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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 Peninsula 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 Peninsula 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 ptitinal suture. Arista not plumose. Face
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 antennal 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; taping anteriorly. Without yellow/orange mark around or across prescutellar area. Scutellum yellow, with narrow black basal band, and large bilobed black apex. Anepesternal yellow stripe from notopleuron to above katepisternum; stripe almost parallel sided, and (dorsally) as broad as notopleural callus; stripe not an inverted L-shape. Katepisternal mark absent. Yellow marking on hypopleural calli across both anatergite and katergite. 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 $R_5$ slightly sinuate near end of vein $R_4$. 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 $R_2$; 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 fuscose. 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. 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).
|                          | B. atrifacies | B. scutellata | B. scutellaris | B. fraserensis nov. sp. |
|--------------------------|---------------|---------------|----------------|-------------------------|
| Face pattern (other than spot) | Black or dark face | No markings; OR line across the lower facial margin | No markings | No markings |
| Face with a dark spot in each antennal furrow | No | No or Yes (normal size) | Yes (normal size) | Yes (large) |
| Number of pairs of frontal setae | 2-3 | 2-3 | 2-3 | 3 |
| Medial vitta shape | Parallel; OR Broadest posteriorly | Parallel; OR Broadest posteriorly | Broadest centrally | Parallel but tapers anteriorly |
| Lateral vitta length | Reaching ia seta | To ia seta | End before ia seta | Not reaching ia seta |
| Scutellum | Yellow Apex | Dark apex | Dark apex (small) | Apex with bilobed black spot |
| Wing length | 5.2 mm | 6-8 mm | 6.1-7.3 mm | 6.9 mm |
| Size of costal band apical spot | trace | Half way to M | small | Medium size, Half way to M |
| Fore femur | Almost whole femur | darkened apically only | ¼ apically darkened | ½ apically darkened |
| Mid femur | ⅔ apically darkened | pale | darkened apically only | ½ apically darkened |
| Hind femur | ⅔ apically darkened | darkened apically only | darkened apically only | ½ apically darkened |
| Predominant color of abdomen | Black | Orange-brown -to- Black | black | Black with tergite 1 and II brown posterior margin |

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).
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 cuelure, 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.

**Ptilon poeciloptera** Kertesz, 1912: 543.

**Phaeospilodes atrifacies** Herking, 1941a: 32.

**Phaeospilodes poeciloptera** (Kertesz); Herking, 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).

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).

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 can be differentiated from other _Euphranta_ species by the hyaline wedge that extends from R1 to cell dm.

Subfamily Tephritinae, Tribe Tephritini,

**Sphenella sinensis** Schiner

**Sphenella sinensis** Schiner, 1868: 267.

**Sphenella indica** Schiner, 1868: 267.

**Trypeta sinensis** Thomson, 1869: 585.

**Material 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 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.

Subfamily Trypetinae, Tribe Tephritini,

**Sphenella sinensis** Schiner

**Trypeta glauca** (Thomson)

**Trypeta glauca** Thomson 1869: 581.

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

**Distribution.** Philippines, Indonesia, Australla, 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) Freidberg, 2002:8

Materials Examined. Two males, Sapi Island, Sabah, 10 VIII 2008, collected on host plant _Wedelia_ sp. (Heliantheeae).

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., _Acanthoneura 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 _Cucurbita_ species). It has been estimated that 67% of _Bactrocera_ species in South East Asia are 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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