569]; ..., 4 December 1985, ... [1♂, QM, QM_REG_NO_T 220568].

Remarks

Baccha purpuricola Walker, 1859 was described by Walker (1858/1859) from Aru Islands based on a single female. A few years later, Walker (1864, p. 212) described a male from Misool Island as the male of *Baccha purpuricola*. Later, Austen (1893) used this male from Misool as the holotype of his new species, *Baccha bicolor*. Austen (1893) explained that the yellow face of this specimen and different abdomen, actually more resembles *Baccha moluccana* Doleschall, 1857; but *moluccana* has a black scutellum and a medial black facial vitta. Since then, the confusion with *purpuricola* has been so frequent that there are specimens from *A. bicolor*, *A. tripartita* and *A. loriae* identified as *Baccha purpuricola* [= *Allobaccha purpuricola* (Walker, 1859)].

The type material of *Baccha semifumosa* and *Baccha schistaceifrons* was studied and both species were found to be the same species as *bicolor* (Austen). Furthermore, one of the syntypes of *Baccha sulica* was found to also belong to *A. bicolor*.

This group of species (*A. bicolor*, *A. tripartita* and *A. loriae*) is quite distinct, but the overall morphological similarity makes it difficult to identify each taxon (see Remarks under *A. loriae*). The author wanted to preserve the recognisable taxa that already had a name, but he is not sure if this is a single very variable species or a complex of many.

Among the studied material, there is another manuscript name referring to a female given by P.H. van Doesburg, *Baccha caeruleifrons*. This female (Indonesia: Lower Mist Camp, 28 January 1939) is quite different from the other studied specimens: face and frons are white pollinose instead of yellow, white pilose instead of yellow; scutum and pleuron are darker, with not large yellow areas; and wing is less microtrichose, with cells BM and R entirely bare, cell CuP bare on basal 1/2, costal cell bare on basal 1/4 and subcostal cell bare on basal 3/5. The author preferred not to describe a new species based on a single specimen, as this specimen might represent an extreme of a variable species or a different one. Other sources of information (e.g. larval morphology, molecular markers) are needed to solve this morphological variability.

There is another manuscript name from P.H. van Doesburg, *Baccha ambonensis* (for one male from Ambon, October 1949), which has been never published; thus, it is not available, and refers to a specimen of *A. bicolor*.

Some specimens were identified as *Episyrphus* 88–17 Thompson, in litt.

***Asiobaccha bimaculata* (Keiser, 1952) comb. nov.**
(Figure 5a, b, e)

Baccha bimaculata Keiser, 1952: 161. Holotype: ♀, NMB. Type locality: Indonesia: Langgai. *Baccha* (*Allobaccha*) *bimaculata* of Knutson et al. 1975: 321.

Differential diagnosis

Dark species with yellow face and scutellum (Figure 5a, e), with broad alula, and infuscated wing, which is bare basally (including basal part of cell R) (Figure 5b). It has a well-defined mesonotal collar, and the metatarsus is bicolourous (Figure 5a). The most similar species is *A. nubilipennis*, but *A. bimaculata* differs from it by having tergum 3 black with two medial subtriangular yellow maculae, pointing anteriorly and not reaching lateral margins (*A. nubilipennis* has a complete yellow fascia on tergum 3) and the colour of the pleural pollinosity (golden in *bimaculata* and white-yellow in *nubilipennis*). Another characteristic to separate both species is the colouration of the metafemur; *A. bimaculata* has the metafemur dark brown with a yellow apex, while *A. nubilipennis* has a yellow metafemur with a medial dark annulus.

Variation. A paler specimen has metafemur yellow very basally and apically.

***Length* (*N* = 4).** Body, 12.7–14.0 (13.2) mm; wing, 10.5–12.7 (11.3) mm.

Geographical distribution

Species known from Sumba Island.

Type locality

Indonesia: East Nusa Tenggara Province, Pulau Sumba, Sumba Tengah (Central Sumba Regency, Langgai, 10°03'S, 120°28'E.

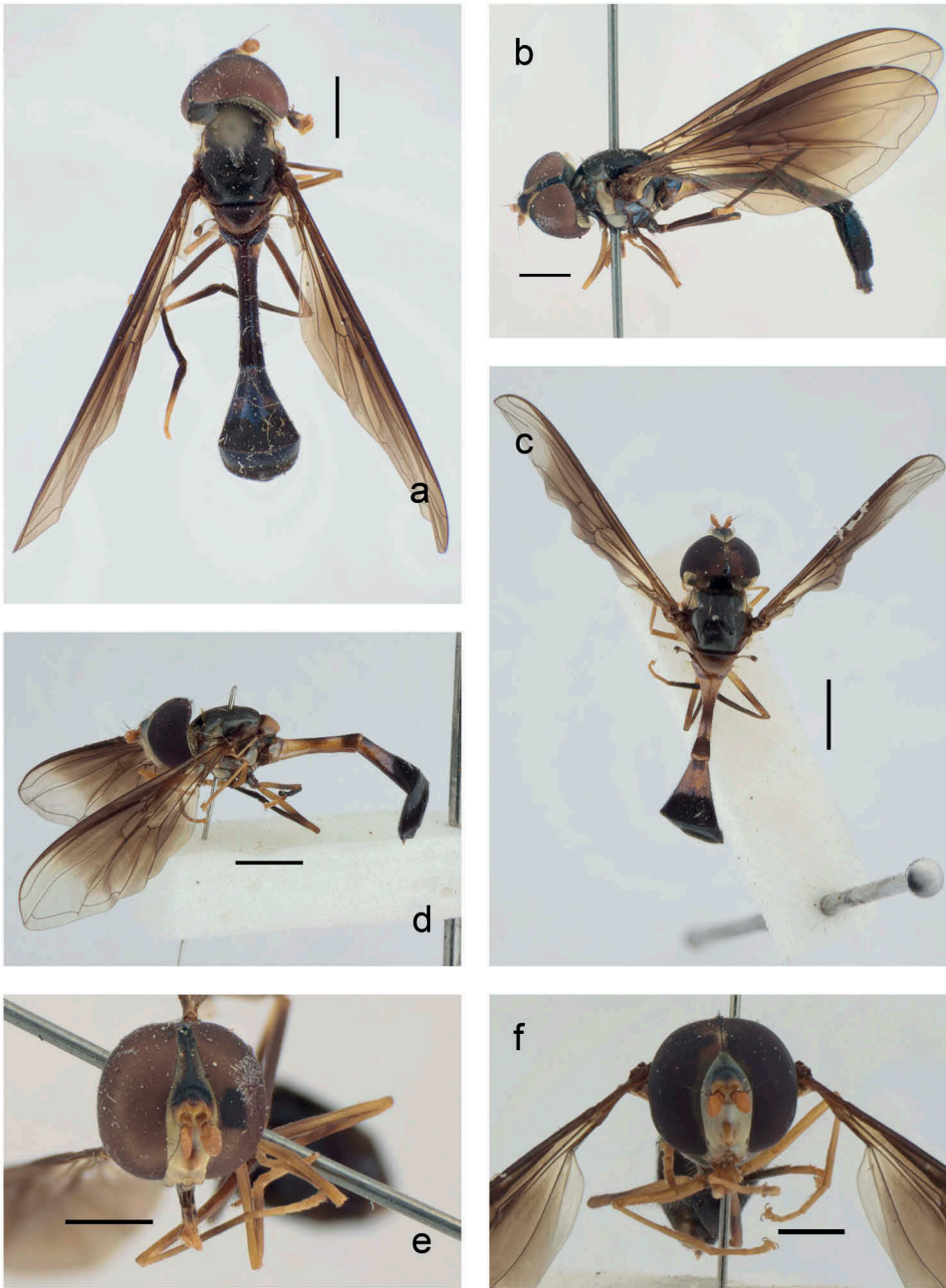


Figure 5. *Asiobaccha bimaculata* (Keiser). a–b, e, holotype ♀. (a) Dorsal view; (b) lateral view; (e) frontal view. *Asiobaccha doesburgi* Mengual sp. nov. c–d, f, holotype ♂. (c) Dorsal view; (d) lateral view; (f) frontal view. Scale bars: a–d = 2 mm; e, f = 1 mm.

Material examined

Type material. *Holotype*, female, deposited in the Naturhistorisches Museum (Basel, Austria) and labelled: 'TYPUS' [red] 'C.-SUMBA // Langgai // 16.7.1949 // Expedition // Bühler-Sutter', 'HOLOTYPE // *Asiobaccha* // *bimaculata* // (Keiser) // det. X. Mengual 2014'

[red] (specimen photographed). *Paratypes*: 'PARA- // TYPUS', 'C.-SUMBA // Langgaliru // 5.10.1949 // Expedition // Bühler-Sutter', 'PARATYPE // *Asiobaccha* // *bimaculata* // det. X. Mengual 2014' [yellow] [1♀, NMB]; 'PARA- // TYPUS', 'O.-SUMBA // Lalukku // 7.7.1949 // Expedition // Bühler-Sutter', 'PARATYPE // *Asiobaccha* // *bimaculata* // det. X. Mengual 2014' [yellow] [1♀, NMB].

Nontype material. INDONESIA: East Nusa Tenggara Prov., Sumba, near Lewapaku, km 57 on Waingapu to Waikobubak road, 9–12 December 1985, J.D. Weintraub [1♀, USNM, USNMMENT 00890789].

***Asiobaccha doesburgi* Mengual sp. nov.**
(Figure 5c, d, f)

Description

Male: Head. Face with distinct facial tubercle, yellow, darker basolaterally along eye margin, pale pilose except dark pilose dorsolaterally, white-silver pollinose except tubercle shiny (Figure 5f); gena yellow; lunule yellow, shiny; frons slightly protruded forward, black, dark pilose, pale pollinose laterally and dorsally, shiny basomedially dorsad to lunule; vertical triangle narrow, black, slightly pollinose; antenna bright yellow, black pilose; arista brown, bare; eye bare; occiput black, white-silver pollinose, entirely yellow pilose.

Thorax. Scutum dark, medially brown pollinose, with short and scarce pale pile; mesonotal fringe well-defined on anterior part of scutum, with yellow pile; postpronotum paler, somewhat yellow, yellow pollinose; notopleuron tawny, yellow pollinose; scutellum yellow, yellow pilose, subscutellar fringe absent (Figure 5c, d). Pleuron brown, dark brown, except anepisternum yellow (brown between anterior and posterior anepisternum), katepisternum with dorsal, broad yellow macula and katatergum paler; pale pilose, densely white pollinose; anterior anepimeron pilose dorsally; metaepisternum pilose ventrad to spiracle; metasternum bare; calypter small, reduced, yellow; plumula small, pale; halter pedicel yellow, capitulum dark; posterior spiracular fringes yellow. *Wing*: alula triangular, broader than costal cell apically, bare with some microtrichia basally. Wing membrane hyaline apically and basally, but clearly infuscated (dark brown) medially; stigma dark brown and costal cell brownish; extensively microtrichose, except cell R bare on basal 1/2, cell BM bare on basal 1/2–3/4, costal cell bare very basally, and cell CuP and anal lobe bare on basal 1/5. *Legs*: pro- and mesoleg yellow except black coxae; metacoxa and metatrochanter black, metafemur yellow with diffuse subapical dark annulus, metatibia black somewhat paler basally, metabasitarsomere black except yellow on apical 1/10 or less, metatarsi 2–5 yellow.

Abdomen. Petiolate, unmarginated, mainly black pilose except tergum 1 pale pilose. Tergum 1 yellow with a posterior narrow brown fascia; tergum 2 yellow with a medial, diffuse brown macula and brown on posterior 1/5; tergum 3 black with a basal, broad yellow fascia (about 1/2 of tergum length) reaching anterior margin; tergum 4 black with grey pollinose fascia on basal 1/3; other terga black (Figure 5c, d); sterna 1–2 yellow, sterna 4–7 black, and sternum 3 yellow on anterior 1/2 and black on posterior 1/2.

Female. Similar to male except for normal sexual dimorphism and as follows: frons pollinose, ocellar triangle shiny contrasting with frons.

Variation. Some specimens have a medial, small dark macula on the yellow fascia of tergum 3, on anterior margin. Paler specimens have yellow halter and basal 1/2 of metatibia pale.

Length (*N* = 4). Body, 13.0–15.0 (14.3) mm; wing, 11.8–13.5 (12.5) mm.

Geographical distribution

Species known from Papua New Guinea.

Etymology

This species is named after Pieter H. van Doesburg, Sr. (1892–1971) in his honour to acknowledge his work on Syrphidae, especially on this genus. The name is to be treated as a noun in the genitive case.

Differential diagnosis

Species with a broad alula, mostly bare, terga 1 and 2 mainly yellow, tergum 4 black, mesonotal fringe present and infuscated wing. Similar to *A. virtuosa* and *A. nubilipennis*, but *A. doesburgi* has tergum 1 yellow, tergum 4 black, and cell R bare basally.

Type locality

Papua New Guinea: Morobe Province, Bulolo District, Manki Logging Area, 70°20'S, 146°42'E.

Material examined

Type material. *Holotype*, male, deposited in The Natural History Museum, formerly British Museum (Natural History) (London, United Kingdom) and labelled: 'PAPUA NEW GUINEA: // Bulolo, // Manki Logging Area // 20.v.1983 // H. Roberts' [handwritten] '*Allobaccha* ♂ // ? *nubilipennis* Austen // N.P. Wyatt det. 1983', '2129', 'HOLOTYPE // *Asiobaccha* // *doesburgi* // des. X. Mengual 2014' [red] (specimen photographed). *Paratypes*: PAPUA NEW GUINEA: Morobe Prov., NE Wau, 1200 m, 4 February 1970, J. Sedlacek [1♂, BPBM]; ..., NE Wau, 1100–1200 m, June 1968, N.L.H. Krauss [1♀, ZFMK, ZFMKDIP 00011911]; ..., Kaisenik, 16 August 1978, on *Pinus patula*, H. Roberts [1♀, BMNH]; Central Prov., Tapini, 1100 m, November 1968, N.L. H. Krauss [1♀, BPBM]; Chimbu Prov., Wahgi Valley, Kerowagi area, 1700 m, 24 June 1957, D. Elmo Hardy [1♀, ZFMK, ZFMKDIP 00011909].

***Asiobaccha loriae* (de Meijere, 1908) comb. nov.** (Figure 6a, b, e)

Baccha loriae de Meijere, 1908: 324. Holotype lost. Neotype: ♂, MSNG, here designated.

Type locality: Papua New Guinea, Moroka. Brunetti 1915: 218; Sack 1926: 574; Sack 1932b: 231; Hull 1936: 196; Knutson et al. 1975: 324.

Allobaccha loriae of Thompson and Vockeroth 1989: 441; de Jong 2000: 120.

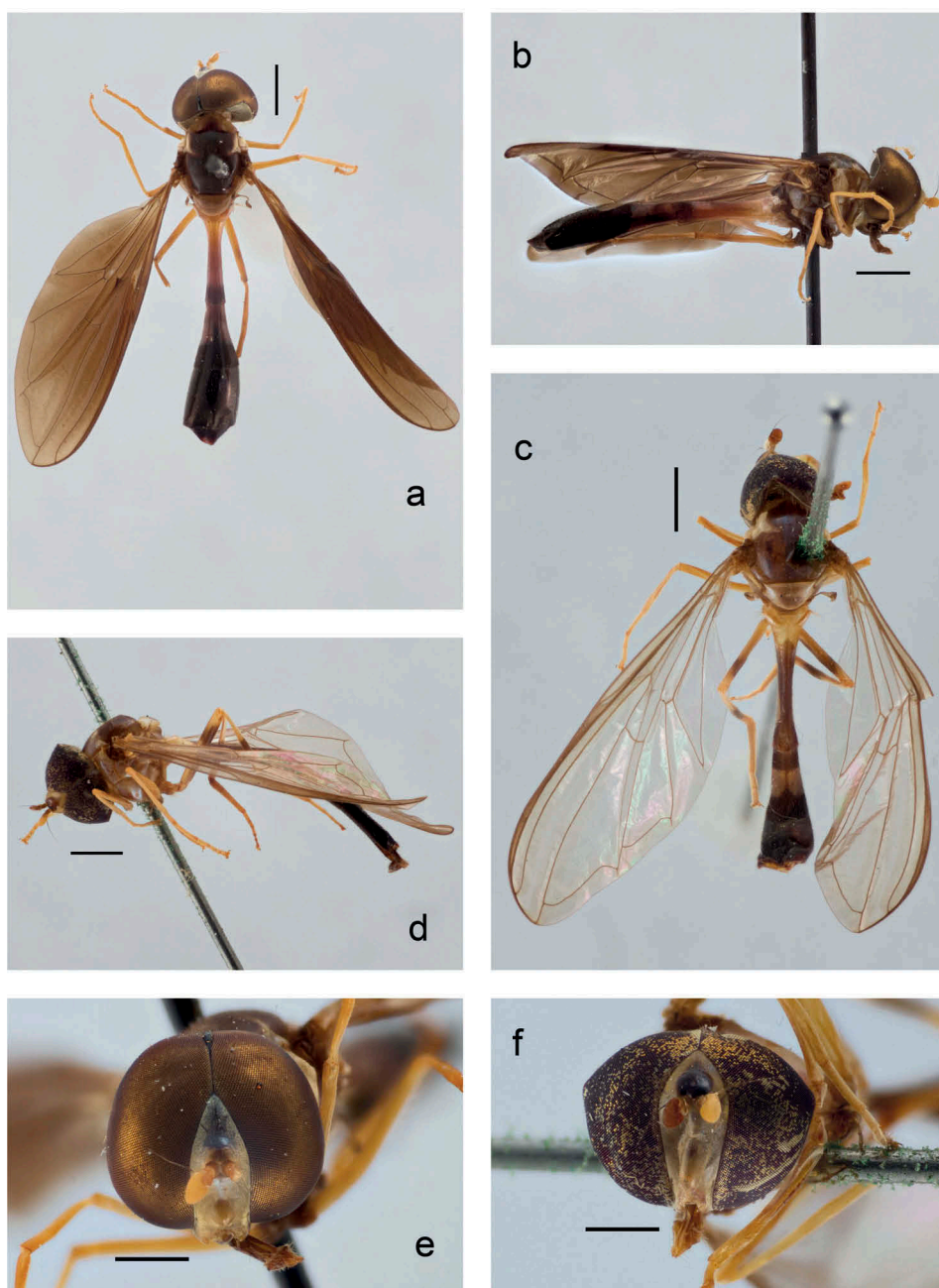


Figure 6. *Asiobaccha lorae* (Meijere). a–b, e, ♂. (a) Dorsal view; (b) lateral view; (e) frontal view. *Asiobaccha maculosa* Mengual & Thompson sp. nov. c–d, f, holotype ♂. (c) Dorsal view; (d) lateral view; (f) frontal view. Scale bars: a–d = 2 mm; e, f = 1 mm.

Description of the neotype

Male: Head. Face with facial tubercle, yellow, yellow pilose, yellow pollinose except on tubercle; gena yellow, darker posteriorly; lunule yellow; frons yellow on ventral 1/3, black on dorsal 2/3, yellow pilose, yellow pollinose except basomedially; vertical triangle

narrow, black; antenna yellow, yellow pilose; arista brown, bare; eye bare, holoptic; occiput white pollinose, yellow pilose on basal 3/4, brown pilose on dorsal 1/4 (Figure 6e).

Thorax. Scutum brown to black on central part, with short, pale pile; mesonotal fringe absent; postpronotum yellow, bare; notopleuron yellow, yellow pollinose, yellow pilose; postalar callus lighter (tawny) in background colour, as well as scutum in front of scutellum; scutellum yellow, yellow pilose, subscutellar fringe with yellow pile (Figure 6a, b). Pleuron yellow with two dorsoventral black vittae: one from wing base to mesocoxa (central part of anepimeron, area between katepisternum and meron and ventral part of katepisternum black), and another vitta on metaepimeron, metaepisternum and metacoxa, all black; yellow pilose, anterior anepisternum pilose dorsally; metaepisternum pale pilose ventrad to spiracle; metasternum bare; calypter yellow; plumula almost absent; halter: pedicel yellow-brown, capitulum dark brown; posterior spiracular fringes yellow. *Wing:* membrane infuscated, dark, entirely microtrichose except alula bare. Alula triangular, narrower than costal cell, mostly bare with a few microtrichia. *Legs:* proleg completely yellow; mesoleg yellow except mesocoxa black; metaleg yellow with black metacoxa, metafemur with a dark subapical annulus, and brown tarsus.

Abdomen. Petiolate, unmarginated. Tergum 1 yellow, yellow pilose; tergum 2 yellow with a diffuse brown fascia on posterior margin; tergum 3 yellow on anterior 1/2–3/5, shiny black on posterior 2/5–1/2, with a diffuse, narrow brown fascia close to the anterior margin; terga 4 and 5 shiny black (Figure 6a, b); sterna with the same pattern as terga without brown fascia on terga 2 and 3; genital segments 7–10 yellow.

Female. Similar to male except normal sexual dimorphism and as follows: lunule yellow; frons mostly black, white pollinose with a medial, bare, shiny vitta.

Variation. The colouration of the pleuron and metaleg is quite variable: darker specimens having katepisternum blacker on ventral side and darker annulus on metafemur, and lighter specimens with a yellow metaleg. The abdominal pattern is similar in all studied specimens, with the broad fasciae on terga 2 and 3 more or less visible. The wing colouration is also variable and some specimens with apical part hyaline. The wing is completely microtrichose, but a very few specimens have very small areas (not well defined) in the very basal part of the cell BM (less than 1/20 of the cell).

Length (*N* = 4). Body, 9.0–14.5 (12.5) mm; wing, 7.5–12.0 (10.5) mm.

Geographical distribution

Species known from New Guinea Island, Sumbawa Island* and Philippines (Luzon)*.

Differential diagnosis

Species with yellow face, alula bare, narrower than costal cell, wing entirely microtrichose and infuscated, and without mesonotal fringe. The abdominal pattern is identical

to another two species with tergum 4 entirely black, *A. bicolor* and *A. tripartita*, but differs by the wing microtrichia as stated in the key.

Original type locality

Papua New Guinea: Paumomu (river), unknown coordinates (de Jong 2000).

Neotype locality

Papua New Guinea: Central Province, Moroka, 1300 m, 09°25'S, 147°35'E (de Jong 2000).

Material examined

Type material. *Neotype*, male, deposited in the Museo Civico di Storia Naturale 'Giacomo Doria' (Genova, Italy) and labelled: 'N.GUINEA S. E. // Moroka, 1300 m. // LORIA VII-XI 93' [handwritten] 'Museo Civ. // Genova', 'NEOTYPE // Asiobaccha // loriae (Meij.) // des. X. Mengual 2014' [red, handwritten].

Nontype material. PAPUA NEW GUINEA: Central Prov., Moroka, 1300 m, July–November 1893, L. Loria [1♀, MSNG]; ..., Darade Plantation, 80 km N of Port Moresby, 500 m, 7 September 1959, T.C. Maa [1♂, BPBM; 1♂, ZFMK, ZFMKDIP 00011913]; Northern Prov., Kokoda, 1200 ft., April 1933, L.E. Cheesman [1♂ 1♀, BMNH; 1♂ 1♀, CNC; 1♂, ZFMK, ZFMKDIP 00011910]; ..., Buna District, Monda, August 1943, W.G. Bodenstein [1♂, CNC]; West Sepik Prov., Telefomin District, Eliptamin Valley, 1200–1350 m, 1–15 September 1959, W.W. Brandt [1♂, BPBM]; Madang Prov., Finisterre Range, Saidor, Aiyawa village, 16–23 June 1958, W.W. Brandt [1♂, BPBM] (specimen photographed); ..., Saidor, Gabumi village, 1–21 July 1958, W.W. Brandt [1♂, ZFMK, ZFMKDIP 00011912]; Morobe Prov., Lae, July 1944, F.E. Skinner [1♀, BPBM]; ..., Nadzab, Markham, River val., along E. fork Ngafir Creek, 25 June 1944, K.V. Krombein [1♀, USNM, USNMENT 00890742]; ..., 2 July 1944, ... [1♀, USNM, USNMENT 00890747]; Brown River(?), 12–23 October 1968 [1♂, BPBM]. INDONESIA: West Papua Prov., Fak Fak, S coast of Bomberai, 10–100 m, 11 June 1959, T.C. Maa [1♀, BPBM]; ..., Waigeo Island, 25–26 October 2012, J.H. Skevington [1♀, CNC, 'J. Skevington Specimen# 25733']; ..., Kebar Valley, W of Manokwari, 550 m, 4–31 January 1962, S. Quate [1♀, BPBM]; ..., L.W. Quate [1♀, BPBM]; ..., S. and L.W. Quate [1♀, ZFMK, ZFMKDIP 00011936]; ..., trail Sucumi to Ransiki, 300–10 m, 7 August 1957, D.E. Hardy [1♀, BPBM]; Papua Prov., Waris, S of Hollandia (Jayapura), 450–500 m, 1–7 August 1959, T.C. Maa [1♀, BPBM]; ..., Cyclops Mts, Sabron, 900 ft., May 1936, L.E. Cheesman [1♀, CNC]; Papua Prov., Jayawijaya Regency, Bernhard Camp, Jayawijaya central mountains, 50 m, 03°29'S, 139°13'E, 6 October 1938, J. Olthof [1♀, ZFMK, ZFMKDIP 00011933; 1♀, RMNH]; ..., 1 October 1938, ... [1♀, RMNH]; ..., 13 September 1938, ... [1♀, RMNH]; Klamong Oilfids, 18–24 August 1948, M.A. Lieftinck [1♂ 1♀, RMNH]; Alkmaar Bivak, Lorentz River, December 1909, 04°40'S, 138°43'E, Elland [1♀, RMNH].

Remarks

de Meijere (1908) described *Baccha loriae* using a single female specimen from Paumomu (Papua New Guinea). Additionally, he referred to another female from Bujacori (*Bujakori*, south of Papua New Guinea) with some differences, mainly the darker colouration of the scutellum and metaleg. de Meijere (1908) opened the question as to whether this second female belongs to another species, but mentioned that both

specimens are similar to *Baccha sulica* Austen, 1893. Again, he listed the differences with *sulica* and these were only about colouration.

The type material of *Baccha loriae*, which belongs to the MSNG, was destroyed/lost in a fire at the HHNM during the 1956 uprising in Budapest (de Jong 2000; and confirmed by current personnel of both institutions: Maria Tavano, MSNG; and Zoltán Soltész and Eszter Ágnes Lazányi-Bacsó, HHNM). The second female from Bujacori was found at the MSNG and identified as *Asiobaccha bicolor*.

The colour variation mentioned by de Meijere (1908) is in the normal variation range of *A. bicolor*, and it might be possible that *Baccha loriae* is a junior synonym of *A. bicolor*. The problem is that there are three very closely related species with the same external appearance (see below) and the type of *loriae* is destroyed. Accordingly and in order to give a name to a taxon close to *A. tripartita* and *A. bicolor*, a neotype for *Baccha loriae* de Meijere, 1908 is here designated to fix and ensure the universal and consistent interpretation of the name.

Asiobaccha loriae belongs to a species group within *Asiobaccha* that lacks a mesonotal collar and has similar abdominal pattern, including *A. bicolor*, *A. tripartita* and *A. loriae*. This group might be a complex of more species with significant differences in the wing microtrichia pattern, or they might belong to a single, variable, widespread species. Male genitalia of the three recognised species are identical, as well as general external morphology and colouration. The variation occurs in the wing microtrichia, and the author has been able to separate the three taxa mentioned above. In the author's opinion, another source of characters, such as DNA, will be needed to solve this doubt, although the wing microtrichia pattern serves to separate well all three recognised species.

The two specimens from Nadzab were identified as *Episyrphus* 87–1 Thompson, in litt.

Asiobaccha maculosa Mengual & Thompson sp. nov.

(Figures 6c, d, f, 12e)

Description

Male: Head. Face with facial tubercle, yellow, yellow pilose; gena yellow, slightly white pollinose posteriorly; lunule black; frons yellow with a medial, black macula pointing backwards, yellow pilose, without pollinosity; vertical triangle narrow, black, yellow pilose, white pollinose posteriorly; antenna yellow-brown, yellow pilose; arista brown, bare; eye bare, holoptic; occiput white pollinose, yellow pilose (Figure 6f).

Thorax. Scutum brown to black, with short, yellow pile; mesonotal fringe absent; postpronotum yellow, bare, white pollinose; notopleuron yellow, slightly white pollinose, yellow pilose; postalar callus lighter in background colour; scutellum yellow with a posteromedial black macula, yellow pilose, subscutellar fringe absent (Figure 6c, d). Pleuron yellow, katatergum and anatergum darker, brownish, yellow pilose; metaepisternum yellow pilose ventrad to spiracle; metasternum bare; calypter yellow; plumula very short, yellow; halter: pedicel yellow, capitulum brown; posterior spiracular fringes yellow. **Wing:** membrane hyaline; stigma, costal cell and R_1 yellow; microtrichose, except cell BM and CuP very basally. Alula present, rectangular, narrower than costal cell, microtrichose. **Legs:**

completely yellow, except metafemur yellow dorsally and dark brown ventrally, with a dark subapical annulus (ring), metatibia yellow with a medial dark annulus.

Abdomen. Petiolate, unmargined. Tergum 1 yellow, yellow pilose; tergum 2 mostly dark, dark brown to black, with a basal yellow fascia (two basal, triangular yellow maculae joined medially) and two lateral yellow maculae, yellow and black pilose; tergum 3 black with two medial, rectangular, large yellow maculae not joined medially reaching lateral margins; tergum 4 black with two submedial, yellow fasciate maculae reaching anterior margin; tergum 5 black with two anteromedial yellow maculae; terga 4 and 5 with posterior margin yellowish (Figure 6c, d); sterna 1–3 yellowish, sternum 3 with a black fascia, and sterna 4 and 5 dark.

Female. Similar to male except normal sexual dimorphism and as follows: lunule black; frons yellow laterally on basal 1/2 with a medial, black vittae joining the black area on posterior 1/2, shiny on basal 1/2 and yellow pollinose on posterior 1/2 and ocellar triangle. The pollinose area on posterior 1/2 of the frons has a thin, medial shiny vitta (Figure 12e). Both female paratypes lack the alula, but this might be due to preservation conditions in author's opinion.

Length ($N = 3$). Body, 12.0–14.0 (13.2) mm; wing, 12.5–13.2 (12.7) mm.

Geographical distribution

Sumatra and Malay Peninsula.

Etymology

The specific epithet is derived from the Latin *maculosus* denoting spotted, dappled (Brown 1956, p. 742). The name is to be treated as adjective.

Differential diagnosis

This species present a face entirely yellow, not pollinose, frons with a dark macula on lunule, alula very narrow, and the scutellum yellow with a medial, dark macula. This taxon is similar to *A. tinctiventris*, but it differs in the following characters: alula narrow (*A. tinctiventris* has the alula broader than costal cell), frons and face largely shiny, and yellow markings on tergum 3.

Type locality

Indonesia: Sumatra, Bukittinggi, Fort de Kock, 0°18'S, 100°20'E (de Jong 2000).

Material examined

Type material. *Holotype*, male, deposited in the Naturalis Biodiversity Center (Leiden, The Netherlands) and labelled: 'Fort de Kock // (Sumatra) 920 M. // 1925 // leg. E. Jacobson', 'Baccha // Loriae Meij', '♂', 'HOLOTYPE // Asiobaccha // maculosa // des. X. Mengual 2014' [red] (specimen photographed). *Paratypes*: INDONESIA: Sumatra, Bukittinggi, Fort de Kock, 0°18'S, 100°20'E, 1925, E. Jacobson [1♀, RMNH] (specimen photographed); Sumatra, west coast, Tandjungadang, 1000 m, November 1925, E. Jacobson [1♀, ZFMK, ZFMKDIP 00011937]. MALAYSIA: Pahang, Cameron's Highlands, 3500 ft., 26 May 1931, H.T. Pagden [1♂, USNM, USNMMENT00890798].

Remarks

The type material of *Asiobaccha maculosa* was identified as *Baccha loriae* Meijere most probably by Pieter H. van Doesburg (Senior). This conclusion by Herman de Jong and Ben Brugge (RMNH) was made after a handwriting comparison with the handwriting on labels of species described by van Doesburg. Originally a coleopterist, van Doesburg started to work on the Syrphidae during the Second World War. He identified remaining unsorted material in the Amsterdam Syrphidae collection, and it must have been in the early 1940s that the identification labels were attached (2014 e-mail from H. de Jong to author).

The type material of *A. maculosa* does not match the original description of *Baccha loriae*. Meijere clearly stated that the scutellum was uniform in colour (de Meijere 1908, p. 319, key couplet 7) and the abdomen had no yellow markings (de Meijere 1908, p. 319, key couplet 8). The paratypes of *A. maculosa*, two females and a male, have no alula. After checking the male genitalia and all other external morphological characters, the author could not find any difference except the absence of the alula. Therefore, the author assumes the loss of the alula due to preservation conditions as this has occurred with the lectotype of *A. virtuosa*.

The Malayan specimen in the USNM was identified as *Episyrphus* 74–27 Thompson, in litt.

Asiobaccha marissae Mengual sp. nov. (Figures 1, 7a, b, e)

Asiobaccha n. sp. of Mengual 2015: 398 (DNA voucher ZFMK_XM127).

Description

Male: Head. Face with distinct round facial tubercle, yellow, yellow pilose, yellow pollinose except shiny medially on tubercle; gena yellow; lunule yellow; frons yellow, somewhat darker dorsally, yellow pilose, densely yellow pollinose laterally and dorsally, shiny basomedially; antenna yellow, yellow pilose; arista brown, yellow basally, bare; antennal base with lateral lobular expansions on each side; vertical triangle narrow, black; eye bare; occiput black, grey pollinose, yellow pilose with some brownish/darker pile on dorsal 1/4 (Figures 1, 7e).

Thorax. Scutum yellow anterior to transverse suture, dark brown or black posterior to suture, yellow pilose with some brown pile on posterior 1/2, brown pollinose on dark areas; without mesonotal fringe; postpronotum yellow, bare; postalar callus yellow; scutellum yellow, yellow pilose, subscutellar fringe present with yellow pile (Figure 7a, b). Pleuron yellow with a vertical black marking going from dorsomedial anepimeron to mesocoxa; anatergum, metaepimeron and metaepisternum black; yellow pilose and yellow pollinose; anterior anepisternum pilose on anterodorsal quarter; metaepisternum pilose ventrad to spiracle; metasternum bare; calypter small, reduced, yellow; plumula absent; halter pedicel yellow, capitulum darker; posterior spiracular fringes yellow. **Wing:** alula narrow, narrower than costal cell, bare; wing hyaline, yellow anteriorly, stigma a bit darker, extensively microtrichose except costal cell bare on basal 1/6 or less, cell R bare on basal 1/3, cell BM bare on basal 1/2, and cell CuP and anal lobe bare basally. **Legs:** entirely yellow, except meso- and metacoxa black and metafemur yellow with a subapical dark annulus.

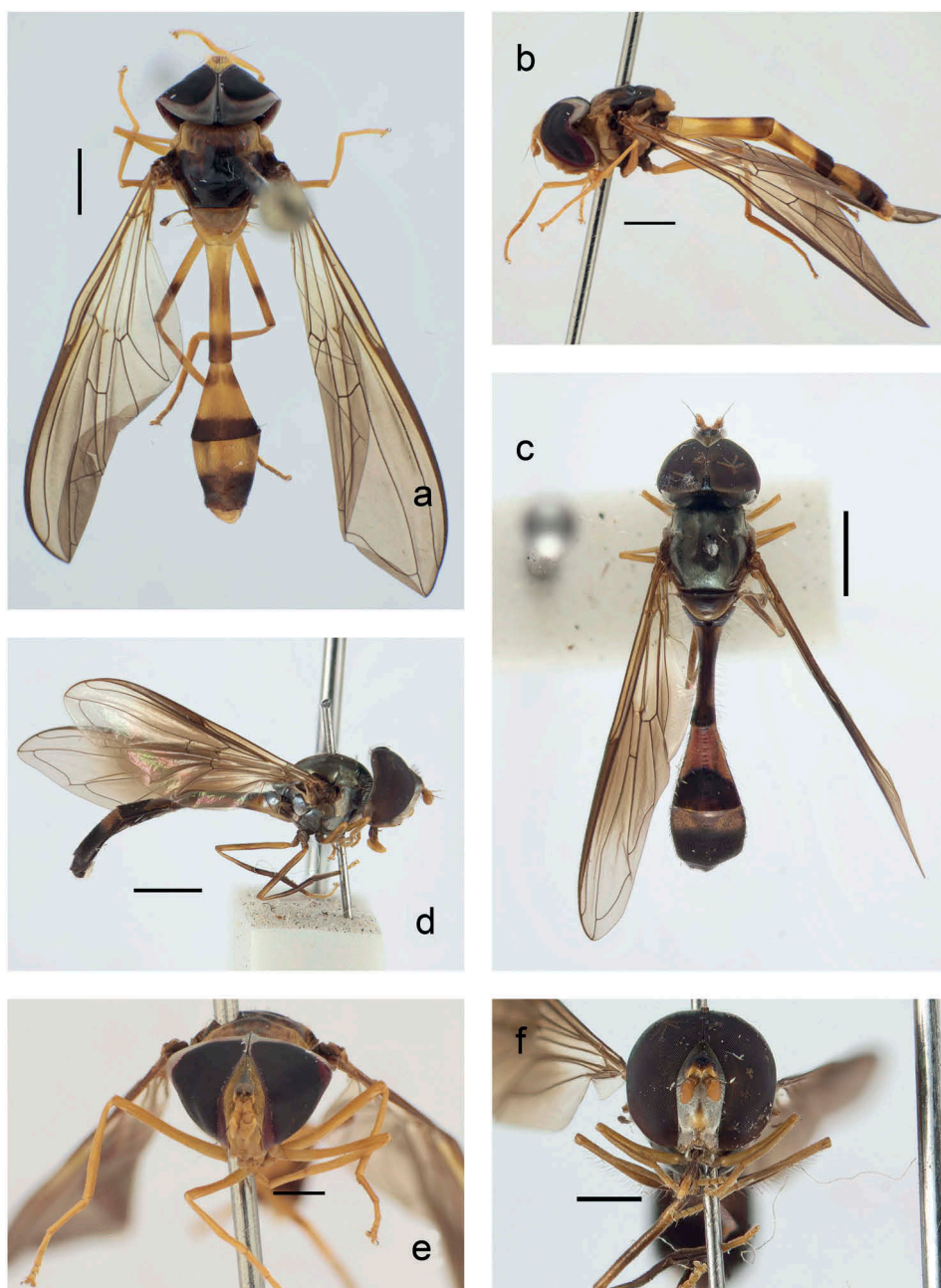


Figure 7. *Asciobaccha marissae* Mengual sp. nov. a–b, e, paratype ♂. (a) Dorsal view; (b) lateral view; (e) frontal view. *Asciobaccha notofasciata* Thompson & Mengual sp. nov. c–d, f, ♂. (c) dorsal view; (d) lateral view; (f) frontal view. Scale bars: a–d = 2 mm; e, f = 1 mm.

Abdomen. Petiolate, unmargined. Tergum 1 yellow, yellow pilose; tergum 2 yellow with a medial, diffuse brown macula, and a diffuse dark fascia on posterior margin; tergum 3 yellow with a basal, diffuse brown fascia on anterior margin and a black fascia on

posterior margin emarginated medially; tergum 4 black with a basal, broad, yellow fascia on anterior 3/5 deeply emarginated posteromedially; tergum 5 yellow with brown lateral margins (Figures 1, 7a); sterna yellow, and sterna 3 and 4 with a posterior, black fascia.

Female. Similar to male except for normal sexual dimorphism and as follows: frons yellow on ventral 1/5, black on dorsal 4/5, densely yellow pollinose except basal 1/4.

Variation. The dark annulus of the metafemur is not well-defined in some specimens. The extension of the black posterior area on scutum is variable, as well as the extension of the posterior black fascia on terga 3 and 4.

Length (N = 4). Body, 9.5–13.0 (11.9) mm; wing, 9.0–12.0 (11.3) mm.

Geographical distribution

Species known only from Sulawesi.

Genetics

The GenBank accession numbers for this species are: 28S gene (KM270823, specimen ZFMK_XM127), 18S gene (KM270771, specimen ZFMK_XM127), COI gene (KM270854, specimen ZFMK_XM127).

Etymology

This species is named after my wife, Marissa Sendra i Peiró, in her honour. This species is the most colourful, radiant and distinguished of *Asiobaccha*, just as Marissa is for my life. The name is to be treated as a noun in the genitive case.

Differential diagnosis

Species with a narrow alula, without mesonotal fringe, tergum 4 with an anterior, broad yellow fascia and scutellum yellow. *Asiobaccha marissae* has unique characteristics, such as the abdominal colouration and the lobular expansions on each side at the antennal base. This species is similar to *Asiobaccha notofasciata* but the latter has a well-developed mesonotal fringe, alula broad and no modified antennal base. *Asiobaccha marissae* differs from other species without mesonotal fringe by the yellow fascia on tergum 4 and the antennal base expansions.

Type locality

Indonesia: Southeast Sulawesi Province, North Kolaka Regency, Rante Angin, east of Tinukari, 03°27.7'S, 121°5.1'E.

Material examined

Type material. *Holotype*, male, deposited in the Museum Zoologicum Bogoriense (Bogor, Java, Indonesia) and labelled: 'INDONESIA: SE SULA- // WESI, North Kolaka // Rante Angin, // east of Tinukari', '03°27.7'S 121°5.1' E // 23.VI.2010 // L.S. Kimsey // MEK002', 'DNA voucher specimen // ZFMK, Lab code // D263 // Bonn, Germany', 'HOLOTYPE // *Asiobaccha* // *marissae* // des. X. Mengual 2014' [red] 'ZFMK DIP //

00011932' [barcode]. *Paratypes*: INDONESIA: SE Sulawesi, South Konawe, Meramo, Summersari, Tanjung Peropa Wildlife Sanctuary, 430 m, 03°64'46.1"S, 121°09'85.9"E, 4 November 2010, Ubaidillah R, B. Kimsey, Nugroho H., Lupiyaningdyah P., Darmawan Sw. [1♀, BME, ZFMKDIP 00015932, DNA voucher ZFMK D264]; SE Sulawesi, North Kolaka, Mt. Mekongga, near Tinukari, 1000 m, 03°38'23.244"S, 121°08'56.76"E, 30 September 2010, R. B. Kimsey [1♀, ZFMK, ZFMKDIP 00011935, DNA voucher XM127; 1♂, ZFMK, ZFMKDIP 00015929 (specimen photographed)]; SE Sulawesi, nr Sanggona, Base Camp Gn. Watuwila, Malise trap 12, 200 m, 15–19 October 1989, C.v. Achterberg [1♀, RMNH, ZFMKDIP 00015930]; South Sulawesi, Rantepao area, Todjambu, 14–20 June 1982, M.A. Lieftinck [1♀, RMNH, ZFMKDIP 00015931]; ..., Gn. Bulusaraung, nr Camba, Malawa, Malaise trap 2, 750 m, 7 February–28 March 1995, C.v. Achterberg, Y. Yasir [1♀, ZFMK, ZFMKDIP 00011934]; ..., nr. Bantaeng, Borong Rappoa, Gn Daulu, Malaise trap 17, 700 m, 4–24 April 1991, C.v. Achterberg [1♀, ZFMK, ZFMKDIP 00011925].

***Asiobaccha notofasciata* Thompson & Mengual sp. nov.**
(Figure 7c, d, f)

Episyrphus (*Asiobaccha*) sp. of Carver et al. 2003: 111.

Episyrphus (*Asiobaccha*) #88–16 Thompson, in litt. of Blüthgen 2003: 71.

Asiobaccha 88–16 Thompson, in litt. of Mengual 2015: 398 (DNA voucher CNC_JSM218).

Description

Male: Head. Face with distinct round facial tubercle, yellow, white pollinose, yellow pilose except black pilose laterodorsally; gena yellow; lunule yellow, yellow also between antennal bases; frons protruded forward, black with anterior M-shaped yellow macula, black pilose, golden-brownish pollinose posteriorly, shiny black medially; vertical triangle narrow, isosceles, with the ocelli on the anterior half, black, black pilose; antenna yellow, black pilose; arista dark brown, bare; eye bare, holoptic; occiput black, grey-silver pollinose, yellowish-white pilose on ventral 2/3 and brown pilose on dorsal 1/3 (Figure 7f).

Thorax. Scutum black, brown pollinose, yellow pilose; mesonotal fringe or collar well-defined on anterior part of scutum, with white pile; postpronotum dark, bare; notopleuron black, densely white pollinose, yellow pilose; postalar callus lighter in background colour; scutellum brownish, yellow pilose, subscutellar fringe absent (Figure 7c, d). Pleuron mostly dark brown to black, except posterior anepisternum yellowish on posterior half, katapisternum with dorsal yellowish macula, both areas densely white pollinose; katatergum whitish pollinose; anterior anepisternum yellow pilose on posterodorsal quarter, posterior anepisternum and meron yellow pilose, dorsal and ventral katapisternal pile patches broadly separated, metaepisternum yellow pilose ventrad to spiracle; metasternum bare; calypter yellow; plumula yellow; halter brown; posterior spiracular fringes yellow. **Wing:** membrane hyaline, lightly infuscated medially; stigma brown; extensively microtrichose, except costal cell bare very basally, cell R bare on basal half, cell BM bare on basal 2/3, and cell CuP and anal lobe bare basally. Alula present, broader than costal cell, bare with microtrichia on anteroapical quarter. **Legs:** coxae and trochanters black, pro- and mesoleg yellow, yellow pilose; metafemur yellow,

metatibia black, yellow on basal 1/4, metabasitarsomere black, yellow apically, remainder of tarsi yellow.

Abdomen. Petiolate, unmarginated. Dorsum mainly black, yellowish-white pilose on tergum 1, black on the remaining; tergum 1 black; tergum 2 with two basolateral yellow maculae and two more yellow maculae submedially; tergum 3 with anterior broad yellow fascia, broader than the half of tergum length; tergum 4 with anterior broad yellow fascia; tergum 5 black (Figure 7c, d); male genitalia black.

Female. Similar to male except normal sexual dimorphism and as follows: frons black, with anterior yellow macula, white pilose, white pollinose except a thin shiny medial line. Pleuron more yellow, lighter; scutellum yellow. Abdominal tergum 1 yellow laterally, tergum 2 with basolateral maculae and medial maculae connected laterally with yellow lateral margins, tergum 5 with two yellow maculae on anterior margin.

Variation. Female from Mt. Garnet is a bit lighter, and it seems to be a teneral specimen.

Length (N = 2). body, 11.3 mm (11–11.5 mm); wing, 9.8 mm (9–10.5 mm).

Biology

In New South Wales, Australia, a second-instar larva of *Asiobaccha notofasciata* was found feeding on *Aphis* (*Aphis*) *clerodendri* in a pseudogall of *Clerodendrum tomentosum* (Blüthgen 2003; Carver et al. 2003). Blüthgen (2003) indicated that the pupal stage lasted 10 days at 23°C.

Geographical distribution

Species known from New South Wales and Queensland (Australia).

Genetics

The BOLD Process IDs for the DNA barcodes (5'–COI) for this species are: SYRAU033-15 (specimen CNC373897), SYRAU034-15 (specimen CNC373913), SYRAU035-15 (specimen CNC373916), SYRAU036-15 (specimen CNC373910), and the following specimens: AMK379153, CNC457370, CNC451750, CNC373897, CNC373910, CNC373913, CNC373916, CNC385072, CNC451728, CNC451729 and K410200.

The GenBank accession numbers for this species are: 28S gene (KM270822, specimen CNC_JSM218), 18S gene (KM270770, specimen CNC_JSM218), protein-coding COI gene (KM270853, specimen CNC_JSM218).

Etymology

The specific epithet is derived from the Greek *notos* meaning south (Brown 1956, p. 731) and the Latin *fasciatus* meaning 'envelop with bands, swathe' (Brown 1956, p. 317), and it refers to Australia and the characteristic abdominal fasciae of this species. Species epithet is to be treated as adjective.

Differential diagnosis

This species has a mesonotal fringe, the face and the scutellum are yellow, and the alula is broader than the costal cell. *Asiobaccha notofasciata* has the wing bare basally, including cell R, and the abdominal tergum 4 black with a broad yellow fascia on anterior 1/2, reaching anterior margin, slightly emarginated medially on posterior margin, and tergum 5 black with two basal elongate yellow maculae on anterior margin. It can be distinguished from *A. doesburgi* by the abdominal colouration pattern and the contrasting, darker stigma.

Type locality

Australia: Queensland, Hilltop near Kinkin, 26°19'7.24"S, 152°51'18.10"E.

Material examined

Type material. *Holotype*, male, deposited in the Queensland Museum (Brisbane, Australia) and labelled: 'Australia: QLD: Hilltop near // Kinkin; 26°19'7.24" S // 152°51'18.10" E; 14.xi.2014 // J.H. Skevington; // **CNC373913**, 'Legs removed // for DNA // analysis' [green] '*HOLOTYPE* // *Asiobaccha* // *notofasciata* // Mengual, 2015' [red, handwritten]. *Paratypes*: AUSTRALIA: New South Wales, 3 km North of Lansdowne via Taree, 23 December 1992, G. Williams [1♂, AMS, AMK 405065]; ..., Sydney, Lane Cove, 33° 55'34.95"S, 151°07'33.37"E, August 1988, G.A. Holloway [1♂, AMS, AMK 405060]; ..., Mooney Mooney Creek, near Gosford, 30 November 1978, D.K. McAlpine, B.J. Day [1♂, AMS, AMK 405069]; ..., Northmead, 26 January 1963, D.K. McAlpine [1♀, AMS, AMK 405068]; ..., Pt. Macquarie, 25 August 1941, H.W. Simmonds [1♂, AMS, AMK 405061]; ..., Turrumurra, February 1972, D. Clyne [1♂, AMS, AMK 405062]; ..., Wilson River Reserve via Bellangry, 28 January 1983, D.K. McAlpine, K.C. Kheo [1♂, AMS, AMK 405066]; ..., Woronora River, Engadine, December 1985, G.A. Holloway [1♂ 1♀, AMS, AMK 405064, 405067]; Queensland, Brisbane, Forest park, Scrub Creek, 27°25'41"S, 152°50'18"E, 28 September–15 October 2002, Malaise, J. Skevington and J.M. Cumming [1♀, CNC]; ..., 52 km SW by S of Mt. Garnet, 18°03'S, 144°31'12"E, 700 m, 28 May 1977, I.F.B. Common and E.D. Edwards [1♂ 1♀, USNM] (♂ specimen photographed); ..., Sanford Valley, Cedar Creek, 27°19'42"S, 152°47'35"E, 15 April 2000, J. and A. Skevington, M. Mathieson [1♀, CNC, JSM0218 'J. Skevington Specimen# 20512']; ..., 2 Km West of Rainbow Beach, 25° 58'S, 153°09'E, 24 September 1994, G. and A. Daniels, C.J. Burwell [2♂, AMS, AMK 405124, 405125]; ..., Caloundra, 22 November 1980, R. Eastwood [1♂ 1♀, AMS, AMK 405117, 405118]; ..., Enoggera Creek at Scrub Road, Brisbane Forest Park, 20 m, 27°25'60"S, 152° 49'60"E, 14 March 1998, G. Daniels [1♀, AMS, AMK 405120]; ..., Eungella National Park, Digging's Road, 21°08'35.61"S, 148°29'10.69"E, 20 December 2014, J.H., A.M. and A.W. Skevington [1♀, CNC, CNC 385072]; ..., Finch bay, Cooktown, 15°28'S, 145°13'60"E, 15 May 1989, G. and A. Daniels [1♀, AMS, AMK 405114]; ..., North Queensland, Forty Mile Scrub, 65 km West of Mount Garnet, 23 April 1976, A. and M. Walford-Huggins [2♂, AMS, AMK 405121, 405123]; ..., Brisbane, Jamboree Heights, 20 m, 27°33'S, 152°55'E, 14 February 1999, G. Daniels [1♀, AMS, AMK 405119]; ..., North West of Brisbane, Mount Tension Woods, 4 February 1983, G. Daniels [1sp., AMS, AMK 405113]; ..., near Rainbow Beach, 14 November 1982, G. and A. Daniels [2♂, AMS, AMK 405115, 405116]; ..., Hilltop near Kinkin, 26°19'07.23"S, 152°51'18.09"E, 14 November 2014, J.H. Skevington [17♂, CNC, CNC 373915, 373916, 373917, 373914, 373911, 373912, 373918, 373919, 373920,

373910, 373909, 373898, 373899, 373900, 373897, 373896, 373895; 4♂, ZFMK, CNC 373901, 373902, 373907, 373908; 4♂, USNM, CNC 373906, 373905, 373903, 373904; ..., 3 km ENE of Benarkin, 26°52'30"S, 152°09'50.4"E, 10–26 April 2010, Monteith, Malaise trap [1♂, QM, QM_REG._NO._T 222238]; ..., 28 March–10 April 2010, ... [1♂, QM, QM_REG._NO._T 222239]; ..., Blackbutt Range, top, 26°52'33.6"S, 152°11'31.2"E, 10–26 April 2010, Monteith, Malaise trap [1♀, QM, QM_REG._NO._T 222241]; ..., Brisbane, 16 September 1937, N.H. Shaw [1♀, QM, QM_REG._NO._T 220529]; ..., 4 September 1960, B. Watkins [1♀, QM, QM_REG._NO._T 220522]; ..., 1960, Haseler [1♀, QM, QM_REG._NO._T 220525]; ..., 1929 [1♀, QM, QM_REG._NO._T 220527]; ..., 1951, F. Bollman [1♀, QM, QM_REG._NO._T 220526]; ..., 19 February 1961, M.E. Dowe [1♂, QM, QM_REG._NO._T 220528]; ..., 19 September 1960, J.K. Connor [1♂, QM, QM_REG._NO._T 220524]; ..., Burpengary, 23 May 1966, N. Gardner [1♀, QM, QM_REG._NO._T 220520]; ..., Fraser Island, Central Forestry Station, 22–30 November 1977, K. Walker [1♂, QM, QM_REG._NO._T 220521]; ..., Conondale National Park, 17–18 February 1998, J. and A. Skevington [1♂, QM, QM_REG._NO._T 220549]; ..., Enoggera Res., site 3, 100 m, 27°27'S, 152°55'E, 15–18 March 2000, Burwell and Evans, Malaise trap [3♀, QM, QM_REG._NO._T 221479, 221478, 221480]; ..., 10 November–21 December 1999, ... [2♀, QM, QM_REG._NO._T 221482, 221483]; ..., 27 January–15 March 2000, ... [1♀, QM, QM_REG._NO._T 221484]; ..., 15–18 March 2000, ... [1♂, QM, QM_REG._NO._T 221481]; ..., Eungella National Park, Broken River Picnic Ground, 21°10'S, 148°25'E, 24 May 1997, J. and A. Skevington [1♀, QM, QM_REG._NO._T 220552]; ..., Eungella National Park, 80 km Northwest of Mackay, 16–19 October 1979, A. Hooks, H.E. and M.A. Evans [1♀, QM, QM_REG._NO._T 220540]; ..., Ferny Grove, 1928, J. Mann [1♀, QM, QM_REG._NO._T 220533]; ..., Great Sandy National Park, Cooloola Section, 25°57'15"S, 153°06'27"E, 1–5 October 1996, S. Winterton, D.K. Yeates, C. Lambkin, [3♀, QM, QM_REG._NO._T 220541, 220542, 220543, 220544]; ..., 13 km WSW Monto, Hurdle Gully, 350 m, 24°54'S, 151°00'E, 20 December 1997, Burwell and Evans [1♀, QM, QM_REG._NO._T 221476]; ..., Imbil, 1937 [1♀, QM, QM_REG._NO._T 220516]; ..., Lamington NP, IBISCA, 28°12'36"S, 153°07'37.2"E, 16 December 2008–6 January 2009, G. Monteith, Malaise trap [1♀, QM, QM_REG._NO._T 222242]; ..., Miva via Gympie, 25°58'S, 152°30'E, 15–16 October 1996, S. Evans and H. Nahrung, Malaise trap [1♀, QM, QM_REG._NO._T 222240]; ..., Montville, Deane [1♂, QM, QM_REG._NO._T 220532]; ..., Moreton Island, Mount Tempest Summit, 280 m, 27°09'S, 153°24'E, 22 March 1998, J. and A. Skevington [2♂, QM, QM_REG._NO._T 220550, 220551]; ..., Mount Beerburum, 22 April 1997, J. Skevington and C. Lambkin [1♂, QM, QM_REG._NO._T 220550, 220512]; ..., Brisbane, Mount Cotton, 10 March 1984, S. Johnson [2♀, QM, QM_REG._NO._T 220513, 220514]; ..., Mount Edwards, 1934, F.A. Perkins [2♀, QM, QM_REG._NO._T 220530, 220531]; ..., Brisbane Forest Park, Mount Glorious, Scrub Creek Road, 27°25'S, 152°50'E, 17–24 October 1997, N. Power, Malaise trap [2♀, QM, QM_REG._NO._T 220538, 220539]; ..., Mount Grenville, 770 m, 28°04'S, 152°30'E, 6 April 1997, J. Skevington [1♂, QM, QM_REG._NO._T 220511]; ..., 6 April–24 August 1997, J. Skevington, D. Yeates and C. Lambkin [3♂, QM, QM_REG._NO._T 220546, 220547, 220548]; ..., Townsville, Mount Stuart, 21 April 1984, S. Johnson [3♂, QM, QM_REG._NO._T 220545, 220515, 220517]; ..., Mount Tamborine, 16 February 1960, F. A. Perkins [1♀, QM, QM_REG._NO._T 220523]; ..., 3 April 1971, A.L. Bishop [1♀, QM, QM_REG._NO._T 220519]; ..., East of Cooroy, Mount Tinbeerwah, 26°24'S, 152°59'E, 7 November 1998, J. and A. Skevington [4♂, QM, QM_REG._NO._T 220535, 220536,

220537, 220553]; ... , Southport, 20 February 1960, K. Korboot [1♀, QM, QM_REG._NO._T 220534]; ... , Stony Ck., Blue Mt. RF., 260 m, 21°37'S, 148°59'E, 3–4 October 1999, C.J. Burwell, S.G. Evans [1♀, QM, QM_REG._NO._T 221485]; ... , Stony creek, track crossing, 280 m, 21°37'S, 148°59'E, 4 October 1999, Burwell and Evans [1♂, QM, QM_REG._NO._T 221477]; ... , Upper Cedar Creek, Via Samford, 12 April 1963, B.V. Timms [1♀, QM, QM_REG._NO._T 220518]; ... , Brisbane, Windsor, 27°26'S, 153°01'E, 18–19 September 1999, C.J. Burwell [3♂ 1♀, QM, QM_REG._NO._T 223730, 223731, 223732, 223733]; ... , 2.9 km SSE of Yarraman, 26°51'51''S, 151°59'42''E, 28 March–10 April 2010, Monteith, Malaise trap [1♀, QM, QM_REG._NO._T 222237]; ... , 12–28 March 2010, ... [1♂ 3♀, QM, QM_REG._NO._T 222233, 222234, 222235, 222236].

Remarks

Some specimens were identified as *Episyrphus* 88–16 Thompson, in litt. Pictures of live specimens are available at: http://www.brisbaneinsects.com/brisbane_hoverflies/SlenderHoverfly.htm

Asiobaccha nubilipennis (Austen, 1893) comb. nov. (Figures 8a, b, e, 12c, 13a, b, 14a)

Baccha nubilipennis Austen, 1893: 136. Lectotype: ♂, BMNH, here designated. Type locality: Sri Lanka: Kandy. Wulp 1896: 121; Brunetti 1910: 171; Kertész 1910: 157; Kertész 1913: 275; Brunetti 1915: 218; Sack 1922: 261; Brunetti 1923: 116, 413; Curran 1928: 247; Shiraki 1930: 414, 416; Sack 1932a: 216, 218; Cherian 1934: 698; Keiser 1958: 190, 201; Biswas et al. 1975: 24; Ahmad and Nasim 2009: 353.

Baccha nubilipennis Matsumura 1916: 225.

Baccha (*Asiobaccha*) *nubilipennis* of Violovitsh 1976: 131, 132.

Baccha (*Allobaccha*) *nubilipennis* of Knutson et al. 1975: 322; Kapoor et al. 1979: 60; Thapa 2000: 326; Mitra et al. 2008: 13.

Allobaccha nubilipennis of Muraleedharan and Radhakrishnan 1986: 307; Peck 1988: 53; Radhakrishnan and Muraleedharan 1993: 176, 177; Cheng and Huang 1997: 424; Cheng and Huang 1998: 120; Hazarika et al. 2001: 167; Dirickx 2010: 231; Huang and Cheng 2012: 72.

Asiobaccha nubilipennis of Ghorpadé 1994: 4.

Episyrphus (*Asiobaccha*) *nubilipennis* of Thompson and Rotheray 1998: 97, fig. 5.76; Rojo et al. 2003: 56; Mengual et al. 2008: 545; Ichige 2009: 10–12.

Differential diagnosis

This taxon has a broad alula, mostly bare, with a yellow face and a pale scutellum (Figures 8e, 14a), with a well-defined mesonotal collar, and the metatarsus bicolourous (Figure 8a). This species has an infuscated wing, bare basomedially (including basal part of cell R), and terga 1 and 4 black (Figures 8a, 12c, 14a), characteristics that differentiate *A. nubilipennis* from *A. virtuosa*. *Asiobaccha nubilipennis* belongs to a species group with mesonotal fringe, which includes *A. aea*, *A. virtuosa*, *A. doesburgi*, *A. notofasciata*, *A. aquila* and *A. bimaculata*. Morphologically, the most similar species to *A. nubilipennis* is *A. bimaculata*, also with terga 1 and 4 black and metatarsus bicolourous, but they can be identified using the

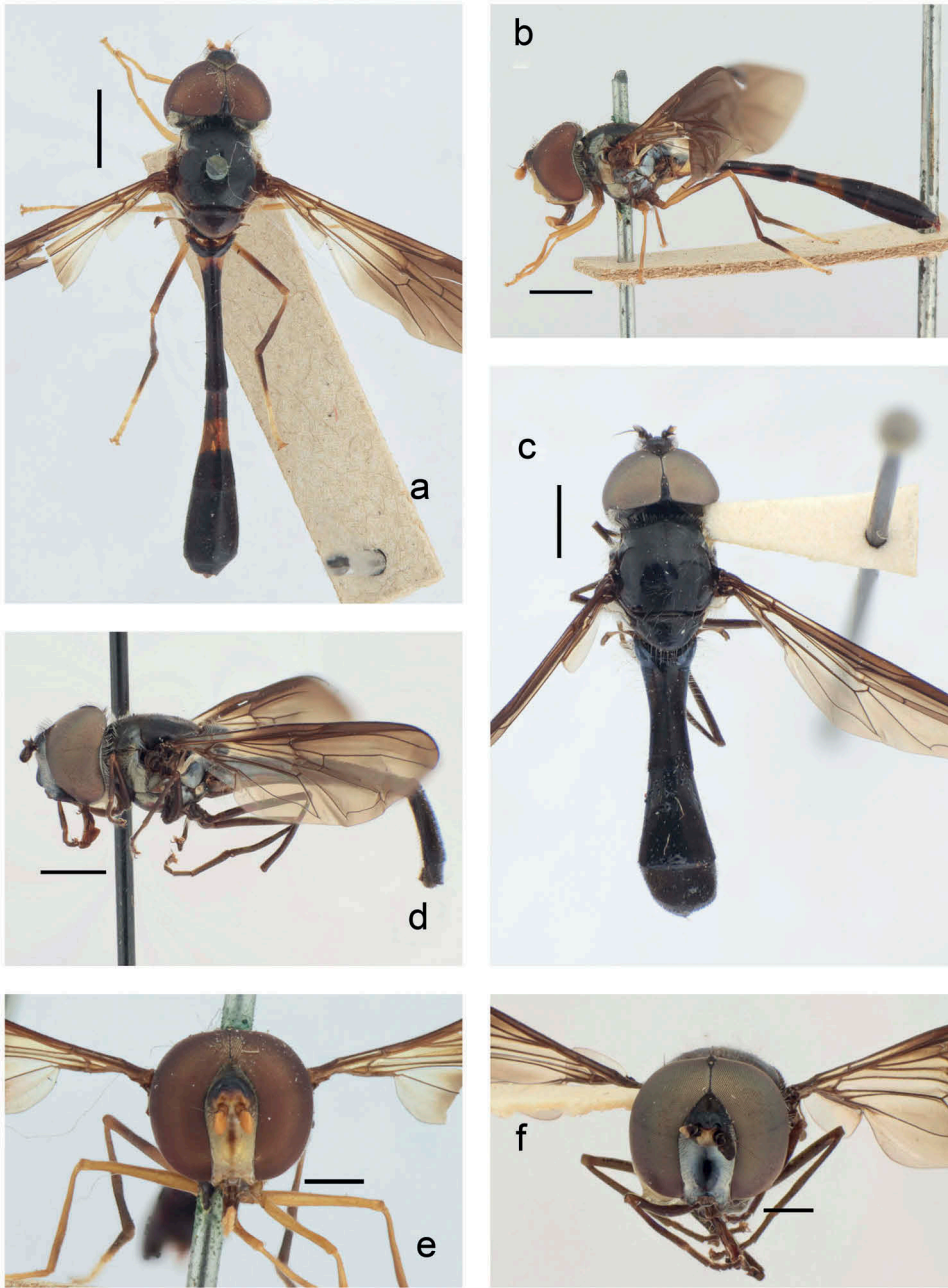


Figure 8. *Asiobaccha nubilipennis* (Austen). a–b, e, lectotype ♂. (a) Dorsal view; (b) lateral view; (e) frontal view. *Asiobaccha praefica* (Bezzi). c–d, f, ♂. (c) Dorsal view; (d) lateral view; (f) frontal view. Scale bars: a–d = 2 mm; e, f = 1 mm.

characteristics in the key. Moreover, *A. nubilipennis* has tergum 3 black with a basomedial yellow fascia not reaching basal margin, a different abdominal pattern from *A. bimaculata* that has tergum 3 with two medial subtriangular yellow maculae pointing anteriorly.

Variation. Species slightly variable, although its geographical distribution is the largest in this genus. Some specimens of *A. nubilipennis* from Sumatra have the cell R almost entirely microtrichose but with a basal, small bare area. The infuscation of the wing is very variable, from a medial, small brown area to a complete dark brown wing. The author has studied a female (JAPAN: Ryukyu, Iriomote Island, 1 July 1932; USNM) that has the yellow fascia on abdominal tergum 3 divided medially into two maculae.

Length (*N* = 5). Body, 11.6–17.0 (14.0) mm; wing, 10.0–14.0 (12.0) mm.

Biology

Muraleedharan and Radhakrishnan (1986) and Radhakrishnan and Muraleedharan (1993) reported larvae of *A. nubilipennis* feeding on *Aphis* (*Toxoptera*) *aurantii* in tea plantations in Anamallai Hills, Tamil Nadu, India.

Geographical distribution

Species with the widest geographical range in the genus. It is known from Sri Lanka, India, and Nepal* through China* to Japan, Myanmar*, Taiwan, Vietnam, Laos, Thailand, Malaysia and south to Indonesia (Sumatra, Java, Sulawesi). Knutson et al. (1975) listed this species from Nepal for the first time in the literature based on citations in older literature. There is only one taxon from Nepal, listed as *Baccha* sp. near *maculata* Walker, which might refer to *A. nubilipennis*, but this single female has the thorax, scutellum and pleura shining black; thus, it cannot be *A. nubilipennis*. This author has checked all the literature used by Knutson et al. (1975) and additional works, and has not found any citation of *A. nubilipennis* from Nepal. Consequently, the presence of *A. nubilipennis* in this country is questionable.

Type locality

Sri Lanka: Central Province, Kandy, 07°17'N, 80°38'E.

Material examined

Type material. *Lectotype*, male, deposited in The Natural History Museum, formerly British Museum (Natural History) (London, United Kingdom) and labelled: 'Type // ♂' [round, red margin] 'LECTO- // TYPE // ♂' [round, purple margin] 'Kandy. // Ceylon. // 28. vi.92. // circa 1,700 ft. // Col. Yerbury. // 92. – 192.' 'Baccha // nubilipennis // Aust'. // Type ♂ [on the reverse of previous label, handwritten] 'LECTOTYPE ♂ // Baccha // nubilipennis AUSTEN' [yellow] 'Asiobaccha ♂ // nubilipennis // (Austen) // K. D. Ghorpade det. 1983', 'LECTOTYPE // Asiobaccha // nubilipennis // des. X. Mengual 2014' [red] (specimen photographed). *Paralectotype*: 'PARA- // LECTO- // TYPE // ♂' [round, blue margin] 'Kandy. // Ceylon. // 30.v.92. // circa 1,700 ft. // Col. Yerbury. // 92. – 192.' 'Baccha // nubilipennis // Aust'. [on the reverse of previous label, handwritten] 'PARALECTOTYPE // Asiobaccha // nubilipennis // det. X. Mengual 2014' [yellow] [1♂, BMNH].

Nontype material. More than 100 specimens from Sri Lanka, India (Kerala, Tamil Nadu, Karnataka), Japan (Ryukyu Islands), Taiwan, Vietnam, Laos, Thailand, Malaysia and Indonesia (Java, Sulawesi, Sumatra). Specimen photographed: TAIWAN: Koshun, 25 April–25 May 1918, J. Sonan, K. Miyake, M. Yoshino [1♀, CNC]. Male genitalia drawing

from specimen: INDIA: Tamil Nadu, Burliar, 860 m, 23 October 1975, Viraktamath [1♂, ZFMK].

Remarks

Austen (1893) described this species from several male and female specimens collected by L.C. Yerbury in Sri Lanka. He stated that the typical specimens are a male collected on 28 June 1892 and a female collected on 25 May 1892. In the BMNH, there were two males, and the specimen collected on 28 June 1892 by Yerbury is designated here as the lectotype to fix and ensure the universal and consistent interpretation of the name.

At the BMNH there was another female specimen collected by E.E. Green from Sri Lanka with the 'paralectotype' label. The present author does not consider it a paralectotype because Austen (1893) did not list this specimen among the studied material.

Asiobaccha praefica (Bezzi, 1928) comb. nov. (Figure 8c, d, f)

Baccha praefica Bezzi, 1928: 76. Lectotype: ♀, BMNH, here designated. Type locality: Fiji: Ovalau Island. Hull 1937: 83.

Episyrphus (*Asiobaccha*) *praefica* of Thompson and Vockeroth 1989: 443; Evenhuis 2011.

Differential diagnosis

Species with the face, the scutellum and the abdomen dark (Figure 8c), with bluish shine, and with a broad alula (Figure 8d, f). It is very similar to *A. samoensis*, both with the metatarsi dark brown or black (Figure 8d), but they can be distinguished by the microtrichosity of the basal cells: *A. praefica* has the cell BM bare basally (also cell CuP sometimes), and *A. samoensis* has the wing entirely microtrichose. Usually specimens of *A. praefica* show a pollinose abdominal pattern (black pollinose maculae on terga 2–4), that most specimens of *A. samoensis* lack; but the pollinose pattern is variable and some *A. praefica* may not clearly show it.

Variation. Specimens from Fiji at CNC show a more microtrichose wing, but cell BM has a bare area basally. Nevertheless, this bare area is smaller (about 1/4) than the bare area in other specimens (about 1/2 basal cell BM).

Length (*N* = 5). Body, 10.5–13.0 (11.4) mm; wing, 9.0–10.7 (9.6) mm.

Geographical distribution

Fiji, New Caledonia, Tonga, Vanuatu.

Type locality

Fiji: Eastern Division, Lomaiviti Province, Ovalau island, 17°41'S, 178°49'E.

Material examined

Type material. *Lectotype*, female, deposited in The Natural History Museum, formerly British Museum (Natural History) (London, United Kingdom) and labelled as indicated below. *Paralectotype*: 'Fiji Is. // Levuka // may/21 607 // H. W. Simmonds', 'Para- // type' [round, yellow margin] 'Fiji Is. // Pres. by // Imp. Bur. Ent. // Brit. Mus. // 1929–1.' 'PARALECTOTYPE // *Asiobaccha* // *praeifica* // det. X. Mengual 2014' [yellow, second and third lines handwritten] [1♀, BMNH].

Nontype material. FIJI: Kadavu Prov., Kadavu island, Vunisea Village, Korosalusalu Mt., trail above Microwave Towers, 200 m, 19°03'14"S, 178°09'51"E, 23 January 2006, J. Skevington, hilltopping [1♂, CNC, CNC DIPTERA #2377, BOLD: CNCDB2457-11]; ..., Tavuki district, SW Namalata Village, Moanakaka Bird Sanctuary, 135 m, coastal limestone forest, 19°04'09"S, 178°07'38"E, 21 January 2006, J. Skevington, hilltopping [1♀, CNC, CNC DIPTERA #2361, BOLD: CNCDB2456-11]; Rewa Prov., Viti Levu island, Lami, February 1951, N.L.H. Krauss [1♀, BPBM]; Lau Prov., Oneata Island, 19 August 1924, E.H. Bryan Jr. [1♂, BPBM]; Lomaiviti Prov., Wakaya island, 17 October 1924, E.H. Bryan Jr. [1♀, BPBM; 1♀, ZFMK, ZFMKDIP 00011927]. NEW CALEDONIA: Grande Terre island, South Prov., Nouméa, 10 September 1940, FXW [1♂, BPBM]; ..., 17 September 1940, FXW [1♂, BPBM]; ..., 23 September 1940, FXW [1♂, BPBM]; ..., 24 September 1940, FXW [1♂, BPBM; 2♂, ZFMK, ZFMKDIP 00011926, 00011931]; ..., hills behind Nouméa, 12 September 1940, FXW [1♂, BPBM]; Nouméa, February 1957, J. Rageau [6♀, RMNH]; ..., Riviere Bleue Prov. Pk., trail to Vallée de Pourina, 19 November 1992, 700 m, D.W. Webb, Malaise trap across forest path, [1♂, INHS]; ..., Thi River Valley, 1 November 1940, FXW [1♀, BPBM]; ..., in mountains up Boulari River, 3–4 November 1958, C.R. Joyce [1♂, BPBM; 1♂, ZFMK, ZFMKDIP 00011929] (ZFMK specimen photographed); ..., Anse Vata, 25 October 1958, C.R. Joyce [1♀, BPBM]; ..., Plane Des Lacs, 30 October 1958, C.R. Joyce [1♂, BPBM]; ..., Mt. Koghi, 19 February 1963, N.L.H. Krauss [1♀, BPBM]; ..., Mt. Khogi, 17 km NNE Nouméa, 500 m, 5–15 November 1992, D.W. Webb, Malaise trap in tropical forest [1♀, INHS]; ..., Mt. Koghi, 500 m, 15 February 1963, C.M. Yoshimoto [1♀, BPBM]; ..., Col de Pirogue, 23 January 1962, N.L.H. Krauss [1♀, BPBM]; ..., Col d'Amieu, 750 m, 3 March 1960, J.L. Gressitt [1♀, BPBM]; ..., Sarraméa, 100–200 m, 2 March 1960, J.L. Gressitt [1♂, BPBM]; North Prov., Hienghène, 10–150 m, 14–17 August 1979, G.M. Nishida [1♀, BPBM]; Loyalty Islands Prov., Lifou island, 16–18 February 1963, C.M. Yoshimoto [1♀, BPBM]. TONGA: Tongatapu island, Nukualofa, 0–50 m, February 1972, N.L.H. Krauss [1♀, BPBM]; 'Eua, Hafu, 100–200 m, February 1972, N.L.H. Krauss [1♀, ZFMK, ZFMKDIP 00011928]. VANUATU: Malampa Prov., NE Malakula island, June 1930, L.E. Cheesman [1♀, CNC]; Tafea Prov., Aneityum island, November 1930, L.E. Cheesman [2♂, BMNH]; Tafea Prov., Erromango island, 8 km W of Ipota, 100–200 m, March 1970, N.L.H. Krauss [1♀, ZFMK, ZFMKDIP 00011916].

Remarks

Bezzi (1928) based his new species on several female specimens from Ovalau (May 1922) and Levuka (May 1921), collected by H.W. Simmonds; and from Cuvu (November 1921) collected by R. Veitch. The two female syntype specimens collected by H.W. Simmonds were available for this study. Among the syntypes, there is a pinned female labelled: 'Ovalau /may/22 // 604 // H. W. Simmonds Fiji.' '*Baccha* // *praeifica* // typ. ♀ n. sp.' [in red writing] 'Holo- // type' [round, red margin] 'Fiji Is. // Pres. by // Imp. Bur. Ent. // Brit. Mus. // 1929–1.' 'LECTOTYPE // *Asiobaccha* // *praeifica* // (Bezzi) // des. X. Mengual 2014'

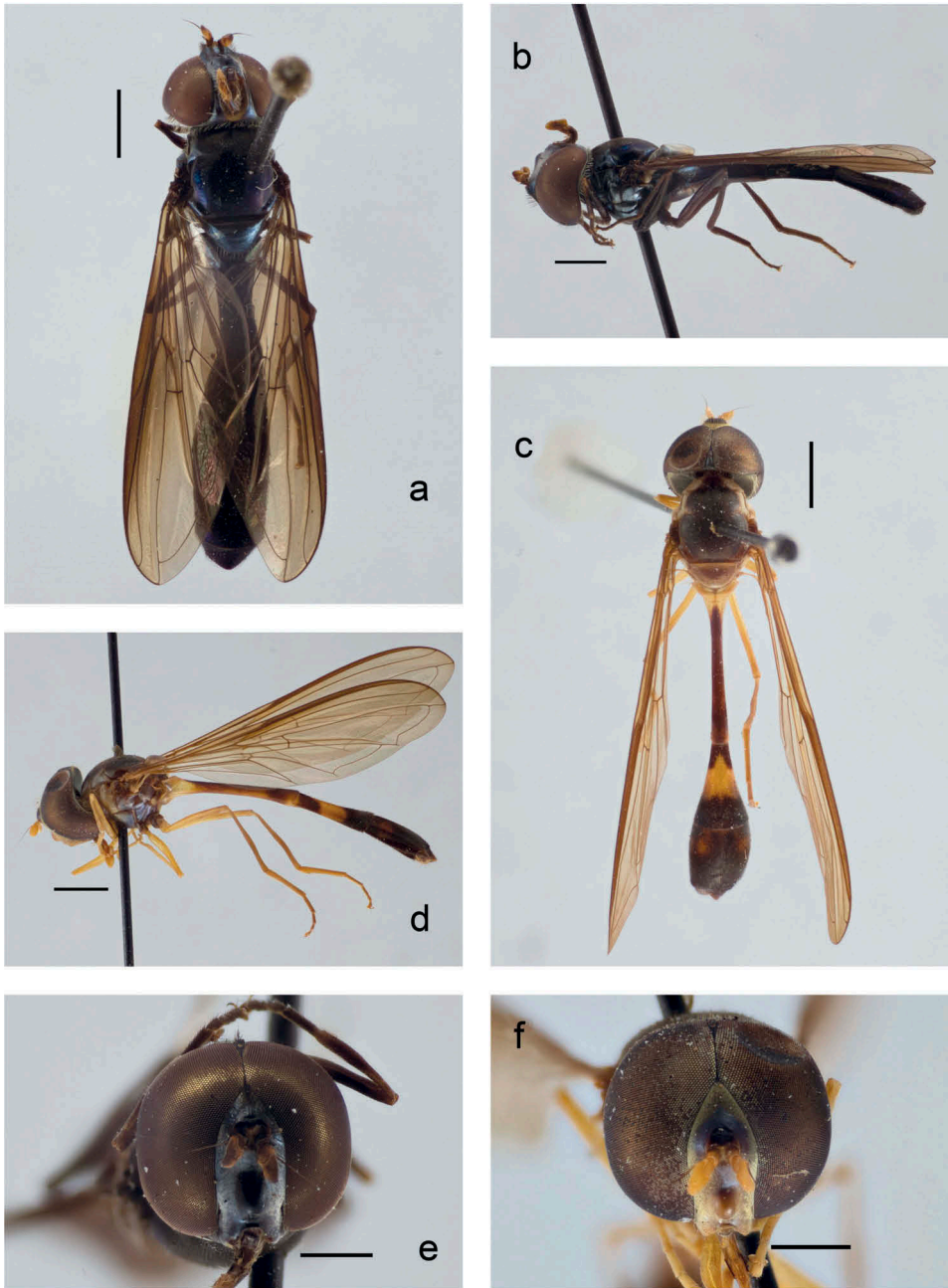


Figure 9. *Asciobaccha samoensis* Mengual sp. nov. a–b, e, holotype ♂. (a) Dorsal view; (b) lateral view; (e) frontal view. *Asciobaccha sauteri* (Kertész). c–d, f, lectotype ♂. (c) Dorsal view; (d) lateral view; (f) frontal view. Scale bars: a–d = 2 mm; e, f = 1 mm.

[red; second and third lines handwritten]. This specimen is here designated as lectotype to fix and ensure the universal and consistent interpretation of the name. The other female syntype has been labelled as paralectotype.

The three specimens collected in Vanuatu by L.E. Cheesman have a manuscript name provided by Frank M. Hull, *Baccha praefica* subsp. *opacea*. This name has been never published; thus, it is not available.

***Asiobaccha samoensis* Mengual sp. nov.**
(Figure 9a, b, e)

Baccha praefica of Hull 1929: 194.

Episyrphus (*Asiobaccha*) *praefica* of Thompson and Vockeroth 1989: 443 (in part, citation from Samoa).

Description

Male: Head. Face with distinct round facial tubercle, black, black pilose, white-silver pollinose laterally, shiny medially; gena black; lunule black, shiny; frons slightly protruded forward, black, black pilose, dark brown pollinose posteriorly; vertical triangle narrow, isosceles, with the ocelli on the anterior half, black, black pilose; antenna yellow, basoflagellomere brown dorsally, black pilose; arista brown, bare; eye bare, holoptic; occiput black, grey-silver pollinose, pale pilose on ventral 3/4 and dark pilose on dorsal 1/4 (Figure 9e).

Thorax. Scutum black with purple iridescence and partly brown pollinose, with short, black pile; mesonotal fringe or collar well-defined on anterior part of scutum, with pale pile; postpronotum black, bare; notopleuron black, pale pilose; scutellum black, brown pollinose on anterior margin, with short, black pile, subscutellar fringe with long, pale pile (Figure 9a, b). Pleuron black, white pollinose on dorsal katapisternum and posterior anepisternum; anterior anepisternum yellow pilose on posterodorsal quarter, posterior anepisternum and anepimeron pale pilose; metaepisternum with short, dark pile ventrad to spiracle; metasternum bare; calypter small, reduced, yellow; plumula small, pale; halter dark brown to black; posterior spiracular fringes pale. **Wing:** alula broad, as broad as or broader than cell BM, microtrichose. Wing membrane infuscated, brown; entirely microtrichose. **Legs:** dark brown to black.

Abdomen. Parallel sided, slightly petiolate, unmargined; dark with bluish-purple iridescence without pollinosity, or small, black pollinose maculae medially; terga 1 and 2 pale pilose, and terga 4–6 black pilose; tergum 3 pale pilose anteriorly and black pilose posteriorly (Figure 9a, b); sterna black. Male genitalia dark.

Female. Similar to male except for normal sexual dimorphism and as follows: frons black, shiny, white pollinose only lateroventrally; occiput entirely pale pilose.

Variation. Some specimens may have the face, under the white pollinose laterals, a yellow background. Lighter individuals have basal part of pro- and mesotibiae yellow and postalar callus light brown.

Length (N = 5). Body, 10.0–14.5 (12.5) mm; wing, 8.0–10.0 (9.4) mm.

Geographical distribution

Species known only from Samoan Islands.

Etymology

The specific epithet is derived from the country's name where the species is found, Samoa, and the Latin suffix *-ensis* denoting place, locality, country, or belonging to, pertaining to (Brown 1956, p. 45, 303). Species epithet is to be treated as adjective.

Differential diagnosis

This taxon has the face, the scutellum and the abdomen dark, with purple shine, and it presents a broad alula. It is very similar to *A. praeifica*, both with the metatarsi dark brown or black, but they can be distinguished by the microtrichosity of the basal cells: *A. praeifica* has the cell BM bare basally, and *A. samoensis* has the wing entirely microtrichose.

Type locality

American Samoa: Eastern district, Tutuila island, N.P. American Samoa, Mt. 'Alava, 300–480 m, 14°15'53"S, 170°41'17"W.

Material examined

Type material. *Holotype*, male, deposited in the Bernice P. Bishop Museum (Honolulu, Hawaii, USA) and labelled: 'SAMOA: Tutuila, // Mt. Alava, 300 – // 480 m, 9.III.1971' 'N.L.H. Krauss // Collector // BISHOP MUSEUM' 'HOLOTYPE // *Asiobaccha* // *samoensis* // *des. X. Mengual 2014*' [red] (specimen photographed). *Paratypes*: AMERICAN SAMOA: Tutuila island, N.P. American Samoa, Mt. 'Alava, 300–480 m, 9 March 1971, N.L.H. Krauss [1♂, BPBM; 1♂, ZFMK, ZFMKDIP 00011919]; Tutuila island, 9 August 1957, W.R. Kellen [1♀, BPBM]; ..., Pago Pago, 16 April 1924, E.H. Bryan Jr. [1♂, CNC]; ..., Pago Pago, 21 July 1925, G.P. Wilder [1sp., BPBM]; ..., Pago Pago, 14 December 1925, P.A. Buxton and G.H. Hopkins [1♀, BPBM]; ..., Malaota, 10 September 1953, C.P. Hoyt, sweeping ferns [1♂, ZFMK, ZFMKDIP 00011930]; Manu'a district, Tau island, Tavalogi Ridge, 165 m, 16–19 February 1965, G.A. Samuelson, Malaise trap [2♂ 2♀, BPBM; 1♂ 1♀, ZFMK, ZFMKDIP 00011943, 00011940]. SAMOA: Tuamasaga district, Upolu island, Tuaeufu, 16 September 1923, Swezey and Wilder [1♀, BPBM; 1♀, ZFMK, ZFMKDIP 00011938]; ..., Afiamalu, 19 June 1940, 2100 ft., E.C. Zimmerman, beating [1♀, BPBM]; ..., Malololelei, 2000 ft., 18 April 1924, P.A. Buxton and G.H. Hopkins [1♂, BPBM]; ..., 17 June 1924, P.A. Buxton and G.H. Hopkins [1♀, CNC]; ..., 21 June 1924, J.S. Armstrong [1♀, BMNH]; ..., 22 June 1924, J.S. Armstrong [1♀, CNC]; ..., 30 June 1924, J.S. Armstrong [1♀, BPBM]; Palauli district, Savai'i island, Sala'ilua, 19 May 1924, E.H. Bryan Jr. [1♀, BPBM]; ..., 21 May 1924, E.H. Bryan Jr. [1♀, BMNH]; ..., 22 May 1924, E.H. Bryan Jr. [1♂, BMNH]; ..., Safune, lower forest, 1000–2000 ft., 11 May 1924, E.H. Bryan Jr. [1♀, RMNH]; ..., Asau, 200 m, 3 January 1969, B. Hocking [1♀, ZFMK, ZFMKDIP 00011941].

Asiobaccha sauteri (Kertész, 1913) comb. nov.

(Figure 9c, d, f)

Baccha sauteri Kertész, 1913: 275. Lectotype: ♂, RMNH, here designated. Type locality: Taiwan, Hengchun Township. Sack 1922: 261; Shiraki 1930: 414, 416; Knutson et al. 1975: 324.

Differential diagnosis

Asiobaccha sauteri has no alula, the anal lobe is reduced, and the cell C microtrichose (Figure 9c, d). This species is distinguishable from other species by yellow markings on abdomen and by the absence of an alula.

Variation. Some specimens have two small yellow maculae on tergum 4 anterobasally without reaching any margin. Specimens collected in Philippines and Sulawesi are darker than the other studied individuals, with the face entirely black (see Figure 9f). At first, the author thought about describing a new species, but the variability of the dark areas in the face and pleuron as well as in the abdomen makes this option risky. These specimens have scutum and scutellum black and face black, except the female from Sulawesi that has black face and yellow scutellum.

Length ($N = 5$). Body, 13.2–15.5 (14.6) mm; wing, 11.0–12.5 (11.9) mm.

Geographical distribution

Taiwan, Vietnam, Indonesia (Sulawesi) and Philippines (Luzon).

Type locality

Taiwan: Pingtung County, Hengchun Township [=Koshun], 21°58'N, 120°45'E.

Material examined

Type material. *Lectotype*, male, deposited in the Naturalis Biodiversity Center (Leiden, The Netherlands) and labelled as indicated below (specimen photographed). *Paralectotype*: 'Formosa // Sauter' 'Koshun // 909.III.' 'Baccha // sauteri Kert // typus // det. Kertész' [handwritten except fourth line; third line in red] 'Baccha // sauteri // n. sp.' 'SYNTYPE' [red] 'Baccha // Sauteri // Kertész, 1913 // ZMAN type DIPT.1769.1' [red] 'PARALECTOTYPE // Asiobaccha // sauteri // det. X. Mengual 2014' [yellow, second and third lines handwritten] [1♀, RMNH]; 'Formosa // Sauter' 'Fuhosho // 909.VII.' 'Baccha // sauteri Kert // Typus // det. Kertész' 'Col. // Klöcker' 'PARALECTOTYPE // Asiobaccha // sauteri // det. X. Mengual 2014' [yellow, second and third lines handwritten] [1♀, ZMUC]; 'Formosa // Sauter' 'Koshun // 1908.X.' 'Baccha // sauteri Kert // Typus // det. Kertész' 'TYPUS' [red] 'Baccha // sauteri // Kertész' 'Baccha // sauteri // R. FREY det.' 'PARALECTOTYPE // Asiobaccha // sauteri // det. X. Mengual 2014' [yellow, second and third lines handwritten] [1♀, CNC]; 'Formosa // Sauter' 'Koshun // 1908.X.' 'Baccha // sauteri Kert // Typus // det. Kertész' 'Spec. typ. No' 'PARALECTOTYPE // Asiobaccha // sauteri // det. X. Mengual 2014' [yellow, second and third lines handwritten] [1♀, MZH].

Nontype material. INDONESIA: Central Sulawesi Prov., Lore-Lindu N.P., nr Dongi-Dongi shelter, ca. 1100 m, 1°15'S, 120°20'E, 6–9 December 1985, Mal. trap 6 (PW58), C.v. Achterberg [1♀, RMNH]. PHILIPPINES: Palawan Island, Mantalingajan, Tagembung, 150 m, 18 September 1961, Noona Dan Exp. 61–62 [1♂, ZMUC]; ..., 19 September 1961, ... [♀, ZMUC]; Luzon, Mt. Banahaw (spelled as Banahao), P.L. Baker [1♂, USNM, USNM ENT 00890741]. TAIWAN: Tapani, March 1911, Sauter [♂ USNM, USNM ENT 00890761]; Taito, 25 February–27 March 1919, S. Inamura, J. Sonan and M. Yoshino [1♂ 1sp., CNC]. VIETNAM: Kon

Tum Province, Chu Mon Ray N.P., 700–900 m, 26 September–5 October 2006, Mai Phu Quy and Nguyen Thanh Manh, Mal. traps [1♀, RMNH; 1♀, ZFMK, ZFMKDIP 00011942].

Remarks

Kertész (1913) based his new species on several specimens, male and female individuals, from different localities of Taiwan: Takao (8 November 1907) [now known as Kaohsiung], Janano-Taiko (October 1908), Kosempo (20 January 1908, 21 March 1908, June 1908), Tainan (February 1909), Koshun (October 1908, March 1909) [now known as Hengchun], Fuhosho (July 1909) and Sokotsu (May 1912). The author assumes that the Kertész's collection was deposited at the Hungarian Natural History Museum (HNHM) and that most of this material perished in a fire in 1956, as did most of the Syrphidae collection. This fact has been corroborated by HNHM personnel.

Kertész (1913) did not designate a holotype in his work. Only two male and three female syntypes were available for this study. Among the syntypes, there is a pinned male at RMNH labelled: 'Formosa // Sauter' 'Koshun // 909.III.' 'Baccha // sauteri Kert // typus // det. Kertész' [handwritten except fourth line; third line in red] 'SYNTYPE' [red] 'Baccha // Sauteri // Kertész, 1913 // ZMAN type DIPT.1769.2' [red] 'LECTOTYPE // Asiobaccha // sauteri // des. X. Mengual 2014' [red; second and third lines handwritten]. This specimen is here designated as lectotype to fix and ensure the universal and consistent interpretation of the name. The other female syntypes have been labelled as paralectotype.

The second male syntype at RMNH is labelled as follows: 'Formosa // Sauter' 'Koshun // 909.III.' 'Baccha // sauteri Kert // typus // det. Kertész' [handwritten except fourth line; third line in red] 'SYNTYPE' [red] 'Baccha // Sauteri // Kertész, 1913 // ZMAN type DIPT.1769.3' [red]. This male specimen is missing the entire abdomen, but the most important characteristic is that it has a very narrow, linear alula. This specimen keys out to another species in the present identification key, *A. tripartita*, but this male has alula microtrichose and linear, not bare and triangular as in *A. tripartita*. At this moment, the author cannot identify this syntype without doubt and prefers to leave this specimen without species name.

There is another male, deposited at the USNM, studied and identified by Kertész (original handwriting on the identification label), which is not listed in the original description. Thus, it is not included in the type series, although it bears a 'typus' label.

Specimens from Philippines are darker than other studied specimens as mentioned above. The female from Sulawesi has a bit more different abdominal colouration, but this came out of a Malaise trap and it was dried out using the alcohol/xylene-amy acetate method (van Achterberg et al. 2010). These specimens might represent a different species or just a local variation of *A. sauteri*.

Asiobaccha selsi Mengual sp. nov.

(Figure 10a, b, f)

Description

Male: Head. Face with distinct facial tubercle, darkened, brown, yellow pilose, white pollinose laterally and bare medially; gena brown; lunule yellow becoming black dorsally, yellow also between antennal bases; frons black, black pilose, pale pollinose laterally and posteriorly, shiny medially; vertical triangle narrow, isosceles, with the ocelli

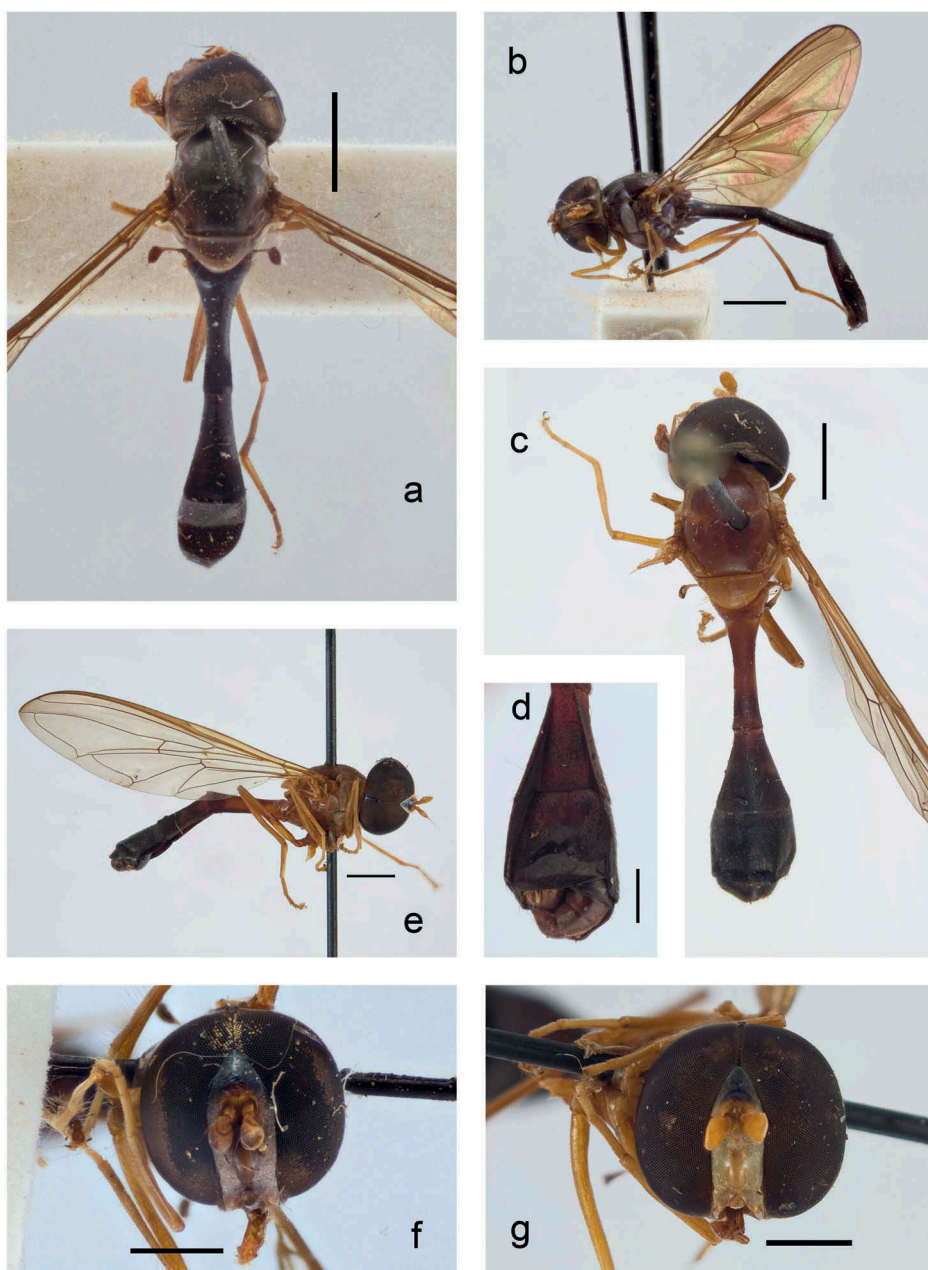


Figure 10. *Asiacampoplex selsi* Mengual sp. nov. a–b, f, holotype ♂. (a) Dorsal view; (b) lateral view; (f) frontal view. *Asiacampoplex taronja* Mengual sp. nov. c–e, g, holotype ♂. (c) Dorsal view; (d) abdominal sternum and male genitalia, ventral view; (e) lateral view; (g) frontal view. Scale bars: a–c, e = 2 mm; d, f, g = 1 mm.

on the anterior half, black, black pilose; antenna yellow, basoflagellomere brown dorsally, black pilose; arista brown, bare; eye bare, holoptic; occiput black, grey-silver pollinose, pale pilose on ventral 2/3 and dark pilose on dorsal 1/3 (Figure 10f).

Thorax. Scutum black, laterally pale pollinose, scarcely black pilose; without mesonotal fringe on anterior part of scutum; postpronotum light brown, bare; notopleuron brown, densely white pollinose, pale pilose; postalar callus brown; scutellum yellowish brown, yellow pilose, subscutellar fringe absent (Figure 10a, b). Pleuron mostly brown to light brown, densely white pollinose, pale pilose; metaepisternum yellow pilose ventrad to spiracle; metasternum bare; calypter small, reduced, yellow; plumula small, yellow; halter: pedicel brown, capitulum black; posterior spiracular fringes yellow. *Wing:* alula absent, anal lobe reduced. Wing membrane infuscated, brown; extensively bare basomedially: cells C and R microtrichose only on apical 1/5 or less, cells BM and CuP bare with a few microtrichia apically, and cell CuA1 and anal lobe bare basally. *Legs:* mostly yellow, yellow pilose, except metafemur and metatibia with some dark pile.

Abdomen. Petiolate, unmarginated. Dark, with no clear markings; terga 3 and 5 lighter basally, and terga 2–4 scattered dark pollinose on apical 1/2. Entirely black pilose except tergum 1 with long, thick pale pile on lateral sides (Figure 10a, b). Male genitalia dark.

Female. Similar to male except for normal sexual dimorphism and as follows: gena yellow, frons black, shiny, white pollinose only laterally, pale and dark pilose. Abdomen dark, black pollinose on apical 1/5 on tergum 2, and on apical 1/3–1/2 on terga 3 to 5; the area not covered by the black pollinosity is bluish grey, pale pollinose.

Variation. Face is variable between light brown to brown. Some specimens are lighter having scutellum yellowish and lateral margins of the scutum light brown; others have the scutellum dark brown. In some female specimens the abdominal area not covered by the black pollinosity is lighter without becoming yellow or orange. Thus, the abdomen is dark in general, but paler colouration might appear due to preservation/drying conditions.

Length (*N* = 5). Body, 11.0–12.5 (11.8) mm; wing, 10.0–12.0 (10.6) mm.

Geographical distribution

Species known only from New Guinea.

Etymology

This species is named after all of my colleagues at the Systematic Entomology Laboratory, Agricultural Research Service, United States Department of Agriculture (SEL), and all my colleagues and friends at the Entomology Department of the USNM, Smithsonian Institution (SI). The name is a combination of letters (acronyms SEL + SI) and is to be treated as a noun in apposition.

Differential diagnosis

Asiobaccha selsi has no alula and a reduced anal lobe of the wing. This species is darker than other species without alula, with tergum 1 dark and most of the abdomen without clear pale markings. *Asiobaccha selsi* differs from other species without alula by having the wing cell C almost completely bare, microtrichose on apical 1/5 or less.

Type locality

Papua New Guinea: Morobe Province, Bulolo district, NE Wau, n. 1700 m, 07°16'S, 146°46'E.

Material examined

Type material. *Holotype*, male, deposited in the Bernice P. Bishop Museum (Honolulu, Hawaii, USA) and labelled: 'SOLOMON IS. // Guadalcanal: Gold // Ridge-Suta // (Jonapau) 1100 m. // VI-26-1956' 'J. L. Gressitt // Collector' 'HOLOTYPE // *Asiobaccha* // *albipeza* // *des. X. Mengual 2014*' [red] (specimen photographed). *Paratypes*: PAPUA NEW GUINEA: Bougainville Prov., Kokure, 690 m, 8 June 1956, E.J. Ford Jr. [1♀, BPBM]; ... , Togerao, 600 m, 15–21 April 1968, Malaise trap, R. Straatman [1♀, ZFMK, ZFMKDIP 00011907]. SOLOMON ISLANDS: Isabel Prov., Molao, 30 June 1960, C.W. O'Brien [1♂, BPBM]; Makira-Ulawa Prov., Makira (= San Cristóbal), Napagiwae, 19 August 1960, C.W. O'Brien [1♀, BPBM]; Guadalcanal Prov., Suta, 500–1200 m, 27 June 1956, J. L. Gressitt [1♂, ZFMK, ZFMKDIP 00011904].

Remarks

Male genitalia of populations from Indonesia and Papua New Guinea do not show any difference between them. Specimens from the collection at RMNH have a manuscript name given by P. H. van Doesburg, *Baccha fumipennis*, which was never published; thus, it is not available.

Asiobaccha taronja Mengual sp. nov. (Figures 10c, d, e, g, 13c, d)

Description

Male: Head. Face narrow with distinct facial tubercle, yellow, yellow pilose, yellow pollinose except tubercle shiny; gena narrow, yellow; lunule yellow, shiny; frons yellow ventrally, mostly black, pale pilose, white-silver pollinose laterally and dorsally, shiny basomedially dorsad to lunule; vertical triangle narrow, black; antenna yellow, yellow pilose; arista brown, yellow basally, bare; eye bare; occiput very narrow, black, white-silver pollinose, entirely yellow pilose (Figure 10g).

Thorax. Entirely orange-yellow; scutum orange pollinose medially, with almost no pile; without mesonotal fringe; scutellum yellow, yellow pilose, subscutellar fringe absent (Figure 10c). Pleuron yellow pollinose; anterior anepisternum almost bare, with a few short, yellow pile; metaepisternum pilose ventrad to spiracle; metasternum bare; calyp-ter small, reduced, orange-yellow; plumula absent; halter pedicel orange, capitulum dark; posterior spiracular fringes orange (Figure 10e). *Wing*: alula narrow, narrower than costal cell, bare; anal lobe reduced. Wing membrane hyaline, stigma yellow, extensively microtrichose except cell BM bare on basal 2/3, cell R bare on basal 1/3, and cells CuP and anal lobe basally. *Legs*: entirely orange-yellow.

Abdomen. Petiolate, unmarginated, mainly black pilose except tergum 1 pale pilose and tergum 2 pale pilose medially and basally. Tergum 1 orange-yellow; tergum 2 orange-yellow with a brownish fascia on posterior margin; tergum 3 orange yellow on anterior

2/3, darker posteriorly; tergum 4 black with a yellow fascia on anterior 1/4, tergum 5 black (Figure 10c, e); sterna orange-yellow except sternum 4 black on posterior 1/2; male genitalia yellow, large, with epandrium and hypandrium enclosed under sternum 4, epandrium with a posterodorsal elongation and surstylus placed posteromedially, superior lobes expanded laterally (Figures 10d, 13c, d).

Female. Unknown.

Variation. The holotype has tergum 3 darker, and the paratype male misses the head.

Length ($N = 1$). Body, 14.0 mm; wing, 13.0 mm.

Geographical distribution

Species known only from Solomon Islands.

Etymology

The specific epithet is derived from the Catalan *taronja* meaning orange. Species epithet is to be treated as adjective.

Differential diagnosis

This species is very distinct, mostly orange-yellow with terminal terga black, with a broad head and a narrow face, and very large male genitalia, unique among other species of this genus (Figure 13c, d). *Asiobaccha taronja* belongs to a species group with pale markings on abdomen, narrow alula, and without mesonotal fringe, which occur from Indonesia south and eastwards. This species has a short and robust abdominal pedicel (tergum 2) compared with the species group with mesonotal fringe (e.g. *A. virtuosa* and *A. nubilipennis*, among others) and it is very easy to distinguish from other species, such as *A. marissae* and *A. bicolor*, by the large male genitalia and the overall body colouration, especially the orange mesonotum.

Type locality

Solomon Islands: Guadalcanal Province, Paripao, 09°33'S, 160°20'E.

Material examined

Type material. *Holotype*, male, deposited in the Bernice P. Bishop Museum (Honolulu, Hawaii, USA) and labelled: 'SOLOMON IS. // Guadalcanal // Paripao, 22 May '60' 'C. W. O' Brien // Collector' 'HOLOTYPE // *Asiobaccha* // *taronja* // des. X. Mengual 2014' [red; second and third lines handwritten] (specimen photographed). *Paratypes*: SOLOMON ISLANDS: Isabel Prov., Santa Isabel Island, Molao, 29 June 1960, C.W. O'Brien [1♂, ZFMK, ZFMKDIP 00011949].

Asiobaccha tinctiventris (de Meijere, 1924) comb. nov.
(Figures 11a, b, e, 12f)

Baccha tinctiventris de Meijere, 1924: 21. Holotype: ♀, RMNH. Type locality: Indonesia: Sumatra, Aur Kumanis. Curran 1931a: 322; Curran 1947: 5.

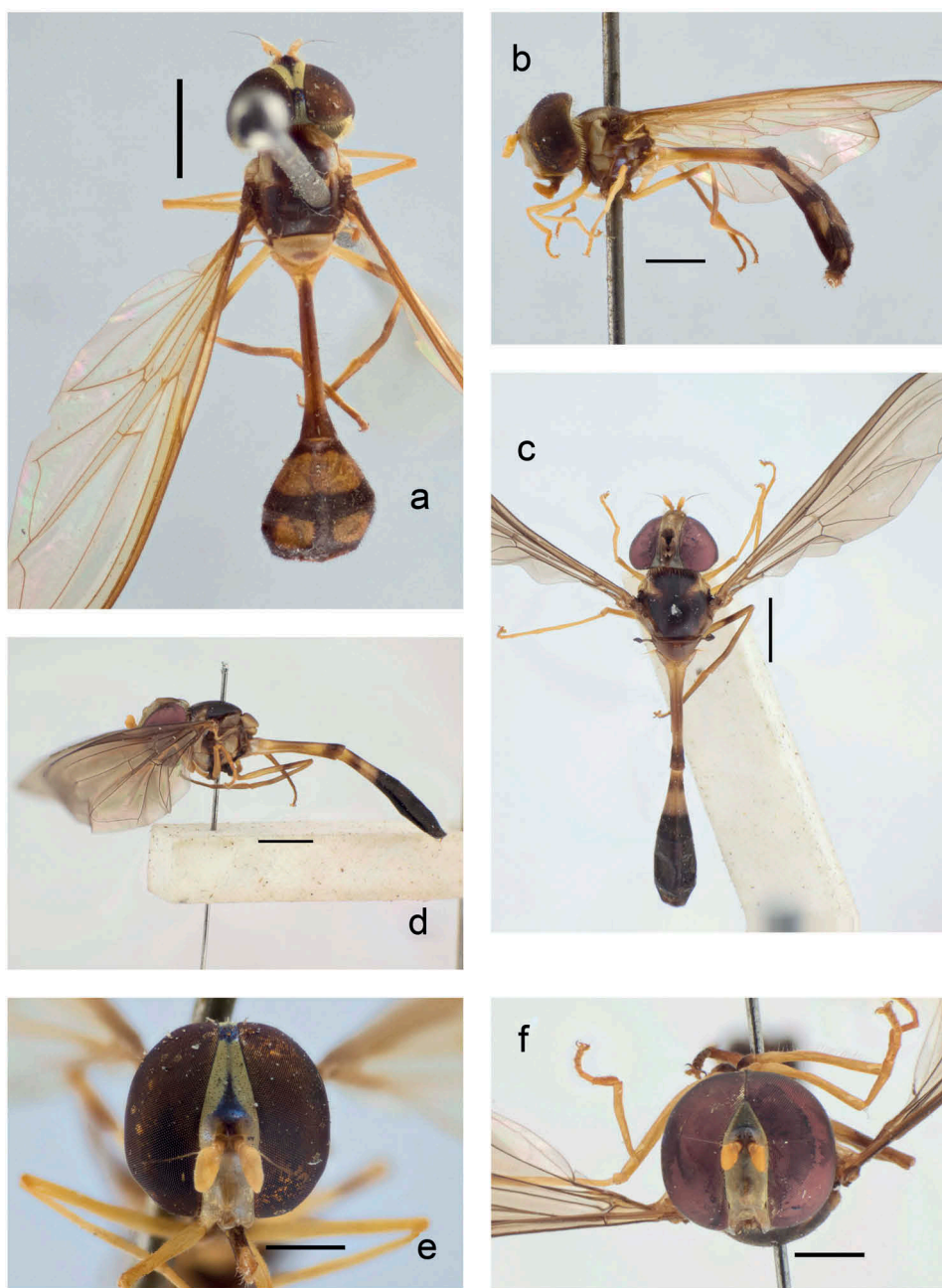


Figure 11. *Asiobaccha tinctiventris* (Meijere). a–b, e, holotype ♀. (a) Dorsal view; (b) lateral view; (e) frontal view. *Asiobaccha tripartita* (Walker). c–d, f, ♂. (c) Dorsal view; (d) lateral view; (f) frontal view. Scale bars: a–d = 2 mm; e, f = 1 mm.

Baccha luteolimbata de Meijere, 1924: 22. Syn. nov. Curran 1931a: 322; Curran 1947: 5.

Baccha (*Allobaccha*) *luteolimbata* of Knutson et al. 1975: 322.

Baccha (*Allobaccha*) *tinctiventris* of Knutson et al. 1975: 323.

Allobaccha luteolimbata of de Jong 2000: 126.

Allobaccha tinctiventris of de Jong 2000: 214.

Differential diagnosis

Species with the face entirely yellow, densely yellow pollinose, and the frons with a medial dark macula on lunule, and very pollinose laterally and posteriorly (Figures 11e, 12f). The abdomen is very petiolate, with tergum 3 broadening considerably (Figure 11a, b). This species is similar to *A. maculosa*, but differs in the following characters: the alula is broad, broader than the costal cell; frons and face are densely pale pollinose; the ocellar triangle is shiny; the metatibia is mostly black, yellow only basally; and tergum 3 has yellow markings (a single medial, triangular yellow fascia that is not divided medially).

Length (*N* = 3). Body, 11.5–16.0 (14.0) mm; wing, 10.0–15.0 (12.5) mm.

Geographical distribution

Borneo, Malay Peninsula, Sumatra, Java, Vietnam.

Type locality

Indonesia: Sumatra, Aur Kumanis, unknown coordinates (de Jong 2000).

Material examined

Type material. *Holotype*, female, deposited in the Naturalis Biodiversity Center (Leiden, The Netherlands) and labelled: 'Edw. Jacobson // Aur Kumanis // Sum. 3 1914' 'Baccha // tinctiventris // det. de Meijere. // Type' [handwritten except third line, de Meijere] 'Baccha // tinctiventris // de Meijere, 1924 // ZMAN type DIPT.1060.1' [red] 'HOLOTYPE // Asiobaccha // tinctiventris // det. X. Mengual 2014' [red] (specimen photographed).

Type material of *Baccha luteolimbata* de Meijere, 1924. *Lectotype*, male, deposited in the Naturalis Biodiversity Center (Leiden, The Netherlands) and labelled: 'Edw. Jacobson // Aur Kumanis // Sum. 3 1914' 'Baccha // luteolimbata // det. de Meijere. // Type' [handwritten except third line, de Meijere] 'Baccha // luteolimbata // de Meijere, 1924 // ZMAN type DIPT.1015.1' [red] 'LECTOTYPE // Baccha // luteolimbata // des. X. Mengual 2014' [red] (specimen photographed). This specimen is here designated as lectotype to fix and ensure the universal and consistent interpretation of the name. *Paralectotype*, female, deposited in the Naturalis Biodiversity Center (Leiden, The Netherlands) and labelled: 'Edw. Jacobson // Aur Kumanis // Sum. 3 1914' 'Baccha // luteolimbata // de Meijere, 1924 // ZMAN type DIPT.1015.2' [red] 'PARALECTOTYPE // Baccha // luteolimbata // des. X. Mengual 2014' [yellow]. This specimen is here designated as paralectotype.

Nontype material. INDONESIA: south Sumatra, SW Lampung distr. (= Lampung), Mt. Tanggamoes (= Tanggamus), Gisting ult., 600–700 m, December 1939, M.A. Lieftinck [1♂, RMNH]; East Borneo, Manjapoe, 18 June 1937 [1♀, BMNH]; Java, Penandjoeng peninsula, 3300 m, July 1936, Cast Preanger [1♀, IRSNB]. MALAYSIA: Sarawak, Kuching, 29 March 1900 [1 sp., AMNH]; ..., 30 March 1900 [1 sp., AMNH]; ..., 1 September 1897 [1 ♀, AMNH]; ..., 21 May 1900 [1 ♀, AMNH]; Penang Island (= Pulo Penang) [1♂, ZMUC].

VIETNAM: Đồng Nai Province, Cát Tiên National Park, ca. 100 m, 9 April–13 May 2007, Mal Phy Quy and Nguyen Thanh Manh, Malaise trap [1♀, RMNH]; ..., ca. 100 m, Crocodile trail, 7 October 2005, R. de Vries [1♀, ZFMK, ZFMKDIP 00011945].

Remarks

The type material of *Baccha luteolimbata* was studied and the two specimens were found to belong to *Asiobaccha tinctiventris* (Meijere).

Asiobaccha tripartita (Walker, 1861) comb. nov. (Figures 11c, d, f, 14d)

Baccha tripartita Walker, 1861: 285. Holotype: ♂, BMNH. Type locality: Indonesia: Misool Island. Schiner 1868: 344; Bigot 1892: 166; Wulp 1896: 121; Kertész 1910: 157.

Baccha flavipes Doesburg, 1959: 233. Syn. nov.

Baccha sulica Austen, 1893: 144 (in part). Syn. nov. Wulp 1896: 121; Kertész 1910: 157.

Baccha (*Allobaccha*) *sulica* of Knutson et al. 1975: 323 (in part).

Baccha (*Allobaccha*) *tripartita* of Knutson et al. 1975: 323.

Baccha papuana Hull, unpublished of Greve and Ismay 1983: 74.

Episyrphus (*Asiobaccha*) *sulica* of Thompson and Vockeroth 1989: 443 (in part).

Episyrphus (*Asiobaccha*) *tripartita* of Thompson and Vockeroth 1989: 443.

Allobaccha flavipes of Thompson and Vockeroth 1989: 441.

Allobaccha papuana (Hull, unpublished name) of Rojo et al. 2003: 20.

Differential diagnosis

This species has a yellow face (Figure 11f), the alula is bare, narrower than costal cell, the wing is partly bare basally (Figure 14d), and it does not have a mesonotal fringe. The abdominal pattern is identical to that of two other species, *A. bicolor* and *A. loriae*, with tergum 4 entirely black (Figure 11c, d), but differs by the wing microtrichia as stated in the key. *Asiobaccha bicolor* and *A. tripartita* differ from *A. loriae* by having the wing bare basally, easy to distinguish because both always have the cell CuP and anal lobe partly bare basally (Figure 14c, d); sometimes *A. loriae* specimens may have very small bare areas in the cell BM but the cell CuP and the anal lobe are always microtrichose. On the other hand, *A. tripartita* has a more extensive microtrichia and bare basal areas of the wing are on basal 1/3–1/2 cell BM only (Figure 14d), while *A. bicolor* has the cell R bare on basal 1/3–1/2 and the cell BM bare on basal 1/2 or more (Figure 14c).

Variation. Wing microtrichia is a bit less variable in this species: the bare area of cell BM varies between basal 1/3 to basal 1/2. Furthermore, a few specimens have costal cell bare very basally. The specimen from New Ireland has the scutum entirely yellow-orange. Wing colouration varies from very dark to almost hyaline.

Length (*N* = 4). Body, 11.0–13.0 (12.3) mm; wing, 10.0–12.0 (11.1) mm.

Biology

Greve and Ismay (1983) mentioned one species of *Baccha* with the following information: 'Ex *Tiracola* (Lep., Noctuidae) larva, Brevaturu, N.P., August, 1971'. The species

mentioned is *Baccha* ? [sic] *papuana* Hull. This record is compiled by Rojo et al. (2003) but with a different name, *Allobaccha papuana* (Hull, unpublished name).

In the opinion of this author, this species might refer to the unpublished name of *Baccha papuana* Hull that appears in two specimens from Mafulu kept at the BMNH and CNC, although there is no information in the original labels about *Tiracola*.

After studying the work of Greve and Ismay (1983), this citation may refer to a larva of a syrphid species parasiting a larva of *Tiracola* Moore, 1881 (Lepidoptera: Noctuidae) from Brevaturu N.P. in Papua New Guinea. However, there is no species of *Asiobaccha* or *Baccha* that parasitises butterfly larvae. Consequently, this record by Greve and Ismay (1983) may not refer to a species of *Baccha*, *Allobaccha* or *Asiobaccha*, or, on the other hand, it might indicate that the larva of *Baccha* was preying on the *Tiracola* larva and the adult emerged from a puparium.

Geographical distribution

Kai Islands, Misool Island, New Guinea Island, New Ireland Island and Woodlark Island.

Type locality

Indonesia: West Papua Province, Raja Ampat Regency, Misool Island (Mysol), between 01°40' and 02°04'S, and between 129°43' and 130°26'E.

Material examined

Type material. *Holotype*, male, deposited in The Natural History Museum, formerly British Museum (Natural History) (London, United Kingdom) and labelled: 'W' [round, handwritten] 'Mysol. // Wallace.' 'Baccha // tripartita // Wlk.' [on the reverse of previous label, handwritten] 'tripartita' [handwritten] 'HOLOTYPE // Asiobaccha // tripartita // (Walker) // det. X. Mengual 2014' [red].

Type material of *Baccha sulica* Austen, 1893. *Syntype*, female, deposited in The Natural History Museum (London, UK) and labelled: 'SYN- // TYPE' [round, blue margin] 'Mysol' [round, light blue] 'hl // 124' [on the reverse of previous label, handwritten] 'Mysol. // (Wallace.) // 61.124.' 'Baccha // sulica // Aust.' [on the reverse of previous label, handwritten].

Type material of *Baccha flavipes* Doesburg, 1959. *Holotype*, female, deposited in the Naturalis Biodiversity Center (Leiden, The Netherlands) and labelled: 'HOLOTYPE' [yellow] 'G.den Hoed // Ifar 12-57' [handwritten] 'Museum Leiden // Collectie // Van Doesburg // rec. 1973' 'Baccha ♀ // flavipes Dobg. // det. v. Doesburg'.

Nontype material. INDONESIA: Maluku Prov., Great Kai Island, Mountain Daab, April 1922, T. Mortensen [2♀, ZMUC]; Papua Prov., 11 km SE of Oerberfaren, Bodem, 100 m, 7–17 July 1959, T.C. Maa [♀, BPBM]; ..., Wataikwa River, August 1910, A.F.R. Wollaston 1911–229 [1♀, BMNH]; ..., Araucaria River, SW von Bernhard Camp, 800 m, 6 January 1939, L.J. Toxopeus [1♀, RMNH]. PAPUA NEW GUINEA: Central Prov., Owen Stanley Range, Goilala, Loloipa, 1–15 February 1958, W.W. Brandt [1♂ 1♀, BPBM; 1♂, ZFMK, ZFMKDIP 00011948]; ..., Goilala, Tapini, 975 m, 16–25 November 1957, W.W. Brandt [1♂, BPBM]; Central Prov., Mafulu, 4000 ft., January 1934, L.E. Cheesman [1♀, BMNH; 1♀, CNC]; West Sepik Prov., Telefomin District, Eliptamin Valley, 1200–1350 m,

19–30 June 1959, W.W. Brandt [1♀, BPBM]; Madang Prov., Finisterre Range, Saidor, Sibog village, 27 May–5 June 1958, W.W. Brandt [1♀, BPBM]; Jiwaka Prov., Upper Jimi valley, Tsenga, 1200 m, 15 July 1955, J.L. Gressitt, light trap [1♂, BPBM]; Morobe Prov., Bulolo Gorge, 800 m, 17 January 1962, G. Monteith [1♂, BPBM]; ..., 6 miles NW Lae, Rain forest, 15 m, 9 July 1957, D.E. Hardy [1♂, ZFMK, ZFMKDIP 00011952]; ..., Bulolo, Manki Logging area, 2 June 1983, H. Roberts [1♂, BMNH] (specimen photographed); ..., Wau, 6–14 March 1974, H. Hippa, P.T. Lehtinen [1♀, MZH]; ..., Wau, April 1968, M. Sedlacek [1sp., BPBM]; ..., Wau, Nakata Range, 4700 ft., 9 June 1968, J.W. Boyes [1♂, CNC]; Milne Bay Prov., Woodlark Island, Kulumadai Hill, 4–9 March 1957, W.W. Brandt [1♂ 1♀, BPBM; 1♀, ZFMK, ZFMKDIP 00011950]; ..., 16 March 1957, ... [1♀, ZFMK, ZFMKDIP 00011953]; New Ireland Prov., Danu, Kalili Bay, 3 April 1962, Noona Dan Exp. 61–62 [1♂, ZMUC]; ..., 30 April 1962, ... [1♀, ZMUC].

Remarks

Austen (1893) described *Baccha sulica* based on two female specimens, but only the female from Sula Island had Walker's handwriting. Austen (1893) stated that he found the type of this species, but he could not find if it was already described. In my opinion, he decided to describe a new species based on Walker's handwriting. The most interesting fact is that Austen (1893) used the same argument to separate *sulica* from *Baccha moluccana* as to separate *bicolor* from *moluccana*, but he did not compare his two new species. In the BMNH there are the two syntypes of *Baccha sulica*, but one belongs to *A. bicolor* (specimen from Sula Island and Walker's handwriting) and the other syntype belongs to *A. tripartita* (specimen from Misool).

Specimens from the New Ireland at ZMUC have a manuscript name given by P.H. van Doesburg, *Baccha pleuralis*, never published. Specimens from Mafulu have a manuscript name given by F. M. Hull, *Baccha papuana*, again never published. None of these three names is available.

As already mentioned, *A. tripartita* might belong to a widespread taxon and might include also *A. loriae* and *A. bicolor* (see Remarks under *A. bicolor* and *A. loriae*). There are specimens of *A. tripartita* and *A. bicolor* from the same localities, but, more interestingly, specimens of *bicolor* and *tripartita* from New Ireland Island have an orange scutum. Both females from Great Kai Island also have the scutum orange.

Asiobaccha virtuosa (Curran, 1928) comb. nov. (Figures 12a, b, d, 14b)

Baccha virtuosa Curran, 1928: 246. Lectotype: ♂, BMNH, here designated. Type locality:

Malaysia, Rhododendron Hill. Curran 1931a: 322; Curran 1942: 6; Curran 1947: 5.

Baccha gigas Curran, 1931b: 356. Syn. nov. Curran 1931a: 322; Curran 1947: 5.

Baccha (*Baccha*) *virtuosa* of Knutson et al. 1975: 323.

Baccha (*Allobaccha*) *gigas* of Knutson et al. 1975: 322.

Asiobaccha virtuosa of Mengual 2015: 398 (DNA voucher ZFMK_XM224).

Differential diagnosis

This species has the face entirely yellow and the abdomen with yellow markings (Figure 12a, d), the alula partly microtrichose, the wing with partly bare basal cells

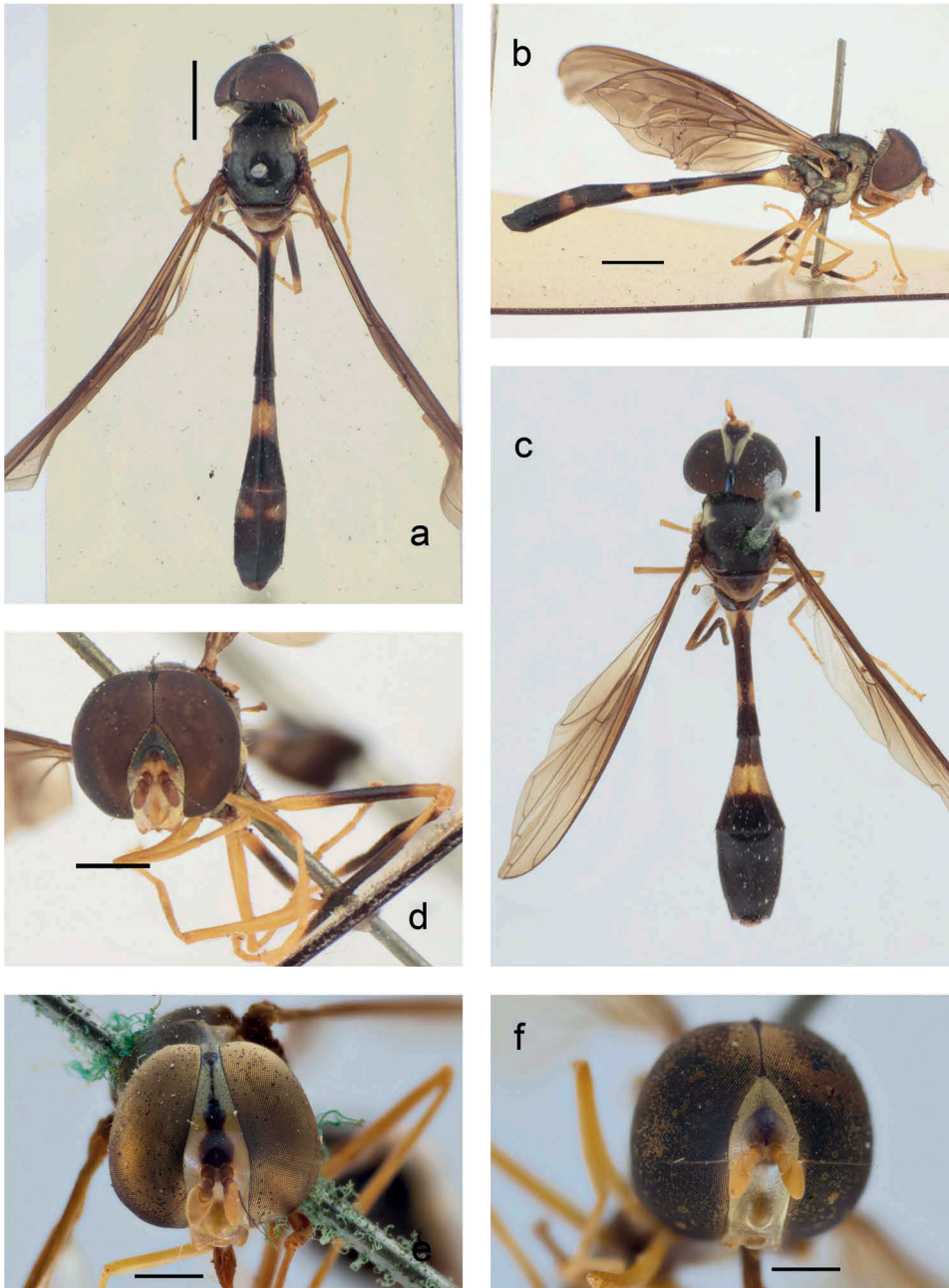


Figure 12. *Asiocaccha virtuosa* (Curran). a–b, d, lectotype ♂. (a) Dorsal view; (b) lateral view; (d) frontal view. *Asiocaccha maculosa* Mengual & Thompson sp. nov., paratype ♀. (c) Dorsal view. *Asiocaccha nubilipennis* (Austen), ♀. (e) Frontal view. *Asiocaccha tinctiventris* (Meijere), ♂. (f) Frontal view. Scale bars: a–c = 2 mm; d–f = 1 mm.

(Figure 14b), and a well-defined mesonotal collar. It is similar to *A. nubilipennis*, but *A. virtuosa* has the cell R completely microtrichose and tergum 4 with two subrectangular yellow maculae (Figures 12a, b, 14b).

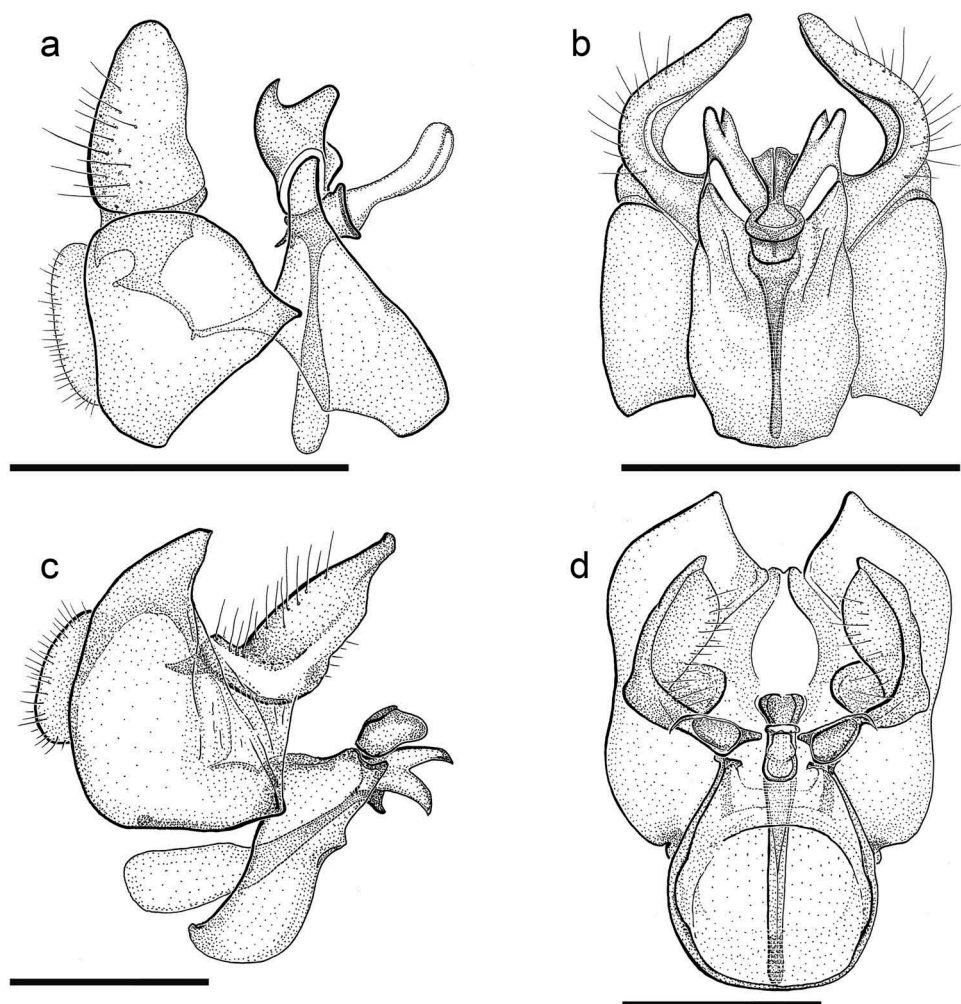


Figure 13. *Asiobaccha nubilipennis* (Austen). a–b, ♂, male genitalia. (a) Lateral view; (b) ventral view. *Asiobaccha taronja* Mengual sp. nov. c–d, paratype ♂, male genitalia. (c) Lateral view; (d) ventral view. Scale bars = 0.5 mm.

Length ($N = 3$). Body, 11.0–14.7 (13.2) mm; wing, 10.5–13.0 (11.9) mm.

Geographical distribution

Malay Peninsula, Sumatra and Borneo.

Genetics

The GenBank accession numbers for this species are: 28S gene (KM270824, specimen ZFMK_XM224), 18S gene (KM270772, specimen ZFMK_XM224), COI gene (KM270855, specimen ZFMK_XM224).

Type locality

Malaysia: Pahang, Cameron's Highlands, Rhododendron Hill, 04°29'N, 101°22'E.

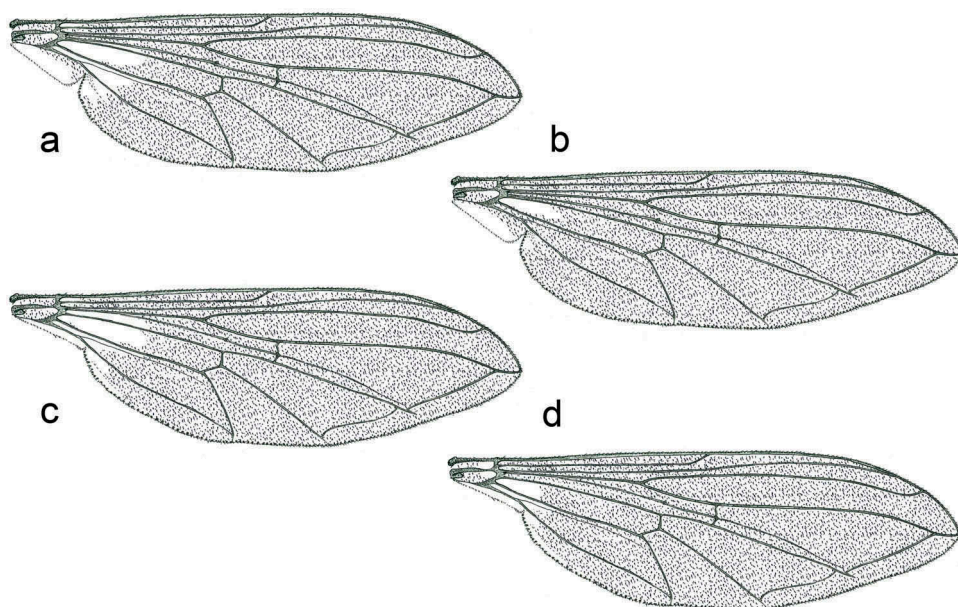


Figure 14. *Asiobaccha nubilipennis* (Austen). (a) Wing. *Asiobaccha virtuosa* (Curran). (b) Wing. *Asiobaccha bicolor* (Austen). (c) Wing. *Asiobaccha tripartita* (Walker). (d) Wing. Images with the microtrichia pattern for each species; the infuscation of the wing membrane is not illustrated.

Material examined

Type material. *Lectotype*, male, deposited in The Natural History Museum, formerly British Museum (Natural History) (London, United Kingdom), and labelled as indicated below (specimen photographed).

Type material of *Baccha gigas* Curran, 1931. *Holotype*, female, deposited in The Natural History Museum, formerly British Museum (Natural History) (London, United Kingdom), and labelled: 'Holo- // type' [round, red margin] '*Baccha* // TYPE // *gigas* ♀ // Curran. // No.' [red] 'B.N. BORNEO. // Mt. Kinabalu, // Marei Parei, // 5,000 ft. // 30; 4; 1929.' [pink] 'H.M. Pendlebury // coll. // F.M.S. Museums.' [on the reverse of previous label, italics] '*Baccha* // *gigas* // Curran. // Det. // C.H. Curran' 'Pres. by // Fed.Malay States // Museum. // B.M. 1934–74.'

Nontype material. MALAYSIA: Pahang, Brinchang, 24 November–2 December 1977, B. Bendell [1♂, CNC]; Pahang, Cameron's Highlands, G. Perdah, 5100 ft., 30 April 1941, J.A. Reid [1♂, BMNH]; Pahang, Cameron's Highlands, G. Terbalvar, 4481 ft., 19 July 1928, H.M. Pendlebury [1♀, BMNH]; Pahang, Cameron's Highlands, 4000–4500 ft., 15 June 1935, H.M. Pendlebury [1 sp., BMNH]; Pahang, Fraser's Hill, 4200 ft., 22 July 1936, H.M. Pendlebury [1♂ 1♀, BMNH]; ..., 15 July 1936, ... [1♀, BMNH]; ..., 4000 ft., 5 June 1941, ... [1 sp., BMNH]; ..., 2 July 1931, ... [1♂, AMNH]; ..., 4000 ft., 31 May 1932, ... [1♂, AMNH]; Perak, Larut Hills, 4500 ft., 22 February 1932, H.M. Pendlebury [1 ♂, USNM, USNM ENT 00890806]; ..., 3700–4500 ft., 14–15 February 1932, ... [1♂, AMNH]; Sabah, Mt. Kinabalu, 5000 ft., 1–5 May 1973, K.M. Guichard [1♀, BMNH]; Sabah, Mt. Kinabalu, Marei Parei, 5000 ft., 29 April

1929, H.M. Pendlebury [1♀, CNC]; Sabah, Penampang District, Crocker Range, Gunung Alab, 1660 m, 05°48'47"N, 116°20'16"E, 16 October 2011, M. Hauser and S. Gaimari [1♀, CSCA; 1♀, ZFMK, ZFMKDIP 00011954; DNA voucher ZFMK_XM224]; ..., Long Gong Kugan, 1630 m, 05°49'44"N, 116°19'37"E, 22 October 2011, M. Hauser and S. Gaimari [1♀, ZFMK, ZFMKDIP 00011951]; Long Pa Sia to Long Semado, kerangas, 1485 m, 3–5 December 1987, C.v. Achterberg, Malaise [1♀, RMNH]. INDONESIA: south Sumatra, SW Lampong district, Mt. Tanggamoës, 600–700 m, December 1939, M.A. Lieftinck [1♀, RMNH].

Remarks

Curran (1928) described *A. virtuosa* from two males collected the same day by H. M. Pendlebury. In BMNH, there is a pinned male labelled: 'Fed. Malay States //Pahang, 'Cameron's // Highlands' Rhododendron // Hill. 5200 ft. 19.VI.1923. // H. M. Pendlebury' 'Syn- // type' [round, blue margin] 'HoloTYPE ♂ // *Baccha* // *virtuosa* // No Curran' [red] 'Brit. Mus. // 1926–56.' 'LECTOTYPE // *Asiobaccha* // *virtuosa* // des. X. Mengual 2014' [red; second and third lines handwritten]. This specimen is here designated as lectotype to fix and ensure the universal and consistent interpretation of the name.

The holotype of *A. virtuosa* has no alula on the right wing and only the basal portion of the alula remains in the left wing.

The holotype female of *Baccha gigas* is in poor condition, missing the left wing and most of the abdomen (only terga 1 and 2 remain). The name *Baccha gigas* was introduced in the identification key from Curran (1931a, p. 322), and the only difference from *Asiobaccha virtuosa* stated by the same author is the colouration of the wing: *virtuosa* has wings wholly brown, darker in front, while *gigas* has wings dark only in front. The holotype of *Baccha gigas* Curran was studied and was found to be the same species as *Asiobaccha virtuosa* Curran.

Specimens from the collection at RMNH have a manuscript name given by P.H. van Doesburg, *Baccha flavitarsis*, never published; thus, it is not available.

Key to the species of *Asiobaccha* Virolvitsh

1. Alula broad or reduced but always present (Figures 1, 3a, 8a) 4
 - Alula absent, anal lobe reduced (Figure 9d)..... 2
2. Cell C almost completely bare, microtrichose on apical 1/5. Face with white pollinosity (Figure 10f). Abdomen dark; tergum 1 dark (Figure 10a, b) (New Guinea) ***A. selsi*** Mengual sp. nov.
 - Cell C entirely microtrichose. Face with yellow pollinosity (Figure 9f). Abdomen black with yellow markings on terga 2 and 3, sometimes also on tergum 4 (Figures 6c, 9c, d); tergum 1 usually yellow, not always..... 3
3. Pleuron dark: meron, metaepisternum and metacoxa dark brown (Figure 9d). Metatibia yellow-brown (Figure 9c, d). Scutellum unicolor, between yellow-brown to black (Taiwan, Vietnam, Sulawesi and Luzon)..... ***A. sauteri*** (Kertész)
 - Pleuron lighter: meron, metaepisternum and metacoxa yellow (Figure 6d). Metatibia yellow with medial broad, black annulus (Figure 6c, d). Scutellum yellow

- with medial dark area (Sumatra and Malay Peninsula).....
 **A. maculosa** Mengual & Thompson sp. nov.
- [Note: *A. maculosa* has a narrow, linear alula but it is absent in all the paratypes; *A. sauteri* has no alula. This species is keyed out in couplets 3 and 8]
4. Scutellum yellowish (Figures 5c, 10c). Abdomen usually with yellow or orange markings (Figures 5c, 7a, 10c). Face bright yellow (Figures 5e, 8e) 7
- Scutellum and abdomen entirely black (Figures 3c, 8c). Face variable: black to dark yellow (Figures 3f, 8f) 5
5. Metatarsi yellowish white, except metabasitarsomere dark on basal 1/5 (Figure 3c, d). Alula mostly bare, microtrichose only on anterodistal quarter, narrower than cell BM (Solomon Islands)..... **A. albipeza** Mengual sp. nov.
- Metatarsi dark, black or dark brown (Figures 8d, 9b). Alula microtrichose on apical half or more, as broad as or broader than cell BM 6
6. Cell BM bare on basal half or more, cells R and CuP bare basally, costal cell bare on basal half or less (Vanuatu, New Caledonia, Fiji, Tonga)..... **A. praeifica** (Bezzi)
- Wing entirely microtrichose except alula bare very basally (Samoa).....
 **A. samoensis** Mengual sp. nov.
7. Scutellum variable, usually entirely yellow or dark brown, never with a medial, round black macula. Tergum 4 different..... 9
- Scutellum yellow with a medial, isolated dark/black macula surrounded by yellow (Figure 11a). Tergum 4 with two longitudinal yellow vitta reaching anterior margin (Figure 11a)..... 8
8. Alula broad, broader than costal cell. Tergum 3 with a submedial, triangular yellow fascia, not divided medially (Figure 11a). Male: Frontal triangle densely yellow pollinose dorsally (Figure 12f). Female: frons yellow pollinose on dorsal 3/4 (between anterior ocellus and antennal base), laterally joining pollinosity of face; and ocellar triangle shiny (Figure 11e) (Borneo, Malay Peninsula, Sumatra, Java, Vietnam)..... **A. tinctiventris** (Meijere)
- Alula narrow, as narrow as or narrower than costal cell (Figure 6c). Tergum 3 with two broad yellow maculae, not medially joined (Figure 6c). Male: Frontal triangle shiny, not pollinose (Figure 6f). Female: frons yellow pollinose only on dorsal 1/2 or less (between anterior ocellus and antennal base), isolated from facial pollinosity; and ocellar triangle pollinose (Figure 12e) (Sumatra and Malay Peninsula).....
 **A. maculosa** Mengual & Thompson sp. nov.
9. Mesonotal fringe or collar absent on anterior part of scutum (Figures 4d, 10e). Alula narrower than costal cell, at most as broad as costal cell (Figure 14c, d) 17
- Mesonotal fringe or collar well-defined on anterior part of scutum (Figures 3b, 4b). Alula usually broader than costal cell in the apical part (Figure 14a, b) 10
- [NOTE: *A. tinctiventris* has no mesonotal collar but alula broader than costal cell. This species is keyed out in couplets 7 and 8]
10. Wing entirely microtrichose, except alula bare on posterior margin (Figure 3a, b) (Solomon Islands)..... **A. aea** Mengual & Thompson sp. nov.

- Wing bare basomedially; cell BM bare basally (Figures 4a, 5c)..... 11
- 11. Abdominal tergum 1 black or brownish, sometimes yellowish on lateral margins (Figure 4a); tergum 2 black with two pairs of yellow maculae: one basally, which may join medially, and another medially; tergum 3 with two triangular maculae or with a broad yellow fascia not reaching anterior margin (Figures 4a, 8a)..... 14
- Abdominal tergum 1 yellow with or without narrow dark fascia on posterior margin (Figure 4a); tergum 2 yellowish, brownish posteriorly, with a dorsomedial brownish macula; tergum 3 with broad yellow fasciate maculae reaching anterior margin (Figures 5c, d, 7c)..... 12
- [Note: *A. virtuosa* does not totally comply with any options of the couplet 11, as it has tergum 1 yellow, but yellow macula on tergum 3 does not reach anterior margin. For this reason, it appears twice in the key]
- 12. Cell R entirely microtrichose posterior to spurious vein (Figure 14b). Tergum 4 with two subtriangular/rectangular yellow maculae, isolated from anterior margin (Figure 12a, b)..... ***A. virtuosa*** (Curran)
- Cell R bare basally, posterior to spurious vein. Tergum 4 black, or with yellow markings reaching anterior margin (Figures 5d, 7c) 13
- 13. Abdominal tergum 4 black, sometimes with two diffuse round yellow maculae on anterior margin; tergum 5 black (Figure 5c, d). Stigma brown, not contrasting with colouration of subcostal cell or cell R1 (Figure 5d) (New Guinea).....
- ***A. doesburgi*** Mengual sp. nov.
- Abdominal tergum 4 black with a broad yellow fascia on anterior 1/2, slightly emarginated medially on posterior margin; tergum 5 black with two basal elongate yellow maculae on anterior margin (Figure 7c, d). Stigma darker, contrasting with subcostal cell and cell R1 (Figure 7c) (Australia).....
- ***A. notofasciata*** Thompson & Mengual sp. nov.
- 14. Abdominal tergum 4 black with two subtriangular/rectangular yellow maculae, broadening laterally and not reaching the lateral margin, on basal half of the tergum (Figure 12a); golden yellow pollinosity on posterior anepisternum, katapisternum and katatergum; cell R entirely microtrichose posterior to spurious vein (Figure 14b) (Malay Peninsula, Sumatra and Borneo)..... ***A. virtuosa*** (Curran)
- Abdominal tergum 4 black, at most with two round very small yellow maculae on the anterolateral margin of the tergum (Figures 4a, 8a, 12c); white or golden pollinosity on posterior anepisternum, katapisternum and katatergum; cell R bare on basal 1/3 or more, posterior to spurious vein (Figure 14a)..... 15
- [NOTE: Some specimens of *A. nubilipennis* from Sumatra have the cell R almost entirely microtrichose, although they have tergum 4 black and key out to couplet 16]
- 15. Metatarsus entirely black; scutellum black, sometimes posterior margin tawny (Figure 4a, b) (Philippines)..... ***A. aquila*** Thompson & Mengual sp. nov.
- Metatarsus pale (white-yellow), except metabasitarsomere black on basal 2/3; scutellum yellow-brown (Figures 5a, 8b) 16

16. Abdominal tergum 3 with two medial subtriangular yellow maculae, pointing anteriorly and not reaching lateral margins; metafemur mostly dark brown; pleuron with yellow golden pollinosity (Figure 5a, b) (Sumba)..... **A. bimaculata** (Keiser)
- Abdominal tergum 3 with medial broad yellow fascia (about 1/3 to 1/2 of tergum length) reaching lateral margins, sometimes also with two laterobasal small yellow maculae (Figures 8a, 12c); metafemur yellow with medial dark annulus (Figure 8b); pleuron with white or yellow pollinosity (widely spread: from Sri Lanka, India to Japan, south to Indonesia)..... **A. nubilipennis** (Austen)
17. Scutum, scutellum, pleuron and legs yellowish orange; abdomen mostly yellowish orange basally (Figure 10c). Male genitalia large, with epandrium and hypandrium enclosed under sternum 4 (Figure 10d) (Solomon Islands)..... **A. taronja** Mengual sp. nov.
- Scutum darker dorsally, scutellum yellowish (Figure 11c), pleuron yellow with two black vittae (from dorsomedial anepimeron to mesocoxa and on metaepisternum) and legs partly yellow (Figure 7b). Male genitalia small, epandrium and hypandrium exposed and not covered by sternum 4 18
18. Abdominal tergum 4 black on posterior 2/5 with yellow fascia on anterior 3/5, emarginate posteromedially and broadening laterally (Figure 7a); antennal base with lateral lobular expansions on each side (Figure 1) (Sulawesi)..... **A. marissae** Mengual sp. nov.
- Abdominal tergum 4 entirely black, sometimes with purple gloss (Figures 6a, 11c); antennal base normal, without lateral expansions 19
19. Wing entirely microtrichose: cell BM microtrichose; anal lobe and cell CuP microtrichose (Figure 6a); alula mostly bare (New Guinea, Sumbawa and Luzon)..... **A. loriae** (Meijere)
- Wing bare basomedially: cell BM bare on basal 1/5 or more; cell CuP and anal lobe bare basally (Figures 11c, 14c, d); alula mostly bare..... 20
20. Cell R entirely microtrichose; cell BM bare on basal 1/3–1/2 (Figures 11c, 14d) (Kai Islands, Misool, New Guinea, New Ireland, and Woodlark islands)..... **A. tripartita** (Walker)
- Cell R bare on basal 1/3–1/2; cell BM bare on basal 1/2 or more (Figures 4c, 14c) (Moluccas (Maluku and North Maluku Provinces), New Guinea, New Ireland, and Australia)..... **A. bicolor** (Austen)

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References

- Ahmad M, Nasim M. 2009. Family Syrphidae. In: Ahmad M, Kabir SMH, Ahmed ATA, Rahman AKA, Ahmed ZU, Begum ZNT, Hassan MA, Khondker M, editors. Encyclopedia of Flora and Fauna of Bangladesh, vol. 21 Pterygota Part. Dhaka: Asiatic Society of Bangladesh; p. 352–368.
- Austen EE. 1893. Descriptions of new species of dipterous insects of the family Syrphidae in the collection of the British Museum, with notes on species described by the late Francis Walker. – Part I. Bacchini and Brachyopini. *Proc Zool Soc Lond.* 1893:132–164.
- Bezzi M. 1928. *Diptera Brachycera and Athericera of the Fiji Islands based on material in the British Museum (Natural History)*. London: British Museum (Natural History).
- Bigot JMF. 1892. Catalogue of the Diptera of the Oriental Region. Part II. *J Asiat Soc Bengal.* 61:133–178.
- Biswas S, Lahiri AR, Ghosh AK. 1975. A preliminary study of the insect fauna of Meghalaya. 2. Diptera, Syrphidae: eleven new records and notes on other species. *Proc Zool Soc Calcutta.* 27:23–27.
- Blüthgen N. 2003. How availability and quality of nectar and honeydew shape an Australian rainforest ant community [dissertation]. Bayreuth: Bayreuth University. Available from: <https://epub.uni-bayreuth.de/971/>
- Brown RW. 1956. *Composition of scientific words a manual of methods and a lexicon of materials for the practice of logotechnics*. Baltimore: Published by the author.
- Brunetti E. 1910. Notes on Ceylon Diptera. *Spolia Zeylan.* 6:170–172.
- Brunetti E. 1915. Notes on Oriental Syrphidae, with descriptions of new species, Pt. II. *Rec Indian Mus.* 11:201–256, pl. 13.
- Brunetti E. 1923. Diptera. Pipunculidae, Syrphidae, Conopidae, Oestridae. In: Shipley AE, editor. *Fauna of British India including Ceylon and Burma, vol III*. London: Taylor Francis.
- Carver M, Blüthgen N, Grimshaw J, Bellis G. 2003. *Aphis clerodendri* Matsumura (Hemiptera: Aphididae), attendant ants (Hymenoptera: Formicidae) and associates on *Clerodendrum* (Verbenaceae) in Australia. *Aust J Entomol.* 42:109–113.

- Cheng XY, Huang CM. 1997. The syrphids from the tropical forest region of Xishuangbanna, Yunnan Province (Diptera: Syrphidae). *Acta Zootaxon Sinica*. 22:421–429.
- Cheng XY, Huang CM. 1998. Syrphidae. In: Xue W, Zhao CM, editors. *Flies of China*, Volume 1. Shenyang: Liaoning Science and Technology Press; p. 118–223.
- Cherian MC. 1934. Notes on some south Indian syrphids. *J Bombay Nat Hist Soc*. 37:697–699.
- Curran CH. 1928. The Syrphidae of the Malay Peninsula. *J Fed Malay States Mus*. 14:141–324.
- Curran CH. 1931a. Additional records and descriptions of Syrphidae from the Malay Peninsula. *J Fed Malay States Mus*. 16:290–338.
- Curran CH. 1931b. Records and descriptions of Syrphidae from North Borneo including Mt Kinabalu. *J Fed Malay States Mus*. 16:333–376.
- Curran CH. 1942. Syrphidae from Sarawak and the Malay Peninsula (Diptera). *Am Mus Novit*. 1216:1–8.
- Curran CH. 1947. The Syrphidae of Guadalcanal with notes on related species. *Am Mus Novit*. 1364:1–17.
- de Jong H. 2000. The types of Diptera described by J.C.H. de Meijere. Leiden: Backhuys Publishers.
- de Meijere JCH. 1908. Studien über sudostasiatische Dipteren. III. *Tijdschr Entomol*. 51:191–332, pls. 7–8.
- de Meijere JCH. 1924. Studien über südostasiatische Dipteren XV. Dritter Beitrag zur Kenntnis der sumatranischen Dipteren. *Tijdschr Entomol*. 67:1–64.
- de Meijere JCH. 1929. Fauna Buruana. Syrphiden nebst einigen Brachyceren Orthorrhaphen. *Treubia*. 7:378–387.
- Dirickx HG. 2010. Notes sur le genre *Allobaccha* Curran, 1928 (Diptera, Syrphidae) à Madagascar avec descriptions de cinq nouvelles espèces [Notes on the genus *Allobaccha* Curran, 1928 (Diptera, Syrphidae) in Madagascar, with descriptions of five new species]. *Rev Suisse Zool*. 117:213–233.
- Doesburg PJ van. 1959. Passalidae (Col.) en Syrphidae (Dipt.) van Ned. Nieuw-Guinea. *Entomol Ber*. 19:231–235.
- Doleschall CL. 1857. Tweede bijdrage tot de kennis der dipterologische fauna van Nederlandsch Indie. *Nat Tijdschr Ned Indië*. 14:377–418, 10 pls.
- Edwards FW. 1915. Report on the Diptera collected by the British Ornithologists' Union Expedition and the Wollaston Expedition in Dutch New Guinea. With a section on the Asilidae by E. E. Austen. *Trans Zool Soc Lond*. 20:391–424.
- Evenhuis NL. 2011. Checklist of Diptera of Fiji. [Internet]. [cited 2015 Aug 10]. Available from: <http://hbs.bishopmuseum.org/fiji/checklists/diptera.html>
- Fabricius JC. 1775. *Systema entomologiae, sistens insectorum classes, ordines, genera, species, adiectis synonymis, locis, descriptionibus, observationibus*. Flensburg et Lipsiae [= Flensburg & Leipzig]: Kortii.
- Fabricius JC. 1781. *Species insectorum, exhibentes eorum differentias específicas, synonyma auctorum, loca natalia, metamorphosin, adiectis observationibus, descriptionibus*. Hamburgi et Kilonii [= Hamburg & Kiel]: Impensis C. E. Bohnii.
- Fabricius JC. 1794. *Entomologia systematica emendata et aucta: secundum classes, ordines, genera, species, adiectis synonymis, locis, observationibus, descriptionibus*, Volume 4. Hafniae [= Copenhagen]: Impensis Christ. Gottl. Proft.
- Fabricius JC. 1805. *Systema antliatorum: secundum ordines, genera, species, adiectis synonymis, locis, observationibus, descriptionibus*. Brunsvigae [= Brunswick]: Apud Carolum Reichard.
- Frey R. 1946. Übersicht der Gattungen der Syrphiden-Unterfamilie Syrphinae (Syrphine + Bacchinae). *Notulae Ent*. (1945) 25:152–172.
- Ghorpadé K. 1994. Diagnostic keys to new and known genera and species of Indian subcontinent Syrphini (Diptera: Syrphidae). *Coleman Insect Biosyst*. 3:1–15.
- Greve JE van S, Ismay JW. 1983. Crop insect survey of Papua New Guinea from July 1st 1969 to December 31st 1978. *P N G Agric J*. 32:1–120.
- Hazarika LK, Puzari KC, Wahab S. 2001. Biological control of tea pests. In: Upadhyay RK, Mukerji KG, Chamola BP, editors. *Biocontrol potential and its exploitation in sustainable agriculture*, vol. 2. New York: Kluwer Academic/Plenum Publishers; p. 159–180.

- Holt BG, Lessard JP, Borregaard MK, Fritz SA, Araújo MB, Dimitrov D, Fabre PH, Graham CH, Graves GR, Jönsson KA, et al. **2013**. An update of Wallace's Zoogeographic Regions of the world. *Science*. 339:74–78.
- Huang C, Cheng X. **2012**. *Diptera: Syrphidae*. Fauna Sinica, Insecta vol. 50. Neijing: Science Press.
- Hull FM. **1929**. *Syrphidae*. Insects Samoa Samoan Terr Arthropod. 6:191–198.
- Hull FM. **1936**. A check list of the described *Syrphidae* from Australia and the Regional Islands. *J Fed Malay States Mus*. 18:190–212.
- Hull FM. **1937**. A check list of the *Syrphidae* of Oceania. *Occas pap Bernice P. Bishop Mus.* 13:79–87.
- Hull FM. **1949a**. The genus *Baccha* from the New World. *Entomol Am*. 27:89–285, 47 pls.
- Hull FM. **1949b**. The morphology and inter-relationship of the genera of syrphid flies, recent and fossil. *Trans Zool Soc Lond*. 26:257–408.
- Ichige K. **2009**. Notes on Japanese *Bacchini* and *Episyrphus* (*Asiobaccha*) (Diptera, Syrphidae). *Hana Abu*. 28:9–22.
- Kapoor VC, Malla YK, Rajbhandari Y. **1979**. Syrphid flies (Diptera: Syrphidae) from Kathmandu Valley, Nepal with a Check List of Syrphidae of Nepal. *J Nat Hist Mus Tribhuvan Univ*. 3:51–68.
- Keiser F. **1952**. *Syrphidae* (Dipt.) von Sumba, Sumbawa, Flores und Timor. *Wissenschaftliche Ergebnisse der Sumba-Expedition des Museums für Volkerkunde und des Naturhistorischen Museums in Basel*, 1949. *Verh Natur Ges Basel*. 63:153–175.
- Keiser F. **1958**. Beitrag zur Kenntnis der Syrphidenfauna von Ceylon (Dipt.). *Rev Suisse Zool*. 65:185–239.
- Kertész K. **1910**. *Catalogus dipterorum hucusque descriptorum*, vol. VII. Budapestini [= Budapest]: G. Engelmann.
- Kertész K. **1913**. H. Sauter's Formosa-Ausbeute. *Syrphidae* [Dipt.]. *Ann Hist-Nat Mus Natl Hung*. 11:273–285.
- Knutson LV, Thompson FC, Vockeroth JR. **1975**. Family Syrphidae. In: Delfinado MD, Hardy DE, editors. *A catalog of the Diptera of the Oriental Region, Volume II, Suborder Brachycera through Division Aschiza, Suborder Cyclorrhapha*. Honolulu: The University Press of Hawaii; p. 306–373.
- Matsumura S. **1916**. *Thousand insects of Japan. Additamenta*. Vol. 2 (Diptera). Keisei-sha. 2 + 185–474 + 4:pls. 16–25.
- Matsumura S, Adachi J. **1917**. Synopsis of the economic *Syrphidae* of Japan. (Pt III). *Entomol Mag Kyoto*. 3:14–46.
- Mengual X. **2012**. The flower fly genus *Citrogramma* Vockeroth (Diptera: Syrphidae): illustrated revision with descriptions of new species. *Zool J Linn Soc*. 164:99–172.
- Mengual X. **2015**. The systematic position and phylogenetic relationships of *Asiobaccha* Virolvitsh (Diptera, Syrphidae). *J Asia-Pacific Entomol*. 18:397–408.
- Mengual X, Ståhls G, Rojo S. **2008**. First phylogeny of predatory flower flies (Diptera, Syrphidae, Syrphinae) using mitochondrial COI and nuclear 28S rRNA genes: conflict and congruence with the current tribal classification. *Cladistics*. 24:543–562.
- Mengual X, Ståhls G, Rojo S. **2012**. Is the mega-diverse genus *Ocyptamus* (Diptera, Syrphidae) monophyletic? Evidence from molecular characters including the secondary structure of 28S rRNA. *Mol Phylogenet Evol*. 62:191–205.
- Mitra B, Mukherjee M, Banerjee D. **2008**. A check-list of hover-flies (Diptera: Syrphidae) of Eastern Himalayas. *Rec Zool Survey India Occas Pap*. 284:1–47.
- Muraleedharan N, Radhakrishnan B. **1986**. Syrphid predators of the tea aphid, *Toxoptera aurantii* (Boyer der Fonscolombe), in the Anamallais. *Indian J Agric Sci*. 56:307.
- Peck LV. **1988**. Family Syrphidae. In: Soós Á, Papp L, editors. *Catalogue of Palaearctic Diptera*, volume 8. Budapest: Akadémiai Kiadó; p. 11–230.
- Radhakrishnan B, Muraleedharan N. **1993**. Bio-ecology of six species of syrphid predators of the tea aphid, *Toxoptera aurantii* (Boyer de Fonscolombe) in Southern India. *Entomon*. 18:175–180.
- Rojo S, Gilbert F, Marcos-García MA, Nieto JM, Mier MP. **2003**. A world review of predatory hoverflies (Diptera, Syrphidae: Syrphinae) and their prey. Alicante: CIBIO Ediciones.

- Sack P. 1922. H. Sauter's Formosa-Ausbeute: Syrphiden II (Dipt.). Arch Naturgeschichte. 87:258–276.
- Sack P. 1926. Syrphiden (Dipteren) von den Philippinen und Malaya. Philippine J Sci. 29:563–596.
- Sack P. 1932a. Syrphidae. In: Lindner E, editor. Die Fliegen der Palaearktischen Region, IV/6. Stuttgart: Schweizerbart.
- Sack P. 1932b. Syrphiden (Diptera) von den Kleinen Sunda-Inseln (Ergebnisse der Sunda-Expedition Rensch). Zool Anz. 100:225–234.
- Schiner IR. 1868. Diptera. In: von Wüllerstorff-Urbair B, editor. Reise der österreichischen Fregatte Novara um die Erde in den Jahren 1857, 1858, 1859 unter den Befehlen des Commodore B. von Wüllerstorff-Urbair. Zoologischer Theil, 2 Band. Vienna: Carl Gerold's Sohn.
- Shiraki T. 1930. Die Syrphiden des Japanischen Kaiserreiches mit Berücksichtigung benachbarter Gebiete. Mem Fac Sci Agric Taihoku Imp Univ. 1:1–446.
- Thapa VK. 2000. An inventory of Nepal's insects, volume III (Hemiptera, Hymenoptera, Coleoptera & Diptera). Kathmandu: IUCN Nepal.
- Thompson FC. 1999. A key to the genera of the flower flies of the Neotropical Region including the descriptions of genera and species and a glossary of taxonomic terms. Contrib Entomol Int. 3:319–378.
- Thompson FC. 2013. Family Syrphidae. In: Thompson FC, Pape T, editors. Systema Dipteriorum, version 1.5. [Internet]. [cited 2015 Jul 2]. Available from:] <http://www.diptera.org>.
- Thompson FC, Rotheray GE. 1998. Family Syrphidae. In: Papp L, Darvas B, editors. Manual of Palaearctic Diptera, volume 3. Budapest: Science Herald; p. 81–139.
- Thompson FC, Vockeroth JR. 1989. Family Syrphidae. In: Evenhuis NL, editor. Catalog of the Diptera of the Australasian and Oceanian Regions. Hawaii: Bishop Museum Special Publication 86; p. 437–458.
- van Achterberg C, Shaw MR, Grootaert P. 2010. Chapter 17 – Flight interception traps for arthropods. In: Eymann J, Degreef J, Häuser C, Monje JC, Samyn Y, VandenSpiegel D, editors. Manual on field recording techniques and protocols for All Taxa Biodiversity Inventories and Monitoring. ABC Taxa, vol. 8 part 2. Brussels: Belgian National Focal Point to the Global Taxonomy Initiative; p. 423–462.
- van der Wulp FM. 1896. Catalogue of the described Diptera from south Asia. The Hague: M. Nijhoff.
- Violovitsh NA. 1976. Survey on species of genus *Baccha* Fabricius, 1805 (Diptera, Syrphidae) from the Palaearctic fauna. Nov Mal Vidy Faun Sibir. 10:130–154.
- Vockeroth JR. 1969. A revision of the genera of the Syrphini (Diptera: Syrphidae). Mem Entomol Soc Canada. 62:1–176.
- Walker F. 1858/1859. Catalogue of the dipterous insects collected in the Aru Islands by Mr. A. R. Wallace, with descriptions of new species. J Proc Linn Soc Zool. 3:77–110, 111–131.
- Walker F. 1861. Catalogue of the dipterous insects collected in Batchian, Kaisaa and Makian, and at Tidon in Celebes, by Mr. A. R. Wallace, with descriptions of new species. J Proc Linn Soc Zool. 5:270–303.
- Walker F. 1864. Catalogue of the dipterous insects collected in Waigiou, Mysol, and North Ceram, by Mr. A. R. Wallace, with descriptions of new species. J Proc Linn Soc Zool. 7:202–238.