

RECORDS OF DACINE FRUIT FLIES AND NEW SPECIES OF *DACUS* (DIPTERA: TEPHRITIDAE) IN BHUTAN

R. A. I. Drew and M.C. Romig

*International Centre for the Management of Pest Fruit Flies, Australian School of Environmental Studies,
Faculty of Environmental Sciences, Griffith University, QLD 4111, Australia
Email: D.Drew@griffith.edu.au (Corresponding author)*

C. Dorji

National Plant Protection Centre, Department of Agriculture, Ministry of Agriculture, Thimphu, Bhutan

ABSTRACT. – Twenty-nine species of *Bactrocera* Macquart and *Dacus* Fabricius are recorded from Bhutan, including two new species, *Dacus (Mellesis) dorjii* Drew & Romig and *Dacus (Mellesis) fletcheri* Drew. Information is given on location of type specimens, host plants, attractant records and geographic distributions for all species. For revised species, synonymies, diagnoses and remarks are also included.

KEY WORDS. – Tephritidae, Dacinae, *Bactrocera*, *Dacus*, Bhutan.

INTRODUCTION

The subfamily Dacinae, consisting primarily of two major genera, *Bactrocera* Macquart and *Dacus* Fabricius, is distributed from the southern and eastern African continent, across southern Asia and the Indian subcontinent, through southeast Asia and across the southern Pacific zone (Tsuruta & White, 2001; Drew, 2004). The fauna in the southern Asian and Indian subcontinental areas has been described primarily by Bezzi (1913, 1915, 1916), Kapoor (1971, 1993), Munro (1935, 1939), Perkins (1938), Hering (1956), Hardy (1971), Drew & Hancock (1994), Drew et al. (1998), White & Evenhuis (1999), Tsuruta & White (2001) and Drew & Raghu (2002). However, the fauna of Bhutan has not previously been extensively surveyed and researched. This fauna is distributed in a unique region for the Dacinae which is widely regarded as a tropical/subtropical subfamily of Tephritidae. The species in Bhutan are the most northern of all Dacinae in the general area of distribution of the subfamily and the fact that they occur in higher altitudes in the southern and eastern escarpment of the Himalayas, makes them particularly interesting. This paper presents records and new species collected during a survey in Bhutan from 2000 to 2005.

MATERIALS AND METHODS

Morphological terminology follows Drew & Hancock (1994). Specimens have been received on loan for study from or are located in the Australian National Insect Collection, CSIRO, Canberra (ANIC); The Natural History Museum, London,

UK (BMNH); Bernice P. Bishop Museum, Honolulu, Hawaii, USA (BPBM); Deutsches Entomologisches Institut, Eberswalde, Germany (DEI); Institute of Zoology, Academia Sinica, Beijing, China (IZAS); Hungarian Natural History Museum, Budapest, Hungary (MNM); Museo Civico di Storia Naturale, Milano, Italy (MSNM); Museum Zoologicum Bogoriense, Bogor, Java (MZB); National Plant Protection Centre, Thimphu, Bhutan (NPPC); Queensland Department of Primary Industries, Brisbane, Australia (QDPI); Queensland Museum, Brisbane, Australia (QM); University of Queensland Insect Collection, Brisbane, Australia (UQIC); National Museum of Natural History, Smithsonian Institution, Washington D.C., USA (USNM); Zoologisches Museum, Berlin, Germany (ZMB); Zoological Museum, University of Copenhagen, Denmark (ZMUC); Zoological Reference Collection of the Raffles Museum of Biodiversity Research, National University of Singapore (ZRC); Zoological Survey of India, Kolkata (ZSI).

SPECIES LIST OF *BACTROCERA* AND *DACUS* FOUND IN BHUTAN

Bactrocera Macquart

Bactrocera (Bactrocera) aethriobasis (Hardy)
Bactrocera (Bactrocera) correcta (Bezzi)
Bactrocera (Bactrocera) dorsalis (Hendel)
Bactrocera (Bactrocera) gombakensis Drew & Hancock
Bactrocera (Bactrocera) invadens Drew, Tsuruta & White
Bactrocera (Bactrocera) nigrofemorialis White & Tsuruta

Bactrocera (Bactrocera) rubigina Wang & Zhao
Bactrocera (Bactrocera) tuberculata (Bezzi)
Bactrocera (Bactrocera) verbascifoliae Drew & Hancock
Bactrocera (Bactrocera) vishnu Drew & Hancock
Bactrocera (Bactrocera) zonata (Saunders)
Bactrocera (Hemigynodacus) diversa (Coquillett)
Bactrocera (Tetradacus) minax (Enderlein)
Bactrocera (Zeugodacus) assamensis White
Bactrocera (Zeugodacus) atrifacies (Perkins)
Bactrocera (Zeugodacus) biguttata (Bezzi)
Bactrocera (Zeugodacus) cucurbitae (Coquillett)
Bactrocera (Zeugodacus) diaphora (Hendel)
Bactrocera (Zeugodacus) scutellaris (Bezzi)
Bactrocera (Zeugodacus) scutellata (Hendel)
Bactrocera (Zeugodacus) signata (Hering)
Bactrocera (Zeugodacus) tau (Walker)
Bactrocera (Zeugodacus) yoshimotoi (Hardy)
Bactrocera (Zeugodacus) zahadi Mahmood

Dacus Fabricius

Dacus (Callantra) longicornis (Wiedemann)
Dacus (Melleis) dorjii, new species
Dacus (Melleis) feijeni White
Dacus (Melleis) fletcheri, new species
Dacus (Melleis) siamensis Drew & Hancock

TAXONOMY

Bactrocera Macquart

Bactrocera (Bactrocera) aethriobasis (Hardy)

Dacus aethriobasis Hardy, 1973: 30. Holotype male in KUB.
Bactrocera (Bactrocera) aethriobasis – Norrbom et al., 1998: 87.

Material examined. – BHUTAN: 2 males (13 May.2000), 1 male (20 May.2000), 3 males (27 May.2000), 3 males (2 Jun.2000), Phuentsholing, coll. S. Thapa; 1 male, Gelephu, Purana Bastey, 26 Feb.2005, coll. Maha Prasad & Karma Namgyel. All specimens attracted to methyl eugenol. Specimens in NPPC and QDPI.

Diagnosis. – A large species; face fulvous with a pair of medium sized oval black spots; scutum entirely red-brown, postpronotal lobes and notopleura yellow, mesopleural stripe reaching anterior *npl.* seta dorsally, broad parallel sided lateral postsutural vittae ending behind *ia.* seta, medial postsutural vitta absent; setae: *sc.* 2; *prsc.* 2; *ia.* 1; *p.sa.* 1; *a.sa.* 1; *mpl.* 1; *npl.* 2; *scp.* 4; scutellum yellow with narrow red-brown basal band; legs with all segments entirely fulvous; wings with cells *bc* and *c* colourless and entirely devoid of microtrichia, narrow pale fuscous costal band confluent with R_{2+3} and extremely narrow and very pale fuscous beyond apex of R_{2+3} around costal margin of wing to end just beyond extremity of R_{4+5} , cubital streak reduced to pale fuscous within cell cup, supernumerary lobe weak; abdominal terga III-V either entirely dark fuscous to black or dark fuscous to black with dark red-brown either side of a medial longitudinal black band from centre of tergum IV to cover anterior 3/4 of tergum V, a pair of oval black shining spots on tergum V.

Attractant. – Methyl eugenol.

Distribution. – Thailand. New record for lower altitudes of Bhutan.

Hosts. – No known record.

Remarks. – A non pest species previously recorded only from Thailand. It is readily distinguished by the following characters – scutum red-brown, broad parallel sided lateral postsutural vittae, wings with a very narrow costal band and cubital streak absent, abdominal terga III-V black.

Bactrocera (Bactrocera) correcta (Bezzi)

Chaetodacus correctus Bezzi, 1916: 107. Syntypes in ZSI.

Strumeta paratuberculatus Philip, 1950: 31.

Dacus dutti Kapoor, 1971: 480.

Dacus bangaloriensis Agarwal & Kapoor, 1983: 169.

Bactrocera (Bactrocera) correcta – Liang et al., 1993: 137; Norrbom et al., 1998: 89.

Material examined. – BHUTAN: 1 male, Thimphu, Lumitshawa, 18 Oct.2000, coll. C. Dorji, attracted to methyl eugenol. Specimen in NPPC.

Diagnosis. – Face fulvous with a pair of small transverse oval black spots; scutum with base colour mostly black, postpronotal lobes and notopleura yellow, mesopleural stripe reaching to anterior *npl.* seta dorsally, moderately broad parallel sided lateral postsutural vittae reaching to *ia.* seta, medial postsutural vitta absent; setae: *sc.* 2; *prsc.* 2; *ia.* 1; *p.sa.* 1; *a.sa.* 1; *mpl.* 1; *npl.* 2; *scp.* 2; scutellum yellow except for narrow black basal band; legs with all segments entirely fulvous except tending fuscous apically on hind tibiae; wings with cells *bc* and *c* colourless and entirely devoid of microtrichia, narrow costal band confluent with R_{2+3} and ending at apex of this vein, a small fuscous spot around apex of R_{4+5} , cubital streak absent, supernumerary lobe weak; abdominal terga III-V red-brown with a black ‘T’ pattern consisting of a narrow transverse black band across anterior margin of tergum III and a narrow medial longitudinal black band over all three terga and very narrow dark fuscous lateral margins on terga IV and V, a pair of oval red-brown shining spots on tergum V.

Attractant. – Methyl eugenol.

Distribution. – Widespread (Pakistan, India, Nepal, Sri Lanka, Thailand, Southern China). New record for Bhutan.

Hosts. – Wide host range in wild and commercial fruits (see Allwood et al., 1999).

Remarks. – *Bactrocera correcta* (Bezzi) is a significant pest species in some parts of its geographic distribution. It is similar to *Bactrocera dorsalis* (Hendel) in overall appearance but is readily distinguished by having the costal band ending at apex of R_{2+3} and with a separate small fuscous spot around apex of R_{4+5} .

***Bactrocera (Bactrocera) dorsalis* (Hendel)**

Musca ferruginea Fabricius, 1794: 342. Preoccupied by *Musca ferruginea* Scopoli, 1763 (see Hardy, 1969: 396).
Dacus ferrugineus – Fabricius, 1805: 274.
Dacus dorsalis Hendel, 1912: 18. Lectotype female, Taiwan: Koshun, Formosa, ix.08 (Sauter) (BMNH).
Bactrocera ferruginea – Bezzi, 1913: 95.
Chaetodacus ferrugineus var. *dorsalis* (Hendel), Hendel, 1915: 426.
Chaetodacus ferrugineus – Bezzi, 1916: 104.
Chaetodacus ferrugineus dorsalis – Bezzi, 1916: 104.
Chaetodacus ferrugineus var. *okinawanus* Shiraki, 1933: 62; Hardy & Adachi, 1956: 8; Hardy, 1969: 402 (syn.).
Dacus (Strumeta) dorsalis – Hardy & Adachi, 1956: 7; Hardy, 1969: 395–402, 1973: 41–42, 1974: 29–31.
Strumeta dorsalis – Hering, 1956: 63.
Strumeta ferruginea – Hering, 1956: 63.
Strumeta dorsalis okinawana – Shiraki, 1968: 23.
Dacus (Bactrocera) dorsalis – Hardy, 1977: 49–50; Drew, 1982: 60–63; Drew, 1989: 63 n. comb.
Bactrocera (Bactrocera) dorsalis – Drew & Hancock, 1994: 17; Norrbom et al., 1998: 90.

Material examined. – BHUTAN: a large number of specimens collected in areas of Bhutan below 1500 m altitude in both cultivated and subtropical habitats. All specimens attracted to methyl eugenol. Specimens in NPPC and QDPI.

Diagnosis. – Face fulvous with a pair of medium sized circular black spots; scutum with base colour black, postpronotal lobes and notopleura yellow, mesopleural stripe reaching midway between anterior margin of notopleuron and anterior *npl.* seta dorsally, a pair of broad parallel sided lateral postsutural vittae ending just behind *ia.* seta, medial postsutural vitta absent; setae: *sc.* 2; *prsc.* 2; *ia.* 1; *p.sa.* 1; *a.sa.* 1; *mpl.* 1; *npl.* 2; *scp.* 4; scutellum yellow with a narrow black basal band; legs with segments mostly fulvous except fore tibiae pale fuscous and hind tibiae fuscous; wings with cells bc and c colourless, microtrichia in outer corner of cell c only, narrow fuscous costal band confluent with R_{2+3} and remaining narrow around costal margin to end just beyond apex of R_{4+5} , a narrow pale fuscous cubital streak, supernumerary lobe weak; abdominal terga III–V fulvous with a black ‘T’ pattern consisting of a narrow transverse black band across anterior margin of tergum III and a narrow medial longitudinal black band over all three terga, narrow dark fuscous to black anterolateral corners on terga IV and V (in some specimens the lateral margins of tergum III tend to have medium width lateral dark fuscous to black bands, a pair of oval fulvous shining spots on tergum V (see Drew & Hancock, 1994 for a complete description).

Attractant. – Methyl eugenol.

Distribution. – Widespread from the Indian subcontinent, across southeast Asia and the northern Pacific (see Drew & Hancock, 1994).

Hosts. – A very wide range of wild and commercial fruits (see Allwood et al., 1999).

Remarks. – This species has been adequately described and illustrated by Drew & Hancock (1994). It is recognized as a species of major economic significance within the *dorsalis* complex. The *dorsalis* complex comprises species with a black scutum, lateral postsutural vittae present, medial postsutural vitta absent, wings colourless except for narrow costal band, abdominal terga III–V pale with a black ‘T’ pattern.

***Bactrocera (Bactrocera) gombokensis* Drew & Hancock**

Bactrocera (Bactrocera) gombokensis Drew & Hancock, 1994: 24; Norrbom et al., 1998: 91. Holotype male in BMNH.

Material examined. – BHUTAN: 1 male, Phuentsholing, 6 May.2000, coll. S. Thapa; 1 male, Tsirang, 19 Jun.2000, coll. T.D. & S.D; 1 male, Tsirang, Darachu, 30 May.2001, coll. B. Fletcher; 4 males, Namling 16 km, 1600 m, 9 Jun.2001, subtropical forest, coll. Brian Fletcher; 1 male, Lingmethang 11 km, 1100 m, 9 Jun.2001, subtropical forest, coll. Brian Fletcher; 2 males, Lingmethang, 700 m, 9 Jun.2001, mango tree, coll. Brian Fletcher; 5 males (15 Nov.2004), 3 males (5 Dec.2004), Samdrup Jongkhar District, coll. Wangdi. All specimens attracted to cue lure. Specimens in NPPC and QDPI.

Diagnosis. – A medium sized species; face fulvous with a pair of large circular black spots; scutum base colour black, postpronotal lobes and notopleura yellow, mesopleural stripe reaching midway between anterior margin of notopleuron and anterior *npl.* seta dorsally, a pair of medium width parallel sided lateral postsutural vittae ending at *ia.* seta, medial postsutural vitta absent; setae: *sc.* 2; *prsc.* 2; *ia.* 1; *p.sa.* 1; *a.sa.* 1; *mpl.* 1; *npl.* 2; *scp.* 4; scutellum yellow with a narrow black basal band; legs with femora fulvous with large black subapical spots on outer surfaces; wings with cells bc and c colourless, microtrichia in outer corner of cell c only, a narrow fuscous costal band confluent with R_{2+3} and remaining narrow around costal margin to end just beyond apex of R_{4+5} , cubital streak absent but with some pale fuscous in base of cell cup, supernumerary lobe weak; abdominal terga III–V orange-brown with a ‘T’ pattern consisting of a narrow transverse black band across anterior margin of tergum III and widening to cover outer 1/3 of the lateral margins, a narrow medial longitudinal black band over all three terga, anterolateral corners of terga IV and V dark fuscous to black.

Attractant. – Cue lure.

Distribution. – Peninsular Malaysia. New record for Bhutan.

Hosts. – No known record.

Remarks. – *Bactrocera gombokensis* Drew & Hancock is a non-pest member of the *dorsalis* complex. It is readily distinguished by the following characters – large black spots on outer apical surfaces of all femora, costal band narrow without apical expansion and cubital streak absent.

***Bactrocera (Bactrocera) invadens*
Drew, Tsuruta & White**

Bactrocera (Bactrocera) invadens Drew, Tsuruta & White, 2005: 149. Holotype male in BMNH.

Material examined. – BHUTAN: 19 males, Phuentsholing, 6 May.2000, coll. S. Thapa; 2 males, Phuentsholing 10 km, 10 Jun.2000, coll. S. Thapa; 1 male, Rimchu 1, 28 Jun.2000, coll. C. Dorji et al.; 1 male (5 Jul.2000), 1 male (26 Jul.2000), 1 male (16 Aug.2000), Rimchu 1, C. Dorji; 3 males, Rimchu, 17 May.2001, coll. R. Drew & M. Romig; 1 male, Rimchu 2, 28 Jul.2000, coll. C. Dorji; 1 male, Lingmethang 11 km, 1100 m, subtropical forest, 9 Jun.2001, coll. Brian Fletcher; 1 male, Gelephu, Purana Bastey, 23 Nov.2004, coll. Maha Prasad & Karma Namgyel. All specimens attracted to methyl eugenol. Specimens in NPPC and QDPI.

Diagnosis. – A medium sized species; face fulvous with a pair of medium to large oval black spots; scutum with base colour red-brown with variable dark fuscous to black patterns (in occasional specimens the scutum base colour is black), postpronotal lobes and notopleura yellow, mesopleural stripe reaching midway between anterior margin of notopleuron and anterior *npl.* seta dorsally, a pair of broad parallel sided lateral postsutural vittae ending at or just behind *ia.* seta, medial postsutural vitta absent; setae: *sc.* 2; *prsc.* 2; *ia.* 1; *p.sa.* 1; *a.sa.* 1; *mpl.* 1; *npl.* 2; *scp.* 4; scutellum yellow except for narrow dark basal band; legs with femora entirely fulvous; wings with cells bc and c colourless, microtrichia in outer corner of cell c only, narrow fuscous costal band confluent with R_{2+3} and remaining narrow around costal margin to end just beyond extremity of R_{4+5} , a narrow pale fuscous cubital streak, supernumerary lobe weak; abdominal terga III-V orange-brown with a 'T' pattern consisting of a narrow transverse black band across anterior margin of tergum III which expands to cover lateral margins, a narrow medial longitudinal black band over all three terga, narrow dark fuscous to black lateral margins on terga IV and V, dark orange-brown shining spots on tergum V.

Attractant. – Methyl eugenol.

Distribution. – Sri Lanka, Central Africa. New record for Bhutan.

Hosts. – Recorded from guava, mango, citrus, papaya, and some wild hosts in Africa (see Drew et al., 2005).

Remarks. – This species was recently described (Drew et al., 2005) after it invaded central Africa from Kenya through to Ghana. It is proving to be a major pest in the countries it has invaded and has probably originated in Sri Lanka. It is similar to *Bactrocera dorsalis* (Hendel), *Bactrocera kandiensis* Drew & Hancock and *Bactrocera rubigina* Wang & Zhao. It differs from *B. dorsalis* in having a red-brown scutum occasionally with dark patterns, narrow lateral postsutural vittae and a longer male aedeagus. It differs from *B. kandiensis* in having a smaller bare colourless area adjacent to cell bm in the wing and from *B. rubigina* in having a narrower costal band not overlapping R_{2+3} , a more distinct dark 'T' pattern on abdominal terga III-V, shining spots on tergum V pale coloured and males attracted to methyl eugenol.

***Bactrocera (Bactrocera) nigrofemoralis*
White & Tsuruta**

Bactrocera (Bactrocera) nigrofemoralis White & Tsuruta, in Tsuruta & White, 2001: 79. Holotype male in BMNH.

Material examined. – BHUTAN: 2 males (6 May.2000), 2 males (20 May.2000), Phuentsholing, coll. S. Thapa; 1 male, Rimchu 1, 7 Jun.2000, coll. C. Dorji et al.; 1 male, Gelephu, Purana Bastey, 1 Feb.2005, coll. Maha Prasad & Karma Namgyel. All specimens attracted to cue lure. Specimens in NPPC and QDPI.

Diagnosis. – Face entirely black except narrow fulvous lateral margins and dorsally below antennal sockets; scutum entirely black, postpronotal lobes and notopleura yellow, mesopleural stripe reaching anterior *npl.* seta dorsally, narrow parallel sided lateral postsutural vittae reaching to *ia.* seta, medial postsutural vitta absent; setae: *sc.* 2; *prsc.* 2; *ia.* 1; *p.sa.* 1; *a.sa.* 1; *mpl.* 1; *npl.* 2; *scp.* 4; scutellum yellow except for narrow to medium black basal band; legs with fore femora shining black on entire outer surfaces, fulvous on inner surfaces and on basal and apical extremities, mid femora entirely shining black except dark fulvous on basal and apical extremities, hind femora fulvous except shining black on apical 1/3, fore tibiae fuscous, mid tibiae dark fulvous tending pale fuscous basally, hind tibiae dark fuscous, tarsal segments entirely fulvous tending darker fulvous on apical four segments; wings with cells bc and c colourless, microtrichia in outer corner of cell c only, a narrow fuscous costal band confluent with R_{2+3} and remaining very narrow around costal margin to end at apex of R_{4+5} , a very narrow fuscous cubital streak, supernumerary lobe weak; abdominal tergum III dark fuscous to black except red-brown posterocentrally either side of a narrow medial longitudinal black band, tergum IV fuscous to dark fuscous except red-brown posterocentrally either side of a narrow medial longitudinal black band (the posterocentral red-brown markings extend towards the lateral margins), tergum V red-brown with dark fuscous anterolateral corners and a narrow medial longitudinal fuscous to black band, a pair of oval dark fuscous to black shining spots on tergum V.

Attractant. – Cue lure.

Distribution. – Southern India, Sri Lanka. New record for Bhutan.

Hosts. – *Terminalia catappa* (Family Combretaceae) (see Tsuruta et al., 1997).

Remarks. – This species belongs to a group similar to *Bactrocera nigrotibialis* (Perkins), having a black scutum, wings with a narrow fuscous costal band and cubital streak, femora and tibiae with extensive areas of black and abdominal terga mostly black. It is distinct in possessing a broader mesopleural stripe reaching dorsally to the anterior *npl.* seta, and the lateral postsutural vittae narrow, parallel sided and reaching to the *ia.* seta. It is not known to be a pest species.

***Bactrocera (Bactrocera) rubigina* Wang & Zhao**

Dacus rubiginus Wang & Zhao, 1989: 211. Holotype male in IZAS.
Bactrocera (Bactrocera) rubigina – Liang et al., 1993: 138; Norrbom et al., 1998: 95.

Material examined. – BHUTAN: 2 males (13 May.2000), 2 males (20 May.2000), 1 male (27 May.2000), Phuentsholing, coll. S. Thapa, 1 male, Lumitshawa, 5 May.2000, coll. C. Dorji; 1 male (17 May.2000), 1 male (24 May.2000), Rimchu, coll. C. Dorji; 1 male, Rimchu 1, 5 Jul.2000, coll. C. Dorji et al.; 4 males (17 May.2000), 1 male (31 May.2000), Rimchu 1, coll. C. Dorji; 2 males, Rimchu 1, 21 Jun.2000, coll. Nado et al.; 2 males, Rimchu 1, 10 May.2000, coll. B.S. Fletcher; 2 males, Rimchu 2, 7 Jun.2000, coll. Dorji & Nado; 1 male, Rimchu 2, 17 May.2000, coll. C. Dorji; 2 males, Rimchu 2, 10 May.2000, coll. B.S. Fletcher; 1 male, Rimchu 3, 10 May.2000, coll. B.S. Fletcher; 2 males, Tsirang, 31 Jul.2000; 1 male, Tsirang, 10 Jul.2000, coll. T.D. & S.D.; 1 male (15 May.2000), 1 male (5 Jun.2000), Suntalay, coll. S. Wangdi et al.; 1 male, Namling 14 km, 1800 m, subtropical forest, 7 Jun.2000, coll. Brian Fletcher; 1 male, Lingmethang, 11 km, 1100 m, subtropical forest, 9 Jun.2001, coll. Brian Fletcher; 13 males (15 Nov.2004), 11 males (5 Dec.2004), 1 male (29 Dec.2004), Samdrup Jongkhar District, coll. Wangdi; 1 male (9 Nov.2004), 1 male (1 Feb.2005), Gelephu, Purana Bastey, coll. Maha Prasad & Karma Namgyel. All specimens attracted to cue lure. Specimens in NPPC and QDPI.

Diagnosis. – Face fulvous with a pair of medium sized oval black spots; scutum with base colour red-brown and dark red-brown to fuscous lanceolate dark patterns; postpronotal lobes and notopleura yellow, mesopleural stripe reaching midway between anterior margin of notopleuron and anterior *npl.* seta dorsally, medium width lateral postsutural vittae narrowing posteriorly to end before *ia.* seta, medial postsutural vitta absent; setae: *sc.* 2; *prsc.* 2; *ia.* 1; *p.sa.* 1; *a.sa.* 1; *mpl.* 1; *npl.* 2; *scp.* 4; scutellum yellow except for narrow red-brown basal band; legs with femora entirely fulvous, fore tibiae fuscous to dark fuscous, mid tibiae fulvous tending fuscous basally, hind tibiae dark fuscous, tarsal segments entirely fulvous tending darker on apical four segments; wings with cells bc and c colourless, microtrichia in outer corner of cell c only, narrow fuscous costal band just overlapping R_{2+3} where it is very pale and widening slightly beyond apex of R_{2+3} to end beyond extremity of R_{4+5} , a narrow fuscous cubital streak, supernumerary lobe weak; abdominal terga III-V red-brown with a ‘T’ pattern consisting of a narrow transverse black band across anterior margin of tergum III and widening to cover lateral margins where it tends to be dark fuscous, a narrow medial longitudinal black band over all three terga but ending before posterior margin of tergum V, anterolateral corners of terga IV and V dark fuscous, a pair of dark red-brown to fuscous shining spots on tergum V.

Attractant. – Cue lure.

Distribution. – China (Hainan). New record for Bhutan.

Hosts. – *Litsea verticillata* (Family Lauraceae) (see Liang et al., 1993).

Remarks. – This species is similar to *Bactrocera invadens* Drew, Tsuruta & White in general body colours. See remarks on *B. invadens* for similarities and differences. It is important to note that males of *B. rubigina* Wang & Zhao respond to cue lure while males of *B. invadens* respond to methyl eugenol. *Bactrocera rubigina* is not a pest species.

***Bactrocera (Bactrocera) tuberculata* (Bezzi)**

Chaetodacus tuberculatus Bezzi, 1916: 106. Holotype male in BMNH.

Bactrocera (Bactrocera) tuberculata – Liang et al., 1993: 138; Norrbom et al., 1998: 96.

Material examined. – BHUTAN: 3 males (6 May.2000), 6 males (13 May.2000), 6 males (20 May.2000), 11 males (27 May.2000), 5 males (2 Jun.2000), Phuentsholing, coll. S. Thapa; 1 male, Rimchu 1, 28. Jun.2000, coll. C. Dorji; 1 male (17 May.2000), 1 male (21 Jun.2000), Rimchu 2, coll. C. Dorji; 5 males, Suntalay, 15 May.2000, coll. S. Wangdi, T. Dorji & S. Dorji; 3 males, Suntalay, 5 Jun.2000, coll. S.D., T.D. & S.W.; 1 male, Suntalay, Tsirang, 11 Nov.2004, coll. Karma Dukpa; 1 male, Samdrup Jongkhar District, 5 Dec.2004, coll. Wangdi. All specimens attracted to methyl eugenol. Specimens in NPPC and QDPI.

Diagnosis. – Face fulvous with a pair of medium sized circular black spots; scutum entirely black, postpronotal lobes and notopleura yellow, mesopleural stripe reaching almost to anterior *npl.* seta dorsally, a pair of broad parallel sided lateral postsutural vittae ending behind *ia.* seta, medial postsutural vitta absent; setae: *sc.* 2; *prsc.* 2; *ia.* 1; *p.sa.* 1; *a.sa.* 1; *mpl.* 1; *npl.* 2; *scp.* 4; scutellum yellow except for a narrow black basal band; legs with all segments entirely fulvous; wings with cells bc and c colourless and entirely devoid of microtrichia, a narrow pale fuscous costal band confluent with R_{2+3} and ending at extremity of this vein, a small fuscous spot around apex of R_{4+5} , a very narrow pale fuscous cubital streak, supernumerary lobe weak; abdominal terga III-V entirely black.

Attractant. – Methyl eugenol.

Distribution. – Myanmar, Southwest China. New record for Bhutan.

Hosts. – A range of commercial and wild hosts (see Allwood et al., 1999).

Remarks. – This species is unique in having a black scutum, abdominal terga III-V entirely black, wing with costal band terminating at apex of R_{2+3} and a small fuscous spot around apex of R_{4+5} . It is not known to be a pest species.

***Bactrocera (Bactrocera) verbascifoliae* Drew & Hancock**

Bactrocera (Bactrocera) verbascifoliae Drew & Hancock, 1994: 64; Norrbom et al., 1998: 96. Holotype female in BMNH.

Material examined. – BHUTAN: 3 males, Phuentsholing, 10 km, 10 Jun.2000, coll. S. Thapa; 1 male, Phuentsholing, 13 May.2000, coll. S. Thapa PQI; 1 male, Rimchu, 17 May.2001, coll. R. Drew & M. Romig; 2 males, Samdrup Jongkhar District, 15 Nov.2004, coll. S. Wangdi. All specimens attracted to methyl eugenol. Specimens in NPPC and QDPI.

Diagnosis. – Face fulvous with a pair of medium size circular black spots; scutum with base colour black, postpronotal lobes and notopleura yellow, mesopleural stripe reaching midway between anterior margin of notopleuron and anterior *npl.* seta dorsally, a pair of narrow parallel sided lateral postsutural vittae ending at *ia.* seta, medial postsutural vitta absent; setae: *sc.* 2; *prsc.* 2; *ia.* 1; *p.sa.* 1; *a.sa.* 1; *mpl.* 1; *npl.* 2; *scp.* 4; scutellum yellow except for a narrow black basal band; legs with femora entirely fulvous, fore tibiae pale fuscous, mid tibiae fulvous tending pale fuscous basally, hind tibiae pale fuscous; wings with cells bc and c colourless, microtrichia in outer corner of cell c only, a narrow fuscous costal band confluent with or slightly overlapping R_{2+3} and remaining narrow around costal margin to end beyond extremity of R_{4+5} (in some specimens there is a slight swelling around apex of R_{4+5}), a narrow fuscous cubital streak ending before wing margin, supernumerary lobe weak; abdominal terga III-V orange-brown with a narrow transverse black band across anterior margin of tergum III and expanding to cover lateral margins where it becomes dark fuscous, a narrow medial longitudinal dark fuscous to black band over all three terga, anterolateral corners of terga IV and V dark fuscous to black.

Attractant. – Methyl eugenol.

Distribution. – India, Thailand. New Record for Bhutan.

Hosts. – Species of wild *Solanum* including *Solanum verbascifolium* (Family Solanaceae) (see Drew & Hancock, 1994; Allwood et al., 1999).

Remarks. – This species is a non pest member of the *dorsalis* complex with a specialised host plant association. It is similar to *B. dorsalis* (Hendel) in general colour patterns but differs in having narrow lateral postsutural vittae and a short aculeus on the female ovipositor (see Drew & Hancock, 1994).

***Bactrocera (Bactrocera) vishnu* Drew and Hancock**

Bactrocera (Bactrocera) vishnu Drew & Hancock, 1994: 65; Norrbom et al., 1998: 96. Holotype male in BMNH.

Material examined. – BHUTAN: 1 male, Rimchu 1, 24 May.2000, coll. C. Dorji; 1 male, Rimchu 1, 14 Jun.2000, coll. Nado; 1 male, Rimchu 1, 21 Jun.2000, coll. Nado et al.; 1 male, Rimchu 2, 10 May.2000, coll. B.S. Fletcher; 1 male, Rimchu 2, 16 Aug.2000, coll. C. Dorji; 1 male, Lingmethang, 700 m, mango tree, 9 Jun.2001, coll. Brian Fletcher. All specimens attracted to cue lure. Specimens in NPPC and QDPI.

Diagnosis. – Face fulvous with a pair of large oval black spots; scutum almost entirely black, postpronotal lobes and notopleura yellow, mesopleural stripe reaching midway between anterior margin of notopleuron and anterior *npl.* seta

dorsally, a pair of moderately broad parallel sided lateral postsutural vittae ending at or just behind *ia.* seta, medial postsutural vitta absent; setae: *sc.* 2; *prsc.* 2; *ia.* 1; *p.sa.* 1; *a.sa.* 1; *mpl.* 1; *npl.* 2; *scp.* 4; scutellum yellow except for narrow black basal band; legs with femora fulvous except for a large oval black spot on outer apical surfaces of fore femora, fore and mid tibiae fulvous tending dark fuscous basally, hind tibiae dark fuscous, tarsi with all segments entirely fulvous; wings with cells bc and c colourless, microtrichia in outer corner of cell c only, narrow fuscous costal band just overlapping R_{2+3} and remaining narrow to end just beyond extremity of R_{4+5} , a narrow fuscous cubital streak confined to cell cup, supernumerary lobe weak; abdominal terga III-V dark orange-brown except for dull black across anterior 1/2 of tergum III and expanding to cover lateral margins and anterolateral corners of terga IV and V dark fuscous to dull black.

Attractant. – Cue lure.

Distribution. – Southern India. New record for Bhutan.

Hosts. – No known record.

Remarks. – This species is a non pest member of the *dorsalis* complex and is distinct in having a large oval preapical black spot on the fore femora, a narrow medial longitudinal dark band on abdominal terga III-V and fuscous shining spots on tergum V (see Drew & Hancock, 1994).

***Bactrocera (Bactrocera) zonata* (Saunders)**

Dasyneura zonata Saunders, 1842: 61.

Bactrocera maculigera Doleschall, 1858: 122.

Rivellia persicae Bigot, 1890: 192.

Dacus ferrugineus var. *mangiferae* Cotes, 1893: 17.

Bactrocera (Bactrocera) zonata – Norrbom et al., 1998: 96.

Material examined. – BHUTAN: a large number of specimens collected across Bhutan from the following locations below approx. 1600 m – Sarpang District, Purana Bastey, Gelephu; Mongar District, Namling; Chukha District, Phuentsholing; Punakha District, Rimchu. All specimens attracted to methyl eugenol. Specimens in NPPC and QDPI.

Diagnosis. – Face fulvous with small circular black spots; scutum entirely red-brown, postpronotal lobes and notopleura yellow, mesopleural stripe reaching to anterior *npl.* seta dorsally, medium width parallel sided lateral postsutural vittae reaching just behind *ia.* seta, medial postsutural vitta absent; setae: *sc.* 2; *prsc.* 2; *ia.* 1; *p.sa.* 1; *a.sa.* 1; *mpl.* 1; *npl.* 2; *scp.* 2; scutellum yellow except for a narrow red-brown basal band; legs with all segments fulvous except hind tibiae pale fuscous; wings with cells bc and c colourless and devoid of microtrichia, pale fuscous costal band confluent with R_{2+3} and ending at apex of this vein, small fuscous spot around apex of R_{4+5} , cubital streak absent but with a very pale fuscous tint in cell cup, supernumerary lobe weak; abdominal terga III-V red-brown with a narrow transverse black band across anterior margin of tergum III and expanding to dark fuscous

across lateral margins and a narrow medial longitudinal black band over all three terga (these dark patterns can be reduced to a narrow transverse band across anterior margin of tergum III sometimes broken in the midline and the medial longitudinal band reduced to a narrow dark fuscous line on tergum V), a pair of oval red-brown shining spots on tergum V.

Attractant. – Methyl eugenol.

Distribution. – From Sri Lanka, India and Pakistan through to Vietnam. New Record for Bhutan.

Hosts. – A wide range of wild and commercial host plants (see Allwood et al., 1999).

Remarks. – *Bactrocera zonata* (Saunders) is a major pest species that appears to be confined to the dryer and more temperate climatic zones of southern and southeast Asia. It is readily distinguished by the general red-brown colour pattern of the scutum and abdomen, the wing with costal band ending at the apex of R_{2+3} , a small fuscous spot around apex of R_{4+5} and the cubital streak absent.

Bactrocera (Hemigymnodacus) diversa (Coquillett)

Dacus diversus Coquillett, 1904: 139. Syntypes in USNM.

Dacus quadrifidus Hendel, 1928: 343.

Dacus citronellae Kapoor & Katiyar, 1969: 123.

Dacus (Hemigymnodacus) diversus – Hardy, 1973: 19.

Bactrocera (Hemigymnodacus) diversa – Liang et al., 1993: 138.

Bactrocera (Paratridacus) diversa – Norrbom et al., 1998: 99.

Material examined. – BHUTAN: 1 male, Purana Bastey, 30 Nov.2004, coll. Karma Namgyel, attracted to methyl eugenol. Specimen in NPPC.

Diagnosis. – Face entirely fulvous without dark markings; scutum entirely black, postpronotal lobes and notopleura yellow, mesopleural stripe almost reaching anterior *npl.* seta dorsally, broad parallel sided lateral postsutural vittae beginning with a small spot anterior to mesonotal suture and ending just behind *ia.* seta, a narrow medial longitudinal postsutural vitta present; setae: *sc.* 2; *prsc.* 2; *ia.* 1; *p.sa.* 1; *a.sa.* 1; *mpl.* 1; *npl.* 2; *scp.* 2; scutellum yellow except for narrow black basal band; legs with femora fulvous with dark fuscous to black subapical spots on outer surfaces of all femora (on the mid femora they cover approximately 1/2 the outer apical surface), fore and mid tibiae fulvous tending dark fuscous basally, hind tibiae dark fuscous, tarsal segments entirely fulvous; wings with cells bc and c colourless, microtrichia in outer corner of cell c only, narrow dark fuscous costal band confluent with R_{2+3} and widening across apex of wing, medium width dark fuscous cubital streak present, supernumerary lobe strong and rounded; abdominal terga III-V red-brown with distinct ‘T’ patterns on terga III and IV consisting of a transverse black band across anterior margin of each tergum and a medium width medial longitudinal black band running to hind margin of each tergum, tergum V red-brown with large anterolateral dark fuscous to black corners

and a narrow medial longitudinal dark fuscous to black band on anterior 1/2, a pair of red-brown oval shining spots on tergum V.

Attractant. – Methyl eugenol.

Distribution. – Sri Lanka, India, Nepal, China, Thailand. New record for Bhutan.

Hosts. – Flowers of a range of wild and commercial species of the Family Cucurbitaceae.

Remarks. – *Bactrocera diversa* (Coquillett) is a biologically unusual species of Dacinae in that it oviposits into flowers of its host, not fruit. It is readily distinguished by the following characters – face entirely fulvous (no dark patterns), scutum black with lateral and medial postsutural vittae, yellow spot anterior to mesonotal suture, wing with cells bc and c colourless, narrow costal band confluent with R_{2+3} , strong supernumerary lobe in males, legs with subapical dark spots on all femora, abdominal terga III-V with black ‘T’ patterns on all terga. It is a pest species in that it causes loss of flowers in commercial crops but does not have quarantine significance for export trade.

Bactrocera (Tetradacus) minax (Enderlein)

Polistomimetes minax Enderlein, 1920: 358. Lectotype male in BMNH.

Mellessis citri Chen, 1940: 133.

Dacus (Polistomimetes) minax – Drew, 1979: 76.

Bactrocera (Tetradacus) minax – White & Wang, 1992: 276, lectotype designation; Norrbom et al., 1998: 101. Lectotype male in BMNH.

Material examined. – BHUTAN: 1 female and 2 males (17 May.2000), 3 females and 3 males (24 May.2000), 2 females (31 May.2000), 1 female and 1 male (7 Jun.2000), Rimchu 1, coll. C. Dorji; 1 male, Rimchu 2, 21 Jun.2000; 1 female, Rimchu 1, new trap, 12 Jul.2000, coll. C. Dorji & P. Loday. All specimens attracted to methyl eugenol. Specimens in QDPI.

Diagnosis. – A very large species; face fulvous with narrow elongate facial spots reaching oral margin; scutum red-brown without dark patterns, postpronotal lobes and notopleura yellow, a broad lateral yellow band connecting postpronotal lobe and notopleuron, mesopleural stripe extending to anterior *npl.* seta dorsally, two broad parallel sided lateral postsutural vittae ending at *ia.* seta, a short narrow medial longitudinal postsutural vitta; setae: *sc.* 2; *prsc.* absent; *ia.* 1; *p.sa.* 1; *a.sa.* absent; *mpl.* 1; *npl.* 2; *scp.* 2; scutellum yellow with a narrow red-brown basal band; legs with all segments mostly fulvous; wings with cells bc and c fuscous, microtrichia in outer corner of cell bc and outer 1/2 of cell c, a broad fuscous costal band overlapping R_{4+5} and becoming darker towards the apex but not expanding into a spot, a narrow fuscous cubital streak but not reaching margin of wing, supernumerary lobe weak; abdomen elongate oval and petiolate (similar to many *Dacus* species), terga III-V orange-brown with a moderately broad transverse fuscous band across anterior

margin of tergum III and a medium width medial longitudinal pale fuscous band over all three terga, anterolateral corners of tergum IV fuscous, anterolateral corners of tergum V pale fuscous.

Attractant. – Weak attraction to methyl eugenol during 2000 field work in Bhutan.

Distribution. – Sikkim, India, Bhutan, China.

Hosts. – A wide range of wild and edible citrus (Family Rutaceae).

Remarks. – *Bactrocera minax* (Enderlein) is an extremely large species, probably the largest known *Bactrocera*. It is readily distinguished by its *Dacus* (*Callantra*) like petiolate abdomen shape, general red-brown colour patterns on the thorax and abdomen, broad costal band overlapping R_{4+5} and with a dark fuscous spot in apex which is not an expansion of the band. It is a significant pest species.

***Bactrocera* (*Zeugodacus*) *assamensis* White**

Bactrocera (*Zeugodacus*) *assamensis* White, in White & Evenhuis, 1999: 522. Holotype female in BMNH.

Material examined. – BHUTAN: 1 male, Rimchu trap No. 1, 7 Jun.2000, coll. C. Dorji et al.; 1 male, Rimchu trap No. 1, 14 Jun.2000, coll. Nado & Tshomo; 1 male, Rimchu trap No. 1, 5 Oct.2000, coll. C. Dorji; 1 male, Rimchu trap No. 2, 10 May.2000, coll. B.S. Fletcher; 1 male, Rimchu trap No. 3, 4 May.2000, coll. B.S. Fletcher; 1 male, Tsirang, 17 Jun.2000, coll. T.D. & S.D.; 1 male (10 May.2000), 1 male (17 May.2000), Lumitshawa, coll. C. Dorji; 2 males, Namling 14 km, 7 Jun.2001, coll. Brian Fletcher. All specimens attracted to cue lure. Specimens in NPPC and QDPI.

Diagnosis. – A large species; face fulvous with a pair of medium sized elongate oval black spots; postpronotal lobes yellow with inner margins narrowly black; notopleura either entirely dark fuscous to black or dark fuscous to black with small apical yellow spots; scutum shining black; narrow lateral postsutural vittae present; very short and narrow medial postsutural vitta present; mesopleural stripe reaching midway between anterior margin of notopleuron and anterior *npl.* seta dorsally; scutellum yellow with a broad medial longitudinal dark fuscous to black band or in some specimens a broad apical dark fuscous to black spot; wing with a narrow dark fuscous costal band extremely narrow or absent beyond apex of R_{2+3} and widening into a distinct spot across apex of R_{4+5} and a narrow fuscous cubital streak; a small diffuse fuscous spot around CuA_1 at hind margin of wing; cells bc and c colourless; microtrichia in outer corner of cell c only; abdominal terga III-V mostly dark fuscous to black with small red-brown spots posterocentrally on terga III and IV either side of a narrow medial longitudinal black band and red-brown across posterior margin of tergum V.

Attractant. – Cue lure.

Distribution. – Assam. New record for Bhutan.

Hosts. – No known record.

Remarks. – *Bactrocera* (*Zeugodacus*) *assamensis* White is similar to *Bactrocera* (*Zeugodacus*) *biguttata* (Bezzi), *Bactrocera* (*Zeugodacus*) *freidbergi* White and *Bactrocera* (*Zeugodacus*) *tappanus* (Shiraki) in having two *sc.* setae and dark coloured notopleura. It differs from *B. freidbergi* in having dark patterns on the scutellum, from *B. tappanus* in having abdominal terga III-V mostly dark fuscous to black and femora uniformly black around apices, and from *B. biguttata* in having a medial longitudinal dark band on the scutellum, microtrichia on cell br of wing and cubital streak present. It is not a pest species.

***Bactrocera* (*Zeugodacus*) *atrifacies* (Perkins)**

Zeugodacus atrifacies Perkins, 1938: 140. Type probably lost, not in UQIC or QM.

Dacus (*Zeugodacus*) *atrifacies* – Hardy, 1973: 58; Hardy, 1977: 57.

Bactrocera (*Zeugodacus*) *atrifacies* – Norrbom et al., 1998: 102.

Material examined. – BHUTAN: 7 males (10 May.2002), 9 males (17 May.2002), 15 males (24 May.2002), Rimchu, coll. C. Dorji; 4 males (17 May.2000), 14 males (24 May.2000), 9 males (31 May.2000), 1 male (30 Aug.2000), Rimchu trap No. 1, coll. C. Dorji; 11 males (7 Jun.2000), 2 males (28 Jun.2000), 4 males (5 Jul.2000), 4 males (19 Jul.2000), 2 males (26 Jul.2000), 3 males (2 Aug.2000), 1 male (16 Aug.2000), Rimchu trap No. 1, coll. C. Dorji et al.; 2 males, Rimchu trap No. 1, 14 Jun.2000, coll. Nado; 3 males, Rimchu trap No. 1, 21 Jun.2000, coll. Nado et al.; 1 male, Rimchu trap No. 1, 4 May.2000, coll. B.S. Fletcher; 4 males (10 May.2000), 2 males (14 Jun.2000), Rimchu trap No. 1; 1 male, Rimchu trap No. 2, 4 May.2000, coll. B.S. Fletcher; 5 males (17 May.2000), 4 males (21 May.2000), 5 males (24 May.2000), 1 male (10 Aug.2000), Rimchu trap No. 2, coll. C. Dorji; 1 male, Rimchu trap No. 3, 17 May.2000, coll. C. Dorji; 3 males, 5 Jun.2000, Suntalay; 1 male, Suntalay, 22 May.2000, coll. P. Loday & C. Dorji; 4 males (11 Jun.2000), 4 males (3 Jul.2000), 1 male (31 Jul.2000), Tsirang, Suntalay; 1 male, Tsirang, 19 Aug.2000; 1 male (19 Jun.2000), 2 males (10 Jul.2000), Tsirang, coll. T.D. & S.D.; 1 male (6 May.2000), 1 male (13 May.2000), Phuentsholing, coll. S. Thapa; 2 males, Namling 16km, 9 Jun.2001, coll. Brian Fletcher; 1 male, Lumitshawa, 24 May.2000, coll. C. Dorji. All specimens attracted to cue lure. Specimens in NPPC and QDPI.

Diagnosis. – A medium sized species; face entirely shining black; postpronotal lobes and notopleura yellow; scutum shining black; medium width lateral and narrow medial postsutural vittae present; a yellow spot anterior to mesonotal suture; mesopleural stripe reaching midway between anterior margin of notopleuron and anterior *npl.* seta dorsally; scutellum yellow; wing with a narrow dark fuscous costal band expanding slightly across apex of R_{4+5} and broad dark fuscous cubital streak; cells bc and c colourless; microtrichia in outer corner of cell c only; abdominal terga almost entirely dark fuscous to black with, in some specimens, small red-brown to dark red-brown spots posterocentrally on terga III and IV and with bright orange-brown to fulvous shining spots on tergum V.

Attractant. – Cue lure.

Distribution. – China, Malaysia. New record for Bhutan.

Hosts. – No known record.

Remarks. – *Bactrocera (Zeugodacus) atrifacies* (Perkins) belongs to the *scutellaris* complex and particularly the group with 4 *sc.* setae. It differs from other species in this group in possessing an entirely black face. In facial colour, general leg colour patterns and terga III-V mostly dark fuscous to black, it is similar to *Bactrocera (Zeugodacus) diaphora* (Hendel) but the latter possesses two *sc.* setae.

One specimen in UQIC with the following labels is not the type of *B. atrifacies* – “Pahang FMS, Kuala Teku 500’, Dec 6th 1921, H.M. Pendlebury”, “TYPE”, “*Zeugodacus maculipennis* Dol. det. F.A. Perkins”, “*Dacus (Zeugodacus) atrifacies* (Perkins), poss. as *limbipennis* Macq. From Bukit Kuta, Selangor”. This is a specimen of *Bactrocera (Zeugodacus) caudata* (Fabricius) and the label data are not in agreement with those recorded by Perkins (1938) for *B. atrifacies*. It is not a pest species.

***Bactrocera (Zeugodacus) biguttata* (Bezzi)**

Chaetodacus biguttatus Bezzi, 1916: 111, holotype in ZSI.

Bactrocera (Bactrocera) biguttatus – Hardy, 1977: 49.

Bactrocera (Zeugodacus) biguttata – Norrbom et al., 1998: 102.

Material examined. – BHUTAN: 1 male, Tsirang, Darachu, 30 May.2001, coll. Brian Fletcher; 4 males, Namling 7 km, 9 Jun.2001, coll. Brian Fletcher. All specimens attracted to cue lure. Specimens in NPPC and QDPI.

Diagnosis. – A unique medium to large sized species; face fulvous with a pair of medium sized oval black spots; postpronotal lobes yellow with crescent shaped black markings on inner surfaces; notopleura shining black; scutum entirely shining black; very narrow lateral and medial postsutural vittae present; mesopleural stripe reaching midway between anterior margin of notopleuron and anterior *npl.* seta dorsally; scutellum shining black with small anterolateral yellow corners; wing with a narrow fuscous costal band absent or almost absent beyond apex of R_{2+3} and a dark fuscous spot across apex of R_{4+5} ; cubital streak reduced to pale fuscous within cell cup; cells bc and c colourless; cells bc and c entirely devoid of microtrichia; abdominal terga III-V shining black with at most small red-brown spots on posterior margins of terga III and IV either side of a medial longitudinal black band and narrow red-brown band across posterior margin of tergum V.

Attractant. – Cue lure.

Distribution. – Northern India. New record for Bhutan.

Hosts. – No known record.

Remarks. – *Bactrocera (Zeugodacus) biguttata* (Bezzi) is similar to *Bactrocera (Zeugodacus) assamensis* White in possessing dark coloured notopleura, dark markings on the

scutellum and femora and abdominal terga III-V mostly black. It differs from *B. assamensis* in having the scutellum almost entirely shining black, cell br colourless and devoid of microtrichia, a crescent shaped black marking on inner margins of postpronotal lobes and the cubital streak reduced to pale fuscous within cell cup. It is not a pest species.

***Bactrocera (Zeugodacus) cucurbitae* (Coquillett)**

Dacus cucurbitae Coquillett, 1899: 129; Froggatt, 1909: 84–85.

Bactrocera cucurbitae – Bezzi, 1913: 96–97.

Chaetodacus cucurbitae – Bezzi, 1916: 109–10; Hendel, 1915: 426, 1927: 28; Shiraki, 1933: 73–76.

Strumeta cucurbitae – Perkins, 1938: 127.

Dacus (Strumeta) cucurbitae – Hardy & Adachi, 1954: 164–165; Hardy, 1973: 38–40, 1974: 27–29.

Dacus (Zeugodacus) cucurbitae – Drew, 1973: 23–27; Hardy, 1977: 57, 1982: 203, 1983: 36.

Dacus aureus Tseng & Chu, 1982: 85.

Bactrocera (Zeugodacus) cucurbitae – Drew 1989: 212; Norrbom et al., 1998: 102.

Dacus yuiliensis Tseng & Chu, 1992: 84 (new name for *aureus* preoccupied by May, 1951: 10).

Material examined. – BHUTAN: 1 male, Rimchu 1, 20 Sep.2000, coll. C. Dorji; 1 male (17 Jul.2000), 1 male (2 Oct.2000), Tsirang, coll. S.D.; 1 male, Gelephu, Purana Bastey, 1 Feb.2005, coll. Maha Prasad & Karma Namgyel. All specimens attracted to cue lure. Specimens in NPPC and QDPI.

Diagnosis. – A medium sized species; face fulvous with large black oval spots; postpronotal lobes and notopleura yellow; scutum red-brown with or without fuscous markings; lateral and medial postsutural vittae present; a yellow spot anterior to mesonotal suture; mesopleural stripe reaching midway between anterior margin of notopleuron and anterior *npl.* seta dorsally; scutellum entirely yellow; wing with a broad fuscous costal band paler between R_{2+3} and R_{4+5} and expanding into a large spot in apex of wing, pale infuscation along r-m crossvein and dark fuscous along dm-cu crossvein, a broad fuscous cubital streak; cells bc and c colourless; microtrichia in outer corner of cell c only; abdominal terga III-V red-brown with a ‘T’ pattern consisting of a narrow black transverse band across anterior margin of tergum III and a medium to broad medial longitudinal band over all three terga, anterolateral corners of terga IV and V fuscous to dark fuscous.

Attractant. – Cue lure.

Distribution. – Endemic to the region from Pakistan and India across southeast Asia. Now widespread across tropical and subtropical countries, including Papua New Guinea, Solomon Islands, northern Pacific islands, northern Africa and Egypt.

Hosts. – A wide range of wild and edible host fruits from many plant families and specialising in the Family Cucurbitaceae (see Allwood et al., 1999).

Remarks. – *Bactrocera (Zeugodacus) cucurbitae* (Coquillett) is one species of Dacinae that has been extensively studied,

both ecologically and taxonomically. It is regarded as one of the major pest species within the Dacinae and has a worldwide distribution in the tropical and subtropical zones. See Drew (1989) for details. During the late 1990s, it spread across the Solomon Islands. It is readily distinguished in having basic red-brown on the scutum and abdomen with variable dark patterns, wing with the costal band expanded into a large spot at apex and r-m and dm-cu crossveins infuscated, abdominal terga III-V with a black 'T' pattern.

***Bactrocera (Zeugodacus) diaphora* (Hendel)**

Chaetodacus diaphorus Hendel, 1915: 425, lectotype in MNM; Shiraki, 1933: 69.

Chaetodacus ater Chen, 1940: 131. Preoccupied by *atra* Malloch, 1938: 113.

Dacus (Strumeta) diaphorus – Hardy, 1973: 40.

Dacus (Bactrocera) diaphorus – Hardy, 1977: 49; Tseng, Chen & Chu, 1992: 28.

Dacus (Zeugodacus) sicieni Chao & Lin, 1993: 77. New name for *ater* Chen, 1940.

Bactrocera (Zeugodacus) diaphora – Wang, 1996: 68; Norrbom et al., 1998: 102.

Material examined. – BHUTAN: 1 male (17 May.2000), 1 male (26 Jul.2000), 2 males (16 Aug.2000), 2 males (6 Sep.2000), 1 male (12 Sep.2000), 1 male (20 Sep.2000), 1 male (27 Sep.2000), Rimchu trap No. 1, coll. C. Dorji; 1 male (7 Jun.2000), 3 males (28 Jun.2000), 5 males (5 Jul.2000), 1 male (2 Aug.2000), 1 male (10 Aug.2000), Rimchu trap No. 1, coll. C. Dorji et al.; 5 males, Rimchu trap No. 1, 14 Jun.2000, coll. Nado; 1 male, Rimchu trap No. 1, 21 Jun.2000, coll. Nado et al.; 2 males (21 May.2000), 1 male (24 May.2000), 2 males (28 Jun.2000), 1 male (26 Jul.2000), 3 males (10 Aug.2000), 2 males (16 Aug.2000), 1 male (30 Aug.2000), 1 male (6 Sep.2000), 1 male (27 Sep.2000), Rimchu trap No. 2, coll. C. Dorji; 1 male, Tsirang, 17 Jul.2000, coll. S.D.; 1 male, Tsirang, 11 Sep.2000; 1 male, Lumitshawa, 24 May.2000, coll. C. Dorji; 1 male, Lumitshawa, 10 May.2000, coll. B.S. Fletcher; 1 male, Namling 16 km, 9 Jun.2001, coll. Brian Fletcher; 1 male, Lingmethang, 9 Jun.2001, coll. Brian Fletcher. All specimens attracted to cue lure. Specimens in NPPC and QDPI.

Diagnosis. – A medium sized species; face shining black; postpronotal lobes and notopleura yellow; scutum shining black; narrow lateral and medial postsutural vittae; a yellow spot anterior to mesonotal suture; mesopleural stripe reaching almost to anterior *npl.* seta dorsally; scutellum yellow with a dark fuscous to black apical spot enclosing apical setae; wing with a narrow dark fuscous costal band widening slightly across apex of R_{4+5} ; a narrow fuscous cubital streak; cells bc and c colourless; microtrichia in outer corner of cell c only; abdominal tergum III entirely dark fuscous to black, terga IV and V dark fuscous except red-brown on posterior apex of tergum V.

Attractant. – Cue lure.

Distribution. – From India and Sri Lanka to China and across southeast Asia. New record for Bhutan.

Hosts. – No known record

Remarks. – *Bactrocera (Zeugodacus) diaphora* (Hendel) is similar to *Bactrocera (Zeugodacus) yoshimotoi* (Hardy) in possessing two *sc.* setae and yellow notopleura. It differs from this species in having the face entirely black and all femora with large areas of dark fuscous to black. It is not a pest species.

***Bactrocera (Zeugodacus) scutellaris* (Bezzi)**

Bactrocera scutellaris Bezzi, 1913: 98. Lectotype male in ZSI.

Zeugodacus malaisei Hering, 1938: 4; Norrbom et al., 1998: 103 (syn.).

Dacus pusaensis Kapoor & Katiyar, 1970: 252; Norrbom et al., 1998: 103 (syn.).

Dacus (Zeugodacus) scutellaris – Hardy, 1973: 68; Hardy, 1977: 59; Wang, 1996: 70.

Bactrocera (Zeugodacus) scutellaris – Liang et al., 1993: 138; Norrbom et al., 1998: 103.

Material examined. – BHUTAN: 2 males (10 May.2002), 1 male (24 May.2002), Rimchu, coll. C. Dorji; 5 males (17 May.2000), 1 male (24 May.2000), 2 males (31 May.2000), 4 males (26 Jul.2000), 3 males (10 Aug.2000), 3 males (16 Aug.2000), 13 males (6 Sep.2000), 7 males (12 Sep.2000), 21 males (20 Sep.2000), 7 males (27 Sep.2000), 12 males (5 Oct.2000), Rimchu trap No. 1, coll. C. Dorji; 2 males (7 Jun.2000), 7 males (28 Jun.2000), 2 males (5 Jul.2000), 5 males (19 Jul.2000), 12 males (23 Jul.2000), 1 male (2 Aug.2000), 6 males (30 Aug.2000), Rimchu trap No. 1, coll. C. Dorji et al.; 2 males, Rimchu trap No. 1, 4 May.2000, coll. B.S. Fletcher; 3 males, Rimchu trap No. 1, 14 Jun.2000, coll. Nado & Tshomo; 1 male, Rimchu trap No. 1, 21 Jun.2000, coll. Nado et al.; 3 males, Rimchu trap No. 1, 10 May.2000; 3 males (28 Jun.2000), 2 males (12 Jul.2000), 3 males (16 Jul.2000), 5 males (26 Jul.2000), 2 males (5 Oct.2000), 1 male (16 Nov.2000), Rimchu trap No. 2, coll. C. Dorji; 3 males (4 May.2000), 2 males (10 May.2000), Rimchu trap No. 2, coll. B.S. Fletcher; 3 males (4 May.2000), 1 male (10 May.2000), Rimchu trap No. 3, coll. B.S. Fletcher; 2 males, Tsirang, 11 Jun.2000, Suntalay; 1 male, Tsirang, 28 Jun.2000, coll. S. Wangdi; 1 male, Tsirang, 12 Jul.2000, coll. C. Dorji; 1 male (19 Jun.2000), 2 males (10 Jul.2000), Tsirang, coll. T.D. & S.D.; 4 males (3 Jul.2000), 4 males (17 Jul.2000), 7 males (31 Jul.2000), 4 males (21 Aug.2000), Tsirang; 3 males (31 May.2000), 1 male (13 Sep.2000), Lumitshawa, coll. C. Dorji; 1 male, Lumitshawa, 17 May.2000, coll. C. Dorji et al.; 1 male, Lumitshawa, 3 May.2000, coll. B.S. Fletcher; 2 males, Lumitshawa, 21 Jun.2000, coll. Nado et al.; 3 males, Namling 7 km, 9 Jun.2001, coll. Brian Fletcher; 3 males, Namling 11 km, 9 Jun.2001, coll. Brian Fletcher; 26 males, Namling 14 km, 7 Jun.2001, coll. Brian Fletcher; 50 males, Namling 16 km, 9 Jun.2001, coll. Brian Fletcher; 2 males, Lingmethang 11 km, 9 Jun.2001, coll. Brian Fletcher. All specimens attracted to cue lure. Specimens in NPPC and QDPI.

Diagnosis. – A small to medium sized species; face fulvous with a pair of transverse oval black spots pointed towards centre; postpronotal lobes and notopleura yellow; scutum shining black; narrow lateral and medial postsutural vittae present; a very small yellow spot anterior to mesonotal suture; mesopleural stripe equal in width to notopleuron dorsally; scutellum yellow with a distinct black apical spot; wing with a narrow dark fuscous costal band which is extremely narrow beyond apex of R_{2+3} and widening into a distinct spot around apex of R_{4+5} , broad dark fuscous cubital streak present; cells bc and c colourless; microtrichia in outer corner of cell c only; abdominal terga III-V mostly dark fuscous to black.

Attractant. – Cue lure.

Distribution. – Widespread across south Asia to southeast Asia. New record for Bhutan.

Hosts. – Flowers of species in the Family Cucurbitaceae (see Allwood et al., 1999).

Remarks. – *Bactrocera (Zeugodacus) scutellaris* Bezzi appears to be the most widespread of all *scutellaris* complex species. It is readily distinguished by the shining black scutum, very narrow lateral and medial postsutural vittae, scutellum yellow with a dark spot at apex, costal band extremely narrow beyond apex of R_{2+3} and with a small spot around apex of R_{4+5} , abdominal terga III-V mostly dark fuscous to black. As for *B. diversa* (Coquillett), *B. scutellaris* attacks flowers of Cucurbitaceae species so may have pest status but no quarantine significance for export trade.

***Bactrocera (Zeugodacus) scutellata* (Hendel)**

Dacus scutellatus Hendel, 1912: 20, holotype male in DEI.

Dacus trivittatus – Matsumura, 1916: 411 (misident., see Shiraki, 1933: 82).

Dacus (Chaetodacus) bezzii Miyake, 1919: 146.

Zeugodacus scutellatus – Shiraki, 1933: 82.

Dacus (Zeugodacus) scutellatus – Hardy, 1977: 59; Tseng et al., 1992:74; Wang, 1996: 71.

Bactrocera (Zeugodacus) scutellata – Liang et al., 1993: 138; Norrbom et al., 1998: 103.

Material examined. – BHUTAN: 1 male (19 Jul.2000), 1 male (16 Aug.2000), Rimchu trap No. 1, coll. C. Dorji; 2 males, Rimchu trap No. 1, 23 Jul.2000, coll. C. Dorji et al. All specimens attracted to cue lure. Specimens in NPPC and QDPI.

Diagnosis. – A large species; face fulvous with a pair of medium sized circular black spots; postpronotal lobes and notopleura yellow; scutum shining black; lateral and medial postsutural vittae present; mesopleural stripe reaching midway between anterior margin of notopleuron and anterior *npl.* seta; scutellum yellow with a black apical spot; wing with a narrow fuscous costal band confluent with R_{2+3} and remaining narrow beyond apex of this vein before expanding across apex of R_{4+5} , a broad fuscous cubital streak, pale fuscous along dm-cu crossvein; cells bc and c colourless; microtrichia in outer corner of cell c only; abdominal terga III-V each with a dark fuscous to black ‘T’ pattern.

Attractant. – Cue lure.

Distribution. – Distributed across subtropical southeast Asia. New record for Bhutan.

Hosts. – Flowers of species in the Family Cucurbitaceae (see Allwood et al., 1999).

Remarks. – *Bactrocera (Zeugodacus) scutellata* (Hendel) is a large species readily distinguished by the shining black scutum, lateral and medial postsutural vittae broader than in

B. scutellaris (Bezzi), face with circular black spots, scutellum yellow with a black apical spot, femora entirely fulvous, 4 *sc.* setae, wing with a strong supernumerary lobe and broad cubital streak, costal band confluent with R_{2+3} and remaining narrow beyond apex of R_{2+3} before widening gradually across apex of R_{4+5} , abdominal terga III-V each with a separate general ‘T’ pattern. As for *B. diversa* (Coquillett) and *B. scutellaris*, *B. scutellata* attacks flowers of some Cucurbitaceae species so may have pest status but no quarantine significance for export trade.

***Bactrocera (Zeugodacus) signata* (Hering)**

Zeugodacus bezzianus f. *signata* Hering, 1941: 10, male and female syntypes in BMNH; Norrbom et al., 1998: 104 as synonym of *B. tau* (Walker).

Material examined. – BHUTAN: 5 males, Rimchu 2, 10 May.2000, coll. B.S. Fletcher; 1 male, Tsirang, 10 Jul.2000, coll. T.D. & S.D.; 1 male, Suntalay, 28 Jun.2000, coll. S. Wangdi; 1 male, Lingmethang 11km, 9 Jun.2001, coll. Brian Fletcher; 1 male, Rimchu 1, 4 May.2000, coll. B.S. Fletcher; 1 male, Rimchu 1, 7 Jun.2000, coll. C. Dorji et al.; 1 male, Rimchu 1, 24 May.2000, coll. C. Dorji; 1 male, Rimchu 1, 21 Jun.2000, coll. Nado et al. All specimens attracted to cue lure. Specimens in NPPC and QDPI.

Diagnosis. – A large species; face fulvous with a pair of medium sized oval black spots; postpronotal lobes and notopleura yellow; scutum orange-brown with extensive areas of black; lateral and medial postsutural vittae present; a yellow spot anterior to mesonotal suture; mesopleural stripe reaching midway between anterior margin of notopleuron and anterior *npl.* seta dorsally; scutellum yellow with a dark fuscous apical spot; wing with a narrow fuscous costal band overlapping R_{2+3} and ending in a *tau* like spot in apex of wing, a moderately broad fuscous cubital streak; cells bc and c colourless; microtrichia in outer corner of cell c only; abdominal terga III-V fulvous except for a ‘T’ pattern consisting of a broad black transverse band across anterior margin of tergum III and a moderately broad medial longitudinal black band over all three terga, broad anterolateral black corners on terga IV and V.

Attractant. – Cue lure.

Distribution. – Sikkim. New record for Bhutan.

Hosts. – No known record.

Remarks. – *Bactrocera (Zeugodacus) signata* (Hering) in many characters resembles *tau* complex species. It is similar to *Bactrocera (Zeugodacus) rubella* (Hardy) in possessing extensive areas of red-brown on the scutum, 4 *sc.* setae, medial and lateral postsutural vittae, basic red-brown scutum, wings colourless except for costal band and cubital streak, costal band expanded into a spot at apex and lateral postsutural vittae reaching to or behind *ia.* setae. It differs from *B. rubella* in having a well developed supernumerary lobe in the male wing, costal band just overlapping R_{2+3} (not almost to R_{4+5}) and apical spot in costal band around apex of R_{4+5} (not

reaching M). Within the *tau* complex, it is similar to *Bactrocera (Zeugodacus) pubescens* (Bezzi) in having a dark fuscous spot on the apex of the scutellum but differs in possessing dark fuscous spots on the apices of all femora and the apex of the aculeus needle shaped. In *B. pubescens* the femora are entirely fulvous and the apex of the aculeus trilobed. In studying large numbers of *B. tau* (Walker) specimens from across southeast Asia, none has been observed with a dark spot on the apex of the scutellum. This is not a pest species.

***Bactrocera (Zeugodacus) tau* (Walker)**

Dasyneura tau Walker, 1849: 1074.

Dacus hageni de Meijere, 1911: 375, type locality, Sumatra.

Dacus caudatus var. *nubilus* Hendel, 1912: 16, type locality Taiwan.

Dacus nubilus ssp. *femoralis* Hendel, 1934: 11, type locality China.

Dacus (Zeugodacus) tau – Hardy, 1977: 60.

Bactrocera (Zeugodacus) tau – Liang et al., 1993: 138; Wang, 1996: 72; Norrbom et al., 1998: 104.

Material examined. – BHUTAN: 9 males (10 May.2000), 8 males (17 May.2000), 4 males (24 May.2000), 5 males (31 May.2000), 4 males (21 Jun.2000), 8 males (23 Jul.2000), 7 males (10 Aug.2000), 6 males (16 Aug.2000), 17 males (30 Aug.2000), 23 males (6 Sep.2000), 18 males (12 Sep.2000), 25 males (20 Sep.2000), 21 males (27 Sep.2000), 18 males (5 Oct.2000), 8 males (18 Oct.2000), 7 males (16 Nov.2000), Rimchu trap No. 1, coll. C. Dorji; 3 males (7 Jun.2000), 1 male (28 Jun.2000), 6 males (19 Jul.2000), Rimchu trap No. 1, coll. C. Dorji et al.; 5 males, Rimchu trap No. 1, 4 May.2000, coll. B.S. Fletcher; 4 males, Rimchu trap No. 1, 14 Jun.2000, coll. Nado; 1 male, Rimchu trap No. 1, 21 Jun.2000, coll. Nado et al.; 2 males, Rimchu trap No. 2, 10 May.2000, coll. B.S. Fletcher; 1 male, Rimchu trap No. 3, 10 May.2000, coll. B.S. Fletcher; 7 males (10 May.2002), 4 males (17 May.2002), 1 male (24 May.2002), Rimchu, coll. C. Dorji; 2 males, Rimchu, 26 Apr.2000, coll. Clarke & Fletcher; 6 males, Phuentsholing, 6 May.2000; 6 males (17 Jul.2000), 6 males (31 Jul.2000), 6 males (7 Aug.2000), 2 males (2 Oct.2000), 2 males (23 Oct.2000), Tsirang; 5 males (19 Jun.2000), 11 males (10 Jul.2000), Tsirang, coll. T.D. & S.D.; 4 males, Tsirang (Damphu orchard), 20 Apr.2000; 6 males, Suntalay, 28 Jun.2000, coll. S. Wangdi; 9 males, Lingmethang 11 km, 9 Jun.2001, coll. Brian Fletcher. All specimens attracted to cue lure. Specimens in NPPC and QDPI.

Diagnosis. – A medium sized species; face fulvous with a pair of medium sized circular to oval black spots; postpronotal lobes and notopleura yellow; scutum black with large areas of red-brown centrally and antero-centrally; lateral and medial postsutural vittae present; yellow spot anterior to mesonotal suture in front of lateral postsutural vittae; mesopleural stripe reaching midway between anterior margin of notopleuron and anterior *npl.* seta; scutellum entirely yellow; wing with a narrow dark fuscous costal band overlapping R_{2+3} and expanding into a distinct apical spot and broad dark fuscous cubital streak; cells bc and c colourless; microtrichia in outer corner of cell c only; abdominal terga III-V fulvous with a black ‘T’ pattern and anterolateral corners of terga IV and V with broad black markings.

Attractant. – Cue lure.

Distribution – Widespread across south and southeast Asia. New record for Bhutan.

Hosts – Recorded from nine plant families and specialising in species of the Family Cucurbitaceae.

Remarks. – *Bactrocera (Zeugodacus) tau* (Walker) is a very common species throughout southeast Asia. It is an economic pest species, mainly in cucurbit crops, but can be misidentified as it belongs to a complex of closely related species. It is best distinguished by the following characters – scutum black with large areas of red-brown, costal band expanded into a distinct spot at apex, supernumerary lobe in male wing large and keel shaped, abdominal terga III-V fulvous with a black ‘T’ pattern and lateral margins of terga IV and V with either anterolateral corners dark or with lateral longitudinal dark bands over both terga.

***Bactrocera (Zeugodacus) yoshimotoi* (Hardy)**

Dacus (Strumeta) yoshimotoi Hardy, 1973: 53. Holotype male in BPBM.

Bactrocera (Bactrocera) yoshimotoi – Hardy, 1977: 52; Norrbom et al., 1998: 96.

Bactrocera (Zeugodacus) yoshimotoi – White & Evenhuis, 1999: 534.

Material examined. – BHUTAN: 12 males (10 May.2002), 11 males (17 May.2002), 7 males (24 May.2002), Rimchu, coll. C. Dorji; 2 males (10 May.2000), 29 males (17 May.2000), 24 males (24 May.2000), 3 males (31 May.2000), 11 males (7 Jun.2000), 18 males (28 Jun.2000), 13 males (5 Jul.2000), 12 males (19 Jul.2000), 27 males (23 Jul.2000), 4 males (26 Jul.2000), 4 males (2 Aug.2000), 12 males (10 Aug.2000), 11 males (16 Aug.2000), 33 males (30 Aug.2000), 50 males (6 Sep.2000), 37 males (12 Sep.2000), 47 males (20 Sep.2000), 17 males (27 Sep.2000), 1 male (5 Oct.2000), Rimchu trap No. 1, coll. C. Dorji; 25 males (4 May.2000), 26 males (10 May.2000), Rimchu trap No. 1, coll. B.S. Fletcher; 22 males, Rimchu trap No. 1, 21 Jun.2000, coll. Nado et al.; 4 males, Rimchu trap No. 1, 14 Jun.2000, coll. Nado & Tshomo; 3 males, Rimchu trap No. 2, 4 May.2002, coll. B.S. Fletcher; 1 male, Rimchu trap No. 2, 28 Jun.2000, coll. C. Dorji; 1 male (10 May.2000), 1 male (17 May.2000), Lumitshawa, coll. C. Dorji; 3 males (3 Jul.2000), 4 males (21 Aug.2000), Tsirang, Suntalay; 1 male, Tsirang, 7 Aug.2000; 1 male, Phuentsholing, 6 May.2000, coll. S. Thapa. All specimens attracted to cue lure. Specimens in NPPC and QDPI.

Diagnosis. – A small to medium sized species; face fulvous with a pair of small to large transverse oval black spots; postpronotal lobes and notopleura yellow; two narrow lateral postsutural vittae; a moderately broad medial postsutural vitta; mesopleural stripe slightly wider than notopleuron dorsally; scutellum yellow; wing with a narrow fuscous costal band confluent with R_{2+3} and remaining narrow beyond apex of this vein before widening across apex of R_{4+5} , a broad fuscous cubital streak; cells bc and c colourless; microtrichia in outer corner of cell c only; abdominal terga III and IV red-brown with a general black ‘T’ pattern on each tergum, tergum V red-brown with a broad medial longitudinal black band and moderately broad black lateral margins.

Attractant. – Cue lure.

Distribution. – Vietnam. New record for Bhutan.

Hosts. – No known record.

Remarks. – *Bactrocera* (*Zeugodacus*) *yoshimotoi* (Hardy) is readily distinguished by the face with transverse oval black spots, postpronotal lobes and notopleura yellow, two *sc.* setae, femora entirely fulvous, a strong supernumerary lobe in the male wing, abdominal terga III and IV with separate black ‘T’ patterns and tergum V with a medial longitudinal black band and lateral margins black. It is not a pest species.

Bactrocera (*Zeugodacus*) *zahadi* Mahmood

Bactrocera (*Zeugodacus*) *zahadi* Mahmood, 1999: 232 (holotype male in BMNH); Drew & Raghu, 2002: 350.

Material examined. – BHUTAN: 1 male (12 Apr.2000), 1 male (5 Oct.2000), Rimchu 1, coll. C. Dorji; 1 male, Tsirang, Dampfu Orchard, 20 Apr.2000; 1 male, Suntalay, 28 Jun.2000, coll. S. Wangdi. All specimens attracted to cue lure. Specimens in NPPC and QDPI.

Diagnosis. – A medium sized species; face fulvous with a pair of large irregularly oval black spots; postpronotal lobes and notopleura yellow; scutum black with areas of red-brown; lateral and medial postsutural vittae present; small yellow spot anterior to mesonotal suture; mesopleural stripe just slightly wider than notopleuron dorsally; scutellum entirely yellow; wing with a narrow fuscous costal band expanding into a *tau*-like spot in apex of wing, a broad fuscous cubital streak; cells *bc* and *c* colourless; microtrichia in outer corner of cell *c* only; legs with femora fulvous except for subapical dark fuscous spots on fore and mid femora and dark fuscous around apical 1/4 of hind femora; abdominal terga III-V fulvous with a ‘T’ pattern consisting of a narrow transverse black band across anterior margin of tergum III and a moderately broad medial longitudinal black band over all three terga, large anterolateral black corners on terga IV and V.

Attractant. – Cue lure.

Distribution. – Southern Sri Lanka, India, Myanmar, Pakistan and Bhutan.

Hosts. – No known record.

Remarks. – *Bactrocera* (*Zeugodacus*) *zahadi* Mahmood is extremely close to *Bactrocera* (*Zeugodacus*) *tau* (Walker) and may be a synonym of the latter. After studying large numbers of *B. tau* from across southeast Asia, it is clear that the lateral dark colour patterns on abdominal terga IV and V vary from small dark anterolateral corners to broad lateral longitudinal dark bands over both terga. Also, the femora colour varies from entirely fulvous to fulvous with preapical dark spots on some or all femora. One sound characteristic of *B. tau* is that it possesses a large keel shaped supernumerary lobe in the male wing which also is present in the holotype of *B. zahadi*. No good characters can be found to separate *B. tau* and *B. zahadi*. It is not a pest species.

Dacus Fabricius

Under genus *Dacus*, the species are placed within the subgenera *Callantra* Walker and *Mellesis* Bezzi in accordance with the subgeneric classification of Hancock & Drew (2006).

Dacus (*Callantra*) *longicornis* Wiedemann

Dacus longicornis Wiedemann, 1830: 524; de Meijere, 1911: 380; Bezzi, 1909: 292. Type locality: Java. Holotype female in ZMUC.

Bactrocera vespoides Doleschall, 1859: 123. Type locality: Ambon, Indonesia. Holotype male in ZMB.

Callantra smieroides Walker, 1860: 154; Bezzi, 1916: 120 (as *smicroides*, lapsus); Hardy & Adachi, 1954: 151–152; Hardy, 1959: 162; Drew, 1973: 2–6; Hardy, 1977: 46; Drew et al., 1998: 604 (as syn.). Type locality: Makassar, Sulawesi. Holotype male in BMNH.

Dacus vespoides – Bezzi 1909: 262 (syn.).

Mellesis destillatoria Bezzi, 1916: 118; Drew et al., 1998: 604 (as syn.). Type locality: Bhamo, Burma. Holotype female in MSNM.

Mellesis eumenoides Bezzi, 1916: 119; Drew et al., 1998: 604 (as syn.). Type locality: Tatkon, Burma. Lectotype male in BMNH.

Mellesis bioculata Bezzi, 1919: 437; Drew et al., 1998: 604 (as syn.). Type locality: Mt Makiling, Luzon, Philippines. Lectotype male in MSNM.

Callantra vespoides – Enderlein, 1920: 358; Hardy & Adachi, 1954: 169; Hardy, 1977: 46 (as syn.).

Dacus (*Callantra*) *smieroides* – Malloch, 1939: 411–412; Drew, 1989: 248–249; White & Elson-Harris, 1994: 317.

Callantra destillatoria – Hardy, 1973: 9; Hardy, 1977: 45.

Callantra eumenoides – Hardy, 1973: 11; Hardy, 1977: 45.

Callantra bioculata – Hardy, 1974: 6–7; Hardy, 1977: 45.

Callantra longicornis – Hardy, 1977: 45–46.

Callantra unifasciatus Hardy, 1982: 184–186; Drew et al., 1998: 604 (as syn.). Type locality: Wotu, Sulawesi. Holotype male in MBB.

Callantra variegata Wang, 1990: 73, 76; Drew et al., 1998: 604 (as syn.). Type locality: Daimonglong, Yunnan, China. Holotype male in IZAS.

Dacus (*Callantra*) *variegata* – Liang et al., 1993: 139.

Dacus (*Callantra*) *eumenoides* – Kapoor, 1993: 83.

Dacus (*Callantra*) *longicornis* – Drew et al., 1998: 604.

Material examined. – BHUTAN: 1 male, Phuentsholing, 13 May.2000, coll. S. Thapa; 1 male (2 Oct.2000), 1 male (16 Oct.2000), Tsirang; 1 male (9 Nov.2004), 1 male (16 Nov.2004), Gelephu, Purana Bastey, coll. Maha Prasard & Karma Namgyel; 2 males (2 Nov.2004), 1 male (23 Nov.2004), Purana Bastey, coll. Karma Namgyel & Maha Prasard. All specimens attracted to cue lure. Specimens in NPPC and QDPI.

Diagnosis. – Face fulvous with a pair of small irregularly oval black spots; scutum dark red-brown without distinct dark patterns, postpronotal lobes yellow except posterodorsal corners fuscous, notopleura yellow, mesopleural stripe narrow equal in width to notopleuron dorsally, lateral and medial postsutural vittae absent, a narrow yellow triangle running along anterior margin of mesonotal suture with base on notopleuron; setae: *sc.* 2; *prsc.* absent; *ia.* 1; *p.sa.* 1; *a.sa.* 1; *mpl.* 1; *npl.* 2; *scp.* 4; scutellum yellow except for broad red-brown basal band; legs with fore femora dark red-brown to fuscous, mid femora dark red-brown to fuscous except fulvous

on basal 1/4, hind femora dark fuscous, fore and mid tibiae dark red-brown to fuscous, hind tibiae dark fuscous, fore tarsi with all segments dark red-brown, mid and hind tarsi with basal segment fulvous and apical four segments red-brown; wings with cells bc and c fuscous, dense microtrichia over all of cell c and most of cell bc, a broad dark fuscous costal band overlapping R_{4+5} for its entire length and sometimes becoming darker at apex, cubital streak indistinct but a broad pale fuscous area generally over cell cup and across wing margin towards cell dm, supernumerary lobe weak; abdominal terga III-V generally dark fuscous to black with a paler band often across posterior margin of tergum III, large orange-brown spots posterocentrally on terga IV and V with the spot on tergum V often expanded anteriorly into a medial longitudinal orange-brown band, oval shining spots on tergum V red-brown to dark fuscous.

Attractant. – Cue lure.

Distribution. – Widespread across the region from southern Asia to southeast Asia (see Drew et al., 1998).

Hosts. – Wild species in the Family Cucurbitaceae (see Drew et al., 1998).

Remarks. – This species has a widespread distribution across southern Asia and southeast Asia and has been regularly misidentified with numerous synonyms being described (see notes above). It has been adequately described and illustrated by Drew et al. (1998) and is best distinguished by the combination of the following characters – red-brown scutum, cells bc and c fuscous, costal band overlapping R_{4+5} , face fulvous with a pair of black spots, anatergite fuscous, katatergite yellow, postpronotal lobes mostly yellow, mesopleural stripe narrow (slightly wider than notopleuron dorsally). It has minor pest status.

***Dacus (Mellesis) dorjii* Drew & Romig, new species**

(Fig. 1)

Material examined. – Holotype: male, BHUTAN: Lumitshawa, 17 May.2000, attracted to cue lure, coll. C. Dorji, deposited in BMNH.

Paratypes: 1 male, same data as holotype; 3 males (24 May.2000), 2 males (10 Aug.2000), Lumitshawa, coll. C. Dorji; 4 males, Lumitshawa, 10 May.2000, coll. B.S. Fletcher; 1 male, Rimchu, 26 Apr.2000, coll. Clarke & Fletcher; 1 male, Rimchu trap No. 1, 4 May.2000, coll. B.S. Fletcher; 1 male, Rimchu trap No. 2, 4 May.2000, coll. B.S. Fletcher; 6 males, Tsirang, Darachu, altitude 1500 m, 30 May.2001, coll. Brian Fletcher; 3 males, 16km from Namling, altitude 1600 m, 9 Jun.2001, coll. Brian Fletcher; 5 males, 14 km from Namling, altitude 1800m, 7 Jun.2001, coll. Brian Fletcher; 18 males, 11 km from Namling, altitude 2000 m, 9 Jun.2001, coll. Brian Fletcher; 27 males, 7 km from Namling, altitude 2200 m, 9 Jun.2001, coll. Brian Fletcher; 3 males, 19 km from Sengor, 6 Jun.2001, altitude 2600 m, coll. Brian Fletcher; 2 males, 25 km from Sengor, altitude 2400 m, 7 Jun.2001, coll. Brian Fletcher. All specimens attracted to cue lure. 10 paratypes in ANIC; 10 paratypes in BMNH; 17 paratypes in NPPC; 10 paratypes in QM (Reg. Nos T. 99310 – T. 99319); 20 paratypes in QDPI; 10 paratypes in ZRC.

Diagnosis. – A medium sized species; face mostly black with oral and lateral margins fulvous; postpronotal lobes black; notopleura yellow; scutum black; lateral and medial postsutural vittae absent; a yellow triangle along anterior margin of mesonotal suture; mesopleural stripe equal in width to notopleuron dorsally; scutellum yellow; wing with a broad dark fuscous costal band overlapping R_{4+5} throughout, cubital streak absent; cells bc and c fuscous; microtrichia covering all of cell c and outer 1/2 of cell bc; abdominal terga mostly black except for a narrow red-brown transverse band across intersegmental line between terga I and II and orange-brown spots posterocentrally on terga IV and V.

Description. – **Male.** Head. Height 1.26mm. Frons: length 1.33 times breadth; fuscous with fulvous along anterior margin and dark fuscous around bases of orbital setae; orbital setae black: 1 *s.or.*, 2 *i.or.*; lunule fuscous. Ocellar triangle black. Vertex black. Face black consisting of a central triangular black pattern connecting two medium sized oval black spots, oral and lateral margins fulvous to red-brown; length 0.36mm. Genae fulvous, large dark fuscous subocular spot present. Occiput black, fulvous along eye margins; occipital row with a small number of weak setae. Antennae with segment 1 dark fuscous, segment 2 black, segment 3 dark fuscous; arista black (red-brown basally); length of segments: 0.42mm; 0.45mm; 0.75mm.

Thorax. Scutum black with red-brown behind *ia.* setae. Pleural areas entirely black. Yellow markings as follows: notopleura; narrow mesopleural stripe equal in width to notopleuron dorsally, anterior margin straight; a distinct triangle along anterior margin of mesonotal suture with base on notopleuron. Postpronotal lobes black. Anatergite and katatergite entirely black. Lateral and medial postsutural vittae absent. Postnotum entirely black. Scutellum yellow except for narrow dark basal band. Setae: *sc.* 2; *prsc.* absent; *ia.* 1; *p.sa.* 1; *a.sa.* absent (occasionally one weak seta present); *mpl.* 1; *npl.* 2; *scp.* 2.

Legs. All femora entirely black except small areas of dark red-brown on apices of mid and hind femora; all tibiae dark fuscous to black; fore tarsi with basal segment fuscous and apical four segments slightly darker fuscous, mid and hind tarsi with basal segment fulvous and apical four segments red-brown; mid tibiae each with an apical black spur.

Wings. Length 5.9mm; cells bc and c fuscous; dense microtrichia covering all of cell c and outer 1/2 of cell bc; remainder of wings colourless except dark fuscous cell sc, broad dark fuscous costal band overlapping R_{4+5} throughout; cubital streak absent; dense aggregation of microtrichia around A_1+CuA_2 ; supernumerary lobe weak.

Abdomen. Elongate oval and petiolate; terga fused; pecten present on tergum III. Tergum I and sterna I and II longer than wide. All terga entirely black except dark red-brown across intersegmental line between terga I and II and orange-brown posterocentral markings on terga IV and V. Posterior lobe of surstylus long, sternum V with a slight concavity on posterior margin.

Attractant. – Cue lure.

Distribution. – Known mostly from the higher altitudes of Bhutan (over 2,000 m).

Hosts. – No known record.

Remarks. – *Dacus (Melleis) dorjii* new species, is similar to *Dacus (Melleis) siamensis* Drew & Hancock, *Dacus (Melleis) tenebrosus* Drew & Hancock and *Dacus (Melleis) vijaysegarani* Drew & Hancock in the general colour patterns of the body, legs and wings. It differs from these species in possessing a black face, entirely yellow notopleura and the anatergite and katatergite entirely black and in lacking *a.sa.* setae. *D. dorjii* also differs from *D. tenebrosus* in having

a narrow mesopleural stripe equal in width to the notopleuron and from *D. siamensis* in having distinct orange-brown spots posterocentrally on terga IV and V. It is not a pest species.

Etymology. – This species is named after Mr. Chenchu Dorji, National Plant Protection Centre, Ministry of Agriculture, Thimphu, Bhutan in recognition of his contributions to Entomology, especially fruit fly research, in that country.

***Dacus (Melleis) feijeni* White**

Dacus (Callantra) feijeni White, in Drew et al., 1998: 590. Holotype male in BMNH.

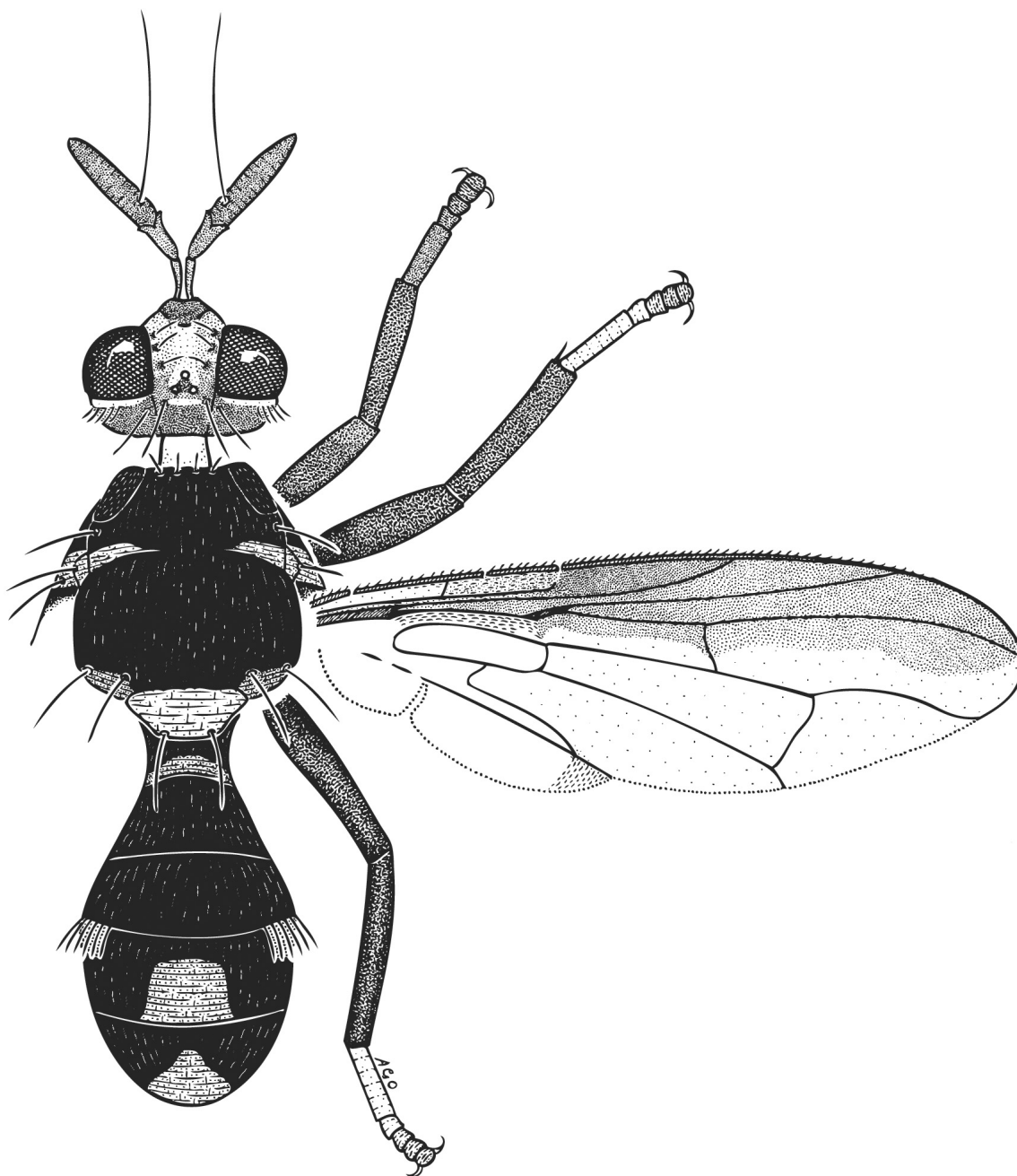


Fig. 1. *Dacus (Melleis) dorjii*, new species, holotype male: dorsal view.

Material examined. – BHUTAN: 1 male, Rimchu trap No. 1, 17 May.2000, coll. C. Dorji; 1 male, 16 km from Namling, 1600 m, 9 Jun.2001, coll. Brian Fletcher. Both specimens attracted to cue lure. Specimens in NPPC and QDPI.

Diagnosis. – Face fulvous with a pair of large circular to oval black spots; scutum dark red-brown, postpronotal lobes and notopleura yellow, narrow mesopleural stripe equal in width to notopleuron dorsally, a yellow triangle along anterior margin of mesonotal suture with base at notopleuron, lateral and medial postsutural vittae absent; setae: *sc.* 2; *prsc.* absent; *ia.* 1; *p.sa.* 1; *a.sa.* 1; *mpl.* 1; *npl.* 2; *scp.* 4; scutellum yellow except for narrow red-brown basal band; legs with fore and mid femora entirely red-brown, hind femora fulvous tending fuscous to dark fuscous on apical 1/3, fore tibiae fuscous, mid tibiae red-brown tending fuscous apically, hind tibiae dark red-brown to fuscous, tarsi with basal segment fulvous and apical four segments fulvous to red-brown; wings with cells bc and c pale fuscous, dense microtrichia covering all of cell c and outer corner of cell bc, a broad dark fuscous costal band confluent with R_{4+5} basally then distinctly overlapping this vein around the region of r-m crossvein to the apex of the wing, cubital streak absent, supernumerary lobe weak; abdomen elongate oval and petiolate, terga III-V red-brown with a ‘T’ pattern consisting of a broad fuscous to dark fuscous band across anterior margin of tergum III expanding to cover lateral margins and a narrow medial longitudinal dark fuscous band over all three terga, broad fuscous to dark fuscous anterolateral corners on terga IV and V.

Attractant. – Cue lure.

Distribution. – Bhutan.

Hosts. – No known record.

Remarks. – This species was adequately described and illustrated in Drew et al. (1998). It is best distinguished by possessing the combination of dark red-brown scutum, yellow postpronotal lobes, red-brown femora and tibiae and abdominal terga III-V red-brown to fuscous. It is not a pest species.

***Dacus (Mellesis) fletcheri* Drew, new species**

(Fig. 2 a, b)

Material examined. – Holotype: male, BHUTAN: 19 km from Sengor, altitude 2600 m, 6 Jun.2001, coll. Brian Fletcher, attracted to cue lure, deposited in BMNH.

Paratypes: 10 males, same data as holotype; 8 males, 9 km from Sengor, altitude 2800 m, 9 Jun.2001, coll. Brian Fletcher; 8 males, 25 km from Sengor, altitude 2400 m, 7 Jun.2001, coll. Brian Fletcher; 1 male, 7 km from Namling, altitude 2200 m, 9 Jun.2001, coll. Brian Fletcher; 1 male, 11 km from Namling, altitude 2000 m, 9 Jun.2001, coll. Brian Fletcher; 1 male, Suntalay, Tsirang, 11 Nov.2004, coll. Karma Duckpar and Karma Yangzom; 1 male, Lumitshawa, 10 May.2000, coll. Brian Fletcher; 1 male, Lumitshawa, 31 May.2000, coll. C. Dorji; 1 male, 2 km from Lumitshawa, 26 Apr.2000, coll. Clarke & Fletcher. All specimens

attracted to cue lure. 4 paratypes in ANIC; 4 paratypes in BMNH; 6 paratypes in NPPC, 4 paratypes in QM (Reg. Nos T. 99320 – T. 99323); 8 paratypes in QDPI; 6 paratypes in ZRC.

Diagnosis. – A large species; face with a pair of medium sized oval black spots and a distinct black spot medially below bases of antennae; postpronotal lobes dark fuscous to black; notopleura yellow; scutum black; lateral and medial postsutural vittae absent; a distinct yellow triangle along anterior margin of mesonotal suture; narrow mesopleural stripe equal in width to notopleuron dorsally; scutellum yellow; wing with a broad dark fuscous costal band overlapping R_{4+5} ; cubital streak absent; cells bc and c dark fuscous; microtrichia covering all of both cells bc and c; abdominal terga II-V black with distinct orange-brown spots posteromedially and increasing in size from terga II-IV and a medial longitudinal orange-brown area on tergum V which expands across posterior margin of tergum; terga II-IV with large protuberances posterocentrally along the midline best viewed in lateral view of the abdomen.

Description. – **Male.** Head. Height 1.76mm. Frons: length 1.26 times breadth; fuscous with fulvous along lateral and anterior margins and darker fuscous around bases of orbital setae; orbital setae black: 1 *s.or.*, 2 *i.or.*; lunule fuscous. Ocellar triangle black. Vertex dark fuscous. Face generally fuscous with a pair of medium sized oval black spots and a black spot medially below bases of antennae; length 0.48 mm. Genae fuscous, small dark fuscous subocular spot present; black seta present. Occiput black, fulvous along eye margins; occipital row with 2–4 small black setae. Antennae with segments 1 and 2 dark fuscous to black; segment 3 dark fuscous; length of segments: 0.66mm; 0.72mm; 1.14mm.

Thorax. Scutum black with red-brown behind *ia.* setae and around margins of mesonotal suture and yellow triangle anterior to mesonotal suture. Pleural areas entirely dark fuscous to black. Yellow markings as follows: notopleura; narrow mesopleural stripe equal in width to notopleuron dorsally, anterior margin straight; a distinct triangle along anterior margin of mesonotal suture with base at notopleuron. Postnotum dark fuscous to black. Anatergite fuscous to black; katatergite entirely black. Lateral and medial postsutural vittae absent. Postnotum black. Scutellum yellow except for narrow black basal band. Setae: *sc.* 2; *prsc.* absent; *ia.* 1; *p.sa.* 1; *a.sa.* 1; *mpl.* 1; *npl.* 2; *scp.* 2.

Legs. Femora entirely black except for small apical red-brown areas; fore tibiae dark fuscous to fuscous, mid and hind tibiae red-brown to fuscous; fore tarsi with all segments fuscous to dark fuscous, mid and hind tarsi with basal segment fulvous and apical four segments pale fuscous; mid tibiae each with an apical black spur.

Wings. Length 8.25mm; cells bc and c dark fuscous; dense microtrichia covering all of both cells; remainder of wings colourless except for a broad dark fuscous costal band confluent with vein M at basal area of cell dm and distinctly overlapping R_{4+5} to apex of wing; cubital streak absent; dense aggregation of microtrichia around A_1+CuA_2 ; supernumerary lobe weak.

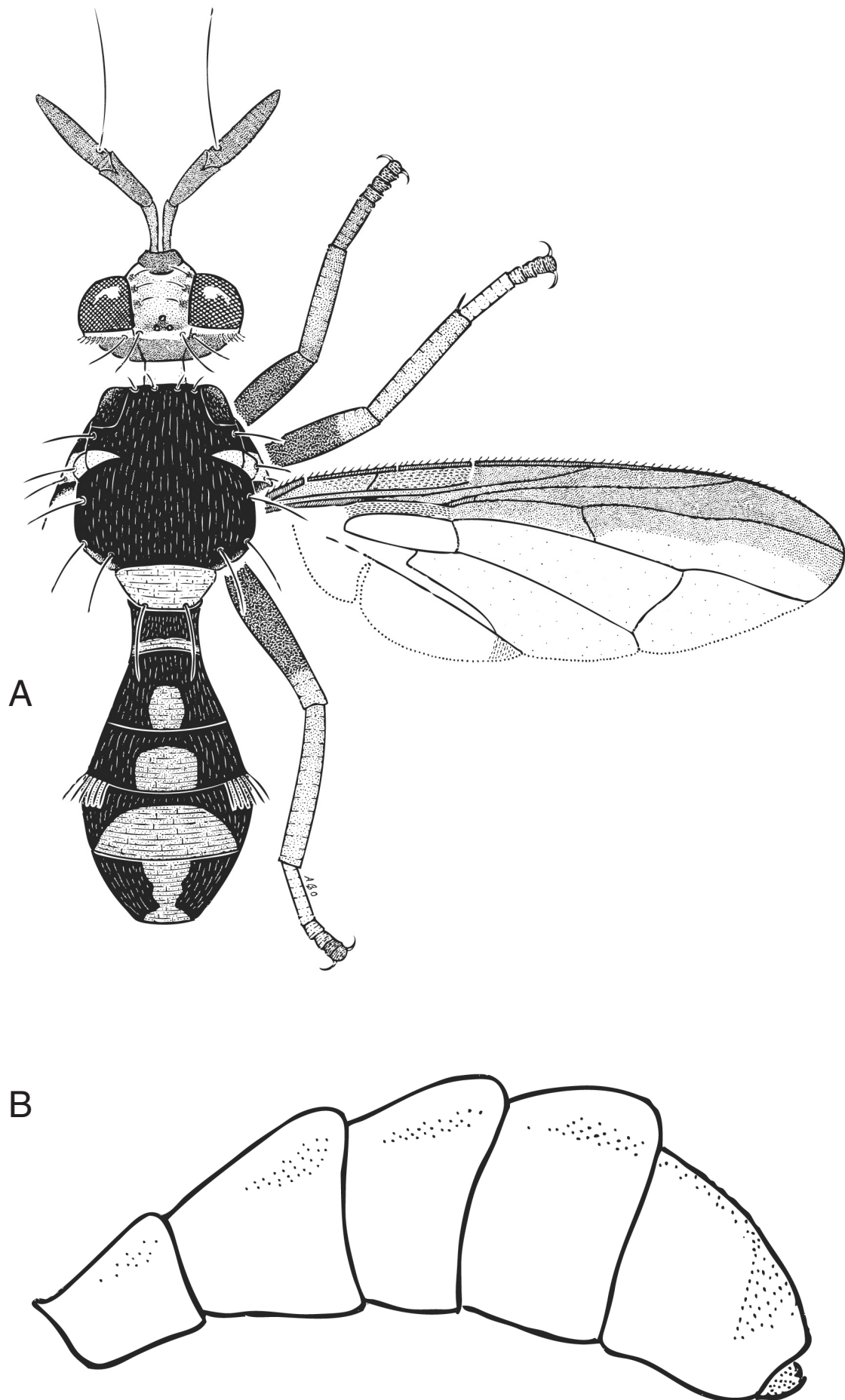


Fig. 2. *Dacus (Mellesis) fletcheri*, new species, holotype male: a, dorsal view; b, abdomen lateral view.

Abdomen. Elongate oval and petiolate; terga fused; pecten present on tergum III. Tergum I and sterna I and II longer than wide. Tergum I dark fuscous to black with narrow red-brown band along intersegmental line between tergum I and II; tergum II black with a large orange-brown spot posterocentrally; terga III and IV black with orange-brown posterocentral areas increasing in size from tergum II to tergum IV; tergum V black with a medial longitudinal orange-brown area that expands across posterior margin. A pair of oval shining spots which vary from entirely orange-brown to dark fuscous to black on the anterior half and orange-brown on posterior half. Posterior lobe of surstylus long, sternum V with a slight concavity on posterior margin. Terga II, III and IV with distinct large protuberances posterocentrally on the mid-line (these are best observed from the lateral view of the abdomen).

Attractant. – Cue lure.

Distribution. – Known only from the higher altitudes of Bhutan, generally above 2000 m.

Hosts. – No known record.

Remarks. – *Dacus (Melleis) fletcheri* new species, is similar to *Dacus (Callantra) siamensis* Drew & Hancock, *Dacus (Melleis) tenebrosus* Drew & Hancock and *Dacus (Melleis) vijaysegarani* Drew & Hancock in the general colour patterns of the body, wings and legs. It is distinct from these species in possessing large posterocentral orange-brown markings on abdominal terga II, III and IV and orange-brown medially on tergum V, large protuberances posteromedially on the midline of terga II, III and IV and the abdominal shape elongate-oval, not distinctly club shaped. It is not a pest species.

Etymology. – This species is named after Dr. Brian Fletcher, Sydney, Australia, in recognition of his outstanding contributions to fruit fly ecology, especially in the subfamily Dacinae, worldwide. He also collected the holotype and some paratypes of this species.

Dacus (Melleis) siamensis Drew & Hancock

Dacus (Callantra) siamensis Drew & Hancock, in Drew et al., 1998: 626. Holotype male in BMNH.

Material examined. – BHUTAN: 1 male, Suntalay, 22 May.2000, coll. S.W. & S. Dorji; 1 male, Suntalay, 5 Jun.2000, coll. S. Wangdi, T.D. & S.D.; 1 male, Suntalay, 5 Jun.2000; 1 male, Purana Bastey, 23 Nov.2004, coll. Karma Namgyel & Maha Prasard. All specimens attracted to cue lure. Specimens in NPPC and QDPI.

Diagnosis. – Face fulvous with a ‘U’ shaped black pattern consisting of medium sized oval black spots connected with a narrow black band across the dorsal margin of face; scutum primarily dull black, postpronotal lobes dark fuscous to black, notopleura yellow, mesopleural stripe slightly wider than notopleuron dorsally, lateral and medial postsutural vittae

absent; a yellow triangle along anterior margin of mesonotal suture with base at notopleuron; setae: *sc.* 2; *prsc.* absent; *ia.* 1; *p.sa.* 1; *a.sa.* 1; *mpl.* 1; *npl.* 2; *scp.* 4; scutellum yellow except for a narrow black basal band; legs with all femora entirely black (tending paler on apices of mid femora), all tibiae entirely dark fuscous, fore tarsi with all segments fuscous, mid and hind tarsi with basal segments fulvous and apical four segments fuscous; wings with cells bc and c dark fuscous, dense microtrichia covering all of cell c and most of cell bc, a broad dark fuscous costal band overlapping R₄₊₅, cubital streak absent, in some specimens there is a very pale fuscous tint throughout most of wing membrane, supernumerary lobe weak; abdomen elongate, club shaped and petiolate, all terga generally dark fuscous to black except fulvous along intersegmental line between terga I and II and, in some specimens, dark orange-brown posterocentrally on terga IV and V.

Attractant. – Cue lure.

Distribution. – Central and northern Thailand. New record for Bhutan.

Hosts. – No known record.

Remarks. – This species has been adequately described and illustrated in Drew et al. (1998). It is readily distinguished by the following characters: scutum black, postpronotal lobes black, notopleura yellow, anatergite black, katatergite mostly yellow, face fulvous with an inverted U-shaped black pattern, costal band overlapping R₄₊₅, cells bc and c dark fuscous, femora and tibiae mostly black, abdominal terga mostly black. It is not a pest species.

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LITERATURE CITED

- Agarwal, M. L. & V. C. Kapoor, 1983. Two new species of *Dacus* Fabricius (Diptera: Tephritidae) from India. *Journal of Entomological Research* (New Delhi), **7**: 169-171.
- Allwood, A. L., A. Chinajariyawong, R. A. I. Drew, E. L. Hamacek, D. L. Hancock, C. Hengsawad, J. C. Jipanin, M. Jirasurat, C. Kong Krong, S. Kritsaneepaiboon, C. T. S. Leong & S. Vijaysegaran, 1999. Host plant records for fruit flies (Diptera: Tephritidae) in Southeast Asia. *Raffles Bulletin of Zoology, Supplement*, **7**: 1-92.
- Bezzi, M., 1909. Le species dei generi *Ceratitidis*, *Anastrepha*, e *Dacus*. *Bollettino del Laboratorio di Zoologia Generale e Agraria Portici*, **3**: 273-313.

- Bezzi, M., 1913. Indian trypaneids (fruit-flies) in the collection of the Indian Museum, Calcutta. *Memoirs of the Indian Museum*, **3**: 53-175.
- Bezzi, M., 1915. On the Ethiopian fruit-flies of the genus *Dacus*. *Bulletin of Entomological Research*, **6**: 85-101.
- Bezzi, M., 1916. On the fruit-flies of the genus *Dacus* (s.l.) occurring in India, Burma, and Ceylon. *Bulletin of Entomological Research*, **7**: 99-121.
- Bezzi, M., 1919. Fruit flies of the genus *Dacus* sensu-latiore (Diptera) from the Philippine Islands. *Philippine Journal of Science*, **15**: 411-443.
- Bigot, J. M. F., 1890. New species of Indian Diptera. *Indian Museum Notes*, **1**: 191-192.
- Chao, Y. S. & X. L. Lin, 1993. A new name of *Dacus* (*Zeugodacus*) *ater* (Diptera: Tephritidae). *Entomotaxonomia*, **15**: 77-78.
- Chen, S. H., 1940. Two new Dacinae from Szechwan. *Sinensia*, **11**: 131-135.
- Coquillett, D. W., 1899. A new trypetid from Hawaii. *Entomological News*, **10**: 129-130.
- Coquillett, D. W., 1904. New Diptera from India and Australia. *Proceedings of the Entomological Society of Washington*, **6**: 137-140.
- Cotes, E. C., 1893. Miscellaneous notes. *Indian Museum Notes*, **3**: 1-62.
- Doleschall, C. L., 1858. Derde bijdrage tot de kennis der dipteran fauna van Nederlandsch Indie. *Natuurkunde Tijdschrift Nederlandisch-Indie*, **17**: 73-128.
- Drew, R. A. I., 1973. Revised descriptions of species of Dacini (Diptera: Tephritidae) from the South Pacific area. I. Genus *Callantra* and the *Dacus* group of subgenera of genus *Dacus*. *Bulletin of Queensland Department of Primary Industries, Division of Plant Industry*, No. 652, 39 pp.
- Drew, R. A. I., 1979. The genus *Dacus* Fabricius (Diptera: Tephritidae) – two new species from northern Australia and a discussion of some subgenera. *Journal of the Australian Entomological Society*, **18**: 71-80.
- Drew, R. A. I., 1982. Taxonomy, In: Drew, R. A. I., G. H. S. Hooper & M. A. Bateman (eds.), *Economic fruit flies of the South Pacific Region*. Queensland Department of Primary Industries, Brisbane. Pp. 1-97.
- Drew, R. A. I., 1989. The tropical fruit flies (Diptera: Tephritidae: Dacinae) of the Australasian and Oceanian Regions. *Memoirs of the Queensland Museum*, **26**: 1-521.
- Drew, R. A. I., 2004. Biogeography and Speciation in the Dacini (Diptera: Tephritidae: Dacinae). *D. Elmo Hardy Memorial Volume. Contributions to the Systematics and Evolution of Diptera*. Evenhuis, N. L. & K. Y. Kaneshiro (eds.). *Bishop Museum Bulletin in Entomology*, **12**: 165-178.
- Drew, R. A. I. & D. L. Hancock, 1994. The *Bactrocera dorsalis* complex of fruit flies (Diptera: Tephritidae: Dacinae) in Asia. *Bulletin of Entomological Research*, 1994 (Supplement No. 2). 68 pp.
- Drew, R. A. I. & S. Raghu, 2002. The fruit fly fauna (Diptera: Tephritidae: Dacinae) of the rainforest habitat of the Western Ghats, India. *Raffles Bulletin of Zoology*, **50**: 327-352.
- Drew, R. A. I., D. L. Hancock & I. M. White, 1998. Revision of the tropical fruit flies (Diptera: Tephritidae: Dacinae) of South East Asia. II. *Dacus* Fabricius. *Invertebrate Taxonomy*, **12**: 567-654.
- Drew, R. A. I., K. Tsuruta & I. M. White, 2005. A new species of pest fruit fly (Diptera: Tephritidae: Dacinae) from Sri Lanka and Africa. *African Entomology*, **13**: 149-154.
- Enderlein, G., 1920. Zur Kenntnis tropischer Frucht-Bohrfliegen. *Zoologische Jahrbücher, Abteilung für Systematik*, **43**: 336-360.
- Fabricius, J. C., 1794. *Entomologia systematica emendata et aucta. Secundum classes, ordines, genera, species, adiectis synonymis, locis, observationibus*. Tome 4. Hafniae. 472 pp.
- Fabricius, J. C., 1805. *Systema antliatorum secundum ordines, genera, species, adiectis synonymis, locis, observationibus, descriptionibus*. Reichard, Brunsvigae. 373 pp.
- Froggatt, W. W., 1909. Part III. Fruit flies. A general account of the flies belonging to the family Trypetidae, that damage sound fruit, with descriptions of the different species (some described as new) and their habits, range, and suggestions for destroying them. In: *Official report on fruit fly and other pests in various countries 1907-1908. Report on parasitic and injurious insects*. New South Wales Department of Agriculture, Sydney. Pp. 73-115.
- Hancock, D. L. & R. A. I. Drew, 2006. A revised classification of subgenera and species groups in *Dacus* Fabricius (Diptera: Tephritidae). *Instrumenta Biodiversitatis*, **7**: 167-205.
- Hardy, D. E., 1959. The Walker types of fruit flies (Tephritidae-Diptera) in the British Museum collection. *Bulletin of the British Museum (Natural History) Entomology*, **8**: 159-242.
- Hardy, D. E., 1969. Taxonomy and distribution of the oriental fruit fly and related species (Tephritidae-Diptera). *Proceedings of the Hawaiian Entomological Society*, **20**: 395-428.
- Hardy, D. E., 1971. Diptera: Tephritidae from Ceylon. *Entomologica Scandinavia Supplement*, **1**: 287-292.
- Hardy, D. E., 1973. The fruit flies (Tephritidae-Diptera) of Thailand and bordering countries. *Pacific Insects Monograph*, **31**: 353 pp.
- Hardy, D. E., 1974. The fruit flies of the Philippines (Diptera: Tephritidae). *Pacific Insects Monograph*, **32**: 1-266.
- Hardy, D. E., 1977. Family Tephritidae (Trypetidae, Trupaneidae). In: Delfinado, M. & D.E. Hardy (eds.), *A catalog of the Diptera of the Oriental Region, Volume III, Suborder Cyclorrhapha, (excluding Division Aschiza)*. University of Hawaii Press, Honolulu. Pp. 44-134.
- Hardy, D. E., 1982. The Dacini of Sulawesi (Diptera: Tephritidae). *Treubia*, **28**: 173-241.
- Hardy, D. E., 1983. The fruit flies of the genus *Dacus* Fabricius of Java, Sumatra and Lombok, Indonesia (Diptera: Tephritidae). *Treubia*, **29**: 1-45.
- Hardy, D. E. & M. S. Adachi, 1954. Studies in the fruit flies of the Philippine Islands, Indonesia and Malaya. Part 1. Dacini (Tephritidae-Diptera). *Pacific Science*, **8**: 147-204.
- Hardy, D. E. & M. S. Adachi, 1956. Diptera: Tephritidae. *Insects of Micronesia*, **14**: 1-28.
- Hendel, F. G., 1912. [H. Sauter's Formosa-Ausbeute.] Genus *Dacus*, Fabricius (1805) (Diptera). *Supplementa Entomologica*, **1**: 13-24.
- Hendel, F. G., 1915. H. Sauter's Formosa-Ausbeute. Tephritinae. *Annales Musei Nationalis Hungarici*, **13**: 424-467.
- Hendel, F. G., 1927. Chapter 49: Trypetidae. In: Linder, E., *Die Fliegen der palaearktischen Region*, **5**: 1-221.

- Hendel, F. G., 1928. Neue oder weniger bekannte Bohrfliegen (Trypetidae) meist aus dem Deutschen Entomologischen Institut Berlin-Dahlem. *Entomologische Mitteilungen*, **17**: 341-370.
- Hendel, F. G., 1934. Schwedisch-chinesische wissenschaftliche Expedition nach den nordwestlichen Provinzen Chinas, unter Leitung von Dr. Sven Hedin und Prof. Su Ping-chang. Insekten gesammelt vom schwedischen Arzt der Expedition Dr. David Hummel 1927-1930. 13. Diptera.-5. Muscaria holometopa. *Arkiv för Zoologi*, **25A**: 18 pp.
- Hering, E. M., 1938. Entomological results from the Swedish Expedition 1934 to Burma and British India. Diptera: Family Trypetidae. [23. Beitrag zur Kenntnis der Trypetidae]. *Arkiv för Zoologi*, **30A**: 56 pp.
- Hering, E. M., 1941. Neue Dacinae und Trypetinae des Zoologischen Museums der Universität Berlin. *Siruna Seva*, **3**: 1-25.
- Hering, E. M., 1956. Trypetidae (Diptera) von Ceylon (53. Beitrag zur Kenntnis der Trypetidae). *Verhandlungen der Naturforschenden Gesellschaft in Basel*, **67**: 62-74.
- Kapoor, V. C., 1971. Four new species of fruit flies (Tephritidae) from India. *Oriental Insects*, **5**: 477-482.
- Kapoor, V. C., 1993. Indian Fruit Flies (Insecta: Diptera: Tephritidae). Oxford & IBH Publishing Co., New Dehli, Bombay & Calcutta. 228 pp.
- Kapoor, V. C. & K. N. Katiyar, 1969. New record of *Melanodacus* Perkins, a subgenus of *Dacus* Fabricius, with description of its new species (Dacinae: Tephritidae). *Bulletin of Entomology*, **10**: 123-125.
- Kapoor, V. C. & K. N. Katiyar, 1970. New record of *Paradacus* Perkins, a subgenus of *Dacus* Fabricius, with description of its new species (Dacinae: Tephritidae). *Entomologist*, **103**: 252-254.
- Liang, G. Q., D. L. Hancock, W. Xu & F. Liang, 1993. Notes on the Dacinae of southern China (Diptera: Tephritidae). *Journal of the Australian Entomological Society*, **32**: 137-140.
- Mahmood, K., 1999. Taxonomy of the *Bactrocera* (*Zeugodacus*) *tau* (Tephritidae: Diptera) complex in Asia. *Pakistan Journal of Zoology*, **31**: 219-235.
- Malloch, J. R., 1938. Trypetidae of the Mangarevan Expedition (Diptera). *Occasional Papers of the Bernice. P. Bishop Museum*, **14**: 111-116.
- Malloch, J. R., 1939. The Diptera of the Territory of New Guinea XI. Family Trypetidae. *Proceedings of the Linnean Society of New South Wales*, **64**: 409-465.
- Matsumura, S., 1916. [Thousand Insects of Japan. Additamenta]. Vol. 2 (Diptera). Keisei-sha, Tokyo. Pp. 413-424.
- May, A. W. S., 1951. New Genera and species of Dacinae (Trypetidae, Diptera) from Queensland. *Queensland Journal of Agricultural Science*, **8**: 5-13.
- Meijere, J. C. H. de, 1911. Studien über sudostasiatische Dipteren. VI. *Tijdschrift voor Entomologie*, **54**: 258-432.
- Miyake, T., 1919. Studies on the fruit flies of Japan. *Bulletin of the Imperial Central Agricultural Experiment Station in Japan*, **2**: 85-165.
- Munro, H. K., 1935. Records of Indian Trypetidae (Diptera) with descriptions of some apparently new species. *Records of the Indian Museum*, **37**: 15-27.
- Munro, H. K., 1939. The fruit fly, *Dacus ferrugineus* Fabr., and its variety *dorsalis* Hendel in north west India. *Indian Journal of Entomology*, **1**: 101-105.
- Norrbom, A. L., L. E. Carroll, F. C. Thomson, I. M. White & A. Freidberg, 1998. Systematic database of names. *Myia*, **9**: 65-251.
- Perkins, F. A., 1938. Studies in Oriental and Australian Trypaneidae. -Part II. Adraminae and Dacinae from India, Ceylon, Malaya, Sumatra, Java, Borneo, Philippine Islands, and Formosa. *Proceedings of the Royal Society of Queensland*, **49**: 120-144.
- Philip, A., 1950. Description of one new species of *Strumeta* Walker (Trypetidae: Diptera) from Burma and a record of one far-eastern species of the genus from India. *Indian Journal of Entomology*, **10**: 31-32.
- Saunders, W. W., 1842. Descriptions of four new dipterous insects from central and northern India. *Transactions of the Entomological Society of London*, **3**: 59-61.
- Scopoli, J. A., 1763. *Entomologia carniolica exhibens insecta carnioliae indigena et distributa in ordines, genera, species, varietates. Methodo Linnaeana*, Johannis Thomae Trattner, Vindobonae. xxxviii+419 pp.
- Shiraki, T., 1933. A systematic study of Trypetidae in the Japanese Empire. *Memoirs of the Faculty of Science and Agriculture Taihoku Imperial University*, **8**: 1-509.
- Shiraki, T., 1968. Fruit flies of the Ryukyu Islands (Diptera: Tephritidae). *United States National Museum Bulletin*, **263**: 104 pp.
- Tseng, Y. H. & Y. I. Chu, 1992. [New name], p. 84 In Tseng, Y. H., C. C. Chen & Y. I. Chu, The fruit flies, Genus *Dacus* Fabricius of Taiwan (Diptera: Tephritidae). *Journal of Taiwan Museum*, **45**: 15-91.
- Tseng, Y. H. & Y. I. Chu, 1982. A new fruit fly from Taiwan (Diptera: Tephritidae). *Chinese Journal of Entomology*, **2**: 85-90.
- Tseng, Y. H., C. C. Chen & Y. I. Chu, 1992. The fruit flies, Genus *Dacus* Fabricius of Taiwan (Diptera: Tephritidae). *Journal of Taiwan Museum*, **45**: 15-91.
- Tsuruta, K. & I. M. White, 2001. Eleven new species of the genus *Bactrocera* Macquart (Diptera: Tephritidae) from Sri Lanka. *Entomological Science*, **4**: 69-87.
- Tsuruta, K., I. M. White, H.M.J. Bandara, H. Rajapakse, S. A. H. Sundaraperuma, S.B.M.U.C. Kahawatta & G.B.J.P. Rajapakse, 1997. A preliminary note on the host plants of fruit flies of the Tribe Dacini (Diptera: Tephritidae) in Sri Lanka. *Esakia*, **37**: 149-160.
- Walker, F., 1849. *List of the specimens of dipterous insects in the collection of the British Museum*. Part IV. British Museum (Natural History), London.
- Walker, F., 1860. Catalogue of the dipterous insects collected at Makassar in Celebes, by Mr A. R. Wallace, with descriptions of new species. *Proceedings of the Linnean Society of London*, **4**: 149-160.
- Wang, X. -J., 1990. Notes on six new species of the genus *Callantra* from China (Diptera: Tephritidae). *Acta Zootaxonomica Sinica*, **15**: 67-76.
- Wang, X. -J., 1996. The fruit flies (Diptera: Tephritidae) of the East Asian Region. *Acta Zootaxonomica Sinica*, **21**: 1-338.
- Wang, X. -J. & M. -Z. Zhao, 1989. Notes on the genus *Dacus* Fabricius in China with descriptions of five new species (Diptera: Tephritidae). *Acta Zootaxonomica Sinica*, **14**: 209-219.
- White, I. M. & M. M. Elson-Harris, 1992. Fruit flies of economic significance: their identification and bionomics. International Institute of Entomology, London. 601 pp.

- White, I. M. & N. L. Evenhuis, 1999. New species and records of Indo-Australasian Dacini (Diptera: Tephritidae). *Raffles Bulletin of Zoology*, **47**: 487-540.
- White, I. M. & X. -J. Wang, 1992. Taxonomic notes on some dacine (Diptera: Tephritidae) fruit flies associated with citrus, olives, and cucurbits. *Bulletin of Entomological Research*, **82**: 275-279.
- Wiedemann, C.R.W., 1830. *Aussereuropaische zweifflugelige Insekten*. Vol. 2. Schultz, Hamm. 684 pp.