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FRUIT FLIES (DIPTERA: TEPHRITIDAE) FROM MALAYSIA AND BRUNEI DARUSSALAM: NEW SPECIES AND RECORDS

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ABSTRACT

Bactrocera (Zeugodacus) *fraserensis*, **new species**, a Dacinae fruit fly from Peninsular Malaysia is described and illustrated. It closely resembles *Bactrocera* (Zeugodacus) *atrifacies* Perkins, *Bactrocera* (Zeugodacus) *scutellaris* (Bezzi) and *Bactrocera* (Zeugodacus) *scutellata* (Hendel). The differences between these species are given. New records from Peninsular Malaysia are *Acanthonevra hemileina* Hering, *Acanthonevra shinonagai* Hardy, *Phaeospilodes fenestella* (Coquillett), *Sphenella sinensis* Schiner and *Trupanea glauca* (Thomson). New records from East Malaysia are *Calloptera asteria* (Hendel), *Dacus* (Callantra) *ooii* Drew & Hancock, and *Dacus* (Callantra) *vijaysegarani* Drew & Hancock, while those from Brunei Darussalam are *Carpophthorella sookae* Chua and *Euphranta sabahensis* Hancock & Drew.

Key Words: *Bactrocera* (Zeugodacus) *fraserensis*, new records, Malaysia, Brunei Darussalam

RESUMEN

Se describe e ilustra *Bactrocera* (Zeugodacus) *fraserensis*, una **nueva especie** de la subfamilia Dacinae de la mosca de fruta encontrada en la Península de Malasia. Esta especie es muy parecida a las especies *Bactrocera* (Zeugodacus) *atrifacies* Perkins, *Bactrocera* (Zeugodacus) *scutellaris* (Bezzi) y *Bactrocera* (Zeugodacus) *scutellata* (Hendel). Se informa sobre las diferencias entre estas especies. Los nuevos registros de la Península de Malasia son *Acanthonevra hemileina* Hering, *Acanthonevra shinonagai* Hardy, *Phaeospilodes fenestella* (Coquillett), *Sphenella sinensis* Schiner y *Trupanea glauca* (Thomson). Los nuevos registros de Malasia Oriental son *Calloptera asteria* (Hendel), *Dacus* (Callantra) *ooii* Drew & Hancock, y *Dacus* (Callantra) *vijaysegarani* Drew & Hancock, mientras que las especies de Brunei Darussalam son *Carpophthorella sookae* Chua y *Euphranta sabahensis* Hancock & Drew.

The family Tephritidae is well represented in the tropical Asian countries and includes some of the most serious fruit pests such as *Bactrocera carambolae* Hancock and Drew, *B. cucurbitae* (Coquillett), *B. latifrons* (Hendel), and *B. papayae* Hancock and Drew. However there are many more species feeding on flower heads or bamboo shoots which are not likely to be considered as pests. They usually have beautiful wing patterns and distinct markings on the body that are important in their classification.

Korneyev (1999) revised the family of Tephritidae, subdividing it into 6 subfamilies: Dacinae, Trypetinae, Tephritinae, Phytalmiinae, Tachiniscinae, and Blepharoneurinae. Dacinae has a major tribe, Dacini consisting of mainly 2 genera, *Bactrocera* and *Dacus*. *Bactrocera* is a large genus consisting of 629 described species out of 880 in the tribe Dacini (Drew 2004), and contains most of the fruit fly pests in the tropical and subtropical countries.

The *Zeugodacus* group of the genus *Bactrocera* Macquart has 11 subgenera, many species of which are Australasian and Oceanian in distribution. Malaysian species are represented only in the subgenera *Paradacus* Perkins, *Paratridacus*

Shiraki, *Parazeugodacus* Shiraki, *Sinodacus* Hendel, and *Zeugodacus* Hendel (Chua 1998).

Species of the subgenus *Zeugodacus* can be recognized by the long posterior surstylus lobe, a slightly concave posterior margin of the abdominal sternum V of the male, and 4 scutellar bristles (in most species).

A new species of the subgenus *Zeugodacus*, *Bactrocera* (Zeugodacus) *fraserensis* **sp. nov.**, from Peninsular Malaysia is described here. We also report here for the first time several other species from Malaysia and Brunei Darussalam.

SYSTEMATICS

Tephritidae Newman, 1834

Subfamily Dacinae

Bactrocera Macquart 1834

Bactrocera (Zeugodacus) *fraserensis* Chua
sp. nov. (Fig. 1)

Description. Holotype male.

Head. Pedicel+first flagellomere not longer than ptilinal suture. Arista not plumose. Face

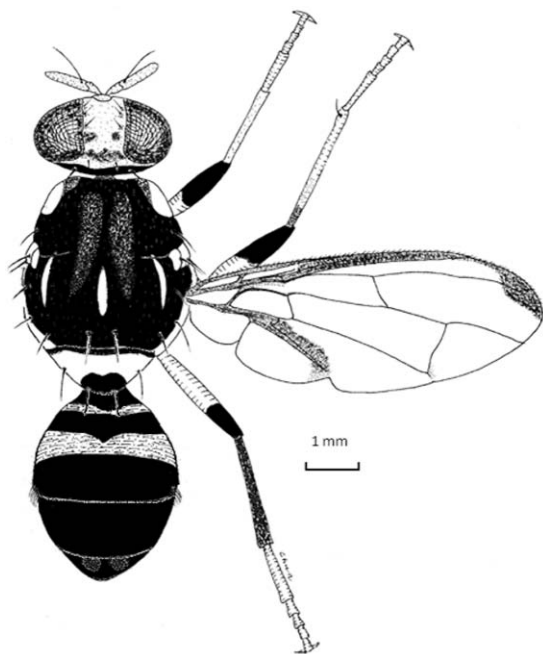


Fig 1. *Bactrocera* (*Zeugodacus*) *fraserensis*, **nov. sp.** male.

with a dark spot in each antennal furrow; spot irregular shape; spot large; without other markings. Frons with 3 pairs frontal setae; 1 pair orbital setae; with spots at seta bases. Lunule edge dark. Without dark mark between eye and antenna base.

Thorax. Predominant color of scutum black except for 2 broad grey vitta. Postpronotal lobe partly fuscous. No yellow spot laterad of postpronotal lobe. Prescutum without lateral yellow/orange vitta. Notopleuron yellow. Notopleural suture without isolated wedge shaped mark. Scutum with narrow lateral postsutural yellow vittae, which extend anterior to suture as small rounded spots, tapered posteriorly and ending before intra-alar seta. Scutum with a narrow medial vitta; not extended anterior to suture; tapering anteriorly. Without yellow/orange mark around or across prescutellar area. Scutellum yellow, with narrow black basal band, and large bilobed black apex. Anepisternum yellow stripe from notopleuron to above katapisternum; stripe almost parallel sided, and (dorsally) as broad as notopleural callus; stripe not an inverted L-shape. Katapisternal mark absent. Yellow marking on hypopleural calli across both anatergite and katatergite. Mediotergite black. Postpronotal lobe without a seta. Anterior notopleural seta, anterior supra-alar seta, prescutellar acrostichal setae and basal scutellar setae present.

Wing. Length 6.9 mm. Vein R_{2+3} slightly sinuate near end of vein R_1 . Vein R_{4+5} not setulose. Cell

bm not tapered to base. Cell dm expanded apically. Cells bc and c without extensive covering of microtrichia. Cell br (narrowed part) fuscous, with extensive covering of microtrichia. With a complete costal band; band not extending below R_{2+3} ; not extended narrowly all the way to vein M; expanded into a medium sized spot at apex; band not abruptly darkened at apex. Wing with an anal streak. Cells bc and c hyaline. Wing not overall fumose. Wing not patterned (other than costal band and anal streak).

Leg. Fore femur without stout ventral spines. All femora, pale basally, black apically (at least one-third apically). Fore and mid tibiae fuscous, hind tibiae black.

Abdomen. Predominant color of abdomen black. Tergites not fused. Abdomen not wasp-waisted. Tergites I with narrow posterior brown band, and II with posterior half brown. Tergite V without a dorsal hump. Ceromata round/ovoid.

Female: unknown.

Holotype. male (Holotype will be deposited, after publication, in Zoological Reference collection Department of Biological Sciences, National University of Singapore), MALAYSIA: Fraser's Hill, Pahang [3°42'59"N 101°44'13"E] 1500m, 19 VIII 2009, Chua Tock Hing. Three paratypes, male, 2 caught on 19VII 2009, and 1 on 7 IV 2010, same location. Paratypes are kept with the author.

Distribution. Three male specimens collected from Bukit Fraser (Fraser's Hill), Pahang, Malaysia.

Host. Unknown.

Attractant. Cuelure.

Remarks. This species resembles *Bactrocera* (*Zeugodacus*) *atrifacies* (Perkins), *Bactrocera* (*Zeugodacus*) *scutellaris* (Bezzi) and *Bactrocera* (*Zeugodacus*) *scutellata* (Hendel) in having 3 vittae, and part of the femora dark. Differences between *B. fraserensis* and the other species are given in Table 1.

Bactrocera fraserensis may be differentiated from the above 3 species by the rather large dark spots in the antennal furrow, the 2 central broad grey vittae and the narrow yellow vittae in the scutum, the medium size apical spot of the costal band and the color pattern of the abdomen.

Etymology. Named after the location, Bukit Fraser, Pahang, Malaysia.

Subfamily Dacinae, Tribe Dacini
Dacus (*Callantra*) *ooii* Drew & Hancock

Dacus (*Callantra*) *ooii* Drew & Hancock 1998: 614.

Materials Examined. Three males, attracted to cuelure, Limbang, Sarawak, 26 VII 2001.

Distribution. Southern Thailand, Peninsular Malaysia, Indonesia, East Malaysia (Sarawak, new record).

TABLE 1. DIFFERENCES BETWEEN *B. FRASERENSIS* AND *B. ATRIFACIES*, AND BETWEEN *B. SCUTELLARIS* AND *BACTROCERA SCUTELLATA*. INFORMATION ON OTHER SPECIES IS TAKEN FROM WHITE & HANCOCK (1997).

	<i>B. atrifacies</i>			<i>B. scutellata</i>	<i>B. scutellaris</i>	<i>B. fraserensis</i> nov. sp.
Face pattern (other than spot)	Black or dark face	No markings; OR line across the lower facial margin	No markings	No markings	No markings	No markings
Face with a dark spot in each antennal furrow	No	No or Yes (normal size)	Yes (normal size)	Yes (normal size)	Yes (large)	Yes (large)
Number of pairs of frontal setae	2-3	2-3	2-3	2-3	3	3
Medial vitta shape	Parallel; OR Broadest posteriorly	Parallel; OR Broadest posteriorly	Broadest centrally	Broadest centrally	Parallel but tapers anteriorly	Parallel but tapers anteriorly
Lateral vitta length	Reaching <i>ia</i> seta	To <i>ia</i> seta	End before <i>ia</i> seta	End before <i>ia</i> seta	Not reaching <i>ia</i> seta	Not reaching <i>ia</i> seta
Scutellum	Yellow Apex	Dark apex	Dark apex (small)	Dark apex (small)	Apex with bilobed black spot	Apex with bilobed black spot
Wing length	5.2 mm	6-8 mm	6.1-7.3 mm	6.1-7.3 mm	6.9 mm	6.9 mm
Size of costal band apical spot	trace	Half way to M	small	small	Medium size, Half way to M	Medium size, Half way to M
Fore femur	Almost whole femur	darkened apically only	$\frac{1}{4}$ apically darkened	$\frac{1}{4}$ apically darkened	$\frac{2}{3}$ apically darkened	$\frac{2}{3}$ apically darkened
Mid femur	$\frac{3}{4}$ apically darkened	pale	darkened apically only	darkened apically only	$\frac{1}{2}$ apically darkened	$\frac{1}{2}$ apically darkened
Hind femur	$\frac{2}{3}$ apically darkened	darkened apically only	darkened apically only	darkened apically only	$\frac{1}{2}$ apically darkened	$\frac{1}{2}$ apically darkened
Predominant color of abdomen	Black	Orange-brown -to- Black	black	black	Black with tergite 1 and II brown posterior margin	Black with tergite 1 and II brown posterior margin

Remarks. The specimens at hand fit very well the description given by Drew & Hancock (in Drew et al. 1998).

Dacus (Callantra) *vijaysegarani* Drew & Hancock

Dacus (Callantra) *vijaysegarani* Drew & Hancock 1998: 636.

Material Examined. One male, attracted to cueleur, Kobuni Ulu, Kota Kinabalu, Sabah, 23 XII 2009.

Distribution. Southern Thailand, Peninsular Malaysia, East Malaysia (Sabah, new record).

Remarks. The specimen at hand (and also another specimen collected in West Malaysia) fit well the description given by Drew & Hancock (in Drew et al. 1998) except the petiole is all black and the scutum all black (that is without a narrow dark red-brown along posterior margin).

Subfamily Dacinae, Tribe Ceratitidini
Phaeospilodes fenestella (Coquillett)

Oxyphora fenestella Coquillett, 1910: 308.

Ptilona poeciloptera Kertész, 1912: 543.

Phaeospilodes torquata Hering, 1939: 171.

Phaeospilodes atrifacis Hering, 1941a: 32.

Phaeospilodes poeciloptera (Kertész); Hering, 1941b: 49; Hardy, 1973:199

Material Examined. One female, attracted to cut bamboo shoot, Baling, Kedah, 20 VIII 2004.

Distribution. Hong Kong, Thailand, Peninsular Malaysia (new record).

Remarks. There is some difference in the wing pattern between the specimen at hand and the description given by Hancock & Drew (1999).

Carpophthorella sookae Chua

Carpophthorella sookae Chua 2003:465.

Distribution. Peninsular Malaysia, Brunei Darussalam (new record).

Materials Examined. Two females attracted to cut bamboo shoot, Bukit Kukop, Brunei Darussalam, 28 IX 2001, and 1 female, ex bamboo shoot collected same place and date.

Remarks. This species is recorded for the first time from Brunei Darussalam, and may be present in other parts of the Borneo Island.

Subfamily Phytalmiinae, Tribe Acanthonevrini
Acanthonevra hemileina Hering

Acanthonevra hemileina Hering 1939: 173.

Material Examined. One female, Bukit Larut, Perak, Malaysia, 12 V 2004.

Distribution. India, Vietnam, Peninsular Malaysia (new record).

Remarks. This species can be recognized easily by the anterior two-thirds of the wings brown and the entire posterior margin hyaline.

Acanthonevra shinonagai Hardy

Acanthonevra shinonagai Hardy 1986: 25.

Material Examined. One female, Kuala Lumpur, 1 VIII 1984;

Distribution. East Malaysia (Sabah, Sarawak), Brunei Darussalam, Peninsular Malaysia (new record).

Remarks. This species can be differentiated from other *Acanthonevra* species by the hyaline wedge that extends from R1 to cell dm.

Subfamily Trypetinae, Tribe Adramini
Euphranta sabahensis Hancock and Drew

Euphranta sabahensis Hancock & Drew (2004).

Material Examined. One female, 20 X 1999, Kuala Belalong, Brunei Darussalam.

Distribution. East Malaysia (Sabah), Brunei Darussalam (new record).

Remarks. This species is close to *E. hainanensis* (Zia) from Hainan, China (Hancock & Drew, 2004) and is a member of the *camelliae* group.

Subfamily Tephritinae, Tribe Tephritini,
Sphenella sinensis Schiner

Sphenella sinensis Schiner, 1868: 267.

Sphenella indica Schiner, 1868: 267.

Trypeta sinensis Thomson, 1869: 585.

Materials Examined. Malaysia: One male, 7 III 2008; 1 male, 11 III 2008; 1 female, 13 III 2008; 1 male, 18 III 2008 all from Bandar Sunway; 1 male, 20 V 2008, Damansara Jaya; 1 male, 29 V 2008; 1 male, 1 female; 2 VI 2008; 1 male, 7 VII 2008; 1 male, 1 female 5 V 2008, all from Kuala Lumpur; 1 female, 30 VI 2008, Lukut. All specimens collected on the host plant, *Emilia sonchifolia* Benth. (Asteraceae).

Distribution. Oriental region and New Guinea.

Remarks. This species is very widespread in Malaysia, and can be found wherever the host plant is present.

Trupanea glauca (Thomson)

Trypeta glauca Thomson 1869: 581.

Materials Examined. One male, 16 II 2008, 1 female, 2 males, 19 II 2008, all caught with sweep net in waste ground vegetation, Kampung Kerinchi, Kuala Lumpur.

Distribution. Philippines, Indonesia, Australia, Peninsular Malaysia (new record).

Remarks. It breeds in the flower heads of Asteraceae, and is supposedly widespread in the Pacific region.

Subfamily Tephritinae, Tribe Schitopterini
Calloptera asteria (Hendel)

Calloptera asteria (Hendel) Freidberg, 2002:8
Rhadochaeta asteria Hendel, 1915: 462.

Materials Examined. Two males, Sapi Island, Sabah, 10 VIII 2008, collected on host plant *Wedelia* sp. (Heliantheae).

Distribution. New Guinea, Solomon Island, Oriental Region (Formosa, Japan, India, Thailand, Laos, Vietnam), East Malaysia (new record).

Remarks. This is a small species, 2.7 mm or less long, with a black rounded pterostigma almost in the center of the wing.

DISCUSSION

Drew (2004) noted that endemism of Dacini fruit flies occurs in regions which have been isolated over a considerable period of time, and he defined these regions as the Indian subcontinent, South East Asia, Papua New Guinea, Australia, and the Pacific Islands. Each region has a different degree of endemism, and adjacent regions (e.g., between the Indian subcontinent and South East Asia) may share several common species.

As noted earlier by Chua (2002), South East Asia (Thailand, Peninsular Malaysia, Indonesia, and the Borneo Island consisting of East Malaysia, Brunei Darussalam, and Kalimantan) appear to share many fruit fly species. What was described from Thailand and Peninsular likely will eventually be recorded from the Borneo Island, whether it is from Brunei Darussalam (e.g., *Carpophthorella sookae*) or East Malaysia (e.g., *Calloptera asteria* (Hendel)). Similarly those found in the Borneo Island probably will occur in Peninsular Malaysia (e.g., *Acanthonevra shinonagai*).

This would indicate within South East Asia that there is little endemism of species, if any at all. This is most likely due to the similar environment and similar tropical rainforests occurring in these countries, which would have the same host plant family or plant species available to the fruit flies. Host plants not only provide the food for the immature stages, but also a habitat for the adults, as studies have indicated that adult feeding, courtship, and mating take place on the host plants (Drew & Romig 2000; Green et al. 1993). Furthermore, many species are polyphagous, utilizing various plant species of the same family (*Bactrocera cucurbitae* feeding on a range of cucurbit species). It has been estimated that 67% of *Bactrocera* species in South East Asia use hosts in 1 plant family only (Drew 2004). Similarly, many

bamboo species are found throughout the South East Asia, resulting in the same bamboo-shoot fruit fly species being recorded.

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