

Additions to the Fruit Fly Fauna (Diptera: Tephritidae: Dacinae) of Bangladesh, with a Key to the Species

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Abstract. Five species of *Bactrocera* are reported to occur in Bangladesh for the first time. The species previously recorded as *B. nigrofemoralis* is actually *B. nigrifacia*. An illustrated key to the nineteen species known to occur in the country, plus *B. nigrofemoralis*, is provided.

The dacine fruit fly fauna of the Indian subcontinent has received attention by taxonomists in recent years (Drew and Raghu 2002, Drew et al. 2007, David and Ramani 2011, Drew and Romig 2013), with 84 species recorded from the region (excluding Sri Lanka): 58 species in India, 44 in Bhutan, 8 in Nepal, and 11 in Pakistan. The first annotated checklist of 15 species known to occur in Bangladesh was recently published (Leblanc et al. 2013), based on surveys initiated in early 2013 and reviewing known literature.

Field surveys have continued into 2014, and several additional species have been collected. Two traps, each baited with a male lure (cue-lure and methyl eugenol) (described in Leblanc et al. 2013), have been maintained at each of 47 locations (Fig. 1), between May 2013 and November 2014, to collect male fruit flies. Several species, not attracted to male lures, were also collected by hand with a net or a vial. All but two locations were in agricultural environments. Even the two sites in forested national parks were in proximity to

agriculture. All but a few localities were surveyed once, with traps maintained for 1–3 days. The Atomic Energy Research Establishment (AERE), Savar Upazila, near Dhaka, on the other hand, was regularly surveyed. A total of 57 collections yielded 5,706 specimens, representing 18 species (Table 1). Of the species known to occur in the country, all but *Dacus ciliatus* Loew were collected.

Four new country records, reported here, have been uncovered since the first published survey, and one erroneous record in our previous paper is rectified here. We include a key for all 19 species plus the erroneously recorded species, likely to actually occur in Bangladesh.

Bactrocera (Bactrocera) correcta (Bezzi) [1 specimen from the Atomic Energy Research Establishment (AERE), in Savar Upazila, near Dhaka, 6 specimens from Chittagong Medical College Hospital Campus in Chittagong District, and 1 specimen from Chakaria Upazila in Cox'sbazar District]. New but expected record for Bangladesh. A polyphagous

Table 1. Summary of species collected.

Species	Collection Method	Number of		Pest status
		specimens	localities	
<i>B. (Bactrocera) correcta</i> (Bezzi)	Methyl eugenol	8	3	Polyphagous fruit pest
<i>B. (Bactrocera) dorsalis</i> (Hendel)	Methyl eugenol	3525	44	Major polyphagous fruit pest
<i>B. (Bactrocera) latifrons</i> (Hendel)	Hand collecting	11	1	Pest of Solanaceae (mostly)
<i>B. (Bactrocera) nigrifacia</i> Zhang, Ji & Chen	Cue-lure	33	12	Non-pest
<i>B. (Bactrocera) rubigina</i> (Wang & Zhao)	Cue-lure	223	10	Non-pest
<i>B. (Bactrocera) tuberculata</i> (Bezzi)	Methyl eugenol	15	3	Oligophagous fruit pest
<i>B. (Bactrocera) zonata</i> (Saunders)	Methyl eugenol	162	18	Polyphagous fruit pest
<i>B. (Bactrocera)</i> species 45 (likely <i>B. propinqua</i>) ¹	Cue-lure	4	3	Non-pest
<i>B. (Bactrocera)</i> sp. (possibly <i>B. bhutanica</i>) ²	Methyl eugenol	4	2	Non-pest
<i>B. (Daculus) digressa</i> Radhakrishnan	Cue-lure	10	4	Non-pest
<i>B. (Hemigynodacus) diversa</i> (Coquillett)	Hand collecting	49	3	Pest of Cucurbitaceae at the flowering stage
<i>B. (Parasinodacus) cilifera</i> (Hendel)	Cue-lure	1	1	Non-pest
<i>B. (Sinodacus) bogorensis</i> (Hardy)	Cue-lure	8	3	Non-pest
<i>B. (Sinodacus) hochii</i> (Zia)	Cue-lure	2	2	Potential cucurbit pest bred from <i>Luffa cylindrica</i>
<i>B. (Zeugodacus) caudata</i> (Fabricius)	Cue-lure	67	11	Pest of pumpkin at the flowering stage
<i>B. (Zeugodacus) cucurbitae</i> (Coquillett)	Cue-lure	867	43	Major pest of Cucurbitaceae (mostly) flowers and fruit
<i>B. (Zeugodacus) tau</i> (Walker)	Cue-lure	662	45	Pest of Cucurbitaceae (mostly) at the fruit stage
<i>D. (Callantra) longicornis</i> (Wiedemann)	Cue-lure	55	13	Minor pest of Cucurbitaceae (<i>Luffa</i> , <i>Trichosanthes</i>) fruits

¹species 45 is genetically similar to *B. propinqua* (Hardy & Adachi) from Laos and China (San Jose, unpublished)²This species is similar to *B. bhutanica*, but *B. bhutanica* is attracted to cue-lure.

fruit pest widespread from India and Sri Lanka, East to Vietnam and south to northern Peninsular Malaysia.

Bactrocera (Bactrocera) tuberculata (Bezzi) [13 specimen from AERE, 1 specimen from South Surma Upazila, in Sylhet District, and 1 specimen in Lawachora National Park (LNP), in Komolgonj Upazila, Moulavibazar District]. New country record for Bangladesh. This oligophagous fruit pest ranges from Bhutan to southern Vietnam.

Bactrocera (Sinodacus) bogorensis (Hardy) [4 specimens from Kurigram Sadar Upazila in Kurigram District, 3 specimens from Lalmonirhat Sadar Upazila in Lalmonirhat District, and 1 specimen from Polasbari Upazila in Gaibandha District]. New country record and northwest expansion of a species previously restricted to Indonesia (Java, Sumatra, Sulawesi) (Drew and Romig 2013).

Bactrocera (Bactrocera) nigrifacia Zhang, Ji & Chen. This species was erroneously reported as *B. nigrofemorialis* White and Tsuruta (Leblanc et al. 2013), although the latter species is likely present in Bangladesh, since it is known from Sri Lanka, southern India, Pakistan and Bhutan. The range of *B. nigrifacia*, known from northern Thailand and adjacent Yunnan Province (China) (Drew and Romig 2013), is now extended to Bangladesh. Both species are therefore included in the identification key.

Bactrocera (Bactrocera) sp [3 specimens in Citrus Research Center, Jaintapur Upazila in Sylhet District, and 1 specimen in LNP]. This species is similar to *B. bhutaniae* (Drew and Romig), which ranges from Bhutan to Vietnam. However we collected these flies in methyl eugenol traps, whereas *B. bhutaniae* is attracted to cue-lure (Drew and Romig 2013). Additional samples will be required to ascertain the identity of this species.

Key to the species recorded in Bangladesh

- 1 Large wasp-like red-brown fly (wing at least 8 mm long) with abdomen tergite 1 longer than broad (Fig. 4 q) and wing costal band broad and overlapping R₄₊₅ vein (Fig. 6 d); males attracted to cue-lure*Dacus longicornis*
- Smaller fly (wing less than 8 mm long) with abdomen tergite 1 broader than long (Figs. 4 a–p, r) and wing costal band narrow, at most overlapping R₂₊₃ (Figs. 5, 6 a–c, d) 2
- 2(1) Scutum with yellow median postsutural vitta present (Figs. 3 a, b, e, g, h, p), though sometimes very reduced (Fig. 3 h)3
- Scutum with yellow median postsutural vitta absent (Figs. 3 c, d, f, i–o, q–t)8
- 3(2) Wing with infuscations along r-m and dm-cu crossveins, in addition to the costal band and anal streak; males attracted to cue-lure (Fig. 5 e) *Bactrocera cucurbitae*
- Wing with infuscations restricted to the costal band and anal streak (Figs. 5 a, b, g, h, i, 6 a)4
- 4(3) Apex of costal band on wing greatly expanded into an enlarged circular spot (Fig. 5 i); yellow median postsutural vitta very short and narrow and yellow lateral vittae absent or very reduced (Fig. 3 h); males attracted to cue-lure*Bactrocera hochii*

- Apex of costal band on wing not so greatly expanded (Figs. 5 a, b, g, 6 a); yellow median and lateral postsutural vittae well developed (Figs. 3 a, b, g, p)5
- 5(4) Face fulvous with a pair of circular to oval black spots (Fig. 2 f); apex of wing costal band expanded into an apical spot (Fig. 6 a); males attracted to cue-lure*Bactrocera tau*
- Face uniformly black (Fig. 2 a) or fulvous, with (Figs. 2 b, d) or without (Fig. 2 e) a transverse black band; apex of wing costal band at most slightly expanded (Figs. 5 a, b, g)6
- 6(5) Face entirely black (Fig. 2 a); femora basally fulvous and apically dark fuscous to black; males attracted to cue-lure..... *Bactrocera bogorensis*
- Face fulvous, with (Fig. 2 b, d) or without (Fig. 2 e) a transverse dark band; femora mostly or entirely fulvous.....7
- 7(6) Face entirely fulvous in male (Fig. 2 e) or fulvous with transverse dark band across oral margin in female (Fig. 2 d); scutellum with one pair (rarely two pairs in male) of apical bristles (Fig. 3 g); pecten on male abdomen absent (Fig. 4 g); males weakly attracted to methyl eugenol*Bactrocera diversa*
- Face entirely fulvous with transverse dark band across oral margin in both sexes (Fig. 2 b); scutellum with two pairs of apical bristles (Fig. 3 b); pecten on male abdomen present (Fig. 4 b); males attracted to cue-lure*Bactrocera caudata*
- 8(2) Costal band interrupted (Figs. 5 d, 6 b, c) or drastically narrowed (Fig. 5 c) before reaching its apex9
- Costal band not interrupted before reaching its apex (Figs. 5 f, h, j–n, 6 e) ...12
- 9(8) Scutum and abdomen red-brown (Figs. 3 r, 4 p); males attracted to methyl eugenol*Bactrocera zonata*
- Scutum predominantly to entirely black (Figs. 3 c, d, q); abdomen black or predominantly red-brown (Figs. 4 c, d, o) 10
- 10(9) Abdomen red-brown with a dark T-shaped pattern on terga III-V (Fig. 4 d); males attracted to methyl eugenol*Bactrocera correcta*
- Abdomen predominantly or entirely black (Fig. 4 c, o) 11
- 11(10) Legs entirely fulvous; face fulvous with a pair of oval black spots (similar to Fig. 2 f); males attracted to methyl eugenol*Bactrocera tuberculata*
- Fore femora black and mid and hind femora basally fulvous and apically black; face fulvous with two parallel transverse black bands, across oral margin and below antennal sockets (Fig. 2 c); males attracted to cue-lure*Bactrocera cilifera*
- 12(8) Yellow lateral postsutural vittae absent (Fig. 3 t); scutum and abdomen predominantly red-brown (Figs. 3 t, 4 r); abdomen with tergites fused into a single plate; males not attracted to lures *Dacus ciliatus*
- Yellow lateral postsutural vittae present (Figs. 3 f, i–o), though sometimes very short; scutum and abdomen color variable; abdomen with tergites not fused 13
- 13(12) Fore, middle and apex of hind femora black, abdomen predominantly or mostly black 14
- Femora fulvous or red-brown with at most a dark anterolateral spot on fore femur; abdomen pale colored 15
- 14(13) Yellow lateral postsutural vittae narrow and ending long before ia. setae (Fig. 126 in Drew and Romig 2013)*Bactrocera nigrofemorialis*

- Yellow lateral postsutural vittae broad, parallel-sided, and ending at ia. setae (Fig. 3 j)*Bactrocera nigrifacia*
- 15(13) Abdomen orange-brown, without a T-shaped dark pattern (Fig. 4 i); apex of wing costal band expanded (Fig. 5 j)*Bactrocera latifrons*
- Abdomen with a T-shaped pattern (Figs. 4 f, k, l, m); apex of costal band not as expanded (Figs. 5 f, h, l, m, n) 16
- 16(15) Anterior supra-alar bristles (on scutum between wing attachment and yellow lateral postsutural vittae) and prescutellar bristles absent; scutum and abdomen predominantly orange-brown with a narrow dark T-shaped dark pattern on abdomen (Figs. 3 f, 4 f); femora predominantly red-brown; males attracted to cue-lure*Bactrocera digressa*
- Anterior supra-alar bristles and prescutellar bristles present; scutum color variable and abdomen with a T-shaped pattern, with medial band narrow (Fig. 4 k) to broad (Fig. 4 l, m); femora fulvous with at most small anterolateral spots on fore femora 17
- 17(16) Scutum uniformly red-brown with at most a faint lanceolate pattern (Fig. 3 k); abdomen red-brown with a faint or incomplete T-shaped pattern with the medial band very narrow (Fig. 4 k); wing costal band overlapping R_{2+3} and slightly expanded apically (Fig. 5 l); males attracted to cue-lure...*Bactrocera rubigina*
- Scutum color highly variable, from predominantly orange-brown to almost entirely black; abdomen orange-brown with a usually well-defined T-shaped pattern with the medial band usually broader; wing costal band narrowly overlapping R_{2+3} and expanded apically (Figs. 5 m, n), or confluent and not expanded apically (Fig. 5 h) 18
- 18(17) Wing costal band confluent with R_{2+3} vein, and not expanded or at most very slightly expanded apically (Fig. 5 h); scutum color pattern highly variable, from almost entirely black to black with variable lanceolate orange-brown patterns to entirely orange-brown (see Fig. 2 a–h in Leblanc et al. 2013); abdomen with a T-shaped pattern with medial band narrow, and limited to extensive lateral dark markings (Fig. 3 a–e in Leblanc et al. 2013); males attracted to methyl eugenol*Bactrocera dorsalis*
- Wing costal band at least faintly overlapping R_{2+3} , appearing as a faint tinge below the vein, and expanded apically (Figs. 5 m, n); scutum color pattern as in Figures 3 (l–o); abdomen with a T-shaped pattern with medial band broader and with generally limited lateral dark markings (Figs. 4 l, m) 19
- 19(18) Scutum black medially and orange-brown laterally (Figs. 3 l–n); femora fulvous with a faint dark spot on anterolateral surface of fore femora; males attracted to cue-lure *Bactrocera* species 45 (likely *B. propinqua*)
- Scutum orange-brown with one narrow medial and two narrow lateral black bands connected near apex of scutum (Fig. 3 o); femora entirely fulvous; males attracted to methyl eugenol*Bactrocera* sp. (possibly *B. bhutaniae*)

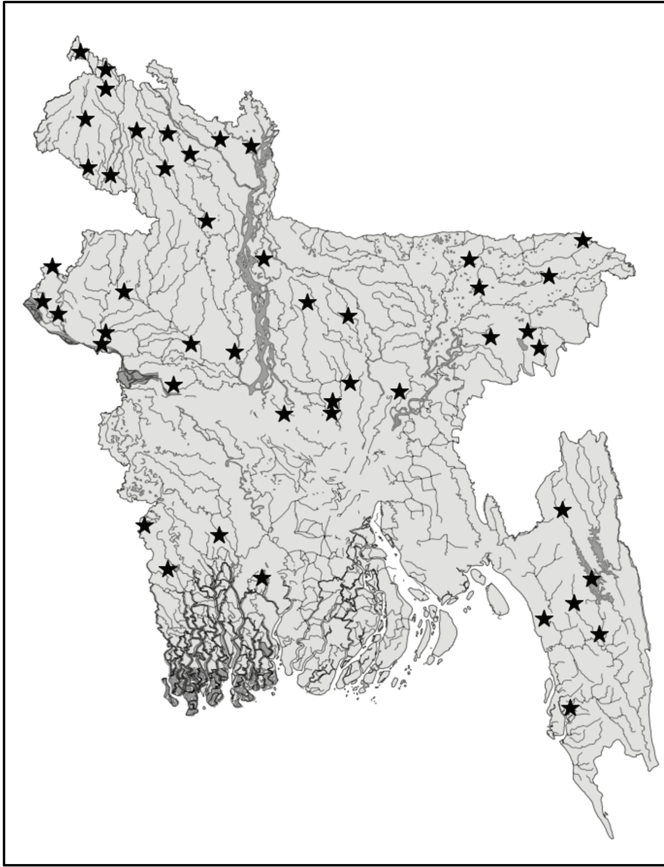


Figure 1. Location of collection sites in Bangladesh.

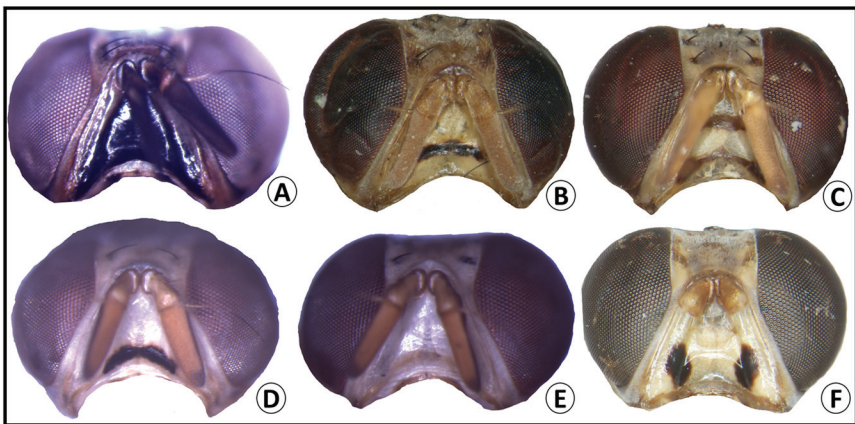


Figure 2. Face color patterns for *Bactrocera bogorensis* (A), *B. caudata* (B), *B. cilifera* (C), *B. diversa* female (D) and male (E), and *B. tau* (F).

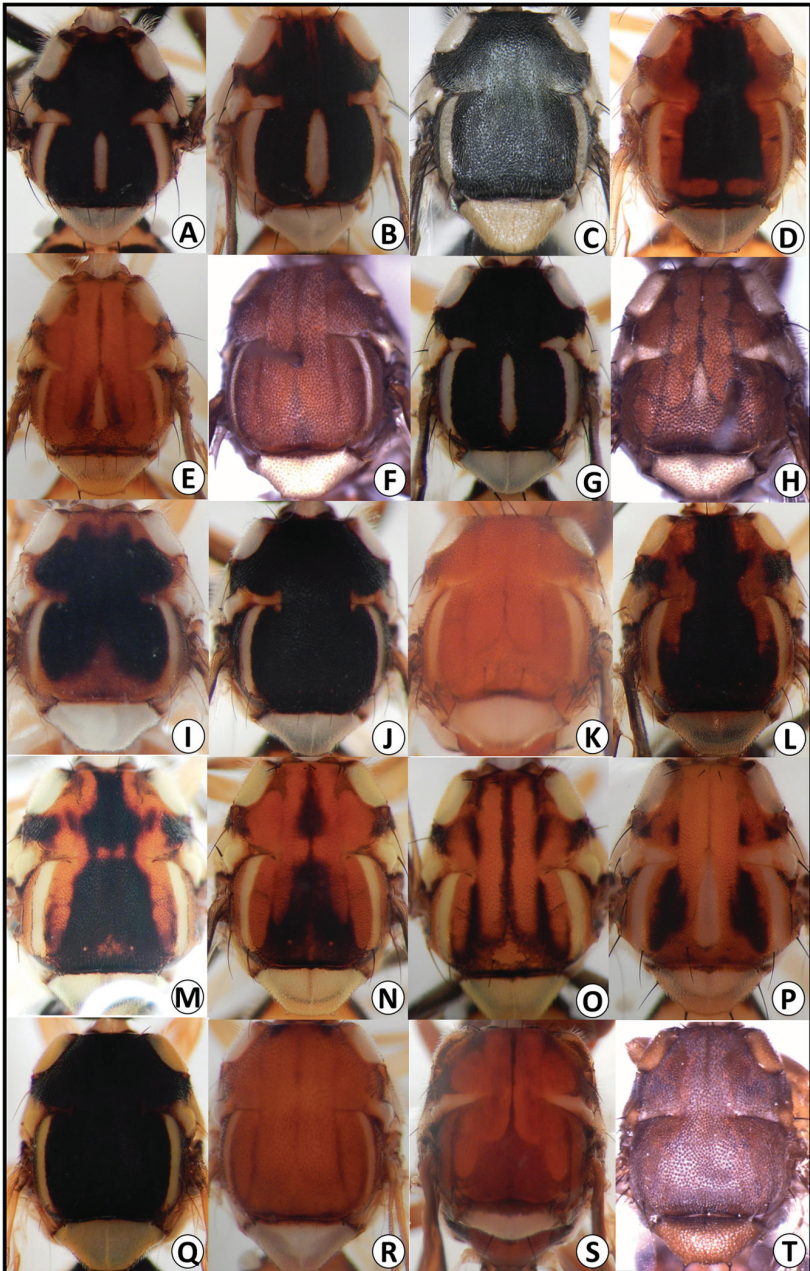


Figure 3. Scutum color patterns for *Bactrocera bogorensis* (A), *B. caudata* (B), *B. cilifera* (C), *B. correcta* (D), *B. cucurbitae* (E), *B. digressa* (F), *B. diversa* (G), *B. hochii* (H), *B. latifrons* (I), *B. nigrifacia* (J), *B. rubigina* (K), *B. species 45* (L,M,N), *B. sp.* (possibly *B. bhutaniae*) (O), *B. tau* (P), *B. tuberculata* (Q), *B. zonata* (R), *Dacus longicornis* (S), and *D. ciliatus* (T).

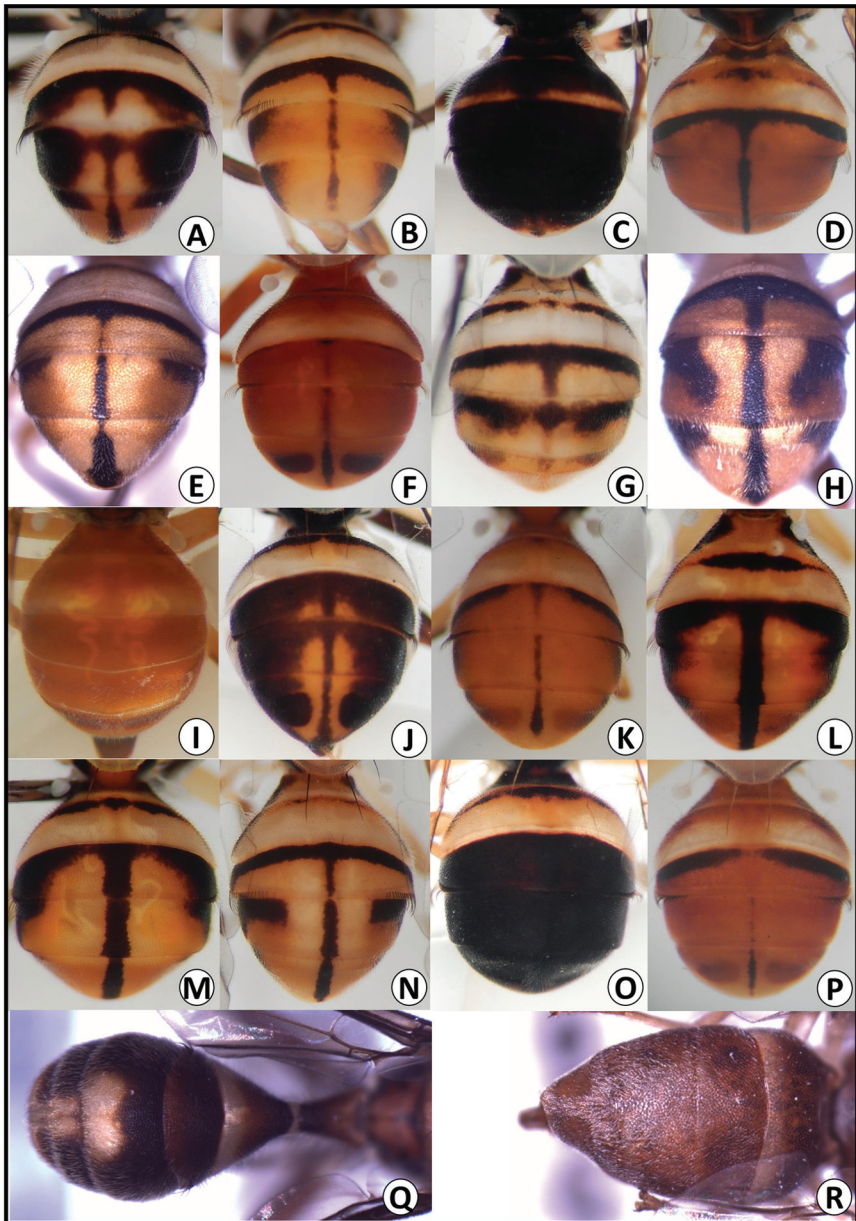


Figure 4. Abdomen color patterns for *Bactrocera bogorensis* (A), *B. caudata* (B), *B. cilifera* (C), *B. correcta* (D), *B. cucurbitae* (E), *B. digressa* (F), *B. diversa* (G), *B. hochii* (H), *B. latifrons* (I), *B. nigrifacia* (J), *B. rubigina* (K), *B. species 45* (L), *B. sp.* (possibly *B. bhutaniae*) (M), *B. tau* (N), *B. tuberculata* (O), *B. zonata* (P), *Dacus longicornis* (Q), and *D. ciliatus* (R).

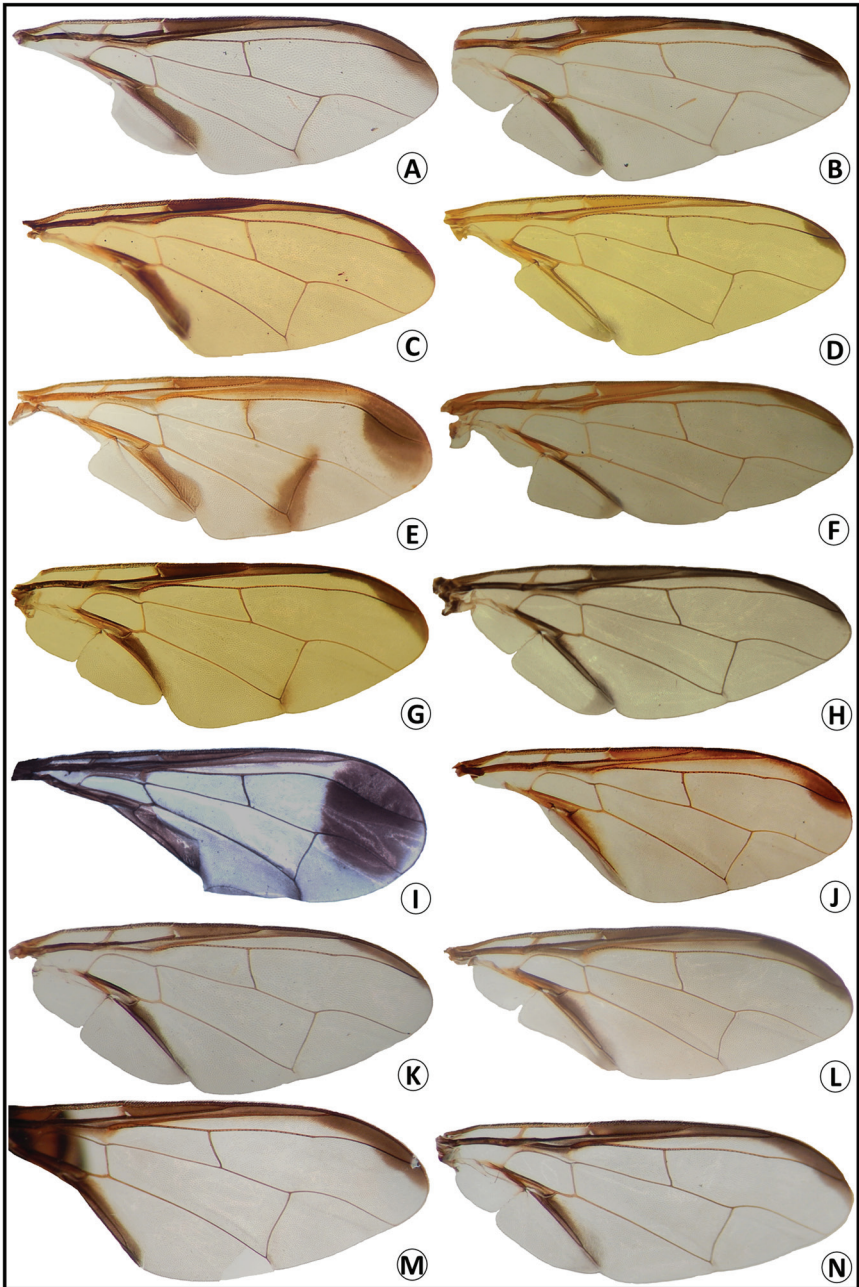


Figure 5. Wings of *Bactrocera bogorensis* (A), *B. caudata* (B), *B. cilifera* (C), *B. correcta* (D), *B. cucurbitae* (E), *B. digressa* (F), *B. diversa* (G), *B. dorsalis* (H), *B. hochii* (I), *B. latifrons* (J), *B. nigrifacia* (K), *B. rubigina* (L), *B. species 45* (M), *B. sp.* (possibly *B. bhutaniae*) (N).

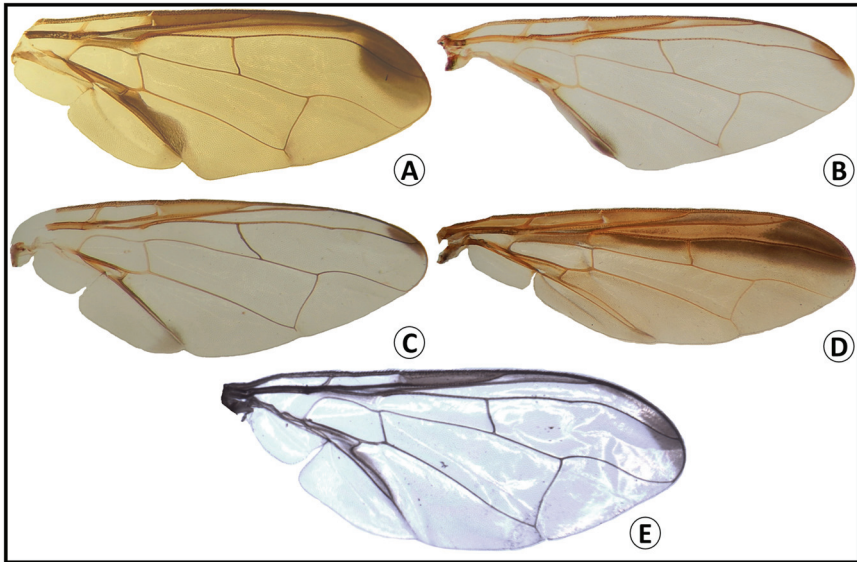


Figure 6. Wings of *Bactrocera tau* (A), *B. tuberculata* (B), *B. zonata* (C), *Dacus longicornis* (D), and *D. ciliatus* (E).

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